

# The Org Manual

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Release 9.7

The Org Mode Developers

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This manual is for Org version 9.7.

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# 1 Introduction

## 1.1 Summary

Org Mode is an authoring tool and a TODO lists manager for GNU Emacs. It relies on a lightweight plain-text markup language used in files with the ‘.org’ extension.

Authoring Org files is best supported by Emacs, but you can view, understand, and change them with any text editor.

As an authoring tool, Org helps you write structured documents and provides exporting facilities. Org files can also be used for literate programming and reproducible research. As a TODO lists manager, Org helps you organize your tasks in a flexible way, from daily needs to detailed project-planning, allowing logging, multiple views on your tasks, exporting your agendas, etc.

Org mode is implemented on top of Outline mode, which makes it possible to keep the content of large files well structured. Visibility cycling and structure editing help to work with the tree. Tables are easily created with a built-in table editor. Plain text URL-like links connect to websites, emails, Usenet messages, BBDB entries, and any files related to the projects.

Org develops organizational tasks around notes files that contain lists or information about projects as plain text. Project planning and task management make use of metadata which is part of an outline node. Based on this data, specific entries can be extracted in queries and create dynamic *agenda views* that also integrate the Emacs calendar and diary. Org can be used to implement many different project planning schemes, such as David Allen’s GTD system.

Org files can serve as a single source authoring system with export to many different formats such as HTML, L<sup>A</sup>T<sub>E</sub>X, Open Document, and Markdown. New export backends can be derived from existing ones, or defined from scratch.

Org files can include source code blocks, which makes Org uniquely suited for authoring technical documents with code examples. Org source code blocks are fully functional; they can be evaluated in place and their results can be captured in the file. This makes it possible to create a single file reproducible research compendium.

Org keeps simple things simple. When first fired up, it should feel like a straightforward, easy to use outliner. Complexity is not imposed, but a large amount of functionality is available when needed. Org is a toolbox. Many users actually run only a—very personal—fraction of Org’s capabilities, and know that there is more whenever they need it.

All of this is achieved with strictly plain text files, the most portable and future-proof file format. Org runs in Emacs. Emacs is one of the most widely ported programs, so that Org mode is available on every major platform.

There is a website for Org which provides links to the newest version of Org, as well as additional information, frequently asked questions (FAQ), links to tutorials, etc. This page is located at <https://orgmode.org>.

An earlier version (7.3) of this manual was available as a paperback book from the Network Theory Ltd. publishing company, closed in 2009.

## 1.2 Installation

Org is included in distributions of GNU Emacs, you probably do not need to install it. Most users will simply activate Org and begin exploring its features.

If, for one reason or another, you want to install Org on top of this pre-packaged version, you can use the Emacs package system or clone Org's git repository. We **strongly recommend** sticking to a single installation method.

When installing Org on top of the pre-packaged version, please note that Org stable versions are meant to be fully compatible with the last three stable versions of Emacs but not with older Emacsen.

Some Org components also depend on third-party packages available through package archives. Org is only guaranteed to be compatible with the latest stable versions of these third-party packages.

### Using Emacs packaging system

Recent Emacs distributions include a packaging system which lets you install Emacs libraries. You can install Org from the “package menu”, with *M-x list-packages*. See [Section “Package Menu” in emacs](#).

**Important:** You need to do this in a session where no ‘.org’ file has been visited, i.e., where no Org built-in function have been loaded. Otherwise autoload Org functions will mess up the installation.

To avoid interference with built-in Org mode, you can use command line:

```
emacs -Q -batch -eval "(progn (require 'package) (package-initialize) (package-refresh-
```

This approach has the advantage of isolating the upgrade process from a running Emacs session, ensuring that version conflicts can not arise.

### Using Org's git repository

You can clone Org's repository and install Org like this:

```
$ cd ~/src/  
$ git clone https://git.savannah.gnu.org/git/emacs/org-mode.git  
$ cd org-mode/  
$ make autoloads
```

Note that in this case, ‘make autoloads’ is mandatory: it defines Org's version in ‘org-version.el’ and Org's autoloads in ‘org-loaddefs.el’.

Make sure you set the load path correctly in your Emacs init file:

```
(add-to-list 'load-path "~/src/org-mode/lisp")
```

You can also compile with ‘make’, generate the documentation with ‘make doc’, create a local configuration with ‘make config’ and install Org with ‘make install’. Please run ‘make help’ to get the list of compilation/installation options.

For more detailed explanations on Org's build system, please check the Org Build System page on [Worg](#).

## Installing Org’s contributed packages

Org’s repository used to contain ‘`contrib/`’ directory for add-ons contributed by others. As of Org 9.5, the directory has been moved to the dedicated `org-contrib` repository, which you can install separately as a `package` from NonGNU ELPA.

There are enough valuable packages maintained outside of the Org repository. Worg has a list of `org-contrib` and `external packages`, certainly it is not exhaustive.

## 1.3 Activation

Org mode buffers need Font Lock to be turned on: this is the default in Emacs<sup>1</sup>.

There are compatibility issues between Org mode and some other Elisp packages (see [Section 17.14.2 \[Conflicts\], page 267](#)). Please take the time to check the list.

For a better experience, the three Org commands `org-store-link`, `org-capture` and `org-agenda` ought to be accessible anywhere in Emacs, not just in Org buffers. To that effect, you need to bind them to globally available keys, like the ones reserved for users (see [Section “Key Binding Conventions” in elisp](#)). Here are suggested bindings, please modify the keys to your own liking in your [Section “Init File” in emacs](#).

```
(global-set-key (kbd "C-c l") #'org-store-link)
(global-set-key (kbd "C-c a") #'org-agenda)
(global-set-key (kbd "C-c c") #'org-capture)
```

Files with the ‘`.org`’ extension use Org mode by default. To turn on Org mode in a file that does not have the extension ‘`.org`’, make the first line of a file look like this:

```
MY PROJECTS    -*- mode: org; -*-
```

which selects Org mode for this buffer no matter what the file’s name is. See also the variable `org-insert-mode-line-in-empty-file`.

Many commands in Org work on the region if the region is *active*. To make use of this, you need to have Transient Mark mode turned on, which is the default. If you do not like it, you can create an active region by using the mouse to select a region, or pressing `C-SPC` twice before moving point.

## 1.4 Feedback

If you find problems with Org, or if you have questions, remarks, or ideas about it, please send an email to the Org mailing list <mailto:emacs-orgmode@gnu.org>. You can subscribe to the list [from this web page](#). If you are not a member of the mailing list, your mail will be passed to the list after a moderator has approved it<sup>2</sup>. We ask you to read and respect the [GNU Kind Communications Guidelines](#) when sending messages on this mailing list. Please allow up to one month for the response and followup if no response is received on the bug report.

For bug reports, please first try to reproduce the bug with the latest version of Org available—if you are running an outdated version, it is quite possible that the bug has been

<sup>1</sup> If you do not use Font Lock globally turn it on in Org buffer with ‘`(add-hook 'org-mode-hook #'turn-on-font-lock)`’.

<sup>2</sup> Please consider subscribing to the mailing list in order to minimize the work the mailing list moderators have to do.

fixed already. If the bug persists, prepare a report and provide as much information as possible, including the version information of Emacs (*M-x emacs-version*) and Org (*M-x org-version*), as well as the Org related setup in the Emacs init file. The easiest way to do this is to use the command

```
M-x org-submit-bug-report <RET>
```

which puts all this information into an Emacs mail buffer so that you only need to add your description. If you are not sending the Email from within Emacs, please copy and paste the content into your Email program.

Sometimes you might face a problem due to an error in your Emacs or Org mode setup. Before reporting a bug, it is very helpful to start Emacs with minimal customizations and reproduce the problem. Doing so often helps you determine if the problem is with your customization or with Org mode itself. You can start a typical minimal session with a command like the example below.

```
$ emacs -Q -l /path/to/minimal-org.el
```

However if you are using Org mode as distributed with Emacs, a minimal setup is not necessary. In that case it is sufficient to start Emacs as ‘emacs -Q’. The ‘minimal-org.el’ setup file can have contents as shown below.

```
;;; Minimal setup to load latest `org-mode'.

;; Activate debugging.
(setq debug-on-error t
      debug-on-signal nil
      debug-on-quit nil)

;; Add latest Org mode to load path.
(add-to-list 'load-path (expand-file-name "/path/to/org-mode/lisp"))
```

If you are using Org mode version from Git repository, you can start minimal session using make.

```
# Bare Emacs
make repro
# or pass extra arguments
make repro REPRO_ARGS="-l /path/to/minimal/config.el /tmp/bug.org"
```

If an error occurs, a “backtrace” can be very useful—see below on how to create one. Often a small example file helps, along with clear information about:

1. What exactly did you do?
2. What did you expect to happen?
3. What happened instead?

If you experience degraded performance, you can record a “profile” and share it on the Org mailing list. See below for the instructions how to record a useful profile.

Thank you for helping to improve this program.

## How to create a useful backtrace

If working with Org produces an error with a message you do not understand, you may have hit a bug. The best way to report this is by providing, in addition to what was mentioned

above, a backtrace. This is information from the built-in debugger about where and how the error occurred. Here is how to produce a useful backtrace:

1. Reload uncompiled versions of all Org mode Lisp files. The backtrace contains much more information if it is produced with uncompiled code. To do this, use

```
C-u M-x org-reload <RET>
```

or, from the menu: Org → Refresh/Reload → Reload Org uncompiled.

2. Then, activate the debugger:

```
M-x toggle-debug-on-error <RET>
```

or, from the menu: Options → Enter Debugger on Error.

3. Do whatever you have to do to hit the error. Do not forget to document the steps you take.
4. When you hit the error, a `*Backtrace*` buffer appears on the screen. Save this buffer to a file—for example using `C-x C-w`—and attach it to your bug report.

## How to profile Org performance

Sometimes, Org is becoming slow for no apparent reason. Such slowdown is often caused by interaction between third-party packages and Org mode. However, identifying the root cause is not always straightforward.

Emacs is able to record performance statistics, which can then be used to find out which functions are taking most of the time to execute. To record the statistics, one can use so-called profiler. To use the Emacs profiler, we recommend the following steps:

1. Make sure that no profiler is currently active:

```
M-x profiler-stop <RET>
```

2. Start a new CPU profiler session:

```
M-x profiler-start <RET> cpu <RET>
```

3. Use Emacs as usual, performing the actions that are deemed slow.
4. Display and examine the recorded performance statistics:

```
M-x profiler-report <RET>
```

This command will display a summary of the commands and functions that have been executed between `profiler-start` and `profiler-report` invocations, with command taking most of the time displayed on top.

‘<TAB>’ key can be used to fold and unfold lines in the profiler buffer. The child items revealed upon unfolding are the functions and commands called by the unfolded parent.

The root causes are often buried deep inside sub-children items in the profiler. You can press ‘B’ (`profiler-report-render-reversed-calltree`) to quickly reveal the actual function/command that takes most of the time to run.

Pressing ‘C’ `profiler-report-render-calltree` will recover the original view.

5. If you need further help, you can share the statistics data.

Just save the data by issuing

```
M-x profiler-report-write-profile <RET>
/path/to/profile-file-to-be-saved <RET>
```

Then, you can attached the saved file to your email to the Org mailing list, alongside with details about what you did to trigger the slowdown.

Note that the saved statistics will only contain the function names and how long their execution takes. No private data will be recorded.

## 1.5 Typesetting Conventions Used in this Manual

### TODO keywords, tags, properties, etc.

Org uses various syntactical elements: TODO keywords, tags, property names, keywords, blocks, etc. In this manual we use the following conventions:

‘TODO’

‘WAITING’ TODO keywords are written with all capitals, even if they are user-defined.

‘boss’

‘ARCHIVE’ Tags are case-sensitive. User-defined tags are usually written in lowercase; built-in tags with special meaning are written as they should appear in the document, usually with all capitals.

‘Release’

‘PRIORITY’

User-defined properties are capitalized; built-in properties with special meaning are written with all capitals.

‘TITLE’

‘BEGIN’ . . . ‘END’

Keywords and blocks are written in uppercase to enhance their readability, but you can use lowercase in your Org files.

### Key bindings and commands

The manual lists both the keys and the corresponding commands for accessing a functionality. Org mode often uses the same key for different functions, depending on context. The command that is bound to such keys has a generic name, like `org-metaright`. In the manual we will, wherever possible, give the function that is internally called by the generic command. For example, in the chapter on document structure, *M-RIGHT* will be listed to call `org-do-demote`, while in the chapter on tables, it will be listed to call `org-table-move-column-right`.

## 2 Document Structure

Org is an outliner. Outlines allow a document to be organized in a hierarchical structure, which, least for me, is the best representation of notes and thoughts. An overview of this structure is achieved by folding, i.e., hiding large parts of the document to show only the general document structure and the parts currently being worked on. Org greatly simplifies the use of outlines by compressing the entire show and hide functionalities into a single command, `org-cycle`, which is bound to the TAB key.

### 2.1 Headlines

Headlines define the structure of an outline tree. Org headlines start on the left margin<sup>1</sup> with one or more stars followed by a space. For example:

```
* Top level headline
** Second level
*** Third level
    some text
*** Third level
    more text
* Another top level headline
```

The name defined in `org-footnote-section` is reserved. Do not use it as a title for your own headings.

Some people find the many stars too noisy and would prefer an outline that has white-space followed by a single star as headline starters. This can be achieved using an Org Indent minor mode. See [Section 17.4 \[Clean View\], page 258](#) for more information.

Headlines are not numbered. However, you may want to dynamically number some, or all, of them. See [Section 17.6 \[Dynamic Headline Numbering\], page 260](#).

An empty line after the end of a subtree is considered part of it and is hidden when the subtree is folded. However, if you leave at least two empty lines, one empty line remains visible after folding the subtree, in order to structure the collapsed view. See the variable `org-cycle-separator-lines` to modify this behavior.

### 2.2 Visibility Cycling

#### 2.2.1 Global and local cycling

Outlines make it possible to hide parts of the text in the buffer. Org uses just two commands, bound to TAB and *S-TAB* to change the visibility in the buffer.

TAB (`org-cycle`)

*Subtree cycling*: Rotate current subtree among the states

```
,-> FOLDED -> CHILDREN -> SUBTREE --.
'-----'
```

<sup>1</sup> See the variables `org-special-ctrl-a/e`, `org-special-ctrl-k`, and `org-ctrl-k-protect-subtree` to configure special behavior of *C-a*, *C-e*, and *C-k* in headlines. Note also that clocking only works with headings indented less than 30 stars.

Point must be on a headline for this to work<sup>2</sup>.

*S-TAB* (`org-global-cycle`)

*C-u TAB* *Global cycling*: Rotate the entire buffer among the states

```
,-> OVERVIEW -> CONTENTS -> SHOW ALL --.
|-----|
```

When *S-TAB* is called with a numeric prefix argument *N*, view contents only up to headlines of level *N*.

Note that inside tables (see [Chapter 3 \[Tables\]](#), page 18), *S-TAB* jumps to the previous field instead.

You can run global cycling using *TAB* only if point is at the very beginning of the buffer, but not on a headline, and `org-cycle-global-at-bob` is set to a non-`nil` value.

*C-u C-u TAB* (`org-cycle-set-startup-visibility`)

Switch back to the startup visibility of the buffer (see [Section 2.2.2 \[Initial visibility\]](#), page 9).

*C-u C-u C-u TAB* (`org-show-all`)

Show all, including drawers.

*C-c C-r* (`org-reveal`)

Reveal context around point, showing the current entry, the following heading and the hierarchy above. It is useful for working near a location that has been exposed by a sparse tree command (see [Section 2.5 \[Sparse Trees\]](#), page 12) or an agenda command (see [Section 11.5 \[Agenda Commands\]](#), page 125). With a prefix argument, show, on each level, all sibling headings. With a double prefix argument, also show the entire subtree of the parent.

*C-c C-k* (`org-show-branches`)

Expose all the headings of the subtree, but not their bodies.

*C-c TAB* (`org-show-children`)

Expose all direct children of the subtree. With a numeric prefix argument *N*, expose all children down to level *N*.

*C-c C-x b* (`org-tree-to-indirect-buffer`)

Show the current subtree in an indirect buffer<sup>3</sup>. With a numeric prefix argument *N*, go up to level *N* and then take that tree. If *N* is negative then go up that many levels. With a *C-u* prefix, do not remove the previously used indirect buffer.

*C-c C-x v* (`org-copy-visible`)

Copy the *visible* text in the region into the kill ring.

<sup>2</sup> See, however, the option `org-cycle-emulate-tab`.

<sup>3</sup> The indirect buffer contains the entire buffer, but is narrowed to the current tree. Editing the indirect buffer also changes the original buffer, but without affecting visibility in that buffer. For more information about indirect buffers, see [Section “Indirect Buffers” in emacs](#).

### 2.2.2 Initial visibility

When Emacs first visits an Org file, the global state is set to `showeverything`, i.e., all file content is visible<sup>4</sup>. This can be configured through the variable `org-startup-folded`, or on a per-file basis by adding one of the following lines anywhere in the buffer:

```
#+STARTUP: overview
#+STARTUP: content
#+STARTUP: showall
#+STARTUP: show2levels
#+STARTUP: show3levels
#+STARTUP: show4levels
#+STARTUP: show5levels
#+STARTUP: showeverything
```

Furthermore, any entries with a ‘VISIBILITY’ property (see [Chapter 7 \[Properties and Columns\]](#), page 67) get their visibility adapted accordingly. Allowed values for this property are ‘folded’, ‘children’, ‘content’, and ‘all’.

`C-u C-u TAB` (`org-cycle-set-startup-visibility`)

Switch back to the startup visibility of the buffer, i.e., whatever is requested by startup options and ‘VISIBILITY’ properties in individual entries.

### 2.2.3 Catching invisible edits

Sometimes you may inadvertently edit an invisible part of the buffer and be confused on what has been edited and how to undo the mistake. By default, Org prevents such edits for a limited set of user commands. Users can control which commands are affected by customizing `org-fold-catch-invisible-edits-commands`.

The strategy used to decide if a given edit is dangerous is controlled by `org-fold-catch-invisible-edits`. See the docstring of this option on the available strategies. Set the option to `nil` to disable catching invisible edits completely.

## 2.3 Motion

The following commands jump to other headlines in the buffer.

`C-c C-n` (`org-next-visible-heading`)

Next heading.

`C-c C-p` (`org-previous-visible-heading`)

Previous heading.

`C-c C-f` (`org-forward-heading-same-level`)

Next heading same level.

`C-c C-b` (`org-backward-heading-same-level`)

Previous heading same level.

`C-c C-u` (`outline-up-heading`)

Backward to higher level heading.

---

<sup>4</sup> When `org-agenda-inhibit-startup` is non-`nil`, Org does not honor the default visibility state when first opening a file for the agenda (see [Section A.8 \[Speeding Up Your Agendas\]](#), page 284).

**C-c C-j** (`org-goto`)

Jump to a different place without changing the current outline visibility. Shows the document structure in a temporary buffer, where you can use the following keys to find your destination:

<b>TAB</b>	Cycle visibility.
<b>DOWN / UP</b>	Next/previous visible headline.
<b>RET</b>	Select this location.
<b>/</b>	Do a Sparse-tree search

The following keys work if you turn off `org-goto-auto-isearch`

<b>n / p</b>	Next/previous visible headline.
<b>f / b</b>	Next/previous headline same level.
<b>u</b>	One level up.
<b>0 ... 9</b>	Digit argument.
<b>q</b>	Quit.

See also the variable `org-goto-interface`.

## 2.4 Structure Editing

**M-RET** (`org-meta-return`)

Insert a new heading, item or row.

If the command is used at the *beginning* of a line, and if there is a heading or a plain list item (see [Section 2.6 \[Plain Lists\], page 13](#)) at point, the new heading/item is created *before* the current line. When used at the beginning of a regular line of text, turn that line into a heading.

When this command is used in the middle of a line, the line is split and the rest of the line becomes the new item or headline. If you do not want the line to be split, customize `org-M-RET-may-split-line`.

Calling the command with a `C-u` prefix unconditionally inserts a new heading at the end of the current subtree, thus preserving its contents. With a double `C-u C-u` prefix, the new heading is created at the end of the parent subtree instead.

**C-RET** (`org-insert-heading-respect-content`)

Insert a new heading at the end of the current subtree.

**M-S-RET** (`org-insert-todo-heading`)

Insert new TODO entry with same level as current heading. See also the variable `org-treat-insert-todo-heading-as-state-change`.

**C-S-RET** (`org-insert-todo-heading-respect-content`)

Insert new TODO entry with same level as current heading. Like `C-RET`, the new headline is inserted after the current subtree.

**TAB** (`org-cycle`)

In a new entry with no text yet, the first **TAB** demotes the entry to become a child of the previous one. The next **TAB** makes it a parent, and so on, all the way to top level. Yet another **TAB**, and you are back to the initial level.

*M-LEFT* (`org-do-promote`)

*M-RIGHT* (`org-do-demote`)

Promote or demote current heading by one level.

When there is an active region—i.e., when Transient Mark mode is active—promotion and demotion work on all headlines in the region. To select a region of headlines, it is best to place both point and mark at the beginning of a line, mark at the beginning of the first headline, and point at the line just after the last headline to change.

*M-S-LEFT* (`org-promote-subtree`)

Promote the current subtree by one level.

*M-S-RIGHT* (`org-demote-subtree`)

Demote the current subtree by one level.

*M-UP* (`org-move-subtree-up`)

Move subtree up, i.e., swap with previous subtree of same level.

*M-DOWN* (`org-move-subtree-down`)

Move subtree down, i.e., swap with next subtree of same level.

*C-c @* (`org-mark-subtree`)

Mark the subtree at point. Hitting repeatedly marks subsequent subtrees of the same level as the marked subtree.

*C-c C-x C-w* (`org-cut-subtree`)

Kill subtree, i.e., remove it from buffer but save in kill ring. With a numeric prefix argument N, kill N sequential subtrees.

*C-c C-x M-w* (`org-copy-subtree`)

Copy subtree to kill ring. With a numeric prefix argument N, copy the N sequential subtrees.

*C-c C-x C-y* (`org-paste-subtree`)

Yank subtree from kill ring. This does modify the level of the subtree to make sure the tree fits in nicely at the yank position. The yank level can also be specified with a numeric prefix argument, or by yanking after a headline marker like ‘\*\*\*\*’. With *C-u* prefix, force inserting as a sibling. With *C-u C-u* prefix argument, force inserting as a child.

*C-y* (`org-yank`)

Depending on the variables `org-yank-adjusted-subtrees` and `org-yank-folded-subtrees`, Org’s internal `yank` command pastes subtrees folded and in a clever way, using the same command as *C-c C-x C-y*. With the default settings, no level adjustment takes place, but the yanked tree is folded unless doing so would swallow text previously visible. Any prefix argument to this command forces a normal `yank` to be executed, with the prefix passed along. A good way to force a normal yank is *C-u C-y*. If you use `yank-pop` after a yank, it yanks previous kill items plainly, without adjustment and folding.

*C-c C-x c* (`org-clone-subtree-with-time-shift`)

Clone a subtree by making a number of sibling copies of it. You are prompted for the number of copies to make, and you can also specify if any timestamps

in the entry should be shifted. This can be useful, for example, to create a number of tasks related to a series of lectures to prepare. For more details, see the docstring of the command `org-clone-subtree-with-time-shift`.

`C-c C-w` (`org-refile`)

Refile entry or region to a different location. See [Section 9.1 \[Refile and Copy\]](#), page 95.

`C-c ^` (`org-sort`)

Sort same-level entries. When there is an active region, all entries in the region are sorted. Otherwise the children of the current headline are sorted. The command prompts for the sorting method, which can be alphabetically, numerically, by time—first timestamp with active preferred, creation time, scheduled time, deadline time—by priority, by TODO keyword—in the sequence the keywords have been defined in the setup—or by the value of a property. Reverse sorting is possible as well. You can also supply your own function to extract the sorting key. With a `C-u` prefix, sorting is case-sensitive.

`C-x n s` (`org-narrow-to-subtree`)

Narrow buffer to current subtree.

`C-x n b` (`org-narrow-to-block`)

Narrow buffer to current block.

`C-x n w` (`widen`)

Widen buffer to remove narrowing.

`C-c *` (`org-toggle-heading`)

Turn a normal line or plain list item into a headline—so that it becomes a subheading at its location. Also turn a headline into a normal line by removing the stars. If there is an active region, turn all lines in the region into headlines. If the first line in the region was an item, turn only the item lines into headlines. Finally, if the first line is a headline, remove the stars from all headlines in the region.

Note that when point is inside a table (see [Chapter 3 \[Tables\]](#), page 18), the Meta-Cursor keys have different functionality.

## 2.5 Sparse Trees

An important feature of Org mode is the ability to construct *sparse trees* for selected information in an outline tree, so that the entire document is folded as much as possible, but the selected information is made visible along with the headline structure above it<sup>5</sup>. Just try it out and you will see immediately how it works.

Org mode contains several commands creating such trees, all these commands can be accessed through a dispatcher:

`C-c /` (`org-sparse-tree`)

This prompts for an extra key to select a sparse-tree creating command.

---

<sup>5</sup> See also the variable `org-show-context-detail` to decide how much context is shown around each match.

`C-c / r` or `C-c / /` (`org-occur`)

Prompts for a regexp (see [Section 17.9 \[Regular Expressions\]](#), page 264) and shows a sparse tree with all matches. If the match is in a headline, the headline is made visible. If the match is in the body of an entry, headline and body are made visible. In order to provide minimal context, also the full hierarchy of headlines above the match is shown, as well as the headline following the match. Each match is also highlighted; the highlights disappear when the buffer is changed by an editing command, or by pressing `C-c C-c`<sup>6</sup>. When called with a `C-u` prefix argument, previous highlights are kept, so several calls to this command can be stacked.

`M-g n` or `M-g M-n` (`next-error`)

Jump to the next sparse tree match in this buffer.

`M-g p` or `M-g M-p` (`previous-error`)

Jump to the previous sparse tree match in this buffer.

For frequently used sparse trees of specific search strings, you can use the variable `org-agenda-custom-commands` to define fast keyboard access to specific sparse trees. These commands will then be accessible through the agenda dispatcher (see [Section 11.2 \[Agenda Dispatcher\]](#), page 112). For example:

```
(setq org-agenda-custom-commands
      '(("f" occur-tree "FIXME")))
```

defines the key `f` as a shortcut for creating a sparse tree matching the string ‘`FIXME`’.

The other sparse tree commands select headings based on TODO keywords, tags, or properties and are discussed later in this manual.

To print a sparse tree, you can use the Emacs command `ps-print-buffer-with-faces` which does not print invisible parts of the document. Or you can use the command `C-c C-e C-v` to export only the visible part of the document and print the resulting file.

## 2.6 Plain Lists

Within an entry of the outline tree, hand-formatted lists can provide additional structure. They also provide a way to create lists of checkboxes (see [Section 5.6 \[Checkboxes\]](#), page 59). Org supports editing such lists, and every exporter (see [Chapter 13 \[Exporting\]](#), page 151) can parse and format them.

Org knows ordered lists, unordered lists, and description lists.

- *Unordered* list items start with ‘-’, ‘+’, or ‘\*’<sup>7</sup> as bullets.
- *Ordered* list items start with a numeral followed by either a period or a right parenthesis<sup>8</sup>, such as ‘1.’ or ‘1)’<sup>9</sup> If you want a list to start with a different value—e.g.,

<sup>6</sup> This depends on the option `org-remove-highlights-with-change`.

<sup>7</sup> When using ‘\*’ as a bullet, lines must be indented so that they are not interpreted as headlines. Also, when you are hiding leading stars to get a clean outline view, plain list items starting with a star may be hard to distinguish from true headlines. In short: even though ‘\*’ is supported, it may be better to not use it for plain list items.

<sup>8</sup> You can filter out any of them by configuring `org-plain-list-ordered-item-terminator`.

<sup>9</sup> You can also get ‘a.’, ‘A.’, ‘a)’ and ‘A)’ by configuring `org-list-allow-alphabetical`. To minimize confusion with normal text, those are limited to one character only. Beyond that limit, bullets automatically become numbers.

20—start the text of the item with ‘`[@20]`’<sup>10</sup>. Those constructs can be used in any item of the list in order to enforce a particular numbering.

- *Description* list items are unordered list items, and contain the separator ‘`::`’ to distinguish the description *term* from the description.

Items belonging to the same list must have the same indentation on the first line. In particular, if an ordered list reaches number ‘10.’, then the 2-digit numbers must be written left-aligned with the other numbers in the list. An item ends before the next line that is less or equally indented than its bullet/number.

A list ends whenever every item has ended, which means before any line less or equally indented than items at top level. It also ends before two blank lines. In that case, all items are closed. Here is an example:

```
* Lord of the Rings
My favorite scenes are (in this order)
1. The attack of the Rohirrim
2. Eowyn's fight with the witch king
   + this was already my favorite scene in the book
   + I really like Miranda Otto.
3. Peter Jackson being shot by Legolas
   - on DVD only
   He makes a really funny face when it happens.
8. [08] <favorite scenes 4 to 8 are skipped for brevity>
But in the end, no individual scenes matter but the film as a whole.
Important actors in this film are:
- Elijah Wood :: He plays Frodo
- Sean Astin :: He plays Sam, Frodo's friend. I still remember him
  very well from his role as Mikey Walsh in /The Goonies/.
```

Org supports these lists by tuning filling and wrapping commands to deal with them correctly, and by exporting them properly (see [Chapter 13 \[Exporting\]](#), page 151). Since indentation is what governs the structure of these lists, many structural constructs like ‘`#+BEGIN_`’ blocks can be indented to signal that they belong to a particular item.

If you find that using a different bullet for a sub-list—than that used for the current list-level—improves readability, customize the variable `org-list-demote-modify-bullet`. To get a greater difference of indentation between items and their sub-items, customize `org-list-indent-offset`.

The following commands act on items when point is in the first line of an item—the line with the bullet or number. Some of them imply the application of automatic rules to keep list structure intact. If some of these actions get in your way, configure `org-list-automatic-rules` to disable them individually.

#### TAB (`org-cycle`)

Items can be folded just like headline levels. Normally this works only if point is on a plain list item. For more details, see the variable `org-cycle-include-plain-lists`. If this variable is set to `integrate`, plain list items are treated

<sup>10</sup> If there’s a checkbox in the item, the cookie must be put *before* the checkbox. If you have activated alphabetical lists, you can also use counters like ‘`[@b]`’.

like low-level headlines. The level of an item is then given by the indentation of the bullet/number. Items are always subordinate to real headlines, however; the hierarchies remain completely separated. In a new item with no text yet, the first TAB demotes the item to become a child of the previous one. Subsequent TABs move the item to meaningful levels in the list and eventually get it back to its initial position.

**M-RET** (`org-insert-item`)

Insert new item at current level. With a prefix argument, force a new heading (see [Section 2.4 \[Structure Editing\]](#), page 10). If this command is used in the middle of an item, that item is *split* in two, and the second part becomes the new item<sup>11</sup>. If this command is executed *before item's body*, the new item is created *before* the current one.

**M-S-RET** Insert a new item with a checkbox (see [Section 5.6 \[Checkboxes\]](#), page 59).

**S-UP**

**S-DOWN** Jump to the previous/next item in the current list, but only if `org-support-shift-select` is off<sup>12</sup>. If not, you can still use paragraph jumping commands like `C-UP` and `C-DOWN` to quite similar effect.

**M-UP**

**M-DOWN** Move the item including subitems up/down<sup>13</sup>, i.e., swap with previous/next item of same indentation. If the list is ordered, renumbering is automatic.

**M-LEFT**

**M-RIGHT** Decrease/increase the indentation of an item, leaving children alone.

**M-S-LEFT**

**M-S-RIGHT**

Decrease/increase the indentation of the item, including subitems. Initially, the item tree is selected based on current indentation. When these commands are executed several times in direct succession, the initially selected region is used, even if the new indentation would imply a different hierarchy. To use the new hierarchy, break the command chain by moving point.

As a special case, using this command on the very first item of a list moves the whole list. This behavior can be disabled by configuring `org-list-automatic-rules`. The global indentation of a list has no influence on the text *after* the list.

**C-c C-c** If there is a checkbox (see [Section 5.6 \[Checkboxes\]](#), page 59) in the item line, toggle the state of the checkbox. In any case, verify bullets and indentation consistency in the whole list.

**C-c -** Cycle the entire list level through the different itemize/enumerate bullets ('-', '+', '\*', '1.', '1') or a subset of them, depending on `org-plain-list-ordered-item-terminator`, the type of list, and its indentation. With a numeric prefix

<sup>11</sup> If you do not want the item to be split, customize the variable `org-M-RET-may-split-line`.

<sup>12</sup> If you want to cycle around items that way, you may customize `org-list-use-circular-motion`.

<sup>13</sup> See `org-list-use-circular-motion` for a cyclic behavior.

argument N, select the Nth bullet from this list. If there is an active region when calling this, all lines are converted to list items. With a prefix argument, the selected text is changed into a single item. If the first line already was a list item, any item marker is removed from the list. Finally, even without an active region, a normal line is converted into a list item.

**C-c \*** Turn a plain list item into a headline—so that it becomes a subheading at its location. See [Section 2.4 \[Structure Editing\]](#), page 10, for a detailed explanation.

**C-c C-\*** Turn the whole plain list into a subtree of the current heading. Checkboxes (see [Section 5.6 \[Checkboxes\]](#), page 59) become ‘TODO’, respectively ‘DONE’, keywords when unchecked, respectively checked.

**S-LEFT**

**S-RIGHT** This command also cycles bullet styles when point is in on the bullet or anywhere in an item line, details depending on `org-support-shift-select`.

**C-c ^** Sort the plain list. Prompt for the sorting method: numerically, alphabetically, by time, or by custom function.

## 2.7 Drawers

Sometimes you want to keep information associated with an entry, but you normally do not want to see it. For this, Org mode has *drawers*. They can contain anything but a headline and another drawer. Drawers look like this:

```
** This is a headline
Still outside the drawer
:DRAWERNAME:
This is inside the drawer.
:END:
After the drawer.
```

You can interactively insert a drawer at point by calling `org-insert-drawer`, which is bound to `C-c C-x d`. With an active region, this command puts the region inside the drawer. With a prefix argument, this command calls non-interactive function `org-insert-property-drawer`, which creates a ‘PROPERTIES’ drawer right below the current headline. Org mode uses this special drawer for storing properties (see [Chapter 7 \[Properties and Columns\]](#), page 67). You cannot use it for anything else.

Completion over drawer keywords is also possible using `M-TAB`<sup>14</sup>.

Visibility cycling (see [Section 2.2 \[Visibility Cycling\]](#), page 7) on the headline hides and shows the entry, but keep the drawer collapsed to a single line. In order to look inside the drawer, you need to move point to the drawer line and press `TAB` there.

You can also arrange for state change notes (see [Section 5.3.2 \[Tracking TODO state changes\]](#), page 54) and clock times (see [Section 8.4 \[Clocking Work Time\]](#), page 85) to be stored in a ‘LOGBOOK’ drawer. If you want to store a quick note there, in a similar way to state changes, use

**C-c C-z** Add a time-stamped note to the ‘LOGBOOK’ drawer.

<sup>14</sup> Many desktops intercept `M-TAB` to switch windows. Use `C-M-i` or `ESC TAB` instead.

## 2.8 Blocks

Org mode uses ‘#+BEGIN’ ... ‘#+END’ blocks for various purposes from including source code examples (see [Section 12.6 \[Literal Examples\]](#), page 145) to capturing time logging information (see [Section 8.4 \[Clocking Work Time\]](#), page 85). These blocks can be folded and unfolded by pressing TAB in the ‘#+BEGIN’ line. You can also get all blocks folded at startup by configuring the variable `org-hide-block-startup` or on a per-file basis by using

```
#+STARTUP: hideblocks  
#+STARTUP: nohideblocks
```

## 3 Tables

Org comes with a fast and intuitive table editor. Spreadsheet-like calculations are supported using the Emacs Calc package (see `calc`).

### 3.1 Built-in Table Editor

Org makes it easy to format tables in plain ASCII. Any line with ‘|’ as the first non-whitespace character is considered part of a table. ‘|’ is also the column separator<sup>1</sup>. Moreover, a line starting with ‘|-’ is a horizontal rule. It separates rows explicitly. Rows before the first horizontal rule are header lines. A table might look like this:

```
| Name | Phone | Age |
|-----+-----+-----|
| Peter | 1234 | 17 |
| Anna | 4321 | 25 |
```

A table is re-aligned automatically each time you press `TAB`, `RET` or `C-c C-c` inside the table. `TAB` also moves to the next field—`RET` to the next row—and creates new table rows at the end of the table or before horizontal lines. The indentation of the table is set by the first line. Horizontal rules are automatically expanded on every re-align to span the whole table width. So, to create the above table, you would only type

```
|Name|Phone|Age|
|-
```

and then press `TAB` to align the table and start filling in fields. Even faster would be to type ‘|Name|Phone|Age’ followed by `C-c RET`.

When typing text into a field, Org treats `DEL`, *Backspace*, and all character keys in a special way, so that inserting and deleting avoids shifting other fields. Also, when typing *immediately* after point was moved into a new field with `TAB`, `S-TAB` or `RET`, the field is automatically made blank. If this behavior is too unpredictable for you, configure the option `org-table-auto-blank-field`.

### Creation and conversion

`C-c | (org-table-create-or-convert-from-region)`

Convert the active region to table. If every line contains at least one `TAB` character, the function assumes that the material is tab separated. If every line contains a comma, comma-separated values (CSV) are assumed. If not, lines are split at whitespace into fields. You can use a prefix argument to force a specific separator: `C-u` forces CSV, `C-u C-u` forces `TAB`, `C-u C-u C-u` prompts for a regular expression to match the separator, and a numeric argument `N` indicates that at least `N` consecutive spaces, or alternatively a `TAB` will be the separator.

If there is no active region, this command creates an empty Org table. But it is easier just to start typing, like `| N a m e | P h o n e | A g e RET | - TAB`.

<sup>1</sup> To insert a vertical bar into a table field, use ‘`\vert`’ or, inside a word ‘`abc\vert{}def`’.

## Re-aligning and field motion

*C-c C-c* (`org-table-align`)

Re-align the table without moving point.

*TAB* (`org-table-next-field`)

Re-align the table, move to the next field. Creates a new row if necessary.

*M-x org-table-blank-field*

Blank the current table field or active region.

*S-TAB* (`org-table-previous-field`)

Re-align, move to previous field.

*RET* (`org-table-next-row`)

Re-align the table and move down to next row. Creates a new row if necessary. At the beginning or end of a line, *RET* still inserts a new line, so it can be used to split a table.

*M-a* (`org-table-beginning-of-field`)

Move to beginning of the current table field, or on to the previous field.

*M-e* (`org-table-end-of-field`)

Move to end of the current table field, or on to the next field.

## Column and row editing

*M-LEFT* (`org-table-move-column-left`)

Move the current column left.

*M-RIGHT* (`org-table-move-column-right`)

Move the current column right.

*M-S-LEFT* (`org-table-delete-column`)

Kill the current column.

*M-S-RIGHT* (`org-table-insert-column`)

Insert a new column at point position. Move the recent column and all cells to the right of this column to the right.

*M-UP* (`org-table-move-row-up`)

Move the current row up.

*M-DOWN* (`org-table-move-row-down`)

Move the current row down.

*M-S-UP* (`org-table-kill-row`)

Kill the current row or horizontal line.

*S-UP* (`org-table-move-cell-up`)

Move cell up by swapping with adjacent cell.

*S-DOWN* (`org-table-move-cell-down`)

Move cell down by swapping with adjacent cell.

*S-LEFT* (`org-table-move-cell-left`)

Move cell left by swapping with adjacent cell.

*S-RIGHT* (`org-table-move-cell-right`)

Move cell right by swapping with adjacent cell.

*M-S-DOWN* (`org-table-insert-row`)

Insert a new row above the current row. With a prefix argument, the line is created below the current one.

*C-c -* (`org-table-insert-hline`)

Insert a horizontal line below current row. With a prefix argument, the line is created above the current line.

*C-c RET* (`org-table-hline-and-move`)

Insert a horizontal line below current row, and move point into the row below that line.

*C-c ^* (`org-table-sort-lines`)

Sort the table lines in the region. The position of point indicates the column to be used for sorting, and the range of lines is the range between the nearest horizontal separator lines, or the entire table. If point is before the first column, you are prompted for the sorting column. If there is an active region, the mark specifies the first line and the sorting column, while point should be in the last line to be included into the sorting. The command prompts for the sorting type, alphabetically, numerically, or by time. You can sort in normal or reverse order. You can also supply your own key extraction and comparison functions. When called with a prefix argument, alphabetic sorting is case-sensitive.

## Regions

*C-c C-x M-w* (`org-table-copy-region`)

Copy a rectangular region from a table to a special clipboard. Point and mark determine edge fields of the rectangle. If there is no active region, copy just the current field. The process ignores horizontal separator lines.

*C-c C-x C-w* (`org-table-cut-region`)

Copy a rectangular region from a table to a special clipboard, and blank all fields in the rectangle. So this is the “cut” operation.

*C-c C-x C-y* (`org-table-paste-rectangle`)

Paste a rectangular region into a table. The upper left corner ends up in the current field. All involved fields are overwritten. If the rectangle does not fit into the present table, the table is enlarged as needed. The process ignores horizontal separator lines.

*M-RET* (`org-table-wrap-region`)

Split the current field at point position and move the rest to the line below. If there is an active region, and both point and mark are in the same column, the text in the column is wrapped to minimum width for the given number of lines. A numeric prefix argument may be used to change the number of desired lines. If there is no region, but you specify a prefix argument, the current field is made blank, and the content is appended to the field above.

## Calculations

### `C-c +` (`org-table-sum`)

Sum the numbers in the current column, or in the rectangle defined by the active region. The result is shown in the echo area and can be inserted with `C-y`.

### `S-RET` (`org-table-copy-down`)

When current field is empty, copy from first non-empty field above. When not empty, copy current field down to next row and move point along with it.

Depending on the variable `org-table-copy-increment`, integer and time stamp field values, and fields prefixed or suffixed with a whole number, can be incremented during copy. Also, a 0 prefix argument temporarily disables the increment.

This key is also used by shift-selection and related modes (see [Section 17.14.2 \[Conflicts\]](#), page 267).

## Miscellaneous

### `C-c `` (`org-table-edit-field`)

Edit the current field in a separate window. This is useful for fields that are not fully visible (see [Section 3.2 \[Column Width and Alignment\]](#), page 22). When called with a `C-u` prefix, just make the full field visible, so that it can be edited in place. When called with two `C-u` prefixes, make the editor window follow point through the table and always show the current field. The follow mode exits automatically when point leaves the table, or when you repeat this command with `C-u C-u C-c ``.

### `M-x org-table-import`

Import a file as a table. The table should be TAB or whitespace separated. Use, for example, to import a spreadsheet table or data from a database, because these programs generally can write TAB-separated text files. This command works by inserting the file into the buffer and then converting the region to a table. Any prefix argument is passed on to the converter, which uses it to determine the separator.

### `C-c |` (`org-table-create-or-convert-from-region`)

Tables can also be imported by pasting tabular text into the Org buffer, selecting the pasted text with `C-x C-x` and then using the `C-c |` command (see [\[Creation and conversion\]](#), page 18).

### `M-x org-table-export`

Export the table, by default as a TAB-separated file. Use for data exchange with, for example, spreadsheet or database programs. The format used to export the file can be configured in the variable `org-table-export-default-format`. You may also use properties ‘TABLE\_EXPORT\_FILE’ and ‘TABLE\_EXPORT\_FORMAT’ to specify the file name and the format for table export in a subtree. Org supports quite general formats for exported tables. The exporter format is the same as the format used by Orgtbl radio tables, see [Section A.5.3 \[Translator functions\]](#), page 281, for a detailed description.

*M-x org-table-header-line-mode*

Turn on the display of the first data row of the table at point in the window header line when this first row is not visible anymore in the buffer. You can activate this minor mode by default by setting the option `org-table-header-line-p` to `t`.

*M-x org-table-transpose-table-at-point*

Transpose the table at point and eliminate hlines.

## 3.2 Column Width and Alignment

The width of columns is automatically determined by the table editor. The alignment of a column is determined automatically from the fraction of number-like versus non-number fields in the column.

Editing a field may modify alignment of the table. Moving a contiguous row or column—i.e., using `TAB` or `RET`—automatically re-aligns it. If you want to disable this behavior, set `org-table-automatic-realign` to `nil`. In any case, you can always align manually a table:

*C-c C-c (org-table-align)*

Align the current table.

Setting the option `org-startup-align-all-tables` re-aligns all tables in a file upon visiting it. You can also set this option on a per-file basis with:

```
#+STARTUP: align
#+STARTUP: noalign
```

Sometimes a single field or a few fields need to carry more text, leading to inconveniently wide columns. Maybe you want to hide away several columns or display them with a fixed width, regardless of content, as shown in the following example.

	---	+	-----	+	-----					---	+	-----	...	+	...			
		<6>									<6>		...		...			
	1		one			some		----	\		1		one		...		...	
	2		two			boring		----	/		2		two		...		...	
	3		This is a long text		column						3		This i	...		...		
	---	+	-----	+	-----					---	+	-----	...	+	...			

To set the width of a column, one field anywhere in the column may contain just the string '`<N>`' where `N` specifies the width as a number of characters. You control displayed width of columns with the following tools:

*C-c TAB (org-table-toggle-column-width)*

Shrink or expand current column.

If a width cookie specifies a width `W` for the column, shrinking it displays the first `W` visible characters only. Otherwise, the column is shrunk to a single character.

When called before the first column or after the last one, ask for a list of column ranges to operate on.

*C-u C-c TAB (org-table-shrink)*

Shrink all columns with a column width. Expand the others.

**C-u C-u C-c TAB** (`org-table-expand`)  
Expand all columns.

To see the full text of a shrunk field, hold the mouse over it: a tool-tip window then shows the full contents of the field. Alternatively, **C-h .** (`display-local-help`) reveals them, too. For convenience, any change near the shrunk part of a column expands it.

Setting the option `org-startup-shrink-all-tables` shrinks all columns containing a width cookie in a file the moment it is visited. You can also set this option on a per-file basis with:

```
#+STARTUP: shrink
```

If you would like to overrule the automatic alignment of number-rich columns to the right and of string-rich columns to the left, you can use ‘<r>’, ‘<c>’ or ‘<l>’ in a similar fashion. You may also combine alignment and field width like this: ‘<r10>’.

Lines which only contain these formatting cookies are removed automatically upon exporting the document.

### 3.3 Column Groups

When Org exports tables, it does so by default without vertical lines because that is visually more satisfying in general. Occasionally however, vertical lines can be useful to structure a table into groups of columns, much like horizontal lines can do for groups of rows. In order to specify column groups, you can use a special row where the first field contains only ‘/’. The further fields can either contain ‘<’ to indicate that this column should start a group, ‘>’ to indicate the end of a column, or ‘<>’ (no space between ‘<’ and ‘>’) to make a column a group of its own. Upon export, boundaries between column groups are marked with vertical lines. Here is an example:

N	N <sup>2</sup>	N <sup>3</sup>	N <sup>4</sup>	sqrt(n)	sqrt[4](N)
/	<		>	<	>
1	1	1	1	1	1
2	4	8	16	1.4142	1.1892
3	9	27	81	1.7321	1.3161

```
#+TBLFM: $2=$1^2::$3=$1^3::$4=$1^4::$5=sqrt($1)::$6=sqrt(sqrt(($1)))
```

It is also sufficient to just insert the column group starters after every vertical line you would like to have:

N	N <sup>2</sup>	N <sup>3</sup>	N <sup>4</sup>	sqrt(n)	sqrt[4](N)
/	<			<	

### 3.4 The Orgtbl Minor Mode

If you like the intuitive way the Org table editor works, you might also want to use it in other modes like Text mode or Mail mode. The minor mode Orgtbl mode makes this possible. You can always toggle the mode with `M-x orgtbl-mode`. To turn it on by default, for example in Message mode, use

```
(add-hook 'message-mode-hook #'turn-on-orgtbl)
```

Furthermore, with some special setup, it is possible to maintain tables in arbitrary syntax with Orgtbl mode. For example, it is possible to construct L<sup>A</sup>T<sub>E</sub>X tables with the underlying ease and power of Orgtbl mode, including spreadsheet capabilities. For details, see [Section A.5 \[Tables in Arbitrary Syntax\]](#), page 278.

## 3.5 The Spreadsheet

The table editor makes use of the Emacs Calc package to implement spreadsheet-like capabilities. It can also evaluate Emacs Lisp forms to derive fields from other fields. While fully featured, Org’s implementation is not identical to other spreadsheets. For example, Org knows the concept of a *column formula* that will be applied to all non-header fields in a column without having to copy the formula to each relevant field. There is also a formula debugger, and a formula editor with features for highlighting fields in the table corresponding to the references at point in the formula, moving these references by arrow keys.

### 3.5.1 References

To compute fields in the table from other fields, formulas must reference other fields or ranges. In Org, fields can be referenced by name, by absolute coordinates, and by relative coordinates. To find out what the coordinates of a field are, press `C-c ?` in that field, or press `C-c }` to toggle the display of a grid.

#### Field references

Formulas can reference the value of another field in two ways. Like in any other spreadsheet, you may reference fields with a letter/number combination like ‘B3’, meaning the second field in the third row. However, Org prefers to use another, more general representation that looks like this:<sup>2</sup>

```
@ROW$COLUMN
```

Column specifications can be absolute like ‘\$1’, ‘\$2’, . . . , ‘\$N’, or relative to the current column, i.e., the column of the field which is being computed, like ‘\$+1’ or ‘\$-2’. ‘\$<’ and ‘\$>’ are immutable references to the first and last column, respectively, and you can use ‘\$>>>’ to indicate the third column from the right.

The row specification only counts data lines and ignores horizontal separator lines, or “hlines”. Like with columns, you can use absolute row numbers ‘@1’, ‘@2’, . . . , ‘@N’, and row numbers relative to the current row like ‘@+3’ or ‘@-1’. ‘@<’ and ‘@>’ are immutable references the first and last row in the table, respectively. You may also specify the row relative to one of the hlines: ‘@I’ refers to the first hline, ‘@II’ to the second, etc. ‘@-I’ refers to the first such line above the current line, ‘@+I’ to the first such line below the current line. You can also write ‘@III+2’ which is the second data line after the third hline in the table.

---

<sup>2</sup> Org understands references typed by the user as ‘B4’, but it does not use this syntax when offering a formula for editing. You can customize this behavior using the variable `org-table-use-standard-references`.

‘@0’ and ‘\$0’ refer to the current row and column, respectively, i.e., to the row/column for the field being computed. Also, if you omit either the column or the row part of the reference, the current row/column is implied.

Org’s references with *unsigned* numbers are fixed references in the sense that if you use the same reference in the formula for two different fields, the same field is referenced each time. Org’s references with *signed* numbers are floating references because the same reference operator can reference different fields depending on the field being calculated by the formula.

Here are a few examples:

‘@2\$3’	2nd row, 3rd column (same as ‘C2’)
‘\$5’	column 5 in the current row (same as ‘E&’)
‘@2’	current column, row 2
‘@-1\$-3’	field one row up, three columns to the left
‘@-1\$2’	field just under hline above current row, column 2
‘@>\$5’	field in the last row, in column 5

## Range references

You may reference a rectangular range of fields by specifying two field references connected by two dots ‘. .’. The ends are included in the range. If both fields are in the current row, you may simply use ‘\$2. . \$7’, but if at least one field is in a different row, you need to use the general ‘@ROW\$COLUMN’ format at least for the first field, i.e., the reference must start with ‘@’ in order to be interpreted correctly. Examples:

‘\$1. . \$3’	first three fields in the current row
‘\$P. . \$Q’	range, using column names (see <a href="#">Section 3.5.10 [Advanced features], page 34</a> )
‘\$<<<. . \$>>’	start in third column, continue to the last but one
‘@2\$1. . @4\$3’	nine fields between these two fields (same as ‘A2. . C4’)
‘@-1\$-2. . @-1’	3 fields in the row above, starting from 2 columns on the left
‘@I. . II’	between first and second hline, short for ‘@I. . @II’

Range references return a vector of values that can be fed into Calc vector functions. Empty fields in ranges are normally suppressed, so that the vector contains only the non-empty fields. For other options with the mode switches ‘E’, ‘N’ and examples, see [Section 3.5.2 \[Formula syntax for Calc\], page 26](#).

## Field coordinates in formulas

One of the very first actions during evaluation of Calc formulas and Lisp formulas is to substitute ‘@#’ and ‘\$#’ in the formula with the row or column number of the field where the current result will go to. The traditional Lisp formula equivalents are `org-table-current-dline` and `org-table-current-column`. Examples:

```
‘if(@# % 2, $#, string(""))’
```

Insert column number on odd rows, set field to empty on even rows.

```
‘$2 = '(identity remote(FOO, @@#$1))’
```

Copy text or values of each row of column 1 of the table named *FOO* into column 2 of the current table.

```
'@3 = 2 * remote(FOO, @1$$#)'
```

Insert the doubled value of each column of row 1 of the table named *FOO* into row 3 of the current table.

For the second and third examples, table *FOO* must have at least as many rows or columns as the current table. Note that this is inefficient<sup>3</sup> for large number of rows.

## Named references

'\$name' is interpreted as the name of a column, parameter or constant. Constants are defined globally through the variable `org-table-formula-constants`, and locally—for the file—through a line like this example:

```
#+CONSTANTS: c=299792458. pi=3.14 eps=2.4e-6
```

Also, properties (see [Chapter 7 \[Properties and Columns\]](#), page 67) can be used as constants in table formulas: for a property 'Xyz' use the name '\$PROP\_Xyz', and the property will be searched in the current outline entry and in the hierarchy above it. If you have the 'constants.el' package, it will also be used to resolve constants, including natural constants like '\$h' for Planck's constant, and units like '\$km' for kilometers<sup>4</sup>. Column names and parameters can be specified in special table lines. These are described below, see [Section 3.5.10 \[Advanced features\]](#), page 34. All names must start with a letter, and further consist of letters and numbers.

## Remote references

You may also reference constants, fields and ranges from a different table, either in the current file or even in a different file. The syntax is

```
remote(NAME,REF)
```

where *NAME* can be the name of a table in the current file as set by a '#+NAME:' line before the table. It can also be the ID of an entry, even in a different file, and the reference then refers to the first table in that entry. *REF* is an absolute field or range reference as described above for example '@3\$3' or '\$somename', valid in the referenced table.

When *NAME* has the format '@ROW\$COLUMN', it is substituted with the name or ID found in this field of the current table. For example 'remote(\$1, @@>\$2)' ⇒ 'remote(year\_2013, @@>\$1)'. The format 'B3' is not supported because it can not be distinguished from a plain table name or ID.

### 3.5.2 Formula syntax for Calc

A formula can be any algebraic expression understood by the Emacs Calc package. Note that Calc has the non-standard convention that '/' has lower precedence than '\*', so that 'a/b\*c' is interpreted as '(a/(b\*c))'. Before evaluation by `calc-eval` (see [Section "Calling Calc from Your Programs" in calc](#)), variable substitution takes place according to the rules described above.

The range vectors can be directly fed into the Calc vector functions like `vmean` and `vsum`.

<sup>3</sup> The computation time scales as  $O(N^2)$  because table *FOO* is parsed for each field to be copied.

<sup>4</sup> The file 'constants.el' can supply the values of constants in two different unit systems, 'SI' and 'cgs'. Which one is used depends on the value of the variable `constants-unit-system`. You can use the 'STARTUP' options 'constSI' and 'constcgs' to set this value for the current buffer.

A formula can contain an optional mode string after a semicolon. This string consists of flags to influence Calc and other modes during execution. By default, Org uses the standard Calc modes (precision 12, angular units degrees, fraction and symbolic modes off). The display format, however, has been changed to `(float 8)` to keep tables compact. The default settings can be configured using the variable `org-calc-default-modes`.

- `'p20'` Set the internal Calc calculation precision to 20 digits.
- `'n3', 's3', 'e2', 'f4'`  
Normal, scientific, engineering or fixed format of the result of Calc passed back to Org. Calc formatting is unlimited in precision as long as the Calc calculation precision is greater.
- `'D', 'R'` Degree and radian angle modes of Calc.
- `'F', 'S'` Fraction and symbolic modes of Calc.
- `'u'` Units simplification mode of Calc. Calc is also a symbolic calculator and is capable of working with values having a unit, represented with numerals followed by a unit string in Org table cells. This mode instructs Calc to simplify the units in the computed expression before returning the result.
- `'T', 't', 'U'` Duration computations in Calc or Lisp, [Section 3.5.4 \[Durations and time values\]](#), page 29.
- `'E'` If and how to consider empty fields. Without `'E'` empty fields in range references are suppressed so that the Calc vector or Lisp list contains only the non-empty fields. With `'E'` the empty fields are kept. For empty fields in ranges or empty field references the value `'nan'` (not a number) is used in Calc formulas and the empty string is used for Lisp formulas. Add `'N'` to use 0 instead for both formula types. For the value of a field the mode `'N'` has higher precedence than `'E'`.
- `'N'` Interpret all fields as numbers, use 0 for non-numbers. See the next section to see how this is essential for computations with Lisp formulas. In Calc formulas it is used only occasionally because there number strings are already interpreted as numbers without `'N'`.
- `'L'` Literal, for Lisp formulas only. See the next section.

Unless you use large integer numbers or high-precision calculation and display for floating point numbers you may alternatively provide a `printf` format specifier to reformat the Calc result after it has been passed back to Org instead of letting Calc already do the formatting<sup>5</sup>. A few examples:

- `'$1+$2'` Sum of first and second field
- `'$1+$2;%.2f'` Same, format result to two decimals
- `'exp($2)+exp($1)'` Math functions can be used
- `'$0;%.1f'` Reformat current cell to 1 decimal
- `'($3-32)*5/9'` Degrees F  $\rightarrow$  C conversion

<sup>5</sup> The `printf` reformatting is limited in precision because the value passed to it is converted into an “integer” or “double”. The “integer” is limited in size by truncating the signed value to 32 bits. The “double” is limited in precision to 64 bits overall which leaves approximately 16 significant decimal digits.

<code>‘\$c/\$1/\$cm’</code>	Hz → cm conversion, using <code>‘constants.el’</code>
<code>‘tan(\$1);Dp3s1’</code>	Compute in degrees, precision 3, display SCI 1
<code>‘sin(\$1);Dp3%.1e’</code>	Same, but use <code>printf</code> specifier for display
<code>‘vmean(\$2..\$7)’</code>	Compute column range mean, using vector function
<code>‘vmean(\$2..\$7);EN’</code>	Same, but treat empty fields as 0
<code>‘taylor(\$3,x=7,2)’</code>	Taylor series of \$3, at x=7, second degree

Calc also contains a complete set of logical operations (see [Section “Logical Operations”](#) in `calc`). For example

```
‘if($1 < 20, teen, string(""))’
    “teen” if age ‘$1’ is less than 20, else the Org table result field is set to empty
    with the empty string.
```

```
‘if("$1" == "nan" || "$2" == "nan", string(""), $1 + $2); E f-1’
    Sum of the first two columns. When at least one of the input fields is empty
    the Org table result field is set to empty. ‘E’ is required to not convert empty
    fields to 0. ‘f-1’ is an optional Calc format string similar to ‘%.1f’ but leaves
    empty results empty.
```

```
‘if(typeof(vmean($1..$7)) == 12, string(""), vmean($1..$7)); E’
    Mean value of a range unless there is any empty field. Every field in the range
    that is empty is replaced by ‘nan’ which lets ‘vmean’ result in ‘nan’. Then
    ‘typeof =’ 12= detects the ‘nan’ from vmean and the Org table result field is
    set to empty. Use this when the sample set is expected to never have missing
    values.
```

```
‘if("$1..$7" == "[]", string(""), vmean($1..$7))’
    Mean value of a range with empty fields skipped. Every field in the range that
    is empty is skipped. When all fields in the range are empty the mean value is
    not defined and the Org table result field is set to empty. Use this when the
    sample set can have a variable size.
```

```
‘vmean($1..$7); EN’
    To complete the example before: Mean value of a range with empty fields
    counting as samples with value 0. Use this only when incomplete sample sets
    should be padded with 0 to the full size.
```

You can add your own Calc functions defined in Emacs Lisp with `defmath` and use them in formula syntax for Calc.

### 3.5.3 Emacs Lisp forms as formulas

It is also possible to write a formula in Emacs Lisp. This can be useful for string manipulation and control structures, if Calc’s functionality is not enough.

A formula is evaluated as a Lisp form when it starts with a single-quote followed by an opening parenthesis. Cell table references are interpolated into the Lisp form before execution. The evaluation should return either a string or a number. Evaluation modes and a `printf` format used to render the returned values can be specified after a semicolon.

By default, references are interpolated as literal Lisp strings: the field content is replaced in the Lisp form stripped of leading and trailing white space and surrounded in double-quotes. For example:

```
'(concat $1 $2)
```

concatenates the content of columns 1 and column 2.

When the ‘N’ flag is used, all referenced elements are parsed as numbers and interpolated as Lisp numbers, without quotes. Fields that cannot be parsed as numbers are interpolated as zeros. For example:

```
'(+ $1 $2);N
```

adds columns 1 and 2, equivalent to Calc’s ‘\$1+\$2’. Ranges are inserted as space-separated fields, so they can be embedded in list or vector syntax. For example:

```
'(apply '+ '($1..$4));N
```

computes the sum of columns 1 to 4, like Calc’s ‘vsum(\$1..\$4)’.

When the ‘L’ flag is used, all fields are interpolated literally: the cell content is replaced in the Lisp form stripped of leading and trailing white space and without quotes. If a reference is intended to be interpreted as a string by the Lisp form, the reference operator itself should be enclosed in double-quotes, like “\$3”. The ‘L’ flag is useful when strings and numbers are used in the same Lisp form. For example:

```
'(substring "$1" $2 $3);L
```

extracts the part of the string in column 1 between the character positions specified in the integers in column 2 and 3 and it is easier to read than the equivalent:

```
'(substring $1 (string-to-number $2) (string-to-number $3))
```

When the formula itself contains ‘;’ symbol, Org mode may incorrectly interpret everything past ‘;’ as format specifier:

```
'(concat $1 ";")
```

You can put an extra trailing ‘;’ to indicate that all the earlier instances of ‘;’ belong to the formula itself:

```
'(concat $1 ";");
```

### 3.5.4 Durations and time values

If you want to compute time values use the ‘T’, ‘t’, or ‘U’ flag, either in Calc formulas or Emacs formulas:

```
| Task 1 | Task 2 | Total |
|-----+-----+-----|
| 2:12 | 1:47 | 03:59:00 |
| 2:12 | 1:47 | 03:59 |
| 3:02:20 | -2:07:00 | 0.92 |
#+TBLFM: @2$3=$1+$2;T::@3$3=$1+$2;U::@4$3=$1+$2;t
```

Input duration values must be of the form ‘HH:MM[:SS]’, where seconds are optional. With the ‘T’ flag, computed durations are displayed as ‘HH:MM:SS’ (see the first formula above). With the ‘U’ flag, seconds are omitted so that the result is only ‘HH:MM’ (see second formula above). Zero-padding of the hours field depends upon the value of the variable `org-table-duration-hour-zero-padding`.

With the ‘t’ flag, computed durations are displayed according to the value of the option `org-table-duration-custom-format`, which defaults to `hours` and displays the result as a fraction of hours (see the third formula in the example above).

Negative duration values can be manipulated as well, and integers are considered as seconds in addition and subtraction.

### 3.5.5 Field and range formulas

To assign a formula to a particular field, type it directly into the field, preceded by ‘:=’, for example ‘vsum(@II..III)’. When you press TAB or RET or C-c C-c with point still in the field, the formula is stored as the formula for this field, evaluated, and the current field is replaced with the result.

Formulas are stored in a special ‘TBLFM’ keyword located directly below the table. If you type the equation in the fourth field of the third data line in the table, the formula looks like ‘@3\$4=\$1+\$2’. When inserting/deleting/swapping column and rows with the appropriate commands, *absolute references* (but not relative ones) in stored formulas are modified in order to still reference the same field. To avoid this from happening, in particular in range references, anchor ranges at the table borders (using ‘@<’, ‘@>’, ‘\$<’, ‘\$>’), or at hlines using the ‘@I’ notation. Automatic adaptation of field references does not happen if you edit the table structure with normal editing commands—you must fix the formulas yourself.

Instead of typing an equation into the field, you may also use the following command

C-u C-c = (org-table-eval-formula)

Install a new formula for the current field. The command prompts for a formula with default taken from the ‘TBLFM’ keyword, applies it to the current field, and stores it.

The left-hand side of a formula can also be a special expression in order to assign the formula to a number of different fields. There is no keyboard shortcut to enter such range formulas. To add them, use the formula editor (see [Section 3.5.8 \[Editing and debugging formulas\]](#), page 31) or edit the ‘TBLFM’ keyword directly.

‘\$2=’      Column formula, valid for the entire column. This is so common that Org treats these formulas in a special way, see [Section 3.5.6 \[Column formulas\]](#), page 30.

‘@3=’      Row formula, applies to all fields in the specified row. ‘@>=’ means the last row.

‘@1\$2..@4\$3=’

Range formula, applies to all fields in the given rectangular range. This can also be used to assign a formula to some but not all fields in a row.

‘\$NAME=’    Named field, see [Section 3.5.10 \[Advanced features\]](#), page 34.

### 3.5.6 Column formulas

When you assign a formula to a simple column reference like ‘\$3=’, the same formula is used in all fields of that column, with the following very convenient exceptions: (i) If the table contains horizontal separator hlines with rows above and below, everything before the first such hline is considered part of the table *header* and is not modified by column formulas. Therefore a header is mandatory when you use column formulas and want to add hlines to group rows, like for example to separate a total row at the bottom from the summand rows above. (ii) Fields that already get a value from a field/range formula are left alone by column formulas. These conditions make column formulas very easy to use.

To assign a formula to a column, type it directly into any field in the column, preceded by an equal sign, like ‘=\$1+\$2’. When you press TAB or RET or C-c C-c with point still in

the field, the formula is stored as the formula for the current column, evaluated and the current field replaced with the result. If the field contains only '=', the previously stored formula for this column is used. For each column, Org only remembers the most recently used formula. In the 'TBLFM' keyword, column formulas look like '\$4=\$1+\$2'. The left-hand side of a column formula can not be the name of column, it must be the numeric column reference or '\$>'.

Instead of typing an equation into the field, you may also use the following command:

`C-c = (org-table-eval-formula)`

Install a new formula for the current column and replace current field with the result of the formula. The command prompts for a formula, with default taken from the 'TBLFM' keyword, applies it to the current field and stores it. With a numeric prefix argument, e.g., `C-5 C-c =`, the command applies it to that many consecutive fields in the current column.

### 3.5.7 Lookup functions

Org has three predefined Emacs Lisp functions for lookups in tables.

'(org-lookup-first VAL S-LIST R-LIST &optional PREDICATE)'

Searches for the first element *S* in list *S-LIST* for which

(PREDICATE VAL *S*)

is non-nil; returns the value from the corresponding position in list *R-LIST*. The default *PREDICATE* is `equal`. Note that the parameters *VAL* and *S* are passed to *PREDICATE* in the same order as the corresponding parameters are in the call to `org-lookup-first`, where *VAL* precedes *S-LIST*. If *R-LIST* is nil, the matching element *S* of *S-LIST* is returned.

'(org-lookup-last VAL S-LIST R-LIST &optional PREDICATE)'

Similar to `org-lookup-first` above, but searches for the *last* element for which *PREDICATE* is non-nil.

'(org-lookup-all VAL S-LIST R-LIST &optional PREDICATE)'

Similar to `org-lookup-first`, but searches for *all* elements for which *PREDICATE* is non-nil, and returns *all* corresponding values. This function can not be used by itself in a formula, because it returns a list of values. However, powerful lookups can be built when this function is combined with other Emacs Lisp functions.

If the ranges used in these functions contain empty fields, the 'E' mode for the formula should usually be specified: otherwise empty fields are not included in *S-LIST* and/or *R-LIST* which can, for example, result in an incorrect mapping from an element of *S-LIST* to the corresponding element of *R-LIST*.

These three functions can be used to implement associative arrays, count matching cells, rank results, group data, etc. For practical examples see [this tutorial on Worg](#).

### 3.5.8 Editing and debugging formulas

You can edit individual formulas in the minibuffer or directly in the field. Org can also prepare a special buffer with all active formulas of a table. When offering a formula for

editing, Org converts references to the standard format (like ‘B3’ or ‘D&’) if possible. If you prefer to only work with the internal format (like ‘@3\$2’ or ‘\$4’), configure the variable `org-table-use-standard-references`.

`C-c =` or `C-u C-c =` (`org-table-eval-formula`)

Edit the formula associated with the current column/field in the minibuffer. See [Section 3.5.6 \[Column formulas\]](#), page 30, and [Section 3.5.5 \[Field and range formulas\]](#), page 30.

`C-u C-u C-c =` (`org-table-eval-formula`)

Re-insert the active formula (either a field formula, or a column formula) into the current field, so that you can edit it directly in the field. The advantage over editing in the minibuffer is that you can use the command `C-c ?`.

`C-c ?` (`org-table-field-info`)

While editing a formula in a table field, highlight the field(s) referenced by the reference at point position in the formula.

`C-c }` (`org-table-toggle-coordinate-overlays`)

Toggle the display of row and column numbers for a table, using overlays. These are updated each time the table is aligned; you can force it with `C-c C-c`.

`C-c {` (`org-table-toggle-formula-debugger`)

Toggle the formula debugger on and off. See below.

`C-c '` (`org-table-edit-formulas`)

Edit all formulas for the current table in a special buffer, where the formulas are displayed one per line. If the current field has an active formula, point in the formula editor marks it. While inside the special buffer, Org automatically highlights any field or range reference at point position. You may edit, remove and add formulas, and use the following commands:

`C-c C-c` or `C-x C-s` (`org-table-fedit-finish`)

Exit the formula editor and store the modified formulas. With `C-u` prefix, also apply the new formulas to the entire table.

`C-c C-q` (`org-table-fedit-abort`)

Exit the formula editor without installing changes.

`C-c C-r` (`org-table-fedit-toggle-ref-type`)

Toggle all references in the formula editor between standard (like ‘B3’) and internal (like ‘@3\$2’).

`TAB` (`org-table-fedit-lisp-indent`)

Pretty-print or indent Lisp formula at point. When in a line containing a Lisp formula, format the formula according to Emacs Lisp rules. Another `TAB` collapses the formula back again. In the open formula, `TAB` re-indents just like in Emacs Lisp mode.

`M-TAB` (`lisp-complete-symbol`)

Complete Lisp symbols, just like in Emacs Lisp mode.

*S-UP*, *S-DOWN*, *S-LEFT*, *S-RIGHT*

Shift the reference at point. For example, if the reference is ‘B3’ and you press *S-RIGHT*, it becomes ‘C3’. This also works for relative references and for hline references.

*M-S-UP* (`org-table-fedit-line-up`)

Move the test line for column formulas up in the Org buffer.

*M-S-DOWN* (`org-table-fedit-line-down`)

Move the test line for column formulas down in the Org buffer.

*M-UP* (`org-table-fedit-scroll-up`)

Scroll up the window displaying the table.

*M-DOWN* (`org-table-fedit-scroll-down`)

Scroll down the window displaying the table.

*C-c }*

Turn the coordinate grid in the table on and off.

Making a table field blank does not remove the formula associated with the field, because that is stored in a different line—the ‘TBLFM’ keyword line. During the next recalculation, the field will be filled again. To remove a formula from a field, you have to give an empty reply when prompted for the formula, or to edit the ‘TBLFM’ keyword.

You may edit the ‘TBLFM’ keyword directly and re-apply the changed equations with *C-c C-c* in that line or with the normal recalculation commands in the table.

## Using multiple ‘TBLFM’ lines

You may apply the formula temporarily. This is useful when you want to switch the formula applied to the table. Place multiple ‘TBLFM’ keywords right after the table, and then press *C-c C-c* on the formula to apply. Here is an example:

```
| x | y |
|---+---|
| 1 |   |
| 2 |   |
#+TBLFM: $2=$1*1
#+TBLFM: $2=$1*2
```

Pressing *C-c C-c* in the line of ‘#+TBLFM: \$2=\$1\*2’ yields:

```
| x | y |
|---+---|
| 1 | 2 |
| 2 | 4 |
#+TBLFM: $2=$1*1
#+TBLFM: $2=$1*2
```

If you recalculate this table, with *C-u C-c \**, for example, you get the following result from applying only the first ‘TBLFM’ keyword.

```
| x | y |
|---+---|
| 1 | 1 |
| 2 | 2 |
```

```
#+TBLFM: $2=$1*1
#+TBLFM: $2=$1*2
```

## Debugging formulas

When the evaluation of a formula leads to an error, the field content becomes the string ‘#ERROR’. If you want to see what is going on during variable substitution and calculation in order to find a bug, turn on formula debugging in the Tbl menu and repeat the calculation, for example by pressing *C-u C-u C-c = RET* in a field. Detailed information are displayed.

### 3.5.9 Updating the table

Recalculation of a table is normally not automatic, but needs to be triggered by a command. To make recalculation at least semi-automatic, see [Section 3.5.10 \[Advanced features\]](#), page 34.

In order to recalculate a line of a table or the entire table, use the following commands:

*C-c \** (*org-table-recalculate*)

Recalculate the current row by first applying the stored column formulas from left to right, and all field/range formulas in the current row.

*C-u C-c \** or *C-u C-c C-c*

Recompute the entire table, line by line. Any lines before the first hline are left alone, assuming that these are part of the table header.

*C-u C-u C-c \** or *C-u C-u C-c C-c* (*org-table-iterate*)

Iterate the table by recomputing it until no further changes occur. This may be necessary if some computed fields use the value of other fields that are computed *later* in the calculation sequence.

*M-x org-table-recalculate-buffer-tables*

Recompute all tables in the current buffer.

*M-x org-table-iterate-buffer-tables*

Iterate all tables in the current buffer, in order to converge table-to-table dependencies.

### 3.5.10 Advanced features

If you want the recalculation of fields to happen automatically, or if you want to be able to assign *names*<sup>6</sup> to fields and columns, you need to reserve the first column of the table for special marking characters.

*C-#* (*org-table-rotate-recalc-marks*)

Rotate the calculation mark in first column through the states ‘#’, ‘\*’, ‘!’, ‘\$’. When there is an active region, change all marks in the region.

Here is an example of a table that collects exam results of students and makes use of these features:

```
|---+-----+-----+-----+-----+-----+-----|
| | Student | Prob 1 | Prob 2 | Prob 3 | Total | Note |
```

<sup>6</sup> Such names must start with an alphabetic character and use only alphanumeric/underscore characters.

!		P1	P2	P3	Tot	
#	Maximum	10	15	25	50	10.0
^		m1	m2	m3	mt	
#	Peter	10	8	23	41	8.2
#	Sam	2	4	3	9	1.8
	Average				25.0	
^					at	
\$	max=50					

```
#+TBLFM: $6=vsum($P1..$P3)::$7=10*$Tot/$max;%.1f::$at=vmean(@-II..@-I);%.1f
```

**Important:** Please note that for these special tables, recalculating the table with *C-u C-c \** only affects rows that are marked ‘#’ or ‘\*’, and fields that have a formula assigned to the field itself. The column formulas are not applied in rows with empty first field.

The marking characters have the following meaning:

- ‘!’        The fields in this line define names for the columns, so that you may refer to a column as ‘\$Tot’ instead of ‘\$6’.
- ‘^’        This row defines names for the fields *above* the row. With such a definition, any formula in the table may use ‘\$m1’ to refer to the value ‘10’. Also, if you assign a formula to a names field, it is stored as ‘\$name = ...’.
- ‘\_’        Similar to ‘^’, but defines names for the fields in the row *below*.
- ‘\$’        Fields in this row can define *parameters* for formulas. For example, if a field in a ‘\$’ row contains ‘max=50’, then formulas in this table can refer to the value 50 using ‘\$max’. Parameters work exactly like constants, only that they can be defined on a per-table basis.
- ‘#’        Fields in this row are automatically recalculated when pressing TAB or RET or *S-TAB* in this row. Also, this row is selected for a global recalculation with *C-u C-c \**. Unmarked lines are left alone by this command.
- ‘\*’        Selects this line for global recalculation with *C-u C-c \**, but not for automatic recalculation. Use this when automatic recalculation slows down editing too much.
- ‘/’        Do not export this line. Useful for lines that contain the narrowing ‘<N>’ markers or column group markers.

Finally, just to whet your appetite for what can be done with the fantastic Calc package, here is a table that computes the Taylor series of degree n at location x for a couple of functions.

	Func	n	x	Result
#	exp(x)	1	x	1 + x

```

| # | exp(x)      | 2 | x  | 1 + x + x^2 / 2 |
| # | exp(x)      | 3 | x  | 1 + x + x^2 / 2 + x^3 / 6 |
| # | x^2+sqrt(x) | 2 | x=0 | x*(0.5 / 0) + x^2 (2 - 0.25 / 0) / 2 |
| # | x^2+sqrt(x) | 2 | x=1 | 2 + 2.5 x - 2.5 + 0.875 (x - 1)^2 |
| * | tan(x)      | 3 | x  | 0.0175 x + 1.77e-6 x^3 |
|---+-----+---+-----+-----|
#+TBLFM: $5=taylor($2,$4,$3);n3

```

### 3.6 Org Plot

Org Plot can produce graphs of information stored in Org tables, either graphically or in ASCII art.

#### Graphical plots using Gnuplot

Org Plot can produce 2D and 3D graphs of information stored in Org tables using [Gnuplot](#) and [Gnuplot mode](#). To see this in action, ensure that you have both Gnuplot and Gnuplot mode installed on your system, then call `C-c " g` or `M-x org-plot/gnuplot` on the following table.

```

#+PLOT: title:"Citas" ind:1 deps:(3) type:2d with:histograms set:"yrange [0:]"
| Sede          | Max cites | H-index |
|-----+-----+-----|
| Chile         | 257.72   | 21.39   |
| Leeds         | 165.77   | 19.68   |
| Sao Paulo    | 71.00    | 11.50   |
| Stockholm    | 134.19   | 14.33   |
| Morelia      | 257.56   | 17.67   |

```

Org Plot supports a range of plot types, and provides the ability to add more. For example, a radar plot can be generated like so:

```

#+PLOT: title:"An evaluation of plaintext document formats" transpose:yes type:radar m
| Format          | Fine-grained-control | Initial Effort | Syntax simplicity | Edit
|-----+-----+-----+-----+-----|
| Word           | 2 | 4 | 4 |
| LaTeX          | 4 | 1 | 1 |
| Org Mode       | 4 | 2 | 3.5 |
| Markdown       | 1 | 3 | 3 |
| Markdown + Pandoc | 2.5 | 2.5 | 2.5 |

```

Notice that Org Plot is smart enough to apply the table's headers as labels. Further control over the labels, type, content, and appearance of plots can be exercised through the 'PLOT' keyword preceding a table. See below for a complete list of Org Plot options. For more information and examples see the [Org Plot tutorial](#).

#### Plot options

- 'set' Specify any Gnuplot option to be set when graphing.
- 'title' Specify the title of the plot.
- 'ind' Specify which column of the table to use as the 'x' axis.

- `'timeind'` Specify which column of the table to use as the `'x'` axis as a time value.
- `'deps'` Specify the columns to graph as a Lisp style list, surrounded by parentheses and separated by spaces for example `'dep: (3 4)'` to graph the third and fourth columns. Defaults to graphing all other columns aside from the `'ind'` column.
- `'transpose'`  
When `'y'`, `'yes'`, or `'t'` attempt to transpose the table data before plotting. Also recognizes the shorthand option `'trans'`.
- `'type'` Specify the type of the plot, by default one of `'2d'`, `'3d'`, `'radar'`, or `'grid'`. Available types can be customized with `org-plot/preset-plot-types`.
- `'with'` Specify a `'with'` option to be inserted for every column being plotted, e.g., `'lines'`, `'points'`, `'boxes'`, `'impulses'`. Defaults to `'lines'`.
- `'file'` If you want to plot to a file, specify `"path/to/desired/output-file"`.
- `'labels'` List of labels to be used for the `'deps'`. Defaults to the column headers if they exist.
- `'line'` Specify an entire line to be inserted in the Gnuplot script.
- `'map'` When plotting `'3d'` or `'grid'` types, set this to `'t'` to graph a flat mapping rather than a `'3d'` slope.
- `'min'` Provides a minimum axis value that may be used by a plot type. Implicitly assumes the `'y'` axis is being referred to. Can explicitly provide a value for a either the `'x'` or `'y'` axis with `'xmin'` and `'ymin'`.
- `'max'` Provides a maximum axis value that may be used by a plot type. Implicitly assumes the `'y'` axis is being referred to. Can explicitly provide a value for a either the `'x'` or `'y'` axis with `'xmax'` and `'ymax'`.
- `'ticks'` Provides a desired number of axis ticks to display, that may be used by a plot type. If none is given a plot type that requires ticks will use `org--plot/sensible-tick-num` to try to determine a good value.
- `'timefmt'` Specify format of Org mode timestamps as they will be parsed by Gnuplot. Defaults to `'%Y-%m-%d-%H:%M:%S'`.
- `'script'` If you want total control, you can specify a script file—place the file name between double-quotes—which will be used to plot. Before plotting, every instance of `'$datafile'` in the specified script will be replaced with the path to the generated data file. Note: even if you set this option, you may still want to specify the plot type, as that can impact the content of the data file.

## ASCII bar plots

While point is on a column, typing `C-c " a` or `M-x orgtbl-ascii-plot` create a new column containing an ASCII-art bars plot. The plot is implemented through a regular column formula. When the source column changes, the bar plot may be updated by refreshing the table, for example typing `C-u C-c *`.

```
| Sede          | Max cites |
|-----+-----+-----|
```

```

| Chile          |      257.72 | WWWWWWWWWWWW |
| Leeds         |      165.77 | WWWWWWWWh   |
| Sao Paolo     |       71.00 | WWW;         |
| Stockholm     |      134.19 | WWWWWW:     |
| Morelia       |      257.56 | WWWWWWWWWWWW |
| Rochefourchat |       0.00 |              |
#+TBLFM: $3='(orgtbl-ascii-draw $2 0.0 257.72 12)

```

The formula is an Elisp call.

`orgtbl-ascii-draw` *value min max &optional width* [Function]

Draw an ASCII bar in a table.

*VALUE* is the value to plot.

*MIN* is the value displayed as an empty bar. *MAX* is the value filling all the *WIDTH*.

Sources values outside this range are displayed as ‘too small’ or ‘too large’.

*WIDTH* is the number of characters of the bar plot. It defaults to ‘12’.

## 4 Hyperlinks

Like HTML, Org provides support for links inside a file, external links to other files, Usenet articles, emails, and much more.

### 4.1 Link Format

Org recognizes plain URIs, possibly wrapped within angle brackets<sup>1</sup>, and activate them as clickable links.

The general link format, however, looks like this:

```
[[LINK] [DESCRIPTION]]
```

or alternatively

```
[[LINK]]
```

Some ‘\’, ‘[’ and ‘]’ characters in the *LINK* part need to be “escaped”, i.e., preceded by another ‘\’ character. More specifically, the following characters, and only them, must be escaped:

1. all ‘[’ and ‘]’ characters,
2. every ‘\’ character preceding either ‘]’ or ‘[’,
3. every ‘\’ character at the end of the link.

Functions inserting links (see [Section 4.5 \[Handling Links\]](#), page 43) properly escape ambiguous characters. You only need to bother about the rules above when inserting directly, or yanking, a URI within square brackets. When in doubt, you may use the function `org-link-escape`, which turns a link string into its escaped form.

Once a link in the buffer is complete, with all brackets present, Org changes the display so that ‘DESCRIPTION’ is displayed instead of ‘[[LINK] [DESCRIPTION]]’ and ‘LINK’ is displayed instead of ‘[[LINK]]’. Links are highlighted in the `org-link` face, which, by default, is an underlined face.

You can directly edit the visible part of a link. This can be either the *LINK* part, if there is no description, or the *DESCRIPTION* part otherwise. To also edit the invisible *LINK* part, use `C-c C-1` with point on the link (see [Section 4.5 \[Handling Links\]](#), page 43).

If you place point at the beginning or just behind the end of the displayed text and press `BS`, you remove the—invisible—bracket at that location<sup>2</sup>. This makes the link incomplete and the internals are again displayed as plain text. Inserting the missing bracket hides the link internals again. To show the internal structure of all links, use the menu: Org → Hyperlinks → Literal links, customize `org-link-descriptive`, or use ‘`literallinks`’ [Section 17.8 \[startup option\]](#), page 261.

<sup>1</sup> Plain URIs are recognized only for a well-defined set of schemes. See [Section 4.4 \[External Links\]](#), page 41. Unlike URI syntax, they cannot contain parenthesis or white spaces, either. URIs within angle brackets have no such limitation.

<sup>2</sup> More accurately, the precise behavior depends on how point arrived there—see [Section “Invisible Text” in elisp](#).

## 4.2 Internal Links

A link that does not look like a URL—i.e., does not start with a known scheme or a file name—refers to the current document. You can follow it with `C-c C-o` when point is on the link, or with a mouse click (see [Section 4.5 \[Handling Links\]](#), page 43).

Org provides several refinements to internal navigation within a document. Most notably, a construct like `[[#my-custom-id]]` specifically targets the entry with the `'CUSTOM_ID'` property set to `'my-custom-id'`. Also, an internal link looking like `[[[*Some section]]` points to a headline with the name `'Some section'`<sup>3</sup>.

When the link does not belong to any of the cases above, Org looks for a *dedicated target*: the same string in double angular brackets, like `<<My Target>>`.

If no dedicated target exists, the link tries to match the exact name of an element within the buffer. Naming is done, unsurprisingly, with the `'NAME'` keyword, which has to be put in the line before the element it refers to, as in the following example

```
#+NAME: My Target
| a | table      |
|----+-----|
| of | four cells |
```

Ultimately, if none of the above succeeds, Org searches for a headline that is exactly the link text but may also include a `TODO` keyword and tags, or initiates a plain text search, according to the value of `org-link-search-must-match-exact-headline`.

Note that you must make sure custom IDs, dedicated targets, and names are unique throughout the document. Org provides a linter to assist you in the process, if needed. See [Section 17.10 \[Org Syntax\]](#), page 264.

During export, internal links are used to mark objects and assign them a number. Marked objects are then referenced by links pointing to them. In particular, links without a description appear as the number assigned to the marked object<sup>4</sup>. In the following excerpt from an Org buffer

```
1. one item
2. <<target>>another item
Here we refer to item [[target]].
```

The last sentence will appear as `'Here we refer to item 2'` when exported.

In non-Org files, the search looks for the words in the link text. In the above example the search would be for `'target'`.

Following a link pushes a mark onto Org's own mark ring. You can return to the previous position with `C-c &`. Using this command several times in direct succession goes back to positions recorded earlier.

<sup>3</sup> To insert a link targeting a headline, in-buffer completion can be used. Just type a star followed by a few optional letters into the buffer and press `M-TAB`. All headlines in the current buffer are offered as completions.

<sup>4</sup> When targeting a `'NAME'` keyword, the `'CAPTION'` keyword is mandatory in order to get proper numbering (see [Section 12.8 \[Captions\]](#), page 148).

### 4.3 Radio Targets

Org can automatically turn any occurrences of certain target names in normal text into a link. So without explicitly creating a link, the text connects to the target radioing its position. Radio targets are enclosed by triple angular brackets. For example, a target ‘<<<My Target>>>’ causes each occurrence of ‘my target’ in normal text to become activated as a link. The Org file is scanned automatically for radio targets only when the file is first loaded into Emacs. To update the target list during editing, press `C-c C-c` with point on or at a target.

### 4.4 External Links

Org supports links to files, websites, Usenet and email messages, BBDB database entries and links to both IRC conversations and their logs. External links are URL-like locators. They start with a short identifying string followed by a colon. There can be no space after the colon.

Here is the full set of built-in link types:

- ‘file’      File links. File name may be remote, absolute, or relative.  
As a special case, “file” prefix may be omitted if the file name is complete, e.g., it starts with ‘./’, or ‘/’.
- ‘attachment’  
Same as file links but for files and folders attached to the current node (see [Section 10.2 \[Attachments\], page 105](#)). Attachment links are intended to behave exactly as file links but for files relative to the attachment directory.
- ‘bbdb’      Link to a BBDB record, with possible regexp completion.
- ‘docview’   Link to a document opened with DocView mode. You may specify a page number.
- ‘doi’        Link to an electronic resource, through its handle.
- ‘elisp’      Execute an Elisp command upon activation.
- ‘gnus’, ‘rmail’, ‘mhe’  
Link to messages or folders from a given Emacs MUA.
- ‘help’       Display documentation of a symbol in ‘\*Help\*’ buffer.
- ‘http’, ‘https’  
Web links.
- ‘id’          Link to a specific headline by its ID property, in an Org file.
- ‘info’        Link to an Info manual, or to a specific node.
- ‘irc’         Link to an IRC channel.
- ‘mailto’     Link to message composition.
- ‘news’        Usenet links.
- ‘shell’       Execute a shell command upon activation.

For ‘file:’ and ‘id:’ links, you can additionally specify a line number, or a text search string, separated by ‘::’. In Org files, you may link to a headline name, a custom ID, or a code reference instead.

The following table illustrates the link types above, along with their options:

Link Type	Example
http	‘http://staff.science.uva.nl/c.dominik/’
https	‘https://orgmode.org/’
doi	‘doi:10.1000/182’
file	‘file:/home/dominik/images/jupiter.jpg’ ‘/home/dominik/images/jupiter.jpg’ (same as above) ‘file:papers/last.pdf’ ‘./papers/last.pdf’ (same as above) ‘file://ssh:me@some.where:papers/last.pdf’ (remote) ‘/ssh:me@some.where:papers/last.pdf’ (same as above) ‘file:sometextfile::NNN’ (jump to line number) ‘file:projects.org’ ‘file:projects.org::some words’ (text search) <sup>5</sup> ‘file:projects.org::*task title’ (headline search) ‘file:projects.org::#custom-id’ (headline search)
attachment	‘attachment:projects.org’ ‘attachment:projects.org::some words’ (text search)
docview	‘docview:papers/last.pdf::NNN’
id	‘id:B7423F4D-2E8A-471B-8810-C40F074717E9’ ‘id:B7423F4D-2E8A-471B-8810-C40F074717E9::*task’ (headline search)
news	‘news:comp.emacs’
mailto	‘mailto:adent@galaxy.net’
mhe	‘mhe:folder’ (folder link) ‘mhe:folder#id’ (message link)
rmail	‘rmail:folder’ (folder link) ‘rmail:folder#id’ (message link)
gnus	‘gnus:group’ (group link) ‘gnus:group#id’ (article link)
bbdb	‘bbdb:R.*Stallman’ (record with regexp)
irc	‘irc:/irc.com/#emacs/bob’
help	‘help:org-store-link’
info	‘info:org#External links’
shell	‘shell:ls *.org’
elisp	‘elisp:(find-file "Elisp.org")’ (Elisp form to evaluate) ‘elisp:org-agenda’ (interactive Elisp command)

On top of these built-in link types, additional ones are available through the ‘org-contrib’ repository (see [Section 1.2 \[Installation\]](#), page 2). For example, these links

<sup>5</sup> The actual behavior of the search depends on the value of the variable `org-link-search-must-match-exact-headline`. If its value is `nil`, then a fuzzy text search is done. If it is `t`, then only the exact headline is matched, ignoring spaces and statistic cookies. If the value is `query-to-create`, then an exact headline is searched; if it is not found, then the user is queried to create it.

to VM or Wanderlust messages are available when you load the corresponding libraries from the ‘org-contrib’ repository:

‘vm:folder’	VM folder link
‘vm:folder#id’	VM message link
‘vm://myself@some.where.org/folder#id’	VM on remote machine
‘vm-imap:account:folder’	VM IMAP folder link
‘vm-imap:account:folder#id’	VM IMAP message link
‘wl:folder’	Wanderlust folder link
‘wl:folder#id’	Wanderlust message link

For information on customizing Org to add new link types, see [Section A.3 \[Adding Hyperlink Types\]](#), page 276.

A link should be enclosed in double brackets and may contain descriptive text to be displayed instead of the URL (see [Section 4.1 \[Link Format\]](#), page 39), for example:

```
[https://www.gnu.org/software/emacs/] [GNU Emacs]]
```

If the description is a file name or URL that points to an image, HTML export (see [Section 13.9 \[HTML Export\]](#), page 165) inlines the image as a clickable button. If there is no description at all and the link points to an image, that image is inlined into the exported HTML file.

Org also recognizes external links amid normal text and activates them as links. If spaces must be part of the link (for example in ‘`bdb:R.*Stallman`’), or if you need to remove ambiguities about the end of the link, enclose the link in square or angular brackets.

## 4.5 Handling Links

Org provides methods to create a link in the correct syntax, to insert it into an Org file, and to follow the link.

The main function is `org-store-link`, called with *M-x org-store-link*. Because of its importance, we suggest to bind it to a widely available key (see [Section 1.3 \[Activation\]](#), page 3). It stores a link to the current location. The link is stored for later insertion into an Org buffer—see below. The kind of link that is created depends on the current buffer:

### *Org mode buffers*

For Org files, if there is a ‘<<target>>’ at point, the link points to the target. If there is a named block (using ‘#+name:’) at point, the link points to that name. Otherwise it points to the current headline, which is also the description.

If the headline has a ‘CUSTOM\_ID’ property, store a link to this custom ID. In addition or alternatively, depending on the value of `org-id-link-to-org-use-id`, create and/or use a globally unique ‘ID’ property for the link<sup>6</sup>. So using this command in Org buffers potentially creates two links: a human-readable link from the custom ID, and one that is globally unique and works even if the entry is moved from file to file. The ‘ID’ property can be either a UUID (default) or a timestamp, depending on `org-id-method`. Later, when inserting the link, you need to decide which one to use.

<sup>6</sup> The Org Id library must first be loaded, either through `org-customize`, by enabling `id` in `org-modules`, or by adding ‘(require ‘org-id)’ in your Emacs init file.

When `org-id-link-consider-parent-id` is `t`<sup>7</sup>, parent ‘ID’ properties are considered. This allows linking to specific targets, named blocks, or headlines (which may not have a globally unique ‘ID’ themselves) within the context of a parent headline or file which does.

For example, given this org file:

```
* Parent
:PROPERTIES:
:ID: abc
:END:
** Child 1
** Child 2
```

Storing a link with point at “Child 1” will produce a link ‘<id:abc::\*Child 1>’, which precisely links to the “Child 1” headline even though it does not have its own ID.

*Email/News clients: VM, Rmail, Wanderlust, MH-E, Gnus*

Pretty much all Emacs mail clients are supported. The link points to the current article, or, in some Gnus buffers, to the group. The description is constructed according to the variable `org-link-email-description-format`. By default, it refers to the addressee and the subject.

*Web browsers: W3M and EWW*

Here the link is the current URL, with the page title as the description.

*Contacts: BBDB*

Links created in a BBDB buffer point to the current entry.

*Chat: IRC*

For IRC links, if the variable `org-irc-link-to-logs` is non-`nil`, create a ‘file’ style link to the relevant point in the logs for the current conversation. Otherwise store an ‘irc’ style link to the user/channel/server under the point.

*Other files* For any other file, the link points to the file, with a search string (see [Section 4.8 \[Search Options\], page 47](#)) pointing to the contents of the current line. If there is an active region, the selected words form the basis of the search string. You can write custom Lisp functions to select the search string and perform the search for particular file types (see [Section 4.9 \[Custom Searches\], page 48](#)).

You can also define dedicated links to other files. See [Section A.3 \[Adding Hyperlink Types\], page 276](#).

*Agenda view*

When point is in an agenda view, the created link points to the entry referenced by the current line.

From an Org buffer, the following commands create, navigate or, more generally, act on links.

---

<sup>7</sup> Also, `org-link-context-for-files` and `org-id-link-use-context` should be both enabled (which they are, by default).

**C-c C-l (org-insert-link)**

Insert a link<sup>8</sup>. This prompts for a link to be inserted into the buffer. You can just type a link, using text for an internal link, or one of the link type prefixes mentioned in the examples above. The link is inserted into the buffer, along with a descriptive text<sup>9</sup>. If some text was selected at this time, it becomes the default description.

*Inserting stored links*

All links stored during the current session are part of the history for this prompt, so you can access them with UP and DOWN (or *M-p*, *M-n*).

*Completion support*

Completion with TAB helps you to insert valid link prefixes like ‘http’ or ‘ftp’, including the prefixes defined through link abbreviations (see [Section 4.7 \[Link Abbreviations\], page 46](#)). If you press RET after inserting only the prefix, Org offers specific completion support for some link types<sup>10</sup>. For example, if you type *f i l e RET*—alternative access: *C-u C-c C-l*, see below—Org offers file name completion, and after *b b d b RET* you can complete contact names.

**C-u C-c C-l**

When *C-c C-l* is called with a *C-u* prefix argument, insert a link to a file. You may use file name completion to select the name of the file. The path to the file is inserted relative to the directory of the current Org file, if the linked file is in the current directory or in a sub-directory of it, or if the path is written relative to the current directory using ‘./’. Otherwise an absolute path is used, if possible with ‘~/’ for your home directory. You can force an absolute path with two *C-u* prefixes.

**C-c C-l (with point on existing link)**

When point is on an existing link, *C-c C-l* allows you to edit the link and description parts of the link.

**C-c C-o (org-open-at-point)**

Open link at point. This launches a web browser for URL (using `browse-url-at-point`), run VM/MH-E/Wanderlust/Rmail/Gnus/BBDB for the corresponding links, and execute the command in a shell link. When point is on an internal link, this command runs the corresponding search. When point is on the tags part of a headline, it creates the corresponding tags view (see [Section 11.3.3 \[Matching tags and properties\], page 117](#)). If point is on a timestamp, it compiles the agenda for that date. Furthermore, it visits text

<sup>8</sup> Note that you do not have to use this command to insert a link. Links in Org are plain text, and you can type or paste them straight into the buffer. By using this command, the links are automatically enclosed in double brackets, and you will be asked for the optional descriptive text.

<sup>9</sup> After insertion of a stored link, the link will be removed from the list of stored links. To keep it in the list for later use, use a triple *C-u* prefix argument to *C-c C-l*, or configure the option `org-link-keep-stored-after-insertion`.

<sup>10</sup> This works if a function has been defined in the `:complete` property of a link in `org-link-parameters`.

and remote files in ‘file’ links with Emacs and select a suitable application for local non-text files. Classification of files is based on file extension only. See option `org-file-apps`. If you want to override the default application and visit the file with Emacs, use a `C-u` prefix. If you want to avoid opening in Emacs, use a `C-u C-u` prefix.

If point is on a headline, but not on a link, offer all links in the headline and entry text. If you want to setup the frame configuration for following links, customize `org-link-frame-setup`.

**RET** When `org-return-follows-link` is set, RET also follows the link at point.

*mouse-2* or *mouse-1*

On links, *mouse-1* and *mouse-2* opens the link just as `C-c C-o` does.

*mouse-3* Like *mouse-2*, but force file links to be opened with Emacs, and internal links to be displayed in another window<sup>11</sup>.

`C-c %` (`org-mark-ring-push`)

Push the current position onto the Org mark ring, to be able to return easily. Commands following an internal link do this automatically.

`C-c &` (`org-mark-ring-goto`)

Jump back to a recorded position. A position is recorded by the commands following internal links, and by `C-c %`. Using this command several times in direct succession moves through a ring of previously recorded positions.

`C-c C-x C-n` (`org-next-link`)

`C-c C-x C-p` (`org-previous-link`)

Move forward/backward to the next link in the buffer. At the limit of the buffer, the search fails once, and then wraps around. The key bindings for this are really too long; you might want to bind this also to `M-n` and `M-p`.

```
(with-eval-after-load 'org
  (define-key org-mode-map (kbd "M-n") #'org-next-link)
  (define-key org-mode-map (kbd "M-p") #'org-previous-link))
```

## 4.6 Using Links Outside Org

You can insert and follow links that have Org syntax not only in Org, but in any Emacs buffer. For this, Org provides two functions: `org-insert-link-global` and `org-open-at-point-global`.

You might want to bind them to globally available keys. See [Section 1.3 \[Activation\]](#), [page 3](#) for some advice.

## 4.7 Link Abbreviations

Long URL can be cumbersome to type, and often many similar links are needed in a document. For this you can use link abbreviations. An abbreviated link looks like this

```
[[linkword:tag] [description]]
```

<sup>11</sup> See the variable `org-link-use-indirect-buffer-for-internals`.

where the tag is optional. The *linkword* must be a word, starting with a letter, followed by letters, numbers, ‘-’, and ‘\_’. Abbreviations are resolved according to the information in the variable `org-link-abbrev-alist` that relates the linkwords to replacement text. Here is an example:

```
(setq org-link-abbrev-alist
  '(("bugzilla" . "https://10.1.2.9/bugzilla/show_bug.cgi?id=")
    ("Nu Html Checker" . "https://validator.w3.org/nu/?doc=%h")
    ("duckduckgo" . "https://duckduckgo.com/?q=%s")
    ("omap" . "https://nominatim.openstreetmap.org/search?q=%s&polygon=")
    ("ads" . "https://ui.adsabs.harvard.edu/search/q=%20author%3A\"%s\""))
```

If the replacement text contains the string ‘%s’, it is replaced with the tag. Using ‘%h’ instead of ‘%s’ percent-encodes the tag (see the example above, where we need to encode the URL parameter). Using ‘%(my-function)’ passes the tag to a custom Lisp function, and replace it by the resulting string.

If the replacement text do not contain any specifier, it is simply appended to the string in order to create the link.

Instead of a string, you may also specify a Lisp function to create the link. Such a function will be called with the tag as the only argument.

With the above setting, you could link to a specific bug with ‘[[bugzilla:129]]’, search the web for ‘OrgMode’ with ‘[[duckduckgo:OrgMode]]’, show the map location of the Free Software Foundation ‘[[omap:31 Milk Street, Boston]]’ or of Carsten’s office ‘[[omap:Science Park 904, Amsterdam, The Netherlands]]’ and find out what the Org author is doing besides Emacs hacking with ‘[[ads:Dominik,C]]’.

If you need special abbreviations just for a single Org buffer, you can define them in the file with

```
#+LINK: bugzilla https://10.1.2.9/bugzilla/show_bug.cgi?id=
#+LINK: duckduckgo https://duckduckgo.com/?q=%s
#+LINK: "Nu Html Checker" https://validator.w3.org/nu/?doc=%h
```

The abbreviations containing spaces must be quoted.

In-buffer completion (see [Section 17.1 \[Completion\], page 257](#)) can be used after ‘[’ to complete link abbreviations. You may also define a Lisp function that implements special (e.g., completion) support for inserting such a link with `C-c C-l`. Such a function should not accept any arguments, and should return the full link with a prefix. You can set the link completion function like this:

```
(org-link-set-parameter "type" :complete #'some-completion-function)
```

## 4.8 Search Options in File Links

File links can contain additional information to make Emacs jump to a particular location in the file when following a link. This can be a line number or a search option after a double colon<sup>12</sup>. For example, when the command `org-store-link` creates a link (see [Section 4.5 \[Handling Links\], page 43](#)) to a file, it encodes the words in the current line as a search string that can be used to find this line back later when following the link with `C-c C-o`.

<sup>12</sup> For backward compatibility, line numbers can also follow a single colon.

Note that all search options apply for Attachment and ID links in the same way that they apply for File links.

Here is the syntax of the different ways to attach a search to a file link, together with explanations for each:

```
[[file:~/code/main.c::255]]
[[file:~/xx.org::My Target]]
[[file:~/xx.org::*My Target]]
[[file:~/xx.org::#my-custom-id]]
[[file:~/xx.org::/regexp/]]
[[attachment:main.c::255]]
```

`'255'` Jump to line 255.

`'My Target'`

Search for a link target `<<My Target>>`, or do a text search for `'my target'`, similar to the search in internal links, see [Section 4.2 \[Internal Links\]](#), page 40. In HTML export (see [Section 13.9 \[HTML Export\]](#), page 165), such a file link becomes a HTML reference to the corresponding named anchor in the linked file.

`'*My Target'`

In an Org file, restrict search to headlines.

`'#my-custom-id'`

Link to a heading with a `'CUSTOM_ID'` property

`'/REGEXP/'`

Do a regular expression search for *REGEXP* (see [Section 17.9 \[Regular Expressions\]](#), page 264). This uses the Emacs command `occur` to list all matches in a separate window. If the target file is in Org mode, `org-occur` is used to create a sparse tree with the matches.

As a degenerate case, a file link with an empty file name can be used to search the current file. For example, `'[[file::find me]]'` does a search for `'find me'` in the current file, just as `'[[find me]]'` would.

## 4.9 Custom Searches

The default mechanism for creating search strings and for doing the actual search related to a file link may not work correctly in all cases. For example, BibTeX database files have many entries like `year="1993"` which would not result in good search strings, because the only unique identification for a BibTeX entry is the citation key.

If you come across such a problem, you can write custom functions to set the right search string for a particular file type, and to do the search for the string in the file. Using `add-hook`, these functions need to be added to the hook variables `org-create-file-search-functions` and `org-execute-file-search-functions`. See the docstring for these variables for more information. Org actually uses this mechanism for BibTeX database files, and you can use the corresponding code as an implementation example. See the file `'ol-bibtex.el'`.

## 5 TODO Items

Org mode does not maintain TODO lists as separate documents<sup>1</sup>. Instead, TODO items are an integral part of the notes file, because TODO items usually come up while taking notes! With Org mode, simply mark any entry in a tree as being a TODO item. In this way, information is not duplicated, and the entire context from which the TODO item emerged is always present.

Of course, this technique for managing TODO items scatters them throughout your notes file. Org mode compensates for this by providing methods to give you an overview of all the things that you have to do.

### 5.1 Basic TODO Functionality

Any headline becomes a TODO item when it starts with the word ‘TODO’, for example:

```
*** TODO Write letter to Sam Fortune
```

The most important commands to work with TODO entries are:

*C-c C-t* (`org-todo`)

Rotate the TODO state of the current item among

```
,-> (unmarked) -> TODO -> DONE --.
'-----'
```

If TODO keywords have fast access keys (see [Section 5.2.4 \[Fast access to TODO states\]](#), [page 52](#)), prompt for a TODO keyword through the fast selection interface; this is the default behavior when `org-use-fast-todo-selection` is `non-nil`.

The same state changing can also be done “remotely” from the agenda buffer with the `t` command key (see [Section 11.5 \[Agenda Commands\]](#), [page 125](#)).

*S-RIGHT S-LEFT*

Select the following/preceding TODO state, similar to cycling. Useful mostly if more than two TODO states are possible (see [Section 5.2 \[TODO Extensions\]](#), [page 50](#)). See also [Section 17.14.2 \[Conflicts\]](#), [page 267](#), for a discussion of the interaction with shift-selection. See also the variable `org-treat-S-cursor-todo-selection-as-state-change`.

*C-c / t* (`org-show-todo-tree`)

View TODO items in a *sparse tree* (see [Section 2.5 \[Sparse Trees\]](#), [page 12](#)). Folds the entire buffer, but shows all TODO items—with not-DONE state—and the headings hierarchy above them. With a prefix argument, or by using *C-c / T*, search for a specific TODO. You are prompted for the keyword, and you can also give a list of keywords like ‘`KWD1|KWD2|...`’ to list entries that match any one of these keywords. With a numeric prefix argument `N`, show the tree for the `N`th keyword in the variable `org-todo-keywords`. With two prefix arguments, find all TODO states, both un-done and done.

---

<sup>1</sup> Of course, you can make a document that contains only long lists of TODO items, but this is not required.

*M-x org-agenda t* (`org-todo-list`)

Show the global TODO list. Collects the TODO items (with not-DONE states) from all agenda files (see [Chapter 11 \[Agenda Views\]](#), page 111) into a single buffer. The new buffer is in Org Agenda mode, which provides commands to examine and manipulate the TODO entries from the new buffer (see [Section 11.5 \[Agenda Commands\]](#), page 125). See [Section 11.3.2 \[Global TODO list\]](#), page 116, for more information.

*S-M-RET* (`org-insert-todo-heading`)

Insert a new TODO entry below the current one.

Changing a TODO state can also trigger tag changes. See the docstring of the option `org-todo-state-tags-triggers` for details.

## 5.2 Extended Use of TODO Keywords

By default, marked TODO entries have one of only two states: TODO and DONE. Org mode allows you to classify TODO items in more complex ways with *TODO keywords* (stored in `org-todo-keywords`). With special setup, the TODO keyword system can work differently in different files.

Note that *tags* are another way to classify headlines in general and TODO items in particular (see [Chapter 6 \[Tags\]](#), page 62).

### 5.2.1 TODO keywords as workflow states

You can use TODO keywords to indicate different, possibly *sequential* states in the process of working on an item, for example<sup>2</sup>:

```
(setq org-todo-keywords
      '((sequence "TODO" "FEEDBACK" "VERIFY" "|" "DONE" "DELEGATED")))
```

The vertical bar separates the TODO keywords (states that *need action*) from the DONE states (which need *no further action*). If you do not provide the separator bar, the last state is used as the DONE state.

With this setup, the command `C-c C-t` cycles an entry from ‘TODO’ to ‘FEEDBACK’, then to ‘VERIFY’, and finally to ‘DONE’ and ‘DELEGATED’. You may also use a numeric prefix argument to quickly select a specific state. For example `C-3 C-c C-t` changes the state immediately to ‘VERIFY’. Or you can use *S-RIGHT* and *S-LEFT* to go forward and backward through the states. If you define many keywords, you can use in-buffer completion (see [Section 17.1 \[Completion\]](#), page 257) or a special one-key selection scheme (see [Section 5.2.4 \[Fast access to TODO states\]](#), page 52) to insert these words into the buffer. Changing a TODO state can be logged with a timestamp, see [Section 5.3.2 \[Tracking TODO state changes\]](#), page 54, for more information.

### 5.2.2 TODO keywords as types

The second possibility is to use TODO keywords to indicate different *types* of action items. For example, you might want to indicate that items are for “work” or “home”. Or, when you work with several people on a single project, you might want to assign action items

<sup>2</sup> Changing the variable `org-todo-keywords` only becomes effective after restarting Org mode in a buffer.

directly to persons, by using their names as TODO keywords. This type of functionality is actually much better served by using tags (see [Chapter 6 \[Tags\], page 62](#)), so the TODO implementation is kept just for backward compatibility.

Using TODO types, it would be set up like this:

```
(setq org-todo-keywords '((type "Fred" "Sara" "Lucy" "|" "DONE")))
```

In this case, different keywords do not indicate states, but rather different types. So the normal work flow would be to assign a task to a person, and later to mark it DONE. Org mode supports this style by adapting the workings of the command `C-c C-t`<sup>3</sup>. When used several times in succession, it still cycles through all names, in order to first select the right type for a task. But when you return to the item after some time and execute `C-c C-t` again, it will switch from any name directly to ‘DONE’. Use prefix arguments or completion to quickly select a specific name. You can also review the items of a specific TODO type in a sparse tree by using a numeric prefix to `C-c / t`. For example, to see all things Lucy has to do, you would use `C-3 C-c / t`. To collect Lucy’s items from all agenda files into a single buffer, you would use the numeric prefix argument as well when creating the global TODO list: `C-3 M-x org-agenda t`.

### 5.2.3 Multiple keyword sets in one file

Sometimes you may want to use different sets of TODO keywords in parallel. For example, you may want to have the basic TODO/DONE, but also a workflow for bug fixing, and a separate state indicating that an item has been canceled—so it is not DONE, but also does not require action. Your setup would then look like this:

```
(setq org-todo-keywords
  '((sequence "TODO" "|" "DONE")
    (sequence "REPORT" "BUG" "KNOWNCAUSE" "|" "FIXED")
    (sequence "|" "CANCELED")))
```

The keywords should all be different, this helps Org mode keep track of which sub-sequence should be used for a given entry. In this setup, `C-c C-t` only operates within a sub-sequence, so it switches from ‘DONE’ to (nothing) to ‘TODO’, and from ‘FIXED’ to (nothing) to ‘REPORT’. Therefore you need a mechanism to initially select the correct sequence. In addition to typing a keyword or using completion (see [Section 17.1 \[Completion\], page 257](#)), you may also apply the following commands:

`C-u C-u C-c C-t`

`C-S-RIGHT`

`C-S-LEFT` These keys jump from one TODO sub-sequence to the next. In the above example, `C-u C-u C-c C-t` or `C-S-RIGHT` would jump from ‘TODO’ or ‘DONE’ to ‘REPORT’, and any of the words in the second row to ‘CANCELED’. Note that the `C-S-` key binding conflict with shift-selection (see [Section 17.14.2 \[Conflicts\], page 267](#)).

`S-RIGHT`

`S-LEFT` `S-LEFT` and `S-RIGHT` walk through *all* keywords from all sub-sequences, so for example `S-RIGHT` would switch from ‘DONE’ to ‘REPORT’ in the example above.

---

<sup>3</sup> This is also true for the `t` command in the agenda buffer.

For a discussion of the interaction with shift-selection, see [Section 17.14.2 \[Conflicts\]](#), page 267.

### 5.2.4 Fast access to TODO states

If you would like to quickly change an entry to an arbitrary TODO state instead of cycling through the states, you can set up keys for single-letter access to the states. This is done by adding the selection character after each keyword, in parentheses<sup>4</sup>. For example:

```
(setq org-todo-keywords
  '((sequence "TODO(t)" "|" "DONE(d)")
    (sequence "REPORT(r)" "BUG(b)" "KNOWNCAUSE(k)" "|" "FIXED(f)")
    (sequence "|" "CANCELED(c)")))
```

If you then press `C-c C-t` followed by the selection key, the entry is switched to this state. `SPC` can be used to remove any TODO keyword from an entry.

### 5.2.5 Setting up keywords for individual files

It can be very useful to use different aspects of the TODO mechanism in different files. For file-local settings, you need to add special lines to the file which set the keywords and interpretation for that file only. For example, to set one of the two examples discussed above, you need one of the following lines, starting in column zero anywhere in the file:

```
#+TODO: TODO FEEDBACK VERIFY | DONE CANCELED
```

You may also write `'#+SEQ_TODO'` to be explicit about the interpretation, but it means the same as `'#+TODO'`, or

```
#+TYP_TODO: Fred Sara Lucy Mike | DONE
```

A setup for using several sets in parallel would be:

```
#+TODO: TODO(t) | DONE(d)
#+TODO: REPORT(r) BUG(b) KNOWNCAUSE(k) | FIXED(f)
#+TODO: | CANCELED(c)
```

To make sure you are using the correct keyword, type `'#+'` into the buffer and then use `M-TAB` to complete it (see [Section 17.1 \[Completion\]](#), page 257).

Remember that the keywords after the vertical bar—or the last keyword if no bar is there—must always mean that the item is DONE, although you may use a different word. After changing one of these lines, use `C-c C-c` with point still in the line to make the changes known to Org mode<sup>5</sup>.

### 5.2.6 Faces for TODO keywords

Org mode highlights TODO keywords with special faces: `org-todo` for keywords indicating that an item still has to be acted upon, and `org-done` for keywords indicating that an item is finished. If you are using more than two different states, you might want to use special faces for some of them. This can be done using the variable `org-todo-keyword-faces`. For example:

<sup>4</sup> All characters are allowed except `@`, `^` and `!`, which have a special meaning here.

<sup>5</sup> Org mode parses these lines only when Org mode is activated after visiting a file. `C-c C-c` with point in a line starting with `'#+'` is simply restarting Org mode for the current buffer.

```
(setq org-todo-keyword-faces
  '(("TODO" . org-warning) ("STARTED" . "yellow")
    ("CANCELED" . (:foreground "blue" :weight bold))))
```

While using a list with face properties as shown for ‘CANCELED’ *should* work, this does not always seem to be the case. If necessary, define a special face and use that. A string is interpreted as a color. The variable `org-faces-easy-properties` determines if that color is interpreted as a foreground or a background color.

### 5.2.7 TODO dependencies

The structure of Org files—hierarchy and lists—makes it easy to define TODO dependencies. Usually, a parent TODO task should not be marked as done until all TODO subtasks, or children tasks, are marked as done. Sometimes there is a logical sequence to (sub)tasks, so that one subtask cannot be acted upon before all siblings above it have been marked as done. If you customize the variable `org-enforce-todo-dependencies`, Org blocks entries from changing state to DONE while they have TODO children that are not DONE. Furthermore, if an entry has a property ‘ORDERED’, each of its TODO children is blocked until all earlier siblings are marked as done. Here is an example:

```
* TODO Blocked until (two) is done
** DONE one
** TODO two

* Parent
:PROPERTIES:
:ORDERED: t
:END:
** TODO a
** TODO b, needs to wait for (a)
** TODO c, needs to wait for (a) and (b)
```

You can ensure an entry is never blocked by using the ‘NOBLOCKING’ property (see [Chapter 7 \[Properties and Columns\]](#), page 67):

```
* This entry is never blocked
:PROPERTIES:
:NOBLOCKING: t
:END:
```

*C-c C-x o* (`org-toggle-ordered-property`)

Toggle the ‘ORDERED’ property of the current entry. A property is used for this behavior because this should be local to the current entry, not inherited from entries above like a tag (see [Chapter 6 \[Tags\]](#), page 62). However, if you would like to *track* the value of this property with a tag for better visibility, customize the variable `org-track-ordered-property-with-tag`.

*C-u C-u C-u C-c C-t*

Change TODO state, regardless of any state blocking.

If you set the variable `org-agenda-dim-blocked-tasks`, TODO entries that cannot be marked as done because of unmarked children are shown in a dimmed font or even made invisible in agenda views (see [Chapter 11 \[Agenda Views\]](#), page 111).

You can also block changes of TODO states by using checkboxes (see [Section 5.6 \[Checkboxes\]](#), page 59). If you set the variable `org-enforce-todo-checkbox-dependencies`, an entry that has unchecked checkboxes is blocked from switching to DONE.

If you need more complex dependency structures, for example dependencies between entries in different trees or files, check out the module `'org-depend.el'` in the `'org-contrib'` repository.

## 5.3 Progress Logging

To record a timestamp and a note when changing a TODO state, call the command `org-todo` with a prefix argument.

`C-u C-c C-t` (`org-todo`)

Prompt for a note and record a the time of the TODO state change. The note is inserted as a list item below the headline, but can also be placed into a drawer, see [Section 5.3.2 \[Tracking TODO state changes\]](#), page 54.

If you want to be more systematic, Org mode can automatically record a timestamp and optionally a note when you mark a TODO item as DONE, or even each time you change the state of a TODO item. This system is highly configurable, settings can be on a per-keyword basis and can be localized to a file or even a subtree. For information on how to clock working time for a task, see [Section 8.4 \[Clocking Work Time\]](#), page 85.

### 5.3.1 Closing items

The most basic automatic logging is to keep track of *when* a certain TODO item was marked as done. This can be achieved with<sup>6</sup>

```
(setq org-log-done 'time)
```

Then each time you turn an entry from a TODO (not-done) state into any of the DONE states, a line `'CLOSED: [timestamp]'` is inserted just after the headline. If you turn the entry back into a TODO item through further state cycling, that line is removed again. If you turn the entry back to a non-TODO state (by pressing `C-c C-t SPC` for example), that line is also removed, unless you set `org-closed-keep-when-no-todo` to `non-nil`. If you want to record a note along with the timestamp, use<sup>7</sup>

```
(setq org-log-done 'note)
```

You are then prompted for a note, and that note is stored below the entry with a `'Closing Note'` heading.

### 5.3.2 Tracking TODO state changes

You might want to automatically keep track of when a state change occurred and maybe take a note about this change. You can either record just a timestamp, or a time-stamped note. These records are inserted after the headline as an itemized list, newest first<sup>8</sup>. When taking a lot of notes, you might want to get the notes out of the way into a drawer (see [Section 2.7 \[Drawers\]](#), page 16). Customize the variable `org-log-into-drawer` to get this

<sup>6</sup> The corresponding in-buffer setting is: `'#+STARTUP: logdone'`.

<sup>7</sup> The corresponding in-buffer setting is: `'#+STARTUP: lognotedone'`.

<sup>8</sup> See the variable `org-log-states-order-reversed`.

behavior—the recommended drawer for this is called ‘LOGBOOK’<sup>9</sup>. You can also overrule the setting of this variable for a subtree by setting a ‘LOG\_INTO\_DRAWER’ property.

Since it is normally too much to record a note for every state, Org mode expects configuration on a per-keyword basis for this. This is achieved by adding special markers ‘!’ (for a timestamp) or ‘@’ (for a note with timestamp) in parentheses after each keyword. For example, with the setting

```
(setq org-todo-keywords
      '((sequence "TODO(t)" "WAIT(w@/!)" "|" "DONE(d!)" "CANCELED(c@)")))
```

You not only define global TODO keywords and fast access keys, but also request that a time is recorded when the entry is set to ‘DONE’, and that a note is recorded when switching to ‘WAIT’ or ‘CANCELED’<sup>10</sup>. The setting for ‘WAIT’ is even more special: the ‘!’ after the slash means that in addition to the note taken when entering the state, a timestamp should be recorded when *leaving* the ‘WAIT’ state, if and only if the *target* state does not configure logging for entering it. So it has no effect when switching from ‘WAIT’ to ‘DONE’, because ‘DONE’ is configured to record a timestamp only. But when switching from ‘WAIT’ back to ‘TODO’, the ‘/!’ in the ‘WAIT’ setting now triggers a timestamp even though ‘TODO’ has no logging configured.

You can use the exact same syntax for setting logging preferences local to a buffer:

```
#+TODO: TODO(t) WAIT(w@/!) | DONE(d!) CANCELED(c@)
```

To record a timestamp without a note for TODO keywords configured with ‘@’, just type `C-c C-c` to enter a blank note when prompted.

In order to define logging settings that are local to a subtree or a single item, define a ‘LOGGING’ property in this entry. Any non-empty ‘LOGGING’ property resets all logging settings to `nil`. You may then turn on logging for this specific tree using ‘STARTUP’ keywords like ‘lognotedone’ or ‘logrepeat’, as well as adding state specific settings like ‘TODO(!)’. For example:

```
* TODO Log each state with only a time
:PROPERTIES:
:LOGGING: TODO(!) WAIT(!) DONE(!) CANCELED(!)
:END:
* TODO Only log when switching to WAIT, and when repeating
:PROPERTIES:
:LOGGING: WAIT(@) logrepeat
:END:
* TODO No logging at all
:PROPERTIES:
:LOGGING: nil
:END:
```

<sup>9</sup> Note that the ‘LOGBOOK’ drawer is unfolded when pressing `SPC` in the agenda to show an entry—use `C-u SPC` to keep it folded here.

<sup>10</sup> It is possible that Org mode records two timestamps when you are using both `org-log-done` and state change logging. However, it never prompts for two notes: if you have configured both, the state change recording note takes precedence and cancel the closing note.

### 5.3.3 Tracking your habits

Org has the ability to track the consistency of a special category of TODO, called “habits.” To use habits, you have to enable the `habit` module by customizing the variable `org-modules`.

A habit has the following properties:

1. The habit is a TODO item, with a TODO keyword representing an open state.
2. The property ‘STYLE’ is set to the value ‘habit’ (see [Chapter 7 \[Properties and Columns\]](#), page 67).
3. The TODO has a scheduled date, usually with a ‘.+’ style repeat interval. A ‘++’ style may be appropriate for habits with time constraints, e.g., must be done on specific days of week (‘++1w’), or a ‘+’ style for an unusual habit that can have a backlog, e.g., weekly reports. See [Section 8.3.2 \[Repeated tasks\]](#), page 84 for more details about repeat intervals.
4. The TODO may also have minimum and maximum ranges specified by using the syntax ‘.+2d/3d’, which says that you want to do the task at least every three days, but at most every two days.
5. State logging for the DONE state is enabled (see [Section 5.3.2 \[Tracking TODO state changes\]](#), page 54), in order for historical data to be represented in the consistency graph. If it is not enabled it is not an error, but the consistency graphs are largely meaningless.

To give you an idea of what the above rules look like in action, here’s an actual habit with some history:

```

** TODO Shave
  SCHEDULED: <2009-10-17 Sat .+2d/4d>
  :PROPERTIES:
  :STYLE:      habit
  :LAST_REPEAT: [2009-10-19 Mon 00:36]
  :END:
- State "DONE"      from "TODO"      [2009-10-15 Thu]
- State "DONE"      from "TODO"      [2009-10-12 Mon]
- State "DONE"      from "TODO"      [2009-10-10 Sat]
- State "DONE"      from "TODO"      [2009-10-04 Sun]
- State "DONE"      from "TODO"      [2009-10-02 Fri]
- State "DONE"      from "TODO"      [2009-09-29 Tue]
- State "DONE"      from "TODO"      [2009-09-25 Fri]
- State "DONE"      from "TODO"      [2009-09-19 Sat]
- State "DONE"      from "TODO"      [2009-09-16 Wed]
- State "DONE"      from "TODO"      [2009-09-12 Sat]

```

What this habit says is: I want to shave at most every 2 days—given by the ‘SCHEDULED’ date and repeat interval—and at least every 4 days. If today is the 15th, then the habit first appears in the agenda (see [Chapter 11 \[Agenda Views\]](#), page 111) on Oct 17, after the minimum of 2 days has elapsed, and will appear overdue on Oct 19, after four days have elapsed.

What's really useful about habits is that they are displayed along with a consistency graph, to show how consistent you've been at getting that task done in the past. This graph shows every day that the task was done over the past three weeks, with colors for each day. The colors used are:

Blue	If the task was not to be done yet on that day.
Green	If the task could have been done on that day.
Yellow	If the task was going to be overdue the next day.
Red	If the task was overdue on that day.

In addition to coloring each day, the day is also marked with an asterisk if the task was actually done that day, and an exclamation mark to show where the current day falls in the graph.

There are several configuration variables that can be used to change the way habits are displayed in the agenda.

**org-habit-graph-column**

The buffer column at which the consistency graph should be drawn. This overwrites any text in that column, so it is a good idea to keep your habits' titles brief and to the point.

**org-habit-preceding-days**

The amount of history, in days before today, to appear in consistency graphs.

**org-habit-following-days**

The number of days after today that appear in consistency graphs.

**org-habit-show-habits-only-for-today**

If non-nil, only show habits in today's agenda view. The default value is `t`. Pressing `C-u K` in the agenda toggles this variable.

Lastly, pressing `K` in the agenda buffer causes habits to temporarily be disabled and do not appear at all. Press `K` again to bring them back. They are also subject to tag filtering, if you have habits which should only be done in certain contexts, for example.

## 5.4 Priorities

If you use Org mode extensively, you may end up with enough TODO items that it starts to make sense to prioritize them. Prioritizing can be done by placing a *priority cookie* into the headline of a TODO item right after the TODO keyword, like this:

```
*** TODO [#A] Write letter to Sam Fortune
```

By default, Org mode supports three priorities: 'A', 'B', and 'C'. 'A' is the highest priority. An entry without a cookie is treated as equivalent if it had priority 'B'. Priorities make a difference only for sorting in the agenda (see [Section 11.3.1 \[Weekly/daily agenda\], page 113](#)). Outside the agenda, they have no inherent meaning to Org mode. The cookies are displayed with the face defined by the variable `org-priority-faces`, which can be customized.

You can also use numeric values for priorities, such as

```
*** TODO [#1] Write letter to Sam Fortune
```

When using numeric priorities, you need to set `org-priority-highest`, `org-priority-lowest` and `org-priority-default` to integers, which must all be strictly inferior to 65.

Priorities can be attached to any outline node; they do not need to be TODO items.

`C-c` , (`org-priority`)

Set the priority of the current headline. The command prompts for a priority character ‘A’, ‘B’ or ‘C’. When you press SPC instead, the priority cookie, if one is set, is removed from the headline. The priorities can also be changed “remotely” from the agenda buffer with the `,` command (see [Section 11.5 \[Agenda Commands\]](#), page 125).

`S-UP` (`org-priority-up`)

`S-DOWN` (`org-priority-down`)

Increase/decrease the priority of the current headline<sup>11</sup>. Note that these keys are also used to modify timestamps (see [Section 8.2 \[Creating Timestamps\]](#), page 78). See also [Section 17.14.2 \[Conflicts\]](#), page 267, for a discussion of the interaction with shift-selection.

You can change the range of allowed priorities by setting the variables `org-priority-highest`, `org-priority-lowest`, and `org-priority-default`. For an individual buffer, you may set these values (highest, lowest, default) like this (please make sure that the highest priority is earlier in the alphabet than the lowest priority):

```
#+PRIORITIES: A C B
```

Or, using numeric values:

```
#+PRIORITIES: 1 10 5
```

## 5.5 Breaking Down Tasks into Subtasks

It is often advisable to break down large tasks into smaller, manageable subtasks. You can do this by creating an outline tree below a TODO item, with detailed subtasks on the tree<sup>12</sup>. To keep an overview of the fraction of subtasks that have already been marked as done, insert either ‘[/]’ or ‘[%]’ anywhere in the headline. These cookies are updated each time the TODO status of a child changes, or when pressing `C-c C-c` on the cookie. For example:

```
* Organize Party [33%]
** TODO Call people [1/2]
*** TODO Peter
*** DONE Sarah
** TODO Buy food
** DONE Talk to neighbor
```

If a heading has both checkboxes and TODO children below it, the meaning of the statistics cookie become ambiguous. Set the property ‘`COOKIE_DATA`’ to either ‘checkbox’ or ‘todo’ to resolve this issue.

<sup>11</sup> See also the option `org-priority-start-cycle-with-default`.

<sup>12</sup> To keep subtasks out of the global TODO list, see the option `org-agenda-todo-list-sublevels`.

If you would like to have the statistics cookie count any TODO entries in the subtree (not just direct children), configure the variable `org-hierarchical-todo-statistics`. To do this for a single subtree, include the word ‘recursive’ into the value of the ‘`COOKIE_DATA`’ property.

```
* Parent capturing statistics [2/20]
:PROPERTIES:
:COOKIE_DATA: todo recursive
:END:
```

If you would like a TODO entry to automatically change to DONE when all children are done, you can use the following setup:

```
(defun org-summary-todo (n-done n-not-done)
  "Switch entry to DONE when all subentries are done, to TODO otherwise."
  (let (org-log-done org-todo-log-states) ; turn off logging
    (org-todo (if (= n-not-done 0) "DONE" "TODO"))))
```

```
(add-hook 'org-after-todo-statistics-hook #'org-summary-todo)
```

Another possibility is the use of checkboxes to identify (a hierarchy of) a large number of subtasks (see [Section 5.6 \[Checkboxes\]](#), page 59).

## 5.6 Checkboxes

Every item in a plain list<sup>13</sup> (see [Section 2.6 \[Plain Lists\]](#), page 13) can be made into a checkbox by starting it with the string ‘`[ ]`’. This feature is similar to TODO items (see [Chapter 5 \[TODO Items\]](#), page 49), but is more lightweight. Checkboxes are not included into the global TODO list, so they are often great to split a task into a number of simple steps. Or you can use them in a shopping list.

Here is an example of a checkbox list.

```
* TODO Organize party [2/4]
- [-] call people [1/3]
  - [ ] Peter
  - [X] Sarah
  - [ ] Sam
- [X] order food
- [ ] think about what music to play
- [X] talk to the neighbors
```

The ‘`[2/4]`’ and ‘`[1/3]`’ in the first and second line are cookies indicating how many checkboxes present in this entry have been checked off, and the total number of checkboxes present. This can give you an idea on how many checkboxes remain, even without opening a folded entry. The cookies can be placed into a headline or into (the first line of) a plain list item. Each cookie covers checkboxes of direct children structurally below the headline/item on which the cookie appears<sup>14</sup>. You have to insert the cookie yourself by typing either ‘`[/]`’

<sup>13</sup> With the exception of description lists. But you can allow it by modifying `org-list-automatic-rules` accordingly.

<sup>14</sup> Set the variable `org-checkbox-hierarchical-statistics` if you want such cookies to count all checkboxes below the cookie, not just those belonging to direct children.

or ‘[%]’. With ‘[/]’ you get an ‘n out of m’ result, as in the examples above. With ‘[%]’ you get information about the percentage of checkboxes checked (in the above example, this would be ‘[50%]’ and ‘[33%]’, respectively). In a headline, a cookie can count either checkboxes below the heading or TODO states of children, and it displays whatever was changed last. Set the property ‘COOKIE\_DATA’ to either ‘checkbox’ or ‘todo’ to resolve this issue.

If the current outline node has an ‘ORDERED’ property, checkboxes must be checked off in sequence, and an error is thrown if you try to check off a box while there are unchecked boxes above it.

A checkbox can be in one of the three states:

1. not checked ‘[ ]’
2. partially checked ‘[-]’
3. checked ‘[X]’

Checkboxes work hierarchically, so if a checkbox item has children that are checkboxes, toggling one of the children checkboxes makes the parent checkbox reflect if none, some, or all of the children are checked.

If all child checkboxes are not checked, the parent checkbox is also not checked.

```
- [ ] call people
  - [ ] Peter
  - [ ] Sarah
```

If some but not all child checkboxes are checked, the parent checkbox is partially checked.

```
- [-] call people
  - [X] Peter
  - [ ] Sarah
```

If all child checkboxes are checked, the parent checkbox is also checked.

```
- [X] call people
  - [X] Peter
  - [X] Sarah
```

The following commands work with checkboxes:

**C-c C-c** (*org-toggle-checkbox*)

Toggle checkbox status or—with prefix argument—checkbox presence at point. With a single prefix argument, add an empty checkbox or remove the current one<sup>15</sup>. With a double prefix argument, set it to ‘[-]’, which is considered to be an intermediate state.

**C-c C-x C-b** (*org-toggle-checkbox*)

Toggle checkbox status or—with prefix argument—checkbox presence at point. With double prefix argument, set it to ‘[-]’, which is considered to be an intermediate state.

- If there is an active region, toggle the first checkbox in the region and set all remaining boxes to the same status as the first. With a prefix argument, add or remove the checkbox for all items in the region.

<sup>15</sup> **C-u C-c C-c** on the *first* item of a list with no checkbox adds checkboxes to the rest of the list.

- If point is in a headline, toggle checkboxes in the region between this headline and the next—so *not* the entire subtree.
- If there is no active region, just toggle the checkbox at point.

**C-c C-x C-r** (`org-toggle-radio-button`)

Toggle checkbox status by using the checkbox of the item at point as a radio button: when the checkbox is turned on, all other checkboxes on the same level will be turned off. With a universal prefix argument, toggle the presence of the checkbox. With a double prefix argument, set it to ‘[-]’.

**C-c C-c** can be told to consider checkboxes as radio buttons by setting ‘#+ATTR\_ORG: :radio t’ right before the list or by calling **M-x org-list-checkbox-radio-mode** to activate this minor mode.

**M-S-RET** (`org-insert-todo-heading`)

Insert a new item with a checkbox. This works only if point is already in a plain list item (see [Section 2.6 \[Plain Lists\]](#), page 13).

**C-c C-x o** (`org-toggle-ordered-property`)

Toggle the ‘ORDERED’ property of the entry, to toggle if checkboxes must be checked off in sequence. A property is used for this behavior because this should be local to the current entry, not inherited like a tag. However, if you would like to *track* the value of this property with a tag for better visibility, customize `org-track-ordered-property-with-tag`.

**C-c #** (`org-update-statistics-cookies`)

Update the statistics cookie in the current outline entry. When called with a **C-u** prefix, update the entire file. Checkbox statistic cookies are updated automatically if you toggle checkboxes with **C-c C-c** and make new ones with **M-S-RET**. TODO statistics cookies update when changing TODO states. If you delete boxes/entries or add/change them by hand, use this command to get things back into sync.

## 6 Tags

An excellent way to implement labels and contexts for cross-correlating information is to assign *tags* to headlines. Org mode has extensive support for tags.

Every headline can contain a list of tags; they occur at the end of the headline. Tags are normal words containing letters, numbers, ‘\_’, and ‘@’. Tags must be preceded and followed by a single colon, e.g., ‘:work:’. Several tags can be specified, as in ‘:work:urgent:’. Tags by default are in bold face with the same color as the headline. You may specify special faces for specific tags using the variable `org-tag-faces`, in much the same way as you can for TODO keywords (see [Section 5.2.6 \[Faces for TODO keywords\]](#), page 52).

### 6.1 Tag Inheritance

*Tags* make use of the hierarchical structure of outline trees. If a heading has a certain tag, all subheadings inherit the tag as well. For example, in the list

```
* Meeting with the French group      :work:
** Summary by Frank                  :boss:notes:
*** TODO Prepare slides for him      :action:
```

the final heading has the tags ‘work’, ‘boss’, ‘notes’, and ‘action’ even though the final heading is not explicitly marked with those tags. You can also set tags that all entries in a file should inherit just as if these tags were defined in a hypothetical level zero that surrounds the entire file. Use a line like this<sup>1</sup>

```
#+FILETAGS: :Peter:Boss:Secret:
```

To limit tag inheritance to specific tags, or to turn it off entirely, use the variables `org-use-tag-inheritance` and `org-tags-exclude-from-inheritance`.

Tag inheritance is relevant when the agenda search tries to match a tag, either in the `tags` or `tags-todo` agenda types. In other agenda types, `org-use-tag-inheritance` has no effect. Still, you may want to have your tags correctly set in the agenda, so that tag filtering works fine, with inherited tags. Set `org-agenda-use-tag-inheritance` to control this: the default value includes all agenda types, but setting this to `nil` can really speed up agenda generation.

### 6.2 Setting Tags

Tags can simply be typed into the buffer at the end of a headline. After a colon, *M-TAB* offers completion on tags. There is also a special command for inserting tags:

*C-c C-q* (`org-set-tags-command`)

Enter new tags for the current headline. Org mode either offers completion or a special single-key interface for setting tags, see below. After pressing `RET`, the tags are inserted and aligned to `org-tags-column`. When called with a *C-u* prefix, all tags in the current buffer are aligned to that column, just to make things look nice. Tags are automatically realigned after promotion, demotion, and TODO state changes (see [Section 5.1 \[TODO Basics\]](#), page 49).

---

<sup>1</sup> As with all these in-buffer settings, pressing *C-c C-c* activates any changes in the line.

`C-c C-c` (`org-set-tags-command`)

When point is in a headline, this does the same as `C-c C-q`.

Org supports tag insertion based on a *list of tags*. By default this list is constructed dynamically, containing all tags currently used in the buffer<sup>2</sup>. You may also globally specify a hard list of tags with the variable `org-tag-alist`. Finally you can set the default tags for a given file using the ‘TAGS’ keyword, like

```
#+TAGS: @work @home @tennisclub
#+TAGS: laptop car pc sailboat
```

If you have globally defined your preferred set of tags using the variable `org-tag-alist`, but would like to use a dynamic tag list in a specific file, add an empty ‘TAGS’ keyword to that file:

```
#+TAGS:
```

If you have a preferred set of tags that you would like to use in every file, in addition to those defined on a per-file basis by ‘TAGS’ keyword, then you may specify a list of tags with the variable `org-tag-persistent-alist`. You may turn this off on a per-file basis by adding a ‘STARTUP’ keyword to that file:

```
#+STARTUP: noptag
```

By default Org mode uses the standard minibuffer completion facilities for entering tags. However, it also implements another, quicker, tag selection method called *fast tag selection*. This allows you to select and deselect tags with just a single key press. For this to work well you should assign unique letters to most of your commonly used tags. You can do this globally by configuring the variable `org-tag-alist` in your Emacs init file. For example, you may find the need to tag many items in different files with ‘@home’. In this case you can set something like:

```
(setq org-tag-alist '(("@work" . ?w) ("@home" . ?h) ("laptop" . ?l)))
```

If the tag is only relevant to the file you are working on, then you can instead set the ‘TAGS’ keyword as:

```
#+TAGS: @work(w) @home(h) @tennisclub(t) laptop(l) pc(p)
```

The tags interface shows the available tags in a splash window. If you want to start a new line after a specific tag, insert ‘\n’ into the tag list

```
#+TAGS: @work(w) @home(h) @tennisclub(t) \n laptop(l) pc(p)
```

or write them in two lines:

```
#+TAGS: @work(w) @home(h) @tennisclub(t)
#+TAGS: laptop(l) pc(p)
```

You can also group together tags that are mutually exclusive by using braces, as in:

```
#+TAGS: { @work(w) @home(h) @tennisclub(t) } laptop(l) pc(p)
```

you indicate that at most one of ‘@work’, ‘@home’, and ‘@tennisclub’ should be selected. Multiple such groups are allowed.

Do not forget to press `C-c C-c` with point in one of these lines to activate any changes.

<sup>2</sup> To extend this default list to all tags used in all agenda files (see [Chapter 11 \[Agenda Views\], page 111](#)), customize the variable `org-complete-tags-always-offer-all-agenda-tags`.

To set these mutually exclusive groups in the variable `org-tags-alist`, you must use the dummy tags `:startgroup` and `:endgroup` instead of the braces. Similarly, you can use `:newline` to indicate a line break. The previous example would be set globally by the following configuration:

```
(setq org-tag-alist '((:startgroup . nil)
                      ("@work" . ?w) ("@home" . ?h)
                      ("@tennisclub" . ?t)
                      (:endgroup . nil)
                      ("laptop" . ?l) ("pc" . ?p)))
```

If at least one tag has a selection key then pressing `C-c C-c` automatically presents you with a special interface, listing inherited tags, the tags of the current headline, and a list of all valid tags with corresponding keys<sup>3</sup>.

Pressing keys assigned to tags adds or removes them from the list of tags in the current line. Selecting a tag in a group of mutually exclusive tags turns off any other tag from that group.

In this interface, you can also use the following special keys:

<code>TAB</code>	Enter a tag in the minibuffer, even if the tag is not in the predefined list. You can complete on all tags present in the buffer and globally pre-defined tags from <code>org-tag-alist</code> and <code>org-tag-persistent-alist</code> . You can also add several tags: just separate them with a comma.
<code>SPC</code>	Clear all tags for this line.
<code>RET</code>	Accept the modified set.
<code>C-g</code>	Abort without installing changes.
<code>q</code>	If <code>q</code> is not assigned to a tag, it aborts like <code>C-g</code> .
<code>!</code>	Turn off groups of mutually exclusive tags. Use this to (as an exception) assign several tags from such a group.
<code>C-c</code>	Toggle auto-exit after the next change (see below). If you are using expert mode, the first <code>C-c</code> displays the selection window.

This method lets you assign tags to a headline with very few keys. With the above setup, you could clear the current tags and set ‘@home’, ‘laptop’ and ‘pc’ tags with just the following keys: `C-c C-c SPC h l p RET`. Switching from ‘@home’ to ‘@work’ would be done with `C-c C-c w RET` or alternatively with `C-c C-c C-c w`. Adding the non-predefined tag ‘sarah’ could be done with `C-c C-c TAB s a r a h RET`.

If you find that most of the time you need only a single key press to modify your list of tags, set the variable `org-fast-tag-selection-single-key`. Then you no longer have to press `RET` to exit fast tag selection—it exits after the first change. If you then occasionally need more keys, press `C-c` to turn off auto-exit for the current tag selection process (in effect: start selection with `C-c C-c C-c` instead of `C-c C-c`). If you set the variable to the value `expert`, the special window is not even shown for single-key tag selection, it comes up only when you press an extra `C-c`.

---

<sup>3</sup> Keys are automatically assigned to tags that have no configured keys.

The number of tags displayed in the fast tag selection interface is limited by `org-fast-tag-selection-maximum-tags` to avoid running out of keyboard keys. You can customize this variable.

## 6.3 Tag Hierarchy

Tags can be defined in hierarchies. A tag can be defined as a *group tag* for a set of other tags. The group tag can be seen as the “broader term” for its set of tags. Defining multiple group tags and nesting them creates a tag hierarchy.

One use-case is to create a taxonomy of terms (tags) that can be used to classify nodes in a document or set of documents.

When you search for a group tag, it return matches for all members in the group and its subgroups. In an agenda view, filtering by a group tag displays or hide headlines tagged with at least one of the members of the group or any of its subgroups. This makes tag searches and filters even more flexible.

You can set group tags by using brackets and inserting a colon between the group tag and its related tags—beware that all whitespaces are mandatory so that Org can parse this line correctly:

```
#+TAGS: [ GTD : Control Persp ]
```

In this example, ‘GTD’ is the group tag and it is related to two other tags: ‘Control’, ‘Persp’. Defining ‘Control’ and ‘Persp’ as group tags creates a hierarchy of tags:

```
#+TAGS: [ Control : Context Task ]
#+TAGS: [ Persp : Vision Goal AOF Project ]
```

That can conceptually be seen as a hierarchy of tags:

- ‘GTD’
  - ‘Persp’
    - ‘Vision’
    - ‘Goal’
    - ‘AOF’
    - ‘Project’
  - ‘Control’
    - ‘Context’
    - ‘Task’

You can use the `:startgroupstag`, `:groupstags` and `:endgroupstag` keyword directly when setting `org-tag-alist` directly:

```
(setq org-tag-alist '(:startgroupstag
                      ("GTD")
                      (:groupstags
                       ("Control")
                       ("Persp"))
                      (:endgroupstag
                       (:startgroupstag
                        ("Control"))
```

```
(:grouptags)
("Context")
("Task")
(:endgrouptag)))
```

The tags in a group can be mutually exclusive if using the same group syntax as is used for grouping mutually exclusive tags together; using curly brackets.

```
#+TAGS: { Context : @Home @Work @Call }
```

When setting `org-tag-alist` you can use `:startgroup` and `:endgroup` instead of `:startgrouptag` and `:endgrouptag` to make the tags mutually exclusive.

Furthermore, the members of a group tag can also be regular expressions, creating the possibility of a more dynamic and rule-based tag structure (see [Section 17.9 \[Regular Expressions\]](#), page 264). The regular expressions in the group must be specified within curly brackets. Here is an expanded example:

```
#+TAGS: [ Vision : {V@.+} ]
#+TAGS: [ Goal : {G@.+} ]
#+TAGS: [ AOF : {AOF@.+} ]
#+TAGS: [ Project : {P@.+} ]
```

Searching for the tag ‘Project’ now lists all tags also including regular expression matches for ‘P@.+’, and similarly for tag searches on ‘Vision’, ‘Goal’ and ‘AOF’. For example, this would work well for a project tagged with a common project-identifier, e.g., ‘P@2014\_OrgTags’.

If you want to ignore group tags temporarily, toggle group tags support with `org-toggle-tags-groups`, bound to `C-c C-x q`. If you want to disable tag groups completely, set `org-group-tags` to `nil`.

## 6.4 Tag Searches

Once a system of tags has been set up, it can be used to collect related information into special lists.

`C-c / m` or `C-c \ (org-match-sparse-tree)`

Create a sparse tree with all headlines matching a tags search. With a `C-u` prefix argument, ignore headlines that are not a TODO line.

`M-x org-agenda m (org-tags-view)`

Create a global list of tag matches from all agenda files. See [Section 11.3.3 \[Matching tags and properties\]](#), page 117.

`M-x org-agenda M (org-tags-view)`

Create a global list of tag matches from all agenda files, but check only TODO items.

These commands all prompt for a match string which allows basic Boolean logic like ‘+boss+urgent-project1’, to find entries with tags ‘boss’ and ‘urgent’, but not ‘project1’, or ‘Kathy|Sally’ to find entries which are tagged, like ‘Kathy’ or ‘Sally’. The full syntax of the search string is rich and allows also matching against TODO keywords, entry levels and properties. For a complete description with many examples, see [Section 11.3.3 \[Matching tags and properties\]](#), page 117.

## 7 Properties and Columns

A property is a key-value pair associated with an entry. Properties can be set so they are associated with a single entry, with every entry in a tree, or with the whole buffer.

There are two main applications for properties in Org mode. First, properties are like tags, but with a value. Imagine maintaining a file where you document bugs and plan releases for a piece of software. Instead of using tags like ‘`release_1`’, ‘`release_2`’, you can use a property, say ‘`Release`’, that in different subtrees has different values, such as ‘1.0’ or ‘2.0’. Second, you can use properties to implement (very basic) database capabilities in an Org buffer. Imagine keeping track of your music CDs, where properties could be things such as the album, artist, date of release, number of tracks, and so on.

Properties can be conveniently edited and viewed in column view (see [Section 7.5 \[Column View\]](#), page 71).

### 7.1 Property Syntax

Properties are key-value pairs. When they are associated with a single entry or with a tree they need to be inserted into a special drawer (see [Section 2.7 \[Drawers\]](#), page 16) with the name ‘`PROPERTIES`’, which has to be located right below a headline, and its planning line (see [Section 8.3 \[Deadlines and Scheduling\]](#), page 82) when applicable. Each property is specified on a single line, with the key—surrounded by colons—first, and the value after it. Keys are case-insensitive. Here is an example:

```
* CD collection
** Classic
*** Goldberg Variations
    :PROPERTIES:
    :Title:      Goldberg Variations
    :Composer:   J.S. Bach
    :Artist:     Glenn Gould
    :Publisher:  Deutsche Grammophon
    :NDisks:    1
    :END:
```

Depending on the value of `org-use-property-inheritance`, a property set this way is associated either with a single entry, or with the subtree defined by the entry, see [Section 7.4 \[Property Inheritance\]](#), page 70.

You may define the allowed values for a particular property ‘`Xyz`’ by setting a property ‘`Xyz_ALL`’. This special property is *inherited*, so if you set it in a level 1 entry, it applies to the entire tree. When allowed values are defined, setting the corresponding property becomes easier and is less prone to typing errors. For the example with the CD collection, we can pre-define publishers and the number of disks in a box like this:

```
* CD collection
  :PROPERTIES:
  :NDisks_ALL:  1 2 3 4
  :Publisher_ALL: "Deutsche Grammophon" Philips EMI
  :END:
```

Properties can be inserted at the buffer level. That means they apply before the first headline and can be inherited by all entries in a file. Property blocks defined before the first headline must be at the top of the buffer with only comments above them.

Properties can also be defined using lines like:

```
#+PROPERTY: NDisks_ALL 1 2 3 4
```

If you want to add to the value of an existing property, append a '+' to the property name. The following results in the property 'var' having the value 'foo=1 bar=2'.

```
#+PROPERTY: var foo=1
#+PROPERTY: var+ bar=2
```

It is also possible to add to the values of inherited properties. The following results in the 'Genres' property having the value 'Classic Baroque' under the 'Goldberg Variations' subtree.

```
* CD collection
** Classic
   :PROPERTIES:
   :Genres: Classic
   :END:
*** Goldberg Variations
    :PROPERTIES:
    :Title:    Goldberg Variations
    :Composer: J.S. Bach
    :Artist:   Glenn Gould
    :Publisher: Deutsche Grammophon
    :NDisks:   1
    :Genres+:  Baroque
    :END:
```

Note that a property can only have one entry per drawer.

Property values set with the global variable `org-global-properties` can be inherited by all entries in all Org files.

The following commands help to work with properties:

*M-TAB* (`pcomplete`)

After an initial colon in a line, complete property keys. All keys used in the current file are offered as possible completions.

*C-c C-x p* (`org-set-property`)

Set a property. This prompts for a property name and a value. If necessary, the property drawer is created as well.

*C-u M-x org-insert-drawer*

Insert a property drawer into the current entry. The drawer is inserted early in the entry, but after the lines with planning information like deadlines. If before first headline the drawer is inserted at the top of the drawer after any potential comments.

*C-c C-c* (`org-property-action`)

With point in a property drawer, this executes property commands.

- C-c C-c s* (`org-set-property`)  
Set a property in the current entry. Both the property and the value can be inserted using completion.
- S-RIGHT* (`org-property-next-allowed-value`)  
*S-LEFT* (`org-property-previous-allowed-value`)  
Switch property at point to the next/previous allowed value.
- C-c C-c d* (`org-delete-property`)  
Remove a property from the current entry.
- C-c C-c D* (`org-delete-property-globally`)  
Globally remove a property, from all entries in the current file.
- C-c C-c c* (`org-compute-property-at-point`)  
Compute the property at point, using the operator and scope from the nearest column format definition.

## 7.2 Special Properties

Special properties provide an alternative access method to Org mode features, like the TODO state or the priority of an entry, discussed in the previous chapters. This interface exists so that you can include these states in a column view (see [Section 7.5 \[Column View\], page 71](#)), or to use them in queries. The following property names are special and should not be used as keys in the properties drawer:

<code>'ALLTAGS'</code>	All tags, including inherited ones.
<code>'BLOCKED'</code>	<code>t</code> if task is currently blocked by children or siblings.
<code>'CATEGORY'</code>	The category of an entry.
<code>'CLOCKSUM'</code>	The sum of <code>CLOCK</code> intervals in the subtree. <code>org-clock-sum</code> must be run first to compute the values in the current buffer.
<code>'CLOCKSUM_T'</code>	The sum of <code>CLOCK</code> intervals in the subtree for today. <code>org-clock-sum-today</code> must be run first to compute the values in the current buffer.
<code>'CLOSED'</code>	When was this entry closed?
<code>'DEADLINE'</code>	The deadline timestamp.
<code>'FILE'</code>	The filename the entry is located in.
<code>'ITEM'</code>	The headline of the entry.
<code>'PRIORITY'</code>	The priority of the entry, a string with a single letter.
<code>'SCHEDULED'</code>	The scheduling timestamp.
<code>'TAGS'</code>	The tags defined directly in the headline.
<code>'TIMESTAMP'</code>	The first active keyword-less timestamp in the entry. <sup>1</sup>
<code>'TIMESTAMP_IA'</code>	The first inactive keyword-less timestamp in the entry.
<code>'TODO'</code>	The TODO keyword of the entry.

<sup>1</sup> For both `'TIMESTAMP'` and `'TIMESTAMP_IA'`: the word “first” refers to the first occurrence in the entry, not the earliest in time; the prefix `'CLOCK:'` at the beginning of a clock entry is considered a keyword in this context; and timestamps inside property drawers are ignored.

## 7.3 Property Searches

To create sparse trees and special lists with selection based on properties, the same commands are used as for tag searches (see [Section 6.4 \[Tag Searches\]](#), page 66).

`C-c / m` or `C-c \ (org-match-sparse-tree)`

Create a sparse tree with all matching entries. With a `C-u` prefix argument, ignore headlines that are not a TODO line.

`M-x org-agenda m (org-tags-view)`

Create a global list of tag/property matches from all agenda files.

`M-x org-agenda M (org-tags-view)`

Create a global list of tag matches from all agenda files, but check only TODO items.

The syntax for the search string is described in [Section 11.3.3 \[Matching tags and properties\]](#), page 117.

There is also a special command for creating sparse trees based on a single property:

`C-c / p`

Create a sparse tree based on the value of a property. This first prompts for the name of a property, and then for a value. A sparse tree is created with all entries that define this property with the given value. If you enclose the value in curly braces, it is interpreted as a regular expression and matched against the property values (see [Section 17.9 \[Regular Expressions\]](#), page 264).

## 7.4 Property Inheritance

The outline structure of Org documents lends itself to an inheritance model of properties: if the parent in a tree has a certain property, the children can inherit this property. Org mode does not turn this on by default, because it can slow down property searches significantly and is often not needed. However, if you find inheritance useful, you can turn it on by setting the variable `org-use-property-inheritance`. It may be set to `t` to make all properties inherited from the parent, to a list of properties that should be inherited, or to a regular expression that matches inherited properties. If a property has the value `nil`, this is interpreted as an explicit un-define of the property, so that inheritance search stops at this value and returns `nil`.

Org mode has a few properties for which inheritance is hard-coded, at least for the special applications for which they are used:

**COLUMNS** The ‘**COLUMNS**’ property defines the format of column view (see [Section 7.5 \[Column View\]](#), page 71). It is inherited in the sense that the level where a ‘**COLUMNS**’ property is defined is used as the starting point for a column view table, independently of the location in the subtree from where columns view is turned on.

**CATEGORY** For agenda view, a category set through a ‘**CATEGORY**’ property applies to the entire subtree.

**ARCHIVE** For archiving, the ‘**ARCHIVE**’ property may define the archive location for the entire subtree (see [Section 9.2.1 \[Moving subtrees\]](#), page 96).

**LOGGING** The ‘LOGGING’ property may define logging settings for an entry or a subtree (see [Section 5.3.2 \[Tracking TODO state changes\]](#), page 54).

## 7.5 Column View

A great way to view and edit properties in an outline tree is *column view*. In column view, each outline node is turned into a table row. Columns in this table provide access to properties of the entries. Org mode implements columns by overlaying a tabular structure over the headline of each item. While the headlines have been turned into a table row, you can still change the visibility of the outline tree. For example, you get a compact table by switching to “contents” view—*S-TAB S-TAB*, or simply *c* while column view is active—but you can still open, read, and edit the entry below each headline. Or, you can switch to column view after executing a sparse tree command and in this way get a table only for the selected items. Column view also works in agenda buffers (see [Chapter 11 \[Agenda Views\]](#), page 111) where queries have collected selected items, possibly from a number of files.

### 7.5.1 Defining columns

Setting up a column view first requires defining the columns. This is done by defining a column format line.

#### 7.5.1.1 Scope of column definitions

To specify a format that only applies to a specific tree, add a ‘COLUMNS’ property to the top node of that tree, for example:

```
** Top node for columns view
:PROPERTIES:
:COLUMNS: %25ITEM %TAGS %PRIORITY %TODO
:END:
```

A ‘COLUMNS’ property within a property drawer before first headline will apply to the entire file. As an addition to property drawers, keywords can also be defined for an entire file using a line like:

```
#+COLUMNS: %25ITEM %TAGS %PRIORITY %TODO
```

If a ‘COLUMNS’ property is present in an entry, it defines columns for the entry itself, and for the entire subtree below it. Since the column definition is part of the hierarchical structure of the document, you can define columns on level 1 that are general enough for all sublevels, and more specific columns further down, when you edit a deeper part of the tree.

#### 7.5.1.2 Column attributes

A column definition sets the attributes of a column. The general definition looks like this:

```
 %[WIDTH]PROPERTY[(TITLE)] [{SUMMARY-TYPE}]
```

Except for the percent sign and the property name, all items are optional. The individual parts have the following meaning:

**WIDTH** An integer specifying the width of the column in characters. If omitted, the width is determined automatically.

**PROPERTY**

The property that should be edited in this column. Special properties representing meta data are allowed here as well (see [Section 7.2 \[Special Properties\]](#), page 69).

**TITLE** The header text for the column. If omitted, the property name is used.

**SUMMARY-TYPE**

The summary type. If specified, the column values for parent nodes are computed from the children<sup>2</sup>.

Supported summary types are:

'+'	Sum numbers in this column.
'+;% .1f'	Like '+', but format result with '%.1f'.
'\$'	Currency, short for '+;% .2f'.
'min'	Smallest number in column.
'max'	Largest number.
'mean'	Arithmetic mean of numbers.
'X'	Checkbox status, '[X]' if all children are '[X]'.
'X/'	Checkbox status, '[n/m]'.
'X%'	Checkbox status, '[n%]'.
':'	Sum times, HH:MM, plain numbers are minutes.
':min'	Smallest time value in column.
':max'	Largest time value.
':mean'	Arithmetic mean of time values.
'@min'	Minimum age <sup>3</sup> (in days/hours/mins/seconds).
'@max'	Maximum age (in days/hours/mins/seconds).
'@mean'	Arithmetic mean of ages (in days/hours/mins/seconds).
'est+'	Add low-high estimates.

You can also define custom summary types by setting `org-columns-summary-types`.

The `'est+'` summary type requires further explanation. It is used for combining estimates, expressed as low-high ranges. For example, instead of estimating a particular task will take 5 days, you might estimate it as 5–6 days if you're fairly confident you know how much work is required, or 1–10 days if you do not really know what needs to be done. Both ranges average at 5.5 days, but the first represents a more predictable delivery.

When combining a set of such estimates, simply adding the lows and highs produces an unrealistically wide result. Instead, `'est+'` adds the statistical mean and variance of the subtasks, generating a final estimate from the sum. For example, suppose you had ten tasks, each of which was estimated at 0.5 to 2 days of work. Straight addition produces an estimate of 5 to 20 days, representing what to expect if everything goes either extremely well or extremely poorly. In contrast, `'est+'` estimates the full job more realistically, at 10–15 days.

<sup>2</sup> If more than one summary type applies to the same property, the parent values are computed according to the first of them.

<sup>3</sup> An age can be defined as a duration, using units defined in `org-duration-units`, e.g., '3d 1h'. If any value in the column is as such, the summary is also expressed as a duration.

Here is an example for a complete columns definition, along with allowed values<sup>4</sup>.

```
:COLUMNS:  %25ITEM %9Approved(Approved?){X} %Owner %11Status \
              %10Time_Estimate{:} %CLOCKSUM %CLOCKSUM_T
:Owner_ALL:  Tammy Mark Karl Lisa Don
>Status_ALL:  "In progress" "Not started yet" "Finished" ""
:Approved_ALL: "[ ]" "[X]"
```

The first column, ‘%25ITEM’, means the first 25 characters of the item itself, i.e., of the headline. You probably always should start the column definition with the ‘ITEM’ specifier. The other specifiers create columns ‘Owner’ with a list of names as allowed values, for ‘Status’ with four different possible values, and for a checkbox field ‘Approved’. When no width is given after the ‘%’ character, the column is exactly as wide as it needs to be in order to fully display all values. The ‘Approved’ column does have a modified title (‘Approved?’, with a question mark). Summaries are created for the ‘Time\_Estimate’ column by adding time duration expressions like HH:MM, and for the ‘Approved’ column, by providing an ‘[X]’ status if all children have been checked. The ‘CLOCKSUM’ and ‘CLOCKSUM\_T’ columns are special, they lists the sums of CLOCK intervals in the subtree, either for all clocks or just for today.

## 7.5.2 Using column view

### Turning column view on or off

*C-c C-x C-c* (*org-columns*)

Turn on column view. If point is before the first headline in the file, column view is turned on for the entire file, using the ‘#+COLUMNS’ definition. If point is somewhere inside the outline, this command searches the hierarchy, up from point, for a ‘COLUMNS’ property that defines a format. When one is found, the column view table is established for the tree starting at the entry that contains the ‘COLUMNS’ property. If no such property is found, the format is taken from the ‘#+COLUMNS’ line or from the variable *org-columns-default-format*, and column view is established for the current entry and its subtree.

*r* or *g* on a columns view line (*org-columns-redo*)

Recreate the column view, to include recent changes made in the buffer.

*C-c C-c* or *q* on a columns view line (*org-columns-quit*)

Exit column view.

### Editing values

LEFT, RIGHT, UP, DOWN

Move through the column view from field to field.

1..9,0 Directly select the Nth allowed value, 0 selects the 10th value.

---

<sup>4</sup> Please note that the ‘COLUMNS’ definition must be on a single line; it is wrapped here only because of formatting constraints.

- n* or *S-RIGHT* (`org-columns-next-allowed-value`)  
*p* or *S-LEFT* (`org-columns-previous-allowed-value`)  
 Switch to the next/previous allowed value of the field. For this, you have to have specified allowed values for a property.
- e* (`org-columns-edit-value`)  
 Edit the property at point. For the special properties, this invokes the same interface that you normally use to change that property. For example, the tag completion or fast selection interface pops up when editing a ‘TAGS’ property.
- C-c C-c* (`org-columns-toggle-or-columns-quit`)  
 When there is a checkbox at point, toggle it. Else exit column view.
- v* (`org-columns-show-value`)  
 View the full value of this property. This is useful if the width of the column is smaller than that of the value.
- a* (`org-columns-edit-allowed`)  
 Edit the list of allowed values for this property. If the list is found in the hierarchy, the modified values is stored there. If no list is found, the new value is stored in the first entry that is part of the current column view.

## Modifying column view on-the-fly

- <* (`org-columns-narrow`)  
*>* (`org-columns-widen`)  
 Make the column narrower/wider by one character.
- S-M-RIGHT* (`org-columns-new`)  
 Insert a new column, to the left of the current column.
- S-M-LEFT* (`org-columns-delete`)  
 Delete the current column.
- M-LEFT* (`org-columns-move-left`)  
 Move the current column left.
- M-RIGHT* (`org-columns-move-right`)  
 Move the current column right.
- M-UP* (`org-columns-move-row-up`)  
 Move the current row up.
- M-DOWN* (`org-columns-move-row-down`)  
 Move the current row down.

### 7.5.3 Capturing column view

Since column view is just an overlay over a buffer, it cannot be exported or printed directly. If you want to capture a column view, use a ‘columnview’ dynamic block (see [Section A.6 \[Dynamic Blocks\]](#), page 281). The frame of this block looks like this:

```
* The column view
#+BEGIN: columnview :hlines 1 :id "label"
```

`#+END:`

This dynamic block has the following parameters:

- `‘:id’` This is the most important parameter. Column view is a feature that is often localized to a certain (sub)tree, and the capture block might be at a different location in the file. To identify the tree whose view to capture, you can use four values:
  - `‘local’` Use the tree in which the capture block is located.
  - `‘global’` Make a global view, including all headings in the file.
  - `‘file:FILENAME’` Run column view at the top of the *FILENAME* file.
  - `‘LABEL’` Call column view in the tree that has an ‘ID’ property with the value *LABEL*. You can use *M-x org-id-copy* to create a globally unique ID for the current entry and copy it to the kill-ring.
- `‘:match’` When set to a string, use this as a tags/property match filter to select only a subset of the headlines in the scope set by the `:id` parameter.
- `‘:hlines’` When *t*, insert an hline after every line. When a number *N*, insert an hline before each headline with level  $\leq N$ .
- `‘:vlines’` When non-*nil*, force column groups to get vertical lines.
- `‘:maxlevel’` When set to a number, do not capture entries below this level.
- `‘:skip-empty-rows’` When non-*nil*, skip rows where the only non-empty specifier of the column view is ‘ITEM’.
- `‘:exclude-tags’` List of tags to exclude from column view table: entries with these tags will be excluded from the column view.
- `‘:indent’` When non-*nil*, indent each ‘ITEM’ field according to its level.
- `‘:link’` When non-*nil*, link the ‘ITEM’ headlines in the table to their origins.
- `‘:format’` Specify a column attribute (see [Section 7.5.1.2 \[Column attributes\], page 71](#)) for the dynamic block.
- `‘:formatter’` A function to format column view data and insert it into the buffer. See the option `org-columns-dblock-formatter`.

The following commands insert or update the dynamic block:

`org-columns-insert-dblock`

Insert a dynamic block capturing a column view. Prompt for the scope or ID of the view.

This command can be invoked by calling `org-dynamic-block-insert-dblock` (*C-c C-x x*) and selecting “columnview” (see [Section A.6 \[Dynamic Blocks\], page 281](#)).

*C-c C-c C-c C-x C-u* (`org-dblock-update`)

Update dynamic block at point. Point needs to be on the ‘#+BEGIN’ line of the dynamic block.

*C-u C-c C-x C-u* (`org-update-all-dblocks`)

Update all dynamic blocks (see [Section A.6 \[Dynamic Blocks\]](#), page 281). This is useful if you have several clock table blocks, column-capturing blocks or other dynamic blocks in a buffer.

You can add formulas to the column view table and you may add plotting instructions in front of the table—these survive an update of the block. If there is a ‘TBLFM’ keyword after the table, the table is recalculated automatically after an update.

An alternative way to capture and process property values into a table is provided by Eric Schulte’s ‘`org-collector.el`’, which is a package in ‘`org-contrib`’<sup>5</sup>. It provides a general API to collect properties from entries in a certain scope, and arbitrary Lisp expressions to process these values before inserting them into a table or a dynamic block.

---

<sup>5</sup> Contributed packages are not part of Emacs, but are distributed with the main distribution of Org—visit <https://orgmode.org>.

## 8 Dates and Times

To assist project planning, TODO items can be labeled with a date and/or a time. The specially formatted string carrying the date and time information is called a *timestamp* in Org mode. This may be a little confusing because timestamp is often used as indicating when something was created or last changed. However, in Org mode this term is used in a much wider sense.

Timestamps can be used to plan appointments, schedule tasks, set deadlines, track time, and more. The following sections describe the timestamp format and tooling that Org mode provides for common use cases dealing with time and time intervals.

### 8.1 Timestamps

A timestamp is a specification of a date—possibly with a time or time range—in a special format, either ‘<2003-09-16 Tue>’ or ‘<2003-09-16 Tue 09:39>’ or ‘<2003-09-16 Tue 12:00-12:30>’<sup>1</sup>. A timestamp can appear anywhere in the headline or body of an Org tree entry. Its presence causes entries to be shown on specific dates in the agenda (see [Section 11.3.1 \[Weekly/daily agenda\], page 113](#)). We distinguish:

#### Plain timestamp; Event; Appointment

A simple timestamp just assigns a date/time to an item. This is just like writing down an appointment or event in a paper agenda. In the agenda display, the headline of an entry associated with a plain timestamp is shown exactly on that date. There can be multiple timestamps in an item.

```
* Meet Peter at the movies
  <2006-11-01 Wed 19:15>
* Discussion on climate change
  <2006-11-02 Thu 10:00-12:00>
* My days off
  <2006-11-03 Fri>
  <2006-11-06 Mon>
```

#### Timestamp with repeater interval

A timestamp may contain a *repeater interval*, indicating that it applies not only on the given date, but again and again after a certain interval of N hours (h), days (d), weeks (w), months (m), or years (y). The following shows up in the agenda every Wednesday:

```
* Pick up Sam at school
  <2007-05-16 Wed 12:30 +1w>
```

---

<sup>1</sup> The Org date format is inspired by the standard ISO 8601 date/time format. To use an alternative format, see [Section 8.2.2 \[Custom time format\], page 81](#). The day name is optional when you type the date yourself. However, any date inserted or modified by Org adds that day name, for reading convenience.

### Diary-style expression entries

For more complex date specifications, Org mode supports using the special expression diary entries implemented in the [Section “Special Diary Entries” in emacs<sup>2</sup>](#). For example, with optional time:

```
* 22:00-23:00 The nerd meeting on every 2nd Thursday of the month
  <%%(diary-float t 4 2) 22:00-23:00>
```

### Time range

Time range is a timestamp having two time units connected by ‘-’

```
* Discussion on climate change
  <2006-11-02 Thu 10:00-12:00>
```

### Time/Date range

Two timestamps connected by ‘--’ denote a range. In the agenda, the headline is shown on the first and last day of the range, and on any dates that are displayed and fall in the range. The first example specifies just the dates of the range while the second example specifies a time range for each date.

```
** Meeting in Amsterdam
  <2004-08-23 Mon>--<2004-08-26 Thu>
** This weeks committee meetings
  <2004-08-23 Mon 10:00-11:00>--<2004-08-26 Thu 10:00-11:00>
```

### Inactive timestamp

Just like a plain timestamp, but with square brackets instead of angular ones. These timestamps are inactive in the sense that they do *not* trigger an entry to show up in the agenda.

```
* Gillian comes late for the fifth time
  [2006-11-01 Wed]
```

## 8.2 Creating Timestamps

For Org mode to recognize timestamps, they need to be in the specific format. All commands listed below produce timestamps in the correct format.

### C-c . (org-timestamp)

Prompt for a date and insert a corresponding timestamp. When point is at an existing timestamp in the buffer, the command is used to modify this timestamp instead of inserting a new one. When this command is used twice in succession, a time range is inserted.

When called with a prefix argument, use the alternative format which contains date and time. The default time can be rounded to multiples of 5 minutes. See the option `org-timestamp-rounding-minutes`.

<sup>2</sup> When working with the standard diary expression functions, you need to be very careful with the order of the arguments. That order depends evilly on the variable `calendar-date-style`. For example, to specify a date December 1, 2005, the call might look like `(diary-date 12 1 2005)` or `(diary-date 1 12 2005)` or `(diary-date 2005 12 1)`, depending on the settings. This has been the source of much confusion. Org mode users can resort to special versions of these functions, namely `org-date`, `org-anniversary`, `org-cyclic`, and `org-block`. These work just like the corresponding `diary-` functions, but with stable ISO order of arguments (year, month, day) wherever applicable, independent of the value of `calendar-date-style`.

With two prefix arguments, insert an active timestamp with the current time without prompting.

`C-c ! (org-timestamp-inactive)`

Like `C-c .`, but insert an inactive timestamp that does not cause an agenda entry.

`C-c C-c` Normalize timestamp, insert or fix day name if missing or wrong.

`C-c < (org-date-from-calendar)`

Insert a timestamp corresponding to point date in the calendar.

`C-c > (org-goto-calendar)`

Access the Emacs calendar for the current date. If there is a timestamp in the current line, go to the corresponding date instead.

`C-c C-o (org-open-at-point)`

Access the agenda for the date given by the timestamp or -range at point (see [Section 11.3.1 \[Weekly/daily agenda\]](#), page 113).

`S-LEFT (org-timestamp-down-day)`

`S-RIGHT (org-timestamp-up-day)`

Change date at point by one day. These key bindings conflict with shift-selection and related modes (see [Section 17.14.2 \[Conflicts\]](#), page 267).

`S-UP (org-timestamp-up)`

`S-DOWN (org-timestamp-down)`

On the beginning or enclosing bracket of a timestamp, change its type. Within a timestamp, change the item under point. Point can be on a year, month, day, hour or minute. When the timestamp contains a time range like `'15:30-16:30'`, modifying the first time also shifts the second, shifting the time block with constant length. To change the length, modify the second time. Note that if point is in a headline and not at a timestamp, these same keys modify the priority of an item (see [Section 5.4 \[Priorities\]](#), page 57). The key bindings also conflict with shift-selection and related modes (see [Section 17.14.2 \[Conflicts\]](#), page 267).

`C-c C-y (org-evaluate-time-range)`

Evaluate a time range by computing the difference between start and end. With a prefix argument, insert result after the time range (in a table: into the following column).

### 8.2.1 The date/time prompt

When Org mode prompts for a date/time, the default is shown in default date/time format, and the prompt therefore seems to ask for a specific format. But it in fact accepts date/time information in a variety of formats. Generally, the information should start at the beginning of the string. Org mode finds whatever information is in there and derives anything you have not specified from the *default date and time*. The default is usually the current date and time, but when modifying an existing timestamp, or when entering the second stamp of a range, it is taken from the stamp in the buffer. When filling in information, Org mode assumes that most of the time you want to enter a date in the future: if you omit the

month/year and the given day/month is *before* today, it assumes that you mean a future date<sup>3</sup>. If the date has been automatically shifted into the future, the time prompt shows this with ‘(=>F)’.

For example, let’s assume that today is **June 13, 2006**. Here is how various inputs are interpreted, the items filled in by Org mode are in **bold**.

```

‘3-2-5’           ⇒ 2003-02-05
‘2/5/3’          ⇒ 2003-02-05
‘14’             ⇒ 2006-06-14
‘12’             ⇒ 2006-07-12
‘2/5’           ⇒ 2007-02-05
‘Fri’           ⇒ nearest Friday (default date or later)
‘sep 15’        ⇒ 2006-09-15
‘feb 15’        ⇒ 2007-02-15
‘sep 12 9’      ⇒ 2009-09-12
‘12:45’         ⇒ 2006-06-13 12:45
‘22 sept 0:34’ ⇒ 2006-09-22 0:34
‘w4’           ⇒ ISO week for of the current year 2006
‘2012 w4 fri’   ⇒ Friday of ISO week 4 in 2012
‘2012-w04-5’    ⇒ Same as above

```

Furthermore you can specify a relative date by giving, as the *first* thing in the input: a plus/minus sign, a number and a letter—‘h’, ‘d’, ‘w’, ‘m’ or ‘y’—to indicate a change in hours, days, weeks, months, or years. With ‘h’ the date is relative to the current time, with the other letters and a single plus or minus, the date is relative to today at 00:00. With a double plus or minus, it is relative to the default date. If instead of a single letter, you use the abbreviation of day name, the date is the Nth such day, e.g.:

```

‘+0’           ⇒ today
‘.’           ⇒ today
‘+2h’         ⇒ two hours from now
‘+4d’         ⇒ four days from today
‘+4’          ⇒ same as +4d
‘+2w’         ⇒ two weeks from today
‘++5’         ⇒ five days from default date
‘+2tue’       ⇒ second Tuesday from now

```

The function understands English month and weekday abbreviations. If you want to use un-abbreviated names and/or other languages, configure the variables `parse-time-months` and `parse-time-weekdays`.

Not all dates can be represented in a given Emacs implementation. By default Org mode forces dates into the compatibility range 1970–2037 which works on all Emacs implementations. If you want to use dates outside of this range, read the docstring of the variable `org-read-date-force-compatible-dates`.

You can specify a time range by giving start and end times or by giving a start time and a duration (in HH:MM format). Use one or two dash(es) as the separator in the former case and use ‘+’ as the separator in the latter case, e.g.:

<sup>3</sup> See the variable `org-read-date-prefer-future`. You may set that variable to the symbol `time` to even make a time before now shift the date to tomorrow.

```

'11am-1:15pm'    ⇒ 11:00-13:15
'11h-13h15'     ⇒ same as above
'11am--1:15pm'  ⇒ same as above
'11am+2:15'     ⇒ same as above

```

Parallel to the minibuffer prompt, a calendar is popped up<sup>4</sup>. When you exit the date prompt, either by clicking on a date in the calendar, or by pressing `RET`, the date selected in the calendar is combined with the information entered at the prompt. You can control the calendar fully from the minibuffer:

```

RET                Choose date at point in calendar.
mouse-1           Select date by clicking on it.
S-RIGHT           One day forward.
S-LEFT            One day backward.
S-DOWN            One week forward.
S-UP              One week backward.
M-S-RIGHT         One month forward.
M-S-LEFT          One month backward.
>                 Scroll calendar forward by one month.
<                 Scroll calendar backward by one month.
M-v               Scroll calendar forward by 3 months.
C-v               Scroll calendar backward by 3 months.
C-.               Select today's date5

```

The actions of the date/time prompt may seem complex, but I assure you they will grow on you, and you will start getting annoyed by pretty much any other way of entering a date/time out there. To help you understand what is going on, the current interpretation of your input is displayed live in the minibuffer<sup>6</sup>.

## 8.2.2 Custom time format

Org mode uses the standard ISO notation for dates and times as it is defined in ISO 8601. If you cannot get used to this and require another representation of date and time to keep you happy, you can get it by customizing the variables `org-display-custom-times` and `org-timestamp-custom-formats`.

`C-c C-x C-t` (`org-toggle-timestamp-overlays`)

Toggle the display of custom formats for dates and times.

Org mode needs the default format for scanning, so the custom date/time format does not *replace* the default format. Instead, it is put *over* the default format using text properties. This has the following consequences:

- You cannot place point onto a timestamp anymore, only before or after.
- The `S-UP` and `S-DOWN` keys can no longer be used to adjust each component of a timestamp. If point is at the beginning of the stamp, `S-UP` and `S-DOWN` change the

<sup>4</sup> If you do not need/want the calendar, configure the variable `org-popup-calendar-for-date-prompt`.

<sup>5</sup> You can also use the calendar command `.` to jump to today's date, but if you are inserting an hour specification for your timestamp, `.` will then insert a dot after the hour. By contrast, `C-.` will always jump to today's date.

<sup>6</sup> If you find this distracting, turn off the display with `org-read-date-display-live`.

stamp by one day, just like *S-LEFT S-RIGHT*. At the end of the stamp, change the time by one minute.

- If the timestamp contains a range of clock times or a repeater, these are not overlaid, but remain in the buffer as they were.
- When you delete a timestamp character-by-character, it only disappears from the buffer after *all* (invisible) characters belonging to the ISO timestamp have been removed.
- If the custom timestamp format is longer than the default and you are using dates in tables, table alignment will be messed up. If the custom format is shorter, things do work as expected.

### 8.3 Deadlines and Scheduling

A timestamp may be preceded by special keywords to facilitate planning. Both the timestamp and the keyword have to be positioned immediately after the task they refer to.

‘DEADLINE’

Meaning: the task—most likely a TODO item, though not necessarily—is supposed to be finished on that date.

On the deadline date, the task is listed in the agenda. In addition, the agenda for *today* carries a warning about the approaching or missed deadline, starting `org-deadline-warning-days` before the due date, and continuing until the entry is marked as done. An example:

```
*** TODO write article about the Earth for the Guide
    DEADLINE: <2004-02-29 Sun>
    The editor in charge is [[bbdb:Ford Prefect]]
```

You can specify a different lead time for warnings for a specific deadlines using the following syntax. Here is an example with a warning period of 5 days ‘DEADLINE: <2004-02-29 Sun -5d>’. This warning is deactivated if the task gets scheduled and you set `org-agenda-skip-deadline-prewarning-if-scheduled` to `t`.

‘SCHEDULED’

Meaning: you are planning to start working on that task on the given date.

The headline is listed under the given date<sup>7</sup>. In addition, a reminder that the scheduled date has passed is present in the compilation for *today*, until the entry is marked as done, i.e., the task is automatically forwarded until completed.

```
*** TODO Call Trillian for a date on New Years Eve.
    SCHEDULED: <2004-12-25 Sat>
```

If you want to *delay* the display of this task in the agenda, use ‘SCHEDULED: <2004-12-25 Sat -2d>’: the task is still scheduled on the 25th but will appear two days later. In case the task contains a repeater, the delay is considered to affect all occurrences; if you want the delay to only affect the first scheduled occurrence of the task, use ‘--2d’ instead. See `org-scheduled-delay-days`

---

<sup>7</sup> It will still be listed on that date after it has been marked as done. If you do not like this, set the variable `org-agenda-skip-scheduled-if-done`.

and `org-agenda-skip-scheduled-delay-if-deadline` for details on how to control this globally or per agenda.

**Important:** Scheduling an item in Org mode should *not* be understood in the same way that we understand *scheduling a meeting*. Setting a date for a meeting is just a simple appointment, you should mark this entry with a simple plain timestamp, to get this item shown on the date where it applies. This is a frequent misunderstanding by Org users. In Org mode, *scheduling* means setting a date when you want to start working on an action item.

You may use timestamps with repeaters in scheduling and deadline entries. Org mode issues early and late warnings based on the assumption that the timestamp represents the *nearest instance* of the repeater. However, the use of diary expression entries like

```
<%(diary-float t 42)>
```

in scheduling and deadline timestamps is limited. Org mode does not know enough about the internals of each function to issue early and late warnings. However, it shows the item on each day where the expression entry matches.

### 8.3.1 Inserting deadlines or schedules

The following commands allow you to quickly insert a deadline or to schedule an item:<sup>8</sup>

`C-c C-d` (`org-deadline`)

Insert ‘DEADLINE’ keyword along with a stamp. The insertion happens in the line directly following the headline. Remove any ‘CLOSED’ timestamp. When called with a prefix argument, also remove any existing deadline from the entry. Depending on the variable `org-log-redeadline`, take a note when changing an existing deadline<sup>9</sup>.

`C-c C-s` (`org-schedule`)

Insert ‘SCHEDULED’ keyword along with a stamp. The insertion happens in the line directly following the headline. Remove any ‘CLOSED’ timestamp. When called with a prefix argument, also remove the scheduling date from the entry. Depending on the variable `org-log-reschedule`, take a note when changing an existing scheduling time<sup>10</sup>.

`C-c / d` (`org-check-deadlines`)

Create a sparse tree with all deadlines that are either past-due, or which will become due within `org-deadline-warning-days`. With `C-u` prefix, show all deadlines in the file. With a numeric prefix, check that many days. For example, `C-1 C-c / d` shows all deadlines due tomorrow.

`C-c / b` (`org-check-before-date`)

Sparse tree for deadlines and scheduled items before a given date.

<sup>8</sup> The ‘SCHEDULED’ and ‘DEADLINE’ dates are inserted on the line right below the headline. Do not put any text between this line and the headline.

<sup>9</sup> Note the corresponding ‘STARTUP’ options ‘logredeadline’, ‘lognoteredeadline’, and ‘nologredeadline’.

<sup>10</sup> Note the corresponding ‘STARTUP’ options ‘logreschedule’, ‘lognotereschedule’, and ‘nologreschedule’.

`C-c / a (org-check-after-date)`

Sparse tree for deadlines and scheduled items after a given date.

Note that `org-schedule` and `org-deadline` supports setting the date by indicating a relative time e.g., `+1d` sets the date to the next day after today, and `--1w` sets the date to the previous week before any current timestamp.

### 8.3.2 Repeated tasks

Some tasks need to be repeated again and again. Org mode helps to organize such tasks using a so-called repeater in a `DEADLINE`, `SCHEDULED`, or plain timestamps<sup>11</sup>. In the following example:

```
** TODO Pay the rent
   DEADLINE: <2005-10-01 Sat +1m>
```

the `+1m` is a repeater; the intended interpretation is that the task has a deadline on `<2005-10-01>` and repeats itself every (one) month starting from that time. You can use yearly, monthly, weekly, daily and hourly repeat cookies by using the `'y'`, `'m'`, `'w'`, `'d'` and `'h'` letters. If you need both a repeater and a special warning period in a deadline entry, the repeater should come first and the warning period last

```
DEADLINE: <2005-10-01 Sat +1m -3d>
```

Deadlines and scheduled items produce entries in the agenda when they are over-due, so it is important to be able to mark such an entry as done once you have done so. When you mark a `DEADLINE` or a `SCHEDULED` with the TODO keyword `DONE`, it no longer produces entries in the agenda. The problem with this is, however, is that then also the *next* instance of the repeated entry will not be active. Org mode deals with this in the following way: when you try to mark such an entry as done, using `C-c C-t`, it shifts the base date of the repeating timestamp by the repeater interval, and immediately sets the entry state back to TODO<sup>12</sup>. In the example above, setting the state to `DONE` would actually switch the date like this:

```
** TODO Pay the rent
   DEADLINE: <2005-11-01 Tue +1m>
```

When task contains multiple timestamps with repeater interval, all these timestamps are shifted.

To mark a task with a repeater as DONE, use `C-- 1 C-c C-t`, i.e., `org-todo` with a numeric prefix argument of `-1`.

A timestamp<sup>13</sup> is added under the deadline, to keep a record that you actually acted on the previous instance of this deadline.

As a consequence of shifting the base date, this entry is no longer visible in the agenda when checking past dates, but all future instances will be visible.

<sup>11</sup> Org does not repeat inactive timestamps, however. See [Section 8.1 \[Timestamps\]](#), page 77.

<sup>12</sup> In fact, the target state is taken from, in this sequence, the `'REPEAT_TO_STATE'` property, the variable `org-todo-repeat-to-state` if it is a string, the previous TODO state if `org-todo-repeat-to-state` is `t`, or the first state of the TODO state sequence.

<sup>13</sup> You can change this using the option `org-log-repeat`, or the `'STARTUP'` options `'logrepeat'`, `'lognoterepeat'`, and `'nologrepeat'`. With `'lognoterepeat'`, you will also be prompted for a note.

With the ‘+1m’ cookie, the date shift is always exactly one month. So if you have not paid the rent for three months, marking this entry DONE still keeps it as an overdue deadline. Depending on the task, this may not be the best way to handle it. For example, if you forgot to call your father for 3 weeks, it does not make sense to call him 3 times in a single day to make up for it. Finally, there are tasks, like changing batteries, which should always repeat a certain time *after* the last time you did it. For these tasks, Org mode has special repeaters ‘++’ and ‘.+’. For example:

```
** TODO Call Father
DEADLINE: <2008-02-10 Sun ++1w>
Marking this DONE shifts the date by at least one week, but also
by as many weeks as it takes to get this date into the future.
However, it stays on a Sunday, even if you called and marked it
done on Saturday.
```

```
** TODO Empty kitchen trash
DEADLINE: <2008-02-08 Fri 20:00 ++1d>
Marking this DONE shifts the date by at least one day, and also
by as many days as it takes to get the timestamp into the future.
Since there is a time in the timestamp, the next deadline in the
future will be on today's date if you complete the task before
20:00.
```

```
** TODO Check the batteries in the smoke detectors
DEADLINE: <2005-11-01 Tue .+1m>
Marking this DONE shifts the date to one month after today.
```

```
** TODO Wash my hands
DEADLINE: <2019-04-05 08:00 Fri .+1h>
Marking this DONE shifts the date to exactly one hour from now.
```

You may have both scheduling and deadline information for a specific task. If the repeater is set for the scheduling information only, you probably want the repeater to be ignored after the deadline. If so, set the variable `org-agenda-skip-scheduled-repeats-after-deadline` to `t`. However, any scheduling information without a repeater is no longer relevant once the task is done, and thus, removed upon repeating the task. If you want both scheduling and deadline information to repeat after the same interval, set the same repeater for both timestamps.

An alternative to using a repeater is to create a number of copies of a task subtree, with dates shifted in each copy. The command `C-c C-x c` was created for this purpose; it is described in [Section 2.4 \[Structure Editing\]](#), page 10.

## 8.4 Clocking Work Time

Org mode allows you to clock the time you spend on specific tasks in a project. When you start working on an item, you can start the clock. When you stop working on that task, or when you mark the task done, the clock is stopped and the corresponding time interval

is recorded. It also computes the total time spent on each subtree<sup>14</sup> of a project. And it remembers a history of tasks recently clocked, so that you can jump quickly between a number of tasks absorbing your time.

To save the clock history across Emacs sessions, use:

```
(setq org-clock-persist 'history)
(org-clock-persistence-insinuate)
```

When you clock into a new task after resuming Emacs, the incomplete clock<sup>15</sup> is retrieved (see [\[Resolving idle time \(1\)\]](#), page 91) and you are prompted about what to do with it.

### 8.4.1 Clocking commands

**C-c C-x C-i** (`org-clock-in`)

Start the clock on the current item (clock-in). This inserts the ‘`CLOCK`’ keyword together with a timestamp. If this is not the first clocking of this item, the multiple ‘`CLOCK`’ lines are wrapped into a ‘`LOGBOOK`’ drawer (see also the variable `org-clock-into-drawer`). You can also overrule the setting of this variable for a subtree by setting a ‘`CLOCK_INTO_DRAWER`’ or ‘`LOG_INTO_DRAWER`’ property. When called with a `C-u` prefix argument, select the task from a list of recently clocked tasks. With two `C-u C-u` prefixes, clock into the task at point and mark it as the default task; the default task is always be available with letter `d` when selecting a clocking task. With three `C-u C-u C-u` prefixes, force continuous clocking by starting the clock when the last clock stopped.

While the clock is running, Org shows the current clocking time in the mode line, along with the title of the task. The clock time shown is all time ever clocked for this task and its children. If the task has an effort estimate (see [Section 8.5 \[Effort Estimates\]](#), page 92), the mode line displays the current clocking time against it<sup>16</sup>. If the task is a repeating one (see [Section 8.3.2 \[Repeated tasks\]](#), page 84), show only the time since the last reset of the task<sup>17</sup>. You can exercise more control over show time with the ‘`CLOCK_MODELINE_TOTAL`’ property. It may have the values ‘`current`’ to show only the current clocking instance, ‘`today`’ to show all time clocked on this tasks today—see also the variable `org-extend-today-until`, `all` to include all time, or `auto` which is the default<sup>18</sup>. Clicking with `mouse-1` onto the mode line entry pops up a menu with clocking options.

**C-c C-x C-o** (`org-clock-out`)

Stop the clock (clock-out). This inserts another timestamp at the same location where the clock was last started. It also directly computes the resulting time in inserts it after the time range as ‘`=>HH:MM`’. See the variable `org-log-note-`

<sup>14</sup> Clocking only works if all headings are indented with less than 30 stars. This is a hard-coded limitation of `lmax` in `org-clock-sum`.

<sup>15</sup> To resume the clock under the assumption that you have worked on this task while outside Emacs, use ‘`(setq org-clock-persist t)`’.

<sup>16</sup> To add an effort estimate “on the fly”, hook a function doing this to `org-clock-in-prepare-hook`.

<sup>17</sup> The last reset of the task is recorded by the ‘`LAST_REPEAT`’ property.

<sup>18</sup> See also the variable `org-clock-mode-line-total`.

clock-out for the possibility to record an additional note together with the clock-out timestamp<sup>19</sup>.

*C-c C-x C-x* (*org-clock-in-last*)

Re-clock the last clocked task. With one *C-u* prefix argument, select the task from the clock history. With two *C-u* prefixes, force continuous clocking by starting the clock when the last clock stopped.

*C-c C-x C-e* (*org-clock-modify-effort-estimate*)

Update the effort estimate for the current clock task.

*C-c C-c* or *C-c C-y* (*org-evaluate-time-range*)

Recompute the time interval after changing one of the timestamps. This is only necessary if you edit the timestamps directly. If you change them with *S-<cursor>* keys, the update is automatic.

*C-S-UP* (*org-clock-timestamps-up*)

*C-S-DOWN* (*org-clock-timestamps-down*)

On **CLOCK** log lines, increase/decrease both timestamps so that the clock duration keeps the same value.

*S-M-UP* (*org-timestamp-up*)

*S-M-DOWN* (*org-timestamp-down*)

On ‘**CLOCK**’ log lines, increase/decrease the timestamp at point and the one of the previous, or the next, clock timestamp by the same duration. For example, if you hit *S-M-UP* to increase a clocked-out timestamp by five minutes, then the clocked-in timestamp of the next clock is increased by five minutes.

Only ‘**CLOCK**’ logs created during current Emacs session are considered when adjusting next/previous timestamp.

*C-c C-t* (*org-todo*)

Changing the TODO state of an item to DONE automatically stops the clock if it is running in this same item.

*C-c C-x C-q* (*org-clock-cancel*)

Cancel the current clock. This is useful if a clock was started by mistake, or if you ended up working on something else.

*C-c C-x C-j* (*org-clock-goto*)

Jump to the headline of the currently clocked in task. With a *C-u* prefix argument, select the target task from a list of recently clocked tasks.

*C-c C-x C-d* (*org-clock-display*)

Display time summaries for each subtree in the current buffer. This puts overlays at the end of each headline, showing the total time recorded under that heading, including the time of any subheadings. You can use visibility cycling to study the tree, but the overlays disappear when you change the buffer (see variable *org-remove-highlights-with-change*) or press *C-c C-c*.

The *l* key may be used in the agenda (see [Section 11.3.1 \[Weekly/daily agenda\], page 113](#)) to show which tasks have been worked on or closed during a day.

<sup>19</sup> The corresponding in-buffer setting is: ‘*#+STARTUP: lognoteclock-out*’.

**Important:** note that both `org-clock-out` and `org-clock-in-last` can have a global keybinding and do not modify the window disposition.

## 8.4.2 The clock table

Org mode can produce quite complex reports based on the time clocking information. Such a report is called a *clock table*, because it is formatted as one or several Org tables.

### `org-clock-report`

Insert or update a clock table. When called with a prefix argument, jump to the first clock table in the current document and update it. The clock table includes archived trees.

This command can be invoked by calling `org-dynamic-block-insert-dblock` (`C-c C-x x`) and selecting “clocktable” (see [Section A.6 \[Dynamic Blocks\]](#), page 281).

### `C-c C-c` or `C-c C-x C-u` (`org-dblock-update`)

Update dynamic block at point. Point needs to be in the ‘BEGIN’ line of the dynamic block.

### `C-u C-c C-x C-u`

Update all dynamic blocks (see [Section A.6 \[Dynamic Blocks\]](#), page 281). This is useful if you have several clock table blocks in a buffer.

### `S-LEFT`

### `S-RIGHT` (`org-clocktable-try-shift`)

Shift the current ‘:block’ interval and update the table. Point needs to be in the ‘#+BEGIN: clocktable’ line for this command. If ‘:block’ is ‘today’, it is shifted to ‘today-1’, etc.

Here is an example of the frame for a clock table as it is inserted into the buffer by `org-clock-report`:

```
#+BEGIN: clocktable :maxlevel 2 :emphasize nil :scope file
#+END:
```

The ‘#+BEGIN’ line contains options to define the scope, structure, and formatting of the report. Defaults for all these options can be configured in the variable `org-clocktable-defaults`.

First there are options that determine which clock entries are to be selected:

#### ‘:maxlevel’

Maximum level depth to which times are listed in the table. Clocks at deeper levels are summed into the upper level.

#### ‘:scope’

The scope to consider. This can be any of the following:

‘nil’	the current buffer or narrowed region
‘file’	the full current buffer
‘subtree’	the subtree where the clocktable is located
‘treeN’	the surrounding level N tree, for example ‘tree3’
‘tree’	the surrounding level 1 tree
‘agenda’	all agenda files

- |                        |   |
|------------------------|---|
| ‘("file" ...)’         | scan these files  |
| ‘FUNCTION’             | scan files returned by calling <i>FUNCTION</i> with no argument |
| ‘file-with-archives’   | current file and its archives                                   |
| ‘agenda-with-archives’ | all agenda files, including archives                            |
- ‘:block’ The time block to consider. This block is specified either absolutely, or relative to the current time and may be any of these formats:
- |   |                       |
|---|-----------------------|
| ‘2007-12-31’                            | New year eve 2007     |
| ‘2007-12’                               | December 2007         |
| ‘2007-W50’                              | ISO-week 50 in 2007   |
| ‘2007-Q2’                               | 2nd quarter in 2007   |
| ‘2007’                                  | the year 2007         |
| ‘today’, ‘yesterday’, ‘today-N’         | a relative day        |
| ‘thisweek’, ‘lastweek’, ‘thisweek-N’    | a relative week       |
| ‘thismonth’, ‘lastmonth’, ‘thismonth-N’ | a relative month      |
| ‘thisyear’, ‘lastyear’, ‘thisyear-N’    | a relative year       |
| ‘untilnow’ <sup>20</sup>                | all clocked time ever |
- When this option is not set, Org falls back to the value in `org-clock-display-default-range`, which defaults to the current year.
- Use *S-LEFT* or *S-RIGHT* to shift the time interval.
- ‘:tstart’ A time string specifying when to start considering times. Relative times like “<-2w>” can also be used. See [Section 11.3.3 \[Matching tags and properties\]](#), [page 117](#) for relative time syntax.
- ‘:tend’ A time string specifying when to stop considering times. Relative times like “<now>” can also be used. See [Section 11.3.3 \[Matching tags and properties\]](#), [page 117](#) for relative time syntax.
- ‘:wstart’ The starting day of the week. The default is 1 for Monday.
- ‘:mstart’ The starting day of the month. The default is 1 for the first.
- ‘:step’ Set to ‘day’, ‘week’, ‘semimonth’, ‘month’, ‘quarter’, or ‘year’ to split the table into chunks. To use this, either ‘:block’, or ‘:tstart’ and ‘:tend’ are required.
- ‘:stepskip0’  
When non-`nil`, do not show steps that have zero time.
- ‘:fileskip0’  
When non-`nil`, do not show table sections from files which did not contribute.
- ‘:match’ A tags match to select entries that should contribute. See [Section 11.3.3 \[Matching tags and properties\]](#), [page 117](#) for the match syntax.
- Then there are options that determine the formatting of the table. There options are interpreted by the function `org-clocktable-write-default`, but you can specify your own function using the ‘:formatter’ parameter.
- ‘:emphasize’  
When non-`nil`, emphasize level one and level two items.

<sup>20</sup> When using `:step`, `untilnow` starts from the beginning of 2003, not the beginning of time.

- `:lang` Language<sup>21</sup> to use for descriptive cells like “Task”.
- `:link` Link the item headlines in the table to their origins.
- `:narrow` An integer to limit the width of the headline column in the Org table. If you write it like ‘50!’, then the headline is also shortened in export.
- `:indent` Indent each headline field according to its level.
- `:filetitle`  
Show title in the file column if the file has a ‘`#+title`’.
- `:hidefiles`  
Hide the file column when multiple files are used to produce the table.
- `:tcolumns`  
Number of columns to be used for times. If this is smaller than ‘`:maxlevel`’, lower levels are lumped into one column.
- `:level` Should a level number column be included?
- `:sort` A cons cell containing the column to sort and a sorting type. E.g., ‘`:sort (1 . ?a)`’ sorts the first column alphabetically.
- `:compact`  
Abbreviation for ‘`:level nil :indent t :narrow 40! :tcolumns 1`’. All are overwritten except if there is an explicit ‘`:narrow`’.
- `:timestamp`  
A timestamp for the entry, when available. Look for ‘`SCHEDULED`’, ‘`DEADLINE`’, ‘`TIMESTAMP`’ and ‘`TIMESTAMP_IA`’ special properties (see [Section 7.2 \[Special Properties\]](#), page 69), in this order.
- `:tags` When this flag is non-`nil`, show the headline’s tags.
- `:properties`  
List of properties shown in the table. Each property gets its own column.
- `:inherit-props`  
When this flag is non-`nil`, the values for ‘`:properties`’ are inherited.
- `:formula`  
Content of a ‘`TBLFM`’ keyword to be added and evaluated. As a special case, ‘`:formula %`’ adds a column with % time. If you do not specify a formula here, any existing formula below the clock table survives updates and is evaluated.
- `:formatter`  
A function to format clock data and insert it into the buffer.

To get a clock summary of the current level 1 tree, for the current day, you could write:

```
#+BEGIN: clocktable :maxlevel 2 :block today :scope tree1 :link t
#+END:
```

To use a specific time range you could write<sup>22</sup>

<sup>21</sup> Language terms can be set through the variable `org-clock-clocktable-language-setup`.

<sup>22</sup> Note that all parameters must be specified in a single line—the line is broken here only to fit it into the manual.

```
#+BEGIN: clocktable :tstart "<2006-08-10 Thu 10:00>"
                  :tend "<2006-08-10 Thu 12:00>"
#+END:
```

A range starting a week ago and ending right now could be written as

```
#+BEGIN: clocktable :tstart "<-1w>" :tend "<now>"
#+END:
```

A summary of the current subtree with % times would be

```
#+BEGIN: clocktable :scope subtree :link t :formula %
#+END:
```

A horizontally compact representation of everything clocked during last week would be

```
#+BEGIN: clocktable :scope agenda :block lastweek :compact t
#+END:
```

### 8.4.3 Resolving idle time and continuous clocking

#### Resolving idle time

If you clock in on a work item, and then walk away from your computer—perhaps to take a phone call—you often need to “resolve” the time you were away by either subtracting it from the current clock, or applying it to another one.

By customizing the variable `org-clock-idle-time` to some integer, such as 10 or 15, Emacs can alert you when you get back to your computer after being idle for that many minutes<sup>23</sup>, and ask what you want to do with the idle time. There will be a question waiting for you when you get back, indicating how much idle time has passed constantly updated with the current amount, as well as a set of choices to correct the discrepancy:

- k*            To keep some or all of the minutes and stay clocked in, press *k*. Org asks how many of the minutes to keep. Press RET to keep them all, effectively changing nothing, or enter a number to keep that many minutes.
- K*            If you use the shift key and press *K*, it keeps however many minutes you request and then immediately clock out of that task. If you keep all of the minutes, this is the same as just clocking out of the current task.
- s*            To keep none of the minutes, use *s* to subtract all the away time from the clock, and then check back in from the moment you returned.
- S*            To keep none of the minutes and just clock out at the start of the away time, use the shift key and press *S*. Remember that using shift always leave you clocked out, no matter which option you choose.
- C*            To cancel the clock altogether, use *C*. Note that if instead of canceling you subtract the away time, and the resulting clock amount is less than a minute, the clock is still canceled rather than cluttering up the log with an empty entry.

<sup>23</sup> On computers using macOS, idleness is based on actual user idleness, not just Emacs’s idle time. For X11, you can install a utility program ‘`x11idle.c`’, available in the ‘`org-contrib/`’ repository, or install the `xprintidle` package and set it to the variable `org-clock-x11idle-program-name` if you are running Debian, to get the same general treatment of idleness. On other systems, idle time refers to Emacs idle time only.

What if you subtracted those away minutes from the current clock, and now want to apply them to a new clock? Simply clock in to any task immediately after the subtraction. Org will notice that you have subtracted time “on the books”, so to speak, and will ask if you want to apply those minutes to the next task you clock in on.

There is one other instance when this clock resolution magic occurs. Say you were clocked in and hacking away, and suddenly your cat chased a mouse who scared a hamster that crashed into your UPS’s power button! You suddenly lose all your buffers, but thanks to auto-save you still have your recent Org mode changes, including your last clock in.

If you restart Emacs and clock into any task, Org will notice that you have a dangling clock which was never clocked out from your last session. Using that clock’s starting time as the beginning of the unaccounted-for period, Org will ask how you want to resolve that time. The logic and behavior is identical to dealing with away time due to idleness; it is just happening due to a recovery event rather than a set amount of idle time.

You can also check all the files visited by your Org agenda for dangling clocks at any time using `M-x org-resolve-clocks RET` (or `C-c C-x C-z`).

## Continuous clocking

You may want to start clocking from the time when you clocked out the previous task. To enable this systematically, set `org-clock-continuously` to `non-nil`. Each time you clock in, Org retrieves the clock-out time of the last clocked entry for this session, and start the new clock from there.

If you only want this from time to time, use three universal prefix arguments with `org-clock-in` and two `C-u C-u` with `org-clock-in-last`.

## Clocking out automatically after some idle time

When you often forget to clock out before being idle and you don’t want to manually set the clocking time to take into account, you can set `org-clock-auto-clockout-timer` to a number of seconds and add `(org-clock-auto-clockout-insinuate)` to your `.emacs` file.

When the clock is running and Emacs is idle for more than this number of seconds, the clock will be clocked out automatically.

Use `M-x org-clock-toggle-auto-clockout RET` to temporarily turn this on or off.

## 8.5 Effort Estimates

If you want to plan your work in a very detailed way, or if you need to produce offers with quotations of the estimated work effort, you may want to assign effort estimates to entries. If you are also clocking your work, you may later want to compare the planned effort with the actual working time, a great way to improve planning estimates.

Effort estimates are stored in a special property `EFFORT`. Multiple formats are supported, such as `‘3:12’`, `‘1:23:45’`, or `‘1d3h5min’`; see the file `‘org-duration.el’` for more detailed information about the format.

You can set the effort for an entry with the following commands:

**C-c C-x e (org-set-effort)**

Set the effort estimate for the current entry. With a prefix argument, set it to the next allowed value—see below. This command is also accessible from the agenda with the **e** key.

**C-c C-x C-e (org-clock-modify-effort-estimate)**

Modify the effort estimate of the item currently being clocked.

Clearly the best way to work with effort estimates is through column view (see [Section 7.5 \[Column View\]](#), page 71). You should start by setting up discrete values for effort estimates, and a ‘COLUMNS’ format that displays these values together with clock sums—if you want to clock your time. For a specific buffer you can use:

```
#+PROPERTY: Effort_ALL 0 0:10 0:30 1:00 2:00 3:00 4:00 5:00 6:00 7:00
#+COLUMNS: %40ITEM(Task) %17Effort(Estimated Effort){:} %CLOCKSUM
```

or, even better, you can set up these values globally by customizing the variables `org-global-properties` and `org-columns-default-format`. In particular if you want to use this setup also in the agenda, a global setup may be advised.

The way to assign estimates to individual items is then to switch to column mode, and to use *S-RIGHT* and *S-LEFT* to change the value. The values you enter are immediately summed up in the hierarchy. In the column next to it, any clocked time is displayed.

If you switch to column view in the daily/weekly agenda, the effort column summarizes the estimated work effort for each day<sup>24</sup>, and you can use this to find space in your schedule. To get an overview of the entire part of the day that is committed, you can set the option `org-agenda-columns-add-appointments-to-effort-sum`. The appointments on a day that take place over a specified time interval are then also added to the load estimate of the day.

Effort estimates can be used in secondary agenda filtering that is triggered with the `/` key in the agenda (see [Section 11.5 \[Agenda Commands\]](#), page 125). If you have these estimates defined consistently, two or three key presses narrow down the list to stuff that fits into an available time slot.

## 8.6 Taking Notes with a Relative Timer

Org provides two types of timers. There is a relative timer that counts up, which can be useful when taking notes during, for example, a meeting or a video viewing. There is also a countdown timer.

The relative and countdown are started with separate commands.

**C-c C-x 0 (org-timer-start)**

Start or reset the relative timer. By default, the timer is set to 0. When called with a **C-u** prefix, prompt the user for a starting offset. The prompt will default to a timer string at point (if any), providing a convenient way to restart taking notes after a break in the process. When called with a double prefix argument **C-u C-u**, change all timer strings in the active region by a certain amount. This can be used to fix timer strings if the timer was not started at exactly the right moment.

<sup>24</sup> Please note the pitfalls of summing hierarchical data in a flat list (see [Section 11.8 \[Agenda Column View\]](#), page 138).

*C-c C-x ;* (`org-timer-set-timer`)

Start a countdown timer. The user is prompted for a duration. `org-timer-default-timer` sets the default countdown value. Giving a numeric prefix argument overrides this default value. This command is available as `;` in agenda buffers.

Once started, relative and countdown timers are controlled with the same commands.

*C-c C-x .* (`org-timer`)

Insert a relative time into the buffer. The first time you use this, the timer starts. Using a prefix argument restarts it.

*C-c C-x -* (`org-timer-item`)

Insert a description list item with the current relative time. With a prefix argument, first reset the timer to 0.

*M-RET* (`org-insert-heading`)

Once the timer list is started, you can also use *M-RET* to insert new timer items.

*C-c C-x ,* (`org-timer-pause-or-continue`)

Pause the timer, or continue it if it is already paused.

*C-c C-x \_* (`org-timer-stop`)

Stop the timer. After this, you can only start a new timer, not continue the old one. This command also removes the timer from the mode line.

## 9 Refiling and Archiving

Once information is in the system, it may need to be moved around. Org provides Refile, Copy and Archive commands for this. Refile and Copy helps with moving and copying outlines. Archiving helps to keep the system compact and fast.

### 9.1 Refile and Copy

When reviewing the captured data, you may want to refile or to copy some of the entries into a different list, for example into a project. Cutting, finding the right location, and then pasting the note is cumbersome. To simplify this process, you can use the following special command:

**C-c C-w** (`org-refile`)

Refile the entry or region at point. This command offers possible locations for refileing the entry and lets you select one with completion. The item (or all items in the region) is filed below the target heading as a subitem. Depending on `org-reverse-note-order`, it is either the first or last subitem.

By default, all level 1 headlines in the current buffer are considered to be targets, but you can have more complex definitions across a number of files. See the variable `org-refile-targets` for details. If you would like to select a location via a file-path-like completion along the outline path, see the variables `org-refile-use-outline-path` and `org-outline-path-complete-in-steps`. If you would like to be able to create new nodes as new parents for refileing on the fly, check the variable `org-refile-allow-creating-parent-nodes`. When the variable `org-log-refile`<sup>1</sup> is set, a timestamp or a note is recorded whenever an entry is refiled.

**C-u C-c C-w**

Use the refile interface to jump to a heading.

**C-u C-u C-c C-w** (`org-refile-goto-last-stored`)

Jump to the location where `org-refile` last moved a tree to.

**C-2 C-c C-w**

Refile as the child of the item currently being clocked.

**C-3 C-c C-w**

Refile and keep the entry in place. Also see `org-refile-keep` to make this the default behavior, and beware that this may result in duplicated ‘ID’ properties.

**C-0 C-c C-w** or **C-u C-u C-u C-c C-w** (`org-refile-cache-clear`)

Clear the target cache. Caching of refile targets can be turned on by setting `org-refile-use-cache`. To make the command see new possible targets, you have to clear the cache with this command.

**C-c M-w** (`org-refile-copy`)

Copying works like refileing, except that the original note is not deleted.

---

<sup>1</sup> Note the corresponding ‘STARTUP’ options ‘`logrefile`’, ‘`lognoterefile`’, and ‘`nologrefile`’.

`C-c C-M-w` (`org-refile-reverse`)

Works like refiling, except that it temporarily toggles how the value of `org-reverse-note-order` applies to the current buffer. So if `org-refile` would append the entry as the last entry under the target header, `org-refile-reverse` will prepend it as the first entry, and vice-versa.

## 9.2 Archiving

When a project represented by a (sub)tree is finished, you may want to move the tree out of the way and to stop it from contributing to the agenda. Archiving is important to keep your working files compact and global searches like the construction of agenda views fast.

`C-c C-x C-a` (`org-archive-subtree-default`)

Archive the current entry using the command specified in the variable `org-archive-default-command`.

### 9.2.1 Moving a tree to an archive file

The most common archiving action is to move a project tree to another file, the archive file.

`C-c C-x C-s` or short `C-c $` (`org-archive-subtree`)

Archive the subtree starting at point position to the location given by `org-archive-location`.

`C-u C-c C-x C-s`

Check if any direct children of the current headline could be moved to the archive. To do this, check each subtree for open TODO entries. If none is found, the command offers to move it to the archive location. If point is *not* on a headline when this command is invoked, check level 1 trees.

`C-u C-u C-c C-x C-s`

As above, but check subtree for timestamps instead of TODO entries. The command offers to archive the subtree if it *does* contain a timestamp, and that timestamp is in the past.

The default archive location is a file in the same directory as the current file, with the name derived by appending ‘`_archive`’ to the current file name. You can also choose what heading to file archived items under, with the possibility to add them to a datetree in a file. For information and examples on how to specify the file and the heading, see the documentation string of the variable `org-archive-location`.

There is also an in-buffer option for setting this variable, for example:

```
#+ARCHIVE: %s_done::
```

If you would like to have a special archive location for a single entry or a (sub)tree, give the entry an ‘`ARCHIVE`’ property with the location as the value (see [Chapter 7 \[Properties and Columns\]](#), page 67).

When a subtree is moved, it receives a number of special properties that record context information like the file from where the entry came, its outline path the archiving time etc. Configure the variable `org-archive-save-context-info` to adjust the amount of information added.

When `org-archive-subtree-save-file-p` is non-`nil`, save the target archive buffer.

## 9.2.2 Internal archiving

If you want to just switch off—for agenda views—certain subtrees without moving them to a different file, you can use the ‘ARCHIVE’ tag.

A headline that is marked with the ‘ARCHIVE’ tag (see [Chapter 6 \[Tags\], page 62](#)) stays at its location in the outline tree, but behaves in the following way:

- It does not open when you attempt to do so with a visibility cycling command (see [Section 2.2 \[Visibility Cycling\], page 7](#)). You can force cycling archived subtrees with `C-c C-TAB`, or by setting the option `org-cycle-open-archived-trees`. Also normal outline commands, like `org-show-all`, open archived subtrees.
- During sparse tree construction (see [Section 2.5 \[Sparse Trees\], page 12](#)), matches in archived subtrees are not exposed, unless you configure the option `org-sparse-tree-open-archived-trees`.
- During agenda view construction (see [Chapter 11 \[Agenda Views\], page 111](#)), the content of archived trees is ignored unless you configure the option `org-agenda-skip-archived-trees`, in which case these trees are always included. In the agenda you can press `v a` to get archives temporarily included.
- Archived trees are not exported (see [Chapter 13 \[Exporting\], page 151](#)), only the headline is. Configure the details using the variable `org-export-with-archived-trees`.
- Archived trees are excluded from column view unless the variable `org-columns-skip-archived-trees` is configured to `nil`.

The following commands help manage the ‘ARCHIVE’ tag:

`C-c C-x a` (`org-toggle-archive-tag`)

Toggle the archive tag for the current headline. When the tag is set, the headline changes to a shadowed face, and the subtree below it is hidden.

`C-u C-c C-x a`

Check if any direct children of the current headline should be archived. To do this, check each subtree for open TODO entries. If none is found, the command offers to set the ‘ARCHIVE’ tag for the child. If point is *not* on a headline when this command is invoked, check the level 1 trees.

`C-c C-TAB` (`org-cycle-force-archived`)

Cycle a tree even if it is tagged with ‘ARCHIVE’.

`C-c C-x A` (`org-archive-to-archive-sibling`)

Move the current entry to the *Archive Sibling*. This is a sibling of the entry with the heading ‘Archive’ and the archive tag. The entry becomes a child of that sibling and in this way retains a lot of its original context, including inherited tags and approximate position in the outline.

## 10 Capture and Attachments

An important part of any organization system is the ability to quickly capture new ideas and tasks, and to associate reference material with them. Org does this using a process called *capture*. It also can store files related to a task (*attachments*) in a special directory. Finally, it can parse RSS feeds for information. To learn how to let external programs (for example a web browser) trigger Org to capture material, see [Section 17.16 \[Protocols\]](#), page 270.

### 10.1 Capture

Capture lets you quickly store notes with little interruption of your work flow. Org's method for capturing new items is heavily inspired by John Wiegley's excellent Remember package.

#### 10.1.1 Setting up capture

The following customization sets a default target file for notes.

```
(setq org-default-notes-file (concat org-directory "/notes.org"))
```

You may also define a global key for capturing new material (see [Section 1.3 \[Activation\]](#), page 3).

#### 10.1.2 Using capture

*M-x org-capture* (`org-capture`)

Display the capture templates menu. If you have templates defined (see [Section 10.1.3 \[Capture templates\]](#), page 99), it offers these templates for selection or use a new Org outline node as the default template. It inserts the template into the target file and switch to an indirect buffer narrowed to this new node. You may then insert the information you want.

*C-c C-c* (`org-capture-finalize`)

Once you have finished entering information into the capture buffer, *C-c C-c* returns you to the window configuration before the capture process, so that you can resume your work without further distraction. When called with a prefix argument, finalize and then jump to the captured item.

*C-c C-w* (`org-capture-refile`)

Finalize the capture process by refileing the note to a different place (see [Section 9.1 \[Refile and Copy\]](#), page 95). Please realize that this is a normal refileing command that will be executed—so point position at the moment you run this command is important. If you have inserted a tree with a parent and children, first move point back to the parent. Any prefix argument given to this command is passed on to the `org-refile` command.

*C-c C-k* (`org-capture-kill`)

Abort the capture process and return to the previous state.

You can also call `org-capture` in a special way from the agenda, using the *k c* key combination. With this access, any timestamps inserted by the selected capture template defaults to the date at point in the agenda, rather than to the current date.

To find the locations of the last stored capture, use `org-capture` with prefix commands:

***C-u M-x org-capture***

Visit the target location of a capture template. You get to select the template in the usual way.

***C-u C-u M-x org-capture***

Visit the last stored capture item in its buffer.

You can also jump to the bookmark `org-capture-last-stored`, which is automatically created unless you customize `org-bookmark-names-plist`.

To insert the capture at point in an Org buffer, call `org-capture` with a `C-0` prefix argument.

### 10.1.3 Capture templates

You can use templates for different types of capture items, and for different target locations. The easiest way to create such templates is through the customize interface.

**C** Customize the variable `org-capture-templates`.

Before we give the formal description of template definitions, let's look at an example. Say you would like to use one template to create general TODO entries, and you want to put these entries under the heading 'Tasks' in your file '`~/org/gtd.org`'. Also, a date tree in the file '`journal.org`' should capture journal entries. A possible configuration would look like:

```
(setq org-capture-templates
      '((("t" "Todo" entry (file+headline "~/org/gtd.org" "Tasks")
          "* TODO %?\n %i\n %a")
        ("j" "Journal" entry (file+datetree "~/org/journal.org")
          "* %?\nEntered on %U\n %i\n %a"))))
```

If you then press `t` from the capture menu, Org will prepare the template for you like this:

```
* TODO
[[file:LINK TO WHERE YOU INITIATED CAPTURE]]
```

During expansion of the template, '`%a`' has been replaced by a link to the location from where you called the capture command. This can be extremely useful for deriving tasks from emails, for example. You fill in the task definition, press `C-c C-c` and Org returns you to the same place where you started the capture process.

To define special keys to capture to a particular template without going through the interactive template selection, you can create your key binding like this:

```
(define-key global-map (kbd "C-c x")
  (lambda () (interactive) (org-capture nil "x")))
```

#### 10.1.3.1 Template elements

Now let's look at the elements of a template definition. Each entry in `org-capture-templates` is a list with the following items:

**keys** The keys that selects the template, as a string, characters only, for example "`a`", for a template to be selected with a single key, or "`bt`" for selection with two keys. When using several keys, keys using the same prefix key must

be sequential in the list and preceded by a 2-element entry explaining the prefix key, for example:

```
("b" "Templates for marking stuff to buy")
```

If you do not define a template for the *C* key, this key opens the Customize buffer for this complex variable.

description

A short string describing the template, shown during selection.

type

The type of entry, a symbol. Valid values are:

**entry** An Org mode node, with a headline. Will be filed as the child of the target entry or as a top-level entry. The target file should be an Org file.

**item** A plain list item, placed in the first plain list at the target location. Again the target file should be an Org file.

**checkitem**

A checkbox item. This only differs from the plain list item by the default template.

**table-line**

A new line in the first table at the target location. Where exactly the line will be inserted depends on the properties `:prepend` and `:table-line-pos` (see below).

**plain** Text to be inserted as it is.

target

Specification of where the captured item should be placed. In Org files, targets usually define a node. Entries will become children of this node. Other types will be added to the table or list in the body of this node. Most target specifications contain a file name. If that file name is the empty string, it defaults to `org-default-notes-file`. A file can also be given as a variable or as a function called with no argument. When an absolute path is not specified for a target, it is taken as relative to `org-directory`.

Valid values are:

```
‘(file "path/to/file")’
```

Text will be placed at the beginning or end of that file.

```
‘(id "id of existing org entry")’
```

Filing as child of this entry, or in the body of the entry.

```
‘(file+headline "filename" "node headline")’
```

Fast configuration if the target heading is unique in the file.

```
‘(file+olp "filename" "Level 1 heading" "Level 2" ...)’
```

For non-unique headings, the full path is safer.

```
‘(file+regexp "filename" "regexp to find location")’
```

Use a regular expression to position point.



- :empty-lines-after**  
Set this to the number of lines that should be inserted after the new item. Overrides **:empty-lines** for the number of lines inserted after.
- :empty-lines-before**  
Set this to the number of lines that should be inserted before the new item. Overrides **:empty-lines** for the number lines inserted before.
- :clock-in**  
Start the clock in this item.
- :clock-keep**  
Keep the clock running when filing the captured entry.
- :clock-resume**  
If starting the capture interrupted a clock, restart that clock when finished with the capture. Note that **:clock-keep** has precedence over **:clock-resume**. When setting both to non-nil, the current clock will run and the previous one will not be resumed.
- :time-prompt**  
Prompt for a date/time to be used for date/week trees and when filling the template. Without this property, capture uses the current date and time. Even if this property has not been set, you can force the same behavior by calling **org-capture** with a **C-1** prefix argument.
- :tree-type**  
Use **week** to make a week tree instead of the month-day tree, i.e., place the headings for each day under a heading with the current ISO week. Use **month** to group entries by month only. Default is to group entries by day.
- :unnarrowed**  
Do not narrow the target buffer, simply show the full buffer. Default is to narrow it so that you only see the new material.
- :table-line-pos**  
Specification of the location in the table where the new line should be inserted. It should be a string like **'II-3'** meaning that the new line should become the third line before the second horizontal separator line.
- :kill-buffer**  
If the target file was not yet visited when capture was invoked, kill the buffer again after capture is completed.
- :no-save** Do not save the target file after finishing the capture.
- :refile-targets**  
Temporarily set **org-refile-targets** to the value of this property.

- `:hook`      A nullary function or list of nullary functions run before `org-capture-mode-hook` when the template is selected.
- `:prepare-finalize`  
A nullary function or list of nullary functions run before `org-capture-prepare-finalize-hook` when the template is selected.
- `:before-finalize`  
A nullary function or list of nullary functions run before `org-capture-before-finalize-hook` when the template is selected.
- `:after-finalize`  
A nullary function or list of nullary functions run before `org-capture-after-finalize-hook` when the template is selected.

### 10.1.3.2 Template expansion

In the template itself, special “%-escapes”<sup>4</sup> allow dynamic insertion of content. The templates are expanded in the order given here:

- `%[FILE] ’`    Insert the contents of the file given by *FILE*.
- `%(EXP) ’`    Evaluate Emacs expression *EXP* and replace it with the result. The *EXP* form must return a string. Only placeholders pre-existing within the template, or introduced with  `%[file] ’`, are expanded this way. Since this happens after expanding non-interactive “%-escapes”, those can be used to fill the expression.
- `%<FORMAT> ’`  
The result of `format-time-string` on the *FORMAT* specification.
- `%t ’`        Timestamp, date only.
- `%T ’`        Timestamp, with date and time.
- `%u ’, %U ’`    Like  `%t ’`,  `%T ’` above, but inactive timestamps.
- `%i ’`        Initial content, the region when capture is called while the region is active. If there is text before  `%i ’` on the same line, such as indentation, and  `%i ’` is not inside a  `%(exp) ’` form, that prefix is added before every line in the inserted text.
- `%a ’`        Annotation, normally the link created with  `org-store-link`.
- `%A ’`        Like  `%a ’`, but prompt for the description part.
- `%l ’`        Like  `%a ’`, but only insert the literal link.
- `%L ’`        Like  `%l ’`, but without brackets (the link content itself).
- `%c ’`        Current kill ring head.
- `%x ’`        Content of the X clipboard.

---

<sup>4</sup> If you need one of these sequences literally, escape the  `% ’` with a backslash.

<code>'%k'</code>	Title of the currently clocked task.
<code>'%K'</code>	Link to the currently clocked task.
<code>'%n'</code>	User name (taken from <code>user-full-name</code> ).
<code>'%f'</code>	File visited by current buffer when <code>org-capture</code> was called.
<code>'%F'</code>	Full path of the file or directory visited by current buffer.
<code>'%:keyword'</code>	Specific information for certain link types, see below.
<code>'%^g'</code>	Prompt for tags, with completion on tags in target file.
<code>'%^G'</code>	Prompt for tags, with completion all tags in all agenda files.
<code>'%^t'</code>	Like <code>'%t'</code> , but prompt for date. Similarly <code>'%^T'</code> , <code>'%^u'</code> , <code>'%^U'</code> . You may define a prompt like <code>'%^{Birthday}t'</code> .
<code>'%^C'</code>	Interactive selection of which kill or clip to use.
<code>'%^L'</code>	Like <code>'%^C'</code> , but insert as link.
<code>'%^{PROP}p'</code>	Prompt the user for a value for property <i>PROP</i> . You may specify a default value with <code>'%^{PROP default}'</code> .
<code>'%^{PROMPT}X'</code> , X is one of g,G,t,T,u,U,C,L	Prompt the user as in <code>'%^X'</code> , but use the custom prompt string. You may specify a default value and completions with <code>'%^{PROMPT default completion1 completion2 completion3...}'</code> .
<code>'%^{PROMPT}'</code>	Prompt the user for a string and replace this sequence with it. You may specify a default value and a completion table with <code>'%^{prompt default completion2 completion3...}'</code> . The arrow keys access a prompt-specific history.
<code>'%\N'</code>	Insert the text entered at the <i>N</i> th <code>'%^{PROMPT}'</code> , where <i>N</i> is a number, starting from 1.
<code>'%?'</code>	After completing the template, position point here.

For specific link types, the following keywords are defined<sup>5</sup>:

Link type	Available keywords
bbdb	<code>'%:name'</code> , <code>'%:company'</code>
irc	<code>'%:server'</code> , <code>'%:port'</code> , <code>'%:nick'</code>
mh, rmail	<code>'%:type'</code> , <code>'%:subject'</code> , <code>'%:message-id'</code> <code>'%:from'</code> , <code>'%:fromname'</code> , <code>'%:fromaddress'</code> <code>'%:to'</code> , <code>'%:toname'</code> , <code>'%:toaddress'</code> <code>'%:date'</code> (message date header field) <code>'%:date-timestamp'</code> (date as active timestamp)

<sup>5</sup> If you define your own link types (see [Section A.3 \[Adding Hyperlink Types\]](#), page 276), any property you store with `org-store-link-props` can be accessed in capture templates in a similar way.

	<code>'%:date-timestamp-inactive'</code> (date as inactive timestamp)
	<code>'%:fromto'</code> (either “to NAME” or “from NAME”) <sup>6</sup>
gnus	<code>'%:group'</code> , for messages also all email fields
w3, w3m	<code>'%:url'</code>
info	<code>'%:file'</code> , <code>'%:node'</code>
calendar	<code>'%:date'</code>
org-protocol	<code>'%:link'</code> , <code>'%:description'</code> , <code>'%:annotation'</code>

### 10.1.3.3 Templates in contexts

To control whether a capture template should be accessible from a specific context, you can customize `org-capture-templates-contexts`. Let’s say, for example, that you have a capture template “p” for storing Gnus emails containing patches. Then you would configure this option like this:

```
(setq org-capture-templates-contexts
      '(("p" ((in-mode . "message-mode")))))
```

You can also tell that the command key `p` should refer to another template. In that case, add this command key like this:

```
(setq org-capture-templates-contexts
      '(("p" "q" ((in-mode . "message-mode")))))
```

See the docstring of the variable for more information.

## 10.2 Attachments

It is often useful to associate reference material with an outline node. Small chunks of plain text can simply be stored in the subtree of a project. Hyperlinks (see [Chapter 4 \[Hyperlinks\], page 39](#)) can establish associations with files that live elsewhere on a local, or even remote, computer, like emails or source code files belonging to a project.

Another method is *attachments*, which are files located in a directory belonging to an outline node. Org uses directories either named by a unique ID of each entry, or by a ‘DIR’ property.

### 10.2.1 Attachment defaults and dispatcher

By default, Org attach uses ID properties when adding attachments to outline nodes. This makes working with attachments fully automated. There is no decision needed for folder-name or location. ID-based directories are by default located in the ‘data/’ directory, which lives in the same directory where your Org file lives<sup>7</sup>.

When attachments are made using `org-attach` a default tag ‘ATTACH’ is added to the node that gets the attachments.

For more control over the setup, see [Section 10.2.2 \[Attachment options\], page 107](#).

The following commands deal with attachments:

<sup>6</sup> This is always the other, not the user. See the variable `org-link-from-user-regexp`.

<sup>7</sup> If you move entries or Org files from one directory to another, you may want to configure `org-attach-id-dir` to contain an absolute path.

**C-c C-a (org-attach)**

The dispatcher for commands related to the attachment system. After these keys, a list of commands is displayed and you must press an additional key to select a command:

**a (org-attach-attach)**

Select a file and move it into the task's attachment directory. The file is copied, moved, or linked, depending on `org-attach-method`. Note that hard links are not supported on all systems.

**c/m/l** Attach a file using the copy/move/link method. Note that hard links are not supported on all systems.

**b (org-attach-buffer)**

Select a buffer and save it as a file in the task's attachment directory.

**n (org-attach-new)**

Create a new attachment as an Emacs buffer.

**z (org-attach-sync)**

Synchronize the current task with its attachment directory, in case you added attachments yourself.

**o (org-attach-open)**

Open current task's attachment. If there is more than one, prompt for a file name first. Opening follows the rules set by `org-file-apps`. For more details, see the information on following hyperlinks (see [Section 4.5 \[Handling Links\]](#), page 43).

**O (org-attach-open-in-emacs)**

Also open the attachment, but force opening the file in Emacs.

**f (org-attach-reveal)**

Open the current task's attachment directory.

**F (org-attach-reveal-in-emacs)**

Also open the directory, but force using Dired in Emacs.

**d (org-attach-delete-one)**

Select and delete a single attachment.

**D (org-attach-delete-all)**

Delete all of a task's attachments. A safer way is to open the directory in Dired and delete from there.

**s (org-attach-set-directory)**

Set a specific directory as the entry's attachment directory. This works by putting the directory path into the 'DIR' property.

**S (org-attach-unset-directory)**

Remove the attachment directory. This command removes the 'DIR' property and asks the user to either move content inside that folder, if an 'ID' property is set, delete the content, or to leave the attachment directory as is but no longer attached to the outline node.

## 10.2.2 Attachment options

There are a couple of options for attachments that are worth mentioning.

### `org-attach-id-dir`

The directory where attachments are stored when ‘ID’ is used as method.

### `org-attach-dir-relative`

When setting the ‘DIR’ property on a node using `C-c C-a s` (`org-attach-set-directory`), absolute links are entered by default. This option changes that to relative links.

### `org-attach-use-inheritance`

By default folders attached to an outline node are inherited from parents according to `org-use-property-inheritance`. If one instead want to set inheritance specifically for Org attach that can be done using `org-attach-use-inheritance`. Inheriting documents through the node hierarchy makes a lot of sense in most cases. Especially when using attachment links (see [Section 10.2.3 \[Attachment links\], page 108](#)). The following example shows one use case for attachment inheritance:

```
* Chapter A ...
  :PROPERTIES:
  :DIR: Chapter A/
  :END:
** Introduction
Some text

#+NAME: Image 1
[[attachment:image 1.jpg]]
```

Without inheritance one would not be able to resolve the link to ‘image 1.jpg’, since the link is inside a sub-heading to ‘Chapter A’.

Inheritance works the same way for both ‘ID’ and ‘DIR’ property. If both properties are defined on the same headline then ‘DIR’ takes precedence. This is also true if inheritance is enabled. If ‘DIR’ is inherited from a parent node in the outline, that property still takes precedence over an ‘ID’ property defined on the node itself.

### `org-attach-method`

When attaching files using the dispatcher `C-c C-a` it defaults to copying files. The behavior can be changed by customizing `org-attach-method`. Options are Copy, Move/Rename, Hard link or Symbolic link.

### `org-attach-preferred-new-method`

This customization lets you choose the default way to attach to nodes without existing ‘ID’ and ‘DIR’ property. It defaults to `id` but can also be set to `dir`, `ask` or `nil`.

### `org-attach-archive-delete`

Configure this to determine if attachments should be deleted or not when a subtree that has attachments is archived.

**org-attach-auto-tag**

When attaching files to a heading it will be assigned a tag according to what is set here.

**org-attach-id-to-path-function-list**

When ‘ID’ is used for attachments, the ID is parsed into a part of a directory-path. See **org-attach-id-uuid-folder-format** for the default function. Define a new one and add it as first element in **org-attach-id-to-path-function-list** if you want the folder structure in any other way. All functions in this list will be tried when resolving existing ID’s into paths, to maintain backward compatibility with existing folders in your system.

**org-attach-store-link-p**

Stores a link to the file that is being attached. The link is stored in **org-stored-links** for later insertion with *C-c C-l* (see [Section 4.5 \[Handling Links\], page 43](#)). Depending on what option is set in **org-attach-store-link-p**, the link is stored to either the original location as a file link, the attachment location as an attachment link or to the attachment location as a file link.

**org-attach-commands**

List of all commands used in the attach dispatcher.

**org-attach-expert**

Do not show the splash buffer with the attach dispatcher when **org-attach-expert** is set to **non-nil**.

See customization group ‘Org Attach’ if you want to change the default settings.

### 10.2.3 Attachment links

Attached files and folders can be referenced using attachment links. This makes it easy to refer to the material added to an outline node. Especially if it was attached using the unique ID of the entry!

```
* TODO Some task
:PROPERTIES:
:ID:          95d50008-c12e-479f-a4f2-cc0238205319
:END:
```

See attached document for more information: `[[attachment:info.org]]`

See [Section 4.4 \[External Links\], page 41](#) for more information about these links.

### 10.2.4 Automatic version-control with Git

If the directory attached to an outline node is a Git repository, Org can be configured to automatically commit changes to that repository when it sees them.

To make Org mode take care of versioning of attachments for you, add the following to your Emacs config:

```
(require 'org-attach-git)
```

### 10.2.5 Attach from Dired

It is possible to attach files to a subtree from a Dired buffer. To use this feature, have one window in Dired mode containing the file(s) to be attached and another window with point in the subtree that shall get the attachments. In the Dired window, with point on a file, *M-x org-attach-dired-to-subtree* attaches the file to the subtree using the attachment method set by variable `org-attach-method`. When files are marked in the Dired window then all marked files get attached.

Add the following lines to the Emacs init file to have *C-c C-x a* attach files in Dired buffers.

```
(add-hook 'dired-mode-hook
  (lambda ()
    (define-key dired-mode-map
      (kbd "C-c C-x a")
      #'org-attach-dired-to-subtree)))
```

The following code shows how to bind the previous command with a specific attachment method.

```
(add-hook 'dired-mode-hook
  (lambda ()
    (define-key dired-mode-map (kbd "C-c C-x c")
      (lambda ()
        (interactive)
        (let ((org-attach-method 'cp))
          (call-interactively #'org-attach-dired-to-subtree))))))
```

## 10.3 RSS Feeds

Org can add and change entries based on information found in RSS feeds and Atom feeds. You could use this to make a task out of each new podcast in a podcast feed. Or you could use a phone-based note-creating service on the web to import tasks into Org. To access feeds, configure the variable `org-feed-alist`. The docstring of this variable has detailed information. With the following

```
(setq org-feed-alist
  '(("Slashdot"
     "https://rss.slashdot.org/Slashdot/slashdot"
     "~/txt/org/feeds.org" "Slashdot Entries")))
```

new items from the feed provided by `'rss.slashdot.org'` result in new entries in the file `'~/org/feeds.org'` under the heading `'Slashdot Entries'`, whenever the following command is used:

*C-c C-x g* (`org-feed-update-all`)  
Collect items from the feeds configured in `org-feed-alist` and act upon them.

*C-c C-x G* (`org-feed-goto-inbox`)  
Prompt for a feed name and go to the inbox configured for this feed.

Under the same headline, Org creates a drawer `'FEEDSTATUS'` in which it stores information about the status of items in the feed, to avoid adding the same item several times.

For more information, including how to read atom feeds, see `'org-feed.el'` and the docstring of `org-feed-alist`.

## 11 Agenda Views

Due to the way Org works, TODO items, time-stamped items, and tagged headlines can be scattered throughout a file or even a number of files. To get an overview of open action items, or of events that are important for a particular date, this information must be collected, sorted and displayed in an organized way.

Org can select items based on various criteria and display them in a separate buffer. Six different view types are provided:

- an *agenda* that is like a calendar and shows information for specific dates,
- a *TODO list* that covers all unfinished action items,
- a *match view*, showing headlines based on the tags, properties, and TODO state associated with them,
- a *text search view* that shows all entries from multiple files that contain specified keywords,
- a *stuck projects view* showing projects that currently do not move along, and
- *custom views* that are special searches and combinations of different views.

The extracted information is displayed in a special *agenda buffer*. This buffer is read-only, but provides commands to visit the corresponding locations in the original Org files, and even to edit these files remotely.

By default, the report ignores commented (see [Section 13.6 \[Comment Lines\]](#), page 159) and archived (see [Section 9.2.2 \[Internal archiving\]](#), page 97) entries. You can override this by setting `org-agenda-skip-comment-trees` and `org-agenda-skip-archived-trees` to `nil`.

Two variables control how the agenda buffer is displayed and whether the window configuration is restored when the agenda exits: `org-agenda-window-setup` and `org-agenda-restore-windows-after-quit`.

### 11.1 Agenda Files

The information to be shown is normally collected from all *agenda files*, the files listed in the variable `org-agenda-files`<sup>1</sup>. If a directory is part of this list, all files with the extension `.org` in this directory are part of the list.

Thus, even if you only work with a single Org file, that file should be put into the list<sup>2</sup>. You can customize `org-agenda-files`, but the easiest way to maintain it is through the following commands

**C-c [ (org-agenda-file-to-front)**

Add current file to the list of agenda files. The file is added to the front of the list. If it was already in the list, it is moved to the front. With a prefix argument, file is added/moved to the end.

<sup>1</sup> If the value of that variable is not a list, but a single file name, then the list of agenda files is maintained in that external file.

<sup>2</sup> When using the dispatcher, pressing `<` before selecting a command actually limits the command to the current file, and ignores `org-agenda-files` until the next dispatcher command.

`C-c ]` (`org-remove-file`)

Remove current file from the list of agenda files.

`C-'`

`C-,` (`org-cycle-agenda-files`)

Cycle through agenda file list, visiting one file after the other.

`M-x org-switchb`

Command to use an `Iswitchb`-like interface to switch to and between Org buffers.

The Org menu contains the current list of files and can be used to visit any of them.

If you would like to focus the agenda temporarily on a file not in this list, or on just one file in the list, or even on only a subtree in a file, then this can be done in different ways. For a single agenda command, you may press `<` once or several times in the dispatcher (see [Section 11.2 \[Agenda Dispatcher\]](#), page 112). To restrict the agenda scope for an extended period, use the following commands:

`C-c C-x <` (`org-agenda-set-restriction-lock`)

Restrict the agenda to the current subtree. If there already is a restriction at point, remove it. When called with a universal prefix argument or with point before the first headline in a file, set the agenda scope to the entire file. This restriction remains in effect until removed with `C-c C-x >`, or by typing either `<` or `>` in the agenda dispatcher. If there is a window displaying an agenda view, the new restriction takes effect immediately.

`C-c C-x >` (`org-agenda-remove-restriction-lock`)

Remove the restriction created by `C-c C-x <`.

When working with Speedbar, you can use the following commands in the Speedbar frame:

`<` (`org-speedbar-set-agenda-restriction`)

Restrict the agenda to the item—either an Org file or a subtree in such a file—at point in the Speedbar frame. If agenda is already restricted there, remove the restriction. If there is a window displaying an agenda view, the new restriction takes effect immediately.

`>` (`org-agenda-remove-restriction-lock`)

Remove the restriction.

## 11.2 The Agenda Dispatcher

The views are created through a dispatcher, accessible with `M-x org-agenda`, or, better, bound to a global key (see [Section 1.3 \[Activation\]](#), page 3). It displays a menu from which an additional letter is required to execute a command. The dispatcher offers the following default commands:

`a` Create the calendar-like agenda (see [Section 11.3.1 \[Weekly/daily agenda\]](#), page 113).

`t`

`T` Create a list of all TODO items (see [Section 11.3.2 \[Global TODO list\]](#), page 116).

- m*
- M* Create a list of headlines matching a given expression (see [Section 11.3.3 \[Matching tags and properties\]](#), page 117).
- s* Create a list of entries selected by a boolean expression of keywords and/or regular expressions that must or must not occur in the entry.
- /* Search for a regular expression in all agenda files and additionally in the files listed in `org-agenda-text-search-extra-files`. This uses the Emacs command `multi-occur`. A prefix argument can be used to specify the number of context lines for each match, the default is 1.
- #* Create a list of stuck projects (see [Section 11.3.5 \[Stuck projects\]](#), page 120).
- !* Configure the list of stuck projects (see [Section 11.3.5 \[Stuck projects\]](#), page 120).
- <* Restrict an agenda command to the current buffer<sup>3</sup>. If narrowing is in effect restrict to the narrowed part of the buffer. After pressing *<*, you still need to press the character selecting the command.
- < <* If there is an active region, restrict the following agenda command to the region. Otherwise, restrict it to the current subtree. After pressing *< <*, you still need to press the character selecting the command.
- \** Toggle sticky agenda views. By default, Org maintains only a single agenda buffer and rebuilds it each time you change the view, to make sure everything is always up to date. If you switch between views often and the build time bothers you, you can turn on sticky agenda buffers (make this the default by customizing the variable `org-agenda-sticky`). With sticky agendas, the dispatcher only switches to the selected view, you need to update it by hand with *r* or *g*. You can toggle sticky agenda view any time with `org-toggle-sticky-agenda`.

You can also define custom commands that are accessible through the dispatcher, just like the default commands. This includes the possibility to create extended agenda buffers that contain several blocks together, for example the weekly agenda, the global TODO list and a number of special tags matches. See [Section 11.6 \[Custom Agenda Views\]](#), page 133.

## 11.3 The Built-in Agenda Views

In this section we describe the built-in views.

### 11.3.1 Weekly/daily agenda

The purpose of the weekly/daily *agenda* is to act like a page of a paper agenda, showing all the tasks for the current week or day.

---

<sup>3</sup> For backward compatibility, you can also press *1* to restrict to the current buffer.

*M-x org-agenda a (org-agenda-list)*

Compile an agenda for the current week from a list of Org files. The agenda shows the entries for each day. With a numeric prefix argument<sup>4</sup>—like *C-u 2 1 M-x org-agenda a*—you may set the number of days to be displayed.

The default number of days displayed in the agenda is set by the variable `org-agenda-span`. This variable can be set to any number of days you want to see by default in the agenda, or to a span name, such as `day`, `week`, `month` or `year`. For weekly agendas, the default is to start on the previous Monday (see `org-agenda-start-on-weekday`). You can also set the start date using a date shift: `(setq org-agenda-start-day "+10d")` starts the agenda ten days from today in the future. `org-agenda-start-on-weekday` takes precedence over `org-agenda-start-day` in weekly and bi-weekly agendas.

Remote editing from the agenda buffer means, for example, that you can change the dates of deadlines and appointments from the agenda buffer. The commands available in the Agenda buffer are listed in [Section 11.5 \[Agenda Commands\]](#), page 125.

## Calendar/Diary integration

Emacs contains the calendar and diary by Edward M. Reingold. The calendar displays a three-month calendar with holidays from different countries and cultures. The diary allows you to keep track of anniversaries, lunar phases, sunrise/set, recurrent appointments (weekly, monthly) and more. In this way, it is quite complementary to Org. It can be very useful to combine output from Org with the diary.

In order to include entries from the Emacs diary into Org mode’s agenda, you only need to customize the variable

```
(setq org-agenda-include-diary t)
```

After that, everything happens automatically. All diary entries including holidays, anniversaries, etc., are included in the agenda buffer created by Org mode. `SPC`, `TAB`, and `RET` can be used from the agenda buffer to jump to the diary file in order to edit existing diary entries. The `i` command to insert new entries for the current date works in the agenda buffer, as well as the commands `S`, `M`, and `C` to display Sunrise/Sunset times, show lunar phases and to convert to other calendars, respectively. `c` can be used to switch back and forth between calendar and agenda.

If you are using the diary only for expression entries and holidays, it is faster to not use the above setting, but instead to copy or even move the entries into an Org file. Org mode evaluates diary-style expression entries, and does it faster because there is no overhead for first creating the diary display. Note that the expression entries must start at the left margin, no whitespace is allowed before them, as seen in the following segment of an Org file:<sup>5</sup>

```
* Holidays
:PROPERTIES:
:CATEGORY: Holiday
```

<sup>4</sup> For backward compatibility, the universal prefix argument `C-u` causes all TODO entries to be listed before the agenda. This feature is deprecated, use the dedicated TODO list, or a block agenda instead (see [Section 11.6.2 \[Block agenda\]](#), page 134).

<sup>5</sup> The variable `org-anniversary` used in the example is just like `diary-anniversary`, but the argument order is always according to ISO and therefore independent of the value of `calendar-date-style`.

```

:END:
%%(org-calendar-holiday) ; special function for holiday names

* Birthdays
:PROPERTIES:
:CATEGORY: Ann
:END:
%%(org-anniversary 1956 5 14) Arthur Dent is %d years old
%%(org-anniversary 1869 10 2) Mahatma Gandhi would be %d years old

```

## Anniversaries from BBDB

If you are using the Insidious Big Brother Database to store your contacts, you very likely prefer to store anniversaries in BBDB rather than in a separate Org or diary file. Org supports this and can show BBDB anniversaries as part of the agenda. All you need to do is to add the following to one of your agenda files:

```

* Anniversaries
:PROPERTIES:
:CATEGORY: Anniv
:END:
%%(org-bbdb-anniversaries)

```

You can then go ahead and define anniversaries for a BBDB record. Basically, you need a field named ‘anniversary’ for the BBDB record which contains the date in the format ‘YYYY-MM-DD’ or ‘MM-DD’, followed by a space and the class of the anniversary (‘birthday’, ‘wedding’, or a format string). If you omit the class, it defaults to ‘birthday’. Here are a few examples, the header for the file ‘ol-bbdb.el’ contains more detailed information.

```

1973-06-22
06-22
1955-08-02 wedding
2008-04-14 %s released version 6.01 of Org mode, %d years ago

```

After a change to BBDB, or for the first agenda display during an Emacs session, the agenda display suffers a short delay as Org updates its hash with anniversaries. However, from then on things will be very fast, much faster in fact than a long list of ‘%%(diary-anniversary)’ entries in an Org or Diary file.

If you would like to see upcoming anniversaries with a bit of forewarning, you can use the following instead:

```

* Anniversaries
:PROPERTIES:
:CATEGORY: Anniv
:END:
%%(org-bbdb-anniversaries-future 3)

```

That will give you three days’ warning: on the anniversary date itself and the two days prior. The argument is optional: if omitted, it defaults to 7.

## Appointment reminders

Org can interact with Emacs appointments notification facility. To add the appointments of your agenda files, use the command `org-agenda-to-appt`. This command lets you filter through the list of your appointments and add only those belonging to a specific category or matching a regular expression. It also reads a `'APPT_WARNTIME'` property which overrides the value of `appt-message-warning-time` for this appointment. See the docstring for details.

### 11.3.2 The global TODO list

The global TODO list contains all unfinished TODO items formatted and collected into a single place.

*M-x org-agenda t* (`org-todo-list`)

Show the global TODO list. This collects the TODO items from all agenda files (see [Chapter 11 \[Agenda Views\], page 111](#)) into a single buffer. By default, this lists items with a state that is not a DONE state. The buffer is in Agenda mode, so there are commands to examine and manipulate the TODO entries directly from that buffer (see [Section 11.5 \[Agenda Commands\], page 125](#)).

*M-x org-agenda T* (`org-todo-list`)

Like the above, but allows selection of a specific TODO keyword. You can also do this by specifying a prefix argument to `t`. You are prompted for a keyword, and you may also specify several keywords by separating them with `'|'` as the boolean OR operator. With a numeric prefix, the Nth keyword in `org-todo-keywords` is selected.

The `r` key in the agenda buffer regenerates it, and you can give a prefix argument to this command to change the selected TODO keyword, for example `3 r`. If you often need a search for a specific keyword, define a custom command for it (see [Section 11.2 \[Agenda Dispatcher\], page 112](#)).

Matching specific TODO keywords can also be done as part of a tags search (see [Section 6.4 \[Tag Searches\], page 66](#)).

Remote editing of TODO items means that you can change the state of a TODO entry with a single key press. The commands available in the TODO list are described in [Section 11.5 \[Agenda Commands\], page 125](#).

Normally the global TODO list simply shows all headlines with TODO keywords. This list can become very long. There are two ways to keep it more compact:

- Some people view a TODO item that has been *scheduled* for execution or have a *deadline* (see [Section 8.1 \[Timestamps\], page 77](#)) as no longer *open*. Configure the variables `org-agenda-todo-ignore-scheduled` to exclude some or all scheduled items from the global TODO list, `org-agenda-todo-ignore-deadlines` to exclude some or all items with a deadline set, `org-agenda-todo-ignore-timestamp` to exclude some or all items with an active timestamp other than a DEADLINE or a SCHEDULED timestamp and/or `org-agenda-todo-ignore-with-date` to exclude items with at least one active timestamp.
- TODO items may have sublevels to break up the task into subtasks. In such cases it may be enough to list only the highest level TODO headline and omit the sublevels

from the global list. Configure the variable `org-agenda-todo-list-sublevels` to get this behavior.

### 11.3.3 Matching tags and properties

If headlines in the agenda files are marked with *tags* (see [Chapter 6 \[Tags\]](#), page 62), or have properties (see [Chapter 7 \[Properties and Columns\]](#), page 67), you can select headlines based on this metadata and collect them into an agenda buffer. The match syntax described here also applies when creating sparse trees with `C-c / m`.

#### *M-x org-agenda m* (`org-tags-view`)

Produce a list of all headlines that match a given set of tags. The command prompts for a selection criterion, which is a boolean logic expression with tags, like `+work+urgent-withboss` or `work|home` (see [Chapter 6 \[Tags\]](#), page 62). If you often need a specific search, define a custom command for it (see [Section 11.2 \[Agenda Dispatcher\]](#), page 112).

#### *M-x org-agenda M* (`org-tags-view`)

Like *m*, but only select headlines that are also TODO items. To exclude scheduled/deadline items, see the variable `org-agenda-tags-todo-honor-ignore-options`. Matching specific TODO keywords together with a tags match is also possible, see [Section 6.4 \[Tag Searches\]](#), page 66.

The commands available in the tags list are described in [Section 11.5 \[Agenda Commands\]](#), page 125.

A search string can use Boolean operators `&` for AND and `|` for OR. `&` binds more strongly than `|`. Parentheses are currently not implemented. Each element in the search is either a tag, a regular expression matching tags, or an expression like `PROPERTY OPERATOR VALUE` with a comparison operator, accessing a property value. Each element may be preceded by `-` to select against it, and `+` is syntactic sugar for positive selection. The AND operator `&` is optional when `+` or `-` is present. Here are some examples, using only tags.

`+work-boss`

Select headlines tagged `work`, but discard those also tagged `boss`.

`work|laptop`

Selects lines tagged `work` or `laptop`.

`work|laptop+night`

Like before, but require the `laptop` lines to be tagged also `night`.

Instead of a tag, you may also specify a regular expression enclosed in curly braces (see [Section 17.9 \[Regular Expressions\]](#), page 264). For example, `work+{^boss.*}` matches headlines that contain the tag `:work:` and any tag *starting* with `boss`.

Group tags (see [Section 6.3 \[Tag Hierarchy\]](#), page 65) are expanded as regular expressions. E.g., if `work` is a group tag for the group `:work:lab:conf:`, then searching for `work` also searches for `{\(?:work\\|lab\\|conf\\)}` and searching for `-work` searches for all headlines but those with one of the tags in the group (i.e., `-{\(?:work\\|lab\\|conf\\)}`).

You may also test for properties (see [Chapter 7 \[Properties and Columns\]](#), page 67) at the same time as matching tags. The properties may be real properties, or special properties that represent other metadata (see [Section 7.2 \[Special Properties\]](#), page 69). For example, the property ‘TODO’ represents the TODO keyword of the entry. Or, the property ‘LEVEL’ represents the level of an entry. So searching ‘+LEVEL=3+boss-TODO="DONE"’ lists all level three headlines that have the tag ‘boss’ and are *not* marked with the TODO keyword ‘DONE’. In buffers with `org-odd-levels-only` set, ‘LEVEL’ does not count the number of stars, but ‘LEVEL=2’ corresponds to 3 stars etc.

Here are more examples:

```
‘work+TODO="WAITING"’
```

Select ‘work’-tagged TODO lines with the specific TODO keyword ‘WAITING’.

```
‘work+TODO="WAITING"|home+TODO="WAITING"’
```

Waiting tasks both at work and at home.

When matching properties, a number of different operators can be used to test the value of a property. Here is a complex example:

```
+work-boss+PRIORITY="A"+Coffee="unlimited"+Effort<*2
  +With={Sarah\Denny}+SCHEDULED>="<2008-10-11>"
```

The type of comparison depends on how the comparison value is written:

- If the comparison value is a plain number, a numerical comparison is done, and the allowed operators are ‘<’, ‘=’, ‘>’, ‘<=’, ‘>=’, and ‘<>’. As a synonym for the equality operator ‘=’, there is also ‘==’; ‘!=’ and ‘/=’ are synonyms of the inequality operator ‘<>’.
- If the comparison value is enclosed in double-quotes, a string comparison is done, and the same operators are allowed.
- If the comparison value is enclosed in double-quotes *and* angular brackets (like ‘DEADLINE<="<2008-12-24 18:30>"’), both values are assumed to be date/time specifications in the standard Org way, and the comparison is done accordingly. Valid values also include “<now>” for now (including time), “<today>”, and “<tomorrow>” for these days at 0:00 hours, i.e., without a time specification. You can also use strings like “<+5d>” or “<-2m>” with units ‘d’, ‘w’, ‘m’, and ‘y’ for day, week, month, and year, respectively.
- If the comparison value is enclosed in curly braces, a regexp match is performed, with ‘=’ meaning that the regexp matches the property value, and ‘<>’ meaning that it does not match.
- All operators may be optionally followed by an asterisk ‘\*’, like in ‘<\*', ‘!=\*’, etc. Such *starred operators* work like their regular, unstarred counterparts except that they match only headlines where the tested property is actually present. This is most useful for search terms that logically exclude results, like the inequality operator.

So the search string in the example finds entries tagged ‘work’ but not ‘boss’, which also have a priority value ‘A’, a ‘Coffee’ property with the value ‘unlimited’, an ‘EFFORT’ property that is numerically smaller than 2, a ‘With’ property that is matched by the regular expression ‘Sarah\Denny’, and that are scheduled on or after October 11, 2008.

Note that the test on the ‘EFFORT’ property uses operator ‘<\*', so that the search result will include only entries that actually have an ‘EFFORT’ property defined and with numerical

value smaller than 2. With the regular ‘<’ operator, the search would handle entries without an ‘EFFORT’ property as having a zero effort and would include them in the result as well.

You can use all characters valid in property names when matching properties. However, you have to quote some characters in property names with backslashes when using them in search strings, namely all characters different from alphanumerics and underscores<sup>6</sup>. For example, to search for all entries having a property ‘`boss-prio`’, ‘`boss:prio`’, or ‘`boss\prio`’, respectively, with value ‘C’, use search strings

```
boss\-prio="C"
boss\:prio="C"
boss\\prio="C"
```

You can configure Org mode to use property inheritance during a search, but beware that this can slow down searches considerably. See [Section 7.4 \[Property Inheritance\]](#), page 70, for details.

For backward compatibility, and also for typing speed, there is also a different way to test TODO states in a search. For this, terminate the tags/property part of the search string (which may include several terms connected with ‘|’) with a ‘/’ and then specify a Boolean expression just for TODO keywords. The syntax is then similar to that for tags, but should be applied with care: for example, a positive selection on several TODO keywords cannot meaningfully be combined with boolean AND. However, *negative selection* combined with AND can be meaningful. To make sure that only lines are checked that actually have any TODO keyword (resulting in a speed-up), use `M-x org-agenda M`, or equivalently start the TODO part after the slash with ‘!’. Using `M-x org-agenda M` or ‘/!’ does not match TODO keywords in a DONE state. Examples:

```
‘work/WAITING’
```

Same as ‘`work+TODO="WAITING"`’.

```
‘work/!-WAITING-NEXT’
```

Select ‘`work`’-tagged TODO lines that are neither ‘`WAITING`’ nor ‘`NEXT`’.

```
‘work/!+WAITING|+NEXT’
```

Select ‘`work`’-tagged TODO lines that are either ‘`WAITING`’ or ‘`NEXT`’.

### 11.3.4 Search view

This agenda view is a general text search facility for Org mode entries. It is particularly useful to find notes.

`M-x org-agenda s (org-search-view)`

This is a special search that lets you select entries by matching a substring or specific words using a boolean logic.

For example, the search string ‘`computer equipment`’ matches entries that contain ‘`computer equipment`’ as a substring, even if the two words are separated by more space or a line break.

Search view can also search for specific keywords in the entry, using Boolean logic. The search string ‘`+computer +wifi -ethernet -{8\11[bg]}`’ matches note entries that contain the keywords ‘`computer`’ and ‘`wifi`’, but not the keyword ‘`ethernet`’, and which are

<sup>6</sup> If you quote alphanumeric characters or underscores with a backslash, that backslash is ignored.

also not matched by the regular expression ‘8\.11[bg]’, meaning to exclude both ‘8.11b’ and ‘8.11g’. The first ‘+’ is necessary to turn on boolean search, other ‘+’ characters are optional. For more details, see the docstring of the command `org-search-view`.

You can incrementally and conveniently adjust a boolean search from the agenda search view with the following keys

```
[      Add a positive search word
]      Add a negative search word
{      Add a positive regular expression
}      Add a negative regular expression
```

Note that in addition to the agenda files, this command also searches the files listed in `org-agenda-text-search-extra-files`.

### 11.3.5 Stuck projects

If you are following a system like David Allen’s GTD to organize your work, one of the “duties” you have is a regular review to make sure that all projects move along. A *stuck* project is a project that has no defined next actions, so it never shows up in the TODO lists Org mode produces. During the review, you need to identify such projects and define next actions for them.

```
M-x org-agenda # (org-agenda-list-stuck-projects)
      List projects that are stuck.
```

```
M-x org-agenda !
      Customize the variable org-stuck-projects to define what a stuck project is
      and how to find it.
```

You almost certainly need to configure this view before it works for you. The built-in default assumes that all your projects are level-2 headlines, and that a project is not stuck if it has at least one entry marked with a TODO keyword ‘TODO’ or ‘NEXT’ or ‘NEXTACTION’.

Let’s assume that you, in your own way of using Org mode, identify projects with a tag ‘:PROJECT:’, and that you use a TODO keyword ‘MAYBE’ to indicate a project that should not be considered yet. Let’s further assume that the TODO keyword ‘DONE’ marks finished projects, and that ‘NEXT’ and ‘TODO’ indicate next actions. The tag ‘:@shop:’ indicates shopping and is a next action even without the NEXT tag. Finally, if the project contains the special word ‘IGNORE’ anywhere, it should not be listed either. In this case you would start by identifying eligible projects with a tags/TODO match (see [Section 6.4 \[Tag Searches\]](#), page 66) ‘+PROJECT/-MAYBE-DONE’, and then check for ‘TODO’, ‘NEXT’, ‘@shop’, and ‘IGNORE’ in the subtree to identify projects that are not stuck. The correct customization for this is:

```
(setq org-stuck-projects
      '( "+PROJECT/-MAYBE-DONE" ("NEXT" "TODO") ("@shop")
        "\\<IGNORE\\>"))
```

Note that if a project is identified as non-stuck, the subtree of this entry is searched for stuck projects.

## 11.4 Presentation and Sorting

Before displaying items in an agenda view, Org mode visually prepares the items and sorts them. Each item occupies a single line. The line starts with a *prefix* that contains the *category* (see [Section 11.4.1 \[Categories\], page 121](#)) of the item and other important information. You can customize in which column tags are displayed through `org-agenda-tags-column`. You can also customize the prefix using the option `org-agenda-prefix-format`. This prefix is followed by a cleaned-up version of the outline headline associated with the item.

### 11.4.1 Categories

The category is a broad label assigned to each agenda item. By default, the category is simply derived from the file name, but you can also specify it with a special line in the buffer, like this:

```
#+CATEGORY: Thesis
```

If you would like to have a special category for a single entry or a (sub)tree, give the entry a ‘CATEGORY’ property with the special category you want to apply as the value.

The display in the agenda buffer looks best if the category is not longer than 10 characters. You can set up icons for category by customizing the `org-agenda-category-icon-alist` variable.

### 11.4.2 Time-of-day specifications

Org mode checks each agenda item for a time-of-day specification. The time can be part of the timestamp that triggered inclusion into the agenda, for example

```
<2005-05-10 Tue 19:00>
```

Time ranges can be specified with two timestamps:

```
<2005-05-10 Tue 20:30>--<2005-05-10 Tue 22:15>
```

In the headline of the entry itself, a time(range)—like ‘12:45’ or a ‘8:30-1pm’—may also appear as plain text<sup>7</sup>.

If the agenda integrates the Emacs diary (see [Section 11.3.1 \[Weekly/daily agenda\], page 113](#)), time specifications in diary entries are recognized as well.

For agenda display, Org mode extracts the time and displays it in a standard 24 hour format as part of the prefix. The example times in the previous paragraphs would end up in the agenda like this:

```
8:30-13:00 Arthur Dent lies in front of the bulldozer
12:45..... Ford Prefect arrives and takes Arthur to the pub
19:00..... The Vogon reads his poem
20:30-22:15 Marvin escorts the Hitchhikers to the bridge
```

If the agenda is in single-day mode, or for the display of today, the timed entries are embedded in a time grid, like

```
8:00..... -----
8:30-13:00 Arthur Dent lies in front of the bulldozer
```

<sup>7</sup> You can, however, disable this by setting `org-agenda-search-headline-for-time` variable to a nil value.

```

10:00..... -----
12:00..... -----
12:45..... Ford Prefect arrives and takes Arthur to the pub
14:00..... -----
16:00..... -----
18:00..... -----
19:00..... The Vogon reads his poem
20:00..... -----
20:30-22:15 Marvin escorts the Hitchhikers to the bridge

```

The time grid can be turned on and off with the variable `org-agenda-use-time-grid`, and can be configured with `org-agenda-time-grid`.

### 11.4.3 Sorting of agenda items

Before being inserted into a view, the items are sorted. How this is done depends on the type of view.

- For the daily/weekly agenda, the items for each day are sorted. The default order is to first collect all items containing an explicit time-of-day specification. These entries are shown at the beginning of the list, as a *schedule* for the day. After that, items remain grouped in categories, in the sequence given by `org-agenda-files`. Within each category, items are sorted by urgency, which is composed of the base priority (see [Section 5.4 \[Priorities\]](#), page 57; 2000 for priority ‘A’, 1000 for ‘B’, and 0 for ‘C’), plus additional increments for overdue scheduled or deadline items.
- For the TODO list, items remain in the order of categories, but within each category, sorting takes place according to urgency. The urgency used for sorting derives from the priority cookie, with additions depending on how close an item is to its due or scheduled date.
- For tags matches, items are not sorted at all, but just appear in the sequence in which they are found in the agenda files.

Sorting can be customized using the variable `org-agenda-sorting-strategy`, and may also include criteria based on the estimated effort of an entry (see [Section 8.5 \[Effort Estimates\]](#), page 92).

### 11.4.4 Filtering/limiting agenda items

Agenda built-in or custom commands are statically defined. Agenda filters and limits allow flexibly narrowing down the list of agenda entries.

*Filters* only change the visibility of items, are very fast and are mostly used interactively<sup>8</sup>. You can switch quickly between different filters without having to recreate the agenda. *Limits* on the other hand take effect before the agenda buffer is populated, so they are mostly useful when defined as local variables within custom agenda commands.

---

<sup>8</sup> Custom agenda commands can preset a filter by binding one of the variables `org-agenda-tag-filter-preset`, `org-agenda-category-filter-preset`, `org-agenda-effort-filter-preset` or `org-agenda-regexp-filter-preset` as an option. This filter is then applied to the view and persists as a basic filter through refreshes and more secondary filtering. The filter is a global property of the entire agenda view—in a block agenda, you should only set this in the global options section, not in the section of an individual block.

## Filtering in the agenda

The general filtering command is `org-agenda-filter`, bound to `/`. Before we introduce it, we describe commands for individual filter types. All filtering commands handle prefix arguments in the same way: A single `C-u` prefix negates the filter, so it removes lines selected by the filter. A double prefix adds the new filter condition to the one(s) already in place, so filter elements are accumulated.

### `\ (org-agenda-filter-by-tag)`

Filter the agenda view with respect to a tag. You are prompted for a tag selection letter; `SPC` means any tag at all. Pressing `TAB` at that prompt offers completion to select a tag, including any tags that do not have a selection character. The command then hides all entries that do not contain or inherit this tag. Pressing `+` or `-` at the prompt switches between filtering for and against the next tag. To clear the filter, press `\` twice (once to call the command again, and once at the prompt).

### `< (org-agenda-filter-by-category)`

Filter by category of the line at point, and show only entries with this category. When called with a prefix argument, hide all entries with the category at point. To clear the filter, call this command again by pressing `<`.

### `= (org-agenda-filter-by-regexp)`

Filter the agenda view by a regular expression: only show agenda entries matching the regular expression the user entered. To clear the filter, call the command again by pressing `=`.

### `_ (org-agenda-filter-by-effort)`

Filter the agenda view with respect to effort estimates, so select tasks that take the right amount of time. You first need to set up a list of efforts globally, for example

```
(setq org-global-properties
      '(("Effort_ALL". "0 0:10 0:30 1:00 2:00 3:00 4:00")))
```

You can then filter for an effort by first typing an operator, one of `<`, `>` and `=`, and then the one-digit index of an effort estimate in your array of allowed values, where `0` means the 10th value. The filter then restricts to entries with effort smaller-or-equal, equal, or larger-or-equal than the selected value. For application of the operator, entries without a defined effort are treated according to the value of `org-sort-agenda-noeffort-is-high`. To clear the filter, press `_` twice (once to call the command again, and once at the first prompt).

### `^ (org-agenda-filter-by-top-headline)`

Filter the current agenda view and only display items that fall under the same top-level headline as the current entry. To clear the filter, call this command again by pressing `^`.

### `/ (org-agenda-filter)`

This is the unified interface to four of the five filter methods described above. At the prompt, specify different filter elements in a single string, with full completion support. For example,

```
+work-John+<0:10-/plot/
```

selects entries with category ‘work’ and effort estimates below 10 minutes, and deselects entries with tag ‘John’ or matching the regexp ‘plot’ (see [Section 17.9 \[Regular Expressions\]](#), page 264). You can leave ‘+’ out if that does not lead to ambiguities. The sequence of elements is arbitrary. The filter syntax assumes that there is no overlap between categories and tags. Otherwise, tags take priority. If you reply to the prompt with the empty string, all filtering is removed. If a filter is specified, it replaces all current filters. But if you call the command with a double prefix argument, or if you add an additional ‘+’ (e.g., ‘++work’) to the front of the string, the new filter elements are added to the active ones. A single prefix argument applies the entire filter in a negative sense.

```
| (org-agenda-filter-remove-all)
```

Remove all filters in the current agenda view.

## Computed tag filtering

If the variable `org-agenda-auto-exclude-function` is set to a user-defined function, that function can select tags that should be used as a tag filter when requested. The function will be called with lower-case versions of all tags represented in the current view. The function should return “-tag” if the filter should remove entries with that tag, “+tag” if only entries with this tag should be kept, or ‘nil’ if that tag is irrelevant. For example, let’s say you use a ‘Net’ tag to identify tasks which need network access, an ‘Errand’ tag for errands in town, and a ‘Call’ tag for making phone calls. You could auto-exclude these tags based on the availability of the Internet, and outside of business hours, with something like this:

```
(defun my-auto-exclude-fn (tag)
  (when (cond ((string= tag "net")
              (/= 0 (call-process "/sbin/ping" nil nil nil
                                "-c1" "-q" "-t1" "mail.gnu.org")))
          ((member tag '("errand" "call"))
           (let ((hr (nth 2 (decode-time))))
             (or (< hr 8) (> hr 21))))))
  (concat "-" tag)))
```

```
(setq org-agenda-auto-exclude-function #'my-auto-exclude-fn)
```

You can apply this self-adapting filter by using a triple prefix argument to `org-agenda-filter`, i.e. press `C-u C-u C-u /`, or by pressing `RET` in `org-agenda-filter-by-tag`.

## Setting limits for the agenda

Here is a list of options that you can set, either globally, or locally in your custom agenda views (see [Section 11.6 \[Custom Agenda Views\]](#), page 133).

```
org-agenda-max-entries
```

Limit the number of entries.

```
org-agenda-max-effort
```

Limit the duration of accumulated efforts (as minutes).

`org-agenda-max-todos`

Limit the number of entries with TODO keywords.

`org-agenda-max-tags`

Limit the number of tagged entries.

When set to a positive integer, each option excludes entries from other categories: for example, ‘`(setq org-agenda-max-effort 100)`’ limits the agenda to 100 minutes of effort and exclude any entry that has no effort property. If you want to include entries with no effort property, use a negative value for `org-agenda-max-effort`. One useful setup is to use `org-agenda-max-entries` locally in a custom command. For example, this custom command displays the next five entries with a ‘NEXT’ TODO keyword.

```
(setq org-agenda-custom-commands
      '(("n" todo "NEXT"
         ((org-agenda-max-entries 5)))))
```

Once you mark one of these five entry as DONE, rebuilding the agenda will again the next five entries again, including the first entry that was excluded so far.

You can also dynamically set temporary limits, which are lost when rebuilding the agenda:

~ `(org-agenda-limit-interactively)`

This prompts for the type of limit to apply and its value.

## 11.5 Commands in the Agenda Buffer

Entries in the agenda buffer are linked back to the Org file or diary file where they originate. You are not allowed to edit the agenda buffer itself, but commands are provided to show and jump to the original entry location, and to edit the Org files “remotely” from the agenda buffer. In this way, all information is stored only once, removing the risk that your agenda and note files may diverge.

Some commands can be executed with mouse clicks on agenda lines. For the other commands, point needs to be in the desired line.

### Motion

`n` (`org-agenda-next-line`)

Next line (same as DOWN and `C-n`).

`p` (`org-agenda-previous-line`)

Previous line (same as UP and `C-p`).

### View/Go to Org file

SPC or `mouse-3` (`org-agenda-show-and-scroll-up`)

Display the original location of the item in another window. With a prefix argument, make sure that drawers stay folded.

`L` (`org-agenda-recenter`)

Display original location and recenter that window.

TAB or `mouse-2` (`org-agenda-goto`)

Go to the original location of the item in another window.

**RET** (`org-agenda-switch-to`)

Go to the original location of the item and delete other windows.

**F** (`org-agenda-follow-mode`)

Toggle Follow mode. In Follow mode, as you move point through the agenda buffer, the other window always shows the corresponding location in the Org file. The initial setting for this mode in new agenda buffers can be set with the variable `org-agenda-start-with-follow-mode`.

**C-c C-x b** (`org-agenda-tree-to-indirect-buffer`)

Display the entire subtree of the current item in an indirect buffer. With a numeric prefix argument *N*, go up to level *N* and then take that tree. If *N* is negative, go up that many levels. With a `C-u` prefix, do not remove the previously used indirect buffer.

**C-c C-o** (`org-agenda-open-link`)

Follow a link in the entry. This offers a selection of any links in the text belonging to the referenced Org node. If there is only one link, follow it without a selection prompt.

## Change display

**A** Interactively select another agenda view and append it to the current view.

**o** Delete other windows.

**v d** or short **d** (`org-agenda-day-view`)

Switch to day view. When switching to day view, this setting becomes the default for subsequent agenda refreshes. A numeric prefix argument may be used to jump directly to a specific day of the year. For example, `32 d` jumps to February 1st. When setting day view, a year may be encoded in the prefix argument as well. For example, `200712 d` jumps to January 12, 2007. If such a year specification has only one or two digits, it is expanded into one of the 30 next years or the last 69 years.

**v w** or short **w** (`org-agenda-week-view`)

Switch to week view. When switching week view, this setting becomes the default for subsequent agenda refreshes. A numeric prefix argument may be used to jump directly to a specific day of the ISO week. For example `9 w` to ISO week number 9. When setting week view, a year may be encoded in the prefix argument as well. For example, `200712 w` jumps to week 12 in 2007. If such a year specification has only one or two digits, it is expanded into one of the 30 next years or the last 69 years.

**v m** (`org-agenda-month-view`)

Switch to month view. Because month views are slow to create, they do not become the default for subsequent agenda refreshes. A numeric prefix argument may be used to jump directly to a specific day of the month. When setting month view, a year may be encoded in the prefix argument as well. For example, `200712 m` jumps to December, 2007. If such a year specification has only one or two digits, it is expanded into one of the 30 next years or the last 69 years.

- `v y` (`org-agenda-year-view`)  
Switch to year view. Because year views are slow to create, they do not become the default for subsequent agenda refreshes. A numeric prefix argument may be used to jump directly to a specific day of the year.
- `v SPC` (`org-agenda-reset-view`)  
Reset the current view to `org-agenda-span`.
- `f` (`org-agenda-later`)  
Go forward in time to display the span following the current one. For example, if the display covers a week, switch to the following week. With a prefix argument, repeat that many times.
- `b` (`org-agenda-earlier`)  
Go backward in time to display earlier dates.
- `.` (`org-agenda-goto-today`)  
Go to today.
- `j` (`org-agenda-goto-date`)  
Prompt for a date and go there.
- `J` (`org-agenda-clock-goto`)  
Go to the currently clocked-in task *in the agenda buffer*.
- `D` (`org-agenda-toggle-diary`)  
Toggle the inclusion of diary entries. See [Section 11.3.1 \[Weekly/daily agenda\]](#), [page 113](#).
- `v l` or `v L` or short `l` (`org-agenda-log-mode`)  
Toggle Logbook mode. In Logbook mode, entries that were marked as done while logging was on (see the variable `org-log-done`) are shown in the agenda, as are entries that have been clocked on that day. You can configure the entry types that should be included in log mode using the variable `org-agenda-log-mode-items`. When called with a `C-u` prefix argument, show all possible logbook entries, including state changes. When called with two prefix arguments `C-u C-u`, show only logging information, nothing else. `v L` is equivalent to `C-u v l`.
- `v [` or short `[` (`org-agenda-manipulate-query-add`)  
Include inactive timestamps into the current view. Only for weekly/daily agenda.
- `v a` (`org-agenda-archives-mode`)  
Toggle Archives mode. In Archives mode, trees that are archived (see [Section 9.2.2 \[Internal archiving\]](#), [page 97](#)) are also scanned when producing the agenda. To exit archives mode, press `v a` again. The initial setting for this mode in new agenda buffers can be set with the variable `org-agenda-start-with-archives-mode`, which can be set with the same values as `org-agenda-archives-mode`.
- `v A`  
Toggle Archives mode. Include all archive files as well.

- v R** or short **R** (`org-agenda-clockreport-mode`)  
 Toggle Clockreport mode. In Clockreport mode, the daily/weekly agenda always shows a table with the clocked times for the time span and file scope covered by the current agenda view. The initial setting for this mode in new agenda buffers can be set with the variable `org-agenda-start-with-clockreport-mode`. By using a prefix argument when toggling this mode (i.e., `C-u R`), the clock table does not show contributions from entries that are hidden by agenda filtering<sup>9</sup>. See also the variables `org-clock-report-include-clocking-task` and `org-agenda-clock-report-header`.
- v c**  
 Show overlapping clock entries, clocking gaps, and other clocking problems in the current agenda range. You can then visit clocking lines and fix them manually. See the variable `org-agenda-clock-consistency-checks` for information on how to customize the definition of what constituted a clocking problem. To return to normal agenda display, press `l` to exit Logbook mode.
- v E** or short **E** (`org-agenda-entry-text-mode`)  
 Toggle entry text mode. In entry text mode, a number of lines from the Org outline node referenced by an agenda line are displayed below the line. The maximum number of lines is given by the variable `org-agenda-entry-text-maxlines`. Calling this command with a numeric prefix argument temporarily modifies that number to the prefix value.
- G** (`org-agenda-toggle-time-grid`)  
 Toggle the time grid on and off. See also the variables `org-agenda-use-time-grid` and `org-agenda-time-grid`.
- r** (`org-agenda-redo`)  
**g**  
 Recreate the agenda buffer, for example to reflect the changes after modification of the timestamps of items with `S-LEFT` and `S-RIGHT`. When the buffer is the global TODO list, a prefix argument is interpreted to create a selective list for a specific TODO keyword.
- C-x C-s** or short **s** (`org-save-all-org-buffers`)  
 Save all Org buffers in the current Emacs session, and also the locations of IDs.
- C-c C-x C-c** (`org-agenda-columns`)  
 Invoke column view (see [Section 7.5 \[Column View\], page 71](#)) in the agenda buffer. The column view format is taken from the entry at point, or, if there is no entry at point, from the first entry in the agenda view. So whatever the format for that entry would be in the original buffer (taken from a property, from a ‘`COLUMNS`’ keyword, or from the default variable `org-columns-default-format`) is used in the agenda.
- C-c C-x >** (`org-agenda-remove-restriction-lock`)  
 Remove the restriction lock on the agenda, if it is currently restricted to a file or subtree (see [Section 11.1 \[Agenda Files\], page 111](#)).
- M-UP** (`org-agenda-drag-line-backward`)  
 Drag the line at point backward one line. With a numeric prefix argument, drag backward by that many lines.

---

<sup>9</sup> Only tags filtering is respected here, effort filtering is ignored.

Moving agenda lines does not persist after an agenda refresh and does not modify the contributing Org files.

*M-DOWN* (`org-agenda-drag-line-forward`)

Drag the line at point forward one line. With a numeric prefix argument, drag forward by that many lines.

## Remote editing

*0--9* Digit argument.

*C-\_* (`org-agenda-undo`)

Undo a change due to a remote editing command. The change is undone both in the agenda buffer and in the remote buffer.

*t* (`org-agenda-todo`)

Change the TODO state of the item, both in the agenda and in the original Org file. A prefix arg is passed through to the `org-todo` command, so for example a *C-u* prefix are will trigger taking a note to document the state change.

*C-S-RIGHT* (`org-agenda-todo-nextset`)

Switch to the next set of TODO keywords.

*C-S-LEFT*, `org-agenda-todo-previousset`

Switch to the previous set of TODO keywords.

*C-k* (`org-agenda-kill`)

Delete the current agenda item along with the entire subtree belonging to it in the original Org file. If the text to be deleted remotely is longer than one line, the kill needs to be confirmed by the user. See variable `org-agenda-confirm-kill`.

*C-c C-w* (`org-agenda-refile`)

Refile the entry at point.

*C-c C-x C-a* or short *a* (`org-agenda-archive-default-with-confirmation`)

Archive the subtree corresponding to the entry at point using the default archiving command set in `org-archive-default-command`. When using the *a* key, confirmation is required.

*C-c C-x a* (`org-agenda-toggle-archive-tag`)

Toggle the archive tag (see [Section 9.2.2 \[Internal archiving\]](#), page 97) for the current headline.

*C-c C-x A* (`org-agenda-archive-to-archive-sibling`)

Move the subtree corresponding to the current entry to its *archive sibling*.

*C-c C-x C-s* or short *\$* (`org-agenda-archive`)

Archive the subtree corresponding to the current headline. This means the entry is moved to the configured archive location, most likely a different file.

*T* (`org-agenda-show-tags`)

Show all tags associated with the current item. This is useful if you have turned off `org-agenda-show-inherited-tags`, but still want to see all tags of a headline occasionally.

- : (`org-agenda-set-tags`)  
Set tags for the current headline. If there is an active region in the agenda, change a tag for all headings in the region.
- , (`org-agenda-priority`)  
Set the priority for the current item. Org mode prompts for the priority character. If you reply with `SPC`, the priority cookie is removed from the entry.
- + or *S-UP* (`org-agenda-priority-up`)  
Increase the priority of the current item. The priority is changed in the original buffer, but the agenda is not resorted. Use the `r` key for this.
- or *S-DOWN* (`org-agenda-priority-down`)  
Decrease the priority of the current item.
- C-c C-x e* or short *e* (`org-agenda-set-effort`)  
Set the effort property for the current item.
- C-c C-z* or short *z* (`org-agenda-add-note`)  
Add a note to the entry. This note is recorded, and then filed to the same location where state change notes are put. Depending on `org-log-into-drawer`, this may be inside a drawer.
- C-c C-a* (`org-attach`)  
Dispatcher for all command related to attachments.
- C-c C-s* (`org-agenda-schedule`)  
Schedule this item. With a prefix argument, remove the scheduling timestamp
- C-c C-d* (`org-agenda-deadline`)  
Set a deadline for this item. With a prefix argument, remove the deadline.
- S-RIGHT* (`org-agenda-do-date-later`)  
Change the timestamp associated with the current line by one day into the future. If the date is in the past, the first call to this command moves it to today. With a numeric prefix argument, change it by that many days. For example, `3 6 5 S-RIGHT` changes it by a year. With a *C-u* prefix, change the time by one hour. If you immediately repeat the command, it will continue to change hours even without the prefix argument. With a double *C-u C-u* prefix, do the same for changing minutes. The stamp is changed in the original Org file, but the change is not directly reflected in the agenda buffer. Use `r` or `g` to update the buffer.
- S-LEFT* (`org-agenda-do-date-earlier`)  
Change the timestamp associated with the current line by one day into the past.
- > (`org-agenda-date-prompt`)  
Change the timestamp associated with the current line. The key `>` has been chosen, because it is the same as *S-.* on my keyboard.
- I* (`org-agenda-clock-in`)  
Start the clock on the current item. If a clock is running already, it is stopped first.

- O* (`org-agenda-clock-out`)  
Stop the previously started clock.
- X* (`org-agenda-clock-cancel`)  
Cancel the currently running clock.
- J* (`org-agenda-clock-goto`)  
Jump to the running clock in another window.
- k* (`org-agenda-capture`)  
Like `org-capture`, but use the date at point as the default date for the capture template. See `org-capture-use-agenda-date` to make this the default behavior of `org-capture`.

## Bulk remote editing selected entries

- m* (`org-agenda-bulk-mark`)  
Mark the entry at point for bulk action. If there is an active region in the agenda, mark the entries in the region. With numeric prefix argument, mark that many successive entries.
- \** (`org-agenda-bulk-mark-all`)  
Mark all visible agenda entries for bulk action.
- u* (`org-agenda-bulk-unmark`)  
Unmark entry for bulk action.
- U* (`org-agenda-bulk-unmark-all`)  
Unmark all marked entries for bulk action.
- M-m* (`org-agenda-bulk-toggle`)  
Toggle mark of the entry at point for bulk action.
- M-\** (`org-agenda-bulk-toggle-all`)  
Toggle mark of every entry for bulk action.
- %* (`org-agenda-bulk-mark-regexp`)  
Mark entries matching a regular expression for bulk action.
- B* (`org-agenda-bulk-action`)  
Bulk action: act on all marked entries in the agenda. This prompts for another key to select the action to be applied. The prefix argument to *B* is passed through to the *s* and *d* commands, to bulk-remove these special timestamps. By default, marks are removed after the bulk. If you want them to persist, set `org-agenda-bulk-persistent-marks` to `t` or hit *p* at the prompt.
- p* Toggle persistent marks.
- \$* Archive all selected entries.
- A* Archive entries by moving them to their respective archive siblings.
- t* Change TODO state. This prompts for a single TODO keyword and changes the state of all selected entries, bypassing blocking and suppressing logging notes—but not timestamps.

- + Add a tag to all selected entries.
- Remove a tag from all selected entries.
- s* Schedule all items to a new date. To shift existing schedule dates by a fixed number of days, use something starting with double plus at the prompt, for example ‘++8d’ or ‘++2w’.
- d* Set deadline to a specific date.
- r* Prompt for a single refile target and move all entries. The entries are no longer in the agenda; refresh (*g*) to bring them back.
- S* Reschedule randomly into the coming N days. N is prompted for. With a prefix argument (*C-u B S*), scatter only across weekdays.
- f* Apply a function<sup>10</sup> to marked entries. For example, the function below sets the ‘CATEGORY’ property of the entries to ‘web’.

```
(defun set-category ()
  (interactive "P")
  (let ((marker (or (org-get-at-bol 'org-hd-marker)
                    (org-agenda-error))))
    (org-with-point-at marker
      (org-back-to-heading t)
      (org-set-property "CATEGORY" "web")))))
```

## Calendar commands

*c* (`org-agenda-goto-calendar`)

Open the Emacs calendar and go to the date at point in the agenda.

*c* (`org-calendar-goto-agenda`)

When in the calendar, compute and show the Org agenda for the date at point.

*i* (`org-agenda-diary-entry`)

Insert a new entry into the diary, using the date at point and (for block entries) the date at the mark. This adds to the Emacs diary file<sup>11</sup>, in a way similar to the *i* command in the calendar. The diary file pops up in another window, where you can add the entry.

If you configure `org-agenda-diary-file` to point to an Org file, Org creates entries in that file instead. Most entries are stored in a date-based outline tree that will later make it easy to archive appointments from previous months/years. The tree is built under an entry with a ‘DATE\_TREE’ property, or else with years as top-level entries. Emacs prompts you for the entry text—if you specify it, the entry is created in `org-agenda-diary-file` without further interaction. If you directly press RET at the prompt without typing text, the target file is shown in another window for you to finish the entry there. See also the *k r* command.

<sup>10</sup> You can also create persistent custom functions through `org-agenda-bulk-custom-functions`.

<sup>11</sup> This file is parsed for the agenda when `org-agenda-include-diary` is set.

*M* (`org-agenda-phases-of-moon`)

Show the phases of the moon for the three months around current date.

*S* (`org-agenda-sunrise-sunset`)

Show sunrise and sunset times. The geographical location must be set with calendar variables, see the documentation for the Emacs calendar.

*C* (`org-agenda-convert-date`)

Convert the date at point into many other cultural and historic calendars.

*H* (`org-agenda-holidays`)

Show holidays for three months around point date.

## Quit and exit

*q* (`org-agenda-quit`)

Quit agenda, remove the agenda buffer.

*x* (`org-agenda-exit`)

Exit agenda, remove the agenda buffer and all buffers loaded by Emacs for the compilation of the agenda. Buffers created by the user to visit Org files are not removed.

## 11.6 Custom Agenda Views

Custom agenda commands serve two purposes: to store and quickly access frequently used TODO and tags searches, and to create special composite agenda buffers. Custom agenda commands are accessible through the dispatcher (see [Section 11.2 \[Agenda Dispatcher\], page 112](#)), just like the default commands.

### 11.6.1 Storing searches

The first application of custom searches is the definition of keyboard shortcuts for frequently used searches, either creating an agenda buffer, or a sparse tree (the latter covering of course only the current buffer).

Custom commands are configured in the variable `org-agenda-custom-commands`. You can customize this variable, for example by pressing *C* from the agenda dispatcher (see [Section 11.2 \[Agenda Dispatcher\], page 112](#)). You can also directly set it with Emacs Lisp in the Emacs init file. The following example contains all valid agenda views:

```
(setq org-agenda-custom-commands
      '(("x" agenda)
        ("y" agenda*)
        ("w" todo "WAITING")
        ("W" todo-tree "WAITING")
        ("u" tags "+boss-urgent")
        ("v" tags-todo "+boss-urgent")
        ("U" tags-tree "+boss-urgent")
        ("f" occur-tree "\\<FIXME\\>")
        ("h" . "HOME+Name tags searches") ;description for "h" prefix
        ("hl" tags "+home+Lisa")
        ("hp" tags "+home+Peter"))
```

```
("hk" tags "+home+Kim"))
```

The initial string in each entry defines the keys you have to press after the dispatcher command in order to access the command. Usually this is just a single character, but if you have many similar commands, you can also define two-letter combinations where the first character is the same in several combinations and serves as a prefix key<sup>12</sup>. The second parameter is the search type, followed by the string or regular expression to be used for the matching. The example above will therefore define:

- x* as a global search for agenda entries planned<sup>13</sup> this week/day.
- y* as the same search, but only for entries with an hour specification like ‘[h]h:mm’—think of them as appointments.
- w* as a global search for TODO entries with ‘WAITING’ as the TODO keyword.
- W* as the same search, but only in the current buffer and displaying the results as a sparse tree.
- u* as a global tags search for headlines tagged ‘boss’ but not ‘urgent’.
- v* The same search, but limiting it to headlines that are also TODO items.
- U* as the same search, but only in the current buffer and displaying the result as a sparse tree.
- f* to create a sparse tree (again, current buffer only) with all entries containing the word ‘FIXME’.
- h* as a prefix command for a ‘HOME’ tags search where you have to press an additional key (*l*, *p* or *k*) to select a name (Lisa, Peter, or Kim) as additional tag to match.

Note that *\*-tree* agenda views need to be called from an Org buffer as they operate on the current buffer only.

### 11.6.2 Block agenda

Another possibility is the construction of agenda views that comprise the results of *several* commands, each of which creates a block in the agenda buffer. The available commands include **agenda** for the daily or weekly agenda (as created with **a**), **alltodo** for the global TODO list (as constructed with **t**), **stuck** for the list of stuck projects (as obtained with **#**) and the matching commands discussed above: **todo**, **tags**, and **tags-todo**.

Here are two examples:

```
(setq org-agenda-custom-commands
  '(("h" "Agenda and Home-related tasks"
    ((agenda "")
     (tags-todo "home")
     (tags "garden"))))
```

<sup>12</sup> You can provide a description for a prefix key by inserting a cons cell with the prefix and the description.

<sup>13</sup> *Planned* means here that these entries have some planning information attached to them, like a timestamp, a scheduled or a deadline string. See **org-agenda-entry-types** on how to set what planning information is taken into account.

```

("o" "Agenda and Office-related tasks"
 ((agenda "")
  (tags-todo "work")
  (tags "office"))))

```

This defines `h` to create a multi-block view for stuff you need to attend to at home. The resulting agenda buffer contains your agenda for the current week, all TODO items that carry the tag ‘home’, and also all lines tagged with ‘garden’. Finally the command `o` provides a similar view for office tasks.

### 11.6.3 Setting options for custom commands

Org mode contains a number of variables regulating agenda construction and display. The global variables define the behavior for all agenda commands, including the custom commands. However, if you want to change some settings just for a single custom view, you can do so. Setting options requires inserting a list of variable names and values at the right spot in `org-agenda-custom-commands`. For example:

```

(setq org-agenda-custom-commands
  '((("w" todo "WAITING"
      ((org-agenda-sorting-strategy '(priority-down))
       (org-agenda-prefix-format " Mixed: "))
      ("U" tags-tree "+boss-urgent"
       ((org-show-context-detail 'minimal)))
      ("N" search ""
       ((org-agenda-files ('("~/org/notes.org"))
        (org-agenda-text-search-extra-files nil)))))

```

Now the `w` command sorts the collected entries only by priority, and the prefix format is modified to just say ‘Mixed:’ instead of giving the category of the entry. The sparse tags tree of `U` now turns out ultra-compact, because neither the headline hierarchy above the match, nor the headline following the match are shown. The command `N` does a text search limited to only a single file.

For command sets creating a block agenda, `org-agenda-custom-commands` has two separate spots for setting options. You can add options that should be valid for just a single command in the set, and options that should be valid for all commands in the set. The former are just added to the command entry; the latter must come after the list of command entries. Going back to the block agenda example (see [Section 11.6.2 \[Block agenda\], page 134](#)), let’s change the sorting strategy for the `h` commands to `priority-down`, but let’s sort the results for ‘garden’ tags query in the opposite order, `priority-up`. This would look like this:

```

(setq org-agenda-custom-commands
  (('("h" "Agenda and Home-related tasks"
      (agenda)
      (tags-todo "home")
      (tags "garden"
       ((org-agenda-sorting-strategy '(priority-up))))
      ((org-agenda-sorting-strategy '(priority-down))))
    ("o" "Agenda and Office-related tasks"
      (agenda)

```

```
(tags-todo "work")
(tags "office"))))
```

As you see, the values and parentheses setting is a little complex. When in doubt, use the customize interface to set this variable—it fully supports its structure. Just one caveat: when setting options in this interface, the *values* are just Lisp expressions. So if the value is a string, you need to add the double-quotes around the value yourself.

To control whether an agenda command should be accessible from a specific context, you can customize `org-agenda-custom-commands-contexts`. Let's say for example that you have an agenda command `o` displaying a view that you only need when reading emails. Then you would configure this option like this:

```
(setq org-agenda-custom-commands-contexts
      '(("o" (in-mode . "message-mode"))))
```

You can also tell that the command key `o` should refer to another command key `r`. In that case, add this command key like this:

```
(setq org-agenda-custom-commands-contexts
      '(("o" "r" (in-mode . "message-mode"))))
```

See the docstring of the variable for more information.

## 11.7 Exporting Agenda Views

If you are away from your computer, it can be very useful to have a printed version of some agenda views to carry around. Org mode can export custom agenda views as plain text, HTML<sup>14</sup>, Postscript, PDF<sup>15</sup>, and iCalendar files. If you want to do this only occasionally, use the following command:

```
C-x C-w (org-agenda-write)
Write the agenda view to a file.
```

If you need to export certain agenda views frequently, you can associate any custom agenda command with a list of output file names<sup>16</sup>. Here is an example that first defines custom commands for the agenda and the global TODO list, together with a number of files to which to export them. Then we define two block agenda commands and specify file names for them as well. File names can be relative to the current working directory, or absolute.

```
(setq org-agenda-custom-commands
      '(("X" agenda "" nil ("agenda.html" "agenda.ps"))
        ("Y" alltodo "" nil ("todo.html" "todo.txt" "todo.ps"))
        ("h" "Agenda and Home-related tasks"
          ((agenda "")
           (tags-todo "home")
           (tags "garden"))))
```

<sup>14</sup> For HTML you need to install Hrvoje Nikšić's `'htmlize.el'` as an Emacs package from [NonGNU ELPA](#) or from [Hrvoje Nikšić's repository](#).

<sup>15</sup> To create PDF output, the Ghostscript `ps2pdf` utility must be installed on the system. Selecting a PDF file also creates the postscript file.

<sup>16</sup> If you want to store standard views like the weekly agenda or the global TODO list as well, you need to define custom commands for them in order to be able to specify file names.

```

nil
("~/views/home.html"))
("o" "Agenda and Office-related tasks"
 ((agenda)
  (tags-todo "work")
  (tags "office")))
nil
("~/views/office.ps" "~/calendars/office.ics"))))

```

The extension of the file name determines the type of export. If it is `.html`, Org mode uses the `htmlize` package to convert the buffer to HTML and save it to this file name. If the extension is `.ps`, `ps-print-buffer-with-faces` is used to produce Postscript output. If the extension is `.ics`, iCalendar export is run over all files that were used to construct the agenda, and limit the export to entries listed in the agenda. Any other extension produces a plain ASCII file.

The export files are *not* created when you use one of those commands interactively because this might use too much overhead. Instead, there is a special command to produce *all* specified files in one step:

```
e (org-store-agenda-views)
    Export all agenda views that have export file names associated with them.
```

You can use the options section of the custom agenda commands to also set options for the export commands. For example:

```
(setq org-agenda-custom-commands
  '(("X" agenda ""
    ((ps-number-of-columns 2)
     (ps-landscape-mode t)
     (org-agenda-prefix-format " [ ] ")
     (org-agenda-with-colors nil)
     (org-agenda-remove-tags t))
    ("theagenda.ps"))))

```

This command sets two options for the Postscript exporter, to make it print in two columns in landscape format—the resulting page can be cut in two and then used in a paper agenda. The remaining settings modify the agenda prefix to omit category and scheduling information, and instead include a checkbox to check off items. We also remove the tags to make the lines compact, and we do not want to use colors for the black-and-white printer. Settings specified in `org-agenda-exporter-settings` also apply, e.g.,

```
(setq org-agenda-exporter-settings
  '(ps-number-of-columns 2)
  (ps-landscape-mode t)
  (org-agenda-add-entry-text-maxlines 5)
  (htmlize-output-type 'css))

```

but the settings in `org-agenda-custom-commands` take precedence.

From the command line you may also use:

```
emacs -eval (org-batch-store-agenda-views) -kill
```

or, if you need to modify some parameters<sup>17</sup>

```
emacs -eval '(org-batch-store-agenda-views           \
              org-agenda-span (quote month)         \
              org-agenda-start-day "2007-11-01"    \
              org-agenda-include-diary nil         \
              org-agenda-files (quote ("~/org/project.org")))' \
        -kill
```

which creates the agenda views restricted to the file ‘~/org/project.org’, without diary entries and with a 30-day extent.

You can also extract agenda information in a way that allows further processing by other programs. See [Section A.9 \[Extracting Agenda Information\], page 284](#), for more information.

## 11.8 Using Column View in the Agenda

Column view (see [Section 7.5 \[Column View\], page 71](#)) is normally used to view and edit properties embedded in the hierarchical structure of an Org file. It can be quite useful to use column view also from the agenda, where entries are collected by certain criteria.

*C-c C-x C-c* (org-agenda-columns)

Turn on column view in the agenda.

To understand how to use this properly, it is important to realize that the entries in the agenda are no longer in their proper outline environment. This causes the following issues:

1. Org needs to make a decision which columns format to use. Since the entries in the agenda are collected from different files, and different files may have different columns formats, this is a non-trivial problem. Org first checks if `org-overriding-columns-format` is currently set, and if so, takes the format from there. You should set this variable only in the *local settings section* of a custom agenda command (see [Section 11.6 \[Custom Agenda Views\], page 133](#)) to make it valid for that specific agenda view. If no such binding exists, it checks, in sequence, `org-columns-default-format-for-agenda`, the format associated with the first item in the agenda (through a property or a ‘#+COLUMNS’ setting in that buffer) and finally `org-columns-default-format`.
2. If any of the columns has a summary type defined (see [Section 7.5.1.2 \[Column attributes\], page 71](#)), turning on column view in the agenda visits all relevant agenda files and make sure that the computations of this property are up to date. This is also true for the special ‘CLOCKSUM’ property. Org then sums the values displayed in the agenda. In the daily/weekly agenda, the sums cover a single day; in all other views they cover the entire block.

It is important to realize that the agenda may show the same entry *twice*—for example as scheduled and as a deadline—and it may show two entries from the same hierarchy (for example a *parent* and its *child*). In these cases, the summation in the agenda leads to incorrect results because some values count double.

3. When the column view in the agenda shows the ‘CLOCKSUM’ property, that is always the entire clocked time for this item. So even in the daily/weekly agenda, the clocksum

<sup>17</sup> Quoting depends on the system you use, please check the FAQ for examples.

listed in column view may originate from times outside the current view. This has the advantage that you can compare these values with a column listing the planned total effort for a task—one of the major applications for column view in the agenda. If you want information about clocked time in the displayed period use clock table mode (press *R* in the agenda).

4. When the column view in the agenda shows the ‘`CLOCKSUM_T`’ property, that is always today’s clocked time for this item. So even in the weekly agenda, the clocksum listed in column view only originates from today. This lets you compare the time you spent on a task for today, with the time already spent—via ‘`CLOCKSUM`’—and with the planned total effort for it.

## 12 Markup for Rich Contents

Org is primarily about organizing and searching through your plain-text notes. However, it also provides a lightweight yet robust markup language for rich text formatting and more. For instance, you may want to center or emphasize text. Or you may need to insert a formula or image in your writing. Org offers syntax for all of this and more. Used in conjunction with the export framework (see [Chapter 13 \[Exporting\]](#), page 151), you can author beautiful documents in Org—like the fine manual you are currently reading.

### 12.1 Paragraphs

Paragraphs are separated by at least one empty line. If you need to enforce a line break within a paragraph, use ‘\’ at the end of a line.

To preserve the line breaks, indentation and blank lines in a region, but otherwise use normal formatting, you can use this construct, which can also be used to format poetry.

```
#+BEGIN_VERSE
Great clouds overhead
Tiny black birds rise and fall
Snow covers Emacs

---AlexSchroeder
#+END_VERSE
```

When quoting a passage from another document, it is customary to format this as a paragraph that is indented on both the left and the right margin. You can include quotations in Org documents like this:

```
#+BEGIN_QUOTE
Everything should be made as simple as possible,
but not any simpler ---Albert Einstein
#+END_QUOTE
```

If you would like to center some text, do it like this:

```
#+BEGIN_CENTER
Everything should be made as simple as possible, \
but not any simpler
#+END_CENTER
```

### 12.2 Emphasis and Monospace

You can make words ‘**bold\***’, ‘*/italic/*’, ‘\_underlined\_’, ‘=verbatim=’ and ‘~code~’, and, if you must, ‘+strike-through+’. Text in the code and verbatim string is not processed for Org specific syntax; it is exported verbatim. Org provides a single command as entry point for inserting the marker character.

*C-c C-x C-f* (org-emphasize)

Prompt for a marker character and insert or change an emphasis. If there is an active region, change that region to a new emphasis. If there is no region, just insert the marker characters and position the cursor between them.

To turn off fontification for marked up text, you can set `org-fontify-emphasized-text` to `nil`. To narrow down the list of the fontified markup syntax, you can customize `org-emphasis-alist`<sup>1</sup>.

To hide the emphasis markup characters in your buffers, set `org-hide-emphasis-markers` to `t`.

Sometimes, when marked text also contains the marker character itself, the result may be unsettling. For example,

```
/One may expect this whole sentence to be italicized, but the
following ~user/?variable~ contains /= character, which effectively
stops emphasis there./
```

You can use zero width space to help Org sorting out the ambiguity. See [Section 17.12 \[Escape Character\]](#), page 265 for more details.

## 12.3 Subscripts and Superscripts

‘`^`’ and ‘`_`’ are used to indicate super- and subscripts. To increase the readability of ASCII text, it is not necessary, but OK, to surround multi-character sub- and superscripts with curly braces. For example

```
The radius of the sun is R_sun = 6.96 x 10^8 m. On the other hand,
the radius of Alpha Centauri is R_{Alpha Centauri} = 1.28 x R_{sun}.
```

If you write a text where the underscore is often used in a different context, Org’s convention to always interpret these as subscripts can get in your way. Configure the variable `org-use-sub-superscripts` and/or `org-export-with-sub-superscripts` to change this convention. For example, when setting these variables to `{}`, ‘`a_b`’ is not displayed/exported<sup>2</sup> as a subscript, but ‘`a_{b}`’ is.

You can set both `org-use-sub-superscripts` and `org-export-with-sub-superscripts` in a file using the export option ‘`^:`’ (see [Section 13.2 \[Export Settings\]](#), page 153). For example, ‘`#+OPTIONS: ^: {}`’ sets the two options to `{}` and limits super- and subscripts to the curly bracket notation.

You can also toggle the visual display of super- and subscripts:

```
C-c C-x \ (org-toggle-pretty-entities)
```

This command formats sub- and superscripts in a WYSIWYM way.

Set both `org-pretty-entities` and `org-pretty-entities-include-sub-superscripts` to `t` to start with super- and subscripts *visually* interpreted as specified by the option `org-use-sub-superscripts`.

## 12.4 Special Symbols

You can use L<sup>A</sup>T<sub>E</sub>X-like syntax to insert special symbols—named entities—like ‘`\alpha`’ to indicate the Greek letter, or ‘`\to`’ to indicate an arrow. Completion for these symbols is available, just type ‘`\`’ and maybe a few letters, and press *M-TAB* to see possible completions.

<sup>1</sup> The markup will still be recognized. Just not highlighted visually in Emacs.

<sup>2</sup> The underlying markup still remains a sub/superscript. Only the visual display and export behavior changes.

If you need such a symbol inside a word, terminate it with a pair of curly brackets. For example

Pro tip: Given a circle  $\Gamma$  of diameter  $d$ , the length of its circumference is  $\pi d$ .

A large number of entities is provided, with names taken from both HTML and L<sup>A</sup>T<sub>E</sub>X; you can comfortably browse the complete list from a dedicated buffer using the command `org-entities-help`. It is also possible to provide your own special symbols in the variable `org-entities-user`.

During export, these symbols are transformed into the native format of the exporter backend. Strings like `\alpha` are exported as `&alpha;` in the HTML output, and as `\(\alpha\)` in the L<sup>A</sup>T<sub>E</sub>X output. Similarly, `\nbsp` becomes `&nbsp;` in HTML and `~` in L<sup>A</sup>T<sub>E</sub>X.

If you would like to see entities displayed as UTF-8 characters, use the following command<sup>3</sup>:

`C-c C-x \ (org-toggle-pretty-entities)`

Toggle display of entities as UTF-8 characters. This does not change the buffer content which remains plain ASCII, but it overlays the UTF-8 character for display purposes only.

In addition to regular entities defined above, Org exports in a special way<sup>4</sup> the following commonly used character combinations: `\-` is treated as a shy hyphen, `--` and `---` are converted into dashes, and `...` becomes a compact set of dots.

## 12.5 Embedded L<sup>A</sup>T<sub>E</sub>X

Plain ASCII is normally sufficient for almost all note taking. Exceptions include scientific notes, which often require mathematical symbols and the occasional formula. L<sup>A</sup>T<sub>E</sub>X<sup>5</sup> is widely used to typeset scientific documents. Org mode supports embedding L<sup>A</sup>T<sub>E</sub>X code into its files, because many academics are used to writing and reading L<sup>A</sup>T<sub>E</sub>X source code, and because it can be readily processed to produce pretty output for a number of export backends.

### 12.5.1 L<sup>A</sup>T<sub>E</sub>X fragments

Org mode can contain L<sup>A</sup>T<sub>E</sub>X math fragments, and it supports ways to process these for several export backends. When exporting to L<sup>A</sup>T<sub>E</sub>X, the code is left as it is. When exporting to HTML, Org can use either [MathJax](#) (see [Section 13.9.11 \[Math formatting in HTML export\]](#), page 170) or transcode the math into images (see [Section 12.5.2 \[Previewing L<sup>A</sup>T<sub>E</sub>X fragments\]](#), page 143).

L<sup>A</sup>T<sub>E</sub>X fragments do not need any special marking at all. The following snippets are identified as L<sup>A</sup>T<sub>E</sub>X source code:

<sup>3</sup> You can turn this on by default by setting the variable `org-pretty-entities`, or on a per-file base with the `'STARTUP'` option `'entitiespretty'`.

<sup>4</sup> This behavior can be disabled with `'-` export setting (see [Section 13.2 \[Export Settings\]](#), page 153).

<sup>5</sup> L<sup>A</sup>T<sub>E</sub>X is a macro system based on Donald E. Knuth's T<sub>E</sub>X system. Many of the features described here as "L<sup>A</sup>T<sub>E</sub>X" are really from T<sub>E</sub>X, but for simplicity I am blurring this distinction.

- Environments of any kind<sup>6</sup>. The only requirement is that the ‘\begin’ statement appears on a new line, preceded by only whitespace.
- Text within the usual L<sup>A</sup>T<sub>E</sub>X math delimiters. Prefer ‘\(...\)’ for inline fragments. The ‘\$...\$’ alternative has some restrictions and may be a source of confusion. To avoid conflicts with currency specifications, single ‘\$’ characters are only recognized as math delimiters if the enclosed text contains at most two line breaks, is directly attached to the ‘\$’ characters with no whitespace in between, and if the closing ‘\$’ is followed by whitespace or punctuation (but not a dash).

Sometimes, it may necessary to have a literal dollar symbol even when it is recognized as L<sup>A</sup>T<sub>E</sub>X math delimiter. Org provides ‘\dollar’ and ‘\USD’ entities (see [Section 12.4 \[Special Symbols\]](#), page 141) that are rendered as ‘\$’ for such scenarios. Also, see [Section 17.12 \[Escape Character\]](#), page 265.

For example:

```
\begin{equation}                                % arbitrary environments,
x=\sqrt{b}                                       % even tables, figures, etc
\end{equation}
```

If  $a^2=b$  and  $(b=2)$ , then the solution must be either  $a=+\sqrt{2}$  or  $a=-\sqrt{2}$ .

L<sup>A</sup>T<sub>E</sub>X processing can be configured with the variable `org-export-with-latex`. The default setting is `t` which means MathJax for HTML, and no processing for ASCII and L<sup>A</sup>T<sub>E</sub>X backends. You can also set this variable on a per-file basis using one of these lines:

```
‘#+OPTIONS: tex:t’           Do the right thing automatically (MathJax)
‘#+OPTIONS: tex:nil’        Do not process LATEX fragments at all
‘#+OPTIONS: tex:verbatim’  Verbatim export, for jsMath or so
```

## 12.5.2 Previewing L<sup>A</sup>T<sub>E</sub>X fragments

If you have a working L<sup>A</sup>T<sub>E</sub>X installation and ‘`dvipng`’, ‘`dvisvgm`’ or ‘`convert`’ installed<sup>7</sup>, L<sup>A</sup>T<sub>E</sub>X fragments can be processed to produce images of the typeset expressions to be used for inclusion while exporting to HTML (see [Section 12.5.1 \[L<sup>A</sup>T<sub>E</sub>X fragments\]](#), page 142), or for inline previewing within Org mode.

You can customize the variables `org-format-latex-options` and `org-format-latex-header` to influence some aspects of the preview. In particular, the `:scale` (and for HTML export, `:html-scale`) property of the former can be used to adjust the size of the preview images.

### C-c C-x C-l (`org-latex-preview`)

Produce a preview image of the L<sup>A</sup>T<sub>E</sub>X fragment at point and overlay it over the source code. If there is no fragment at point, process all fragments in the current entry—between two headlines.

<sup>6</sup> When MathJax is used, only the environments recognized by MathJax are processed. When `dvipng`, `dvisvgm`, or ImageMagick suite is used to create images, any L<sup>A</sup>T<sub>E</sub>X environment is handled.

<sup>7</sup> These are respectively available at <https://sourceforge.net/projects/dvipng/>, <http://dvisvgm.bplaced.net/> and from the ImageMagick suite. Choose the converter by setting the variable `org-preview-latex-default-process` accordingly.

When called with a single prefix argument, clear all images in the current entry. Two prefix arguments produce a preview image for all fragments in the buffer, while three of them clear all the images in that buffer.

You can turn on the previewing of all  $\LaTeX$  fragments in a file with

```
#+STARTUP: latexpreview
```

To disable it, simply use

```
#+STARTUP: nolatexpreview
```

### 12.5.3 Using $\CD\LaTeX$ to enter math

$\CD\LaTeX$  mode is a minor mode that is normally used in combination with a major  $\LaTeX$  mode like  $\AUCTeX$  in order to speed-up insertion of environments and math templates. Inside Org mode, you can make use of some of the features of  $\CD\LaTeX$  mode. You need to install ‘`cdlatex.el`’ and ‘`texmathp.el`’ (the latter comes also with  $\AUCTeX$ ) from [NonGNU ELPA](https://staff.fnwi.uva.nl/c.dominik/Tools/cdlatex/) with the [Emacs packaging system](#) or alternatively from <https://staff.fnwi.uva.nl/c.dominik/Tools/cdlatex/>. Do not use  $\CD\LaTeX$  mode itself under Org mode, but use the special version Org  $\CD\LaTeX$  minor mode that comes as part of Org. Turn it on for the current buffer with `M-x org-cdlatex-mode`, or for all Org files with

```
(add-hook 'org-mode-hook #'turn-on-org-cdlatex)
```

When this mode is enabled, the following features are present (for more details see the documentation of  $\CD\LaTeX$  mode):

`C-c {`

Insert an environment template.

`TAB`

The `TAB` key expands the template if point is inside a  $\LaTeX$  fragment<sup>8</sup>. For example, `TAB` expands ‘`fr`’ to ‘`\frac{}{}`’ and position point correctly inside the first brace. Another `TAB` gets you into the second brace.

Even outside fragments, `TAB` expands environment abbreviations at the beginning of a line. For example, if you write ‘`equ`’ at the beginning of a line and press `TAB`, this abbreviation is expanded to an ‘`equation`’ environment. To get a list of all abbreviations, type `M-x cdlatex-command-help`.

`^`

`_`

Pressing `_` and `^` inside a  $\LaTeX$  fragment inserts these characters together with a pair of braces. If you use `TAB` to move out of the braces, and if the braces surround only a single character or macro, they are removed again (depending on the variable `cdlatex-simplify-sub-super-scripts`).

```

Pressing the backquote followed by a character inserts math macros, also outside  $\LaTeX$  fragments. If you wait more than 1.5 seconds after the backquote, a help window pops up.

<sup>8</sup> Org mode has a method to test if point is inside such a fragment, see the documentation of the function `org-inside-LaTeX-fragment-p`.

Pressing the single-quote followed by another character modifies the  $\text{\LaTeX}$  symbol before point with an accent or a font. If you wait more than 1.5 seconds after the single-quote, a help window pops up. Character modification works only inside  $\text{\LaTeX}$  fragments; outside the quote is normal.

## 12.6 Literal Examples

You can include literal examples that should not be subjected to markup. Such examples are typeset in monospace, so this is well suited for source code and similar examples.

```
#+BEGIN_EXAMPLE
  Some example from a text file.
#+END_EXAMPLE
```

There is one limitation, however. You must insert a comma right before lines starting with either `'*`, `',*`, `'#+` or `',#+`, as those may be interpreted as outlines nodes or some other special syntax. Org transparently strips these additional commas whenever it accesses the contents of the block.

```
#+BEGIN_EXAMPLE
,* I am no real headline
#+END_EXAMPLE
```

For simplicity when using small examples, you can also start the example lines with a colon followed by a space. There may also be additional whitespace before the colon:

```
Here is an example
: Some example from a text file.
```

If the example is source code from a programming language, or any other text that can be marked up by Font Lock in Emacs, you can ask for the example to look like the fontified Emacs buffer<sup>9</sup>. This is done with the code block, where you also need to specify the name of the major mode that should be used to fontify the example<sup>10</sup>, see [Section 17.2 \[Structure Templates\]](#), [page 257](#) for shortcuts to easily insert code blocks.

```
#+BEGIN_SRC emacs-lisp
  (defun org-xor (a b)
    "Exclusive or."
    (if a (not b) b))
#+END_SRC
```

Both in `'example'` and in `'src'` snippets, you can add a `'-n'` switch to the `'#+BEGIN'` line<sup>11</sup>, to get the lines of the example numbered. The `'-n'` takes an optional numeric argument specifying the starting line number of the block. If you use a `'+n'` switch, the numbering from the previous numbered snippet is continued in the current one. The `'+n'` switch can

<sup>9</sup> This works automatically for the HTML backend (it requires version 1.34 of the `'htmlize.el'` package, which you need to install). Fontified code chunks in  $\text{\LaTeX}$  can be achieved using either the `listings`  $\text{\LaTeX}$  package, `minted`  $\text{\LaTeX}$  package, or by using `engrave-faces`. Refer to `org-latex-src-block-backend` for details.

<sup>10</sup> Source code in code blocks may also be evaluated either interactively or on export. See [Chapter 16 \[Working with Source Code\]](#), [page 227](#) for more information on evaluating code blocks.

<sup>11</sup> In the `'src'` snippets, switches must be placed right after the language name and before the [Section 16.2 \[header arguments\]](#), [page 228](#)

also take a numeric argument. This adds the value of the argument to the last line of the previous block to determine the starting line number.

```
#+BEGIN_SRC emacs-lisp -n 20
  ;; This exports with line number 20.
  (message "This is line 21")
#+END_SRC

#+BEGIN_SRC emacs-lisp +n 10
  ;; This is listed as line 31.
  (message "This is line 32")
#+END_SRC
```

In literal examples, Org interprets strings like `(ref:name)` as labels, and use them as targets for special hyperlinks like `[[(name)]]`—i.e., the reference name enclosed in single parentheses. In HTML, hovering the mouse over such a link remote-highlights the corresponding code line<sup>12</sup>, which is kind of cool.

You can also add a `-r` switch which *removes* the labels from the source code<sup>13</sup>. With the `-n` switch, links to these references are labeled by the line numbers from the code listing. Otherwise links use the labels with no parentheses. Here is an example:

```
#+BEGIN_SRC emacs-lisp -n -r
  (save-excursion                (ref:sc)
    (goto-char (point-min))      (ref:jump))
#+END_SRC
In line [[(sc)]] we remember the current position. [[(jump)]] [Line (jump)]
jumps to point-min.
```

Source code and examples may be *indented* in order to align nicely with the surrounding text, and in particular with plain list structure (see [Section 2.6 \[Plain Lists\]](#), page 13). By default, Org only retains the relative indentation between lines, e.g., when exporting the contents of the block. However, you can use the `-i` switch to also preserve the global indentation, if it does matter. See [Section 16.10 \[Editing Source Code\]](#), page 250.

If the syntax for the label format conflicts with the language syntax, use a `-l` switch to change the format, for example

```
#+BEGIN_SRC pascal -n -r -l "((%s))"
```

See also the variable `org-coderef-label-format`.

HTML export also allows examples to be published as text areas (see [Section 13.9.12 \[Text areas in HTML export\]](#), page 170).

Because the `#+BEGIN` ... `#+END` patterns need to be added so often, a shortcut is provided (see [Section 17.2 \[Structure Templates\]](#), page 257).

**C-c ' (org-edit-special)**

Edit the source code example at point in its native mode. This works by switching to a temporary buffer with the source code. You need to exit by

<sup>12</sup> This requires some Javascript which is *not* automatically included in the HTML output: you have to customize the variable `org-html-head-include-scripts` to `t` to have it included (it is `nil` by default).

<sup>13</sup> Adding `-k` to `-n -r` *keeps* the labels in the source code while using line numbers for the links, which might be useful to explain those in an Org mode example code.

pressing `C-c '` again. The edited version then replaces the old version in the Org buffer. Fixed-width regions—where each line starts with a colon followed by a space—are edited using Artist mode<sup>14</sup> to allow creating ASCII drawings easily. Using this command in an empty line creates a new fixed-width region.

Calling `org-store-link` (see Section 4.5 [Handling Links], page 43) while editing a source code example in a temporary buffer created with `C-c '` prompts for a label. Make sure that it is unique in the current buffer, and insert it with the proper formatting like `'(ref:label)'` at the end of the current line. Then the label is stored as a link `'(label)'`, for retrieval with `C-c C-l`.

## 12.7 Images

An image is a link to an image file<sup>15</sup> that does not have a description part, for example

```
./img/cat.jpg
```

If you wish to define a caption for the image (see Section 12.8 [Captions], page 148) and maybe a label for internal cross-references (see Section 4.2 [Internal Links], page 40), make sure that the link is on a line by itself and precede it with `'CAPTION'` and `'NAME'` keywords as follows:

```
#+CAPTION: This is the caption for the next figure link (or table)
#+NAME:    fig:SED-HR4049
[[./img/a.jpg]]
```

Such images can be displayed within the buffer with the following command:

`C-c C-x C-v` (`org-toggle-inline-images`)

Toggle the inline display of linked images. When called with a prefix argument, also display images that do have a link description. You can ask for inline images to be displayed at startup by configuring the variable `org-startup-with-inline-images`<sup>16</sup>.

By default, Org mode displays inline images according to their actual width, but no wider than `fill-column` characters.

You can customize the displayed image width using `org-image-actual-width` variable (globally) or `'ORG-IMAGE-ACTUAL-WIDTH'` property (subtree-level)<sup>17</sup>. Their value can be the following:

- (default) `Non-nil`, use the actual width of images when inlining them. If the actual width is too wide, limit it according to `org-image-max-width`.
- When set to a number, use `imagemagick` (when available) to set the image's width to this value.
- When set to a number in a list, try to get the width from any `'#+ATTR.*'` keyword if it matches a width specification like:

<sup>14</sup> You may select a different mode with the variable `org-edit-fixed-width-region-mode`.

<sup>15</sup> What Emacs considers to be an image depends on `image-file-name-extensions` and `image-file-name-regexps`.

<sup>16</sup> The variable `org-startup-with-inline-images` can be set within a buffer with the `'STARTUP'` options `'inlineimages'` and `'noinlineimages'`.

<sup>17</sup> The width can be customized in Emacs  $\geq$  24.1, built with `imagemagick` support.

```
#+ATTR_HTML: :width 300px
```

and fall back on that number if none is found.

- When set to `nil`, try to get the width from an ‘`#+ATTR.*`’ keyword and fall back on the original width or `org-image-max-width` if none is found.

`org-image-max-width` limits the maximum displayed image width, but only when the image width is not set explicitly. Possible maximum width can be set to:

- (default) `fill-column`, limit width to `fill-column` number of characters.
- `window`, limit width to current window width.
- integer number, limit width to that specified number of pixels.
- `nil`, do not limit the width.

Org mode can left-align, center or right-align the display of inline images. This setting is controlled (globally) by `org-image-align`. Only standalone images are affected, corresponding to links with no surrounding text in their paragraph except for whitespace. Its value can be the following:

- (default) The symbol `left`, which inserts the image where the link appears in the buffer.
- The symbol `center`, which will preview links centered in the Emacs window.
- The symbol `right`, which will preview links right-aligned in the Emacs window.

Inline image alignment can be specified for each link using the ‘`#+ATTR.*`’ keyword if it matches an alignment specification like:

```
#+ATTR_HTML: :align center
```

Org will use the alignment specification from any ‘`#+ATTR.*`’ keyword, such as ‘`#+ATTR_HTML`’ or ‘`#+ATTR_LATEX`’, but ‘`#+ATTR_ORG`’ (if present) will override the others. For instance, this link

```
#+ATTR_HTML: :align right
#+ATTR_ORG: :align center
[[/path/to/image/file.png]]
```

will be displayed centered in Emacs but exported right-aligned to HTML.

When ‘`#+ATTR_ORG`’ is not set, inline image alignment is also read from the ‘`:center`’ attribute supported by some export backends (like HTML,  $\text{\LaTeX}$  and Beamer.)

Inline images can also be displayed when cycling the folding state. When custom option `org-cycle-inline-images-display` is set, the visible inline images under subtree will be displayed automatically.

## 12.8 Captions

You can assign a caption to a specific part of a document by inserting a ‘`CAPTION`’ keyword immediately before it:

```
#+CAPTION: This is the caption for the next table (or link)
| ... | ... |
|-----+-----|
```

Optionally, the caption can take the form:

```
#+CAPTION[Short caption]: Longer caption.
```

Even though images and tables are prominent examples of captioned structures, the same caption mechanism can apply to many others—e.g.,  $\text{\LaTeX}$  equations, source code blocks. Depending on the export backend, those may or may not be handled.

## 12.9 Horizontal Rules

A line consisting of only dashes, and at least 5 of them, is exported as a horizontal line.

## 12.10 Creating Footnotes

A footnote is started by a footnote marker in square brackets in column 0, no indentation allowed. It ends at the next footnote definition, headline, or after two consecutive empty lines. The footnote reference is simply the marker in square brackets, inside text. Markers always start with ‘fn:’. For example:

```
The Org website[fn:1] now looks a lot better than it used to.
...
[fn:50] The link is: https://orgmode.org
```

Org mode extends the number-based syntax to *named* footnotes and optional inline definition. Here are the valid references:

```
‘[fn:NAME]’
```

A named footnote reference, where *NAME* is a unique label word, or, for simplicity of automatic creation, a number.

```
‘[fn:: This is the inline definition of this footnote]’
```

An anonymous footnote where the definition is given directly at the reference point.

```
‘[fn:NAME: a definition]’
```

An inline definition of a footnote, which also specifies a name for the note. Since Org allows multiple references to the same note, you can then use ‘[fn:NAME]’ to create additional references.

Footnote labels can be created automatically, or you can create names yourself. This is handled by the variable `org-footnote-auto-label` and its corresponding ‘STARTUP’ keywords. See the docstring of that variable for details.

The following command handles footnotes:

**C-c C-x f** The footnote action command.

When point is on a footnote reference, jump to the definition. When it is at a definition, jump to the—first—reference.

Otherwise, create a new footnote. Depending on the variable `org-footnote-define-inline`<sup>18</sup>, the definition is placed right into the text as part of the reference, or separately into the location determined by the variable `org-footnote-section`.

When this command is called with a prefix argument, a menu of additional options is offered:

<sup>18</sup> The corresponding in-buffer setting is: ‘#+STARTUP: fninline’ or ‘#+STARTUP: nofninline’.

- s* Sort the footnote definitions by reference sequence.
- r* Renumber the simple ‘fn:N’ footnotes.
- S* Short for first *r*, then *s* action.
- n* Rename all footnotes into a ‘fn:1’ . . . ‘fn:n’ sequence.
- d* Delete the footnote at point, including definition and references.

Depending on the variable `org-footnote-auto-adjust`<sup>19</sup>, renumbering and sorting footnotes can be automatic after each insertion or deletion.

*C-c C-c* If point is on a footnote reference, jump to the definition. If it is at the definition, jump back to the reference. When called at a footnote location with a prefix argument, offer the same menu as *C-c C-x f*.

*C-c C-o* or *mouse-1/2*

Footnote labels are also links to the corresponding definition or reference, and you can use the usual commands to follow these links.

---

<sup>19</sup> The corresponding in-buffer options are ‘#+STARTUP: fnadjust’ and ‘#+STARTUP: nofnadjust’.

## 13 Exporting

At some point you might want to print your notes, publish them on the web, or share them with people not using Org. Org can convert and export documents to a variety of other formats while retaining as much structure (see [Chapter 2 \[Document Structure\], page 7](#)) and markup (see [Chapter 12 \[Markup for Rich Contents\], page 140](#)) as possible.

The libraries responsible for translating Org files to other formats are called *backends*. Org ships with support for the following backends:

- *ascii* (ASCII format)
- *beamer* (L<sup>A</sup>T<sub>E</sub>X Beamer format)
- *html* (HTML format)
- *icalendar* (iCalendar format)
- *latex* (L<sup>A</sup>T<sub>E</sub>X format)
- *md* (Markdown format)
- *odt* (OpenDocument Text format)
- *org* (Org format)
- *texinfo* (Texinfo format)
- *man* (Man page format)

Users can install libraries for additional formats from the Emacs packaging system. For easy discovery, these packages have a common naming scheme: `ox-NAME`, where *NAME* is a format. For example, `ox-koma-letter` for *koma-letter* backend. More libraries can be found in the ‘`org-contrib`’ repository (see [Section 1.2 \[Installation\], page 2](#)).

Org only loads backends for the following formats by default: ASCII, HTML, iCalendar, L<sup>A</sup>T<sub>E</sub>X, and ODT. Additional backends can be loaded in either of two ways: by configuring the `org-export-backends` variable, or by requiring libraries in the Emacs init file. For example, to load the Markdown backend, add this to your Emacs config:

```
(require 'ox-md)
```

### 13.1 The Export Dispatcher

The export dispatcher is the main interface for Org’s exports. A hierarchical menu presents the currently configured export formats. Options are shown as easy toggle switches on the same screen.

Org also has a minimal prompt interface for the export dispatcher. When the variable `org-export-dispatch-use-expert-ui` is set to a non-nil value, Org prompts in the minibuffer. To switch back to the hierarchical menu, press `?`.

**C-c C-e** (`org-export-dispatch`)

Invokes the export dispatcher interface. The options show default settings. The `C-u` prefix argument preserves options from the previous export, including any subtree selections.

Org exports the entire buffer by default. If the Org buffer has an active region, then Org exports just that region.

Within the dispatcher interface, the following key combinations can further alter what is exported, and how.

**C-a**

Toggle asynchronous export. Asynchronous export uses an external Emacs process with a specially configured initialization file to complete the exporting process in the background, without tying-up Emacs. This is particularly useful when exporting long documents.

Output from an asynchronous export is saved on the *export stack*. To view this stack, call the export dispatcher with a double **C-u** prefix argument. If already in the export dispatcher menu, **&** displays the stack.

You can make asynchronous export the default by setting `org-export-in-background`.

You can set the initialization file used by the background process by setting `org-export-async-init-file`.

**C-b**

Toggle body-only export. Useful for excluding headers and footers in the export. Affects only those backend formats that have sections like ‘<head>...</head>’ in HTML.

To make body-only export the default, customize the variable `org-export-body-only`.

**C-f**

Toggle force-publishing export. Publish functions normally only publish changed files (see [BROKEN LINK: \*\*Triggering Publication]). Forced publishing causes files to be published even if their timestamps do not indicate the file has been changed.

To make forced publishing the default, customize the variable `org-export-force-publishing`. (This is similar to `org-publish-use-timestamps-flag`, but only affects the export dispatcher.)

**C-s**

Toggle subtree export. When turned on, Org exports only the subtree starting from point position at the time the export dispatcher was invoked. Org uses the top heading of this subtree as the document’s title. If point is not on a heading, Org uses the nearest enclosing header. If point is in the document preamble, Org signals an error and aborts export.

To make subtree export the default, customize the variable `org-export-initial-scope`.

**C-v**

Toggle visible-only export. This is useful for exporting only certain parts of an Org document by adjusting the visibility of particular headings. See also [Section 2.5 \[Sparse Trees\], page 12](#).

To make visible-only export the default, customize the variable `org-export-visible-only`.

## 13.2 Export Settings

Export options can be set: globally with variables; for an individual file by making variables buffer-local with in-buffer settings (see [Section 17.8 \[In-buffer Settings\], page 261](#)); by setting individual keywords or specifying them in compact form with the ‘OPTIONS’ keyword; or for a tree by setting properties (see [Chapter 7 \[Properties and Columns\], page 67](#)). Options set at a specific level override options set at a more general level.

In-buffer settings may appear anywhere in the file, either directly or indirectly through a file included using ‘#+SETUPFILE: filename or URL’ syntax. Option keyword sets tailored to a particular backend can be inserted from the export dispatcher (see [Section 13.1 \[The Export Dispatcher\], page 151](#)) using the ‘Insert template’ command by pressing #. To insert keywords individually, a good way to make sure the keyword is correct is to type ‘#+’ and then to use *M-TAB*<sup>1</sup> for completion.

The export keywords available for every backend, and their equivalent global variables, include:

- ‘AUTHOR’    The document author (`user-full-name`).
- ‘CREATOR’    Entity responsible for output generation (`org-export-creator-string`).
- ‘DATE’        A date or a timestamp<sup>2</sup>.
- ‘EMAIL’      The email address (`user-mail-address`).
- ‘LANGUAGE’    Language to use for translating certain strings (`org-export-default-language`). With ‘#+LANGUAGE: fr’, for example, Org translates ‘Table of contents’ to the French ‘Table des matières’<sup>3</sup>.
- ‘SELECT\_TAGS’    List of tags that will, if present, be selected for export. The default value is `org-export-select-tags` ‘(“export”)’. When a tree is tagged with ‘export’, Org selects that tree and its subtrees for export, ignoring all the other sections that do not possess the ‘export’ tag.  
When selectively exporting files with ‘export’ tags set, Org does not export any text that appears before the first headline.  
Note that a file without the ‘export’ tags will export all its sections.  
To select non-default tags for export, customize `org-export-select-tags` (globally) or add ‘#+SELECT\_TAGS: tag1 tag2’ to the document.
- ‘EXCLUDE\_TAGS’    List of tags that will be excluded from export. The default value is `org-export-exclude-tags` ‘(“noexport”)’. When a tree is tagged with ‘noexport’, Org excludes that tree and its subtrees from export.  
Entries tagged with ‘noexport’ are unconditionally excluded from the export, even if they have an ‘export’ tag. Even if a subtree is not exported, Org executes any code blocks contained there.

<sup>1</sup> Many desktops intercept *M-TAB* to switch windows. Use *C-M-i* or *ESC TAB* instead.

<sup>2</sup> The variable `org-export-date-timestamp-format` defines how this timestamp are exported.

<sup>3</sup> For export to L<sup>A</sup>T<sub>E</sub>X format—or L<sup>A</sup>T<sub>E</sub>X-related formats such as Beamer—, the ‘`org-latex-package-alist`’ variable needs further configuration. See [Section 13.10.2 \[L<sup>A</sup>T<sub>E</sub>X specific export settings\], page 174](#).

To select non-default tags for the exclusion, customize `org-export-exclude-tags` (globally) or add `'#+EXCLUDE_TAGS: tag1 tag2'` to the document.

`'TITLE'` Org displays this title. For long titles, use multiple `'#+TITLE'` lines.

`'EXPORT_FILE_NAME'`

The name of the output file to be generated. Otherwise, Org generates the file name based on the buffer name and the extension based on the backend format.

The `'OPTIONS'` keyword is a compact form. To configure multiple options, use several `'OPTIONS'` lines. `'OPTIONS'` recognizes the following arguments.

- ' Toggle smart quotes (`org-export-with-smart-quotes`). Depending on the language used, when activated, Org treats pairs of double quotes as primary quotes, pairs of single quotes as secondary quotes, and single quote marks as apostrophes.
- \* Toggle emphasized text (`org-export-with-emphasize`).
- Toggle conversion of special strings (`org-export-with-special-strings`).
- : Toggle fixed-width sections (`org-export-with-fixed-width`).
- < Toggle inclusion of time/date active/inactive stamps (`org-export-with-timestamps`).
- \n Toggles whether to preserve line breaks (`org-export-preserve-breaks`).
- ^ Toggle TeX-like syntax for sub- and superscripts. If you write `'^:{'`, `'a_{b}'` is interpreted, but the simple `'a_b'` is left as it is (`org-export-with-sub-superscripts`).
- arch Configure how archived trees are exported. When set to `headline`, the export process skips the contents and processes only the headlines (`org-export-with-archived-trees`).
- author Toggle inclusion of author name into exported file (`org-export-with-author`).
- expand-links Toggle expansion of environment variables in file paths (`org-export-expand-links`).
- broken-links Toggles if Org should continue exporting upon finding a broken internal link. When set to `mark`, Org clearly marks the problem link in the output (`org-export-with-broken-links`).
- c Toggle inclusion of `'CLOCK'` keywords (`org-export-with-clocks`).
- creator Toggle inclusion of creator information in the exported file (`org-export-with-creator`).
- d Toggles inclusion of drawers, or list of drawers to include, or list of drawers to exclude (`org-export-with-drawers`).
- date Toggle inclusion of a date into exported file (`org-export-with-date`).
- e Toggle inclusion of entities (`org-export-with-entities`).

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>email</code>     | Toggle inclusion of the author’s e-mail into exported file ( <code>org-export-with-email</code> ).                                                                                                                                                                                                                                                                                                                                           |
| <code>f</code>         | Toggle the inclusion of footnotes ( <code>org-export-with-footnotes</code> ).                                                                                                                                                                                                                                                                                                                                                                |
| <code>H</code>         | Set the number of headline levels for export ( <code>org-export-headline-levels</code> ). Below that level, headlines are treated differently. In most backends, they become list items.                                                                                                                                                                                                                                                     |
| <code>inline</code>    | Toggle inclusion of inlinetasks ( <code>org-export-with-inlinetasks</code> ).                                                                                                                                                                                                                                                                                                                                                                |
| <code>num</code>       | Toggle section-numbers ( <code>org-export-with-section-numbers</code> ). When set to number N, Org numbers only those headlines at level N or above. Set ‘UNNUMBERED’ property to non-nil to disable numbering of heading and subheadings entirely. Moreover, when the value is ‘notoc’ the headline, and all its children, do not appear in the table of contents either (see <a href="#">Section 13.3 [Table of Contents], page 156</a> ). |
| <code>p</code>         | Toggle export of planning information ( <code>org-export-with-planning</code> ). “Planning information” comes from lines located right after the headline and contain any combination of these cookies: ‘SCHEDULED’, ‘DEADLINE’, or ‘CLOSED’.                                                                                                                                                                                                |
| <code>pri</code>       | Toggle inclusion of priority cookies ( <code>org-export-with-priority</code> ).                                                                                                                                                                                                                                                                                                                                                              |
| <code>prop</code>      | Toggle inclusion of property drawers, or list the properties to include ( <code>org-export-with-properties</code> ).                                                                                                                                                                                                                                                                                                                         |
| <code>stat</code>      | Toggle inclusion of statistics cookies ( <code>org-export-with-statistics-cookies</code> ).                                                                                                                                                                                                                                                                                                                                                  |
| <code>tags</code>      | Toggle inclusion of tags, may also be <code>not-in-toc</code> ( <code>org-export-with-tags</code> ).                                                                                                                                                                                                                                                                                                                                         |
| <code>tasks</code>     | Toggle inclusion of tasks (TODO items); or <code>nil</code> to remove all tasks; or <code>todo</code> to remove done tasks; or list the keywords to keep ( <code>org-export-with-tasks</code> ).                                                                                                                                                                                                                                             |
| <code>tex</code>       | <code>nil</code> does not export; <code>t</code> exports; <code>verbatim</code> keeps everything in verbatim ( <code>org-export-with-latex</code> ).                                                                                                                                                                                                                                                                                         |
| <code>timestamp</code> | Toggle inclusion of the creation time in the exported file ( <code>org-export-timestamp-file</code> ).                                                                                                                                                                                                                                                                                                                                       |
| <code>title</code>     | Toggle inclusion of title ( <code>org-export-with-title</code> ).                                                                                                                                                                                                                                                                                                                                                                            |
| <code>toc</code>       | Toggle inclusion of the table of contents, or set the level limit ( <code>org-export-with-toc</code> ).                                                                                                                                                                                                                                                                                                                                      |
| <code>todo</code>      | Toggle inclusion of TODO keywords into exported text ( <code>org-export-with-todo-keywords</code> ).                                                                                                                                                                                                                                                                                                                                         |
| <code> </code>         | Toggle inclusion of tables ( <code>org-export-with-tables</code> ).                                                                                                                                                                                                                                                                                                                                                                          |

When exporting subtrees, special node properties can override the above keywords. These properties have an ‘EXPORT\_’ prefix. For example, ‘DATE’ becomes, ‘EXPORT\_DATE’ when used for a specific subtree. Except for ‘SETUPFILE’, all other keywords listed above have an ‘EXPORT\_’ equivalent.

If `org-export-allow-bind-keywords` is non-`nil`, Emacs variables can become buffer-local during export by using the ‘`BIND`’ keyword. Its syntax is ‘`#+BIND: variable value`’. This is particularly useful for in-buffer settings that cannot be changed using keywords.

### 13.3 Table of Contents

The table of contents includes all headlines in the document. Its depth is therefore the same as the headline levels in the file. If you need to use a different depth, or turn it off entirely, set the `org-export-with-toc` variable accordingly. You can achieve the same on a per file basis, using the following ‘`toc`’ item in ‘`OPTIONS`’ keyword:

```
#+OPTIONS: toc:2          (only include two levels in TOC)
#+OPTIONS: toc:nil       (no default TOC at all)
```

Org includes both numbered and unnumbered headlines in the table of contents<sup>4</sup>. If you need to exclude an unnumbered headline, along with all its children, set the ‘`UNNUMBERED`’ property to ‘`notoc`’ value.

```
* Subtree not numbered, not in table of contents either
:PROPERTIES:
:UNNUMBERED: notoc
:END:
```

Org normally inserts the table of contents in front of the exported document. To move the table of contents to a different location, first turn off the default with `org-export-with-toc` variable or with ‘`#+OPTIONS: toc:nil`’. Then insert ‘`#+TOC: headlines N`’ at the desired location(s).

```
#+OPTIONS: toc:nil
...
#+TOC: headlines 2
```

To adjust the table of contents depth for a specific section of the Org document, append an additional ‘`local`’ parameter. This parameter becomes a relative depth for the current level. The following example inserts a local table of contents, with direct children only.

```
* Section
#+TOC: headlines 1 local
```

Note that for this feature to work properly in  $\text{\LaTeX}$  export, the Org file requires the inclusion of the `titletoc` package. Because of compatibility issues, `titletoc` has to be loaded *before* `hyperref`. Customize the `org-latex-default-packages-alist` variable.

The following example inserts a table of contents that links to the children of the specified target.

```
* Target
:PROPERTIES:
:CUSTOM_ID: TargetSection
:END:
** Heading A
** Heading B
```

---

<sup>4</sup> At the moment, some export backends do not obey this specification. For example,  $\text{\LaTeX}$  export excludes every unnumbered headline from the table of contents.

```
* Another section
#+TOC: headlines 1 :target #TargetSection
```

The ‘:target’ attribute is supported in HTML, Markdown, ODT, and ASCII export.

Use the ‘TOC’ keyword to generate list of tables—respectively, all listings—with captions.

```
#+TOC: listings
#+TOC: tables
```

Normally Org uses the headline for its entry in the table of contents. But with ‘ALT\_TITLE’ property, a different entry can be specified for the table of contents.

## 13.4 Include Files

[During export], page 207, you can include the content of another file. For example, to include your ‘.emacs’ file, you could use:

```
#+INCLUDE: "~/emacs" src emacs-lisp
```

There are three positional arguments after the include keyword, they are:

1. The file name, this is the sole mandatory argument. Org neither checks for correctness or validates the content in any way.
2. The block name to wrap the file content in. When this is ‘example’, ‘export’, or ‘src’ the content is escaped by `org-escape-code-in-string`. Arbitrary block names may be given, however block names starting with ‘:’ must be quoted, i.e. ‘:name’.
3. The source code language to use for formatting the contents. This is relevant to both ‘export’ and ‘src’ block types.

If an included file is not specified as having any markup language, Org assumes it be in Org format and proceeds as usual with a few exceptions. Org makes the footnote labels (see Section 12.10 [Creating Footnotes], page 149) in the included file local to that file. The contents of the included file belong to the same structure—headline, item—containing the ‘INCLUDE’ keyword. In particular, headlines within the file become children of the current section. That behavior can be changed by providing an additional keyword parameter, ‘:minlevel’. It shifts the headlines in the included file to become the lowest level. For example, this syntax makes the included file a sibling of the current top-level headline:

```
#+INCLUDE: "~/my-book/chapter2.org" :minlevel 1
```

Inclusion of only portions of files are specified using ranges parameter with ‘:lines’ keyword. The line at the upper end of the range will not be included. The start and/or the end of the range may be omitted to use the obvious defaults.

```
#+INCLUDE: "~/emacs" :lines "5-10"   Include lines 5 to 10, 10 excluded
#+INCLUDE: "~/emacs" :lines "-10"    Include lines 1 to 10, 10 excluded
#+INCLUDE: "~/emacs" :lines "10-"    Include lines from 10 to EOF
```

Inclusions may specify a file-link to extract an object matched by `org-link-search`<sup>5</sup> (see Section 4.8 [Search Options], page 47). The ranges for ‘:lines’ keyword are relative to the requested element. Therefore,

---

<sup>5</sup> Note that `org-link-search-must-match-exact-headline` is locally bound to non-nil. Therefore, `org-link-search` only matches headlines and named elements.

```
#+INCLUDE: "./paper.org::*conclusion" :lines "1-20"
```

includes the first 20 lines of the headline named ‘conclusion’.

To extract only the contents of the matched object, set ‘:only-contents’ property to non-nil. This omits any planning lines or property drawers. For example, to include the body of the heading with the custom ID ‘theory’, you can use

```
#+INCLUDE: "./paper.org::#theory" :only-contents t
```

The following command allows navigating to the included document:

```
C-c ' (org-edit-special)
      Visit the included file at point.
```

## 13.5 Macro Replacement

Macros replace text snippets during export. Macros are defined globally in `org-export-global-macros`, or document-wise with the following syntax:

```
#+MACRO: name replacement text; $1, $2 are arguments
```

which can be referenced using ‘{{{name(arg1, arg2)}}}’<sup>6</sup>. For example

```
#+MACRO: poem Rose is $1, violet's $2. Life's ordered: Org assists you.
{{{poem(red,blue)}}}
```

becomes

```
Rose is red, violet's blue. Life's ordered: Org assists you.
```

As a special case, Org parses any replacement text starting with ‘(eval’ as an Emacs Lisp expression and evaluates it accordingly. Within such templates, arguments become strings. Thus, the following macro

```
#+MACRO: gnustamp (eval (concat "GNU/" (capitalize $1)))
```

turns ‘{{{gnustamp(linux)}}}’ into ‘GNU/Linux’ during export.

Org recognizes macro references in following Org markup areas: paragraphs, headlines, verse blocks, tables cells and lists. Org also recognizes macro references in keywords, such as ‘CAPTION’, ‘TITLE’, ‘AUTHOR’, ‘DATE’, and for some backend specific export options.

Org comes with following pre-defined macros:

```
'{{{keyword(NAME)}}}'
'{{{title}}}'
'{{{author}}}'
'{{{email}}}'
```

The ‘keyword’ macro collects all values from *NAME* keywords throughout the buffer, separated with white space. ‘title’, ‘author’ and ‘email’ macros are shortcuts for, respectively, ‘{{{keyword(TITLE)}}}’, ‘{{{keyword(AUTHOR)}}}’ and ‘{{{keyword(EMAIL)}}}’.

---

<sup>6</sup> Since commas separate the arguments, commas within arguments have to be escaped with the backslash character. So only those backslash characters before a comma need escaping with another backslash character.

`'{{{date}}}'`

`'{{{date(FORMAT)}}}'`

This macro refers to the 'DATE' keyword. *FORMAT* is an optional argument to the 'date' macro that is used only if 'DATE' is a single timestamp. *FORMAT* should be a format string understood by `format-time-string`.

`'{{{time(FORMAT)}}}'`

`'{{{modification-time(FORMAT, VC)}}}'`

These macros refer to the document's date and time of export and date and time of modification. *FORMAT* is a string understood by `format-time-string`. If the second argument to the `modification-time` macro is non-nil, Org uses 'vc.el' to retrieve the document's modification time from the version control system. Otherwise Org reads the file attributes.

`'{{{input-file}}}'`

This macro refers to the filename of the exported file.

`'{{{property(PROPERTY-NAME)}}}'`

`'{{{property(PROPERTY-NAME, SEARCH OPTION)}}}'`

This macro returns the value of property *PROPERTY-NAME* in the current entry. If *SEARCH-OPTION* (see [Section 4.8 \[Search Options\]](#), page 47) refers to a remote entry, use it instead.

`'{{{n}}}'`

`'{{{n(NAME)}}}'`

`'{{{n(NAME, ACTION)}}}'`

This macro implements custom counters by returning the number of times the macro has been expanded so far while exporting the buffer. You can create more than one counter using different *NAME* values. If *ACTION* is '-', previous value of the counter is held, i.e., the specified counter is not incremented. If the value is a number, the specified counter is set to that value. If it is any other non-empty string, the specified counter is reset to 1. You may leave *NAME* empty to reset the default counter.

Moreover, inline source blocks (see [Section 16.2 \[Structure of Code Blocks\]](#), page 228) use the special 'results' macro to mark their output. As such, you are advised against re-defining it, unless you know what you are doing.

The surrounding brackets can be made invisible by setting `org-hide-macro-markers` to a non-nil value.

Org expands macros at the very beginning of the export process.

## 13.6 Comment Lines

Lines starting with zero or more whitespace characters followed by one '#' and a whitespace are treated as comments and, as such, are not exported.

Likewise, regions surrounded by '#+BEGIN\_COMMENT' ... '#+END\_COMMENT' are not exported.

Finally, a 'COMMENT' keyword at the beginning of an entry, but after any other keyword or priority cookie, comments out the entire subtree. In this case, the subtree is not exported

and no code block within it is executed either<sup>7</sup>. The command below helps changing the comment status of a headline.

`C-c ; (org-toggle-comment)`

Toggle the ‘COMMENT’ keyword at the beginning of an entry.

## 13.7 ASCII/Latin-1/UTF-8 export

ASCII export produces an output file containing only plain ASCII characters. This is the simplest and most direct text output. It does not contain any Org markup. Latin-1 and UTF-8 export use additional characters and symbols available in these encoding standards. All three of these export formats offer the most basic of text output for maximum portability.

On export, Org fills and justifies text according to the text width set in `org-ascii-text-width`.

Org exports links using a footnote-like style where the descriptive part is in the text and the link is in a note before the next heading. See the variable `org-ascii-links-to-notes` for details.

### ASCII export commands

`C-c C-e t a (org-ascii-export-to-ascii)`

`C-c C-e t l`

`C-c C-e t u`

Export as an ASCII file with a ‘.txt’ extension. For ‘myfile.org’, Org exports to ‘myfile.txt’, overwriting without warning. For ‘myfile.txt’, Org exports to ‘myfile.txt.txt’ in order to prevent data loss.

`C-c C-e t A (org-ascii-export-to-ascii)`

`C-c C-e t L`

`C-c C-e t U`

Export to a temporary buffer. Does not create a file.

### ASCII specific export settings

The ASCII export backend has one extra keyword for customizing ASCII output. Setting this keyword works similar to the general options (see [Section 13.2 \[Export Settings\], page 153](#)).

‘SUBTITLE’

The document subtitle. For long subtitles, use multiple ‘#+SUBTITLE’ lines in the Org file. Org prints them on one continuous line, wrapping into multiple lines if necessary.

### Header and sectioning structure

Org converts the first three outline levels into headlines for ASCII export. The remaining levels are turned into lists. To change this cut-off point where levels become lists, see [Section 13.2 \[Export Settings\], page 153](#).

---

<sup>7</sup> For a less drastic behavior, consider using a select tag (see [Section 13.2 \[Export Settings\], page 153](#)) instead.

## Quoting ASCII text

To insert text within the Org file by the ASCII backend, use one the following constructs, inline, keyword, or export block:

```
Inline text @@ascii:and additional text@@ within a paragraph.

#+ASCII: Some text

#+BEGIN_EXPORT ascii
Org exports text in this block only when using ASCII backend.
#+END_EXPORT
```

## ASCII specific attributes

ASCII backend recognizes only one attribute, ‘:width’, which specifies the width of a horizontal rule in number of characters. The keyword and syntax for specifying widths is:

```
#+ATTR_ASCII: :width 10
-----
```

## ASCII special blocks

Besides ‘#+BEGIN\_CENTER’ blocks (see [Section 12.1 \[Paragraphs\], page 140](#)), ASCII backend has these two left and right justification blocks:

```
#+BEGIN_JUSTIFYLEFT
It's just a jump to the left...
#+END_JUSTIFYLEFT

#+BEGIN_JUSTIFYRIGHT
...and then a step to the right.
#+END_JUSTIFYRIGHT
```

## 13.8 Beamer Export

Org uses Beamer export to convert an Org file tree structure into high-quality interactive slides for presentations. Beamer is a L<sup>A</sup>T<sub>E</sub>X document class for creating presentations in PDF, HTML, and other popular display formats.

### 13.8.1 Beamer export commands

*C-c C-e l b* (org-beamer-export-to-latex)  
Export as L<sup>A</sup>T<sub>E</sub>X file with a ‘.tex’ extension. For ‘myfile.org’, Org exports to ‘myfile.tex’, overwriting without warning.

*C-c C-e l B* (org-beamer-export-as-latex)  
Export to a temporary buffer. Does not create a file.

*C-c C-e l P* (org-beamer-export-to-pdf)  
Export as L<sup>A</sup>T<sub>E</sub>X file and then convert it to PDF format.

*C-c C-e l O*  
Export as L<sup>A</sup>T<sub>E</sub>X file, convert it to PDF format, and then open the PDF file.

### 13.8.2 Beamer specific export settings

Beamer export backend has several additional keywords for customizing Beamer output. These keywords work similar to the general options settings (see [Section 13.2 \[Export Settings\]](#), page 153).

`'BEAMER_THEME'`

The Beamer layout theme (`org-beamer-theme`). Use square brackets for options. For example:

```
#+BEAMER_THEME: Rochester [height=20pt]
```

`'BEAMER_FONT_THEME'`

The Beamer font theme.

`'BEAMER_INNER_THEME'`

The Beamer inner theme.

`'BEAMER_OUTER_THEME'`

The Beamer outer theme.

`'BEAMER_HEADER'`

Arbitrary lines inserted in the preamble, just before the `'hyperref'` settings.

`'DESCRIPTION'`

The document description. For long descriptions, use multiple `'DESCRIPTION'` keywords. By default, `'hyperref'` inserts `'DESCRIPTION'` as metadata. Use `org-latex-hyperref-template` to configure document metadata. Use `org-latex-title-command` to configure typesetting of description as part of front matter.

`'KEYWORDS'`

The keywords for defining the contents of the document. Use multiple `'KEYWORDS'` lines if necessary. By default, `'hyperref'` inserts `'KEYWORDS'` as metadata. Use `org-latex-hyperref-template` to configure document metadata. Use `org-latex-title-command` to configure typesetting of keywords as part of front matter.

`'SUBTITLE'`

Document's subtitle. For typesetting, use `org-beamer-subtitle-format` string. Use `org-latex-hyperref-template` to configure document metadata. Use `org-latex-title-command` to configure typesetting of subtitle as part of front matter.

### 13.8.3 Frames and Blocks in Beamer

Org transforms heading levels into Beamer's sectioning elements, frames and blocks. Any Org tree with a not-too-deep-level nesting should in principle be exportable as a Beamer presentation.

- Org headlines become Beamer frames when the heading level in Org is equal to `org-beamer-frame-level` or 'H' value in a `'OPTIONS'` line (see [Section 13.2 \[Export Settings\]](#), page 153).

Org overrides headlines to frames conversion for the current tree of an Org file if it encounters the `'BEAMER_ENV'` property set to `'frame'` or `'fullframe'`. Org ignores

whatever `org-beamer-frame-level` happens to be for that headline level in the Org tree. In Beamer terminology, a full frame is a frame without its title.

- Org exports a Beamer frame’s objects as block environments. Org can enforce wrapping in special block types when ‘`BEAMER_ENV`’ property is set<sup>8</sup>. For valid values see `org-beamer-environments-default`. To add more values, see `org-beamer-environments-extra`.
- If ‘`BEAMER_ENV`’ is set to ‘`appendix`’, Org exports the entry as an appendix. When set to ‘`note`’, Org exports the entry as a note within the frame or between frames, depending on the entry’s heading level. When set to ‘`noteNH`’, Org exports the entry as a note without its title. When set to ‘`againframe`’, Org exports the entry with ‘`\againframe`’ command, which makes setting the ‘`BEAMER_REF`’ property mandatory because ‘`\againframe`’ needs frame to resume.

When ‘`ignoreheading`’ is set, Org export ignores the entry’s headline but not its content. This is useful for inserting content between frames. It is also useful for properly closing a ‘`column`’ environment.

When ‘`BEAMER_ACT`’ is set for a headline, Org export translates that headline as an overlay or action specification. When enclosed in square brackets, Org export makes the overlay specification a default. Use ‘`BEAMER_OPT`’ to set any options applicable to the current Beamer frame or block. The Beamer export backend wraps with appropriate angular or square brackets. It also adds the ‘`fragile`’ option for any code that may require a verbatim block.

To create a column on the Beamer slide, use the ‘`BEAMER_COL`’ property for its headline in the Org file. Set the value of ‘`BEAMER_COL`’ to a decimal number representing the fraction of the total text width. Beamer export uses this value to set the column’s width and fills the column with the contents of the Org entry. If the Org entry has no specific environment defined, Beamer export ignores the heading. If the Org entry has a defined environment, Beamer export uses the heading as title. Behind the scenes, Beamer export automatically handles L<sup>A</sup>T<sub>E</sub>X column separations for contiguous headlines. To manually adjust them for any unique configurations needs, use the ‘`BEAMER_ENV`’ property.

### 13.8.4 Beamer specific syntax

Since Org’s Beamer export backend is an extension of the L<sup>A</sup>T<sub>E</sub>X backend, it recognizes other L<sup>A</sup>T<sub>E</sub>X specific syntax—for example, ‘`#+LATEX:`’ or ‘`#+ATTR_LATEX:`’. See [Section 13.10 \[L<sup>A</sup>T<sub>E</sub>X Export\]](#), page 173, for details.

Beamer export wraps the table of contents generated with ‘`toc:t`’ ‘`OPTION`’ keyword in a ‘`frame`’ environment. Beamer export does not wrap the table of contents generated with ‘`TOC`’ keyword (see [Section 13.3 \[Table of Contents\]](#), page 156). Use square brackets for specifying options.

```
#+TOC: headlines [currentsection]
```

Insert Beamer-specific code using the following constructs:

```
#+BEAMER: \pause
```

---

<sup>8</sup> If ‘`BEAMER_ENV`’ is set, Org export adds ‘`B_environment`’ tag to make it visible. The tag serves as a visual aid and has no semantic relevance.

```

#+BEGIN_EXPORT beamer
  Only Beamer export backend exports this.
#+END_EXPORT

```

Text @@beamer:some code@@ within a paragraph.

Inline constructs, such as the last one above, are useful for adding overlay specifications to objects with `bold`, `item`, `link`, `radio-target` and `target` types. Enclose the value in angular brackets and place the specification at the beginning of the object as shown in this example:

```
A *@@beamer:<2->@@useful* feature
```

Beamer export recognizes the ‘ATTR\_BEAMER’ keyword with the following attributes from Beamer configurations: ‘:environment’ for changing local Beamer environment, ‘:overlay’ for specifying Beamer overlays in angular or square brackets, and ‘:options’ for inserting optional arguments.

```

#+ATTR_BEAMER: :environment nonindentlist
- item 1, not indented
- item 2, not indented
- item 3, not indented

#+ATTR_BEAMER: :overlay <+-->
- item 1
- item 2

#+ATTR_BEAMER: :options [Lagrange]
Let  $G$  be a finite group, and let  $H$  be
a subgroup of  $G$ . Then the order of  $H$  divides the order of  $G$ .

```

### 13.8.5 Editing support

Org Beamer mode is a special minor mode for faster editing of Beamer documents.

```
#+STARTUP: beamer
```

*C-c C-b* (`org-beamer-select-environment`)

Org Beamer mode provides this key for quicker selections in Beamer normal environments, and for selecting the ‘BEAMER\_COL’ property.

### 13.8.6 A Beamer example

Here is an example of an Org document ready for Beamer export.

```

#+TITLE: Example Presentation
#+AUTHOR: Carsten Dominik
#+OPTIONS: H:2 toc:t num:t
#+LATEX_CLASS: beamer
#+LATEX_CLASS_OPTIONS: [presentation]
#+BEAMER_THEME: Madrid
#+COLUMNS: %45ITEM %10BEAMER_ENV(Env) %10BEAMER_ACT(Act) %4BEAMER_COL(Col)

* This is the first structural section

```

```

** Frame 1
*** Thanks to Eric Fraga                                     :B_block:
    :PROPERTIES:
    :BEAMER_COL: 0.48
    :BEAMER_ENV: block
    :END:
    for the first viable Beamer setup in Org
*** Thanks to everyone else                                 :B_block:
    :PROPERTIES:
    :BEAMER_COL: 0.48
    :BEAMER_ACT: <2->
    :BEAMER_ENV: block
    :END:
    for contributing to the discussion
**** This will be formatted as a beamer note                :B_note:
    :PROPERTIES:
    :BEAMER_env: note
    :END:
** Frame 2 (where we will not use columns)
*** Request
    Please test this stuff!

```

## 13.9 HTML Export

Org mode contains an HTML exporter with extensive HTML formatting compatible with XHTML 1.0 strict standard.

### 13.9.1 HTML export commands

*C-c C-e h h* (`org-html-export-to-html`)

Export as HTML file with a `.html` extension. For `'myfile.org'`, Org exports to `'myfile.html'`, overwriting without warning. *C-c C-e h o* exports to HTML and opens it in a web browser.

*C-c C-e h H* (`org-html-export-as-html`)

Exports to a temporary buffer. Does not create a file.

### 13.9.2 HTML specific export settings

HTML export has a number of keywords, similar to the general options settings described in [Section 13.2 \[Export Settings\], page 153](#).

'DESCRIPTION'

This is the document's description, which the HTML exporter inserts it as a HTML meta tag in the HTML file. For long descriptions, use multiple 'DESCRIPTION' lines. The exporter takes care of wrapping the lines properly.

The exporter includes a number of other meta tags, which can be customized by modifying `org-html-meta-tags`.

- `'HTML_DOCTYPE'`  
Specify the document type, for example: HTML5 (`org-html-doctype`).
- `'HTML_CONTAINER'`  
Specify the HTML container, such as `'div'`, for wrapping sections and elements (`org-html-container-element`).
- `'HTML_LINK_HOME'`  
The URL for home link (`org-html-link-home`).
- `'HTML_LINK_UP'`  
The URL for the up link of exported HTML pages (`org-html-link-up`).
- `'HTML_MATHJAX'`  
Options for MathJax (`org-html-mathjax-options`). MathJax is used to typeset  $\text{\LaTeX}$  math in HTML documents. See [Section 13.9.11 \[Math formatting in HTML export\]](#), page 170, for an example.
- `'HTML_HEAD'`  
Arbitrary lines for appending to the HTML document's head (`org-html-head`).
- `'HTML_HEAD_EXTRA'`  
More arbitrary lines for appending to the HTML document's head (`org-html-head-extra`).
- `'KEYWORDS'`  
Keywords to describe the document's content. HTML exporter inserts these keywords as HTML meta tags. For long keywords, use multiple `'KEYWORDS'` lines.
- `'LATEX_HEADER'`  
Arbitrary lines for appending to the preamble; HTML exporter appends when transcoding  $\text{\LaTeX}$  fragments to images (see [Section 13.9.11 \[Math formatting in HTML export\]](#), page 170).
- `'SUBTITLE'`  
The document's subtitle. HTML exporter formats subtitle if document type is `'HTML5'` and the CSS has a `'subtitle'` class.

Some of these keywords are explained in more detail in the following sections of the manual.

### 13.9.3 HTML doctypes

Org can export to various (X)HTML flavors.

Set the `org-html-doctype` variable for different (X)HTML variants. Depending on the variant, the HTML exporter adjusts the syntax of HTML conversion accordingly. Org includes the following ready-made variants:

- `"html4-strict"`
- `"html4-transitional"`
- `"html4-frameset"`
- `"xhtml-strict"`

- "xhtml-transitional"
- "xhtml-frameset"
- "xhtml-11"
- "html5"
- "xhtml5"

See the variable `org-html-doctype-alist` for details. The default is "xhtml-strict".

Org's HTML exporter does not by default enable new block elements introduced with the HTML5 standard. To enable them, set `org-html-html5-fancy` to non-nil. Or use an 'OPTIONS' line in the file to set 'html5-fancy'.

HTML5 documents can have arbitrary '#+BEGIN' ... '#+END' blocks. For example:

```
#+BEGIN_aside
  Lorem ipsum
#+END_aside
```

exports to:

```
<aside>
  <p>Lorem ipsum</p>
</aside>
```

while this:

```
#+ATTR_HTML: :controls controls :width 350
#+BEGIN_video
#+HTML: <source src="movie.mp4" type="video/mp4">
#+HTML: <source src="movie.ogg" type="video/ogg">
Your browser does not support the video tag.
#+END_video
```

exports to:

```
<video controls="controls" width="350">
  <source src="movie.mp4" type="video/mp4">
  <source src="movie.ogg" type="video/ogg">
  <p>Your browser does not support the video tag.</p>
</video>
```

When special blocks do not have a corresponding HTML5 element, the HTML exporter reverts to standard translation (see `org-html-html5-elements`). For example, '#+BEGIN\_lederhosen' exports to `<div class="lederhosen">`.

Special blocks cannot have headlines. For the HTML exporter to wrap the headline and its contents in `<section>` or `<article>` tags, set the 'HTML\_CONTAINER' property for the headline.

### 13.9.4 HTML preamble and postamble

The HTML exporter has delineations for preamble and postamble. The default value for `org-html-preamble` is `t`, which makes the HTML exporter insert the preamble. See the variable `org-html-preamble-format` for the format string.

Set `org-html-preamble` to a string to override the default format string. If set to a function, the HTML exporter expects the function to return a string upon execution. The

HTML exporter inserts this string in the preamble. The HTML exporter does not insert a preamble if `org-html-preamble` is set `nil`.

The above also applies to `org-html-postamble` and `org-html-postamble-format`. In addition, `org-html-postamble` can be set to `auto` (its default value), which makes the HTML exporter build a postamble from looking up author's name, email address, creator's name, and date.

### 13.9.5 Exporting to minimal HTML

If you want to output a minimal HTML file, with no CSS, no Javascript, no preamble or postamble, here are the variable you would need to set:

```
(setq org-html-head ""
      org-html-head-extra ""
      org-html-head-include-default-style nil
      org-html-head-include-scripts nil
      org-html-preamble nil
      org-html-postamble nil
      org-html-use-infojs nil)
```

### 13.9.6 Quoting HTML tags

The HTML export backend transforms '`<`' and '`>`' to '`&lt;`' and '`&gt;`'. To include raw HTML code in the Org file so the HTML export backend can insert that HTML code in the output, use this inline syntax: '`@html:...@`'. For example:

```
@html:<b>@bold text@html:</b>@
```

For larger raw HTML code blocks, use these HTML export code blocks:

```
#+HTML: Literal HTML code for export
```

```
#+BEGIN_EXPORT html
```

```
  All lines between these markers are exported literally
```

```
#+END_EXPORT
```

### 13.9.7 Headlines in HTML export

Headlines are exported to '`<h1>`', '`<h2>`', etc. Each headline gets the '`id`' attribute from '`CUSTOM_ID`' property, or a unique generated value, see [Section 4.2 \[Internal Links\]](#), page 40.

When `org-html-self-link-headlines` is set to a non-`nil` value, the text of the headlines is also wrapped in '`<a>`' tags. These tags have a '`href`' attribute making the headlines link to themselves.

### 13.9.8 Links in HTML export

The HTML export backend transforms Org's internal links (see [Section 4.2 \[Internal Links\]](#), page 40) to equivalent HTML links in the output. The backend similarly handles Org's automatic links created by radio targets (see [Section 4.3 \[Radio Targets\]](#), page 41) similarly. For Org links to external files, the backend transforms the links to *relative* paths.

For Org links to other '`.org`' files, the backend automatically changes the file extension to '`.html`' and makes file paths relative. If the '`.org`' files have an equivalent '`.html`' version at the same location, then the converted links should work without any further

manual intervention. However, to disable this automatic path translation, set `org-html-link-org-files-as-html` to `nil`. When disabled, the HTML export backend substitutes the ID-based links in the HTML output. For more about linking files when publishing to a directory, see [Section 14.1.6 \[Publishing links\], page 218](#).

Org files can also have special directives to the HTML export backend. For example, by using ‘`#+ATTR_HTML`’ lines to specify new format attributes to `<a>` or `<img>` tags. This example shows changing the link’s title and style:

```
#+ATTR_HTML: :title The Org mode website :style color:red;
[[https://orgmode.org]]
```

### 13.9.9 Tables in HTML export

The HTML export backend uses `org-html-table-default-attributes` when exporting Org tables to HTML. By default, the exporter does not draw frames and cell borders. To change for this for a table, use the following lines before the table in the Org file:

```
#+CAPTION: This is a table with lines around and between cells
#+ATTR_HTML: :border 2 :rules all :frame border
```

The HTML export backend preserves column groupings in Org tables (see [Section 3.3 \[Column Groups\], page 23](#)) when exporting to HTML.

Additional options for customizing tables for HTML export.

`org-html-table-align-individual-fields`

Non-`nil` attaches style attributes for alignment to each table field.

`org-html-table-caption-above`

Non-`nil` places caption string at the beginning of the table.

`org-html-table-data-tags`

Opening and ending tags for table data fields.

`org-html-table-default-attributes`

Default attributes and values for table tags.

`org-html-table-header-tags`

Opening and ending tags for table’s header fields.

`org-html-table-row-tags`

Opening and ending tags for table rows.

`org-html-table-use-header-tags-for-first-column`

Non-`nil` formats column one in tables with header tags.

### 13.9.10 Images in HTML export

The HTML export backend has features to convert Org image links to HTML inline images and HTML clickable image links.

When the link in the Org file has no description, the HTML export backend by default in-lines that image. For example: ‘`[[file:myimg.jpg]]`’ is in-lined, while ‘`[[file:myimg.jpg][the image]]`’ links to the text, ‘the image’. For more details, see the variable `org-html-inline-images`.

On the other hand, if the description part of the Org link is itself another link, such as ‘file:’ or ‘http:’ URL pointing to an image, the HTML export backend in-lines this image and links to the main image. This Org syntax enables the backend to link low-resolution thumbnail to the high-resolution version of the image, as shown in this example:

```
[[file:highres.jpg][file:thumb.jpg]]
```

To change attributes of in-lined images, use ‘#+ATTR\_HTML’ lines in the Org file. This example shows realignment to right, and adds `alt` and `title` attributes in support of text viewers and modern web accessibility standards.

```
#+CAPTION: A black cat stalking a spider
#+ATTR_HTML: :alt cat/spider image :title Action! :align right
[[./img/a.jpg]]
```

The HTML export backend copies the ‘http’ links from the Org file as-is.

### 13.9.11 Math formatting in HTML export

$\LaTeX$  math snippets (see [Section 12.5.1 \[LaTeX fragments\]](#), page 142) can be displayed in two different ways on HTML pages. The default is to use the [MathJax](#), which should work out of the box with Org<sup>9</sup><sup>10</sup>. Some MathJax display options can be configured via `org-html-mathjax-options`, or in the buffer. For example, with the following settings,

```
#+HTML_MATHJAX: align: left indent: 5em tagside: left
```

equation labels are displayed on the left margin and equations are five em from the left margin.

See the docstring of `org-html-mathjax-options` for all supported variables. The MathJax template can be configure via `org-html-mathjax-template`.

If you prefer, you can also request that  $\LaTeX$  fragments are processed into small images that will be inserted into the browser page. Before the availability of MathJax, this was the default method for Org files. This method requires that the `dvipng` program, `dvisvgm` or `ImageMagick` suite is available on your system. You can still get this processing with

```
#+OPTIONS: tex:dvipng
#+OPTIONS: tex:dvisvgm
```

or

```
#+OPTIONS: tex:imagemagick
```

### 13.9.12 Text areas in HTML export

Before Org mode’s Babel, one popular approach to publishing code in HTML was by using ‘:textarea’. The advantage of this approach was that copying and pasting was built into browsers with simple JavaScript commands. Even editing before pasting was made simple.

The HTML export backend can create such text areas. It requires an ‘#+ATTR\_HTML’ line as shown in the example below with the ‘:textarea’ option. This must be followed by either an example or a source code block. Other Org block types do not honor the ‘:textarea’ option.

<sup>9</sup> By default, Org loads MathJax from `jsDelivr`, as recommended in [Getting Started with MathJax Components](#).

<sup>10</sup> Please note that exported formulas are part of an HTML document, and that signs such as ‘<’, ‘>’, or ‘&’ have special meanings. See [MathJax TeX and LaTeX in HTML documents](#).

By default, the HTML export backend creates a text area 80 characters wide and height just enough to fit the content. Override these defaults with ‘:width’ and ‘:height’ options on the ‘#+ATTR\_HTML’ line.

```
#+ATTR_HTML: :textarea t :width 40
#+BEGIN_EXAMPLE
  (defun org-xor (a b)
    "Exclusive or."
    (if a (not b) b))
#+END_EXAMPLE
```

### 13.9.13 CSS support

You can modify the CSS style definitions for the exported file. The HTML exporter assigns the following special CSS classes<sup>11</sup> to appropriate parts of the document—your style specifications may change these, in addition to any of the standard classes like for headlines, tables, etc.

p.author	author information, including email
p.date	publishing date
p.creator	creator info, about org mode version
.title	document title
.subtitle	document subtitle
.todo	TODO keywords, all not-done states
.done	the DONE keywords, all states that count as done
.WAITING	each TODO keyword also uses a class named after itself
.timestamp	timestamp
.timestamp-kwd	keyword associated with a timestamp, like ‘SCHEDULED’
.timestamp-wrapper	span around keyword plus timestamp
.tag	tag in a headline
._HOME	each tag uses itself as a class, “@” replaced by “_”
.target	target for links
.linenr	the line number in a code example
.code-highlighted	for highlighting referenced code lines
div.outline-N	div for outline level N (headline plus text)
div.outline-text-N	extra div for text at outline level N
.section-number-N	section number in headlines, different for each level
.figure-number	label like “Figure 1:”
.table-number	label like “Table 1:”
.listing-number	label like “Listing 1:”
div.figure	how to format an in-lined image
pre.src	formatted source code
pre.example	normal example
p.verse	verse paragraph
div.footnotes	footnote section headline
p.footnote	footnote definition paragraph, containing a footnote
.footref	a footnote reference number (always a <sup>)

<sup>11</sup> If the classes on TODO keywords and tags lead to conflicts, use the variables `org-html-todo-kwd-class-prefix` and `org-html-tag-class-prefix` to make them unique.

`.footnum`                      footnote number in footnote definition (always <sup>)</p>
 <p>`.org-svg`                        default class for a linked `.svg` image</p>
 </div>
 <div data-bbox="142 160 856 210" data-label="Text">
 <p>The HTML export backend includes a compact default style in each exported HTML file. To override the default style with another style, use these keywords in the Org file. They will replace the global defaults the HTML exporter uses.</p>
 </div>
 <div data-bbox="188 214 992 247" data-label="Text">
 <pre>#+HTML\_HEAD: <link rel="stylesheet" type="text/css" href="style1.css" />
 #+HTML\_HEAD\_EXTRA: <link rel="alternate stylesheet" type="text/css" href="style2.css"</pre>
 </div>
 <div data-bbox="142 251 856 283" data-label="Text">
 <p>To just turn off the default style, customize `org-html-head-include-default-style` variable, or use this option line in the Org file.</p>
 </div>
 <div data-bbox="188 287 428 303" data-label="Text">
 <pre>#+OPTIONS: html-style:nil</pre>
 </div>
 <div data-bbox="142 307 856 357" data-label="Text">
 <p>For longer style definitions, either use several `'HTML_HEAD'` and `'HTML_HEAD_EXTRA'` keywords, or use `<style> ... </style>` blocks around them. Both of these approaches can avoid referring to an external file.</p>
 </div>
 <div data-bbox="142 360 856 427" data-label="Text">
 <p>In order to add styles to a subtree, use the `'HTML_CONTAINER_CLASS'` property to assign a class to the tree. In order to specify CSS styles for a particular headline, you can use the ID specified in a `'CUSTOM_ID'` property. You can also assign a specific class to a headline with the `'HTML_HEADLINE_CLASS'` property.</p>
 </div>
 <div data-bbox="142 430 856 463" data-label="Text">
 <p>Never change the `org-html-style-default` constant. Instead use other simpler ways of customizing as described above.</p>
 </div>
 <div data-bbox="142 475 680 494" data-label="Section-Header">
 <h3>13.9.14 JavaScript supported display of web pages</h3>
 </div>
 <div data-bbox="142 500 856 632" data-label="Text">
 <p>Sebastian Rose has written a JavaScript program especially designed to allow two different ways of viewing HTML files created with Org. One is an *Info*-like mode where each section is displayed separately and navigation can be done with the `n` and `p` keys, and some other keys as well, press `?` for an overview of the available keys. The second one has a *folding* view, much like Org provides inside Emacs. The script is available at <https://orgmode.org/org-info.js> and the documentation at <https://orgmode.org/worg/code/org-info-js/>. The script is hosted on <https://orgmode.org>, but for reliability, prefer installing it on your own web server.</p>
 </div>
 <div data-bbox="167 636 594 652" data-label="Text">
 <p>To use this program, just add this line to the Org file:</p>
 </div>
 <div data-bbox="188 657 484 672" data-label="Text">
 <pre>#+INFOJS\_OPT: view:info toc:nil</pre>
 </div>
 <div data-bbox="142 676 856 710" data-label="Text">
 <p>The HTML header now has the code needed to automatically invoke the script. For setting options, use the syntax from the above line for options described below:</p>
 </div>
 <div data-bbox="142 717 856 767" data-label="Text">
 <p>`'path:'`        The path to the script. The default is to grab the script from <https://orgmode.org/org-info.js>, but you might want to have a local copy and use a path like `'./scripts/org-info.js'`.</p>
 </div>
 <div data-bbox="142 774 741 791" data-label="Text">
 <p>`'view:'`        Initial view when the website is first shown. Possible values are:</p>
 </div>
 <div data-bbox="234 795 757 861" data-label="Text">
 <ul style="list-style-type: none; padding-left: 0;">
 <li>`'info'`        Info-like interface with one section per page</li>
 <li>`'overview'`    Folding interface, initially showing only top-level</li>
 <li>`'content'`     Folding interface, starting with all headlines visible</li>
 <li>`'showall'`     Folding interface, all headlines and text visible</li>
 </ul>
 </div>
 <div data-bbox="142 868 856 902" data-label="Text">
 <p>`'sdepth:'`    Maximum headline level still considered as an independent section for info and folding modes. The default is taken from `org-export-headline-levels`, i.e.,</p>
 </div>
 </div>

the ‘H’ switch in ‘OPTIONS’. If this is smaller than in `org-export-headline-levels`, each info/folding section can still contain child headlines.

- ‘`toc:`’ Should the table of contents *initially* be visible? Even when ‘nil’, you can always get to the “toc” with `i`.
- ‘`tdepth:`’ The depth of the table of contents. The defaults are taken from the variables `org-export-headline-levels` and `org-export-with-toc`.
- ‘`ftoc:`’ Does the CSS of the page specify a fixed position for the “toc”? If yes, the toc is displayed as a section.
- ‘`ltoc:`’ Should there be short contents (children) in each section? Make this ‘above’ if the section should be above initial text.
- ‘`mouse:`’ Headings are highlighted when the mouse is over them. Should be ‘underline’ (default) or a background color like ‘#cccccc’.
- ‘`buttons:`’ Should view-toggle buttons be everywhere? When ‘nil’ (the default), only one such button is present.

You can choose default values for these options by customizing the variable `org-infojs-options`. If you always want to apply the script to your pages, configure the variable `org-export-html-use-infojs`.

## 13.10 L<sup>A</sup>T<sub>E</sub>X Export

The L<sup>A</sup>T<sub>E</sub>X export backend can handle complex documents, incorporate standard or custom L<sup>A</sup>T<sub>E</sub>X document classes, generate documents using alternate L<sup>A</sup>T<sub>E</sub>X engines, and produce fully linked PDF files with indexes, bibliographies, and tables of contents, destined for interactive online viewing or high-quality print publication.

While the details are covered in-depth in this section, here are some quick references to variables for the impatient: for engines, see `org-latex-compiler`; for build sequences, see `org-latex-pdf-process`; for packages, see `org-latex-default-packages-alist` and `org-latex-packages-alist`.

An important note about the L<sup>A</sup>T<sub>E</sub>X export backend: it is sensitive to blank lines in the Org document. That’s because L<sup>A</sup>T<sub>E</sub>X itself depends on blank lines to tell apart syntactical elements, such as paragraphs.

The following sections expect users to be familiar with common L<sup>A</sup>T<sub>E</sub>X terminology. You may refer to <https://tug.org/begin.html> to get familiar with L<sup>A</sup>T<sub>E</sub>X basics. Users with L<sup>A</sup>T<sub>E</sub>X installed may also run ‘`texdoc latex`’ from terminal to open L<sup>A</sup>T<sub>E</sub>X introduction<sup>12</sup>

### 13.10.1 L<sup>A</sup>T<sub>E</sub>X/PDF export commands

`C-c C-e l l` (`org-latex-export-to-latex`)

Export to a L<sup>A</sup>T<sub>E</sub>X file with a ‘.tex’ extension. For ‘myfile.org’, Org exports to ‘myfile.tex’, overwriting without warning.

<sup>12</sup> The command will open a PDF file, which is also available for download from <http://mirrors.ctan.org/info/latex-doc-ptr/latex-doc-ptr.pdf>

*C-c C-e l L* (`org-latex-export-as-latex`)

Export to a temporary buffer. Do not create a file.

*C-c C-e l p* (`org-latex-export-to-pdf`)

Export as L<sup>A</sup>T<sub>E</sub>X file and convert it to PDF file.

*C-c C-e l o*

Export as L<sup>A</sup>T<sub>E</sub>X file and convert it to PDF, then open the PDF using the default viewer.

*M-x org-export-region-as-latex*

Convert the region to L<sup>A</sup>T<sub>E</sub>X under the assumption that it was in Org mode syntax before. This is a global command that can be invoked in any buffer.

The L<sup>A</sup>T<sub>E</sub>X export backend can use any of these L<sup>A</sup>T<sub>E</sub>X engines: ‘`pdflatex`’, ‘`xelatex`’, and ‘`lualatex`’. These engines compile L<sup>A</sup>T<sub>E</sub>X files with different compilers, packages, and output options. The L<sup>A</sup>T<sub>E</sub>X export backend finds the compiler version to use from `org-latex-compiler` variable or the ‘`#+LATEX_COMPILER`’ keyword in the Org file. See the docstring for the `org-latex-default-packages-alist` for loading packages with certain compilers. Also see `org-latex-bibtex-compiler` to set the bibliography compiler<sup>13</sup>.

### 13.10.2 L<sup>A</sup>T<sub>E</sub>X specific export settings

The L<sup>A</sup>T<sub>E</sub>X export backend has several additional keywords for customizing L<sup>A</sup>T<sub>E</sub>X output. Setting these keywords works similar to the general options (see [Section 13.2 \[Export Settings\]](#), page 153).

‘DESCRIPTION’

The document’s description. The description along with author name, keywords, and related file metadata are inserted in the output file by the `hyperref` package. See `org-latex-hyperref-template` for customizing metadata items. See `org-latex-title-command` for typesetting description into the document’s front matter. Use multiple ‘DESCRIPTION’ keywords for long descriptions.

‘LANGUAGE’

Language code of the primary document language. When ‘LANGUAGE’ keyword is not not specified use the value of `org-export-default-language` (by default - ‘en’, American English)

The list of language codes supported by Org is stored in the variable `org-latex-language-alist`.

In order to be effective, the ‘`babel`’ or ‘`polyglossia`’ packages—according to the L<sup>A</sup>T<sub>E</sub>X compiler used—must be loaded with the appropriate language as argument. This can be accomplished by modifying the `org-latex-packages-alist` variable, e.g., with the following snippet (note that ‘`polyglossia`’ does not work with pdfL<sup>A</sup>T<sub>E</sub>X):

```
(add-to-list 'org-latex-packages-alist
             ('("AUTO" "babel" t ("pdflatex" "xelatex" "lualatex"))))
(add-to-list 'org-latex-packages-alist
             ('("AUTO" "polyglossia" t ("xelatex" "lualatex"))))
```

<sup>13</sup> This does not allow setting different bibliography compilers for different files. However, “smart” L<sup>A</sup>T<sub>E</sub>X compilation systems, such as `latexmk`, can select the correct bibliography compiler.

**‘LATEX\_CLASS’**

This is L<sup>A</sup>T<sub>E</sub>X document class, such as *article*, *report*, *book*, and so on, which contain predefined preamble and headline level mapping that the L<sup>A</sup>T<sub>E</sub>X export backend needs. The backend reads the default class name from the `org-latex-default-class` variable. Org has *article* as the default class. A valid default class must be an element of `org-latex-classes`.

**‘LATEX\_CLASS\_OPTIONS’**

Options the L<sup>A</sup>T<sub>E</sub>X export backend uses when calling the L<sup>A</sup>T<sub>E</sub>X document class.

**‘LATEX\_COMPILER’**

The compiler, such as ‘`pdflatex`’, ‘`xelatex`’, ‘`lualatex`’, for producing the PDF. See `org-latex-compiler`.

**‘LATEX\_HEADER’****‘LATEX\_HEADER\_EXTRA’**

Arbitrary lines to add to the document’s preamble, before the hyperref settings. See `org-latex-classes` for adjusting the structure and order of the L<sup>A</sup>T<sub>E</sub>X headers.

**‘KEYWORDS’**

The keywords for the document. The description along with author name, keywords, and related file metadata are inserted in the output file by the hyperref package. See `org-latex-hyperref-template` for customizing metadata items. See `org-latex-title-command` for typesetting description into the document’s front matter. Use multiple ‘KEYWORDS’ lines if necessary.

**‘SUBTITLE’**

The document’s subtitle. It is typeset as per `org-latex-subtitle-format`. If `org-latex-subtitle-separate` is non-nil, it is typed outside of the `\title` macro. See `org-latex-hyperref-template` for customizing metadata items. See `org-latex-title-command` for typesetting description into the document’s front matter.

The following sections have further details.

### 13.10.3 L<sup>A</sup>T<sub>E</sub>X header and sectioning structure

The L<sup>A</sup>T<sub>E</sub>X export backend converts the first three of Org’s outline levels into L<sup>A</sup>T<sub>E</sub>X headlines. The remaining Org levels are exported as lists. To change this globally for the cut-off point between levels and lists, (see [Section 13.2 \[Export Settings\], page 153](#)).

By default, the L<sup>A</sup>T<sub>E</sub>X export backend uses the *article* class.

To change the default class globally, edit `org-latex-default-class`. To change the default class locally in an Org file, add option lines ‘`#+LATEX_CLASS: myclass`’. To change the default class for just a part of the Org file, set a subtree property, ‘`EXPORT_LATEX_CLASS`’. The class name entered here must be valid member of `org-latex-classes`. This variable defines a header template for each class into which the exporter splices the values of `org-latex-default-packages-alist` and `org-latex-packages-alist`. Use the same three variables to define custom sectioning or custom classes.

The L<sup>A</sup>T<sub>E</sub>X export backend sends the ‘`LATEX_CLASS_OPTIONS`’ keyword and ‘`EXPORT_LATEX_CLASS_OPTIONS`’ property as options to the L<sup>A</sup>T<sub>E</sub>X `\documentclass` macro.

The options and the syntax for specifying them, including enclosing them in square brackets, follow L<sup>A</sup>T<sub>E</sub>X conventions.

```
#+LATEX_CLASS_OPTIONS: [a4paper,11pt,twoside,twocolumn]
```

The L<sup>A</sup>T<sub>E</sub>X export backend appends values from ‘LATEX\_HEADER’ and ‘LATEX\_HEADER\_EXTRA’ keywords to the L<sup>A</sup>T<sub>E</sub>X header. The docstring for `org-latex-classes` explains in more detail. Also note that L<sup>A</sup>T<sub>E</sub>X export backend does not append ‘LATEX\_HEADER\_EXTRA’ to the header when previewing L<sup>A</sup>T<sub>E</sub>X snippets (see [Section 12.5.2 \[Previewing L<sup>A</sup>T<sub>E</sub>X fragments\]](#), page 143).

A sample Org file with the above headers:

```
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [a4paper]
#+LATEX_HEADER: \usepackage{xyz}

* Headline 1
  some text
* Headline 2
  some more text
```

L<sup>A</sup>T<sub>E</sub>X packages ‘babel’ or ‘polyglossia’ can also be loaded in a document. The “AUTO” string will be replaced in both cases by the appropriate value for the ‘LANGUAGE’ keyword, if present in the document, or by the value of `org-export-default-language`. Let’s see some examples in one or another case.

‘Babel’ accepts the classic syntax and (in addition) the new syntax with the ‘`\babelprovide`’ command to load the languages using the new ‘INI’ files procedure. Keep in mind that there are a number of languages that are only served in babel using ‘INI’ files, so they cannot be declared using the classic syntax, but only using the ‘`\babelprovide`’ command (see <https://mirrors.ctan.org/macros/latex/required/babel/base/babel.pdf>). Valid usage examples could be:

```
#+LATEX_HEADER: \usepackage[french,italian,AUTO]{babel}
```

where “AUTO” is the main language. But it can also be loaded using the ‘`\babelprovide`’ command:

```
#+LATEX_HEADER: \usepackage[french,italian]{babel}
#+LATEX_HEADER: \babelprovide[import, main]{AUTO}
```

‘Polyglossia’, for this procedure to be effective, must be loaded using the same ‘babel’ classic syntax (but note that *this is not* the actual polyglossia syntax). For example, suppose a document declares Polytonic Greek as the primary language, and French as the secondary language. In this case, it would be expressed as:

```
#+LANGUAGE: el-polyton
#+LATEX_HEADER: \usepackage[french,AUTO]{polyglossia}
```

This would produce in L<sup>A</sup>T<sub>E</sub>X (with the actual ‘polyglossia’ syntax):

```
\usepackage{polyglossia}
\setmainlanguage[variant=polytonic]{greek}
\setotherlanguage{french}
```

### 13.10.4 Quoting $\LaTeX$ code

When the available  $\LaTeX$  export customizations are not sufficient to fine-tune the desired output, it is possible to insert any arbitrary  $\LaTeX$  code (see [Section 12.5 \[Embedded  \$\LaTeX\$ \]](#), [page 142](#)). There are three ways to embed such code in the Org file and they all use different quoting syntax.

Inserting in-line quoted with @ symbols:

```
Code embedded in-line @@latex:any arbitrary LaTeX code@@ in a paragraph.
```

Inserting as one or more keyword lines in the Org file:

```
#+LATEX: any arbitrary LaTeX code
```

Inserting as an export block in the Org file, where the backend exports any code between begin and end markers:

```
#+BEGIN_EXPORT latex
  any arbitrary LaTeX code
#+END_EXPORT
```

### 13.10.5 Tables in $\LaTeX$ export

The  $\LaTeX$  export backend can pass several  $\LaTeX$  attributes for table contents and layout. Besides specifying a label (see [Section 4.2 \[Internal Links\]](#), [page 40](#)) and a caption (see [Section 12.8 \[Captions\]](#), [page 148](#)), the other valid  $\LaTeX$  attributes include:

**‘:mode’** The  $\LaTeX$  export backend wraps the table differently depending on the mode for accurate rendering of math symbols. Mode is either ‘table’, ‘math’, ‘inline-math’, ‘verbatim’ or ‘tabbing’.

For ‘math’ or ‘inline-math’ mode,  $\LaTeX$  export backend wraps the table in a math environment, but every cell in it is exported as-is. For ‘tabbing’ the  $\LaTeX$  tabbing environment is used and the correct tabbing delimiters ‘\>’ are used. The  $\LaTeX$  export backend determines the default mode from `org-latex-default-table-mode`. The  $\LaTeX$  export backend merges contiguous tables in the same mode into a single environment.

**‘:environment’**

Set the default  $\LaTeX$  table environment for the  $\LaTeX$  export backend to use when exporting Org tables. Common  $\LaTeX$  table environments are provided by these packages: `tabularx`, `longtable`, `array`, `tabu`, and `bmatrix`. For packages, such as `tabularx` and `tabu`, or any newer replacements, include them in the `org-latex-packages-alist` variable so the  $\LaTeX$  export backend can insert the appropriate load package headers in the converted  $\LaTeX$  file. Look in the docstring for the `org-latex-packages-alist` variable for configuring these packages for  $\LaTeX$  snippet previews, if any.

**‘:caption’**

Use ‘CAPTION’ keyword to set a simple caption for a table (see [Section 12.8 \[Captions\]](#), [page 148](#)). For custom captions, use ‘:caption’ attribute, which accepts raw  $\LaTeX$  code. ‘:caption’ value overrides ‘CAPTION’ value.

`:float`

`:placement`

The table environments by default are not floats in  $\text{\LaTeX}$ . To make them floating objects use `:float` with one of the following options: `t` (for a default `table` environment), `sideways` (for a `sidewaystable` environment), `multicolumn` (to span the table across multiple columns of a page in a `table*` environment) and `nil`. In addition to these three values, `:float` can pass through any arbitrary value, for example a user-defined float type with the `float`  $\text{\LaTeX}$  package.

$\text{\LaTeX}$  floats can also have additional layout `:placement` attributes. These are the usual `[h t b p ! H]` permissions specified in square brackets. Note that for `:float sideways` tables, the  $\text{\LaTeX}$  export backend ignores `:placement` attributes.

`:align`

`:font`

`:width`

The  $\text{\LaTeX}$  export backend uses these attributes for regular tables to set their alignments, fonts, and widths.

`:options`

The `:options` attribute allows adding an optional argument with a list of various table options (between brackets in  $\text{\LaTeX}$  export), since certain tabular environments, such as `longtblr` of the `tabularray`  $\text{\LaTeX}$  package, provides this structure. For example: `:options remark{Note}={note},remark{Source}={source}`.

`:spread`

When `:spread` is non-`nil`, the  $\text{\LaTeX}$  export backend spreads or shrinks the table by the `:width` for `tabu` and `longtabu` environments. `:spread` has no effect if `:width` is not set.

`:booktabs`

`:center`

`:rmlines`

All three commands are toggles. `:booktabs` brings in modern typesetting enhancements to regular tables. The `booktabs` package has to be loaded through `org-latex-packages-alist`. `:center` is for centering the table. `:rmlines` removes all but the very first horizontal line made of ASCII characters from “`table.el`” tables only.

`:math-prefix`

`:math-suffix`

`:math-arguments`

The  $\text{\LaTeX}$  export backend inserts `:math-prefix` string value in a `math` environment before the table. The  $\text{\LaTeX}$  export backend inserts `:math-suffix` string value in a `math` environment after the table. The  $\text{\LaTeX}$  export backend inserts `:math-arguments` string value between the macro name and the table’s contents. `:math-arguments` comes in use for matrix macros that require more than one argument, such as `qbordermatrix`.

$\text{\LaTeX}$  table attributes help formatting tables for a wide range of situations, such as matrix product or spanning multiple pages:

```
#+ATTR_LATEX: :environment longtable :align l|lp{3cm}r|l
| ... | ... |
| ... | ... |

#+ATTR_LATEX: :mode math :environment bmatrix :math-suffix \times
| a | b |
| c | d |
#+ATTR_LATEX: :mode math :environment bmatrix
| 1 | 2 |
| 3 | 4 |
```

Set the caption with the  $\LaTeX$  command ‘`\bicaption{HeadingA}{HeadingB}`’:

```
#+ATTR_LATEX: :caption \bicaption{HeadingA}{HeadingB}
| ... | ... |
| ... | ... |
```

### 13.10.6 Images in $\LaTeX$ export

The  $\LaTeX$  export backend processes image links in Org files that do not have descriptions, such as these links ‘`[[file:img.jpg]]`’ or ‘`[[./img.jpg]]`’, as direct image insertions in the final PDF output. In the PDF, they are no longer links but actual images embedded on the page. The  $\LaTeX$  export backend uses ‘`\includegraphics`’ macro to insert the image. But for TikZ (<https://sourceforge.net/projects/pgf/>) images, the backend uses an `\input` macro wrapped within a `tikzpicture` environment.

For specifying image ‘`:width`’, ‘`:height`’, ‘`:scale`’ and other ‘`:options`’, use this syntax:

```
#+ATTR_LATEX: :width 5cm :options angle=90
[[./img/sed-hr4049.pdf]]
```

A ‘`:scale`’ attribute overrides both ‘`:width`’ and ‘`:height`’ attributes.

For custom commands for captions, use the ‘`:caption`’ attribute. It overrides the default ‘`#+CAPTION`’ value:

```
#+ATTR_LATEX: :caption \bicaption{HeadingA}{HeadingB}
[[./img/sed-hr4049.pdf]]
```

When captions follow the method as described in [Section 12.8 \[Captions\], page 148](#), the  $\LaTeX$  export backend wraps the picture in a floating ‘`figure`’ environment. To float an image without specifying a caption, set the ‘`:float`’ attribute to one of the following:

- ‘`t`’            For a default ‘`figure`’ environment.
- ‘`multicolumn`’  
              To span the image across multiple columns of a page; the backend wraps the image in a ‘`figure*`’ environment.
- ‘`wrap`’        For text to flow around the image on the right; the figure occupies the left half of the page.
- ‘`sideways`’    For a new page with the image sideways, rotated ninety degrees, in a ‘`sidewaysfigure`’ environment; overrides ‘`:placement`’ setting.
- ‘`nil`’         To avoid a ‘`:float`’ even if using a caption.

Any arbitrary value

For example, a user-defined float type with the ‘float’  $\LaTeX$  package.

Use the ‘placement’ attribute to modify a floating environment’s placement.

```
#+ATTR_LATEX: :float wrap :width 0.38\textwidth :placement {r}{0.4\textwidth}
[[./img/hst.png]]
```

The  $\LaTeX$  export backend centers all images by default. Setting ‘:center’ to ‘nil’ disables centering. To disable centering globally, set `org-latex-images-centered` to ‘nil’.

Set the ‘:comment-include’ attribute to non-nil value for the  $\LaTeX$  export backend to comment out the ‘\includegraphics’ macro.

### 13.10.7 Plain lists in $\LaTeX$ export

The  $\LaTeX$  export backend accepts the ‘environment’ and ‘options’ attributes for plain lists. Both attributes work together for customizing lists, as shown in the examples:

```
#+LATEX_HEADER: \usepackage[inline]{enumitem}
Some ways to say "Hello":
#+ATTR_LATEX: :environment itemize*
#+ATTR_LATEX: :options [label={}, itemjoin={,}, itemjoin*={, and}]
- Hola
- Bonjour
- Guten Tag.
```

Since  $\LaTeX$  supports only four levels of nesting for lists, use an external package, such as ‘enumitem’ in  $\LaTeX$ , for levels deeper than four:

```
#+LATEX_HEADER: \usepackage{enumitem}
#+LATEX_HEADER: \renewlist{itemize}{itemize}{9}
#+LATEX_HEADER: \setlist[itemize]{label=$\circ$}
- One
  - Two
    - Three
      - Four
        - Five
```

### 13.10.8 Source blocks in $\LaTeX$ export

$\LaTeX$  export backend provides multiple ways to render src blocks in  $\LaTeX$ , according to the value of `org-latex-src-block-backend`. The default value ‘verbatim’ renders the src code verbatim, without any extra styling. Alternative values allow more colorful styling, but require additional  $\LaTeX$  (‘listings’, ‘minted’), system (‘minted’), or Emacs (‘engraved’) packages. See the `org-latex-src-block-backend` docstring for more details.

The  $\LaTeX$  export backend can make source code blocks into floating objects through the attributes ‘:float’ and ‘:options’. For ‘:float’:

‘t’            Makes a source block float; by default floats any source block with a caption.

‘multicolumn’

Spans the source block across multiple columns of a page.

‘nil’         Avoids a ‘:float’ even if using a caption; useful for source code blocks that may not fit on a page.

```
#+ATTR_LATEX: :float nil
#+BEGIN_SRC emacs-lisp
  Lisp code that may not fit in a single page.
#+END_SRC
```

The  $\text{\LaTeX}$  export backend passes string values in ‘:options’ to  $\text{\LaTeX}$  packages for customization of that specific source block. In the example below, the ‘:options’ are set for Engraved or Minted. Minted is a source code highlighting  $\text{\LaTeX}$  package with many configurable options<sup>14</sup>. Both Minted and Engraved are built on `fvextra`, and so support many of the same options.

```
#+ATTR_LATEX: :options mathescape
#+BEGIN_SRC emacs-lisp
  (defun Fib (n) ; $n_i = n_{i-2} + n_{i-1}$
    (if (< n 2) n (+ (Fib (- n 1)) (Fib (- n 2)))))
#+END_SRC
```

To apply similar configuration options for all source blocks in a file, use the `org-latex-listings-options`, `org-latex-engraved-options`, and `org-latex-minted-options` variables.

### 13.10.9 Example blocks in $\text{\LaTeX}$ export

The  $\text{\LaTeX}$  export backend wraps the contents of example blocks in a ‘`verbatim`’ environment. To change this behavior to use another environment globally, specify an appropriate export filter (see [Section 13.17 \[Advanced Export Configuration\], page 205](#)). To change this behavior to use another environment for each block, use the ‘:environment’ parameter to specify a custom environment.

```
#+ATTR_LATEX: :environment myverbatim
#+BEGIN_EXAMPLE
  This sentence is false.
#+END_EXAMPLE
```

### 13.10.10 Special blocks in $\text{\LaTeX}$ export

For other special blocks in the Org file, the  $\text{\LaTeX}$  export backend makes a special environment of the same name. The backend also takes ‘:options’, if any, and appends as-is to that environment’s opening string. For example:

```
#+BEGIN_abstract
  We demonstrate how to solve the Syracuse problem.
#+END_abstract

#+ATTR_LATEX: :options [Proof of important theorem]
#+BEGIN_proof
  ...
  Therefore, any even number greater than 2 is the sum of two primes.
#+END_proof
```

exports to

<sup>14</sup> Minted uses an external Python package for code highlighting, which requires the flag ‘`-shell-escape`’ to be added to `org-latex-pdf-process`.

```
\begin{abstract}
  We demonstrate how to solve the Syracuse problem.
\end{abstract}
```

```
\begin{proof}[Proof of important theorem]
  ...
  Therefore, any even number greater than 2 is the sum of two primes.
\end{proof}
```

If you need to insert a specific caption command, use ‘:caption’ attribute. It overrides standard ‘CAPTION’ value, if any. For example:

```
#+ATTR_LATEX: :caption \MyCaption{HeadingA}
#+BEGIN_proof
  ...
#+END_proof
```

### 13.10.11 Horizontal rules in $\LaTeX$ export

The  $\LaTeX$  export backend converts horizontal rules by the specified ‘:width’ and ‘:thickness’ attributes. For example:

```
#+ATTR_LATEX: :width .6\textwidth :thickness 0.8pt
-----
```

### 13.10.12 Verse blocks in $\LaTeX$ export

The  $\LaTeX$  export backend accepts five attributes for verse blocks: ‘:lines’, ‘:center’, ‘:versewidth’, ‘:latexcode’ and ‘:literal’. The three first require the external  $\LaTeX$  package ‘verse.sty’, which is an extension of the standard  $\LaTeX$  environment.

‘:lines’ To add marginal verse numbering. Its value is an integer, the sequence in which the verses should be numbered.

‘:center’ With value ‘t’ all the verses on the page are optically centered (a typographic convention for poetry), taking as a reference the longest verse, which must be indicated by the attribute ‘:versewidth’.

‘:versewidth’  
Its value is a literal text string with the longest verse.

‘:latexcode’  
It accepts any arbitrary  $\LaTeX$  code that can be included within a  $\LaTeX$  ‘verse’ environment.

‘:literal’  
With value t, all blank lines are preserved and exported as ‘\vspace\*{\baselineskip}’, including the blank lines before or after contents. Note that without the ‘:literal’ attribute, one or more blank lines between stanzas are exported as a single blank line, and any blank lines before or after the content are removed, which is more consistent with the syntax of the  $\LaTeX$  ‘verse’ environment, and the one provided by the ‘verse’ package. If the ‘verse’ package is loaded, the vertical spacing between all stanzas can

be controlled by the global length ‘\stanzaskip’ (see <https://www.ctan.org/pkg/verse>).

A complete example with Shakespeare’s first sonnet:

```
#+ATTR_LATEX: :center t :latexcode \color{red} :lines 5
#+ATTR_LATEX: :versewidth Feed'st thy light's flame with self-substantial fuel,
#+BEGIN_VERSE
From fairest creatures we desire increase,
That thereby beauty's rose might never die,
But as the ripper should by time decease
His tender heir might bear his memory
But thou, contracted to thine own bright eyes,
Feed'st thy light's flame with self-substantial fuel,
Making a famine where abundance lies,
Thyself thy foe, to thy sweet self too cruel.
Thou that art now the world's fresh ornament,
And only herald to the gaudy spring,
Within thine own bud buriest thy content,
And, tender churl, mak'st waste in niggardly.
Pity the world, or else this glutton be,
To eat the world's due, by the grave and thee.
#+END_VERSE
```

### 13.10.13 Quote blocks in $\LaTeX$ export

The  $\LaTeX$  export backend accepts two attributes for quote blocks: ‘:environment’, for an arbitrary quoting environment (the default value is that of `org-latex-default-quote-environment: "quote"`) and ‘:options’. For example, to choose the environment ‘quotation’, included as an alternative to ‘quote’ in standard  $\LaTeX$  classes:

```
#+ATTR_LATEX: :environment quotation
#+BEGIN_QUOTE
some text...
#+END_QUOTE
```

To choose the ‘foreigndisplayquote’ environment, included in the  $\LaTeX$  package ‘csquotes’, with the ‘german’ option, use this syntax:

```
#+LATEX_HEADER: \usepackage[autostyle=true]{csquotes}
#+ATTR_LATEX: :environment foreigndisplayquote :options {german}
#+BEGIN_QUOTE
some text in German...
#+END_QUOTE
```

which is exported to  $\LaTeX$  as

```
\begin{foreigndisplayquote}{german}
some text in German...
\end{foreigndisplayquote}
```

## 13.11 Markdown Export

The Markdown export backend, “md”, converts an Org file to Markdown format, as defined at <https://daringfireball.net/projects/markdown/>. This is the original Markdown specification, developed by John Gruber and Aaron Swartz.

Since “md” backend is built on top of the HTML backend (see [Section 13.9 \[HTML Export\], page 165](#)), it converts every Org construct not defined in Markdown syntax, such as tables, to HTML.

Do note that the original markdown syntax has differences with other commonly used Markdown flavors. See <https://en.wikipedia.org/wiki/Markdown> for more details.

### Markdown export commands

`C-c C-e m m` (`org-md-export-to-markdown`)

Export to a text file with Markdown syntax. For ‘myfile.org’, Org exports to ‘myfile.md’, overwritten without warning.

`C-c C-e m M` (`org-md-export-as-markdown`)

Export to a temporary buffer. Does not create a file.

`C-c C-e m o`

Export as a text file with Markdown syntax, then open it.

### Header and sectioning structure

Based on `org-md-headline-style`, Markdown export can generate headlines of both *atx* and *setext* types. *setext* limits headline levels to two whereas *atx* limits headline levels to six. *mixed* exports headline levels one and two in *setext*-style, and headline levels three through six as *atx*-style headlines. Beyond these limits, the export backend converts headlines to lists. To set a limit to a level before the absolute limit (see [Section 13.2 \[Export Settings\], page 153](#)).

## 13.12 OpenDocument Text Export

The ODT export backend handles creating of OpenDocument Text (ODT) format. Documents created by this exporter use the *OpenDocument-v1.2 specification*<sup>15</sup> and are compatible with LibreOffice 3.4.

### 13.12.1 Pre-requisites for ODT export

The ODT export backend relies on the zip program to create the final compressed ODT output. Check if ‘zip’ is locally available and executable. Without it, export cannot finish.

### 13.12.2 ODT export commands

`C-c C-e o o` (`org-odt-export-to-odt`)

Export as OpenDocument Text file.

If `org-odt-preferred-output-format` is specified, the ODT export backend automatically converts the exported file to that format.

<sup>15</sup> See [Open Document Format for Office Applications \(OpenDocument\) Version 1.2](#).

For ‘myfile.org’, Org exports to ‘myfile.odt’, overwriting without warning. The ODT export backend exports a region only if a region was active.

If the selected region is a single tree, the ODT export backend makes the tree head the document title. Incidentally, `C-c @` selects the current subtree. If the tree head entry has, or inherits, an ‘EXPORT\_FILE\_NAME’ property, the ODT export backend uses that for file name.

`C-c C-e o O`

Export as an OpenDocument Text file and open the resulting file.

If `org-export-odt-preferred-output-format` is specified, open the converted file instead. See [\[Automatically exporting to other formats\]](#), page 185.

### 13.12.3 ODT specific export settings

The ODT export backend has several additional keywords for customizing ODT output. Setting these keywords works similar to the general options (see [Section 13.2 \[Export Settings\]](#), page 153).

‘DESCRIPTION’

This is the document’s description, which the ODT export backend inserts as document metadata. For long descriptions, use multiple lines, prefixed with ‘DESCRIPTION’.

‘KEYWORDS’

The keywords for the document. The ODT export backend inserts the description along with author name, keywords, and related file metadata as metadata in the output file. Use multiple ‘KEYWORDS’ if necessary.

‘ODT\_STYLES\_FILE’

The ODT export backend uses the `org-odt-styles-file` by default. See [Section 13.12.5 \[Applying custom styles\]](#), page 186 for details.

‘SUBTITLE’

The document subtitle.

### 13.12.4 Extending ODT export

The ODT export backend can produce documents in other formats besides ODT using a specialized ODT converter process. Its common interface works with popular converters to produce formats such as ‘doc’, or convert a document from one format, say ‘csv’, to another format, say ‘xls’.

Customize `org-odt-convert-process` variable to point to ‘unoconv’, which is the ODT’s preferred converter. Working installations of LibreOffice would already have ‘unoconv’ installed. Alternatively, other converters may be substituted here. See [\[Configuring a document converter\]](#), page 190.

### Automatically exporting to other formats

If ODT format is just an intermediate step to get to other formats, such as ‘doc’, ‘docx’, ‘rtf’, or ‘pdf’, etc., then extend the ODT export backend to directly produce that format. Specify the final format in the `org-odt-preferred-output-format` variable. This is one way to extend (see [Section 13.12.2 \[ODT export commands\]](#), page 184).

## Converting between document formats

The Org export backend is made to be inter-operable with a wide range of text document format converters. Newer generation converters, such as LibreOffice and Pandoc, can handle hundreds of formats at once. Org provides a consistent interaction with whatever converter is installed. Here are some generic commands:

*M-x org-odt-convert*

Convert an existing document from one format to another. With a prefix argument, opens the newly produced file.

### 13.12.5 Applying custom styles

The ODT export backend comes with many OpenDocument styles (see [\[Working with OpenDocument style files\]](#), page 191). To expand or further customize these built-in style sheets, either edit the style sheets directly or generate them using an application such as LibreOffice. The example here shows creating a style using LibreOffice.

#### Applying custom styles: the easy way

1. Create a sample ‘example.org’ file with settings as shown below, and export it to ODT format.

```
#+OPTIONS: H:10 num:t
```

2. Open the above ‘example.odt’ using LibreOffice. Use the *Stylist* to locate the target styles, which typically have the “Org” prefix. Open one, modify, and save as either OpenDocument Text (ODT) or OpenDocument Template (OTT) file.
3. Customize the variable `org-odt-styles-file` and point it to the newly created file. For additional configuration options, see [\[Overriding factory styles\]](#), page 191.

To apply an ODT style to a particular file, use the ‘ODT\_STYLES\_FILE’ keyword as shown in the example below:

```
#+ODT_STYLES_FILE: "/path/to/example.ott"
```

or

```
#+ODT_STYLES_FILE: ("/path/to/file.ott" ("styles.xml" "image/hdr.png"))
```

### Using third-party styles and templates

The ODT export backend relies on many templates and style names. Using third-party styles and templates can lead to mismatches. Templates derived from built-in ODT templates and styles seem to have fewer problems.

### 13.12.6 Links in ODT export

ODT exporter creates native cross-references for internal links. It creates Internet-style links for all other links.

A link with no description and pointing to a regular, un-itemized, outline heading is replaced with a cross-reference and section number of the heading.

A ‘`\ref{label}`’-style reference to an image, table etc., is replaced with a cross-reference and sequence number of the labeled entity. See [Section 13.12.10 \[Labels and captions in ODT export\]](#), page 190.

### 13.12.7 Tables in ODT export

The ODT export backend handles native Org mode tables (see [Chapter 3 \[Tables\]](#), page 18) and simple ‘`table.el`’ tables. Complex ‘`table.el`’ tables having column or row spans are not supported. Such tables are stripped from the exported document.

By default, the ODT export backend exports a table with top and bottom frames and with ruled lines separating row and column groups (see [Section 3.3 \[Column Groups\]](#), page 23). All tables are typeset to occupy the same width. The ODT export backend honors any table alignments and relative widths for columns (see [Section 3.2 \[Column Width and Alignment\]](#), page 22).

Note that the ODT export backend interprets column widths as weighted ratios, the default weight being 1.

Specifying ‘`:rel-width`’ property on an ‘`ATTR_ODT`’ line controls the width of the table. For example:

```
#+ATTR_ODT: :rel-width 50
| Area/Month      |   Jan |   Feb |   Mar |   Sum |
|-----+-----+-----+-----+-----|
| /                |   <   |       |       |   <   |
| <l13>            | <r5>  | <r5>  | <r5>  | <r6>  |
| North America   |     1 |     21 |    926 |    948 |
| Middle East     |     6 |     75 |    844 |    925 |
| Asia Pacific    |     9 |     27 |    790 |    826 |
|-----+-----+-----+-----+-----|
| Sum              |    16 |    123 |   2560 |   2699 |
```

On export, the above table takes 50% of text width area. The exporter sizes the columns in the ratio: 13:5:5:5:6. The first column is left-aligned and rest of the columns, right-aligned. Vertical rules separate the header and the last column. Horizontal rules separate the header and the last row.

For even more customization, create custom table styles and associate them with a table using the ‘`ATTR_ODT`’ keyword. See [\[Customizing tables in ODT export\]](#), page 192.

### 13.12.8 Images in ODT export

#### Embedding images

The ODT export backend processes image links in Org files that do not have descriptions, such as these links ‘`[[file:img.jpg]]`’ or ‘`[[./img.jpg]]`’, as direct image insertions in the final output. Either of these examples works:

```
[[file:img.png]]
[[./img.png]]
```

#### Embedding clickable images

For clickable images, provide a link whose description is another link to an image file. For example, to embed an image ‘`org-mode-unicorn.png`’ which when clicked jumps to <https://orgmode.org> website, do the following

```
[[https://orgmode.org][./org-mode-unicorn.png]]
```

## Sizing and scaling of embedded images

Control the size and scale of the embedded images with the ‘ATTR\_ODT’ attribute.

The ODT export backend starts with establishing the size of the image in the final document. The dimensions of this size are measured in centimeters. The backend then queries the image file for its dimensions measured in pixels. For this measurement, the backend relies on ImageMagick’s identify program or Emacs `create-image` and `image-size` API. ImageMagick is the preferred choice for large file sizes or frequent batch operations. The backend then converts the pixel dimensions using `org-odt-pixels-per-inch` into the familiar 72 dpi or 96 dpi. The default value for this is in `display-pixels-per-inch`, which can be tweaked for better results based on the capabilities of the output device. Here are some common image scaling operations:

Explicitly size the image

To embed ‘img.png’ as a 10 cm x 10 cm image, do the following:

```
#+ATTR_ODT: :width 10 :height 10
[[./img.png]]
```

Scale the image

To embed ‘img.png’ at half its size, do the following:

```
#+ATTR_ODT: :scale 0.5
[[./img.png]]
```

Scale the image to a specific width

To embed ‘img.png’ with a width of 10 cm while retaining the original height:width ratio, do the following:

```
#+ATTR_ODT: :width 10
[[./img.png]]
```

Scale the image to a specific height

To embed ‘img.png’ with a height of 10 cm while retaining the original height:width ratio, do the following:

```
#+ATTR_ODT: :height 10
[[./img.png]]
```

## Anchoring of images

The ODT export backend can anchor images to ‘as-char’, ‘paragraph’, or ‘page’. Set the preferred anchor using the ‘:anchor’ property of the ‘ATTR\_ODT’ line.

To create an image that is anchored to a page:

```
#+ATTR_ODT: :anchor page
[[./img.png]]
```

### 13.12.9 Math formatting in ODT export

The ODT exporter has special support for handling math.

#### 13.12.9.1 $\LaTeX$ math snippets

$\LaTeX$  math snippets (see [Section 12.5.1 \[ \$\LaTeX\$  fragments\]](#), page 142) can be embedded in the ODT document in one of the following ways:

MathML Add this line to the Org file. This option is activated on a per-file basis.

```
#+OPTIONS: tex:t
```

With this option, L<sup>A</sup>T<sub>E</sub>X fragments are first converted into MathML fragments using an external L<sup>A</sup>T<sub>E</sub>X-to-MathML converter program. The resulting MathML fragments are then embedded as an OpenDocument Formula in the exported document.

You can specify the L<sup>A</sup>T<sub>E</sub>X-to-MathML converter by customizing the variables `org-latex-to-mathml-convert-command` and `org-latex-to-mathml-jar-file`.

If you prefer to use MathToWeb<sup>16</sup> as your converter, you can configure the above variables as shown below.

```
(setq org-latex-to-mathml-convert-command
      "java -jar %j -unicode -force -df %o %I"
      org-latex-to-mathml-jar-file
      "/path/to/mathtoweb.jar")
```

or, to use L<sup>A</sup>T<sub>E</sub>X<sup>ML</sup><sup>17</sup> instead,

```
(setq org-latex-to-mathml-convert-command
      "latexmlmath %i --presentationmathml=%o")
```

To quickly verify the reliability of the L<sup>A</sup>T<sub>E</sub>X-to-MathML converter, use the following commands:

*M-x org-export-as-odf*

Convert a L<sup>A</sup>T<sub>E</sub>X math snippet to an OpenDocument formula (‘.odf’) file.

*M-x org-export-as-odf-and-open*

Convert a L<sup>A</sup>T<sub>E</sub>X math snippet to an OpenDocument formula (‘.odf’) file and open the formula file with the system-registered application.

PNG images

Add this line to the Org file. This option is activated on a per-file basis.

```
#+OPTIONS: tex:dvipng
```

```
#+OPTIONS: tex:dvisvgm
```

or

```
#+OPTIONS: tex:imagemagick
```

Under this option, L<sup>A</sup>T<sub>E</sub>X fragments are processed into PNG or SVG images and the resulting images are embedded in the exported document. This method requires `dvipng` program, `dvisvgm` or `ImageMagick` programs.

### 13.12.9.2 MathML and OpenDocument formula files

When embedding L<sup>A</sup>T<sub>E</sub>X math snippets in ODT documents is not reliable, there is one more option to try. Embed an equation by linking to its MathML (‘.mml’) source or its OpenDocument formula (‘.odf’) file as shown below:

<sup>16</sup> See [MathToWeb](#).

<sup>17</sup> See <https://dlmf.nist.gov/LaTeXML/>.

```
[[./equation.mml]]
```

or

```
[[./equation.odf]]
```

### 13.12.10 Labels and captions in ODT export

ODT format handles labeling and captioning of objects based on their types. Inline images, tables,  $\text{\LaTeX}$  fragments, and Math formulas are numbered and captioned separately. Each object also gets a unique sequence number based on its order of first appearance in the Org file. Each category has its own sequence. A caption is just a label applied to these objects.

```
#+CAPTION: Bell curve
#+NAME: fig:SED-HR4049
[[./img/a.png]]
```

When rendered, it may show as follows in the exported document:

Figure 2: Bell curve

To modify the category component of the caption, customize the option `org-odt-category-map-alist`. For example, to tag embedded images with the string “Illustration” instead of the default string “Figure”, use the following setting:

```
(setq org-odt-category-map-alist
      '(("__Figure__" "Illustration" "value" "Figure" org-odt--enumerable-image-p)))
```

With the above modification, the previous example changes to:

Illustration 2: Bell curve

### 13.12.11 Literal examples in ODT export

The ODT export backend supports literal examples (see [Section 12.6 \[Literal Examples\]](#), [page 145](#)) with full fontification. Internally, the ODT export backend relies on ‘`htmlfontify.el`’ to generate the style definitions needed for fancy listings. The auto-generated styles get ‘`OrgSrc`’ prefix and inherit colors from the faces used by Emacs Font Lock library for that source language.

For custom fontification styles, customize the `org-odt-create-custom-styles-for-srcblocks` option.

To turn off fontification of literal examples, customize the `org-odt-fontify-srcblocks` option.

### 13.12.12 Advanced topics in ODT export

The ODT export backend has extensive features useful for power users and frequent users of ODT formats.

#### Configuring a document converter

The ODT export backend works with popular converters with little or no extra configuration. See [Section 13.12.4 \[Extending ODT export\]](#), [page 185](#). The following is for unsupported converters or tweaking existing defaults.

Register the converter

```
Add the name of the converter to the org-odt-convert-processes variable.
Note that it also requires how the converter is invoked on the command line.
See the variable’s docstring for details.
```

**Configure its capabilities**

Specify which formats the converter can handle by customizing the variable `org-odt-convert-capabilities`. Use the entry for the default values in this variable for configuring the new converter. Also see its docstring for details.

**Choose the converter**

Select the newly added converter as the preferred one by customizing the option `org-odt-convert-process`.

**Working with OpenDocument style files**

This section explores the internals of the ODT exporter; the means by which it produces styled documents; the use of automatic and custom OpenDocument styles.

The ODT exporter relies on two files for generating its output. These files are bundled with the distribution under the directory pointed to by the variable `org-odt-styles-dir`. The two files are:

**‘OrgOdtStyles.xml’**

This file contributes to the `‘styles.xml’` file of the final ODT document. This file gets modified for the following purposes:

1. To control outline numbering based on user settings;
2. To add styles generated by `‘htmlfontify.el’` for fontification of code blocks.

**‘OrgOdtContentTemplate.xml’**

This file contributes to the `‘content.xml’` file of the final ODT document. The contents of the Org outline are inserted between the `‘<office:text>’` ... `‘</office:text>’` elements of this file.

Apart from serving as a template file for the final `‘content.xml’`, the file serves the following purposes:

1. It contains automatic styles for formatting of tables which are referenced by the exporter;
2. It contains `‘<text:sequence-decl>’` ... `‘</text:sequence-decl>’` elements that control numbering of tables, images, equations, and similar entities.

The following two variables control the location from where the ODT exporter picks up the custom styles and content template files. Customize these variables to override the factory styles used by the exporter.

**org-odt-styles-file**

The ODT export backend uses the file pointed to by this variable, such as `‘styles.xml’`, for the final output. It can take one of the following values:

**‘FILE.xml’**

Use this file instead of the default `‘styles.xml’`

**‘FILE.odt’ or ‘FILE.ott’**

Use the `‘styles.xml’` contained in the specified OpenDocument Text or Template file

- 'FILE.odt' or 'FILE.ott' and a subset of included files
  - Use the 'styles.xml' contained in the specified OpenDocument Text or Template file. Additionally extract the specified member files and embed those within the final ODT document.
  - Use this option if the 'styles.xml' file references additional files like header and footer images.
- nil Use the default 'styles.xml'.

#### org-odt-content-template-file

Use this variable to specify the blank 'content.xml' used in the final output.

## Creating one-off styles

The ODT export backend can read embedded raw OpenDocument XML from the Org file. Such direct formatting is useful for one-off instances.

### Embedding ODT tags as part of regular text

Enclose OpenDocument syntax in '@@odt:...@@' for inline markup. For example, to highlight a region of text do the following:

```
@@odt:<text:span text:style-name="Highlight">This is highlighted
text</text:span>@@. But this is regular text.
```

**Hint:** To see the above example in action, edit the 'styles.xml' (see [Factory styles], page 191) and add a custom *Highlight* style as shown below:

```
<style:style style:name="Highlight" style:family="text">
  <style:text-properties fo:background-color="#ff0000"/>
</style:style>
```

### Embedding a one-line OpenDocument XML

The ODT export backend can read one-liner options with '#+ODT:' in the Org file. For example, to force a page break:

```
#+ODT: <text:p text:style-name="PageBreak"/>
```

**Hint:** To see the above example in action, edit your 'styles.xml' (see [Factory styles], page 191) and add a custom 'PageBreak' style as shown below.

```
<style:style style:name="PageBreak" style:family="paragraph"
  style:parent-style-name="Text_20_body">
  <style:paragraph-properties fo:break-before="page"/>
</style:style>
```

### Embedding a block of OpenDocument XML

The ODT export backend can also read ODT export blocks for OpenDocument XML. Such blocks use the '#+BEGIN\_EXPORT odt' ... '#+END\_EXPORT' constructs.

For example, to create a one-off paragraph that uses bold text, do the following:

```
#+BEGIN_EXPORT odt
  <text:p text:style-name="Text_20_body_20_bold">
  This paragraph is specially formatted and uses bold text.
  </text:p>
#+END_EXPORT
```

## Customizing tables in ODT export

Override the default table format by specifying a custom table style with the ‘`#+ATTR_ODT`’ line. For a discussion on default formatting of tables, see [Section 13.12.7 \[Tables in ODT export\]](#), page 187.

This feature closely mimics the way table templates are defined in the OpenDocument-v1.2 specification<sup>18</sup>.

For quick preview of this feature, install the settings below and export the table that follows:

```
(setq org-export-odt-table-styles
      (append org-export-odt-table-styles
              '(("TableWithHeaderRowAndColumn" "Custom"
                ((use-first-row-styles . t)
                 (use-first-column-styles . t))))
              ("TableWithFirstRowandLastRow" "Custom"
                ((use-first-row-styles . t)
                 (use-last-row-styles . t))))))

#+ATTR_ODT: :style TableWithHeaderRowAndColumn
| Name | Phone | Age |
| Peter | 1234 | 17 |
| Anna | 4321 | 25 |
```

The example above used ‘`Custom`’ template and installed two table styles ‘`TableWithHeaderRowAndColumn`’ and ‘`TableWithFirstRowandLastRow`’. **Important:** The OpenDocument styles needed for producing the above template were pre-defined. They are available in the section marked ‘`Custom Table Template`’ in ‘`OrgOdtContentTemplate.xml`’ (see [\[Factory styles\]](#), page 191). For adding new templates, define new styles there.

To use this feature proceed as follows:

1. Create a table template<sup>19</sup>.

A table template is set of ‘`table-cell`’ and ‘`paragraph`’ styles for each of the following table cell categories:

- Body
- First column
- Last column
- First row
- Last row
- Even row
- Odd row
- Even column
- Odd Column

<sup>18</sup> [OpenDocument-v1.2 Specification](#)

<sup>19</sup> See the ‘`<table:table-template>`’ element of the OpenDocument-v1.2 specification.

The names for the above styles must be chosen based on the name of the table template using a well-defined convention.

The naming convention is better illustrated with an example. For a table template with the name ‘Custom’, the needed style names are listed in the following table.

Cell type	Cell style	Paragraph style
Body	‘CustomTableCell’	‘CustomTableParagraph’
First column	‘CustomFirstColumnTableCell’	‘CustomFirstColumnTableParagraph’
Last column	‘CustomLastColumnTableCell’	‘CustomLastColumnTableParagraph’
First row	‘CustomFirstRowTableCell’	‘CustomFirstRowTableParagraph’
Last row	‘CustomLastRowTableCell’	‘CustomLastRowTableParagraph’
Even row	‘CustomEvenRowTableCell’	‘CustomEvenRowTableParagraph’
Odd row	‘CustomOddRowTableCell’	‘CustomOddRowTableParagraph’
Even column	‘CustomEvenColumnTableCell’	‘CustomEvenColumnTableParagraph’
Odd column	‘CustomOddColumnTableCell’	‘CustomOddColumnTableParagraph’

To create a table template with the name ‘Custom’, define the above styles in the ‘<office:automatic-styles>’ ... ‘</office:automatic-styles>’ element of the content template file (see [\[Factory styles\]](#), page 191).

2. Define a table style<sup>20</sup>.

To define a table style, create an entry for the style in the variable `org-odt-table-styles` and specify the following:

- the name of the table template created in step (1),
- the set of cell styles in that template that are to be activated.

For example, the entry below defines two different table styles ‘TableWithHeaderRowAndColumn’ and ‘TableWithFirstRowandLastRow’ based on the same template ‘Custom’. The styles achieve their intended effect by selectively activating the individual cell styles in that template.

```
(setq org-export-odt-table-styles
      (append org-export-odt-table-styles
              '(("TableWithHeaderRowAndColumn" "Custom"
                ((use-first-row-styles . t)
                 (use-first-column-styles . t))))
              ("TableWithFirstRowandLastRow" "Custom"
                ((use-first-row-styles . t)
                 (use-last-row-styles . t))))))
```

3. Associate a table with the table style.

To do this, specify the table style created in step (2) as part of the ‘ATTR\_ODT’ line as shown below.

```
#+ATTR_ODT: :style TableWithHeaderRowAndColumn
| Name | Phone | Age |
```

<sup>20</sup> See the attributes ‘table:template-name’, ‘table:use-first-row-styles’, ‘table:use-last-row-styles’, ‘table:use-first-column-styles’, ‘table:use-last-column-styles’, ‘table:use-banding-rows-styles’, and ‘table:use-banding-column-styles’ of the ‘<table:table>’ element in the OpenDocument-v1.2 specification.

```
| Peter | 1234 | 17 |
| Anna  | 4321 | 25 |
```

## Validating OpenDocument XML

Sometimes ODT format files may not open due to `.odt` file corruption. To verify if such a file is corrupt, validate it against the OpenDocument Relax NG Compact (RNC) syntax schema. But first the `.odt` files have to be decompressed using `zip`. Note that `.odt` files are ZIP archives: [Section “File Archives” in emacs](#). The contents of ODT files are in XML. For general help with validation—and schema-sensitive editing—of XML files: [Section “Introduction” in nxml-mode](#).

Customize `org-odt-schema-dir` to point to a directory with OpenDocument RNC files and the needed schema-locating rules. The ODT export backend takes care of updating the `rng-schema-locating-files`.

### 13.13 Org Export

`org` export backend creates a normalized version of the Org document in current buffer. The exporter evaluates Babel code (see [Section 16.5 \[Evaluating Code Blocks\], page 238](#)) and removes content specific to other backends.

#### Org export commands

`C-c C-e O o` (`org-odt-export-to-org`)  
Export as an Org file with a `.org` extension. For `'myfile.org'`, Org exports to `'myfile.org.org'`, overwriting without warning.

`C-c C-e O v` (`org-odt-export-to-org`)  
Export to an Org file, then open it.

### 13.14 Texinfo Export

#### 13.14.1 Texinfo export commands

`C-c C-e i t` (`org-texinfo-export-to-texinfo`)  
Export as a Texinfo file with `.texi` extension. For `'myfile.org'`, Org exports to `'myfile.texi'`, overwriting without warning.

`C-c C-e i i` (`org-texinfo-export-to-info`)  
Export to Texinfo format first and then process it to make an Info file. To generate other formats, such as DocBook, customize the `org-texinfo-info-process` variable.

#### 13.14.2 Texinfo specific export settings

The Texinfo export backend has several additional keywords for customizing Texinfo output. Setting these keywords works similar to the general options (see [Section 13.2 \[Export Settings\], page 153](#)).

`'SUBTITLE'`  
The document subtitle.

- `'SUBAUTHOR'`  
Additional authors for the document.
- `'TEXINFO_FILENAME'`  
The Texinfo filename.
- `'TEXINFO_CLASS'`  
The default document class (`org-texinfo-default-class`), which must be a member of `org-texinfo-classes`.
- `'TEXINFO_HEADER'`  
Arbitrary lines inserted at the end of the header.
- `'TEXINFO_POST_HEADER'`  
Arbitrary lines inserted after the end of the header.
- `'TEXINFO_DIR_CATEGORY'`  
The directory category of the document. Defaults to `Misc`.
- `'TEXINFO_DIR_NAME'`  
The directory name of the document. This is the short name under which the `m` command will find your manual in the main Info directory. It defaults to the base name of the Texinfo file.  
  
The full form of the Texinfo entry is `* DIRNAME: NODE`. where `NODE` is usually just `(FILENAME)`. Normally this option only provides the `DIRNAME` part, but if you need more control, it can also be the full entry (recognized by the presence of parentheses or a leading `~* ~`).
- `'TEXINFO_DIR_DESC'`  
The directory description of the document. Defaults to the title of the document.
- `'TEXINFO_PRINTED_TITLE'`  
The printed title of the document.

### 13.14.3 Texinfo file header

After creating the header for a Texinfo file, the Texinfo backend automatically generates a name and destination path for the Info file. To override this default with a more sensible path and name, specify the `'TEXINFO_FILENAME'` keyword.

Along with the output's file name, the Texinfo header also contains language details (see [Section 13.2 \[Export Settings\], page 153](#)) and encoding system as set in the `org-texinfo-coding-system` variable. Insert `'TEXINFO_HEADER'` keywords for each additional command in the header, for example:

```
#+TEXINFO_HEADER: @synindex
```

Instead of repeatedly installing the same set of commands, define a class in `org-texinfo-classes` once, and then activate it in the document by setting the `'TEXINFO_CLASS'` keyword to that class.

### 13.14.4 Texinfo title and copyright page

The default template for hard copy output has a title page with ‘TITLE’ and ‘AUTHOR’ keywords (see [Section 13.2 \[Export Settings\], page 153](#)). To replace the regular title with something different for the printed version, use the ‘TEXINFO\_PRINTED\_TITLE’ and ‘SUBTITLE’ keywords. Both expect raw Texinfo code for setting their values.

If one ‘AUTHOR’ line is not sufficient, add multiple ‘SUBAUTHOR’ keywords. They have to be set in raw Texinfo code.

```
#+AUTHOR: Jane Smith
#+SUBAUTHOR: John Doe
#+TEXINFO_PRINTED_TITLE: This Long Title@inlinefmt{tex,*} Is Broken in @TeX{}
```

Copying material is defined in a dedicated headline with a non-nil ‘COPYING’ property. The backend inserts the contents within a ‘@copying’ command at the beginning of the document. The heading itself does not appear in the structure of the document.

Copyright information is printed on the back of the title page.

```
* Legalese
:PROPERTIES:
:COPYING: t
:END:
```

This is a short example of a complete Texinfo file, version 1.0.

Copyright \copy 2016 Free Software Foundation, Inc.

### 13.14.5 Info directory file

The end result of the Texinfo export process is the creation of an Info file. This Info file’s metadata has variables for category, title, and description: ‘TEXINFO\_DIR\_CATEGORY’, ‘TEXINFO\_DIR\_NAME’, and ‘TEXINFO\_DIR\_DESC’ keywords that establish where in the Info hierarchy the file fits.

Here is an example that writes to the Info directory file:

```
#+TEXINFO_DIR_CATEGORY: Emacs
#+TEXINFO_DIR_NAME: Org Mode
#+TEXINFO_DIR_DESC: Outline-based notes management and organizer
```

### 13.14.6 Headings and sectioning structure

The Texinfo export backend uses a pre-defined scheme to convert Org headlines to equivalent Texinfo structuring commands. A scheme like this maps top-level headlines to numbered chapters tagged as @chapter and lower-level headlines to unnumbered chapters tagged as @unnumbered. To override such mappings to introduce @part or other Texinfo structuring commands, define a new class in `org-texinfo-classes`. Activate the new class with the ‘TEXINFO\_CLASS’ keyword. When no new class is defined and activated, the Texinfo export backend defaults to the `org-texinfo-default-class`.

If an Org headline’s level has no associated Texinfo structuring command, or is below a certain threshold (see [Section 13.2 \[Export Settings\], page 153](#)), then the Texinfo export backend makes it into a list item.

The Texinfo export backend makes any headline with a non-nil ‘APPENDIX’ property into an appendix. This happens independent of the Org headline level or the ‘TEXINFO\_CLASS’ keyword.

The Texinfo export backend creates a menu entry after the Org headline for each regular sectioning structure. To override this with a shorter menu entry, use the ‘ALT\_TITLE’ property (see [Section 13.3 \[Table of Contents\], page 156](#)). Texinfo menu entries also have an option for a longer ‘DESCRIPTION’ property. Here’s an example that uses both to override the default menu entry:

```
* Controlling Screen Display
:PROPERTIES:
:ALT_TITLE: Display
:DESCRIPTION: Controlling Screen Display
:END:
```

The text before the first headline belongs to the *Top* node, i.e., the node in which a reader enters an Info manual. As such, it is expected not to appear in printed output generated from the ‘.texi’ file. See [Section “The Top Node” in texinfo](#), for more information.

### 13.14.7 Indices

The Texinfo export backend recognizes these indexing keywords if used in the Org file: ‘CINDEX’, ‘FINDEX’, ‘KINDEX’, ‘PINDEX’, ‘TINDEX’ and ‘VINDEF’. Write their value as verbatim Texinfo code; in particular, ‘{’, ‘}’ and ‘@’ characters need to be escaped with ‘@’ if they do not belong to a Texinfo command.

```
#+CINDEX: Defining indexing entries
```

For the backend to generate an index entry for a headline, set the ‘INDEX’ property to ‘cp’ or ‘vr’. These abbreviations come from Texinfo that stand for concept index and variable index. The Texinfo manual has abbreviations for all other kinds of indexes. The backend exports the headline as an unnumbered chapter or section command, and then inserts the index after its contents.

```
* Concept Index
:PROPERTIES:
:INDEX: cp
:END:
```

### 13.14.8 Quoting Texinfo code

Use any of the following three methods to insert or escape raw Texinfo code:

```
Richard @@texinfo:@sc{@@Stallman@@texinfo:}@@ commence' GNU.
```

```
#+TEXINFO: @need800
This paragraph is preceded by...
```

```
#+BEGIN_EXPORT texinfo
@auindex Johnson, Mark
@auindex Lakoff, George
#+END_EXPORT
```

### 13.14.9 Plain lists in Texinfo export

The Texinfo export backend converts unordered and ordered lists in the Org file using the default command ‘@itemize’.

Ordered lists are numbered when exported to Texinfo format. Such numbering obeys any counter (see [Section 2.6 \[Plain Lists\], page 13](#)) in the first item of the list. The ‘:enum’ attribute also let you start the list at a specific number, or switch to a lettered list, as illustrated here:

```
#+ATTR_TEXINFO: :enum A
1. Alpha
2. Bravo
3. Charlie
```

The Texinfo export backend by default converts description lists in the Org file using the default command ‘@table’, which results in a table with two columns. To change this behavior, set ‘:table-type’ attribute to either ‘ftable’ or ‘vtable’ value. For more information, see [Section “Two-column Tables” in texinfo](#).

The Texinfo export backend by default also applies a text highlight based on the defaults stored in `org-texinfo-table-default-markup`. To override the default highlight command, specify another one with the ‘:indic’ attribute.

Org syntax is limited to one entry per list item. Nevertheless, the Texinfo export backend can split that entry according to any text provided through the ‘:sep’ attribute. Each part then becomes a new entry in the first column of the table.

The following example illustrates all the attributes above:

```
#+ATTR_TEXINFO: :table-type vtable :sep , :indic asis
- foo, bar :: This is the common text for variables foo and bar.
```

becomes

```
@vtable @asis
@item foo
@itemx bar
This is the common text for variables foo and bar.
@end table
```

The ‘:compact’ attribute is an alternative to the ‘:sep’ attribute, which allows writing each entry on its own line. If this attribute is non-nil and an item in a description list has no body but is followed by another item, then the second item is transcoded to ‘@itemx’. This example is transcoded to the same output as above.

```
#+ATTR_TEXINFO: :table-type vtable :indic asis :compact t
- foo ::
- bar ::
This is the common text for variables foo and bar.
```

Support for this compact syntax can also be enabled for all lists in a file using the ‘compact-itemx’ export option, or globally using the variable `org-texinfo-compact-itemx`.

The Texinfo export backend also supports two approaches to writing Texinfo definition commands (see [Section “Definition Commands” in texinfo](#)). One of them uses description

lists and is described below, the other relies on special blocks (see [Section 13.14.14 \[Special blocks in Texinfo export\]](#), page 201).

Items in a description list in an Org file that begin with ‘Function:’ or certain other prefixes are converted using Texinfo definition commands. This works even if other items in the same list do not have such a prefix; if necessary a single description list is converted using multiple tables (such as ‘@vtable’) and definition commands (such as ‘@defun’).

```
- Function: org-texinfo-drawer drawer contents info ::
  Transcode a DRAWER element from Org to Texinfo.
```

becomes

```
@defun org-texinfo-drawer drawer contents info ::
  Transcode a DRAWER element from Org to Texinfo.
@end defun
```

The recognized prefixes are ‘Command:’, ‘Function:’, ‘Macro:’, ‘Special Form:’, ‘Variable:’ and ‘User Option:’. These are the same prefixes that appear in the Info file for the respective definition commands. For example a ‘Function:’ item in the Org file is converted to a ‘@defun’ command in the Texinfo file, which in turn is converted to a definition prefixed with ‘-- Function:’ in the Info file.

As a special case the prefix ‘Key:’ is also recognized. No Texinfo definition command exists for key bindings and the output in Info files also lacks the ‘Key:’ prefix. Even so this special case is supported because it provides a convenient shorthand, as illustrated here:

```
- Key: C-c C-c (do-something) ::
  This command does something.

- User Option: do-something-somehow ::
  This option controls how exactly ~do-something~ does its thing.
```

becomes

```
@table @asis
@item @kbd{C-c C-c} (@code{do-something})
@kindex C-c C-c
@findex do-something
This command does something.
@end table

@defopt do-something-somehow
This option controls how exactly @code{do-something} does its thing.
@end defopt
```

Command in parenthesis, as done above, is optional.

### 13.14.10 Tables in Texinfo export

When exporting tables, the Texinfo export backend uses the widest cell width in each column. To override this and instead specify as fractions of line length, use the ‘:columns’ attribute. See example below.

```
#+ATTR_TEXINFO: :columns .5 .5
| a cell | another cell |
```

### 13.14.11 Images in Texinfo export

Insert a file link to the image in the Org file, and the Texinfo export backend inserts the image. These links must have the usual supported image extensions and no descriptions. To scale the image, use ‘:width’ and ‘:height’ attributes. For alternate text, use ‘:alt’ and specify the text using Texinfo code, as shown in the example:

```
#+ATTR_TEXINFO: :width 1in :alt Alternate @i{text}
[[ridt.pdf]]
```

### 13.14.12 Quotations in Texinfo export

You can write the text of a quotation within a quote block (see [Section 12.1 \[Paragraphs\]](#), page 140). You may also emphasize some text at the beginning of the quotation with the ‘:tag’ attribute.

```
#+ATTR_TEXINFO: :tag Warning
#+BEGIN_QUOTE
Striking your thumb with a hammer may cause severe pain and discomfort.
#+END_QUOTE
```

To specify the author of the quotation, use the ‘:author’ attribute.

```
#+ATTR_TEXINFO: :author King Arthur
#+BEGIN_QUOTE
The Lady of the Lake, her arm clad in the purest shimmering samite,
held aloft Excalibur from the bosom of the water, signifying by divine
providence that I, Arthur, was to carry Excalibur. That is why I am
your king.
#+END_QUOTE
```

### 13.14.13 Key bindings in Texinfo export

Org does not provide any markup for key bindings that corresponds to Texinfo’s @kbd and @key commands. One way to deal with this is to fall back to code syntax. ‘~C-x SPC~’, for example, is transcoded to @code{C-x SPC}.

A better approach is to define and use an Org macro named kbd. To make that easier the function org-texinfo-kbd-macro is provided, which is intended to be used like this:

```
#+macro: kbd (eval (org-texinfo-kbd-macro $1))
```

```
Type {{{kbd(C-c SPC)}}}.
```

which becomes

```
Type @kbd{C-c @key{SPC}}.
```

### 13.14.14 Special blocks in Texinfo export

The Texinfo export backend supports two approaches to writing Texinfo definition commands. One of them is described here, the other in [Section 13.14.9 \[Plain lists in Texinfo export\]](#), page 199.

The Texinfo export backend converts special blocks to commands with the same name. It also adds any ‘:options’ attributes to the end of the command, as shown in this example:

```

#+ATTR_TEXINFO: :options org-org-export-to-org ...
#+BEGIN_defun
  A somewhat obsessive function name.
#+END_defun

```

becomes

```

@defun org-org-export-to-org ...
  A somewhat obsessive function name.
@end defun

```

### 13.14.15 A Texinfo example

Here is a more detailed example Org file. See [Section “GNU Sample Texts” in texinfo](#) for an equivalent example using Texinfo code.

```

#+TITLE: GNU Sample {{{version}}}
#+SUBTITLE: for version {{{version}}}, {{{updated}}}
#+AUTHOR: A.U. Thor
#+EMAIL: bug-sample@gnu.org

```

```

#+OPTIONS: ':t toc:t author:t email:t
#+LANGUAGE: en

```

```

#+MACRO: version 2.0
#+MACRO: updated last updated 4 March 2014

```

```

#+TEXINFO_FILENAME: sample.info
#+TEXINFO_HEADER: @syncodeindex pg cp

```

```

#+TEXINFO_DIR_CATEGORY: Texinfo documentation system
#+TEXINFO_DIR_NAME: sample
#+TEXINFO_DIR_DESC: Invoking sample

```

```

#+TEXINFO_PRINTED_TITLE: GNU Sample

```

```

This manual is for GNU Sample (version {{{version}}},
{{{updated}}}).

```

```

* Copying
:PROPERTIES:
:COPYING: t
:END:

```

```

This manual is for GNU Sample (version {{{version}}},
{{{updated}}}), which is an example in the Texinfo documentation.

```

```

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```

```

#+BEGIN_QUOTE

```

```

Permission is granted to copy, distribute and/or modify this
document under the terms of the GNU Free Documentation License,
Version 1.3 or any later version published by the Free Software
Foundation; with no Invariant Sections, with no Front-Cover Texts,
and with no Back-Cover Texts. A copy of the license is included in
the section entitled "GNU Free Documentation License".
#+END_QUOTE

```

\* Invoking sample

```

#+PINDEX: sample
#+CINDEX: invoking @command{sample}

```

This is a sample manual. There is no sample program to invoke, but if there were, you could see its basic usage and command line options here.

\* GNU Free Documentation License

```

:PROPERTIES:
:APPENDIX: t
:END:

```

```

#+INCLUDE: fdl.org

```

\* Index

```

:PROPERTIES:
:INDEX:    cp
:END:

```

## 13.15 iCalendar Export

A large part of Org mode's interoperability success is its ability to easily export to or import from external applications. The iCalendar export backend takes calendar data from Org files and exports to the standard iCalendar format.

By default, iCalendar export only includes headings that contain active timestamps or diary sexps<sup>21</sup>.

The iCalendar export backend can also incorporate TODO entries based on the configuration of the `org-icalendar-include-todo` variable. The backend exports plain timestamps as 'VEVENT', TODO items as 'VTODO', and also create events from deadlines that are in non-TODO items.

The backend uses the deadlines and scheduling dates in Org TODO items for setting the start and due dates for the iCalendar TODO entry. Consult the `org-icalendar-use-deadline`, `org-icalendar-use-scheduled`, and `org-icalendar-todo-unscheduled-start` variables for more details.

<sup>21</sup> Diary sexp events, except certain built-in types (see `icalendar-export-sexp-enumerate-all`), are exported up to `icalendar-export-sexp-enumeration-days` into future.

For tags on the headline, the iCalendar export backend makes them into iCalendar categories. To tweak the inheritance of tags and TODO states, configure the variable `org-icalendar-categories`. To assign clock alarms based on time, configure the `org-icalendar-alarm-time` variable.

The iCalendar format standard requires globally unique identifier—or UID—for each entry. The iCalendar export backend creates UIDs during export. To save a copy of the UID in the Org file set the variable `org-icalendar-store-UID`. The backend looks for the ‘ID’ property of the entry for reusing the same UID for subsequent exports.

Since a single Org entry can result in multiple iCalendar entries—timestamp, deadline, scheduled item, or TODO item—Org adds prefixes to the UID, depending on which part of the Org entry triggered the creation of the iCalendar entry. Prefixing ensures UIDs remains unique, yet enable synchronization programs trace the connections.

`C-c C-e c f` (`org-icalendar-export-to-ics`)

Create iCalendar entries from the current Org buffer and store them in the same directory, using a file extension ‘.ics’.

`C-c C-e c a` (`org-icalendar-export-agenda-files`)

Create iCalendar entries from Org files in `org-agenda-files` and store in a separate iCalendar file for each Org file.

`C-c C-e c c` (`org-icalendar-combine-agenda-files`)

Create a combined iCalendar file from Org files in `org-agenda-files` and write it to `org-icalendar-combined-agenda-file` file name.

The iCalendar export backend includes ‘SUMMARY’, ‘DESCRIPTION’, ‘LOCATION’, ‘TIMEZONE’ and ‘CLASS’ properties from the Org entries when exporting. To force the backend to inherit the ‘LOCATION’, ‘TIMEZONE’ and ‘CLASS’ properties, configure the `org-use-property-inheritance` variable.

‘SUMMARY’, ‘LOCATION’, and ‘DESCRIPTION’ properties can define multi-line summary, location, or description using ‘<PROPERTY>+’ syntax (see [Section 7.1 \[Property Syntax\]](#), page 67):

```
* Meeting at location with multi-line address
<2024-01-08 Mon 14:20-15:00>
:PROPERTIES:
:LOCATION:  Someplace
:LOCATION+:  Some Street 5
:LOCATION+: 12345 Small Town
:END:
```

When Org entries do not have ‘SUMMARY’, ‘DESCRIPTION’, ‘LOCATION’ and ‘CLASS’ properties, the iCalendar export backend derives the summary from the headline, and derives the description from the body of the Org item. The `org-icalendar-include-body` variable limits the maximum number of characters of the content are turned into its description.

The ‘TIMEZONE’ property can be used to specify a per-entry time zone, and is applied to any entry with timestamp information. Time zones should be specified as per the IANA time zone database format, e.g., ‘Asia/Almaty’. Alternately, the property value can be ‘UTC’, to force UTC time for this entry only.

The ‘**CLASS**’ property can be used to specify a per-entry visibility class or access restriction, and is applied to any entry with class information. The iCalendar standard defines three visibility classes:

‘**PUBLIC**’ The entry is publicly visible (this is the default).

‘**CONFIDENTIAL**’

Only a limited group of clients get access to the event.

‘**PRIVATE**’ The entry can be retrieved only by its owner.

The server should treat unknown class properties the same as ‘**PRIVATE**’.

The exported iCalendar file can advise clients how often to check for updates. This duration can be set globally with the `org-icalendar-ttl` variable, or on a per-document basis with the ‘**ICAL-TTL**’ keyword. This option should be set using the iCalendar notation for time durations; consult the docstring of `org-icalendar-ttl` for more details.

Exporting to iCalendar format depends in large part on the capabilities of the destination application. Some are more lenient than others. Consult the Org mode FAQ for advice on specific applications.

## 13.16 Other Built-in Backends

Other export backends included with Org are:

- ‘`ox-man.el`’: Export to a man page.

To activate such backends, either customize `org-export-backends` or load directly with ‘`(require ‘ox-man)`’. On successful load, the backend adds new keys in the export dispatcher (see [Section 13.1 \[The Export Dispatcher\]](#), page 151).

Follow the comment section of such files, for example, ‘`ox-man.el`’, for usage and configuration details.

## 13.17 Advanced Export Configuration

### Export hooks

The export process executes two hooks before the actual exporting begins. The first hook, `org-export-before-processing-functions`, runs before any expansions of macros, Babel code, and include keywords in the buffer. The second hook, `org-export-before-parsing-functions`, runs before the buffer is parsed.

Functions added to these hooks are called with a single argument: the export backend actually used, as a symbol. You may use them for heavy duty structural modifications of the document. For example, you can remove every headline in the buffer during export like this:

```
(defun my-headline-removal (backend)
  "Remove all headlines in the current buffer.
BACKEND is the export backend being used, as a symbol."
  (org-map-entries
   (lambda ()
     (delete-region (point) (line-beginning-position 2)))
```

```
;; We need to tell `org-map-entries' to not skip over heading at
;; point. Otherwise, it would continue from _next_ heading. See
;; the docstring of `org-map-entries' for details.
(setq org-map-continue-from (point))))))
```

```
(add-hook 'org-export-before-parsing-functions #'my-headline-removal)
```

## Filters

Filters are lists of functions to be applied to certain parts for a given backend. The output from the first function in the filter is passed on to the next function in the filter. The final output is the output from the final function in the filter.

The Org export process has many filter sets applicable to different types of objects, plain text, parse trees, export options, and final output formats. The filters are named after the element type or object type: `org-export-filter-TYPE-functions`, where *TYPE* is the type targeted by the filter. Valid types are:

body	bold	babel-call
center-block	clock	code
diary-sexp	drawer	dynamic-block
entity	example-block	export-block
export-snippet	final-output	fixed-width
footnote-definition	footnote-reference	headline
horizontal-rule	inline-babel-call	inline-src-block
inlinetask	italic	item
keyword	latex-environment	latex-fragment
line-break	link	node-property
options	paragraph	parse-tree
plain-list	plain-text	planning
property-drawer	quote-block	radio-target
section	special-block	src-block
statistics-cookie	strike-through	subscript
superscript	table	table-cell
table-row	target	timestamp
underline	verbatim	verse-block

Here is an example filter that replaces non-breaking spaces ~ ~ in the Org buffer with ‘~’ for the L<sup>A</sup>T<sub>E</sub>X backend.

```
(defun my-latex-filter-nobreaks (text backend info)
  "Ensure \" \" are properly handled in LaTeX export."
  (when (org-export-derived-backend-p backend 'latex)
    (replace-regexp-in-string " " "~" text)))
```

```
(add-to-list 'org-export-filter-plain-text-functions
  'my-latex-filter-nobreaks)
```

A filter requires three arguments: the code to be transformed, the name of the backend, and some optional information about the export process. The third argument can be safely ignored. Note the use of `org-export-derived-backend-p` predicate that tests for *latex* backend or any other backend, such as *beamer*, derived from *latex*.

## Defining filters for individual files

The Org export can filter not just for backends, but also for specific files through the ‘BIND’ keyword. Here is an example with two filters; one removes brackets from time stamps, and the other removes strike-through text. The filter functions are defined in a code block in the same Org file, which is a handy location for debugging.

```
#+BIND: org-export-filter-timestamp-functions (tmp-f-timestamp)
#+BIND: org-export-filter-strike-through-functions (tmp-f-strike-through)
#+BEGIN_SRC emacs-lisp :exports results :results none
  (defun tmp-f-timestamp (s backend info)
    (replace-regexp-in-string "&[lg]t;\\| [] [] " "" s))
  (defun tmp-f-strike-through (s backend info) "")
#+END_SRC
```

## Summary of the export process

Org mode export is a multi-step process that works on a temporary copy of the buffer. The export process consists of 4 major steps:

1. Process the temporary copy, making necessary changes to the buffer text;
2. Parse the buffer, converting plain Org markup into an abstract syntax tree (AST);
3. Convert the AST to text, as prescribed by the selected export backend;
4. Post-process the resulting exported text.

Process temporary copy of the source Org buffer<sup>22</sup>:

1. Execute `org-export-before-processing-functions` (see [\[Export hooks\]](#), page 205);
2. Expand ‘`#+include`’ keywords in the whole buffer (see [Section 13.4 \[Include Files\]](#), page 157);
3. Remove commented subtrees in the whole buffer (see [Section 13.6 \[Comment Lines\]](#), page 159);
4. Replace macros in the whole buffer (see [Section 13.5 \[Macro Replacement\]](#), page 158);
5. When `org-export-use-babel` is non-nil (default), process code blocks:
  - Leave code blocks inside archived subtrees (see [Section 9.2.2 \[Internal archiving\]](#), page 97) as is;
  - Evaluate all the other code blocks according to code block headers (see [\[Limit code block evaluation\]](#), page 239);
  - Remove code, results of evaluation, both, or neither according to ‘`:exports`’ header argument (see [Section 16.7 \[Exporting Code Blocks\]](#), page 246).

Parse the temporary buffer, creating AST:

1. Execute `org-export-before-parsing-functions` (see [\[Export hooks\]](#), page 205). The hook functions may still modify the buffer;

<sup>22</sup> Unless otherwise specified, each step of the export process only operates on the accessible portion of the buffer. When subtree export is selected (see [Section 13.1 \[The Export Dispatcher\]](#), page 151), the buffer is narrowed to the body of the selected subtree, so that the rest of the buffer text, except export keywords, does not contribute to the export output.

2. Calculate export option values according to subtree-specific export settings, in-buffer keywords, ‘#+BIND’ keywords, and buffer-local and global customization. The whole buffer is considered;
3. When `org-org-with-cite-processors` is non-nil (default), determine contributing bibliographies and record them into export options (see [Section 15.1 \[Citations\]](#), [page 223](#)). The whole buffer is considered;
4. Execute `org-export-filter-options-functions`;
5. Parse the accessible portion of the temporary buffer to generate an AST. The AST is a nested list of lists representing Org syntax elements (see [Org Element API](#) for more details):

```
(org-data ...
  (heading
    (section
      (paragraph (plain-text) (bold (plain-text))))
    (heading)
    (heading (section ...))))
```

Past this point, modifications to the temporary buffer no longer affect the export; Org export works only with the AST;

6. Remove elements that are not exported from the AST:
  - Headings according to ‘SELECT\_TAGS’ and ‘EXCLUDE\_TAGS’ export keywords; ‘task’, ‘inline’, ‘arch’ export options (see [Section 13.2 \[Export Settings\]](#), [page 153](#));
  - Comments;
  - Clocks, drawers, fixed-width environments, footnotes, L<sup>A</sup>T<sub>E</sub>X environments and fragments, node properties, planning lines, property drawers, statistics cookies, timestamps, etc according to ‘#+OPTIONS’ keyword (see [Section 13.2 \[Export Settings\]](#), [page 153](#));
  - Table rows containing width and alignment markers, unless the selected export backend changes `:with-special-rows` export option to non-nil (see [Section 3.2 \[Column Width and Alignment\]](#), [page 22](#));
  - Table columns containing recal marks (see [Section 3.5.10 \[Advanced features\]](#), [page 34](#)).
7. Expand environment variables in file link AST nodes according to the ‘expand-links’ export option (see [Section 13.2 \[Export Settings\]](#), [page 153](#));
8. Execute `org-export-filter-parse-tree-functions`. These functions can modify the AST by side effects;
9. When `org-org-with-cite-processors` is non-nil (default), replace citation AST nodes and ‘#+print\_bibliography’ keyword AST nodes as prescribed by the selected citation export processor (see [Section 15.2 \[Citation export processors\]](#), [page 224](#)).

Convert the AST to text by traversing the AST nodes, depth-first:

1. Convert the leaf nodes (without children) to text as prescribed by “transcoders” in the selected export backend<sup>23</sup>;

<sup>23</sup> See transcoders and `:translate-alist` in the docstrings of `org-export-define-backend` and `org-export-define-derived-backend`.

2. Pass the converted nodes through the corresponding export filters (see [Filters], page 206);
3. Concatenate all the converted child nodes to produce parent node contents;
4. Convert the nodes with children to text, passing the nodes themselves and their exported contents to the corresponding transcoders and then to the export filters (see [Filters], page 206).

Post-process the exported text:

1. Post-process the converted AST, as prescribed by the export backend.<sup>24</sup> This step usually adds generated content (like Table of Contents) to the exported text;
2. Execute `org-export-filter-body-functions`;
3. Unless `body-only` export is selected (see Section 13.1 [The Export Dispatcher], page 151), add the necessary metadata to the final document, as prescribed by the export backend. Examples: Document author/title; HTML headers/footers; L<sup>A</sup>T<sub>E</sub>X preamble;
4. When `org-org-with-cite-processors` is non-nil (default), add bibliography metadata, as prescribed by the citation export processor;
5. Execute `org-export-filter-final-output-functions`.

## Extending an existing backend

Some parts of the conversion process can be extended for certain elements so as to introduce a new or revised translation. That is how the HTML export backend was extended to handle Markdown format. The extensions work seamlessly so any aspect of filtering not done by the extended backend is handled by the original backend. Of all the export customization in Org, extending is very powerful as it operates at the parser level.

For this example, make the *ascii* backend display the language used in a source code block. Also make it display only when some attribute is non-nil, like the following:

```
#+ATTR_ASCII: :language t
```

Then extend ASCII backend with a custom “my-ascii” backend.

```
(defun my-ascii-src-block (src-block contents info)
  "Transcode a SRC-BLOCK element from Org to ASCII.
  CONTENTS is nil. INFO is a plist used as a communication
  channel."
  (if (not (org-export-read-attribute :attr_ascii src-block :language))
      (org-export-with-backend 'ascii src-block contents info)
      (concat
        (format ",--[ %s ]--\n%s`----"
          (org-element-property :language src-block)
          (replace-regexp-in-string
            "~" "|"
            (org-element-normalize-string
              (org-export-format-code-default src-block info))))))))))
```

---

<sup>24</sup> See `inner-template` in the docstring of `org-export-define-backend`.

```
(org-export-define-derived-backend 'my-ascii 'ascii
  :translate-alist '((src-block . my-ascii-src-block)))
```

The `my-ascii-src-block` function looks at the attribute above the current element. If not true, hands over to `ascii` backend. If true, which it is in this example, it creates a box around the code and leaves room for the inserting a string for language. The last form creates the new backend that springs to action only when translating `src-block` type elements.

To use the newly defined backend, evaluate the following from an Org buffer:

```
(org-export-to-buffer 'my-ascii "*Org MY-ASCII Export*")
```

Further steps to consider would be an interactive function, self-installing an item in the export dispatcher menu, and other user-friendly improvements. See <https://orgmode.org/worg/dev/org-export-reference.html> for more details.

## 13.18 Export Region

Some export backends include commands to convert a region of Org formatted text to another format, such as HTML or  $\text{\LaTeX}$ . The conversion replaces the original source. Here are such commands:

```
org-export-region-to-ascii
  Convert the selected region into ASCII.

org-export-region-to-utf8
  Convert the selected region into UTF-8.

org-export-region-to-html
  Convert the selected region into HTML.

org-export-region-to-latex
  Convert the selected region into  $\text{\LaTeX}$ .

org-export-region-to-texinfo
  Convert the selected region into Texinfo.

org-export-region-to-md
  Convert the selected region into Markdown.
```

The in-place conversion is particularly handy for quick conversion of tables and lists in non-Org buffers. For example, in an HTML buffer, write a list in Org syntax, select it, and convert it to HTML with `M-x org-html-convert-region-to-html`.

## 14 Publishing

Org includes a publishing management system that allows you to configure automatic HTML conversion of *projects* composed of interlinked Org files. You can also configure Org to automatically upload your exported HTML pages and related attachments, such as images and source code files, to a web server.

You can also use Org to convert files into PDF, or even combine HTML and PDF conversion so that files are available in both formats on the server.

Publishing has been contributed to Org by David O’Toole.

### 14.1 Configuration

Publishing needs significant configuration to specify files, destination and many other properties of a project.

#### 14.1.1 The variable `org-publish-project-alist`

Publishing is configured almost entirely through setting the value of one variable, called `org-publish-project-alist`. Each element of the list configures one project, and may be in one of the two following forms:

```
("project-name" :property value :property value ...)
```

i.e., a well-formed property list with alternating keys and values, or:

```
("project-name" :components ("project-name" "project-name" ...))
```

In both cases, projects are configured by specifying property values. A project defines the set of files that are to be published, as well as the publishing configuration to use when publishing those files. When a project takes the second form listed above, the individual members of the `:components` property are taken to be sub-projects, which group together files requiring different publishing options. When you publish such a “meta-project”, all the components are also published, in the sequence given.

#### 14.1.2 Sources and destinations for files

Most properties are optional, but some should always be set. In particular, Org needs to know where to look for source files, and where to put published files.

`:base-directory`

Directory containing publishing source files.

`:publishing-directory`

Directory where output files are published. You can directly publish to a web-server using a file name syntax appropriate for the Emacs tramp package. Or you can publish to a local directory and use external tools to upload your website (see [Section 14.2 \[Uploading Files\]](#), page 219).

`:preparation-function`

Function or list of functions to be called before starting the publishing process, for example, to run ‘make’ for updating files to be published. Each preparation function is called with a single argument, the project property list.

**:completion-function**

Function or list of functions called after finishing the publishing process, for example, to change permissions of the resulting files. Each completion function is called with a single argument, the project property list.

**14.1.3 Selecting files**

By default, all files with extension `‘.org’` in the base directory are considered part of the project. This can be modified by setting the following properties

**:base-extension**

Extension—without the dot—of source files. This actually is a regular expression. Set this to the symbol `any` if you want to get all files in `:base-directory`, even without extension.

**:exclude** Regular expression to match file names that should not be published, even though they have been selected on the basis of their extension.

**:include** List of files to be included regardless of `:base-extension` and `:exclude`.

**:recursive**

Non-`nil` means, check `base-directory` recursively for files to publish.

**14.1.4 Publishing action**

Publishing means that a file is copied to the destination directory and possibly transformed in the process. The default transformation is to export Org files as HTML files, and this is done by the function `org-html-publish-to-html` which calls the HTML exporter (see [Section 13.9 \[HTML Export\], page 165](#)). But you can also publish your content as PDF files using `org-latex-publish-to-pdf`, or as ASCII, Texinfo, etc., using the corresponding functions.

If you want to publish the Org file as an `‘.org’` file but with *archived*, *commented*, and *tag-excluded* trees removed, use `org-org-publish-to-org`. This produces `‘file.org’` and puts it in the publishing directory. If you want a htmlized version of this file, set the parameter `:htmlized-source` to `t`. It produces `‘file.org.html’` in the publishing directory<sup>1</sup>.

Other files like images only need to be copied to the publishing destination; for this you can use `org-publish-attachment`. For non-Org files, you always need to specify the publishing function:

**:publishing-function**

Function executing the publication of a file. This may also be a list of functions, which are all called in turn.

**:htmlized-source**

Non-`nil` means, publish htmlized source.

The function must accept three arguments: a property list containing at least a `:publishing-directory` property, the name of the file to be published, and the path to the publishing directory of the output file. It should take the specified file, make the necessary transformation, if any, and place the result into the destination folder.

<sup>1</sup> If the publishing directory is the same as the source directory, `‘file.org’` is exported as `‘file.org.org’`, so you probably do not want to do this.

### 14.1.5 Options for the exporters

The property list can be used to set many export options for the HTML and  $\text{\LaTeX}$  exporters. In most cases, these properties correspond to user variables in Org. The table below lists these properties along with the variable they belong to. See the documentation string for the respective variable for details.

When a property is given a value in `org-publish-project-alist`, its setting overrides the value of the corresponding user variable, if any, during publishing. Options set within a file (see [Section 13.2 \[Export Settings\], page 153](#)), however, override everything.

#### Generic properties

<code>:author</code>	<code>user-full-name</code>
<code>:email</code>	<code>user-mail-address</code>
<code>:language</code>	<code>org-export-default-language</code>
<code>:select-tags</code>	<code>org-export-select-tags</code>
<code>:exclude-tags</code>	<code>org-export-exclude-tags</code>
<code>:creator</code>	<code>org-export-creator-string</code>
<code>:headline-levels</code>	<code>org-export-headline-levels</code>
<code>:preserve-breaks</code>	<code>org-export-preserve-breaks</code>
<code>:section-numbers</code>	<code>org-export-with-section-numbers</code>
<code>:time-stamp-file</code>	<code>org-export-timestamp-file</code>
<code>:with-archived-trees</code>	<code>org-export-with-archived-trees</code>
<code>:with-author</code>	<code>org-export-with-author</code>
<code>:expand-links</code>	<code>org-export-expand-links</code>
<code>:with-broken-links</code>	<code>org-export-with-broken-links</code>
<code>:with-clocks</code>	<code>org-export-with-clocks</code>
<code>:with-creator</code>	<code>org-export-with-creator</code>
<code>:with-date</code>	<code>org-export-with-date</code>
<code>:with-drawers</code>	<code>org-export-with-drawers</code>
<code>:with-email</code>	<code>org-export-with-email</code>
<code>:with-emphasize</code>	<code>org-export-with-emphasize</code>
<code>:with-entities</code>	<code>org-export-with-entities</code>
<code>:with-fixed-width</code>	<code>org-export-with-fixed-width</code>
<code>:with-footnotes</code>	<code>org-export-with-footnotes</code>
<code>:with-inlinetasks</code>	<code>org-export-with-inlinetasks</code>
<code>:with-latex</code>	<code>org-export-with-latex</code>
<code>:with-planning</code>	<code>org-export-with-planning</code>
<code>:with-priority</code>	<code>org-export-with-priority</code>
<code>:with-properties</code>	<code>org-export-with-properties</code>
<code>:with-smart-quotes</code>	<code>org-export-with-smart-quotes</code>
<code>:with-special-strings</code>	<code>org-export-with-special-strings</code>
<code>:with-statistics-cookies</code>	<code>org-export-with-statistics-cookies</code>
<code>:with-sub-superscript</code>	<code>org-export-with-sub-superscripts</code>
<code>:with-toc</code>	<code>org-export-with-toc</code>
<code>:with-tables</code>	<code>org-export-with-tables</code>
<code>:with-tags</code>	<code>org-export-with-tags</code>
<code>:with-tasks</code>	<code>org-export-with-tasks</code>

:with-timestamps	org-export-with-timestamps
:with-title	org-export-with-title
:with-todo-keywords	org-export-with-todo-keywords
:with-cite-processors	org-export-process-citations
:cite-export	org-cite-export-processors

### ASCII specific properties

:ascii-bullets	org-ascii-bullets
:ascii-caption-above	org-ascii-caption-above
:ascii-charset	org-ascii-charset
:ascii-global-margin	org-ascii-global-margin
:ascii-format-drawer-function	org-ascii-format-drawer-function
:ascii-format-inlinetask-function	org-ascii-format-inlinetask-function
:ascii-headline-spacing	org-ascii-headline-spacing
:ascii-indented-line-width	org-ascii-indented-line-width
:ascii-inlinetask-width	org-ascii-inlinetask-width
:ascii-inner-margin	org-ascii-inner-margin
:ascii-links-to-notes	org-ascii-links-to-notes
:ascii-list-margin	org-ascii-list-margin
:ascii-paragraph-spacing	org-ascii-paragraph-spacing
:ascii-quote-margin	org-ascii-quote-margin
:ascii-table-keep-all-vertical-lines	org-ascii-table-keep-all-vertical-lines
:ascii-table-use-ascii-art	org-ascii-table-use-ascii-art
:ascii-table-widen-columns	org-ascii-table-widen-columns
:ascii-text-width	org-ascii-text-width
:ascii-underline	org-ascii-underline
:ascii-verbatim-format	org-ascii-verbatim-format

### Beamer specific properties

:headline-levels	org-beamer-frame-level
:beamer-subtitle-format	org-beamer-subtitle-format
:beamer-column-view-format	org-beamer-column-view-format
:beamer-theme	org-beamer-theme
:beamer-environments-extra	org-beamer-environments-extra
:beamer-frame-default-options	org-beamer-frame-default-options
:beamer-outline-frame-options	org-beamer-outline-frame-options
:beamer-outline-frame-title	org-beamer-outline-frame-title

### HTML specific properties

:html-doctype	org-html-doctype
:html-container	org-html-container-element
:html-content-class	org-html-content-class
:html-html5-fancy	org-html-html5-fancy
:html-link-use-abs-url	org-html-link-use-abs-url
:html-link-home	org-html-link-home
:html-link-up	org-html-link-up

:html-equation-reference-format	org-html-equation-reference-format
:html-postamble	org-html-postamble
:html-preamble	org-html-preamble
:html-head	org-html-head
:html-head-extra	org-html-head-extra
:html-head-include-default-style	org-html-head-include-default-style
:html-head-include-scripts	org-html-head-include-scripts
:html-allow-name-attribute-in-anchors	org-html-allow-name-attribute-in-anchors
:html-divs	org-html-divs
:html-checkbox-type	org-html-checkbox-type
:html-extension	org-html-extension
:html-footnote-format	org-html-footnote-format
:html-footnote-separator	org-html-footnote-separator
:html-footnotes-section	org-html-footnotes-section
:html-format-drawer-function	org-html-format-drawer-function
:html-format-headline-function	org-html-format-headline-function
:html-format-inlinetask-function	org-html-format-inlinetask-function
:html-home/up-format	org-html-home/up-format
:html-indent	org-html-indent
:html-infojs-options	org-html-infojs-options
:html-infojs-template	org-html-infojs-template
:html-inline-image-rules	org-html-inline-image-rules
:html-link-org-files-as-html	org-html-link-org-files-as-html
:html-mathjax-options	org-html-mathjax-options
:html-mathjax-template	org-html-mathjax-template
:html-metadata-timestamp-format	org-html-metadata-timestamp-format
:html-postamble-format	org-html-postamble-format
:html-preamble-format	org-html-preamble-format
:html-prefer-user-labels	org-html-prefer-user-labels
:html-self-link-headlines	org-html-self-link-headlines
:html-table-align-individual-fields	org-html-table-align-individual-fields
:html-table-caption-above	org-html-table-caption-above
:html-table-data-tags	org-html-table-data-tags
:html-table-header-tags	org-html-table-header-tags
:html-table-use-header-tags-for-first-column	org-html-table-use-header-tags-for-first-column
:html-tag-class-prefix	org-html-tag-class-prefix
:html-text-markup-alist	org-html-text-markup-alist
:html-todo-kwd-class-prefix	org-html-todo-kwd-class-prefix
:html-toplevel-hlevel	org-html-toplevel-hlevel
:html-use-infojs	org-html-use-infojs
:html-validation-link	org-html-validation-link
:html-viewport	org-html-viewport
:html-inline-images	org-html-inline-images
:html-table-attributes	org-html-table-default-attributes
:html-table-row-open-tag	org-html-table-row-open-tag
:html-table-row-close-tag	org-html-table-row-close-tag
:html-xml-declaration	org-html-xml-declaration

:html-wrap-src-lines	org-html-wrap-src-lines
:html-klipsify-src	org-html-klipsify-src
:html-klipse-css	org-html-klipse-css
:html-klipse-js	org-html-klipse-js
:html-klipse-selection-script	org-html-klipse-selection-script
:creator	org-html-creator-string
:with-latex	org-html-with-latex

## **L<sup>A</sup>T<sub>E</sub>X** specific properties

:latex-class	org-latex-default-class
:latex-active-timestamp-format	org-latex-active-timestamp-format
:latex-caption-above	org-latex-caption-above
:latex-classes	org-latex-classes
:latex-default-figure-position	org-latex-default-figure-position
:latex-default-table-environment	org-latex-default-table-environment
:latex-default-quote-environment	org-latex-default-quote-environment
:latex-default-table-mode	org-latex-default-table-mode
:latex-default-footnote-command	org-latex-default-footnote-command
:latex-diary-timestamp-format	org-latex-diary-timestamp-format
:latex-engraved-options	org-latex-engraved-options
:latex-engraved-preamble	org-latex-engraved-preamble
:latex-engraved-theme	org-latex-engraved-theme
:latex-footnote-defined-format	org-latex-footnote-defined-format
:latex-footnote-separator	org-latex-footnote-separator
:latex-format-drawer-function	org-latex-format-drawer-function
:latex-format-headline-function	org-latex-format-headline-function
:latex-format-inlinetask-function	org-latex-format-inlinetask-function
:latex-hyperref-template	org-latex-hyperref-template
:latex-image-default-scale	org-latex-image-default-scale
:latex-image-default-height	org-latex-image-default-height
:latex-image-default-option	org-latex-image-default-option
:latex-image-default-width	org-latex-image-default-width
:latex-images-centered	org-latex-images-centered
:latex-inactive-timestamp-format	org-latex-inactive-timestamp-format
:latex-inline-image-rules	org-latex-inline-image-rules
:latex-link-with-unknown-path-format	org-latex-link-with-unknown-path-format
:latex-src-block-backend	org-latex-src-block-backend
:latex-listings-langs	org-latex-listings-langs
:latex-listings-options	org-latex-listings-options
:latex-listings-src-omit-language	org-latex-listings-src-omit-language
:latex-minted-langs	org-latex-minted-langs
:latex-minted-options	org-latex-minted-options
:latex-prefer-user-labels	org-latex-prefer-user-labels
:latex-subtitle-format	org-latex-subtitle-format
:latex-subtitle-separate	org-latex-subtitle-separate
:latex-table-scientific-notation	org-latex-table-scientific-notation

:latex-tables-booktabs	org-latex-tables-booktabs
:latex-tables-centered	org-latex-tables-centered
:latex-text-markup-alist	org-latex-text-markup-alist
:latex-title-command	org-latex-title-command
:latex-toc-command	org-latex-toc-command
:latex-compiler	org-latex-compiler

### Markdown specific properties

:md-footnote-format	org-md-footnote-format
:md-footnotes-section	org-md-footnotes-section
:md-headline-style	org-md-headline-style
:md-toplevel-hlevel	org-md-toplevel-hlevel

### ODT specific properties

:odt-styles-file	org-odt-styles-file
:odt-content-template-file	org-odt-content-template-file
:odt-display-outline-level	org-odt-display-outline-level
:odt-fontify-srcblocks	org-odt-fontify-srcblocks
:odt-format-drawer-function	org-odt-format-drawer-function
:odt-format-headline-function	org-odt-format-headline-function
:odt-format-inlinetask-function	org-odt-format-inlinetask-function
:odt-inline-formula-rules	org-odt-inline-formula-rules
:odt-inline-image-rules	org-odt-inline-image-rules
:odt-pixels-per-inch	org-odt-pixels-per-inch
:odt-table-styles	org-odt-table-styles
:odt-use-date-fields	org-odt-use-date-fields
:with-latex	org-odt-with-latex

### Texinfo specific properties

:texinfo-class	org-texinfo-default-class
:texinfo-classes	org-texinfo-classes
:texinfo-format-headline-function	org-texinfo-format-headline-function
:texinfo-node-description-column	org-texinfo-node-description-column
:texinfo-active-timestamp-format	org-texinfo-active-timestamp-format
:texinfo-inactive-timestamp-format	org-texinfo-inactive-timestamp-format
:texinfo-diary-timestamp-format	org-texinfo-diary-timestamp-format
:texinfo-link-with-unknown-path-format	org-texinfo-link-with-unknown-path-format
:texinfo-tables-verbatim	org-texinfo-tables-verbatim
:texinfo-table-scientific-notation	org-texinfo-table-scientific-notation
:texinfo-table-default-markup	org-texinfo-table-default-markup
:texinfo-text-markup-alist	org-texinfo-text-markup-alist
:texinfo-format-drawer-function	org-texinfo-format-drawer-function
:texinfo-format-inlinetask-function	org-texinfo-format-inlinetask-function
:texinfo-compact-itemx	org-texinfo-compact-itemx
:with-latex	org-texinfo-with-latex

### 14.1.6 Publishing links

To create a link from one Org file to another, you would use something like ‘[[file:foo.org][The foo]]’ or simply ‘[[file:foo.org]]’ (see [Section 4.4 \[External Links\]](#), page 41). When published, this link becomes a link to ‘foo.html’. You can thus interlink the pages of your “Org web” project and the links will work as expected when you publish them to HTML. If you also publish the Org source file and want to link to it, use an ‘http’ link instead of a ‘file:’ link, because ‘file’ links are converted to link to the corresponding ‘.html’ file.

Links to encrypted Org files, like ‘[[file:foo.org.gpg]]’ are also supported.

You may also link to related files, such as images. Provided you are careful with relative file names, and provided you have also configured Org to upload the related files, these links will work too. See [Section 14.3.2 \[Complex example\]](#), page 220, for an example of this usage.

Links between published documents can contain some search options (see [Section 4.8 \[Search Options\]](#), page 47), which will be resolved to the appropriate location in the linked file. For example, once published to HTML, the following links all point to a dedicated anchor in ‘foo.html’.

```
[[file:foo.org::*heading]]
[[file:foo.org::*#custom-id]]
[[file:foo.org::*target]]
```

### 14.1.7 Generating a sitemap

The following properties may be used to control publishing of a map of files for a given project.

```
:auto-sitemap
    When non-nil, publish a sitemap during org-publish-current-project or
    org-publish-all.

:sitemap-filename
    Filename for output of sitemap. Defaults to ‘sitemap.org’, which becomes
    ‘sitemap.html’.

:sitemap-title
    Title of sitemap page. Defaults to name of file.

:sitemap-style
    Can be list (site-map is just an itemized list of the titles of the files involved)
    or tree (the directory structure of the source files is reflected in the site-map).
    Defaults to tree.

:sitemap-format-entry
    With this option one can tell how a site-map entry is formatted in the site-map.
    It is a function called with three arguments: the file or directory name relative
    to base directory of the project, the site-map style and the current project. It
    is expected to return a string. Default value turns file names into links and
    use document titles as descriptions. For specific formatting needs, one can use
    org-publish-find-date, org-publish-find-title and org-publish-find-
    property, to retrieve additional information about published documents.
```

**:sitemap-function**

Plug-in function to use for generation of the sitemap. It is called with two arguments: the title of the site-map and a representation of the files and directories involved in the project as a nested list, which can further be transformed using `org-list-to-generic`, `org-list-to-subtree` and alike. Default value generates a plain list of links to all files in the project.

**:sitemap-sort-folders**

Where folders should appear in the sitemap. Set this to `first` (default) or `last` to display folders first or last, respectively. When set to `ignore`, folders are ignored altogether. Any other value mixes files and folders. This variable has no effect when site-map style is `tree`.

**:sitemap-sort-files**

How the files are sorted in the site map. Set this to `alphabetically` (default), `chronologically` or `anti-chronologically`. `chronologically` sorts the files with older date first while `anti-chronologically` sorts the files with newer date first. `alphabetically` sorts the files alphabetically. The date of a file is retrieved with `org-publish-find-date`.

**:sitemap-ignore-case**

Should sorting be case-sensitive? Default `nil`.

### 14.1.8 Generating an index

Org mode can generate an index across the files of a publishing project.

**:makeindex**

When non-`nil`, generate an index in the file `'theindex.org'` and publish it as `'theindex.html'`.

The file is created when first publishing a project with the `:makeindex` set. The file only contains a statement `'#+INCLUDE: "theindex.inc"'`. You can then build around this include statement by adding a title, style information, etc.

Index entries are specified with `'INDEX'` keyword. An entry that contains an exclamation mark creates a sub item.

```
*** Curriculum Vitae
#+INDEX: CV
#+INDEX: Application!CV
```

## 14.2 Uploading Files

For those people already utilizing third party sync tools such as Rsync or Unison, it might be preferable not to use the built-in remote publishing facilities of Org mode which rely heavily on Tramp. Tramp, while very useful and powerful, tends not to be so efficient for multiple file transfer and has been known to cause problems under heavy usage.

Specialized synchronization utilities offer several advantages. In addition to timestamp comparison, they also do content and permissions/attribute checks. For this reason you might prefer to publish your web to a local directory—possibly even *in place* with your Org files—and then use Unison or Rsync to do the synchronization with the remote host.

Since Unison, for example, can be configured as to which files to transfer to a certain remote destination, it can greatly simplify the project publishing definition. Simply keep all files in the correct location, process your Org files with `org-publish` and let the synchronization tool do the rest. You do not need, in this scenario, to include attachments such as JPG, CSS or PNG files in the project definition since the third-party tool syncs them.

Publishing to a local directory is also much faster than to a remote one, so that you can afford more easily to republish entire projects. If you set `org-publish-use-timestamps-flag` to `nil`, you gain the main benefit of re-including any changed external files such as source example files you might include with ‘INCLUDE’ keyword. The timestamp mechanism in Org is not smart enough to detect if included files have been modified.

## 14.3 Sample Configuration

Below we provide two example configurations. The first one is a simple project publishing only a set of Org files. The second example is more complex, with a multi-component project.

### 14.3.1 Example: simple publishing configuration

This example publishes a set of Org files to the ‘public\_html’ directory on the local machine.

```
(setq org-publish-project-alist
      '(("org"
         :base-directory "~/org/"
         :publishing-function org-html-publish-to-html
         :publishing-directory "~/public_html"
         :section-numbers nil
         :with-toc nil
         :html-head "<link rel=\"stylesheet\"
                    href=\"../other/mystyle.css\"
                    type=\"text/css\"/>"))))
```

### 14.3.2 Example: complex publishing configuration

This more complicated example publishes an entire website, including Org files converted to HTML, image files, Emacs Lisp source code, and style sheets. The publishing directory is remote and private files are excluded.

To ensure that links are preserved, care should be taken to replicate your directory structure on the web server, and to use relative file paths. For example, if your Org files are kept in ‘~/org/’ and your publishable images in ‘~/images/’, you would link to an image with

```
file:../images/myimage.png
```

On the web server, the relative path to the image should be the same. You can accomplish this by setting up an ‘images/’ folder in the right place on the web server, and publishing images to it.

```
(setq org-publish-project-alist
      `(("orgfiles"
         :base-directory "~/org/"
```

```

:base-extension "org"
:publishing-directory "/ssh:user@host:~/html/notebook/"
:publishing-function org-html-publish-to-html
:exclude ,(rx (or "PrivateFile.org" (seq line-start "private/"))) ;; regexp
:headline-levels 3
:section-numbers nil
:with-toc nil
:html-head "<link rel=\"stylesheet\"
           href=\"../other/mystyle.css\" type=\"text/css\"/>"
:html-preamble t)

("images"
 :base-directory "~/images/"
 :base-extension "jpg\\|gif\\|png"
 :publishing-directory "/ssh:user@host:~/html/images/"
 :publishing-function org-publish-attachment)

("other"
 :base-directory "~/other/"
 :base-extension "css\\|el"
 :publishing-directory "/ssh:user@host:~/html/other/"
 :publishing-function org-publish-attachment)
("website" :components ("orgfiles" "images" "other"))))

```

## 14.4 Triggering Publication

Once properly configured, Org can publish with the following commands:

*C-c C-e P x* (org-publish)

Prompt for a specific project and publish all files that belong to it.

*C-c C-e P p* (org-publish-current-project)

Publish the project containing the current file.

*C-c C-e P f* (org-publish-current-file)

Publish only the current file.

*C-c C-e P a* (org-publish-all)

Publish every project.

Org uses timestamps to track when a file has changed. The above functions normally only publish changed files. You can override this and force publishing of all files by giving a prefix argument to any of the commands above, or by customizing the variable `org-publish-use-timestamps-flag`. This may be necessary in particular if files include other files via ‘SETUPFILE’ or ‘INCLUDE’ keywords.

## 15 Citation handling

While links (see [Chapter 4 \[Hyperlinks\], page 39](#)) are often sufficient to refer to external or internal information from Org, they have their limitations when referring to multiple targets or typesetting printed publications.

Org mode provides a more sophisticated markup to “cite” external resources. For example, consider the following Org mode snippet

```
#+bibliography: citationdata.bib
```

```
Org mode is used by various communities [cite:teaching: @orgteaching;
and TeX: @orgtex]. [cite/author/caps:@orgtex] uses Org mode to simplify
writing scientific publications, while [cite/author/caps:@orgteaching]
experiment with Org babel to improve teaching.
```

```
#+print_bibliography:
```

Org mode will gather citation metadata from the ‘#+bibliography’ database and use it to typeset the exported document in arbitrary formats. For example, the snippet below shows ASCII export output.

```
Org mode is used by various communities (teaching: Birkenkrahe, Marcus,
2023, and TeX: Somma, Emmanuele F, 2023). Somma, Emmanuele F uses Org
mode to simplify writing scientific publications, while Birkenkrahe,
Marcus experiment with Org babel to improve teaching.
```

```
Birkenkrahe, Marcus (2023). /Teaching Data Science with Literate
Programming Tools/, MDPI.
```

```
Somma, Emmanuele F (2023). /Simplifying LaTeX with ORG-mode in Emacs/,
TUGboat volume.
```

In addition to export, users can use completion to search and insert citations from the bibliography (via `org-cite-insert`). Citations also act like ordinary links, jumping to the citation metadata when “following” them using `org-open-at-point`.

You can customize every aspect (*capability*) of citation handling using built-in or external *citation processors*.

Org mode ships with several built-in citation processors tailored to work with L<sup>A</sup>T<sub>E</sub>X export and BibT<sub>E</sub>X bibliographies (‘`bibtex`’, ‘`biblatex`’, and ‘`natbib`’ processors), or with more generic formats described using [Citation Style Language](#) (‘`csl`’ processor). The default citation processor is ‘`basic`’ - it works with arbitrary export formats and recognizes both BibT<sub>E</sub>X and CSL bibliographies. More citation processors are distributed as Emacs packages.

Multiple citation processors can be mixed to meet your preferences. Configure `org-cite-activate-processor`, `org-cite-follow-processor`, `org-cite-insert-processor`, and `org-cite-export-processors` to select which processor to use for every citation capability:

```
activate    Fontification, tooltip preview, etc.
```

follow      At-point actions on citations via `org-open-at-point`.  
 insert      Add and edit citations via `org-cite-insert`.  
 export      Via different libraries for different target formats.

## 15.1 Citations

Before adding citations, first set one-or-more bibliographies, either globally with `org-cite-global-bibliography`, or locally using one or more “bibliography” keywords.

```
#+bibliography: SomeFile.bib
#+bibliography: /some/other/file.json
#+bibliography: "/some/file/with spaces/in its name.bib"
```

Org mode uses all the local and global bibliographies combined to search for citation keys.

One can then insert and edit citations using `org-cite-insert`, called with `C-c C-x @`.

A *citation* requires one or more citation *key(s)*, elements identifying a reference in the bibliography.

- Each citation is surrounded by brackets and uses the ‘cite’ type.
- Each key starts with the character ‘@’.

```
[cite:@key]
```

- Each key can be qualified by a *prefix* (e.g. “see ”) and/or a *suffix* (e.g. “p. 123”), giving information useful or necessary for the comprehension of the citation but not included in the reference.

```
[cite:see @key p. 123]
```

- A single citation can cite more than one reference ; the keys are separated by semicolons ; the formatting of such citation groups is specified by the style.

```
[cite:@key1;@key2;@key3]
```

- One can also specify a stylistic variation for the citations by inserting a ‘/’ and a style name between the ‘cite’ keyword and the colon; this usually makes sense only for the author-year styles.

```
[cite/style:common prefix ;prefix @key suffix; ... ; common suffix]
```

When ‘style’ is not specified, one of the two default styles are used

- either the default style specified in the ‘CITE\_EXPORT’ keyword (see [Section 15.2 \[Citation export processors\]](#), page 224)

```
#+cite_export: basic numeric noauthor/bare
[cite:@key] is the same as [cite/noauthor/bare:@key]
```

- or, if ‘CITE\_EXPORT’ is not set, using the default ‘nil’ style

```
[cite:@key] is the same as [cite/nil:@key]
```

The only mandatory elements are:

- The ‘cite’ keyword and the colon.
- The ‘@’ character immediately preceding each key.
- The brackets surrounding the citation(s) (group).

## 15.2 Citation export processors

Org currently includes the following export processors:

- Two processors can export to a variety of formats, including ‘`latex`’ (and therefore ‘`pdf`’), ‘`html`’, ‘`odt`’ and plain (UTF8) text:
 

<code>basic</code>	a basic export processor, well adapted to situations where backward compatibility is not a requirement and formatting needs are minimal;
<code>cs1</code>	this export processor uses format files written in <b>Citation Style Language</b> via <code>citeproc-el</code> ;
- In contrast, three other processors target  $\text{\LaTeX}$  and  $\text{\LaTeX}$ -derived formats exclusively:
 

<code>bibtex</code>	this export processor uses <code>BibTeX</code> , the historical bibliographic processor used with $\text{\LaTeX}$ , thus allowing the use of data and style files compatible with this processor (including a large number of publishers’ styles). It only supports $\text{\LaTeX}$ ’s ‘ <code>\cite</code> ’ and ‘ <code>\nocite</code> ’ commands.
<code>natbib</code>	as with the <code>bibtex</code> processor, but using the $\text{\LaTeX}$ package ‘ <code>natbib</code> ’, allowing more stylistic variants than $\text{\LaTeX}$ ’s ‘ <code>\cite</code> ’ command.
<code>biblatex</code>	this backend allows the use of data and formats prepared for <code>BibLaTeX</code> , an alternate bibliographic processor used with $\text{\LaTeX}$ , which overcomes some serious <code>BibTeX</code> limitations, but has not (yet?) been widely adopted by publishers.

The ‘`CITE_EXPORT`’ keyword specifies the export processor, citation style, and bibliography style; for example (all arguments are optional)

```
#+cite_export: [export processor name] [bibliography style] [default citation style]
#+cite_export: basic author-year author
```

specifies the ‘`basic`’ export processor with citations inserted as author’s name and references indexed by author’s names and year;

```
#+cite_export: cs1 /some/path/to/vancouver-brackets.csl
```

specifies the ‘`cs1`’ processor and CSL style, which in this case defines numeric citations and numeric references according to the ‘`Vancouver`’ specification (as style used in many medical journals), following a typesetting variation putting citations between brackets;

```
#+cite_export: natbib kluwer
```

specifies the ‘`natbib`’ export processor with a label citation style conformant to the Harvard style and the specification of the Wolkers-Kluwer publisher; since it relies on the `bibtex` processor of your  $\text{\LaTeX}$  installation, it won’t export to anything but PDF.

```
#+cite_export: biblatex numeric,backend=bibtex
```

specifies the ‘`biblatex`’ export processor with the default ‘`numeric`’ style and the ‘`bibtex`’ backend. Always define the style first and then the rest of load-time options for the ‘`biblatex`’ package. Alternatively, you can use the `key=val,key=val` format for the options as documented in the ‘`biblatex`’ package documentation:

```
#+cite_export: biblatex backend=bibtex,style=numeric
```

The `org-cite-biblatex-options` variable in your Emacs configuration uses this format. It will only export to PDF, since it relies on the `biblatex` processor of your  $\text{\LaTeX}$  installation.

## 15.3 Bibliography printing

The ‘PRINT\_BIBLIOGRAPHY’ keyword specifies where the bibliography should be printed (note the colon):

```
#+print_bibliography:
```

The bibliography printed by the L<sup>A</sup>T<sub>E</sub>X-based export processors ‘bibtex’, ‘natbib’ and ‘biblatex’ has a chapter or section heading by default, while the ‘basic’ and ‘csl’ processors print the list of bibliography entries without a heading.

A document may contain more than one ‘PRINT\_BIBLIOGRAPHY’ keywords. Each of the keywords will trigger printing the bibliography.

The keywords can be used with or without additional options. Options can be used, for example, to print only entries that belong to a certain category or to control formatting. The set of supported ‘PRINT\_BIBLIOGRAPHY’ options and their interpretation varies between the different citation export processors. Some export processors do not support passing options.

### 15.3.1 Bibliography options in the ‘biblatex’ and ‘csl’ export processors

The ‘biblatex’ and ‘csl’ export processors support bibliography options through a property list attached to the ‘PRINT\_BIBLIOGRAPHY’ keyword. For example,

```
#+print_bibliography: :keyword algebra :type book
```

Values including spaces must be surrounded with double quotes. If you need to use a key multiple times, you can separate its values with commas, but without any space in-between:

```
#+print_bibliography: :keyword "algebraic logic" :nottype article,book
```

The ‘biblatex’ export processor accepts all options supported by BibL<sup>A</sup>T<sub>E</sub>X’s `\printbibliography` command.

The ‘csl’ processor accepts the following options:

```
‘:keyword <keyword(,keyword2...)>’
```

Print only entries whose keyword field contains all given keywords.

```
‘:notkeyword <keyword(,keyword2...)>’
```

Print only entries whose keyword field does not contain any of the given keywords.

```
‘:type <entrytype>’
```

Print only entries whose type is ‘<entrytype>’. Entry type is the BibT<sub>E</sub>X/BibL<sup>A</sup>T<sub>E</sub>X entry type if this information is available (the entry was read from a BibT<sub>E</sub>X/BibL<sup>A</sup>T<sub>E</sub>X bibliography) and the CSL entry type otherwise.

```
‘:nottype <entrytype(,entrytype2...)>’
```

Print only entries whose type is not among the given entry types. Entry type is determined as in the case of ‘:type’.

```
‘:csltype <entrytype>’
```

Print only entries whose CSL entry type (possibly based on a conversion from BibT<sub>E</sub>X/BibL<sup>A</sup>T<sub>E</sub>X to CSL) is ‘<entrytype>’.

`':notcsltype <entrytype(,entrytype2...)>'`

Print only entries whose CSL entry type (possibly based on a conversion from Bib<sub>T</sub>E<sub>X</sub>/Bib<sub>L</sub>A<sub>T</sub>E<sub>X</sub> to CSL) is not among the listed entry types.

`':filter <predicate>'`

Print only entries for which the given Emacs Lisp predicate returns a non-`nil` value.

## 16 Working with Source Code

Source code here refers to any plain text collection of computer instructions, possibly with comments, written using a human-readable programming language. Org can manage source code in an Org document when the source code is identified with begin and end markers. Working with source code begins with identifying source code blocks. A source code block can be placed almost anywhere in an Org document; it is not restricted to the preamble or the end of the document. However, Org cannot manage a source code block if it is placed inside an Org comment or within a fixed width section.

Here is an example source code block in the Emacs Lisp language:

```
#+BEGIN_SRC emacs-lisp
  (defun org-xor (a b)
    "Exclusive or."
    (if a (not b) b))
#+END_SRC
```

Source code blocks are one of many Org block types, which also include “center”, “comment”, “dynamic”, “example”, “export”, “quote”, “special”, and “verse”. This section pertains to blocks between ‘`#+BEGIN_SRC`’ and ‘`#+END_SRC`’.

Details of Org’s facilities for working with source code are described in the following sections.

### 16.1 Features Overview

Org can manage the source code in the block delimited by ‘`#+BEGIN_SRC`’ . . . ‘`#+END_SRC`’ in several ways that can simplify housekeeping tasks essential to modern source code maintenance. Org can edit, format, extract, export, and publish source code blocks. Org can also compile and execute a source code block, then capture the results. The Org mode literature sometimes refers to source code blocks as *live code* blocks because they can alter the content of the Org document or the material that it exports. Users can control the “liveliness” of each source code block by tweaking the header arguments (see [Section 16.3 \[Using Header Arguments\]](#), page 229) for compiling, execution, extraction, and exporting.

For editing and formatting a source code block, Org uses an appropriate Emacs major mode that includes features specifically designed for source code in that language.

Org can extract one or more source code blocks and write them to one or more source files—a process known as *tangling* in literate programming terminology.

For exporting and publishing, Org’s backends can format a source code block appropriately, often with native syntax highlighting.

For executing and compiling a source code block, the user can configure Org to select the appropriate compiler. Org provides facilities to collect the result of the execution or compiler output, insert it into the Org document, and/or export it. In addition to text results, Org can insert links to other data types, including audio, video, and graphics. Org can also link a compiler error message to the appropriate line in the source code block.

An important feature of Org’s management of source code blocks is the ability to pass variables, functions, and results to one another using a common syntax for source code blocks in any language. Although most literate programming facilities are restricted to

one language or another, Org’s language-agnostic approach lets the literate programmer match each programming task with the appropriate computer language and to mix them all together in a single Org document. This interoperability among languages explains why Org’s source code management facility was named *Org Babel* by its originators, Eric Schulte and Dan Davison.

Org mode fulfills the promise of easy verification and maintenance of publishing reproducible research by keeping text, data, code, configuration settings of the execution environment, the results of the execution, and associated narratives, claims, references, and internal and external links in a single Org document.

## 16.2 Structure of Code Blocks

Org offers two ways to structure source code in Org documents: in a source code block, and directly inline. Both specifications are shown below.

A source code block conforms to this structure:

```
#+NAME: <name>
#+BEGIN_SRC <language> <switches> <header arguments>
<body>
#+END_SRC
```

Do not be put-off by having to remember the source block syntax. Org mode offers a command for wrapping existing text in a block (see [Section 17.2 \[Structure Templates\]](#), [page 257](#)). Org also works with other completion systems in Emacs, some of which predate Org and have custom domain-specific languages for defining templates. Regular use of templates reduces errors, increases accuracy, and maintains consistency.

An inline code block conforms to this structure:

```
src_<language>{<body>}
```

or

```
src_<language>[<header arguments>]{<body>}
```

‘#+NAME: <name>’

Optional. Names the source block so it can be called, like a function, from other source blocks or inline code to evaluate or to capture the results. Code from other blocks, other files, and from table formulas (see [Section 3.5 \[The Spreadsheet\]](#), [page 24](#)) can use the name to reference a source block. This naming serves the same purpose as naming Org tables. Org mode requires unique names. For duplicate names, Org mode’s behavior is undefined. Inline code blocks cannot have a name.

‘#+BEGIN\_SRC’ ... ‘#+END\_SRC’

Mandatory. They mark the start and end of a block that Org requires. The ‘#+BEGIN\_SRC’ line takes additional arguments, as described next.

‘<language>’

Optional. It is the identifier of the source code language in the block. See [Section 16.9 \[Languages\]](#), [page 250](#), for identifiers of supported languages.

When ‘<language>’ identifier is omitted, the block also cannot have ‘<switches>’ and ‘<header arguments>’.

Language identifier is also used to fontify code blocks in Org buffers, when `org-src-fontify-natively` is set to `non-nil`. See [Section 16.10 \[Editing Source Code\]](#), page 250.

‘<switches>’

Optional. Switches provide finer control of the code execution, export, and format (see the discussion of switches in [Section 12.6 \[Literal Examples\]](#), page 145).

‘<header arguments>’

Optional. Heading arguments control many aspects of evaluation, export and tangling of code blocks (see [Section 16.3 \[Using Header Arguments\]](#), page 229). Using Org’s properties feature, header arguments can be selectively applied to the entire buffer or specific subtrees of the Org document.

‘<body>’ Source code in the dialect of the specified language identifier.

## 16.3 Using Header Arguments

Org comes with many header arguments common to all languages. New header arguments are added for specific languages as they become available for use in source code blocks. A header argument is specified with an initial colon followed by the argument’s name in lowercase.

Since header arguments can be set in several ways, Org prioritizes them in case of overlaps or conflicts by giving local settings a higher priority. Header values in function calls, for example, override header values from global defaults.

### System-wide header arguments

System-wide values of header arguments can be specified by customizing the `org-babel-default-header-args` variable, which defaults to the following values:

```
:session    => "none"
:results    => "replace"
:exports    => "code"
:cache      => "no"
:noweb      => "no"
:hlines     => "no"
:tangle     => "no"
```

Inline source blocks (see [Section 16.2 \[Structure of Code Blocks\]](#), page 228) use slightly different default header arguments defined in `org-babel-default-inline-header-args`:

```
:session    => "none"
:results    => "replace"
:exports    => "results"
:hlines     => "yes"
```

The most notable difference between default header arguments for inline and normal source blocks is ‘:exports’ argument. For inline source blocks, results of evaluation are exported by default; not the code.

Unlike the default values, header arguments set using Org mode properties (see [\[Header arguments in Org mode properties\]](#), page 230) do apply to both the normal source blocks and inline source blocks.

The example below sets ‘:noweb’ header arguments to ‘yes’, which makes Org expand ‘:noweb’ references by default.

```
(setq org-babel-default-header-args
      (cons '(:noweb . "yes")
            (assq-delete-all :noweb org-babel-default-header-args)))
```

Each language can have separate default header arguments by customizing the variable `org-babel-default-header-args:<LANG>`, where `<LANG>` is the name of the language. For details, see the language-specific online documentation at <https://orgmode.org/worg/org-contrib/babel/>.

## Header arguments in Org mode properties

For header arguments applicable to the buffer, use ‘PROPERTY’ keyword anywhere in the Org file (see [Section 7.1 \[Property Syntax\]](#), page 67).

The following example makes all the R code blocks execute in the same session. Setting ‘:results’ to ‘silent’ ignores the results of executions for all blocks, not just R code blocks; no results inserted for any block.

```
#+PROPERTY: header-args:R :session *R*
#+PROPERTY: header-args :results silent
```

Header arguments set through Org’s property drawers (see [Section 7.1 \[Property Syntax\]](#), page 67) apply at the subtree level on down. Since these property drawers can appear anywhere in the file hierarchy, Org uses outermost call or source block to resolve the values. Org ignores `org-use-property-inheritance` setting.

In this example, ‘:cache’ defaults to ‘yes’ for all code blocks in the subtree.

```
* sample header
:PROPERTIES:
:header-args: :cache yes
:END:
```

Properties defined through `org-set-property` function, bound to `C-c C-x p`, apply to all active languages. They override properties set in `org-babel-default-header-args`.

Language-specific header arguments are also read from properties ‘header-args:<LANG>’ where `<LANG>` is the language identifier. For example,

```
* Heading
:PROPERTIES:
:header-args:clojure: :session *clojure-1*
:header-args:R: :session *R*
:END:
** Subheading
:PROPERTIES:
:header-args:clojure: :session *clojure-2*
:END:
```

would force separate sessions for Clojure blocks in ‘Heading’ and ‘Subheading’, but use the same session for all R blocks. Blocks in ‘Subheading’ inherit settings from ‘Heading’.

## Code block specific header arguments

Header arguments are most commonly set at the source code block level, on the ‘`#+BEGIN_SRC`’ line. Arguments set at this level take precedence over those set in the `org-babel-default-header-args` variable, and also those set as header properties.

In the following example, setting ‘`:results`’ to ‘`silent`’ makes it ignore results of the code execution. Setting ‘`:exports`’ to ‘`code`’ exports only the body of the code block to HTML or  $\LaTeX$ .

```
#+NAME: factorial
#+BEGIN_SRC haskell :results silent :exports code :var n=0
  fac 0 = 1
  fac n = n * fac (n-1)
#+END_SRC
```

The same header arguments in an inline code block:

```
src_haskell[:exports both]{fac 5}
```

Code block header arguments can span multiple lines using ‘`#+HEADER:`’ on each line. Note that Org currently accepts the plural spelling of ‘`#+HEADER:`’ only as a convenience for backward-compatibility. It may be removed at some point.

Multi-line header arguments on an unnamed code block:

```
#+HEADER: :var data1=1
#+BEGIN_SRC emacs-lisp :var data2=2
  (message "data1:%S, data2:%S" data1 data2)
#+END_SRC

#+RESULTS:
: data1:1, data2:2
```

Multi-line header arguments on a named code block:

```
#+NAME: named-block
#+HEADER: :var data=2
#+BEGIN_SRC emacs-lisp
  (message "data:%S" data)
#+END_SRC

#+RESULTS: named-block
: data:2
```

## Header arguments in function calls

Header arguments in function calls are the most specific and override all other settings in case of an overlap. They get the highest priority. Two ‘`#+CALL:`’ examples are shown below. For the complete syntax of ‘`CALL`’ keyword, see [Section 16.5 \[Evaluating Code Blocks\]](#), page 238.

In this example, ‘`:exports results`’ header argument is applied to the evaluation of the ‘`#+CALL:`’ line.

```
#+CALL: factorial(n=5) :exports results
```

In this example, ‘`:session special`’ header argument is applied to the evaluation of ‘`factorial`’ code block.

```
#+CALL: factorial[:session special](n=5)
```

## 16.4 Environment of a Code Block

### Passing arguments

Use ‘`var`’ for passing arguments to source code blocks. The specifics of variables in code blocks vary by the source language and are covered in the language-specific documentation. The syntax for ‘`var`’, however, is the same for all languages. This includes declaring a variable, and assigning a default value.

The following syntax is used to pass arguments to code blocks using the ‘`var`’ header argument.

```
:var NAME=ASSIGN
```

*NAME* is the name of the variable bound in the code block body. *ASSIGN* is a literal value, such as a string, a number, a reference to a table, a list, a literal example, another code block—with or without arguments—or the results of evaluating a code block. *ASSIGN* may specify a filename for references to elements in a different file, using a ‘`:`’ to separate the filename from the reference.

```
:var NAME=FILE:REFERENCE
```

When ‘`FILE`’ does not exist, the reference is searched in the current file, using the verbatim reference. This way, ‘`:var table=tbl:example`’ will be searched inside the current buffer.

Here are examples of passing values by reference:

table      A table named with a ‘`NAME`’ keyword.

```
#+NAME: example-table
| 1 |
| 2 |
| 3 |
| 4 |

#+NAME: table-length
#+BEGIN_SRC emacs-lisp :var table=example-table
  (length table)
#+END_SRC

#+RESULTS: table-length
: 4
```

When passing a table, you can treat specially the row, or the column, containing labels for the columns, or the rows, in the table.

The ‘`colnames`’ header argument accepts ‘`yes`’, ‘`no`’, or ‘`nil`’ values. The default value is ‘`nil`’: if an input table has column names—because the second row is a horizontal rule—then Org removes the column names, processes the table, puts back the column names, and then writes the table to the results

block. Using ‘yes’, Org does the same to the first non-hline row, even if the initial table does not contain any horizontal rule. When set to ‘no’, Org does not pre-process column names at all.

```

#+NAME: less-cols
| a |
|---|
| b |
| c |

#+BEGIN_SRC python :var tab=less-cols :colnames nil
return [[val + '*' for val in row] for row in tab]
#+END_SRC

#+RESULTS:
| a |
|---|
| b* |
| c* |

```

Similarly, the ‘rownames’ header argument can take two values: ‘yes’ or ‘no’. When set to ‘yes’, Org removes the first column, processes the table, puts back the first column, and then writes the table to the results block. The default is ‘no’, which means Org does not pre-process the first column. Note that Emacs Lisp code blocks ignore ‘rownames’ header argument because of the ease of table-handling in Emacs.

```

#+NAME: with-rownames
| one | 1 | 2 | 3 | 4 | 5 |
| two | 6 | 7 | 8 | 9 | 10 |

#+BEGIN_SRC python :var tab=with-rownames :rownames yes
return [[val + 10 for val in row] for row in tab]
#+END_SRC

#+RESULTS:
| one | 11 | 12 | 13 | 14 | 15 |
| two | 16 | 17 | 18 | 19 | 20 |

```

To refer to a table in another file, join the filename and table name with a colon, for example: ‘:var table=other-file.org:example-table’.

list      A simple named list.

```

#+NAME: example-list
- simple
- not
- nested
- list

#+BEGIN_SRC emacs-lisp :var x=example-list

```

```

    (print x)
#+END_SRC

#+RESULTS:
| simple | list |

```

Note that only the top level list items are passed along. Nested list items are ignored.

code block without arguments

A code block name, as assigned by ‘NAME’ keyword from the example above, optionally followed by parentheses.

```

#+BEGIN_SRC emacs-lisp :var length=table-length()
  (* 2 length)
#+END_SRC

#+RESULTS:
: 8

```

code block with arguments

A code block name, as assigned by ‘NAME’ keyword, followed by parentheses and optional arguments passed within the parentheses. The block is evaluated with point at its location.

```

#+NAME: double
#+BEGIN_SRC emacs-lisp :var input=8
  (* 2 input)
#+END_SRC

#+RESULTS: double
: 16

#+NAME: squared
#+BEGIN_SRC emacs-lisp :var input=double(input=1)
  (* input input)
#+END_SRC

#+RESULTS: squared
: 4

```

literal example, or code block contents

A code block or literal example block with a ‘NAME’ keyword, followed by brackets (optional for example blocks).

```

#+NAME: literal-example
#+BEGIN_EXAMPLE
  A literal example
  on two lines
#+END_EXAMPLE

#+NAME: read-literal-example

```

```

#+BEGIN_SRC emacs-lisp :var x=literal-example[]
  (concatenate #'string x " for you.")
#+END_SRC

#+RESULTS: read-literal-example
: A literal example
: on two lines for you.

```

Indexing variable values enables referencing portions of a variable. Indexes are 0 based with negative values counting backwards from the end. If an index is separated by commas then each subsequent section indexes as the next dimension. Note that this indexing occurs *before* other table-related header arguments are applied, such as ‘hlines’, ‘colnames’ and ‘rownames’. The following example assigns the last cell of the first row the table ‘example-table’ to the variable ‘data’:

```

#+NAME: example-table
| 1 | a |
| 2 | b |
| 3 | c |
| 4 | d |

#+BEGIN_SRC emacs-lisp :var data=example-table[0,-1]
  data
#+END_SRC

#+RESULTS:
: a

```

Two integers separated by a colon reference a range of variable values. In that case the entire inclusive range is referenced. For example the following assigns the middle three rows of ‘example-table’ to ‘data’.

```

#+NAME: example-table
| 1 | a |
| 2 | b |
| 3 | c |
| 4 | d |
| 5 | 3 |

#+BEGIN_SRC emacs-lisp :var data=example-table[1:3]
  data
#+END_SRC

#+RESULTS:
| 2 | b |
| 3 | c |
| 4 | d |

```

To pick the entire range, use an empty index, or the single character ‘\*’. ‘0:-1’ does the same thing. Example below shows how to reference the first column only.

```

#+NAME: example-table
| 1 | a |
| 2 | b |
| 3 | c |
| 4 | d |

#+BEGIN_SRC emacs-lisp :var data=example-table[,0]
  data
#+END_SRC

#+RESULTS:
| 1 | 2 | 3 | 4 |

```

Index referencing can be used for tables and code blocks. Index referencing can handle any number of dimensions. Commas delimit multiple dimensions, as shown below.

```

#+NAME: 3D
#+BEGIN_SRC emacs-lisp
  '(((1 2 3) (4 5 6) (7 8 9))
    ((10 11 12) (13 14 15) (16 17 18))
    ((19 20 21) (22 23 24) (25 26 27)))
#+END_SRC

#+BEGIN_SRC emacs-lisp :var data=3D[1,,1]
  data
#+END_SRC

#+RESULTS:
| 11 | 14 | 17 |

```

Note that row names and column names are not removed prior to variable indexing. You need to take them into account, even when ‘colnames’ or ‘rownames’ header arguments remove them.

Emacs lisp code can also set the values for variables. To differentiate a value from Lisp code, Org interprets any value starting with ‘(’, ‘[’, ‘‘’ or ‘`’ as Emacs Lisp code. The result of evaluating that code is then assigned to the value of that variable. The following example shows how to reliably query and pass the file name of the Org mode buffer to a code block using headers. We need reliability here because the file’s name could change once the code in the block starts executing.

```

#+BEGIN_SRC sh :var filename=(buffer-file-name) :exports both
  wc -w $filename
#+END_SRC

```

Note that values read from tables and lists are not mistakenly evaluated as Emacs Lisp code, as illustrated in the following example.

```

#+NAME: table
| (a b c) |

#+HEADER: :var data=table[0,0]

```

```

#+BEGIN_SRC perl
  $data
#+END_SRC

#+RESULTS:
: (a b c)

```

## Using sessions

Two code blocks can share the same environment. The ‘`session`’ header argument is for running multiple source code blocks under one session. Org runs code blocks with the same session name in the same interpreter process.

‘`none`’ Default. Each code block gets a new interpreter process to execute. The process terminates once the block is evaluated.

*STRING* Any string besides ‘`none`’ turns that string into the name of that session. For example, ‘`:session STRING`’ names it ‘`STRING`’. If ‘`session`’ has no value, then the session name is derived from the source language identifier. Subsequent blocks with the same source code language use the same session. Depending on the language, state variables, code from other blocks, and the overall interpreted environment may be shared. Some interpreted languages support concurrent sessions when subsequent source code language blocks change session names.

Only languages that provide interactive evaluation can have session support. Not all languages provide this support, such as C and ditaa. Even languages, such as Python and Haskell, that do support interactive evaluation impose limitations on allowable language constructs that can run interactively. Org inherits those limitations for those code blocks running in a session.

## Choosing a working directory

The ‘`dir`’ header argument specifies the default directory during code block execution. If it is absent, then the directory associated with the current buffer is used. In other words, supplying ‘`:dir DIRECTORY`’ temporarily has the same effect as changing the current directory with *M-x cd RET DIRECTORY*, and then not setting ‘`dir`’. Under the surface, ‘`dir`’ simply sets the value of the Emacs variable `default-directory`. Setting ‘`mkdirp`’ header argument to a non-`nil` value creates the directory, if necessary.

Setting ‘`dir`’ to the symbol `attach` or the string “`attach`” will set ‘`dir`’ to the directory returned by `(org-attach-dir)`, set ‘`:mkdir yes`’, and insert any file paths, as when using ‘`:results file`’, which are under the node’s attachment directory using ‘`attachment:`’ links instead of the usual ‘`file:`’ links. Any returned path outside of the attachment directory will use ‘`file:`’ links as per usual.

For example, to save the plot file in the ‘`Work/`’ folder of the home directory—notice tilde is expanded:

```

#+BEGIN_SRC R :file myplot.png :dir ~/Work
  matplot(matrix(rnorm(100), 10), type="l")
#+END_SRC

```

To evaluate the code block on a remote machine, supply a remote directory name using Tramp syntax. For example:

```
#+BEGIN_SRC R :file plot.png :dir /scp:dand@yakuba.princeton.edu:
  plot(1:10, main=system("hostname", intern=TRUE))
#+END_SRC
```

Org first captures the text results as usual for insertion in the Org file. Then Org also inserts a link to the remote file, thanks to Emacs Tramp. Org constructs the remote path to the file name from ‘dir’ and `default-directory`, as illustrated here:

```
[[file:/scp:dand@yakuba.princeton.edu:/home/dand/plot.png][plot.png]]
```

When ‘dir’ is used with ‘session’, Org sets the starting directory for a new session. But Org does not alter the directory of an already existing session.

Do not use ‘dir’ with ‘:exports results’ or with ‘:exports both’ to avoid Org inserting incorrect links to remote files. That is because Org does not expand `default-directory` to avoid some underlying portability issues.

## Inserting headers and footers

The ‘prologue’ header argument is for appending to the top of the code block for execution, like a reset instruction. For example, you may use ‘:prologue "reset"’ in a Gnuplot code block or, for every such block:

```
(add-to-list 'org-babel-default-header-args:gnuplot
  '(:prologue . "reset"))
```

Likewise, the value of the ‘epilogue’ header argument is for appending to the end of the code block for execution.

## 16.5 Evaluating Code Blocks

A note about security: With code evaluation comes the risk of harm. Org safeguards by prompting for user’s permission before executing any code in the source block. To customize this safeguard, or disable it, see [Section 17.13 \[Code Evaluation Security\]](#), page 265.

### How to evaluate source code

Org captures the results of the code block evaluation and inserts them in the Org file, right after the code block. The insertion point is after a newline and the ‘RESULTS’ keyword. Org creates the ‘RESULTS’ keyword if one is not already there. More details in [Section 16.6 \[Results of Evaluation\]](#), page 241.

By default, Org enables only Emacs Lisp code blocks for execution. See [Section 16.9 \[Languages\]](#), page 250 to enable other languages.

Org provides many ways to execute code blocks. `C-c C-c` or `C-c C-v e` with the point on a code block<sup>1</sup> calls the `org-babel-execute-src-block` function, which executes the code in the block, collects the results, and inserts them in the buffer.

By calling a named code block<sup>2</sup> from an Org mode buffer or a table. Org can call the named code blocks from the current Org mode buffer or from the “Library of Babel” (see [Section 16.12 \[Library of Babel\]](#), page 255).

<sup>1</sup> The option `org-babel-no-eval-on-ctrl-c-ctrl-c` can be used to remove code evaluation from the `C-c C-c` key binding.

<sup>2</sup> Actually, the constructs ‘`call_<name>()`’ and ‘`src_<lang>{}`’ are not evaluated when they appear in a keyword (see [Section 17.8 \[In-buffer Settings\]](#), page 261).

The syntax for ‘CALL’ keyword is:

```
#+CALL: <name>(<arguments>)
#+CALL: <name>[<inside header arguments>](<arguments>) <end header arguments>
```

The syntax for inline named code blocks is:

```
... call_<name>(<arguments>) ...
... call_<name>[<inside header arguments>](<arguments>)[<end header arguments>] ...
```

When inline syntax is used, the result is wrapped based on the variable `org-babel-inline-result-wrap`, which by default is set to `"=%s="` to produce verbatim text suitable for markup.

‘<name>’ This is the name of the code block (see [Section 16.2 \[Structure of Code Blocks\], page 228](#)) to be evaluated in the current document. If the block is located in another file, start ‘<name>’ with the file name followed by a colon. For example, in order to execute a block named ‘clear-data’ in ‘file.org’, you can write the following:

```
#+CALL: file.org:clear-data()
```

‘<arguments>’

Org passes arguments to the code block using standard function call syntax. For example, a ‘#+CALL:’ line that passes ‘4’ to a code block named ‘double’, which declares the header argument ‘:var n=2’, would be written as:

```
#+CALL: double(n=4)
```

Note how this function call syntax is different from the header argument syntax.

‘<inside header arguments>’

Org passes inside header arguments to the named code block using the header argument syntax. Inside header arguments apply to code block evaluation. For example, ‘[:results output]’ collects results printed to stdout during code execution of that block. Note how this header argument syntax is different from the function call syntax.

‘<end header arguments>’

End header arguments affect the results returned by the code block. For example, ‘:results html’ wraps the results in a ‘#+BEGIN\_EXPORT html’ block before inserting the results in the Org buffer.

## Limit code block evaluation

The ‘eval’ header argument can limit evaluation of specific code blocks and ‘CALL’ keyword. It is useful for protection against evaluating untrusted code blocks by prompting for a confirmation.

‘yes’ Org evaluates the source code, possibly asking permission according to `org-confirm-babel-evaluate`.

‘never’ or ‘no’ Org never evaluates the source code.

‘query’ Org prompts the user for permission to evaluate the source code.

`'never-export'` or `'no-export'`

Org does not evaluate the source code when exporting, yet the user can evaluate it interactively.

`'query-export'`

Org prompts the user for permission to evaluate the source code during export.

If `'eval'` header argument is not set, then Org determines whether to evaluate the source code from the `org-confirm-babel-evaluate` variable (see [Section 17.13 \[Code Evaluation Security\]](#), page 265).

## Cache results of evaluation

The `'cache'` header argument is for caching results of evaluating code blocks. Caching results can avoid re-evaluating a code block that have not changed since the previous run. To benefit from the cache and avoid redundant evaluations, the source block must have a result already present in the buffer, and neither the header arguments—including the value of `'var'` references—nor the text of the block itself has changed since the result was last computed. This feature greatly helps avoid long-running calculations. For some edge cases, however, the cached results may not be reliable.

The caching feature is best for when code blocks are pure functions, that is functions that return the same value for the same input arguments (see [Section 16.4 \[Environment of a Code Block\]](#), page 232), and that do not have side effects, and do not rely on external variables other than the input arguments. Functions that depend on a timer, file system objects, and random number generators are clearly unsuitable for caching.

A note of warning: when `'cache'` is used in a session, caching may cause unexpected results.

When the caching mechanism tests for any source code changes, it does not expand noweb style references (see [Section 16.11 \[Noweb Reference Syntax\]](#), page 251).

The `'cache'` header argument can have one of two values: `'yes'` or `'no'`.

`'no'` Default. No caching of results; code block evaluated every time.

`'yes'` Whether to run the code or return the cached results is determined by comparing the SHA1 hash value of the combined code block and arguments passed to it. This hash value is packed on the `'#+RESULTS:'` line from previous evaluation. When hash values match, Org does not evaluate the code block. When hash values mismatch, Org evaluates the code block, inserts the results, recalculates the hash value, and updates `'#+RESULTS:'` line.

In this example, both functions are cached. But `'caller'` runs only if the result from `'random'` has changed since the last run.

```
#+NAME: random
#+BEGIN_SRC R :cache yes
  runif(+1)
#+END_SRC

#+RESULTS[a2a72cd647ad44515fab62e144796432793d68e1]: random
0.4659510825295
```

```

#+NAME: caller
#+BEGIN_SRC emacs-lisp :var x=random :cache yes
  x
#+END_SRC

#+RESULTS[bec9c8724e397d5df3b696502df3ed7892fc4f5f]: caller
0.254227238707244

```

## 16.6 Results of Evaluation

How Org handles results of a code block execution depends on many header arguments working together. The primary determinant, however, is the ‘**results**’ header argument. It accepts four classes of options. Each code block can take only one option per class:

- Collection For how the results should be collected from the code block;
- Type For which type of result the code block will return; affects how Org processes and inserts results in the Org buffer;
- Format For the result; affects how Org processes results;
- Handling For inserting results once they are properly formatted.

### Collection

Collection options specify the results. Choose one of the options; they are mutually exclusive.

‘**value**’ Default for most Babel libraries<sup>3</sup>. Functional mode. Org gets the value by wrapping the code in a function definition in the language of the source block. That is why when using ‘**:results value**’, code should execute like a function and return a value. For languages like Python, an explicit **return** statement is mandatory when using ‘**:results value**’. Result is the value returned by the last statement in the code block.

When evaluating the code block in a session (see [Section 16.4 \[Environment of a Code Block\]](#), page 232), Org passes the code to an interpreter running as an interactive Emacs inferior process. Org gets the value from the source code interpreter’s last statement output. Org has to use language-specific methods to obtain the value. For example, from the variable `_` in Ruby, and the value of `.Last.value` in R.

‘**output**’ Scripting mode. Org passes the code to an external process running the interpreter. Org returns the contents of the standard output stream as text results. When using a session, Org passes the code to the interpreter running as an interactive Emacs inferior process. Org concatenates any text output from the interpreter and returns the collection as a result.

---

<sup>3</sup> Actually, the constructs ‘`call_<name>()`’ and ‘`src_<lang>{}`’ are not evaluated when they appear in a keyword (see [Section 17.8 \[In-buffer Settings\]](#), page 261).

## Type

Type tells what result types to expect from the execution of the code block. Choose one of the options; they are mutually exclusive.

The default behavior is to automatically determine the result type. The result type detection depends on the code block language, as described in the documentation for individual languages. See [Section 16.9 \[Languages\]](#), page 250.

**‘table’**

**‘vector’** Interpret the results as an Org table. If the result is a single value, create a table with one row and one column. Usage example: `‘:results value table’`. In-between each table row or below the table headings, sometimes results have horizontal lines, which are also known as “hlines”. The `‘hlines’` argument with the default `‘no’` value strips such lines from the input table. For most code, this is desirable, or else those `‘hline’` symbols raise unbound variable errors. A `‘yes’` accepts such lines, as demonstrated in the following example.

```

#+NAME: many-cols
| a | b | c |
|---+---+---|
| d | e | f |
|---+---+---|
| g | h | i |

#+NAME: no-hline
#+BEGIN_SRC python :var tab=many-cols :hlines no
return tab
#+END_SRC

#+RESULTS: no-hline
| a | b | c |
| d | e | f |
| g | h | i |

#+NAME: hlines
#+BEGIN_SRC python :var tab=many-cols :hlines yes
return tab
#+END_SRC

#+RESULTS: hlines
| a | b | c |
|---+---+---|
| d | e | f |
|---+---+---|
| g | h | i |

```

**‘list’** Interpret the results as an Org list. If the result is a single value, create a list of one element.

`'scalar'`  
`'verbatim'`

Interpret literally and insert as quoted text. Do not create a table. Usage example: `' :results value verbatim'`.

`'file'` Interpret as a filename. Save the results of execution of the code block to that file, then insert a link to it. You can control both the filename and the description associated to the link.

Org first tries to generate the filename from the value of the `'file'` header argument and the directory specified using the `'output-dir'` header arguments. If `'output-dir'` is not specified, Org assumes it is the current directory.

```
#+BEGIN_SRC asymptote :results value file :file circle.pdf :output-dir img/
  size(2cm);
  draw(unitcircle);
#+END_SRC
```

If `'file'` header argument is missing, Org generates the base name of the output file from the name of the code block, and its extension from the `'file-ext'` header argument. In that case, both the name and the extension are mandatory.

Result can also be interpreted as path to file. See `' :results link'`.

```
#+name: circle
#+BEGIN_SRC asymptote :results value file :file-ext pdf
  size(2cm);
  draw(unitcircle);
#+END_SRC
```

The `'file-desc'` header argument defines the description (see [Section 4.1 \[Link Format\], page 39](#)) for the link. If `'file-desc'` is present but has no value, the `'file'` value is used as the link description. When this argument is not present, the description is omitted. If you want to provide the `'file-desc'` argument but omit the description, you can provide it with an empty vector (i.e., `:file-desc []`).

By default, Org assumes that a table written to a file has TAB-delimited output. You can choose a different separator with the `'sep'` header argument.

The `'file-mode'` header argument defines the file permissions. To make it executable, use `' :file-mode (identity #o755)'`.

```
#+BEGIN_SRC shell :results file :file script.sh :file-mode (identity #o755)
  echo "#!/bin/bash"
  echo "echo Hello World"
#+END_SRC
```

## Format

Format pertains to the type of the result returned by the code block. Choose one of the options; they are mutually exclusive. The default follows from the type specified above.

`'raw'` Interpreted as raw Org mode. Inserted directly into the buffer. Aligned if it is a table. Usage example: `' :results value raw'`.

- `'code'` Result enclosed in a code block. Useful for parsing. Usage example: `' :results value code'`.
- `'drawer'` Results are added directly to the Org file as with `'raw'`, but are wrapped in a `'RESULTS'` drawer or results macro (for inline code blocks), for later scripting and automated processing. Usage example: `' :results value drawer'`.
- `'html'` Results enclosed in a `'BEGIN_EXPORT html'` block. Usage example: `' :results value html'`.
- `'latex'` Results enclosed in a `'BEGIN_EXPORT latex'` block. Usage example: `' :results value latex'`.
- `'link'`  
`'graphics'`
- When used along with `'file'` type, the result is a link to the file specified in `' :file'` header argument. However, unlike plain `'file'` type, code block output is not written to the disk. The block is expected to generate the file by its side-effects only, as in the following example:
- ```

#+begin_src shell :results file link :file "org-mode-unicorn.svg"
  wget -c "https://orgmode.org/resources/img/org-mode-unicorn.svg"
#+end_src

#+RESULTS:
  [[file:org-mode-unicorn.svg]]

```
- If `' :file'` header argument is omitted, interpret source block result as the file path.
- `'org'` Results enclosed in a `'BEGIN_SRC org'` block. For comma-escape, either TAB in the block, or export the file. Usage example: `' :results value org'`.
- `'pp'` Result converted to pretty-print source code. Enclosed in a code block. Languages supported: Emacs Lisp, Python, and Ruby. Usage example: `' :results value pp'`.

The `'wrap'` header argument unconditionally marks the results block by appending strings to `'#+BEGIN_'` and `'#+END_'`. If no string is specified, Org wraps the results in a `'#+BEGIN_results'` ... `'#+END_results'` block. It takes precedent over the `'results'` value listed above. E.g.,

```

#+BEGIN_SRC emacs-lisp :results html :wrap EXPORT markdown
  "<blink>Welcome back to the 90's</blink>"
#+END_SRC

#+RESULTS:
#+BEGIN_EXPORT markdown
<blink>Welcome back to the 90's</blink>
#+END_EXPORT

```

## Handling

Handling options after collecting the results. Choose one of the options; they are mutually exclusive.

- `'replace'` Default. Insert results in the Org buffer. Remove previous results. Usage example: `':results output replace'`.
- `'silent'` Do not insert results in the Org mode buffer, but echo them in the minibuffer. Usage example: `':results output silent'`.
- `'none'` Compute results, but do not do anything with them. No inserting in the Org mode buffer nor echo them in the minibuffer. The results can still be used when referenced from another code block. Usage example: `':results none'`.
- `'discard'` Ignore the results completely. This option is similar to `'none'`, but no processing is performed on the return value. Calling the code block programmatically (see [\[How to evaluate source code\]](#), page 238) or by reference (see [\[Passing arguments\]](#), page 232 and [Section 16.11 \[Noweb Reference Syntax\]](#), page 251) will always yield `nil`.
- `'append'` Append results to the Org buffer. Latest results are at the bottom. Does not remove previous results. Usage example: `':results output append'`.
- `'prepend'` Prepend results to the Org buffer. Latest results are at the top. Does not remove previous results. Usage example: `':results output prepend'`.

## Post-processing

The `'post'` header argument is for post-processing results from block evaluation. When `'post'` has any value, Org binds the results to `*this*` variable for easy passing to `'var'` header argument specifications (see [Section 16.4 \[Environment of a Code Block\]](#), page 232). That makes results available to other code blocks, or even for direct Emacs Lisp code execution.

The following two examples illustrate `'post'` header argument in action. The first one shows how to attach an `'ATTR_LATEX'` keyword using `'post'`.

```

#+NAME: attr_wrap
#+BEGIN_SRC sh :var data="" :var width="\textwidth" :results output
  echo "#+ATTR_LATEX: :width $width"
  echo "$data"
#+END_SRC

#+HEADER: :file /tmp/it.png
#+BEGIN_SRC dot :post attr_wrap(width="5cm", data=*this*) :results drawer
  digraph{
    a -> b;
    b -> c;
    c -> a;
  }
#+end_src

#+RESULTS:
:RESULTS:
#+ATTR_LATEX :width 5cm
[[file:/tmp/it.png]]

```

```
:END:
```

The second example shows use of ‘colnames’ header argument in ‘post’ to pass data between code blocks.

```
#+NAME: round-tbl
#+BEGIN_SRC emacs-lisp :var tbl="" fmt="%.3f"
  (mapcar (lambda (row)
            (mapcar (lambda (cell)
                      (if (numberp cell)
                          (format fmt cell)
                          cell))
                  row))
          tbl)
#+end_src

#+BEGIN_SRC R :colnames yes :post round-tbl[:colnames yes](*this*)
  set.seed(42)
  data.frame(foo=rnorm(1))
#+END_SRC

#+RESULTS:
foo
1.371
```

## 16.7 Exporting Code Blocks

It is possible to export the *code* of code blocks, the *results* of code block evaluation, *both* the code and the results of code block evaluation, or *none*. Org defaults to exporting *code* for most languages and *results* for inline code blocks. For some languages, such as ditaa, Org defaults to *results* both in ordinary source blocks and in inline source blocks. To export just the body of code blocks, see [Section 12.6 \[Literal Examples\]](#), page 145. To selectively export subtrees of an Org document, see [Chapter 13 \[Exporting\]](#), page 151.

The ‘exports’ header argument is to specify if that part of the Org file is exported to, say, HTML or L<sup>A</sup>T<sub>E</sub>X formats.

- ‘code’      The default. The body of code is included into the exported file. Example: ‘:exports code’.
- ‘results’    The results of evaluation of the code is included in the exported file. Example: ‘:exports results’.
- ‘both’      Both the code and results of evaluation are included in the exported file. Example: ‘:exports both’.
- ‘none’      Neither the code nor the results of evaluation is included in the exported file. Whether the code is evaluated at all depends on other options. Example: ‘:exports none’.

If a source block is named using ‘NAME’ keyword, the same name will be assigned to the results of evaluation. This way, fuzzy links pointing to the named source blocks exported using ‘:exports results’ will remain valid and point to the results of evaluation.

Results of evaluation of a named block can also be explicitly named using a separate ‘NAME’ keyword. The name value set via ‘NAME’ keyword will be preferred over the parent source block.

```
#+NAME: code name
#+BEGIN_SRC emacs-lisp :exports both value
(+ 1 2)
#+END_SRC

#+NAME: results name
#+RESULTS: code name
3
```

This `[[code name][link]]` will point to the code block.

Another `[[results name][link]]` will point to the results.

Explicit setting of the result name may be necessary when a named code block is exported using ‘:exports both’. Links to such block may arbitrarily point either to the code block or to its results when results do not have a distinct name.

Note that all the links pointing to a source block exported using ‘:exports none’ will be broken. This will make export process fail, unless broken links are allowed during export (see [Section 13.2 \[Export Settings\]](#), page 153).

To stop Org from evaluating code blocks to speed exports, use the header argument ‘:eval never-export’ (see [Section 16.5 \[Evaluating Code Blocks\]](#), page 238). To stop Org from evaluating code blocks for greater security, set the `org-export-use-babel` variable to `nil`, but understand that header arguments will have no effect.

Turning off evaluation comes in handy when batch processing. For example, markup languages for wikis, which have a high risk of untrusted code. Stopping code block evaluation also stops evaluation of all header arguments of the code block. This may not be desirable in some circumstances. So during export, to allow evaluation of just the header arguments but not any code evaluation in the source block, set ‘:eval never-export’ (see [Section 16.5 \[Evaluating Code Blocks\]](#), page 238).

Org never evaluates code blocks in commented subtrees when exporting (see [Section 13.6 \[Comment Lines\]](#), page 159). On the other hand, Org does evaluate code blocks in subtrees excluded from export (see [Section 13.2 \[Export Settings\]](#), page 153).

## 16.8 Extracting Source Code

Extracting source code from code blocks is a basic task in literate programming. Org has features to make this easy. In literate programming parlance, documents on creation are *woven* with code and documentation, and on export, the code is tangled for execution by a computer. Org facilitates weaving and tangling for producing, maintaining, sharing, and exporting literate programming documents. Org provides extensive customization options for extracting source code.

When Org tangles code blocks, it expands, merges, and transforms them. Then Org recomposes them into one or more separate files, as configured through the options. During this tangling process, Org expands variables in the source code, and resolves any noweb style references (see [Section 16.11 \[Noweb Reference Syntax\], page 251](#)).

## Header arguments

The `'tangle'` header argument specifies if the code block is exported to source file(s).

- `'yes'`      Export the code block to source file. The file name for the source file is derived from the name of the Org file, and the file extension is derived from the source code language identifier. Example: `'tangle yes'`.
- `'no'`        The default. Do not extract the code in a source code file. Example: `'tangle no'`.

### *FILENAME*

Export the code block to source file whose file name is derived from any string passed to the `'tangle'` header argument. Org derives the file name as being relative to the directory of the Org file's location. Example: `'tangle FILENAME'`.

The `'mkdirp'` header argument creates parent directories for tangled files if the directory does not exist. A `'yes'` value enables directory creation whereas `'no'` inhibits it.

The `'comments'` header argument controls inserting comments into tangled files. These are above and beyond whatever comments may already exist in the code block.

- `'no'`        The default. Do not insert any extra comments during tangling.
- `'link'`      Wrap the code block in comments. Include links pointing back to the place in the Org file from where the code was tangled.
- `'yes'`      Kept for backward compatibility; same as `'link'`.
- `'org'`        Nearest headline text from Org file is inserted as comment. The exact text that is inserted is picked from the leading context of the source block.
- `'both'`     Includes both `'link'` and `'org'` options.
- `'noweb'`    Includes `'link'` option, expands noweb references (see [Section 16.11 \[Noweb Reference Syntax\], page 251](#)), and wraps them in link comments inside the body of the code block.

The `'padline'` header argument controls insertion of newlines to pad source code in the tangled file.

- `'yes'`      Default. Insert a newline before and after each code block in the tangled file.
- `'no'`        Do not insert newlines to pad the tangled code blocks.

The `'shebang'` header argument can turn results into executable script files. By setting it to a string value—for example, `'shebang "#!/bin/bash"'`—Org inserts that string as the first line of the tangled file that the code block is extracted to. Org then turns on the tangled file's executable permission.

The `'tangle-mode'` header argument specifies what permissions to set for tangled files by `set-file-modes`. Permissions are given by an octal value, which can be provided calling the

`identity` function on an elisp octal value. For instance, to create a read-only file one may use `:tangle-mode (identity #o444)`. To reduce the verbosity required, an octal shorthand is defined, `oXXX` (`o` for octal). Using this, our read-only example is `:tangle-mode o444`. Omitting the `o` prefix will cause the argument to be interpreted as an integer, which can lead to unexpected results (`444` is the same as `o674`). Two other shorthands are recognized, ls-style strings like `rw-r--r--`, and chmod-style permissions like `g+w`. Note that chmod-style permissions are based on `org-babel-tangle-default-file-mode`, which is `#o544` by default.

When `:tangle-mode` and `:shebang` are both specified, the give `:tangle-mode` will override the permissions from `:shebang`. When multiple source code blocks tangle to a single file with conflicting `:tangle-mode` header arguments, Org's behavior is undefined.

By default Org expands code blocks during tangling. The `no-expand` header argument turns off such expansions. Note that one side-effect of expansion by `org-babel-expand-src-block` also assigns values (see [Section 16.4 \[Environment of a Code Block\]](#), page 232) to variables. Expansions also replace noweb references with their targets (see [Section 16.11 \[Noweb Reference Syntax\]](#), page 251). Some of these expansions may cause premature assignment, hence this option. This option makes a difference only for tangling. It has no effect when exporting since code blocks for execution have to be expanded anyway.

## Functions

### `org-babel-tangle`

Tangle the current file. Bound to `C-c C-v t`.

With prefix argument only tangle the current code block.

### `org-babel-tangle-file`

Choose a file to tangle. Bound to `C-c C-v f`.

## Tangle hooks

### `org-babel-pre-tangle-hook`

This hook is run before the tangle process begins. The active buffer is buffer to be tangled.

### `org-babel-tangle-body-hook`

This hook is run from a temporary buffer containing expanded code of every tangled code block. The hook can modify the expanded code as needed. The contents of the current buffer will be used as actual code block expansion.

### `org-babel-post-tangle-hook`

This hook is run from within code files tangled by `org-babel-tangle`, making it suitable for post-processing, compilation, and evaluation of code in the tangled files.

### `org-babel-tangle-finished-hook`

This hook is run after post-tangle hooks, in the original buffer.

## Jumping between code and Org

Debuggers normally link errors and messages back to the source code. But for tangled files, we want to link back to the Org file, not to the tangled source file. To make this extra

jump, Org uses `org-babel-tangle-jump-to-org` function with two additional source code block header arguments:

1. Set `'padline'` to true—this is the default setting.
2. Set `'comments'` to `'link'`, which makes Org insert links to the Org file.

## 16.9 Languages

Code blocks in dozens of languages are supported. See Worg website for [language specific documentation](#).

By default, only Emacs Lisp is enabled for evaluation. To enable or disable other languages, customize the `org-babel-load-languages` variable either through the Emacs customization interface, or by adding code to the init file as shown next.

In this example, evaluation is disabled for Emacs Lisp, and enabled for R.

```
(org-babel-do-load-languages
 'org-babel-load-languages
 '((emacs-lisp . nil)
  (R . t)))
```

Note that this is not the only way to enable a language. Org also enables languages when loaded with `require` statement. For example, the following enables execution of Clojure code blocks:

```
(require 'ob-clojure)
```

## 16.10 Editing Source Code

Use `C-c '` to edit the current code block. It opens a new major mode edit buffer containing the body of the source code block, ready for any edits. Use `C-c '` again to close the buffer and return to the Org buffer.

`C-x C-s` saves the buffer and updates the contents of the Org buffer. Set `org-edit-src-auto-save-idle-delay` to save the base buffer after a certain idle delay time. Set `org-edit-src-turn-on-auto-save` to auto-save this buffer into a separate file using Auto-save mode.

While editing the source code in the major mode, the Org Src minor mode remains active. It provides these customization variables as described below. For even more variables, look in the customization group `org-edit-structure`.

### `org-src-lang-modes`

If an Emacs major-mode named `<LANG>-mode` exists, where `<LANG>` is the language identifier from code block's header line, then the edit buffer uses that major mode. Use this variable to arbitrarily map language identifiers to major modes.

When language identifier is omitted in the src block, Org mode's behavior is undefined.

### `org-src-window-setup`

For specifying Emacs window arrangement when the new edit buffer is created.

**org-src-preserve-indentation**

Default is `nil`. Source code is indented. This indentation applies during export or tangling, and depending on the context, may alter leading spaces and tabs. When `non-nil`, source code is aligned with the leftmost column. No lines are modified during export or tangling, which is very useful for white-space sensitive languages, such as Python.

**org-src-ask-before-returning-to-edit-buffer**

When `nil`, Org returns to the edit buffer without further prompts. The default prompts for a confirmation.

Fontification of code blocks can give visual separation of text and code on the display page. Set `org-src-fontify-natively` to `non-nil` to turn on native code fontification in the *Org* buffer. The fontification follows the major mode used to edit the code block (see `org-src-lang-modes` above).

To further customize the appearance of `org-block` for specific languages, customize `org-src-block-faces`. The following example shades the background of regular blocks, and colors source blocks only for Python and Emacs Lisp languages.

```
(require 'color)
(set-face-attribute 'org-block nil :background
  (color-darken-name
    (face-attribute 'default :background) 3))

(setq org-src-block-faces '(("emacs-lisp" (:background "#EEE2FF"))
  ("python" (:background "#E5FFB8"))))
```

## 16.11 Noweb Reference Syntax

Source code blocks can include references to other source code blocks, using a `noweb`<sup>4</sup> style syntax:

```
<<CODE-BLOCK-ID>>
```

where *CODE-BLOCK-ID* refers to either the ‘`NAME`’ of a single source code block, or a collection of one or more source code blocks sharing the same ‘`noweb-ref`’ header argument (see Section 16.3 [Using Header Arguments], page 229). Org can replace such references with the source code of the block or blocks being referenced, or, in the case of a single source code block named with ‘`NAME`’, with the results of an evaluation of that block.

The ‘`noweb`’ header argument controls expansion of `noweb` syntax references. Expansions occur when source code blocks are evaluated, tangled, or exported.

- ‘`no`’        Default. No expansion of `noweb` syntax references in the body of the code when evaluating, tangling, or exporting.
- ‘`yes`’        Expansion of `noweb` syntax references in the body of the code block when evaluating, tangling, or exporting.
- ‘`tangle`’      Expansion of `noweb` syntax references in the body of the code block when tangling. No expansion when evaluating or exporting.

<sup>4</sup> For `noweb` literate programming details, see <https://www.cs.tufts.edu/~nr/noweb/>.

- `'strip-tangle'`  
Expansion of noweb syntax references in the body of the code block when evaluating or exporting. Removes noweb syntax references when exporting.
- `'no-export'`  
Expansion of noweb syntax references in the body of the code block when evaluating or tangling. No expansion when exporting.
- `'strip-export'`  
Expansion of noweb syntax references in the body of the code block when expanding prior to evaluating or tangling. Removes noweb syntax references when exporting.
- `'eval'`  
Expansion of noweb syntax references in the body of the code block only before evaluating.

In the most simple case, the contents of a single source block is inserted within other blocks. Thus, in following example,

```
#+NAME: initialization
#+BEGIN_SRC emacs-lisp
  (setq sentence "Never a foot too far, even.")
#+END_SRC

#+BEGIN_SRC emacs-lisp :noweb yes
  <<initialization>>
  (reverse sentence)
#+END_SRC
```

the second code block is expanded as

```
#+BEGIN_SRC emacs-lisp :noweb yes
  (setq sentence "Never a foot too far, even.")
  (reverse sentence)
#+END_SRC
```

Note that noweb expansion does not automatically carry over `' :var'` header arguments<sup>5</sup>.

---

<sup>5</sup> In the following example, attempting to evaluate the second code block will give an error, because the variables defined in the first code block will not be defined in the second block.

```
#+NAME: get-prompt
#+BEGIN_SRC emacs-lisp :var prompt="root> " :var command="ls"
  (concat prompt command)
#+END_SRC
#+RESULTS: get-prompt
: root> ls
#+BEGIN_SRC emacs-lisp :noweb yes
  <<get-prompt>>
#+END_SRC
```

The previous block is expanded without setting `prompt` and `command` values.

```
#+BEGIN_SRC emacs-lisp
  (concat prompt command)
#+END_SRC
```

You may also include the contents of multiple blocks sharing a common ‘noweb-ref’ header argument, which can be set at the file, subtree, or code block level. In the example Org file shown next, the body of the source code in each block is extracted for concatenation to a pure code file when tangled.

```
#+BEGIN_SRC sh :tangle yes :noweb yes :shebang #!/bin/sh
  <<fullest-disk>>
#+END_SRC
* the mount point of the fullest disk
  :PROPERTIES:
  :header-args: :noweb-ref fullest-disk
  :END:

** query all mounted disks
#+BEGIN_SRC sh
  df \
#+END_SRC

** strip the header row
#+BEGIN_SRC sh
  |sed '1d' \
#+END_SRC

** output mount point of fullest disk
#+BEGIN_SRC sh
  |awk '{if (u < +$5) {u = +$5; m = $6}} END {print m}'
#+END_SRC
```

By default a newline separates each noweb reference concatenation. To use a different separator, edit the ‘noweb-sep’ header argument.

Alternatively, Org can include the results of evaluation of a single code block rather than its body [6]. Evaluation occurs when parentheses, possibly including arguments, are appended to the code block name, as shown below.

```
<<NAME(optional arguments)>>
```

Note that in this case, a code block name set by ‘NAME’ keyword is required; the reference set by ‘noweb-ref’ will not work when evaluation is desired.

Here is an example that demonstrates how the exported content changes when noweb style references are used with parentheses versus without. Given:

```
#+NAME: some-code
#+BEGIN_SRC python :var num=0 :results output :exports none
print(num*10)
#+END_SRC
```

this code block:

```
#+BEGIN_SRC text :noweb yes
```

---

<sup>6</sup> The reference is evaluated with point at the referenced block, using its header arguments (including inherited)

```

    <<some-code>>
    #+END_SRC

```

expands to:

```
print(num*10)
```

Below, a similar noweb style reference is used, but with parentheses, while setting a variable ‘num’ to 10:

```

    #+BEGIN_SRC text :noweb yes
    <<some-code(num=10)>>
    #+END_SRC

```

Note that the expansion now contains the results of the code block ‘some-code’, not the code block itself:

```
100
```

Noweb insertions honor prefix characters that appear before the noweb syntax reference. This behavior is illustrated in the following example. Because the ‘<<example>>’ noweb reference appears behind the SQL comment syntax, each line of the expanded noweb reference is commented. With:

```

    #+NAME: example
    #+BEGIN_SRC text
    this is the
    multi-line body of example
    #+END_SRC

```

this code block:

```

    #+BEGIN_SRC sql :noweb yes
    ---<<example>>
    #+END_SRC

```

expands to:

```

    #+BEGIN_SRC sql :noweb yes
    ---this is the
    ---multi-line body of example
    #+END_SRC

```

Since this change does not affect noweb replacement text without newlines in them, inline noweb references are acceptable.

This feature can also be used for management of indentation in exported code snippets. With:

```

    #+NAME: if-true
    #+BEGIN_SRC python :exports none
    print('do things when true')
    #+end_src

    #+name: if-false
    #+begin_src python :exports none
    print('do things when false')
    #+end_src

```

this code block:

```
#+begin_src python :noweb yes :results output
if true:
  <<if-true>>
else:
  <<if-false>>
#+end_src
```

expands to:

```
if true:
  print('do things when true')
else:
  print('do things when false')
```

This prefix behavior can be turned off in a block by setting the ‘noweb-prefix’ header argument to ‘no’, as in:

```
#+BEGIN_SRC elisp :noweb-prefix no
(setq example-data "<<example>>")
#+END_SRC
```

which expands to:

```
(setq example-data "this is the
multi-line body of example")
```

When in doubt about the outcome of a source code block expansion, you can preview the results with the following command:

*C-c C-v v* or *C-c C-v C-v* (`org-babel-expand-src-block`)

Expand the current source code block according to its header arguments and pop open the results in a preview buffer.

## 16.12 Library of Babel

The “Library of Babel” is a collection of code blocks. Like a function library, these code blocks can be called from other Org files. A collection of useful code blocks is available on [Worg](#). For remote code block evaluation syntax, see [Section 16.5 \[Evaluating Code Blocks\]](#), page 238.

For any user to add code to the library, first save the code in regular code blocks of an Org file, and then load the Org file with `org-babel-lob-ingest`, which is bound to *C-c C-v i*.

## 16.13 Key bindings and Useful Functions

Many common Org mode key sequences are re-bound depending on the context.

Active key bindings in code blocks:

| Key binding    | Function                                     |
|----------------|--|
| <i>C-c C-c</i> | <code>org-babel-execute-src-block</code>     |
| <i>C-c C-o</i> | <code>org-babel-open-src-block-result</code> |
| <i>M-UP</i>    | <code>org-babel-load-in-session</code>       |
| <i>M-DOWN</i>  | <code>org-babel-pop-to-session</code>        |

Active key bindings in Org mode buffer:

| Key binding                            | Function                                 |
|--|--|
| <i>C-c C-v p</i> or <i>C-c C-v C-p</i> | org-babel-previous-src-block             |
| <i>C-c C-v n</i> or <i>C-c C-v C-n</i> | org-babel-next-src-block                 |
| <i>C-c C-v e</i> or <i>C-c C-v C-e</i> | org-babel-execute-maybe                  |
| <i>C-c C-v o</i> or <i>C-c C-v C-o</i> | org-babel-open-src-block-result          |
| <i>C-c C-v v</i> or <i>C-c C-v C-v</i> | org-babel-expand-src-block               |
| <i>C-c C-v u</i> or <i>C-c C-v C-u</i> | org-babel-goto-src-block-head            |
| <i>C-c C-v g</i> or <i>C-c C-v C-g</i> | org-babel-goto-named-src-block           |
| <i>C-c C-v r</i> or <i>C-c C-v C-r</i> | org-babel-goto-named-result              |
| <i>C-c C-v b</i> or <i>C-c C-v C-b</i> | org-babel-execute-buffer                 |
| <i>C-c C-v s</i> or <i>C-c C-v C-s</i> | org-babel-execute-subtree                |
| <i>C-c C-v d</i> or <i>C-c C-v C-d</i> | org-babel-demarcate-block                |
| <i>C-c C-v t</i> or <i>C-c C-v C-t</i> | org-babel-tangle                         |
| <i>C-c C-v f</i> or <i>C-c C-v C-f</i> | org-babel-tangle-file                    |
| <i>C-c C-v c</i> or <i>C-c C-v C-c</i> | org-babel-check-src-block                |
| <i>C-c C-v j</i> or <i>C-c C-v C-j</i> | org-babel-insert-header-arg              |
| <i>C-c C-v l</i> or <i>C-c C-v C-l</i> | org-babel-load-in-session                |
| <i>C-c C-v i</i> or <i>C-c C-v C-i</i> | org-babel-lob-ingest                     |
| <i>C-c C-v I</i> or <i>C-c C-v C-I</i> | org-babel-view-src-block-info            |
| <i>C-c C-v z</i> or <i>C-c C-v C-z</i> | org-babel-switch-to-session-with-code    |
| <i>C-c C-v a</i> or <i>C-c C-v C-a</i> | org-babel-sha1-hash                      |
| <i>C-c C-v h</i> or <i>C-c C-v C-h</i> | org-babel-describe-bindings              |
| <i>C-c C-v x</i> or <i>C-c C-v C-x</i> | org-babel-do-key-sequence-in-edit-buffer |

## 16.14 Batch Execution

Org mode features, including working with source code facilities can be invoked from the command line. This enables building shell scripts for batch processing, running automated system tasks, and expanding Org mode's usefulness.

The sample script shows batch processing of multiple files using `org-babel-tangle`.

```
#!/bin/sh
# Tangle files with Org mode
#
emacs -Q --batch --eval "
  (progn
    (require 'ob-tangle)
    (dolist (file command-line-args-left)
      (with-current-buffer (find-file-noselect file)
        (org-babel-tangle))))
" "$@"
```

## 17 Miscellaneous

### 17.1 Completion

Org has in-buffer completions. Unlike minibuffer completions, which are useful for quick command interactions, Org’s in-buffer completions are more suitable for content creation in Org documents. Type one or more letters and invoke the hot key to complete the text in-place. Depending on the context and the keys, Org offers different types of completions. No minibuffer is involved. Such mode-specific hot keys have become an integral part of Emacs and Org provides several shortcuts.

*M-TAB*

Complete word at point.

- At the beginning of an empty headline, complete TODO keywords.
- After ‘\’, complete T<sub>E</sub>X symbols supported by the exporter.
- After ‘:’ in a headline, complete tags. Org deduces the list of tags from the ‘TAGS’ in-buffer option (see [Section 6.2 \[Setting Tags\], page 62](#)), the variable `org-tag-alist`, or from all tags used in the current buffer.
- After ‘:’ and not in a headline, complete property keys. The list of keys is constructed dynamically from all keys used in the current buffer.
- After ‘[[’, complete link abbreviations (see [Section 4.7 \[Link Abbreviations\], page 46](#)).
- After ‘[[\*’, complete headlines in the current buffer so that they can be used in search links like: ‘[[\*find this headline]]’
- After ‘#+’, complete the special keywords like ‘TYP\_TODO’ or file-specific ‘OPTIONS’. After option keyword is complete, pressing *M-TAB* again inserts example settings for this keyword.
- After ‘STARTUP’ keyword, complete startup items.
- When point is anywhere else, complete dictionary words using Ispell.

### 17.2 Structure Templates

With just a few keystrokes, it is possible to insert empty structural blocks, such as ‘#+BEGIN\_SRC’ ... ‘#+END\_SRC’, or to wrap existing text in such a block.

*C-c C-*, (`org-insert-structure-template`)

Prompt for a type of block structure, and insert the block at point. If the region is active, it is wrapped in the block. First prompts the user for keys, which are used to look up a structure type from the variable below. If the key is `TAB`, `RET`, or `SPC`, the user is prompted to enter a block type.

Available structure types are defined in `org-structure-template-alist`, see the docstring for adding or changing values.

Org Tempo expands snippets to structures defined in `org-structure-template-alist` and `org-tempo-keywords-alist`. For example, `< s TAB` creates a code block. Enable it by customizing `org-modules` or add `(require 'org-tempo)` to your Emacs init file<sup>1</sup>.

<sup>1</sup> For more information, please refer to the commentary section in ‘`org-tempo.el`’.

```

a      ‘#+BEGIN_EXPORT ascii’ ... ‘#+END_EXPORT’
c      ‘#+BEGIN_CENTER’ ... ‘#+END_CENTER’
C      ‘#+BEGIN_COMMENT’ ... ‘#+END_COMMENT’
e      ‘#+BEGIN_EXAMPLE’ ... ‘#+END_EXAMPLE’
E      ‘#+BEGIN_EXPORT’ ... ‘#+END_EXPORT’
h      ‘#+BEGIN_EXPORT html’ ... ‘#+END_EXPORT’
l      ‘#+BEGIN_EXPORT latex’ ... ‘#+END_EXPORT’
q      ‘#+BEGIN_QUOTE’ ... ‘#+END_QUOTE’
s      ‘#+BEGIN_SRC’ ... ‘#+END_SRC’
v      ‘#+BEGIN_VERSE’ ... ‘#+END_VERSE’

```

### 17.3 Speed Keys

Single keystrokes can execute custom commands in an Org file when point is on a headline. Without the extra burden of a meta or modifier key, Speed Keys can speed navigation or execute custom commands. Besides faster navigation, Speed Keys may come in handy on small mobile devices that do not have full keyboards. Speed Keys may also work on TTY devices known for their problems when entering Emacs key chords.

By default, Org has Speed Keys disabled. To activate Speed Keys, set the variable `org-use-speed-commands` to a non-`nil` value. To trigger a Speed Key, point must be at the beginning of an Org headline, before any of the stars.

Org comes with a pre-defined list of Speed Keys. To add or modify Speed Keys, customize the option `org-speed-commands`. For more details, see the variable’s docstring. With Speed Keys activated, `M-x org-speed-command-help`, or `?` when point is at the beginning of an Org headline, shows currently active Speed Keys, including the user-defined ones.

### 17.4 A Cleaner Outline View

Org’s outline with stars and no indents can look cluttered for short documents. For *book-like* long documents, the effect is not as noticeable. Org provides an alternate stars and indentation scheme, as shown on the right in the following table. It displays only one star and indents text to line up with the heading:

|                              |  |                              |
|------------------------------|--|------------------------------|
| * Top level headline         |  | * Top level headline         |
| ** Second level              |  | * Second level               |
| *** Third level              |  | * Third level                |
| some text                    |  | some text                    |
| *** Third level              |  | * Third level                |
| more text                    |  | more text                    |
| * Another top level headline |  | * Another top level headline |

Org can achieve this in two ways, (1) by just displaying the buffer in this way without changing it, or (2) by actually indenting every line in the desired amount with hard spaces and hiding leading stars.

### 17.4.1 Org Indent Mode

To display the buffer in the indented view, activate Org Indent minor mode, using *M-x org-indent-mode*. Text lines that are not headlines are prefixed with virtual spaces to vertically align with the headline text<sup>2</sup>.

To make more horizontal space, the headlines are shifted by two characters. Configure `org-indent-indentation-per-level` variable for a different number.

By default, Org Indent mode turns off `org-adapt-indentation` and does hide leading stars by locally setting `org-hide-leading-stars` to `t`: only one star on each headline is visible, the rest are masked with the same font color as the background. If you want to customize this default behavior, see `org-indent-mode-turns-on-hiding-stars` and `org-indent-mode-turns-off-org-adapt-indentation`.

To globally turn on Org Indent mode for all files, customize the variable `org-startup-indented`. To control it for individual files, use ‘STARTUP’ keyword as follows:

```
#+STARTUP: indent
#+STARTUP: noindent
```

### 17.4.2 Hard indentation

It is possible to use hard spaces to achieve the indentation instead, if the bare ASCII file should have the indented look also outside Emacs<sup>3</sup>. With Org’s support, you have to indent all lines to line up with the outline headers. You would use these settings<sup>4</sup>:

```
(setq org-adapt-indentation t
      org-hide-leading-stars t
      org-odd-levels-only t)
```

*Indentation of text below headlines* (`org-adapt-indentation`)

The first setting modifies paragraph filling, line wrapping, and structure editing commands to preserving or adapting the indentation as appropriate.

*Hiding leading stars* (`org-hide-leading-stars`)

The second setting makes leading stars invisible by applying the face `org-hide` to them. For per-file preference, use these file ‘STARTUP’ options:

```
#+STARTUP: hidestars
#+STARTUP: showstars
```

*Odd levels* (`org-odd-levels-only`)

The third setting makes Org use only odd levels, 1, 3, 5, . . . , in the outline to create more indentation. On a per-file level, control this with:

```
#+STARTUP: odd
#+STARTUP: oddeven
```

To convert a file between single and double stars layouts, use *M-x org-convert-to-odd-levels* and *M-x org-convert-to-oddeven-levels*.

<sup>2</sup> Org Indent mode also sets `wrap-prefix` correctly for indenting and wrapping long lines of headlines or text. This minor mode also handles Visual Line mode and directly applied settings through `word-wrap`.

<sup>3</sup> This works, but requires extra effort. Org Indent mode is more convenient for most applications.

<sup>4</sup> `org-adapt-indentation` can also be set to ‘`headline-data`’, in which case only data lines below the headline will be indented.

## 17.5 Execute commands in the active region

When in an Org buffer and the region is active, some commands will apply to all the subtrees in the active region. For example, hitting `C-c C-s` when multiple headlines are within the active region will successively prompt you for a new schedule date and time. To disable this, set the option `org-loop-over-headlines-in-active-region` to `non-t`, activate the region and run the command normally.

`org-agenda-loop-over-headlines-in-active-region` is the equivalent option of the agenda buffer, where you can also use [\[bulk editing of selected entries\]](#), page 131.

Not all commands can loop in the active region and what subtrees or headlines are considered can be refined: see the docstrings of these options for more details.

## 17.6 Dynamic Headline Numbering

The Org Num minor mode, toggled with `M-x org-num-mode`, displays outline numbering on top of headlines. It also updates it automatically upon changes to the structure of the document.

By default, all headlines are numbered. You can limit numbering to specific headlines according to their level, tags, ‘COMMENT’ keyword, or ‘UNNUMBERED’ property. Set `org-num-max-level`, `org-num-skip-tags`, `org-num-skip-commented`, `org-num-skip-unnumbered`, or `org-num-skip-footnotes` accordingly.

If `org-num-skip-footnotes` is non-nil, footnotes sections (see [Section 12.10 \[Creating Footnotes\]](#), page 149) are not numbered either.

You can control how the numbering is displayed by setting `org-num-face` and `org-num-format-function`.

You can also turn this mode globally for all Org files by setting the option `org-startup-numerated` to ‘t’, or locally on a file by using ‘`#+startup: num`’.

## 17.7 The Very Busy `C-c C-c` Key

The `C-c C-c` key in Org serves many purposes depending on the context. It is probably the most over-worked, multi-purpose key combination in Org. Its uses are well documented throughout this manual, but here is a consolidated list for easy reference.

- If column view (see [Section 7.5 \[Column View\]](#), page 71) is on, exit column view.
- If any highlights shown in the buffer from the creation of a sparse tree, or from clock display, remove such highlights.
- If point is in one of the special ‘KEYWORD’ lines, scan the buffer for these lines and update the information. Also reset the Org file cache used to temporary store the contents of URLs used as values for keywords like ‘SETUPFILE’.
- If point is inside a table, realign the table.
- If point is on a ‘TBLFM’ keyword, re-apply the formulas to the entire table.
- If the current buffer is a capture buffer, close the note and file it. With a prefix argument, also jump to the target location after saving the note.
- If point is on a ‘<<<target>>>’, update radio targets and corresponding links in this buffer.

- If point is on a property line or at the start or end of a property drawer, offer property commands.
- If point is at a footnote reference, go to the corresponding definition, and *vice versa*.
- If point is on a statistics cookie, update it.
- If point is in a plain list item with a checkbox, toggle the status of the checkbox.
- If point is on a numbered item in a plain list, renumber the ordered list.
- If point is on the ‘#+BEGIN’ line of a dynamic block, the block is updated.
- If point is at a timestamp, fix the day name in the timestamp.

## 17.8 Summary of In-Buffer Settings

In-buffer settings start with ‘#+’, followed by a keyword, a colon, one or more spaces, and then a word for each setting. Org accepts multiple settings on the same line. Org also accepts multiple lines for a keyword. This manual describes these settings throughout. A summary follows here.

`C-c C-c` activates any changes to the in-buffer settings. Closing and reopening the Org file in Emacs also activates the changes.

‘#+ARCHIVE: %s\_done:.’

Sets the archive location of the agenda file. The corresponding variable is `org-archive-location`.

‘#+CATEGORY’

Sets the category of the agenda file, which applies to the entire document.

‘#+COLUMNS: %25ITEM ...’

Set the default format for columns view. This format applies when columns view is invoked in locations where no ‘COLUMNS’ property applies.

‘#+CONSTANTS: name1=value1 ...’

Set file-local values for constants that table formulas can use. This line sets the local variable `org-table-formula-constants-local`. The global version of this variable is `org-table-formula-constants`.

‘#+FILETAGS: :tag1:tag2:tag3:’

Set tags that all entries in the file inherit from, including the top-level entries.

‘#+LINK: linkword replace’

Each line specifies one abbreviation for one link. Use multiple ‘LINK’ keywords for more, see [Section 4.7 \[Link Abbreviations\]](#), page 46. The corresponding variable is `org-link-abbrev-alist`.

‘#+PRIORITIES: highest lowest default’

This line sets the limits and the default for the priorities. All three must be either letters A–Z or numbers 0–9. The highest priority must have a lower ASCII number than the lowest priority.

‘#+PROPERTY: Property\_Name Value’

This line sets a default inheritance value for entries in the current buffer, most useful for specifying the allowed values of a property.

**‘#+SETUPFILE: file’**

The setup file or a URL pointing to such file is for additional in-buffer settings. Org loads this file and parses it for any settings in it when Org opens the main file. If URL is specified, the contents are downloaded and stored in a temporary file cache. `C-c C-c` on the settings line re-parses and re-loads the file, and also resets the temporary file cache.

Org also parses and loads *in-buffer settings* from the setup file during normal exporting process. Org parses the *in-buffer settings* as if it was included in the containing Org buffer. The rest of the contents of setup file is ignored.

To visit the setup file—not a URL—use `C-c ' while point is on the line with the setup file name.`

**‘#+STARTUP:’**

Startup options Org uses when first visiting a file.

The first set of options deals with the initial visibility of the outline tree. The corresponding variable for global default settings is `org-startup-folded` with a default value of `showeverything`.

|                  |                            |
|------------------|----------------------------|
| ‘overview’       | Top-level headlines only.  |
| ‘content’        | All headlines.             |
| ‘showall’        | No folding on any entry.   |
| ‘show2levels’    | Headline levels 1-2.       |
| ‘show3levels’    | Headline levels 1-3.       |
| ‘show4levels’    | Headline levels 1-4.       |
| ‘show5levels’    | Headline levels 1-5.       |
| ‘showeverything’ | Show even drawer contents. |

Dynamic virtual indentation is controlled by the variable `org-startup-indented`<sup>5</sup>.

|            |  |
|------------|--|
| ‘indent’   | Start with Org Indent mode turned on.  |
| ‘noindent’ | Start with Org Indent mode turned off. |

Dynamic virtual numeration of headlines is controlled by the variable `org-startup-numerated`.

|         |                                     |
|---------|-------------------------------------|
| ‘num’   | Start with Org num mode turned on.  |
| ‘nonum’ | Start with Org num mode turned off. |

Aligns tables consistently upon visiting a file. The corresponding variable is `org-startup-align-all-tables` with `nil` as default value.

|           |                                 |
|-----------|---------------------------------|
| ‘align’   | Align all tables.               |
| ‘noalign’ | Do not align tables on startup. |

Shrink table columns with a width cookie. The corresponding variable is `org-startup-shrink-all-tables` with `nil` as default value.

When visiting a file, inline images can be automatically displayed. The corresponding variable is `org-startup-with-inline-images`, with a default value `nil` to avoid delays when visiting a file.

---

<sup>5</sup> Note that Org Indent mode also sets the `wrap-prefix` property, such that Visual Line mode (or purely setting `word-wrap`) wraps long lines, including headlines, correctly indented.

‘inlineimages’ Show inline images.  
 ‘noinlineimages’ Do not show inline images on startup.

Bracket links in Org buffers are displayed hiding the link path and brackets. For example, ‘[[https://orgmode.org] [Org Website]]’ is, by default, displayed as “Org Website”, hiding the link itself and just displaying its description. Alternatively, the links can be displayed in full. The corresponding variable is `org-link-descriptive`.

‘descriptivelinks’ Hide path and brackets in links.  
 ‘literallinks’ Do not hide anything.

Logging the closing and reopening of TODO items and clock intervals can be configured using these options (see variables `org-log-done`, `org-log-note-clock-out`, and `org-log-repeat`).

‘logdone’ Record a timestamp when an item is marked as done.  
 ‘lognotedone’ Record timestamp and a note when DONE.  
 ‘nologdone’ Do not record when items are marked as done.  
 ‘logrepeat’ Record a time when reinstating a repeating item.  
 ‘lognoterepeat’ Record a note when reinstating a repeating item.  
 ‘nologrepeat’ Do not record when reinstating repeating item.  
 ‘lognoteclock-out’ Record a note when clocking out.  
 ‘nolognoteclock-out’ Do not record a note when clocking out.  
 ‘logreschedule’ Record a timestamp when scheduling time changes.  
 ‘lognotereschedule’ Record a note when scheduling time changes.  
 ‘nologreschedule’ Do not record when a scheduling date changes.  
 ‘logredeadline’ Record a timestamp when deadline changes.  
 ‘lognoteredeadline’ Record a note when deadline changes.  
 ‘nologredeadline’ Do not record when a deadline date changes.  
 ‘logrefile’ Record a timestamp when refiling.  
 ‘lognoterefile’ Record a note when refiling.  
 ‘nologrefile’ Do not record when refiling.

Here are the options for hiding leading stars in outline headings, and for indenting outlines. The corresponding variables are `org-hide-leading-stars` and `org-odd-levels-only`, both with a default setting `nil` (meaning ‘showstars’ and ‘oddeven’).

‘hidestars’ Make all but one of the stars starting a headline invisible.  
 ‘showstars’ Show all stars starting a headline.  
 ‘indent’ Virtual indentation according to outline level.  
 ‘noindent’ No virtual indentation according to outline level.  
 ‘odd’ Allow only odd outline levels (1, 3, ...).  
 ‘oddeven’ Allow all outline levels.

To turn on custom format overlays over timestamps (variables `org-display-custom-times` and `org-timestamp-custom-formats`), use:

‘customtime’ Overlay custom time format.

The following options influence the table spreadsheet (variable `constants-unit-system`).

‘constcgs’ ‘constants.el’ should use the c-g-s unit system.

`'constSI'`      `'constants.el'` should use the SI unit system.

To influence footnote settings, use the following keywords. The corresponding variables are `org-footnote-define-inline`, `org-footnote-auto-label`, and `org-footnote-auto-adjust`.

`'fninline'`      Define footnotes inline.  
`'fnnoinline'`    Define footnotes in separate section.  
`'fnlocal'`        Define footnotes near first reference, but not inline.  
`'fnprompt'`      Prompt for footnote labels.  
`'fnauto'`         Create `'[fn:1]'`-like labels automatically (default).  
`'fnconfirm'`     Offer automatic label for editing or confirmation.  
`'fnadjust'`      Automatically renumber and sort footnotes.  
`'nofnadjust'`    Do not renumber and sort automatically.  
`'fnanon'`        Create anonymous footnotes with `org-footnote-new`.

To hide blocks or drawers on startup, use these keywords. The corresponding variables are `org-hide-block-startup` and `org-hide-drawer-startup`.

`'hideblocks'`    Hide all begin/end blocks on startup.  
`'nohideblocks'`    Do not hide blocks on startup.  
`'hidedrawers'`    Hide all begin/end blocks on startup.  
`'nohidedrawers'`    Do not hide blocks on startup.

The display of entities as UTF-8 characters is governed by the variable `org-pretty-entities` and the keywords

`'entitiespretty'`    Show entities as UTF-8 characters where possible.  
`'entitiesplain'`    Leave entities plain.

`'#+TAGS: TAG1(c1) TAG2(c2)'`

These lines (several such lines are allowed) specify the valid tags in this file, and (potentially) the corresponding *fast tag selection* keys. The corresponding variable is `org-tag-alist`.

`'#+TODO:','#+SEQ_TODO:','#+TYP_TODO:'`

These lines set the TODO keywords and their interpretation in the current file. The corresponding variable is `org-todo-keywords`.

## 17.9 Regular Expressions

Org, as an Emacs mode, makes use of Emacs regular expressions for searching, matching and filtering. Emacs regular expressions have a somewhat different syntax than some common standards. Most notably, alternation is indicated using `'\|'` and matching groups are denoted by `'\(...\).'`. For example the string `'home\|work'` matches either `'home'` or `'work'`.

For more information, see [Section “Regexprs” in emacs](#).

### 17.10 Org Syntax

A reference document providing a formal description of Org’s syntax is available as a [draft on Worg](#), initially written by Nicolas Goaziou. It defines Org’s core internal concepts such as “headlines”, “sections”, “affiliated keywords”, “(greater) elements” and “objects”. Each part of an Org document belongs to one of the previous categories.

To explore the abstract structure of an Org buffer, run this in a buffer:

```
M-: (org-element-parse-buffer) <RET>
```

It outputs a list containing the buffer’s content represented as an abstract structure. The export engine relies on the information stored in this list. Most interactive commands—e.g., for structure editing—also rely on the syntactic meaning of the surrounding context.

You can probe the syntax of your documents with the command

```
M-x org-lint <RET>
```

It runs a number of checks to find common mistakes. It then displays their location in a dedicated buffer, along with a description and a “trust level”, since false-positive are possible. From there, you can operate on the reports with the following keys:

|                  |   |
|------------------|---|
| <i>C-j</i> , TAB | Display the offending line                  |
| RET              | Move point to the offending line            |
| <i>g</i>         | Check the document again                    |
| <i>h</i>         | Hide all reports from the same checker      |
| <i>i</i>         | Also remove them from all subsequent checks |
| <i>S</i>         | Sort reports by the column at point         |

## 17.11 Context Dependent Documentation

*C-c C-x I* in an Org file tries to open a suitable section of the Org manual depending on the syntax at point. For example, using it on a headline displays “Document Structure” section.

*q* closes the Info window.

## 17.12 Escape Character

You may sometimes want to write text that looks like Org syntax, but should really read as plain text. Org may use a specific escape character in some situations, i.e., a backslash in macros (see [Section 13.5 \[Macro Replacement\]](#), page 158) and links (see [Section 4.1 \[Link Format\]](#), page 39), or a comma in source and example blocks (see [Section 12.6 \[Literal Examples\]](#), page 145). In the general case, however, we suggest to use the zero width space. You can insert one with any of the following:

```
C-x 8 <RET> zero width space <RET>
C-x 8 <RET> 200B <RET>
```

For example, in order to write ‘`[[1,2]]`’ as-is in your document, you may write instead

```
[X[1,2]]
```

where ‘X’ denotes the zero width space character.

## 17.13 Code Evaluation and Security Issues

Unlike plain text, running code comes with risk. Each source code block, in terms of risk, is equivalent to an executable file. Org therefore puts a few confirmation prompts by default. This is to alert the casual user from accidentally running untrusted code.

For users who do not run code blocks or write code regularly, Org’s default settings should suffice. However, some users may want to tweak the prompts for fewer interruptions. To

weigh the risks of automatic execution of code blocks, here are some details about code evaluation.

Org evaluates code in the following circumstances:

#### *Source code blocks*

Org evaluates source code blocks in an Org file during export. Org also evaluates a source code block with the `C-c C-c` key chord. Users exporting or running code blocks must load files only from trusted sources. Be wary of customizing variables that remove or alter default security measures.

**org-confirm-babel-evaluate** [User Option]

When `t`, Org prompts the user for confirmation before executing each code block. When `nil`, Org executes code blocks without prompting the user for confirmation. When this option is set to a custom function, Org invokes the function with these two arguments: the source code language and the body of the code block. The custom function must return either a `t` or `nil`, which determines if the user is prompted. Each source code language can be handled separately through this function argument.

For example, here is how to execute ditaa code blocks without prompting:

```
(defun my-org-confirm-babel-evaluate (lang body)
  (not (string= lang "ditaa"))) ;don't ask for ditaa
(setq org-confirm-babel-evaluate #'my-org-confirm-babel-evaluate)
```

#### *Following ‘shell’ and ‘elisp’ links*

Org has two link types that can directly evaluate code (see [Section 4.4 \[External Links\]](#), page 41). Because such code is not visible, these links have a potential risk. Org therefore prompts the user when it encounters such links. The customization variables are:

**org-link-shell-confirm-function** [User Option]

Function that prompts the user before executing a shell link.

**org-link-elisp-confirm-function** [User Option]

Function that prompts the user before executing an Emacs Lisp link.

#### *Formulas in tables*

Formulas in tables (see [Section 3.5 \[The Spreadsheet\]](#), page 24) are code that is evaluated either by the Calc interpreter, or by the Emacs Lisp interpreter.

## 17.14 Interaction with Other Packages

Org’s compatibility and the level of interaction with other Emacs packages are documented here.

### 17.14.1 Packages that Org cooperates with

‘`calc.el`’ by Dave Gillespie

Org uses the Calc package for implementing spreadsheet functionality in its tables (see [Section 3.5 \[The Spreadsheet\]](#), page 24). Org also uses Calc for embedded calculations. See [Section “Embedded Mode” in `calc`](#).

‘constants.el’ by Carsten Dominik

Org can use names for constants in formulas in tables. Org can also use calculation suffixes for units, such as ‘M’ for ‘Mega’. For a standard collection of such constants, install the ‘constants’ package. Install version 2.0 of this package, available at <https://github.com/cdominik/constants-for-Emacs>. Org checks if the function `constants-get` has been autoloaded. Installation instructions are in the file ‘constants.el’.

‘cdlatex.el’ by Carsten Dominik

Org mode can make use of the CD $\LaTeX$  package to efficiently enter  $\LaTeX$  fragments into Org files. See Section 12.5.3 [CD $\LaTeX$  mode], page 144.

‘imenu.el’ by Ake Stenhoff and Lars Lindberg

Imenu creates dynamic menus based on an index of items in a file. Org mode supports Imenu menus. Enable it with a mode hook as follows:

```
(add-hook 'org-mode-hook
          (lambda () (imenu-add-to-menubar "Imenu")))
```

By default the index is two levels deep—you can modify the depth using the option `org-imenu-depth`.

Org activates Imenu support only in the buffers opened after loading Imenu library. To enable Imenu support in an already opened Org buffer, reload Org.

‘speedbar.el’ by Eric M. Ludlam

Speedbar package creates a special Emacs frame for displaying files and index items in files. Org mode supports Speedbar; users can drill into Org files directly from the Speedbar. The < in the Speedbar frame tweaks the agenda commands to that file or to a subtree.

‘table.el’ by Takaaki Ota

Complex ASCII tables with automatic line wrapping, column- and row-spanning, and alignment can be created using the Emacs table package by Takaaki Ota. Org mode recognizes such tables and exports them properly. `C-c '` to edit these tables in a special buffer, much like Org’s code blocks. Because of interference with other Org mode functionality, Takaaki Ota tables cannot be edited directly in the Org buffer.

```
C-c ' (org-edit-special)
```

Edit a ‘table.el’ table. Works when point is in a ‘table.el’ table.

```
C-c ~ (org-table-create-with-table.el)
```

Insert a ‘table.el’ table. If there is already a table at point, this command converts it between the ‘table.el’ format and the Org mode format. See the documentation string of the command `org-convert-table` for the restrictions under which this is possible.

### 17.14.2 Packages that conflict with Org mode

In Emacs, shift-selection combines motions of point with shift key to enlarge regions. Emacs sets this mode by default. This conflicts with Org’s use of `S-<cursor>` commands to change

timestamps, TODO keywords, priorities, and item bullet types, etc. Since *S-**<cursor>*** commands outside of specific contexts do not do anything, Org offers the variable `org-support-shift-select` for customization. Org mode accommodates shift selection by (i) making it available outside of the special contexts where special commands apply, and (ii) extending an existing active region even if point moves across a special context.

‘`cua.el`’ by Kim F. Storm

Org key bindings conflict with *S-**<cursor>*** keys used by CUA mode. For Org to relinquish these bindings to CUA mode, configure the variable `org-replace-disputed-keys`. When set, Org moves the following key bindings in Org files, and in the agenda buffer—but not during date selection.

|                                |                                 |
|--------------------------------|---------------------------------|
| <i>S-UP</i> ⇒ <i>M-p</i>       | <i>S-DOWN</i> ⇒ <i>M-n</i>      |
| <i>S-LEFT</i> ⇒ <i>M--</i>     | <i>S-RIGHT</i> ⇒ <i>M-+</i>     |
| <i>C-S-LEFT</i> ⇒ <i>M-S--</i> | <i>C-S-RIGHT</i> ⇒ <i>M-S-+</i> |

Yes, these are unfortunately more difficult to remember. If you want to have other replacement keys, look at the variable `org-disputed-keys`.

‘`ecomplete.el`’ by Lars Magne Ingebrigtsen

Ecomplete provides “electric” address completion in address header lines in message buffers. Sadly Orgtbl mode cuts Ecomplete’s power supply: no completion happens when Orgtbl mode is enabled in message buffers while entering text in address header lines. If one wants to use ecomplete one should *not* follow the advice to automatically turn on Orgtbl mode in message buffers (see [Section 3.4 \[Orgtbl Mode\], page 23](#)), but instead—after filling in the message headers—turn on Orgtbl mode manually when needed in the messages body.

‘`filladapt.el`’ by Kyle Jones

Org mode tries to do the right thing when filling paragraphs, list items and other elements. Many users reported problems using both ‘`filladapt.el`’ and Org mode, so a safe thing to do is to disable filladapt like this:

```
(add-hook 'org-mode-hook 'turn-off-filladapt-mode)
```

‘`viper.el`’ by Michael Kifer

Viper uses *C-c /* and therefore makes this key not access the corresponding Org mode command `org-sparse-tree`. You need to find another key for this command, or override the key in `viper-vi-global-user-map` with

```
(define-key viper-vi-global-user-map "C-c /" 'org-sparse-tree)
```

‘`windmove.el`’ by Hovav Shacham

This package also uses the *S-**<cursor>*** keys, so everything written in the paragraph above about CUA mode also applies here. If you want to make the windmove function active in locations where Org mode does not have special functionality on *S-**<cursor>***, add this to your configuration:

```
;; Make windmove work in Org mode:
(add-hook 'org-shiftup-final-hook 'windmove-up)
(add-hook 'org-shiftright-final-hook 'windmove-right)
(add-hook 'org-shiftdown-final-hook 'windmove-down)
(add-hook 'org-shiftright-final-hook 'windmove-right)
```

`'yasnippet.el'`

The way Org mode binds the TAB key (binding to `[tab]` instead of `"\t"`) overrules YASnippet's access to this key. The following code fixed this problem:

```
(add-hook 'org-mode-hook
  (lambda ()
    (setq-local yas/trigger-key [tab])
    (define-key yas/keymap [tab] 'yas/next-field-or-maybe-expand)))
```

The latest version of YASnippet does not play well with Org mode. If the above code does not fix the conflict, start by defining the following function:

```
(defun yas/org-very-safe-expand ()
  (let ((yas/fallback-behavior 'return-nil)) (yas/expand)))
```

Then, tell Org mode to use that function:

```
(add-hook 'org-mode-hook
  (lambda ()
    (make-variable-buffer-local 'yas/trigger-key)
    (setq yas/trigger-key [tab])
    (add-to-list 'org-tab-first-hook 'yas/org-very-safe-expand)
    (define-key yas/keymap [tab] 'yas/next-field)))
```

## 17.15 Using Org on a TTY

Org provides alternative key bindings for TTY and modern mobile devices that cannot perform movement commands on point and key bindings with modifier keys. Some of these workarounds may be more cumbersome than necessary. Users should look into customizing these further based on their usage needs. For example, the normal `S-<cursor>` for editing timestamp might be better with `C-c .` chord.

| Default          | Alternative 1        | Speed key | Alternative 2    |
|------------------|----------------------|-----------|------------------|
| <i>S-TAB</i>     | <i>C-u TAB</i>       | <i>C</i>  |                  |
| <i>M-LEFT</i>    | <i>C-c C-x l</i>     | <i>l</i>  | <i>Esc LEFT</i>  |
| <i>M-S-LEFT</i>  | <i>C-c C-x L</i>     | <i>L</i>  |                  |
| <i>M-RIGHT</i>   | <i>C-c C-x r</i>     | <i>r</i>  | <i>Esc RIGHT</i> |
| <i>M-S-RIGHT</i> | <i>C-c C-x R</i>     | <i>R</i>  |                  |
| <i>M-UP</i>      | <i>C-c C-x u</i>     |           | <i>Esc UP</i>    |
| <i>M-S-UP</i>    | <i>C-c C-x U</i>     | <i>U</i>  |                  |
| <i>M-DOWN</i>    | <i>C-c C-x d</i>     |           | <i>Esc DOWN</i>  |
| <i>M-S-DOWN</i>  | <i>C-c C-x D</i>     | <i>D</i>  |                  |
| <i>S-RET</i>     | <i>C-c C-x c</i>     |           |                  |
| <i>M-RET</i>     | <i>C-c C-x m</i>     |           | <i>Esc RET</i>   |
| <i>M-S-RET</i>   | <i>C-c C-x M</i>     |           |                  |
| <i>S-LEFT</i>    | <i>C-c LEFT</i>      |           |                  |
| <i>S-RIGHT</i>   | <i>C-c RIGHT</i>     |           |                  |
| <i>S-UP</i>      | <i>C-c UP</i>        |           |                  |
| <i>S-DOWN</i>    | <i>C-c DOWN</i>      |           |                  |
| <i>C-S-LEFT</i>  | <i>C-c C-x LEFT</i>  |           |                  |
| <i>C-S-RIGHT</i> | <i>C-c C-x RIGHT</i> |           |                  |

`C-c C-`,                    `C-c C-x s`

## 17.16 Protocols for External Access

Org protocol is a tool to trigger custom actions in Emacs from external applications. Any application that supports calling external programs with an URL as argument may be used with this functionality. For example, you can configure bookmarks in your web browser to send a link to the current page to Org and create a note from it using capture (see [Section 10.1 \[Capture\], page 98](#)). You can also create a bookmark that tells Emacs to open the local source file of a remote website you are browsing.

In order to use Org protocol from an application, you need to register ‘`org-protocol://`’ as a valid scheme-handler. External calls are passed to Emacs through the ‘`emacsclient`’ command, so you also need to ensure an Emacs server is running. More precisely, when the application calls

```
emacsclient "org-protocol://PROTOCOL?key1=val1&key2=val2"
```

Emacs calls the handler associated to *PROTOCOL* with argument ‘`(:key1 val1 :key2 val2)`’.

Org protocol comes with three predefined protocols, detailed in the following sections. Configure `org-protocol-protocol-alist` to define your own.

### 17.16.1 The store-link protocol

Using the `store-link` handler, you can copy links, so that they can be inserted using `M-x org-insert-link` or yanking. More precisely, the command

```
emacsclient "org-protocol://store-link?url=URL&title=TITLE"
```

stores the following link:

```
[[URL] [TITLE]]
```

In addition, *URL* is pushed on the kill-ring for yanking. You need to encode *URL* and *TITLE* if they contain slashes, and probably quote those for the shell.

To use this feature from a browser, add a bookmark with an arbitrary name, e.g., ‘`Org: store-link`’ and enter this as *Location*:

```
javascript:location.href='org-protocol://store-link?' +
  new URLSearchParams({url:location.href, title:document.title});
```

Title is an optional parameter. Another expression was recommended earlier:

```
javascript:location.href='org-protocol://store-link?url='+
  encodeURIComponent(location.href);
```

The latter form is compatible with older Org versions from 9.0 to 9.4.

### 17.16.2 The capture protocol

Activating the “capture” handler pops up a ‘`Capture`’ buffer in Emacs, using `acapture` template.

```
emacsclient "org-protocol://capture?template=X&url=URL&title=TITLE&body=BODY"
```

To use this feature, add a bookmark with an arbitrary name, e.g., ‘`Org: capture`’, and enter this as ‘`Location`’:

```
javascript:location.href='org-protocol://capture?' +
  new URLSearchParams({
    template: 'x', url: window.location.href,
    title: document.title, body: window.getSelection()});
```

You might have seen another expression:

```
javascript:location.href='org-protocol://capture?template=x'+
  '&url='+encodeURIComponent(window.location.href)+
  '&title='+encodeURIComponent(document.title)+
  '&body='+encodeURIComponent(window.getSelection());
```

It is a bit more cluttered than the former one, but it is compatible with previous Org versions 9.0-9.4. In these versions encoding of space as “+” character was not supported by URI decoder.

The capture template to be used can be specified in the bookmark (like ‘X’ above). If unspecified, the template key is set in the variable `org-protocol-default-template-key`. The following template placeholders are available:

|                            |   |
|----------------------------|---|
| <code>%:link</code>        | The URL   |
| <code>%:description</code> | The webpage title                                     |
| <code>%:annotation</code>  | Equivalent to <code>[[%:link] [%:description]]</code> |
| <code>%i</code>            | The selected text                                     |

### 17.16.3 The open-source protocol

The `open-source` handler is designed to help with editing local sources when reading a document. To that effect, you can use a bookmark with the following location:

```
javascript:location.href='org-protocol://open-source?&url='+
  encodeURIComponent(location.href)
```

The variable `org-protocol-project-alist` maps URLs to local file names, by stripping URL parameters from the end and replacing the `:base-url` with `:working-directory` and `:online-suffix` with `:working-suffix`. For example, assuming you own a local copy of ‘`https://orgmode.org/worg/`’ contents at ‘`/home/user/worg`’, you can set `org-protocol-project-alist` to the following

```
(setq org-protocol-project-alist
  '(("Worg"
     :base-url "https://orgmode.org/worg/"
     :working-directory "/home/user/worg/"
     :online-suffix ".html"
     :working-suffix ".org")))
```

If you are now browsing ‘`https://orgmode.org/worg/org-contrib/org-protocol.html`’ and find a typo or have an idea about how to enhance the documentation, simply click the bookmark and start editing.

However, such mapping may not always yield the desired results. Suppose you maintain an online store located at ‘`https://example.com/`’. The local sources reside in ‘`/home/user/example/`’. It is common practice to serve all products in such a store through one file and rewrite URLs that do not match an existing file on the server. That way, a request to ‘`https://example.com/print/posters.html`’ might be rewritten on the server

to something like `'https://example.com/shop/products.php/posters.html.php'`. The open-source handler probably cannot find a file named `'/home/user/example/print/posters.html.php'` and fails.

Such an entry in `org-protocol-project-alist` may hold an additional property `:rewrites`. This property is a list of cons cells, each of which maps a regular expression to a path relative to the `:working-directory`.

Now map the URL to the path `'/home/user/example/products.php'` by adding `:rewrites` rules like this:

```
(setq org-protocol-project-alist
      '(("example.com"
         :base-url "https://example.com/"
         :working-directory "/home/user/example/"
         :online-suffix ".php"
         :working-suffix ".php"
         :rewrites (("example.com/print/" . "products.php")
                    ("example.com/$" . "index.php")))))
```

Since `'example.com/$'` is used as a regular expression, it maps `'https://example.com/'`, `'https://example.com'`, `'https://www.example.com/'` and similar to `'/home/user/example/index.php'`.

The `:rewrites` rules are searched as a last resort if and only if no existing file name is matched.

Two functions can help you filling `org-protocol-project-alist` with valid contents: `org-protocol-create` and `org-protocol-create-for-org`. The latter is of use if you're editing an Org file that is part of a publishing project.

## 17.17 Org Crypt

Org Crypt encrypts the text of an entry, but not the headline, or properties. Behind the scene, it uses the `epa` to encrypt and decrypt files, and EasyPG needs a correct `gnupg` setup.

Any text below a headline that has a `'crypt'` tag is automatically encrypted when the file is saved. To use a different tag, customize the `org-crypt-tag-matcher` setting.

Here is a suggestion for Org Crypt settings in Emacs init file:

```
(require 'org-crypt)
(org-crypt-use-before-save-magic)
(setq org-tags-exclude-from-inheritance '("crypt"))

(setq org-crypt-key nil)
;; GPG key to use for encryption.
;; nil means use symmetric encryption unconditionally.
;; "" means use symmetric encryption unless heading sets CRYPTKEY property.

(setq auto-save-default nil)
;; Auto-saving does not cooperate with org-crypt.el: so you need to
;; turn it off if you plan to use org-crypt.el quite often. Otherwise,
;; you'll get an (annoying) message each time you start Org.
```

```
;; To turn it off only locally, you can insert this:
;;
;; # -*- buffer-auto-save-file-name: nil; -*-
```

It's possible to use different keys for different headings by specifying the respective key as property 'CRYPTKEY', e.g.:

```
* Totally secret :crypt:
:PROPERTIES:
:CRYPTKEY: 0x0123456789012345678901234567890123456789
:END:
```

Note that the 'CRYPTKEY' property is only effective when `org-crypt-key` is non-`nil`. If `org-crypt-key` is `nil`, Org uses symmetric encryption unconditionally.

Excluding the 'crypt' tag from inheritance prevents already encrypted text from being encrypted again.

## 17.18 Org Mobile

Org Mobile is a protocol for synchronizing Org files between Emacs and other applications, e.g., on mobile devices. It enables offline-views and capture support for an Org mode system that is rooted on a "real" computer. The external application can also record changes to existing entries.

This appendix describes Org's support for agenda view formats compatible with Org Mobile. It also describes synchronizing changes, such as to notes, between the mobile application and the computer.

To change tags and TODO states in the mobile application, first customize the variables `org-todo-keywords`, `org-tag-alist` and `org-tag-persistent-alist`. These should cover all the important tags and TODO keywords, even if Org files use only some of them. Though the mobile application is expected to support in-buffer settings, it is required to understand TODO states *sets* (see [Section 5.2.5 \[Per-file keywords\]](#), page 52) and *mutually exclusive* tags (see [Section 6.2 \[Setting Tags\]](#), page 62) only for those set in these variables.

### 17.18.1 Setting up the staging area

The mobile application needs access to a file directory on a server<sup>6</sup> to interact with Emacs. Pass its location through the `org-mobile-directory` variable. If you can mount that directory locally just set the variable to point to that directory:

```
(setq org-mobile-directory "~/orgmobile/")
```

Alternatively, by using TRAMP (see [tramp](#)), `org-mobile-directory` may point to a remote directory accessible through, for example, SSH, SCP, or DAVS:

```
(setq org-mobile-directory "/davs:user@remote.host:/org/webdav/")
```

With a public server, consider encrypting the files. Org also requires OpenSSL installed on the local computer. To turn on encryption, set the same password in the mobile application and in Emacs. Set the password in the variable `org-mobile-use-encryption`<sup>7</sup>.

<sup>6</sup> For a server to host files, consider using a WebDAV server, such as [Nextcloud](#). Additional help is at this [FAQ entry](#).

<sup>7</sup> If Emacs is configured for safe storing of passwords, then configure the variable `org-mobile-encryption-password`; please read the docstring of that variable.

Note that even after the mobile application encrypts the file contents, the file name remains visible on the file systems of the local computer, the server, and the mobile device.

### 17.18.2 Pushing to the mobile application

The command `org-mobile-push` copies files listed in `org-mobile-files` into the staging area. Files include agenda files (as listed in `org-agenda-files`). Customize `org-mobile-files` to add other files. File names are staged with paths relative to `org-directory`, so all files should be inside this directory<sup>8</sup>.

Push creates a special Org file ‘`agendas.org`’ with custom agenda views defined by the user<sup>9</sup>.

Finally, Org writes the file ‘`index.org`’, containing links to other files. The mobile application reads this file first from the server to determine what other files to download for agendas. For faster downloads, it is expected to only read files whose checksums<sup>10</sup> have changed.

### 17.18.3 Pulling from the mobile application

The command `org-mobile-pull` synchronizes changes with the server. More specifically, it first pulls the Org files for viewing. It then appends captured entries and pointers to flagged or changed entries to the file ‘`mobileorg.org`’ on the server. Org ultimately integrates its data in an inbox file format, through the following steps:

1. Org moves all entries found in ‘`mobileorg.org`’<sup>11</sup> and appends them to the file pointed to by the variable `org-mobile-inbox-for-pull`. It should reside neither in the staging area nor on the server. Each captured entry and each editing event is a top-level entry in the inbox file.
2. After moving the entries, Org processes changes to the shared files. Some of them are applied directly and without user interaction. Examples include changes to tags, TODO state, headline and body text. Entries requiring further action are tagged as ‘`FLAGGED`’. Org marks entries with problems with an error message in the inbox. They have to be resolved manually.
3. Org generates an agenda view for flagged entries for user intervention to clean up. For notes stored in flagged entries, Org displays them in the echo area when point is on the corresponding agenda item.

?            Pressing ? displays the entire flagged note in another window. Org also pushes it to the kill ring. To store flagged note as a normal note, use ? z C-y C-c C-c. Pressing ? twice does these things: first it removes the ‘`FLAGGED`’ tag; second, it removes the flagged note from the property drawer; third, it signals that manual editing of the flagged entry is now finished.

<sup>8</sup> Symbolic links in `org-directory` need to have the same name as their targets.

<sup>9</sup> While creating the agendas, Org mode forces ‘ID’ properties on all referenced entries, so that these entries can be uniquely identified if Org Mobile flags them for further action. To avoid setting properties configure the variable `org-mobile-force-id-on-agenda-items` to `nil`. Org mode then relies on outline paths, assuming they are unique.

<sup>10</sup> Checksums are stored automatically in the file ‘`checksums.dat`’.

<sup>11</sup> The file will be empty after this operation.

From the agenda dispatcher, ? returns to the view to finish processing flagged entries. Note that these entries may not be the most recent since the mobile application searches files that were last pulled. To get an updated agenda view with changes since the last pull, pull again.

## 17.19 Drag and Drop & yank-media

Org mode supports drag and drop (DnD) of files. By default, Org asks the user what must be done with the dropped file: attach it, insert ‘file:’ link, or open the file. Customize `org-yank-dnd-method` to set the default DnD action.

When DnD method is “attach”, Org mode first consults DnD metadata to decide the attach method. For example, when file/files are dragged from a file manager, Org may attach by copying or by moving.

If Org cannot figure out which attachment method to use from the metadata, it defaults to `org-yank-dnd-default-attach-method`<sup>12</sup>

Starting from Emacs 29, Org mode supports `yank-media` command to yank images from the clipboard and files from a file manager.

When yanking images from clipboard, Org saves the image on disk and inserts the image link to Org buffer. Images are either saved as attachments to heading (default) or to a globally defined directory. The save location is controlled by `org-yank-image-save-method`.

The yanked images are saved under automatically generated name. You can customize `org-yank-image-file-name-function` to make Org query the image names or change the naming scheme.

When yanking files copied from a file manager, Org respects the value of `org-yank-dnd-method`. Image files pasted this way also respect the value of `org-yank-image-save-method` when the action to perform is ‘attach’.

---

<sup>12</sup> By default, `org-yank-dnd-default-attach-method` is set to nil – use the same value as `org-attach-method` (cp by default).

## Appendix A Hacking

This appendix describes some ways a user can extend the functionality of Org.

### A.1 Hooks

Org has a large number of hook variables for adding functionality. A complete list of hooks with documentation is maintained by the Worg project at <https://orgmode.org/worg/doc.html#hooks>.

### A.2 Add-on Packages

Various authors wrote a large number of add-on packages for Org. Some of these packages used to be part of the ‘org-mode’ repository but are now hosted in a separate ‘org-contrib’ repository [here](#). A Worg page with more information is at: <https://orgmode.org/worg/org-contrib/>.

### A.3 Adding Hyperlink Types

Org has many built-in hyperlink types (see [Chapter 4 \[Hyperlinks\], page 39](#)), and an interface for adding new link types. The following example shows the process of adding Org links to Unix man pages, which look like this

```
[[man:printf][The printf manual]]
```

The following ‘ol-man.el’ file implements it

```
;;; ol-man.el - Support for links to man pages in Org mode
(require 'ol)

(org-link-set-parameters "man"
                        :follow #'org-man-open
                        :export #'org-man-export
                        :store #'org-man-store-link)

(defcustom org-man-command 'man
  "The Emacs command to be used to display a man page."
  :group 'org-link
  :type '(choice (const man) (const woman)))

(defun org-man-open (path _)
  "Visit the manpage on PATH.
PATH should be a topic that can be thrown at the man command."
  (funcall org-man-command path))

(defun org-man-store-link (&optional _interactive?)
  "Store a link to a man page."
  (when (memq major-mode '(Man-mode woman-mode))
    ;; This is a man page, we do make this link.
    (let* ((page (org-man-get-page-name))
```

```

        (link (concat "man:" page))
        (description (format "Man page for %s" page)))
(org-link-store-props
 :type "man"
 :link link
 :description description))))

(defun org-man-get-page-name ()
  "Extract the page name from the buffer name."
  ;; This works for both `Man-mode' and `woman-mode'.
  (if (string-match "\\(\\S-+\\)\\*" (buffer-name))
      (match-string 1 (buffer-name))
      (error "Cannot create link to this man page")))

(defun org-man-export (link description format _)
  "Export a man page link from Org files."
  (let ((path (format "http://man.he.net/?topic=%s&section=all" link))
        (desc (or description link)))
    (pcase format
      (`html (format "<a target=\"_blank\" href=\"%s\">%s</a>" path desc))
      (`latex (format "\\href{%s}{%s}" path desc))
      (`texinfo (format "@uref{%s,%s}" path desc))
      (`ascii (format "%s (%s)" desc path))
      (t path))))

(provide 'ol-man)
;;; ol-man.el ends here

```

To activate links to man pages in Org, enter this in the Emacs init file:

```
(require 'ol-man)
```

A review of ‘ol-man.el’:

1. First, ‘(require 'ol)’ ensures that ‘ol.el’ is loaded.
2. Then `org-link-set-parameters` defines a new link type with ‘man’ prefix and associates functions for following, exporting and storing such links. See the variable `org-link-parameters` for a complete list of possible associations.
3. The rest of the file implements necessary variables and functions.

For example, `org-man-store-link` is responsible for storing a link when `org-store-link` (see [Section 4.5 \[Handling Links\], page 43](#)) is called from a buffer displaying a man page. It is passed an argument `interactive?` which this function does not use, but other store functions use to behave differently when a link is stored interactively by the user. It first checks if the major mode is appropriate. If check fails, the function returns `nil`, which means it isn’t responsible for creating a link to the current buffer. Otherwise the function makes a link string by combining the ‘man:’ prefix with the man topic. It also provides a default description. The function `org-insert-link` can insert it back into an Org buffer later on.

## A.4 Adding Export Backends

Org’s export engine makes it easy for writing new backends. The framework on which the engine was built makes it easy to derive new backends from existing ones.

The two main entry points to the export engine are: `org-export-define-backend` and `org-export-define-derived-backend`. To grok these functions, see ‘`ox-latex.el`’ for an example of defining a new backend from scratch, and ‘`ox-beamer.el`’ for an example of deriving from an existing engine.

For creating a new backend from scratch, first set its name as a symbol in an alist consisting of elements and export functions. To make the backend visible to the export dispatcher, set `:menu-entry` keyword. For export options specific to this backend, set the `:options-alist`.

For creating a new backend from an existing one, set `:translate-alist` to an alist of export functions. This alist replaces the parent backend functions.

For complete documentation, see [the Org Export Reference on Worg](#).

## A.5 Tables in Arbitrary Syntax

Due to Org’s success in handling tables with `Orgtbl`, a frequently requested feature is the use of Org’s table functions in other modes, e.g.,  $\LaTeX$ . This would be hard to do in a general way without complicated customization nightmares. Moreover, that would take Org away from its simplicity roots that `Orgtbl` has proven. There is, however, an alternate approach to accomplishing the same.

This approach involves implementing a custom *translate* function that operates on a native Org *source table* to produce a table in another format. This strategy would keep the excellently working `Orgtbl` simple and isolate complications, if any, confined to the *translate* function. To add more alien table formats, we just add more *translate* functions. Also the burden of developing custom *translate* functions for new table formats is in the hands of those who know those formats best.

### A.5.1 Radio tables

Radio tables are target locations for translated tables that are not near their source. Org finds the target location and inserts the translated table.

The key to finding the target location is the magic words ‘`BEGIN/END RECEIVE ORGTBL`’. They have to appear as comments in the current mode. If the mode is C, then:

```
/* BEGIN RECEIVE ORGTBL table_name */
/* END RECEIVE ORGTBL table_name */
```

At the location of source, Org needs a special line to direct `Orgtbl` to translate and to find the target for inserting the translated table. For example:

```
#+ORGTBL: SEND table_name translation_function arguments ...
```

‘`table_name`’ is the table’s reference name, which is also used in the receiver lines, and the ‘`translation_function`’ is the Lisp function that translates. This line, in addition, may also contain alternating key and value arguments at the end. The translation function gets these values as a property list. A few standard parameters are already recognized and acted upon before the translation function is called:

`‘:skip N’` Skip the first N lines of the table. Hlines do count; include them if they are to be skipped.

`‘:skipcols (n1 n2 ...)’`

List of columns to be skipped. First Org automatically discards columns with calculation marks and then sends the table to the translator function, which then skips columns as specified in `‘skipcols’`.

To keep the source table intact in the buffer without being disturbed when the source file is compiled or otherwise being worked on, use one of these strategies:

- Place the table in a block comment. For example, in C mode you could wrap the table between `‘/*’` and `‘*/’` lines.
- Put the table after an “end” statement. For example `\bye` in  $\text{\TeX}$  and `\end{document}` in  $\text{\LaTeX}$ .
- Comment and un-comment each line of the table during edits. The *M-x orgtbl-toggle-comment* command makes toggling easy.

### A.5.2 A $\text{\LaTeX}$ example of radio tables

To wrap a source table in  $\text{\LaTeX}$ , use the `‘comment’` environment provided by `‘comment.sty’`<sup>1</sup>. To activate it, put `\usepackage{comment}` in the document header. Orgtbl mode inserts a radio table skeleton<sup>2</sup> with the command *M-x orgtbl-insert-radio-table*, which prompts for a table name. For example, if `‘salesfigures’` is the name, the template inserts:

```
% BEGIN RECEIVE ORGTBL salesfigures
% END RECEIVE ORGTBL salesfigures
\begin{comment}
#+ORGTBL: SEND salesfigures orgtbl-to-latex
| | |
\end{comment}
```

The line `‘#+ORGTBL: SEND’` tells Orgtbl mode to use the function `orgtbl-to-latex` to convert the table to  $\text{\LaTeX}$  format, then insert the table at the target (receive) location named `‘salesfigures’`. Now the table is ready for data entry. It can even use spreadsheet features<sup>3</sup>:

```
% BEGIN RECEIVE ORGTBL salesfigures
% END RECEIVE ORGTBL salesfigures
\begin{comment}
#+ORGTBL: SEND salesfigures orgtbl-to-latex
| Month | Days | Nr sold | per day |
|-----+-----+-----+-----|
| Jan   | 23  | 55   | 2.4  |
```

<sup>1</sup> <https://www.ctan.org/pkg/comment>

<sup>2</sup> By default this works only for  $\text{\LaTeX}$ , HTML, and Texinfo. Configure the variable `orgtbl-radio-table-templates` to install templates for other modes.

<sup>3</sup> If the `‘TBLFM’` keyword contains an odd number of dollar characters, this may cause problems with Font Lock in  $\text{\LaTeX}$  mode. As shown in the example you can fix this by adding an extra line inside the `‘comment’` environment that is used to balance the dollar expressions. If you are using  $\text{\AUCTeX}$  with the `font-latex` library, a much better solution is to add the `‘comment’` environment to the variable `LaTeX-verbatim-environments`.

```

| Feb   | 21 | 16 | 0.8 |
| March | 22 | 278 | 12.6 |
#+TBLFM: $4=$3/$2;%.1f
% $ (optional extra dollar to keep Font Lock happy, see footnote)
\end{comment}

```

After editing, `C-c C-c` inserts the translated table at the target location, between the two marker lines.

For hand-made custom tables, note that the translator needs to skip the first two lines of the source table. Also the command has to *splice* out the target table without the header and footer.

```

\begin{tabular}{lrrr}
Month & \multicolumn{1}{c}{Days} & Nr.\ sold & per day\\
% BEGIN RECEIVE ORGTBL salesfigures
% END RECEIVE ORGTBL salesfigures
\end{tabular}
%
\begin{comment}
#+ORGTBL: SEND salesfigures orgtbl-to-latex :splice t :skip 2
| Month | Days | Nr sold | per day |
|-----+-----+-----+-----|
Jan	23	55	2.4
Feb	21	16	0.8
March	22	278	12.6
#+TBLFM: $4=$3/$2;%.1f
\end{comment}

```

The  $\text{\LaTeX}$  translator function `orgtbl-to-latex` is already part of `Orgtbl` mode and uses a `‘tabular’` environment to typeset the table and marks horizontal lines with `\hline`. For additional parameters to control output, see [Section A.5.3 \[Translator functions\]](#), page 281:

`‘:splice BOOLEAN’`

When `{{{var(BOOLEAN)}}` is non-`nil`, return only table body lines; i.e., not wrapped in `‘tabular’` environment. Default is `nil`.

`‘:fmt FMT’` Format string to warp each field. It should contain `‘%s’` for the original field value. For example, to wrap each field value in dollar symbol, you could use `‘:fmt "$%s$”`. Format can also wrap a property list with column numbers and formats, for example `‘:fmt (2 "$%s$" 4 "%s\%"”`. In place of a string, a function of one argument can be used; the function must return a formatted string.

`‘:efmt EFMT’`

Format numbers as exponentials. The spec should have `‘%s’` twice for inserting mantissa and exponent, for example `“%s\%times10^{%s}”`. This may also be a property list with column numbers and formats, for example `‘:efmt (2 "%s\%times10^{%s}$" 4 "%s\%cdot10^{%s}$”`. After `EFMT` has been applied to a value, `FMT`—see above—is also applied. Functions with two arguments can be supplied instead of strings. By default, no special formatting is applied.

### A.5.3 Translator functions

Orgtbl mode has built-in translator functions: `orgtbl-to-csv` (comma-separated values), `orgtbl-to-tsv` (TAB-separated values), `orgtbl-to-latex`, `orgtbl-to-html`, `orgtbl-to-texinfo`, `orgtbl-to-unicode` and `orgtbl-to-orgtbl`. They use the generic translator, `orgtbl-to-generic`, which delegates translations to various export backends.

Properties passed to the function through the ‘`ORGTBL SEND`’ line take precedence over properties defined inside the function. For example, this overrides the default  $\LaTeX$  line endings, `\\`, with `\\[2mm]`:

```
#+ORGTBL: SEND test orgtbl-to-latex :lend " \\\\[2mm]"
```

For a new language translator, define a converter function. It can be a generic function, such as shown in this example. It marks a beginning and ending of a table with ‘`!BTBL!`’ and ‘`!ETBL!`’; a beginning and ending of lines with ‘`!BL!`’ and ‘`!EL!`’; and uses a TAB for a field separator:

```
(defun orgtbl-to-language (table params)
  "Convert the orgtbl-mode TABLE to language."
  (orgtbl-to-generic
   table
   (org-combine-plists
    '(:tstart "!BTBL!" :tend "!ETBL!" :lstart "!BL!" :lend "!EL!" :sep "\t")
    params)))
```

The documentation for the `orgtbl-to-generic` function shows a complete list of parameters, each of which can be passed through to `orgtbl-to-latex`, `orgtbl-to-texinfo`, and any other function using that generic function.

For complicated translations the generic translator function could be replaced by a custom translator function. Such a custom function must take two arguments and return a single string containing the formatted table. The first argument is the table whose lines are a list of fields or the symbol `hline`. The second argument is the property list consisting of parameters specified in the ‘`#+ORGTBL: SEND`’ line. Please share your translator functions by posting them to the Org users mailing list, at <mailto:emacs-orgmode@gnu.org>.

## A.6 Dynamic Blocks

Org supports *dynamic blocks* in Org documents. They are inserted with begin and end markers like any other code block, but the contents are updated automatically by a user function.

You can insert a dynamic block with `org-dynamic-block-insert-dblock`, which is bound to `C-c C-x x` by default. For example, `C-c C-x x c l o c k t a b l e RET` inserts a table that updates the work time (see [Section 8.4 \[Clocking Work Time\]](#), page 85).

Dynamic blocks can have names and function parameters. The syntax is similar to source code block specifications:

```
#+BEGIN: myblock :parameter1 value1 :parameter2 value2 ...
...
#+END:
```

These commands update dynamic blocks:

`C-c C-x C-u (org-dblock-update)`  
Update dynamic block at point.

`C-u C-c C-x C-u`  
Update all dynamic blocks in the current file.

Before updating a dynamic block, Org removes content between the ‘BEGIN’ and ‘END’ markers. Org then reads the parameters on the ‘BEGIN’ line for passing to the writer function as a plist. The previous content of the dynamic block becomes erased from the buffer and appended to the plist under `:content`.

The syntax for naming a writer function with a dynamic block labeled ‘myblock’ is: `org-dblock-write:myblock`.

The following is an example of a dynamic block and a block writer function that updates the time when the function was last run:

```
#+BEGIN: block-update-time :format "on %m/%d/%Y at %H:%M"
...
#+END:
```

The dynamic block’s writer function:

```
(defun org-dblock-write:block-update-time (params)
  (let ((fmt (or (plist-get params :format) "%d. %m. %Y")))
    (insert "Last block update at: "
           (format-time-string fmt))))
```

To keep dynamic blocks up-to-date in an Org file, use the function, `org-update-all-dblocks` in hook, such as `before-save-hook`. The `org-update-all-dblocks` function does not run if the file is not in Org mode.

Dynamic blocks, like any other block, can be narrowed with `org-narrow-to-block`.

## A.7 Special Agenda Views

Org provides a special hook to further limit items in agenda views: `agenda`, `agenda*`<sup>4</sup>, `todo`, `alltodo`, `tags`, `tags-todo`, `tags-tree`. Specify a custom function that tests inclusion of every matched item in the view. This function can also skip as much as is needed.

For a global condition applicable to agenda views, use the `org-agenda-skip-function-global` variable. Org uses a global condition with `org-agenda-skip-function` for custom searching.

This example defines a function for a custom view showing TODO items with ‘waiting’ status. Manually this is a multi-step search process, but with a custom view, this can be automated as follows:

The custom function searches the subtree for the ‘waiting’ tag and returns `nil` on match. Otherwise it gives the location from where the search continues.

```
(defun my-skip-unless-waiting ()
  "Skip trees that are not waiting"
  (let ((subtree-end (save-excursion (org-end-of-subtree t))))
```

<sup>4</sup> The `agenda*` view is the same as `agenda` except that it only considers *appointments*, i.e., scheduled and deadline items that have a time specification ‘[h]h:mm’ in their timestamps.

```
(if (re-search-forward ":waiting:" subtree-end t)
    nil          ; tag found, do not skip
    subtree-end)) ; tag not found, continue after end of subtree
```

To use this custom function in a custom agenda command:

```
(org-add-agenda-custom-command
  ("b" todo "PROJECT"
    ((org-agenda-skip-function 'my-skip-unless-waiting)
     (org-agenda-overriding-header "Projects waiting for something: "))))
```

Note that this also binds `org-agenda-overriding-header` to a more meaningful string suitable for the agenda view.

Search for entries with a limit set on levels for the custom search. This is a general approach to creating custom searches in Org. To include all levels, use `'LEVEL>0'`<sup>5</sup>. Then to selectively pick the matched entries, use `org-agenda-skip-function`, which also accepts Lisp forms, such as `org-agenda-skip-entry-if` and `org-agenda-skip-subtree-if`. For example:

```
'(org-agenda-skip-entry-if 'scheduled)'
  Skip current entry if it has been scheduled.

'(org-agenda-skip-entry-if 'notscheduled)'
  Skip current entry if it has not been scheduled.

'(org-agenda-skip-entry-if 'deadline)'
  Skip current entry if it has a deadline.

'(org-agenda-skip-entry-if 'scheduled 'deadline)'
  Skip current entry if it has a deadline, or if it is scheduled.

'(org-agenda-skip-entry-if 'todo '("TODO" "WAITING"))'
  Skip current entry if the TODO keyword is TODO or WAITING.

'(org-agenda-skip-entry-if 'todo 'done)'
  Skip current entry if the TODO keyword marks a DONE state.

'(org-agenda-skip-entry-if 'timestamp)'
  Skip current entry if it has any timestamp, may also be deadline or scheduled.

'(org-agenda-skip-entry-if 'regexp "regular expression")'
  Skip current entry if the regular expression matches in the entry.

'(org-agenda-skip-entry-if 'notregexp "regular expression")'
  Skip current entry unless the regular expression matches.

'(org-agenda-skip-subtree-if 'regexp "regular expression")'
  Same as above, but check and skip the entire subtree.
```

The following is an example of a search for `'waiting'` without the special function:

```
(org-add-agenda-custom-command
  ("b" todo "PROJECT"
```

---

<sup>5</sup> Note that, for `org-odd-levels-only`, a level number corresponds to order in the hierarchy, not to the number of stars.

```
((org-agenda-skip-function '(org-agenda-skip-subtree-if
                            'regexp ":waiting:"))
  (org-agenda-overriding-header "Projects waiting for something: ")))))
```

## A.8 Speeding Up Your Agendas

Some agenda commands slow down when the Org files grow in size or number. Here are tips to speed up:

- Reduce the number of Org agenda files to avoid slowdowns due to hard drive accesses.
- Reduce the number of DONE and archived headlines so agenda operations that skip over these can finish faster.
- Do not dim blocked tasks:

```
(setq org-agenda-dim-blocked-tasks nil)
```

- Stop preparing agenda buffers on startup:

```
(setq org-agenda-inhibit-startup t)
```

- Disable tag inheritance for agendas:

```
(setq org-agenda-use-tag-inheritance nil)
```

- Disable parsing of some properties:

```
(setq org-agenda-ignore-properties '(stats))
```

This will disable parsing and updating statistic cookies.

These options can be applied to selected agenda views. For more details about generation of agenda views, see the docstrings for the relevant variables, and this [dedicated Worg page](#) for agenda optimization.

## A.9 Extracting Agenda Information

Org provides commands to access agendas through Emacs batch mode. Through this command-line interface, agendas are automated for further processing or printing.

`org-batch-agenda` creates an agenda view in ASCII and outputs to standard output. This command takes one string parameter. When string consists of a single character, Org uses it as a key to `org-agenda-custom-commands`. These are the same ones available through the agenda dispatcher (see [Section 11.2 \[Agenda Dispatcher\]](#), page 112).

This example command line directly prints the TODO list to the printer:

```
emacs -batch -l ~/.emacs -eval '(org-batch-agenda "t")' | lpr
```

When the string parameter length is two or more characters, Org matches it with tags/TODO strings. For example, this example command line prints items tagged with ‘shop’, but excludes items tagged with ‘NewYork’:

```
emacs -batch -l ~/.emacs \
  -eval '(org-batch-agenda "+shop-NewYork")' | lpr
```

An example showing on-the-fly parameter modifications:

```
emacs -batch -l ~/.emacs \
  -eval '(org-batch-agenda "a" \
    org-agenda-span (quote month)) \
```

```

        org-agenda-include-diary nil \
        org-agenda-files (quote ("~/org/project.org"))' \
| lpr

```

which produces an agenda for the next 30 days from just the ‘~/org/projects.org’ file.

For structured processing of agenda output, use `org-batch-agenda-csv` with the following fields:

|            |  |
|------------|--|
| category   | The category of the item   |
| head       | The headline, without TODO keyword, TAGS and PRIORITY  |
| type       | The type of the agenda entry, can be <ul style="list-style-type: none"> <li><code>todo</code> selected in TODO match</li> <li><code>tagsmatch</code> selected in tags match</li> <li><code>diary</code> imported from diary</li> <li><code>deadline</code> a deadline</li> <li><code>scheduled</code> scheduled</li> <li><code>timestamp</code> appointment, selected by timestamp</li> <li><code>closed</code> entry was closed on date</li> <li><code>upcoming-deadline</code> warning about nearing deadline</li> <li><code>past-scheduled</code> forwarded scheduled item</li> <li><code>block</code> entry has date block including date</li> </ul> |
| todo       | The TODO keyword, if any   |
| tags       | All tags including inherited ones, separated by colons   |
| date       | The relevant date, like ‘2007-2-14’  |
| time       | The time, like ‘15:00-16:50’   |
| extra      | String with extra planning info  |
| priority-l | The priority letter if any was given   |
| priority-n | The computed numerical priority  |

If the selection of the agenda item was based on a timestamp, including those items with ‘DEADLINE’ and ‘SCHEDULED’ keywords, then Org includes date and time in the output.

If the selection of the agenda item was based on a timestamp (or deadline/scheduled), then Org includes date and time in the output.

Here is an example of a post-processing script in Perl. It takes the CSV output from Emacs and prints with a checkbox:

```

#!/usr/bin/perl

# define the Emacs command to run
$cmd = "emacs -batch -l ~/.emacs -eval '(org-batch-agenda-csv \"t\")'";

# run it and capture the output
$agenda = qx{$cmd 2>/dev/null};

# loop over all lines

```

```

foreach $line (split(/\n/,$agenda)) {
  # get the individual values
  ($category,$head,$type,$todo,$tags,$date,$time,$extra,
   $priority_1,$priority_n) = split(/,/, $line);
  # process and print
  print "[ ] $head\n";
}

```

## A.10 Using the Property API

Here is a description of the functions that can be used to work with properties.

**org-entry-properties** *&optional pom which* [Function]

Get all properties of the entry at point-or-marker *POM*. This includes the TODO keyword, the tags, time strings for deadline, scheduled, and clocking, and any additional properties defined in the entry. The return value is an alist. Keys may occur multiple times if the property key was used several times. *POM* may also be *nil*, in which case the current entry is used. If *WHICH* is *nil* or *all*, get all properties. If *WHICH* is *special* or *standard*, only get that subclass.

**org-entry-get** *pom property &optional inherit* [Function]

Get value of *PROPERTY* for entry at point-or-marker *POM*. By default, this only looks at properties defined locally in the entry. If *INHERIT* is non-*nil* and the entry does not have the property, then also check higher levels of the hierarchy. If *INHERIT* is the symbol *selective*, use inheritance if and only if the setting of *org-use-property-inheritance* selects *PROPERTY* for inheritance.

**org-entry-delete** *pom property* [Function]

Delete the property *PROPERTY* from entry at point-or-marker *POM*.

**org-entry-put** *pom property value* [Function]

Set *PROPERTY* to *VALUES* for entry at point-or-marker *POM*.

**org-buffer-property-keys** *&optional include-specials* [Function]

Get all property keys in the current buffer.

**org-insert-property-drawer** [Function]

Insert a property drawer for the current entry.

**org-entry-put-multivalued-property** *pom property &rest values* [Function]

Set *PROPERTY* at point-or-marker *POM* to *VALUES*. *VALUES* should be a list of strings. They are concatenated, with spaces as separators.

**org-entry-get-multivalued-property** *pom property* [Function]

Treat the value of the property *PROPERTY* as a whitespace-separated list of values and return the values as a list of strings.

**org-entry-add-to-multivalued-property** *pom property value* [Function]

Treat the value of the property *PROPERTY* as a whitespace-separated list of values and make sure that *VALUE* is in this list.

**org-entry-remove-from-multivalued-property** *pom property value* [Function]  
 Treat the value of the property *PROPERTY* as a whitespace-separated list of values and make sure that *VALUE* is *not* in this list.

**org-entry-member-in-multivalued-property** *pom property value* [Function]  
 Treat the value of the property *PROPERTY* as a whitespace-separated list of values and check if *VALUE* is in this list.

**org-property-allowed-value-functions** [User Option]  
 Hook for functions supplying allowed values for a specific property. The functions must take a single argument, the name of the property, and return a flat list of allowed values. If ‘:ETC’ is one of the values, use the values as completion help, but allow also other values to be entered. The functions must return `nil` if they are not responsible for this property.

## A.11 Using the Mapping API

Org has sophisticated mapping capabilities to find all entries satisfying certain criteria. Internally, this functionality is used to produce agenda views, but there is also an API that can be used to execute arbitrary functions for each or selected entries. The main entry point for this API is:

**org-map-entries** *func &optional match scope &rest skip* [Function]  
 Call *FUNC* at each headline selected by *MATCH* in *SCOPE*.

*FUNC* is a function or a Lisp form. With point positioned at the beginning of the headline, call the function without arguments. Org returns a list of return values of calls to the function.

To avoid preserving point, Org wraps the call to *FUNC* in `save-excursion` form. After evaluation, Org moves point to the end of the line that was just processed. Search continues from that point forward. This may not always work as expected under some conditions, such as if the current subtree was removed by a previous archiving operation. In such rare circumstances, Org skips the next entry entirely when it should not. To stop Org from such skips, make *FUNC* set the variable `org-map-continue-from` to a specific buffer position.

*MATCH* is a tags/property/TODO match. Org iterates only matched headlines. Org iterates over all headlines when *MATCH* is `nil` or `t`.

*SCOPE* determines the scope of this command. It can be any of:

- `nil`        The current buffer, respecting the restriction, if any.
- `tree`        The subtree started with the entry at point.
- `region`      The entries within the active region, if any.
- `file`        The current buffer, without restriction.
- `file-with-archives`  
               The current buffer, and any archives associated with it.
- `agenda`      All agenda files.

**agenda-with-archives**

All agenda files with any archive files associated with them.

## list of filenames

If this is a list, all files in the list are scanned.

The remaining arguments are treated as settings for the scanner's skipping facilities. Valid arguments are:

**archive** Skip trees with the 'ARCHIVE' tag.

**comment** Skip trees with the COMMENT keyword.

## function or Lisp form

Used as value for **org-agenda-skip-function**, so whenever the function returns **t**, *FUNC* is called for that entry and search continues from the point where the function leaves it.

The mapping routine can call any arbitrary function, even functions that change meta data or query the property API (see [Section A.10 \[Using the Property API\], page 286](#)). Here are some handy functions:

**org-todo &optional arg** [Function]  
Change the TODO state of the entry. See the docstring of the functions for the many possible values for the argument *ARG*.

**org-priority &optional action** [Function]  
Change the priority of the entry. See the docstring of this function for the possible values for *ACTION*.

**org-toggle-tag tag &optional onoff** [Function]  
Toggle the tag *TAG* in the current entry. Setting *ONOFF* to either on or off does not toggle tag, but ensure that it is either on or off.

**org-promote** [Function]  
Promote the current entry.

**org-demote** [Function]  
Demote the current entry.

This example turns all entries tagged with 'TOMORROW' into TODO entries with keyword 'UPCOMING'. Org ignores entries in comment trees and archive trees.

```
(org-map-entries '(org-todo "UPCOMING")
                "+TOMORROW" 'file 'archive 'comment)
```

The following example counts the number of entries with TODO keyword 'WAITING', in all agenda files.

```
(length (org-map-entries t "/+WAITING" 'agenda))
```

## Appendix B History and Acknowledgments

### B.1 From Carsten

Org was born in 2003, out of frustration over the user interface of the Emacs Outline mode. I was trying to organize my notes and projects, and using Emacs seemed to be the natural way to go. However, having to remember eleven different commands with two or three keys per command, only to hide and show parts of the outline tree, that seemed entirely unacceptable to me. Also, when using outlines to take notes, I constantly wanted to restructure the tree, organizing it parallel to my thoughts and plans. *Visibility cycling* and *structure editing* were originally implemented in the package ‘`outline-magic.el`’, but quickly moved to the more general ‘`org.el`’. As this environment became comfortable for project planning, the next step was adding *TODO entries*, basic *timestamps*, and *table support*. These areas highlighted the two main goals that Org still has today: to be a new, outline-based, plain text mode with innovative and intuitive editing features, and to incorporate project planning functionality directly into a notes file.

Since the first release, literally thousands of emails to me or to the [mailing list](#) have provided a constant stream of bug reports, feedback, new ideas, and sometimes patches and add-on code. Many thanks to everyone who has helped to improve this package. I am trying to keep here a list of the people who had significant influence in shaping one or more aspects of Org. The list may not be complete, if I have forgotten someone, please accept my apologies and let me know.

Before I get to this list, a few special mentions are in order:

Bastien Guerry

Bastien has written a large number of extensions to Org (most of them integrated into the core by now), including the L<sup>A</sup>T<sub>E</sub>X exporter and the plain list parser. His support during the early days was central to the success of this project. Bastien also invented Worg, helped establishing the Web presence of Org, and sponsored hosting costs for the [orgmode.org](#) website. Bastien stepped in as maintainer of Org between 2011 and 2013, at a time when I desperately needed a break.

Eric Schulte and Dan Davison

Eric and Dan are jointly responsible for the Org Babel system, which turns Org into a multi-language environment for evaluating code and doing literate programming and reproducible research. This has become one of Org’s killer features that define what Org is today.

John Wiegley

John has contributed a number of great ideas and patches directly to Org, including the attachment system (‘`org-attach.el`’), integration with Apple Mail (‘`org-mac-message.el`’), hierarchical dependencies of TODO items, habit tracking (‘`org-habits.el`’), and encryption (‘`org-crypt.el`’). Also, the capture system is really an extended copy of his great ‘`remember.el`’.

Sebastian Rose

Without Sebastian, the HTML/XHTML publishing of Org would be the pitiful work of an ignorant amateur. Sebastian has pushed this part of Org onto a

much higher level. He also wrote ‘`org-info.js`’, a JavaScript program for displaying webpages derived from Org using an Info-like or a folding interface with single-key navigation.

See below for the full list of contributions! Again, please let me know what I am missing here!

## B.2 From Bastien

I (Bastien) have been maintaining Org between 2011 and 2013. This appendix would not be complete without adding a few more acknowledgments and thanks.

I am first grateful to Carsten for his trust while handing me over the maintainership of Org. His unremitting support is what really helped me getting more confident over time, with both the community and the code.

When I took over maintainership, I knew I would have to make Org more collaborative than ever, as I would have to rely on people that are more knowledgeable than I am on many parts of the code. Here is a list of the persons I could rely on, they should really be considered co-maintainers, either of the code or the community:

Eric Schulte

Eric is maintaining the Babel parts of Org. His reactivity here kept me away from worrying about possible bugs here and let me focus on other parts.

Nicolas Goaziou

Nicolas is maintaining the consistency of the deepest parts of Org. His work on ‘`org-element.el`’ and ‘`ox.el`’ has been outstanding, and it opened the doors for many new ideas and features. He rewrote many of the old exporters to use the new export engine, and helped with documenting this major change. More importantly (if that’s possible), he has been more than reliable during all the work done for Org 8.0, and always very reactive on the mailing list.

Achim Gratz

Achim rewrote the building process of Org, turning some *ad hoc* tools into a flexible and conceptually clean process. He patiently coped with the many hiccups that such a change can create for users.

Nick Dokos

The Org mode mailing list would not be such a nice place without Nick, who patiently helped users so many times. It is impossible to overestimate such a great help, and the list would not be so active without him.

I received support from so many users that it is clearly impossible to be fair when shortlisting a few of them, but Org’s history would not be complete if the ones above were not mentioned in this manual.

## B.3 List of Contributions

- Russell Adams came up with the idea for drawers.
- Thomas Baumann wrote ‘`ol-bbdb.el`’ and ‘`ol-mhe.el`’.
- Christophe Bataillon created the great unicorn logo that we use on the Org mode website.

- Alex Bochanek provided a patch for rounding timestamps.
- Jan Böcker wrote `'ol-docview.el'`.
- Brad Bozarth showed how to pull RSS feed data into Org files.
- Tom Breton wrote `'org-choose.el'`.
- Charles Cave's suggestion sparked the implementation of templates for Remember, which are now templates for capture.
- Timothy E Chapman worked on a complete overhaul of the orgmode.org website in 2020 and helped fixing various bugs.
- Pavel Chalmoviansky influenced the agenda treatment of items with specified time.
- Gregory Chernov patched support for Lisp forms into table calculations and improved XEmacs compatibility, in particular by porting `'noutline.el'` to XEmacs.
- Sacha Chua suggested copying some linking code from Planner.
- Baoqiu Cui contributed the DocBook exporter.
- Eddward DeVilla proposed and tested checkbox statistics. He also came up with the idea of properties, and that there should be an API for them.
- Nick Dokos tracked down several nasty bugs.
- Kees Dullemond used to edit projects lists directly in HTML and so inspired some of the early development, including HTML export. He also asked for a way to narrow wide table columns.
- Thomas S. Dye contributed documentation on Worg and helped integrating the Org Babel documentation into the manual.
- Christian Egli converted the documentation into Texinfo format, inspired the agenda, patched CSS formatting into the HTML exporter, and wrote `'org-taskjuggler.el'`.
- David Emery provided a patch for custom CSS support in exported HTML agendas.
- Nic Ferrier contributed mailcap and XOXO support.
- Miguel A. Figueroa-Villanueva implemented hierarchical checkboxes.
- John Foerch figured out how to make incremental search show context around a match in a hidden outline tree.
- Raimar Finken wrote `'org-git-line.el'`.
- Mikael Fornius works as a mailing list moderator.
- Austin Frank works as a mailing list moderator.
- Eric Fraga drove the development of Beamer export with ideas and testing.
- Barry Gidden did proofreading the manual in preparation for the book publication through Network Theory Ltd.
- Niels Giesen had the idea to automatically archive DONE trees.
- Nicolas Goaziou rewrote much of the plain list code.
- Kai Grossjohann pointed out key-binding conflicts with other packages.
- Brian Gough of Network Theory Ltd publishes the Org mode manual as a book.
- Bernt Hansen has driven much of the support for auto-repeating tasks, task state change logging, and the clocktable. His clear explanations have been critical when we started to adopt the Git version control system.

- Manuel Hermenegildo has contributed various ideas, small fixes and patches.
- Phil Jackson wrote ‘`ol-irc.el`’.
- Scott Jaderholm proposed footnotes, control over whitespace between folded entries, and column view for properties.
- Matt Jones wrote MobileOrg Android.
- Tokuya Kameshima wrote ‘`org-wl.el`’ and ‘`org-mew.el`’.
- Shidai Liu (“Leo”) asked for embedded L<sup>A</sup>T<sub>E</sub>X and tested it. He also provided frequent feedback and some patches.
- Matt Lundin has proposed last-row references for table formulas and named invisible anchors. He has also worked a lot on the FAQ.
- David Maus wrote ‘`org-atom.el`’, maintains the issues file for Org, and is a prolific contributor on the mailing list with competent replies, small fixes and patches.
- Jason F. McBrayer suggested agenda export to CSV format.
- Kyle Meyer helped setting up the [public-inbox](#) archive of the [Org mailing list](#) and has been fixing many bugs.
- Max Mikhanosha came up with the idea of refiling.
- Dmitri Minaev sent a patch to set priority limits on a per-file basis.
- Stefan Monnier provided a patch to keep the Emacs Lisp compiler happy.
- Richard Moreland wrote MobileOrg for the iPhone.
- Rick Moynihan proposed allowing multiple TODO sequences in a file and being able to quickly restrict the agenda to a subtree.
- Todd Neal provided patches for links to Info files and Elisp forms.
- Greg Newman refreshed the unicorn logo into its current form.
- Tim O’Callaghan suggested in-file links, search options for general file links, and tags.
- Osamu Okano wrote ‘`orgcard2ref.pl`’, a Perl program to create a text version of the reference card.
- Takeshi Okano translated the manual and David O’Toole’s tutorial into Japanese.
- Oliver Oppitz suggested multi-state TODO items.
- Scott Otterson sparked the introduction of descriptive text for links, among other things.
- Pete Phillips helped during the development of the TAGS feature, and provided frequent feedback.
- Martin Pohlack provided the code snippet to bundle character insertion into bundles of 20 for undo.
- Ihor Radchenko helped with fixing bugs and improving the user experience regarding Org’s speed.
- T. V. Raman reported bugs and suggested improvements.
- Matthias Rempe (Oelde) provided ideas, Windows support, and quality control.
- Paul Rivier provided the basic implementation of named footnotes. He also acted as mailing list moderator for some time.
- Kevin Rogers contributed code to access VM files on remote hosts.

- Frank Ruell solved the mystery of the ‘`keymapp nil`’ bug, a conflict with ‘`allout.el`’.
- Jason Riedy generalized the send-receive mechanism for Orgtbl tables with extensive patches.
- Philip Rooke created the Org reference card, provided lots of feedback, developed and applied standards to the Org documentation.
- Christian Schlauer proposed angular brackets around links, among other things.
- Paul Sexton wrote ‘`org-ctags.el`’.
- Tom Shannon’s ‘`organizer-mode.el`’ inspired linking to VM/BBDB/Gnus.
- Ilya Shlyakhter proposed the Archive Sibling, line numbering in literal examples, and remote highlighting for referenced code lines.
- Stathis Sideris wrote the ‘`ditaa.jar`’ ASCII to PNG converter that is now packaged into the `org-contrib` repository.
- Daniel Sinder came up with the idea of internal archiving by locking subtrees.
- Dale Smith proposed link abbreviations.
- James TD Smith has contributed a large number of patches for useful tweaks and features.
- Adam Spiers asked for global linking commands, inspired the link extension system, added support for Mairix, and proposed the mapping API.
- Ulf Stegemann created the table to translate special symbols to HTML,  $\LaTeX$ , UTF-8, Latin-1 and ASCII.
- Andy Stewart contributed code to ‘`ol-w3m.el`’, to copy HTML content with links transformation to Org syntax.
- David O’Toole wrote ‘`org-publish.el`’ and drafted the manual chapter about publishing.
- Jambunathan K. contributed the ODT exporter.
- Sebastien Vauban reported many issues with  $\LaTeX$  and Beamer export and enabled source code highlighting in Gnus.
- Stefan Vollmar organized a video-recorded talk at the Max-Planck-Institute for Neurology. He also inspired the creation of a concept index for HTML export.
- Jürgen Vollmer contributed code generating the table of contents in HTML output.
- Samuel Wales has provided important feedback and bug reports.
- Chris Wallace provided a patch implementing the ‘QUOTE’ block.
- David Wainberg suggested archiving, and improvements to the linking system.
- Carsten Wimmer suggested some changes and helped fix a bug in linking to Gnus.
- Roland Winkler requested additional key bindings to make Org work on a TTY.
- Piotr Zielinski wrote ‘`org-mouse.el`’, proposed agenda blocks and contributed various ideas and code snippets.
- Marco Wahl wrote ‘`ol-eww.el`’.

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