Laying 3DML Interface Groundwork for a Distributed Digital City Kyoto

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Introduction

In this paper we'll present our designs for a 3D interface to online Digital City Kyoto. Digital City Kyoto is a new approach to creating an on-line city resource. The key principles guiding the design of this system are that it be community based and enable a dynamic, bottom-up collection of practical information. Communities that flourish are those that have multiple uses and can be modified and adapted by residents for diverse purposes not necessarily anticipated by their makers [1]. Participation and visionary ideas from users are essential to the health of Digital City Kyoto.

The initial interface to the Digital City Kyoto is a scalable and intuitive 3D interface, which will lay the groundwork for distributed expansion and easy access to this geographically-bound information. The 3DML language has been selected for the initial phase to increase community participation in the development of the project.

In this paper we'll comment on why 3DML is a good choice for a distributed production model and describe how our prototype works and how it links to web information. We'll touch on our plans for distributed construction. We'll also describe a virtual bus tour feature, and conclude by describing future plans.

3-D Platform Choice

3DML was the chosen as the tool to create the 3D portion of Digital City Kyoto. The 3DML plug-in provides *Doom* or *Quake*-like 3D motion and interface. This tool was selected for a variety of reasons. The main goal was to allow many people to work on this city in order to take advantage of distributed authoring, therefore the authoring tool needed to be quick to learn and work well with web standards.

Although VRML was designed to fill this niche, there is not widespread use of it. This may be due in part to the fact that a good VRML site requires skilled 3D modelers and skilled programmers. 3DML allows rapid creation of web based 3D areas by anyone with the skill to build their own web site. 3DML allows graphics and photos to be mapped onto blocks and rotating planes, creating a geometrically rough city space while VRML allows for geometrically precise figures. Though VRML would be far superior for modeling a car, to represent an entire city 3DML has sufficient resolution and allows for rapid construction.

See **Figure A** for an example of what makes 3DML so intuitive, and why anyone who can build a regular HTML site should be ready to produce a 3DML "spot."

The 3DML plug-in is available at no charge from http://www.flatland.com, and works for recent versions of Internet Explorer and Netscape on the PC. 3DML is a simple to use text-based technology which requires only a 600k plug-in for interpreting text pages and texture maps in 3D., and runs on any reasonably new Pentium. The bandwidth consumed can be low as well, depending on the quality of the texture maps used.

A 3DML rendered spot can appear in any web page window, it integrates well with other technologies. For example, we used Microsoft's free web Agent with Internet Explorer, as well as Acuity's Java based Ichat technology which an individual may make use of simultaneous to exploring the 3D environment. 3DML is also easy to parse and manipulate with cgi programs.

Table 1, 3DML VRML Comparison

	3DML Rover Browser	VRML Cosmo Browser
Recommended Hard Disk Space	approx. 1 - 2 mb	14mb
Precise Models	no	yes
Learning Curve	short	long
Development Time for a Building	hours	days
Developers Required	Someone familiar with building a web site	1 VRML programmer 1 experienced 3D modeler
Easy to manipulate with cgis?	yes	no
Visual Example		

Building 3D Kyoto

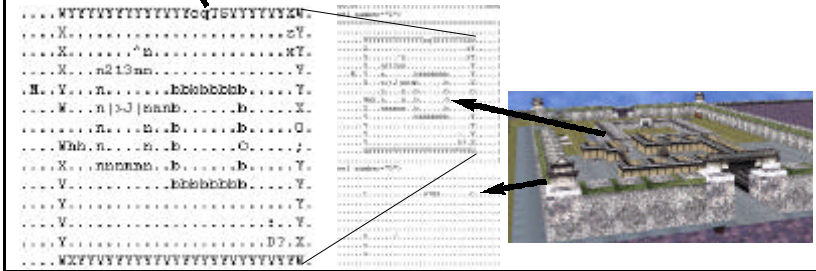
We chose the city of Kyoto for a number of reasons as well. Kyoto is an interesting city that has a famous heritage and a beautiful landscape. In addition to historical Kyoto, residents of Japan's Kansai area frequently visit Kyoto to patronize its businesses. It is a thrilling modern city as well as an international cultural resource.

Our prototype currently contains two different sites in Kyoto, viewable on the Web at http://www.digitalcity.gr.jp. The first is Nijo Castle, a piece of historic Kyoto and an attraction to visitors from around the world. The second site is the Shijo and Kawaramachi-dori area of the city, where citizens of Kyoto and visitors from the surrounding areas and beyond come for shopping, to see movies, and to eat.

The Nijo castle, Kawaramachi & Shijo 3D components were built by taking a digital camera to the sites, and carefully photographing buildings and other features and attractions. Some of these photos were kept

FIGURE A, 3DML Syntax

```
<create symbol="M" block="1" >
    <part name="*" texture="@nijojo1:sign.gif" />
    <exit HREF="http://www.digitalcity.gr.jp/virtualcommunity/nijocaption2.html"
    target="caption" text="Nijo"/>
    <PARAM ANGLE="270" />
</create>
<create symbol="T" block="#" >
    <part name="S" texture="http://www.digitalcity.gr.jp/kyoto/images/nijo/3p.gif" />
    <part name="N" texture="@nijojo1:nijo_outer_wall_b.gif" />
</create>
```



On the right you see the output of the 3DML plug-in. You can follow it's features to the middle diagram where a square of letters matches the courtyard walls and a single letter represents the corner tower top. Zooming in to one level of the 3DML text map, you can follow the letter "T" to the block definition part of the .3DML file. There you see that it has two different textures associated with a type # (solid) block.

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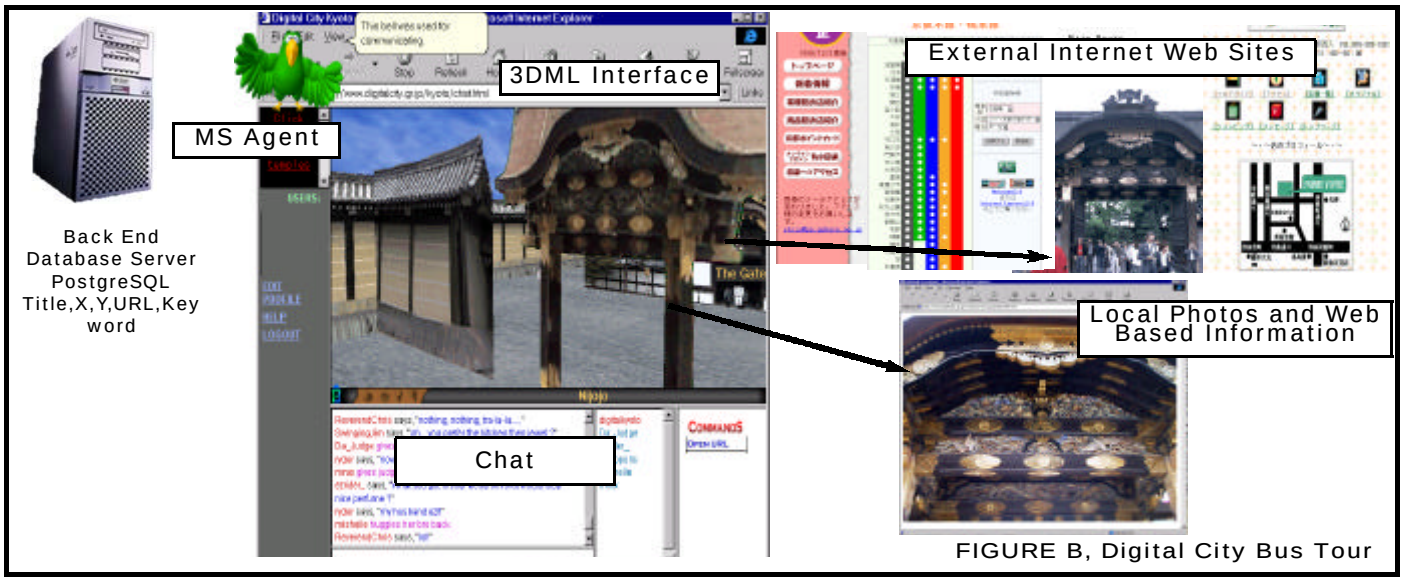

FIGURE B, Digital City Bus Tour

at high resolution to provide a detail view. The remaining photographs were processed, cropped and compressed to allow them to be mapped onto 3D blocks. A map of each area was used to create the 3DML layered letter-block maps, and keep them accurately relating to physical reality. 3D cubes, blocks, ramps and 2D planes were all used as a skeleton to lay the textures on.

During this initial prototyping phase we have been streamlining the building process and writing documentation for user construction within Digital City Kyoto. Citizens will be able to build community by constructing pieces of the city themselves. The model here is not unlike the model that brought success to the web with HTML, and the model used for individuals in Digital Amsterdam [2], MUDs, MOOs and MUCKs (for more MUD information see Mud.Com [3]). Essential in laying the groundwork for a large and thriving digital city, we intend to avoid top-heavy construction, and count on many different people to help us keep the city sustainable and current. High school students, college students, and residents of the area can provide a huge amount of development and creative energy to this city. We plan to enable communication through various channels, such as newsgroups, chat and email.

WWW Information Access

There already are many web sites in existence pertaining to one part or other of the city of Kyoto. By sending a web crawling robot searching for appropriate sites, and by making personal connections with individuals, we've collected a set of information that represents Kyoto on the web.

We are now building a database that allows access to this information. The 3D component (and other interfaces, such as a 2D java map under development) will rely on this back-end database built in the object/ relational system of PostgreSQL. The database will contain X Y information and URL information for both maps to tie into. With either map representation, users will click URLs associated with a the specific area of Kyoto they're examining. People can link to train schedules, business schedules, catalogs, historical information, maps, and the vast array of other resources available on the web.

Links to high resolution graphic details and pre-programmed Microsoft agent commentary are currently available throughout the 3D site. We also have a link to a live video camera in the Shijo Kawaramachi area that provides a real time window into Kyoto.

Digital Bus Tour

We are constructing an agent-guided group chat tour of Digital City Kyoto. A Microsoft Agent guide bird gives tours through the 3D representation of Nijo castle, and along the active streets of Shijo and Kawaramachi. Participants in the tours can talk with one another about their experience in a I-chat window. The agent uses web push technology to move the entire tour from one spot in the tour to another. Once moved to a spot, participants can walk around by themselves in the 3D world, talk among themselves, and listen to the guide bird give historical information, trivia and practical information. Clicking on some features displays high resolution photographs with Agent commentary and text information. External web sites giving further details can be launched in another browser window as well. We hope this tour will encourage communication among visitors and encourage further use of the digital city's resources. See **Figure B.**

Conclusion

The Open Laboratory Digital City project is a three year venture to attempt to construct a next generation digital city. The first version of Digital City Kyoto will be completed by the end of the project's first year, September 1999.

Digital City Kyoto contains a new vision of building a digital city on the net. Digital City Kyoto is a place to collect and share information, a place to build community, and a place where information can be browsed from many interfaces: a 2D map, a 3D interface, and/ or listened to from a personable digital agent. DCK is designed to resist stagnation; citizens of the city will be encouraged to continually add new information. We envision a growing and changing place, which serves residents in the actual city as well as real or digital visitors to the city.

In the future, our hope is to add more live sensor data from the city of Kyoto. For example the City of Kyoto tracks by computer the locations of all of the busses on the streets there. Also for the future, we plan on integrating continued web crawls will weed out old internet URLs and add new ones. Finally, this must be a friendly place for communication among city residents and visitors.

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