Browsing the 3D Web

Neal Leavitt

Observers have touted the 3D Web for years as a way to advance Web technology and meet the needs of both businesses and individuals. Proponents say the addition of a third dimension to Web browsing would result in better visualization and analysis of financial, business, and scientific data; more effective training; more entertaining browsing and game playing; and better viewing of products for sale via e-commerce, a critical factor in selling items that online shoppers can't interact with physically.

The 3D browser, the add-on application that would give users access to the technology's benefits, is a critical part of the 3D Web. Several companies are developing these browsers in anticipation of the 3D Web's popularity, as the "Today's 3D Browsers" sidebar discusses.

However, the 3D Web has not yet become a significant force in the marketplace, even in e-commerce, a potentially important use of the technology. This has held back adoption of 3D browsers.

"Buyers have not yet identified 3D features as an important part of the online shopping experience," said Jupiter Research market analyst Patti Freeman Evans. In fact, she said, many potential users are unaware of 3D Web tools and their potential.

Also, rather than cooperating, many 3D browser companies are working on their own in an effort to develop technologies that will give them dominance over the 3D Web market, added Rita Turkowski, executive director of the Web3D Consortium (www.web3d.org), a nonprofit international standards organization.

Companies' failure to work together has led to a lack of both standardization and a single basic approach around which the technology can grow, which has held back 3D browsers' popularity, she explained.

Other issues, such as the cost of content creation, are also hurdles for the 3D Web. However, proponents hope the emerging X3D specification will help jump-start 3D browser technology's growth by providing a good multiplatform system for 3D-content storage, retrieval, and playback.

In addition, Turkowski said, recent improvements in graphics technologies have added realism to 3D worlds and made the viewing experience more compelling.

Meanwhile, numerous organizations—including those in the medical, IT, public utility, e-commerce, manufacturing, CAD, military, education, and research fields—are starting to express interest in the 3D Web's benefits.

Thus, proponents hope 3D browsers' future will be brighter.

DRIVING 3D BROWSERS

Silicon Graphics developed the first commercial 3D viewer of static images, Webspace, in 1995, and the first commercial 3D browser, Cosmo Player, in 1997.

However, the graphics, processing, and networking technologies were not advanced enough at the time to make the products compelling, so they did not succeed in the marketplace.

Subsequent advances—such as faster networks, better and less expensive graphics cards, less costly memory technologies with larger capacities, and improved data compression and streaming approaches—have made 3D Web technology more effective and accessible.

Market drivers

Vendors are finding it viable to spend time and money developing 3D browsers and affiliated technologies because the market potential is huge.

E-commerce represents one of the biggest commercial uses of 3D browsers, said Nicky Morris, founder and president of browser vendor Three-B International.

A survey by Forrester Research and Shop.org, an association of online retailers, indicated that online US retail sales, excluding travel, were $113 billion in 2005 and will increase to $138 billion this year.

Online games, which are increasingly popular, are another important 3D-browser application. 3D Web technology also could be used for training employees, helping economists and investment specialists develop financial models, and in scientific projects such as protein visualizations.

Moreover, 3D browsers would let companies reuse the 3D CAD files they produce in designing their products directly for marketing and training purposes, rather than having to spend time and money converting them to a 2D format first, said Margaret Gallery, vice president of sales and marketing for 3D Web vendor Parallel Graphics.

Business model

The 3D browser business model is still unfolding. Some vendors, such as Mootools Software, sell their 3D browsers. Others give them away, hoping to make money by selling content-creation tools, said the Web3D Consortium's Turkowski.

Three-B International—which gives away its 3B browser—has several ways to make money from the product. For example, said Morris, users can create their own 3B village—a centralized, online place where people can place photos for 3D viewing—for free. However, Three-B displays paid advertisements with the villages.

INSIDE THE 3D BROWSER

3D browser software performs complex calculations of the perspective, shading, and other features necessary to give a rendered image or object a three-dimensional appearance, explained Web3D Consortium president Alan Hudson.

Typical browsers, such as the one that Figure 1 shows, have several key elements.

The network loader takes content from the network. The parser then parses the file into the format the browser uses. The runtime engine provides the common routines and functions that the browser requires, while the scripting engine processes scripted code. The renderer then produces the image itself.

Most 3D browsers work with either Microsoft's DirectX or the open graphics library specification. OpenGL defines a cross-language, cross-platform API for writing applications that produce 3D and 2D computer graphics. DirectX is a collection of APIs for developing and managing graphics and multimedia effects in games and active Web pages that run on Windows systems.

Some browsers can understand OpenGL and/or DirectX and thus render graphical content written via the technologies.

Today's 3D Browsers

A number of companies are now making 3D browsers. Some sell the software, while others give it away.

Three-B International's free 3B browser, which the company built on the Firefox 2D browser, renders all Web sites in 3D. 3B currently works only with PCs, but Three-B will produce Macintosh and Unix versions soon, noted company founder and president Nicky Morris.

The Browse3D Corp. used Visual C++ to build its Browse3D browser on top of Internet Explorer (IE). Company president Robert Randa said the browser combines the standard Windows gaming interface, which generally uses a full-screen mode with no visible window or toolbar, and Microsoft DirectX capabilities. Browse3D gives away a basic version of the browser and charges for an advanced version.

Sphere Inc. sells the SphereXPlorer, an IE-based browser that works only with Windows-based PCs.

Mootools Software is selling the IE-based 3D Photo Browser for 3D Users, which renders photos in 3D, handles video and audio files, and lets users browse multiple files simultaneously via thumbnail windows. The company also makes 3D Photo Browser for Digital Cameras and 3D Photo Browser Light.

Parallel Graphics is giving away the current beta version of Cortona VRML Client 5.0, a plug-in that turns a number of standard browsers—such as IE and Mozilla—into 3D browsers.
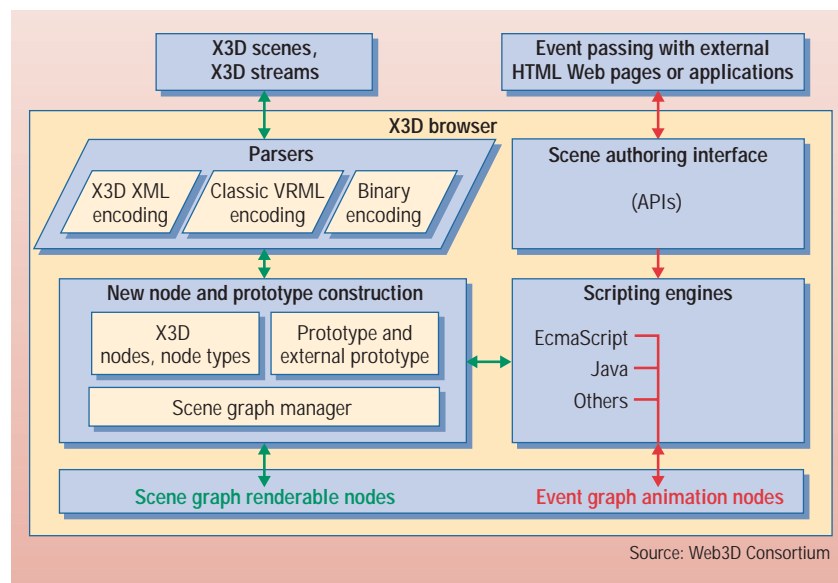

Figure 1. A typical 3D browser works via APIs to content servers and uses runtime and scripting engines and renderers to produce 3D scenes.

ON THE HORIZON

Industry observers hope that new 3D Web technologies will make 3D browsers more compelling.

There have been a number of major recent 3D browser improvements, including the ability to render graphics with better shading and multitexturing and upgraded Web services capabilities.

X3D

Typically, 3D browsers have worked with the Virtual Reality Modeling Language (VRML), a multiplatform file-format standard

that lets developers define the layout and content of 3D scenes.

Now, the Web3D Consortium is trying to marshal industrywide support for the extensible 3D (X3D) graphics standard—adopted by both the consortium and the International Organization for Standardization—for the storage, retrieval, and playback of real-time interactive and immersive 3D graphics content in Web pages, documents, and applications.

The Web3D Consortium released the original X3D standard in 2004 and Revision 1 earlier this year.

X3D consists of extensions to VRML, such as those for humanoid animation, shading, the ability to encode scenes using an XML syntax, and enhanced APIs.

The technology's XML capabilities add semantics to online 3D content; let users, devices, and applications on different platforms across the Internet work with the material; and permit organizations to integrate different data types within their systems.

Moreover, the capabilities enable 3D content to interoperate with the many XML applications that organizations use, noted Turkowski.

Proponents hope these enhancements make 3D content, and thus the browsers used to view them, more useful, stated the Web3D Consortium's Hudson.

"X3D browsers provide an interface to the 3D models and objects via a 3D API," said Turkowski.

A number of mobile 3D browsers—including 3B and the University of Udine's MobiX3D—work with X3D.

"There are also converters that can translate VRML to X3D," said Hudson. However, he added, the consortium wants to expand adoption of native X3D.

Microsoft Vista

Microsoft, which has not joined the Web3D Consortium, plans to begin shipping its Windows Vista operating system in January 2007. Microsoft has designed the OS in part to be a gaming platform.

Vista will introduce DirectX 10, an upgraded collection of multimedia APIs through which browsers can work. DirectX 10 will increase graphics rendering speed by as much as eight times and standardize how developers write games to work with PC system hardware.

Vista will also include the Windows Presentation Foundation, Microsoft's development tool for Web and rich-client applications; and the Extensible Application Markup Language, the company's XML-based language for creating rich GUIs.

The WPF uses DirectX 10 to take advantage of 3D graphics hardware to convert 2D surfaces into 3D textures for rendering.

With WPF and XAML, developers can create custom controls, graphics, 3D images, and animations not available in traditional HTML implementations.

HURDLES TO CLEAR

Creating 3D content is still time-consuming and expensive, which means there isn't much material yet for 3D browsers. However, this may change over time as tools improve and more developers are trained in 3D content creation.

And currently, there is not a great demand for 3D browsers, although proponents hope this will change with potential users' increased exposure to the technology.

Proponents have not promoted the 3D Web aggressively outside of technology markets, so other markets are only starting to see the potential, said Turkowski.

And without a killer app, the 3D Web and 3D browsers won't succeed, according to Tony Parisi, president and founder of Media Machines, a provider of real-time 3D communication technology.

Also, as with other browsers, 3D browsers could have vulnerabilities that would enable buffer overflows and other security problems that attackers could exploit to control the host system, noted Marcus Sachs, di-

rector of the SANS Institute, which provides information-security training, certification, and information.

During the next 12 to 18 months, said Houston, potential markets—including the IT, gas, oil, medical, and retail industries—will undertake initiatives to adopt 3D technology, including browsers, to make better use of their e-commerce capabilities and data.

Also, predicted the Web3D Consortium's Turkowski, "We'll see more networking and communicating with other XML-based Web services—such as news readers, blogs, and podcasts—from within the browser."

Having both X3D as a proper standard for 3D communication over the Web and easy-to-use content-development tools will increase adoption of 3D browsers, she said.

Meanwhile, companies are releasing an increasing number of important 3D Web programs, such as Google Earth, a geographic-imagery and information application that combines map and search technologies, said Jon Peddie, president of Jon Peddie Research. This will increase demand for 3D browsers, he explained.

Despite the potential obstacles to success, said Rob Enderle, president and principal analyst of the Enderle Group, a technology advisory firm, "3D Web browsers are here to stay. Eventually they'll be ubiquitous." ■

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