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Javu Technologies

JavuNetwork: Remote Video Production and Storage

Javu Technologies (<http://www.javu.com>) has developed JavuNetwork, a Java-based, network-centric, digital editing application that incorporates streaming technology and targets the emerging Internet video market. According to a recent Georgia Institute of Technology study, 55 percent of Internet users have already replaced watching television or videos on a VCR with Web surfing on a daily basis. As rich media content—encompassing video, audio, image, animation, and text—becomes the communication paradigm of the emerging Web-centric world, tools will be needed to develop and manage such content. That's where JavuNetwork comes in.

Remote multimedia

The Javu technology builds on a network-centric media management technology originally developed by the Multimedia Research Group of Cornell University's Computer Science Department, which achieves efficiencies far surpassing the old desktop-centric technologies currently on the market. JavuNetwork is the first content creation tool to let users combine and edit nearly every type of video, audio, and image format together with text, and automatically convert them into the finished video, image, or audio format of their choice over the Internet. JavuNetwork has an intuitive, drag-and-drop interface that works with any standard Web browser (see Figure 1).

One of the major drawbacks to video today is the inability of nonprofessionals to edit and enhance video footage from their desktops. Multimedia users generally still have access only to costly and inefficient means of handling video. Although desktop users can use currently available video editing products, these systems are fairly complex, costly, and time consuming, requiring intensive computer resources. This discourages the

average desktop user from delving into the field.

Professional production houses rely on systems such as those provided by Avid, DVision, and Media100. Digital media creators have to go to production houses or acquire a cumbersome and expensive infrastructure. Multimedia remains one of the few contemporary arenas that has not migrated to the client-server model. With the deployment of mass-market, high-bandwidth data networks alleviating the hardware problem, the multimedia industry aims to move the processing away from the PC and onto the Internet.

Transparent Internet-wide multimedia content editing and management through JavuNetwork is possible even in the present low-bandwidth access market. We anticipate that this approach will become standard in the future high-bandwidth market.

Implementation

Written in Java for universal cross-platform access, the client side supports any system that runs on Java 1.1.6 and higher. It thus runs on any PC with Windows 95/98/NT, Mac, or various flavors of Unix. It could also be ported to any platform that supports Java or has a browser, even a Palm Pilot.

On the server side, Java is used in conjunction with other languages for performance reasons. Parts of it are built in C and C++. The JavuNetwork server is scalable from one to multiple machines and across operating environments, harnessing the power of large Internet service provider (ISP) and Internet content provider (ICP) server forms for superior performance as well as mixing and matching NT and Solaris machines for resource flexibility.

JavuNetwork employs a standard streaming server for video delivery, so it can run on top of a RealNetworks RealServer, a Microsoft NetShow

server, or QuickTime. A free-format system, it currently supports most audio formats including MP3. It also supports all image and video formats including the Moving Pictures Expert Group's MPEG-1 and MPEG-2, motion JPEG (M-JPEG) from the Joint Photographic Experts Group, Audio Video Interactive (AVI), QuickTime, output to Real, and Active Streaming Format (ASF). JavuNetwork can further be adapted to support any format for which a codec is available. In addition, the underlying technology—Resolution Independent Video Language—allows the JavuNetwork tool to mix the resolutions of varying formats. RIVL contains a transcoder that converts multiple formats into one another (turning QuickTimes to AVI's, for example) and outputs video in any given resolution.

Although the future of multimedia lies with the establishment of high bandwidth, Javu is well positioned for present low-bandwidth environments as well. It allows full functionality for those with 56-kilobits-per-second modem connections, but can be used with a modem as slow as 28.8 Kbps. When working with video, the smart-view functionality lets you see a proxy image through the Java-based thin client on your desktop, but nothing happens locally aside from sending commands back to the server. Editing a 1024 × 768 MPEG-2 video in the traditional paradigm would require considerable time for downloading, editing, and uploading because it's so information intensive. With the JavuNetwork, you're working with a very high-resolution file while seeing a low-resolution copy of it. Commands are transmitted back to the server and applied to the full resolution copy without ever using the bandwidth to transfer it fully onto the desktop.

Software upgrades are straightforward using this application service provider (ASP) model. Every time you launch the Javu applet on the client side, it checks against the main server for the latest version and downloads a few small Java classes for feature updates.

JavuNetwork functions include

- Distributed architecture with central video editing application server and multiple Java-based thin clients
- Drag-and-drop interface, based on an object-oriented paradigm
- Nonlinear video editing capabilities using an interactive timeline

- Multiple transitional effects (wipes, dissolves, zooms) and special effects (filters, blurs, distortions)
- Advanced image editing capabilities (arbitrary transparency and area fill)
- Basic audio editing (single channel, mixing, overlay, and so on)
- Basic text editing and labeling
- Support for most video, graphics, and audio formats
- Multiformat streaming video and audio support
- Basic project management and collaborative features such as annotation and storyboarding

Using JavuNetwork

VideoFarm.com offers subscribers unlimited access to JavuNetwork. Unlike existing desktop editing solutions, users of the VideoFarm.com service can edit digital media using any Web browser. VideoFarm servers relieve users from having to invest in expensive add-on hardware, processors, and disk space. Javu Technologies is a prime

Figure 1. Screen shot of the JavuNetwork user interface.



example of the rising class of online services known as ASPs that rent software technology to users instead of making them buy it.

Those who have their video digitized can upload the files they want to edit directly to the VideoFarm site. For those who don't, VideoFarm provides digitizing services and offers stock footage. The first time you go to edit your video content, you need to download a setup for Video Farm's editing tool, JavuNetwork, which runs with your Web browser. The interface consists of a menu bar, content window, monitor window, timeline, and JavuMarks (a set of editing tools including filters and transitions). Editing is done through the drag and drop technique, allowing you to cut and paste large segments down to individual video frames. You can also change or add sound, create titles, and enter transitions.

While you're editing a project, you can see what it looks like by playing it back with either RealNetworks' or Microsoft's player. A low-resolution Preview Build lets you view the video. When finished, a Project Build creates the finished video on the VideoFarm server. Once editing is complete, VideoFarm houses and stores the finished video on its servers and allows customers to have the video transparently served through their own Web sites. The finished product can be downloaded to the PC or viewed as streaming video. Multiple users on the network can collaborate on the same project simultaneously from different locations. All media is protected, so you choose what people can see and what they cannot.

Managing intellectual rights is another application of our technology. For example, in order to purchase the last ten minutes of "Casablanca," Time Warner would have to allow for the download of the full video to a local desktop, thereby enabling the user to cut out the necessary piece. However, as soon as the digital copy is downloaded to the desktop, it's gone. With the JavuNetwork technology, Time Warner never releases control of their intellectual rights. The files reside on the server as a digital media repository.

VideoFarm provides further applications in

conjunction with its editing services. The flexibility of JavuNetwork allows for effective file storage and management. For example, you can post your file on the Web for others to download instead of e-mailing large video files. Also, VideoFarm can be used simply to host videos for a monthly rate typically lower than anywhere else on the Web.

Looking ahead

We expect multimedia editing and management to appeal to several audiences. These include the more than 70 million video enthusiasts who have downloaded either RealPlayer or MediaPlayer software; high-bandwidth providers who want to offer prospective subscribers a compelling reason to subscribe and further differentiate themselves from competitors; e-commerce sites and Web publishers seeking more compelling ways to market their products, services, and content; and corporations looking for improved video training, marketing, and sales solutions.

With continuing improvements in quality and mass availability of high-bandwidth access technologies such as xDSL (Digital Subscriber Line), cable modems, satellite networks, and so on, digital video is poised to become the premier medium on the Internet, merging with the currently prevalent audio, image, and text media types. We anticipate an increase in usage once such services are more widely available. Pushing the boundaries of its cross-media tool, Javu plans to add animation and 3D shortly to JavuNetworks' capabilities as well as a simple Hypertext Markup Language (HTML) client that would serve as an editing wizard for beginners.

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