HP & Linux at the movies: take one

The success of this once-maverick operating system has been especially rapid in the digital content creation world. Boutique studios and major workshops have embraced Linux, turning it into a real desktop alternative, and as a major force in the render farm backroom.

Studios such as DreamWorks, Disney, and Weta Digital are using Linux as their Operating System of choice to model, animate, simulate and render. Linux lends itself to the production pipeline of studios that have migrated from UNIX. First, such studios often have many complex plug-ins and tools that are easier to port to another operating system that resembles UNIX.

Also, the Open Source components of Linux prove popular. Free professional tools such as CinePaint, a motion picture editing tool primarily used for painting and retouching of movies, have also played a part in accelerating the adoption of Linux in the 3D graphics space. Many movie studios are now planning a 64-bit Linux future; the 64-bit address space is a necessity in the quest for greater realism, higher resolution renders, better physics, and even larger, more compelling crowd scenes.

Many of the major Digital Content Creation applications, such as Alias\Wavefront's Maya, are available today on Linux. The ISVs have been responsive to the needs of their customers and there is a full proprietary toolchain available.

Alan Ward is one of the HP engineers whose pioneering work helped make all of this a reality. Specialists in the graphics lab at HP had seen the potential of the new OS and began to champion it in the late 1990s. Of course, at that time graphics on Linux were still in their infancy - certainly the professional drivers and tools needed to make it a real alternative for a studio didn't exist.

Not only that, but there was no workstation platform able to run Linux with professional 3D graphics, but a number of the big studios were keen to move onto 32-bit Intel platforms and away from proprietary UNIX. Studios were porting their own tools and applications. The Independent Software Vendors were interested in moving their applications. But there was no hardware yet able to do the job, and a lot of lower-level tools and functions just didn't exist on Linux yet, or if they did, they needed to be tested and made more robust.

Alan explains: "There was a clear demand for Linux early on, but no one had so far been able to deliver 3D graphics for Linux to the standards these studios demanded. HP was designing our own video cards for UNIX and Windows and, of course, we wrote the drivers. So we combined our Windows and UNIX expertise to get the first professional 3D graphics card working on Linux in a production environment.

"Of course, 3D and 2D graphics are important, but getting 3D graphics to perform well is only scratching the surface of all the requirements that the DCC industry had before the the OS could be considered ready for prime-time.

"There were lots of things that had to be ported or written from scratch, then tested. There were many bug fixes that had to be implemented. It was a good feeling when we started to see the performance results and the animations that were being produced with our systems."
Alan and his teammates provided much of the functionality that graphical Linux required to be a serious business alternative, including:

- Improving the performance of the 3D OpenGL library while simultaneously identifying and fixing bugs, ensuring both performance and the robustness required for content creation applications.
- Developing hardware overlay planes to enable interactive graphic edits that can overlay on top of complicated rendered image.
- Coding dual-head support in a Single Logical Screen (SLS), improving the use of two monitors by making them seem as one.
- Supporting Large texture maps up to 16k texels on a side, ensuring bigger and more realistic models.
- Porting 3D texture mapping for volume visualization and real-time shadows.
- Creating parallel visibility testing of bounding boxes to speed up occlusion culling, so that whole objects concealed behind other objects are rendered very quickly or not at all.
- Writing calibration tools for monitors to ensure that the colors the artist sees on his screen are the same as the audience will see at the movie theatre.
- Enabling Aux/Pbuffer support for off-screen rendering, so only the completed render is visible to the artist.
- Improving the graphics tablet drivers.

The team also worked closely with the Independent Software Vendors and the studios themselves to port their own internal tools. This ensured applications would perform well on the new Linux graphics workstations. In short, HP worked in parallel on everything a movie animation studio might need and we were able to do this because we understand Linux, graphics, software development, and the digital content creation business.

Today, similar work continues, drawing on our reserve of graphics expertise and of the needs of our digital content creation customers.

“...” said Alan.

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