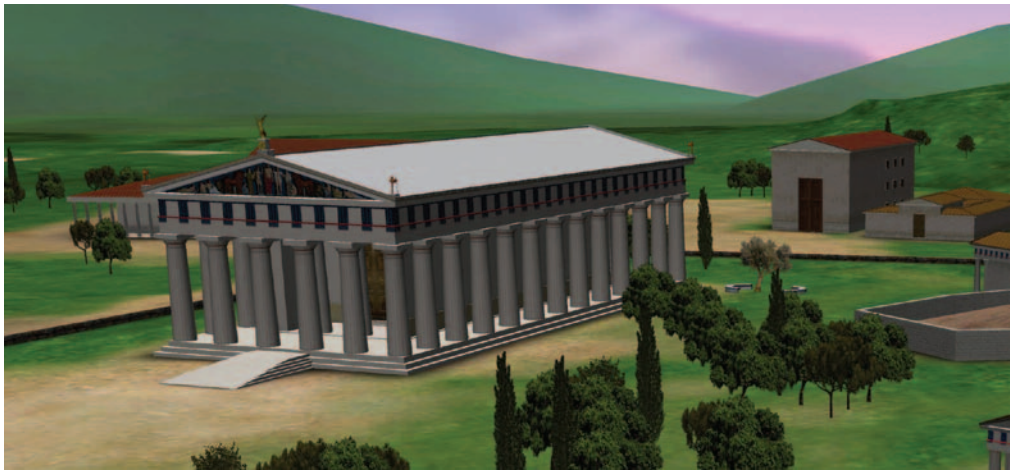
Success Story

Immersive Virtual Reality Environment



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Foundation of the Hellenic World Uses Silicon Graphics Prism Systems To Design Immersive, Interactive Tour of Ancient Agora

To continue to illustrate the extent and scope of Hellenism and its contribution to the development of civilization, the Foundation of the Hellenic World (FHW), a not-for-profit cultural institution in Athens, Greece, is currently designing a virtual reality tour of the Ancient Agora, the birthplace of democracy. The Agora's buildings were the center of public life, a site of political meetings and commercial transactions, and also the administrative, judicial and religious center of ancient Athens. Socrates often met his disciples there, in the shade of the Stoa of Zeus Eleutherios. The ruins of the Agora can be visited today, below the hill where the Acropolis stands, but for the first time, visitors and residents of Athens will be able to tour the ancient Agora immersively and interactively, filled with the living, breathing activities of its long history. Re-creating a virtual Agora is part of FHW's mission to promote an understanding of the past as a point of reference for the shaping of the present and the future, so that modern thought may be inspired by the Hellenic spirit.

For the development of a stunning immersive virtual reality (VR) tour of the Agora, FHW selected a Silicon Graphics Prism™ visualization system. To create the presentation in advance of the 2006 opening of a state-of-the-art immersive 128-seat domed theater, an addition to their innovative cultural center/museum, Hellenic Cosmos, FHW will use the SGI® system to add more animations and much more realistic graphics than its previous VR datasets.

Foundation of the Hellenic World Uses SGI Visualization Technology

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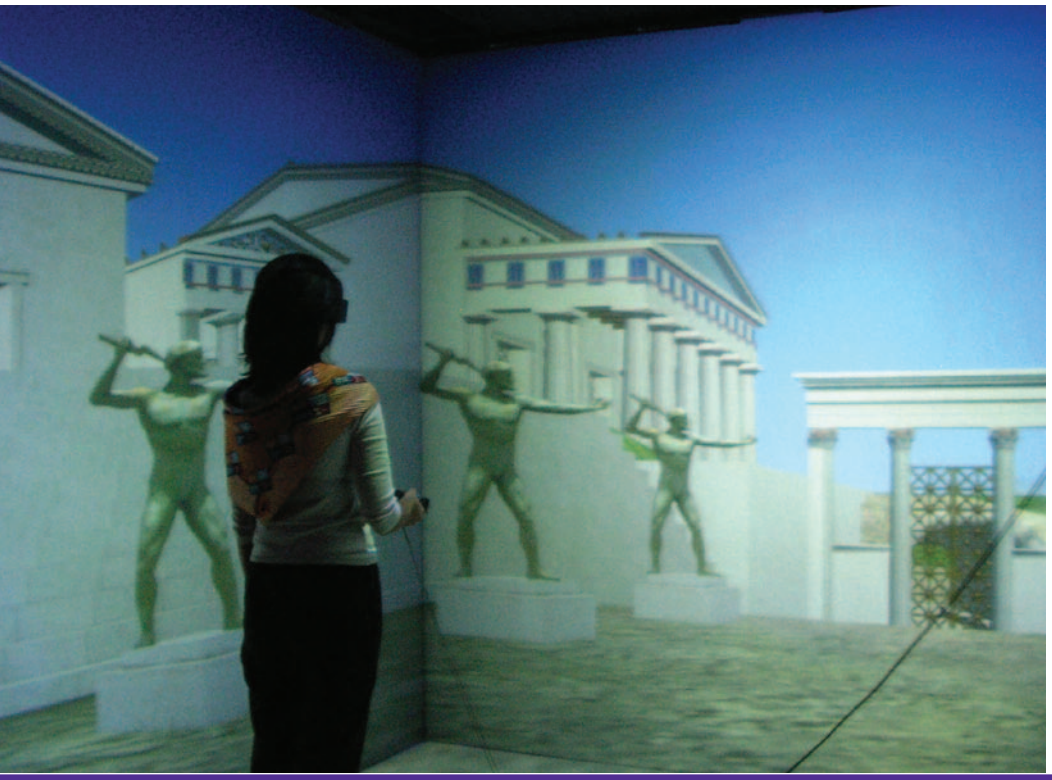
An SGI customer for many years, FHW expanded its permanent virtual exhibits at Hellenic Cosmos last year to coincide with the 2004 Summer Games. The Foundation opened three new exhibits, also created using SGI visualization technology, including an immersive 3D tour of Ancient Olympia, the birthplace of the Olympic Games, which has been enormously successful for the center. To create an even more spectacular virtual tour for the new domed theater, FHW purchased two Silicon Graphics Prism™ visualization systems, one with four ATI® graphics processor units (GPUs), a compositor and eight Intel® Itanium® 2 processors running the Linux® environment. The second Silicon Graphics Prism system is a four-processor, two-GPU configuration that is being used for porting and testing applications. The final implementation solution for the theater will be decided at a later date.

"Our Ancient Olympia tour had 33 virtual buildings and, at about half a gigabyte, was double the size of our previous dataset; it was straining our 7-year-old system. We knew we had to move to a faster machine with bigger texture memory and bigger shared memory for the Ancient Agora, which has 43 buildings, plus we're planning much more interaction," said Athanasios Gaitatzes, head of the Virtual Reality Department, Foundation of the Hellenic World. "We also wanted to move all our existing productions onto the Linux environment of the Silicon Graphics Prism and see how the new graphics cards that SGI is using will work with our old data, and get some exposure to the new machine's new architecture. The Silicon Graphics Prism system's shared memory is very important because otherwise we would have to use a lot of machines – clustering technology. We looked at clusters, and there are problems with powering interactivity, and they are very painstaking to use. The Silicon Graphics Prism system was the only machine that could offer speed, shared memory, and graphics power, along with the compositor, where you can assign quadrants for projection."



FHW also chose the Silicon Graphics Prism visualization system because hybrid graphics clusters offer a low-cost solution at introduction, but additional costs for programming, software licenses, system

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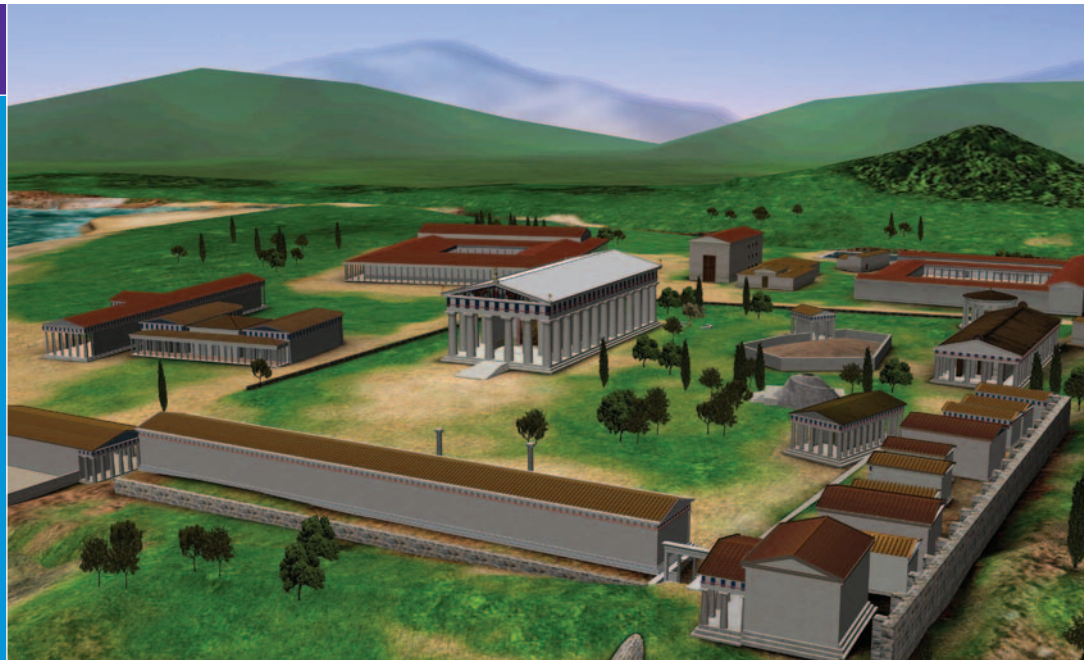

administration, power, and cooling, as well as the productivity costs of workflow inefficiencies must be factored in. For example, each node in a cluster requires its own copy of the operating system and each must be maintained, adding complexity. Further, with large data visualization, the graphics cluster quickly arrives at the point where adding additional systems to the cluster does not achieve the desired result. The scalable Silicon Graphics Prism system seamlessly scales to keep up with the growth of the size of datasets and enables steady, reliable workflows.

The SGI Scalable Graphics Compositor with dynamic load balancing enhances image quality, resolution, and image-processing performance on uncompressed data by combining the power of multiple graphics processors. With the two-GPU Silicon Graphics Prism system, FHW artists can specify that one GPU will draw the top of the screen, for example, and the second will draw the bottom of the screen, and the compositor makes both halves into one single image. Likewise, with a four-GPU system, quadrants can be assigned and the compositor will join them into one large image.

Designing a Virtual Ancient Agora

FHW has just started designing the scenario and modeling the ancient buildings of the Agora on the Silicon Graphics Prism system. Artists and software developers at FHW use Softimage|3D™ and Softimage|XSI™ for modeling the 3D data and write their own framework for development of environments. OpenGL Performer™ is the main, underlying software at FHW. The OpenGL® application programming interface, introduced by SGI in 1992, allows developers to incorporate a broad set of rendering, texture mapping, special effects and other powerful visualization functions and provides a graphics pipeline that allows unfettered access to graphics hardware acceleration. The OpenGL Shading Language supported by the ATI graphics cards in the Silicon Graphics Prism visualization system allows FHW to create the highest level of realism ever achieved.

The realism of the virtual Ancient Agora at FHW will no doubt spark imaginations and enrich a tourist or resident's visit to the Agora as it exists today. For example, in the VR experience, one may see marathon runners pass the cheering crowds around the 5th-century B.C. Temple of Hephaistos and Athena (the Theseion). Strolling past the herb garden and flowers planted around those temples today, the vibrant memory of ancient Athenian life will be inseparable from the now empty monuments and square.

For content creators, the Silicon Graphics Prism system leverages extreme processing power, visualization capability and programmable algorithm accelerators tied to single, system-wide shared "global" memory: hundreds of gigabytes per second of bandwidth are available to all processors and I/O devices. The 64-bit system also renders physics-based special effects in days instead of the weeks required on a 32-bit Linux cluster, creating all kinds of data-intensive realistic effects, such as water flows and particle sequences. Because the Silicon Graphics Prism visualization system seamlessly and independently scales compute, memory, graphics and I/O, FHW has future-proofed their virtual reality facility, and they can easily upgrade and integrate ever-evolving best-of-breed components.

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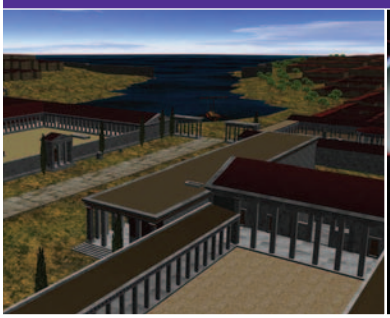

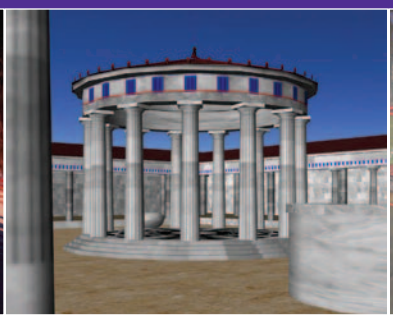


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Gaitatzes has already noticed that their software runs much faster, and that software written in the UNIX® environment is very compatible with the Silicon Graphics Prism system's Linux operating system. Furthermore, open standards have enabled FHW to purchase more affordable interaction devices for their virtual reality environment.

"Porting the Ancient Olympia presentation did not require a lot of changes at all and we expect that the Silicon Graphics Prism is going to make our lives easier as developers," said Gaitatzes. "We have also discovered an unexpected benefit. For our interactive CAVE (Computer-Aided Virtual Environment) and an immersive desk environment, the audience uses wands that have one joystick and three buttons. The wands cost about $3,000 US each. We thought we would see how the Logitech® Rumblepad™, which has two joysticks, 10 buttons and costs only $50, interfaces with the Silicon Graphics Prism system. FHW's engineers actually got it to work, so in the lab we can move around in Ancient Olympia using one of those Rumblepads. We haven't tried it with our audiences yet, but it opens up a lot of possibilities for interaction."

Still in the specification stage, FHW is investigating stereoscopic capabilities for the dome theatre, which is under construction, and has not yet decided on the exact interaction devices.

FHW's staff is made up of archaeologists, historians, architects, museologists, museum educators, computer scientists, graphic designers, producers of multimedia programs and 3D animation modelers. The Academic Board and the Planning and Development Board of the Foundation include many distinguished academics in the fields of History, Archaeology, Art History and Architecture. The Foundation uses state-of-the-art, cutting-edge information and computer technology in its pursuit of the research, awareness and understanding of Hellenic history and culture, promoting an understanding of the past as a point of reference for the shaping of the present and the future. SGI is working closely with the Foundation to support the growth of the Hellenic Cosmos Cultural Center to establish one of the largest immersive virtual reality environments in Europe, which will host some of the biggest virtual heritage projects ever developed.

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