SGI® Onyx® Family of Advanced Visualization Solutions
The Ultimate in High-Performance Visualization

Features
• Unparalleled system performance to solve the world’s toughest visualization problems
• Scalable performance and displays with up to 16 graphics subsystems and over 40 million pixels displayed from a single SGI Onyx system
• The industry’s richest graphics feature set
• Universal access to advanced visualization with Visual Area Networking
• Diverse operating modes that drive productivity and enable one machine to be leveraged for multiple uses
• SGI software and APIs that make implementation a breeze
• Industry-leading support for all major high-definition and standard-definition video formats and graphics-to-video output
• Modular flexibility and serviceability
• Binary compatibility with other SGI Onyx family products

Real, Not Imagined
Creativity and insight are limited by our understanding of today’s reality and our ability to create tomorrow’s. SGI® advanced visualization solutions give you the visual realism, advanced features, and performance needed to see things as they are and how they could be. Whether you are designing the next-generation sports car, uncovering new petroleum reserves, or creating the next blockbuster movie, the SGI Onyx family lets you and your team go beyond the limitations of workstations and unleash the power of advanced visualization.

A Breakthrough in Visual Realism
Making the leap from imagined to real requires more than polygons and pixels per second; it demands an integrated approach to graphics hardware, software, and system design that is only available with the SGI Onyx family of visualization supercomputers. Stunning realism is only achieved when hardware and software are designed together and work in concert to render compelling imagery and maintain the physical truthfulness behind it. Techniques such as image-based rendering, dynamic shaders, and interactive volume rendering are possible because SGI APIs are designed to exploit the advanced features of the SGI Onyx family.

The Right Architecture for Visual Problems
Onyx visualization solutions are based on the award-winning SGI® NUMAflex™ architecture, which provides unprecedented modularity, configurability, and reliability. NUMAflex provides independent scaling and updates for all of the major system components including CPU, memory, storage, I/O, and graphics. The NUMAflex architecture is based on a shared-memory model for all computational resources, which allows system performance to increase linearly as additional resources are added. SGI Onyx has a balanced system architecture designed to simultaneously process 3D graphics, 2D imagery, video data, and high-performance computations. The SGI Onyx family scales from single-user environments up to the ultimate combination of supercomputing and visualization technologies, all with binary compatibility across prior, current, and future SGI products. SGI Onyx enables you to configure the most cost-effective solution for your problem today and provides limitless options to solve your problems as they evolve in the future, protecting your investment.

Diverse Operating Modes Drive Productivity and Economy
SGI Onyx visualization solutions offer flexible operating modes to keep the system working around the clock, thereby maximizing your ROI. These modes can include: use as an interactive multiuser advanced workstation, as an interactive graphics supercomputer, and as an advanced visual system driving an SGI® Reality Center® facility. Put it to work at night and on weekends as a compute server to create data for analysis during the next business day. On one day all of the SGI Onyx system’s advanced visualization power can be dedicated to solve one world-class problem, and the next day it can be partitioned to accelerate your entire department’s workflow.
The SGI Onyx family is the world’s most powerful visualization system, providing breakthrough performance and features for the most demanding visual computing challenges. The family is supported by two different graphics subsystems: InfiniteReality™ for the world’s best image quality, and InfinitePerformance™ for economical workflow acceleration. Each of these graphics subsystems comes in two classes, depending on the desired scalability: SGI® Onyx® 350, the more affordable option, supports up to 32 CPUs and eight graphics pipelines; SGI® Onyx® 3000 provides the ultimate in scalability, supporting up to 128 CPUs and 16 graphics pipelines.

**The Ultimate in Supercomputing and Visualization**

**SGI Onyx 350 InfiniteReality4™**

Are your scientific and engineering analysis problems becoming too complex to visualize on workstations? Are you looking for ways to interactively visualize complete models instead of single subassemblies? If so, this product provides an economical advanced visualization solution for polygon-intensive applications. Solutions scale from 2 or 4 CPUs and one graphics pipeline in a small 2U package up to 32 CPUs and eight graphics pipelines in 18U. Taking advantage of the unique NUMAflex architecture and SGI’s zero-latency compositors, it offers sustained performance up to 140 million polygons per second. In addition, this product can provide a creative alternative to a department contemplating a workstation on every engineer’s desk.

**SGI Onyx 3000 InfinitePerformance**

A more scalable version of the InfinitePerformance graphics family allows for up to 128 CPUs and eight graphics pipelines in one massive shared-memory environment. This product is designed primarily for users with massive computational problems requiring SGI supercomputing technology who want to visualize their results. Being able to crunch your big data and visualize it on the same machine without moving the data over the network can dramatically accelerate your workflow.

**SGI Onyx 3000 InfiniteReality4™**

The ultimate solution for the most challenging demands, this system’s combination of high-performance computing and advanced visualization provides faster time to insight. This product can scale up to 16 InfiniteReality4 pipelines and up to 128 CPUs with up to 1TB of system memory and 716GB per second of I/O. All of that horsepower can be harnessed to solve one “grand-challenge” class problem or it can be partitioned to support an entire department’s computational and graphics needs.

**Scalable Graphics**

SGI has created a breakthrough in graphics system architectures that enables you to build an advanced visualization solution based on low-cost single-component graphics pipelines, which are combined to meet any requirements. Some problems may require a single pipeline’s performance capabilities, but many problems will require harnessing the power of two, four, or eight pipelines, all working seamlessly together to produce the desired results. SGI® Scalable Graphics Compositor provides the glue that enables these pipelines to work together. Each compositor receives DVI inputs from up to four pipelines, and then composites the rendered frames of each into one output. With the combination of the compositor’s zero latency and stress management software in the application, dynamic load balancing of the composition structure is enabled—ensuring that each pipeline is used to its maximum potential.
Industrial Strength
SGI Onyx systems provide insights for critical decisions, enabling breakthroughs in every industry in which competitive pressures fuel innovation. SGI Onyx systems deliver photo-realistic scenes of any data, from any perspective, in real time, with complete interactivity for either individual users or for a group collaborating in a variety of industries.

Universal Access to Advanced Visualization
Visual Area Networking enables anyone with a networked computing device to access the power of an SGI Onyx system. Interactive applications that take advantage of advanced graphics, computing, and I/O power are now available to IRIX®, Solaris®, Linux®, and Windows® desktop and mobile computing users without any modifications to underlying software. Visual Area Networking is the perfect complement to SGI advanced visualization technologies because it enables technical and creative professionals to take their most powerful tool with them wherever they go.

High-Performance APIs Make the Development of Differentiated Software Applications a Snap
SGI has a complete portfolio of advanced visualization software optimized to work with both InfiniteReality and InfinitePerformance graphics, because great hardware is only part of the solution. Whether you are developing software for flight simulation, seismic analysis, photo-realistic design review, or the latest in film editing and special effects, SGI has software designed just for you. It doesn’t matter if you are starting from scratch or adding new features into existing code; software developed by SGI makes it easy to leverage the power of the Onyx family. And, when combined with Visual Area Networking, it allows you to deliver the results directly to any desktop or mobile computing device.

SGI Digital Media
SGI Onyx systems were designed with digital media solutions in mind. A suite of options including professional-quality audio, high-definition (HD) and standard-definition (SD) video input, HD and SD video output, and HD and SD graphics-to-video output are available to create a professional-grade digital media solution. In addition to the hardware, SGI provides Open ML software APIs to help developers get the highest performance and most functionality from their applications.

End-to-End Superior Visualization Solutions
The impact of SGI Reality Center environments and Visual Area Networking solutions can be dramatically improved when the appropriate technologies are brought into the solution. These solutions involve integration into existing infrastructure and workflows, so customized implementations of standard technologies become essential. SGI visualization solutions are based on proven excellence, including systems design, component selection, installation, and post-implementation customer support. Tightly integrated teams of technical experts who have designed and built these solutions before work closely with customers to ensure a superior, comprehensive solution that delivers increased productivity, integrates seamlessly into the existing workflow, and delivers a competitive business advantage.

High-Performance Connectivity
SGI Onyx systems feature versatile networking options including industry-standard Ethernet, HIPPI, and FDDI interfaces. Fibre Channel and ATM connections take network capabilities to a new level of communications performance. The NUMAflex architecture delivers unrivaled system bandwidth that scales with the system, so I/O devices in SGI Onyx systems operate at peak performance, avoiding bandwidth contentions among graphics, video, storage, and I/O that bottleneck other system architectures. Add to that SGI’s revolutionary CXFS™ high-performance shared filesystem, which provides true heterogeneous support for SAN environments with dramatic time savings, and you get a solution that meets all of your connectivity needs.
Onyx 3000 Specifications
Number of processors: 4–128
Number of graphics pipes
InfiniteReality: 1–2
InfinitePerformance: 1–8
Ce-Brick
Processor: 4, 8, 12, or 16 CPUs with 8 MB DDR full-speed SDRAM secondary cache/CPU
Memory: Up to 32 GB SDRAM
In-X Bricks (Base System I/O)
I 1 000Base-T, 2 115.2 Kbaud serial ports, 4 USB ports, 1 internal Ultra60 SCSI channel for up to 2 3.5” hot-pluggable fixed disk drive bays, and 1 channel for externally attached storage, CD/DVDRom drive, 8 available slots on 4 64-bit/100 MHz PCI-X buses (for 3.3 V and universal cards), PCI audio card included

Electrical and Power

- Voltage: 200–230 VAC single phase and 3-phase
- Power: 50/60 Hz
- Heat: 1,700 BTU/hr, max.
- Service type: NEMA L6-30, 208 VAC at 30 amp

Performance

- Texture fill: 8 sample pixels per line
- Volume rendering: Up to 80 M voxels/sec/pipe
- Texture download: Up to 336 MB/sec

InfinitePerformance Specifications

- Each V-brick is 7” (4U) height
- 1 Integrated InfinitePerformance pipe (for Onyx 350 only)
- Dedicated 1.6 GB/sec host connectivity
- Up to 10 MB of texture
- Up to 64 bit RGBA for up to 68 billion colors
- 16 bits/pixel including 24-bit eye space 2 buffer
- Up to 2.6 MB pixels monoscopic or IM pixels stereo driving 1 or 2 output channels (DVI-I) with genlock and swap synchronization

Scalable Graphics Compositor

- Combines 2, 3, or 4 digital display inputs (TMDs via DVI-I) into a single digital (DVI-I) or analog (15W3) output using flexible composition modes with zero latency and load balancing

Service and Support

SGI offers a broad range of services from installation and implementation to system tuning and system management. SGI services are designed to accelerate and optimize system productivity and are delivered by SGI technical experts. Support programs range from basic to 2/24 for mission-critical applications. For more information on available services, please see www.sgi.com/support.