



# Next Generation Graphics Hardware Architectures

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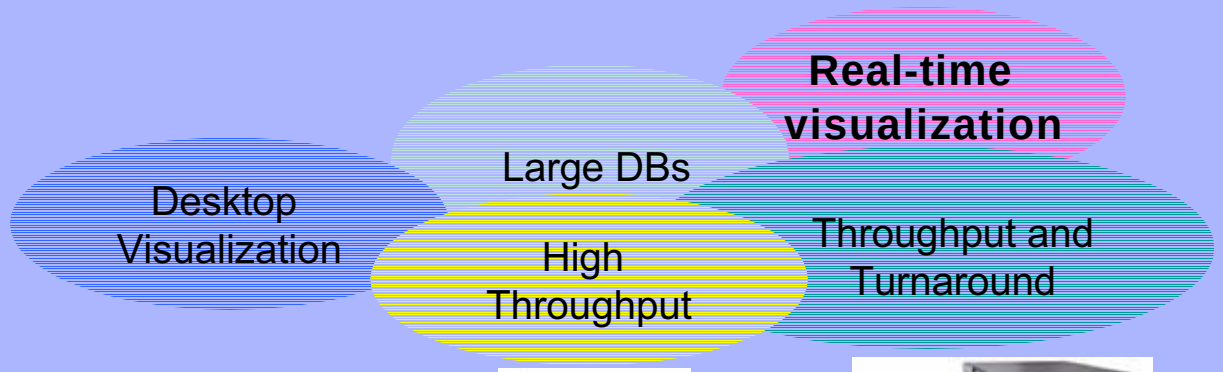
# Agenda

- The ultimate architecture
- Driving the technology
- SGI® Onyx® 3000 series
  - InfiniteReality3™
  - InfinitePerformance™
- SGI® Onyx® 300
- Silicon Graphics Fuel™ visual workstation
- Conclusion
- Q&A

# The Ultimate Architecture


Because some people think that
"There is no tool like an old tool"

# Driving the Technology




SGI® Reality Center™

Silicon Graphics Fuel™
Silicon Graphics® Octane2®
(IRIX®)

SGI® Origin® 300
SGI® Onyx® 300
(IRIX)

SGI® Origin® 3000 series
SGI™ Onyx® 3000 series
(IRIX)

SGI® Origin® 3800
SGI® Onyx® 3800
(IRIX)

Distributed memory — Shared memory

# SGI™ Onyx® 3000 Series

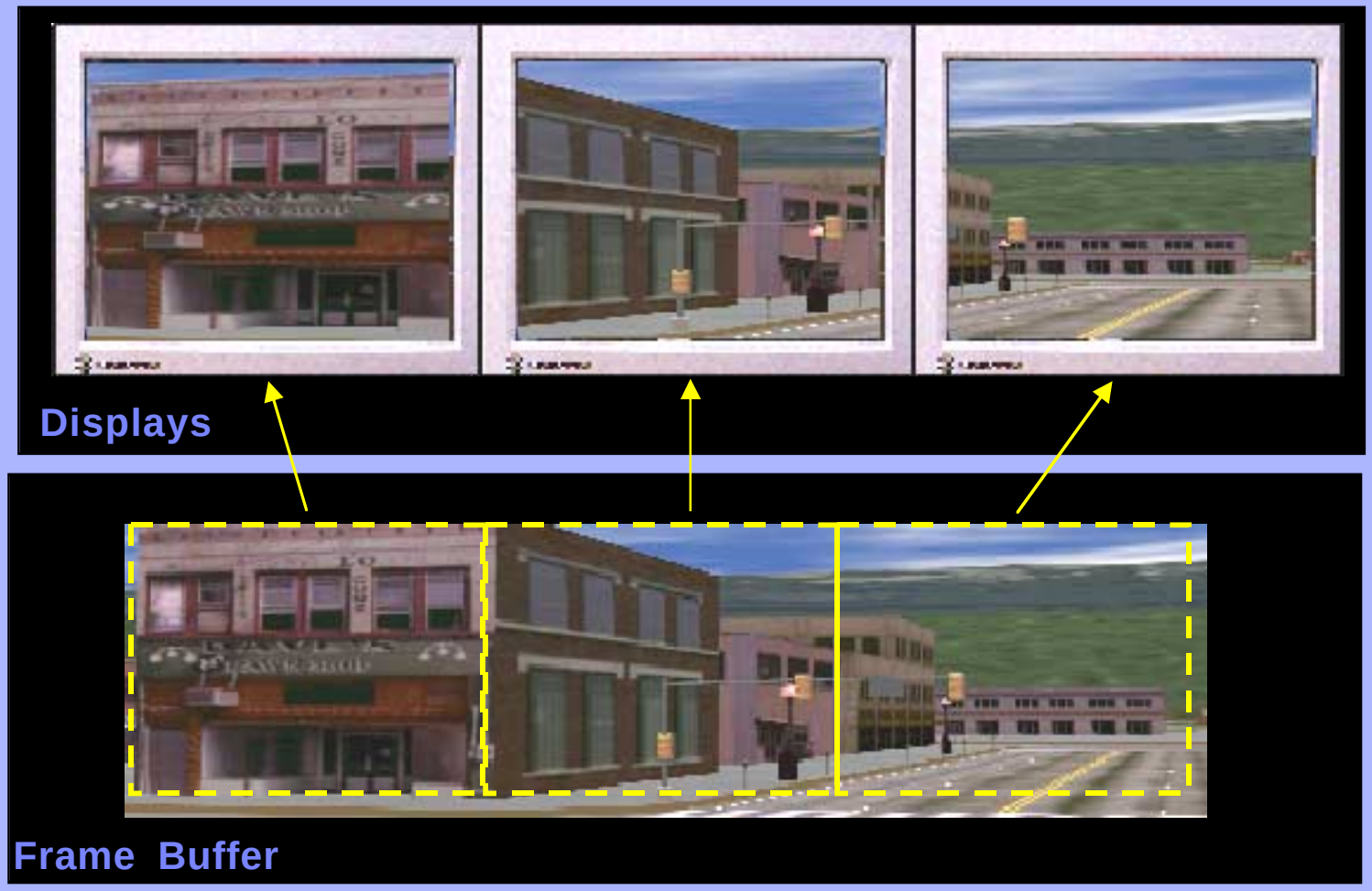
- SGI Onyx 3000 series with **InfiniteReality® graphics**

**Introduced July 2000**

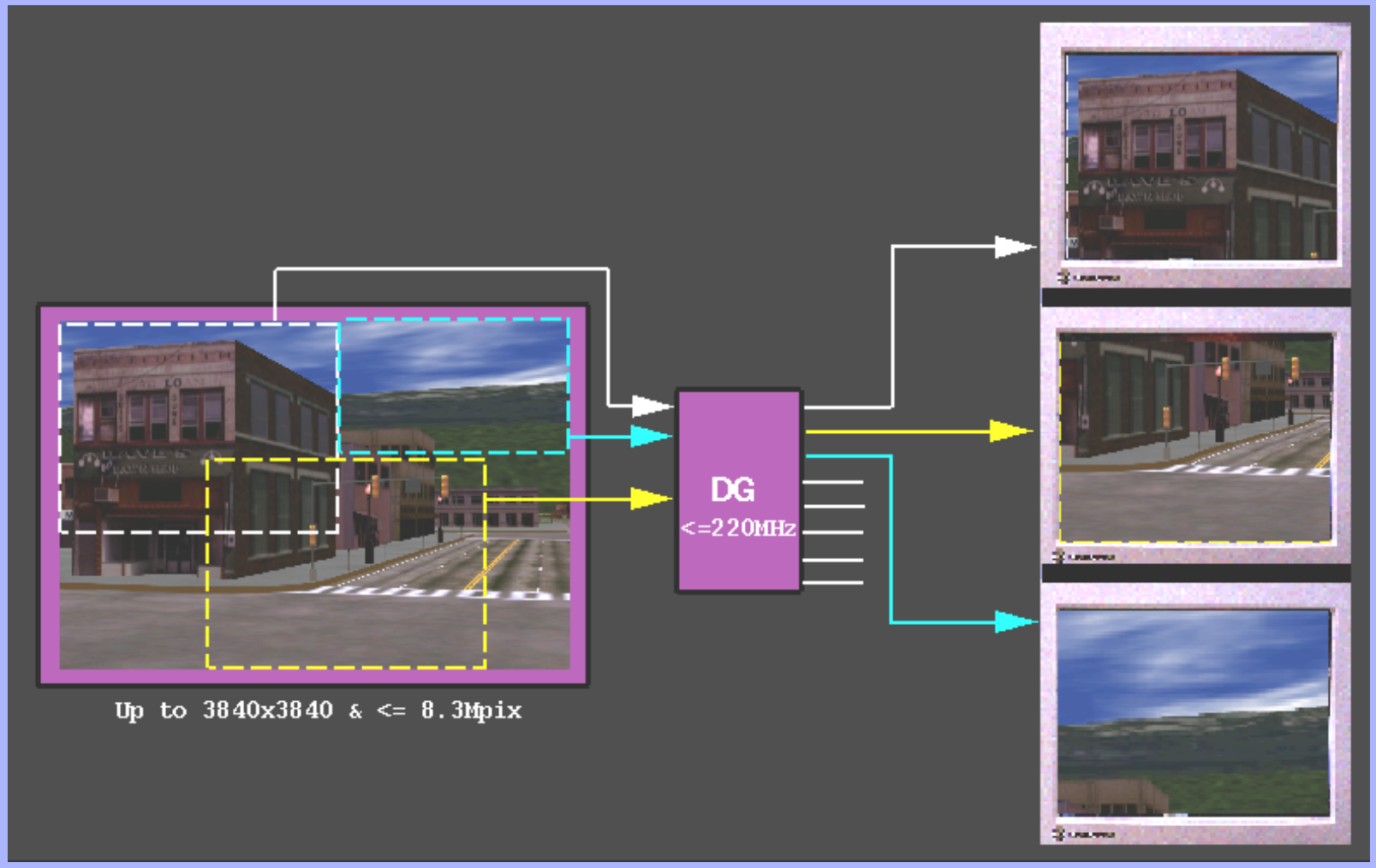
- **The industry's highest quality graphics**
- **Revolutionary NUMAflex™ modular computing design with integrated graphics**

# InfiniteReality™ Performance, Flexibility, and Quality

# InfiniteReality™
# Versatile Frame Buffer



# InfiniteReality™
# Versatile Frame Buffer

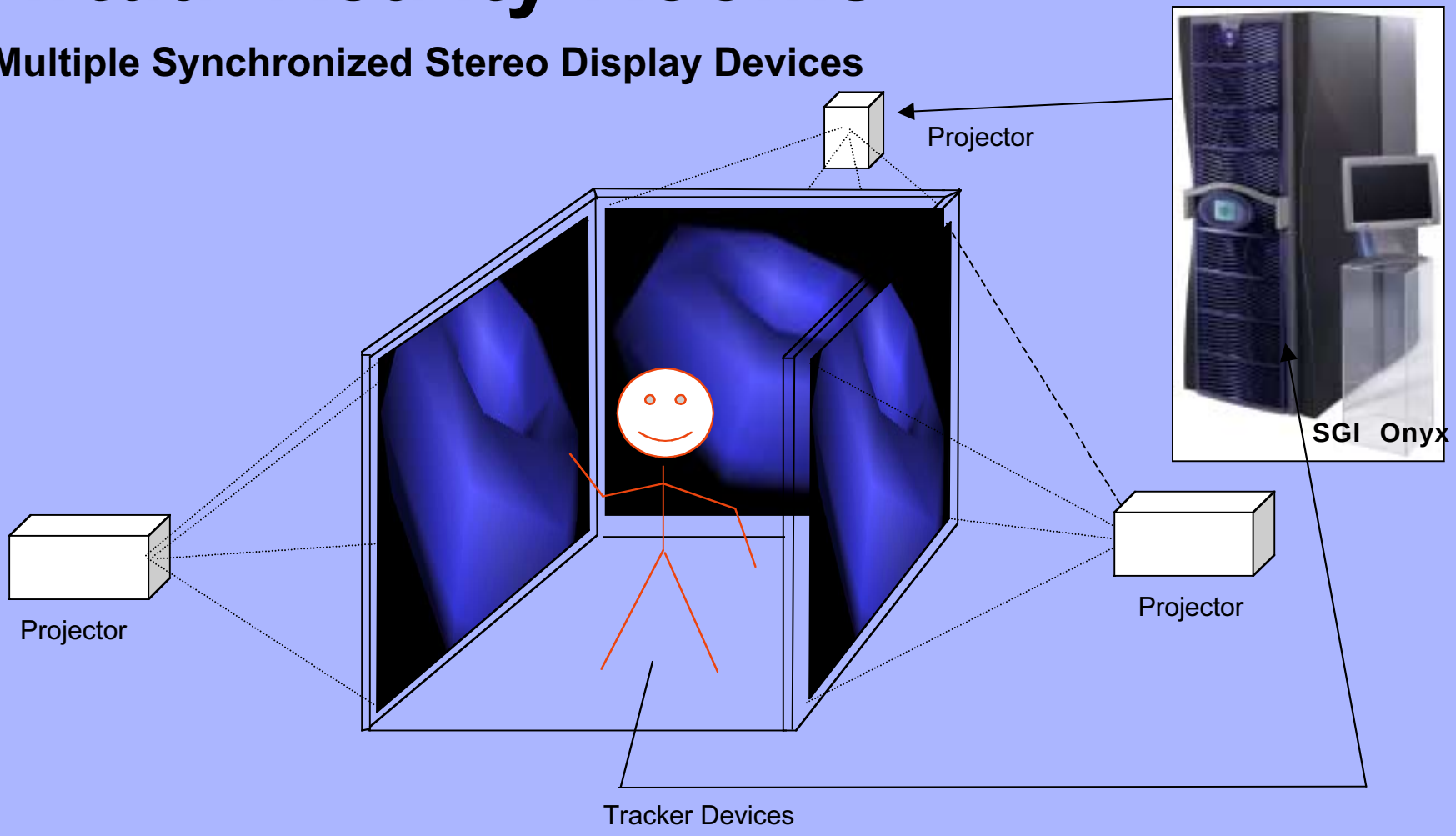


# InfiniteReality™ Reality Center™

**Multichannels are easy!**
**Even in Edge-Blended Configurations**

# InfiniteReality™ Virtual Reality Rooms

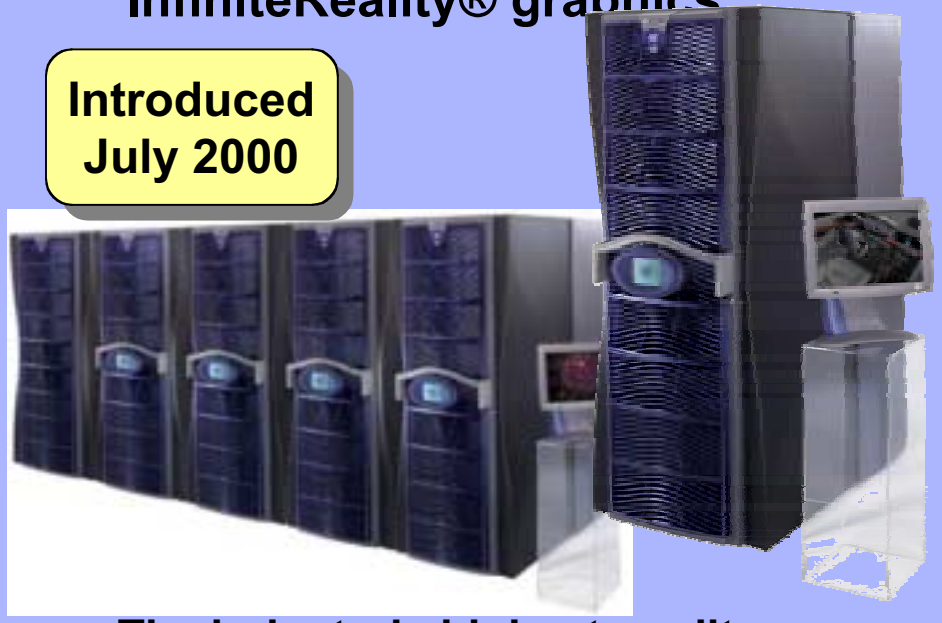
## Multiple Synchronized Stereo Display Devices



# Introducing InfinitePerformance™

- SGI Onyx 3000 series with **InfiniteReality® graphics**

**Introduced July 2000**



- **The industry's highest quality graphics**
- **Revolutionary NUMAflex™ modular computing design with integrated graphics**

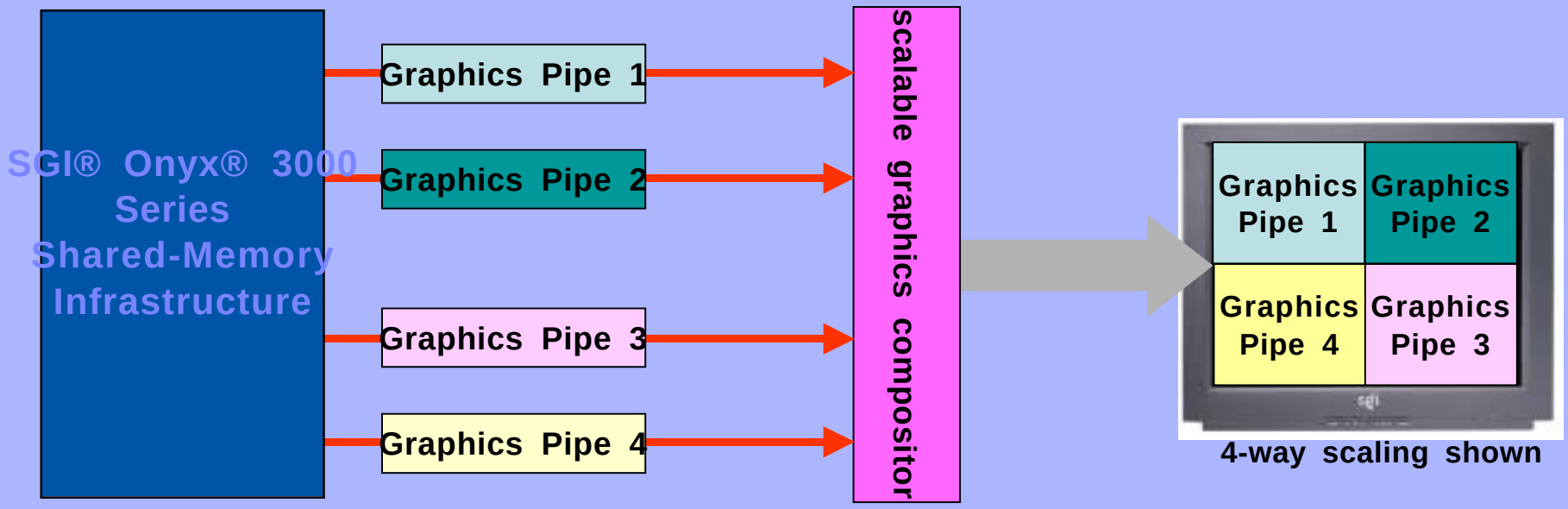
- SGI Onyx 3000 series with **InfinitePerformance® graphics**

**Introduced January 2002**

- **Highest interactive polygon performance**
- **Significantly better polygon-oriented performance/price**
- **Maintains NUMAflex design**

# SGI® Scalable Graphics Concept

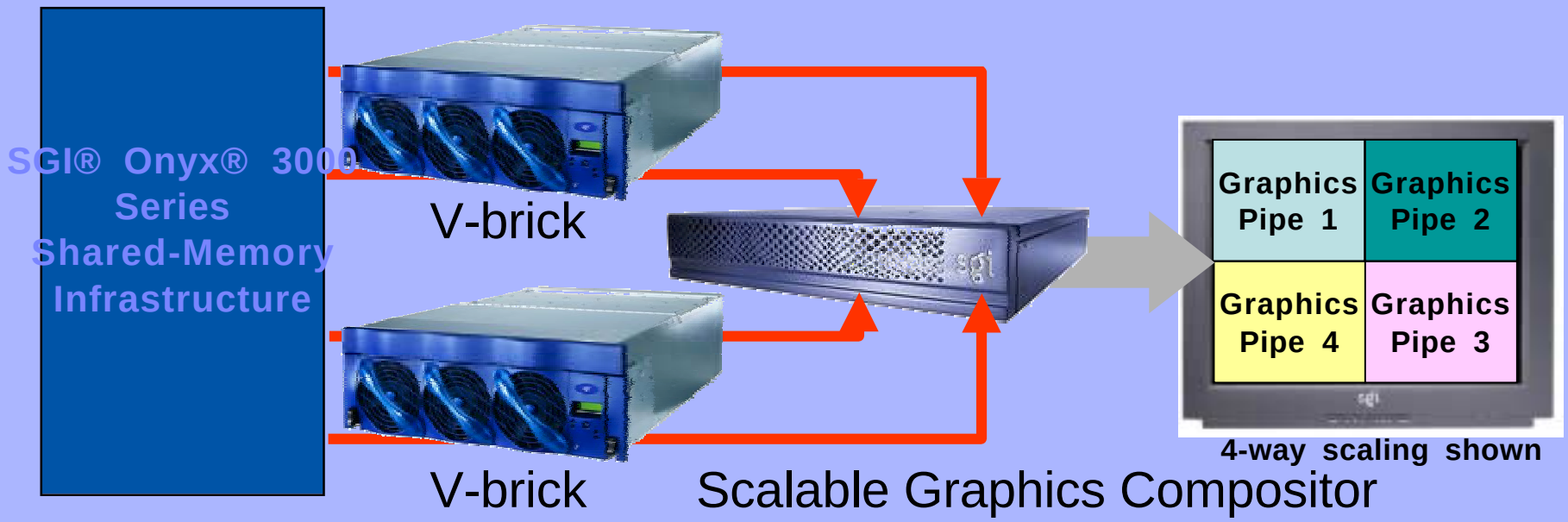
Zero-latency method of combining the graphics power of multiple graphics pipes onto a single display




Zero latency compositing is unique to SGI and enables real-time load-balancing for maximum performance.

# SGI® Scalable Graphics Concept

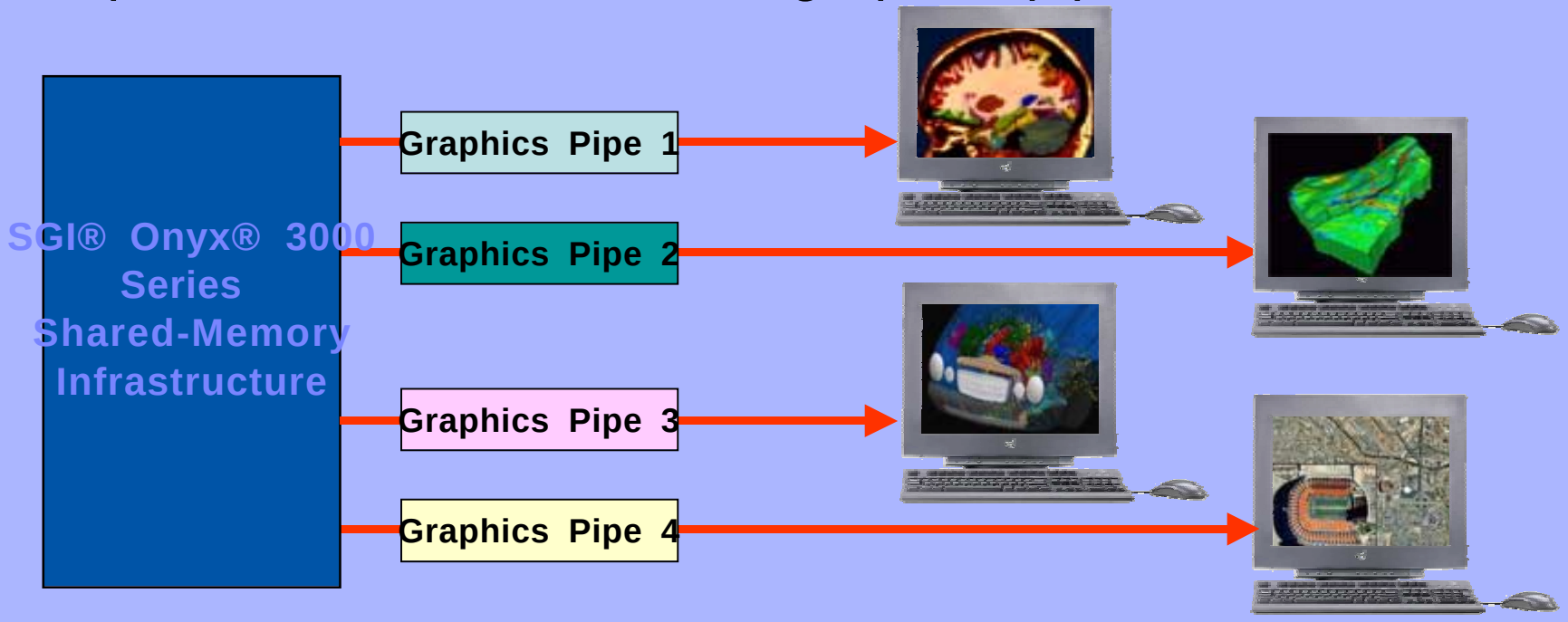
InfinitePerformance™ graphics is made up of two components.




SGI scalable graphics enables applications to scale up to 16 times in both triangles/sec and pixels/sec.

# SGI® Scalable Graphics Concept

SGI® 3000 shared-memory architecture supporting multiple independent workstation class graphics pipes.




Supports multiple independent users
Supports multiple display channels in an SGI® Reality Center™

# SGI™ Onyx® 3200 with InfinitePerformance™

- **SGI Onyx 3200 supporting 1x IP pipe**
  - Allows short-rack form factor (17U)
  - Requires two c-bricks (min. 4p, max. 8p)
  - No scalable graphics compositor!
- **Opportunities:**
  - Compute-heavy single-pipe apps
  - DS-like form-factor requirements
  - Host requirements above Silicon Graphics® Octane2™ (I/O, RAS)
  - Examples: imaging, film restoration, CAD preview

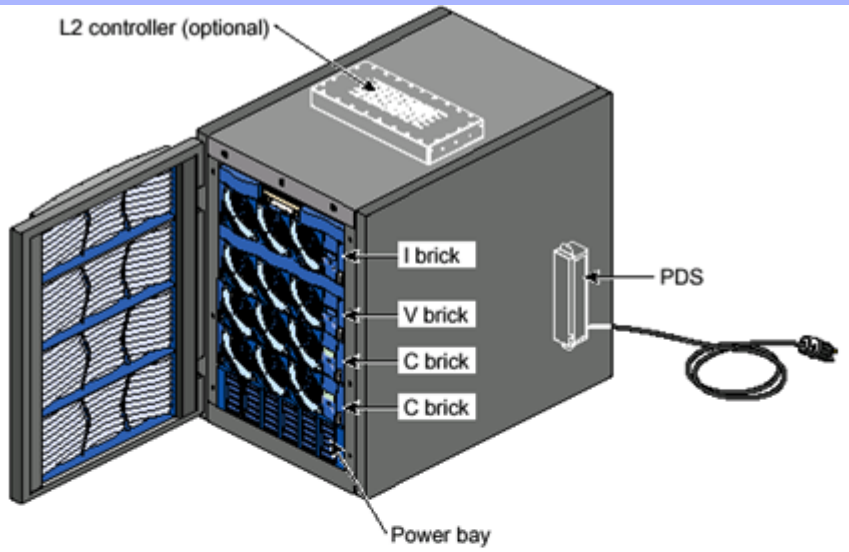
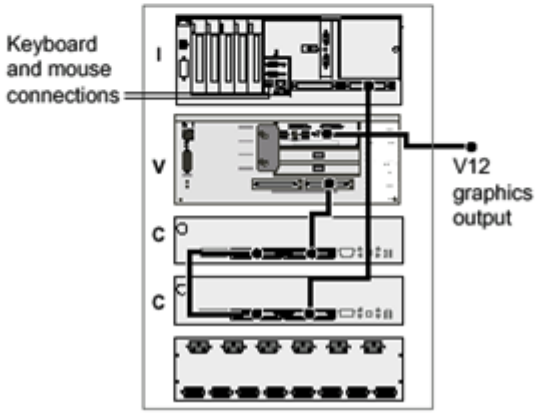
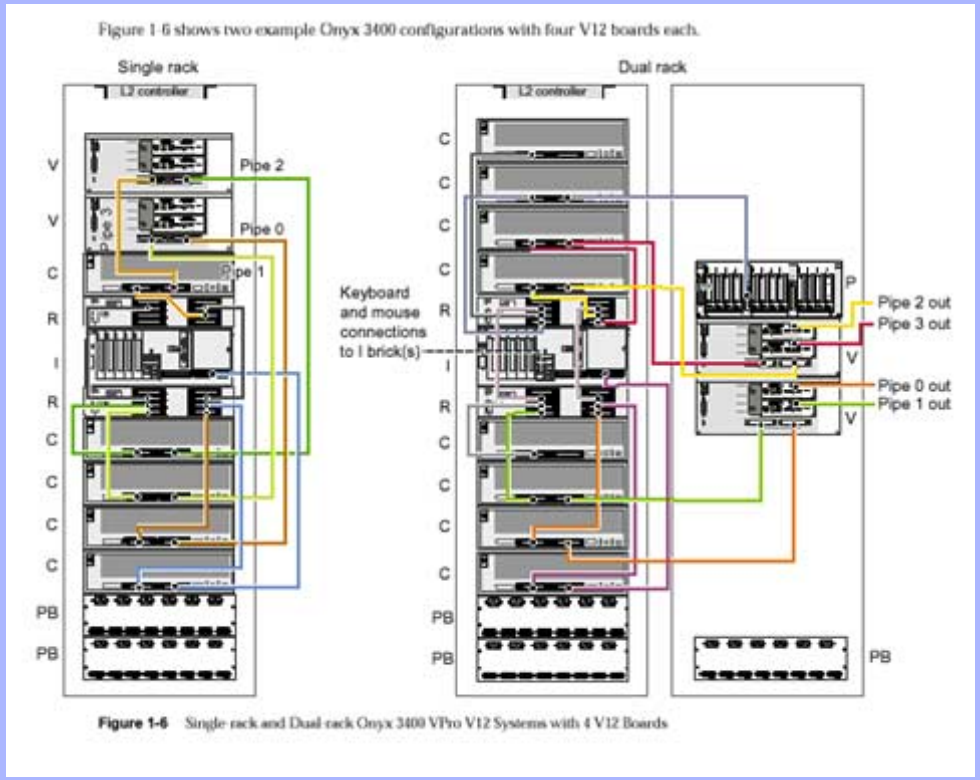



**Figure 1-2** Onyx 3200 VPro V12 System



# SGI™ Onyx® with InfinitePerformance™

- **SGI Onyx 3400 supporting up to 4x IP pipes**
  - **Single or multiple tall racks**
  - **Independent and/or scalable performance with scalable graphics compositor**
- **Opportunities:**
  - **Compute-heavy visualization**
  - **Requirements for solo and/or multipipe**
  - **Scalable performance**
  - **Examples:**
    - **Large-model assembly review**
    - **Engineering analysis (Crash and CFD)**
    - **Visual serving (many "cheap" pipes on one SSI machine)**
  - **Combine HPC with scalable visualization capabilities**

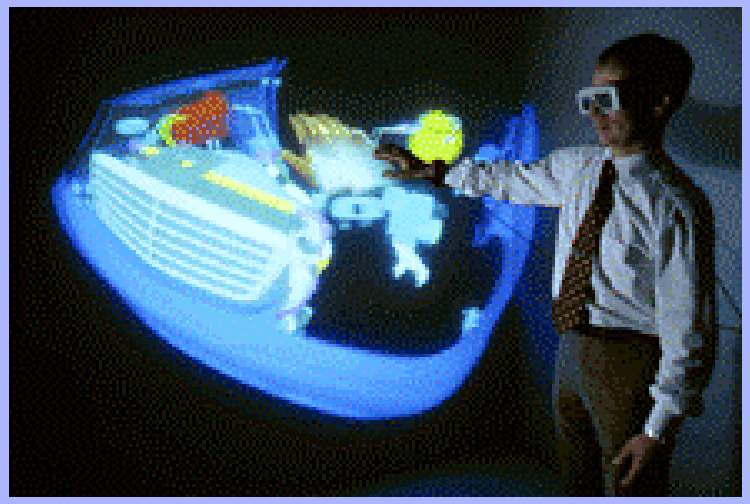


# InfinitePerformance™ Features and Benefits

- **Highest performance on interactive problems**
  - Scalable single screen performance to over 250M polygons/second and 6G pixels/second
- **Low cost add-on to compute servers**
  - Leverage scalable system infrastructure for both HPC and visualization
  - Multiple users share high-performance resources
- **Power user deskside system**
  - 2x compute performance, 60% better compute price/performance than Silicon Graphics® Onyx2®
  - 4x compute performance of desktop Silicon Graphics® Octane2™
- **Low-cost high-performance VR**
  - Dedicated pipe/screen at 50% of SGI® Onyx® 3000 series with InfiniteReality3™
  - Greater system capability, applications availability, and ease of use than a cluster
- **Incredible solution flexibility**
  - Easily switch between usage modes as workloads change

# InfinitePerformance™ Graphics Features

- Geometry performance at close to 18M ▲/sec
- Fill rate compares to 2RM InfiniteReality3™ pipe (448 Mpixel/sec)
- 12-bit per component RGBA
- 16-bit Z buffer
- 96-bit accumulation buffer
- Up to 104MB texture memory
- Specular shading
- Post-texture lighting
- No hardware anti-aliasing



# SGI® Onyx® 3000 Series: Two Graphics Options

**InfiniteReality3™ Graphics**
**= Ultimate Visual Realism**

Image courtesy of EAI

**InfinitePerformance™ Graphics**
**= Ultimate Geometry Performance**
**= Scalable Geometry Performance**

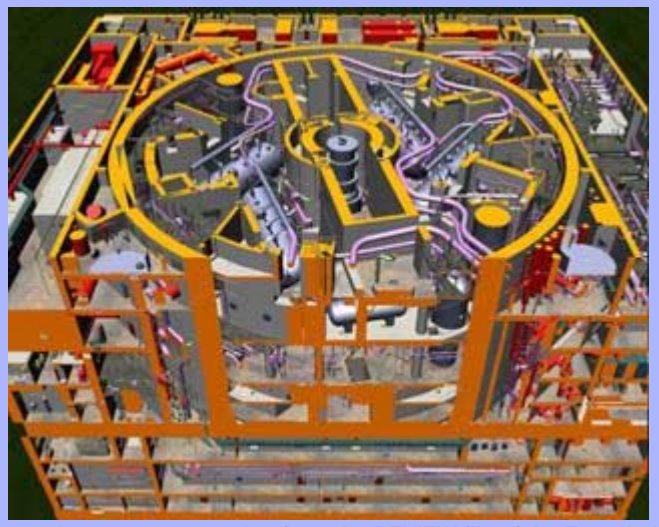


Image shows a cross-section from the REVIEW file of the Temelin NPP [Nuclear Power Plant] reactor designed using PDMS [Plant Design Management System]. Screen image courtesy of Ceske Energeticke Zavody a.s. Jadema elektrarna Temelin.

# Introducing SGI® Onyx® 300 with InfiniteReality3™ Graphics

- New levels of price/performance
- Lower system cost and reduced size
- Most modular visualization system on the planet

# The Power Behind the Concept

## Cost-Effective, Compact NUMAflex™ Computer Platform


SGI Onyx 300 Compute Module

C-brick

I-brick

SGI Onyx 3000

SGI Onyx 300

# A Family of Compact High Performance Modules

## The Ultimate in Flexibility and Investment Protection

Compute Module

SGI® TP900 Storage System

NUMAlink™ module

PCI module

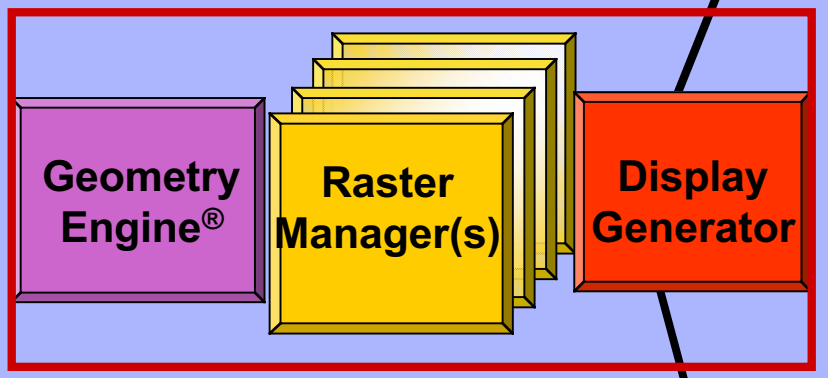
InfiniteReality3™ Graphics

# Delivering More Power in Less Space

## Compact Design Delivers Cost-Effective Technical Computation and Visualization

SGI® Onyx® 300

32-processor maximum
in a single rack



# Cost-Effective Scalability

Up to eight 4RM InfiniteReality3™ graphics pipes

Up to 32 MIPS® R14000™ CPUs

SGI® Onyx® 300 with InfiniteReality3

# SGI® Onyx® 300 with InfiniteReality3™

- Cost-effective solutions for seismic and reservoir visualization tasks

- Scalable I/O performance to rapidly load large data sets
- Virtually unlimited memory to hold them in memory
- Scalable CPUs for feature extraction and processing

# SGI® Onyx® Family Systems

## Performance

**SGI® Onyx ® 3000 Series with InfinitePerformance™**

**Fastest interactive geometry performance**

## Realism

**SGI ® Onyx ® 300 with InfiniteReality3™**

**Compact, cost-effective realism**
**Lowest InfiniteReality3 entry price**

**SGI ® Onyx ® 3000 Series with InfiniteReality3™**

**Ultimate image quality**
**Ultimate digital media**
**Unlimited computation**

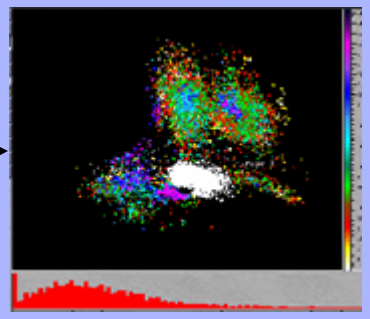
# SGI® Onyx® Family Systems

## Unique combination of

**Complex Data**

- Large datasets (9 PB)
- Fast I/O
- CXFS™ File System
- Real-time data acquisition

**Processing Horse Power**



- 2 to 128 CPUs
- Advanced ccNUMA architecture
- Low latency
- Modular flexibility

**Industry-Leading Graphics**

- Interactive photo-realism
- Fast polygons, fast pixel fill
- Precise color information
- Unlimited geospecific terrain flyover
- Large volume visualization

**Flexible Display Capabilities**

- Super-high resolution
- Multiple displays
- VR devices
- Stereo
- Multiple-mode usage

Real-time environment
Advanced software environment
Huge bandwidth to keep it all moving

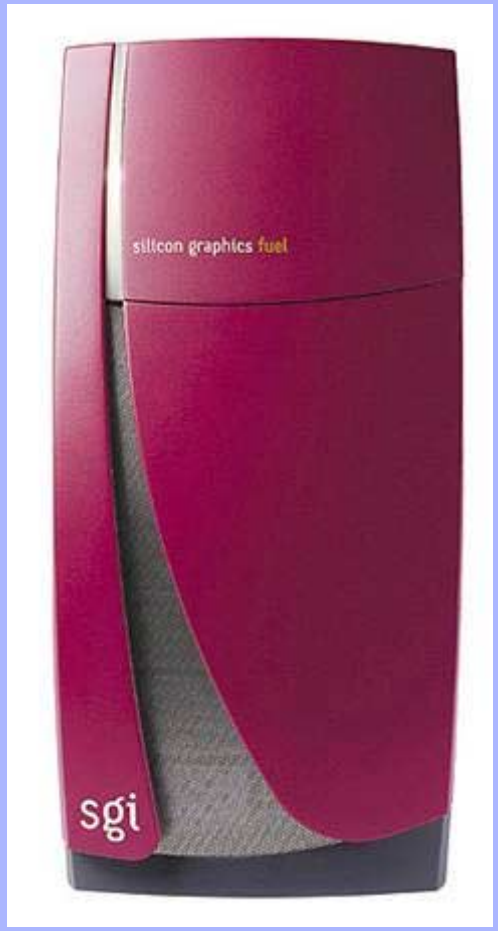
# Silicon Graphics Fuel™ Visual Workstation

A New level of
- Performance
- Productivity
- Precision

on the Desktop

# Fueling a New Level of Performance and Affordability

- New IRIX® workstation line leveraging high-end SGI® 3000 Family architecture
- Includes top-of-the-line VPro™ graphics
- Binary compatibility with current IRIX ensures application availability
- Complementary to Silicon Graphics® O2+™ and Silicon Graphics® Octane2™



# Delivering More Performance at a Lower Price

High-Bandwidth SGI® 3000 Family Architecture

- Increased memory and CPU bandwidth
- Increased secondary cache

New MIPS® Processors

- 500MHz and 600MHz

Industry-Leading VPro™ Graphics

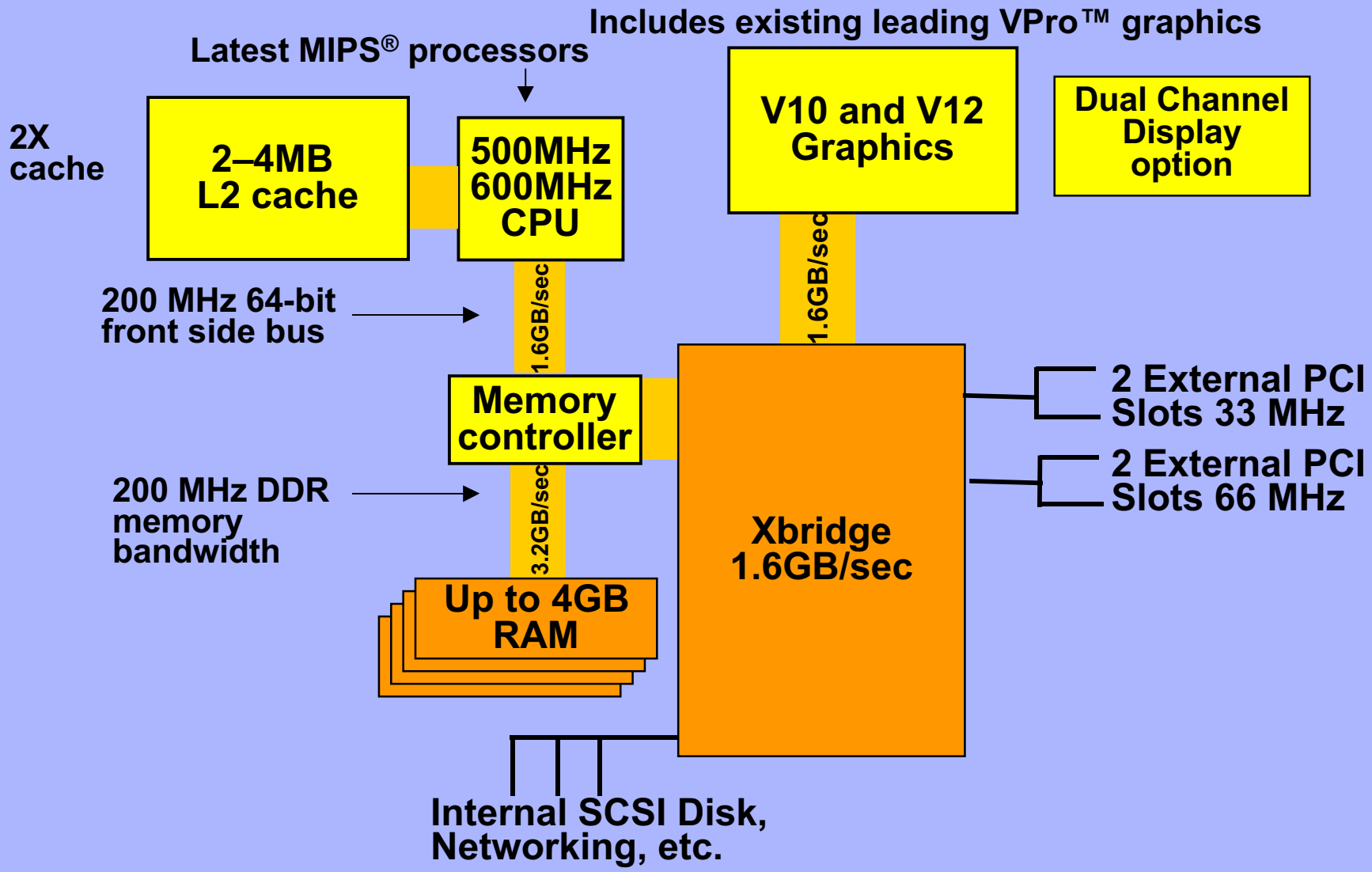
- 48-bit RGBA, fast geometry performance, large texture memory, hardware accelerated specular shading

New Workstation in Power-Packed Form Factor

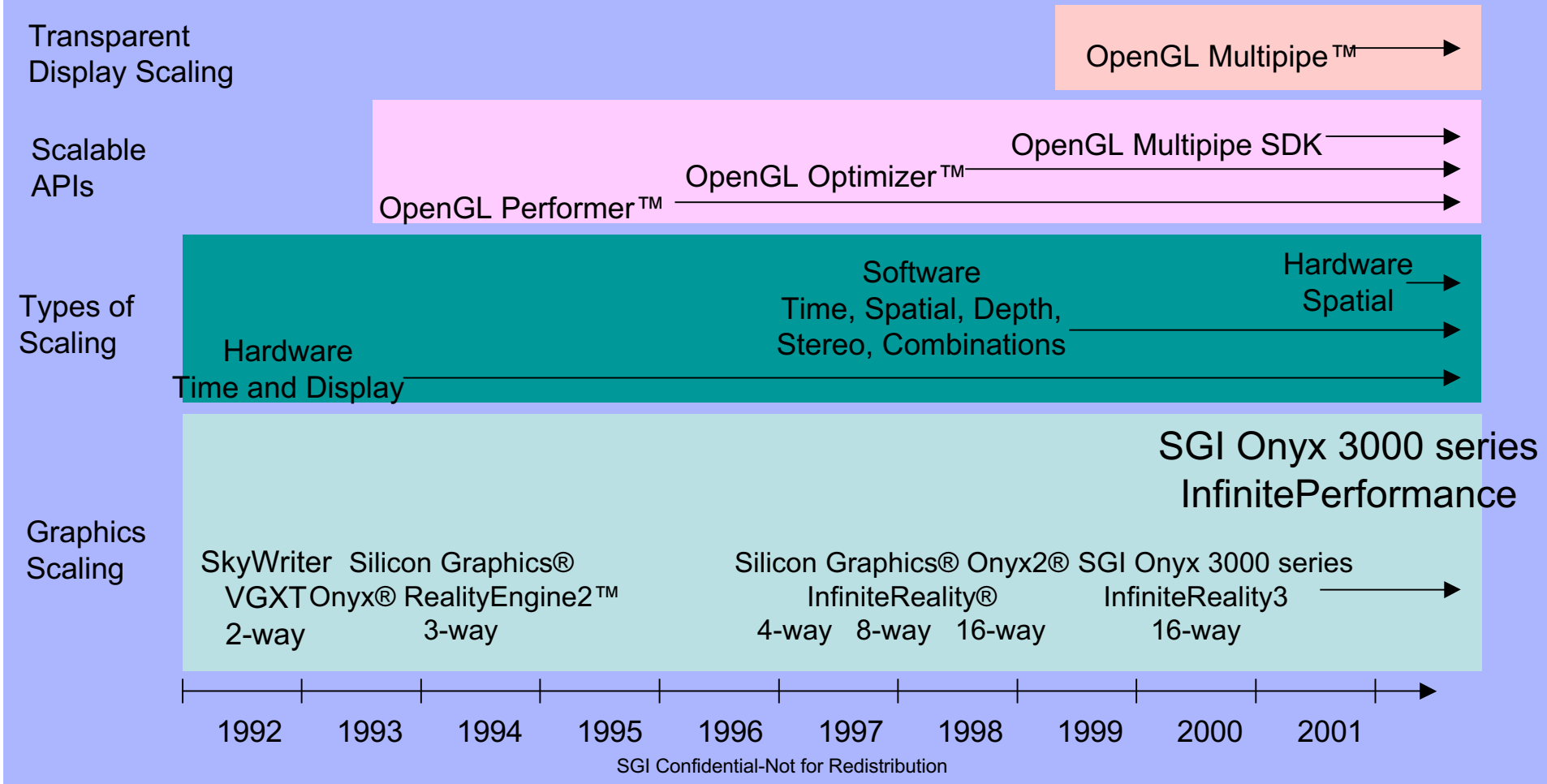
Single Processor

- VPro graphics
- Up to 4MB L2 cache
- Up to 4GB memory
- Binary compatible

# High-Performance Design on the Desktop



# API Support



# Conclusion

- SGI experience: 10 years with scalable graphics and computing systems means that the SGI™® is solving real problems today
- SGI's modular system approach means that SGI is rapidly developing the components to revolutionize tomorrow's workflow
- SGI™ ISV portfolio and software tools mean that customers get up and running quickly

# Questions?

# Thanks