Shared Visualization

Using Centralized Resources for Remote 3D Visualization on Thin Clients

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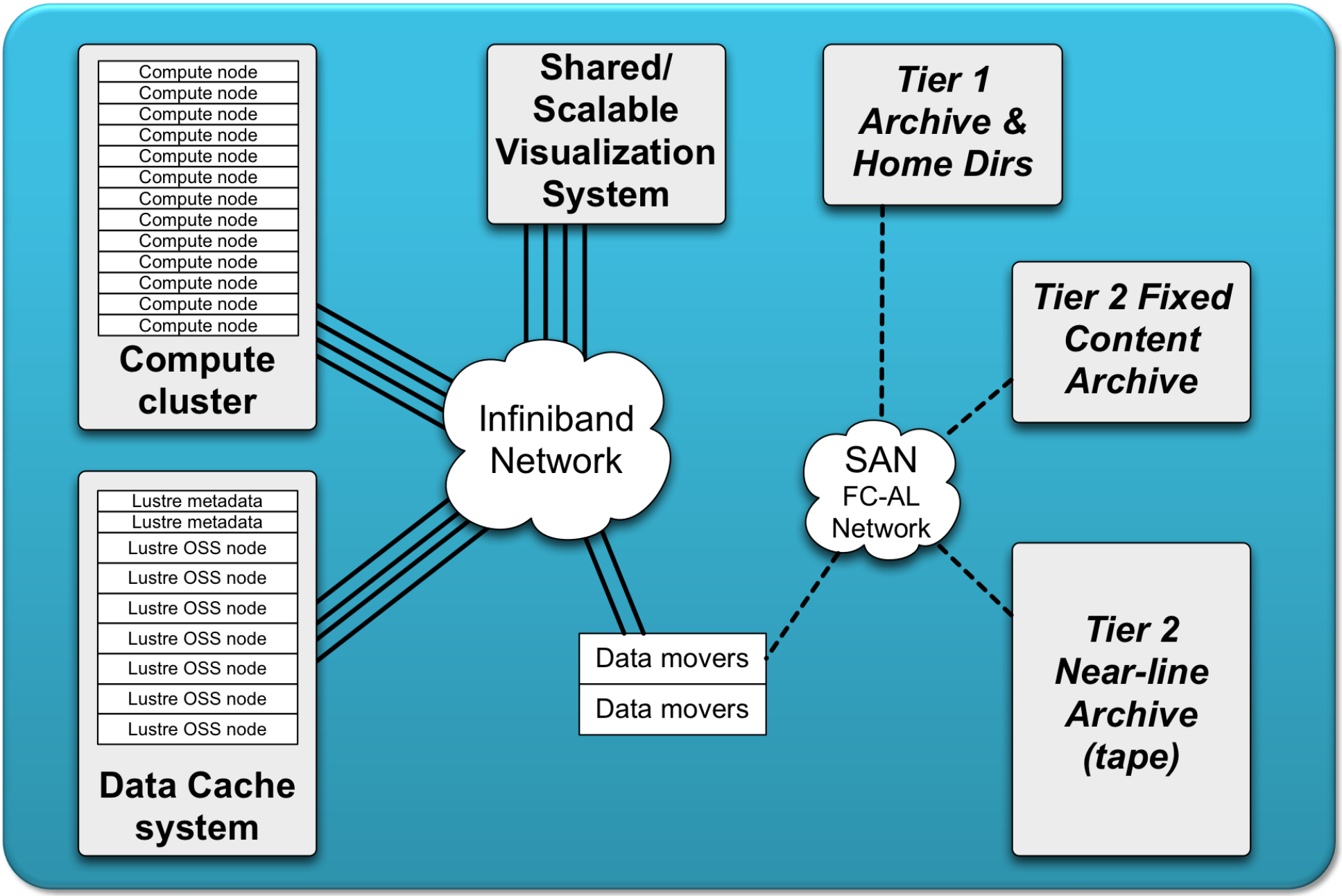
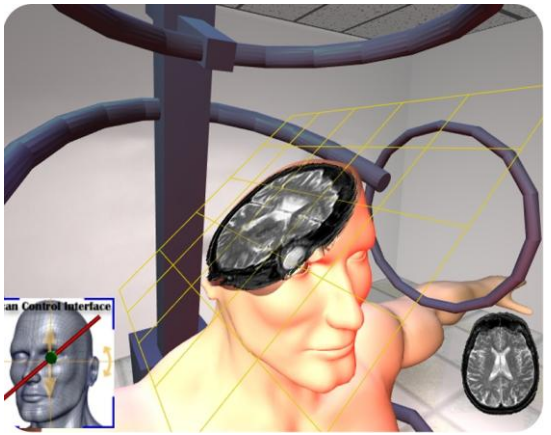
Advanced Computing Solutions &
Advanced Visualization and Graphics
Sun Microsystems

Sun's HPC end-to-end solution

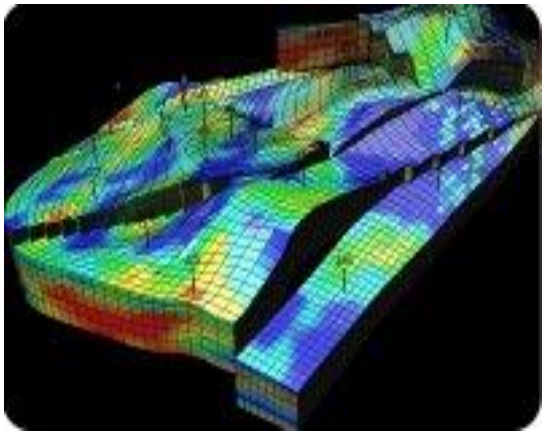


Sun's 25-Year Visualization Heritage

Mechanical Design and Analysis

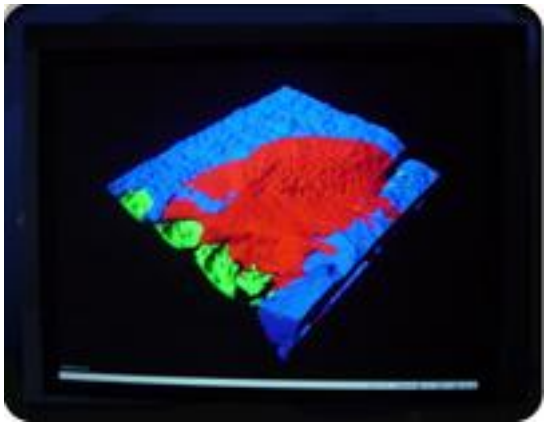


Medical Imaging

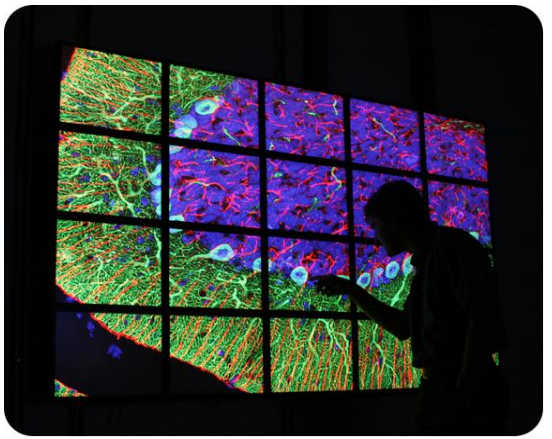


Geosciences and Exploration

Aerospace and Defense



Bio/Nanotechnology

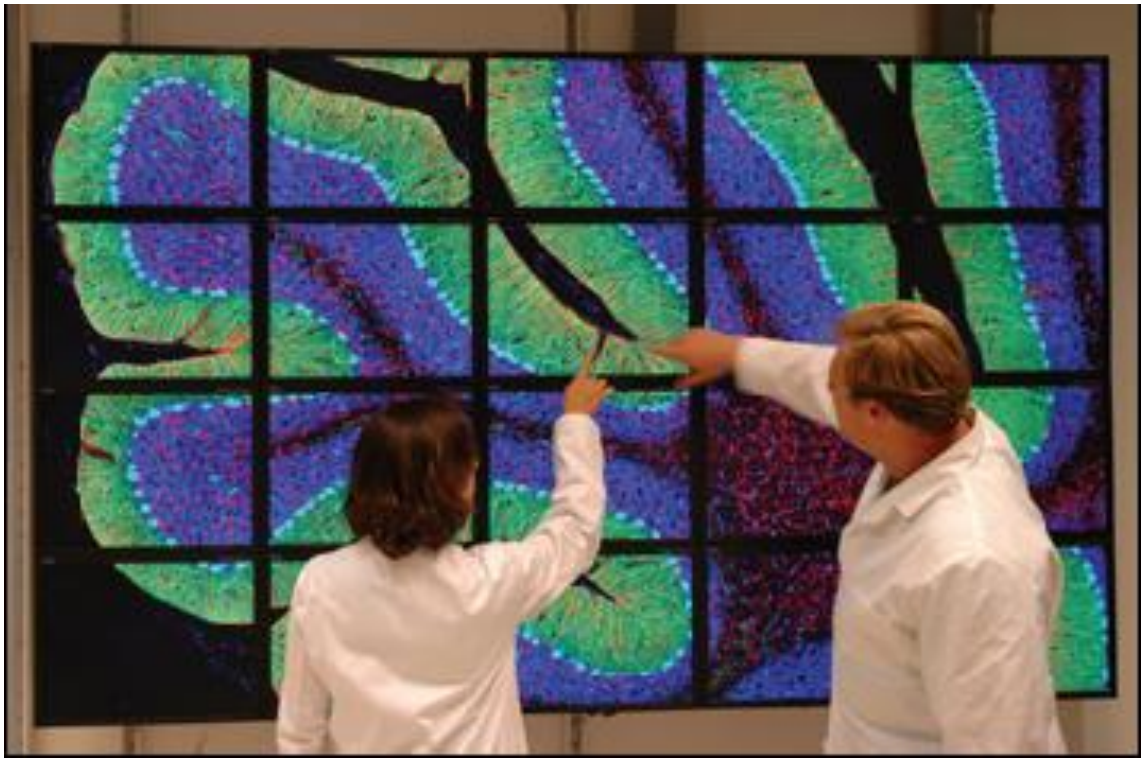


Scientific Research

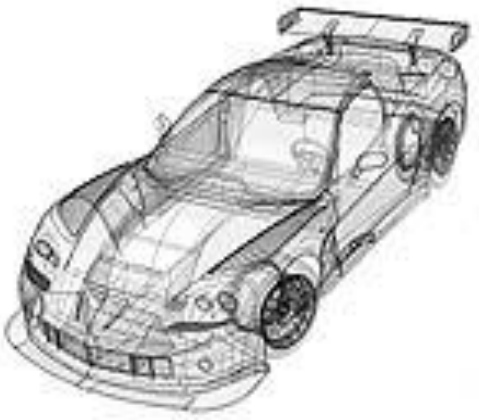
Understanding Huge Data Sets Requires Interactive Visualization

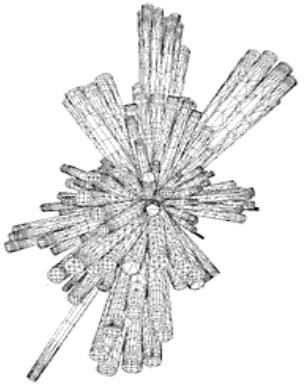
But visualization is hardware intensive

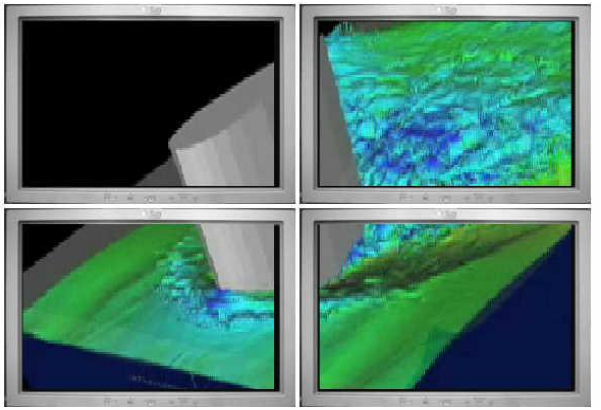
- Big data clogs networks
- Requires lots of memory
- Requires lots of CPU power
- Graphics accelerators need lots of power and cooling
- Workstations inadequate?
- And who wants to work near the heat and noise?



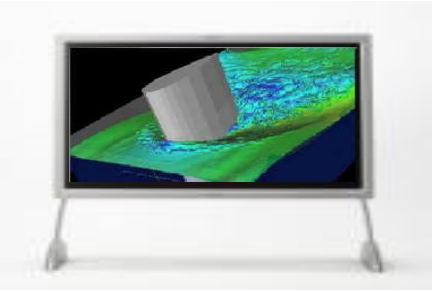
Huge Data Overwhelms the Pipeline(s)







1, 2 or 4 pipes
@ 1920x1200



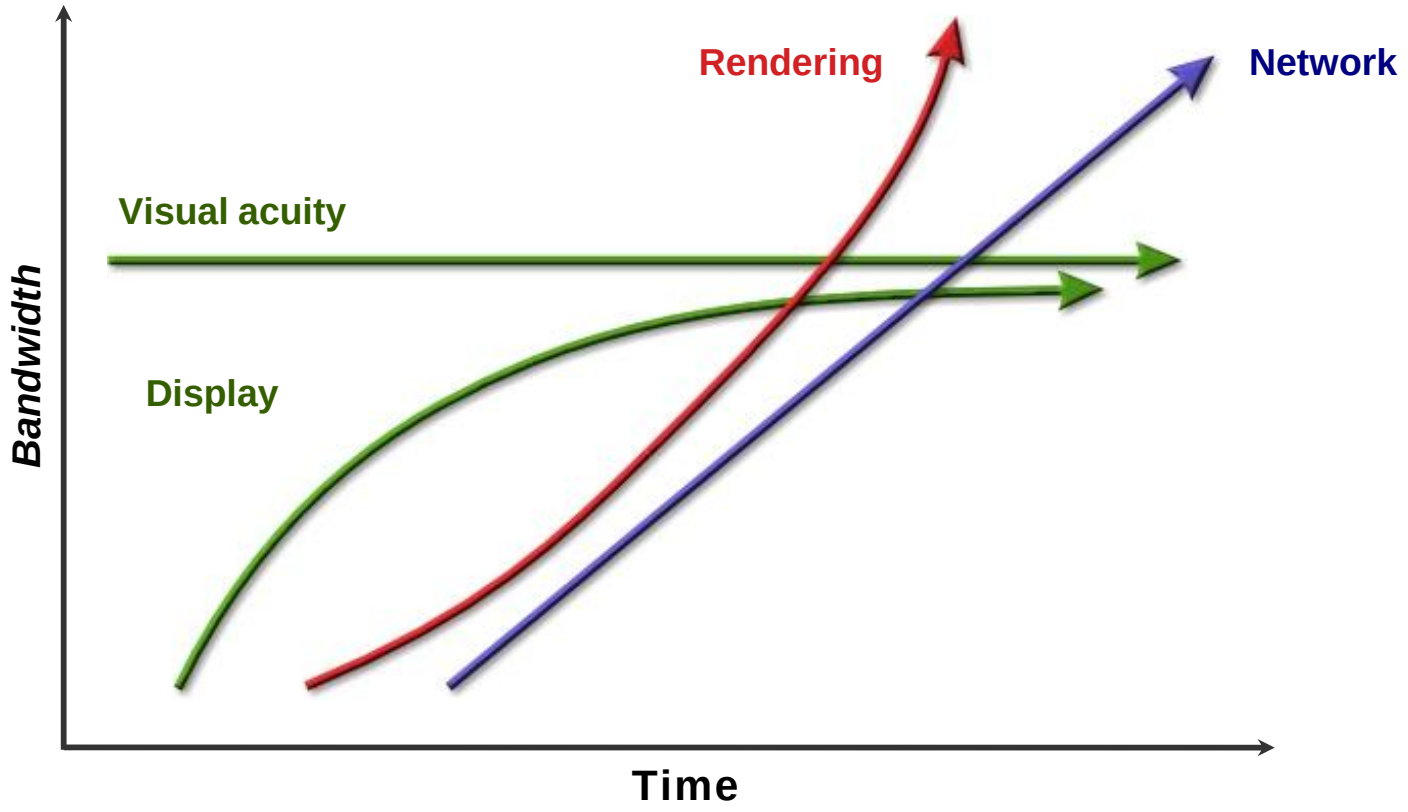
Huge 3D Data Sets (some exceeding 100 GB or 30 M polygons)

Polygon & Texture demands (much) larger than 1GB are common

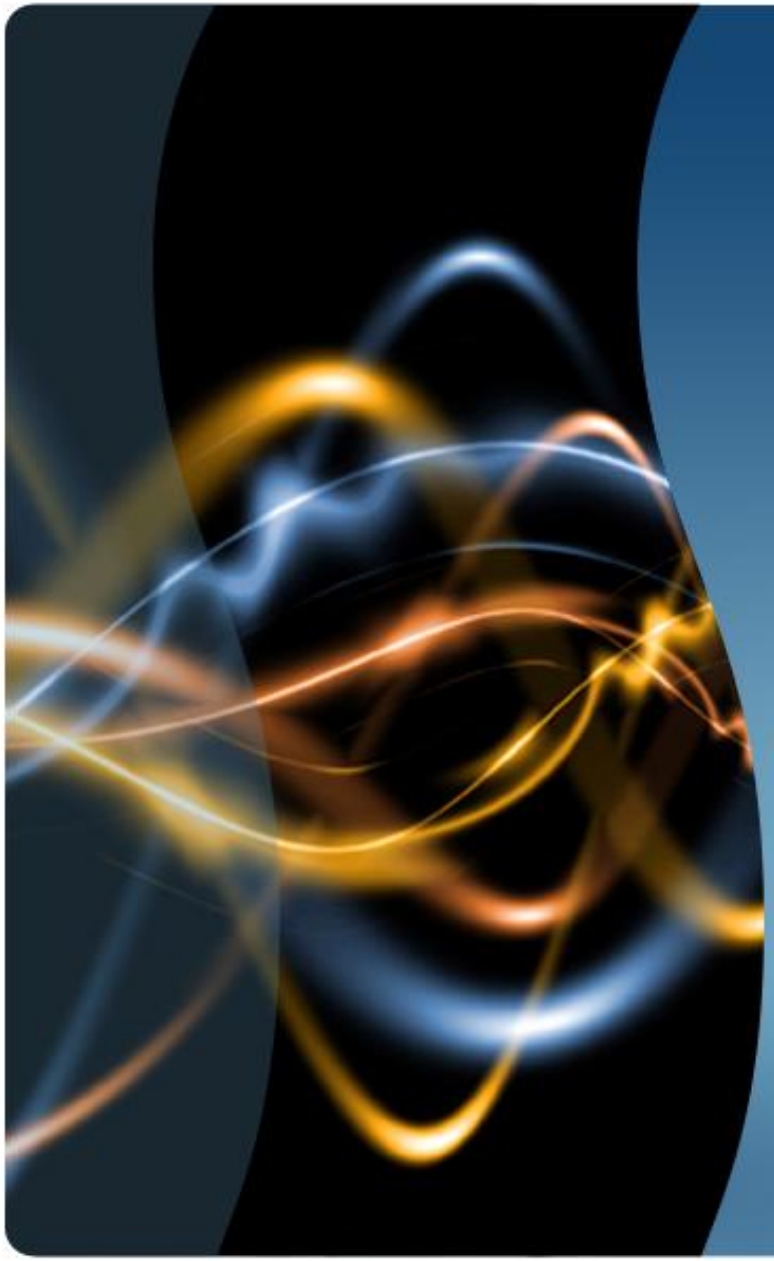
Four heads (or more) are ALWAYS better than one

Multi GPU graphics helps but now CPUs, memory and I/O becomes the limiting factor

We're Reaching a Transition Point



Data sizes are increasing exponentially, while network bandwidth now meets visual acuity requirements, allowing visual applications and services to be consolidated in the datacenter



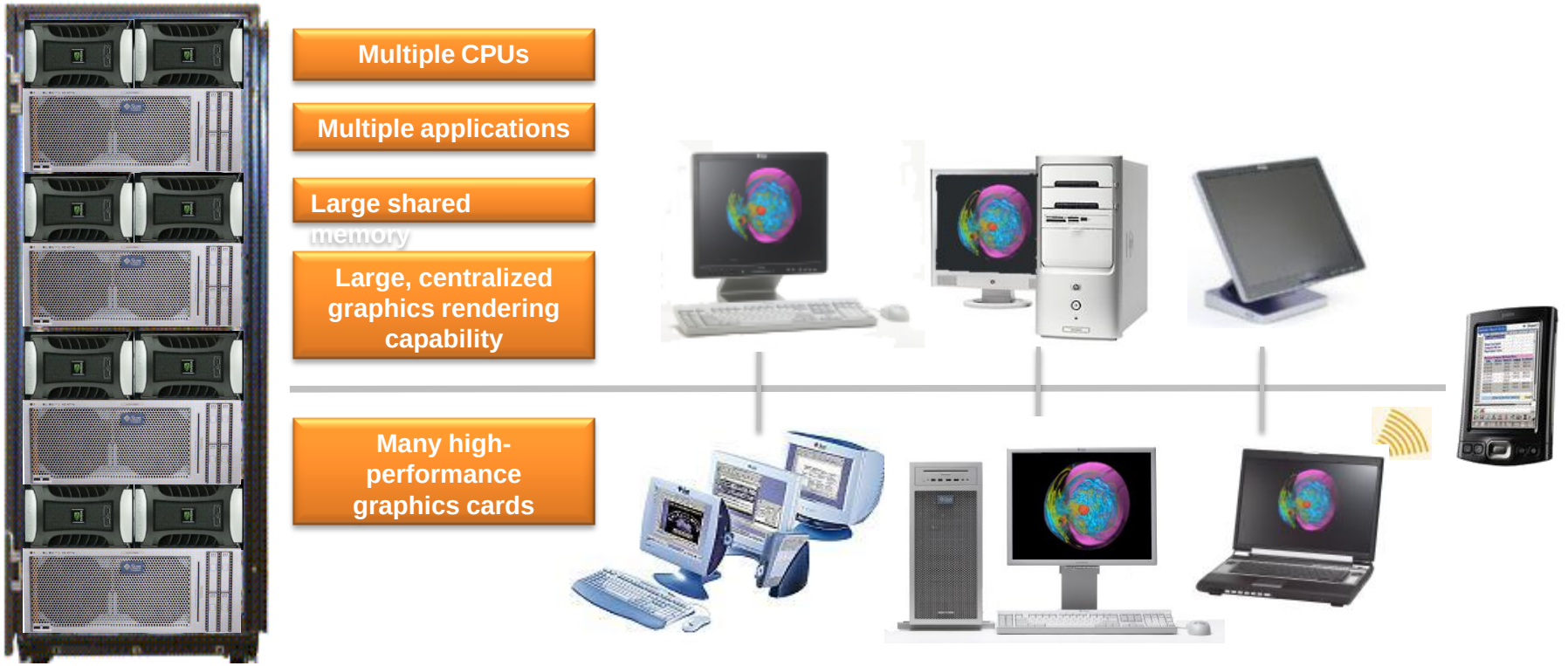
Sun's Motto

The Network IS The Computer

Sun Shared Visualization Software

Secure access to 3D applications on a central resource

- Transparently accessed from a variety of clients
- More efficient utilization of resources
- Easier administration and lower TCO
- Access anytime from anywhere on any device



Sun Fire Server

Definition – Thin Clients

The Sun Ray™ family (SR270, SR2FS and SR2)

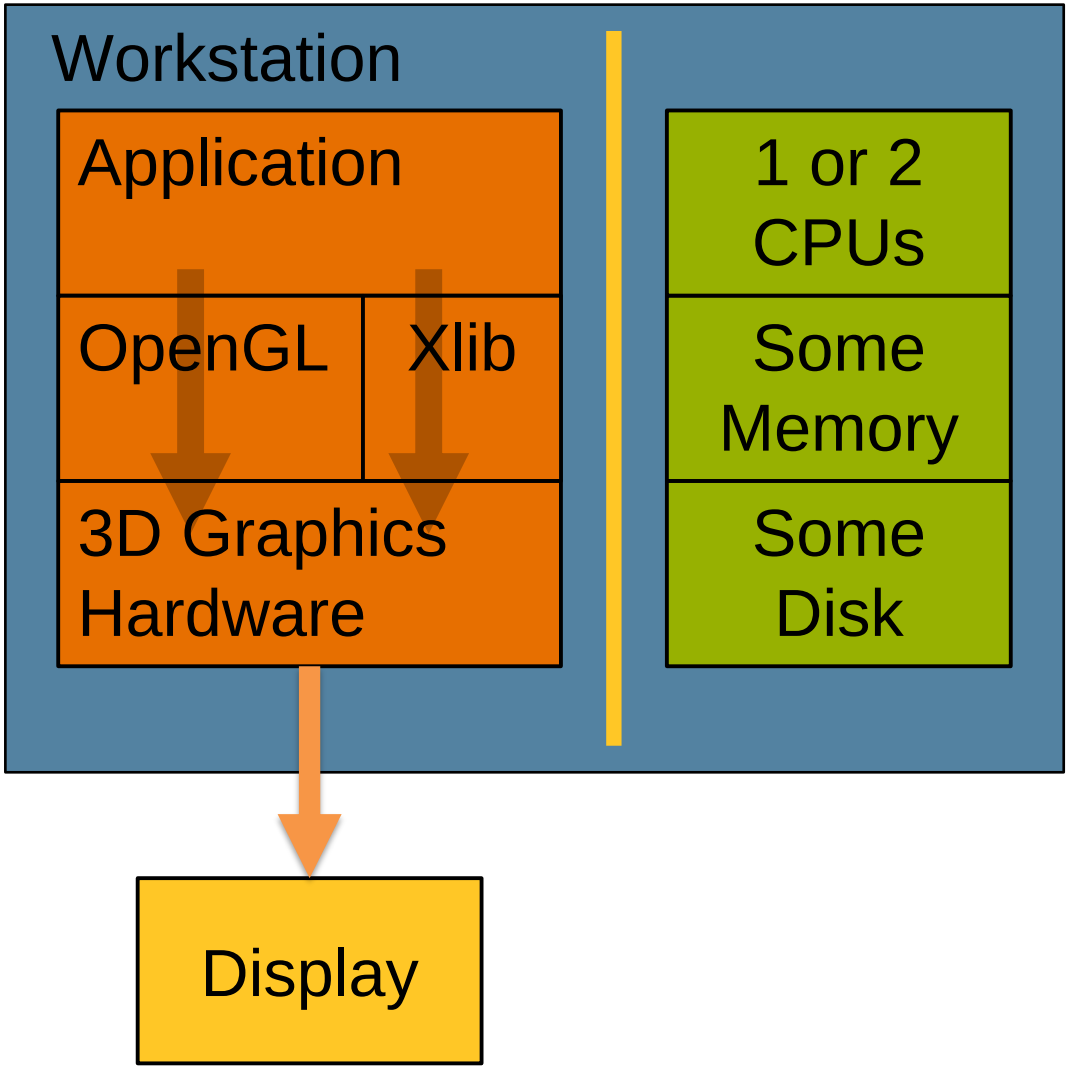
Sun Shared Visualization Software

- Application transparent – no need to modify code
  - > Plugs into any Solaris/Linux OpenGL application
- High performance
  - > Redirects 3D rendering into accelerated pixel buffers on the server's graphics hardware
- Increased efficiency and security
  - > Sends only 2D screen images to client with optimized compression
- Easy access and management
  - > Central graphics resources managed using Sun Grid Engine software
- Community-driven innovation
  - > Sun sponsored VirtualGL Open Source project

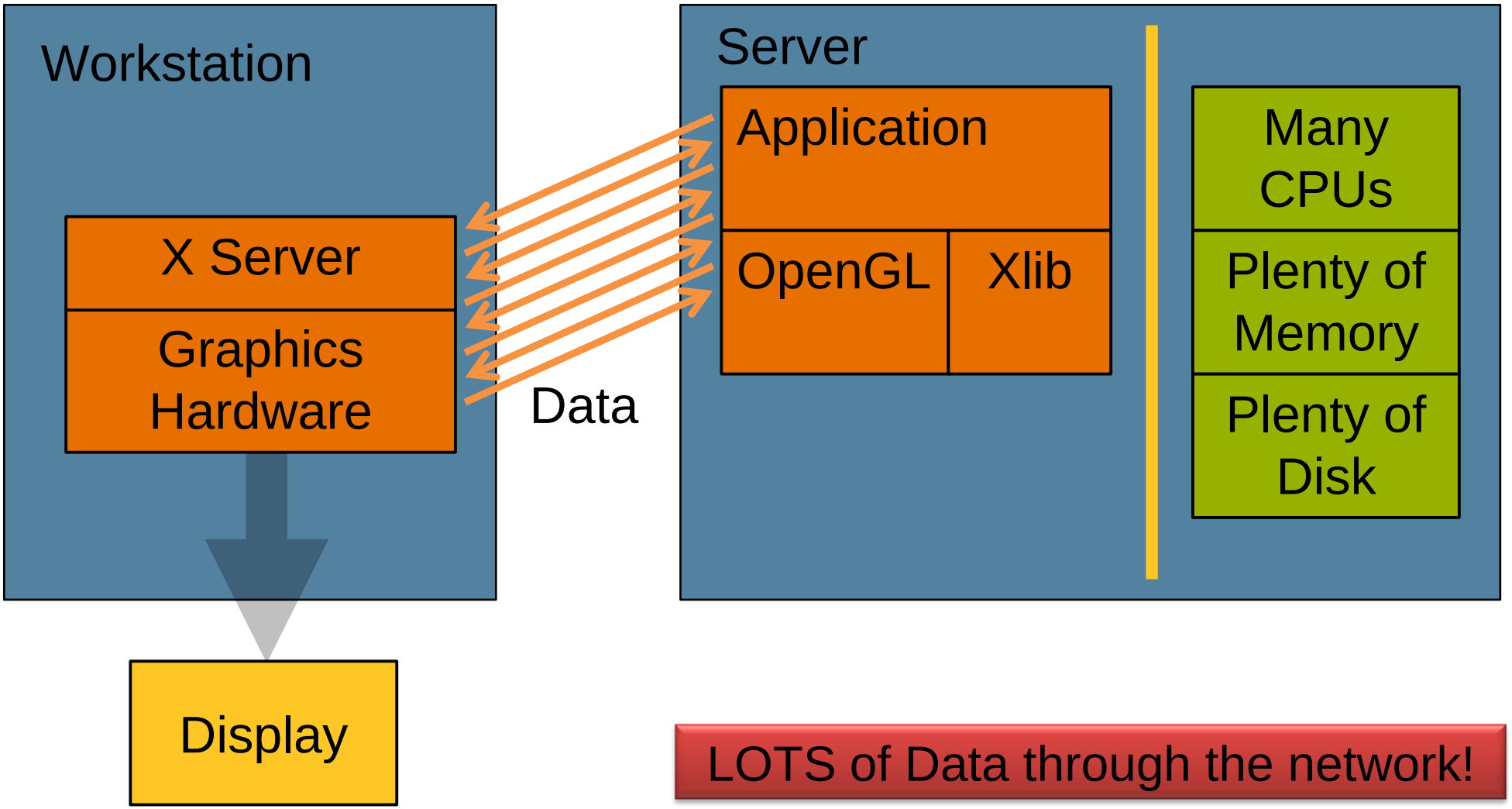
Software Details

- Sun Shared Visualization software
  - Server:
    - Sun UltraSPARC servers and workstations with Sun graphics accelerators
    - Sun x64 servers and workstations with NVIDIA Quadro FX or Quadro Plex VCS graphics solutions
    - OS: Solaris and Linux
  - Client: Solaris, Linux, Windows, Mac OS X and Sun Ray (thin clients)
- Open Source software – Sun sponsored
  - VirtualGL – remote access via any client over standard IP networks
  - TurboVNC – allows X apps designed to run and display on same system to run on one system and display on another and enables collaboration
  - Sun Grid Engine – extensions provide graphics resource management and advance reservation system

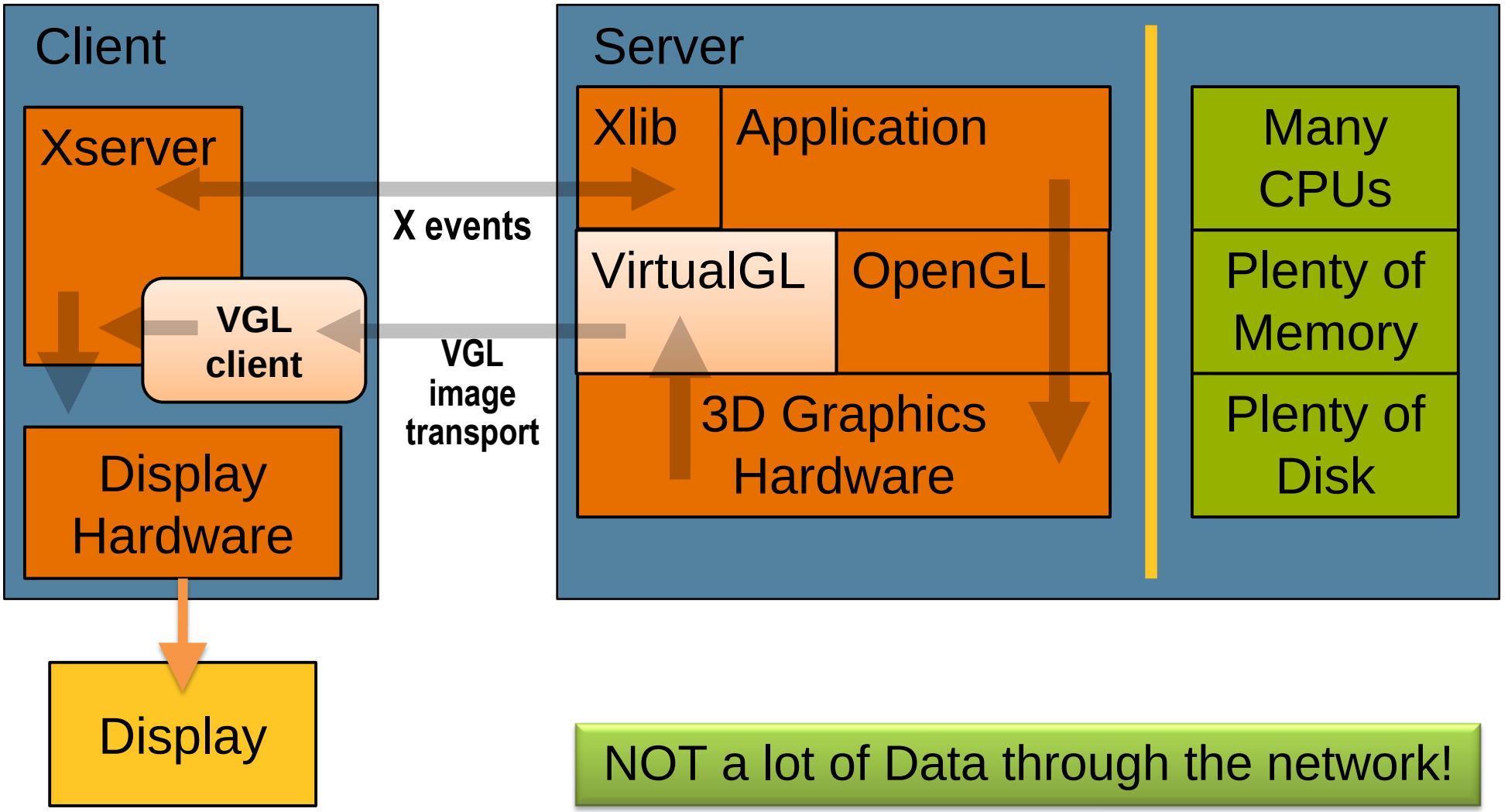
Standard Local Workstation Graphics



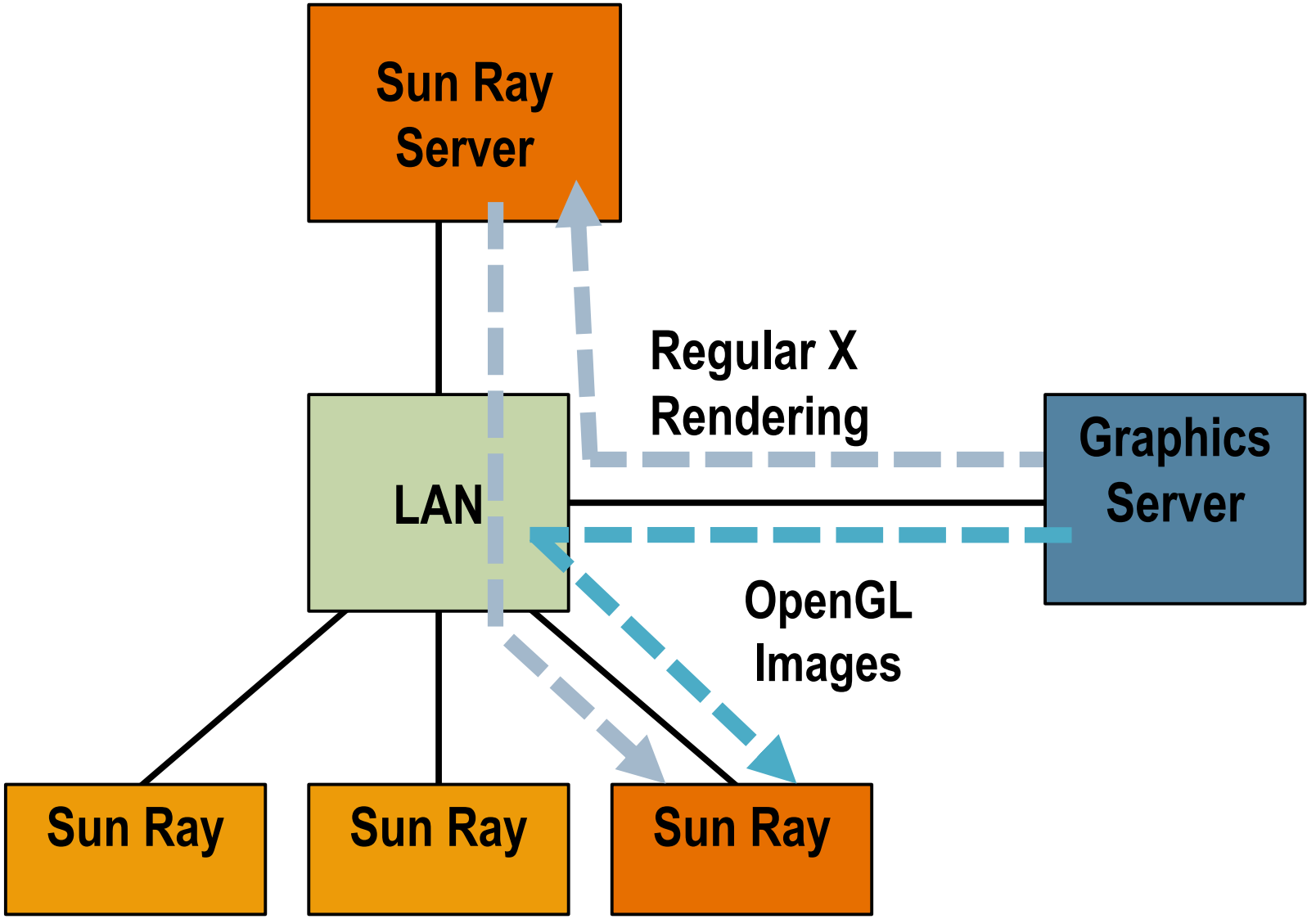
Standard Remote Graphics



Remote Graphics using VirtualGL



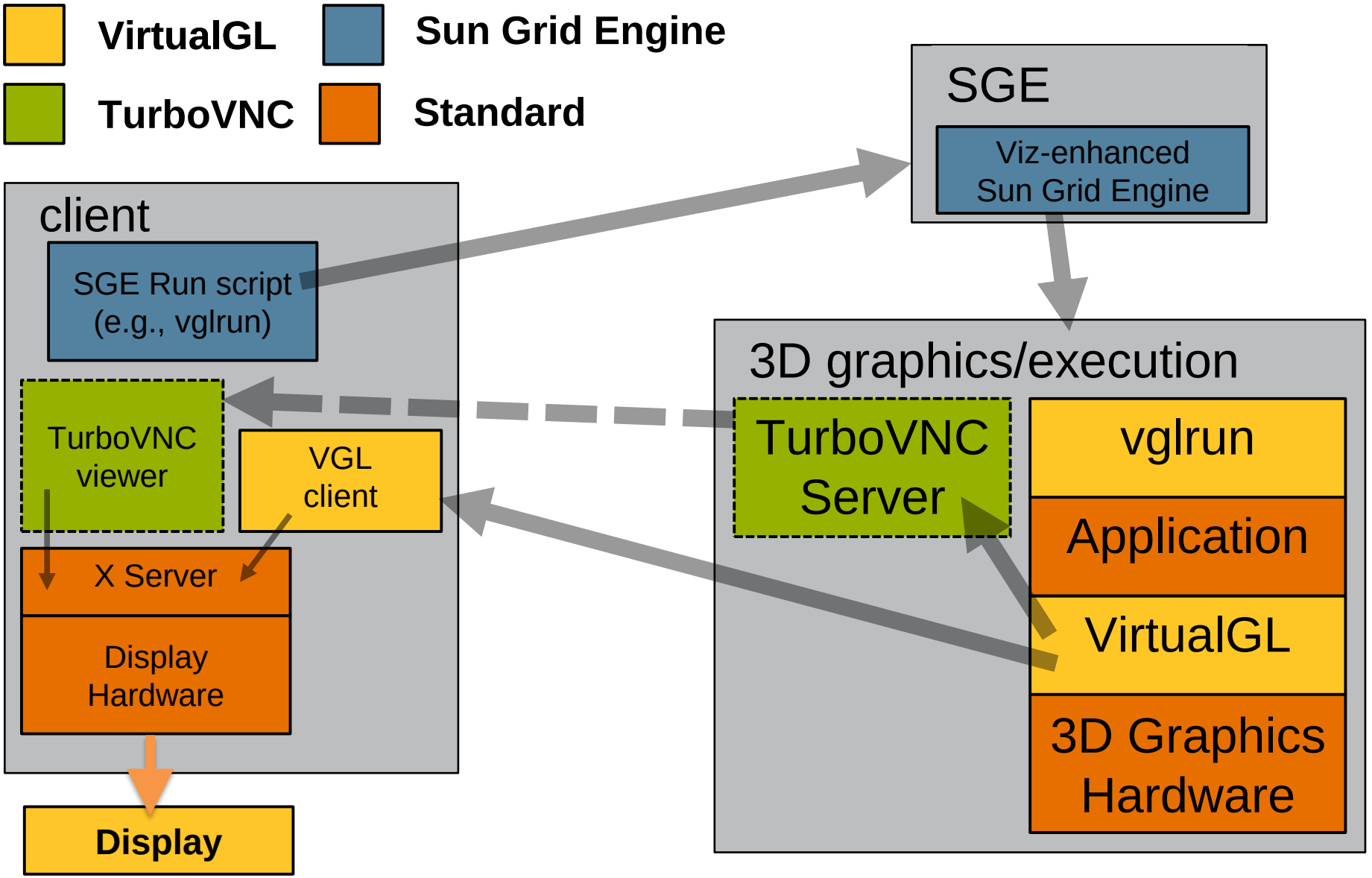
VirtualGL Sun Ray Plug-In



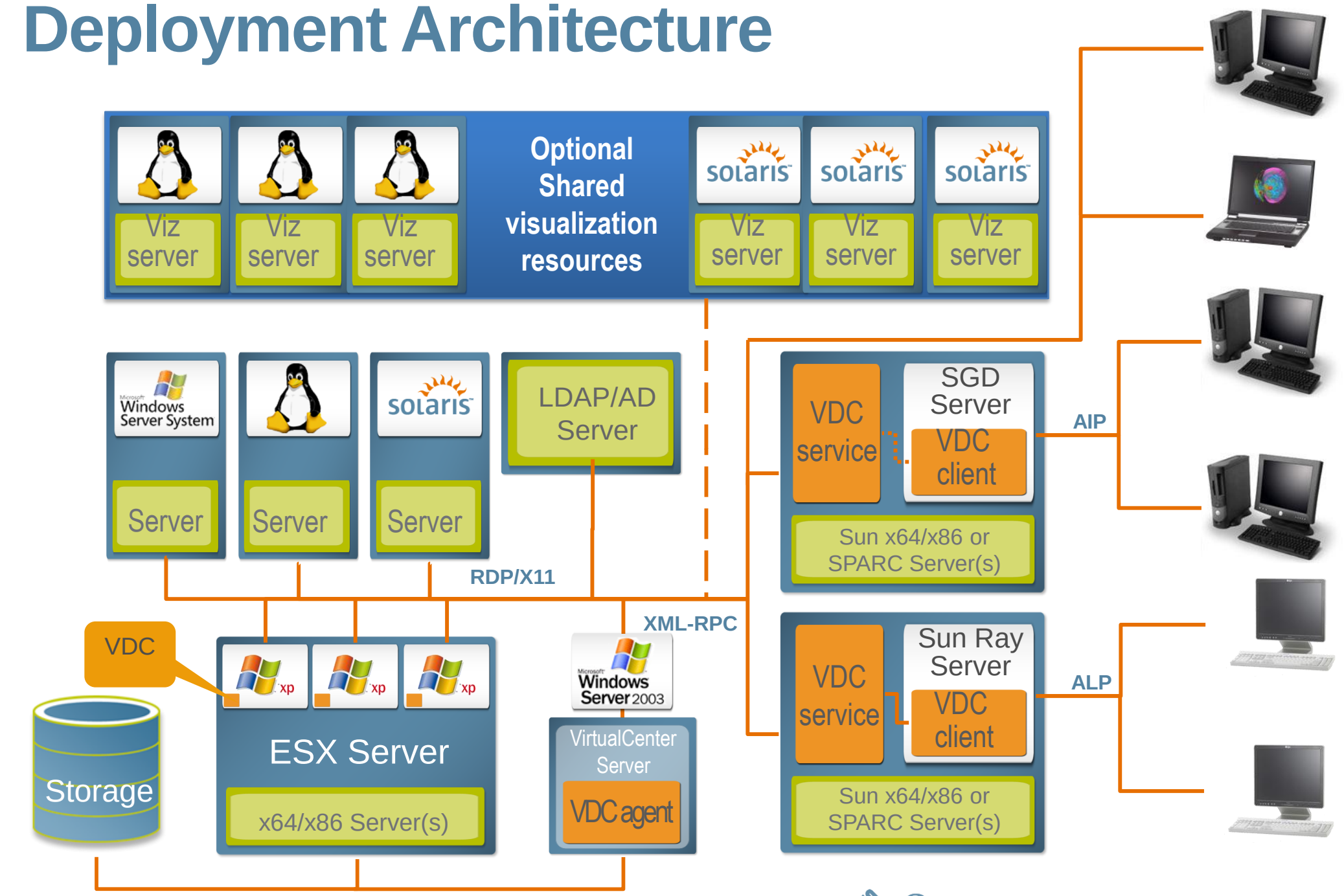
Sun Grid Engine (with Shared Viz Enhancements)

- Purpose
  - Allows users to run hardware-accelerated OpenGL applications on a server with appropriate and available CPU, memory, and graphics resources.
- Components
  - Standard SGE provides management and allocation of regular compute resources (CPUs, memory, OS, software licenses).
  - Enhancements allow SGE to manage of graphics resources
    - provides “user-transparent” connection between the allocated graphics device and the user's display on the remote client.
  - Advance Reservation system allows resources to be reserved for a specific time in the future.
- Open source software developed by Sun

SGE & Sun Shared Visualization Software



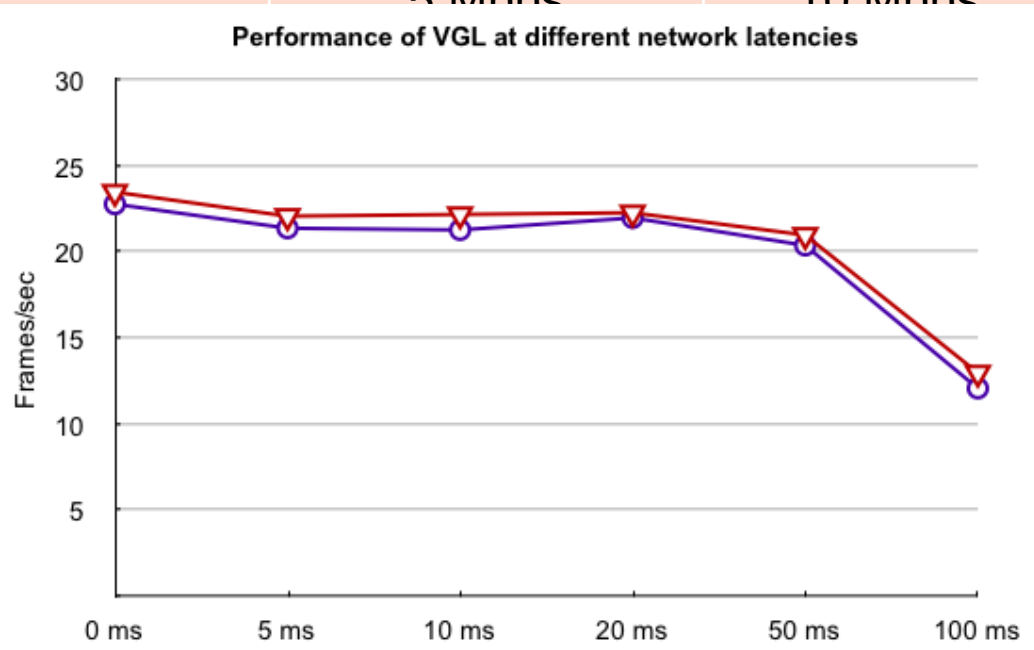
Deployment Architecture

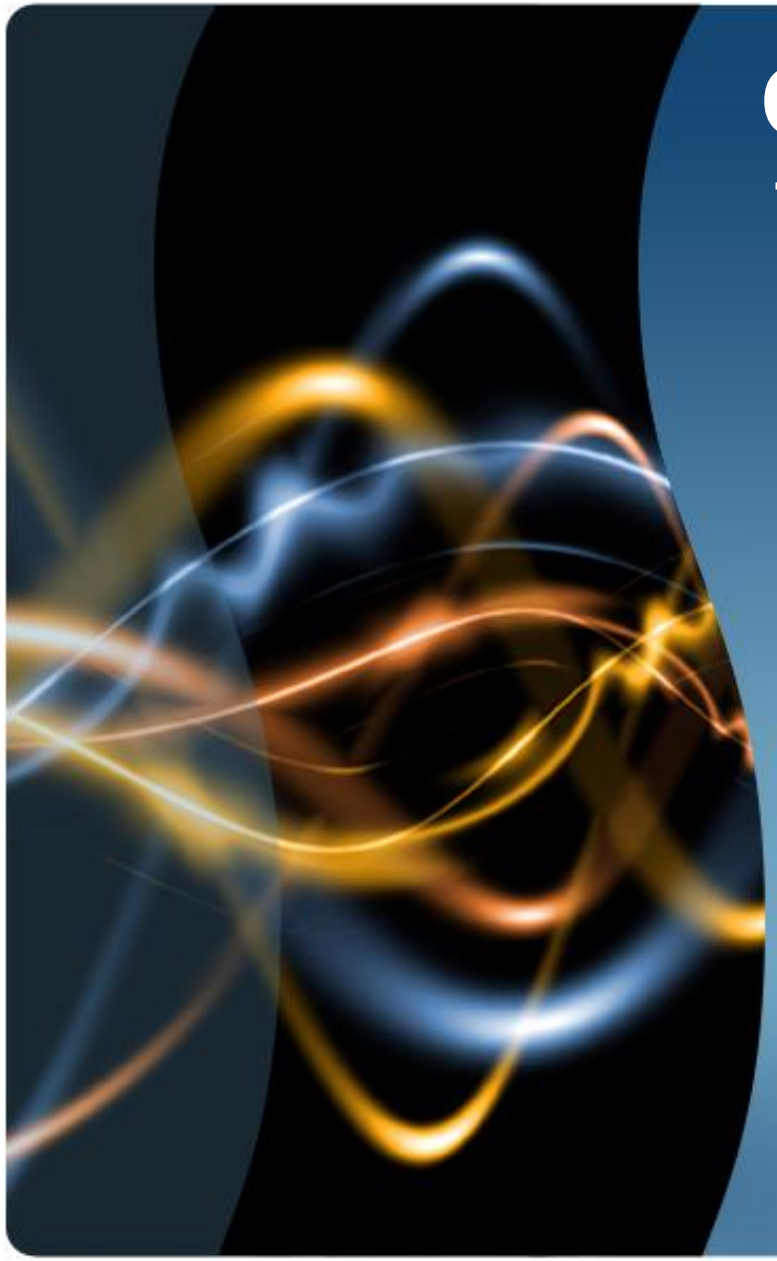


Performance considerations

- Quality settings
- Network Bandwidth
- Network latency
- Interactivity
- Thin Client performance

VGL Settings	Accept. Performance (10 fps)	Full Performance (20+ fps)
HQ (no subsp quality=95)	20 Mbps	40 Mbps
MQ (2Xsubsp quality=80)	10 Mbps	20 Mbps
LQ (4X subsp	5 Mbps	10 Mbps

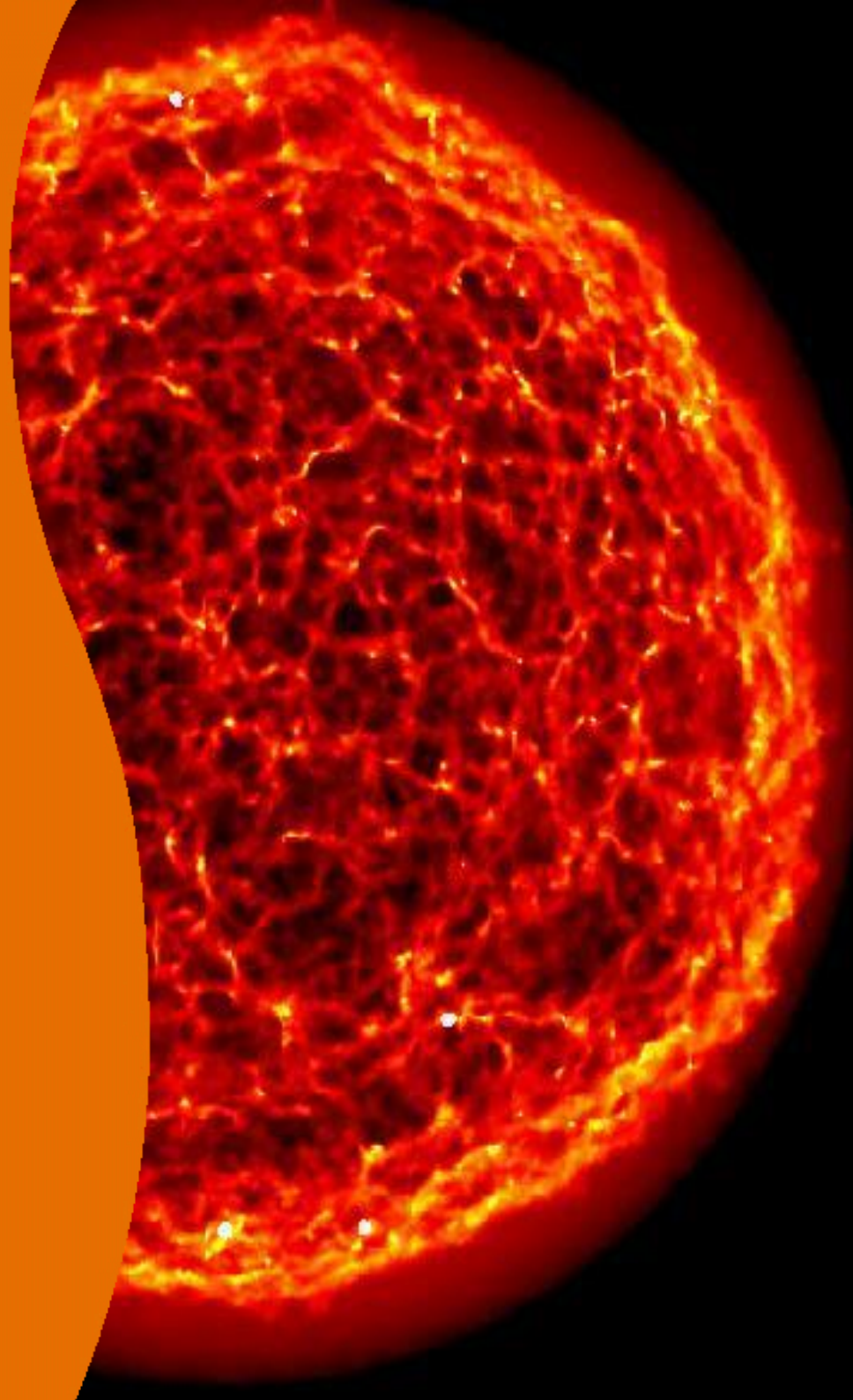




Conclusions

Thin clients are valid for advanced 3D visualization

- Price/Performance
  - Fewer software licenses
  - Lower support costs
  - Resource sharing
  - Environmental issues
- Instant mobility
- Remote access (incl. wide area)
- Security and reliability
- Central administration



Thank You!

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