

# TACC Visualization Hardware and Software

Kelly Gaither

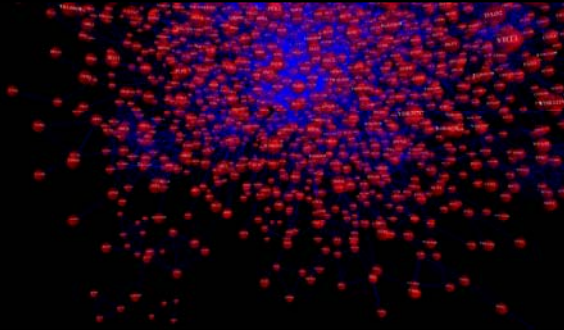
Texas Advanced Computing Center

UT/Portugal Summer Institute

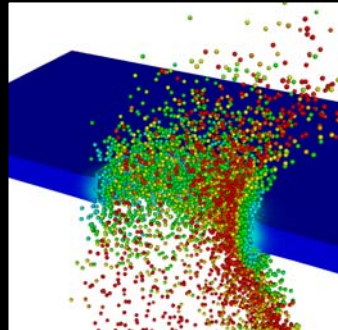
Coimbra, Portugal

July 15, 2008

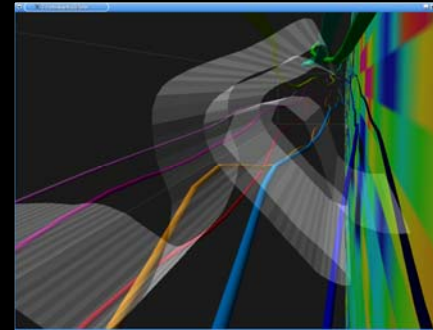
# Visualization at TACC



**Bioinformatics**



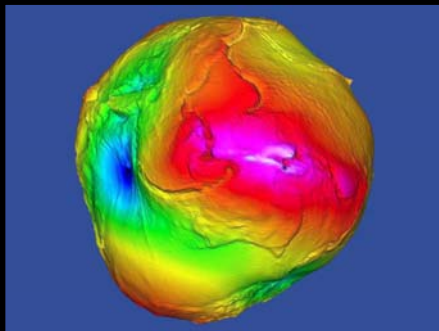
**Orbital Debris**



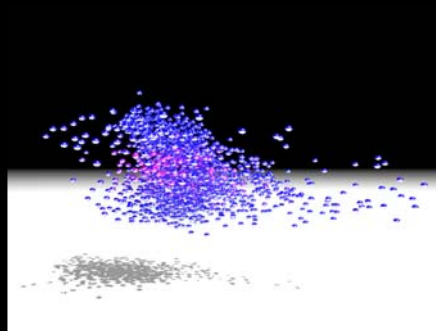
**Turbulent Flow**



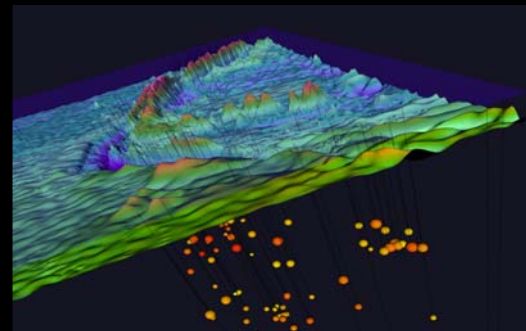
**CT Models**



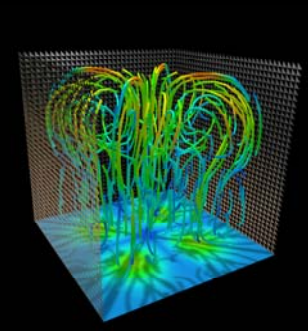
**Gravity Map**



**Quantum Chemistry**



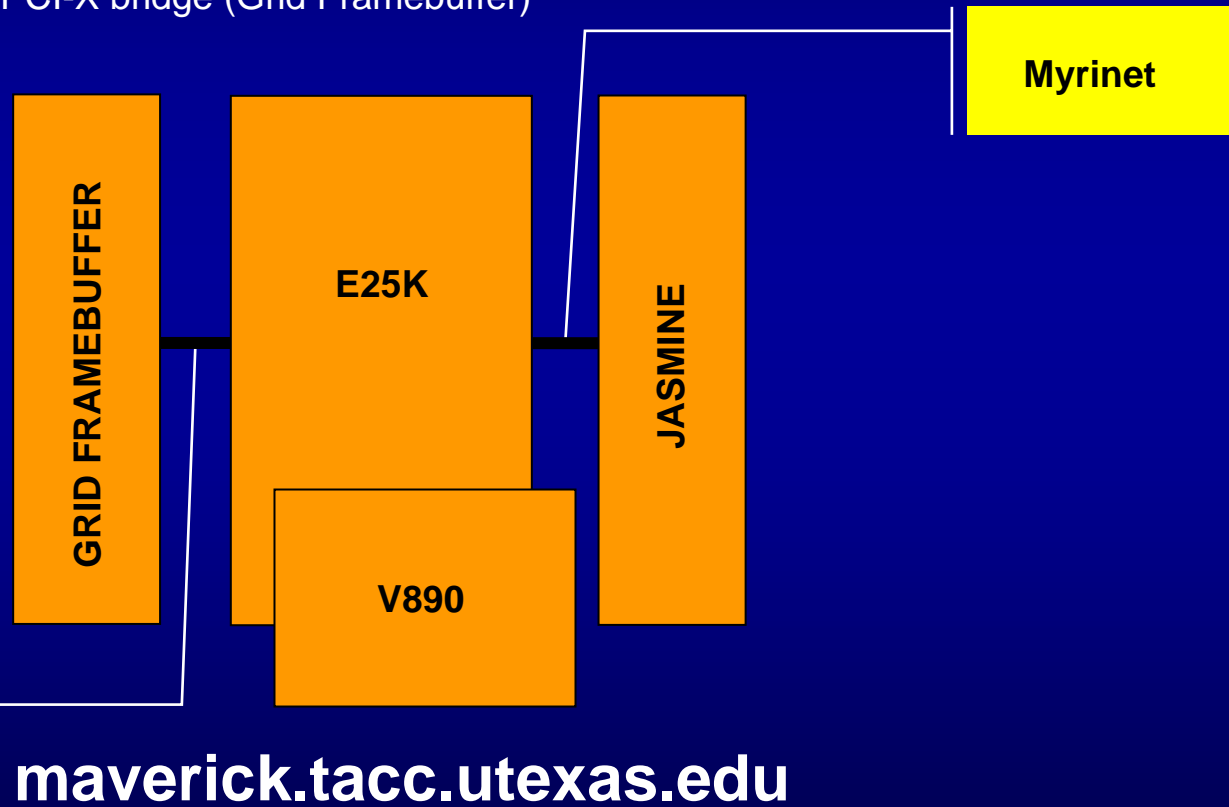
**GeoSciences**



**Natural Convection**

# Maverick

- Collaboration with Sun Microsystems – deployed in October 2004
- V890 front end
- E25K with 64 dual core 1.05 GHz processors and 512 GB of shared memory
- Maverick has 8 dual out high-end commodity cards connected to the E25K by Myrinet (Jasmine)
- Additionally, Maverick has 8 dual out high-end commodity graphics cards connected to E25K by PCI Express to PCI-X bridge (Grid Framebuffer)



# Colt

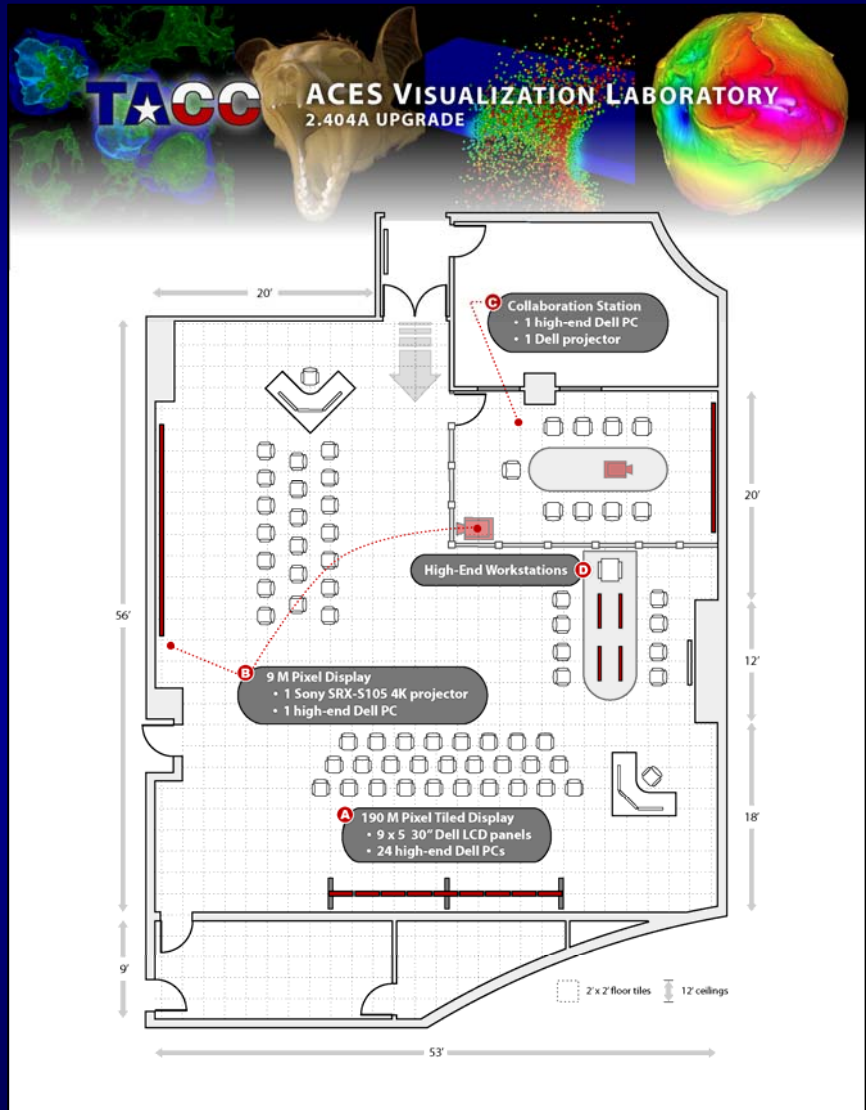
- Generous donation by Dell
- 3x3 Tiled Display (Each display 2560x1600: > 36 MPixels)
- 10 Dell Workstations (1 head node, 9 compute/display nodes)
- Produced a whitepaper on building visualization clusters



# TACC/ACES Visualization Laboratory

- 2900 Square Foot Visualization Laboratory
- Generous donation by Dell, Microsoft, and Platform
- 9x5 Tiled Display (180 MPixels)
- Collaboration Room
- Large projected screen
- GRAND OPENING OCTOBER 2008

[stallion.tacc.utexas.edu](http://stallion.tacc.utexas.edu)



# Ranger-Vis (To Be Named)

- 1 Sun Fire X4600 server (head node) with 2 NVidia Quadro Plex model 4. Each Quadro Plex model 4 contains 2 FX5600's. 8 dual core CPU's and 256 GB of memory.
- 7 Sun X4440 servers (quad socket, quad-core systems), each connected to a QuadroPlex S4 and containing 128 GB of memory.
- Total: 128 cores, 1 TB aggregate memory, 32 GPU's.

# Visualization Software Available at TACC

- Hardware Accelerated (on platforms with GPUs – Graphics Processing Units)
- Programming APIs – OpenGL, vtk (Visualization Tool Kit, OpenInventor, OpenSceneGraph)
  - VTK (Visualization Toolkit) – open source software system for 3D computer graphics, image processing, and visualization
- Visualization Turnkey Systems
  - ParaView (Parallel Visualization Application) – open source general purpose visualization system
  - VisIt – free parallel visualization and graphical analysis tool
  - EnSight – commercial turnkey visualization package target at CFD visualization
  - Amira – commercial turnkey visualization package targeted at visualizing scanned medical data (CAT scan, MRI, etc..)



# Visualization Modes on Ranger Proper and Lonestar Proper

## Current Capability:

- “Interactive” with Software Rendering
  - Parallel Paraview
  - Parallel VisIt
- Batch Mode Rendering
  - Volume Rendering (Ray Tracing, etc)



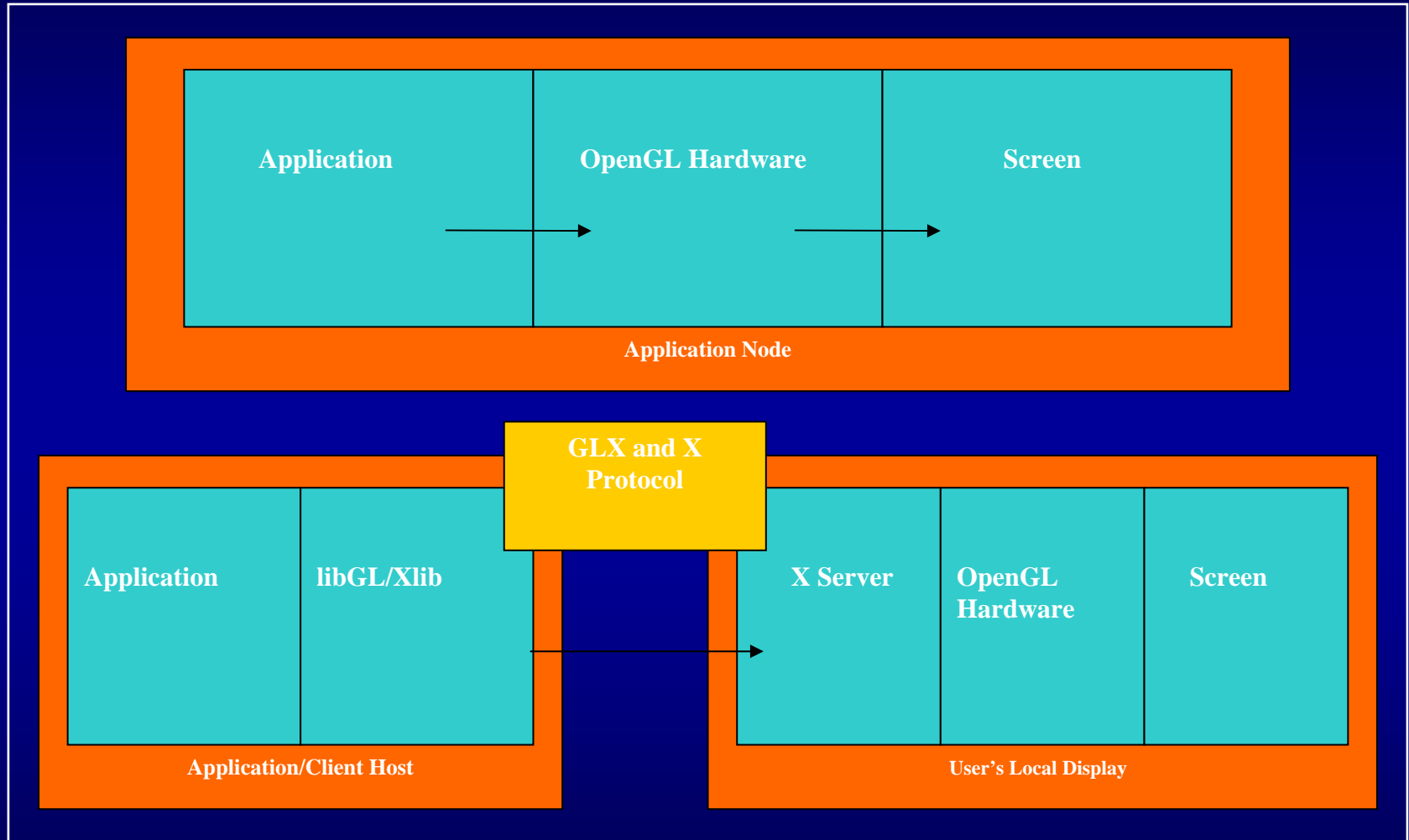
# Visualization Software on Ranger Proper and Lonestar Proper

- Mesa 3D Graphics Library – open source implementation of OpenGL
- VTK (Visualization Toolkit) – open source software system for 3D computer graphics, image processing, and visualization
- ParaView (Parallel Visualization Application) – open source general purpose visualization system
- VisIt – free parallel visualization and graphical analysis tool

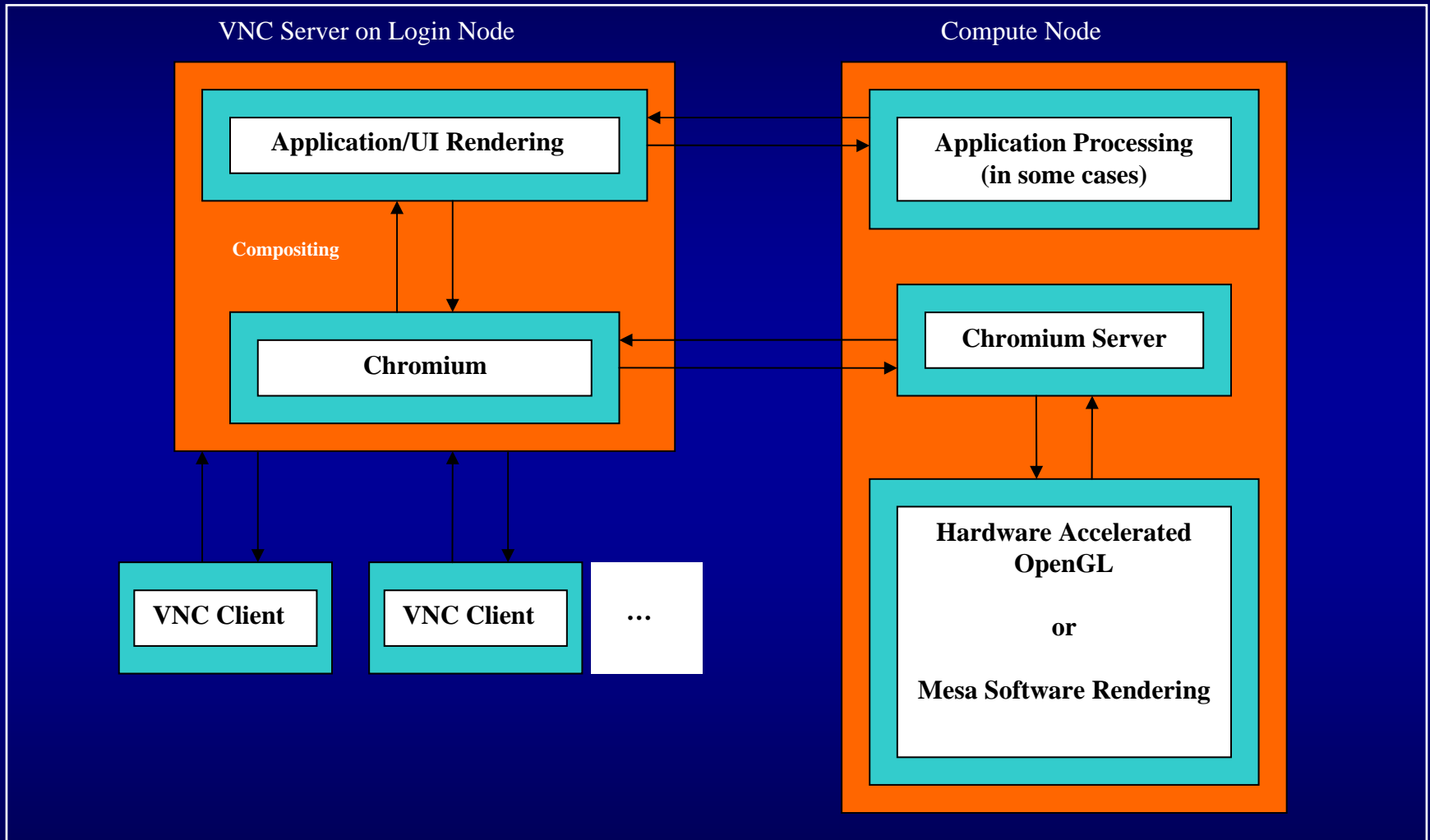
# SCoReViS Software Stack

- NSF STCI funded project that began March 1
- Balance Goals:
  - Accessibility: provide remote and collaborative access to visualization applications over common networks with standard communications protocols.
  - Rendering: include data decomposition, the transformation from data primitives to geometric primitives, and the transformation from geometric primitives to pixels.
  - Scalability: choose between image decomposition or data decomposition depending on underlying size of the data and number of processors available.

# Traditional OpenGL Architecture



# SCoReViS Architecture



Questions?