Remote & Collaborative Visualization

Greg Johnson
TACC Remote Visualization Systems

- **Longhorn** – Dell XD Visualization Cluster
  - 256 nodes, each with 48 GB (or 144 GB) memory, 8 cores, 2 NVIDIA Quadro FX 5800 GPUs with 4 GB graphics memory each
- **Spur** – Sun Visualization Cluster
  - 8 nodes, each with 128 GB (or 256 GB) memory, 16 cores, 4 NVIDIA Quadro FX 5600 GPUs with 1.5 GB graphics memory each
- Available for use by TACC and TeraGrid users
- Both mount Ranger’s filesystems
Remote Visualization Model

- HPC System
- Data Archive
- Large-Scale Visualization Resource
- Display
- Pixels
- Mouse
- Wide-Area Network
- Remote Site
- Local Site
Methods of Remote Access

• **SSH**
  – Basic command-line interface, useful for managing files, submitting jobs, etc.

• **Longhorn Visualization Portal**
  – Simplified web-based interface for:
    • Viewing your allocations
    • Submitting jobs
    • Interacting with remote vis sessions (VNC or EnVision)

• **Direct VNC connection**
SSH Access

• Start the “Secure Shell Client” application
• Click “Quick Connect”
  – Host Name: longhorn.tacc.utexas.edu
  – User Name: <your training account>
  – Click “Connect”
SSH Access

- You’re now on a Longhorn login node
- Can run usual shell utilities
- Manage data, etc.
SSH Access

- For later reference (more details in Longhorn User Guide):
  - Can submit a remote VNC job from here
    - `qsub /share/doc/sge/job.vnc`
    - `tail -f vncserver.out`
    - Connect to address in output file with a VNC viewer
Longhorn Visualization Portal

- [http://portal.longhorn.tacc.utexas.edu](http://portal.longhorn.tacc.utexas.edu)
- A web-based interface that lets you:
  - View your allocations
  - Submit jobs
  - Interact with remote VNC or EnVision sessions
- Avoids the hassle and complexity of manually managing your jobs
- For many users this can be the primary method of interacting with Longhorn
- Advanced users may still use SSH
Login as a **TACC** user with your training account (Firefox)
Start a VNC job

Available Resources

- Longhorn
  Longhorn (longhorn.tacc.utexas.edu), TACC's Dell XD Visualization Cluster, contains 2048 compute cores, 14.5 TB aggregate memory and 512 GPUs. Longhorn has an ODR InfiniBand interconnect and has an attached Lustre parallel file system. Longhorn is connected by 10GbE to Ranger's Lustre parallel file system thus making it more convenient to work on datasets generated on Ranger. Longhorn has 256 nodes + 2 login nodes, with 240 nodes containing 48GB of RAM, 8 Intel Nehalem cores (@ 2.5 GHz), and 2 NVIDIA Quadro FX 5800 GPUs. Longhorn also has an additional 16 large-memory nodes containing 144GB of RAM, 8 Intel Nehalem cores (@ 2.5 GHz), and 2 NVIDIA Quadro FX 5800 GPUs. For more detailed information on Longhorn, please see the Longhorn User Guide.

Queue Information:
updated at March 26, 2010, 9:31:01 am (refresh)
First time only: Set a VNC password
First time only: Set a VNC password
Start a VNC job (submit again)
VNC Session
Running Vis Applications through VNC

• To see available applications:
  – `module avail`

• Examples:
  – Run ParaView:
    • `module load paraview`
    • `vglrun paraview`
  – Run VisIt
    • `module load visit`
    • `vglrun visit`
Accessing your VNC session with a stand-alone viewer

- Navigate to the Jobs tab
- Copy the server address
Accessing your VNC session with a stand-alone viewer

- Navigate to the Jobs tab
- Copy the server address
- Run the “TightVNC Viewer” application
  - Enter the server address from the Jobs tab
  - Click Connect
  - Enter your VNC password set previously
  - Click Okay
Accessing your VNC session with a stand-alone viewer

- Navigate to the Jobs tab
- Copy the server address
- Run the “TightVNC Viewer” application
  - Enter the server address from the Jobs tab
  - Click Connect
  - Enter your VNC password set previously
  - Click Okay
- You can now interact with your VNC session (and share this session with your collaborators)
Parallel Visualization

- You can specify how many nodes (or slots) to use during job submission
- Run vis applications in the parallel environment
EnVision Guided Visualization

• An easy-to-use web-based tool for remote scientific visualization
• Available through the Longhorn Vis Portal
• Developed at TACC
  – Funded in part by TeraGrid and the DoD PET program
  – Development team: Greg Johnson, Steve Mock, Brandt Westing, Matthew Hanlon
Run an EnVision session

- Navigate back to the “Jobs” tab
- End your current job
- Select the session type “EnVision guided visualization”
Run an EnVision session

- Load the mummy data in the remote file browser (click the Examples shortcut)
Run an EnVision session

- Load the mummy data in the remote file browser (click the Examples shortcut)
- *Click the Isosurface icon*
Run an EnVision session

- Load the mummy data in the remote file browser (click the Examples shortcut)
- Click the Isosurface icon
- Add an isosurface with default parameters
Run an EnVision session

• Load the mummy data in the remote file browser (click the Examples shortcut)
• Click the Isosurface icon
• Add an isosurface with default parameters
• **See the visualization in the Rendering tab**
Run an EnVision session

• Click the cutting plane icon in the toolbox
Run an EnVision session

- Click the cutting plane icon in the toolbox
- *Keep the default values; click Add*
Run an EnVision session

- Click the cutting plane icon in the toolbox
- Keep the default values; click Add
- **Click the hand next to the cutting plane under Added Algorithms; use the widget to interact**
Run an EnVision session

- Click the cutting plane icon in the toolbox
- Keep the default values; click Add
- Click the hand next to the cutting plane under Added Algorithms; use the widget to interact
- Click the hand again
Run an EnVision session

- Click the Eye next to each added vis algorithm to hide
Run an EnVision session

- Click the Eye next to each added vis algorithm to hide
- *Click volume rendering icon in the toolbox*
Run an EnVision session

- Click the Eye next to each added vis algorithm to hide
- **Click volume rendering icon in the toolbox**
- **Set values as shown and click Add**
Run an EnVision session

- Click the Eye next to each added vis algorithm to hide
- **Click volume rendering icon in the toolbox**
- **Set values as shown and click Add**
Run an EnVision session

• Click the Eye next to each added vis algorithm to hide
• Click volume rendering icon in the toolbox
• Set values as shown and click Add
• Click volume rendering icon in lower left; change settings as you wish
Run an EnVision session

- Click the Eye next to each added vis algorithm to hide
- Click volume rendering icon in the toolbox
- Set values as shown and click Add
- **Click volume rendering icon in lower left; change settings as you wish**
Run an EnVision session

- Explore the isotropic turbulence example data on your own
Questions?

gregj@tacc.utexas.edu