Remote & Collaborative Visualization

Texas Advanced Computing Center
TACC Remote Visualization Systems

• **Longhorn** – NSF XD Dell Visualization Cluster
  – 256 nodes, each 8 cores, 48 GB (or 144 GB) memory,
    2 NVIDIA Quadro FX 5800 GPUs w/ 4 GB each

• **Stampede** – NSF track2E Dell Supercomputer
  – 128 vis nodes
    • 16-core Intel Xeon (SandyBridge), 32 GB RAM
    • NVIDIA K20 Kepler GPU w/ 8 GB RAM
  – 16 large memory nodes,
    • 32 core Intel Xeon, 1 TB RAM
  – Lustre filesystem (5 GB / 400 GB quota)

• Available for use by TACC and XSEDE users
User guides

http://www.tacc.utexas.edu/user-services/user-guides/longhorn-user-guide

http://www.tacc.utexas.edu/user-services/user-guides/stampede-user-guide
Remote Visualization Model

- HPC System
- Data Archive
- Large-Scale Visualization Resource
- Pixels
- Mouse
- Display
- 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 –pe 1way 8 –geometry 1600x1200
    • touch vncserver.out
    • tail -f vncserver.out
    • Connect to address in output file with a VNC viewer
SSH Access on Stampede

• ssh stampede.tacc.utexas.edu

• sbatch –p vis –A [allocation] /share/doc/slurm/job.vnc – geometry 1920x1080
  – (run vncpasswd)

• touch ~/vncserver.out
• tail -f ~/vncserver.out

• Connect to address in output file with a VNC viewer
Longhorn Visualization Portal

- **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
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 python 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

Start a Job

Resource: Longhorn
Project: AdminLonghorn
Session type: VNC EnVision guided visualization
Number of nodes: 16 (128 slots)

Note: increasing the number of nodes will only increase performance for parallel applications (e.g. ParaView or VisIt).

Click here to set your VNC password.
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

• Explore the isotropic turbulence example data on your own