Remote & Collaborative Visualization

Texas Advanced Computing Center
TACC Remote Vis Systems

- **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, Kepler GPU’s
  - Lustre filesystem (5 GB / 400 GB quota)
- **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
- **Lonestar** – 8 GPU nodes on 2 Dell C6100 servers
  Dual 6-core Intel Xeon X5670, NVIDIA M2090 (6 GB) each
User guides

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

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

http://www.tacc.utexas.edu/user-services/user-guides/lonestar-user-guide
Methods of Remote Access

- SSH + X11 port forwarding
  - Basic command-line interface, useful for managing files, submitting jobs, etc.
- Direct VNC connection
- Longhorn Visualization Portal
  - Simplified web-based interface for:
    - Viewing your allocations
    - Submitting jobs
    - Interacting with remote vis sessions (VNC or EnVision)
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`
- `run vnspassword`
- `touch vncserver.out`
- `tail -f vncserver.out`
- Connect to address in output file with a VNC viewer
VNC clients

- TigerVNC
  http://sourceforge.net/projects/tigervnc/files/

- Some other clients
  - vncviewer (Linux)
  - TightVNC (Windows)
  - Safari / screen sharing (Mac OS)
Connecting to a VNC session

- Cut and paste the VNC address + port
Running Paraview

- module load python qt paraview
- vglrun paraview
Quitting the session

• “exit” from the original shell terminal
• Or, from login shell:
  – `squeue -u [username]`
  – `scancel [job id]`
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
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:
  – \textit{module avail}

• Examples:
  – Run ParaView:
    • \textit{module load python paraview}
    • \textit{vglrun paraview}
  – Run VisIt
    • \textit{module load visit}
    • \textit{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: Admin.Longhorn
Session type: VNC

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