



# NERSC Visualization Update

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## Outline

- Year in review.
- New Visualization Platform at NERSC.
  - *davinci.nerosc.gov*
  - Current davinci FAQ.
- Upcoming Program Directions.



# NERSC Visualization Activities

- **License management improvements.**
  - Remote use of licensed software.
  - Direct response to 2002 Vis Greenbook.
- **Website improvements.**
  - vis.lbl.gov, [www.nersc.gov](http://www.nersc.gov)
- **Many interesting and challenging visualization projects (next slide).**



# NERSC Visualization Activities

The collage displays various scientific visualization outputs:

- Archival Storage:** A diagram showing data flow from HPC Resources to Archival Storage, then to a Web Portal, and finally to User client n.
- Web Portal:** A central diagram showing the Web Portal acting as a hub for data, audio, and video, connecting to HPC Resources, Archival Storage, and multiple User client n sites.
- DFX Vts:** A window showing a 3D visualization of a circular structure with a color scale ranging from -2.442 to 2.442.
- 3D Molecular Models:** Several images showing complex 3D molecular structures, including a large yellow and green structure, a blue and yellow structure, and a blue and yellow structure with a red and green highlight.
- 3D Surface Plots:** A large 3D surface plot showing a curved structure with a color scale ranging from 0.000e+00 to 2.000e+00.
- 3D Volume Plots:** A 3D volume plot showing a curved structure with a color scale ranging from 0.000e+00 to 2.000e+00.
- 3D Point Clouds:** A 3D point cloud visualization of a curved structure.
- 3D Wireframe Models:** A 3D wireframe model of a curved structure.
- 3D Surface Plots (Theta):** A 3D surface plot showing a curved structure with a color scale ranging from 0.00 to 2.77 and 6.91.
- 3D Volume Plots (Density):** A 3D volume plot showing a curved structure with a color scale ranging from 0.000e+00 to 2.000e+00.
- 3D Point Clouds (Theta):** A 3D point cloud visualization of a curved structure with a color scale ranging from 0.00 to 2.77 and 6.91.



# New Visualization Platform

[davinci.nersc.gov](http://davinci.nersc.gov)

- SGI Altix
- 8 1.4 Ghz IA64 Processors
- 48 GB RAM
- 3TB attached FCAL RAID storage
- Dual-channel bonded Gigabit Ethernet, 10Gb Ethernet
- (No graphics hardware at this time.)



## **Davinci.nersc.gov – FAQ**

- **Current Status?**
  - Preproduction.
  - Full production ETA March 2005.
- **User accounts?**
  - Yes! Please request an account and try out the machine.
  - Be advised the machine is in preproduction status.



## Davinci.nersc.gov – FAQ

- **What Center role does davinci play?**
  - **Primary: interactive visualization and data analysis.**
  - **Secondary: batch queue run in “off hours” (exact schedule TBD) to help fulfill allocations.**
- **Charges?**
  - **Yes: for jobs that fulfill allocations.**
  - **No: no charges for interactive use.**



## Davinci.nersc.gov – FAQ

- **Key characteristics:**
  - **SMP, shared-memory, CC-NUMA.**
    - Visualization tends to be more I/O and memory bound rather than CPU bound.
  - **Parallel programming environment flexibility: OpenMP, MPI.**
  - **Excellent for serial analysis/vis requiring large amounts of memory.**
  - **6.4 GB/s internal bidirectional bandwidth.**





## Davinci.nersc.gov – FAQ

- **Shared filesystem?**
  - Yes, we are moving in that direction.
  - Will share a filesystem with Jacquard.
- **Filesystem quotas:**
  - Center policy for home, project.
  - Purge policy on local scratch storage.
- **Backup policy?**
  - Consistent with center policy.



## Davinci.nersc.gov – FAQ

- **Visualization software?**
  - Nominally, same as on seaborg and escher.
  - Some IRIX-only applications will be missing.



## Davinci.nersc.gov – FAQ

- **What about escher?**
  - **Escher will remain in production status at least until davinci is fully commissioned.**



## Future Directions

- **Production visualization:**
  - Populate davinci, commission.
- **Continued focus on tactics for remote visualization.**
  - Pipelined-parallel visualization tools and architectures.
- **Institutional Visualization support.**
  - Challenging, non-OTS solutions.



## Future: Greenbook Input

- **What can the Center do to better support your science's analysis and visualization needs?**
  - **Capacity: data size, temporal requirements.**
  - **Capability: scalability, multidimensional, multivariate, domain-specific needs, ...**



The End