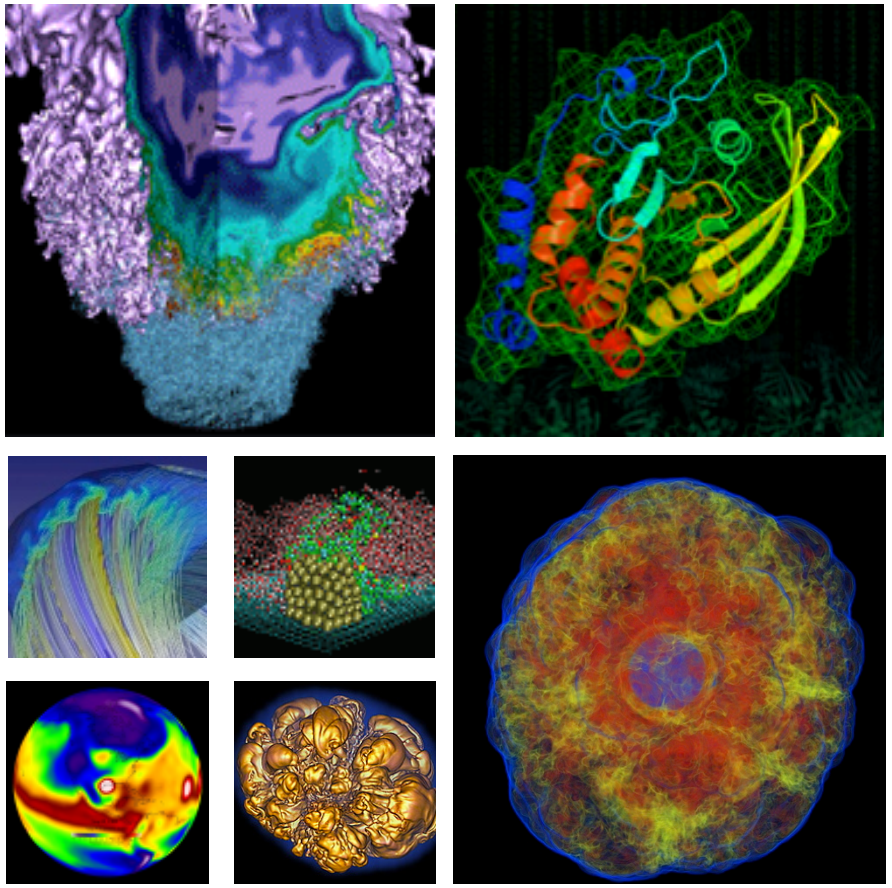
Data Transfer at NERSC



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What are the Data Transfer Nodes?

- **The Data Transfer Nodes (DTN) are servers dedicated to data transfer at NERSC.**
  - Nodes – dtn[01-04].nersc.gov
- **DTNs have access to most of the NERSC file systems, and are tuned to transfer data efficiently.**
- **The Data Transfer Nodes are tuned for transferring large volumes of data between NERSC and other major facilities (ORNL, ANL etc.)**
- **Can also be used to move data between NERSC file systems and HPSS**

In short …

- **Use the DTNs if you want to move large volumes of data in and out of NERSC (or between NERSC systems)**

Login Access

- **All NERSC users have login access**
- **NERSC Users (non-JGI):**
  - `ssh dtn01.nersc.gov` (or `dtn02`)
- **JGI Users:**
  - `ssh dtn03.nersc.gov` (or `dtn04`)
- **Familiar module environment**
  - `module avail`

DTN Filesystems

- **All Global Filesystems (but not /scratch on Hopper and Edison)**

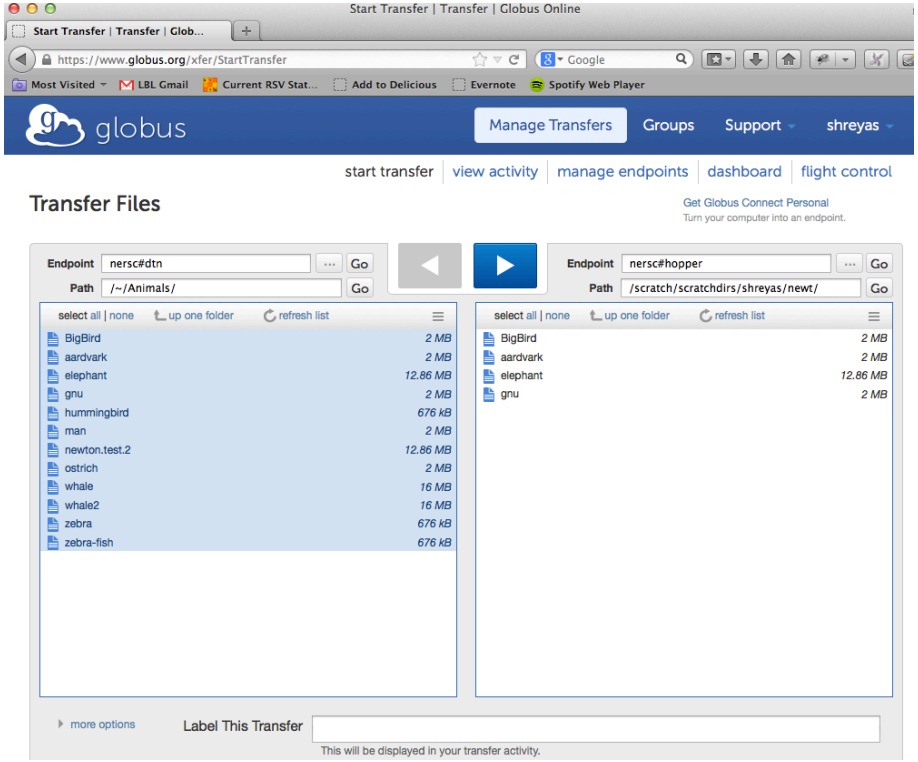
- `/global/homes`
- `/global/scratch2`
- `/global/project`
- `/global/projectb`
- `/global/dna`
- `/global/seqfs`
- `/global/common`

Transfer Tools

- Globus ~~Online~~ – reliably move large data sets in bulk
- scp – Copying individual files and directories
- hsi/htar – For HPSS data transfer
- bbcp – High performance CLI tool with minimal setup
- GridFTP – High performance CLI with grid certificates

Globus

- Managed 3rd party Transfers – http://globus.org
- CLI also available – `ssh cli.globus.org`



Quick Demo

- http://globus.org
- Select `nersc#dtn` endpoint in the transfer window (autocomplete might take a while)
- Select remote endpoint
- Use point and click interface to submit transfer
- Transfer will happen in the background (including retries on failure).
- You can check back on status later
- Globus Connect allows you to have a private endpoint on your laptop

Other tools

- **These are command line tools – use these directly from the DTN nodes or from a remote node**
  - scp
  - bbcp
  - GridFTP (globus-url-copy)

- **Detailed instructions, syntax etc.**
  - http://tinyurl.com/nerscdtn

Secure Copy

- Uses SSH under the covers
- Good for “small” (~100s of MB)

```
scp localfile user@host:remotefile
```

- We use high performance modifications (HPN SSH) to get us better throughput

BaBar Copy (bbcp)

- **Developed for BaBar experiment at SLAC**
- **Peer-to-peer model (not client-server)**
  - Must be installed on each end
    - Easy to build and/or install
    - Available on all NERSC systems
  - Can do third-party transfers
- **Uses ssh authentication**
- **Many tuning options**
- **Good for larger files**
- **Somewhat complicated command-line**
  https://www.nersc.gov/users/data-and-file-systems/transferring-data/bbcp/
  (http://tinyurl.com/nerscbbcp)

GridFTP

- **Use Data Transfer nodes for wide-area transfers**
  - dtn01.nersc.gov
  - dtn02.nersc.gov
  - dtn03.nersc.gov
  - dtn04.nersc.gov
- **Use "grid" name for load-balanced hosts**
  - hoppergrid.nersc.gov
  - edisongrid.nersc.gov
  - carvergrid.nersc.gov
  - pdsfgrid.nersc.gov
- **Grid tools available via "module load globus"**
  - globus-url-copy

http://tinyurl.com/nersc-gridftp

External Collaborators

- **FTP Upload**
  - External collaborators can get temporary FTP accounts to upload data to a "dropbox" like area
  - http://www.nersc.gov/users/data-and-file-systems/transferring-data/nersc-ftp-upload-service/

    (http://tinyurl.com/nerscftp)
  - User will use `take` command to accept (email instructions will be sent)
- **WWW Download**
  - Create a www directory in your project space and put your data on the web
  - Available for public access at

    http://portal.nersc.gov/project/<yourproject>

HPSS

- **To backup or archive your data use HSI and HTAR**

  http://www.nersc.gov/users/data-and-file-systems/hpss/getting-started/

  (http://tinyurl.com/nerschpss)

- **Login to DTN node and run hsi/htar**
  - Preferred to doing this from login nodes for long running transfers
- **Can also to Globus Online transfer**
  - nersc#dtn <-> nersc#hpss

Why DTNs?

- **No firewall restrictions**
- **Tuned for WAN transfers**
  - Fast network (ESnet), optimized configuration
- **You don't get booted for long running transfers**
- **Fixed endpoint (in case you need to tune firewalls on the other end)**
- **Dedicated support for data transfer**

General Tips

- Use Globus for large automated or monitored transfers
- scp should be fine for smaller transfers (<100MB)
- Don’t use DTN nodes for non data transfer purposes
- Also: just use cp for transfer within filesystems

Performance Considerations

- **Performance is most often limited by the remote endpoint**
  - they often are not tuned for WAN transfers
  - often have a 1Gb/sec link.
  - These will lower performance < 100 MB/sec.
- **File system contention may be an issue**
  - Isn't much you can do except try the transfer at a different time or on a different FS.
  - You may need to consider the cost of lost time vs. transferring at a lower rate
- **Don't use your $HOME directory!**
  - Instead use /project, $SCRATCH or $GSCRATCH
- **If you don't think you are getting the performance you expect, let us know: consult@nersc.gov**

For more information

- **General DTN info**
  - http://www.nersc.gov/systems/data-transfer-nodes/
- **Data transfer info**
  - http://www.nersc.gov/users/data-and-file-systems/transferring-data/

  (http://tinyurl.com/nerscdtn)
- **Feedback / Problems?**
  - consult@nersc.gov
- **Globus Support**
  - https://www.globus.org/support/

Thank you.