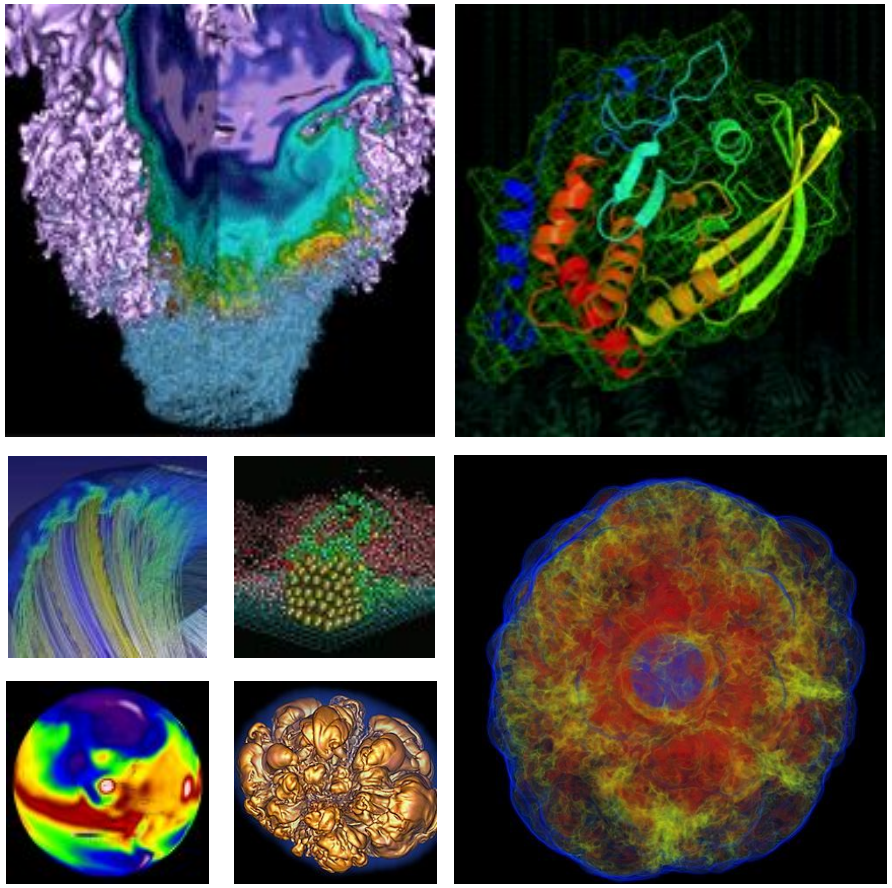
Data Transfer at NERSC



Shreyas Cholia

NERSC Data and Analytics Group

NERSC New User Training

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Dedicated Data Transfer System: Data Transfer Nodes

- **Data Transfer Nodes (DTN) are dedicated servers for moving data at NERSC. (dtnXX.nersc.gov)**
  - Servers include high-bandwidth network interfaces & are tuned for efficient data transfers
    - Monitored bandwidth capacity between NERSC & other major facilities such as ORNL, ANL, BNL, SLAC…
  - Direct access to global NERSC file systems & Cori cscratch1
  - Can be used to move data internally between NERSC systems &/or NERSC HPSS

➢ **Use NERSC DTNs to move large volumes of data in and out of NERSC or between NERSC systems**

Globus

- **The recommended tool for moving data in & out of NERSC**
  - http://www.globus.org/ or http://globus.nersc.gov/
  - Reliable & easy-to-use web-based service:
    - Automatic retries
    - Email notification of success or failure
  - Accessible to all NERSC users
  - NERSC managed endpoints for optimized data transfers

- **Globus extensive documentation https://docs.globus.org**
  - Web based interaction with service
  - REST/API for scripted interactions with service
  - Globus Connect Server & Personal for setting up additional remote endpoints such your personal laptop

NERSC Managed Globus Endpoints

- **Available for all NERSC users**
  - Maps data servers to NERSC resources
  - See: http://www.nersc.gov/users/storage-and-file-systems/transferring-data/globus-online/

NERSC Endpoints

	Endpoint Name	Description	Recommended Use
Most use cases →	**NERSC DTN**	Multi-node, high performant transfer system with access to all NERSC Global File systems (NGF) as well as the large Cori Scratch	Almost all data transfers needs into & out of NERSC
Special use cases	**NERSC HPSS**	Single node system connected directly to the NERSC HPSS tape archive	Remote transfers into & out of HPSS
Special use cases	**NERSC Edison**	Single node system connected to NGF and uniquely to the Edison scratch file system	*Only recommended for access to Edison scratch*
Special use cases	**NERSC PDSF**	Single node system connected to NGF and the two remaining PDSF-specific file systems, eliza3 and eliza18	*Only recommended for access to /eliza3 and /eliza18*
Now obsolete	**NERSC Cori**	Originally a dual-node system needed for accessing the Cori scratch file system. The endpoint is the same as NERSC DTN	*Use NERSC DTN instead*
Now obsolete	**NERSC DTN-JGI**	Single node system that was used to access JGI-specific file systems, which are now connected to the NERSC DTN servers.	*Use NERSC DTN instead*

Globus Demo

Transferring with NERSC HPSS

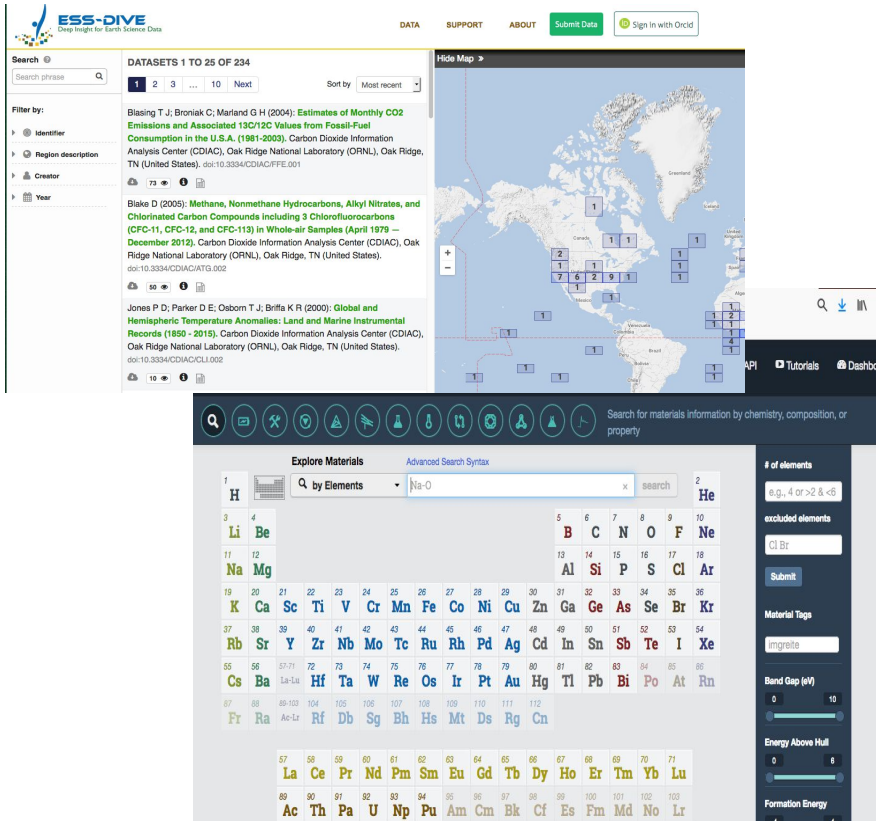
- **HPSS tape archive is recommended for storing/archiving large amounts of data and/or for long periods of time**
  - See: https://docs.nersc.gov/filesystems/archive_access/
- **Use interactive DTNs with hsi/htar to move data to/from HPSS and NERSC file systems**
  - HSI for individual files and conditional access
  - HTAR for aggregation & optimization of storage/archival of large numbers of files
- **Also use Globus Online: NERSC HPSS endpoint**
  - However Globus does not directly support aggregation with 'htar' or tape-ordering
  - Preferred use is for small number of large files

Access for External Collaborators

- **NERSC supports project-level public http access**
  - Project specific area can be created:
    - /global/project/projectdirs/<yourproject>/www
  - These are available for public access under the URL:
    - https://portal.nersc.gov/project/<yourproject>
  - Add HTML and JS for spice
- **FTP Upload site**
  - Temporary anonymous FTP access for external partners to upload data
  - https://www.nersc.gov/users/storage-and-file-systems/transferring-data/nersc-ftp-upload-service

NERSC Science Gateways

- **Web portals that allow you to interface with your data and computation at NERSC**
- **Interfaces built around your science**
  - use “www” project dir to publish
  - Build sophisticated web applications in **SPIN**
- **NEWT REST API to access NERSC resources**
- **Science-as-a-Service!!**
- **Links:**
  - http://www.nersc.gov/users/data-analytics/science-gateways/
  - https://docs.nersc.gov/services/spin/getting_started/



General Tips

- **Use Globus Online for large, automated or monitored transfers**
- **scp is fine for smaller, one-time transfers (<100MB)**
  - But note that Globus is also fine for small transfers
- **Don't use DTN nodes for non-data transfer purposes**
  - Use system login nodes for more general routine tasks
- **Plain "cp" is can be used for transfers within file systems**
  - Can use globus for convenience

Performance Considerations

- **Performance is often limited by the remote endpoint**
  - Not tuned for WAN transfers or have limited network link
  - These can lower performance < 100 MB/sec.
- **File system contention may be an issue**
  - Try the transfer at a different time or on a different FS.
- **Don't use your $HOME directory**
  - Instead use /global/project, $SCRATCH …
- **If you think you are not getting the performance you expect, let us know: consult@nersc.gov**

For more information

- **Data transfer info**
  - http://www.nersc.gov/users/data-and-file-systems/transferring-data
- **Feedback / Problems?**
  - consult@nersc.gov
- **Globus Support**
  - https://www.globus.org/support/