Transferring Data at NERSC

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Dedicated Data Transfer System: Data Transfer Nodes

- Data Transfer Nodes (DTN) are dedicated servers for moving data at NERSC.
  - 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...
  - Provide direct access to global NERSC file systems
  - Can be used to move data between NERSC systems & HPSS

➢ Use the 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/
  – 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
    • Configured for general & specific uses

• **Globus extensive documentation covers**
  – 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

<table>
<thead>
<tr>
<th>Endpoint Name</th>
<th>Description</th>
<th>Recommended Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>NERSC DTN</td>
<td>Multi-node, high performant transfer system with access to all NERSC Global</td>
<td>Almost all data transfers needs into &amp; out of NERSC</td>
</tr>
<tr>
<td></td>
<td>File systems (NGF) as well as the large Cori Scratch</td>
<td></td>
</tr>
<tr>
<td>NERSC HPSS</td>
<td>Single node system connected directly to the NERSC HPSS tape archive</td>
<td>Remote transfers into &amp; out of HPSS</td>
</tr>
<tr>
<td>NERSC Edison</td>
<td>Single node system connected to NGF and uniquely to the Edison scratch file</td>
<td>Only recommended for access to Edison scratch</td>
</tr>
<tr>
<td></td>
<td>system</td>
<td></td>
</tr>
<tr>
<td>NERSC PDSF</td>
<td>Single node system connected to NGF and the two remaining PDSF-specific file</td>
<td>Only recommended for access to /eliza3 and /eliza18</td>
</tr>
<tr>
<td></td>
<td>systems, eliza3 and eliza18</td>
<td></td>
</tr>
<tr>
<td>NERSC Cori</td>
<td>Originally a dual-node system needed for accessing the Cori scratch file system. The endpoint is the same as NERSC DTN</td>
<td>Use NERSC DTN instead</td>
</tr>
<tr>
<td>NERSC DTN-JGI</td>
<td>Single node system that was used to access JGI-specific file systems, which are now connected to the NERSC DTN servers.</td>
<td>Use NERSC DTN instead</td>
</tr>
</tbody>
</table>
Globus: Quick Introduction

NERSC 40 Years at the Forefront

U.S. Department of Energy | Office of Science

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Logging into Globus

You can log into Globus Online with your NERSC Username & Password

Log in to use Globus Web App

Use your existing organizational login
e.g. university, national lab, facility, project, Google or Globus ID
(Your Globus username and password used prior to February 13, 2016 is now Globus ID)

NERSC

Continue

Welcome to the OAuth for MyProxy Client Authorization Page. The Client below is requesting access to your account. If you approve, please sign in with your username and password.

Client Information

Name: Globus
URL: https://www.globus.org

Username
Password

Sign In  Cancel
## Endpoint Selection

- **Search in the Globus Online Web application:**

![Manage Endpoints](image)

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Status</th>
<th>Credential</th>
</tr>
</thead>
<tbody>
<tr>
<td>NERSC Cori</td>
<td>not active</td>
<td>activate</td>
</tr>
<tr>
<td>Managed Public Endpoint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NERSC DTN</td>
<td>ready</td>
<td>expires in 12 days</td>
</tr>
<tr>
<td>Managed Public Endpoint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NERSC DTN JGI</td>
<td>not active</td>
<td>activate</td>
</tr>
<tr>
<td>Managed Public Endpoint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NERSC Edison</td>
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<td>activate</td>
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<tr>
<td>Managed Public Endpoint</td>
<td></td>
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</table>
Activating a NERSC endpoint

Please authenticate to access this endpoint

Advanced option: select up to 277 hours lifetime for activation

Active endpoint opens file system browser

Activate endpoint with your NERSC Username & Password
Transfer Data From NERSC to another endpoint … even your laptop

Laptop endpoint: Globus connect personal

Select file

Transfer initiated

Transfer complete
Other tools and considerations
NERSC Data Transfer Nodes for direct access

• NERSC maintains several DTNs with login access
  – dtn01.nersc.gov, dtn02, dtn03, dtn04

• Familiar module environment
  – Limited software deployment for data transfer needs

• Global file systems are available
  – /global/project, /global/projecta, /global/cscratch1
  – Excludes some Edison & PDSF specific systems
    • Edison: /scratch1, /scratch2, /scratch3
    • PDSF: /eliza3, /eliza18
Transfering with NERSC HPSS

• HPSS tape archive is recommended for storing/archiving large amounts of data and/or for long periods of time
  – See: http://tinyurl.com/nerschpss

• 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

• For archival & retrieval of large number of files
  – Aggregate data into smaller number of files with ‘htar’ for storing
  – Retrieve many files using tape-ordered routines:

• 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
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
  – ever system has login nodes for more general routine tasks

• Plain “`cp`” is still used for transfers within file systems
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 $SCRATCH, /global/project, ...

• **If you think you are not getting the performance you expect, let us know:** consult@nersc.gov
NERSC supports project-level public http access

- Project specific area can be created:
  - /global/project/projectdirs/<yourproject>/www
  - Owned by project PI or designate
- Available for public access
  - http://portal.nersc.gov/project/<yourproject>
For more information

• Data transfer info

• General DTN info
  – http://www.nersc.gov/systems/data-transfer-nodes/

• Feedback / Problems?
  – consult@nersc.gov

• Globus Support
  – https://www.globus.org/support/