NESC HPC Group A End User Training

Dan Schornak (CSC)
Shawn Hoopes (Adaptive Computing)
TRAINING AGENDA – Group A

0800-0810 Training Process
  • Introduce instructors
  • General information
  • Define training roles and responsibilities
  • Review training agenda

0810-0815 Training Objectives
  • Review the objectives of the NESCC HPC Environment overview

0815-0845 Introduction to NESCC HPC Design/Architecture and Environment
  • Describe the overall architecture major components, functions, and features

0845-0900 Available On-line Documentation

0900-0915 BREAK
TRAINING AGENDA – Group A

0915-0945  Introduction to User Environment, Policies, Quotas, and Environmental Variables

0945-1045  Introduction to Programming Environment
  • Introduce tools – shells, applications, compilers, and libraries

1045-1145  Introduction to NESCC Storage and Data Management

1145-1245  **LUNCH BREAK**

1245-1415  Introduction to Job Scheduling using Moab (Adaptive Computing)
  • Efficient job submission techniques
  • Installed NESCC version compared to other NOAA installations
  • Moab/Torque end-user commands and tools

1415-1500  Questions/Answers

1500      Session Wrap up
Need Help? – Where to go...

Zeus User Support and Problem Reporting (Help Desk for NESCC)
rdhpcs.zeus.help@noaa.gov

HPSS User Support and Problem Reporting (Help Desk for NESCC)
rdhpcs.hpss.help@noaa.gov

NESCC FAQ and Documentation Wiki Site – “How to…”
https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/Main_Page

End User Experience

EMC Model Transition Team (Provides updates for porting to TDS and Zeus)
http://www.emc.ncep.noaa.gov/mtt

NESCC Factoid…
“Documentation will continue to be updated on NesccDocs.”
Need Help? – Where to go…

NESCC Documentation Wiki Site – “How to…”
https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/Main_Page

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Need Help? – Where to go...

End User Experience

EMC Model Transition Team (Provides updates for porting to TDS and Zeus)
http://www.emc.ncep.noaa.gov/mtt
## TRAINING OBJECTIVES (Group A)

<table>
<thead>
<tr>
<th>What it is...</th>
<th>What it isn’t...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to NESCC HPC Environment</td>
<td>System Administrator–level Training</td>
</tr>
<tr>
<td>User Environment Overview</td>
<td>Unix scripting Overview</td>
</tr>
<tr>
<td>Programming Environment Overview</td>
<td>Application/System Tuning Overview</td>
</tr>
<tr>
<td>Introduction to Moab Workload Manager/Torque</td>
<td>Moab Administrator–level Training</td>
</tr>
<tr>
<td>Resource Manager</td>
<td></td>
</tr>
</tbody>
</table>

Disclaimer: As Zeus moves through its acceptance period, some training content may become obsolete. For the latest guidance on how to use these NESCC HPC resources, please visit the following site regularly:

https://nesccdocs.rdhpcs.noaa.gov
## NESCC HPC Design/Architecture and Environment

<table>
<thead>
<tr>
<th>Type</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bastion</td>
<td>All login sessions are routed through these hosts. They provide additional security to protect NOAA assets.</td>
</tr>
<tr>
<td>Service Nodes</td>
<td>Where initial login sessions are created. They are for general interactive use for operations such as editing and compiling code, managing files, initiating actions on external network including data transfer and accessing software repository.</td>
</tr>
</tbody>
</table>
| Data Transfer Nodes (DTN) | Provide high speed Inbound and outbound data transfers.  
- FOR EXTERNALLY INITIATED TRANSFERS - |
| Compute System      | Major compute resources for parallel jobs. Accessible through the batch system.                                                         |
| Big Memory Nodes    | Large memory set for applications that require more memory than a single compute node. Accessible through the batch system.       |
| High Performance Storage | High speed filesystems                                                      |
| Home Filesystem     | Storage system optimized for editing and compiling code.                                                                      |
## Zeus System Configuration

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Nodes</td>
<td>8 (48 GB/node)</td>
</tr>
<tr>
<td>Big Memory Nodes</td>
<td>6 (96 GB/node)</td>
</tr>
<tr>
<td>Compute Nodes</td>
<td>2304</td>
</tr>
<tr>
<td>Compute Cores</td>
<td>27648</td>
</tr>
<tr>
<td>Total Flops</td>
<td>383 TF</td>
</tr>
<tr>
<td>Total Data Transfer Nodes</td>
<td>2+</td>
</tr>
<tr>
<td>HPS Capacity</td>
<td>5.6 PB</td>
</tr>
<tr>
<td>HPS Performance</td>
<td>&gt; 70 GB/s</td>
</tr>
</tbody>
</table>

• There will be several DTN types depending on location of originating connection. Policy is being finalized by NOAA management.
General System Information

<table>
<thead>
<tr>
<th>Node Type</th>
<th>Total Cores</th>
<th>Core Speed</th>
<th>Memory</th>
<th>Local Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>12</td>
<td>3.46GHz</td>
<td>48 GB</td>
<td>Yes</td>
</tr>
<tr>
<td>Compute</td>
<td>12</td>
<td>3.46GHz</td>
<td>24 GB</td>
<td>No</td>
</tr>
<tr>
<td>Big Memory</td>
<td>12</td>
<td>3.46GHz</td>
<td>96 GB</td>
<td>No</td>
</tr>
</tbody>
</table>

Notes:

- There are no CRON Nodes. CRON Services will be provided on Zeus through a NOAA developed system that unifies the crontab across all login nodes.
Test and Development System (TDS)

Test LSC System Components (Herc)
HPC System: SGI Altix ICE 8400 EX
Filesystem: Lustre

TDS (a.k.a Herc) - SGI ICE
48 nodes, 3.46 GHz Intel Westmere
12 cores per node
2GB per core (24GB per node)
QDR dual-rail InfiniBand

Lustre

The fast parallel filesystem mount points are /tds_scratch1 and /tds_scratch2. You can create directories for your use under the users directory.


NESCC Factoid…
“TDS is for testing new software components, debugging system problems, and testing applications as necessary. Users will only have access when granted to solve specific problems. This is not a generally accessible resource.”
Zeus Production System

Production LSC System Components (Zeus)
- SGI Altix ICE 8400 EX
- Filesystem: Lustre

SGI ICE – Zeus Compute Nodes
- 2304 IP-105 blades
- 4608 CPUs, X5690 e.46GHz 6-Core
- 24 GB DDR3 1333MHz 2 cores per node
- 4GB per core (48GB per node)
- QDR dual-rail InfiniBand
- Lustre

The fast parallel filesystem mount points are /scratch1 and /scratch2. Users are assigned projects, and those projects have preexisting storage in directories in /scratch1 and /scratch2.

Login Nodes: fe1
- fe2
- fe3
- fe4
- fe5
- fe6
- fe7
- fe8

Get Help! @ rdhpcs.zeus.help@noaa.gov
rdhpcs.hpss.help@noaa.gov
Data Storage

Production LSC System Components (Zeus)
SGI Altix ICE 8400 EX
Filesystem: Lustre

HPSS production system has a 1 PB disk cache
Oracle SL8500 Modular Library with 32 T10Kc drives.
The library has slots for 10000 tapes (50 PB) max capacity, but only
7500 tapes are in the silo at this time (37.5PB).
NESC HPC Design/Architecture and Environment

Wide Area Network

- Internet
- Princeton
- ORNL
- Boulder
- Gaithersburg
- NESCC 3rd Floor
- NESCC 1st Floor
- NESCC
- MAX
- perfSonar
- Data Transfer Nodes
- HPCS Infrastructure Switch EX4200
- HPCS Management Network
- HPCS DMZ
- HPCS S4810 Switches
- HPCS FW SRX 3600
- 10 GbE

Get Help! @ rdhpcs.zeus.help@noaa.gov
rdhpcs.hpss.help@noaa.gov
Available Online Documentation – Good to Know

NESCC Documentation Wikisite: https://nesccdocs.rdhpcs.noaa.gov/
EMC Model Transition Team Website: http://www.emc.ncep.noaa.gov/mtt

Compilers

Available Online Documentation – Good to Know

MPI Libraries
• Message Passing Toolkit (MPT) User’s Guide:

SGI
• Linux® Application Tuning guide for SGI® X86-64 Based Systems:
  http://techpubs.sgi.com/library/tpl/cgi-bin/browse.cgi?coll=linux&db=bks&cmd=toc&pth=/SGI_Developer/LX_86_AppTune

IBM Documentation
• HPSS User Guides: http://www.hpss-collaboration.org/user_doc.shtml

Archival Documentation
• HTAR Man Page: http://www.mgleicher.us/GEL/htar/htar_man_page.html
• HTAR User Guide: http://www.mgleicher.us/GEL/htar/htar_user_guide.html

Administrative Book – Nice to Know
• SGI® Performance Suite 1.3 Start Here:
  http://techpubs.sgi.com/library/tpl/cgi-bin/browse.cgi?coll=linux&db=bks&cmd=toc&pth=/SGI_Admin/PS_Start_Here

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rdhpcs.hpss.help@noaa.gov
Available Online Documentation – Nice to Know

Administrative Books

• SGI® Performance Suite 1.3 Start Here:
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# Group A End User Training

<table>
<thead>
<tr>
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<th>Session</th>
</tr>
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| 0845-0900 | Available On-line Documentation |
| 0900-0915 | **BREAK** |
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| 1145-1245 | **LUNCH BREAK** |
| 1245-1415 | Introduction to Job Scheduling using Moab (Adaptive Computing)  
- Efficient job submission techniques  
- Installed NESCC version compared to other NOAA installations  
- Moab/Torque end-user commands and tools |
| 1415-1500 | Questions/Answers |
| 1500     | Session Wrap up |

Get Help! @ rdhpcs.zeus.help@noaa.gov  
rdhpcs.hpss.help@noaa.gov
Introduction to User Environment, Policies, Quotas, and Environmental Variables

Section Objectives

1. Investigate various login approaches to TDS/Zeus
2. Review and explore the User Environment
3. Learn how to establish an SSH Tunnel
4. Knowing the Limitations – Established Policies and Quotas
LOGGING IN – Getting from here to there

PuTTY Example to TDS

1. Start PuTTY (Host Name: zeus.rdhpcs.noaa.gov)
2. Log into zeus
3. Hit ^C within 5 seconds
4. Enter “tfe1”
5. You’re now on the TDS!

If password-less login has not yet been established
1. Enter the default password: Pa$$w0rd (that’s zero!)
2. Upon entry, please change your password (passwd)

NESCC Factoid…
“Account Names could be in the form of… “John.Public” or “John.Q.Public” (Be safe…stay case sensitive)
LOGGING IN – Getting from here to there
PuTTY Example to TDS (continued)

1. Start PuTTY (Host Name: zeus.rdhpcs.noaa.gov)
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Get Help! @ rdhpcs.zeus.help@noaa.gov
rdhpcs.hpss.help@noaa.gov
LOGGING IN – Getting from here to there
PuTTY Example to Zeus

1. Start PuTTY
   (Host Name: zeus.rdhpcs.noaa.gov)
2. Log into zeus
3. Ignore the ^C prompting - allow 5 seconds to pass
4. You’re now on Zeus!

If you require to be on a specific log in node:
1. Enter ^C instead in step 3 above
2. Select your specific login node (fe1 through fe8) – see TDS example

NESCC Factoid…
“Account Names could be in the form of…”
“John.Public” or “John.Q.Public”
(Be safe…stay case sensitive)
3. Start PuTTY (Host Name: zeus.rdhpcs.noaa.gov)
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3. Ignore the ^C prompting - allow 5 seconds to pass
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Get Help! @ rdhpcs.zeus.help@noaa.gov
rdhpcs.hpss.help@noaa.gov
Keepalive Packets
PuTTY Example (continued)

NESCC Factoid…
“Avoid connection timeouts by sending ‘keepalive’ packets”
Getting data from here to there

Data Transfer Approaches

SSH Port Tunnelling - Outside noaa.gov
1. PuTTY Example
2. WinSCP Example

Data Transfer Host (Preferred Approach) – Inside noaa.gov

Unattended Data Transfer – Inside noaa.gov

NESCC Factoid…
“DTN support is currently available from NCEP, GFDL, DSRC (Boulder), AOML and NSSL. If your laboratory is not listed and needs DTN access or if a current site cannot access the DTN, send a help request.”

https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/Transferring_Data
TUNNELLING – Getting data from here to there

Linux Example

1. Get Your Personal Port Number:
   a. Log in to Zeus (*zeus.rdhpcs.noaa.gov*)
      ```
      ssh Daniel.Schornak@zeus.rdhpcs.noaa.gov
      ```
   b. Enter password and PIN
   c. Hit ^C within 5 seconds *(optional)*
   d. Enter “tfe1” (for TDS) or “fall through” (For Zeus)
   e. Find port tunnel ID in Welcome Message
   f. Log out of the session

2. On Linux station, log in with tunnel attributes:
   ```
   ssh -L21796:localhost:21796 Daniel.Schornak@zeus.rdhpcs.noaa.gov
   ```

3. Verify tunnel is established in Welcome Message

NESC Factoid…
“Port number is unique for each user. Only 1 login session can tunnel
TUNNELLING – Getting data from here to there

Linux Example (continued)

1. Get Your Personal Port Number:
   a. Log in through Zeus (zeus.rdhpcs.noaa.gov)
      `ssh Daniel.Schornak@zeus.rdhpcs.noaa.gov`
   b. Hit ^C within 5 seconds (Optional)
   c. Enter “tfe1” (for TDS) or “fe1” (For Zeus)
   d. Find port tunnel ID in Welcome Message
   e. Log out of the session

2. On Linux station, log in with tunnel attributes:
   `ssh -L21796:localhost:21796 Daniel.Schornak@zeus.rdhpcs.noaa.gov`

3. Verify tunnel is established in Welcome Message

   A port-tunnel has been established for SCP data transfers
   on port 21796 to host zeus.rdhpcs.noaa.gov.

   PLEASE NOTE:
   ================
   You will need to reconfigure your SSH client
TUNNELLING – Getting data from here to there

Linux Example (continued)

Copying Data

To use the port tunnel for SCP from your host:
----------------------------------------------

Template:
  scp -P 21796 /local/path/to/file Daniel.Schornak@localhost:/remote/path/to/file
or
  scp -P 21796 Daniel.Schornak@localhost:/remote/path/to/file /local/path/to/file

(Windows PUTTY users will use pscp instead of scp)

IMPORTANT NOTE:
================
ALWAYS USE 'localhost' for the SCP commands so the port tunnel is used.

NESCC Factoid…

“localhost” <> “hostname”
TUNNELLING – Getting data from here to there

Linux Example (continued)

Creating or editing ~/.ssh/config
Add the following lines on the client:

```
HOST *
    ServerAliveInterval 60
```

Note: Add space in front of “ServerAliveInterval”

NESCC Factoid…
“Avoid connection timeouts by sending ‘keepalive’ packets”
TUNNELLING – Getting data from here to there

WinSCP Example

1. Start WinSCP
2. In Session Window Host name type: localhost
3. Enter your NESCC-provided Local tunnel port number
4. Enter your “User name”
5. Select: “Allow SCP fallback”
6. Select: “Save”
7. Provide a name for your session
8. Select the session name
9. Select “Login”

Prerequisite: Active PuTTY session on must be running

Get Help! @ rdhpcs.zeus.help@noaa.gov
rdhpcs.hpss.help@noaa.gov
WinSCP Example (continued)

10. Enter local NESCC passwd
11. Select "OK"
12. Upon successful login, WinSCP window appears

NESCC Factoid…
“WinSCP provides a manual drop and drag transfer method”
Data Movers – *Getting data from here to there*

**Data Transfer Host** *(Preferred Approach) – Inside noaa.gov*

*Note: Requires Token Authentication*

**Prerequisite (on Zeus)**
- Create your subdirectory in the appropriate `/scratchX/portfolios/<portfolio>/< project>`
  
  *Hint: Use “account_params” command to help determine the <portfolio> and <project>*

**Example Transfer**

```
scp filex Daniel.Schornak@dtn1.fairmont.rdhpcs.noaa.gov:/scratch2/portfolios/BMC/nesccmgmt/Daniel.Schornak
```

Daniel Schornak will see the following prompt:

```
'Daniel.Schornak@dtn1.fairmont.rdhpcs.noaa.gov's password: <PIN+RSA token>
```

Upon successful password entry, the DTN node is added to the “known hosts”

Warning: Permanently added 'dtn1.fairmont.rdhpcs.noaa.gov,140.90.206.58' (RSA) to the list of known hosts.

The file then transfers and reports the following:

```
filex 100% 128MB 32.0MB/s 00:04
```

Jet account users

You can still access jetscp where Zeus is just another remote host.

[https://jetdocs.rdhpcs.noaa.gov/wiki/index.php/Transferring_Files#Option_2: jetscp](https://jetdocs.rdhpcs.noaa.gov/wiki/index.php/Transferring_Files#Option_2: jetscp)
Data Movers – *Getting data from here to there*

**Unattended Data Transfer** – inside .noaa.gov
- Set up upon special request
- Transfers from known specific hosts inside .noaa.gov
- Transfers to known specific user names on Zeus
- Send a request to the help system explaining your requirements and the list of IP addresses from which the transfers will occur

**Outbound transfers**
- No special hosts, all front end nodes have been designed to support transfers
- If you need to transfer data as part of your workflow, submit those pieces of workflow to the service queue

“*What if I need better transfers to Zeus from outside .noaa.gov?*”
*Please email the help system and let us know what you are trying to do. This will help to determine the best solution and course of action.*

rdhpcs.zeus.help@noaa.gov
### User Environment – Environment Variables

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Example Output (echo &lt;Environment Variable&gt;)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$HOME</td>
<td>/home/daniel.schornak</td>
<td>Typically, the initial directory after logging in</td>
</tr>
<tr>
<td>$PATH</td>
<td>/usr/local/bin:/usr/local/X11/bin:/etc:/usr/etc:/usr/local/etc:/</td>
<td>Provides search path for shell commands. (User modifiable)</td>
</tr>
</tbody>
</table>
| $SHELL               | /bin/tcsh                                   | Current active UNIX shell for session (User modifiable) Available shells include:  
|                      |                                            |  sh (bourne SHell);  bash (Bourne-Again SHell);  csh (C SHell);  ksh (Korn SHell);  tcsh (TC SHell);  zsh – Z SHell  |
| $PWD                 | /home/daniel.schornak                      | Print Working Directory. Changing directory locations updates this environment variable |
| $LOGNAME             | daniel.schornak                            | Name of the user |
| $MAIL                | /var/spool/mail/daniel.schornak            | Location of incoming mail |
| $USER                |                                            | Name of the user |
## User Environment – Environment Variables

<table>
<thead>
<tr>
<th>NCEP</th>
<th>USER=daniel.schornak</th>
<th>GFDL</th>
<th>TERM=xterm</th>
<th>NESCC</th>
<th>LANG=en_US.UTF-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANPATH=/opt/sr/sbin/rsct/man</td>
<td>LDR_CNR=1 TEXT</td>
<td>PATH=usr/local/bin:/usr/local/</td>
<td>PATH=usr/local/</td>
<td>PATH=usr/local/</td>
<td></td>
</tr>
<tr>
<td>PATH=usr/local/bin:/usr/local/</td>
<td>G_BROKEN_FILENAMES=1</td>
<td>MAIL=/var/spool/mail/</td>
<td>MAIL=/var/spool/mail/</td>
<td>MAIL=/var/spool/mail/</td>
<td></td>
</tr>
<tr>
<td>MAIL=/var/spool/mail/</td>
<td>LESSOPEN=</td>
<td>/usr/bin/lesspipe.sh %s</td>
<td>PATH=/usr/bin:/bin:/usr/sbin:/usr/local/bin:/</td>
<td>PATH=/usr/bin:/bin:/usr/sbin:/usr/local/bin:/</td>
<td></td>
</tr>
<tr>
<td>PATH=/usr/bin:/bin:/usr/sbin:/usr/local/bin:/</td>
<td>HOSTTYPE=x86_64-linux</td>
<td>HOSTTYPE=x86_64-linux</td>
<td>VENDOR=unknown</td>
<td>VENDOR=unknown</td>
<td></td>
</tr>
<tr>
<td>VENDOR=unknown</td>
<td>LESSCOLORS=</td>
<td>LESSCOLORS=</td>
<td>OSTYPE=unix</td>
<td>OSTYPE=unix</td>
<td></td>
</tr>
<tr>
<td>LESSCOLORS=</td>
<td>HOSTNAME=pp054</td>
<td>HOSTNAME=pp054</td>
<td>GLOBUS_LOCATION=/usr/local/globus/5.4</td>
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<tr>
<td>REMOTEHOST=pp054</td>
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<td>LOADMODULES=</td>
<td>LOADMODULES=</td>
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<tr>
<td>REMOTEHOST=pp054</td>
<td>REMOTEHOST=pp054</td>
<td>REMOTEHOST=pp054</td>
<td>XAUTHORITY=/home/</td>
<td>XAUTHORITY=/home/</td>
<td></td>
</tr>
<tr>
<td>REMOTEHOST=pp054</td>
<td>REMOTEHOST=pp054</td>
<td>REMOTEHOST=pp054</td>
<td>USER=</td>
<td>USER=</td>
<td></td>
</tr>
<tr>
<td>REMOTEHOST=pp054</td>
<td>REMOTEHOST=pp054</td>
<td>REMOTEHOST=pp054</td>
<td>USER=</td>
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<td></td>
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</table>
Introduction to User Environment, Policies, Quotas, and Environmental Variables

Drafted Policies

- Login Node Usage Policy
- Cron Usage Policy
- Home File System Usage Policy
- High Performance Storage Usage Policy
- Filesystem Backup and Data Retention Policy
- Maximum Job Length Policy
Policy – Login Node Usage Policy (Draft)

Policy Name – Login Node Usage Policy (Draft)

The Zeus login (“frontend”) nodes provide access to the rest of the cluster. They are intended for code and batch job management tasks, not for computation.

Login nodes should ONLY be used for tasks similar to the following:

- Editing and compiling code
- Organizing data on project and home directories
- Copying data on and off the system
- Performing other operations that require external access
- Running very short (less than 1 minute) “glue” jobs.

Tasks that do not fit into the above categories should be run via the batch system. Processes that use a significant amount of CPU cycles or use a large amount of memory, particularly if they execute regularly, are better suited to be run on a compute node than a frontend. There are two ways the user can do this:

- Create a batch script and submit it as a compute or serial job
- Use a dedicated node or nodes in an interactive job session

For further details visit:

https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/Login_Node_Usage_Policy
Introduction to User Environment, Policies, Quotas, and Environmental Variables

Policy – Cron Usage Policy (Draft)

Policy Name – Cron Usage Policy (Draft)

The Cron service is provided for users to launch time sensitive jobs. Any cron jobs will be started on the service/login nodes. Therefore any policies that exist on the service nodes should be applied to the cron jobs.

For further details visit:

https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/Cron_Usage_Policy
Introduction to User Environment, Policies, Quotas, and Environmental Variables

Policy – Home File System Usage Policy (Draft)

Policy Name – Home File System Usage Policy (Draft)

The home filesystem is designed for the following operations:

- Editing and compiling code
- Storing a limited number of small files
- Storing user environment configuration files

The home filesystem has a snapshot capability to ensure rapid retrieval of accidentally deleted files.

Operations that should NOT be performed on the home filesystem:

- Storing /home NOT intended for model input/output data or parallel I/O
- Parallel IO of any kind.

Please use the high performance storage filesystems for these types of operations.

The default quota for user’s /home directory is 5GB. Requests for additional space will be considered on a case-by-case basis.

For further details visit:

Introduction to User Environment, Policies, Quotas, and Environmental Variables

Policy – High Performance Storage Usage Policy (Draft)

Policy Name – High Performance Storage Usage Policy (Draft)

The high performance storage (HPS) filesystems (/scratch1 and /scratch2) are fast, parallel, and scalable. They are to be used for model runs and storing model results. The following describes how these filesystems are maintained.

• The HPS filesystems are allocated on a project basis
• Quotas will be enforced on a per project basis
• These filesystems are scratch, and are NOT backed up
• Users should use the HSM to store critical data
• The HPS filesystems will not be scrubbed
• If projects desire this, they can implement it themselves and build their own policies

For further details visit:

https://nescddocs.rdhpcs.noaa.gov/wiki/index.php/High_Performance_Storage_Usage_Policy
Introduction to User Environment, Policies, Quotas, and Environmental Variables

Policy – Filesystem Backup and Data Retention Policy (Draft)

Policy Name – Filesystem Backup and Data Retention Policy (Draft)

All of the filesystems with the exception of /home and the HSMS are considered scratch filesystems. We want users to be aware of the risks with these filesystems. Scratch filesystems are NOT backed up in any way. While we do our best to ensure the reliability of those filesystems, they are not perfect and there is a small risk that data could be lost without any possibility of recovery.

Much of the data generated on the scratch filesystems may be difficult, labor-intensive, or resource-intensive to recreate. In this case, we strongly recommend that you periodically save this data to the HSMS. You should do this at a reasonable frequency based on your work structure. But you should save data to the MSS at a frequency of no less than weekly.

Please do not save ALL of your model results to the HSMS. Only save results you know that you will need in the future. The HSMS is a limited resource and the cost of supporting an HPC system continues to be driven by data storage, not compute processor cycles.

You should not redundantly copy data to the HSMS. You should copy only new data. You should bundle data together as much as feasible using tools such as tar or cpio.

Finally, labor intensive files such as source code should be kept on /home or in a source code repository. Source trees used to build executable programs can be put on the scratch filesystems but THEY SHOULD NOT BE THE ONLY COPY.

Snapshots are created on the /home filesystem nightly and are kept for two weeks back. Within the two week period, files on /home may be restored from the snapshot directory. We also perform nightly backups for Disaster Recovery purposes. These backups are kept for approximately 6 months. Requests to recover data from a Disaster Recovery backup will be evaluated on a case by case basis.

For further details visit:

https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/High_Performance_Storage_Usage_Policy
Policy – Maximum Job Length Policy (Draft)

The maximum job length for jobs on the NESCC systems is 8 hours. This policy has been developed after assessing over a decade of different job patterns as a balance between user needs, fairness within the system, and reducing risk of losing too many CPU hours from failed jobs or system interruptions.

If you require jobs to run longer than this, it is expected that you use checkpoint/restart to save the state of your model. Then you can resubmit the job and have it pickup where it left off.

For further details visit:

https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/Maximum_Job_Length_Policy
### Proposed Zeus Frontend Limits

<table>
<thead>
<tr>
<th>Proposed Zeus Frontend Limits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>memlock(soft)</td>
<td>4194304 (KB) [0.5GB]</td>
</tr>
<tr>
<td>memlock(hard)</td>
<td>8388608 (KB) [1GB]</td>
</tr>
<tr>
<td>nofile (soft/hard)</td>
<td>6400/64000</td>
</tr>
<tr>
<td>locks (soft/hard)</td>
<td>64/1024</td>
</tr>
<tr>
<td>nproc (soft/hard)</td>
<td>64/512</td>
</tr>
<tr>
<td>cpu (soft/hard):</td>
<td>100/2000</td>
</tr>
<tr>
<td>maxlogins (soft/hard):</td>
<td>20/20</td>
</tr>
</tbody>
</table>

Get Help! @ <rdhpcs.zeus.help@noaa.gov> <rdhpcs.hpss.help@noaa.gov>
Introduction to User Environment, Policies, Quotas, and Environmental Variables

In Practice – Tape Storage Access

Tape Storage

The tape storage assets will not be directly mounted to the login or compute nodes. Access is provided through custom scripts (htar and hsi) that will permit the transfer of data to and from the tape storage server.

NESCC Factoid…
“Current methods to use the tape storage are hsi and htar. Other methods will be provided prior to Zeus going into production.”
Introduction to User Environment, Policies, Quotas, and Environmental Variables

Command location: /apps/hpss/bin/hsi.ksh
alias hsi /apps/hpss/bin/hsi.ksh

NESCC Factoid…
“Similar to ftp commands…the hsi command is used to move files to and from the HPSS.”
Introduction to User Environment, Policies, Quotas, and Environmental Variables

**NESCC Factoid…**

“Similar to tar commands…the htar command is used to compress and package files into one file in order to minimize storage requirements – But then moves this file to HPSS storage.”
Recommended Exercises

1. Log into TDS or Zeus
   a. Try using PuTTY (Windows Environment)
   b. Try using SSH (Linux Environment)

2. Get to know your session environmental variables ("printenv")

3. Review and Explore the User Environment

4. Set up an SSH Tunnel between your system and TDS or Zeus

5. Copy files to the /scratch1 or /scratch2 volumes via DTNs

6. Knowing the Limitations – Established Policies and Quotas
   a. Determine available files systems ("df")
   b. Locate posted policies and quotas

Get Help! @ rdhpcs.zeus.help@noaa.gov
         rdhpcs.hpss.help@noaa.gov
# Programming Environment – Environment Variables

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Example Output (echo &lt;Environment Variable&gt;)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$LD_LIBRARY_PATH</td>
<td>/opt/java/jdk1.6.0_04/lib:/opt/udunits/2.1.15/lib:/opt/papi/4.1.0/lib:/opt/ncl/5.2.0_bin/lib:/opt/hdf5/1.8.3-intel/lib:/opt/netcdf/3.6.3-intel/lib:/opt/intel/Compiler/11.1/072/-idb/lib/intel64:/opt/intel/Compiler/11.1/072//-mkl/lib/em64t:/opt/intel/Compiler/11.1/072//lib/intel64:lib:64/usr/lib:64/usr/X11R6/lib64:/usr/local/lib64:/opt/sge/default/lib/1x26-amd64:/usr/local/lib64</td>
<td>Base path for resolving library paths for applications using Shared Objects and linkers</td>
</tr>
<tr>
<td>$LIBRARY_PATH</td>
<td>/lib64:/usr/lib64:/usr/X11R6/lib64:/usr/local/lib64</td>
<td>Provides search locations for resolving interactive and script command entries. (User modifiable)</td>
</tr>
<tr>
<td>$SHELL</td>
<td>/bin/tcsh</td>
<td>Current active UNIX shell for session (User modifiable) Available shells include: <code>sh</code> (bourne SHell); <code>bash</code> (Bourne-Again SHell); <code>csh</code> (C SHell); <code>ksh</code> (Korn SHell); <code>tcsh</code> (TC SHell); <code>zsh</code> (Z SHell)</td>
</tr>
<tr>
<td>$PWD</td>
<td>/home/Daniel.Schornak</td>
<td>Print Working Directory. Changing directory locations updates this environment variable</td>
</tr>
<tr>
<td>$LOGNAME</td>
<td>daniel.schornak</td>
<td>Name of the user</td>
</tr>
<tr>
<td>$MAIL</td>
<td>/var/spool/mail/daniel.schornak</td>
<td>Location of incoming mail</td>
</tr>
<tr>
<td>$USER</td>
<td>Daniel.Schornak</td>
<td>Name of the user</td>
</tr>
</tbody>
</table>
Alias command provides a simplified way of performing compound commands

Example:
At command line type: alias / history
Now display shell history by typing: /

Note:
Add the above entry to .cshrc and it will be available at shell instantiation

Result from using new aliased command
Programming Environment – Editors

<table>
<thead>
<tr>
<th>Available Editors</th>
<th>Learn More</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ed (a.k.a. red)</td>
<td>ed --help</td>
<td>Line editor</td>
</tr>
<tr>
<td></td>
<td>red --help</td>
<td></td>
</tr>
<tr>
<td>vi</td>
<td>vi --help</td>
<td>Visual Interface (Note: vi is aliased to vim at NESCC)</td>
</tr>
<tr>
<td>emacs</td>
<td>emacs --help</td>
<td>Emacs is the extensible, customizable, self-documenting real-time display editor. This Info file describes how to edit with Emacs and some of how to customize it; it corresponds to GNU Emacs version 23.1.</td>
</tr>
<tr>
<td>rvi (a.k.a. vim; rview)</td>
<td>rvi --help rview --help</td>
<td>Vi IMproved, a programmer’s editor</td>
</tr>
<tr>
<td>ex</td>
<td>ex --help</td>
<td>Line editor or VIM editor capability</td>
</tr>
</tbody>
</table>
## General Compiler Discussion

<table>
<thead>
<tr>
<th>Compilers</th>
<th>Intel *&lt;br&gt;(module load intel)</th>
<th>Portland Group&lt;br&gt;(module load pgi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td>icc</td>
<td>pgcc</td>
</tr>
<tr>
<td>F77</td>
<td>ifort</td>
<td>pgf77</td>
</tr>
<tr>
<td>F90</td>
<td>ifort</td>
<td>pgf90</td>
</tr>
<tr>
<td>C++</td>
<td>icpc</td>
<td>pgCC</td>
</tr>
</tbody>
</table>

*Intel compilers are the primary compilers on Zeus*
### Numerical Libraries Discussion

<table>
<thead>
<tr>
<th>Source</th>
<th>Package</th>
<th>Associated Libraries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel</td>
<td>Math Kernel Library (MKL)</td>
<td>BLAS, LAPACK, PARDISO, FFT, FFTW, ScaLAPACK, Vector Math Library (VML), Vector Statistical Library (VSL), Summary Statistics Library (SSL)</td>
</tr>
<tr>
<td>PGI</td>
<td>PGI Math libraries</td>
<td>LAPACK, BLAS, FFT, Cluster FFT</td>
</tr>
<tr>
<td>SGI</td>
<td>Message Passing Toolkit (MPT)</td>
<td>Message Passing Toolkit (MPT) is a software package that supports interprocess data exchange for applications that use concurrent, cooperating processes on a single host or on multiple hosts. Data exchange is done through message passing, which is the use of library calls to request data delivery from one process to another or between groups of processes.</td>
</tr>
</tbody>
</table>

Many codes may use IBM’s ESSL and, in particular, FFT routines. ESSL is not available for the x86_64 platform.
Module Commands

- module help
- module avail
- module whatis
- module load
- module list
- module unload
- module switch
- module show

NESCC Factoid…
“Modules will continue to be refined during the Zeus acceptance period (through March 1st). After that period, defaults will be finalized. Alternate versions will be accessible over time as needed through different module titles.”

Module Command - “module --help”

[daniel.schornak@fe2 ~/]$ module --help

Modules Release 3.2.6 2007-02-14 <Copyright GNU GPL v2 1991>:

Usage: module [ switches ] [ subcommand ] [subcommand-args ]

Switches:
-1:--help this usage info
-3:--version modules version & configuration options
-2:--force force active dependency resolution
-3:--terse terse format avail and list format
-4:--long long format avail and list format
-1:--human readable format avail and list format
-1:--verbose enable verbose messages
-2:--silent disable verbose messages
-1:--create create caches for avail and apropos
-1:--icase case insensitive
-1:--userlvl <lvel> set user level to (nov[ice],exp[ert],adv[anced])

Available SubCommands and Args:
+ add!load modulefile [modulefile ...]
+ rm!unload [modulefile1] modulefile2
+ switch!swap modulefile [modulefile ...]
+ display!show [modulefile [modulefile ...]]
+ avail [modulefile [modulefile ...]]
+ use [-a:--append] dir [dir ...]
+ unused dir [dir ...]
+ update
+ refresh
+ purge
+ list
+ clear
+ help [modulefile [modulefile ...]]
+ whatis [modulefile [modulefile ...]]
+ apropos !keyword string
+ initadd modulefile [modulefile ...]
+ initprepend modulefile [modulefile ...]
+ initrm modulefile [modulefile [modulefile ...]]
+ initswitch modulefile1 modulefile2
+ initlist
+ initclear
Module Commands – “module avail”

Sample Output “module avail”

Sample Output “module --l avail”
Module Commands – “module whatis <module>”

Sample Output – “module whatis <module>”

Get Help! @ rdhpcs.zeus.help@noaa.gov
rdhpcs.hpss.help@noaa.gov
Module Commands – “module load”

Sample Outputs from “printenv”…Before and After “module load intel”
Module Commands

At Log in…

“At a minimum, you will want to:
• module load intel
• module load mpt

At Job Execution…

Related Environmental Variables:

**MODULESHOME** - The location of the master Modules package file directory containing `module` command initialization scripts, the executable program `modulecmd`, and a directory containing a collection of master `modulefiles`.

**MODULEPATH** - The path that the `module` command searches when looking for `modulefiles`.

**LOADEDMODULES** - A colon separated list of all loaded `modulefiles`.

**_LMFILES_** - A colon separated list of the full pathname for all loaded `modulefiles`.

NESC Factoid…
“Modules are not automatically loaded at user log in or job execution.”
Module Commands – “module list”

Sample Output “module list”

```
[daniel.schornak@fe2 ~]$ module list
Currently Loaded Modulefiles:
1) icc/11.1.072
2) mvapich2/1.4.1-intel-11.1
3) netcdf/3.6.3
4) hdf4/4.2r3-intel
5) hdf5/1.8.3
6) ncl/5.2.0-intel
7) intel/11.1.072
8) papi/4.1.0
9) nco/4.0.1
10) udunits/2.1.15
11) mathlibs/fftw
12) uberftp/2.7
13) gmpak/5.11.4
14) jet-tools
15) sge
16) totalview/8.8.0-1
17) wjet
```

Sample Output “module -l list”

```
[daniel.schornak@fe2 ~]$ module -l list
Currently Loaded Modulefiles:
icc/11.1.072
mvapich2/1.4.1-intel-11.1
netcdf/3.6.3
hdf4/4.2r3-intel
hdf5/1.8.3
ncl/5.2.0-intel
intel/11.1.072
papi/4.1.0
nco/4.0.1
udunits/2.1.15
mathlibs/fftw
uberftp/2.7
gmpak/5.11.4
jet-tools
sge
totalview/8.8.0-1
wjet
[daniel.schornak@fe2 ~]$
[daniel.schornak@fe2 ~]$ ```
Module Commands – “module switch <this> <that>”
“module swap <this> <that>”

Change to a newer C compiler version (current: intel/intel-cc-12-12.0.4.191;
want: intel/intel-cc-12-12.1.0_sp1.6.233)

Before…

```
[daniel.schornak@tfe1 ~]$ module list
Currently Loaded Modulefiles:
   1) intel/intel-cc-12-12.0.4.191  3) intel/intel-cmk1-12-12.0.4.191
   2) intel/intel-ic-12-12.0.4.191  4) intel/tools
```

Make the “Switch”…

```
module switch intel/intel-cc-12-12.0.4.191 intel/intel-cc-12-12.1.0_sp1.6.233
(same as: module swap intel/intel-cc-12-12.0.4.191 intel/intel-cc-12-12.1.0_sp1.6.233)
```

After…

```
[daniel.schornak@tfe1 ~]$ module list
Currently Loaded Modulefiles:
   1) intel/intel-cc-12-12.1.0_sp1.6.233  3) intel/intel-cmk1-12-12.0.4.191
   2) intel/intel-ic-12-12.0.4.191  4) intel/tools
```

Get Help! @ rdpcs.zeus.help@noaa.gov
rdpcs.hpss.help@noaa.gov
Module Commands – “module show”

Command shows what environmental variables are set and any associated modules

NESCC Factoid…
“Intel modules cannot coexist with PGI modules. Load one or the other, but not both!”
Module Commands – What to watch out for!

Version incompatibilities among modules can occur

**Solution:**

1. Remove all installed modules and build from scratch \((\text{module clear})\)
   
   Note: “clear” is interactive; “purge” in non-interactive – same results

   ![Console screenshot 1]

   ```
   [Daniel.Schornak@tfe1 ~]$ module clear
   Are you sure you want to clear all loaded modules!? [n] y
   
   [Daniel.Schornak@tfe1 ~]$ module list
   No Modulefiles Currently Loaded.
   
   [Daniel.Schornak@tfe1 ~]$
   ```

2. Load only the modules that you require *

   ![Console screenshot 2]

   ```
   [Daniel.Schornak@tfe1 ~]$ module load intel
   
   [Daniel.Schornak@tfe1 ~]$ module list
   Currently Loaded Modulefiles:
   1) intelprod/cc/12-12.0.4.191  3) intelprod/cmk1/12-12.0.4.191
   2) intelprod/fc/12-12.0.4.191  4) intel/12-12.0.4.191
   
   [Daniel.Schornak@tfe1 ~]$
   ```

   • Note: Interdependent/compatible modules will automatically load
   • 3. Logging out and back in will provide a new session with no modules loaded
Introduction to Programming Environment

Recommended Exercises

1. Module appreciation exercise…
   a. Unload all modules (“module clear”)
   b. Verify Intel C compilers not available (“icc –v; if77 –v”)
   c. Load and verify Intel compiler modules (“icc –v; if77 -v”)
   d. *Load and verify PGI compilers (“pgcc --version; pgf77 –version”)

2. Modules for libraries
   • Check library paths

3. Ensure modules are loaded at login
   • Edit .profile file and add appropriate “module load” entries

4. Ensure modules are loaded at job execution
   • Include “module load <modulename>” in batch script

* Remember to “module clear” or “module unload intel before loading pgi
# Introduction to Programming Environment

## NESCC Software Stack

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<thead>
<tr>
<th>Operating System</th>
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<th>gcc</th>
<th>GrADS</th>
<th>libtool</th>
<th>netCDF v4</th>
<th>Python netcdf module</th>
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<tr>
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<tr>
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<td>X-11</td>
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Introduction to Programming Environment

Preparing for Job Submission – Batch Script Considerations
Use msub. Here is an example batch script:

```bash
#!/bin/sh --login
# -- Request 12 cores
#PBS -l procs=12
# -- Specify a maximum wallclock of 4 hours
#PBS -l walltime=4:00:00
# -- Specify under which account a job should run
#PBS -A hpl
# -- Set the name of the job, or moab will default to STDIN
#PBS -N HPL

# change directory to the working directory of the job
if [ x$PBS_O_WORKDIR != x ]; then
cd $PBS_O_WORKDIR
fi

np=$PBS_NP
module load intel
module load mpt
mpiexec_mpt -np $np ./xhpl
```

NESCC Factoid…
In order to load module, make sure to use “--login“ when declaring the script’s shell…such as:

```bash
#!/bin/bash --login
#!/bin/ksh --login
#!/bin/sh --login
```

All jobs must declare their account identifier
#PBS –A <Project Name>

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https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/Frequently_Asked_Questions#Why_can%27t_I_use_module_commands_inside_of_my_batch_script.3F
Introduction to Programming Environment

Finding your Account Information – *New Tool!*

Use: `account_params`

```
Daniel.Schornak@fe4:~

[Daniel.Schornak@fe4 ~]$ account_params
Account Params -- Information regarding project associations

Processing Unix group file /etc/group
User: Daniel.Schornak
Project: nesccmgmt

Allocation:  Allocation:  Id Name             Amount  Reserved Balance  CreditLimit Available
           Allocation:  -- ------             -------  --------  --------  -------  -------
           Allocation:  84 nesccmgmt       709127157  0       709127157  0       709127157

Directory: /scratch1/portfolios/BMC/nesccmgmt  DiskInUse=84173 GB, Quota=211500 GB
Directory: /scratch2/portfolios/BMC/nesccmgmt  DiskInUse=140185 GB, Quota=211500 GB
```

**NESCC Factoid…**

`account_params` shows…
- **Project Name**
- **Project Allocation Balances**
- **Shows assigned Scratch Space Locations and Quotas**

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Visit: [https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/Getting_Information_About_Your_Account](https://nesccdocs.rdhpcs.noaa.gov/wiki/index.php/Getting_Information_About_Your_Account)
Introduction to Programming Environment

Preparing for Job Submission – Batch Script Considerations (continued)

If you need to change the processor layout, there is a way. Use the nodes option.

```
#PBS -l nodes=4:ppn=6
```

Each node has 12 cores. The above syntax will allocate 4 nodes, and schedule 6 tasks per node. This is what you would want to do for an OpenMP job where each MPI process uses 2 threads.

Other examples:

```
#PBS -l nodes=12:ppn=1
```
Start job on 12 nodes, with one thread per node (For 12 MPI tasks, OMP_NUM_THREADS=12)

```
#PBS -l nodes=2:ppn=1+4:ppn=12
```
Start job with one process on each of the first two nodes, then fill up the last 4 nodes with 48 tasks - This would be for a job that has I/O tasks for the first two MPI ranks.

Introduction to Programming Environment

Optimizing performance for MPI applications using MPT

The default buffer settings used by the MPT MPI library are inadequate to provide decent performance for most applications. It is recommend that you set the following variables prior to calling mpiexec_mpt.

```
setenv MPI_BUFS_PER_PROC=128
setenv MPI_BUFS_PER_HOST=128
setenv MPI_GROUP_MAX=128
```

Hint: For more information: run “man mpi” after loading the mpt module

Introduction to Programming Environment

Interactive Job performance for MPI applications using MPT

If you need to do other interactive work, including running, development, or debugging of jobs, an interactive job is a great way to do this. To create an interactive job, use the -I option to msub:

```
# msub -I -l nodes=1
```

NESCC Factoid…
"Interactive jobs can be any size – just like a normal batch job."
## Introduction to Programming Environment

### Scheduler Commands Cross Reference Table

The table below reflects similar functions across the various schedulers within the NOAA HPC environments.

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<th>ESRL SGE Commands</th>
<th>NESCC (and GFDL) Moab Commands</th>
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<td>qdel</td>
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<tr>
<td>llclass</td>
<td>TBD</td>
<td>TBD</td>
<td>Returns information about job classes</td>
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<tr>
<td>llcc</td>
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<td>TBD</td>
<td>Returns free cpus about job classes</td>
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<td></td>
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<tr>
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<tr>
<td>TBD</td>
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</table>

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Introduction to Programming Environment

Running an Openmp/MPI hybrid job

The previous instructions tell you how to request nodes and placement in a way to support OpenMP/MPI hybrid applications. However, it is necessary to include an additional command to get the processes of your job to be allocated correctly. To do this, use the `omplace` program. Example:

```
# mpiexec_mpt -np $NP omplace ./f.applic.x
```

By default, `omplace` will use the value set by `$OMP_NUM_THREADS`. If that value is not set, it will use 1. You can explicitly set the number of threads to be used by each MPI rank with the `-nt` option. Ex:

```
# mpiexec_mpt -np $NP omplace -nt 4 ./f.applic.x
```

In this example, each `f.applic.x` executable could use 4 threads. You still need to set `OMP_NUM_THREADS` to the correct value for your model run.

Online Documentation – Where to go...

Website
https://nesccdocs.rdhpcs.noaa.gov

Access and Use of TDS

PGI Compilers User Guide

Optimization with Intel Compilers

NESCC Factoid…
“Documentation, such as listed above, will start to be made available on NesscDocs soon.”
Need Help? – Where to go...

Zeus User Support and Problem Reporting – Help Desk for NESCC
rdhpcs.zeus.help@noaa.gov

HPSS User Support and Problem Reporting – Help Desk for NESCC
rdhpcs.hpss.help@noaa.gov

NESCC Documentation Wiki Site – “How to…”
https://nesccdocs.rdhpcs.noaa.gov/

End User Experience

EMC Model Transition Team (Provides updates for porting to TDS and Zeus)
http://www.emc.ncep.noaa.gov/mtt

NESCC Factoid…
“Additional documentation will continue to be made available on the NesccDocs Wiki Site.”
Group A End User Training

0800-0810 Training Process
  • Introduce instructors
  • General information
  • Define training roles and responsibilities
  • Review training agenda

0810-0815 Training Objectives
  • Review the objectives of the NESCC HPC Environment overview

0815-0845 Introduction to NESCC HPC Design/Architecture and Environment
  • Describe the overall architecture major components, functions, and features

0845-0900 Available On-line Documentation

0900-0915 BREAK

0915-0945 Introduction to User Environment, Policies, Quotas, and Environmental Variables

0945-1045 Introduction to Programming Environment
  • Introduce tools – shells, applications, compilers, and libraries

1045-1145 Introduction to NESCC Storage and Data Management

1145-1245 LUNCH BREAK

1245-1415 Introduction to Job Scheduling using Moab (Adaptive Computing)
  • Efficient job submission techniques
  • Installed NESCC version compared to other NOAA installations
  • Moab/Torque end-user commands and tools

1415-1500 Questions/Answers

1500 Session Wrap up

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Shawn Hoopes – Adaptive Computing

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1500       Session Wrap up
Reminder: Please complete and return the Post-training Questionnaire

Additional Questions?
Dan Schornak: dschorna@csc.com
Need Help? – Where to go...

**Help Desk for NESCC**

*rdhpcs.zeus.help@noaa.gov*

HPSS Help Desk for NESCC

*rdhpcs.hpss.help@noaa.gov*

NESCC FAQ and Documentation Website


EMC Model Transition Team – Providing updates for porting to TDS and Zeus

[http://www.emc.ncep.noaa.gov/mtt](http://www.emc.ncep.noaa.gov/mtt)