Connecting to NERSC

Douglas Jacobsen, Yushu Yao
NERSC User Services Group
Outline: Connecting to NERSC

• ssh – the Secure Shell
  – The *lingua franca* of contacting NERSC

• ssh with X-forwarding (Graphical User Interface)

• **NX - Accelerated X** (also uses ssh)
  – Persistent sessions, Accelerated Graphics, KDE Desktop
ssh

• All of the computational systems at NERSC are accessible via ssh
• Each system has a set of load-balanced login nodes which offer ssh service
• Use your **NIM** username & password
• Addresses for NERSC systems:

<table>
<thead>
<tr>
<th>Large-scale Systems</th>
<th>Mid-range Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>edison.nersc.gov</td>
<td>carver.nersc.gov</td>
</tr>
<tr>
<td>hopper.nersc.gov</td>
<td>genepool.nersc.gov</td>
</tr>
<tr>
<td></td>
<td>pdsf.nersc.gov</td>
</tr>
</tbody>
</table>

http://www.nersc.gov/users/network-connections/connecting-to-nersc/
Basic SSH use from Mac/Linux/cygwin

- If you have a UNIX-like computer, you can directly contact NERSC with your built-in ssh client
  1. Open a new terminal
  2. Enter: `ssh -l <NIM username> edison.nersc.gov`

- Depending on your preferences you might want additional ssh flags:
  - `ssh -Y` performs robust X-forwarding over ssh
  - `ssh -A` forwards ssh-agent information (if you use ssh-keys)

- Advanced Topic: ssh keys
  - If you choose to setup an ssh key to access NERSC systems, please use a passphrase on the key *(no unencrypted ssh keys!)*
Many ssh clients exist for Windows
  - A very popular one is **putty**
    - [http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html](http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html)
  - Advanced users might prefer to use ssh directly within **mintty** (from cygwin distribution)

Both of these options support all ssh features (that I’ve ever tried to use)
  - For X-forwarding to work, you’ll need to find X-server software
    - Cygwin/X
    - Exceed
  - Consider using NX instead of X-forwarding
Example Session

doe6933093:~ dmj$ ssh -l <NIM username> hopper.nersc.gov

*****************************************************************
*                                                               *
*                      NOTICE TO USERS                          *
*                      ------------------                          *
*                                                               *
*  Lawrence Berkeley National Laboratory operates this          *
*  computer system under contract to the U.S. Department of     *
*  Energy. This computer system is the property of the United   *
*  States Government and is for authorized use only. *Users     *
*  (authorized or unauthorized) have no explicit or implicit    *
*  expectation of privacy.*                                      *
*                                                               *
*  Any or all uses of this system and all files on this system  *
*  may be intercepted, monitored, recorded, copied, audited,    *
*  inspected, and disclosed to site, Department of Energy, and   *
*  law enforcement personnel, as well as authorized officials   *
*  of other agencies, both domestic and foreign. *By using      *
*  this system, the user consents to such interception,         *
*  monitoring, recording, copying, auditing, inspection, and    *
*  disclosure at the discretion of authorized site or           *
*  Department of Energy personnel.*                             *
*                                                               *
*  *Unauthorized or improper use of this system may result in   *
*  administrative disciplinary action and civil and criminal     *
*  penalties. *By continuing to use this system you indicate   *
*  your awareness of and consent to these terms and conditions  *
*  of use. LOG OFF IMMEDIATELY if you do not agree to the        *
*  conditions stated in this warning.*                          *
*                                                               *
*****************************************************************

Password:  <enter your NIM password here>
Password: <enter your NIM password here>
Last login: Mon Aug  5 10:56:43 2013 from 128.55.19.61

----------------------------- Contact Information ------------------------------
NERSC Contacts                http://www.nersc.gov/about/contact-us/
NERSC Status                  http://www.nersc.gov/users/live-status/
NERSC: 800-66-NERSC (USA)     510-486-8600 (outside continental USA)

----------------- Current Status as of 2013-09-09 14:35 PDT --------------------

Compute Resources:            
Carver:          Available.  
Dirac:           Available.  
Edison:          Available.
     Notes: (09/09/13 14:35 PDT) - Edison is reserved for dedicated
     science runs on 9/12 Thursday 18:00 PDT - 9/13 Friday 6:00 PDT.

Genepool:        Available.  
Hopper:          Available.
     Notes: (09/09/13 8:51 PDT) - /scratch access issues are
     affecting some batch jobs. Engineers are investigating.

PDSF:            Available.

Global Filesystems:    
Global Homes:       Available.
Global Scratch:      Available.
Project:            Available.
ProjectB:           Available.

Mass Storage Systems: 
HPSS Backup:        Available.
HPSS User:          Available.

----------------- Service Status as of 2013-09-09 14:35 PDT --------------------

All services are available.

----------------- Planned Outages ------------------------------
HPSS User:       09/11/13 9:00-13:00 PDT, Scheduled maintenance.
Data Transfer Nodes: 09/18/13 8:00-16:00 PDT, Scheduled maintenance.  
     Maintenance on DTN01 thru DTN04.
Service:         09/22/13 22:00-09/23/13 2:00 PDT, Scheduled maintenance.
     The NERSC production instance of Service Now (Ticket System)
     will be down for an upgrade.

----------------- Past Outages ------------------------------
Carver/Dirac:     09/09/13 13:00-13:11 PDT, System in degraded mode.  
     Restarted Moab.

For past outages, see: https://www.nersc.gov/users/live-status/outage-log/

--------------------------------------------------------------------------------

Password prompt

MOTD: Message of the Day
NERSC will post
• system-status messages
• Upcoming maintenance
• Past outages

Make sure to look at the MOTD to see if something is going on or will happen which may affect your calculations

Prompt at NERSC
Login Node Auto-Logout

• Some NERSC systems won’t give you unlimited time on the login nodes
  – After 8 hours idle, Hopper & Edison login nodes will terminate your session
X-forwarding through SSH
X-forwarding

- Allows you to access Visualization programs remotely at NERSC

Example:
localhost% ssh -l elvis -Y hopper.nersc.gov
...
e/elvis> module load vmd
e/elvis> vmd
<vmd starts up>

NERSC Recommends using NX instead of X-forwarding.
Next section!
NX@NERSC – Accelerated X
Reasons for NX

Desktop:

• **The Pain:** I’m used to starting my workflow on my windows machine and let it run for a week, where is my desktop now?

• **Solution:** NX gives you a desktop, so you can connect to NERSC resources (such as hopper or carver) and start your GUI applications.
Reasons for NX

Sessions:

- **The Pain:** If I lose internet connection, I might lose all running processes.

- **Solution:** NX provides sessions. You can suspend the session without terminating the running processes.
  
  - And get back to the same point when reconnected, *even from a different location or computer.*
Reasons for NX

Speed:

• **The Pain:** X-Windows is slow over network. Tried starting emacs with a slow network connection? It might take minutes to get the window open.

• **Solution:** NX Buffers/Compresses X messages, giving much better X experience
What you need for NX

• Any Desktop/Laptop
  – Windows/Linux/Mac

• NX Client Software (Free)
NERSC NX Service

• 10 Minute Start-up Guide

Documentation:
Go to www.nersc.gov, search for “NX”