

# OLCF Overview for New Users

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OLCF User Support

ORNL is managed by UT-Battelle, LLC for the US Department of Energy



U.S. DEPARTMENT OF  
**ENERGY**

# General Information

- The goal of this presentation is to give a brief introduction to using OLCF systems & OLCF policies
- This is by no means an all-inclusive presentation
- Feel free to ask questions
- Much of this may be a reminder
  - Largely an update to previous presentations:  
<https://vimeo.com/channels/olcftraining/254494153>  
<https://vimeo.com/channels/olcftraining/343636411>  
<https://vimeo.com/channels/olcftraining/405885960>

# Overview

1. Staying Informed
2. OLCF Policies
3. Authentication with RSA Tokens
4. Projects & User Accounts
5. Data Management
6. Using HPSS
7. Finding and Building Software
8. Using Summit
9. Training Opportunities
10. Getting Help

# Staying Informed





# Staying Informed

- OLCF provides multiple layers of user notifications about system status and downtimes
  - Email lists
  - Status indicators on <https://www.olcf.ornl.gov> (at the bottom)
  - Twitter (@OLCFStatus)
- For more information, see the OLCF website:  
<https://www.olcf.ornl.gov/for-users/user-assistance/>

# Staying Informed – *Email Lists*

- *Announce* lists
  - All users are required to be members
  - System-specific (\*-announce@email.ornl.gov) and center-wide (ccs-announce@email.ornl.gov) lists
  - New list: olcf@olcf-communications.org
  - Used for major announcements, weekly notice, etc.
- *Notice* lists
  - By default, “recent” users (active in last 2 weeks)
  - Permanent opt-in/opt-out possible (contact help@olcf.ornl.gov)
  - Used for minor updates, system status, etc.

# Staying Informed – *Weekly Update*

- Sent before noon (Eastern) on Wednesday
- Announcements about outages, training, etc.
- ***ALL USERS should receive this email***
- Also posted on OLCF home page


# Staying Informed – Weekly Update

Oak Ridge Leadership Computing Facility – The OLCF was established at Oak Ridge National Laboratory in 2004 with the mission of standing up a supercomputer 100 times...

Oak Ridge Leadership Computing Facility | Customize | 0 | + New | Edit Page | Howdy, Bill Renaud


**OAK RIDGE** National Laboratory | LEADERSHIP COMPUTING FACILITY

ABOUT OLCF ▾ OLCF RESOURCES ▾ R&D ACTIVITIES ▾ SCIENCE AT OLCF ▾ FOR USERS ▾ OLCF MEDIA ▾




**2020 INCITE CALL FOR PROPOSALS**

Open from April 15 to June 21, 2019, INCITE's call provides an opportunity for researchers to pursue supercomputer allocations at ALCF and OLCF.



**NO SCALING BACK: EXASCALE AT ORNL**

Frontier is expected to be world's most powerful computer for science and innovation when it comes online in 2021.



**SYSTEM DECOMMISSIONS AND CHANGES**

As the OLCF begins preparations for Frontier, be aware of plans that will impact Titan, Eos, Rhea, and the Atlas filesystem in 2019.

CENTER UPDATES

- Weekly Update: June 5, 2019
- Weekly Update: May 29, 2019

MORE UPDATES

UPCOMING EVENTS

07 JUN	INTRODUCTION TO AMD GPU PROGRAMMING WITH HIP ●	EVENT DETAIL
11 JUN	LINUX COMMAND LINE PRODUCTIVITY TOOLS ●	EVENT DETAIL
19 JUN	JUNE 2019 OLCF USER CONFERENCE CALL-OLCF BEST PRACTICES ●	EVENT DETAIL

OLCF: Weekly Update: June 5, 2019 – Announce and Notice Lists

Message

Delete | Reply | Reply All | Forward | Attachment | Meeting | Move | Junk | Rules | Read/Unread | Categorize | Follow Up

OLCF: Weekly Update: June 5, 2019

**OLCF Announcements via CCS-Announce <ccs-announce@email.ornl.gov>**

ccs-announce@email.ornl.gov; OLCF Announcements

Wednesday, June 5, 2019 at 11:55 AM

Show Details

\*\*\* IN THIS MESSAGE \*\*\*

\* Center Announcements

- Frontier CAAR Call for Proposals (Closes Jun 7)
- 2020 INCITE Call for Proposals (Closes Jun 21)
- Notable System Changes in 2019

\* Meetings & Workshops

- Introduction to AMD GPU Programming With HIP Webinar (Jun 7)
- Linux Command Line Productivity Tools Tutorial (Jun 11)
- June OLCF User Conference Call (Jun 19)
- OLCF/ECP OpenMP Hackathon (Jul 22-26)
- Introduction to CMake Training (Jul 29-30)
- 2019 Petascale Computing Institute (Aug 19-23)
- OLCF GPU Hackathon Series (Open Calls; Multiple Dates)
- Want to Be a GPU Hackathon Mentor?

\* Upcoming Scheduled Outages

- HPSS, DTNs (Jun 11)
- Alpine, Summit (Jun 25)

\*\*\* CENTER ANNOUNCEMENTS \*\*\*

FRONTIER CAAR CALL FOR PROPOSALS (CLOSES JUN 7)

The OLCF is now accepting proposals for Center for Accelerated Application Readiness partnerships to prepare modeling and simulation, data-intensive, and machine learning applications for highly effective use of the OLCF Frontier system that will become available to OLCF users in 2022. Applications must be received by 11:59 PM (Eastern Time) on Friday, June 7. For more information about the Frontier CAAR program or to apply, please visit <https://www.olcf.ornl.gov/frontier-center-for-accelerated-application-readiness/>

2020 INCITE CALL FOR PROPOSALS (CLOSES JUN 21)

The 2020 Innovative and Novel Computational Impact on Theory and Experiment (INCITE) Call for Proposals is now open and closes June 21. The INCITE program promotes transformational advances in science and technology for computationally and/or data-intensive, large-scale research projects through large allocations of

# Staying Informed – *System Status*

- Logs from monitoring software are parsed to make educated guess on system status which is sent to multiple destinations
  - OLCF Website
  - Twitter (@OLCFStatus)
  - Appropriate *notice* list
- Fairly accurate, but still a fully automated process
  - Possibility of both false positives and false negatives
  - We do take some measures to mitigate this



# Staying Informed – System Status

Oak Ridge Leadership Computing Facility – The OLCF was established at Oak Ridge National Laboratory in 2004 with the mission of standing up a supercomputer 100 times more powerful than the leading...

OLCF Status (@olcfstatus) | Twitter

OLCF Status (@olcfstatus) 194 TWEETS 28 FOLLOWERS

OLCF Status @olcfstatus · Nov 18  
System status change (18 Nov @ 13:40 EST): titan is up

OLCF Status @olcfstatus · Nov 18  
System status change (18 Nov @ 11:45 EST): titan is down

OLCF Status @olcfstatus · Nov 18  
System status change (18 Nov @ 11:05 EST): atlas2 is degraded

OLCF Titan XK7 Notice: Up (Dec 04) - deleted nagios rt status

Message

OLCF Titan XK7 Notice: Up (Dec 04)

OLCF Cray XK7 Notifications  
Friday, December 4, 2015 at 6:40 PM  
To: OLCF Cray XK7 Notifications

The Cray XK7 (titan) returned to service at approximately 18:25 on Dec 04

[titan-notice mailing list](#)

As an active Titan user, you have been automatically subscribed to this list.  
To be removed from this list, contact [help@olcf.ornl.gov](mailto:help@olcf.ornl.gov)

[www.olcf.ornl.gov/kb\\_articles/communications-to-users/](http://www.olcf.ornl.gov/kb_articles/communications-to-users/)  
[www.olcf.ornl.gov/support/system-user-guides/titan-user-guide/](http://www.olcf.ornl.gov/support/system-user-guides/titan-user-guide/)

Center Status

Summit

Operational

Up since May 14, 2019

Next 10 days scheduled downtimes

Titan

Operational

Up since Apr 9,

Next 10 days scheduled downtimes

# OLCF Policies



# OLCF Policies

- Various OLCF policies are available at [https://docs.olcf.ornl.gov/accounts/olcf\\_policy\\_guide.html](https://docs.olcf.ornl.gov/accounts/olcf_policy_guide.html)
  - Computing Policy
  - Security Policy
  - Data Management Policy
  - Various Project Policies (Reporting, Allocation Utilization, User Agreement)
- The site also includes the acknowledgement statement for publications related to work done on OLCF resources.

# Authentication with RSA Tokens



# Authenticating to OLCF Systems

- Interactive login access is via Secure Shell (SSH)
- Systems use “two-factor” authentication via user-selected PINs and RSA SecurID tokens
- Other authentication methods (password, public key, etc.) are not permitted



# Common Login Issues

- SSH (typically) doesn't prompt for a username
  - By default, it uses your username on the client system
  - You must tell SSH if your username differs
    - Command line: `ssh olcfusername@home.ccs.ornl.gov`
    - Can set this in `~/.ssh/config` file
    - Various ways to do this in graphical SSH clients
  - Unless you request verbose output (`-v[v[v]]`), SSH won't tell you what username it's using

# Common Login Issues

- SSH prompts for a password after PASSCODE fails
  - Typically happens after three PASSCODE failures
  - This is a fallback behavior of SSH (the PASSCODE didn't work, so it's trying something else)
  - We don't use passwords (so nothing you type in will permit login); kill the process (ctrl-c) & try again.

```
Enter PASSCODE:  
Enter PASSOCDE:  
Enter PASSCODE:  
user1@summit.olcf.ornl.gov's password:
```

# Common Login Issues

- RSA token gets out of sync with the server
  - Sometimes you may be prompted for the 'next tokencode'
    - *Tokencode*: The 6 digit number on your RSA token
    - *PIN*: An alphanumeric string of 4-8 characters known only to you
    - *PASSCODE*: Your PIN followed by the current tokencode
  - When this happens, enter (only) the next tokencode your RSA token generates

Enter PASSCODE:

Wait for the tokencode to change, then enter the new tokencode :

# Additional RSA/SSH Tips

- Once you've used a tokencode, you can't re-use it
- If your PASSCODE has failed twice, let the tokencode change before you try again (to avoid token being locked out)

# Projects & User Accounts





# System & Group Access

- **Projects**

- Are granted system access
- Are assigned Unix groups

- **Users**

- Are assigned to projects
- “Inherit” the project’s groups & system accesses
- Are **not** directly added to systems/groups

# Finding Your Project's ID and Allocation

- Use `showproj` to list your projects

```
$ showproj

user1 is a member of the following project(s) on summit:
  abc123
```

- Use `showusage` to show usage on your project(s)

```
$ showusage

summit usage for the project's current allocation period:

Project      Allocation      Project Totals      user1
Usage      Remaining      Usage
-----
abc123      735000      11138      7338862      12
```

***NOTE:*** Both commands display a help message if invoked with `-h`

# Managing Your Allocation

- Projects are not disabled for going over allocation; they receive priority reduction
  - slight for 100-125% of allocation
  - larger for >125% of allocation (also incurs a limit of 1 running job)
- Since we don't disable projects, we don't give refunds (*per se*)
  - We can delay priority reduction if lots of jobs were affected by a particular system issue (same effect but easier to manage)

# Project Closeout

- When your project ends, you'll no longer be able to access OLCF resources associated with that project
  - Even if you're continuing on other projects (and thus retain access to systems like Summit), you won't be able to access the storage areas for the project that ended
- Users will be given a month for data retrieval
  - You won't be able to access the main resources...you will need to use the Data Transfer Nodes

# Data Management





# Storage Areas

- Divided by scope
  - User
  - Shared among project members
  - Shared among (potentially) all users
- Divided by use
  - Home
  - Scratch
  - Archive

# Data Storage Locations

Storage Area	Technology	Purpose of Area
User home	NFS	Frequently accessed user data
Project home	NFS	Frequently accessed project data
User work	Spectrum Scale/GPFS	User's scratch files
Project work	Spectrum Scale/GPFS	Project's scratch files
Global work	Spectrum Scale/GPFS	Sharing data among all users/projects on the system
User archive	HPSS <sup>1</sup>	Long-term storage for user data
Project archive	HPSS <sup>1</sup>	Long-term storage for project data
Global archive	HPSS <sup>1</sup>	Long-term storage for system-wide shared data

*<sup>1</sup>HPSS is not mounted as a filesystem; access is discussed in upcoming slides*

# Data Storage Locations

Storage Area	Location <sup>1</sup>	Default Permissions	Change Permissions?	Backed Up?
User home	/ccs/home/\$USER	0750	Yes	Yes
Project home	/ccs/proj/proj_id	0770	No <sup>3</sup>	Yes
User work <sup>2</sup>	/gpfs/alpine/proj_id/scratch/\$USER	0700	No <sup>3</sup>	<b>No</b>
Project work <sup>2</sup>	/gpfs/alpine/proj_id/proj-shared	2770	No <sup>3</sup>	<b>No</b>
Global work <sup>2</sup>	/gpfs/alpine/proj_id/world-shared	2775	No <sup>3</sup>	<b>No</b>
User archive	/hpss/prod/proj_id/users/\$USER	0700	No <sup>3</sup>	<b>No</b>
Project archive	/hpss/prod/proj_id/proj_shared	2770	No <sup>3</sup>	<b>No</b>
Global archive	/hpss/prod/proj_id/world_shared	2775	No <sup>3</sup>	<b>No</b>

<sup>1</sup> These are recommended ways to reference directories, not necessarily absolute path names.

<sup>2</sup> Or, \$MEMBERWORK/proj\_id, \$PROJWORK/proj\_id, \$WORLDWORK/proj\_id

<sup>3</sup> Top-level directory permissions “enforce” proper scope of user/project/global directories.

# Data Backups

- NFS directories are backed up to a limited extent
  - Accessed via the `.snapshot` subdirectory of an NFS directory
  - The hourly/daily/weekly subdirectories of `.snapshot` are copies of the current directory as of the snapshot time (directory names are the snapshot timestamp)
  - Note that `.snapshot` won't show up in "`ls -al`"
- GPFS **is not** backed up (AND is purged...see next slide)
- HPSS **is not** backed up

# Purge Policy

- “Work” directories (i.e. GPFS) are scratch areas and are not intended for long-term storage
- To ensure available space, they are regularly purged of files not accessed/modified in a certain period of time
  - Current purge threshold is in our Data Management Policy
- You should archive data in these areas to a more permanent location as soon as possible

# Monitoring Storage Usage

- For home directories, use the `quota` command

```
$ quota -Q
Disk quotas for user user1(uid 98765):
    Filesystem blocks    quota   limit   grace   files   quota   limit   grace
nccs-svm1.lb.ccs.ornl.gov:/nccs/home1
                        116432  52428800 52428800          1007  4294967295 4294967295
```

- For archive directories, use `showusage`

```
$ showusage -s hpss
HPSS Storage in GB:
Project          Project Totals          user1
                  Storage          Storage
-----
user1             550.65             550.65
abc123            2107.18            106.52
```

# Data Considerations

- OLCF systems can generate large volumes of data very quickly
- Projects should develop a data strategy as soon as possible
  - Consider directory structures, permissions, group, etc.
  - Try to catch issues early (much easier to “fix” 100 files than 10,000)
  - The `chmod` and `umask` commands are vital
- Several things to consider
  - Where project members will store data
  - File ownership/permissions
  - Transferring data to other locations

# Transferring Data

- Data transfer nodes (`dtm.ccs.ornl.gov`) are the preferred place for internal & external data transfers
- Several ways to transfer your data
  - External (to OLCF): `bbcp`, `scp`, `gridftp`, `globus.org`
  - Internal: `hsi/htar` along with those listed above
- Start early/transfer data as it's generated



# Using HPSS



# The High Performance Storage System

- HPSS is the proper location for long-term storage
  - Not space-constrained like NFS "home" areas
  - Not subject to purge like GPFS
- Directories are project-centric with spaces for user, project, and globally-shared data
- HPSS is accessed via the `hsi` and `htar` commands
- HPSS is also accessible via Globus

# HPSS Directory Structure Changes

- In January, moved from `/home/$USER` and `/proj/proj_id` to `/hpss/prod/...` directories
  - `/proj/proj_id` is now symlink to `/hpss/prod/proj_id/proj-shared`
  - `/home/$USER` is a linkfarm to a user's `/hpss/prod/proj_id` directories

*Existing users w/data in `/home/$USER` have not been migrated; they should move data into `/hpss/prod/...` and will be automatically migrated when all files are moved.*

- Please begin using these directory structures for HPSS data
- (Existing users: Please migrate files in your HPSS home directory to an appropriate project area)

# HPSS Best Practices

- Multiple simultaneous transfers won't necessarily yield benefits (especially on "get" operations)
- Avoid numerous consecutive `hsi get` calls (see next slide)
- File size best practices
  - With `htar`, no member file can be  $\geq 64\text{GiB}$  (the archive itself can be)
  - For optimal transfer performance, use files  $\geq 768\text{GB}$
  - Minimum recommended file size is `512MB`
    - Smaller files will be handled but I/O performance may be negatively affected
    - If you have many small files, try bundling with `htar` to achieve the `512MB` threshold

# HPSS Best Practices

- **Bad practice:** successive hsi get calls

```
$ hsi get /hpss/prod/abc123/users/someuser/file1  
  
$ hsi get /hpss/prod/abc123/users/someuser/file2  
  
$ hsi get /hpss/prod/abc123/users/someuser/file3
```

- **Good practice:** create a list file & call hsi once

```
$ cat getfiles.lst  
get <<EOF  
/hpss/prod/abc123/users/someuser/file1  
/hpss/prod/abc123/users/someuser/file2  
/hpss/prod/abc123/users/someuser/file3  
EOF  
  
$ hsi "in getfiles.lst"
```

# The `hsi` transfer agent

- The `hsi` transfer agent offloads `hsi` transfers started on certain nodes to a dedicated set of transfer nodes
  - Reduces load on login nodes
  - Uses nodes optimized for transfer
- To use it, launch `hsi` from
  - Interactive DTNs (`dtm.ccs.ornl.gov`)
  - Batch/Scheduled DTNs (jobs submitted from `dtm.ccs.ornl.gov`)
- Running `hsi` from other nodes is discouraged

# More HPSS Information

- Data transfer information is available in OLCF User Guides on the website (links at the end of this presentation)
- For even more HPSS information, see the presentation by OLCF's George Markomanolis
  - [https://www.olcf.ornl.gov/wp-content/uploads/2018/12/storage\\_areas\\_summit\\_links.pdf](https://www.olcf.ornl.gov/wp-content/uploads/2018/12/storage_areas_summit_links.pdf)
  - <https://vimeo.com/306433952>

# Finding & Building Software





# Finding Software

- Basic commands are part of the default environment
- Other software via Lmod
  - Similar to Environment Modules (`module load`, etc.) but more powerful
  - <https://lmod.readthedocs.io/>
- Compilers, debugging/optimization tools, other libraries & some scientific apps available

# Finding Software

- Special case: python
  - We provide python+anaconda distributions
  - Recommend using those with a conda or venv to build specific modules you need
- Other software
  - You're free to build what you need in your directories, subject to licensing and export control restrictions
  - If you think something might be of general interest, you can request we install it via <http://www.olcf.ornl.gov/support/software/software-request> or [help@olcf.ornl.gov](mailto:help@olcf.ornl.gov)

# Building Software

- Considering building/installing software in an NFS area
  - Avoids the scratch area purge
  - Also can be “friendlier” to the system, since compiling involves lots of metadata which can impact/be impacted by large parallel filesystems
- Might be possible to build in a ramdisk (such as `/tmp`) with an NFS directory as the installation prefix
  - Be careful with `/tmp` due to permissions

# Using Summit



# Summit Considerations

- Running Jobs
  - Summit uses LSF for the batch queue system
  - Summit uses `jsrun` as its parallel launcher
    - Different approach to thinking about resources
    - OLCF provides tools to help (be sure to join the March user call for more info!)
- Processor Architecture
  - POWER9™
  - Not compatible with x86\_64 binaries, so you may have issues with precompiled software (*LOTS* of stuff targets x86\_64)

# Summit Training Resources

- <https://github.com/olcf-tutorials>
- [https://docs.olcf.ornl.gov/training/training\\_archive.html](https://docs.olcf.ornl.gov/training/training_archive.html),  
in particular:
  - <https://www.olcf.ornl.gov/calendar/introduction-to-nvidia-profilers-on-summit/>
  - <https://www.olcf.ornl.gov/calendar/summit-training-workshop/>
  - <https://www.olcf.ornl.gov/calendar/introduction-to-summit-webinar/>
  - <https://www.olcf.ornl.gov/calendar/jsrun-tutorial/>

# Training Opportunities



# Training Opportunities

- We host numerous training events through the year
  - Monthly User Conference Call
  - Software-specific courses
  - GPU Hackathons  
<https://gpuhackathons.org/>
- Most are in-person and are webcast



# Training Opportunities

- What training is coming up?
  - Watch for announcements in the Weekly Update
  - Check the OLCF Training Calendar  
<https://www.olcf.ornl.gov/for-users/training/training-calendar/>
- Videos of past training events are on the OLCF Vimeo site  
<https://vimeo.com/channels/olcftraining>

# Getting Help



# Where do I find documentation?

- OLCF Website/System User Guides  
<https://docs.olcf.ornl.gov/>
- NVIDIA hosted documentation  
<http://docs.nvidia.com>

# Working With User Support

- Email is often the best option to contact us
  - Especially for sending long/complicated error messages
  - Send as many error messages as possible  
(or place them in a file & direct us to the file)
- “Send” us codes by creating a `.tar` file & directing us to it
- Report new issues in new tickets (not a reply to an old ticket)
  - Helps us in classifying/searching through old tickets
  - Gives it greater visibility

# Requesting Policy Exemptions

- The Resource Utilization Council accepts requests for temporary exemption from some policies (various job limits, purge exemptions, quota increases, etc.)
- Request can be made from our Documents & Forms page (in the third section of the page)  
[https://docs.olcf.ornl.gov/accounts/documents\\_and\\_forms.html](https://docs.olcf.ornl.gov/accounts/documents_and_forms.html)
  - Reviewed by RUC; make requests well in advance to allow for review
  - If requesting job priority, make sure you submit the job...they often run more quickly than you expect

# Finally



# Finally...

- We're here to help you
- Questions/comments/etc. can be sent to the OLCF User Assistance Center
  - Staffed 9AM – 5PM US Eastern Time (exclusive of ORNL holidays)
  - [help@olcf.ornl.gov](mailto:help@olcf.ornl.gov)
  - (865) 241-6536

# List of Links

- General

- <https://www.olcf.ornl.gov>
- [https://docs.olcf.ornl.gov/accounts/olcf\\_policy\\_guide.html](https://docs.olcf.ornl.gov/accounts/olcf_policy_guide.html)
- <http://www.olcf.ornl.gov/support/software/software-request>
- [https://docs.olcf.ornl.gov/accounts/documents\\_and\\_forms.html](https://docs.olcf.ornl.gov/accounts/documents_and_forms.html)

- Documentation

- <https://docs.olcf.ornl.gov>
- <http://docs.nvidia.com>
- <https://lmod.readthedocs.io>



# List of Links

- Training

- <https://vimeo.com/channels/olcftraining>
- <https://github.com/olcf-tutorials>
- [https://docs.olcf.ornl.gov/training/training\\_archive.html](https://docs.olcf.ornl.gov/training/training_archive.html)
- <https://www.olcf.ornl.gov/calendar/introduction-to-nvidia-profilers-on-summit/>
- <https://www.olcf.ornl.gov/calendar/summit-training-workshop/>
- <https://www.olcf.ornl.gov/calendar/introduction-to-summit-webinar/>
- <https://www.olcf.ornl.gov/for-users/training/training-calendar/>
- <https://www.olcf.ornl.gov/calendar/jsrun-tutorial/>

# List of Links

- Training (Continued)
  - [https://www.olcf.ornl.gov/wp-content/uploads/2018/12/storage\\_areas\\_summit\\_links.pdf](https://www.olcf.ornl.gov/wp-content/uploads/2018/12/storage_areas_summit_links.pdf)
  - <https://vimeo.com/306433952> (Summit storage/data transfers)
  - <https://gpuhackathons.org/>