

# ARCC: Advanced Research Computing Center

## What are the core workflow elements?

Prerequisites:

- You've watched the 'Intro to ARCC Services' and 'Intro to HPC Clusters' videos.

# Workflow: Pipeline

Sequence of steps which you will work through from the start to the end of your project.

Typically a pattern you will repeat over and over.

How do you perform and implement your workflow?

The choice is yours.

# Core Elements

The core elements we will introduce are:

- Getting your **data on/off the cluster**.
- **Setting up your environment** to be able to perform your research.
- Running and **submitting your jobs** on the cluster.

# Getting your data on/off the cluster:

Where are you storing it?

Alcova:

- Linux/Mac platform: SMB
- Windows: file explorer
- Within a browser: Globus

On the cluster: /home, /project and/or /gscratch folders:

- Data/File Transfer Tools: **scp**, **sftp**, or **rsync**

Other Options:

- Command line: **wget**, or **git pull** to retrieve your data.

# Setting up your environment:

← → ↻ 🔒 lmod.readthedocs.io/en/latest/

Lmod 8.7.6 documentation »




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## Lmod: A New Environment Module System

## Monthly Zoom Meeting

**NOTE** Lmod is holding Monthly Zoom meeting to discuss various topics. Typically it is the first Tuesday of the Month at 9:30 U.S. Central (which is 14:30 UTC or 15:30 UTC in the winter months). Beginners are welcome. There is always a Q/A session at the beginning. Topic announcements are sent to the Lmod mailing list.

See: <https://github.com/TACC/Lmod/wiki> for details.

## PURPOSE

Lmod is a Lua based module system that easily handles the MODULEPATH Hierarchical problem. Environment Modules provide a convenient way to dynamically change the users' environment through modulefiles. This includes easily adding or removing directories to the PATH environment variable. Modulefiles for Library packages provide environment variables that specify where the library and header files can be found.

# Setting up your environment: Wiki: [LMOD](#)

```
[@tlog1 ~]$ module spider r
```

```
-----  
r:  
-----
```

Versions:

```
r/3.4.4  
r/3.5.0-py27  
r/3.5.0  
r/3.5.1s  
r/3.5.2-py27  
r/3.5.2  
r/3.5.3-py27  
r/3.5.3  
r/3.6.1-intel  
r/3.6.1-py27  
r/3.6.1  
r/4.0.0-py27  
r/4.0.2-intel  
r/4.0.2-py27  
r/4.0.5-py27
```

```
[@tlog1 ~]$ module spider r/4.0.2-py27
```

```
-----  
r: r/4.0.2-py27  
-----
```

You will need to load all module(s) on any one of the lines below before the "r/4.0.2-py27" module is available to load.

```
swset/2018.05 gcc/7.3.0
```

```
[@tlog1 ~]$ module load gcc/7.3.0 r/4.0.2-py27
```

```
[@tlog1 ~]$ R --version
```

```
R version 4.0.2 (2020-06-22) -- "Taking Off Again"  
Copyright (C) 2020 The R Foundation for Statistical Computing  
Platform: x86_64-pc-linux-gnu (64-bit)
```

# Running and submitting your job to the cluster:

1. Allocates access to appropriate computer nodes specific to your requests.
2. Framework for starting, executing, monitoring, and even canceling your jobs.
3. Queue management and job state notification.



```
[@tlog1 ~]$ sbatch run.sh
Submitted batch job 3027333

[@tlog1 ~]$ squeue -u salexan5
```

JOBID	PARTITION	NAME	USER	ST	TIME	NODES	NODELIST (REASON)
3027333	inv-arcc	spa	salexan5	R	0:01	1	mtest2

# Wiki: Slurm Workload Manager:

## Interactive Session

```
[salexan5@tlog1 ~]$ salloc --account=arcc --time=10:00
salloc: Granted job allocation 3027387

[salexan5@mtest2 ~]$ squeue -u salexan5
          JOBID PARTITION      NAME      USER ST      TIME  NODES NODELIST(REASON)
          3027387  inv-arcc  interact salexan5  R      0:11     1 mtest2

[salexan5@mtest2 ~]$ exit
exit
salloc: Relinquishing job allocation 3027387

[salexan5@tlog1 ~]$
```

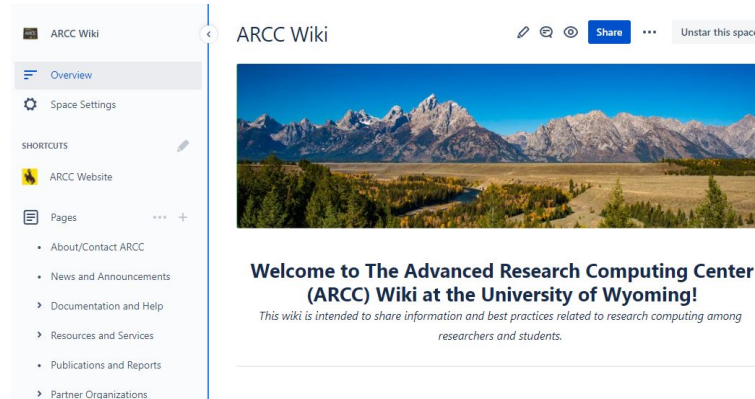
Do NOT run applications on the login nodes.



# Summary

Three core elements that you will need to consider within your workflow:

- Getting your data on/off the cluster.
- Setting up your environment to be able to perform your research.
- Submitting your job to the cluster.

A screenshot of the ARCC Wiki page. On the left is a navigation sidebar with the following items: 'ARCC Wiki' (selected), 'Overview', 'Space Settings', 'SHORTCUTS', 'ARCC Website', 'Pages' (with a sub-menu containing 'About/Contact ARCC', 'News and Announcements', 'Documentation and Help', 'Resources and Services', 'Publications and Reports', and 'Partner Organizations'). The main content area shows the title 'ARCC Wiki' with edit, share, and unstar icons. Below the title is a large landscape photograph of a mountain range. Underneath the photo is the heading 'Welcome to The Advanced Research Computing Center (ARCC) Wiki at the University of Wyoming!' followed by the text 'This wiki is intended to share information and best practices related to research computing among researchers and students.'