Great Lakes Cheat Sheet

ARC·TS ADVANCED RESEARCH COMPUTING TECHNOLOGY SERVICES UNIVERSITY OF MICHIGAN

Guide to general **Linux (Bash)** and **Slurm** commands

Accessing Great Lakes

Logging in from a terminal (Duo required)
ssh *uniqname*@greatlakes.arc-ts.umich.edu

Transferring files between Great Lakes and your system
scp *input uniqname*@greatlakes-xfer.arc-ts.umich.edu:*output*
scp -r *input uniqname*@greatlakes-xfer.arc-ts.umich.edu:*output*
scp *uniqname*@greatlakes-xfer.arc-ts.umich.edu:*input output*

GUI Clients

PuTTY	SSH client for Windows
WinSCP	SCP client for Windows
FileZilla	FTP client for Windows, Mac, and Linux

Basic Linux file management

man *command*	Display the manual page for *command*
pwd	Print out the present working directory
ls	List the files in the current directory
ls -lh	Show long, human-readable listing
ls *dir*	List files inside directory *dir*
rm *file*	Delete *file*
mkdir *dir*	Create empty directory called *dir*
rmdir *dir*	Remove empty directory *dir*
rm -r *dir*	Remove directory *dir* and **all contents**
cd *dir*	Change working directory to *dir*
cd ..	Change working directory to parent
cd	Change working directory to home
ls	List the files in the current directory
cp *file1 file2*	Copy *file1* as *file2*
cp *file1 dir*	Copy *file1* into directory *dir*
mv *file1 file2*	Rename *file1* as *file2*
mv *file1 dir*	Move *file1* into directory *dir*
~ (tilde)	Home directory
. (period)	Current (working) directory
.. (2 periods)	Parent directory
wget *URL*	Download a file from Internet *URL*
unzip *file*.zip	Extract a ZIP file
tar xzf *file*	Extract a gzip compressed tarball (common extensions: *.tar.gz* and *.tgz*)

Viewing and editing text files

cat *file*	Print entire content of *file*
less *file*	Prints content of file page by page
head *file*	Print first 10 lines of *file*
tail *file*	Print last 10 lines of *file*
nano	Simple, easy to use text editor
vim	Minimalist yet powerful text editor
emacs	Extensible and customizable text editor

Advanced file management

chmod	Change read/write/execute permissions
which *cmd*	List the full file path of a command
whereis *cmd*	List all related file paths (binary, source, manual, etc.) of a command
du *dir*	List size of directory and its subdirectories
find	Find file in a directory

Aliases and system variables

alias	Create shortcut to command
env	Lists all environment variables
export *var*=*val*	Create environment variable $*var* with value *val*
echo $*var*	Print the value of variable $*var*
.bashrc	File that defines user aliases and variables

Input and output redirection

$(*command*)	Runs *command* first, then inserts output to the rest of the overall command
<	Standard input redirection
>	Standard output redirection
2>	Standard error redirection
2>&1	Standard error to standard output redirection
cmd1 | *cmd2*	Pipe the output of *cmd1* to *cmd2*

Filters

wc	Word, line, and character count
grep	Find and print text matching a regular expression
sort	Sort input
uniq	Filter duplicate lines
cut	Cut specific fields or columns
sed	Stream editor for search and replace
awk	Extensive tool for complex filtering tasks

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Great Lakes directories

/home/*uniqname*	For use with running jobs, 80 GB quota
/tmp	Small file reads/writes, deleted after 10 days
/scratch	Large file reads/writes, purged periodically
/afs	Only on login node, 10 GB backed up

Lmod

module keyword *string*	Search for module names or descriptions matching *string*
module spider *string*	Search for modules matching *string*
module avail	Show modules that can be loaded now
module load *module*	Load *module* in the environment
module show *module*	Show the help and variables set by *module*
module list	List currently loaded modules
module unload *module*	Remove *module* from environment
module purge	Remove all modules from environment
module save *collection*	Save all currently loaded modules to *collection*
module savelist	Return all saved module collections
module describe *collection*	Return all modules in *collection*
module restore *collection*	Restore all modules from *collection*

Slurm

sbatch *filename*	Submit a job script *filename*
squeue -u *user* OR sq *user*	Show job queue for *user*
scancel *jobid*	Delete job *jobid*
scontrol hold *jobid*	Hold job *jobid*
scontrol release *jobid*	Release job *jobid*
sinfo	Cluster status
srun	Launch parallel job step
sacct	Display job accounting info

Slurm Environment Variables

SLURM_JOBID	Job ID
SLURM_SUBMIT_DIR	Job submission directory
SLURM_SUBMIT_HOST	Host from which job was submitted
SLURM_JOB_NODELIST	Node names allocated to job
SLURM_ARRAY_TASK_ID	Task ID within job array
SLURM_JOB_PARTITION	Job partition

#SBATCH directives and #PBS counterparts

#SBATCH	#PBS	Description
--job-name=*name*	-N *name*	Job name
--account=*name*	-A *name*	Account to charge
--partition=*name*	-q *name*	Submit to partition: standard, gpu. viz, largemem, oncampus, debug
--time=*dd-hh:mm:ss*	-l walltime=*time*	Time limit (walltime)
--nodes=*count*	-l nodes=*count*	Number of nodes
--tasks-per-node=*count*	-l ppn=*count*	Processes per node
--cpus-per-task=*count*	*n/a*	CPU cores per process
--mem=*count*	-l mem=*count*	RAM per node (e.g. 1000M, 1G)
--mem-per-cpu=*count*	-l pmem=*count*	RAM per CPU core
--gres=gpu:*count*	-l gpus=*count*	GPUs per node
--nodelist=*nodes*	-l nodes=*nodes*	Request nodes
--array=*arrayspec*	-t *arrayspec*	Define job array
--output=*%x-%j.log*	-o *filepath*	Standard output in run directory, formatted: jobName-jobID.log
--error=*%x-%j-E.log*	-e *filepath*	Standard error log
--export=ALL	-V	Copy environment
--export=*var*=*val*	-v *var*=*val*	Copy env variable
--depend=*var*:*jobid*	-W depend=*var*:*jobid*	Job dependency states (*var*): after, afterok, afterany, afternotok
--mail-user=*email*	-M *email*	Email for job alerts
--mail-type=*type*	-m *type*	Email alert types: BEGIN, END, NONE, FAIL, REQUEUE
--exclude=*nodes*	*n/a*	Nodes to avoid

ARC-TS custom commands

my_usage	Usage in CPU minutes
my_accounts	Show account membership and resource limits
home-quota	Show home quota and usage per user
scratch-quota *account_root*	Show scratch quota and usage per account
maxwalltime	Show walltime available for jobs (including upcoming maintenance)

ARC-TS Documentation & Support

GL User Guide: *https://arc-ts.umich.edu/greatlakes/user-guide*

OnDemand/remote desktop: *https://greatlakes.arc-ts.umich.edu*

Email *hpc-support@umich.edu* for further Great Lakes support

Sensitive data should **not** be stored or processed on Great Lakes