An Introduction to the Linux Command Line

Matt Gitzendanner *magitz@ufl.edu*

HiPerGator 2.0
The University of Florida Supercomputer

UF | Information Technology

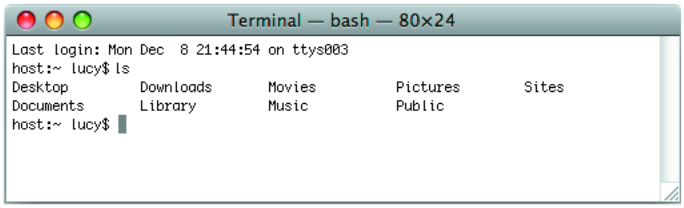
OneIT for the #GatorGood

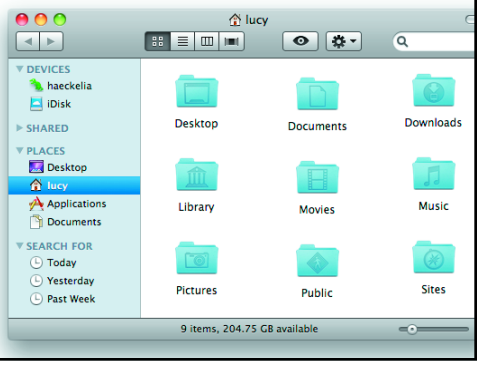
Don't be intimidated!

UF | Information Technology

OneIT for the #GatorGood

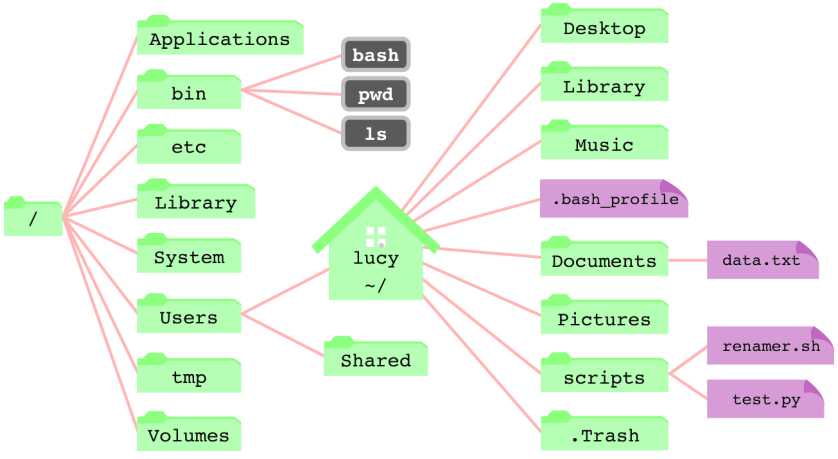
File system





UF | Information Technology

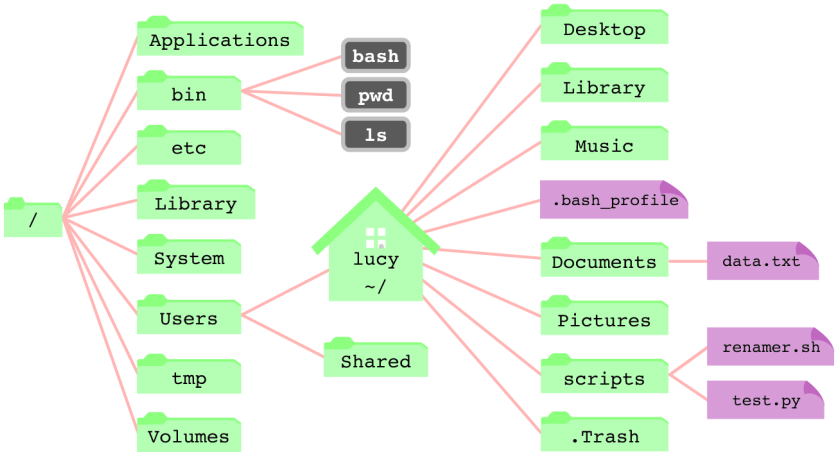
File system



UF | Information Technology

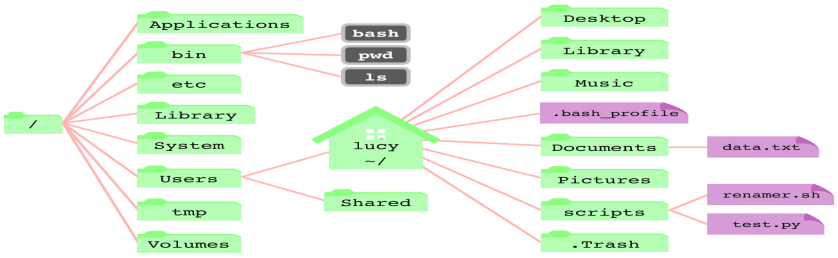
OneIT for the #GatorGood

File system: Paths



/Users/lucy/scripts/test.py

File system: `ls` & `cd`




```
[magitz@gator1 scripts]$ ls
renamer.sh  test.py
[magitz@gator1 scripts]$ cd ../Documents/
[magitz@gator1 Documents]$ ls
data.txt
[magitz@gator1 Documents]$
```

The command prompt

user host current directory

```
[magitz@gator1 scripts]$ ls
renamer.sh  test.py
[magitz@gator1 scripts]$ cd ../Documents/
[magitz@gator1 Documents]$ ls
data.txt
[magitz@gator1 Documents]$
```


File system: Basic commands

- `pwd`: Present Working Directory
- `ls`: List--show contents of directory
- `cd`: Change Directory
- `mkdir`: Make directory
- `rm`: Remove a file (`rm -r` for directories)
- `rmdir`: Remove directory

There is no trashcan! (or backups)

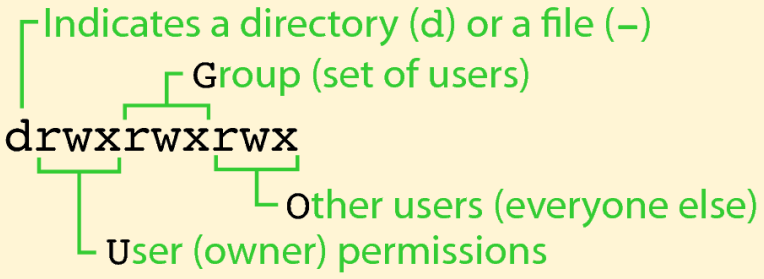
- `cp`: Copy a file: `cp data.txt ../analysis/`
- `mv`: Move a file: `mv data.txt ../analysis/`

Command arguments

- Modify how a command works
  - Used from the most basic command like `ls`, to most applications you will run

```
[magitz@gator1 scripts]$ ls
renamer.sh  test.py
[magitz@gator1 scripts]$ ls -l
total 0
-rw-rw-r-- 1 magitz ufhpc 0 Jul 25 12:22 renamer.sh
-rw-rw-r-- 1 magitz ufhpc 0 Jul 25 12:22 test.py
[magitz@gator1 scripts]$ ls -la
total 8
drwxrwxr-x 2 magitz ufhpc 4096 Jul 25 12:22 .
drwxrwxr-x 4 magitz ufhpc 4096 Jul 25 12:25 ..
-rw-rw-r-- 1 magitz ufhpc    0 Jul 25 12:22 renamer.sh
-rw-rw-r-- 1 magitz ufhpc    0 Jul 25 12:22 test.py
[magitz@gator1 scripts]$
```

Linux permissions



- Change with: `chmod o-rwx file`
  - `ls –l` shows permission details

```
-rw-rw-r-- 1 magitz ufhpc 0 Jul 25 12:22 renamer.sh
```

u g o — user — group

Viewing text files

- `more` and `less`: show contents of a file, `less` has more features (search, scroll up, etc.)
- `head`: show start of file (10 lines by default)
  - `head -n 20 file.txt`
- `tail`: show end of file (10 lines by default)
- `grep`: search for text in file
  - `grep Gainesville weather.txt`

- Text editors: `nano`, `vi`, `vim`, `emacs`, etc.

Redirecting output

- The ">" can be used to redirect output:
  - `grep GNV weather.txt > Gainesville.txt`
  - `ls -l > file_list.txt`

  - **Caution:** > will overwrite the specified file!

- You can append to a file with ">>"

Connecting commands

- The pipe, "|", can be used to send, or pipe, the output of one command to the input of another:
  - `ls -l | grep Jun > files_modified_in_June`

Tip: Don't use spaces in file or directory names

Tools

ssh client to connect to hpg2.rc.ufl.edu

e.g.: Terminal, MobaXterm

SFTP client to move files to / from your computer
Host: **sftp.rc.ufl.edu**

e.g.: Cyberduck, FileZilla

Text editor to prepare files

Especially on Windows, be sure to convert DOS line breaks to Unix, and *don't use Word*
Both have SFTP built in

e.g.: TextWrangler, Notepad++

SSH Clients

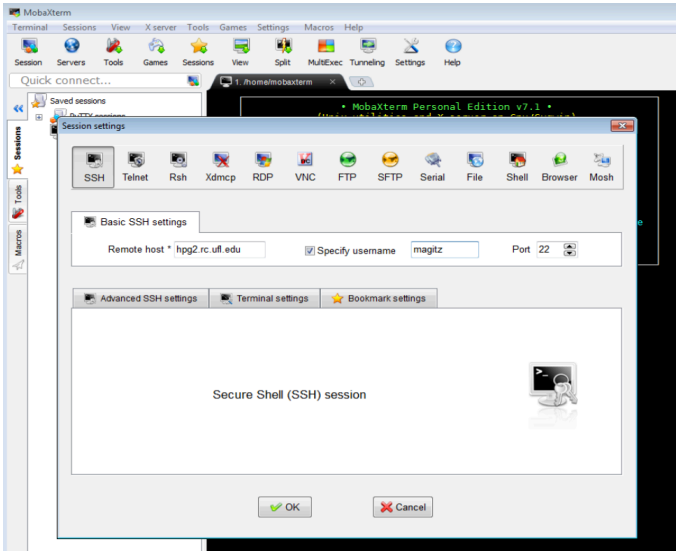
```
ufit-rc-matt:~ matt$ ssh magitz@hpg2.rc.ufl.edu
magitz@hpg2.rc.ufl.edu's password:
Last login: Thu May 26 11:17:26 2016 from 10.243.21.61
                Welcome to UF Research Computing

Do not run interactive jobs on the login nodes.  If you need to
run an interactive job, please use the interactive/test nodes.

    http://wiki.rc.ufl.edu/doc/Test_Nodes

UF Research Computing account policies are available at
the following URL.

    http://www.rc.ufl.edu/about/policies/account

                    UFIT Policy Notice
                    ------------------
The user understands and acknowledges that the computer and the
```

Mac/Linux: Terminal

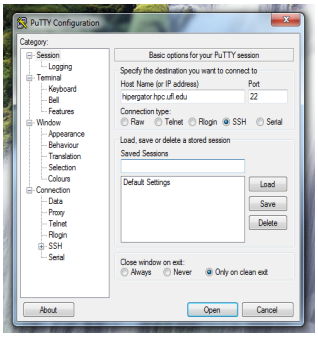
Windows:
MobaXterm or PuTTY

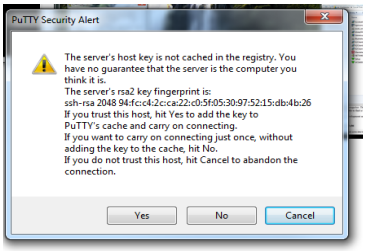
ssh user@hpg2.rc.ufl.edu

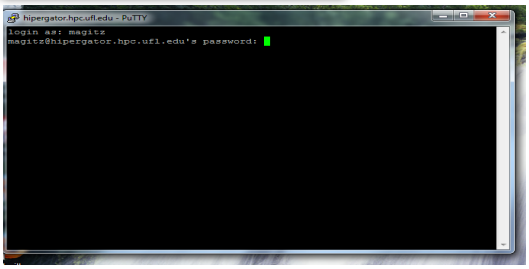
MobaXterm



PuTTY



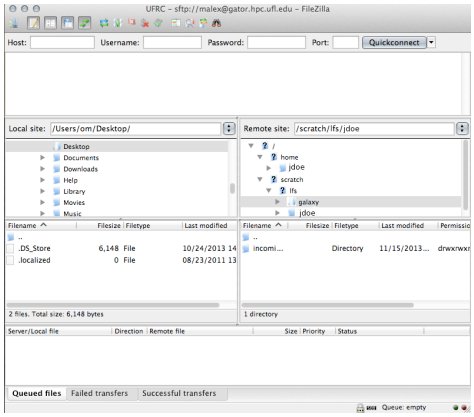




UF | Information Technology

OneIT for the #GatorGood

FileZilla



Host:

sftp.rc.ufl.edu

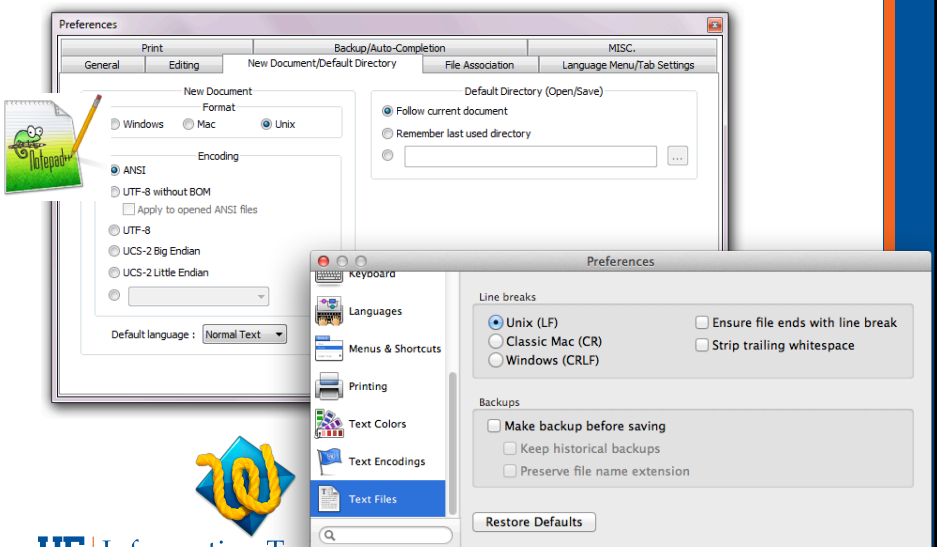
Do not use hpg2 login serve for data transfer

Tutorial at: http://wiki.rc.ufl.edu/doc/FileZilla

UF | Information Technology

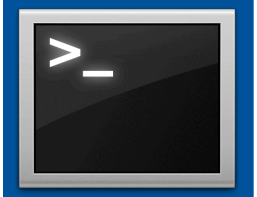
OneIT for the #GatorGood

Unix line breaks



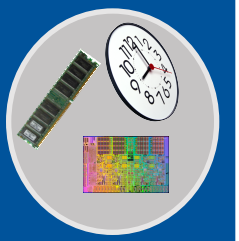
Cluster basics

User interaction



Login node (Head node)

Scheduler



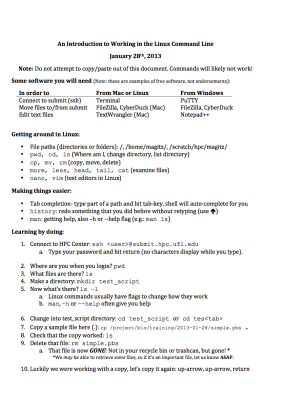
Tell the scheduler what you want to do

Compute resources

Your job runs on the cluster

Learn by doing…

Handouts also available on Wiki



An Introduction to Working in the Linux Command Line

January 28th, 2013

Note: Do not attempt to copy/paste out of this document. Commands will likely not work!

Some software you will need (Note: these are examples of free software, not endorsements):

In order to	From Mac or Linux	From Windows
Connect to submit (ssh)	Terminal	PuTTY
Move files to/from submit	FileZilla, CyberDuck (Mac)	FileZilla, CyberDuck
Edit text files	TextWrangler (Mac)	Notepad++

Getting around in Linux:

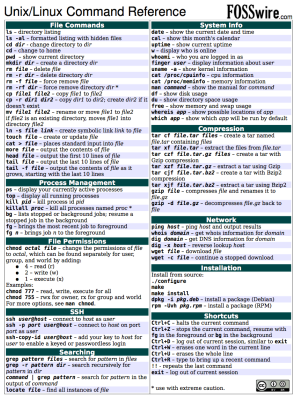
- File paths (directories or folders): /, /home/magitz/, /scratch/hpc/magitz/
- pwd, cd, ls (Where am I, change directory, list directory)
- cp, mv, rm (copy, move, delete)
- more, less, head, tail, cat (examine files)
- nano, vim (text editors in Linux)

Making things easier:

- Tab completion- type part of a path and hit tab-key, shell will auto-complete for you
- history- redo something that you did before without retyping (use ↑)
- man: getting help, also -h or --help flag (e.g.: man ls)

Learning by doing:

1. Connect to HPC Center: ssh <user>@submit.hpc.ufl.edu
   a. Type your password and hit return (no characters display while you type).
2. Where are you when you login? pwd
3. What files are there? ls
4. Make a directory: mkdir test_script
5. Now what's there? ls -l
   a. Linux commands usually have flags to change how they work
   b. man, -h or --help often give you help
6. Change into test_script directory: cd test_script or cd test<tab>
7. Copy a sample file here (.): cp /project/hin/training/2013-01-28/simple.pbs .
8. Check that the copy worked: ls
9. Delete that file: rm simple.pbs
   a. That file is now *GONE*. Not in your recycle bin or trashcan, but gone! *
      * We may be able to retrieve some files, so if it's an important file, let us know ASAP.
10. Luckily we were working with a copy, let's copy it again: up-arrow, up-arrow, return



Unix/Linux Command Reference — FOSSwire.com

File Commands

ls - directory listing
ls -al - formatted listing with hidden files
cd dir - change directory to dir
cd - change to home
pwd - show current directory
mkdir dir - create a directory dir
rm file - delete file
rm -r dir - delete directory dir
rm -f file - force remove file
rm -rf dir - force remove directory dir *
cp file1 file2 - copy file1 to file2
cp -r dir1 dir2 - copy dir1 to dir2; create dir2 if it doesn't exist
mv file1 file2 - rename or move file1 to file2
if file2 is existing directory, moves file1 into directory file2
ln -s file link - create symbolic link link to file
touch file - create or update file
cat > file - places standard input into file
more file - output the contents of file
head file - output the first 10 lines of file
tail file - output the last 10 lines of file
tail -f file - output the contents of file as it grows, starting with the last 10 lines

Process Management

ps - display your currently active processes
top - display all running processes
kill pid - kill process id pid
killall proc - kill all processes named proc *
bg - lists stopped or background jobs; resume a stopped job in the background
fg - brings the most recent job to foreground
fg n - brings job n to the foreground

File Permissions

chmod octal file - change the permissions of file to octal, which can be found separately for user, group, and world by adding:
- 4 - read (r)
- 2 - write (w)
- 1 - execute (x)

Examples:
chmod 777 - read, write, execute for all
chmod 755 - rwx for owner, rx for group and world
For more options, see man chmod.

SSH

ssh user@host - connect to host as user
ssh -p port user@host - connect to host on port port as user
ssh-copy-id user@host - add your key to host for user to enable a keyed or passwordless login

Searching

grep pattern files - search for pattern in files
grep -r pattern dir - search recursively for pattern in dir
command | grep pattern - search for pattern in the output of command
locate file - find all instances of file

System Info

date - show the current date and time
cal - show this month's calendar
uptime - show current uptime
w - display who is online
whoami - who you are logged in as
finger user - display information about user
uname -a - show kernel information
cat /proc/cpuinfo - cpu information
cat /proc/meminfo - memory information
man command - show the manual for command
df - show disk usage
du - show directory space usage
free - show memory and swap usage
whereis app - show possible locations of app
which app - show which app will be run by default

Compression

tar cf file.tar files - create a tar named file.tar containing files
tar xf file.tar - extract the files from file.tar
tar czf file.tar.gz files - create a tar with Gzip compression
tar xzf file.tar.gz - extract a tar using Gzip
tar cjf file.tar.bz2 - create a tar with Bzip2 compression
tar xjf file.tar.bz2 - extract a tar using Bzip2
gzip file - compresses file and renames it to file.gz
gzip -d file.gz - decompresses file.gz back to file

Network

ping host - ping host and output results
whois domain - get whois information for domain
dig domain - get DNS information for domain
dig -x host - reverse lookup host
wget file - download file
wget -c file - continue a stopped download

Installation

Install from source:
./configure
make
make install
dpkg -i pkg.deb - install a package (Debian)
rpm -ivh pkg.rpm - install a package (RPM)

Shortcuts

Ctrl+C - halts the current command
Ctrl+Z - stops the current command, resume with fg in the foreground or bg in the background
Ctrl+D - log out of current session, similar to exit
Ctrl+W - erases one word in the current line
Ctrl+U - erases the whole line
Ctrl+R - type to bring up a recent command
!! - repeats the last command
exit - log out of current session

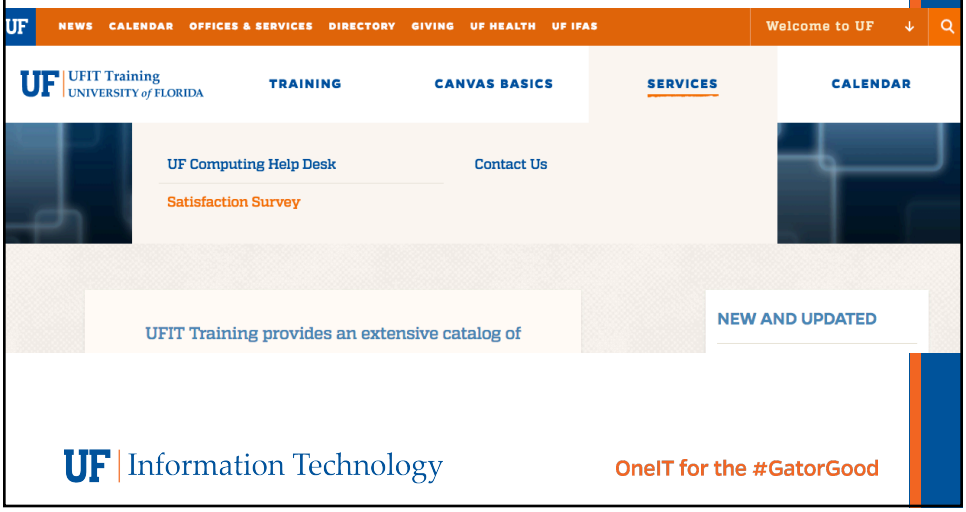
* use with extreme caution.

UF | Information Technology

OneIT for the #GatorGood

Satisfaction Survey

- training.it.ufl.edu



UF | Information Technology

OneIT for the #GatorGood

Next Week:

- Open Q&A session
  - 11:00am
  - NPB 2205

Support

- Support requests

- Web page and wiki