# What We're Going To Do

- Why Unix?
- Cloud Computing
- Connecting to AWS
- Introduction to Unix Commands



## Etiquette

- PowerPoint interspersed with Challenges
- Ask me questions
- Ask demonstrators
- Work together
- Cheat!



#### Linix/Linux Command Deference



System Info         is - directory ling       System Info         is - directory ling       Cal - show the unrunt date and time         cal - change directory to dir       Cal - show the unrunt date and time         cal - change directory to dir       Cal - show the unrunt date and time         cal - change directory to dir       Cal - show the unrunt date and time         cal - change directory to dir       Cal - show the unrunt date and time         cal - change directory to dir       Cal - show the unrunt date and time         cal - change directory to dir       Cal - show the unrunt date and time         cal - change directory dir       Cal - show the unrunt date and time         cal - change directory dir       Cal - show the unrunt date and time         cal - change directory dir       Cal - show the unrunt date and time         cal - change directory dir       Cal - show the unrunt date and time         cal - change directory dir       Cal - show the unrunt uprime         cal - change directory dir       Cal - show the unrunt date and time         cal - change directory dir       Cal - show the unrunt uprime         cal - change directory dir       Cal - show the unrunt uprime         cal - change directory dir       Cal - show the unrunt uprime         cal - show tensory and wap usage       Cal - show the unrun uprime	Unix/Linux Command Rei	elence <b>LO22MiLG</b> <sup>rou</sup>
<ul> <li>is -at - formatted listing with hidden files</li> <li>id - formatted listing with hi</li></ul>	File Commands	System Info
<ul> <li>Is -al - formatted listing with hidden files</li> <li><i>di</i> - change directory to <i>di</i></li> <li><i>di</i> - change to home</li> <li><i>wptime</i> - show current uptime</li> <li><i>w</i> - display who is online</li> <li><i>w</i> - display who is online</li> <li><i>w</i> - <i>di</i> - delete file</li> <li><i>m</i> - <i>f di</i> - force remove file</li> <li><i>m</i> - <i>f di</i> - force remove file</li> <li><i>m</i> - <i>f di</i> - force remove file</li> <li><i>ct</i> / <i>proc</i> / <i>cpuinfo</i> - <i>cpui</i> information</li> <li><i>ct</i> / <i>proc</i> / <i>cpuinfo</i> - <i>cpu</i> information</li> <li><i>ct</i> / <i>proc</i> / <i>cpuinfo</i> - <i>cpu</i></li> <li><i>cp</i> - <i>display</i> all running processes</li> <li><i>tp</i> - <i>display</i> all running processes</li> <li><i>tp</i> - <i>display</i> all running processes</li> <li><i>tp</i> - <i>display</i> all <i>running processes</i></li> <li><i>tp</i> - <i>biss dip di</i></li> <li><i>file frod dife</i></li> <li><i>cotl file</i> - <i>change</i> the <i>permissions</i></li> <li><i>file file iff iffe iffe</i></li></ul>	ls - directory listing	date - show the current date and time
cd / change directory to dir       uptime - show current uptime         pxd - show current directory dir       w - display who is online         pxd - show current directory dir       w - display who is online         m file - delete file       who up are logged in as         file - delete file       finger user - display information about user         uname - a - show kernel information       cat / proc/puinfo - nemory information         rm f file - force remove directory dir*       m - file file - force remove directory dir*         cp file1 file2 - copy diel to file2       if - show disk usage         doesn't exist       man command - show the manual for command         directory file2       in - s file link - create symbolic link link to file         cat > file - output the contents of file       file - show disk usage         tail 1 file - output the contents of file       file tar containing files         tail of - output the last 10 lines of file       tar xf file. tar . gz files - create a tar with Bzip2         process Management       tar xf file. tar. gz - extract a tar using Bzip2         pyd - shigy all running processes       file doesn' - everse of using for a sit grows, starting with the last 10 lines of file         ps - display your currently active processes       file to - file or - gz - back to file         g - prings the most recent job to foreground       file or promession	ls -al - formatted listing with hidden files	cal - show this month's calendar
<ul> <li>cd - change to home</li> <li>m - change to home</li> <li>m - file - create a directory dir</li> <li>m - f dir - create a directory dir</li> <li>m - f dir - force remove file</li> <li>m - f dir - force remove file</li> <li>cp - r dir.1 dir.2 - copy dir.1 to dir.2; create dir.2 if it</li> <li>frile.2 is an existing directory, moves file 1 to file.2</li> <li>cp - r dir.1 dir.2 - copy dir.1 to dir.2; create dir.2 if it</li> <li>free - show memory and swap usage</li> <li>which app - show which app will be run by default</li> <li>free - show memory and swap usage</li> <li>which app - show which app will be run by default</li> <li>free - show memory and swap usage</li> <li>which app - show which app will be run by default</li> <li>free - show memory and swap usage</li> <li>which app - show which app will be run by default</li> <li>file - create or update file</li> <li>file - create or update file</li> <li>file - create or update file</li> <li>file - create a tar named</li> <li>file tar containing files</li> <li>tail file - output the contents of file as it grows, stating with the last 10 lines of file at r cf file. tar. bz2 - create a tar with Bzip2</li> <li>compression</li> <li>tar xf file.tar.bz2 - create a tar using Gzip tar cf file.tar.bz2 - create a tar with Bzip2</li> <li>compression stating file.</li> <li>tar xf file.tar.bz2 - create a tar using Bzip2</li> <li>grip file - compresses file and remames it to file as tig or bring to host end grown dips in the background dips, resume a toped download</li> <li>file ar contained file with treatts of the cortent on for domain dig whost and output results whis domain - get DNS information for domain dig whost and output results whis domain - get DNS information for domain dig whost and output results whis domain - get DNS information for domain dig whost and output results whis domain - get DNS information for domain dig whost and output results whis domain - get DNS information for domain dig whost and output results whis domain - get DNS information for domai</li></ul>	cd dir - change directory to dir	uptime - show current uptime
<pre>who you dre logged in as bout user m file - create a directory dir m - file - delete file m - file - delete file m - file - force remove file m - file - force remove directory dir * cp file file2 - create a life to file2 file file2 - copy dir to dir2; create dir2 file doesn't exist doesn't exist more file - create or update file du - show directory space usage free - show memory and swap usage whereis app - show possible locations of app while app - show which app will be run by default directory file2 In -s file link - create symbolic link link to file touch file - create or update file ext &gt; file - output the first 10 lines of file tail - file - output the contents of file tail - file - output the contents of file tail - file - output the act 10 lines of file ar create a tar with file tar create a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - extract a tar using Gzip tar cf file.tar - gz - ectore a tar with big omain - get Nobis information for domain dig whois domain - get NDNs information for domain dig whois dom</pre>	cd - change to home	w – display who is online
<pre>minipped loss of methods about user m file delete file m file i force remove file m file i force remove file m file i force remove file to file i file i file i concert dire i file i concert dire i file i doesn't exist m of file i concert dire i file i concert dire i file i directory file i file i concert dire i file i touch file - create symbolic link link to file directory file i contain the file more file - output the contents of file touch file - create or update file cat &gt; file i contain the file more file - output the first 10 lines of file tail - file - output the first 10 lines of file tail - file - output the last 10 lines of file tail - file - output the last 10 lines of file tail - file - output the contents of file tail - file - output the last 10 lines of file tail - file - output the contents of file tail - file - output the last 10 lines of file tail - file - output the contents of file a tar xf file. tar. file - create a tar with Bzip2 compression tar xf file - tar. gz - cextract a tar using Bzip2 grip file - compresses file dire compresses file dire and renames it to file g grip - display all running processes top - display all running running</pre>	<b>pwa</b> - show current directory	who and - who you are logged in as
<pre>rm -r dir delete directory dir rm -r dir delete directory dir rm -r dir force remove file rm -r dir force remove directory dir * cp file. force remove directory dir * cp file. force remove directory dir * cp - dir. force remove directory dir * cm - s file file comp dir to dir2; create dir2 lift doesn't exist user to - uptate file of file tat file create or update file cat. &gt; file create or update file cat. &gt; file output the contents of file tat file output the contents of file tat file output the contents of file stat. + file output the contents of file tat. + file output the contents of file stat. + file output the contents of file stat. + file compresses file co</pre>	rm file - delete file	uname -a - show kernel information
<pre>rm -f file - force remove file rm -f file - force remove directory dir * cp file1 file2 - copy file1 to file2 doesn't exist my file1 file2 - copy dir1 to dir2; create dir2 ifil doesn't exist my file1 file2 - create or update file cat &gt; file ink - create symbolic link link to file touch file - create or update file cat &gt; file - output the first 10 lines of file tail - file - output the first 10 lines of file tail - file - output the first 10 lines of file tail - file - output the last 10 lines of file tail - file - output the last 10 lines of file tail - file - output the last 10 lines of file tail - file - output the last 10 lines of file tail - file - output the last 10 lines of file tail - file - output the contents of file act grows, starting with the last 10 lines of file tail - file - output the files file act grows, starting with the last 10 lines of file tail - file - output the files fore file to file - output the files fore file to grows, starting with the last 10 lines of file to ctal, which can be foreground fg - brings how not the foreground ff - brings how not the foreground ff - brings how now crystor group and world ff - tread (r) e 2 - write (w) e 1 - execute (x) Examples: chead 777 - read, write, execute for all chead 777 - read, write, execute for all crt+t4 - lasts the current command, resume with fg in the foreground of gile ssh userghost - connect to host on port user to enable a keyed or passwordless login crt+t4 - log out of current session, similar to exit crt+t4 - crases one word in the background tcrt+t2 - log out of current session. we with extreme caution. * use with extreme cautio</pre>	rm -r dir - delete directory dir	cat /proc/cpuinfo - cpu information
<pre>rm -rf dir - force remove directory dir * pr file 1 file2 - cropy dir1 to dir2; create dir2 if it doesn't exist rv file1 file2 - rename or move file1 to file2 if file2 is an existing directory, moves file1 into directory file2 In -s file 1 file2 - rename or move file1 to file cat &gt; file - create or update file cat &gt; file - cutput the contents of file tail file - output the contents of file tail of file - output the contents of file tail of file - output the contents of file as it grows, starting with the last 10 lines of file tail file - output the first 10 lines of file tail file - output the contents of file as it grows, starting with the last 10 lines  ProceSS Management ps - display your currently active processes titl pid - kill processe named proc * tg - birst stopped or background jobs; resume a stopped job in the background fg - brings job n to the foreground fg - brings he most recent job to foreground fg - brings he most recent job to foreground fg - brings he most recent job to foreground fg - brings he most recent job to foreground fg - brings he most recent job to foreground fg - brings he most recent job to foreground fg - brings ib n to the foreground fg - brings he most recent job to foreground fg - brings ib n to the foreground fg - brings ib n to the foreground fg - brings ib n to the foreground ff - a - tread (r)</pre>	rm -f file - force remove file	cat /proc/meminfo - memory information
<pre>cp r dirl dir2 - copy file1 to file2 de show dirst usage free - show memory and swap usage wr file2 is an existing directory, moves file1 to file2 if file2 is an existing directory, moves file1 to file2 there - show memory and swap usage which app - show which app will be run by default directory file2 to cont file - cureate or update file cat &gt; file - places standard input into file to cot file - output the contents of file tail - file - output the first 10 lines of file tail - file - output the last 10 lines of file tail - file - output the last 10 lines of file tail - file - output the contents of file as it grows, starting with the last 10 lines ps - display all running processes top - display all running processes to cotal, which can be found separately for user, group, and world by adding:</pre>	<pre>rm -rf dir - force remove directory dir *</pre>	man command - show the manual for command
<pre>cp - dr1 dr2 - copy dr1 to dr2; create dr2 if it doesn't exist mv file1 file2 is nexisting directory, moves file1 to file2 if file2 is nexisting directory, moves file1 to directory file2 touch file - create or update file cat &gt; file - places standard input into file more file - output the contents of file tail file - output the first 10 lines of file tail file - output the contents of file tar if tile.tar - extract the files from file.tar thead file - output the contents of file tar if tile.tar - extract the files from file.tar tar xf file.tar - extract a tar using Gzip tar xf file.tar.bz2 - create a tar with Bzip2 compression tar xf file.tar.bz2 - create a tar with Bzip2 compression tar xif file.tar.bz2 - create a tar using Gzip tar xif file.tar.bz2 - create a tar using Gzip tar xif file.tar.bz2 - create a tar using Bzip2 grip file - compresses file and renames it to file.gz grip file - compresses file.gz back to file socped job in the background fg n - brings job n to the foreground ff n - brings job n to the foreground for more options, see man chmod. Sesh - port user@host - connect to host as user ssh - port user@host - connect to host as user ssh - port user@host - connect to host as user ssh - port user@host - add your key to host for user to enable a keyed or passwordless login ff the foreground or bg in the background ff in the foreground or bg in the backgrou</pre>	cp file1 file2 - copy file1 to file2	df – show disk usage
In esting directory, moves file1 to file2         In -s file link - create symbolic link link to file         In -s file link - create symbolic link link to file         cat > file - create or update file         cat > file - output the contents of file         cat > file - output the first 10 lines of file         tail - file - output the contents of file as it         grows, starting with the last 10 lines of file         tail - file - output the contents of file as it         grows, starting with the last 10 lines of file         tail - file - output the contents of file as it         grows, starting with the last 10 lines of <b>Procests Management</b> grows, starting with the last 10 lines of         growp, adword the cancents of file as it         growped job in the background         file - careate ot file - change the permissions of file         to octal, which can be found separately for user,         group, and word by adding:         • 1 - execute (x)         Examples:         chmod 755 - rws for owner, rs for group and word         for more options, see man chmod.         Sth - port user@host - connect to host as user         ssh - sport user@host - connect to host as user         ssh - port user@host - add your key to host for         ssh - port user@host - add your key to host for <td>cp -r airi airi - copy airi to airi; create airi it doesn't evist</td> <td><b>du</b> - show directory space usage</td>	cp -r airi airi - copy airi to airi; create airi it doesn't evist	<b>du</b> - show directory space usage
<pre>if file2 is an existing directory, moves file1 into directory file2 in - s file Link - create symbolic link link to file touch file - places standard input into file more file - output the contents of file head file - output the contents of file tail - file - output the contents of file tail - file - output the last 10 lines of file tail - file - output the contents of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grows, starting with the last 10 lines of file as it grop - ships job n to the foreground fg - brings the most recent job to foreground fg - brings he most recent job to foreground fg - a read (r)</pre>	my file1 file2 - rename or move file1 to file2	where is app - show possible locations of app
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<pre>touch file - create or update file cat &gt; 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 file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the last 10 lines of file tar zf file.tar.gz = cktract a tar using Gzip tar zf file.tar.bz2 - create a tar with Bzip2 compression tar zif file.tar.bz2 - create a tar using Bzip2 gzip file - compresses file and renames it to file.gz gzip file - compresses file and renames it to file.gz file for brings job n to the foreground fg - brings job n to the foreground ff - brings job n to the foreground ff - brings job n to the foreground ff - create (n)</pre>	<pre>ln -s file link - create symbolic link link to file</pre>	Compression
<pre>clat &gt; file - places standard input into file more file - output the contents of file tail file - output the first 10 lines of file tail file - output the contents of file as it grows, starting with the last 10 lines <b>Process Management</b> <b>ps</b> - display our currently active processes top - display all running processes kill pid - kill process id pid killall proce - kill all processes anded proc * bg - lists stopped ob in the background fg - brings the most recent job to foreground fg - brings bn to the foreground ffg - a call file - change the permissions of file to octal, which can be found separately for user, group, and world by adding:</pre>	touch file - create or update file	fle ter containing fles
<pre>more file = output the first 10 lines of file tail - f file - output the hast 10 lines of file tail - f file - output the contents of file as it grows, starting with the last 10 lines</pre>	cat > file - places standard input into file	tar xf file.tar - extract the files from file tar
<pre>The output the last 10 lines of file tail file - output the last 10 lines of file tail file - output the contents of file as it grows, starting with the last 10 lines Process Management ps - display all running processes top - pattern files - search for pattern in files grep - r pattern file s - search for pattern in files grep - r pattern dir - search for pattern in the output of command locate file - find all instances of file * use with extreme caution.</pre>	head file - output the first 10 lines of file	tar czf file.tar.gz files - create a tar with
<pre>tail -f file - output the contents of file as it grows, starting with the last 10 lines</pre>	tail file - output the last 10 lines of file	Gzip compression
grows, starting with the last 10 lines  Process Management ps - display your currently active processes till pid - kill process id pid killall proc - kill all processes kill pid - kill process a named proc* bg - lists stopped or background jobs; resume a stopped job in the background fg - brings job n to the 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:	tail -f file - output the contents of file as it	tar xzf file.tar.gz - extract a tar using Gzip
Process Management         ps - display your currently active processes         top - display all running processes         top - bings top mot background         fg - brings iob n to the foreground         fg - brings iob n tot be foreground         fg - brings iob n tot he foreground         <	grows, starting with the last 10 lines	tar cjf file.tar.bz2 - create a tar with Bzip2
<pre>ps - display your currently active processes top - display all running processes top - display al</pre>	Process Management	compression
<pre>top - display all running processes kill pid - kill proc - sill 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 - brings the most recent job to foreground fg - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - brings the most recent job to foreground ff - bring host - ping host and output results whois domain - get Whois information for domain dig domain - get Whois information for domain file wget -c file - continue a stopped download for more options, see man chmod.</pre>	ps - display your currently active processes	<b>ozin</b> file - compresses file and renames it to
<pre>kill proc - kill all process id pid killall proc - kill all 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 - brings the most recent job to the permissions of file chood ctal file - change the permissions of file file - download file wget file - continue a stopped download install from source: ./configure make make install dpkg - i pkg.deb - install a package (Debian) rpm -Uvh pkg.rpm - install a package (Debian) rpm -Uvh pk</pre>	top – display all running processes	file.gz
<pre>file 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 - bring the permissions of file file - download file wget - c file - continue a stopped download Install from source: ./configure make make install dptg - i pkg.deb - install a package (Debian) rpm -Uvh pkg.rpm - install a package (Debian) fg in the foreground or bg in the background ctrl+z - talts the current command ctrl+W - erases the whole line ctrl+W - log out of current session * use with extreme caution. * use with extreme caution</pre>	kill pid - kill process id pid	gzip -d file.gz - decompresses file.gz back to
NetworkNetworkStoped of backgroundfile permissionsFile Permissionschmod octal file - change the permissions of filechmod octal file - change the permissions of fileoctal which can be found separately for user, group, and world by adding:• 4 - read (r)• 2 - write (w)• 1 - execute (x)Examples: chmod 775 - read, write, execute for all chmod 755 - rwx for owner, rx for group and world For more options, see man chmod.Install from source: · / configure make make install dpg -i pkg.deb - install a package (Debian) rpm -Uvh pkg.rpm - install a pa	<b>killall</b> proc - kill all processes named proc *	file
<pre>indeport joint into the proground fg - brings the most recent job to foreground fg - brings job n to the foreground ff - execute (x) Examples: 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 - p port user@host - add your key to host for user to enable a keyed or passwordless login  Searching ff - r pattern files - search for pattern in files ff - r pattern files - search for pattern in files ff - r pattern dir - search for pattern in the output of command locate file - final ll instances of file</pre>	stopped iob in the background	Network
<pre>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:</pre>	<b>fg</b> - brings the most recent job to foreground	<b>ping</b> host - ping host and output results
File Permissionschmod octal file - change the permissions of file to octal, which can be found separately for user, group, and world by adding:dig domain - get DNS information for domain dig - reverse lookup host wget file - download file wget - c file - continue a stopped download• 4 - read (r) • 2 - write (w) • 1 - execute (x)InstallationExamples: chmod 777 - read, write, execute for all chmod 775 - rwx for owner, rx for group and world For more options, see man chmod.Install from source: . /configure make make install dpg -i pkg.deb - install a package (Debian) rpm -Uvh pkg.rpm - install a package (Debian) rpm -Uvh pkg.rpm - install a package (RPM)ssh user@host - connect to host as user ssh - pport user@host - connect to host on port user to enable a keyed or passwordless loginCtrl+C - halts the current command Ctrl+Z - stops the current command, resume with fg in the foreground or bg in the background Ctrl+W - erases one word in the current line Ctrl+W - erases the whole line Ctrl+W - log out of current sessiongrep r pattern files - search for pattern in files output of command locate file - find all instances of file! we with extreme caution.	<b>fg</b> $n$ - brings job $n$ to the foreground	whois domain - get whois information for domain
<pre>chmod octal file - change the permissions of file to octal, which can be found separately for user, group, and world by adding:</pre>	File Permissions	dig domain - get DNS information for domain
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 775 - read, write, execute for all chmod 755 - rwx for owner, rx for group and world For more options, see man chmod. <b>SSH</b> ssh user@host - connect to host an user ssh -p port user@host - connect to host on port port as user <b>Ssh-copy-id user@host</b> - add your key to host for user to enable a keyed or passwordless login <b>Searching</b> grep -r pattern files - search for pattern in files grep -r pattern files - search for pattern in the output of command   grep pattern - search for pattern in the output of command   grep pattern - search for pattern in the output of command   grep file - command file * use with extreme caution. <b>Wget 7126</b> - download file wget - c file - continue a stopped download <b>Installation</b> Install from source: ./configure make make install a package (Debian) rpm -Uvh pkg.rpm - install a package (RPM) <b>Shortcuts</b> <b>Ctrl+C</b> - halts the current command <b>Ctrl+Z</b> - stops the current command <b>Ctrl+W</b> - erases one word in the current line <b>Ctrl+R</b> - type to bring up a recent command !! - repeats the last command exit - log out of current session * use with extreme caution.	chmod octal file - change the permissions of file	dig -x host - reverse lookup host
group, and world by adding: • 4 - read (r) • 2 - write (w) • 1 - execute (x) Examples: chmod 775 - 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 an user ssh - p port user@host - connect to host on port port as user ssh - p port user@host - connect to host on port user to enable a keyed or passwordless login • Searching grep pattern files - search for pattern in files grep - r pattern dir - search for pattern in the output of command   grep pattern - search for pattern in the output of command   grep pattern - search for pattern in the output of command   grep file - find all instances of file	to octal, which can be found separately for user,	wget file - download file
• 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 - 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 for pattern in the     output of command     locate file - find all instances of file     lo	group, and world by adding:	wget -t /ite-continue a stopped dowinoad
<ul> <li>1 - execute (w)         <ul> <li>1 - execute (x)</li> </ul> </li> <li>Examples:             <ul></ul></li></ul>	• $4 - read(r)$	Installation
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 for pattern in the output of command locate file - find all instances of file * use with extreme caution. //configure make make install dpkg -i pkg.deb - install a package (Debian) rpm -Uvh pkg.rpm - install a package (RPM) Shortcuts Ctrl+Z - balts the current command ctrl+Z - stops the current command, resume with fg in the foreground or bg in the background Ctrl+W - erases one word in the current line Ctrl+R - type to bring up a recent command exit - log out of current session * use with extreme caution.	• $2 - \text{write}(w)$ • $1 - \text{execute}(x)$	Install from source:
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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 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 for pattern in the         command   grep pattern - search for pattern in the         user tile - find all instances of file	chmod 777 - read, write, execute for all	make install
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 for pattern in the output of command   grep pattern - search for pattern in the output of command   grep pattern - search for pattern in the output of command   grep files - search for pattern in the searching files - search for pattern in the output of command   grep files - search for pattern in the searching files - search for pattern in the output of command   grep files - search for pattern in the searching files - search for pattern in the output of command   grep files - search for pattern in the searching files - search for pattern in the output of command   grep files - search for pattern in the searching files - search for pattern in the searching files - search for pattern in the output of command   grep files - search for pattern in the searching files - searching files - search for pattern in the searching files - search	chmod 755 - rwx for owner, rx for group and world	dpkg -i pkg.deb - install a package (Debian)
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ssh-copy-id user@host - add your key to host for user to enable a keyed or passwordless login       fg in the foreground or bg in the background         Searching       grep pattern files - search for pattern in files         grep -r pattern dir - search for pattern in the output of command locate file - find all instances of file       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+R - type to bring up a recent command         User te file - find all instances of file       * use with extreme caution.	ssn -p port usergnost - connect to nost on port	Ctrl+Z - stops the current command, resume with
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pattern in dir         command   grep pattern - search for pattern in the output of command         locate file - find all instances of file    * use with extreme caution.	grep -r pattern dir - search recursively for	!! - repeats the last command
command         grep pattern - search for pattern in the output of command         locate file - find all instances of file       * use with extreme caution.	pattern in dir	exit - log out of current session
locate file - find all instances of file * use with extreme caution.	<b>command</b>   grep pattern - search for pattern in the	
	locate file - find all instances of file	* use with extreme caution.

### What is Unix?

• Operating System



# Why Unix?

- Bioinformatics software designed to run on Unix platforms.
- Large amounts of data.
- Much faster than your Windows PC.



## How Can We Use Unix?

- Linux computers or servers.
- Compute clusters.
- The cloud.
  - What we're going to use this week



### So What is Cloud Computing?









## **Cloud Computing Solutions**



Google Compute Engine



#### AWS "Availability Zones" and Data Centres

#### How it Works











Own copy of the AMI = Instance (Virtual Machine or VM)

# Terminology

- Creating an instance buying a brand new computer with software already installed.
- Starting an instance *turning that computer on.*
- Stopping an instance *turning that computer off.*
- Terminating an instance setting that computer on fire and throwing it out of the window.

### **Connecting to Your Instance**





Remote Desktop Software e.g. X2Go Secure Shell – "SSH" e.g. SSH or PuTTY



You're now connected to your instance and you're ready to learn some Unix!

#### Any Questions So Far?



## The Terminal Window



The Command Line, The Shell, The Prompt

Where you see this "\$" followed by text, I want you to type the text on your command line

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#5       V-rowd       #5       V-rowd       #6         #5       -1. h_row10:00; #5       #5       -1. h_row10:00; #5       -1. h_row10:00; #6         #5       -1. h_row10:00; #5       -1. h_row10:00; #5       -1. h_row10:00; #6       -1. h_row10:00; #6         #5       -1. h_row10:00; #6       #5       -1. h_row10:00; #6       -1. h_row10:00; #6       -1. h_row10:00; #6         #5       -1. h_row10:00; #6       #5       -1. h_row10:00; #6       -1. h_row10:00; #6       -1. h_row10:00; #6         #5       -1. h_row10:00; #6       #5       -1. h_row10:00; #6	1K-blocks 33027952 16414696	Used Available 5288332 26061900 209252 16205444		
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<pre>#\$ -t h_vmem=46  #run in parallel #\$ -pe smp 4  #\$ -pe smp 4 #\$ -a eas #\$ -M s.shaw@abdn.ac.#usage: fastqc.sh <directory containing="" reads=""><out> NOTE DIRECTORY DOES NOT NEED FORWARD SLASH del.i #\$ -1 n_vfn</out></directory></pre>	16513960 ib@o2ib0:/lustre 58541693832 51	10371204 5303896 1118439104 4494486316		
rs     t2-stml     LUC=S1       ut=52     ut=52       #diamond_view,sh = f1     f1       #usage: diamond_view,f4create an array to hold all of the files within the specifiec location     samples=(\$LUC/*fastq.gz)	103212320 412845248 3702573440 2	65307072 32662368 117542944 274330976 2158078784 1356414720 =		
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vector     vector     >       vector     vector     >       vector     >     >       vect	stqc CGEBMS32_filt_fastqc	iference		
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"diamond_view.sh" 211, sore written				
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#### Location is Important

First Task – Where am I?



genomics@harvard\_ami:~\$ pwd
/home/genomics
genomics@harvard\_ami:~\$

This is your "present working directory"





```
genomics@harvard_ami:~$ pwd
/home/genomics
genomics@harvard_ami:~$
```





This location is also known as your Home Directory

Tilde is shorthand for Home:

#### Now let's create some directories and files

Make a directory



Change into this directory



Now what is your present working directory?

NOTE! Directory names (and file names for the matter) can not contain spaces. Underscores are often used instead if you want to separate words.





#### Now let's create some directories and files

Make an empty file



And another two

\$ touch Earth Heaven

Now let's list the contents of the current directory (Data)



genomics@harvard\_ami:~/Data\$ touch rags
genomics@harvard\_ami:~/Data\$ touch Earth Heaven
genomics@harvard\_ami:~/Data\$ ls
Earth Heaven rags
genomics@harvard\_ami:~/Data\$









