

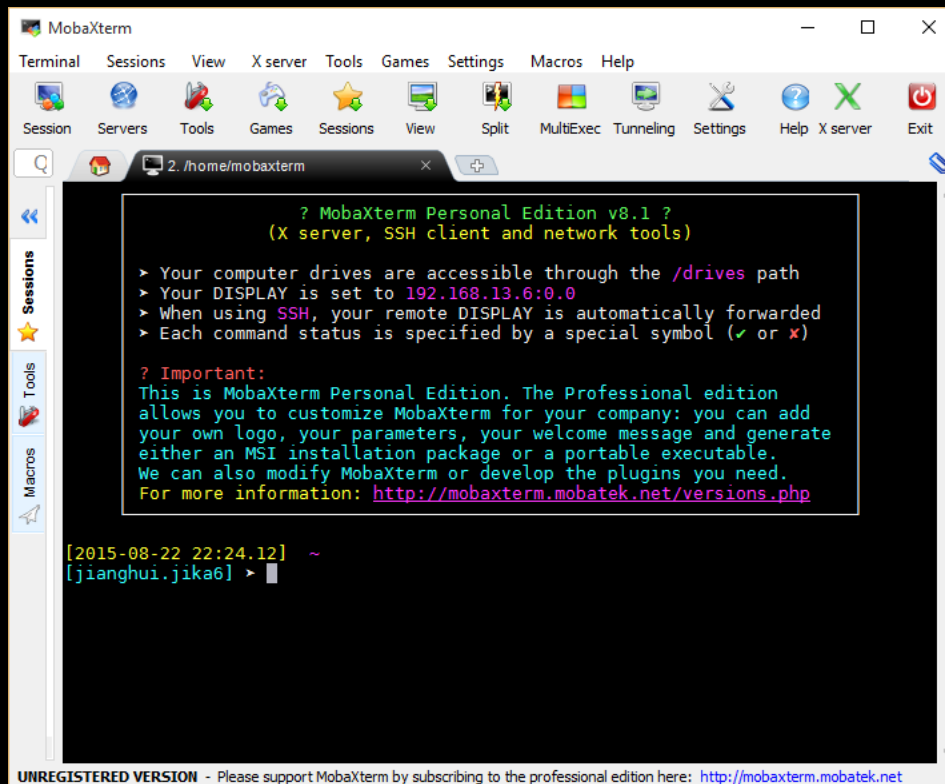
Introduction to Unix

Hui Jiang

jianghui@umich.edu

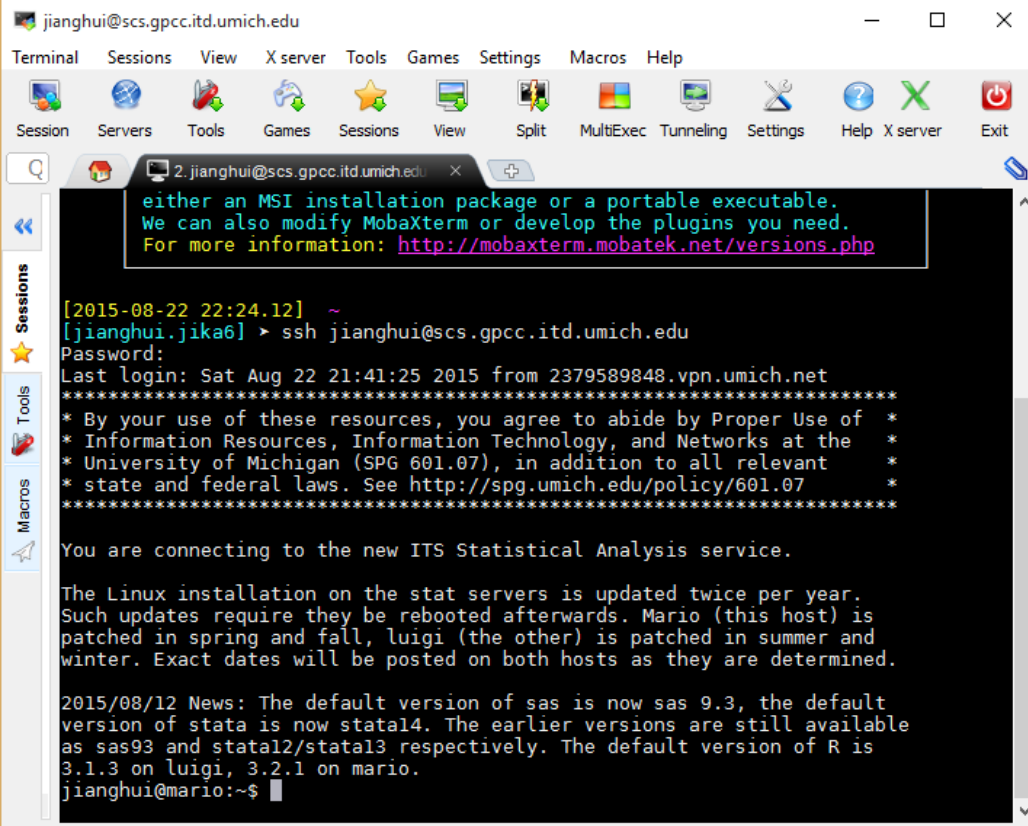
Setting Up

- Mac users: open a Terminal
- Windows users: install MobaXterm and then open a terminal



Connecting to the ITS Statistics and Computation Service Linux Server

- `ssh [your uniqname]@scs.gpcc.itd.umich.edu`



```
jianghui@scs.gpcc.itd.umich.edu
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Settings Help X server Exit
2. jianghui@scs.gpcc.itd.umich.edu
either an MSI installation package or a portable executable.
We can also modify MobaXterm or develop the plugins you need.
For more information: http://mobaxterm.mobatek.net/versions.php
[2015-08-22 22:24.12] ~
[jianghui.jika6] > ssh jianghui@scs.gpcc.itd.umich.edu
Password:
Last login: Sat Aug 22 21:41:25 2015 from 2379589848.vpn.umich.net
*****
* By your use of these resources, you agree to abide by Proper Use of *
* Information Resources, Information Technology, and Networks at the *
* University of Michigan (SPG 601.07), in addition to all relevant *
* state and federal laws. See http://spg.umich.edu/policy/601.07 *
*****
You are connecting to the new ITS Statistical Analysis service.

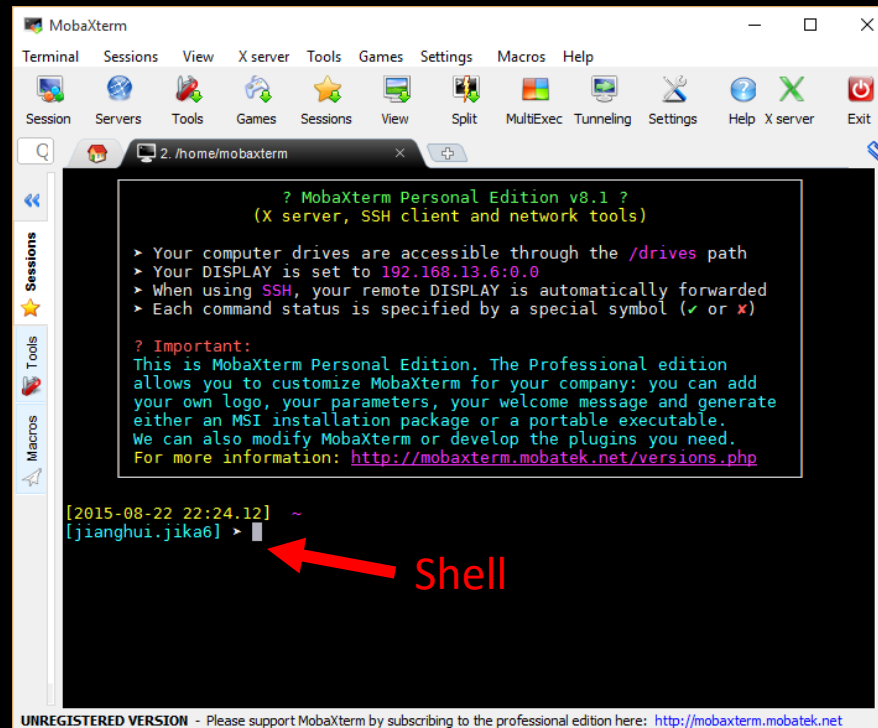
The Linux installation on the stat servers is updated twice per year.
Such updates require they be rebooted afterwards. Mario (this host) is
patched in spring and fall, luigi (the other) is patched in summer and
winter. Exact dates will be posted on both hosts as they are determined.

2015/08/12 News: The default version of sas is now sas 9.3, the default
version of stata is now stata14. The earlier versions are still available
as sas93 and stata12/statal3 respectively. The default version of R is
3.1.3 on luigi, 3.2.1 on mario.
jianghui@mario:~$
```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <http://mobaxterm.mobatek.net>

Terminal vs Shell

- Shell: A command-line interface that allows a user to interact with the operating system.
- Terminal [emulator]: A graphical interface (window) to the shell.



Terminal

Shell

Understanding Process

- Process: A running instance of a program.
- Job: A group of processes.
- Related commands:
 - ps: report a snapshot of the current processes.
 - top: provides a real-time view of the running system.
 - Ctrl-c: stop a job.
 - Ctrl-z: suspend a job.
 - jobs: list the active jobs
 - bg: resume a suspended job in the background.
 - fg: resume a suspended job in the foreground.
 - kill: terminate a process
 - &: start a job in the background

File System Structure

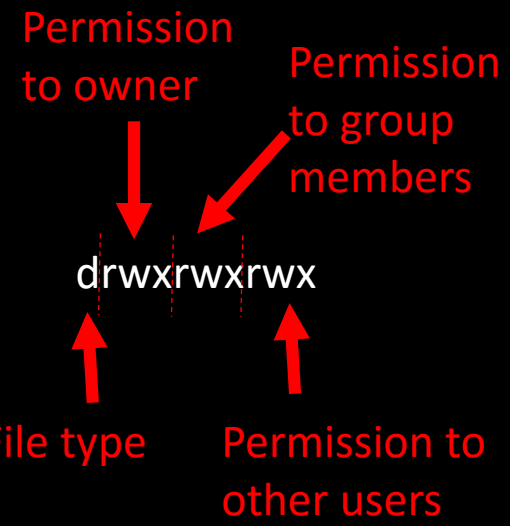
- Information in the **file system** is stored in **files**, which are stored in **directories** (folders). Directories can also store other directories, which forms a **directory tree**.
- **‘/’** is used to represent the **root directory** of the whole file system, and is also used to **separate** directory names.
- A **relative path** specifies a location starting from the current location.
- An **absolute path** specifies a location from the root of the file system.
- **‘..’** means the parent directory.
- **‘.’** means the current directory.
- **‘~’** means the **home directory**.

File System Related Commands

- `pwd`: print the user's current working directory.
- `cd`: change the current working directory.
- `ls`: print a listing of a specific file or directory.
- `cp`: copy files (or directories).
- `mv`: move files (or directories).
- `rm`: remove files (or directories).
- `mkdir`: create a directory.
- `'*'`: a wildcard matching zero or more characters in file (or directory) names.
- `'?'`: a wildcard matching one character in file (or directory) names.

File Permissions

```
jianghui@scs.gpcc.itd.umich.edu
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The full documentation for ls is maintained as a Texinfo manual.
If the info and ls programs are properly installed at your site,
the command
    info coreutils 'ls invocation'
should give you access to the complete manual.
GNU coreutils 8.4                July 2014                LS(1)
jianghui@mario:~$ ls -l
total 21
-rw-----. 1 jianghui root  297 Nov 10  1992 AppleVolumes
drwxr-xr-x. 82 jianghui wheel 4096 Sep 20  2014 biostat615
drwx-----. 3 jianghui root  2048 Jul 15  1992 Network Trash Folder
drwxr-xr-x. 10 jianghui root  2048 Nov  6  2014 Private
drwxr-xr-x.  2 jianghui 1001 2048 Sep  8  2011 privatemodules
drwxr-xr-x.  9 jianghui root  2048 Oct 16  2013 Public
drwxr-xr-x.  4 jianghui 1001 2048 Nov  3  2013 R
drwxr-xr-x.  2 jianghui wheel 2048 Aug 29  2013 sasuser.v93
drwx-----. 3 jianghui root  2048 Jul 15  1992 Shared
drwxr-xr-x.  2 jianghui wheel 2048 Oct  9  2014 test
jianghui@mario:~$
```



Permission Owner Size Date Name Group

File Permission Related Commands

- `chmod`: change file permission.
- `chown`: change file owner and group.

```
jianghui@mario:~/Private$ touch test.file
jianghui@mario:~/Private$ ls -l test.file
-rw-r--r--. 1 jianghui wheel 0 Aug 22 22:59 test.file
jianghui@mario:~/Private$ chmod 666 test.file
jianghui@mario:~/Private$ ls -l test.file
-rw-rw-rw-. 1 jianghui wheel 0 Aug 22 22:59 test.file
jianghui@mario:~/Private$ chmod +x test.file
jianghui@mario:~/Private$ ls -l test.file
-rwxrwxrwx. 1 jianghui wheel 0 Aug 22 22:59 test.file
```

Compiling Software

- Typical steps needed to install a third party software package:
 1. Locate and download the source code (which is usually compressed)
 2. Unpack the source code
 3. Compile the code
 4. Install the resulting executable
 5. Set paths to the installation directory
- Tutorial at <http://www.ee.surrey.ac.uk/Teaching/Unix/unix7.html>