

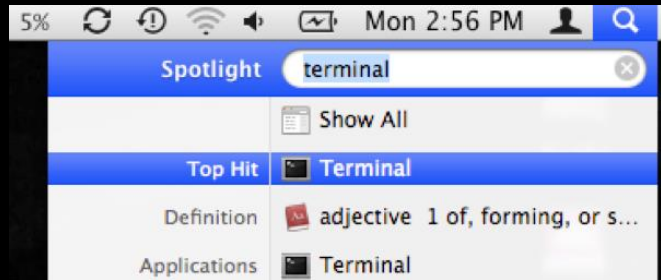
Introduction to Unix

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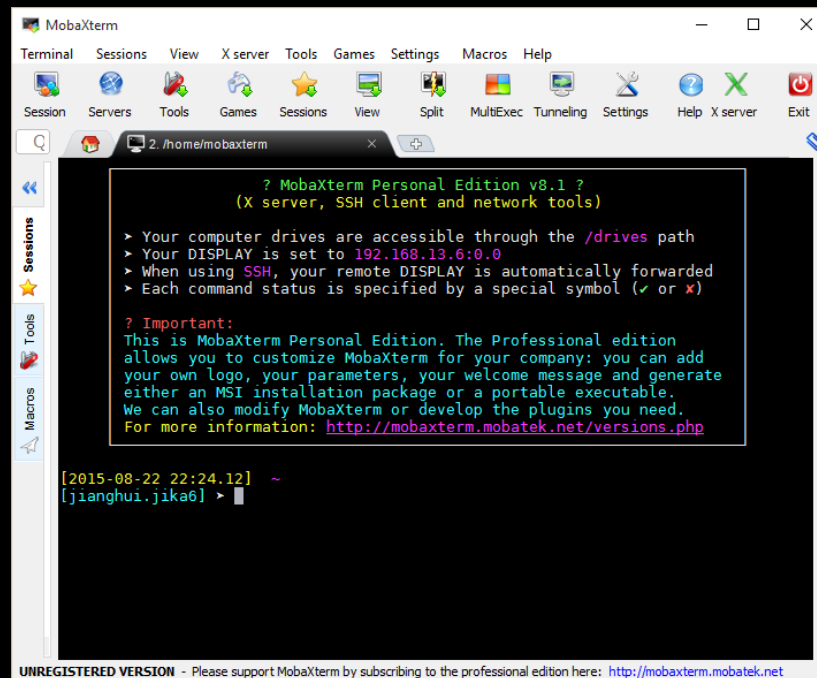
jianghui@umich.edu

Getting Started

- Mac users:
open a
Terminal

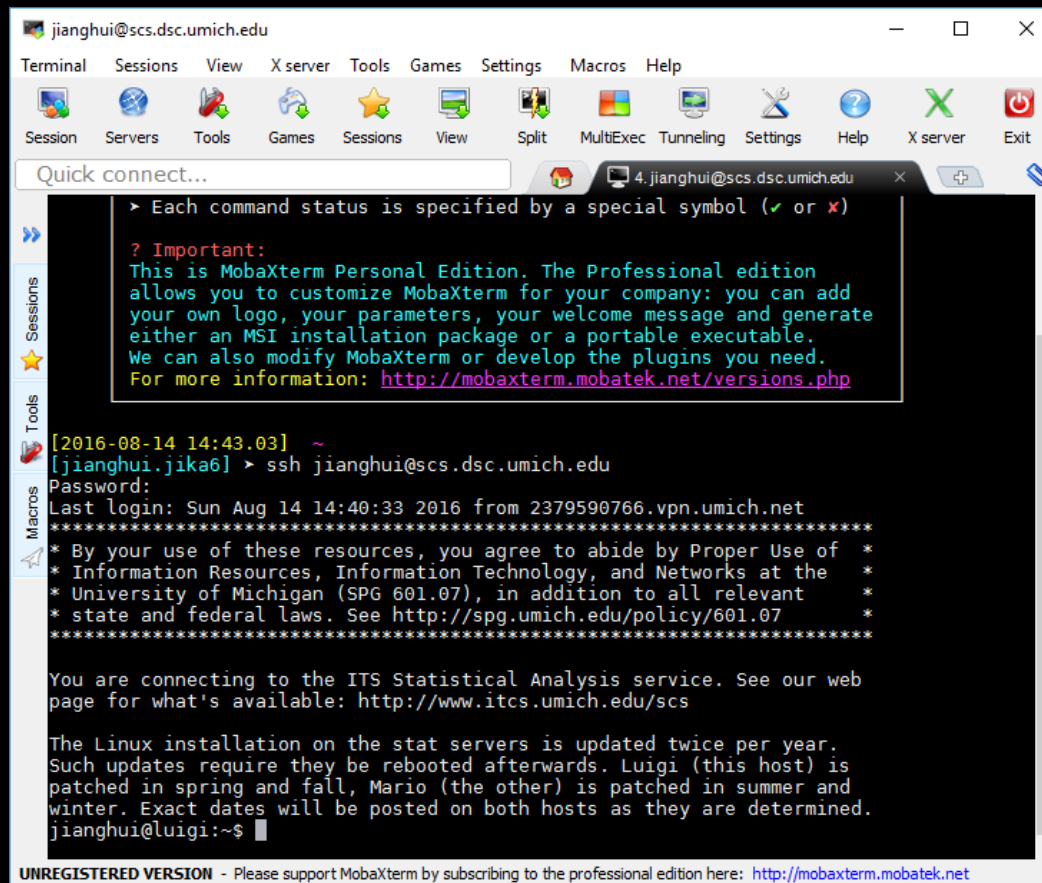


- Windows
users: install
MobaXterm
and then
open a
terminal



Connecting to a Server

- `ssh [your username]@[server host name]`

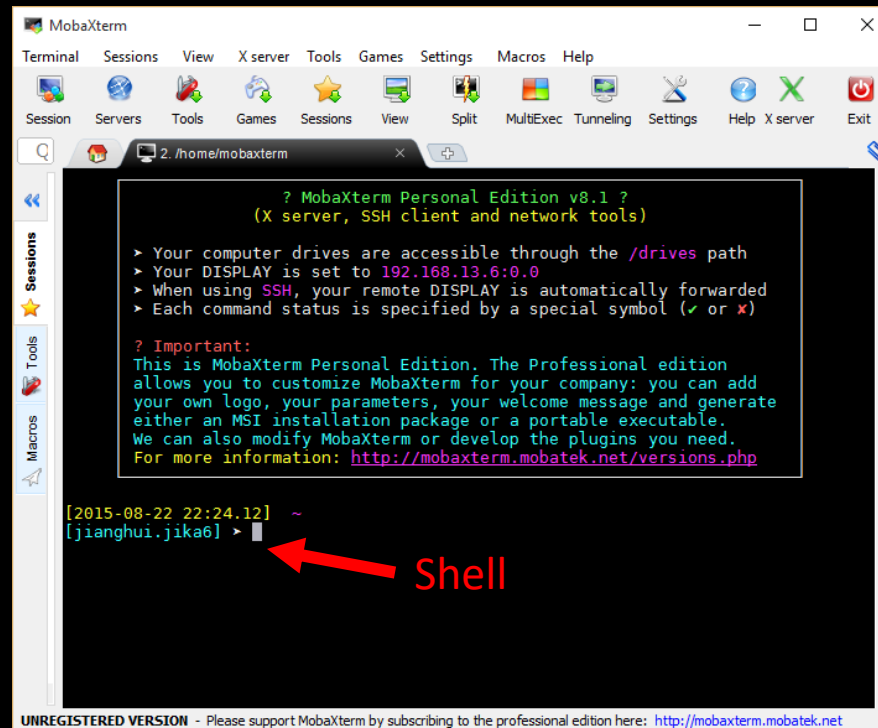


The screenshot shows a MobaXterm terminal window titled "jianghui@scs.dsc.umich.edu". The window has a menu bar with "Terminal", "Sessions", "View", "X server", "Tools", "Games", "Settings", "Macros", and "Help". Below the menu bar is a toolbar with icons for "Session", "Servers", "Tools", "Games", "Sessions", "View", "Split", "MultiExec", "Tunneling", "Settings", "Help", "X server", and "Exit". A "Quick connect..." search bar is visible. The terminal content includes a help message about command status symbols, an important notice about MobaXterm editions, a timestamp "[2016-08-14 14:43.03] ~", the command "[jianghui.jika6] > ssh jianghui@scs.dsc.umich.edu", the password prompt "Password:", the login message "Last login: Sun Aug 14 14:40:33 2016 from 2379590766.vpn.umich.net", a long line of asterisks, a disclaimer about resource use, another line of asterisks, a message about the ITS Statistical Analysis service, a message about Linux updates on stat servers, and the prompt "jianghui@luigi:~\$". At the bottom, it says "UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: http://mobaxterm.mobatek.net".

```
jianghui@scs.dsc.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
Quick connect...
> Each command status is specified by a special symbol (✓ or ✗)
? Important:
This is MobaXterm Personal Edition. The Professional edition
allows you to customize MobaXterm for your company: you can add
your own logo, your parameters, your welcome message and generate
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
[2016-08-14 14:43.03] ~
[jianghui.jika6] > ssh jianghui@scs.dsc.umich.edu
Password:
Last login: Sun Aug 14 14:40:33 2016 from 2379590766.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 ITS Statistical Analysis service. See our web
page for what's available: http://www.itcs.umich.edu/scs
The Linux installation on the stat servers is updated twice per year.
Such updates require they be rebooted afterwards. Luigi (this host) is
patched in spring and fall, Mario (the other) is patched in summer and
winter. Exact dates will be posted on both hosts as they are determined.
jianghui@luigi:~$
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.



Working with Process

- **Process**: A running instance of a program.
- **Job**: A group of processes (from a shell perspective).
- 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.
- An **absolute path** (always starts with **‘/’**) specifies a location from the root of the file system.
- A **relative path** (never starts with **‘/’**) specifies a location starting from the current location.
- **‘..’** (in a relative path) means the **parent directory**.
- **‘.’** (in a relative path) means the **current directory**.
- **‘~’** (in a relative path) means the **home directory**.

Working with the File System

- **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

The image shows a terminal window with a file listing command and its output. A diagram to the right explains the components of the permissions string 'drwxrwxrwx'.

```
jianghui@scs.gpcc.itd.umich.edu
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Settings He X server Exit
2. jianghui@scs.gpcc.itd.umich.edu
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:~$
```

Diagram of 'drwxrwxrwx':

- Permission to owner: points to 'd'
- Permission to group members: points to 'r'
- File type: points to 'd'
- Permission to other users: points to 'x'

Terminal output labels:

- Permission: points to the first character of the permissions string.
- Owner: points to the user name.
- Group: points to the group name.
- Size: points to the file size.
- Date: points to the date and time.
- Name: points to the file name.

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Permission Owner Size Date Name
Group

Permission to owner
Permission to group members
drwxrwxrwx
File type
Permission to other users

Working with File Permissions

- **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>