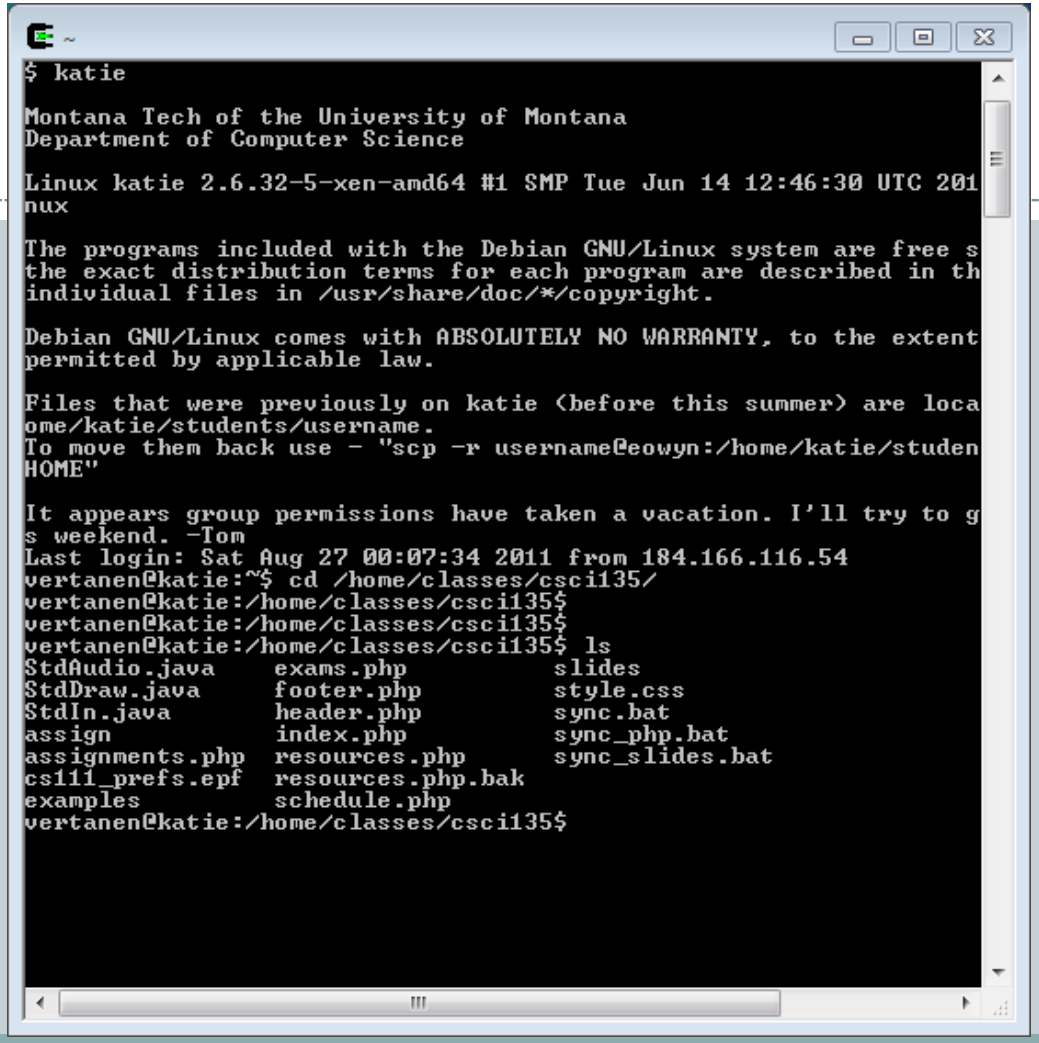
Introduction to Linux

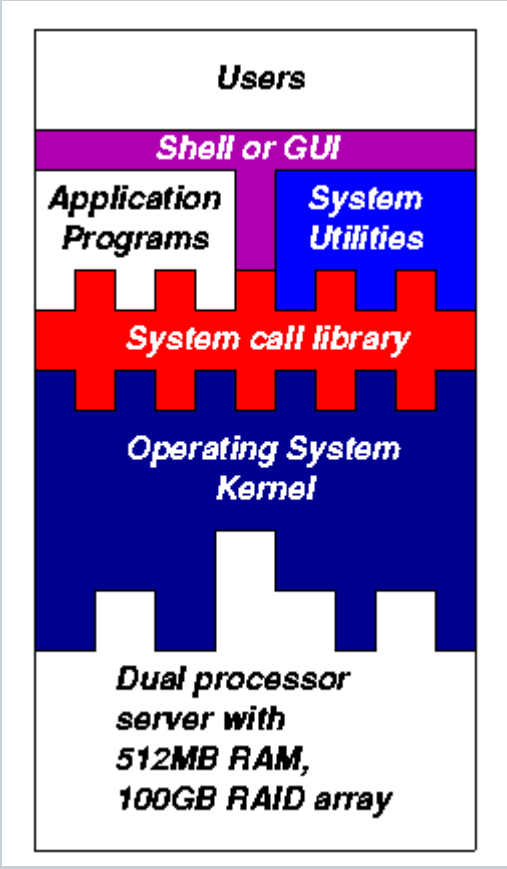


Outline

- Operating Systems
- Linux History
- Linux Architecture
- Logging in to Linux
- Command Format
- Linux Filesystem
- Directory and File Commands
- Wildcard Characters
- Copying Files between Local/Remote Systems

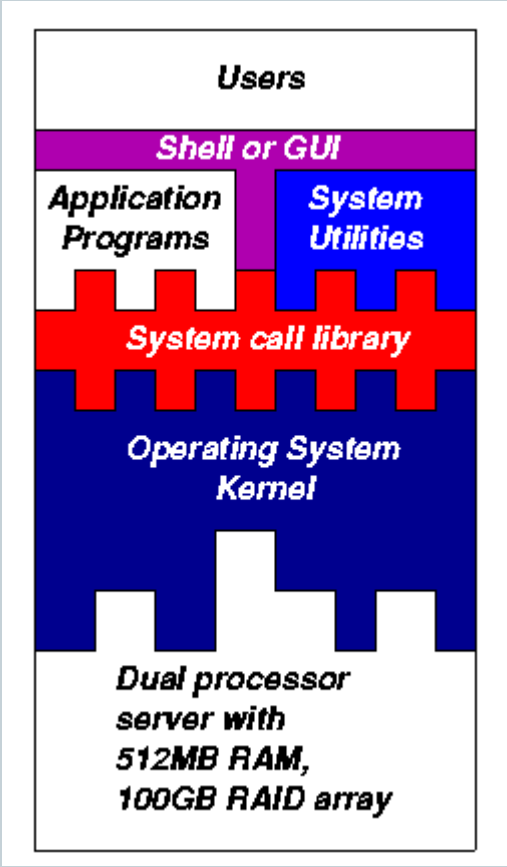
Operating Systems

- Resource manager
  - Allows users and applications to access system resources
    - Safely!
  - Controls process execution to efficiently utilize CPU
  - Provides abstractions so applications need not worry about underlying details

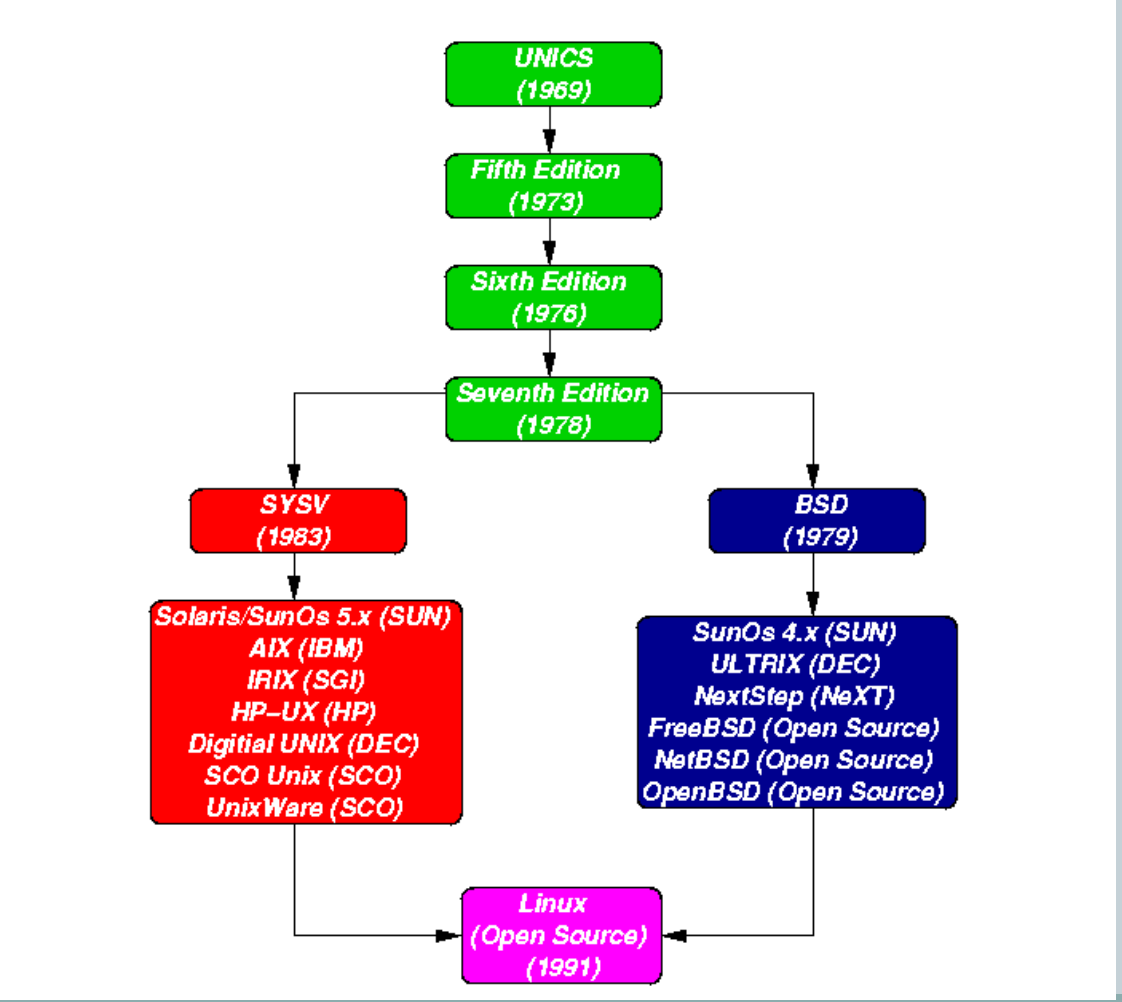


Operating Systems

- Components
  - Kernel
    - Directly controls the underlying hardware
  - System call library
    - Provides services to programs for system calls
      - e.g. write a file to disk, start program execution, communicate on the network, etc.
  - Application programs
  - System utilities
  - Shell



History of Unix / Linux



Linux Architecture

- Kernel
  - Device drivers
  - Memory management
  - File system support
  - Supports most BSD and SYSV calls as well as POSIX
- Shells and GUIs
  - sh – the Bourne shell
  - bash – the Bourne again shell
  - csh – the c shell
  - KDE and GNOME among others

Linux Architecture (continued)

- System utilities
  - Commands to provide tools (which may be linked together) to access operating system services
- Daemons
  - Services that lie dormant until an event occurs
    - remote login
    - printing services
    - web page server
    - etc.
- Application programs
  - emacs editor
  - xv image viewer
  - gcc c ompiler
  - g++ c++ compiler
  - xfig, latex, soffice, etc.

Starting a Command Window in Linux: putty

- Use putty.exe
  - cs.mtech.edu then go to the Students tab, select Software
  - Download both putty and winscp
  - Double click on putty
    - Enter katie.mtech.edu for the Host Name (or you can use an IP)
    - Click Open button – you will see:
      - `login:`
    - Enter login name (first initial last name, all lowercase) – then you will see
      - `password:`
    - If you already changed this, enter your new password. If you haven't, it is your student ID number
      - Make sure you don't keep your ID as a password – this is not secure
    - Note, the password will not show up as you type it

Handy First Commands

- Change your password!
  - `passwd`
  - The system will prompt for old password and then ask you to type your new password twice
  - None of this shows up on the screen
- Logging out
  - `exit`
    - OR
  - `logout`
    - OR
  - `<CTRL>d`

Linux Command Format

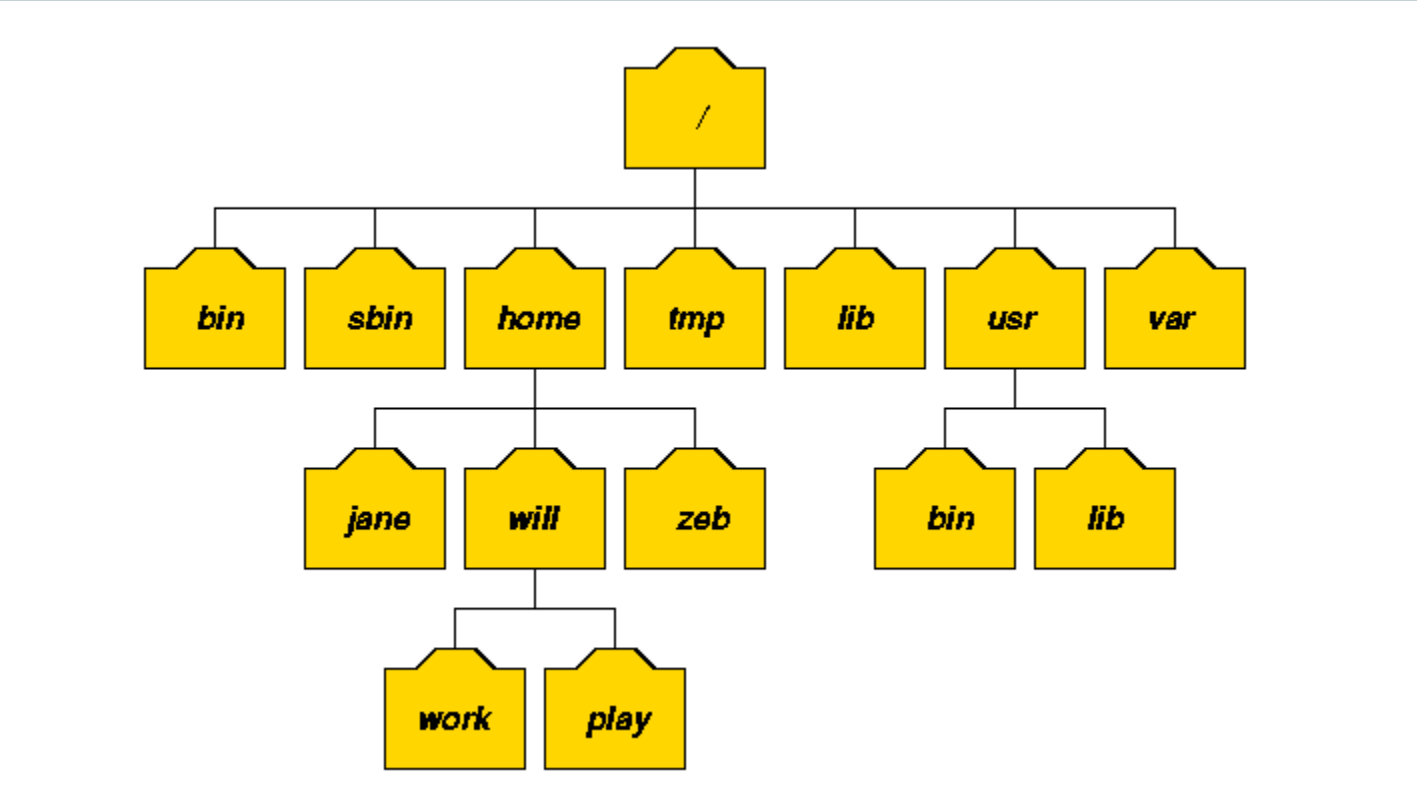
- Most Linux commands are of the form:
  - <command> <-options> <targets>
  - <command> is the name of the command, e.g. `ls`
  - <-options> are the options to the command, e.g. `ls -al`
  - <targets> may or may not be present, but may specify the target of the command, e.g. `ls -al /home`

Linux Filesystem

- Filesystem stores all information that concerns the long-term state of the system
  - OS kernel, executable files for system commands, configuration information, temporary workfiles, user data, special files, user files
- Types of files:
  - Ordinary – contain text, data or program information
  - Directories – folders that hold files or other folders/directories
  - Devices – block oriented (like disk drives) and character oriented (like keyboards)
  - Links – pointer to another file, can have hard links or soft links

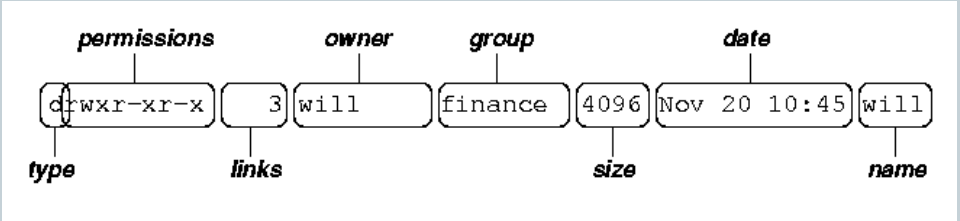
Linux Filesystem

- Typical directory structure



Directory and File Commands

- Print (current) working directory: `pwd`
- List files in directory: `ls`
- `ls -a` shows all files
- `ls -al` shows all files in long format



- Change directory: `cd <path>`
- Make directory: `mkdir <newName>`
- Remove directory: `rmdir <directory>`
- Copy a file: `cp <source> <destination>`
- Move or rename a file: `mv <source> <destination>`
- Remove a file: `rm <filename>`
- Type a file to the screen: `cat <filename>`
- Type to screen one screen at a time: `more` OR `less`

Specifying Multiple Filename

- OR, Oh, this is where regular expressions come in!
- ?
  - matches any single character (like . in RegEx)
- *
  - matches zero or more characters
- [<list of chars>]
  - matches one character in the list

“Escape” Characters

- To use special characters, need to use special notation
  - Try \ in front of special character
  - Try using double quotes around special character(s)
  - Try single quote in front of word

- Another type of special characters – they say interpret or evaluate what is between them – backquotes (below the ~ on your keyboard)
  - e.g.

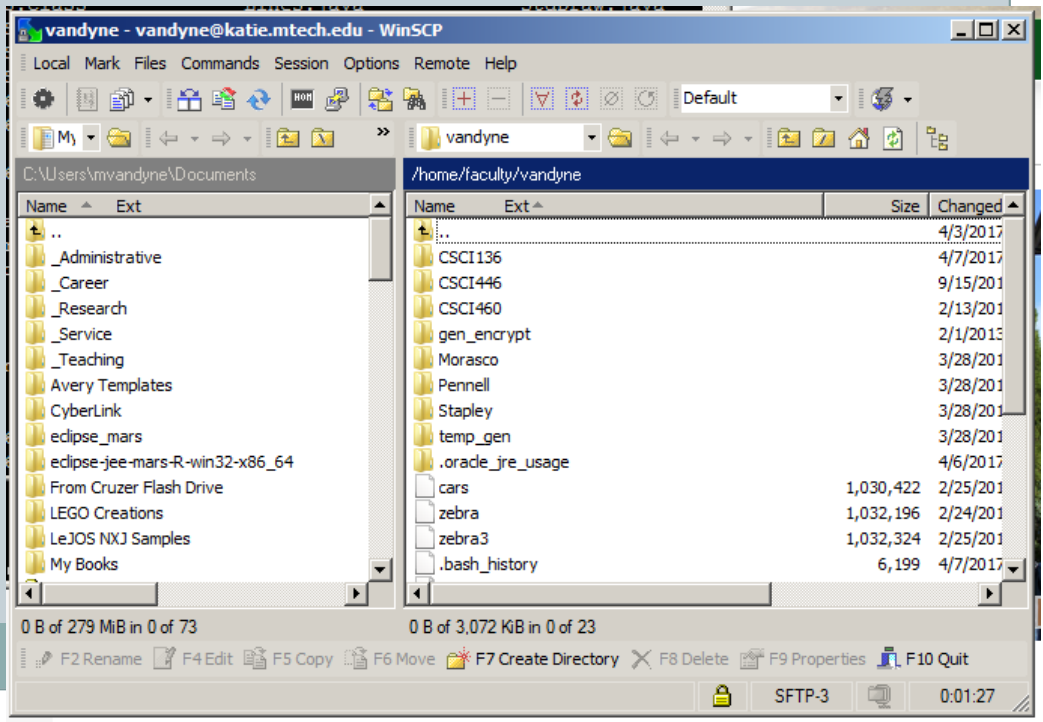
```
$ hostname↵
rose
$ echo this machine is called `hostname`↵
this machine is called rose
```

Copying a File to Another Computer: winscp

- Double click on winscp (you should have already downloaded it from the cs.mtech.edu website)
- Click the Run button
- Enter katie.mtech.edu for the host name
- Enter your user name in the User name box
- Enter your password in the Password box
- Hit Enter or click the Login button

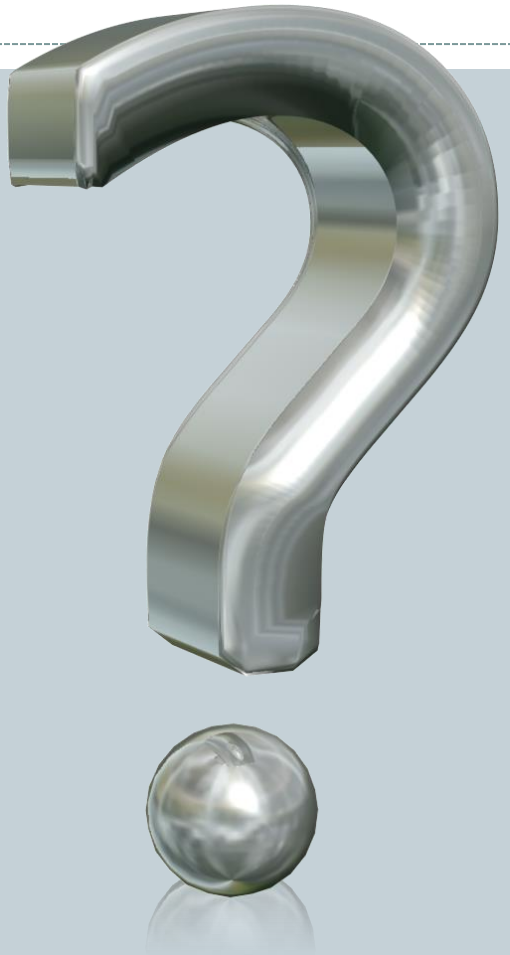
Copying a File to Another Computer: winscp (continued)

- You will see two panes in a window
  - The left side is your local computer
  - The right side is the computer you just logged in to
  - Can drag and drop files between the two sides
  - Or you can drag files from and to File Manager on your local computer



Summary of Helpful Commands

Action	Windows	Mac OS / Unix
Move into a folder	`cd myfolder`	`cd myfolder`
Move into parent folder	`cd ..`	`cd ..`
Move into a folder, absolute folder	`cd \Users\keith`	`cd /Users/keith`
List files in current folder	`dir`	`ls`
Compile program in current folder	`javac Prog.java`	`javac Prog.java`
Run a compiled program	`java Prog`	`java Prog`
See what is in a text file	`type Prog.java`	`more Prog.java`
Auto-complete filenames	`<tab key>`	`<tab key>`
Previous command	`<up arrow>`	`<up arrow>`

Summary

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