Computing Environment
Shell Commands

Unix

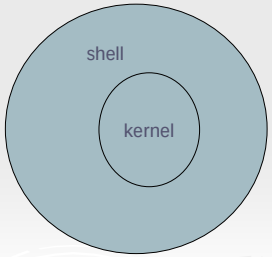
- Generic name for a type of operating system(OS)
- First version in 1969 by Ken Thompson by AT&T Bell Laboratories
- Multi-user and interactive; progressive for its time
- Is written mostly in 'C', and a little bit in assembly
- Has been ported to many different processors
- Two basic versions have evolved
  - derived from Unix System V (owned by AT&T)
  - derived from Berkeley Software Distribution, or BSD
- In 1980's, SunOS branched out from BSD
- Recent 64-bit versions of SunOS are called Solaris™

Linux

- Linux (a.k.a GNU) is similar to Unix
- However it is not proprietary OS like Windows or Solaris
- Users can obtain it freely, modify it and redistribute freely
  - Open Source
- Most non-windows labs in CIS are Linux

Shell

- Shell provides user interface between OS and user
- Thus Unix/Linux is *command* driven
  - Graphical User Interface also exist e.g. KDE



Shell (contd..)

- several different shells exist
- *bash* is popular w/ Linux
  - we will not be using bash in this course
  - However, default shell upon login in Linux machines is bash shell
- we will use *csh* (pronounced “sea shell”)
  - Command interpreter with syntax similar to C language
  - Enhanced version is **tcsh** (t = tenex)
    - allows step up/down through history list using arrow keys
    - Completes file/directory search with ‘tab’ key
  - **To switch from bash mode to csh/tcsh: type “csh/tcsh” at prompt**

Login In

- Your accounts are on ENIAC server
- ENIAC account is also mounted on Linux PC’s
- From an existing shell, log into ENIAC using the current username

  % ssh eniac.seas.upenn.edu
- To open a new shell with a different user name on the same system

  % su - username

File Permissions

- After entering: ls

Desktop mail Maildir public_html
html Mail

- After entering: ls -l

```
drwxr-xr-x  2 username username  4096  2007-09-11  06:51   html
lrwxrwxrwx 1 username username    4    2006-08-30  09:21   mail -> Mail
drwxr-xr-x  3 username username  4096  2007-09-10  06:50   Mail
drwxrwx---  2 username username  4096  2007-09-10  09:21   Maildir
lrwxrwxrwx 1 username username    4    2007-09-08  09:21   public_html -> html
```

“d” = directory / folder

size

Date & Time

Directory /File name

File Permissions(contd..)

- After entering **ls –l** in my home directory, I see:

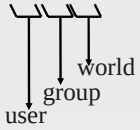
```
drwxr-xr-x  2 faa faa 4096 2007-09-11 06:51  html
drwxr-x---  10 faa faa 4096 2007-09-14 00:36 HW
lrwxrwxrwx 1 faa faa   4   2006-09-08  09:21  mail -> Mail
drwxr-xr-x  3 faa faa 4096 2007-09-10   06:50  Mail
lrwxrwxrwx 1 faa faa   4   2006-09-08  09:21  public_html -> html
```

user group world

r = read permission
w = write permission
x = execute permission

chmod commands

```
drwxr-xr-x   2 faa faa 4096 2007-09-11 06:51  html
drwxr-x---  10 faa faa 4096 2007-09-14 00:36 HW
lrwxrwxrwx 1 faa faa    4    2006-09-08  09:21  mail -> Mail
drwxr-xr-x   3 faa faa 4096 2007-09-10   06:50  Mail
lrwxrwxrwx 1 faa faa    4    2006-09-08  09:21  public_html -> html
```



chmod 700 filename
user can read, write and execute

chmod 600 filename
user can read and write

chmod 500 filename
user can read and execute

chmod 755 filename
for publishing on the web

0_8 : 000_2	---
1_8 : 001_2	--x
2_8 : 010_2	-w-
3_8 : 011_2	-wx
4_8 : 100_2	r--
5_8 : 101_2	r-x
6_8 : 110_2	rw-
7_8 : 111_2	rwx

Settings: .cshrc

.cshrc

- gets executed anytime you start up a **csh** (pronounced *sea shell*)
- This where one would change there environment settings or define shortcuts

To view .cshrc file

- **ls –al list all the files/directories in your home directory**

source .cshrc

re-executes your .cshrc file (at your request)

Preferences and settings

- **Edit .cshrc to perform your settings:**
- **To view your directory path up to 4 directories down:**
  if ($?prompt) set prompt="username%c04:"
- **To create shortcuts use *alias* command**
  - alias ***e*** *emacs* (emacs is an editor)
  - alias **c** *clear* (clear command clears the screen)
- **Add a particular directory to your search path:**
  - set path = ($path .) add search path before "."
  - E.g. set path = ($path /usr/javaj2sdk1.4.2/bin .)

Managing Directories (folders)

mkdir newdir
make a new directory **newdir** under the current directory

cd newdir
change directory to **newdir** (must be under current directory)

cd ..
change to the next directory above this one

rmdir newdir
you can only delete it if it's empty

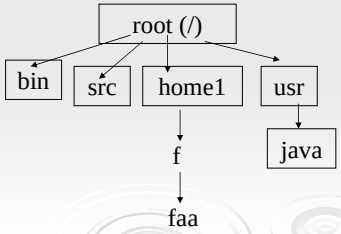
ls -al
show me all files in current directory, including . (hidden) files

ls -l
show me normal files in long form (including their permissions), but omit . (hidden) files

ls
show me all files in short form (directories end in /)

File System

- In UNIX-based systems, files are organized into a 'tree' structure.
- In this tree, there is a 'root,' which is a directory that contains every other directory on the system.
- Other directories, which are 'branches' of the tree.



File and Directory Navigation

cd /
change to the root directory (from where ever you are)

cd $HOME
change to your home directory (from where ever you are)

pwd
print working directory (shows where you currently are)

cd ..
go up one directory (from where ever you are)

cd ../..
go up two directories (from where ever you are)

cd ../progs
go up one directory, then from there go down into the **progs** dir

cd /newdir
change directory to **/newdir** (underneath root directory **/**)

More File Commands

mv filename directory
change a file's directory, you can also change the filename by specifying a second filename instead of a directory.

cp oldfilename newfilename
make a new copy of a file

rm filename
delete **filename** (be *very careful* before using **this**)

rm *
WARNING: removes all files lacking an extension

rm *.*
WARNING: removes all files having an extension

More Commands

cd .
change to the current directory (doesn't really do anything)

cd ~
change to your home directory (on some systems, but not on all)

tput clear(or just clear)
clears console screen ("terminal put" clear)

cat filename
list file contents on screen (file must contain only text chars)

About Files

- **text files**
  - can be displayed, edited or printed
  - contain only ASCII characters up to 127_{10}, including a few *allowed* control chars (e.g. !, & etc.)
  - divided into lines; end of line marked by a control character
  - a C source file is an example of a text file
- **binary files**

  contain arbitrary bit patterns; do not print or display!
- **executable file**

  a binary file; cannot be displayed or printed by the usual means

shell commands for handling files

file *filename*

attempts to report on whether the file is text or binary

cat *filename*

- not useful for binary files
- attempts to display the file on the terminal
- if file is longer than 25 lines, top part may scroll off

cat *filename* | more

- display a text file (piped through the pager program, **more**)
- this shows you 25 lines at a time press any key to get more line
- **od – x filename** displays a file (text or binary) as hex byte values

tar command

- **UNIX archive file commands:**
  - Extract: tar xvf tarfile.tar
  - Compress: tar cvf tarfile.tar sourceDir
    - You can also specific files instead of an entire directory
  - View: tar tvf tarfile.tar
    - Shows the table of contents of the tar file
- **v=verbose, x=extract, f=file, t=table of contents**

pipe and redirect

% command1 | command2

a pipe can be placed between any two shell commands

- it funnels the output of the 1st command to the 2nd one
- EXAMPLE: **cat collatz.c | more**

  displays file collatz.c in paged mode

% command > filename

redirects the output of command to a new copy of filename

- EXAMPLE: **ls –al > all_files.txt**

% command >> filename

redirects the output of command to the *end* of filename (appends)

- EXAMPLE: **ls –al >> all_files.txt**

More enquiries

whoami
displays the current user's login name
whereis *command*
displays the directory where *command* is stored, if found
man *command*
displays the online documentation for *command*, if found
hostname or **uname -n**
displays the fully qualified name of this UNIX host
uname -X
displays version info on the operating system
isalist
lists the instruction set architectures (ISA's) of this host
fpversion
displays the floating point unit and other hardware for this host
finger
displays info about users currently logged on

Calendar Command

```
faa@minus:~> cal
   September 2007
Su Mo Tu We Th Fr Sa
                   1
 2  3   4  5   6  7  8
 9 10  11 12  13 14 15
16 17  18 19  20 21 22
23 24  25 26  27 28 29
30
```


Text Editors

- Become expert in either one of the following
- *emacs* (very popular)
  - **Has menu bar like MS word along with keyboard shortcuts**
  - **http://www.ucc.ie/doc/editing/emacs.html**
- *vi* (less commonly used)
  - *vim* is a more robust version
  - **http://www.linux.org/lessons/beginner/l5/lesson5c.html**

Emacs

- To start Emacs at the command prompt:
  - faa@minus:~> emacs &
- To open a file with Emacs from the command prompt:
  - faa@minus:~> emacs filename &

** the "&" tells emacs to run as a background process

- The Options menu allow you to personalize the environment:
  - Syntax highlighting
  - Parentheses matching
- Some versions of Emacs do not have save and open file icons:
  - Use shortcut *ctrl+x+s* to save
  - Use shortcut *ctrl+x+f* to open a file

Remote Access

Windows:

- Secure CRT
- Filezilla

Mac OS X:

- DataComet-Secure
- Fetch