

Unix

Command-Line Processing

L435/L555

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Using Kenneth Church's *Unix for Poets*

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Processing

Unix
Directories
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Text editing

What is Unix?

Unix is an operating system, like DOS or Windows

- ▶ developed in 1969 by Bell Labs
- ▶ works well for single computers as well as for servers
- ▶ underlying operating system for Macs

Linux: open source version of Unix (mostly for PCs)

Unix

Directories

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Directory Structure

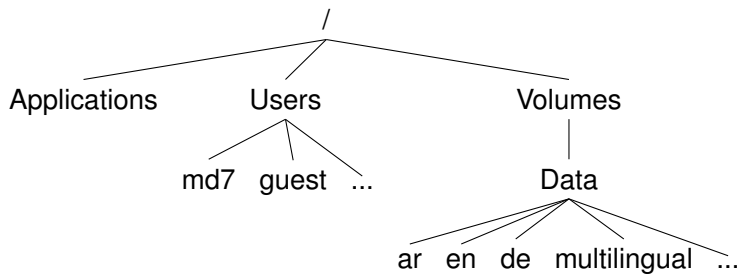
Directory = Folder

- ▶ Directory structure is a tree structure

Important directories:

- ▶ Home directory: your private directory (`/Users/guest`)
- ▶ Root node: `/`
- ▶ Some important directories on a Mac:
 - ▶ `/Applications`
 - ▶ `/Users`
 - ▶ `/Volumes`

Graphical Representation



Useful Commands for Directories

- ▶ list files in current directory:
`ls`
- ▶ list files with more information:
`ls -l`
- ▶ change directories:
`cd <to>`
- ▶ two possibilities to specify <to>:
 - ▶ from root:
`cd /Users/md7`
 - ▶ from where we are:
`cd ../md7`
`..` means 'go up'
- ▶ go back to home directory:
`cd`
- ▶ show the directory where you are:
`pwd`

Unix Cheat Sheet

One quick reference guide:

- ▶ <https://ubuntudanmark.dk/filer/fwunixref.pdf>

Useful Shortcuts

TAB completion

If you start typing a command or filename, then press TAB, the shell will complete the word for you – as far as possible.

Command history

The shell keeps a history of your commands. To scroll through them, simply press the up arrow key.

Looking at Files

- ▶ display contents of file in terminal:
`cat <filename>`
- ▶ display page by page:
`less <filename>`
 - ▶ next page: space bar
 - ▶ quit: `q`
 - ▶ go to beginning of file: `g`
 - ▶ go to end of file: `G`
 - ▶ search forward: `/<expression>` + hit return
 - ▶ search backward: `?<expression>` + hit return
 - ▶ in search: next found occurrence: `n`
- ▶ Likewise, there is the `more <filename>` command

Looking at Files

More Commands

- ▶ display beginning of file (normally 10):
`head <filename>`
- ▶ display *X* beginning lines of file:
`head -X <filename>`
- ▶ display end of file (normally 10):
`tail <filename>`
 - ▶ `tail -X <filename>`: display *X* ending lines
 - ▶ `tail +X <filename>`: display all lines starting at *X*
- ▶ count number of lines, words, characters in a file:
`wc <filename>`

More Useful Commands

- ▶ list files that end in '.txt':

```
ls *.txt
```

- ▶ make directory:

```
mkdir <path/><dirname>
```

```
subdirectory: mkdir results
```

```
in your home directory: mkdir ~/results
```

- ▶ copy a file from one location to another:

```
cp <filename> <path/>
```

- ▶ copy a file to the directory 'results' in your home directory:

```
cp dates.txt ~/results
```

More Useful Commands (2)

- ▶ sort your file:
`sort <filename>`
- ▶ sort (numbers) in numeric order:
`sort -n <filename>`
- ▶ find a word in a file and display all the lines in which it occurred:
`grep <word> <fromfile>`
- ▶ find a word in a file and display all the lines in which it occurred and save results into a file in your home directory (note actual >):
`grep <word> <fromfile> > ~/<tofile>`
- ▶ example:
`grep linguistic mycorp.txt > ~/res.txt`

Tangent: How to Find out More

What other options are there for sorting?

The `man` command lets you see documentation on whatever unix command is in question

- ▶ Find information:

```
man <command>
```

```
man sort | less
```

Tangent: grep & egrep

grep is commonly used, but doesn't offer a full RE syntax

- ▶ For that, use egrep (extended grep)

Bonus: what does grep stand for?

More Useful Commands (3)

- ▶ delete lines (adjacent) with identical content:
`uniq <filename>`
- ▶ delete lines (adjacent) with identical content, but list how many were there:
`uniq -c <filename>`
- ▶ display differences between two files
`diff <filename1> <filename2>`

Permission System

- ▶ `ls -l`

```
-rw-r--r--    1 root   admin  168724 Nov  9  2003 Jokes.pdf
drwxr-xr-x   15 root   admin    510 Aug 31  2006 ar
drwxr-xr-x    3 root   admin    102 Aug  4  2004 cs
drwxr-xr-x    4 root   admin    136 Mar  2  2007 de
drwxr-xr-x   35 root   admin   1190 Feb 18 15:23 en
```

- ▶ change permissions:

```
chmod <who><+/-><what> <file/dir>
```

```
<who>: user = u; group= g; others = o; all = a;
```

```
<what>: read = r; write = w; execute = x;
```

- ▶ example: give user write permissions for file 'hello.txt':

```
chmod u+w hello.txt
```

- ▶ example: deny others write and execute permissions for directory 'test':

```
chmod o-wx test
```

Packing and Unpacking Files

- ▶ pack a file:
`gzip <file>`
 - ▶ results in `<file>.gz`
- ▶ unpack file:
`gunzip <file>.gz`
- ▶ 'pack' more than one file:
`tar cvf <resultfile>.tar <file or directory>`
 - ▶ unpack:
`tar xvf <file>.tar`
- ▶ tar and gzip:
`tar cvzf <resultfile>.tgz <file|directory>`
 - ▶ unpack:
`tar xvzf <file>.tgz`

More on Copy and Move

- ▶ copy a file from one location to another:
`cp <path/filename> <path/filename>`
- ▶ move a file from one location to another:
`mv <filename> <path/>`
- ▶ rename a file:
`mv <oldfilename> <newfilename>`
- ▶ remove a file:
`rm <filename>`
- ▶ remove a directory including contents:
`rm -r <dir>`

Important Shortcuts in Paths

- ▶ `..` (go) up one directory
- ▶ `.` here
- ▶ `~` home directory

Translate

- ▶ exchange characters for others:
`tr 'aeiou' 'X' < <filename>`
`tr 'aeiou' 'AEIOU' < <filename>`
- ▶ collapse characters (squeeze):
`tr -s 'J' < <filename>`
- ▶ exchange complement of characters for others:
`tr -c 'a-z' '\n' < <filename>`
`\n` is a linebreak

Putting Commands Together

- ▶ `<` use following filename as input file
- ▶ `>` use following filename as output file
- ▶ `|` use output of preceding command as input for following commands

- ▶ example:

```
cat <infile> | tr 'A-Z' 'a-z' | sort >  
<outfile>
```

Remote Login

- ▶ login:
`ssh <username>@<machinename>`

e.g. `ssh guest@nlp.indiana.edu`

- ▶ logout:
`exit`

Remote Copy

- ▶ to copy a local file to (your home directory) on another machine:

```
scp <filename> <machine>:
```

```
e.g. scp vm.pos nlp.indiana.edu:
```

- ▶ to copy a file from another machine to the current directory:

```
scp <machine>:<path>/<filename> .
```

```
e.g. scp nlp.indiana.edu:/Volumes/Data/en/  
penntreebankv3/readme.all .
```

(in one line!)

Text editing

Unix offers different utilities for text editing

- ▶ emacs is a fairly basic text editor that can be run in a window or in the shell
- ▶ to start emacs:
`emacs <filename>`
- ▶ to quit:
`Ctrl-x Ctrl-c`
- ▶ save:
`Ctrl-x Ctrl-s`
- ▶ search:
`Ctrl-s`

Other shell editors include `vim` and `nano`

- ▶ We'll discuss good options for Python code writing later