

CS 197U: A Hands on Introduction to Unix System Administration

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- Questions: Email tian@cs.umass.edu
- Assignment 4 due October 15 (today!)
- Have your Virtual Machine configured

Today: Basic System Administration

- Learn to use popular UNIX utilities
- processes, users, file-system
- Debug and diagnose problems with your system

What is System Administration all about?



Figure : XKCD describes sysadmins

What is running on my system?

- `top` : interactive text display
- `ps`, `ps aux`, `ps -elf`
- Memory information : `free`
- Disk space information: `du`, `df`

Monitoring Scripts

- Since output of these commands is plain-text, you can use other utilities and pipes

Task

Notify if a process is consuming more than 10% memory/cpu

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Hint

First, get the highest memory hungry process: `ps aux | awk '{print $4,$11}' | sort -r -n | head -n 1`

Can now append to log, email, etc.

Killing processes

- Sometimes you want to stop/terminate processes
- Maybe consuming too many resources
- Maybe you wrote an infinite loop (oops)

- `kill pid` sends a signal to a process
- *Signal number* determines action
- `-9` sends SIGKILL

Running processes in the background

- A long-running process means that you are “blocked”
- Can't start new processes or execute commands
- Can run things in the *background*
- Append “&” to your command

- Learn about yourself: `whoami` , `id`
- Learn about other users: `who`, `w`, `finger`

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- As the name suggests, also stores the *passwords*
- Passwords are fortunately not stored in plain text anymore

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Print a list of all the users in the system

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Hint

```
cat /etc/passwd | awk -F: '{print $1}'
```

File sizes

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List all files and their sizes

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Hint

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- `find . -type f | xargs ls -l` List only files
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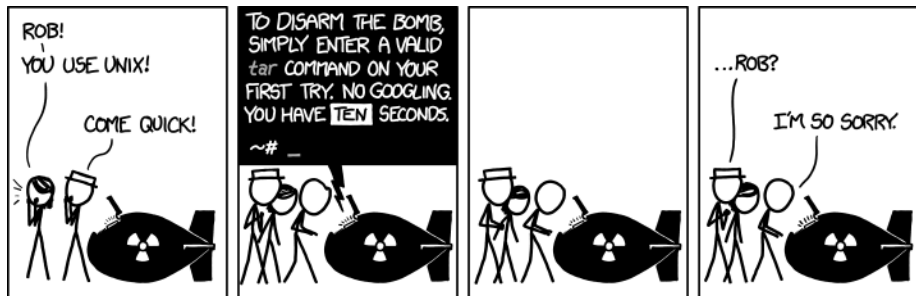
Hint

```
find /usr/share/man -type f | grep -E “.gz$” | xargs ls -s  
| sort -rn | head -n 5
```


Managing files with tar

- `tar` : Create a “bundle” with multiple files
- `tar -cf myArchive.tar *.c` : All C files
- `-z` : gzip compress
- `-x` : extract/untar

Tar options



Transferring files

- Suppose you want to transfer files from one machine to another
- `scp` : copy files over ssh
- `scp myFile.txt username@ip-address:/home/location/`

To transfer multiple files:

- `scp -r myDir username@ip:/home/location`
- First tar, then scp the tar file
- `rsync` is a utility for transferring large number of files
- Usage same as scp: `rsync -a myDir username@ip:/home/location`
- `rsync` does not transfer files if they are already present on the destination

- A file system is mounted on a hard-disk partition
- A single disk can have multiple partitions. Useful to segregate data
- Example: /home usually a separate partition
- Even if root filesystem is corrupted, your data can be easily recovered
- List of mounted filesystems using `mounts`
- Can also mount a particular file system on a partition using `mount`
- `mount /dev/sda1 /home` : sda1 is the partition name given by Linux

Space usage

- Free space on each file system: `df`
- File sizes: `du`

Task

Find disk space occupied by all *pdf* files, and list them by descending order of size.

Hint

Use `du`, `grep`

Logs

What is my system up to?

- `/var/log/` : directory for logs.
- `dmesg` to see kernel log
- `messages` : kernel log
- `syslog` : kernel+application logging
- `auth.log` : Which user has logged in, when

Shell Variables

- PATH variable determines where bash searches for executables
- `env | grep PATH`
- Can change the list of directories in path (Its just a string!)
- Java requires : `/usr/java/jdk1.6.0/bin`
- `~/.bashrc` contains bash configuration variables
- Edit, save, and source `.bashrc` to load the new values
- Instead of editing `.bashrc`, can also export `var=VALUE`
- Can also define command aliases: `alias dir='ls -lsh'`

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How many times have all users logged in?

Sysadmin exercises

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cat auth.log | grep sshd | grep user | grep opened | awk  
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Sysadmin exercises

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Monitoring free memory

Alert when the free memory in the system drops below 100MB

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Hint

```
free -m | head -n 2 | awk '{print $4}' | tail -n 1  
while [[ 1 ]]; do sleep 10; ____ ; done  
Can append to log, email, etc.
```

End

Questions?