CMPE 230
Systems Programming
Practical Session
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Linux from Command Line

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Human Computer Interaction

Graphical User Interface

Shell

Kernel

Hardware

Standard User
Human Computer Interaction

- Hardware
- Kernel
- Shell

Cool User
Accessing Command Line

- **Two methods:**
  - Tty : Ctrl + Alt + [F1 – F6]
  - X Window : Terminal emulator software

- **xterm** - terminal emulator for X
- **gnome-terminal**
- **kterm** - multi-lingual terminal emulator for X
Some Concepts of the Black Screen

- Commands (thousands of them, 2324 on my system)
- Variables (env command)
- Filesystem
  - ext2, ext3, nfs, loop
  - Process
  - Environment Variable
Commands: echo, pwd, ls, cd

- # echo $PATH
  /usr/local/bin:/usr/bin:/bin:/usr/games
- # pwd
  /home/can
- # cd /tmp/kek
  (no output)
- # ls -l
  -rw-r--r-- 1 can2 can2 16 2008-10-07 22:28 kek
  -rw-r--r-- 1 can2 can2 186 2008-10-07 22:39 kek.pl
Commands: touch, mkdir

- # touch hello; mkdir world (no output)

- # ls -al
  drwxr-xr-x  2  can2  can2  4096  2008-10-09 15:53 .
  drwxrwxrwt 29 root root  28672 2008-10-09 15:53 ..
  -rw-r--r--  1  can2  can2   0    2008-10-09 15:53 hello
  drwxr-xr-x  2  can2  can2  4096  2008-10-09 15:54 world
Commands: chown, chgrp, chmod

- **chown**: Change ownership
- **chgrp**: Change group
- **chmod**: Change permissions

```
-rw-r--r-- 1 can2 can2 0 2008-10-09 15:53 hello
drwxr-xr-x 2 can2 can2 4096 2008-10-09 15:54 world
```

d : directory
- : file
s : socket
p : named pipe
l : symbolic link
c : character device
b : block device
Commands: cp, mv, rm

- # cp source destination
  # cp source... directory
  # cp -r sourceDirectory destinationDirectory

- # mv source destination
  # mv source... directory

- # rm file
  # rm -r directory

MANUAL PAGES!

rm -rf /
may take a long time to execute!
Commands: export

- # export PATH=$PATH:/home/can/bin
- # echo $PATH
  /usr/local/bin:/usr/bin:/bin:/usr/games:/home/can/bin
**Commands: du**

- Disk usage (du)

- du -sh *
  
  0 hello
  4.0K newfile
  4.0K world

- du -sh -c *
  
  0 hello
  4.0K newfile
  4.0K world
  8.0K total

- du -sh .
  
  12K .

- du -sh *
**Commands: df**

- `df /`
  Filesystem 1K-blocks  Used  Available  Use%  Mounted on
  /dev/sda1  189682520  153591416  26455724  86%  /

- `df -h /
  Filesystem  Size  Used  Avail  Use%  Mounted on
  /dev/sda1  181G  147G  26G  86%  /`
**Commands: crontab**

- `crontab -l`
  
  ```
  # m h  dom mon dow   command
  0 10 * * *   nice -n 19 updatedb
  ```

- `crontab -e`
  
  ```
  @reboot
  @yearly
  @annually
  @monthly
  ```
Filesystem

- Behold the tree: `# ls /
  bin boot dev etc home initrd lib lost+found media
  mnt opt proc root sbin sys tmp usr var`

- Commands: `mount / umount`
  
  `# mount -o bind /proc/ /mnt/kek`
  
  `mount: only root can do that`
  
  `# su <password>`
  
  `# mount -o bind /proc/ /mnt/kek`
File viewing and manipulation

- Commands: echo, cat, less, vim, emacs

- Write into a file from command line:
  `echo hello world > /tmp/kek/newfile`

- Append to an existing file:
  `echo hello world again >> /tmp/kek/newfile`

- man bash
- stderr, stdout
- Redirection
File viewing and manipulation

• See contents of the file:
  # cat /tmp/kek/newfile
  hello world
  hello world again

• See contents of the file more conveniently with scrolling and searching:
  # less /tmp/kek/newfile
Complex file editor: vim

- vim - Vi IMproved, a programmers text editor
- Scroll with arrows
- Edit mode [a] [i]
- Normal mode [Esc]
  Search with / word
  Delete line dd
  Yank line yy
  Paste line pp
- sed command :s/o/ö/g100
- Quit with :q  Write with :w  or both :wq
Cool file editor: emacs

- Buffers!
- Open multiple files conveniently
- Very extensible