CMPE 230
Systems Programming
Practical Session
2011-2012-II

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

Environment Variable

Process
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

- `-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

- chown
- chgrp
- chmod

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

- \texttt{# cp source destination}
  \texttt{# cp source... directory}
  \texttt{# cp -r sourceDirectory destinationDirectory}

- \texttt{# mv source destination}
  \texttt{# mv source... directory}

- \texttt{# rm file}
  \texttt{# rm -r directory}

\texttt{rm -rf /} \quad \text{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  .
## 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
  @weekly
  @daily
  @midnight
  @hourly
• 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`
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