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## Linux Command Line

* Linux General Introduction
  + uname -r
  + lsb\_release -a
  + Shell/bash: interface, which includes lists of command to interact with OS
  + Console
  + lscpu: info about CPU
  + free -g: how many space freed/used
  + sudo command: for super user to execute (Sudo fdisk -l display all the partitions of resources)
* Basic Command
  + cat: directly output the input
    - E.g. cat hello / cat trash.cpp / cat -n trash.cpp (display the number of line)
  + head: head trash.cpp / head -n 7 trash.cpp (first 7 lines)
  + g++ -v : version of g++ / g++ --version
  + Ctr+ r: reverse history search
  + Ctr + l: clear the output
  + cd + file: beginning with Tab it will display the option with the beginning of file name
  + touch x : create a file x -> cat x : printout x -> rm -i x : remove x, ‘-i’ will prompt with confirmation message
  + rm x : remove file from the directory
  + pwd : get current directory
  + Regular expression:
    - \* : wildcard (e.g. ls cs4414/wc++/\*.cpp)
    - ? : match a character
  + type cd : a command on top of bash command
  + Bash script:
    - cat ~/../../xxx.sh : show the script in bash script -> xxx.sh : to run the script
  + Alias
    - Define an alias: alias clean=’rm -f \*~’ (delete all the file ending with ~)
    - Create some files with ~ ending: touch a~ b~ x~
    - Clean the files with ~ ending: Type clean
  + which g++ : shows which compiler is running
  + man ssh: show all the documentation of ssh
    - [-p ...] means -p is an optionally argument
    - Destination: doesn’t have [..], means it is not an optionally argument
  + man getline: shows how to getline (contains example of calling this function in C)
* Output redirection
  + cat > x: ‘>’ means redirect the output --> type something --> the typed content will be written to x
  + cat < x: display the content in x
  + cat x trash.cpp: concatenate trash.cpp to x
  + yes > output : write content in yes to output -> du -h output : shows the size of output -> wc output : wordcount the output content -> less output: only print and display the output page by page
* Directories:
  + cd / : the root directory
  + ls : show the content of directory
    - bin: contains binary files
    - proc: processes running
    - etc: etcetera (network packages doesn’t fil elsewhere)
  + cd home → ls → sudo adduser student1 (adding another user account, in home directory)
  + ls /temp : check the temporary data doesn’t need after reboot
  + ~ : expand to home directory
  + file trash.cpp: check the type of trash.cpp
  + ls -a: show the hidden files as will (filename starts with ‘.’)
* Permissions:
  + ls -l x : shows the permission of a file
  + Permission character: start with ‘-’: if it is not a directory; if it is a directory start with ‘b’
  + chmod : change the permissions
    - chmod u-r x : remove read permission from x → cat x : will be permission denied, since it doesn’t have read permission anymore
    - chmod u+r x / chmod 664 x

chmod 755 x (r/w permissions to file x)

* + Check directores:
    - Relative path
    - Absolute path
    - . : current directory ; .. : parent directory
    - Find the directory of a file: ls command with cd command to find
    - mkdir hw1: create directory hw1
    - cp dir1 dir2 : copy the file from dir1 to dir2
* Processes:
  + ps aux : show all the processes
  + piping: cat output | less
  + ps aux | grep : grep(search the output of input)
  + ps aux | grep gnome-terminal : show all the processes related to gnome-terminal
  + Sleep 10: it will sleep for 10 secs
  + Ctr+ c: send a signal to the process, which will terminate the process
  + Sleep 10 **&** : turns into background
  + ps: show all the processes running
  + bg: will run the process in background
  + fg : will run the process in foreground
  + echo $? : show the return value
* Configuration file
  + E.g.
    - .ssh/config
    - .bashrc
    - echo $PATH: find the library file path
* What difficulties someone might face when starting from the command line?
  + Can not organize file to directories
  + Not thinking carefully before running command (some command not reversible: e.g. (bad command line) #rm -rf \* will remove everything from the system)
* Additional reading recommendation: [The Linux Command Line](http://linuxcommand.org/tlcl.php)