OS HW1

Operation system 107 fall

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PREWORK

Login Tools

- PuTTY

Editors

- vim

FTP Tools

- FileZilla Client

PuTTY

Download PuTTY

https://goo.gl/rM4Scb

Alternative binary files

The installer packages above will provide all of these (except PuTTYtel), but you can download

(Not sure whether you want the 32-bit or the 64-bit version? Read the FAQ entry.)

putty.exe (the SSH and Telnet client itself)

32-bit:	putty.exe	(or by FTP)	(signature)
64-bit:	putty.exe	(or by FTP)	(signature)

PuTTY

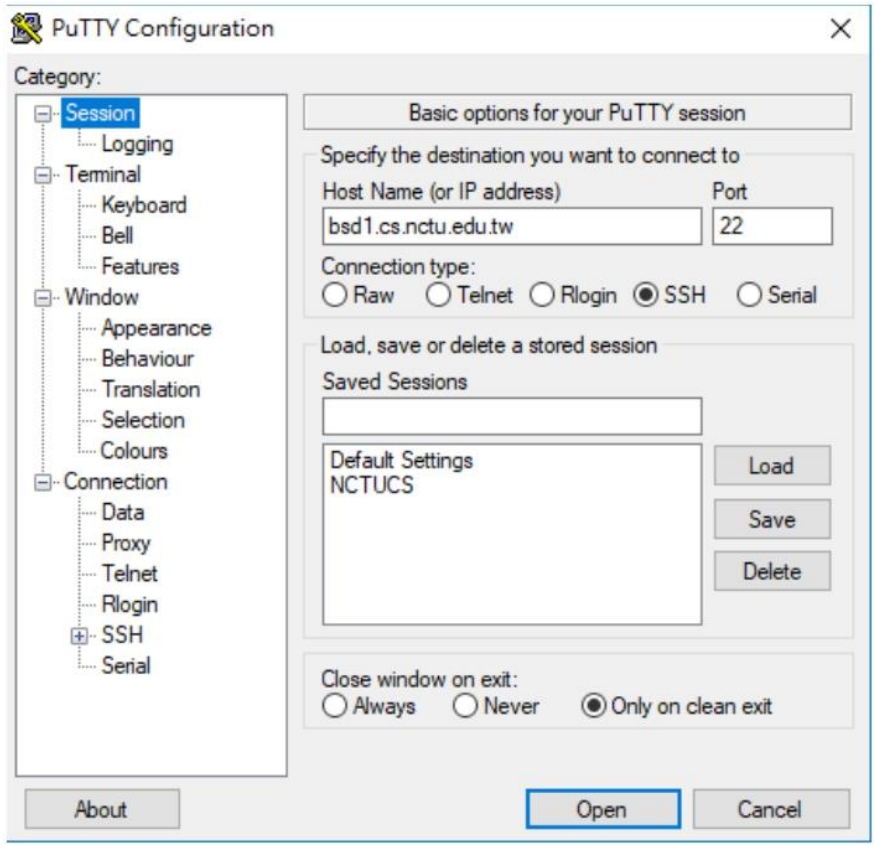
How to Use PuTTY

https://goo.gl/8AJsPL

Login

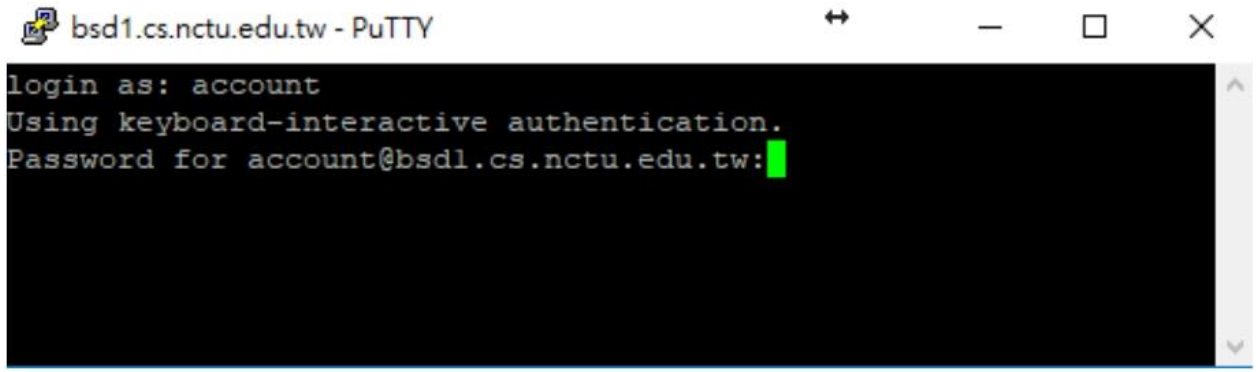
The default for SSH service is port 22

- bsd1.cs.nctu.edu.tw – bsd5.cs.nctu.edu.tw
- linux1.cs.nctu.edu.tw – linux6.cs.nctu.edu.tw



PuTTY

Command



- clear – clear the screen
- ls – list directory contents
- mv – move files or directories
- mkdir – create directories
- rm – remove files or directories
- chmod – change file system modes of files or directories

- Other instruction Reference
  - http://linux.vbird.org/linux_basic/redhat6.1/linux_06command.php#filesystem

FileZilla

- Upload File to Workstation
- Login

主機: bsd1.cs.nctu.edu.tw

協定: SFTP

登入型態: 一般

使用者: 計中申請帳號

密碼: 計中申請密碼

HW 1-1

Finish “hw1_1.c” in order to design a C program to serve as a shell interface that accepts user commands then execute each command in a separate process.

UNIX shells typically allow the child process to run in the background or concurrently, so if a ampersand(&) at the end of the command means the parent and child processes will run concurrently.

You will use:

read(STDIN_FILENO, inputBuffer, MAX_LINE): read command line

fork(): create child process

execvp(char *command, char *params[]): execute system calls

wait()

…

```
#include <stdio.h>
#include <unistd.h>

#defile MAX_LINE 80

int main(void)
{
	char *arg[MAX_LINE/2+1]; /*command line arguments*/
	int should_run = 1; /*flag to determine when to exit program*/

	while(should_run){
		print("osh>");
		fflush(stdout);

		/**
		* your code!
		* After reading user input, the step are:
		* (1) fork a child process using fork()
		* (2) the child process will invoke execvp()
		* (3) if command included &, parent will not invoke wait()
		*/
	}

	return 0;
}
```

HW 1-1

- Change directory

  $cd your/folder/

- Compile

  $gcc -o shell hw1_1.c

- Execute

  $./shell

- **You need**

1. finish “hw1_1.c” as a shell interface.

2. user can keep entering the command until he/she enters “exit”.(a command include the command itself and its parameters).

3. if a user enter “&”, the shell should let child run in the background (means child and parent run concurrently).

Example

Show the content of hi.txt file

Show the file in the directory

Show the date

List all processes in current shell

Perform a full-format processes list

Enter “exit” to finish shell

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```
bsd1 [/u/gcs/106/0656613] -sysu1205- ./shell
osh>cat hi.txt
1234osh>ls
                hi.txt          shell           simple-shell.c ssh
osh>date
Fri Sep 21 21:42:08 CST 2018
osh>ps
  PID TT  STAT    TIME COMMAND
35914  9  Is   0:00.05 /bin/tcsh -l
36059  9  S+   0:00.00 ./shell
36065  9  R+   0:00.00 ps
osh>ps -f
  PID TT  STAT    TIME COMMAND
35914  9  Is   0:00.05 /bin/tcsh -l
36059  9  S+   0:00.00 ./shell
36090  9  R+   0:00.00 ps -f
osh>exit
bsd1 [/u/gcs/106/0656613] -sysu1205-
```

Example

bsd1.cs.nctu.edu.tw - PuTTY

```
bsd1 [/u/gcs/106/0656613] -sysu1205- ./shell
osh>ps -ael
  UID   PID  PPID CPU PRI NI   VSZ   RSS MWCHAN STAT TT     TIME COMMAND
65534   704     1   0  20  0  6304  2084 accept I    v0- 0:00.01  /usr/local/et
    0   797     1   0  52  0  6412  2244 ttyin  Is+  v0  0:00.00  /usr/libexec/
    0   798     1   0  52  0  6412  2244 ttyin  Is+  v1  0:00.00  /usr/libexec/
    0   799     1   0  52  0  6412  2244 ttyin  Is+  v2  0:00.00  /usr/libexec/
    0   800     1   0  52  0  6412  2244 ttyin  Is+  v3  0:00.00  /usr/libexec/
    0   801     1   0  52  0  6412  2244 ttyin  Is+  v4  0:00.00  /usr/libexec/
    0   802     1   0  52  0  6412  2244 ttyin  Is+  v5  0:00.00  /usr/libexec/
    0   803     1   0  52  0  6412  2244 ttyin  Is+  v6  0:00.00  /usr/libexec/
    0   804     1   0  52  0  6412  2244 ttyin  Is+  v7  0:00.00  /usr/libexec/
16287 34602 34598   0  20  0 13960  6100 ttyin  Is+   0  0:00.07  /bin/tcsh -l
16911 77094 77093   0  20  0 13640  5872 ttyin  Is+   1  0:00.06  /bin/tcsh -l
14274 31611 31610   0  52  0 17112 10000 ttyin  Is+   2  0:01.29  /bin/zsh -l
16990 31487 31486   0  52  0 13640  5812 ttyin  Is+   3  0:00.04  /bin/tcsh -l
13634 96468 96441   0  20  0 13640  6252 ttyin  Is+   4  0:00.05  /bin/tcsh -l
16990 31726 31725   0  22  0 13640  5804 ttyin  Is+   5  0:00.02  -tcsh (tcsh)
15184 52240 52239   0  21  0 13640  5888 pause  Is    7  0:00.03  -tcsh (tcsh)
15184 52243 52240   0  20  0 16500  8576 select I+    7  0:00.07  ssh csduty
15184 52358 52239   0  20  0 13640  5892 pause  Is    8  0:00.04  -tcsh (tcsh)
15184 53000 52358   0  20  0 16500  8476 select I+    8  0:00.03  ssh csduty
15197 35914 35913   0  20  0 13640  5820 pause  Ss    9  0:00.05 SSH_CLIENT=116
15197 36176 35914   0  20  0  6284  2080 wait   S+    9  0:00.00 SSH_CLIENT=116
```

Receive “-ael” as args and execute

Example

PID 36227 becomes a zombie (because ps –f **&** will let child process and parent process run concurrently, meaning that the parent process didn't call "wait" for the child)

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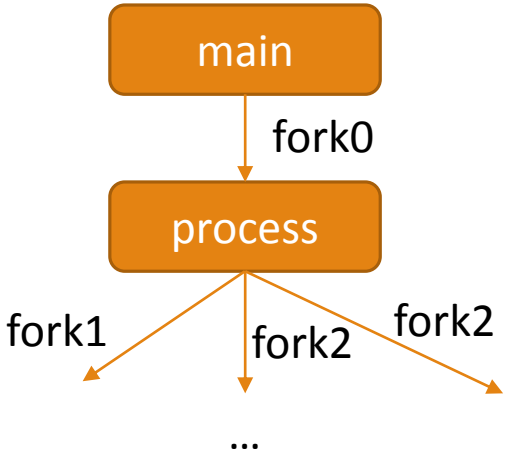
```
bsd1 [/u/gcs/106/0656613] -sysu1205- ./shell
osh>ps -f &
osh>  PID TT  STAT    TIME COMMAND
35914  9  Ss   0:00.05 /bin/tcsh -l
36226  9  S+   0:00.00 ./shell
36227  9  R+   0:00.00 ps -f
ps -f &
osh>  PID TT  STAT    TIME COMMAND
35914  9  Ss   0:00.05 /bin/tcsh -l
36226  9  S+   0:00.00 ./shell
36227  9  Z+   0:00.00 <defunct>
36228  9  R+   0:00.00 ps -f
ps -f
  PID TT  STAT    TIME COMMAND
35914  9  Is   0:00.05 /bin/tcsh -l
36226  9  S+   0:00.00 ./shell
36229  9  R+   0:00.00 ps -f
osh>
```

HW 1-2

Please draw the tree format according the code on the report(OS_document.docx).

You need to clarify which fork(fork0, fork1, fork2 or fork3) the process been made by, for instance:

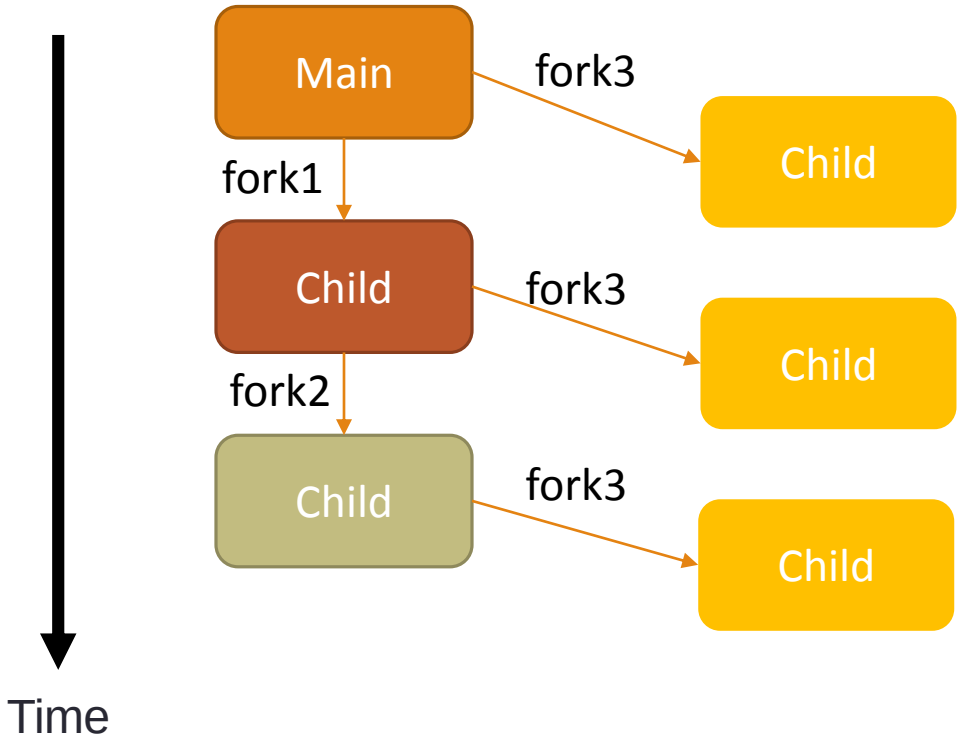



```c
#include <stdio.h>
#include <unistd.h>

int main(void)
{
    pid_t pid;
    pid = fork();//fork0
    for(int i=0;i<2;i++)
    {
        if (pid==0){
            pid = fork();//fork1
            pid = fork();//fork2
        }else if(pid>0){
            pid = fork();//fork3
        }else{
            printf("Error!");
        }
    }
    return 0;
}
```

HW 1-3

Write a program which uses fork() to produce the following tree format (namely, your code should have only 3 fork())



HW 1-3

Output format

Main process

Total 5 Children
The format & fork order
have to be same.
(Fork 1 2 3 3 3)

bsd1.cs.nctu.edu.tw - PuTTY

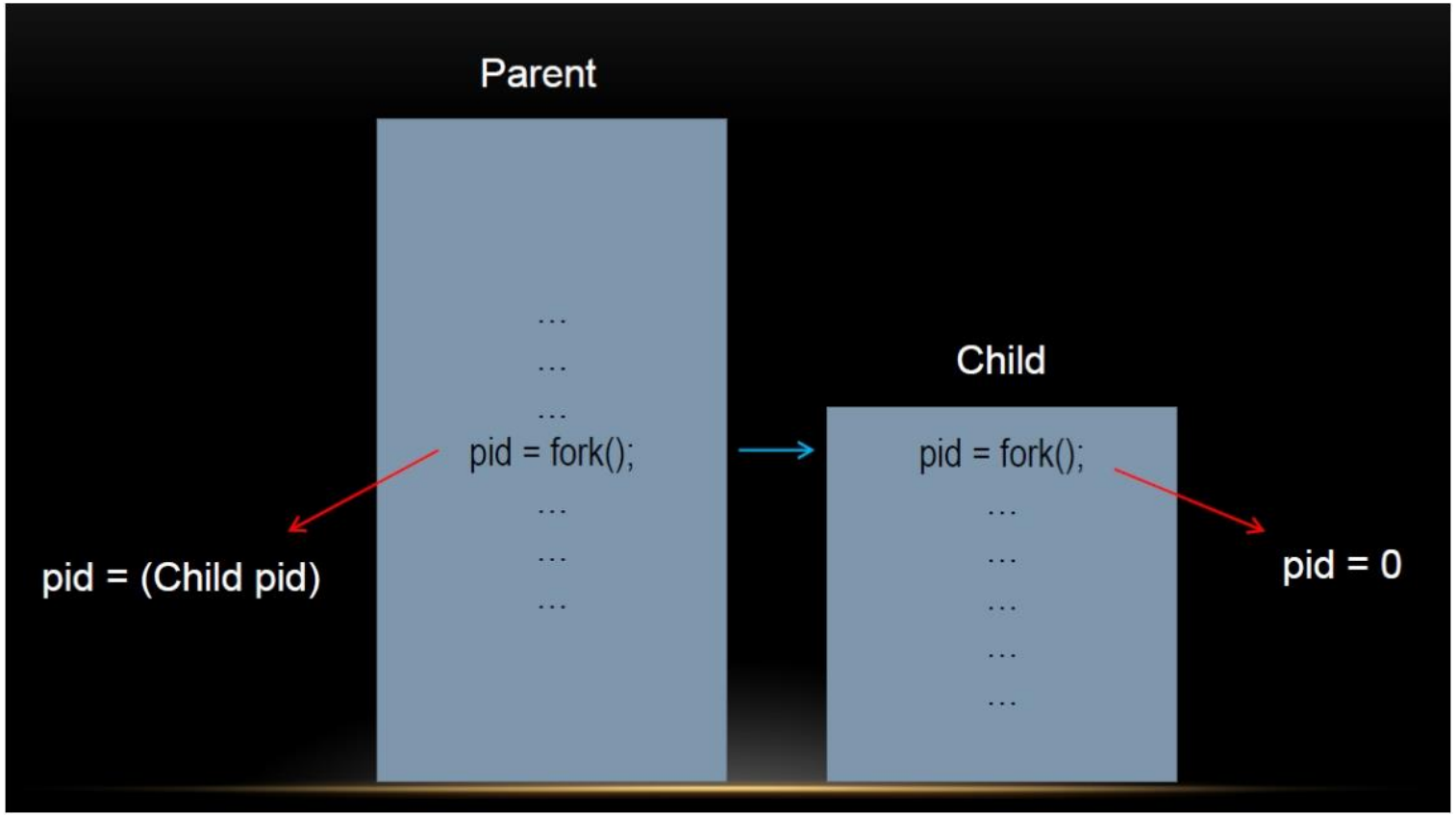
```
bsd1 [/u/gcs/106/0656613] -sysu1205- ./hw1_3
Main process id : 40513.
Fork1, I'm the child 40514, my parent is 40513.
Fork2, I'm the child 40515, my parent is 40514.
Fork3, I'm the child 40516, my parent is 40515.
Fork3, I'm the child 40517, my parent is 40514.
Fork3, I'm the child 40518, my parent is 40513.
bsd1 [/u/gcs/106/0656613] -sysu1205-
```

Hint:

Parent Process has to wait until Child Process finishes, then exit.

Use PID to identify parent and child.

Hint



Submission and Grade

Filename format please according : hw1-1.c, hw1-3.c (or .cpp), OS_report.docx.
Put two *.c(*.cpp) files and a *.docx report into same compressed file named **StudentID_hw1.zip** (ex : 0000000_hw1.zip).

Deadline: 2018/10/14 (SUN) PM11:59

a. Total score: 100pts. **COPY WILL GET A 0 POINT!**

b. hw1-1 score: code 40pts, report Q1 10pts

c. hw1-2 score: report Q2 20pts

d. hw1-3 score: code 20pts, report Q3 10pts

e. Report: format is in OS_report.docx. YOU NEED TO FINISH EVERY PART OF REPORT TO GET SCORE!

Rules

0. Use NCTU CS Workstation as your programming environment
1. Use only C/C++, OTHER LANGUAGES WILL GET 0 POINT!
2. **Incorrect filename format** will get -5 pts
3. **Incorrect output format** will get -5 pts
4. DELAYED SUBMISSION WILL GET 0 POINT!

*If you have any question, just send email to TAs.