

Prince of Songkla University

Faculty of Engineering

Final Examination Semester 1

Academic Year 2006

Date: 7th October 2006

Time: 0900-1200

240-620 Advanced Unix Network Programming Room:

Instructions:

- Books, dictionaries, calculators are allowed
- Attempt all questions, there are 22 of them for total 50 marks.
- Answers can be written in Thai or English

Note: There are 3 pages of this exam paper, include cover.

Basic Unix Low-Level I/O System Call

(5 marks)

1. What function can be used to convert from Unix low-level I/O file descriptor to Standard C Library file pointer (FILE *fp)?
2. What function can be used to convert from Standard C Library file pointer to Unix file descriptor?
3. Explain how can you check that a file already existed on the file system?
4. What is the effect of O_TRUNC flag when being used to open an existing file for writing?
5. How can you know size of a file on file system?

Programming using Basic Low-Level I/O System Call

(10 marks)

6. Write a complete copy program that can be used to copy a binary file with any size to other file. It must be used only Unix low-level I/O system call. Source and target names are given as command arguments. The program must handle all error that possible (e.g. argument not given, source file doesn't exist, target file already existed, etc.) It should use efficient buffer (don't read 1 byte and write 1 byte!)

Interprocess Communication

Popen, Pipe and FIFO

(5 marks)

7. What is the different between system() and popen() functions?
8. What is the major different with pipe and named-pipe?
9. Why single pipe can't be used for two-way communication?
10. How pipe can be used for two-way communication?
11. How can you create a fifo, using a system call (not a shell command)?

Semaphore, Shared Memory and Message Queues

(10 marks)

12. What does key value IPC_PRIVATE mean in term of System V IPC?
13. How can you create a single semaphore to be used by two different processes?
Note: those two processes can be started by different user. Hint: function and flags!
14. How can you destroy the semaphore? (Function and flag!)
15. How can shared memory can be shared between two processes, if shared memory had already created?
16. What is the major different between named-pipe and message queues?

Socket programming

(10 marks)

17. What is the different between socket that created by `socketpair()` and `socket()` functions?
18. Why socket that created in `PF_UNIX` domain must be used on the single machine (can't be used on different computer via network)?
19. What is the purpose of functions `ntohs()`, `htons()`, `ntohl()`, `htonl()` family?
20. What is the sequence of functions used by server program to create `PF_INET` domain, `SOCK_STREAM` type socket to receive request from client program?
21. What is the sequence of functions used by client program to create `PF_INET` domain, `SOCK_STREAM` type socket to send request to server program?

Programming using Socket

(10 marks)

22. Supposed that we have a TCP server that will print temperature when you connect to port 9999 on that machine, assume that the machine has ip address 172.30.9.99.

Write a client program to sampling the temperature data every 5 minutes and store time and temperature to file "temperature.txt". You can use `time()` function to get current time in second.

The output file may look like this

```
1160044106 27.0
1160047106 27.2
1160050106 27.1
```

...

The first column is time, the second column is temperature.

The server, when using **telnet** program to connect to the temperature server at port 9999, you can get the result like this:

```
$ telnet 172.30.9.99 9999
Trying 172.30.9.99
Connected to 172.30.9.99
Escape character is '^]'.
27.3
$
```

Note that, the server will terminate immediately after print out the temperature "27.3" here. (\$ sign is the shell prompt!)