UNIVERSITY of TECHNOLOGY, MAURITIUS

MSc Software Engineering

Cohort: MSE/06/PT

Examinations for 2006 - 2007 / Semester 1

MODULE: UNIX PROGRAMMING

MODULE CODE: OSS501

Duration: 2 Hours and 30 minutes

Instructions to Candidates:

1. This paper consists of **Sections A** and **B**.
2. **Section A is compulsory.**
3. Answer **any two** questions from **Section B**.
4. Questions may be answered in any order but your answers must show the question number clearly.
5. Always start a new question on a fresh page.
6. Total marks 100.

This question paper contains 5 questions and 7 pages.

SECTION A: COMPULSORY
*(Answer **both** Question 1 and Question 2)*

QUESTION 1: (30 MARKS)

(i) **ls -l** shows the following

```
-rwxrwxrwx   1 John     staff       7161 May  8 15:35 example.c
drwxrwxrwx   3 Max      staff       1536 Oct 19 00:54 exe
-rw----r--   2 Clive    staff         10 Nov  3 14:28 file1
-rw-r--r--   2 Smith    staff         10 Nov  3 14:28 file112
-rwxrwxrwx   1 Tom      staff       7080 Dec  8 15:35 account.c
-rw-r--r--   1 Tom      staff         10 Dec  13 14:28 file10
```

Use the above long list to answer the following questions,

(a) How many files are inaccessible to members of the group called staff? ***(1 mark)***

(b) How many files are executable by the owner Tom? ***(1 mark)***

(c) Write a UNIX command that will allow the group staff to have write permission on *file1*. ***(1 mark)***

(d) What will be the permission on the file1 if you set the *umask to 037*? ***(1 mark)***

(e) Write a UNIX command to link *file112* and *file10*. ***(1 mark)***

(ii) Write a UNIX command to list all files in the current working directory with *.exe* extension. ***(1 mark)***

(iii) Write a command to display the number of lines in a file named *account*. ***(1 mark)***

(iv) Write a command to sort a file called staff in reverse alphabetical order. ***(1 mark)***

(v) Write a command that creates a listing of files, then sorts that listing in reverse alphabetical order and puts the results into a file named *Test*. ***(1 mark)***

(vi) Write a command to display a list of all accounts on the system with a login shell of ksh, sorted alphabetically by login name and displayed a screen at a time. ***(2 marks)***

(vii) What command would you use to make the Korn shell variable PRICE available in child shells? ***(1 mark)***

(Continued)...

Question 1 : (continued)

(viii) What command could you use to check the existence of a file *account* in a Korn shell script?

(2 marks)

(ix) Explain the following UNIX command:

Ls –l | grep r-w | wc –l

(2 marks)

(x) Explain the following UNIX command

(cd reports;ls) ; ls

(2 marks)

(xi) Explain in details the order of execution of the *.cshrc* login script and *.login* script in a C shell environment.

(2 marks)

(xii) Explain the following C shell Metacharacters;

(a) &&

(b) ( )

(c) &

(d) | |

(e) |

(5 marks)

(xiii) What is the difference between a hard link and a soft link? And how can you check the link on a file?

(2 marks)

(xiv) Discuss what is a *trap* in the C Shell and explain the following statement:

trap $HOME/.logout 0

(3 marks)

QUESTION 2: (30 MARKS)

(i) What is multithreaded programming? Lists the benefits achieved by multithreading your code in a program. ***(4 marks)***

(ii) What type of coding should be eliminated when designing and coding a multithreaded program? ***(3 marks)***

(iii) A multithreaded program manipulates three types of objects

(a) A thread object.

(b) A mutex.

and (c) A conditional variable.

Explain these objects. ***(3 marks)***

(iv) Among the many different file system that ***FreeBSD*** support is the *Network File System*, also known as the *NFS*. Lists three benefits that *NFS* can provide. ***(3 marks)***

(v) *NFS* consists of two main parts, a server and one or more clients. The client cans remotely access data on a server, In order for this to work properly few daemons has to be configured and running.

(a) ***nfsd***,

(b) ***mountd***,

(c) ***rpcbind***,

Explain these daemons. ***(4 marks)***

(vi) Use the UNIX *rcp* command to copy recursively the directory */usr/reports* from the local host to the directory */user/status/newdata* on the remote host UTM and preserving the original creation dates and access permission mode of the directory that is copied in the new directory. ***(3 marks)***

(vii) Write a UNIX command line for the following program : (***conditional Execution based on failure***) Suppose that the command *mysort* is a sorting program that creates a temporary file (mysort.txt) in the course of its sorting process. When the sorting program finishes successfully, it cleans up after itself, deleting the temporary file. If on the other hand, the program fails, it may neglect to clean up. ***(4 marks)***

(viii) Some important files in Unix/Linux are:

(a) */etc/hosts*.

(b) /etc/resolve.conf.

(c) /etc/routes.

Explain briefly the importance of each of these files. ***(6 marks)***

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 3: (20 MARKS)

(i) All Security authentication mechanism that run on the TRU64 Unix Operating system run under the *Security Integration Architecture* (SIA) layer. Explain with diagram the *Security Integration Architecture.* ***(4 marks)***

(ii) Using UNIX command describe how would you install a multiple layered security product? ***(3 marks)***

(iii) Using UNIX command, how would you enable an ALCs (*access control list*), in the TRU64 Unix system? ***(3 marks)***

(iv) After having loaded the ACLs, what command would you use to determine the status of ACLs in the kernel? (*i.e verifying the kernel change*). ***(2 marks)***

(v) What command will determine if access control list (ACLs) are currently running in the system? ***(3 marks)***

(vi) Some of the files that are required to run a UNIX system are,

(a) /etc/passwd.

(b) /etc/group.

(c) /dev/console.

(d) /sbin/sh.

(e) /vmunix.

Explain the importance of these files. ***(5 marks)***

(Please turn over)

QUESTION 4: (20 MARKS)

(i) Define Remote Procedure Call (RPC). ***(2 marks)***

(ii) Explain with diagram how **RPC** works? ***(4 marks)***

(iii) A remote procedure is uniquely defined by

(a) Program number.

(b) Version number.

(c) Procedure number.

Explain the above terms. ***(3 marks)***

(iv) **ONC RPC** is currently supported on both **UDP/IP** and **TCP/IP** transports. Give three examples for each choice. ***(6 marks)***

(v) From your local host, *rcp* command can copy a file on one remote host to a file on another remote host. Write a UNIX command that will allow you to copy the file *spark* from the directory */u/cave/fred* on remote host *flint* to the directory */u/hut/barney* on remote host *stone*. ***(5 marks)***

(Please turn over)

QUESTION 5: (20 MARKS)

(i) Write brief notes on the Logical Storage Manager. ***(2 marks)***

(ii) Draw the Logical Storage Manager Software Architecture, and explain the function of the Volume Device Driver. ***(4 marks)***

(iii) List three benefits of the Logical Storage Manager. ***(3 marks)***

(iv) The partition on a physical device are mapped by a partition table called the disk label, below is an example of disk label:

 # disklabel -r /dev/rrz16c

8 partitions:

#	size	offset	fstype	[fsize	bsize	cpg]	
a:	1024000	0	4.2BSD	1024	8192	16	# (Cyl. 0 - 304*)
b:	4096000	1024000	swap				# (Cyl. 304*- 1523*)
c:	17773524	0	unused	0	0		# (Cyl. 0 - 5289*)
d:	0	0	unused	0	0		# (Cyl. 0 - -1)
e:	0	0	unused	0	0		# (Cyl. 0 - -1)
f:	0	0	unused	0	0		# (Cyl. 0 - -1)
g:	12653524	5120000	4.2BSD	1024	8192	16	# (Cyl. 1523*- 5289*)
h:	11482068	6291456	unused	0	0		# (Cyl. 1872*- 5289*)

List three characteristics of a *disklabel.* ***(3 marks)***

(v) Write *Unix* commands and explain briefly with examples the process of

(a) Renaming a disk. ***(2 marks)***

(b) Reserving a disk. ***(2 marks)***

(c) Removing a disk. ***(2 marks)***

(d) Disabling a disk. ***(2 marks)***

******END OF QUESTION PAPER******