UNIVERSITY of TECHNOLOGY, MAURITIUS

MSc Software Engineering

Cohort: MSE/07/PT

Examinations for 2007 - 2008 / Semester 1

MODULE: UNIX PROGRAMMING

MODULE CODE: OSS5101

Duration: 2 Hours and 30 minutes

Instructions to Candidates:

1. This paper consists of **Sections A** and **B**.
2. **Section A is compulsory**. Answer both questions.
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. All questions **do not** carry equal marks.
7. Total marks 100.

This question paper contains 5 questions and 6 pages.

SECTION A: COMPULSORY
(Answer both questions)

QUESTION 1: (30 MARKS)

The following example shows the command and display for the disk label information for the `rz4` disk:

```
# disklabel -r /dev/rrz4

   Size   offset  fstype [fsize bsize cpg]
a:  131072       0  unused  1024 8192 16 # (Cyl.    0 - 164*
b:  262144  131072  unused  1024 8192    # (Cyl.  164*- 492*)
c: 2050860       0  unused  1024 8192    # (Cyl.    0 - 2569)
d:  552548  393216  4.2BSD  1024 8192    # (Cyl.  492*- 1185*)
e:  552548  945764  4.2BSD  1024 8192    # (Cyl. 1185*- 1877*)
f:  552548 1498312  unused  1024 8192    # (Cyl. 1877*- 2569*)
g:  819200  393216  unused  1024 8192 16 # (Cyl.  492*- 1519*)
h:  838444 1212416  unused  1024 8192 16 # (Cyl. 1519*- 2569*)
```

(1) List five characteristics of a *disklabeL* from the above information. **[2 marks]**

(2) Disk rz4d contains two files ***account*** and ***printing*** and disk rz4e contains three files ***delivery***, ***purchase*** and ***expenditure***.

(i) Write a UNIX command to link file ***account*** to file ***purchase .***

(ii) What UNIX command would you use to check the link between the two files.

(iii) What is the difference between a hard link and a soft link?

(iv) What will be the permission on the file ***account*** if you set the *umask to 045*.

[4 marks]

(3) Ls –l account gives the following information:

_rw_ rw_ rw_ 1 Paul staff 7080 Dec 8 15:35 printing

Write a unix command to make the file executable by the group staff and the owner only. **[1 mark]**

(4) 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 a.txt. **[1 mark]**

(5) Your current working directory is ***/usr/user/you/database/deliver***. Write a UNIX command to copy the file item from the **/usr/user/you/database/doc** directory into a file in your current directory called ***invoice***? **[2 marks]**

(Continued)…

(6) Write short notes on the following:

(i) Pipe.

(ii) Filter **[2 marks]**

(7) Write a UNIX command to list all accounts on the system with a login shell of *ksh*, sorted alphabetically by login name and display a screen at a time? **[1 mark]**

(8) (a) What process puts the login prompt on your screen?

(b) What process assigns values to HOME, LOGNAME, and PATH?

(c) How do you know what shell you are using? And what UNIX command would you use to change the Shell.

(d) Explain the difference between the ***/etc/profile*** and ***.profile*** file. Which one is executed first? **[4 marks]**

(9) Explain briefly the following Metacharacters in the Korn Shell:

(a) &&

(b) ||

(c) ::

(d) &

(e) () **[5 marks]**

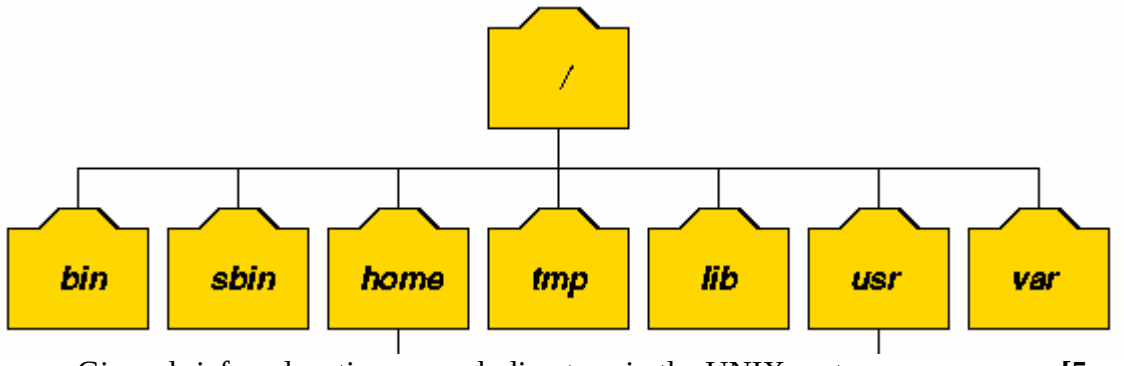
(10) Explain the following Unix Command:

Ls –l | grep r-x | wc –l **[1 mark]**

(11) What command could you use to check the existence of file *chemistry* in a Korn shell script? **[1 mark]**

(12) Write a UNIX command to determine which processes are currently in execution, including those processes not connected to a terminal and the CPU load and redirect the output in a file ***/tmp/test***. **[1 mark]**

(13) Some of the Directories required to run the UNIX system are shown below:



Give a brief explanation on each directory in the UNIX system. **[5 marks]**

(Please turn over)

QUESTION 2: (30 MARKS)

(1) The UNIX file is described by an information block called an ***i*_node**, Describe in detail (with diagram) the system V disk ***i*_node**. **[5 marks]**

(2) List five extra information that are available on an *i*_node once a file has been opened in the memory. **[5 marks]**

(3) **NFS** allows a system to share directories and files over the network. Explain briefly the **three daemons** that should be running on the **NFS** server so that its data is made available to its clients. **[3 marks]**

(4) Use **rcp** UNIX command to copy the local file, **amount_paid** from the directory **/usr/reports** on the local host to the file **overtime** in the directory **/usr/acct** on the remote host **Finance** preserve the original creation date and access permission mode of the copied file in the new file. **[2 marks]**

(5) In the UUCP (Unix Unix Copy program); which two commands allow you to establish a full-duplex connection, giving the appearance of being directly logged in to the remote host. **[2 marks]**

(6) Describe What the UNIX command < **UTM%** cu -s300 2348472 > means in the UUCP . **[2 marks]**

(7) The following **tip** commands from the remote host can be used to perform tasks on the local host while you continue working on the remote host.

(a) **~c**
(b) **~t**
(c) **~<**
(d) **~p**
(e) **~>**

Explain briefly each command listed above **[5 marks]**

(8) Using uux from the Bourne or Korn Shells , explain the following UNIX command:

uux "UTM!cat UTM!/u/doc/F1 UOM!/usr/doc/F2 > UTM!/u/doc/F3"

[2 marks]

(9) Explain the following UUX command:

UTM% uucp /usr/staff/IT UOM\!~uucp **[2 marks]**

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

trap $HOME/.logout 0 **[2 marks]**

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 3: (20 MARKS)

(i) The following ***.kshrc*** login script contains shell variables, command aliases, and command history variables that are set, as well as the permissions for file creation. Explain each line of coding in the script.

```
# Set shell variables
set -o monitor
set -o trackall

# Set command aliases
alias rm='rm -i '
alias rename='mv '
alias h 'history \!* | more'
alias l 'ls -l'
alias c clear

# Set history variables
HISTSIZE=40

# Set file creation permissions
umask 027
```

[7 marks]

(ii) The following ***.cshrc*** script contains shell variables, command aliases, and command history variables that are set. Explain each line of coding of the script.

```
# Set shell variables
set noclobber
set ignoreeof
set notify

# Set command aliases
alias h 'history \!* | more'
alias l 'ls -l'
alias c clear

# Set history variables
set history=40
set savehist=40

# Set prompt
set prompt = '\! % '
```

[7 marks]

(iii) Explain the following Build-in Bourne shell variables:

I. *HOME*
II. *PATH*
III. *CDPATH*
IV. *SHELL*
V. *PS1*
VI. *MAIL*

[6 marks]

(Please turn over)

QUESTION 4: (20 MARKS)

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

(ii) List three benefits that can be achieve by using the LSM Manager. **[2 marks]**

(iii) LSM organizes and optimizes disk usage and guards against media failures using the following objects:

(a) Volumes

(b)Plexes

and (c)Subdisks

Explain in details each of the above objects and show their relationship. **[3 marks]**

(iv) List the three types of disks available in digital UNIX. **[3 marks]**

(v) Write short notes on *disk group*. **[2 marks]**

(vi) If a disk that was in use by LSM fails to restart or has other hardware problems, the disk can be replaced by a new disk which has a different physical unit number than the failed disk. Below is the UNIX commands how to replace a disk that has a different unit number from that of the failed disk rz19 and disk rz19 belongs to the rootdg disk group as disk02. Assume that the spare disk available is as large as the rz19 disk (*for example*, *rz20*),

(1)# **voldg -g rootdg -k rmdisk disk02**
(2)# **voldisksetup -i rz20 privlen=1024 nconfig=1 nlogs=1**
(3)# **voldg -g rootdg -k adddisk disk02=rz20**
(4)# **volrecover -sb disk02**

[8 marks]

QUESTION 5 :(20 MARKS)

(i) Each time a security mechanism is installed or deleted in a Digital UNIX system, SIA is involved. Draw a Security Integration Architecture diagram. **[5 marks]**

(ii) How would you install a layered security product in UNIX? **[4 marks]**

(iii) Write brief notes on the following two files.

(i) /etc/hosts.equiv

(ii) $HOME/ .rhosts. **[4 marks]**

(iv) What is an authentication subsystem in a UNIX system environment? **[2 marks]**

(v) 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]**

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

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