MSc Software Engineering

Cohort: MSE/11A/PT

Examinations for 2011/ Semester I

MODULE: UNIX Programming

MODULE CODE: OSS5101

Duration: 2 Hours and 30 minutes

Reading time: 10 Minutes

Instructions to Candidates:

1. Answer **FOUR** (4) Questions **ONLY**.
2. Questions may be answered in any order but your answers must show the question number clearly.
3. Always start a new question on a fresh page.
4. **Section A is Compulsory and answer any two (2) Questions out of three (3) in Sections B**.
5. Section **A** carries **60** marks and Section **B** carries **40** marks.
6. Total marks 100.

This question paper contains 5 questions and 7 pages.

SECTION A: COMPULSORY

QUESTION 1: (30 MARKS)

(a)   Explain briefly the following Metacharacters in the C Shell

     (i)   &&

     (ii) ||

     (iii) ;

     (iv) &   *(2marks)*

(b)   How do you know what shell you are using? And what UNIX command
would you use to change the Shell.   *(2 marks)*

(c)   Explain the following UNIX command
     (cd etc;ls;pwd) ; ls;pwd;   *(2marks)*

(d)   Write short notes on the following:
     (a) Pipe.
     (b) Filter.
  And give an example where both are used in a UNIX command.   *(2marks)*

(e)   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 */var/process*   *(1marks)*

(f)   What command could you use to check the existence of file *Human
Resource* in a Korn   shell script?   *(2 marks)*

(g)
Discuss what is a **trap** in the C Shell and explain the following
statement: *(2marks)*

     trap $HOME/.logout 0

(h)
Explain the difference between the */etc/profile* and *.profile* file. Which
one is executed first?

     (2marks)

(i)   What is the difference between a hard link and a soft link? How can you check the link on a file?   **(2marks)**

(j)   Explain in details the order of execution of the *.cshrc* login script and *.login* script in a C shell environment.   **(2marks)**

(k)   (i) What process puts the login prompt on your screen?

    (ii) What process assigns values to HOME, LOGNAME, and PATH?   **(3marks)**

(l)   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)**

(m)   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 each command in the UUCP environment   **(5marks)**

(n)   How can you check for a *symbolic link* in a UNIX environment?   **(1marks)**

(o)   Explain the following Unix Command:

        Ls –lrt | grep rwx | wc –l >/tmp/a.txt   **(1marks)**

QUESTION 2: (30 MARKS)

(a) The UNIX file is described by an information block called an **i_node**, Describe in detail (with diagram) the system V disk **i_node**. *(5marks)*

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

(c) Some of the Directories required to run the UNIX system are as follows:

    I.   bin

    II.   dev

    III.   etc

    IV.   lib

    V.   lost + found

    VI.   mnt

    VII.   tmp

    VIII.   usr

Give a brief explanation on each of these directories in the UNIX system. *(8 marks)*

(d) Describe What the UNIX command < **UTM%** cu –s600 2348472 **>** means in the UUCP . *(2 marks)*

(e) *NFS* consists of two main parts, a server and one or more clients. The clients can 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. *(3 marks)*

(f) Write a UNIX command line for the following program : (**conditional Execution based on failure**)

Suppose that the command *result* is a sorting program that creates a temporary file (result.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. **(2 marks)**

Using uux from the Bourne or Korn Shells , explain the following

(g) UNIX command: **(3 marks)**

uux "UTM!cat UTM!/A/doc/S1 UOM!/usr/doc/S2 > UTM!/A/doc/S3"

Explain the following UUX command:

(h) **(2 marks)**

UTM*%* uucp /usr/staff/IT UOM\!~uucp

SECTION B: ANSWER <u>ANY</u> TWO QUESTIONS

QUESTION 3: (20 MARKS)

(a) 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)**

(b) What is an authentication subsystem in a UNIX system environment? **(4 marks)**

(c) After having loaded the Access control lists (ACLs), what command would you use to determine the status of ACLs in the kernel? (i.e *verifying the kernel change*). **(3 marks)**

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

(e) How would you install a layered security product in UNIX? **(5 marks)**

QUESTION 4: (20 MARKS)

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

      I.   */etc/passwd.*

      II.   */etc/group.*

      III. */etc/hosts.*

      IV. */etc/resolve.conf.*

      V.   */etc/routes.*

      VI. */dev/console.*

      VII. */sbin/sh.*

      VIII. */vmunix.*

      IX. /etc/hosts.equiv

      X. $HOME/ .rhosts.   ***(10marks)***

Explain the importance of these files.

(b) 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 *Project* from the directory */u/cave/assign* on remote host *UTM* to the directory */u/hut/project1* on remote host *UOM* by preserving its time.   ***(4marks)***

(c) Define Remote Procedure Call (RPC) and explain with diagram how **RPC** works?   ***(3marks)***

(d) **ONC RPC** is currently supported on both **UDP/IP** and **TCP/IP** transports. Give three examples for each choice.   ***(3marks)***

QUESTION 5: (20 MARKS)

(a) Write brief notes on the Logical Storage Manager.   ***(4marks)***

(b) Draw the Logical Storage Manager Software Architecture, and explain the function of the Volume Device Driver.   ***(3marks)***

    (3marks)

(c)   List three benefits of the Logical Storage Manager

(d)   The command **# disklabel -r rz16a** display the following information:
/dev/rrz16a:
type: SCSI
disk: BB00921B
bytes/sector: 512
sectors/track: 168
tracks/cylinder: 20
sectors/cylinder: 3360
cylinders: 5273
sectors/unit: 17773524

```
#      size     offset   fstype  [fsize bsize        cpg]
 a:  430296      0    4.2BSD   1024  8192   16    # (Cyl.  0 - 128*)
 b: 4115870  430296     swap                # (Cyl.128*1353*)
 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: 13227358 4546166 4.2BSD  1024 8192 16  #(Cyl. 1353*- 5289*)
 h: 11482068 6291456   unused    0    0     # (Cyl. 1872*- 5289*)
```

(2marks)

(e)   List five characteristics of a disklabel.

What is wrong with the following shell program?

```
#!/bin/sh
users=`who | wc -l`
if [ $users >= 4 ]
then
        echo "Heavy load!"
elif[ $users > 1 ]
        echo "Medium load"
else
        echo 'Just me!'
    fi
```

(3marks)

(f)
If a disk that was in use by LSM fails to restart or has other hardware problems, you can replace the disk with a new disk. Describe in detail the procedure how to replace the disk which has a different Unit number.

(5marks)

END OF QUESTION PAPER