Unix for Telecommunications

Portfolio Task – T-Test-1
Pass Level Task

Student ID	
Student Name	
Test Date	Week 5
Time Allowed	30 minutes

Assessment – Staff Use Only

In order to pass the test you **MUST** score a minimum of **80%**

Question:	1	2	3	4	5	Total
Points:	4	6	7	6	9	32
Score:						

Multiple Choice Questions

Q1 Clearly mark your answer below, ambiguous answers will be marked as incorrect

   a) With regard to the concept of the separation between kernel and user space, which of the following statements is **FALSE**?

      A. Only the kernel has full access to all hardware and memory

      B. All processes started by the user root always run in kernel space

      C. User processes run in user space and have limited access to memory

      D. User processes can access resources controlled by the kernel via system calls

                                                    a) ——————

   b) A user `root` plugs a USB key into a server running a FreeBSD installation. Which of the following statements best describe how he can access a file on the USB key

      A. Unless the USB key is formatted with the FreeBSD UFS file-system, files on the key cannot be accessed via FreeBSD

      B. `root` must mount the disk to a sub-directory somewhere within the filesystem and access the files from that location

      C. The USB key is allocated the next available drive letter on the OS and all files can be found on this new disk name

      D. root must mount the disk to **`/mnt`** and access the files from that location

                                                    b) ——————

   c) You launch a shell script with the first line that reads `#!/bin/tne30019`. Which of the following events would occur first?

      A. The script will be executed using the standard shell scripting interpreter **tcsh**

      B. The script will be executed using the standard shell scripting interpreter **sh**

      C. The script will try to execute using the executable `/bin/tne30019` as the shell interpreter

      D. This script will only work within RULE hosts allocated to students in TNE30019/80014

                                                     c) ——————

d) A student wants to connect to a remote Unix machine using `ssh` and run remote X-based applications using X-Forwarding over the `ssh` session. They run the command:

`ssh user@remote.host.com`

After logging in, they execute the command:

`xeyes`

Instead of seeing the application appear on the local screen, the shell reports:

`cannot open display:`

What is the most likely cause of the problem?

A. The student has forgotten to enable the `xauth` authority on `remote.host.com`

B. The student has not enabled X-Forwarding with the `ssh` client when connecting to `remote.host.com`

C. `remote.host.com` is not currently running an X-Server and therefore cannot launch the application to show `xeyes` on the local host

D. The `xeyes` application and/or any associated libraries are not installed on `remote.host.com`

d) —————

(4 marks)

Short Answer Questions

Q2 Consider the procedure of system and daemon startup

a) Write down the correct order in which the following processes are started when the FreeBSD system is booted: **init**, **kernel**, **login**, **bootloader**, **rc**, **sshd**.

> **Solution:**
>
> 1. bootloader (**0.5 mark**)
> 2. kernel (**0.5 mark**)
> 3. init (**0.5 mark**)
> 4. rc (**0.5 mark**)
> 5. sshd (**0.5 mark**)
> 6. login (**0.5 mark** – accept sshd and login reversed)

(3 marks)

b) What is the purpose of the **rc** script on the FreeBSD system?

> **Solution:**
>
> - Launch service/daemon programs (**1 mark**)
> - Allows a user to choose which startup scripts are executed and which aren't (**1 mark**)

(2 marks)

c) How can the user configure the behaviour of **rc** and its scripts on FreeBSD?

> **Solution:**
> Modify `/etc/rc.conf` or `/etc/rc.conf.local` (**1 mark**)

(1 mark)

(6 marks)

Q3 Consider the **ssh** and **sshd** programs

a) After the **ssh** session has been authenticated and established, are communications between the two computers protected using public/private key encryption or symmetric key encryption?

> **Solution:**
> Symmetric Key Cipher (**2 marks**)

<div align="right">(2 marks)</div>

b) A student changes the line in his **sshd_config** file that reads:

     #X11Forwarding no

to

     #X11Forwarding yes

and restarts the **ssh** server. When he logs into the system with X forwarding enabled, he is still unable to start an X-based application. What is the problem?

> **Solution:**
> The line in the **sshd_config** file is still commented out (**1 mark**)

<div align="right">(1 mark)</div>

c) In addition to ssh, what **other** application/service needs to be running on the local computer to enable an X-forwarded application to execute?

> **Solution:**
> An X-Server (**2 marks**)

<div align="right">(2 marks)</div>

d) Why does a ssh client warn you when the certificate stored in **$(HOME)/.ssh/known_hosts** file does not match that sent by the remote system?

> **Solution:** If the public key changes from the one stored from a prior session, this indicates that either the server has a new public key/certificate ($\frac{1}{2}$**mark**), or that somebody may be trying to spoof the server to learn your password ($\frac{1}{2}$**mark**). The warning allows the user to check which of these two cases is correct before proceeding (**1 mark**).

<div align="right">(2 marks)</div>

<div align="right">(**7 marks**)</div>

Q4 This question relates to the Unix OS Kernel.

    a) In which two ways can a device driver be implemented within the kernel?

> **Solution:**
> Compiled into the kernel (**1 mark**). Compiled as a loadable module (**1 mark**).

                                                                 (2 marks)

    b) Device drivers are typically implemented as two separate types, **block** or **character**. For each of the following devices, what types would their drivers be?

        i. Printer: **Character**   (1 mark)

        ii. USB: **Block**   (1 mark)

    c) In which directory would you find the following files?

    Hint: you must specify the most accurate directory, naming a parent directory does not count as a correct answer.

        i. System configuration files: **/etc**   (1 mark)

        ii. Device Driver interfaces: **/dev**   (1 mark)

                                                                 (6 marks)

Q5 This question relates to Unix shell scripting

a) Under Unix, executable files are marked with a flag rather than by their filename extension. Further, all shell scripts are tagged with the first two characters of the text file containing the characters:

> #!

Followed by the name of the shell to use to parse the script.

Nominate two advantages to using this technique to identify and execute shell scripts on a Unix system?

> **Solution:**
> - Have flexibility in supporting multiple different shells ((**1 mark**)
> - Have ability to support new shell languages that are either not installed or yet to be developed ((**1 mark**)

(2 marks)

b) Explain what the operator && does as per the following example with two commands:

> commandA && commandB

> **Solution:** commandB will be executed only if commandA succeeds (zero exit status) (**1 mark**).

(1 mark)

c) Explain how one could store the output of **myscript** in a file **myoutput.txt** and write down the actual command line to do this.

> **Solution:** Redirect stdout to file (**1 mark**).
> **myscript > output.txt** (**1 mark**).

(2 marks)

d) The following shell script (`myscript.sh`) has been written, the script takes a directory as a command line argument:

```
#!/bin/sh
find $1 | grep "secret" || echo "No secrets"
```

i. Explain what each command in the second line of the script does?

> **Solution:**
> `find $1` – Recursively lists all files in the directory
> `grep "secret"` – Filters input lines and only displays lines containing the word secret
> `echo "No secrets"` – Print No Secrets to the screen

(2 marks)

ii. Summarise in simple terms what function the script performs?

> **Solution:**
> List all files in the nominated directory (and subdirectories) that contain the text "secret" in the path. (**1 mark**). If no such files exist, print "No secrets" to the screen

(2 marks)

(9 marks)