



UNIVERSITY OF COLOMBO, SRI LANKA



UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)



Academic Year 2021 – 3rd Year Examination – Semester 6

IT6205 - Systems and Network Administration

Structured Question Paper

(TWO HOURS)

To be completed by the candidate

BIT Examination Index No:

Important Instructions:

- The duration of the paper is **02 (Two) hours**.
- The medium of instruction and questions is **English**.
- Students should answer in English language **only**.
- This paper has **04 questions** and **11 pages**.
- Answer **ALL** questions. All questions carry equal marks.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper. If a page is not printed, please inform the supervisor immediately.
- **Calculators are NOT allowed.**

Questions Answered

Indicate by a cross (×), the numbers of the questions answered.

	Question Numbers				Total
	1	2	3	4	
To be completed by the examiners:					

- 1) (a) Backups are likely the most vital task for a systems administrator. Yet it is also the one that is most often overlooked. Briefly describe a strategy for performing backups that is both efficient and effective.

(3 marks)

ANSWER IN THIS BOX

Backups can be automated and make sure that backups are executed correctly and on schedule.

- (b) Write down three (3) characteristics that you will look for when choosing a Linux based system for a company's essential servers, over and above the features of the Linux distribution.

(3 marks)

ANSWER IN THIS BOX

There can be so many reasons, some of them:

- Is the distribution stable
- Is the distribution stay on top with the latest security patches?
- Is the distribution release updates regularly?
- Is the distribution support help?

- (c) Explain the output of the following Unix/Linux command.

```
$ man -k passwd
```

(3 marks)

ANSWER IN THIS BOX

This command will print a list of man pages that have “passwd” in their one line synopses. This command is similar to apropos command.

- (d) Assume you've been given a text file with 40 lines of code named **mycode.txt**. Create a bash script called **CodeOutput** that prints the line number, a colon, and then the code line. Assume that the bash command is in the **/usr/bin** directory.

(5 marks)

ANSWER IN THIS BOX

```
#!/usr/bin/bash
```

```
exec 0<$1
```

```
counter=1
```

```
while read line; do
```

```
    echo "$counter:$line"
```

```
    $((counter ++))
```

```
done
```

- (e) What is the next step a BIOS takes after it has determined the boot device?

(4 marks)

ANSWER IN THIS BOX

Once the BIOS has figured out what the device to boot from, it tries to read first block of the device. This 512-byte segment is known as the master boot record or MBR.

- (f)

- (i) What is the functionality of the UNIX/Linux command "`fsck`"? (3 marks)
- (ii) Assume you have a server with two hard disks with a capacities of 750 GB and 250 GB respectively, and you need to create two 500 GB partitions to install software. Describe how you would accomplish this task.

(4 marks)

ANSWER IN THIS BOX

- (i) The `fsck` command is for the file system consistency check. It will carefully inspect all data structures and the allocation tree for every file. It relied on a set of heuristic rules about what the file system state might look like after failures at various points during an update.
- (ii) The 750 GB disk and the 250 GB disk can be aggregated in to a 1 TB volume group and then split into two 500 GB logical volumes. One volume would include data blocks from both hard disks.

- 2) (a) In UNIX/Linux systems, what is the function of the `/etc/shadow` file?

(4 marks)

ANSWER IN THIS BOX

A shadow password file is readable only by the superuser and serves to keep encrypted passwords safe from attackers and password cracking programs.

- (b) When a user leaves your company, you should delete their login account and files from the system. All references to the login name added by the system administrator must be removed throughout this operation. Make a list of four (4) items that should be included in your checklist.

(4 marks)

ANSWER IN THIS BOX

- (i) Remove the user from any local user databases
- (ii) Remove the user from the aliases file
- (iii) Remove user's home directory
- (iv) Remove the user's mail Spool

Any other similar correct answers.

(c) YUM (Yellowdog Updater Modified) is a meta-package manager based on the RPM package manager.

(i) In yum, how do you set up general options and pointers to package repositories? **(3 marks)**

(ii) To install the "wget" command on a machine, write down the UNIX/Linux command required. **(2 marks)**

ANSWER IN THIS BOX

(i) The yum configuration file, stored at `/etc/yum.conf`, contains general options and pointers to package repositories.

(ii) The command should be:
`$ yum install wget` or `$ sudo yum install wget`

(d)

(i) What is the role of the `/proc` directory? **(3 marks)**

(ii) List two (2) UNIX/Linux commands that extract data from the `/proc` directory. **(2 marks)**

ANSWER IN THIS BOX

(i) The `/proc` directory is a pseudo file system in which the kernel exposes a variety of information about the system's status and statistics generated by the kernel are presented. One can even modify some parameters by writing to the appropriate `/proc` file.

(ii) Some of the commands are:

`ps`

`top`

- (e) The following is a line in the output of the “ls -l” command executed in the “/home/sujan” directory.

```
-rw-r-x--x 5 sujan staff 967 Apr 08 9:00 code.txt
```

- (i) Write down the UNIX/Linux command to remove the execution permissions for the group and others on the `code.txt` file.

(2 marks)

- (ii) What are the actions required to ensure that `code.txt` can run by entering the following on the command line by the user “sujan”?

```
$ ./code.txt
```

(2 marks)

- (iii) Can you delete the contents of the `code.txt` file by deleting the file? Justify your response.

(2 marks)

- (iv) Write down the UNIX/Linux command to change the group ownership of the above file to the group “student”.

(1 marks)

ANSWER IN THIS BOX

- (i) Command should be:

```
$ chmod go-x code.txt
```

- (ii) Need to make it executable to run as above.

```
$ chmod u+x code.txt
```

- (iii) No. Since link count is 5, it will not remove the data since 4 more files representing the same data.

- (iv) Command should be:

```
$ chown :student code.txt
```

- 3) (a) Assume you have a web server called bit.lk running on the default port. You are given a command-line interface on another machine connected to the network to check whether the webserver is running or not. Provide the GNU/Linux shell command that gives the following output.

```
Trying 192.248.22.125...
```

```
Connected to bit.lk.
```

```
Escape character is '^]'
```

(3 marks)

ANSWER IN THIS BOX

telnet bit.lk 80

- (b) Write a command to get the IP address for a given Fully Qualified Domain Name (FQDN).

(2 marks)

ANSWER IN THIS BOX

nslookup bit.lk, dig bit.lk

- (c) One of the most commonly used technique for load balancing is Round Robin DNS.
(i) Explain how Round Robin DNS works.

(5 marks)

ANSWER IN THIS BOX

Multiple IP addresses are used for a particular host where the DNS server selects the IP address for a particular query based on round robin algorithm.

- (ii) Explain one (01) drawback of using Round Robin DNS for load balancing.
(5 marks)

ANSWER IN THIS BOX

DNS is not aware of the load. Therefore it is not efficient as a load balancing mechanism.

- (d) Write five (05) factors that you need to consider when selecting a web server for your organization.
(5 marks)

ANSWER IN THIS BOX

- Robustness
- Performance
- Cost
- Support
- Access Control and Security
- Features

- (e) Write three (03) open-source web application servers and two (02) commercial web application servers that can be installed on GNU/Linux operating systems.
(5 marks)

ANSWER IN THIS BOX**OSS:****Commercial:**

Tomcat

Websphere

Glassfish

Weblogic

JBoss

Jetty

- 4) (a) Write down the UNIX/Linux command for configuring and enabling the network interface eth1 with the IP address 192.168.1.15 and subnet mask /24.

(4 marks)

ANSWER IN THIS BOX

```
ifconfig eth1 192.168.1.15/24 up
```

(b)

- (i) In UNIX/Linux systems, what is the role of the `cron` daemon?

(3 marks)

- (ii) `crontab` is the name of the configuration file of the `cron` daemon. Is it possible for a single machine to have many `crontab` files? Justify your response.

(3 marks)

- (iii) Provide an example of a `cron` entry and explain it briefly.

(3 marks)

ANSWER IN THIS BOX

- (i) The `cron` daemon is the standard tool for running commands on a predetermined schedule.

- (ii) Yes. There is one `crontab` file per user. `Crontab` files are named with the login names of the users.

- (iii) Any suitable example.

```
45 10 * * 1-5 Command
```

10:45 AM, Monday to Friday executes the "Command".

(c) Answer the following in the context of virtualization.

(i) What is meant by Native Virtualization?

(3 marks)

(ii) What is meant by Live Migration?

(3 marks)

ANSWER IN THIS BOX

(i) Processor hardware assisted virtualization is called Native Virtualization.

(ii) Moving virtual machines in real time between running systems, without interruptions in service or loss of connectivity is called Live Migration.

(d) Assume that `myfile1.txt` only has one line of text, "System & Network Administration," and that `myfile2.txt` is not in the current directory.

(i) What would be the output of the following command executed in the current directory?

```
$ cat myfile1.txt myfile2.txt
```

(3 marks)

(ii) How do you change the above command in (d)(i) so that any errors are written to the `errors.txt` file?

(3 marks)

ANSWER IN THIS BOX

(i) It will display the content of `myfile1.txt` in the terminal and an error message saying no such file exists as `myfile2.txt`.

(ii) By using redirection of errors with file descriptor 2,

```
$ cat myfile1.txt myfile2.txt 2> errors.txt
```
