UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2017 – 3rd Year Examination – Semester 6

IT6205 - Systems and Network Administration

Structured Question Paper

25th November 2017

(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.
- This paper has **04 questions** and **11 pages**.
- **Answer ALL questions**. All questions carry **equal marks.**
- **Write your answers** in English using the space provided **in this question paper**.
- 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				
To be completed by the candidate by marking a cross (×).	1	2	3	4	**Total**
To be completed by the examiners:					

Index No: ……...

1) (a) Large systems installations require vigilant monitoring. Write down four (4) activities a system administrator should perform to monitor such a system.

(4 marks)

ANSWER IN THIS BOX

Following Activities can be performed:

- **Watch log files for early signs of trouble**
- **Regularly ensure that application services are working correctly**
- **Keep eye on the availability of system resources, such as disk, CPU utilization**
- **Use off the shelf monitoring systems**
- **(Any other acceptable answer.)**

(b) Answer the following with regard to open source software licenses.

(i) What is the main difference between GPL and BSD software licenses?
(ii) Write down one (1) UNIX/Linux distribution that is being distributed under a GPL license and another under a BSD license.

(2 X 3 marks)

ANSWER IN THIS BOX

(i) GPL is an example of a *copyleft* Software license. This license is aimed at giving the end-user significant permission, such as permission to redistribute, reverse engineer, or otherwise modify the software. Whereas the BSD license is a *Permissive* free software licenses, which essentially grant the end-user permission to do anything they wish with the source code.

(ii) Under GPL – CentOS or other

Under BSD – FreeBSD or other

(c) Manual pages or man pages provide on-line documentation in a Unix/Linux system. What information other than UNIX commands can be obtained from man pages as concise descriptions?

(4 marks)

ANSWER IN THIS BOX

Man pages provides concise descriptions for drivers, file formats and library routines other than the UNIX commands.

(d) Answer the following with regard to the file system of a UNIX/Linux system.

(i) Regular files and Directories are two file types in UNIX/Linux. Write down three (3) other file types found in UNIX/Linux systems.

(ii) Nine permission bits determine the operations that may be performed on a file and who can perform them. What is the UNIX/Linux command used to set these bits?

(5 marks)

ANSWER IN THIS BOX

(i) They are: Character Device files, Block Device files, Named Pipes, Symbolic Links and Local Domain Sockets. (Any three)

(ii) "chmod" command

(e) Answer the following questions with regard to shutting down a UNIX/Linux system.

(i) Write down the Unix/Linux command for shutting down a running system in 45 minutes with the message "Going down in 45 mins" for all the logged-in users.

(ii) What will be the outcome, if a UNIX/Linux system is switched-off without issuing any shutdown command? **(2 X 3 marks)**

ANSWER IN THIS BOX

(i) shutdown –h +45 "Going down in 45 mins"

(ii) Open databases that are not closed properly can get corrupted and there can be integrity issues as well.

2) (a) In a large Linux based system, the root account is used by several administrators to perform day to day activities. Briefly, explain how the above requirement can be performed effectively in the Linux system.

(5 marks)

ANSWER IN THIS BOX

For this problem the "sudo" program can be used.

Sudo takes as its argument a command line to be executed.

Sudo consults the /etc/sudoers file, which lists the people who are authorized to use sudo and the commands they are allowed to run on each host.

(b)

(i) Compare and contrast RAID 1 and RAID 5 storage with regard to their space utilisation.

(ii) Logical volumes are more flexible and powerful than disk partitioning. Write down three (3) advantages of logical volume management (LVM).

(2 X 3 marks)

ANSWER IN THIS BOX

(i) RAID 1 do mirroring and writes are duplicated two or more disks, whereas RAID 5 strips both data and parity information. RAID 5 is more efficient in it use of disk space than RAID 1.The space efficiency of RAID 5 is 67% and RAID 1 is 50%.

(ii) Moving logical volumes among different physical devices.

Grow and shrink logical volumes on the fly

Take copy-on-write snap shots of logical volumes

Incorporate mirroring or stripping in logical volumes

(c) Following is a line in the output of "***ls –l***" command executed in the "***/home/amal***" directory.

```
-r-xr-x--x 2 amal staff 554 Nov 16 5:00 todo.txt
```

(i) How can Amal add an entry to the todo.txt file?
(ii) Write down the UNIX/Linux command to remove the execution permission of the todo.txt for everyone.
(iii) Write down the UNIX command to set the **setuid** bit of the above todo.txt file.
(iv) We can set the default permissions of a file using the **umask** command. What is the default permission of the user, group and others of a newly created file after executing the command umask 026 on it?

(4 x 2 marks)

ANSWER IN THIS BOX

(i) Since there is no write permission to the user, Amal, cannot add any entry to the file OR change the permission accordingly and then edit the file.

(ii) chmod a-x todo.txt

(iii) chmod u+s todo.txt

(iv) User: read & Write; Group: read only; Other: none

(d)

(i) What is the role of the **ps** command in UNIX/Linux?
(ii) What is the UNIX/Linux command that can be used to change the priority value of a running process?

(2 X3 marks)

ANSWER IN THIS BOX

(i) Ps command will show the Process ID (PID), user ID (UID) and con troll terminal of processes. It also gives information about memory usage, CPU time and current status.

(ii) Nice / renice command

3) (a) The Dynamic Host Configuration Protocol (DHCP) will provide a leased IP address to a host automatically. Write down three (3) leasable parameters that will be provided with a DHCP lease.

(6 marks)

ANSWER IN THIS BOX

- **IP Address and its netmask**
- **Default route gateway**
- **DNS name server(s)**
- **Any other valid service(s) provided.**

(b) The following questions are based on Domain Name Server (DNS) concepts.

(i) Write down an example for a complete DNS resource record.

(ii) What is meant by negative caching in DNS **and** briefly explain how negative caching can be configured for a given zone.

(iii) Write down the basic configuration of a "**named.conf**" file for the following scenario.
Resource record path: **/var/named**, Hint file name: **root.hints**,
Master DNS zone name: **bit.lk**, Master Resource Record file name:**res.bit.lk**.

(12 marks)

ANSWER IN THIS BOX

(i) www.bit.lk. [ttl value] IN A 192.222.1.100

(or any correct form of resource record)

(ii) Configuring DNS servers to cache the results of unsuccessful name resolution attempts is called negative caching.

Negative caching in a zone is now specified by the Minimum field in the Start Of Authority (SOA) resource record for each zone.

Continued …

(iii) The named.conf file contents should be as follows:

```
options {
        directory "/var/named";
};
zone "."  IN {          // root servers file
                type hint;
                file "root.hints";
};
zone “bit.lk" IN {
        type master;
        file "res.bit.lk";
};
```

(c) Answer the following with regard to the Bash shell.

(i) Write down the steps required to create a Bash shell script and execute it.

(ii) Write a Bash shell script to perform the following task.
The script should obtain an input (numeric value) from the user and if that value is less than or equal to 100, it should output "**Inside the Range**". If it is greater than 100 it should output "**Outside the Range**".

(iii) What would be the final result and the Bash terminal output after executing the following Linux command? Assume that both **report-draft** and **report** files exist in the current directory.

```
$ cat <report-draft >report
```

(7 marks)

ANSWER IN THIS BOX

(i) **Create a text file using a text editor and enter the commands required for the shell script.**

Then make that file executable for user and any other group.

Now the shell script is ready to use.

(ii)

```
#!/bin/bash
echo –n "Enter a Number"
read InputVar
if [ "$InputVar –le 100 ]; then
        echo –n "Inside the Range"
else
        echo –n "Outside the Range"
fi
```

(iii) **The output of the above command will be:**

The contents of the report-draft file will be copied to the report file and its previous contents will be erased. It has the same effect as the copy command. No output will be shown in the Bash terminal.

4) (a) The following questions are based on Apache server configuration.

(i) What is the purpose of the command below? Briefly explain its output.

```
$ apachectl  configtest
```

(ii) An Apache web server with the server name "**www.bit.lk**" is configured and hosted on a hosting server with the IP address 192.222.10.150. Another domain with the server name "**www.bit.com**" and with IP address 122.210.10.160 should also be configured with the same content ***without making a duplicate copy***. How do you configure the Apache server for the above requirement?

(12 marks)

ANSWER IN THIS BOX

(i) The above command will validate the Apache configuration file, httpd.conf and if the configuration is free of errors, the command will output "Syntax OK" message. If there are any errors, it will output the errors with its line numbers.

(ii) The two sites can be in two different <VirtualHost> with same DocumentRoot path.

```
<VirtualHost 192.222.10.150>
ServerName      www.bit.lk
DocumentRoot /var/www/htdocs
</VirtualHost>
<VirtualHost 122.210.10.160>
ServerName      www.bit.com
DocumentRoot /var/www/htdocs
</VirtualHost>
```

(b) Consider the following UNIX/Linux commands.

(i) What is the difference between the following two **find** commands?

```
find /var/log –mtime +3 –print
find /var/log –mtime -3 -print
```

(ii) Assume that file1 and file2 do not exist in the current directory. What is the outcome of the following command?

```
$ ln –s file1 file2
```

(iii) Write down the lines corresponding to file1 and file2 of the output of **ls -l** after executing the above command in (ii).

(3 X 2 marks)

ANSWER IN THIS BOX

(i) **Both commands will find files in the /var/log directory. Since search criteria is mtime (modified time of the files), it will output that satisfies the search criteria based on the argument that will be passed.**

+3 ➔Files that were modified more than 3 days ago.

-3 ➔ Files that were modified less than 3 days from now.

(ii) **This will create a symbolic link from source to destination irrespective of the files exists or not.**

Source file is "file1" and Destination file is "file2".

(iii) **file2 will be linked to file1 after above command and it will be shown in the ls –l as follows:**

file2 → file1

(c)

(i) Briefly, explain the key advantages of **virtualization**.

(ii) What is the difference between Virtualization and Cloud Computing?

(7 marks)

ANSWER IN THIS BOX

(i) **Virtualization allows multiple and independent operating systems to run concurrently on the same physical hardware. Administrators can treat each virtual machine as a unique server. A wide variety of hardware platforms support virtualization, and the development of special CPU instructions and multicore processors have Improved the performance.**

(ii) **Virtualization supports multiple and independent OS to run concurrently. Cloud Computing extends such features with massive infrastructure and it can offer computing power as a service such as IAAS, PAAS and SAAS, which provides lots of other advantages than through virtualization.**

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