UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2011/2012 – 3rd Year Examination – Semester 6

IT6204 - Systems and Network Administration

Structured Question Paper

04th August, 2012

(TWO HOURS)

To be completed by the candidate

BIT Examination Index No: .....

Important Instructions:

- The duration of the paper is **2 (Two) hours**.
- The medium of instruction and questions is English.
- This paper has **4 questions** and **10 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.
- **Non-programmable Calculators may be used.**

Questions Answered

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

	Question Numbers				
To be completed by the candidate by marking a cross (×).	1	2	3	4	
To be completed by the examiners:					

1) (a) Write down three (3) activities a professional system administrator shall perform when a user resigns from that organization and no longer has access to the system.

(3 marks)

ANSWER IN THIS BOX

Any three of the following.

- **User account must be disabled.**
- **All data used by the user should be backed up.**
- **Remove all files and his account from the system after a certain period based on the organization's policy.**

(b) Answer the following with regard to UNIX, Linux and its distributions.

(i) Linux is a free UNIX-like operating system. Write down three (3) **other** Unix-like operating systems.

(ii) As the system administrator you are being asked by the higher management to choose a Linux Distribution for their business critical application. Write down three (3) other important points to be considered before taking the final decision, if you are looking only at the features of the new distribution.

(6 marks)

ANSWER IN THIS BOX

(i) Any 3 of the following.

- **FreeBSD or NetBSD**
- **OpenBSD**
- **Open Solaris**

(ii) Any 3 of the following.

Does this distribution

- **update its software promptly?**
- **provide technical support?**
- **stay on top of the latest security patches?**
- **going to be operational at least for 5 years?**

(c) Bootstrapping is the standard term for "starting up a computer". Write down four (4) activities carried out during the bootstrapping.

(4 marks)

ANSWER IN THIS BOX

- **Kernel will be loaded to the memory**
- **Device detection & configuration**
- **Various initialization tasks are performed**
- **System is then made available to the users**

(d) Is it possible for a system administrator to have control over the boot process? Justify your answer.

(4 marks)

ANSWER IN THIS BOX

Yes it is possible by editing the configuration files of the system startup scripts or by changing the arguments given to the boot loader to pass them to the kernel.

(e) Answer the following with regards to multi-booting systems.

(i) What is the size of the Master Boot Record (MBR)?
(ii) What is the role of the boot loader?
(iii) Write down the configuration required in the **grub.conf** file to boot a Windows XP operating system that lies in the sector 2 of the primary IDE drive.

(8 marks)

ANSWER IN THIS BOX

(i) It is a 512 byte segment.

(ii) It is responsible for loading the kernel.

(iii)
```
title Windows XP
rootnoverify (hd0,1)
chainloader +1
```

2) (a) The root account does need a password and extra care should be taken to safeguard it. Explain three (3) situations/scenarios where the root password should be changed.

(6 marks)

ANSWER IN THIS BOX

(i) Every time someone who knows the password leaves your organization

(ii) Whenever the security may have been compromised

(iii) Regularly (say every 3 months)

(b)

(i) Each user's account related information is stored in the ***/etc/passwd*** file. However the encrypted password in the second field of the above file contains an "**x**". What is the reason for this? Justify your answer.

(ii) Where is the actual encrypted password stored and who can read this?

(6 marks)

ANSWER IN THIS BOX

(i) When the encrypted password is stored in the world readable /etc/passwd file, it is not safe. Because today's hardware/software is fast, they can be decrypted very easily. So the encrypted password should be saved in a separate file which is not world readable.

(ii) It is stored in /etc/shadow file and ONLY superuser can read it.

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

```
-rwxr-xr-x 1 sagara stud 112 2012-04-09 10:25 proj.txt
```

(i) Assume that you are now in the "/home/sagara/bit" directory. Write down the UNIX command to create a symbolic link called "my-bit-proj" to the file "proj.txt" in the parent directory.

(ii) Write down the UNIX command to change the current file permission of the "proj.txt" file to: user (read & write), group (read only) and other/world(none).

(iii) Write down the UNIX command to set the ***setuid*** bit of the above "proj.txt" file.

(iv) Write down the command to set the default permission of a file to have the following permissions: user (read and write), group (read) and other/world(read)?

(8 marks)

ANSWER IN THIS BOX

(i) ln –s proj.txt my-bit-proj

(ii) chmod 640 proj.txt

(iii) chmod u+s proj.txt

(iv) umask 022

(d) A process's UID is the user identification number of the person/process who created it.

(i) What is the "effective" UID (EUID) of a process?

(ii) Explain a scenario to demonstrate the use of the EUID in a Linux environment.

(**5 marks**)

ANSWER IN THIS BOX

(i) This is used to evaluate privileges of the process to perform a particular action.

(ii) When a regular user wants to change his/her password, he/she has to call the program "passwd" and need to update master password database. Without having an effective UID to root he/she cannot change his/her password by him/herself.

3) (a) A computer with CentOS operating system need to be configured with the following network details: IP Address: 172.16.100.55/24, DNS Server: 203.144.100.254 (primary) and 8.8.8.8 (backup).

(i) Write down the Linux command (in the terminal mode) to configure and activate the Ethernet interface eth0 with the above IP address.

(ii) Explain how you set the DNS servers for this machine.

(4 marks)

ANSWER IN THIS BOX

(i) ifconfig eth0 172.16.100.55/24 up

(ii) Need to edit /etc/reslov.conf file and first add the primary and then the backup DNS server IPs.

nameserver 203.144.100.254

nameserver 8.8.8.8

(b) A web server (Apache) called "**www.bit.lk**" is configured and hosted in a hosting server with the IP address 192.248.16.150. Another domain called "**www.bit.ucsc.lk**" should also be configured with the same content ***without*** any duplication. How do you configure the Apache server for the above requirement.

(6 marks)

ANSWER IN THIS BOX

Need to configure name-based virtual hosting since only one IP is available for the both web sites. Document Root should be the same for both sites.

NameVirtualHost 192.248.16.150

<VirtualHost>

ServerName www.bit.lk

DocumentRoot /var/www/htdocs

</VirtualHost>

<VirtualHost>

ServerName www.bit.ucsc.lk

DocumentRoot /var/www/htdocs

</VirtualHost>

(c) Answer the following with regard to Domain Name Server (DNS) setup.

(i) Write down an example for a DNS resource record.
(ii) Does the "**named.conf**" file contain any resource records? Justify your answer.

(iii) Write down the DNS master configuration for the zone "**bit.lk**". Note that the zone files will be at "**/var/named/zone**" directory.

(6 marks)

ANSWER IN THIS BOX

(i) **www.bit.lk IN A 192.248.16.150**

(ii) **No. Only the path where the resource records are stored on the named.conf file, named.conf file provides all config details to the name server deamon called bind.**

(iii)
```
options { directory "/var/named/zone"; };
zone "bit.lk" IN {
    type master;
    file "bit.lk";
};
```

(d) When configuring a SMTP mail server for sending/receiving mail, why do we need to configure a POP/IMAP server along with it as well?

(4 marks)

ANSWER IN THIS BOX

SMTP is used to transfer mail from a client to its local mail server and local mail server to remote mail server. SMTP does not facilitate to read mail from the server. In order to read mail from a server another protocol like POP/IMAP is needed to be configured.

(e) Answer the following with regard to Squid caching server configuration.

(i) Soon after defining an access control list with an ACL element (without any other configurations) will it block any traffic?

(ii) Write down the access control list(s) required to block the "youtube.com' domain and its sub-domains. Also the contents of the custom design error page "UT-block" should be displayed when such a ACL is matched. Assume that no other access control lists are available in the current squid.conf file.

(5 marks)

ANSWER IN THIS BOX

(i) Defining an ACL alone does not block anything soon after. It just defines an ACL and needs to use the http_access statement to block/enable traffic.

(ii)

```
acl youtube dstdomain .youtube.com.
deny-info UT-block youtube
http_access deny youtube
```

4) (a) In Linux, scheduled routine tasks can be automated using "cron" jobs.

(i) Write down the UNIX command to view all the scheduled routine tasks of a logged in user.

(ii) What is the outcome of the following cron job?

```
0-30/5 * 1,2,3 * * /etc/myscript.sh
```

(4 marks)

ANSWER IN THIS BOX

(i) crontab -l

(ii) This will execute /etc/myscript.sh file every 5 minutes of the first 30 minutes on the 1st, 2nd and 3rd days of each month.

(b) Answer the following with regard to shells and shell scripting.

(i) Why is shell scripting considered to be an essential tool in UNIX/Linux?
(ii) What are the tools and steps required to create a shell script?
(iii) Write a bash shell script to make a copy of each file with the extension **.txt** to a backup file with the extension **.txt.bak** in the current directory.

(6 marks)

ANSWER IN THIS BOX

(i) **When repetitive work needs to be done (say renaming 1000 files) or some scheduled tasks need to be done, shell scripting provides a great help.**

(ii) **Open a text editor and write the required command in the text file. Now make this file executable and it is ready to use.**

(iii)

```
#!/bin/bash
for file in *.txt;
do
    cp $file $file.bak;
done
```

(c) Explain the functionality of each of the following commands in Unix.

(i) `find /etc/ -perm 655 -mtime -1 -exec ls -l {} \;`

(4 marks)

ANSWER IN THIS BOX

Find files in the /etc directory that were being modified within 1 day and its file permission having 655 and thereafter, output them in the long list mode (ls –l).

(ii) `$ echo "There are `wc -l /etc/passwd` lines in the passwd file."`

(4 marks)

ANSWER IN THIS BOX

There are xxx lines in the passwd file.

xxx represents a number.

(d) Compare and contrast full virtualization and paravirtualization. Provide one example for each type as well.

(7 marks)

ANSWER IN THIS BOX

Under full virtualization the operating system is unaware that it is running on a virtualized platform. A hypervisor (or virtual machine monitor) is installed between the virtual machines (guests) and the hardware. VMware is an example for this type.

Like full virtualization, paravirtualization allows multiple operating systems to run in one machine. However, each OS kernel must be modified to support hypercalls. Xen is an example for this type.

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