Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree
in
Information Technology

Final Examination
Year 2, Semester II (2019)

IE2060 – Computer Systems Administration

Duration: 2 Hours

October 2019

Instructions to candidates:

- This paper is preceded by a **10**-minutes reading period. The supervisor will indicate when answering may commence.
- This paper has **3** questions with a total of 100 marks.
- Answer all the questions in the booklet given.
- This paper contains **5** pages including the cover page.

Question 1 (45 marks)

The questions are based on the scenario given below.

You have been appointed as the new chief systems administrator of a company named SipHala which is an educational institute providing certification and diploma courses in Linux, C programming, etc. The company has a purchased domain named SipHala.lk and its main office is situated in Colombo, where Kaluthara, Gampaha, Kurunagala, and Kandy hosts branches. Currently, they have been using dongles in branches to connect to the main office and each location contains 3 – 4 laboratories with PCs' installed with Linux kernel 2.6.16. Only the main office is connected to the domain settings, but the DNS is not working correctly and the different branches use different private IP address ranges for the local networks. The company is upgrading its entire system (DNS, DHCP, Web, FTP, Proxy, Firewall) and you are responsible for the operation.

A. List four (**4**) major drawbacks of the existing company domain, you see as the chief systems administrator. (4 marks)

B. Suggest a private IP range (**IPv4**) that can be used by all the company branches and main office. The answer should include the network address/s and the subnet mask. (4 marks)

C. Considering the main **DHCP** server configured in the main office.

   i. State an **IP address** for the **DHCP server** using the IP range you have selected for the main office network. (2 marks)

   ii. Describe the step by step process how a new Laptop (**DHCP client**), obtains network **configuration information from the DHCP server**. (10 marks)

   You should;

   - *Indicate the message types that are being exchanged in the process.*
   - *Indicate the source IP address and the destination IP address of each message generated.*

D. Configure the **Local DNS Server** in the main office with a **forward lookup zone (Fig 1)** and a **reverse lookup zone (Fig 2)** for the following. (10 Marks)

   - NS record for the name server in the network
   - MX record for the mail server in the network
   - A record for the webserver in the network

Duplicate the two partially created lookup zone files (Figure 1 and Figure 2) to your answer booklet and complete the DNS entries as needed.

forward.siphala.lk

```
$TTL 86400
@ IN      SOA   dnsServer.siphala.lk.  root.siphala.lk. (
<<IT Number>>          ;Serial
<<Birth Year>>         ;Refresh
1800        ;Retry
604800            ;Expire
86400       ) ;Minimum TTL


//DNS connection mapping entry
//web server mapping entry
//mail server mapping entry
```

Figure 1 – Forward look-up zone sample

reverse.siphala.lk

```
$TTL 86400
@ IN      SOA   dnsServer.siphala.lk.  root.siphala.lk. (
<<IT Number>>          ;Serial
<<Birth Year>>         ;Refresh
1800        ;Retry
604800            ;Expire
86400       ) ;Minimum TTL


//DNS connection mapping entry
//domain pointer mapping entry
//webserver pointer mapping entry
//mail server pointer mapping entry
```

Figure 2 – Reverse look-up zone sample

E. The number of staff, students and PC's in the domain has increased over the past years. Scripting files are needed to automate the manual tasks to reduce the workload and to increase efficiency.

i. Develop a shell script to automatically create **Users** by providing the ***user name*** and ***password*** via command-line arguments. The user password must expire at the first login. (4 marks)

ii. Deveop a shell script with the use of '***for***' loop, print the number of bytes of all the files inside the users, bin directory. (4 marks)

iii. Modify the `/etc/crontab` file to schedule the script you developed in part (ii). The script should be executed every weekend at 11.59 PM every month by the root user. (7 marks)

Question 2 (30 marks)

A. Compare and contrast **Linux** and **Unix** operating systems. (5 marks)

B. During the Linux installation process one important component is the creation of a **SWAP** space.

i. Describe the usage of the swap space. (4 marks)

ii. Mention one difference between the **Windows** and **Linux**, swap implementation. (4 marks)

C. Recommend a **Linux Operating System Distribution** for each of the following applications and explain your choices. (8 marks)

i. A single user working in a home office

ii. A university computer science lab

iii. A corporate web server

iv. A server cluster that runs the database for a shipping company

D. "Linux has made dramatic inroads into production environments."

i. Is the above statement ***true*** or ***false***? (1 mark)

ii. Justify your answer provided in part(i). (3 marks)

E. Name the usage of the following commands in the Linux terminal environment.

(5 marks)

i. `cd/`

ii. `chroot`

iii. `find`

iv. `grep`

v. `awk`

Question 3 (25 marks)

A. How can you add a normal user as a root user? (2 marks)

B. Why shouldn't a Linux system be turned off with the power button on the computer case? (3 marks)

C. What steps will be taken by `init`, if a system is at **run level 4** and you run the command `telinit 1`? (5 marks)

D. List in order the steps used to create a working multi-OS system that includes **Linux** and **Windows**. Use **GRUB** loader. (5 marks)

E. The `umask` command is very useful in Linux administration.

i. Explain the differences between the following `umask` values: `077`, `027`, and `755`. (3 marks)

ii. How would you implement one of above values as a **site-wide default** for new users? (2 marks)

F. Name and briefly describe the **Linux Booting Process** steps. (5 marks)

~ End of the Question Paper ~