Programme Code: TU857
Shared with:
Module Code: CMPU4050
CRN: 22533

TECHNOLOGICAL UNIVERSITY DUBLIN

CITY CAMPUS - GRANGEGORMAN

TU857 – BSc in Computer Science (Infrastructure)

Year 4

SEMESTER 1 EXAMINATIONS
2023/24

Systems Integration

Internal Examiner: Dr Stephen O'Sullivan

External Examiner: Ms. Caroline McEnroy

Exam Duration: 2 hours

Instructions: Answer ALL Questions. All questions worth equal marks.

Special Instructions/Handouts:

1. **(a)** In the context of DNS, describe the purpose of primary and secondary DNS servers.

(5 marks)

(b) Elaborate on the process of how the domain name www.example.net would be resolved using DNS. Assume the DNS client sends its query to an iterative server. In your answer, explain the actions of the client, iterative server, and authoritative servers.

(10 marks)

(c) Provide concise definitions for the following terms in your own words:

i. DNS root
ii. Positive cache
iii. Query type
iv. DNS client
v. MX record

(5 marks)

2. **(a)** Elucidate in detail, a standard DHCP lease renewal process, and explicitly mention the key messages used in this process.

(10 marks)

(b) In your own words, illustrate the contrast between automatic and static allocation in the context of DHCP.

(5 marks)

(c) Catalogue five categories of supplementary configuration information that a DHCP server might furnish to a client in addition to an IP address.

(5 marks)

3. **(a)** In the context of a distributed computing environment, clarify the role of NFS protocol.

(5 marks)

(b) Elaborate on the four sequential steps needed to enable file sharing between a client and server using NFS.

(8 marks)

(c) An NFS server's /etc/exports file features the following entry:
/data/shared 172.16.0.0/20(ro,sync,root_squash)
Provide a comprehensive interpretation of this entry in your own words.

(7 marks)

4. **(a)** Describe in your own words the meaning of the term "Open Source" as it relates to Linux.

(5 marks)

(b) The permissions for a particular file on a Linux system are displayed as:

```
-rw-r--r--
```

Explain in your own words what this notation means.

(5 marks)

(c) On a typical Linux filesystem, what would you typically find in each of the following directories:

i. /var
ii. /dev
iii. /bin
iv. /lib
v. /tmp

(5 marks)

(d) Briefly describe in your own words what each of the following commands do on a Linux system:

i. ls
ii. rm
iii. mv
iv. cat
v. chmod

(5 marks)

5. **(a)** As a database manager for a medium-sized organization, you have been tasked to set up a database server for internal operations with limited resources. Explain the steps required to set up a database server that can be accessed internally.

(5 marks)

(b) After initially setting up the database server for internal operations, the mandate has changed to allow external users to access the database server. Assume the organization uses static, globally accessible public IP addresses. Explain how access to the server could be achieved externally.

(5 marks)

(c) Suppose the organization switches their ISP and is only provided with a single IP address to use with NAT. How would this change affect the external users' access to your database server?

(5 marks)

(d) Describe in your own words how the issue highlighted in part (c) could be mitigated.

(5 marks)