

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

**TECHNOLOGICAL UNIVERSITY DUBLIN**  
CITY CAMPUS - GRANGEGORMAN

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TU857 – BSc in Computer Science (Infrastructure)

**Year 4**

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SEMESTER 1 EXAMINATIONS 2024/25

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**Systems Integration**

**Internal Examiners:** Dr Stephen O’Sullivan  
Dr Paul Doyle

**External Examiner:** Ms. Caroline McEnroy

***Exam Duration: 2 hours***

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

Special Instructions/Handouts:

1. (a) Explain the concept of DNS caching and its benefits in the context of DNS resolution.  
(5 marks)
- (b) Describe the process of resolving the domain name `www.example.org` using DNS. Assume the DNS resolver sends its query to a recursive server. In your answer, reference the behaviour of the resolver, recursive server, and authoritative servers.  
(10 marks)
- (c) Briefly define each of the following terms in your own words:
- i. DNS root server
  - ii. DNS forwarding
  - iii. Reverse DNS lookup
  - iv. DNSSEC
  - v. MX record
- (5 marks)
2. (a) Describe in your own words a typical DHCP transaction, making explicit reference to the four message types used in such a transaction.  
(10 marks)
- (b) In your own words, describe the difference between static and dynamic address allocation in the context of DHCP.  
(5 marks)
- (c) List five types of network configuration information that can be provided to a client by a DHCP server.  
(5 marks)
3. (a) Explain in your own words the purpose of the NFS protocol.  
(5 marks)
- (b) Describe the four steps that must be undertaken to allow file sharing to take place between a client and server using NFS.  
(8 marks)
- (c) The following entry appears in the `/etc/exports` file for an NFS server:  
`/var/shared 192.168.1.0/24(rw,sync,no_root_squash)`  
Give a full explanation of this entry.  
(7 marks)

4. (a) In the context of authentication, explain the difference between identification and authentication. (5 marks)
- (b) Describe the process of authentication using Kerberos. In your answer, reference the roles of the client, authentication server, ticket-granting server, and principal server. (10 marks)
- (c) Briefly define each of the following terms in your own words:
- i. Access Token
  - ii. Single Sign-On (SSO)
  - iii. Multi-factor Authentication (MFA)
  - iv. OAuth
  - v. Identity Provider (IdP)
- (5 marks)
5. (a) In the context of remote access, explain the difference between FTP and SSH. Discuss the security implications of using each protocol. (5 marks)
- (b) Describe the process of establishing a secure SSH connection from a client to a server. Include details on key exchange and authentication. (10 marks)
- (c) Briefly define each of the following terms in the context of remote access:
- i. Public key
  - ii. Private key
  - iii. Port forwarding
  - iv. SCP
  - v. SFTP
- (5 marks)