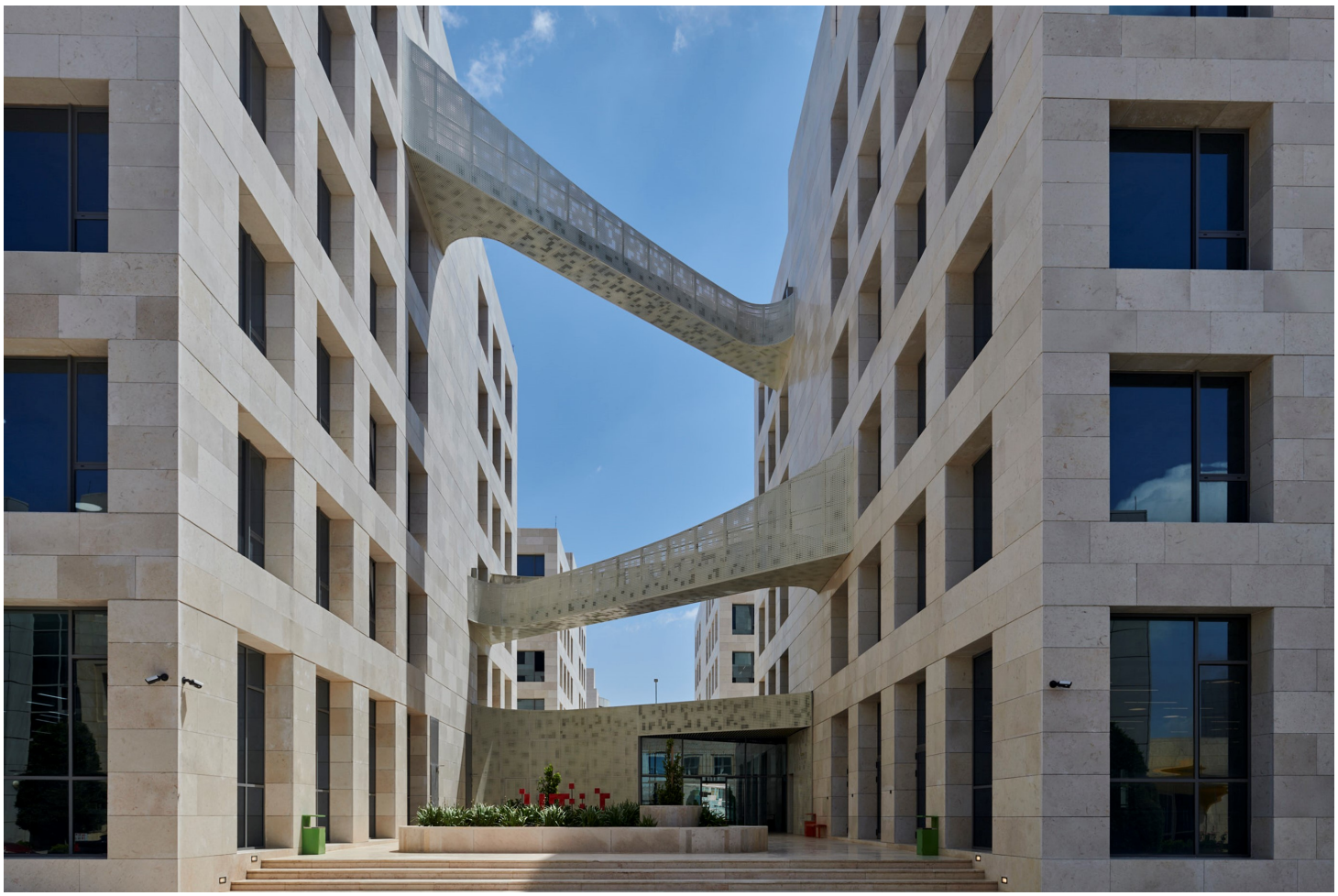
جامعة الحسين التقنية
Al Hussein Technical University

ASSIGNMENT BRIEF

HTU Course No: 10203180	**HTU Course Name:** Networking
BTEC Unit Code: M/618/7393	**BTEC UNIT Name:** Networking

Version: 3



Student Name/ID Number/Section	
HTU Course Number and Title	10203180 Networking
BTEC Unit Code and Title	M/618/7393 Networking
Academic Year	2023-2024 Spring
Assignment Author	Isra' Hasan
Course Tutor	Eman Alzyoud - Elham Derbas - Huthaifa Omari - Sami AlMashaqbeh - Asma'a Lafi - Isra' Hasan
Assignment Title	DataTech company
Assignment Ref No	1
Issue Date	11/03/2024
Formative Assessment dates	From 17/03/2024 to 30/05/2024
Submission Date	08/06/2024
IV Name & Date	Bassam Al-Kasasbeh 10/03/2024

Submission Format

There should be one submission for this assignment (including all parts). Each student individually should submit his work that shall include:

a) **An individual written report** covering the required details in the (Assignment Brief and Guidance) section. *Including student assessment submission and declaration form signed.*

b) **Evidence** of the implemented network (**soft copy of the .pkt** file). Students should use the **CiscoPacket Tracer** simulator **version 8.2**

c) **Implement, test, and diagnose networked systems.**

d) **Please note that the Report and Declaration form must be in a Word file format.**

*** Discussion about the report and the implemented network.** Instructions, date, and time for the discussion will be provided later.

PS: Do not upload a zipped file!! Just upload each file separately.

Report Guidelines:

In your report, you should make use of headings, paragraphs, and subsections as appropriate. not be penalized for exceeding the total word limit. Do not exceed 5000 words. Your report should be:

1. In a form of a **soft copy** submitted via the URL below.
2. Written in a formal business style using **single spacing and font size 12**.
3. Supported with research and referenced using the Harvard referencing system.

Note: Soft copies submissions should be done through the university's eLearning system within the deadline specified above through below link: https://elearning.htu.edu.jo/

Unit Learning Outcomes

LO1 Examine networking principles and their protocols.

LO2 Explain networking devices and operations.

LO3 Design efficient networked systems.

LO4 Implement and diagnose networked systems.

Assignment Brief and Guidance

You have been recently employed as a Junior Network Administrator at Data Tech Company, a specialist in security solutions. Data Tech Company is planning to expand its team and operations by establishing branches in various countries. The top management has decided to open offices in Ankara, Riyadh, Dubai, Beirut, Doha, and Kuwait, in addition to the Headquarters (HQ) located in Amman. You have been brought on board to join the project team responsible for connecting these seven offices. This initiative aims to facilitate seamless collaboration and sharing of project data among employees across all locations.

The primary data center for Data Tech Company is situated within the HQ in Amman, albeit configured as a separate subnet within the HQ network. It is essential that the remote offices are interconnected with this data center, as well as with each other, enabling the efficient access and sharing of project-related data among employees for enhanced collaboration.

In line with the business requirements outlined, it has been determined that employees at Data Tech Company's offices will:

1. Gain access to the company's internal system, utilized for sharing project tasks and data, through a secure website (https://eis.DataTech.com.jo/). Access to this system should be facilitated using a FQDN (Fully Qualified Domain Name).
2. Have the capability to share and transfer various files (such as reports, images, etc.) across all remote offices, ensuring effective communication and resource sharing.
3. Be equipped to send and receive emails among each other, fostering prompt and efficient communication.Be able to securely connect portable devices to the local network wirelessly, enhancing mobility and flexibility in their work environm

Part 1: In-Class Exam

The Exam will take place on campus on the date 5/27/2024 .

Part 2: Technical Design and Simulation

Design efficient networked systems

In this part your team leader asked you to provide a design (as per the specifications below) of the proposed network using Packet Tracer. Requirements and specifications are:

HQ datacentre:

People: 1 administrators.

Resources: 3 PCs, all servers, and no Wi-Fi should be provided in the data center.

- Each device in each subnet must have a dynamic IP address, except for servers and gateways, which must be static.
- It is expected to have more employees in the future but not exceed 100 employees.

Each DATA-TECH remote office, including Amman Office:

Resources: 2 PCs used to access the e-services required using a wired connection, 1 network printer, Wi-Fi access, 1 laptop connected using Wi-Fi access.

- Each station must use a different IP subnet than the other remote offices.
- Each device in each subnet must have a dynamic IP address, except for network printers, servers, and gateways, which must have static addresses.
- It is expected to have more employees in the future, but not exceed 70 employees per office.

-The main subnet is given to you as a Network Engineer as private IP for the whole project is 130.10.0.0/16. For the IP configuration in all remote offices and the data center network, **you must do the proper subnetting** for this range that fits the number of subnets and the number of hosts per subnet. You should take into consideration future expansion in terms of establishing new remote offices.

-For networks between routers (WAN connections), use subnets within the range 201.0.0.0/24 with the proper subnet mask that reserves IP addresses for future expansion. (don't waste IP addresses).

-The loopback address is 30.0.0.1/30**(use the loopback address as the last resort).**

-Use only protocols, configuration, and connection types you learned in the class. Don't use MPLS, VPN, and cloud between WANs.

Network System Implementation:

- Execute the network design using Packet Tracer Simulator, ensuring all specifications are met and documenting the process.

Part 3: The Report

A:

1- Comprehensive Network Design Description:

- Include a detailed step-by-step plan on designing the Local Area Network, with complete subnetting information in table format.
- Present a clear blueprint of the overall network, showcasing all servers, devices, and their placements across all locations. Utilize Packet Tracer snapshots for visual representation.
- Detail network configuration for each device, including valid IP ranges, specific configurations (dynamic or static as applicable), router interfaces with IP addresses, protocols used, and security measures like passwords.

2- Server Installation and Services:

- List the servers to be installed, specifying the services each will provide. At least five services must be included, with DHCP being mandatory.
- Justify the selection of these services, considering application needs, server operating systems, hardware specifications, infrastructure requirements, cost, and performance optimization.
- Provide configurations for each service and the static IP address allocation for each server.

3- Detailed Test Plan :

- Clearly outline what aspects of the network will be tested, including connectivity, service availability, security protocols, and performance metrics.
- Specify the tools or commands to be used for each test, such as Ping, extended ping, traceroute, nslookup, telnet, FTP, ipconfig, etc.

- Present expected results for each test to establish a baseline for assessing the network's functionality and performance.

4- Maintenance Schedule :

- Develop a detailed maintenance schedule to ensure the network's long-term reliability and performance. This schedule should include regular checks on hardware health, software updates, security patch applications, and network performance assessments.
- Highlight procedures for routine backups, disaster recovery plans, and contingency measures to handle unexpected network outages or breaches.
- Include a plan for scalability to accommodate future network growth, additional devices, or expanded communication requirements.

5- Critically evaluate the *logical topology protocol* you selected to demonstrate the efficient utilization of a networking sys.

6- Explore Server Types :

Investigate various server types and justify the selection of specific servers for Data Tech Company, considering aspects like cost, performance optimization, and suitability for the services require

7- Discuss the inter-dependences of the hardware (devices like servers, workstations, client PC, routers, switches…etc) with relevant networking software.(Hint. the packet trip in each device as an example).

B:Implementation, Testing, and Enhancements

1. **Verification and Test Results:**

- Conduct comprehensive testing based on the detailed test plan, record all results, and analyze these against the expected outcomes.
- Highlight any discrepancies and take corrective actions as needed.

2. **Enhancements and Future Proofing:**

- Based on the test results and analysis, recommend potential enhancements to improve network efficiency, security, and scalability.
- Discuss the significance of timely upgrades and adhering to evolving security requirements to safeguard the network.

3. **Critical Reflection:**

- Reflect critically on the entire process, from design and implementation to testing and future planning. Discuss the decisions made, the challenges encountered, and how they were overcome.
- Consider how the design and implementation strategies contribute to the network's adaptability to future technological advancements and business needs.

Learning Outcomes and Assessment Criteria			
Learning Outcome	**Pass**	**Merit**	**Distinction**
LO1 Examine networking principles and their protocols.	**P1** Discuss the benefits and constraints of different network types and standards **P2** Explain the impact of network topology, communication and bandwidth requirements.	**M1** Assess common networking principles and how protocols enable the effectiveness of networked systems.	**D1** Evaluate the topology protocol selected for a given scenario to demonstrate the efficient utilisation of a networking system.
LO2 Explain networking devices and operations.	**P3** Discuss the operating principles of networking devices. **P4** Discuss the inter-dependence of workstation hardware with relevant networking software.	**M2** Explore a range of server types and justify the selection of a server, for a given scenario regarding cost and performance optimisation.	
LO3 Design efficient networked systems.	**P5** Design a networked system to meet a given specification. **P6** Design a maintenance schedule to support the networked system	**M3** Analyse user feedback on your designs with the aim of optimising your design and improving efficiency	**D2** Critically reflect on the implemented network, including the design and Decisions made to enhance the system
LO4 Implement and diagnose networked systems.	**P7** Implement a networked system based on a prepared design. **P8** Document and analyse test results against expected results.	**M4** Recommend potential enhancements for the networked systems.	