جامعة الحسين التقنية
Al Hussein Technical University

# ASSIGNEMNT BRIEF

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| HTU Course No: 30201110 | HTU Course Name: Networking |
| BTEC UNIT No: H/615/1619 | BTEC UNIT Name: Networking |

Assignment Brief Number: 10

Version: 3

جامعة الحسين التقنية
Al Hussein Technical University

# Assignment Brief

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|---|---|
| Student Name/ID Number | |
| HTU Course Number and Title | **30201110 Networking** |
| BTEC course number and title | **H/615/1619 Networking** |
| Academic Year | 2021/2022 (Spring Semester) |
| Assignment Author | Eng. Moath Sulaiman |
| Course Tutor | Eng. Hebah Dahoud, Eng. Sami Al-Mashaqbeh, Eng. Moath Sulaiman |
| Assignment Title | J-Games |
| Assignment Ref No | Assignment 10 |
| Issue Date | **May 12, 2022** |
| Formative Assessment dates | **April 24, 2022; May 15, 2022** |
| Submission Date | **June 16, 2022** |
| IV Name & Date | Dr. Eyad Taqieddin May 9, 2022 |

**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.
b) **Evidence** of the implemented network (**soft copy of the .pkt** file). Students should use the **Cisco Packet Tracer** simulator **version 8.1.1**
c) **Oral/Viva** discussion about the **report** and the **simulated work.** Instructions, date, and time for the discussion will be provided later. A witness statement and/or observation record is considered as evidence for this part.

**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. The expected word limit is about 5000 words (recommended 20-25 pages including designs/screenshots/images…etc), although you will not be penalised for exceeding the total word limit. Do your best to be within the word limit. 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. Must be 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 from 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 for J-Games. J-Games is a Jordanian game development company that develop electronic games for Android, IOS and PlayStation platforms. J-Games accomplished huge profit due to their last three games and planning to have more projects this year. Therefore, they seek to extend their team and operations via opening multiple regional offices. The top management decided to open offices in India, UK, and the US in addition to the HQ in Amman. J-Games has a project to connect those offices together and you were employed to be part of this project team.

The main datacenter for J-Games is located in the same building of the (HQ) in Amman, but it is configured as a separate subnet within the HQ network. The remote offices should be connected to the datacenter, as well as to each other, to access and share projects data and that employees can collaborate with each other.

Based on the business requirements, it has been decided that employees, in J-Games offices, shall:

1. have access to the company internal system used to share project tasks and data through a secure website (https://projects.jgames.com.jo/ ). The access should be done using FQDN (Fully Qualified Domain Name).
2. be able to share and transfer files (like reports, images, etc..) among all remote offices.
3. be able to send and receive emails for each other.
4. be able to connect some portable devices to the local network wirelessly and securely.

Part1:

Regarding the network infrastructure for the remote offices to be implemented, your team leader asked for a meeting to all team members and to discuss different aspects of the project. You were told that in this discussion you will cover the followings *(although those topics to be covered in the discussion, you might write some headlines about them in the report for your own practice)*:

1. discussion about different Network types (minimum four) that might be used in this project including their usage, benefits, and constraints. You should recommend what network types to be used for the project.
2. Explanation of different physical network topologies and their characteristics. Provide detailed comparison (in table format) between any two of the network topologies of your choice. You should select a network topology to be used for the project.
3. Critically evaluate the topology protocol you selected to demonstrate the efficient utilisation of a networking system.

4. Identify Networking Protocols that are needed to achieve the business requirements above. Provide an explanation for each of them.
5. Identify the networking devices (minimum five) that you think might be needed for this project (not necessarily to be implemented in the simulation). Discuss the operating principles of each of them.
6. Explore a range of server types and justify the selection of the servers to be implemented, taking into consideration applications used, infrastructure needs, cost, and performance optimization.
7. Discuss the inter-dependences of the hardware (devices like servers, client PC, routers…etc) with relevant networking software.

Part 2: Design efficient networked systems

As you showed good understanding of the networking principles in the team discussion, your team leader asked you to propose a design (as per the specifications below) and simulate it in Packet Tracer network simulator to evaluate it before the actual implementation. The specifications are:

HQ datacenter:

People: 2 administrators.

Resources: 2 PCs, all servers, no Wi-Fi should be provided in the datacenter

Each J-Games office including Amman Office:

Resources: 7 computers used to access the e-services required, 1 network printers, Wi-Fi access.

- Each station must use different IP subnet than the other remote offices.
- It is expected to have more employees in the future, but not exceeding 22 employee per office.

You are required to:

1. Design a networked system to meet the business requirements listed above. You should include in your report a written step-by-step plan on how you are going to design a Local Area Network. Your design should include:
    a. a clear blueprint of your overall network including all servers and devices in all locations.
    b. Network configuration information for each station. (including devices, valid IP range used, IP configuration used, router configuration…. etc).
    The main subnet given to you as a Network Engineer as private IPS for the whole project is 172.16.16.0/24. For the IP configuration in all remote offices and the datacenter 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 50.0.0.0 with the proper subnet mask.
    c. Detailed information about the servers to be installed:
        i. Services to be installed (minimum five services) with proper justification.
        ii. Configuration of each service
        iii. IP address of the server.

2. Produce a detailed test plan (NOT TEST RESULTS) to test the design against the requirements above. The plan should cover the following:
    a. What to be tested
    b. Tools or commands used for testing.
    c. Expected results.
3. Provide a maintenance schedule to support the networked system.

Part 3: Implement, test, and diagnose networked systems

1. Implement a networked system based on your prepared design. (using Packet Tracer Simulator)
2. Conduct verification with packet sniffer, Ping, extended ping, trace route, nslookup, telnet, ftp, etc.
3. Record the test results and analyse these against expected results.
4. Recommend potential enhancements and investigate what functionalities would allow the networked system to support device growth and the addition of communication devices.
5. Discuss the significance of upgrades and security requirements in your recommendations.
6. Use critical reflection to evaluate own work and justify valid conclusions.

| 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.<br><br>**P2** Explain the impact of **network topology**, communication and bandwidth requirements. | **M1 Compare** common networking principles and how **protocols** enable the **effectiveness** of networked systems. | **D1** Critically 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.<br><br>**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, considering a **given scenario regarding cost and performance optimisation**. | |
| **LO3** Design efficient networked systems | | | |
| | **P5** Design a networked system to meet a given specification.<br><br>**P6** Test and evaluate the design to meet the requirements and analyse user feedback. | **M3** Install and configure network services and applications on your choice. | **D2** Design a maintenance schedule to support the networked system. |
| **LO4** Implement and diagnose networked systems | | | |
| | **P7** Implement a networked system based on a prepared design.<br><br>**P8** Document and analyse test results against expected results. | **M4** Recommend potential enhancements for the networked systems. | **D3** Use critical reflection to evaluate own work and justify valid conclusions. |

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# STUDENT ASSESSMENT SUBMISSION AND DECLARATION

When submitting evidence for assessment, each student must sign a declaration confirming that the work is their own.

<table>
<tr><td colspan="2">Student name:<br><br>Student ID:<br><br>Is the student repeating the unit? ☐ Yes ☐ No</td><td>Assessor name:<br>Eng. Hebah AlDahoud<br>Eng. Sami Mashaqbeh<br>Eng. Moath Sulaiman</td></tr>
<tr><td>Issue date:<br>12/5/2022</td><td>Submission date:<br>16/6/2022</td><td>Submitted on:</td></tr>
<tr><td colspan="3">Programme: Computing</td></tr>
<tr><td colspan="3">HTU Course Name: Networking BTEC Course name: Networking<br><br>HTU Course Code: 30201110 BTEC Course Code: H/615/1619</td></tr>
<tr><td colspan="3">Assignment number and title: Assignment 10: J-Games.</td></tr>
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## Plagiarism

Plagiarism is a particular form of cheating. Plagiarism must be avoided at all costs and students who break the rules, however innocently, may be penalised. It is your responsibility to ensure that you understand correct referencing practices. As a university level student, you are expected to use appropriate references throughout and keep carefully detailed notes of all your sources of materials for material you have used in your work, including any material downloaded from the Internet. Please consult the relevant unit lecturer or your course tutor if you need any further advice.

Student declaration

I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

Student signature: Date: