Module Number: SWE4202

Module Name: Computing Infrastructure
Year/Semester: 2023-24 / Semester 2

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Assessment Number	1
Assessment Type and Weighting	Report of 3000 words (+/- 10%) and 100%
Assessment Name	Coursework Portfolio
Assessment Submission Date	Week 15

Learning Outcomes assessed

LO1: Explain the features of systems hardware, software, network, and security in addition to services provided.
LO2: Apply networking principles and protocols to solve a given problem.
LO3: Create a comprehensive deployment strategy for the new infrastructure.
LO4: Formulate scripted solutions to automate operating system services.
LO5: Implement practical solutions based on the client/server model to solve a given problem.

<u>Assessment Brief</u>

Task 1: Design a Scalable IT Infrastructure for TechXcel Solutions

Scenario:

You are the newly appointed Infrastructure Architect at TechXcel Solutions, a fast-growing consultancy firm. Your task is to design an IT infrastructure that supports this growth. Analyse existing systems to ensure they offer adequate security and are meeting the needs of the organization.

- It is necessary to coordinate with all departments of the organization to ensure that the system performs as it should.

- Analysing business requirements to determine where new hardware, operating systems, or connectivity solutions can be integrated.

With its expansion, TechXcel has acquired a new office in the north of England (Liverpool), and the Chief Information Officer (CIO) has requested a report outlining the computing infrastructure options the company can use to support its digital services.

The firm's details are as follows:

- Since most business processes are digitally supported, high availability and operational performance are essential to the firm's operations.

- Remote consultancies store sensitive client medical information, so security is of utmost importance.

- Data Centres are located at the main London site.

- There will be thirty (30) consulting executives at the new office in Liverpool. However, there is no technological infrastructure in place and will need to be acquired.

Steps:
1. Understand Company Needs:
   - Evaluate the company's future IT needs, including expansion plans.
   - Speak with stakeholders to gather information.

2. Evaluate Current IT Setup:
   - Review the existing network, hardware, software, and security systems.
   - Identify areas that need improvement.

3. Design the Infrastructure:

- Components: Networking, Security, Hardware, Software.
- Goals: Scalability, reliability, and cost-effectiveness.

4. Connect Multiple Sites:
   - Build a network to securely connect different office locations.
   - Ensure efficient data transmission and network performance.

5. Future-Proof the Design:
   - Make sure the infrastructure can grow with the company.
   - Think about cloud services, a larger workforce, and new technologies.

6. Add Security and Compliance:
   - Implement security protocols like encryption and firewalls.
   - Ensure compliance with industry regulations.

7. Use Cisco Packet Tracer:
   - Tool: Simulate the network using Cisco Packet Tracer.

Create network diagrams and test performance.

8. Project Management:
   - Plan the deployment with clear timelines and resource management.

9. Testing:
   - Test network efficiency and performance.
   - Make necessary optimizations.

Deliverables:
- Network design diagrams created in Cisco Packet Tracer.
- Analysis of existing and proposed systems.
- Testing results and deployment plan.

Task 2: Scenario

Scenario:
TechXcel is shifting to a cloud-first approach to increase flexibility and reduce costs. You are required to create a strategy for this migration.

Steps:
1. Analyse Cloud Costs:
   - What are the costs of migrating to the cloud?
   - Look at both the short-term (migration) and long-term (maintenance) expenses.

2. Plan for Mobility and Remote Access:
   - How will employees work remotely?
   - Consider application portability, data accessibility, and network readiness.

3. Evaluate Current Cloud Skills:
   - Assess the team's cloud management skills.
   - Suggest training programs to bridge any gaps.

4. Ensure Scalability and Security:
   - Plan for scalable cloud solutions that can grow with the company.
   - Implement strong security measures for cloud data protection.

5. Cloud Storage and Backup:
   - Ensure reliable cloud storage and backup processes.
   - Plan for disaster recovery in case of failure.

Deliverables:
- A detailed cloud adoption strategy that addresses cost, scalability, security, and performance.
- Use Cisco Packet Tracer to visualize the network's connection to cloud resources.

Task 3. Write a Socket Programming Using Python

Scenario:
You are assigned a project to set up a client-server communication system using Python sockets.

Steps:
Step 1: Create a basic client-server connection where one client communicates with the server.
Step 2: Modify the program to support 10 clients connecting to the server.
- What happens when all clients try to connect? Do they succeed or fail?
Step 3: Modify the server to send a message back to the client each time a message is received.
Step 4: Switch from TCP to UDP and observe the differences when multiple clients connect simultaneously.

Deliverables:
- Python code demonstrating each step.
- A report explaining the behaviour and results of each test.

Assessment Deliverables:

You are required to produce a report (+/- 3000 words) that discusses all the above factors in Task 1 and Task 2.

Minimum Secondary Research Source Requirements:
Level HE4 - It is expected that the Reference List will contain between five and ten sources. As a MINIMUM the Reference List should include one refereed academic journal and three academic books.

Assessment Marking Scheme:

Components	Grade
Task 1. Details about the hardware and software, network, and security specifications, along with the features that support the firm's digital services, should be	40%

detailed in the report. In addition, a reasonable networking strategy should be included with details on principles and protocols supporting digital services. It is essential that a network diagram be included and discussed in this section. ▪ Considering the lack of specificity in the scenario, it is expected that you will make assumptions; however, all assumptions need to be reasonable and clearly stated in your report. ▪ During the analysis, alternatives, and models should be discussed in detail, along with the justification for your chosen strategy. ▪ Put in place strong security procedures to safeguard customer information, intellectual property, and sensitive data. ▪ Create a comprehensive deployment strategy for the new infrastructure. To ensure a successful transition, coordinate with cross-functional teams, including IT personnel, project managers, and stakeholders. Follow the project's development, address any problems, and guarantee on-time, cost-effective delivery. (1500 Words Maximum +/-10%)	
Task 2: ▪ Cloud adoption costs ▪ Mobility/Migration/Portability/Remote access ▪ Skills/Dependence on the cloud/Elasticity/Transparency/Standards ▪ Scalability, accessibility, security, and availability/virtualisation ▪ Cloud performance and storage environment (1000 Words Maximum +/-10%)	25%
Task 3: Client/server communication (500 Words Maximum +/-10% /comments)	20%
Report structure and referencing	10%
Demonstration (Week14)	5%

Formatting requirements

- References list must include a minimum of 5-10 academic sources with a minimum of 3 peer-reviewed academic journals. Harvard referencing format must be used to credit secondary research sources. In-text citations should be included within your discussion (where relevant) using the author-date format and full reference details should be included in your bibliography.
- Diagrams should be captioned and discussed in the body of your report.
- A table of contents should be included.
- Page numbers should be inserted in the centre of the footer.
- The student ID number be placed in the header of each page.

Submission

Please submit to the Turnitin assignment section through Canvas.

Grading

A percentage mark will be provided based on *General Assessment Guidelines for Written Assessments*. Grading is as follows:

A: 70 − 100%	B: 60 − 69%	C: 50 − 59%	D: 40 − 49%	F: Below 40%

Glossary:

- Analyse: Break an issue or topic into smaller parts by looking in depth at each part. Support each part with arguments and evidence for and against (Pros and cons)
- Critically Evaluate/Analyse: When you critically evaluate you look at the arguments for and against an issue. You look at the strengths and weaknesses of the arguments. This could be from an article you read in a journal or from a textbook.
- Discuss: When you discuss you look at both sides of a discussion. You look at both sides of the argument. Then you look at the reason why it is important (for) then you look at the reason why it is important (against).
- Explain: When you explain you must say why it is important or not important.
- Evaluate: When you evaluate you look at the arguments for and against an issue.
- Describe: When you give an account or representation of in words.
- Identify: When you identify you look at the most important points.
- Define: State or describe the nature, scope, or meaning.
- Implement: Put into action/use/effect
- Compare: Identify similarities and differences
- Explore: To find out about
- Recommend: Suggest/put forward as being appropriate, with reasons why.

GENERAL ASSESSMENT GUIDELINES – LEVEL HE4

	Relevance Learning outcomes must be met for an overall pass	Knowledge and Understanding	Analysis, Creativity and Problem-Solving	Self-awareness and Reflection	Research/ Referencing	Written English	Presentation and Structure
Class I (Exceptional Quality) 85% - 100%	Work is directly relevant and expertly addresses the requirements of the brief. Learning outcomes are met.	Demonstrates breadth of knowledge and understanding of theory and practice beyond the threshold expectation for the level. Demonstrates excellent understanding of key concepts in different contexts.	Presents an excellent and cohesive appraisal of findings through the critical analysis of information. Draws clear, justified and thoughtful conclusions. Demonstrates creative flair, originality and initiative. Demonstrates a critical understanding of problem-solving approaches and applies strong problem-solving skills.	Provides insightful reflection and self-awareness in relation to the outcomes of own work and personal responsibility.	A wide range of contemporary and relevant reference sources selected and drawn upon. Sources cited accurately in both the body of text and in the Reference List/ Bibliography.	Writing style is clear and appropriate to the requirements of the assessment. An exceptionally well written answer with competent spelling, grammar and punctuation. For example, paragraphs are well structured and include linking and signposting. Sentences are complete and different types are used. A wide range of appropriate vocabulary is used.	The presentational style and layout are correct for the type of assignment. Evidence of planning and logically structured. Where relevant, there is effective placement of, and reference to, figures, tables and images.
Class I (Excellent Quality) 70% - 84%	Work is relevant and comprehensively addresses the requirements of the brief. Learning outcomes are met.	Demonstrates an excellent breadth of knowledge and understanding of theory and practice for this level. Demonstrates in-depth understanding of key concepts.	Presents an excellent and cohesive discussion of findings through the interpretation and evaluation of information sources. Draws clear, justified and thoughtful conclusions. Demonstrates clearly creativity and initiative. Applies excellent problem-solving skills.	Provides excellent reflection and self-awareness in relation to the outcomes of own work and personal responsibility.	A range of contemporary and relevant reference sources selected and drawn upon. Sources cited accurately in both the body of text and in the Reference List/Bibliography.	Writing style is clear and appropriate to the requirements of the assessment. An excellently well written answer with competent, spelling, grammar and punctuation. For example, paragraphs are well structured and include linking and signposting. Sentences are complete and different types are used. A wide range of appropriate vocabulary is used.	The presentational style and layout are correct for the type of assignment. Evidence of planning and logically structured. Where relevant, there is effective placement of and reference to, figures, tables and images.
Class II/i (Very Good Quality) 60% - 69%	Work is relevant and addresses most of the requirements of the brief well. Learning outcomes are met.	Demonstrates a thorough breadth of knowledge and understanding of theory and practice for this level. Demonstrates very good understanding of key concepts.	Presents a perceptive and cohesive discussion of findings through the interpretation and evaluation of information sources. Draws clear and justified conclusions. Demonstrates creativity and initiative. Applies strong problem-solving skills.	Provides justified reflection and self-awareness in relation to the outcomes of own work and personal responsibility, as required by the assessment.	A range of appropriate reference sources selected and drawn upon. Sources cited accurately in the main in the text and in the Reference List/ Bibliography.	Writing style is clear and appropriate to the requirements of the assessment. A very well written answer with competent spelling, grammar and punctuation. For example, paragraphs are well structured and include linking and signposting. Sentences are complete and different types are used. A range of appropriate vocabulary is used.	The presentational style and layout are correct for the type of assignment. Evidence of planning and logically structured in the main. Where relevant, there is effective placement of figures, tables and images.

	Relevance Learning outcomes must be met for an overall pass	Knowledge and Understanding	Analysis, Creativity and Problem-Solving	Self-awareness and Reflection	Research/ Referencing	Written English	Presentation and Structure
Class II/ii (Good Quality) 50% - 59%	Work addresses key requirements of the brief. Some irrelevant content. Learning outcomes are met.	Demonstrates a sound breadth of knowledge and understanding of theory and practice for this level. Demonstrates sound understanding of key concepts.	Presents a logical discussion of findings through the interpretation and evaluation of information sources. Draws clear and justified conclusions. Demonstrates some creativity and initiative. Applies sound problem-solving skills.	Provides valid reflection and self-awareness in relation to the outcomes of own work and personal responsibility, as required by the assessment.	Relevant reference sources selected and drawn upon. Some sources accurately cited in both the body of text and in the Reference List/Bibliography.	Writing style is mostly appropriate to the requirements of the assessment -Grammar, spelling and punctuation are generally competent and minor lapses do not pose difficulty for the reader. Paragraphs are structured and include some linking and signposting. Sentences are complete. A range of appropriate vocabulary is used.	The presentational style and layout are largely correct for the type of assignment. Logically structured in the most part. Where relevant, effective placement of some figures, tables and images.
Class III (Satisfactory Quality) 40% - 49%	Work addresses the requirements of the brief, although superficially in places. Some irrelevant content. Learning outcomes are met.	Demonstrates a sufficient breadth of knowledge and understanding of theory and practice for this level. Demonstrates a sufficient understanding of key concepts.	Presents a valid discussion of findings through the interpretation and evaluation of information sources. Draws justified conclusions. Demonstrates creativity and initiative in places. Applies sufficient problem-solving skills.	Provides some reflection and self-awareness in relation to the outcomes of own work and personal responsibility, as required by the assessment.	Some relevant reference sources selected and drawn upon. Some weaknesses in referencing technique.	Writing style is occasionally not appropriate for the assessment. Grammar, spelling and punctuation are generally competent, but may pose minor difficulties for the reader. Some paragraphs may lack structure, and there is limited linking and signposting. Some appropriate vocabulary is used	The presentational style and layout are largely correct for the type of assignment. Adequately structured. Inclusion of some figures, tables and images but not always relevant and/or clear.
Borderline Fail 35% - 39%	Work addresses only some of the requirements of the brief. Irrelevant and superficial content. One or more learning outcomes have not been met.	Demonstrates limited knowledge and understanding of theory and practice for this level. Demonstrates a lack of understanding of key concepts.	Presents a limited discussion of findings through the interpretation of information sources. Draws some irrelevant conclusions. Creativity and initiative are lacking. Problem-solving skills are lacking.	Provides limited reflection and self-awareness in relation to the outcomes of own work and personal responsibility, when required.	Sources selected are limited and lack relevance. Poor referencing technique employed.	Writing style is unclear and does not match the requirements of the assessment in question. Deficiencies in spelling, grammar and punctuation makes reading difficult and arguments unclear in places. Paragraphs are poorly structured.	For the type of assignment the presentational style, layout and/or structure are lacking. Figures, tables and images included when required but these lack clarity and relevance.
Fail <34%	Work does not address the requirements of the brief. Irrelevant and superficial content. One or more learning outcomes have not been met.	Demonstrates inadequate knowledge and understanding of theory and practice for this level. Demonstrates insufficient understanding of key concepts.	Presents a limited discussion of findings with little consideration of the quality of information drawn upon. Draws irrelevant conclusions. Creativity, initiative and problem-solving skills are absent.	Provides inadequate reflection and self-awareness in relation to the outcomes of own work and personal responsibility, when required.	There is an absence of relevant sources. Poor referencing technique employed.	Writing style is unclear and does not match the requirements of the assessment in question. Deficiencies in spelling, grammar and punctuation makes reading difficult and arguments unclear. Unstructured paragraphs.	For the type of assignment the presentational style, layout and/or structure are lacking. Figures, tables and images are absent when required or lack relevance/clarity.