

Module Number: SWE4303

Module Name: Computing Infrastructure

Year/Semester: 2025-26 / Semester 2

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| Assessment Number | Assignment 1 |
| Assessment Type (and weighting) | Report 1500 (+/- 10%) words 40% |
| Assessment Name | Network implementation for medical services |
| Assessment Submission Date | Week 8 |

Use of Generative Artificial Intelligence (GAI) Applications in this Assessment

| AI Status | Application | Notes |
|------------|---------------------------|---|
| Category A | No GAI tool is permitted. | While grammar and/or spell checkers may be used to correct individual words and sentences, the use of GAI is not allowed. This is because the learning outcomes require you to produce original assessment work without any GAI assistance <u>Any GAI generated content which is presented as your own original work and is not acknowledged will be assessed for academic misconduct.</u> |

Learning Outcomes:

LO1: Justify a network infrastructural strategy to support service requirements based on a given brief.

LO2: Apply networking principles and protocols to solve a given problem

Assessment Brief

Instructions:

- Written assessments should be word-processed in Arial or Calibri Light font size 12. There should be double-spacing, and each page should be numbered.
- All work must be submitted on Canvas by the due date. Turnitin similarity score must not exceed 20%.
- The assignment must be in MS Word format which complies with academic standards and includes appropriate section headings.
- Reference sources must be cited in the text of the report and listed appropriately at the end in a reference list using Harvard referencing style.
- Late submission within 7 days after the expiry of the initial deadline is allowed but will incur a 10 marks deduction penalty. Any submission past this period will not be marked unless a formal submission extension has been authorised.

Company Overview: MediNet Health Services

Sector: Healthcare and Medical Technology

Headquarters: United Kingdom

Branch: United States (newly launched diagnostic clinic)

| Business | Objective |
|--|------------------|
| MediNet Health Services is a UK-based private healthcare organisation with a growing network of clinics and diagnostic centres. Their main office in London (with 45 administrative and IT staff) now oversees a newly established medical diagnostics branch in the United States (25 clinical and administrative staff). As part of its digital transformation, MediNet aims to implement a highly secure, reliable, and scalable network infrastructure to enable real-time data sharing between clinics, remote patient monitoring, centralized EMR (Electronic Medical Records) access, and secure video consultations. | |

Assignment Task

You have been contracted to design and implement a healthcare-grade network infrastructure for MediNet. This network should support compliance with industry regulations such as General Data Protection Regulation (GDPR) and Health Insurance Portability and Accountability Act (HIPAA), maintain the availability of life-critical applications, and ensure secure connectivity across clinical systems, remote users, and medical devices.

Deliverables: Technical Design and Implementation Report

Part 1: Justify a Network Infrastructure Strategy (LO1)

Key Tasks:

1. Infrastructure Planning and Strategy

Using suitable literatures, discuss MediNet's networking requirements in a clinical environment including electronic medical records (EMR) access; secure video conferencing for telemedicine; staff VoIP communications; and real-time patient monitoring devices (IoT) etc.

Propose a secure and compliant infrastructure strategy supporting multi-site interconnectivity, healthcare-specific availability and redundancy measures, network segmentation (clinical vs. guest), and cloud-hosted backup and disaster recovery systems. Justify the methodology used.

Identify infrastructure components such as layer 3 switches and core routers; firewalls; IDS/IPS; authentication servers (e.g., LDAP/RADIUS); and IoT network controllers. You should consider referencing industry best practices: Cisco's Hierarchical Model, and/or Zero Trust Architecture in healthcare.

2. Security Architecture (CIA Triad & Compliance Focus)

Develop a healthcare-grade security framework focusing on confidentiality: encryption for medical data and access control to EMR systems; integrity: secure data transmission protocols and audit logs; and availability: redundancy in internet links and medical device connectivity.

The security features should include role-based access control (RBAC) for clinical and admin users; access control lists (ACLs) for patient vs. staff zones; endpoint protection for connected IoT/medical devices; site-to-site virtual private network (VPN); and secure socket layer (SSL) VPN for remote consultations and backup systems for patient data (on-prem/cloud hybrid) etc.

Deliverable: A comprehensive report detailing the proposed network infrastructure strategy and security framework with justifications for each chosen component. Note: screenshots of the design/practical work should be included in the report with suitable discussion and supported with literatures.

Part 2: Apply Networking Principles and Protocols (LO2) - Simulation and Deployment Plan

Use Cisco Packet Tracer to simulate the network topology for the headquarters and clinic branch while considering: routing (e.g., OSPF); subnetting; and Virtual Local Area Network (VLAN) setup (Clinical, Admin, Guest Wi-Fi, IoT); Internet Protocol (IP) addressing schemes; redundant links and VPN tunnels; and traffic segmentation for sensitive devices.

Deliverables: A practical implementation plan and a network setup in a simulated environment. Note: screenshots of the design/practical work should be included in the report with suitable discussion and supported with literatures. The Cisco Packet Tracer file should be uploaded as a separate file on Canvas.

Part 3: Personal Reflection

Write a reflective summary addressing your planning and decision-making process; key challenges (e.g., compliance, critical system uptime, etc); and lessons learned particularly around secure design for healthcare systems (200–250 words).

Declaration: At the end of the assessment, you should also include a declaration of any software tools including Generative AI (GAI) applications that you used in developing and completing the assessment.

Minimum Secondary Research Requirements:

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.

Specific Assessment Criteria/Marking Scheme:

First class (70% and above): students will provide

- An excellent justification of the network infrastructure strategy identifying the various components using references.
- An excellent discussion of the ways to implement the security of the company's services considering confidentiality, integrity and availability (CIA) triad while using suitable references.
- An excellent network design and implementation in packet tracer showing interconnectivity, testing, and validation.
- An excellent and insightful reflection on the overall process of completing the assessment.
- A comprehensive and well-structured written report following the format of Introduction, Task (1...n), Personal Reflection, Conclusion, References and Appendix.
- Extensive research demonstrating use of a wide range of well selected secondary research sources will be evident. Academic writing style, English and referencing will be excellent.
- Excellent participation in class activities

Upper Second Class 2(1) (60-69%): students will provide

- A thorough justification of the network infrastructure strategy identifying the various components using references.
- A comprehensive discussion of the ways to implement the security of the company's services considering confidentiality, integrity and availability (CIA) triad while using suitable references.
- A very good network design and implementation in packet tracer showing interconnectivity, testing, and validation.
- A comprehensive reflection on the overall process of completing the assessment.
- A very good and well-structured written report following the format of Introduction, Task (1...n), Personal Reflection, Conclusion, References and Appendix.
- Thorough research demonstrating use of a wide range of well selected secondary research sources will be evident. Academic writing style, English and referencing will be very good.
- Very good participation in class activities

Lower Second Class 2(2) (50-59%): students will provide

- A sound justification of the network infrastructure strategy identifying the various components using references.
- A logical discussion of the ways to implement the security of the company's services considering confidentiality, integrity and availability (CIA) triad while using suitable references.
- A thoughtful network design and implementation in packet tracer showing interconnectivity, testing, and validation.
- A sound reflection on the overall process of completing the assessment.
- An acceptable and well-structured written report following the format of Introduction, Task (1...n), Personal Reflection, Conclusion, References and Appendix.
- A good research demonstrating use of a wide range of well selected secondary research sources will be evident. Academic writing style, English and referencing will be good.
- Good participation in class activities

Third class (40-49%): students will provide

- A satisfactory justification of the network infrastructure strategy identifying the various components using references.
- A satisfactory discussion of the ways to implement the security of the company's services considering confidentiality, integrity and availability (CIA) triad while using suitable references.
- An acceptable network design and implementation in packet tracer showing interconnectivity, testing, and validation.
- A sufficient reflection on the overall process of completing the assessment.
- A satisfactory written report following the format of Introduction, Task (1...n), Personal Reflection, Conclusion, References and Appendix.
- A satisfactory research demonstrating use of a wide range of well selected/some secondary research sources will be evident. Academic writing style, English and referencing will be satisfactory.
- Satisfactory participation in class activities

Fail (39% and below): Students who do not meet the requirements of a third-class grade will not successfully complete the assessment.

| Assessment Criteria/Marking Scheme | Maximum Mark |
|--|--------------|
| Network infrastructure strategy | 20 |
| Security implementation | 20 |
| Network design, validation and testing | 30 |
| Participation in class activities | 10 |
| Personal reflection | 10 |
| Report writing | 10 |
| Total | 100 |

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. |