



ICTICT428

Select cloud storage solutions

Assessment 3 of 3

Project

Assessor Guide



Assessment Instructions

Task Overview

This assessment task is divided into six (6) parts. Read the scenario in Part A and complete the associated tasks in Parts B, C, D, E and F. Project tasks include completing practical tasks in a simulated work environment, such as drafting workplace documentation (e.g. business case, implementation plan, email).

Please provide all required screenshot evidence and written responses in the spaces provided.

Important: Before commencing your work, you must update your *Student name* and *Student number* in the footer from **page 2** onwards.

Additional Resources and Supporting Documents

To complete this assessment, you will need:

- TWS_Email_template.docx
- TWS_Stakeholder meeting transcript.pdf

Assessment Information

Submission

You are entitled to three (3) attempts to complete this assessment satisfactorily. Incomplete assessments will not be marked and will count as one of your three attempts.

All questions must be responded to correctly to be assessed as satisfactory for this assessment.

Answers must be typed into the space provided and submitted electronically via the Learning Platform. Hand-written assessments will not be accepted unless previously arranged with your assessor.

Reasonable adjustment

Students may request a reasonable adjustment for assessment tasks.

Reasonable adjustment usually involves varying:

- the processes for conducting the assessment (e.g. allowing additional time)
- the evidence gathering techniques (e.g. oral rather than written questioning, use of a scribe, modifications to equipment)

However, the evidence collected must allow the student to demonstrate all requirements of the unit.

Refer to the Student Handbook or contact your Trainer for further information.



Please consider the environment before printing this assessment.

Part A: Project scenario and resources

All tasks in this assessment refer to a simulated environment where conditions are typical of an ICT workplace where cloud storage technologies may be used. The scenario relates to a fictitious business organisation called 'TechWave Solutions'.

Read the case study scenario carefully before completing the tasks in Part B.

A1. Scenario

Company background

'TechWave Solutions' is an Australian ICT services provider based in Sydney, specialising in software development, IT consulting, and data analytics. Established in 2010, the company has grown to employ over 200 professionals and services a diverse client base ranging from small startups to large corporations. TechWave Solutions is known for its innovation, customer-centric approach, and commitment to sustainability.



TechWave Solutions operates from its head office in Sydney, where the majority of its software development and data analytics projects are conducted. The company also has satellite offices in Melbourne and Brisbane, with teams working on various client projects that require seamless access to shared data and collaborative tools. Cloud storage technologies are primarily utilised at the Sydney headquarters but are essential for ensuring connectivity and data access across all locations.

Current challenges in data storage

The company is currently facing challenges with its on-premises data storage infrastructure, including limited scalability, high maintenance costs, and difficulties in providing seamless data access to remote offices in Melbourne and Brisbane.

Your role and responsibilities

You are **Alex Turner**, a newly hired Cloud Solutions Analyst responsible for assisting in the selection and implementation of cloud storage solutions that align with the organisational requirements of TechWave Solutions.

This role involves analysing data storage needs, evaluating cloud storage options, and developing strategies to ensure a smooth transition and integration of the chosen cloud storage solution.

You will play a crucial role in enhancing TechWave Solutions' data management capabilities by selecting and implementing efficient, secure, and scalable cloud storage solutions that meet the organisation's evolving needs.

A2. Data storage requirements and guidelines

TechWave Solutions handles a significant volume of sensitive data, including client information, proprietary software code, and analytics reports. The company's data storage requirements include:

- The ability to scale storage capacity up or down based on project demands.
- Robust security measures to protect sensitive client data and intellectual property.
- Ensuring data is easily accessible to authorised personnel across all locations.

- Adherence to Australian data protection regulations, such as the Privacy Act 1988 and the Australian Privacy Principles (APPs).

Data storage guidelines

Guidelines for data storage and information management at TechWave Solutions include regular data backups, encryption of data at rest and in transit, user access controls, and periodic audits to ensure compliance with regulatory requirements and adherence to work health and safety (WHS) and sustainability guidelines.

You are also aware of the industry standards and guidelines for cloud adoption by reviewing a range of information sources such as;

- [app-guidelines-combined-December-2022.pdf \(oaic.gov.au\)](#) (PDF)– online version ->- [Australian Privacy Principles guidelines | OAIC](#)
- The latest version of the ISM - [Information Security Manual \(ISM\) | Cyber.gov.au](#)
- Fact Sheets
 - [Cloud computing and privacy consumer factsheet \(infrastructure.gov.au\)](#) (PDF)
 - [Cloud computing and privacy small business factsheet \(infrastructure.gov.au\)](#) (PDF)

A3. WHS standards, guidelines and requirements

TechWave Solutions adheres to Australian Work Health and Safety standards and codes of practice by ensuring:

- that all activities related to the adoption and management of cloud storage comply with the WHS Act is crucial. This includes the setup, maintenance, and use of IT infrastructure and data centers
- a safe working environment for all employees outlined by 'Safe Work Australia' (<https://www.safeworkaustralia.gov.au/>) codes of practice, considering ergonomic guidelines for employees working with IT infrastructure, ensuring workstations are designed to minimise strain and injury
- that when implementing cloud storage solutions, compliance with regulations regarding electrical safety, safe manual handling, and the management of hazardous manual tasks is achieved.

A4. Sustainability standards, guidelines and requirements

In terms of sustainability, TechWave Solutions is committed to reducing its environmental impact through:

- Green IT strategies: Implementing green IT strategies and practices aimed at improving the sustainability of IT operations, including energy-efficient data centers and responsible e-waste management.
- Energy-Efficient Data Centres: Partnering with cloud providers that use renewable energy and implement energy-efficient practices.
- Remote Work Policies: Encouraging remote work to reduce the carbon footprint associated with commuting.

A5. Industry-accepted cloud storage options

TechWave Solutions prefers to evaluate cloud storage solutions from AWS, Microsoft Azure and Google Cloud Services due to their extensive feature sets, reliability, and strong presence in the Australian market.

The organisation prefers to select suitable cloud storage option(s) from the following list of products that are currently popular in the ICT industry.

- [Amazon S3 \(Simple Storage Service\)](https://aws.amazon.com/s3/) Long URL: <https://aws.amazon.com/s3/>
- [Amazon EBS \(Elastic Block Store\)](https://aws.amazon.com/efs/) Long URL: <https://aws.amazon.com/efs/>
- [Amazon EFS \(Elastic File System\)](https://aws.amazon.com/efs/) Long URL: <https://aws.amazon.com/efs/>
- [Azure Blob Storage](https://azure.microsoft.com/en-us/services/storage/blobs/) Long URL: <https://azure.microsoft.com/en-us/services/storage/blobs/>
- [Azure Disk Storage](https://azure.microsoft.com/en-us/products/storage/disks/) Long URL: <https://azure.microsoft.com/en-us/products/storage/disks/>
- [Azure Files](https://azure.microsoft.com/en-us/services/storage/files/) Long URL: <https://azure.microsoft.com/en-us/services/storage/files/>
- [Google Cloud Storage](https://cloud.google.com/storage) Long URL: <https://cloud.google.com/storage>
- [Persistent Disk](https://cloud.google.com/persistent-disk) Long URL: <https://cloud.google.com/persistent-disk>
- [Filestore](https://cloud.google.com/filestore) Long URL: <https://cloud.google.com/filestore>

A6. Cloud storage provider requirements and Service Level Agreements (SLA)

The Service Level Agreements (SLA) documentation from the organisation's preferred industry-standard cloud service providers can be accessed via the following links:

- [AWS Service Level Agreements \(amazon.com\)](https://aws.amazon.com/legal/service-level-agreements/) (Long URL: <https://aws.amazon.com/legal/service-level-agreements/>)
- [Service Level Agreements | Azure](https://www.azure.cn/en-us/support/sla/summary/) (Long URL: <https://www.azure.cn/en-us/support/sla/summary/>)
- [Google Cloud Platform Service Level Agreements](https://cloud.google.com/terms/sla/) (Long URL: <https://cloud.google.com/terms/sla/>)

Part B: Prepare a business case for cloud storage needs

In this part of the assessment, you will determine the need for cloud storage solutions according to the responsibilities of your role as a 'Cloud Solutions Analyst'.

To complete this part of the assessment, you are required to:

- read the scenario in Part A, section A1 and within this section, carefully
- review, evaluate and maintain an understanding of the information derived from the range of complex texts provided in Part A, sections A2-6
- analyse and synthesise the highly embedded mathematical information in the textual sources provided
- generate a written report (Business case) that documents the organisation's cloud storage requirements.

Scenario continued:

To address the current data storage issues, TechWave Solutions is evaluating whether a private cloud model or a hybrid cloud model would provide them with the optimal solution to meet their cloud storage needs.

This morning, you (Alex Turner) were in a meeting with TechWave Solution's key stakeholders to discuss organisational data storage requirements and guidelines. Refer to the transcript of this meeting by accessing 'TWS_Stakeholder meeting_transcript.pdf' document.

As a Cloud Solutions Analyst, you are tasked with reviewing TechWave Solutions' current data storage requirements, existing guidelines, and relevant industry standards discussed during the meeting. Your objective is to determine the necessity and suitability of cloud storage solutions within the scope of your responsibilities. This includes evaluating the current state of data storage, identifying data and security risks, and recommending a cloud storage deployment model that aligns with the organisation's needs and compliance requirements.

Your manager had requested that a business case be prepared to document the need for a cloud storage solution in a simple report format that includes the following key elements:

- Title
- Summary
- Body
- Conclusion

Tasks:

B1. Review, organise and evaluate the organisation's data storage requirements, guidelines, and industry standards from the range of resources provided in Part A of this assessment.

B2. Monitor (examine) the organisation's requirements and adherence to legislative requirements by carefully reviewing the discussion contents of the stakeholder meeting transcript 'TWS_Stakeholder meeting_transcript.pdf'.

B3. Write a report (Business Case) compiling the information reviewed in the previous task to determine the need for cloud storage solutions.

IMPORTANT: The report must include the following key elements:

- a. Title
- b. Introduction – a brief overview of the current data storage practices, including data types stored, and the aim of the document (50 – 75 words)
- c. Body of the report – this must include the following information under appropriate sub-headings:
 - i. limitations of the current data storage infrastructure (40-75 words)
 - ii. data storage requirements and guidelines, including any mathematical information (65-100 words)
 - iii. industry standards and best practices, including WHS and sustainability considerations (65-100 words)
 - iv. a list of data and security risks to be evaluated against the cloud storage options. (65-100 words)
 - v. recommendations on the appropriate cloud storage options for consideration. (65-100 words)
- d. Conclusion – a concluding paragraph justifying the need for cloud storage solutions (50 – 85 words)

Evidence of completing the task:

Write the report (Business Case) in the space within the template given below.

Assessor instructions: Students must determine the need for cloud storage solutions according to the responsibilities of their role as a 'Cloud Solutions Analyst' and demonstrate their ability to generate complex written texts using a writing style appropriate for a Business Case.

Students are likely to use different wording than the sample answer provided. However, the acceptable responses must:

- be within the specified word limit
- use the required documentation format, including the essential elements
- reflect the characteristics described in the exemplar answer.

A sample answer is provided below.



Introduction

TechWave Solutions currently utilises on-premises servers to store various types of data, including client information, proprietary software code, and analytical reports.

Currently facing challenges with its on-premises data storage infrastructure, TechWave Solutions is evaluating whether a private cloud model or a hybrid cloud model will best meet its cloud storage needs. This business case aims to analyse these options, considering data storage requirements, industry standards, and data security risks, and provide a recommendation.

Body of the report

Challenges and limitations of the current storage infrastructure:

The data storage infrastructure, while secure, faces several limitations:

- Our current on-premises infrastructure is limited by scalability issues,
- Occasional performance bottlenecks during peak usage times, impacting operational efficiency.
- High costs associated with hardware maintenance and upgrades.

Data storage requirements and guidelines

Based on consultations with department heads and IT staff, the following requirements and guidelines have been identified:

- Scalability: Ability to handle rapid data growth (i.e. at an annual rate of 20%) without significant capital investment in hardware.
- Security: Enhanced security measures, including encryption and regular backups, to protect sensitive data.
- Performance: Ability to provide the analytics teams with fast access to large datasets (i.e. maximum latency 50ms for data retrieval and uptime of at least 99.9%)
- Compliance: Adherence to the Privacy Act 1988 and Australian Privacy Principles, ensuring data protection and privacy.

Industry standards and best practices

These include:

- ISO/IEC 27018: A standard for protecting personal data in the cloud.
- NIST Guidelines: Recommendations for cloud security and data management.
- ASD Essential Eight: The Australian Cyber Security Centre's (ACSC) Essential Eight strategies to mitigate cybersecurity incidents, emphasising the need for robust security practices.

Additionally, we need to ensure our solutions:

- aligns with our sustainability goals, ensuring energy-efficient data centre operations and by leveraging renewable energy sources
- comply with work health and safety standards, providing ergonomic and safe working conditions for our employees.

Data and security risks evaluation

For TechWave Solutions, transitioning from on-premises servers to cloud storage introduces new data and security risks that need careful consideration; such as the following.

- Storing sensitive data in the cloud heightens the risk of unauthorised access.
- Potential loss or corruption due to hardware failures or insufficient backup systems.
- Compliance issues, necessitating adherence to data protection laws
- Data transmission between remote offices and cloud platforms increases interception risks.
- Challenges in data sovereignty laws, demanding compliance with local regulations.
- Relying solely on a cloud provider risks vendor lock-in and service interruptions, necessitating reliability assessments.

Recommendations on cloud storage option selection:

Based on the analysis, the hybrid cloud model is recommended for TechWave Solutions as it:

- offers the flexibility to scale using public cloud resources while maintaining critical data on-premises.
- can reduce maintenance costs by approximately 30%, saving around \$100,000 over the next three years by leveraging the public cloud for less sensitive data
- ensuring seamless data access for remote offices, improving collaboration and productivity.
- allows the storage of sensitive data in the private cloud with strict security controls, while public cloud resources can be used for less sensitive data, balancing security and accessibility.

Conclusion

TechWave Solutions faces significant challenges with its current on-premises data storage infrastructure. After evaluating the private and hybrid cloud models, the hybrid cloud model is recommended as the optimal solution. It provides scalability, cost efficiency, seamless data access, and robust security, addressing the company's primary requirements and ensuring compliance with industry standards. Implementing the hybrid model will enhance TechWave Solutions' ability to manage increasing data volumes, reduce costs, and provide secure data access across all locations, supporting the company's growth and sustainability objectives.

Assessor instructions:

Assessors are to indicate the task result as Satisfactory (S) or Not Yet Satisfactory (NYS).

Assessor comments:	<input type="checkbox"/> S	<input type="checkbox"/> NYS
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Part C: Cloud storage options comparison

In this part of the assessment, you are required to identify and evaluate multiple cloud storage options with respect to organisational data storage requirement.

When completing the task, you are required to:

- read the scenario carefully
- refer to the list of cloud storage options currently used in the industry as outlined in Part A, section A5 of this assessment.

Scenario continued:

You are tasked with evaluating potential cloud storage solutions from the organisation's preferred cloud storage providers to meet the following needs of the organisation.

Public Cloud Storage Solution Requirements:

- Utilise public cloud services for storing non-sensitive data and archival purposes.
- Cost-effective storage options.
- Integration with existing on-premises infrastructure.
- Flexibility to scale resources based on demand.
- Robust security measures to protect data in transit and at rest.

The solution should take into consideration the data and security risks identified in the Business Case (which you have created in Part B of this assessment).

Task:

C1. Select three (3) potential cloud storage solutions from three (3) different cloud storage providers that meet the needs of the organisation.

C2. Evaluate each cloud storage solution (options 1, 2 and 3) according to the following criteria and document your findings in 'Table 1'.

- Cloud service provider
- Cloud storage option (name)
- Data - in terms of storage capacity, data redundancy and other specific data risks identified in the Business Case. (10-25 words)
- Security - in terms of encryption, access control, compliance and also considering the specific security risks identified in the Business Case. (15 – 30 words)
- Performance - in terms of latency and retrieval (15 – 30 words)
- Usability - in terms of management, data transfer and integration (15 – 30 words)
- Advantages – broader organisational benefits (15 – 30 words)
- Disadvantages - broader organisational detriments (15 – 30 words)

Evidence of completing the task:

Assessor instructions: Students must identify and evaluate multiple cloud storage options with respect to organisational data storage requirements in the given scenario. The students must also consider the data and security risks identified in the Business Case when writing answers for Task C2 (c, d).

Students are likely to use different wording than the sample answer provided. However, the acceptable responses must:

- be within the specified word limit
- reflect the characteristics described in the exemplar answer.

A sample answer is provided below.

Table 1 - Answer table for Part C

Cloud storage solutions			
Criterion	Option 1	Option 2	Option 3
a. Cloud service provider	Amazon Web Services (AWS)	Microsoft Azure	Google Cloud Services
b. Cloud storage option	AWS S3	Azure Blob Storage	Google Cloud Storage

Cloud storage solutions

Criterion	Option 1	Option 2	Option 3
<p>c. Data (in terms of storage capacity and data redundancy and other specific data risks identified in the Business Case.) (30 - 65 words)</p>	<p>Storage Capacity: Virtually unlimited.</p> <p>Data Redundancy: Multiple redundancy options (Standard, Standard-IA, Glacier).</p> <p>Data sovereignty: Allows users to select specific regions for data storage, facilitating compliance with local data sovereignty laws by ensuring data remains within chosen jurisdictions.</p> <p>Vendor Lock-in: This risk is mitigated through standardised APIs, data export tools, and hybrid storage solutions like AWS Storage Gateway, allowing seamless integration and data migration.</p>	<p>Storage Capacity: Virtually unlimited.</p> <p>Data Redundancy: Locally redundant storage (LRS), zone-redundant storage (ZRS), geo-redundant storage (GRS).</p> <p>Data sovereignty: Allows data storage in specific regional datacenters, ensuring adherence to local data sovereignty laws by controlling the geographical location of stored data.</p> <p>Vendor Lock-in: This risk is reduced by supporting open standards and offering data migration tools, and hybrid solutions like Azure Stack for on-premises integration.</p>	<p>Storage Capacity: Virtually unlimited.</p> <p>Data Redundancy: Regional, Multi-Regional, Nearline, Coldline.</p> <p>Data sovereignty: Offers regional storage options, enabling compliance with local data sovereignty laws by ensuring data is stored within specific geographic regions.</p> <p>Vendor Lock-in: This risk is addressed by interoperable APIs, data portability tools, and hybrid solutions like Anthos, facilitating seamless data integration and migration.</p>
<p>d. Security (in terms of encryption, access control, compliance and other specific security risks identified in the Business Case.) (30 - 65 words)</p>	<p>Encryption: Server-side encryption (SSE-S3, SSE-KMS, SSE-C) and client-side encryption.</p> <p>Access Control: IAM policies, bucket policies, and Access Control Lists (ACLs).</p> <p>Compliance: Complies with various standards (HIPAA, GDPR, ISO 27001, etc.).</p> <p>Security risk mitigation: Offers robust encryption and fine-grained access control via IAM policies, ensuring sensitive data is securely stored and</p>	<p>Encryption: Server-side encryption (SSE) by default; customer-managed keys.</p> <p>Access Control: Role-Based Access Control (RBAC), Shared Access Signatures (SAS), Azure AD integration.</p> <p>Compliance: Meets standards like GDPR, HIPAA, ISO 27001.</p> <p>Security risk mitigation: Employs Azure Active Directory and role-based access control (RBAC) to manage permissions, combined with encryption</p>	<p>Encryption: Default server-side encryption; customer-managed encryption keys.</p> <p>Access Control: IAM policies, ACLs, signed URLs.</p> <p>Compliance: Complies with standards such as GDPR, HIPAA, ISO 27001.</p> <p>Risk mitigation: Secures sensitive data through Identity and Access Management (IAM), encryption at rest and in transit, and detailed audit logging to monitor access.</p>

Cloud storage solutions

Criterion	Option 1	Option 2	Option 3
	accessed only by authorised users.	in transit and at rest, to protect sensitive data.	
e. Performance (in terms of latency and retrieval) (15 – 30 words)	<p>Latency: Low latency for frequent access; optimised for high throughput.</p> <p>Data Retrieval: Standard and expedited retrieval options for archival data (Glacier).</p>	<p>Latency: Optimised for low latency and high throughput.</p> <p>Data Retrieval: Tiered access options (Hot, Cool, Archive) with different retrieval times.</p>	<p>Latency: Designed for low latency and high throughput.</p> <p>Data Retrieval: Different retrieval speeds for storage classes (Nearline, Coldline).</p>
f. Usability (in terms of management, data transfer and integration) (15 – 30 words)	<p>Management: Easy integration with AWS Management Console and SDKs.</p> <p>Data Transfer: Supports multipart upload, AWS DataSync, and Transfer Acceleration.</p> <p>Integration: Seamless integration with other AWS services (EC2, Lambda, RDS, etc.).</p>	<p>Management: Managed through Azure Portal, Azure CLI, and SDKs.</p> <p>Data Transfer: Azure Data Box, AzCopy for large data transfers.</p> <p>Integration: Deep integration with Azure services (VMs, Azure Functions, etc.).</p>	<p>Management: Managed via Google Cloud Console, gsutil, and SDKs.</p> <p>Data Transfer: Transfer Appliance, Storage Transfer Service for large data sets.</p> <p>Integration: Integrated with Google Cloud services (Compute Engine, BigQuery, etc.).</p>
g. Advantages (Broader organisational benefits) (15 – 30 words)	<p>Highly scalable and durable.</p> <p>Comprehensive security features.</p> <p>Wide range of storage classes for different use cases.</p> <p>Strong ecosystem integration.</p>	<p>Flexible access tiers for cost management.</p> <p>Strong integration with Microsoft ecosystem.</p> <p>Extensive security and compliance features.</p> <p>Simplified data management tools.</p>	<p>Simple and predictable pricing.</p> <p>High performance and availability.</p> <p>Strong integration with Google Cloud ecosystem.</p> <p>Comprehensive security and compliance.</p>
h. Disadvantages (Broader organisational detriments) (15 – 30 words)	<p>Complex pricing structure.</p> <p>Potential data transfer costs.</p> <p>Requires knowledge of AWS ecosystem for optimal use.</p>	<p>Azure-specific knowledge required.</p> <p>Potentially higher costs for data retrieval from Archive tier.</p> <p>Data transfer charges can add up.</p>	<p>Google Cloud-specific knowledge required.</p> <p>Potential data transfer costs.</p> <p>Limited to Google Cloud ecosystem for seamless integration.</p>

Assessor instructions:

Assessors are to indicate the task result as Satisfactory (S) or Not Yet Satisfactory (NYS).

Part D: Cloud storage provider comparison

In this part of the assessment, you are required to review the service level agreement (SLA) documents of the cloud service providers relevant to the cloud storage options selected in Part C of this assessment and evaluate providers with respect to organisational data storage requirements.

When completing the task, you are required to:

- read the scenario carefully
- refer to the Service level agreements (SLA) documentation relevant to the organisation's preferred cloud storage providers outlined in Part A, section A6 of this assessment
- analyse and synthesise the highly embedded mathematical information in the SLA documentation.

Scenario continued:

TechWave Solutions wants to evaluate cloud storage solutions from AWS, Microsoft Azure and Google Cloud Services due to their extensive feature sets, reliability, and strong presence in the Australian market.

TechWave Solutions requires comprehensive SLAs from its cloud storage providers to ensure service reliability and performance and, therefore, has outlined the following requirements.

Public Cloud Storage Provider Requirements:

- High Availability and Uptime Guarantees
 - Minimum monthly uptime percentage
 - Ensure continuous data access and minimise downtime
- Data Ownership and Control
 - Full data ownership retained by the organisation
 - Robust tools for data access management
- Disaster Recovery
 - Multi-region or dual-region storage options
- Performance and Scalability
 - Guarantees low latency and high throughput
 - Scalable storage solutions
- Security Standards and Compliance
 - Compliance with industry-standard security certifications and regulations
 - Regular audits to ensure ongoing compliance

As the Cloud Solutions Analyst, you are tasked with evaluating whether the potential cloud storage providers meet the needs of the organisation.

Task:

D1. Review the service level agreements (SLAs) for the three (3) identified cloud storage solutions (options 1, 2 and 3) in Part C.

D2. Evaluate each cloud storage provider of cloud storage solutions (options 1, 2 and 3) according to the following criteria and document your findings in 'Table 2'.

- a. Cloud service provider (name)
- b. Cloud storage option (name)
- c. Hidden costs – in terms of data transfer costs, API requests, storage classes and retrieval costs (55-70 words)
- d. Ownership of data and control (10-25 words)
- e. Disaster recovery (10-30 words)
- f. Rights to data retrieval (15 -30 words)
- g. Availability - including details of uptime percentages (20-35 words)
- h. Performance - in terms of latency and throughput (30-65 words)
- i. Security standards [10-25 words)
- j. Audit rights [10-25 words)
- k. Data storage location [15-30 words)
- l. Dispute mediation process [15-30 words)

Evidence of completing the task:

Assessor instructions: Students must review the service level agreement (SLA) documents of the cloud service providers relevant to the cloud storage options and evaluate them concerning organisational data storage requirements in the given scenario.

Students are likely to use different wording than the sample answer provided. However, the acceptable responses must:

- be within the specified word limit
- reflect the characteristics described in the exemplar answer.

A sample answer is provided below.

Table 2 - Answer table for Part D

Cloud storage solutions			
Criteria	Option 1	Option 2	Option 3
a. Cloud service provider	Amazon Web Services	Microsoft Azure	Google Cloud Services
b. Cloud storage option	AWS S3	Azure Blob Storage	Google Cloud Storage
c. Hidden costs (in terms of data transfer costs, API requests, storage classes and retrieval costs) [55-70 words)	<p>Data Transfer Costs: Charges apply for data transfer out of S3 to the internet, other AWS regions, or AWS services.</p> <p>API Requests: Costs associated with GET, PUT, LIST, DELETE requests.</p> <p>Storage Classes: Different pricing for Standard, Intelligent-Tiering, Infrequent Access, One Zone-IA, Glacier, and Glacier Deep Archive.</p>	<p>Data Transfer Costs: Charges apply for data transfer out of Azure Blob Storage to the internet or other Azure services.</p> <p>API Requests: Costs associated with operations such as PUT, GET, LIST, DELETE requests.</p> <p>Storage Tiers: Different pricing for Hot, Cool, and Archive tiers, with varying costs for storage and access.</p> <p>Retrieval Costs: Significant for Cool and Archive tiers,</p>	<p>Data Transfer Costs: Charges apply for data transfer out of Google Cloud Storage to the internet or other Google services.</p> <p>API Requests: Costs associated with operations such as PUT, GET, LIST, DELETE requests.</p> <p>Storage Tiers: Different pricing for Standard, Nearline, Coldline, and Archive storage classes, with varying costs for storage and access.</p>

Cloud storage solutions

Criteria	Option 1	Option 2	Option 3
	<p>Retrieval Costs: Especially significant for Glacier and Glacier Deep Archive, where data retrieval can incur additional fees.</p>	<p>where accessing stored data can incur additional fees.</p>	<p>Retrieval Costs: Significant for Nearline, Coldline, and Archive storage classes, where accessing stored data can incur additional fees.</p>
d. Ownership of data and control (10 -25 words)	<p>Customers retain full ownership of their data stored in Amazon S3. AWS provides tools for managing and controlling access to data.</p>	<p>Customers retain full ownership of their data stored in Azure Blob Storage. Azure provides tools for managing and controlling access to data.</p>	<p>Customers retain full ownership of their data stored in Google Cloud Storage. Google provides tools for managing and controlling access to data.</p>
e. Disaster recovery (10-30 words)	<p>AWS offers multiple storage classes and cross-region replication to enhance disaster recovery capabilities.</p>	<p>Azure offers multiple redundancy options including Locally Redundant Storage (LRS), Zone Redundant Storage (ZRS), Geo Redundant Storage (GRS), and Read Access-Geo Redundant Storage (RA-GRS) to enhance disaster recovery capabilities.</p>	<p>Google Cloud Storage offers multi-region and dual-region storage options to enhance disaster recovery capabilities. Turbo replication feature ensures rapid replication of data.</p>
f. Rights to data retrieval (15 -30 words)	<p>Customers can access and retrieve their data anytime, but retrieval costs vary depending on the storage class and the speed of retrieval.</p>	<p>Customers can access and retrieve their data anytime, with costs varying based on the storage tier and speed of retrieval.</p>	<p>Customers can access and retrieve their data anytime, with costs varying based on the storage class and speed of retrieval.</p>
g. Availability (including details of uptime percentages) (20-35 words)	<p>Availability SLA: AWS commits to a monthly uptime percentage of 99.9% for Standard and other specified classes, with Service Credits provided if availability falls below this threshold.</p>	<p>Azure commits to a monthly uptime percentage of 99.99% for read operations on RA-GRS accounts, and 99.9% for write operations and other redundancy options, with lower guarantees for Cool and Archive tiers.</p>	<p>Google commits to a monthly uptime percentage of 99.95% for Standard storage class in multi-region or dual-region, and 99.9% for Standard storage class in regional locations and other storage classes in multi-region or dual-region.</p>
h. Performance (in terms of latency and throughput)	<p>Latency:</p> <ul style="list-style-type: none"> GET Requests: Typically low single- 	<p>Latency: Hot Access Tier: Optimised for low latency</p>	<p>Latency: Standard Storage Class: Low latency comparable</p>

Cloud storage solutions

Criteria	Option 1	Option 2	Option 3
(30-65 words)	<p>digit millisecond latency</p> <ul style="list-style-type: none"> • PUT Requests: Typically low double-digit millisecond latency <p>Throughput:</p> <ul style="list-style-type: none"> • Supports thousands of requests per second per prefix in a bucket. Performance scales with the number of prefixes. 	<p>access with similar performance characteristics to AWS S3 for frequently accessed data</p> <p>Cool and Archive Access Tiers: Typically higher latency compared to the Hot tier due to the nature of infrequent access</p> <p>Throughput:</p> <p>Azure Blob Storage can handle thousands of requests per second per blob storage account. Performance scales with the number of blob containers and storage accounts.</p>	<p>to AWS S3 for frequently accessed data</p> <p>Nearline, Coldline, and Archive: Higher latency due to less frequent access and longer retrieval times, especially for Coldline and Archive</p> <p>Throughput:</p> <p>Google Cloud Storage can support high request rates and large throughput per bucket. Performance scales with the number of objects and buckets.</p>
i. Security standards [10-25 words)	AWS S3 complies with industry standards including ISO 27001, HIPAA, GDPR, and SOC 1/2/3.	Azure Blob Storage complies with industry standards including ISO 27001, HIPAA, GDPR, and SOC 1/2/3.	Google Cloud Storage complies with industry standards including ISO 27001, HIPAA, GDPR, and SOC 1/2/3.
j. Audit rights [10-25 words)	Customers can access AWS's audit reports under NDA and perform their own audits within the scope of AWS's policies.	Customers can access Azure's audit reports under NDA and perform their own audits within the scope of Azure's policies.	Customers can access Google's audit reports under NDA and perform their own audits within the scope of Google's policies.
k. Data storage location [15-30 words)	<p>Customers can select from multiple AWS regions worldwide for data storage, allowing compliance with data residency requirements.</p> <p>Cross-region replication is available to enhance data durability and disaster recovery.</p>	<p>Customers can select from multiple Azure regions worldwide for data storage, allowing compliance with data residency requirements.</p> <p>Cross-region replication is available to enhance data durability and disaster recovery.</p>	<p>Customers can select from multiple Google Cloud regions worldwide for data storage, allowing compliance with data residency requirements.</p> <p>Multi-region and dual-region options provide enhanced durability and availability.</p>
l. Dispute mediation process [15-30 words)	The AWS SLA provides a structured process for handling disputes, primarily involving the	The Azure SLA provides a structured process for handling disputes, primarily involving the	The Google SLA provides a structured process for handling disputes, primarily involving the

Cloud storage solutions

Criteria	Option 1	Option 2	Option 3
	issuance of Service Credits for service outages or performance issues.	issuance of Service Credits for service outages or performance issues.	issuance of Financial Credits for service outages or performance issues.

Assessor instructions:

Assessors are to indicate the task result as Satisfactory (S) or Not Yet Satisfactory (NYS).

Assessor comments:

S

NYS

Part E: Develop an implementation plan for a cloud storage solution

In this part of the assessment, you are required to develop and document an implementation plan for one cloud storage solution that aligns with the organisation's data storage requirements.

When completing the task, you are required to:

- read the scenario carefully
- use the template provided to develop the required documentation
- plan strategic priorities and outcomes in a flexible, efficient and effective manner, considering the organisation's diverse ICT environment that is exposed to competing demands as outlined in the scenario.

Scenario continued:

You are tasked with developing a plan to implement the hybrid cloud storage solution. When developing this plan, you will use the organisation's recommended ICT implementation plan template that includes:

- a title
- an objective
- phases and timeline details
- an implementation checklist including the key requirements for:
 - Storage operations
 - Storage security
 - Storage governance
 - Storage cost management

Also, consider the following competing demands of the organisation

- The cloud storage solution should be implemented within a 20-week timeframe to avoid disruptions and meet business milestones.
- Balancing a timely rollout with the need for comprehensive testing is a critical consideration.
- The storage operations must ensure future readiness while addressing current performance bottlenecks and integrating with existing systems.

- Balancing the implementation of stringent security measures, such as encryption and access controls, to comply with Privacy while ensuring that authorised employees have seamless and efficient access to necessary data.
- Expenses must be managed carefully, aiming to minimise initial capital expenditure and ongoing operational costs.

Tasks:

- E1. Select one (1) cloud storage solution that closely aligns with the organisation's data storage requirements from the options evaluated in Parts C and D of this assessment.
- E2. Develop and document a draft of the high-level implementation plan for the selected cloud storage solution using the documentation template provided in 'Table 3', according to the following criteria.
- Objective (15-30 words)
 - Phases and timeline – including a brief outline of what happens at each stage (100 - 130 words)
 - An implementation checklist - including a list of relevant processes (i.e. to ensure meeting organisational and regulatory requirements) and evaluations (from Parts C and D) within the following key categories of storage requirements (125 - 180 words):
 - Storage operations
 - Storage security
 - Storage governance
 - Storage cost management

Evidence of completing the task:

Assessor instructions: Students must develop and document an implementation plan for one cloud storage solution that aligns with the organisation's data storage requirements and demonstrate their ability to:


- generate complex written texts using a writing style appropriate for an ICT implementation plan
- plan strategic priorities and outcomes within a flexible, efficient and effective context according to the context given in the scenario (i.e. a diverse environment exposed to competing demands).

Students are likely to use different wording than the sample answer provided. However, the acceptable responses must:

- be within the specified word limit
- use the required documentation format, including the essential elements
- reflect the characteristics described in the exemplar answer.

A sample answer is provided below.

Table 3 - ICT implementation plan template

	<h1>ICT implementation plan</h1>
Title:	High-Level Implementation Plan for AWS S3 Hybrid Cloud Solution
Objective:	Implement a hybrid cloud solution leveraging AWS S3 to: <ul style="list-style-type: none"> • enhance storage operations, security, governance, and cost management aligned with industry best practices • meet organisational storage requirements.
Phases and timeline:	<ol style="list-style-type: none"> 1. Planning (Week 1-3): Define project scope, gather requirements from stakeholders. 2. Design (Week 4-5): Design architecture, detailing integration points between on-premises and AWS S3 storage.

	<ol style="list-style-type: none"> 3. Setup (Week 6-8): Procure required hardware and software, configure AWS S3 storage buckets, and set up observability tools for monitoring performance and security operations. 4. Migration (Week 9-11): Develop and execute a migration plan, including data classification and prioritisation. Conduct a pilot migration to validate processes. 5. Testing (Week 12-14): Perform functional, security, and performance testing. Implement backup and recovery testing to ensure data integrity and availability. 6. Deployment (Week 15-17): Complete data migration, transition to live environment with continuous monitoring and adjustments as needed. 7. Post-Implementation (Week 18-20): Review and optimise storage operations, update documentation, and train personnel.
Implementation checklist:	<p>Storage Operations:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Observability: Implement AWS CloudWatch to monitor storage metrics. <input type="checkbox"/> Performance: Ensure optimal performance through regular benchmarking. <input type="checkbox"/> Backup and Recovery: Set up automated backups and test recovery processes regularly. <input type="checkbox"/> Security Operations: Use AWS Identity and Access Management (IAM) and encryption for data security. <input type="checkbox"/> Cost Management: Monitor and optimise storage costs using AWS Cost Explorer. <p>Storage Security:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Type of Data: Classify data based on sensitivity and compliance requirements. <input type="checkbox"/> Importance of Data: Prioritise critical data for high-availability storage. <input type="checkbox"/> Compliance Issues: Ensure adherence to relevant regulations (e.g., GDPR, HIPAA). <p>Storage Governance:</p> <p>To manage access Limitations on the:</p> <ul style="list-style-type: none"> <input type="checkbox"/> amount of data - implement quotas to manage storage usage. <input type="checkbox"/> type of data - restrict access based on data classification. <input type="checkbox"/> type of storage - use appropriate storage classes (Standard, Infrequent Access, Glacier) based on data access patterns. <p>Storage Cost Management:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Billing: Understand and manage billing based on the amount of data stored, storage class used, and data retrieval patterns. Use AWS Budgets to set cost alerts and AWS Cost Explorer for detailed billing analysis.

Assessor instructions:

Assessors are to indicate the task result as Satisfactory (S) or Not Yet Satisfactory (NYS).

Assessor comments:	<input type="checkbox"/> S <input type="checkbox"/> NYS
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Part F: Seek feedback to improve plans and processes

In this part of the assessment, you are required to seek feedback to improve the previously documented implementation plan and its processes.

Scenario continued:

You have previously developed and documented a draft plan for implementing a cloud storage solution that aligns with TechWave Solutions' storage requirements.

As you would like to improve the plan and its processes further, you are planning to seek feedback from the project's key stakeholders via email prior to the scheduled project meeting next week.

You are also aware that you must use the organisation's recommended Email template as outlined in 'TWS_Email_template.docx' when drafting emails to TechWave Solution's stakeholders.

Tasks:

Draft an email addressing the key stakeholders (or group) to ask for feedback and suggestions according to the following criteria.

- a. Address the key stakeholders in the project.
Note: Refer to the initial meeting transcript, 'TWS_Stakeholder meeting transcript.pdf', for the list of names and email addresses of the key stakeholders involved in the project.
- b. Use clear language to convey:
 - i. the purpose of the email
 - ii. that the draft implementation plan is attached to the email
- c. Use TechWave Solution's standard email template (TWS_Email_template.docx) to draft the email.

(Word count: 100 – 150 words in the email body).

Evidence of task completion: (Drafted email to Client)

Save your email using the TWS_Email_template.docx under the following naming convention: ICTICT428_03_Email_your name_yymmdd and upload it together with your assessment for marking.

Assessor instructions: Students must demonstrate their ability to seek feedback to improve plans and processes using a writing style appropriate for a formal business email.

Students are likely to use different wording than the sample answer provided. However, the acceptable responses must:

- be within the specified word limit
- use the required documentation format, including the essential elements
- reflect the characteristics described in the exemplar answer.

A sample answer is provided below.

Student Lastname, Student Firstname

From: Lastname, Firstname

Sent: Tuesday, 04th June 2024, 4:00 PM

To: john.miller@techwavesolutions.com.au, sarah.johnson@techwavesolutions.com.au, emma.brown@techwavesolutions.com.au, david.lee@techwavesolutions.com.au, lisa.turner@techwavesolutions.com.au, anna.green@techwavesolutions.com.au

Attached documents: *Hybrid cloud storage_implementation plan.pdf*

Subject: Request for feedback on the Hybrid Cloud Storage Implementation Plan

Dear Team,

I hope this email finds you well.

As part of our ongoing efforts to enhance our ICT infrastructure, I have developed a comprehensive implementation plan for our upcoming hybrid cloud storage solution using AWS S3. This plan is crucial to ensure that our storage operations, security, governance, and cost management are optimally aligned with our business goals.

Please find the detailed implementation plan attached for your review. I have outlined the phases, timeline, required resources, risk management strategies, and a checklist to guide the implementation process. Your insights and feedback are invaluable to ensure the success of this initiative.

Please provide your feedback by this Friday, so we can incorporate any necessary adjustments before our project meeting next week.

Thank you for your time and expertise.

Kind regards

Alex Turner

Cloud Solutions Analyst

alex.turner@techwavesolutions.com.au



Before printing this email please consider the environment.

This message may contain privileged information or confidential information or both and is intended for the recipient named. If you are not the intended addressee, please delete it and notify the sender.

Assessor instructions:

Assessors are to indicate the task result as Satisfactory (S) or Not Yet Satisfactory (NYS).

Assessor comments:

S

NYS

Assessment submission checklist

Students must have completed all questions within this assessment before submitting. This includes:

Part B: Prepare business case for cloud storage needs		
B1, B2, B3(a-d)	Drafted Business case	<input type="checkbox"/>
Part C: Compare cloud storage options		
C1, C2(a-h)	Completed comparison table for three (3) cloud storage options	<input type="checkbox"/>
Part D: Compare cloud storage providers		

D1, D2(a-l)	Completed comparison table for three (3) cloud service providers	<input type="checkbox"/>
Part E: Develop an implementation plan for a cloud storage solution		
E1, E2(a-c)	Drafted ICT implementation plan	<input type="checkbox"/>
Part F: Seek feedback to improve plans and processes		
a-c	Drafted Email to key stakeholders	<input type="checkbox"/>

Assessment feedback

Assessors are to indicate the assessment outcome as Satisfactory (S) or Not Yet Satisfactory (NYS).

<p>Assessor Name:</p> <p>Date:</p> <p>Assessor comments:</p>	<p><input type="checkbox"/> S <input type="checkbox"/> NYS</p>
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Congratulations, you have reached the end of Assessment 3!

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