Just IT

B2W group

Apprenticeships | Training | Recruitment

Data Technician

Name:

Course Date:

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Day 1: Task 1

Please research and complete the below questions relating to key concepts of cloud.

Be prepared to discuss the below in the group following this task.

What can cloud computing do for us in the real-world?	Cloud computing enables on-demand access to computing resources—such as storage, processing power, and applications—over the internet. This capability supports various real-world applications: ● **Media Streaming:** Platforms like Netflix and Spotify utilize cloud infrastructure to deliver content to millions of users worldwide, ensuring scalability and high availability. ● **Ride-Sharing Services:** Companies like Uber and DiDi rely on cloud computing to process real-time data for ride matching, navigation, and payment processing. ● **Education:** Cloud-based tools like SlideRocket and Coursera facilitate e-learning by providing accessible educational resources and platforms.
How can it benefit a business?	Cloud computing offers several advantages to businesses: ● **Cost Savings:** By adopting cloud services, businesses can reduce expenses related to hardware procurement, maintenance, and energy consumption. ● **Scalability and Flexibility:** Cloud resources can be scaled up or down based on demand, allowing businesses to respond swiftly to market changes without significant infrastructure investments. ● **Enhanced Collaboration:** Cloud platforms enable teams to collaborate in real-time, improving productivity and communication across different locations.

	• **Advanced Security:** Leading cloud providers implement robust security measures, including data encryption and regular updates, to protect against cyber threats.
What's the alternative to cloud computing?	Alternatives to cloud computing include: • **On-Premises Infrastructure:** Traditional IT setups where businesses maintain their own servers and data centers. While offering complete control, this approach often involves higher costs and limited scalability. • **Edge Computing:** Processing data closer to the source (e.g., IoT devices) to reduce latency and bandwidth usage, beneficial for real-time applications. • **Hybrid Cloud Solutions:** Combining on-premises infrastructure with cloud services, allowing businesses to leverage the benefits of both environments.
What cloud providers can we use, what are their features and functions?	Several major cloud providers offer a range of services: **1. Amazon Web Services (AWS)** • **Features:** ➢ Market leader in cloud services with a broad range of offerings. ➢ Global infrastructure with availability zones and data centers worldwide. ➢ Strong support for big data, AI/ML, IoT, and DevOps. • **Functions:** ➢ **Compute:** EC2 (virtual servers), Lambda (serverless computing). ➢ **Storage:** S3 (object storage), EBS (block storage), Glacier (archival). ➢ **Databases:** RDS (relational), DynamoDB (NoSQL), Redshift (data warehouse). ➢ **Networking:** VPC, Route 53 (DNS), API Gateway. ➢ **AI/ML:** SageMaker, Rekognition, Lex (chatbots).

- **DevOps & CI/CD:** CodeBuild, CodeDeploy, CloudFormation.

- **Use Case Example:**

Netflix uses AWS for scalable storage and streaming, including real-time analytics and global distribution.

2. Microsoft Azure

- **Features:**
  - Deep integration with Microsoft tools like Office 365, Windows Server, and Active Directory.
  - Hybrid cloud support with Azure Stack.
  - Strong enterprise and compliance focus.
- **Functions:**
  - **Compute:** Azure Virtual Machines, App Services, Functions (serverless).
  - **Storage:** Blob Storage, Disk Storage, Azure Files.
  - **Databases:** Azure SQL Database, Cosmos DB (global NoSQL), Database for MySQL/PostgreSQL.
  - **AI/ML:** Azure Cognitive Services, Azure ML.
  - **DevOps:** Azure DevOps, GitHub Actions (via Microsoft acquisition).
  - **Security:** Azure Active Directory, Defender for Cloud.
- **Use Case Example:**

Volkswagen uses Azure for connected car services and real-time vehicle data analysis.

3. Google Cloud Platform (GCP)

- **Features:**
  - Known for advanced data analytics, AI/ML, and Kubernetes (original creators).
  - Strong support for open-source and container-based workloads.
  - Competitive pricing and powerful big data tools.
- **Functions:**
  - **Compute:** Compute Engine, Cloud Functions, Kubernetes Engine (GKE).
  - **Storage:** Cloud Storage, Persistent Disks,

	Filestore. ➢ **Databases:** BigQuery (analytics), Cloud SQL, Firestore (NoSQL). ➢ **AI/ML:** Vertex AI, TensorFlow, Cloud Vision, Natural Language API. ➢ **Big Data:** BigQuery, Dataflow, Pub/Sub. ➢ **DevOps:** Cloud Build, Cloud Run, Deployment Manager. ● **Use Case Example:** Spotify uses GCP for its data analytics and machine learning pipelines, enabling music recommendations. Other notable providers include: ● **IBM Cloud:** Offers AI-driven solutions and enterprise services. ● **Oracle Cloud:** Specializes in database management and enterprise applications. ● **DigitalOcean:** Caters to developers and small businesses with simplified cloud services.

Day 1: Task 2

Please research the below cloud offerings, explain what they are and examples of use cases.

Cloud Offerings	Explain what it is	When / how might you use this service in the real-world?
IaaS (Infrastructure as a service)	Infrastructure as a Service (IaaS) is a cloud computing model that delivers fundamental IT resources—such as virtual machines, storage, and networking—over the internet. It allows businesses to rent these resources	● **Website Hosting:** Organizations can host websites and applications using IaaS, benefiting from scalability and reduced hardware costs. ● **Development and Testing:** Development teams can quickly set up and dismantle test and development environments, accelerating the software development lifecycle. ● **Data Storage and Backup:** IaaS

	on a pay-as-you-go basis, eliminating the need to invest in and maintain physical hardware.	provides scalable storage solutions, enabling businesses to handle large volumes of data and implement effective backup and recovery strategies.
PaaS (Platform as a service)	Platform as a Service (PaaS) is a cloud computing model that offers a ready-to-use development environment, including hardware and software tools, over the internet. It enables developers to build, test, and deploy applications without the complexity of managing the underlying infrastructure.	• **Application Development:** Developers can use PaaS to create web or mobile applications efficiently, focusing solely on coding and functionality. • **Business Analytics:** Companies can develop and deploy analytics applications to process and analyze large datasets, gaining valuable business insights. • **API Development and Management:** PaaS platforms often provide tools for building and managing APIs, facilitating integration between different services and applications.
SaaS (Software as a service)	Software as a Service (SaaS) is a software distribution model where applications are hosted by a service provider and made available to users over the internet. Users can access these applications via web browsers without installing or maintaining the software themselves.	• **Email and Collaboration Tools:** Services like Gmail and Microsoft 365 allow users to communicate and collaborate in real-time without managing the underlying infrastructure. • **Customer Relationship Management (CRM):** Platforms like Salesforce enable businesses to manage customer interactions and data efficiently. • **Streaming Services:** Applications like Netflix provide on-demand video content to users globally, leveraging SaaS to deliver seamless streaming experiences.

Day 1: Task 3

Please research the below terms and explain what they are, when they would be appropriate and a real-world example of where it could be implemented (i.e. what type of organisation).

Public Cloud	**Definition:** A Public Cloud is a cloud computing model where third-party providers offer computing resources (like servers, storage, and applications) over the internet. These resources are shared among multiple organizations and individuals. **When to Use:** ➢ When scalability and cost-effectiveness are priorities. ➢ For workloads with variable demands. ➢ When rapid deployment is needed without investing in infrastructure. **Real-World Example:** A startup launching a new mobile application can use public cloud services to host the app, ensuring scalability as user demand grows, without the overhead of managing physical servers.
Private Cloud	**Definition:** A Private Cloud is a cloud computing environment dedicated exclusively to a single organization. It can be hosted on-premises or by a third-party provider, offering greater control over data, security, and

	compliance. **When to Use:** ➢ When handling sensitive data requiring strict compliance (e.g., healthcare, finance). ➢ For organizations needing customized infrastructure. ➢ When performance and security are paramount. **Real-World Example:** A financial institution managing confidential client information might deploy a private cloud to ensure data privacy and meet regulatory standards.
Hybrid Cloud	**Definition:** A Hybrid Cloud combines public and private cloud environments, allowing data and applications to move between them. This model offers flexibility, optimizing existing infrastructure while leveraging the scalability of public clouds. **When to Use:** ➢ When needing to keep sensitive data on-premises while utilizing public cloud resources for less-critical operations. ➢ For gradual cloud adoption strategies. ➢ When dealing with varying workloads that require flexible resource allocation. **Real-World Example:** A retail company might use a private cloud to store customer data securely while employing public cloud services to handle increased traffic during holiday sales.
Community Cloud	**Definition:**

A Community Cloud is a collaborative cloud infrastructure shared among several organizations with common concerns, such as security, compliance, or jurisdiction. It can be managed internally or by a third-party and can be hosted on-premises or externally.

When to Use:

- When multiple organizations have shared goals and need to collaborate securely.
- For industries with strict regulatory requirements.
- When pooling resources for cost efficiency and shared infrastructure.

Real-World Example:

Government agencies within a specific region might utilize a community cloud to share data and applications related to public services, ensuring compliance with local regulations.

Day 2: Task 1

Describe, with examples, the **three** major areas that the Computer Misuse Act deals with.

Area	Description	Example
Unauthorized Access to Computer Material	This area deals with accessing computer systems, programs, or data without permission. Even if no damage is done, simply gaining access without authorization is an offense.	An employee uses another colleague's password (without permission) to log into their email and read confidential messages.
Unauthorized Access with Intent to Commit or Facilitate Further Offenses	This applies when someone accesses a computer system without permission with the intention of committing a more serious crime, such as fraud or theft.	A hacker gains unauthorized access to a retail company's database intending to steal customer credit card information and sell it online.
Unauthorized Modification of Computer Material	This area focuses on intentionally altering or deleting data or software without permission. It also includes introducing malware or viruses.	A disgruntled former employee installs a virus on the company network before leaving, which deletes important sales records.

The computer misuse act 1990 is an act where an individual can be criminalised because of computer related offense. Describe three extra powers that the Police and Justice Act 2006 (Computer Misuse) has added.

Description

Criminalizing Denial of Service (DoS) Attacks

- **Description:**

The amendment made it explicitly illegal to carry out or attempt Denial of Service (DoS) attacks, where a computer system is deliberately overloaded to prevent legitimate access.

- **Why it matters:**

Previously, DoS attacks were hard to prosecute under the original Act because they didn't always involve unauthorized access.

- **Example:**

A person floods an online retailer's website with fake traffic, causing it to crash during a major sale event.

Increased Penalties for Offenses

- **Description:**

The amendment raised the maximum penalties for several computer misuse offenses, reflecting the greater impact of cybercrime on businesses and individuals.

- **Why it matters:**

It allows courts to impose longer prison sentences and higher fines, serving as a stronger deterrent.

- **Example:**

A hacker who steals financial data from a bank now faces up to 10 years in prison, rather than just 5.

Making it Illegal to Make, Supply, or Obtain Hacking Tools

- **Description:**

It became a criminal offense to create, distribute, or possess tools (like software or scripts) intended to be used for committing computer crimes.

- **Why it matters:**

This targets not only hackers but also those who support or enable them by

creating and selling hacking tools.

- **Example:**

A person writes a keylogger program and offers it for sale online, knowing it will be used to steal passwords.

Look at the below website to answer the questions: https://www.gov.uk/personal-data-my-employer-can-keep-about-me

Write down three items of data which a company can store about an employee.
Name
Address
Date of Birth

Give three more examples of data that an employer can only store if they first get the employee's permission.
Race and Ethnicity
Religion
Political Membership or Opinions

Conduct further research to answer the below questions.

Question	Answer
Provide one example of: Copyright infringement	Uploading a full movie to YouTube without permission from the copyright owner. This violates the copyright holder's exclusive right to distribute and publicly display their work.
Provide one example of: Plagiarism	Copying a paragraph from an online article into a school essay without quoting the source or giving credit. This presents someone else's work as your

	own, which is a clear case of plagiarism.
What are two consequences of copyright infringement and software piracy?	• **Legal Penalties** Individuals or businesses can face fines or lawsuits, and in severe cases, criminal charges leading to imprisonment. • **Loss of Reputation and Business Trust** Being caught using pirated software or infringing copyright can damage a company's reputation, leading to loss of customers and professional credibility.
Give three possible consequences for individuals when using pirated software	• **Legal Action** Individuals can face fines or prosecution for violating software licensing laws. • **Malware Infections** Pirated software often comes bundled with viruses, spyware, or ransomware, putting personal data at risk. • **Lack of Updates and Support** Users of pirated software don't receive official updates, patches, or customer support, making their systems more vulnerable to bugs and security threats.

Listed below are some laws which we have covered today:

1. Computer Misuse Act 1990
2. Police and Justice Act 2006 (Computer Misuse)

3. Copyright, Designs and Patents Act 1988
4. Copyright (Computer Programs) Regulations 1992
5. The Health and Safety (Display Screen Equipment) Regulations 1992
6. Data Protection Act 2018
7. Consumer Rights Act 2015

- Insert a number in the first column of each row to match each of the statements with one of the above Acts.

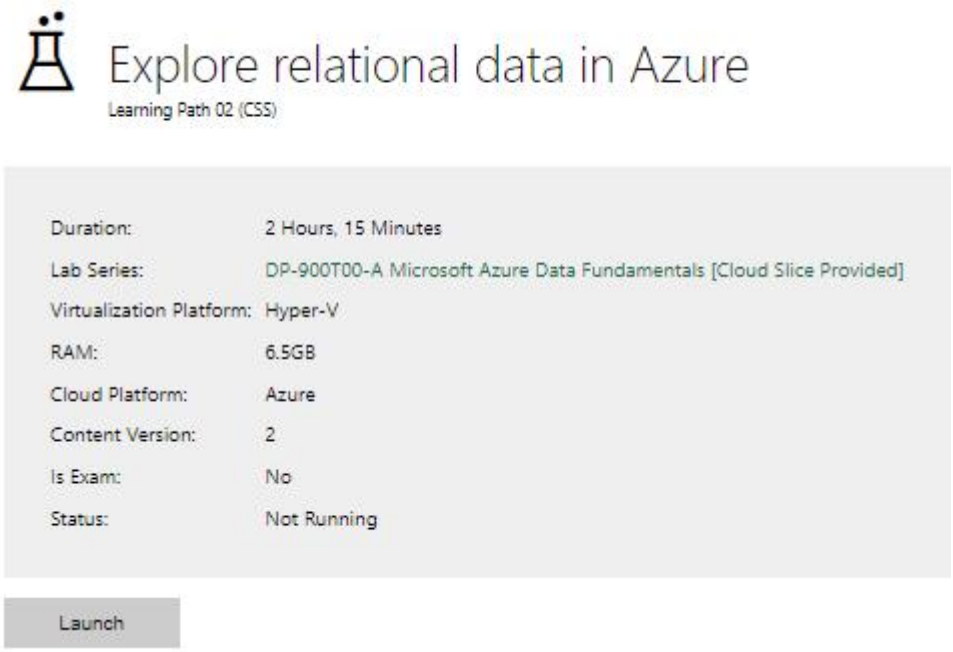
- One of statements is incorrect and not illegal. For this statement, write 'Not illegal'.

Act number	Clause
4	With some exceptions, it is illegal to use unlicensed software
7	Any product, digital or otherwise, must be fit for the purpose it is supplied for
1	Unauthorised modification of computer material is illegal
Not illegal	It is illegal to create or use a hacking tool for penetration testing
6	Personal data may only be used for specified, explicit purposes
5	Employers must provide their computer users with adequate health and safety training for any workstation they work at
2	It is illegal to distribute hacking tools for criminal purposes

3	It is illegal to distribute an illicit recording
6	Personal data may not be kept longer than necessary
1	Gaining unauthorised access to a computer system is illegal
5	Employers must ensure that employees take regular and adequate breaks from looking at their screens
2	It is illegal to prevent or hinder access (e.g. by a denial-of-service attack) to any program or data held in any computer
6	Personal data must be accurate and where necessary kept up to date

Day 3: Task 1

Please complete the below lab (3) *'Explore relational data in Azure'* and paste evidence of the completed lab in the box provided.



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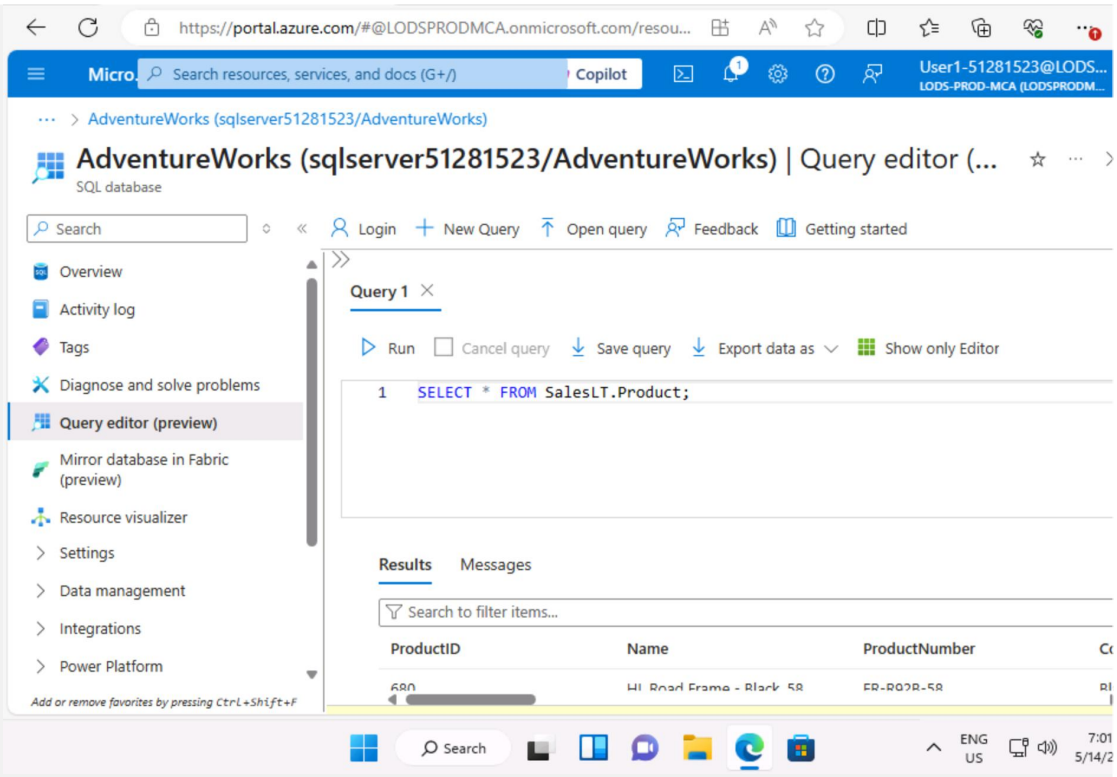
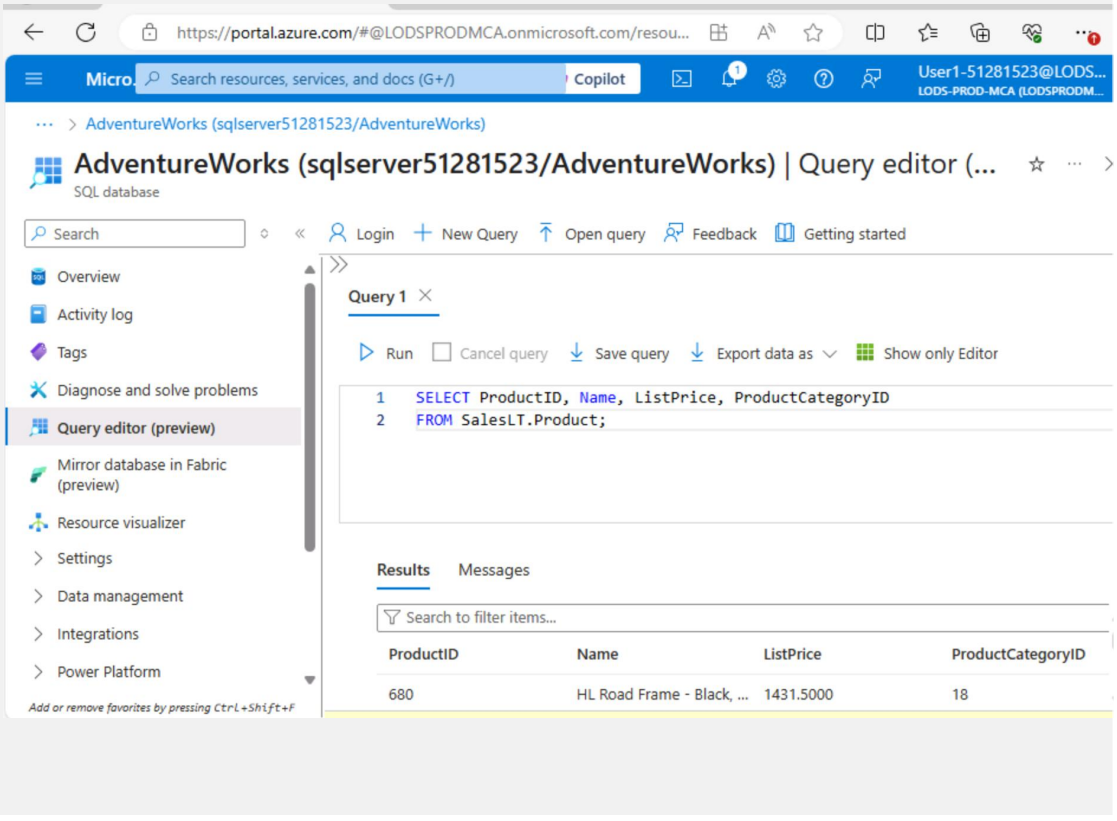
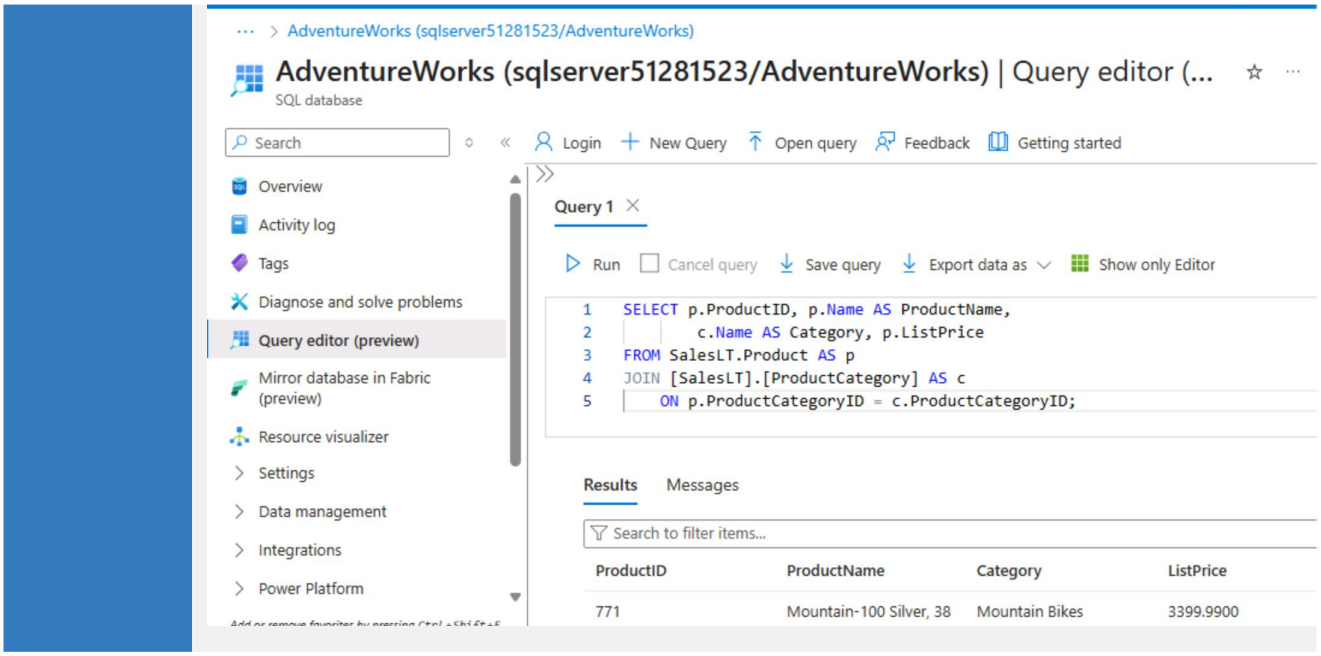
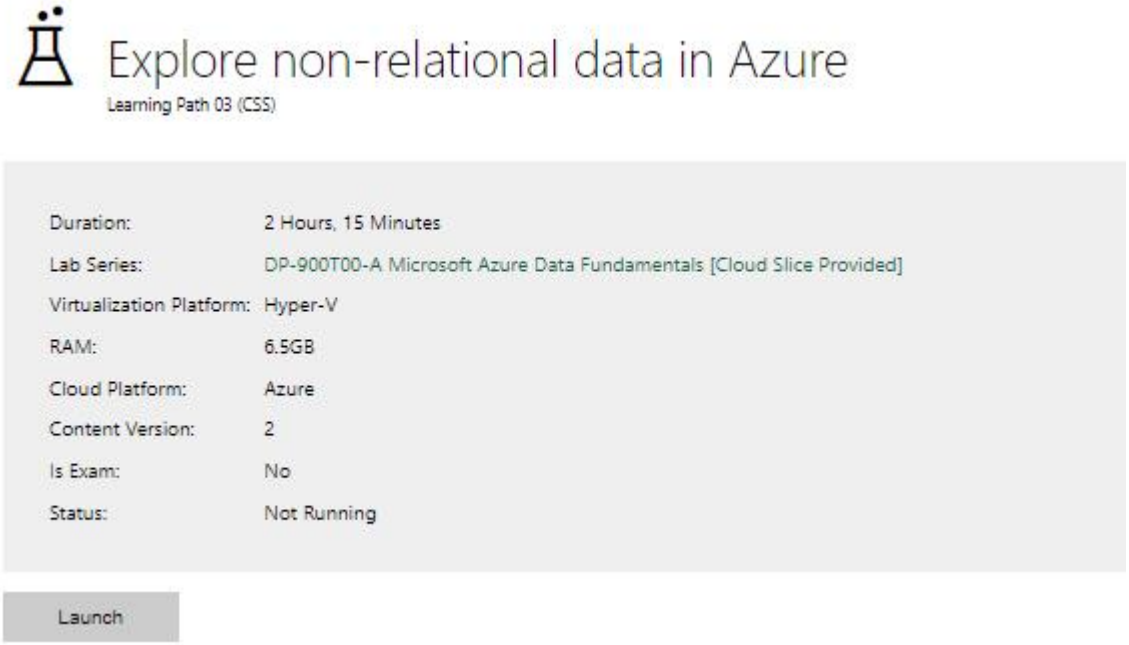






Day 3: Task 2

Please complete the below lab (4) *'Explore non-relational data in Azure'* and paste evidence of the completed lab in the box provided.



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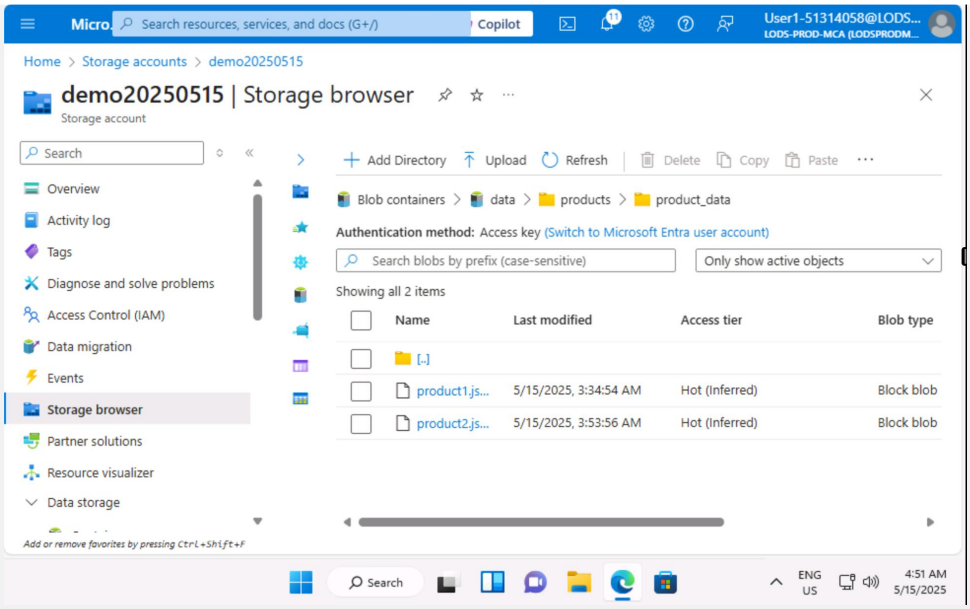

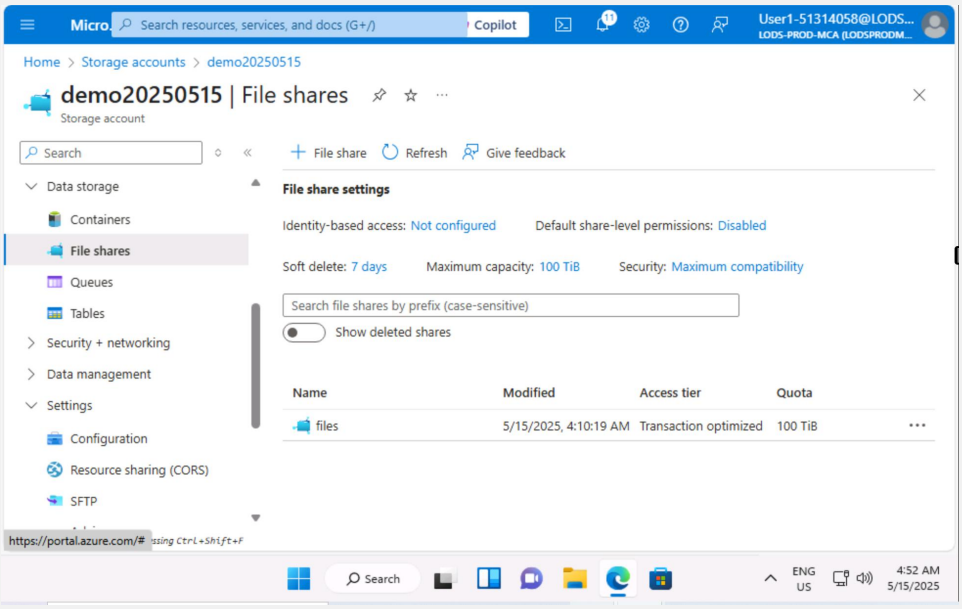

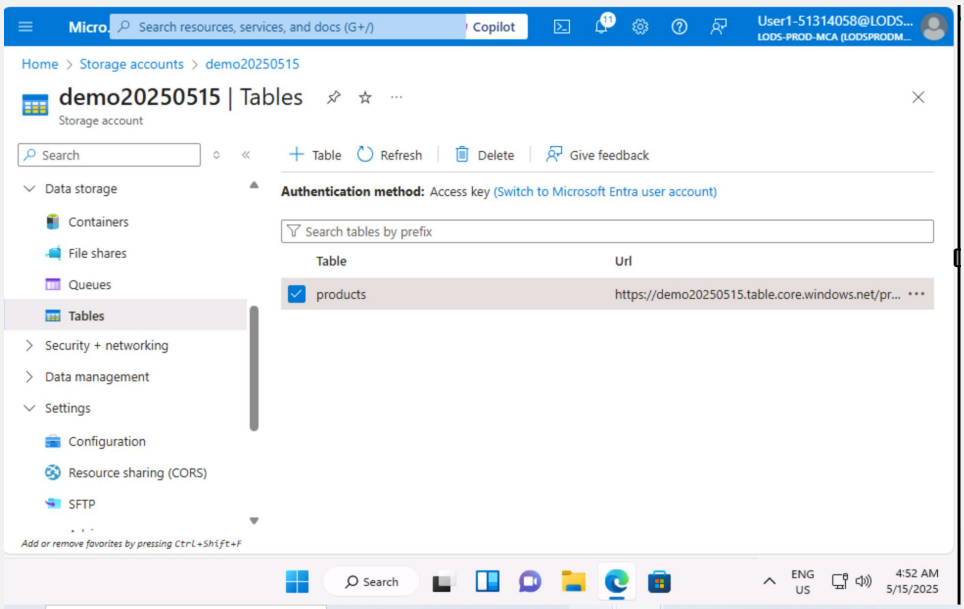

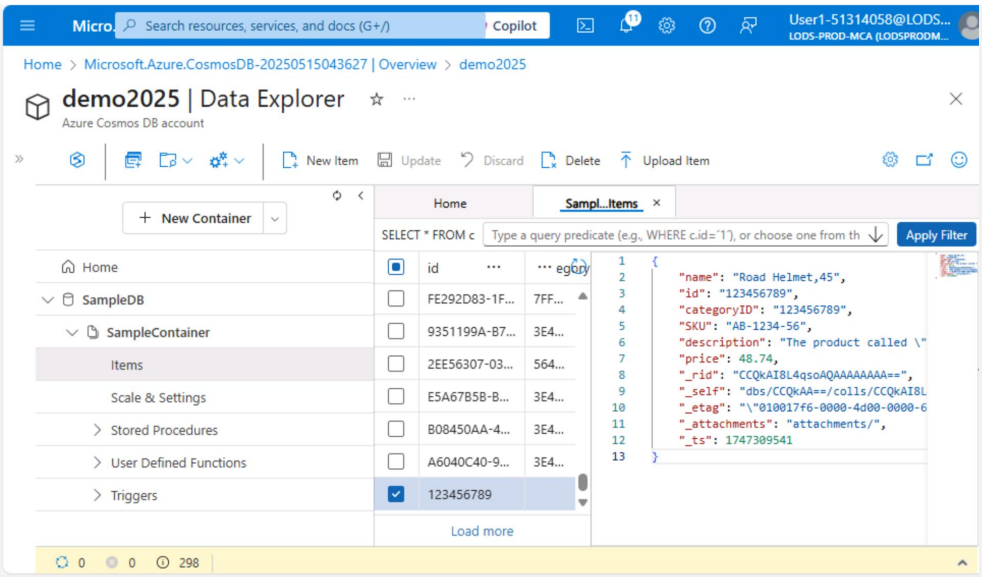
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New Container
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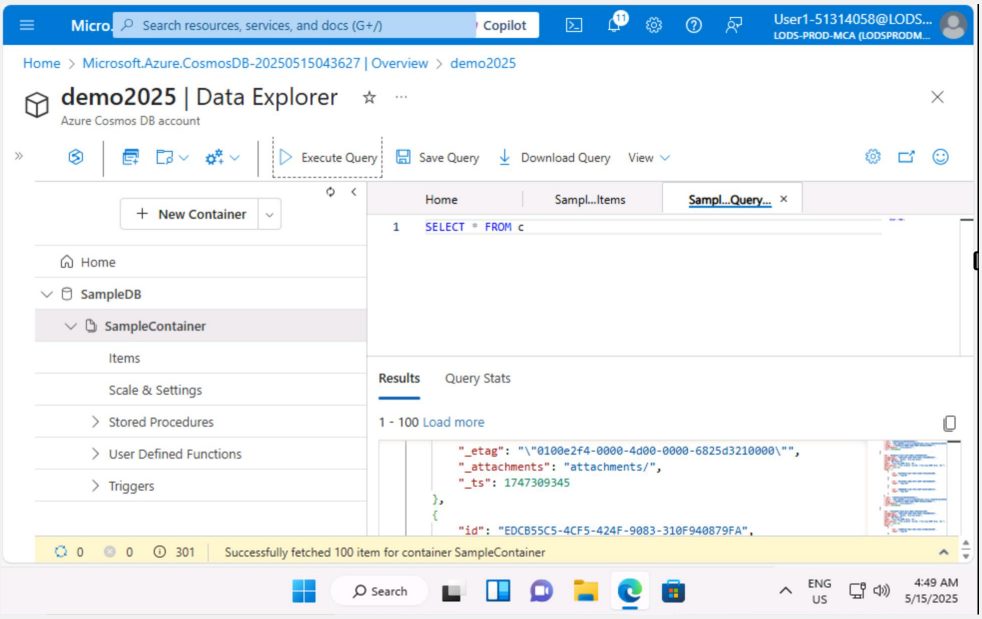
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User Defined Functions
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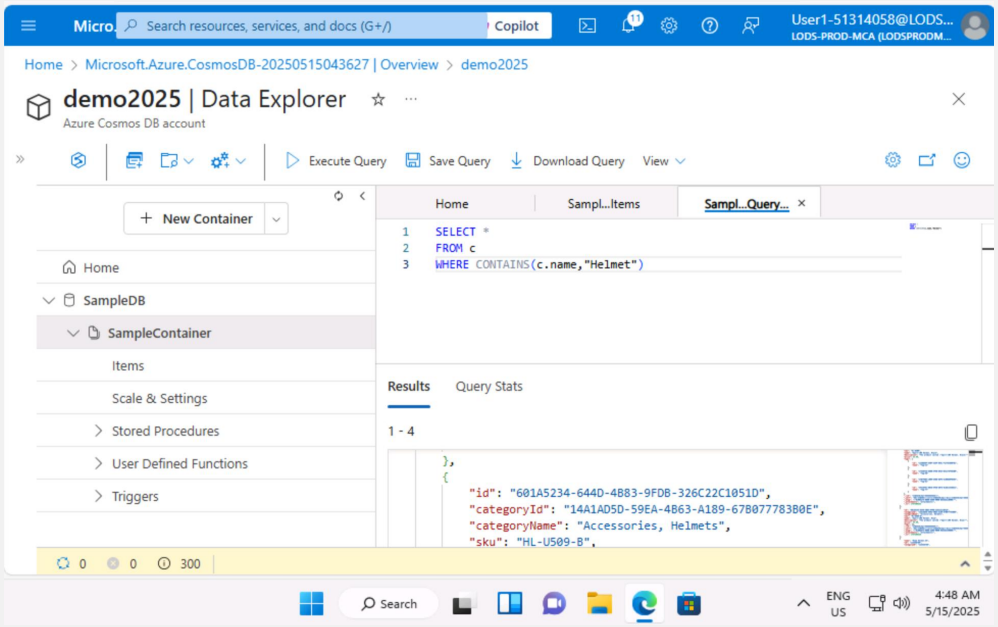
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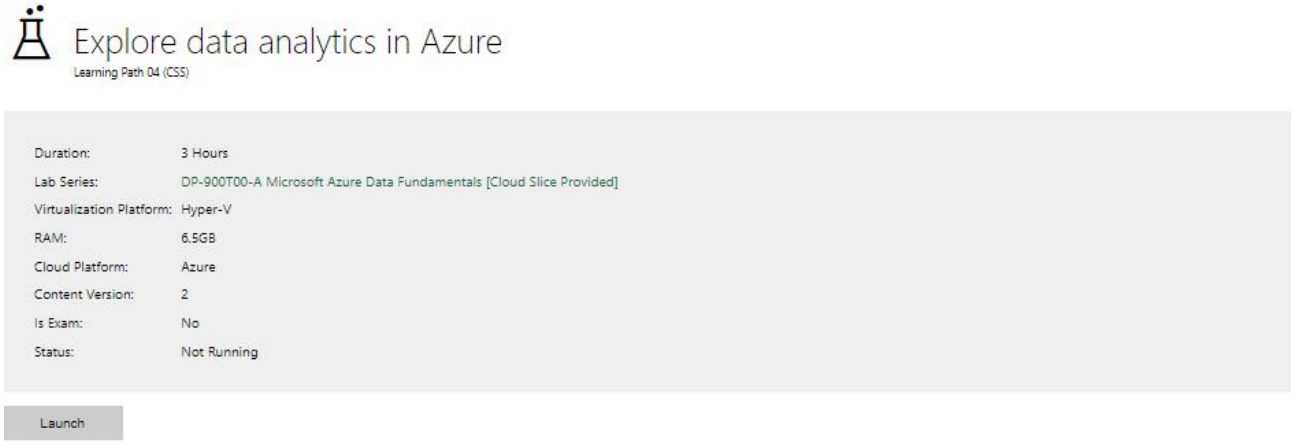
Day 3: Task 3

Please complete the below lab (5) 'Explore data analytics in Azure' and paste evidence of the completed lab in the box provided.



Completed lab	**- Lab doesn't work.**

Day 4: Task 1

In your teams, complete the Azure DP-900 practice exam and paste your result below – this is open book and please research and discuss your answers as a team.

6

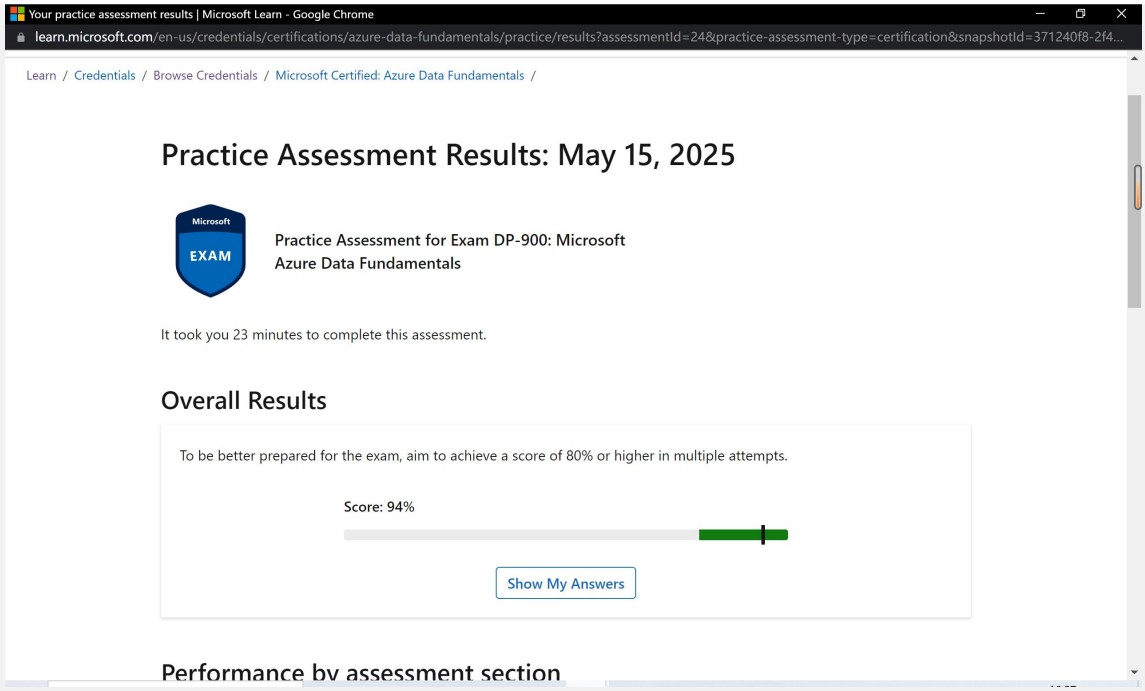
Practice Assessment: DP-900T00-A Microsoft Azure Data Fundamentals

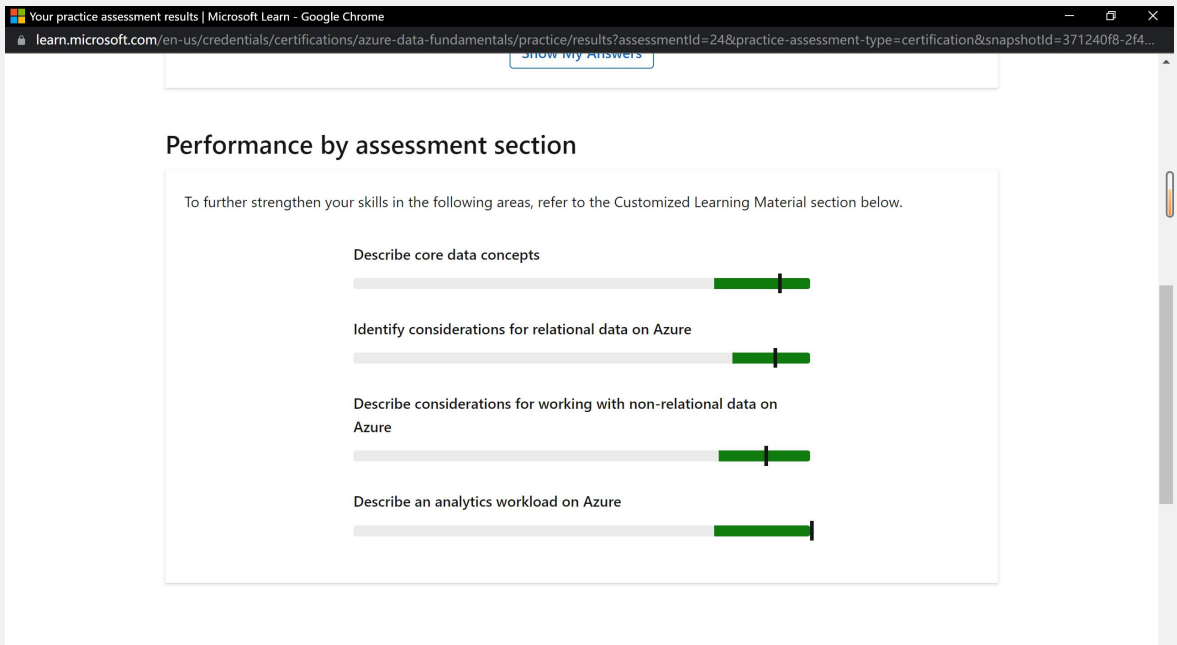
Practice Assessment for Microsoft Certifications for DP-900T00-A

Additional Details

Required: No
Available Instructor-Led: Yes
Available Self-Paced: Yes

Result





Day 4: Task 2

1. Scenario Background

"Paws & Whiskers" is a growing pet shop that aims to improve its business by analysing sales, customer information, and inventory data. Currently, the data is collected manually or stored in spreadsheets. Management is interested in transitioning to Microsoft Azure to streamline data storage, analysis, and reporting, enabling them to make data-driven decisions.

2. Data Laws and Regulations

Identify and explain the data laws and regulations relevant to handling customer data within the proposal. Ensure you cover the following points:

- **GDPR Compliance**: Highlight the importance of adhering to the General Data Protection Regulation (GDPR), particularly as it relates to storing and processing customer information.
- **Data Protection Act (DPA) 2018**: Outline how the DPA 2018 may affect the way "Paws & Whiskers" collects and stores data, ensuring compliance with UK laws on data privacy.
- **Other Industry Standards**: Research any additional data protection standards or regulations that may apply to pet shop data, particularly if they involve sensitive or payment information.

3. Azure Service Recommendations

Recommend Microsoft Azure services that would suit the company's data analysis needs and explain why these services are suitable. Your recommendations should include:

- **Data Storage**: Identify suitable storage options, such as **Azure Blob Storage** or **Azure SQL Database**, and discuss the benefits of each for storing large datasets, including inventory, sales transactions, and customer details.
- **Data Analysis Tools**: Recommend tools such as **Azure Machine Learning** for customer behaviour analysis or **Azure Synapse Analytics** for analysing sales trends.
- **Data Integration and Automation**: Explain how services like **Azure Data Factory** could automate data collection and integration processes, improving efficiency.

4. Data Types and Data Modelling

Define the types of data "Paws & Whiskers" will need to work with and describe your approach to data modelling:

- **Data Categories**: Identify key data types, such as customer demographics, transaction history, pet inventory, and product categories.

- **Data Modelling Approach**: Outline how you would structure this data using a relational model or a data warehouse approach, considering factors like tables, entities, relationships, and primary keys.

5. Data Storage Formats and Structures in Azure

Discuss how you would store data within Azure and the formats you would recommend:

- **Data Formats**: Specify recommended formats (e.g., CSV for raw data imports, JSON for structured data, Parquet for analytics) and explain why these formats are suitable for specific data types.
- **Data Security and Encryption**: Include recommendations for securing data using Azure's built-in encryption features and access controls to ensure compliance with data privacy regulations.

6. Additional Considerations

Provide any other considerations that might enhance data handling and efficiency in Azure, such as:

- **Backup and Disaster Recovery**: Outline a backup plan using **Azure Backup** or **Azure Site Recovery** to safeguard against data loss.
- **Data Visualisation**: Discuss potential use of **Power BI** within Azure for creating dashboards that provide management with real-time insights into sales and customer trends.
- **Future Scalability**: Comment on how Azure services can scale as the business grows, accommodating larger datasets and more complex analyses.

Submission Guidelines:

1. **Structure**: Ensure your report is well-organised, with sections for each task (e.g., Data Laws, Azure Services, Data Types, etc.).
2. **Formatting**: Include headings, bullet points where appropriate, and any visuals or diagrams that support your explanations.
3. **References**: Cite any resources or regulations referenced in the report.
4. **Length**: Aim for 1500-2000 words.

1. Scenario Background

"Paws & Whiskers" is a growing pet retail business striving to enhance operations by analysing sales trends, customer behaviours, and inventory performance. Currently reliant on manual processes and spreadsheets, the company seeks to modernise its data strategy by transitioning to Microsoft Azure. This move will streamline data storage, improve reporting accuracy, enable advanced analytics, and support data-driven decision-making, driving growth and operational efficiency.

2. Data Laws and Regulations

a. GDPR Compliance

The General Data Protection Regulation (GDPR) is a European Union regulation focused on protecting individuals' personal data and privacy. Despite the UK's exit from the EU, companies handling data from EU citizens must still comply.

Key GDPR principles relevant to "Paws & Whiskers":

- **Consent:** Personal data must be collected with clear consent for a defined purpose.
- **Data Minimisation:** Only collect data necessary for operations.
- **Data Access & Portability:** Customers have the right to access and request copies of their data.
- **Right to Erasure:** Customers can request their data be deleted permanently.
- **Data Breach Notification:** In case of a breach, regulatory authorities must be notified within 72 hours.

b. Data Protection Act (DPA) 2018

The Data Protection Act 2018 complements GDPR and governs data protection within the UK.

Key considerations:

- Lawful Basis for Processing: Define specific reasons for storing customer data.
- Security Measures: Use Azure's encryption and access control tools.
- Age-Related Data: Ensure enhanced protections are applied when dealing with minors.

c. Other Industry Standards

Relevant standards:

- **PCI DSS:** Required for securely handling credit card payments.
- **ISO/IEC 27001:** Ensures best practices in information security management.

3. Azure Service Recommendations

a. Data Storage

Azure SQL Database:

- Ideal for structured data like customer records and transaction history.
- Auto-scaling, backups, and built-in threat detection.

Azure Blob Storage:

- Best for unstructured data like images and logs.
- Low-cost and scalable object storage.

b. Data Analysis Tools

Azure Synapse Analytics:

- Combines warehousing and big data analytics.
- Supports trend and sales analysis.

Azure Machine Learning:

- Provides predictive insights like customer behaviour or product recommendations.

c. Data Integration and Automation

Azure Data Factory:

- Automates and orchestrates data pipelines.
- Reduces manual entry and enables real-time data syncing.

4. Data Types and Data Modelling

a. Data Categories

Key data types include:

- Customer Demographics
- Transaction History
- Pet Inventory
- Product Categories
- Supplier Details

b. Data Modelling Approach

Relational model using Azure SQL:

- **Customers** (CustomerID PK)
- **Transactions** (TransactionID PK, CustomerID FK)
- **Products** (ProductID PK)
- **Inventory** (InventoryID PK, ProductID FK)
- **Suppliers** (SupplierID PK)
- **Pets** (PetID PK, CustomerID FK)

c. Data Warehouse construction

Build data warehouse model with fact and dimension tables for further business analytics.

5. Data Storage Formats and Structures in Azure

a. Data Formats

Recommended formats:

- **CSV:** For raw data imports.
- **JSON:** For structured data and APIs.
- **Parquet:** Optimised for analytical queries in Synapse or Data Lake.

b. Data Security and Encryption

Security measures:

- Encryption at Rest using AES-256.
- Encryption in Transit via HTTPS.
- Azure Active Directory for authentication.
- Role-Based Access Control (RBAC).
- Advanced Threat Protection for anomaly detection.

6. Additional Considerations

a. Backup and Disaster Recovery

Azure Backup:

- Automates SQL and file backups with long-term retention.

Azure Site Recovery:

- Enables workload replication across regions for high availability.

b. Data Visualisation

Power BI:

- Connects with Azure services to create real-time dashboards.
- Supports sales, inventory, and customer analysis.

c. Future Scalability

Azure enables:

- Elastic scaling via SQL Elastic Pools and Synapse Serverless Pools.
- Geographic scaling and resource expansion as data grows.

Conclusion

By migrating to Microsoft Azure, "Paws & Whiskers" will transform its data capabilities with secure, scalable, and efficient solutions. Azure's compliance support, analytics power, and integration features make it ideal for the business's growth.

References

1. ICO. (2018). Guide to GDPR. https://ico.org.uk
2. UK Government. Data Protection Act 2018. https://www.legislation.gov.uk
3. Microsoft Azure Docs. https://learn.microsoft.com/en-us/azure
4. PCI Security Standards Council. https://www.pcisecuritystandards.org

Course Notes

It is recommended to take notes from the course, use the space below to do so, or use the revision guide shared with the class:

We have included a range of additional links to further resources and information that you may find useful, these can be found within your revision guide.

END OF WORKBOOK

Please check through your work thoroughly before submitting and update the table of contents if required.

Please send your completed work booklet to your trainer.