

**Data Technician**

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| Course Date:12 May 2025 |
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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.

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| What can cloud computing do for us in the real-world? | Cloud computing is the on-demand delivery of IT resources over the Internet with pay-as-you-go pricing. Instead of buying, owning, and maintaining physical data centres and servers, user can access technology services, such as computing power, storage, and databases, on an as-needed basis from a cloud provider. |
| How can it benefit a business? | Cloud computing provides computing resources over the internet, allowing users to access these services on demand. It offers pay-as-you-go option, and avoiding the costs of maintaining physical hardware. Also, provide accessibility facility from anywhere with an internet connection. Business does not need expertise and expensive resources for the technology. Moreover, it provide world class standard and securities. |
| What’s the alternative to cloud computing? | The alternative to cloud computing is on-premises computing, where a business its own resources such as servers, storage, and software locally on its own infrastructure. |
| What cloud providers can we use, what are their features and functions? | There are many cloud providers, these includes Microsoft Azure, Amazon Web Services (AWS), and Google Cloud Platform (GCP). Azure offers a wide range of services, including compute, storage, databases, networking, AI, and easily supports Microsoft tools such as MySQL. On the other hand, AWS also offer many services, including compute, storage, databases, networking, analytics, and it is highly scalable. Besides, GCP offer services that includes computing, networking, storage, data analytics, machine learning, and excellent data analytics option. |

# Day 1: Task 2

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

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| Cloud Offerings | Explain what it is | When / how might you use this service in the real-world? |
| IaaS (Infrastructure as a service) | Configured network and computing resources where virtual machines, switches, routers, firewalls, load balancers. | The start-up business with low budget can use this service such as **Amazon EC2 (AWS)** to host its website, where the business rent the virtual infrastructure as the basis of pay as you go. |
| PaaS (Platform as a service) | Virtual machines with pre-installed operating systems and software or database environments. User need to create and maintains the applications. | The developer can use this service, for example, can use Google App Engine to build and deploy web application without handling server management. |
| SaaS (Software as a service) | Fully configured applications where  User do not think about how the service is maintained or how the underlying infrastructure is managed. | A corporation can use this service such as using Microsoft 365 they can email, documentation, and teamwork. As the software runs in the cloud and accessible via internet, so need to maintain of install on-premise. |

# 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).

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| Public Cloud | |  | | --- | | Services and infrastructure are provided by the cloud provider like Amazon or Microsoft provides the infrastructure. For example, Netflix uses AWS public cloud. | |
| Private Cloud | |  | | --- | | The entire cloud infrastructure such as the physical servers, storage, and networking must be secured by the organisation that owns the private cloud. The government organisation like passport office where the user need full control to prohibit any data leak. | |
| Hybrid Cloud | |  | | --- | | It is the combination of private and public cloud where organisation own on-premises data centre with a public cloud infrastructure. It can be used to analyse customer trend. | |
| Community Cloud | It provides a collaborative infrastructure among the organisations have common need, where resources and services are shared, allowing for cost-sharing and the benefits of a private cloud without the high costs of dedicated infrastructure. It can be used in the hospital where some common information need to be shared and also need to follow some same rules. |

# Day 2: Task 1

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

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| Area | Description | Example |
| Unauthorised access to computer material | Accessing a computer system without permission. | A student is guessing other student’s username and password, then logging into their account. |
| Unauthorised access with intent to commit further offences | Gaining unauthorised access with the intent to commit another crime, such as fraud or theft. | A student hacking into teachers system to modify the marks. |
| Unauthorised modification of computer material. | Intentionally changing, deleting, or corrupting data or software without permission. | A student installing malware to delete projects on the system. |

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.

|  |
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| Description |
| Unauthorised access to computer material. A person is guilty of an offence if does any unauthorised act in relation to a computer and at the time when the person does the act knows that it is unauthorised. On summary conviction in England and Wales, to imprisonment for a term not exceeding 12 months or to a fine not exceeding the statutory maximum or to both. |
| Unauthorised acts with intent to impair, or with recklessness as to impairing, operation of computer, etc. A person is guilty of an offence if the person does any unauthorised act in relation to a computer and at the time when he does the act he knows that it is unauthorised. This means **justpossessing or distributing** hacking tools, even if not used, can now be a **criminal offence**. |
| Making, supplying or obtaining articles for use in computer misuse offences. A person is guilty of an offence if he supplies or offers to supply any article believing that it is likely to be used to commit, or to assist in the commission of, an offence under section. This includes creating or spreading malicious software (“malware”) that can be used in computer misuse offences. A denial of service (DoS) attack involves one computer or network resource flooding a server or network resource with requests which causes it to become unavailable. The 2006 Act **explicitly criminalised DoS and DDoS attacks**, treating them as a form of unauthorized act impairing the operation of a computer. The maximum sentence for this offence is **10 years**. |

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 |
| Educational Qualification |

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| Give three more examples of data that an employer can only store if they first get the employee’s permission. |
| Race and ethnicity |
| Trade union membership |
| Health and medical orientation |

Conduct further research to answer the below questions.

|  |  |
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| Question | Answer |
| Provide one example of: Copyright infringement | Downloading licensed software from unauthorized sites. |
| Provide one example of: Plagiarism | Providing someone’s ideas as own words but not citing the original source. |
| What are two consequences of copyright infringement and software piracy? | Fine, and  Criminal charge. |
| Give three possible consequences for individuals when using pirated software | Risk of malware infection.  Legal penalty.  Increase overall vulnerability |

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

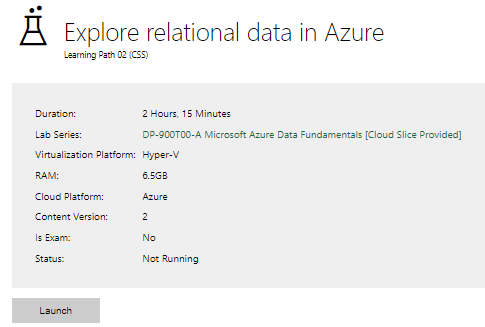
* Insert a number in the first column of each row to match each of the statements with one of the above Acts.
* One of statements is incorrect and not illegal. For this statement, write ‘Not illegal’.

|  |  |
| --- | --- |
| **Act number** | **Clause** |
| 3 | 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 |
| Not illegal | Unauthorised modification of computer material is illegal |
| 3 | 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 |

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# Day 3: Task 1

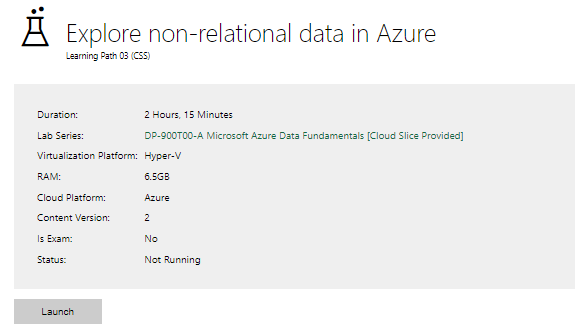
Please complete the below lab (3) *‘Explore relational data in Azure’* and paste evidence of the completed lab in the box provided.



|  |  |
| --- | --- |
| Completed lab | **Deployment is completed:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-16 000057.png  **Mirror database:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-16 000222.png  **Query editor:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-16 000309.png  **First query:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-16 000433.png  **Second query:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-16 000759.png  **Final query**:  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-16 000906.png |

# Day 3: Task 2

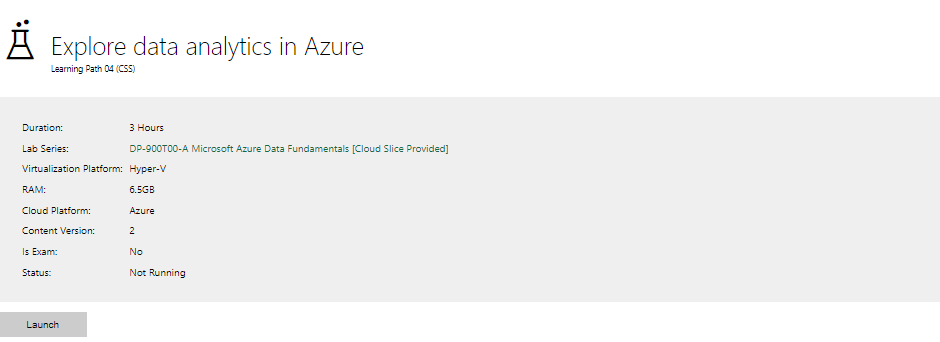
Please complete the below lab (4) *‘Explore non-relational data in Azure’* and paste evidence of the completed lab in the box provided.



|  |  |
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| Completed lab | **Data container:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 140121.png  **Deployment is complete**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 113411.png  **Explore Azure file share:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 143541.png  **Explore Azure table:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 145056.png  **Inserting data in table:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 145448.png  **Deployment is in progress and then completed:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 151308.png  **Working with JSON:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 152047.png  **Query:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 152520.png  **Query:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 152832.png  **Query:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 153440.png  **Query:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 153733.png  **Query:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 153856.png  **Query:**  C:\Users\Bob\Pictures\Screenshots\Screenshot 2025-05-15 154021.png |

# Day 3: Task 3

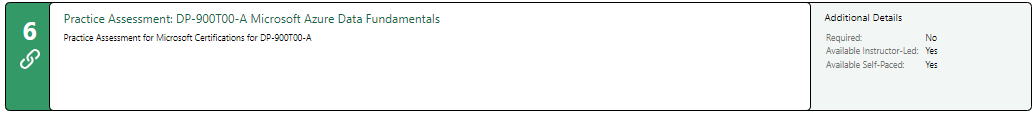
Please complete the below lab (5) ‘Explore data analytics in Azure’ and paste evidence of the completed lab in the box provided.



|  |  |
| --- | --- |
| Completed lab |  |

# 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.



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| 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.

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| **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.  **Existing System Analysis**  **System description**  Paws & Whiskers is a small but growing pet shop with 25 employees. Currently, the business manages its day-to-day transactions manually and stores data on a local computer, including records in a physical ledger book. Their existing infrastructure consists of one server, five computers, and two printers.  The organization aims to implement strategic improvements to maintain competitive sustainability. However, the current system lacks data integrity, making it difficult to generate effective reports or visualize data for informed decision-making. Additionally, there is a high risk of data breaches and data loss of sensitive information such as customers’ dates of birth and addresses, which is easily accessible to employees, including IT staff. There are also inadequate backup and disaster recovery procedures in place.  This situation exposes the organization to several vulnerabilities, including reputational damage, breaches of data protection regulations, loss of customer trust, and the potential failure of storage devices. Moreover, there is a continuous cost burden associated with maintaining an on-premises system and staffing requirements.  Given these challenges, the management is considering a transition to Microsoft Azure to streamline data storage, analysis, and reporting enabling more efficient, secure, and data-driven decision-making.  **Entities**  Customer, Sales, Inventory, Product, Supplier, and Employee  **Data collection and storing**  Physical ledger book and Spreadsheet  **System**  On-premise  **Entity and Attributes**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Customer information** |  | **Sales Information** |  | **Inventory information** | | CustomerID (INT, PK)  FirstName (VARCHAR)  LastName (VARCHAR)  Address (VARCHAR)  PhoneNumber (VARCHAR)  Email (VARCHAR) |  | SalesID (INT, PK)  SaleDate (DATE)  Quantity (INT)  TotalPrice (DECIMAL)  Tax (DECIMAL)  GrantTotal (DECIMAL) |  | PetID (INT, PK)  Species (VARCHAR)  Breed (VARCHAR)  Name (VARCHAR)  DateOfBirth (DATE)  PurchasePrice (DECIMAL) | |  |  |  |  |  | | **Product information** |  | **Supplier information** |  | **Employee information** | | ProductID (INT, PK)  ProductName (VARCHAR)  Description (VARCHAR)  Price (DECIMAL) |  | supplier\_id  SupplierName  address  email  phone  ProductRange |  | EmployeeID (INT, PK)  FirstName (VARCHAR)  LastName (VARCHAR)  JobTitle (VARCHAR)  HireDate (DATE)  DateOfBirth(DATE)  NID(VARCHAR)  BankDetails(VARCHAR) |   **Data flow diagram**  https://documents.lucid.app/documents/c420365a-91c3-44d1-b504-82dfe181a756/pages/0_0?a=643&x=-1351&y=26&w=1102&h=497&store=1&accept=image%2F*&auth=LCA%20657a33dcae1cf84c7e916f4f5bd2b1fd959d1d9f1d86acb4d78034ec3935abca-ts%3D1747989654  **Finding and Recommendation**  The above tables, attributes, and data flow diagram indicates the organisation is handling huge number of sensitive data in relation to customers, employees, suppliers, and pets these includes customers name, address, phone numbers; suppliers address, name, phone number; employees date of birth, national insurance number, national identity, bank information, phone number, address, and many more. Therefore, the organization must ensure and enforce data protection and security policies that align with legal regulations such as GDPR in the UK/EU, Data Protection Act 2018, and Access Control policy.  **2. Data Laws and Regulations**  **GDPR Compliance**  The General Data Protection Regulation (GDPR) is a privacy law that protects data in the European Union (EU) and European Economic Area (EEA). After the United Kingdom left the EU and EEA in 2020, the country has incorporated GDPR into its [Data Protection Act](https://www.gov.uk/data-protection#:~:text=The%20Data%20Protection%20Act%202018%20is%20the%20UK's%20implementation%20of,used%20fairly%2C%20lawfully%20and%20transparently), which means England, Scotland, Wales, and Northern Ireland all have the same data processing rules. In other words, GDPR applies to the EU, EEA, and UK.  In part, the regulation says personal data must be protected against "unauthorized or unlawful processing, and against accidental loss, destruction or damage”. Paws & Whiskers pet shop contents customer’s personal data includes: name, identification number, address, location, phone number, customer type. Additionally employee’s personal data consists: date of birth, bank information, national insurance number, national identification, ethnicity, religious, union membership, and health condition.  The organisation is in the greater risk as they are using local computers and physical ledgers to store and process personal sensitive data. The hard disk can be damaged any time and there is no fall back procedure. Also, the physical ledgers and computers are easily accessible by every employees within the organisation. So, the organisation is vulnerable in relation to the guidelines of data handling and data security according to the stated law above.  There are heavy consequences of non-compliance with GDPR these includes significant penalties, including fines of up to €20 million or 4% of a business's annual global turnover, whichever is greater. It can also damage a business's reputation and erode customer trust.  Recommendation   * + To ensure GDPR compliance when handling customer data, businesses should obtain explicit consent from customers before collecting and processing their data, use secure systems and tools to store and process data, regularly review and update their data protection measures, and provide customers with the ability to access and delete their data upon request.   Businesses can train employees on GDPR compliance through a variety of methods, including workshops, training sessions, e-learning courses, and internal policies and guidelines. It is important to ensure that all employees who handle customer data are trained on GDPR regulations and best practices to protect customer data and avoid non-compliance.  **Data Protection Act (DPA) 2018**  These acts are essentially about the ethical use of personal data and keeping every individual’s personal data secure. The new law enforces in the UK, the General Data Protection Regulation (GDPR), which came into force in Europe on 25 May 2018. The DPA 2018 works alongside theUK General Data Protection Regulation (UK GDPR).  The organisation need to ensure the customer have control over their personal data, such as right to know how their name, address, date of birth, are used, how they can access, update, or delete. The pet shop is maintaining ledger book where updating and deletion of record is not possible. On the other hand the company is not maintain strong security system in relation to software and personnel, so the customer’s data can be leaked easily. Moreover, it is noticeable the organisation do not have any clear rules regrading to follow the data protection legislations, during the interview the staff were unable to express their knowledge about it. Also, they are not maintaining the rule of how long the data can be stored.  Recommendation  The organisation must obey the DPA 2018 to protect personal data, builds trust, ensures responsible use of information, and prohibit consequence of legal risks. This process will ensure reputation and be run with the competition. So it is essential to implement a secure, user friendly, and state of the art system.  **Other Industry Standards**  C**omputer Misuse Act 1990**   * 1. This makes the illegal unauthorised access to computer material, unauthorised access with intent to commit further offences, and unauthorised modification of computer material.   2. Later the major amendments to this act that is Police and Justice Act 2006 states making, owning or distributing hacking tools is illegal if the person intends or believes it will be used for computer misuse. Also, denial of Service attacks is illegal with a penalty of up to 10 years in prison.   Also, making, owning or supplying hacking tools is illegal, this includes creating or spreading malicious software that can be used in computer misuse offences such as Viruses, Worms, Trojans, Ransomware attacks.  The pet shop is running like a family business where professionalisms are minimising. However, it is a growing organisation and looking forward to expanding its business environment. In reality it is observed the employees can easily able to misuse customer data, for example snooping into personal records without a valid reason that can be prosecuted under this act. Also, they are seldom to maintain strong cybersecurity measures as they require expertise and additional budget. So, data can be hacked any time or be corrupted  Recommendation  The pet shop should enforces strict user access controls, monitor internal access, and respond to threats quickly, which will help create a safe environment for handling customer data and maintaining. Otherwise, business may loss of customer trust, harm business reputation, and may face legal consequence as well as can be out from the completive market.  **3. Azure Service Recommendations**  **Data Storage**  **Azure Blob storage**  Blob Storage is best for storing unstructured data and serving images or documents directly to a browser, storing files for distributed access, streaming video and audio, storing data for backup and restore, disaster recovery, and archiving. Also, provide service for storing data for analysis by an on-premises or Azure-hosted service. Users or client applications can access objects in Blob Storage via HTTP/HTTPS, from anywhere in the world. The advantages of Blob Storage, including cost effective storage solution, high availability, strong consistency, and disaster recovery capabilities.  Blob data storage offers three types of resources includes storage account, container, and blob. Where storage account provides a unique namespace in Azure for data, container organizes a set of blobs, and blob is a binary large object used to images, audio, or multimedia objects.  So, Azure Blob Storage able to fulfil the demand of pet shop as it require to store the large objects such as the images of pets, videos, and accessible by in web browser for the customer and promotional advertising. It provides great data security includes backup and disaster recovery.  **Azure SQL Database**  Azure SQL Database is a fully managed relational database service, which ideal for storing structured data such as sales transactions, customer details, and inventory records. Moreover, this database enable to focus on the domain specific database administration and optimization activities that are critical for business, and it provides a highly available and high-performance data storage layer for the applications and solutions in Azure. It enables to process both relational data and [nonrelation structures](https://learn.microsoft.com/en-us/azure/azure-sql/multi-model-features?view=azuresql), such as graphs, JSON, spatial, and XML. So, it will meet the requirement of the existing pet shop system.  Additionally, SQL Database is a fully managed service that has built-in high availability, backups, and other common maintenance operations where Microsoft handles to manage the underlying infrastructure. It has currently 38 datacentres around the world, so the organisation can run their database at the nearer datacentre.  Besides, the current business is need to modernise their system where Azure SQL Database secure migration of apps from on-premises to the cloud, along with access to the Azure Resource Manager API for dynamic provisioning and all without the need to pay for additional hardware. Moreover, it offers Point in Time Restore (PITR) that provides users to fall back to full version of their database as far as a month in the past, and Long Term Retention (LTR) that provides backup for as long as 10 years. Besides, it has scalable performance to handle growing data volumes, and built-security, which is necessary for this growing organisation.  In conclusion, the Azure SQL Database option will be suitable for the Paws & Whiskers as the pet shop is a growing organisation and may suitable to for relational database that will support to store both data and images as well as data security.  **Data Analysis Tools**  **Azure Machine Learning**  Azure Machine Learning predictive analytics capabilities can predict customer demand much more accurately, leading to optimised inventory management and reduce carrying costs. It provides accurate sales forecasts that help a business to set realistic revenue goals and allocate resources. Moreover, it can segment customers based on various factors like demographics, purchase history, and online behaviour that can support business to shape their marketing efforts and product recommendations to specific groups as well as enhance marketing campaigns and sales strategies to reach the right customers with the right message. Eventually, in the light of above benefits Azure Machine Learning can help businesses save money on marketing costs and customer gaining expenses. For example, PepsiCo uses Azure Machine Learning to identify consumer shopping trends and produce store-level actionable insights.  In summary, Azure Machine Learning provides a powerful platform for businesses to analyse customer behaviour, predict future trends, and make data-driven decisions that can lead to increased customer loyalty, retention, and revenue.  **Azure Synapse Analytics**  Azure Synapse Analytics is a comprehensive data analytics service that integrates big data processing, data warehousing, and data integration on a single platform. It allows users to query both relational and non-relational data using server less or provisioned resources.  Azure Synapse Analytics offers centralized data management, enhanced performance with parallel processing, and continuous integration with tools like Power BI and Azure Machine Learning. It also provides advanced security features and cost-efficient data handling with its consumption-based pricing model.  In conclusion, for business analysis, both Azure Synapse Analytics and Azure Machine Learning play separate but complementary roles. Azure Synapse Analytics is primarily used for data warehousing, querying, and transforming data, while Azure Machine Learning focuses on building, training, and deploying predictive models. In the context of the pet shop it is advisable to Azure Synapse Analytics as prediction of sales trends are important in respect to the growing business.  **Data Integration and Automation**  Azure Data Factory is a cloud-based data integration service that allows to create data-driven workflows in the cloud for arranging and automating data movement and data transformation. ADF does not store any data itself. It allows you to create data-driven workflows to orchestrate the movement of data between supported data stores and then process the data using compute services in other regions or in an on premise environment.  It enable to connect multiple data sources such as POS systems, SQL databases, and Excel files. Also, transform the data using mapping data flows or custom logic, and store the integrated data into a central destination, for example Azure SQL Database, Azure Synapse, or Power BI. Moreover, the integration runtime facilitate data movement between data stores in public and private as well as on premise or virtual private networks, providing support for built-in connectors, format conversion, column mapping, and performant and scalable data transfer. It is cost effective pricing, for example, $1.50 per 1000 runs.  **4. Data Types and Data Modelling**  **Data Categories**  **Data structure**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Table Name** | **Field Name** | **Data Type** | **Key** | **Description** | | Customer | customer\_id  first\_name  last\_name  address  city  postcode  country  email  phone\_number  date\_of\_reg | INT  VARCHAR(50)  VARCHAR(50)  VARCHAR(50)  VARCHAR(25)  VARCHAR(10)  VARCHAR(50)  VARCHAR(100)  VARCHAR(15)  DATE | PK | Unique customers ID  First name  Last name  Address first line  City  Postcode  Country  Email address  Phone number  Date of registration | | **Table Name** | **Field Name** | **Data Type** | **Key** | **Description** | | Transaction | transaction\_id  customer\_id  employee\_id  trans\_date  total\_amount  pay\_method  status | INT  INT  INT  DATE  DECIMAL(10,2)  DECIMAL(10,2  VARCHAR(20) | PK  FK  FK | Unique transaction ID  Links to Customer.customer\_id  Links to Employee.employee.id  Transaction date and time  Total amount for transaction  Payment method  Completed/Refunded/Cancelled | | TransDetail | trans\_detail\_id  transaction\_id  product\_id  quantity  unit price  discount  total price | INT  INT  INT  INT  DECIMAL(10,2)  DECIMAL(10,2)  DECIMAL(10,2) | PK  FK  FK | Transaction detail identifier  Links to Transaction.transaction\_id  Links to Product.product\_id  Number of units sold  Price per unit  Discount if applicable  Total amount payable | | Inventory | inventory\_id  product\_id  stock\_quantity  reorder\_level  reorder\_quantity  status | INT  INT  INT  INT  INT  VARCHAR(20) | PK  FK | Unique pet identifier  Links to Product.product\_id  Stock in hand  Threshold for reorder  Reorder quantity  Stock status low, high, out | | Product | product\_id  product\_name  category  description  unit\_price  purchase\_price  supplier\_id  created\_date | INT  VARCHAR(50)  VARCHAR(20)  VARCHAR(50)  INT  DECIMAL(10,2)  INT  DATE | PK  FK | Unique product identifier  Product name  Category of species, or food  Description of the product  Selling price  Purchasing price  Links to Supplier.supplier\_id  Date of entry | | Supplier | supplier\_id  first\_name  last\_name  address  city  post\_code  country  email  phone  product\_range | INT  VARCHAR(50)  VARCHAR(50)  VARCHAR(100)  VARCHAR(25)  VARCHAR(10)  VARCHAR(50)  VARCHAR(100)  VARCHAR(15)  VARCHAR(50) | PK | Supplier Unique identifier  Supplier first name  Supplier last name  Address  City  Post code  Country  Email  Phone  Type of product they supply | | **Table Name** | **Field Name** | **Data Type** | **Key** | **Description** | | Employee | employee\_id  first\_name  last\_name  Email  phone  hire\_date  department  position  salary  status | INT  VARCHAR(50)  VARCHAR(50)  VARCHAR(50)  VARCHAR(20)  DATE  VARCHAR(20)  VACHAR(20)  DECEIMAL(6,2)  VARCHAR(20) | PK | Employee identifier  Employee first name  Employee last name  Department  Role  Date of hiring  Department  Job title  Monthly salary  Current, Leave, Previous |   **Data Modelling Approach**  https://documents.lucid.app/documents/493479de-39d8-4033-b5ca-56ffffca0996/pages/0_0?a=759&x=-130&y=-793&w=1080&h=1142&store=1&accept=image%2F*&auth=LCA%20bd293116ede3e9db5ad81aeafdb8e7cc5c192a805efb93132726aed5ea85212b-ts%3D1748101543  **Figure: Entity relationship diagram**  **5. Data Storage Formats and Structures in Azure**  **Data Formats**  Azure supports variety of data formats includes Binary formats, CSV, JSON, ORC, SQL, and ORC. There are many azure storage services and most of them commonly support same data formats. Some of them have been discussed below:  Firstly, Blob Storage, which is mainly suitable for unstructured data like images, videos, documents, and backups. It supports many data formats, these includes Binary formats such as JPEG, PNG, MP4, DOCX. Then CSV that is suitable for importing and exporting tabular data, especially raw data. Also, JSON (JavaScript Object Notation) that is useful for semi-structured data, configuration files, and data exchange between applications.  Secondly, Azure SQL Database / Azure Database for MySQL is suitable for relational databases for structured transactional data. It supports CSV, and JSON data format BACPAC/DACPAC.  Finally, Azure Cosmos DB that is a NoSQL database service and it supports multiple data formats includes JSON: The native format for the Document API (Core API). Documents are stored as JSON, and Table API.  The proposed system is require tabular form of database as well as the relational database can be suitable, which can be used for data visualisation to optimise the business forecast decision. So, JSON/SQL can be recommended.  **Data Security and Encryption**  To help protect data in the cloud, need to account for the possible states in which data can occur, and what controls are available for that state. Best practices for Azure data security and encryption relate to the following data states:  At rest: This includes all information storage objects, containers, and types that exist statically on physical media, whether magnetic or optical disk. Transparent Data Encryption (TDE) is for Azure SQL Database, Azure Database for PostgreSQL, and Azure Database for MySQL, TDE encrypts the data at rest, including the database files, log files, and backups.  In transit: When data is being transferred between components, locations, or programs, it's in transit. Azure Blob Storage and Data Lake Storage Gen2, enable the "Secure transfer required" setting to ensure that only HTTPS requests are allowed.  In Use: When data is being processed, the specialized AMD & Intel chipset based Confidential compute VMs keep the data encrypted in memory using hardware managed keys. Azure Active Directory integration is for centralized identity management and authentication for services like Azure SQL Database and Azure Storage.  In conclusion, Azure AD authentication where possible for enhanced security and manageability.  **6. Additional Considerations**  **Backup and Disaster Recovery**  Azure offers an end-to-end backup and disaster recovery solution that’s simple, secure, scalable, cost effective, and can be integrated with on-premises data protection solutions. In the case of service disruption or accidental deletion or corruption of data, it’ll help recover business services in a timely and orchestrated manner. The Azure backup and disaster recovery solution is simple to architect, cloud-native, highly available, and resilient.  **Azure Backup**  Azure Backup allows to back up and restore Virtual Machines (Hyper-V and VMWare), files, folders, system state, on-premises workloads or even an SQL database. Business system can backup Windows or Linux VMs, files, folders and system state using the backup extension or [Microsoft Azure Recovery Services](https://learn.microsoft.com/en-us/azure/backup/backup-azure-about-mars) (MARS) agent. It offers pay-as-you-go subscription model, which means only need to pay for the storage space you use.  **Azure Site Recovery**  [Azure Site Recovery](https://azure.microsoft.com/en-us/products/site-recovery/) services provide [Disaster Recovery as a Service](https://unitrendsstage.wpengine.com/blog/disaster-recovery-as-a-service-draas) (DRaaS) by replicating an Azure Virtual Machine to a different Azure region. Like Azure Backup, the organisation can automate the replication process, and it can be set up to occur at regular intervals. Azure Site Recovery offers several disaster recovery options like replication, failover and failback, which can configure and manage in the Azure portal. The existing business is vulnerable in data security, so it is essential to consider Azure backup and recovery solution as it is cost effective.  **Data Visualisation**  The pet shop is a growing organisation and need to be sustained with the competitor. The organisation may benefited through introducing dashboard that may drive by Power BI. This can provide real time insights, analysis sales, inventory, customer choice, and customer feedback as well as clear overview of the business performance for further decision making.  **Future Scalability**  Azure storage services like Blob Storage and Data Lake Storage offer virtually limitless capacity, while database services such as Azure SQL Database and Cosmos DB provide options to scale compute and storage. For analytics, Azure Synapse Analytics and Azure Databricks can optimise processing power on demand. This ensures that as data volumes increase and analytical needs become more sophisticated, Azure resources can adapt, providing the necessary performance and capacity while optimizing costs through pay-as-you-go models.  **References**  **Azure Machine Learning:** <https://www.formuspro.com/azure-machine-learning/>  Azure Data Factory: <https://azure.microsoft.com/en-gb/products/data-factory>  Azure Data Factory: <https://www.qa.com/resources/blog/what-is-azure-data-factory/>  GDPR: <https://www.fivecrm.com/blog/gdpr-and-customer-services/>  Data Flow diagram, Kettles, Degan: <https://www.youtube.com/watch?v=ab1DZ6o7QBs&t=42s>  Lucid Chart, Database Chart: <https://www.youtube.com/watch?v=RBZtPhZkUZM> |

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| **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:

My instructor has made every effort to ensure our educational progress. I am confident that we are on the correct path to further our self-exploration.

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| **Additional Information** |

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.

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