

**Data Technician**

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| Course Date: 3/02/2025 |
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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 offers unprecedented flexibility, scalability, and cost efficiency. It provides computing services over the Internet by large remote servers, including servers, storage, databases, networking, software, analytics, and more. Having access to this such resources is available on-demand without the necessity of physical infrastructure.  Cloud computing also plays an essential role in our daily lives, which can be evident in so many ways such as playing a video game hosted in the cloud, streaming a movie on Netflix, or using a cloud service like Google Gmail,  When it comes to applicability, scalability, and flexibility, the cloud computing architecture outperforms traditional on-premises infrastructure by a greater margin. |
| How can it benefit a business? | Many Business benefits from cloud computing as business look for affordable ways to replace the legacy system,  Scalability: is one of the most distinctive. This is indeed the easiest thing for businesses to do after adjusting to the initial changes. Resources Can be changed as per needs and watch out for over-supply and under-utilization of hardware.  Disaster recovery: Cloud computing offers services to store data in the cloud; to prevent incidents like natural disasters or operational inefficiencies are inevitable. In modern times with a great amount of data being generated every second, no company can afford incidents, that can harm their data and sources Using cloud computing has prevent the data recovery functions will always have the backup to save your day in emergencies.  Enhanced collaboration among teams  Clear communication and establishing an appropriate co-working environment is essential for people to work in a team. Cloud computing does what is needed to encourage collaboration among employees. Teams can communicate access and share files in real-time from anywhere in the world. With cloud computing teams can work in a more collaborative and comfortable environment of getting the work done.  Enhanced collaboration among teams  Clear communication and establishing an appropriate co-working environment is essential for people to work in a team. Cloud computing does what is needed to encourage collaboration among employees. Teams can communicate access and share files in real-time from anywhere in the world. With cloud computing teams can work in a more collaborative and comfortable environment of getting the work done.  Cost Savings  Traditional systems often build up on exponentially expensive servers and hardware and not every company can afford them. Although costs are another major incentive for going cloud, they minimize the need for expensive on-premises infrastructure and maintenance, which allows companies to have more convenient ways to scale their business while being cloudsured.  Data security  Data security concerns have always been a headache for companies seeking affordable ways and bid adieu to the traditional ways of storing and sharing data. To address the most pressing issues with data storage Cloud providers typically invest heavily in robust measures for security, making it much easier for companies to safeguard sensitive data. |
| What’s the alternative to cloud computing? | **1. Fog Computing**  Fog computing (also known as fogging) is decentralized infrastructure that performs a portion of computing somewhere between the data source and the origin server (or the cloud).  **2. Edge Computing**  Edge computing is a distributed IT architecture in which data processing happens at or as close to the source of data as possible. This tech reduces latency and bandwidth by processing data at local devices, such as an IoT device or an edge server.  **3. Mesh Computing**  A mesh network (or meshnet) is an architecture in which the infrastructure nodes (bridges, switches, etc.) connect directly and non-hierarchically to as many other nodes as possible. Since there are at least two pathways to each node, there are numerous routes for data to travel, which makes meshnets a highly reliable design.  **4. Bare Metal Cloud (BMC)**  Bare metal cloud enables a company to rent physical servers but deploy, scale, and manage them in a public cloud-like fashion. BMC servers are deployed automatically in just a couple of minutes with the requested OS or bare metal hypervisor. Server deployment and management can be performed via API and CLI, which provides automation opportunities, similar to public cloud  **5. On-Prem Hosting**  The most obvious of all alternatives to cloud computing is to opt for on-prem hosting. One can set up an on-site server room and equip it with all the hardware needed to run apps and workloads in-hous.  **6. Colocation Hosting**  Colocation (or colo) is a data center service in which a third-party facility provides space for privately-owned servers and other computing hardware. Customers rent space by the rack, cabinet, cage, or room, depending on the amount of equipment that needs housing. |
| What cloud providers can we use, what are their features and functions? | Google Cloud,  Microsoft Azure,  Amazon Web Services (AWS |

# 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) | Infrastructure as a service (IaaS) is the on-demand availability of highly scalable computing resources as services over the internet. With IaaS, the service provider owns and operates the infrastructure, but customers will need to purchase and manage software, such as operating systems, middleware, data, and applications. They only pay for what they use. | IaaS helps eliminate much of the complexity and costs associated with building and maintaining physical infrastructure in an on-premises data center.  In real world providers manage and maintain the infrastructure, so one can concentrate on install, configure, manage software and keep data secure.  IaaS provides additional services, such as detailed billing management, logging, monitoring, storage resiliency, and security. In other words, one can easily increase or decrease resources, allowing one to pay less when needed or instantly provision and scale out resources to meet new demand.  Eg. **Coca-Cola Amatil Improved their CRM with SoftLayer**  The beverage giant Coca-Cola collaborated with SoftLayer to manage their CRM system effectively during peak seasons.  They collaborated with SoftLayer and followed a pay-as-you-go architecture.  **Some popular IaaS providers include**:  Amazon Web Services (AWS) EC2  Microsoft Azure Virtual Machines  Google Compute Engine (GCE) |
| PaaS (Platform as a service) | Platform as a service (PaaS) is a complete development and deployment environment in the cloud, with resources that enable organisation to deliver everything from simple cloud-based apps to sophisticated, cloud-enabled enterprise applications. This resource is purchase from a cloud service provider on a pay-as-you-go basis and access them over a secure Internet connection. | Development framework. PaaS provides a framework that developers can build upon to develop or customize cloud-based applications. Eg Create an Excel macro, PaaS lets developers create applications using built-in software components. Cloud features such as scalability, high-availability, and multi-tenant capability are included, reducing the amount of coding that developers must do.  Analytics or business intelligence Tools provided as a service with PaaS allow organizations to analyze and mine their data, finding insights, patterns and predicting outcomes to improve forecasting, product design decisions, investment returns, and other business decisions.  PaaS providers may offer other services that enhance applications, such as workflow, directory, security, and scheduling to upscale one's services, eg google up Engineer  Eg real world - Order takeout or delivery where the meal is prepared and one doesn’t have to worry about the ingredients or how the meal is going to be cooked, but have to worry about where one well eat, the utensils, and cleaning up after your meal. |
| SaaS (Software as a service) | Software as a service (SaaS) allows users to connect to and use cloud-based apps over the Internet. SaaS provides a complete software solution that people can purchase on a pay-as-you-go basis from a cloud service provider. | Using of web-based email service, such as personal emails, outlook, Hotmail, Yahoo and office tools such as Microsoft office 365, are all forms of SaaS. With these services, one logs into an account over the Internet, often from a web browser. The email software is located on the service provider’s network, and messages are stored there as well.  One can access their email and stored messages from a web browser on any computer or Internet-connected device.  The previous examples are free services for personal use. For organizational use, organisation can rent productivity apps, such as email, collaboration, and calendaring; and sophisticated business applications such as customer relationship management (CRM), enterprise resource planning (ERP), and document management. One pays for the use of these apps by subscription or according to the level of use.  The service provider ensures the availability and the security of the app and users' data as well. SaaS allows organization to get quickly up and running with an app at minimal upfront cost. |

# 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 | Public clouds: are types of cloud computing deployment. The cloud resources (like servers and storage) are owned and operated by a third-party cloud service provider and delivered over the internet. With a public cloud, all hardware, software, and other supporting infrastructure are owned and managed by the cloud provider. Google cloud and Microsoft Azure are example of a public cloud.  In a public cloud, one shares the same hardware, storage, and network devices with other organizations or cloud “tenants,” and can access services and manage their account using a web browser. Public cloud deployments are frequently used to provide web-based email, online office applications, storage, and testing and development environments.  Google Cloud provides a suite of public cloud computing services that helps companies across every industry to solve their toughest challenges and run their apps wherever they need them.  For organizations looking for an alternative to traditional on-premises IT architectures or other types of cloud computing, the public cloud offers nearly infinite scalability and self-service provisioning to meet workload and user demands.  Eg think of it as similar to renting an apartment, one pays rent for a single unit within the building. The manager handles the maintenance although one shares the overall space with other tenants, with security around own belongings. |
| Private Cloud | Private clouds are built, run, and used by a single organization, typically located on-premises. They provide greater control, customization, and data security but come with similar costs and resource limitations associated with traditional IT environments.  Private cloud is more like owning a house, where one has their own personal space that belongs to them, but one is also personally responsible for the overall care and upkeep of the house.  **One disadvantage- Scalability and Cost is high** |
| Hybrid Cloud | A hybrid cloud is a type of cloud computing that combines on-premises infrastructure—or a private cloud—with a public cloud. Hybrid clouds allow data and apps to move between the two environments.  Many organizations choose a hybrid cloud approach due to business imperatives such as meeting regulatory and data sovereignty requirements, taking full advantage of on-premises technology investment, or addressing low latency issues.  Hybrid cloud allow one to leverage the resources and services from different computing environments and choose which is the most optimal for the workloads. |
| Community Cloud | A community cloud provides a shared infrastructure tailored to the common needs of multiple organizations. Positioned between public and private clouds, it combines the public cloud's collaborative benefits with the private cloud's security and control.  Community cloud (a public cloud open only to a select user base with shared interests, such as the same cybersecurity risks or compliance rules)  This model typically involves a centralized cloud infrastructure to address specific needs, security requirements, or compliance standards of a particular business sector. It provides a shared cloud environment that integrates services across different types of cloud solutions to solve sector-specific challenges |

# 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; | Gaining access to computer systems and or data without permission from the Ower. This can involve hacking or accessing accounts without the owner's consent. | Eg. Guessing a colleagues at work password to access their email without their permission. Having access without their permission is a clear violation of the Computer Misuse Act. |
| Unauthorised access to computer material with intent to commit or facilitate the commission of a further offence; | This section of the act involves gaining access to a computer system or data illegally with the intention of committing further criminal acts, such as fraud or theft. | Someone accesses a company's database to obtain sensitive customer information with eg personal details with intent to commit identity theft. |
| Unauthorised modification of computer material. | Gaining access to alter a computer data or programs without the owner's permission, which can include actions like the introduction of malicious software or data corruption. | An employee of a company intentionally alters or deletes sensitive documents about the company’s system, causing operational harm. |

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 |
| Key additions and amendments to the Computer Misuse Act under the Police and Justice Act 2006:  **Amendment of Unauthorized Access Offenses:**   * 1. The Act extended the scope of the Computer Misuse Act to cover offenses that involves the creation, distribution, and use of tools that can be used to access computer systems without authorization from the Ower. This may include hacking tools, such as software that helps unauthorized access by users bypassing security measures. |
| 1. **Cybercrime Offenses:**    1. The Act created new offenses for unauthorized acts with the intent to impair the operation of a computer; such actions that causes harm, disruption, or damage to a computer system or network, even if no data or information is accessed. |
| 1. **Enhanced Penalties:**    1. It increased penalties for those found guilty of committing computer misuse offenses, reflecting the growing severity of digital crimes and the need for stronger deterrents. |

Look at the below website to answer the questions:

<https://www.gov.uk/personal-data-my-employer-can-keep-about-me>

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| Write down three items of data which a company can store about an employee. |
| Name |
| Address |
| Emergency contact details |

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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 |
| Health and medical conditions |
| Sexual orientation |

Conduct further research to answer the below questions.

|  |  |
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| Question | Answer |
| Provide one example of: Copyright infringement | Uploading and using someone else eg full song or video without the owner's permission or proper license- is violating the copyright of the music, as the original creator holds exclusive rights over the work. |
| Provide one example of: Plagiarism | Is an act of coping and pasting another person’s ideas, words or text from a website without proper citation or acknowledgment of where the documents was originally sourced. This act represents passing off someone else's work and ideas as their own, this can violate academic integrity.  (Hornby, 2010) or Oxford Advanced Learner’s Dictionary, 2010). |
| What are two consequences of copyright infringement and software piracy? | Legal Consequences:  - Civil Penalties  - Criminal Penalties  Financial Consequences:  - Loss of Revenue  - Legal Costs |
| Give three possible consequences for individuals when using pirated software | Legal Consequences  Financial Consequences  Security Risk/ vulnerabilities |

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 |
| 6 | 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.



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

Complete the exercises below if finished early. [Azure Lab 1 Exercises](https://forms.office.com/e/kz2sCX75fc)

# 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 |  |

# 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.



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| Completed lab | Unable to lunch lab for completion 6/01/25. |

# 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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| **2.Data Laws and Regulations**  According to General Data Protection Regulation ((GDPR) 2018), data protection law is set to ensure businesses that collect and process customers’ personal information, both in the UK and EU countries are safely collected and securely stored for intended use. This law outlined to protect the privacy and customers’ data. Considering GDPR and DPA (2018), recommendation for “Paws and Whiskers” to comply with this law is paramount to avoid financial penalties, which according to European Commission - Data Protection (2024), can be substantial when not adhere to.  Non-compliance to data protection laws can also lead to legal action and dispute being taking against business organisation. Being compliant is not just legally binding but also best practice. In line with “Paws and Whiskers”, this pet shop will need to demonstrate appropriate technical and organisational measures in place to evidence how customers personal data is processed and privacy maintained within Data Protection Act (DPA) 2018.  In the UK, data protection is governed by the UK General Data Protection Regulation (UK GDPR) and the Data Protection Act (2018). These laws mandate that organizations handles customers personal data fairly, lawfully, transparently and ensure appropriate security measures are in place to protect these data against unauthorized access, loss, or damage. The act ensures compliance with UK laws on data privacy. As per compliance business organisations that handles customers’ data should aim at safeguarding customers sensitive information, which is not only a legal requirement, but also customers trust business organisation that securely process their data, knowing companies are compliant with legislation (UK GDPR, 2018).  "Paws & Whiskers" obligation to complies with GDPR and Data protection act (2018), further shared light on protecting customers’ sensitive data such as payment/card details to be protected, by Payment Card Industry Data Security Standard (PCI DSS). These security standards are designed to ensure that all organisation that accept, process, store, or transmit customers’ sensitive information adhere to the guidelines to ensure the security of payment information such as credit card details are maintained, a crucial standard that prevents credit card fraud and ensures the security of payment information (PCI Security Standards Council, PCI DSS v3.2.1 Quick Reference Guide).  Although companies manage secure collection of customers new data from different sources such as Internet or other devices, it is also important to manage existing personal data, a crucial process in handling customer data securely before implementing a data governance strategy. As such “Paws & Whiskers" will need to have a clear understanding of how to handle and protect both new and existing data of customers. Considering this, “Paws & Whiskers" will reorganise the need to protect customers data that the company already possesses. This comprehensive approach helps in safeguarding customers sensitive information, prevent data breaches, and complying with legal and regulatory requirements (Grassi Advisors, 2024),  **3.Azure Service Recommendations**  Microsoft Azure (2023) offer varies storage solution for growing businesses such as “Paws & Whiskers". Based on the needs and services requirement appropriate for “Paws & Whiskers" Microsoft Azure outlines the features and capability of a growing business with potential to require a large dataset such as Azure SQL and Aure Blob storage. These two cloud computers, although processes data differently, they complement each other and can be use together to create a comprehensive data storage solution that meets the needs of business such as “Paws & Whiskers". Microsoft (2023) shares light on Azure Blob Storage. Reports Blob is unstructured storage solution that optimizes and stores massive amounts of unstructured data which doesn't adhere to a particular data model. However, Blob storage is flexible and supports various data types, including text, binary data, images and document files, blob storage can back-up and restore disaster recovery document making it versatile for business use.  Blob storage also offers scalability solutions with different storage tiers (Hot, Cool, and Archive) that allows business to optimize costs based on access frequency and availability use. In addition, blob storage is used for static website hosting, streaming videos and audio and analysis data. Blob storage can be accessed from anywhere, provided one has internet connection, making it easily accessible. Azure Blob Storage provides robust security features, including role-based access control (RBAC) and shared access signatures (SAS), to protect customer data, a reassurance that all customers with organisation such as "Paws & Whiskers" will feel the sense of security and reliability when this option is used (Microsoft 2023).  Additionally, Azure SQL service solution, also offers businesses with wide range of all sizes, in support of organizational use. Azure SQL is fully managed relational database service that provides high performance, scalability, and security for structured data, according to Microsoft (2023). This service is ideal for small businesses that need a reliable database solution without the overhead of managing the infrastructure. This reduces costs by eliminating the need for physical servers and maintenance. It also offers flexible pricing plans on pay as you go service for business’s specific needs. In addition, Azure SQL Database offers built-in high availability and disaster recovery options, which ensures that data is always accessible. It also handles most of the database management functions such as upgrades, patches, backups, and monitoring without users' involvement, another great storage service, that “Paws & Whiskers" will benefit from.  Azure SQL database solution enables businesses to focus on domain-specific database administration and optimization activities that enables business growth, this appears to be the right choice for a variety of modern cloud applications. This storage service enables businesses to process both relational data and non-relational structure a (multi- model capability) such as graphs, JSON, spatial, and XML. Microsoft, (2023) Azure SQL enables business to easily define and scale performance within two different purchasing models: a [vCore-based](https://learn.microsoft.com/en-us/azure/azure-sql/database/service-tiers-vcore?view=azuresql) and [DTU-based purchasing model](https://learn.microsoft.com/en-us/azure/azure-sql/database/service-tiers-dtu?view=azuresql). These models are built with clumonstore indexes features which enhance performance when working with large datasets, making it the preferred and the ideal for analytic workloads.  Azure SQL is well-suited for managing structured inventory data, providing efficient querying and reporting capabilities. According to Microsoft (2023), Azure SQL can handle transactional data with high concurrency and reliability, whiles Azure Blob can store logs and backups of sales transaction records, which can meet the needs of "Paws & Whiskers" as a growing business. Additionally, due to "Paws & Whiskers" requirement to store customers’ details both recommended storage solution have the capacity to meet business needs, although Azure SQL database stores information in a structured format ensuring data integrity and security, Blob stores customer-related data, using unstructured database, taking in the form of scanned documents and multimedia files.  According to Microsoft (2024), Azure Synapse Analytic tool helps to provide and monitor real-time trends and growth of business’s, it brings together big data and data warehousing capabilities. It gives businesses freedom to query data on their terms, using either serverless or dedicated resources at scale Microsoft (2024). Furthermore, Azure Synapse Analytics can integrate with other business intelligent tools such as Power BI to formulate an interactive visual report on a dashboard which aids in data driven decision, an intelligent tool when “Paws & Whiskers" business incorporate into their business will be beneficial.  Azure Data Factory, another cloud-based integration service, allows systems update when filters and functions are schedules and enable for automated deployment. Configurating this features automation reduces the need for manual data entry and ensures that data is consistently and accurately collected and updated. Business’s that leverage Azure Data Factory, sees the streamline collection and integration processes of their data, leading to improved efficiency, accuracy, and scalability. Microsoft (2025) indicates, Azure Data factory provides robust monitoring and management capabilities, which allows business to track the progress of data pipelines, identify issues, and take corrective actions. This visibility ensures that data integration processes run smoothly and efficiently, an approach when "Paws & Whiskers" incorporate into their service will enable the trends of growth for pet shop to easily analysis their data. **4. Data Types and Data Modelling****Types of Data "Paws & Whiskers"**   1. **Customer Data**:  * **Personal Information**: Names, addresses, phone numbers. * **Pet Information**: Types of pets, names, pet birthdays, age, gender * **Purchase History**: Previous purchases, preferred products.  1. **Inventory Data**:  * **Product Information**: Product names, pet food, supplier details. * **Stock Levels**: Quantity of products in stock, reorder levels, stock turnover rates.  1. **Sales Data**:  * **Transaction Records**: Sales transactions, payment methods, (card/cash) discounts applied. * **Sales Metrics**: Revenue, profit margins, sales by product/ sales by date.  **Relational Model**  1. **Tables and Entities**    1. **Customers Table**:       1. Primary Key: CustomerID       2. Attributes: CustomerID, FirstName, LastName, Address, PhoneNumber, Email, PetType, PetName, PetBirthday    2. **Products Table**:       1. Primary Key: ProductID       2. Attributes: ProductID, ProductName, Category, Price, SupplierID, StockLevel, ReorderLevel    3. **Sales Table**:       1. Primary Key: SaleID       2. Attributes: SaleID, CustomerID, ProductID, SaleDate, Quantity, TotalPrice    4. **Suppliers Table**:       1. Primary Key: SupplierID       2. Attributes: SupplierID, SupplierName, ContactPerson, PhoneNumber, Email, Address    5. **Employees Table**:       1. Primary Key: EmployeeID       2. Attributes: EmployeeID, FirstName, LastName, Position, Salary, HireDate, PhoneNumber, Email 2. **Relationships**    1. **Customers and Sales**: One-to-Many relationship (One customer can have multiple sales)       1. Foreign Key in Sales Table: CustomerID    2. **Products and Sales**: One-to-Many relationship (One product can be sold in multiple sales)       1. Foreign Key in Sales Table: ProductID    3. **Suppliers and Products**: One-to-Many relationship (One supplier can supply multiple products)       1. Foreign Key in Products Table: SupplierID 3. **Normalization**    1. The data will be normalized to reduce redundancy and maintain data integrity.  **5. Data Storage Formats and Structures in Azure**  |  |  | | --- | --- | | CSV (Comma-Separated Values): | * **Use Case**: Raw data imports, simple data exchange, and data migration. * **Suitability**: CSV is a straightforward, human-readable format that is widely supported by various tools and systems. It is ideal for importing and exporting raw data. * **Example**: Transaction records, sales data, inventory lists. | | JSON (JavaScript Object Notation): | * **Use Case**: Structured data, API responses, and configuration files. * **Suitability**: JSON is a lightweight data-interchange format that is easy to read and write. It is suitable for structured data and widely used in web applications and APIs. * **Example**: Customer information, product details, application configuration. | | Parquet: | * **Use Case**: Big data analytics, data warehousing, and efficient querying. * **Suitability**: Parquet is a columnar storage format that provides efficient data compression and encoding schemes. It is optimized for read-heavy analytics workloads, making it ideal for large datasets. * **Example**: Analytical data, log files, large-scale data processing   (Microsoft, 2023). |   According to Micrsoft (2023), Azure Storage Service Encryption (SSE) is a robust built –in feature that automatically encrypts organisational data. This protects businesses data and helps meet the organizational security compliance and privacy regulation. Azure Storage encryption is enabled for all storage accounts, including Resource Manager and classic storage accounts. This encryption in Azure cannot be disabled as is secured by default. When “Paws & Whiskers" opt for this storage service, they will not need to modify code to benefit as is incorporated in the service, regardless of its’ performance tier (standard or premium), access tier (hot or cool), or deployment model (Azure Resource Manager or classic). All Azure Storage resources are encrypted, including blobs, disks, files, queues, and tables, all without additional cost from business.  **Additional Considerations**   |  |  | | --- | --- | | 1: Identify Critical Data and Workloads | Identify data and workloads needed back- up. (Virtual machines, databases, file shares, and application data | | 2: Set Up a Recovery Services Vault | from Azure portal, create a Recovery Services vault, which will store the backup data and recovery points. | | 3: Configure Backup Policies | Schedule backups to occur daily, weekly, or as needed by “Paws & Whiskers”.  Set retention periods to determine how long each backup should be kept (e.g., daily backups retained for 30 days, weekly backups for 6 months, and monthly backups for 1 year).  Ensure policies meet business Recovery Point Objective (RPO) and Recovery Time Objective (RTO) requirements. | | 4: Enable Backup for Resources | Navigate to the Virtual Machines that needs back-up.  Select "Backup" and configure backup settings using appropriate backup policy.  Use Azure Backup to configure backups for Azure SQL databases and or Files shares via backup policy. | | 5: Monitor and Manage Backups | Monitor the status of backups ensure successfully completion within Azure portal.  Business can set –up alerts to help receive notification of backup failures or issues.  Regularly review and update backup policies to reflect changes in business requirements or data growth.  Test the restoration process periodically to ensure backups are valid and can be restored when needed. | | 6: Test and Validate Backups | Conduct regular tests to verify that backup data can be successfully restored.  Perform test restores to validate the integrity and completeness of the backup data. | | 7: Implement Security Measures | Ensure backup data is encrypted both in transit and at rest using Azure Storage Service Encryption (SSE) with 256-bit AES encryption.  Implement Role-Based Access Control (RBAC) to restrict access to the Recovery Services vault and backup configurations.  Enable Multi-Factor Authentication (MFA) for added security. | | 8: Document and Train | Record backup plan, to include backup policies, schedules, retention periods, and restoration procedures.  Offer training to IT staff to enable them handle backup and restoration process in the event data is lost (Microsoft, ((2025) *Backup and restore data in Azure).* |   Microsoft states Power BI seamlessly integrates with variety of Azure data sources when directly connected to Azure SQL and Blob storage database. This integration allows organisations to aggregate data from multiple sources into a unified view. Enabling analysing performance in real time. Businesses that uses’ this robust approach can scale their analytics capability whiles maintaining high performance and reliability. This approach of incorporating Power BI and Azure database enable business such as "Paws & Whiskers" monitor their performance visually in real-time, ability to see trends of customers behaviours and sales growth. Business management such as Paws & Whiskers, may analysis data within seconds, visualise customers interaction with products and services. These business tools are said to have multitude connections which allows businesses to use intelligence solution to create a unique model that meet their needs. |

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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:

The main difference between IaaS (Infrastructure as a Service) and PaaS (Platform as a Service) lies in the level of control and management responsibilities:

**IaaS (Infrastructure as a Service):**

Provider’s responsibility: The provider manages the physical infrastructure (servers, storage, networking, etc.), but you (the customer) are responsible for the operating systems, applications, and data.

Customer’s responsibility: You manage the OS, software configurations, and runtime environment.

Flexibility: IaaS offers more flexibility because you have more control over the operating system and software stack.

Use case: It's ideal for users who need customizable infrastructure or want to run virtual machines and build their own applications with more control over the environment.

**PaaS (Platform as a Service):**

Provider’s responsibility: The provider manages both the underlying infrastructure and the platform (operating systems, middleware, runtime environments, etc.).

Customer’s responsibility: You are only responsible for managing your applications and data.

Simplification: PaaS simplifies the development process because the platform includes tools, frameworks, and services for building and deploying applications.

Use case: It’s ideal for developers who want to focus on coding and building applications without worrying about managing servers, networks, or operating systems.

Summary:

IaaS provides virtualized computing resources with more control for the user over the operating system and applications.

PaaS provides a platform that abstracts the infrastructure management and offers tools to simplify app development and deployment.

In essence, IaaS is more about providing raw infrastructure, while PaaS is about providing a complete environment for developing and deploying apps

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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.

**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.**