

**Data Technician**

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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 has a huge impact on our everyday lives and businesses in many ways.  Examples:   1. **Access anywhere, anytime**: Could computing allows people to access files, applications, and services from anywhere with an internet connection. If whether you are at home, at work or traveling. This flexibility supports remote work and global collaboration. 2. **Cost Savings**: Cloud services eliminate the need for businesses to invest in expensive physical servers and infrastructure. Cloud services operate on a pay-as-you-go model, so users only pay for the resources they use, which reduces the upfront cost of hardware and maintenance. For businesses, it can significantly reduce IT expenses. 3. **Data Storage and Backup**: Cloud services allow individuals and organizations to store vast amounts of data without needing to manage physical hardware. It also provides automatic backups, ensuring that data is protected and recoverable in case of disasters. 4. **Scalability**: Cloud computing offers scalable resources, meaning you can increase or decrease your data storage, computing power, or software resources based on demand. For businesses, this is particularly useful for handling spikes in traffic or usage. 5. **Collaboration**: Cloud-based tools like Google Drive, Microsoft 365, and others make it easier for teams to collaborate on documents, share files, and communicate in real-time, regardless of geographical location. This has made remote work much more feasible. 6. **Software as a Service (SaaS)**: Instead of buying software outright and installing it on every machine, cloud computing offers SaaS, where applications like Salesforce, Dropbox, or Slack are accessed over the internet. This reduces the need for installation, updates, and hardware management. 7. **Flexibility and Mobility**: With cloud computing, people can access their files, applications, and data from virtually any device with an internet connection—be it a smartphone, tablet, laptop, or desktop. This makes working on the go and across different devices much easier. 8. **Improved Security**: Many cloud providers offer advanced security features like encryption, access controls, and compliance with various regulations (e.g., GDPR or HIPAA). These features are often more robust than what many small businesses can afford with on-premise solutions. 9. **Artificial Intelligence and Big Data**: The cloud provides access to powerful computing resources that can analyse large datasets, run machine learning models, and derive actionable insights. This is invaluable in fields like healthcare, marketing, finance, and more. 10. **Disaster Recovery**: Cloud computing provides a safety net in the event of a disaster (e.g., a natural disaster, fire, or hardware failure) since data and systems are stored remotely, ensuring business continuity even if local infrastructure fails. 11. **IoT (Internet of Things)**: Cloud computing is essential for managing the data generated by IoT devices. From smart homes to industrial machines, cloud platforms provide the computing power necessary to process, analyze, and act on the data from connected devices.   **For Businesses:** Cloud computing allows companies to scale their infrastructure and resources up or down quickly based on demand. For instance, e-commerce sites can handle spikes in traffic during holidays or sales without needing to invest in extra servers.  **For Developers:** It provides the flexibility to build and deploy applications without worrying about underlying hardware, making it easier to innovate and test ideas. |
| How can it benefit a business? | Cloud computing can offer a multitude of benefits to businesses, from small startups to large enterprises and it enables businesses to process large volumes of data quickly. This is useful for analysing customer behaviour, optimizing operations, or predicting trends. Companies can tap into powerful cloud-based analytics tools like AWS, Azure, or Google Cloud without having to invest in specialized hardware.  You can refer to key points mentioned in the above page and also here are the some other key advantages:  **Business Continuity**:   * With cloud infrastructure, businesses can ensure continuity even in the face of disruptions. Whether it’s natural disasters, network outages, or other emergencies, cloud services are designed to keep data and systems accessible. * Cloud environments are often built for high availability and redundancy, ensuring that operations can continue smoothly.   **Faster Time to Market**:   * Cloud services enable businesses to quickly deploy and test new applications, products, or services. This accelerates the time it takes to bring innovations to market and allows businesses to remain competitive. * For startups and small businesses, this means they can compete with larger companies without the same infrastructure or investment.   **Compliance and Regulatory Support**:   * Many cloud providers comply with industry standards and regulations, such as GDPR, HIPAA, and PCI-DSS. This reduces the burden on businesses to manage compliance themselves and ensures that they are meeting required legal and regulatory standards. * This is especially important for businesses in sectors like healthcare, finance, and education, where data security and privacy are critical.   **Improved Customer Experience**:   * Cloud solutions like customer relationship management (CRM) systems (e.g., Salesforce) allow businesses to have a unified view of customer interactions, helping improve service and support. * Businesses can provide better, more personalized experiences for customers, respond more quickly to inquiries, and improve overall satisfaction.   **Innovation and Competitive Advantage**:   * By embracing the cloud, businesses can tap into innovative technologies that would otherwise be too costly or complex to implement. This includes services such as automated workflows, advanced data analysis, and integration with other platforms. * These capabilities help businesses streamline their operations, improve decision-making, and stay ahead of competitors.   In summary, cloud computing can help businesses be more efficient, cost-effective, secure, and flexible, allowing them to focus on growth, innovation, and customer satisfaction while minimizing overhead and complexity.Top of Form |
| What’s the alternative to cloud computing? | The main alternative to cloud computing is **on-premise computing**, where businesses manage and maintain their hardware, software, and infrastructure. Unlike cloud computing, which relies on remote servers hosted by third-party providers, on-premise solutions keep everything in-house. Here’s a breakdown of on-premise computing and some other alternatives:  **1. On-Premise Computing (Traditional IT Infrastructure)**   * **Description**: Businesses build and maintain their own data centers, servers, and network infrastructure within their physical premises. They install and manage the necessary software, security systems, backups, and storage devices themselves. * **Pros**:   + Full control over the infrastructure and data.   + Can be customized to meet specific business needs.   + Potentially more secure if handled properly (no third-party access).   + No ongoing subscription fees, though there are initial costs for hardware and maintenance. * **Cons**:   + High upfront costs for hardware, software, and maintenance.   + Requires skilled IT personnel to manage systems, security, and software updates.   + Scalability is more difficult—expanding capacity means purchasing and installing additional hardware.   + Risk of data loss or downtime in case of a system failure (unless there’s a robust disaster recovery plan).   **2. Private Cloud**   * **Description**: A private cloud is similar to public cloud computing, but it is dedicated to a single organization. It can be hosted on-premise or by a third-party provider, but it’s isolated from other customers. * **Pros**:   + Offers more control and customization than public cloud.   + Provides some of the same benefits of cloud computing (scalability, flexibility, etc.).   + Can be more secure than public cloud for sensitive or critical data. * **Cons**:   + More expensive than public cloud due to the need for dedicated resources.   + Still requires significant management, either by the company’s own IT team or a third-party vendor.   **3. Colocation Services**   * **Description**: With colocation, businesses rent space in a third-party data center and place their own servers and hardware there. The colocation provider supplies power, cooling, and physical security, but the business is still responsible for the hardware, software, and management. * **Pros**:   + Provides the benefits of data center infrastructure without the capital investment in building your own.   + Offers more control over hardware than cloud services. * **Cons**:   + Requires ongoing management of the hardware and software.   + Still involves high upfront costs for purchasing and setting up servers.   **4. Hybrid Cloud**   * **Description**: A hybrid cloud is a mix of on-premise infrastructure and public cloud services. Businesses use both on-site resources and remote cloud services to meet their needs, often allowing for more flexibility. * **Pros**:   + Combines the benefits of both cloud and on-premise solutions.   + Offers greater flexibility and scalability while maintaining control over critical data. * **Cons**:   + More complex to manage, requiring integration between the two environments.   + Higher costs for maintaining both on-premise infrastructure and cloud services.   **5. Managed Hosting Services**   * **Description**: Managed hosting involves renting a dedicated server from a hosting provider, where the provider manages the hardware, networking, and security. The business is responsible for the software and data running on the server. * **Pros**:   + Less technical expertise required than with on-premise systems.   + The hosting provider handles many maintenance tasks (e.g., hardware upgrades, security patches). * **Cons**:   + Less flexibility than cloud services, as scaling up or down may be more challenging.   + More expensive than some cloud options, depending on the provider.   **Key Differences Between Cloud Computing and Alternatives:**   * **Cost**: On-premise solutions often require a larger upfront investment in hardware, while cloud services are typically pay-as-you-go. Over time, cloud computing may be more cost-effective for businesses that need flexibility, though on-premise solutions can be cheaper in the long run if infrastructure needs don’t change much. * **Scalability**: Cloud computing excels in scalability, allowing businesses to quickly increase or decrease resources. On-premise and managed hosting require purchasing additional hardware, making scaling slower and more expensive. * **Management**: Cloud providers handle much of the infrastructure management (e.g., security, backups, updates), while on-premise solutions require more in-house management from IT teams. * **Security**: On-premise solutions give businesses full control over their security, but it’s up to them to ensure everything is properly protected. Cloud providers offer robust security features, but the data is managed externally, which may raise concerns for certain businesses. * **Accessibility**: Cloud computing is accessible from anywhere with an internet connection, enabling remote work and global access. On-premise infrastructure requires on-site access, or at best, a secure VPN for remote access, making it less flexible. |
| What cloud providers can we use, what are their features and functions? | There are several major cloud providers offering a wide range of services, each with distinct features and functions. Below are the top cloud providers and an overview of what they offer:  **1. Amazon Web Services (AWS)**   * **Overview**: AWS is the largest and most widely used cloud computing platform, providing a vast range of services for compute, storage, networking, databases, machine learning, analytics, and more. * **Key Features and Functions**:   + **Compute**: EC2 (Elastic Compute Cloud) for scalable virtual servers, Lambda for serverless computing.   + **Storage**: S3 (Simple Storage Service) for scalable object storage, EBS (Elastic Block Store) for persistent block storage, and Glacier for low-cost archive storage.   + **Databases**: RDS (Relational Database Service), DynamoDB (NoSQL), Aurora (relational), and Redshift (data warehousing).   + **Machine Learning/AI**: SageMaker for training models, Rekognition for image and video analysis, Lex for conversational interfaces.   + **Networking**: VPC (Virtual Private Cloud) for isolated networks, CloudFront for content delivery, Route 53 for DNS services.   + **Developer Tools**: CodeDeploy, CodeBuild, CodePipeline for DevOps and CI/CD processes.   + **Security**: IAM (Identity and Access Management), CloudTrail for logging, and Shield for DDoS protection. * **Best for**: Large enterprises, startups, and businesses needing a highly flexible and scalable cloud environment with a broad selection of services.   **2. Microsoft Azure**   * **Overview**: Azure is Microsoft's cloud platform and is a strong contender to AWS. It offers a wide variety of cloud services, particularly for businesses using Microsoft technologies. * **Key Features and Functions**:   + **Compute**: Virtual Machines (VMs), Azure Functions (serverless), Azure Kubernetes Service (AKS).   + **Storage**: Blob Storage, Disk Storage, and Azure Files for file-based storage.   + **Databases**: Azure SQL Database, Cosmos DB (NoSQL), Azure Database for MySQL/PostgreSQL.   + **Machine Learning/AI**: Azure Machine Learning for model building, Cognitive Services for pre-built AI solutions like vision, speech, and language processing.   + **Networking**: Virtual Network, ExpressRoute for dedicated connections, and Load Balancer.   + **Developer Tools**: Visual Studio integration, Azure DevOps, and GitHub (owned by Microsoft).   + **Security**: Azure Active Directory, Key Vault for secrets management, Azure Security Center. * **Best for**: Businesses that rely heavily on Microsoft software (Windows Server, SQL Server, Active Directory) and enterprises that require hybrid cloud solutions (on-premises and cloud integration).   **3. Google Cloud Platform (GCP)**   * **Overview**: GCP is known for its strong data analytics and machine learning tools, and it is popular with developers and data-driven companies. * **Key Features and Functions**:   + **Compute**: Compute Engine for virtual machines, App Engine for serverless applications, Kubernetes Engine for containerized applications.   + **Storage**: Cloud Storage, Persistent Disks, and Filestore.   + **Databases**: Cloud SQL, BigQuery for data analytics and large-scale data analysis.   + **Machine Learning/AI**: TensorFlow, AutoML, BigQuery ML for building machine learning models.   + **Networking**: Virtual Private Cloud (VPC), Cloud CDN, Cloud Interconnect.   + **Developer Tools**: Cloud SDK, Cloud Build, Firebase for mobile app development.   + **Security**: Identity and Access Management (IAM), Cloud Armor for DDoS protection, Cloud Security Command Center. * **Best for**: Companies with heavy data analytics or machine learning needs, as well as developers who prefer working with Google’s developer tools and Kubernetes.   **4. IBM Cloud**   * **Overview**: IBM Cloud provides a combination of Platform as a Service (PaaS) and Infrastructure as a Service (IaaS), along with AI, data analytics, and IoT services. It also includes strong support for hybrid cloud solutions. * **Key Features and Functions**:   + **Compute**: Virtual Servers, Containers, Kubernetes, and Serverless.   + **Storage**: Cloud Object Storage, Block Storage, File Storage.   + **Databases**: Db2, MongoDB, Cloudant (NoSQL), and PostgreSQL.   + **Machine Learning/AI**: Watson AI for natural language processing, visual recognition, and conversational agents.   + **Networking**: IBM Cloud VPN, Load Balancer, Cloud Internet Services.   + **Developer Tools**: Cloud Foundry, Continuous Delivery, DevOps toolchains.   + **Security**: Identity and Access Management (IAM), IBM Cloud Security Advisor, Key Protect for data encryption. * **Best for**: Enterprises that require strong hybrid cloud solutions and those looking for AI-powered applications through Watson.   **5. Oracle Cloud Infrastructure (OCI)**   * **Overview**: Oracle Cloud is often favored by companies that rely heavily on Oracle databases and enterprise applications. It offers a robust set of infrastructure and software services. * **Key Features and Functions**:   + **Compute**: Compute instances, Oracle Kubernetes Engine, and serverless computing.   + **Storage**: Block Volumes, Object Storage, File Storage.   + **Databases**: Oracle Autonomous Database, Oracle Database Cloud Service, MySQL Database.   + **Machine Learning/AI**: Oracle Cloud Infrastructure AI, Data Science for model building.   + **Networking**: Virtual Cloud Network (VCN), Load Balancer, FastConnect for private connections.   + **Security**: Oracle Identity Cloud Service, Key Management, Web Application Firewall. * **Best for**: Businesses heavily invested in Oracle databases, enterprise applications, and looking for a high-performance cloud infrastructure.   **6. Alibaba Cloud**   * **Overview**: Alibaba Cloud is the leading cloud provider in China and is growing in other global markets. It offers a range of services for computing, storage, networking, and data analytics. * **Key Features and Functions**:   + **Compute**: Elastic Compute Service (ECS), Serverless, Kubernetes.   + **Storage**: Object Storage Service (OSS), Elastic Block Storage, and Apsara File Storage.   + **Databases**: ApsaraDB for MySQL, SQL Server, and NoSQL databases.   + **Machine Learning/AI**: Machine Learning Platform for AI (PAI), DataV for data visualization.   + **Networking**: Virtual Private Cloud (VPC), Cloud Firewall, Direct Connect for dedicated networking.   + **Security**: Cloud Firewall, Anti-DDoS Protection, Encryption Services. * **Best for**: Businesses operating in China or Asia-Pacific regions, as well as those needing high-performance computing and big data solutions.   **7. Salesforce Cloud**   * **Overview**: While Salesforce is primarily known for its CRM platform, it also offers a range of cloud-based services, including marketing automation, customer service solutions, and more. * **Key Features and Functions**:   + **CRM**: Salesforce Sales Cloud, Service Cloud, Marketing Cloud, and Commerce Cloud.   + **Data**: Salesforce Data Cloud for managing customer data and insights.   + **AI**: Salesforce Einstein for AI-powered insights and automation.   + **Automation**: Workflow automation, chatbots, and predictive analytics. * **Best for**: Businesses looking for a comprehensive customer relationship management solution with cloud-based marketing, sales, and service automation.   **Conclusion:**  Each cloud provider has its strengths, and the choice depends on the specific needs of your business.   * **AWS** is the most comprehensive and flexible. * **Azure** is ideal for businesses invested in Microsoft tools. * **GCP** is excellent for data-driven businesses and developers. * **IBM Cloud** excels at hybrid cloud and AI-powered solutions. * **Oracle Cloud** is the go-to for businesses using Oracle databases and enterprise applications. * **Alibaba Cloud** is the top choice for businesses targeting China or Asia-Pacific. * **Salesforce** is perfect for businesses looking for advanced CRM solutions. |

# 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, or IaaS, delivers on-demand infrastructure resources to organizations via the cloud, such as compute, storage, networking, and virtualization.  Instead of having to purchase and manage physical hardware, businesses can rent these resources from a cloud provider, which handles all of the underlying infrastructure. Customers don’t have to manage, maintain, or update their own data center infrastructure, but are responsible for the operating system, middleware, virtual machines, and any apps or data. | **1. Hosting a Website:**   * **Scenario**: A business wants to host a website without buying and maintaining expensive servers. * **How IaaS Helps**: The business can rent virtual servers (like AWS EC2 or Azure Virtual Machines) to run their website. They can easily increase or reduce resources based on website traffic.   **2. Backing Up Data:**   * **Scenario**: A company wants to back up important files and data in case of system failure. * **How IaaS Helps**: The company can store its data in the cloud, so if something goes wrong with their local systems, they can quickly recover everything from the cloud.   **3. Testing Software:**   * **Scenario**: A software development team needs an environment to test their programs, but they don’t want to buy extra equipment. * **How IaaS Helps**: The team can quickly set up and rent virtual machines to test their software in different environments, then shut them down when they’re done, saving time and money.   **4. Running Big Data Projects:**   * **Scenario**: A business wants to analyze large amounts of data but doesn't have the hardware to handle it. * **How IaaS Helps**: The company can rent powerful computing resources in the cloud to process and analyze the data without needing to invest in expensive equipment.   **5. Running Old Software:**   * **Scenario**: A business relies on old software that requires specific hardware but doesn't want to maintain outdated equipment. * **How IaaS Helps**: The company can run this old software on rented virtual machines in the cloud, making it easier to keep the software running without the hassle of old hardware.   **6. Virtual Desktops for Employees:**   * **Scenario**: A company wants employees to work from home and access their work computers remotely. * **How IaaS Helps**: The business can set up virtual desktops in the cloud, allowing employees to access their work computer from anywhere, using just an internet connection. |
| PaaS (Platform as a service) | Platform as a service, or PaaS, delivers and manages all the hardware and software resources to develop applications through the cloud. Developers and IT operations teams can use PaaS to develop, run, and manage applications without having to build and maintain the infrastructure or platform on their own. Customers still have to write the code and manage their data and applications, but the environment to build and deploy apps is managed and maintained by the cloud service provider. | **1. Building a Web or Mobile App:**   * **Scenario**: A startup wants to create a mobile app or website but doesn’t have the resources to manage servers or complex software setups. * **How PaaS Helps**: They can use a PaaS provider like **Google App Engine** or **Heroku** to build and deploy their app. The platform takes care of the server, storage, and scaling while the developers focus on writing the app code. * **Example**: A new social media app can be built on PaaS and launched quickly, without the need to manage infrastructure or worry about server failures.   **2. Launching a SaaS (Software as a Service) Product:**   * **Scenario**: A company wants to offer a cloud-based service, such as a project management tool, to customers, but doesn’t want to deal with server maintenance or scaling issues. * **How PaaS Helps**: The company can use PaaS to host their service, letting them focus on features and user experience. The PaaS handles all the infrastructure, updates, and scaling as needed. * **Example**: A project management tool built using **Microsoft Azure App Service** could be automatically scaled to handle more users during high-demand periods, like at the start of a new quarter.   **3. Rapid Prototyping or Testing:**   * **Scenario**: A development team wants to quickly test a new app idea without investing in servers and infrastructure. * **How PaaS Helps**: They can use PaaS to quickly develop and deploy a prototype, test it, and adjust it as needed without worrying about server setup or hardware. * **Example**: A team could use **Heroku** to build and test a new app feature and share it with users for feedback, all while the platform manages the hosting and scaling.   **4. Managing Databases for an Application:**   * **Scenario**: A business needs a database for their app but doesn't want to spend time managing it. * **How PaaS Helps**: Many PaaS providers, like **AWS Elastic Beanstalk**, come with integrated database services. The business can easily set up a database without managing the infrastructure. * **Example**: An online store could use PaaS to host their product database, where it automatically scales as more customers visit the site.   **5. Collaborating on Application Development:**   * **Scenario**: A development team is working on an app and wants to collaborate without setting up complex server systems. * **How PaaS Helps**: PaaS provides a shared environment where developers can work on the same project, and changes can be pushed to the cloud easily. * **Example**: A development team can work on a new mobile game using **Google App Engine** and deploy updates directly to the platform for testing without worrying about the servers. |
| SaaS (Software as a service) | Software as a service, or SaaS, provides the entire application stack, delivering an entire cloud-based application that customers can access and use. SaaS products are completely managed by the service provider and come ready to use, including all updates, bug fixes, and overall maintenance. Most SaaS applications are accessed directly through a web browser, which means customers don’t have to download or install anything on their devices. | **1. Using Google Docs for Writing and Collaboration:**   * **Example**: Instead of installing word-processing software on your computer, you use **Google Docs**. You can write documents, collaborate with others, and access your work from any device with internet access. * **How it helps**: You don’t need to worry about saving your work, as it’s automatically saved in the cloud. Plus, you can work on it from anywhere.   **2. Managing Business Emails with Gmail:**   * **Example**: A business uses **Gmail** for email instead of managing email servers themselves. They just sign in to their Gmail account and start sending emails, and Google takes care of the rest. * **How it helps**: There's no need to worry about setting up or maintaining email servers. You just use it online.   **3. Team Communication with Slack:**   * **Example**: Your team uses **Slack** to chat and share files. You don’t need to install anything or worry about servers—it’s all online. * **How it helps**: You can message teammates, share files, and manage projects from anywhere using just a web browser or app.   **4. Video Meetings with Zoom:**   * **Example**: Instead of setting up complicated video conferencing software, you simply use **Zoom** through your browser or app to have virtual meetings. * **How it helps**: You can host or join video calls easily, no matter where you are, and Zoom takes care of all the technical details.   **5. Tracking Sales with Salesforce:**   * **Example**: A business uses **Salesforce** to manage customer relationships, track sales, and keep records. Employees log in online to access and update customer data. * **How it helps**: The business doesn’t need to install or maintain the software themselves, and they can access it from any device. |

# 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 | **A public cloud** is a cloud computing environment where computing resources like servers, storage, databases, and applications are owned by a third-party cloud service provider and made available to the general public and organizations via the internet.  In the public cloud model, multiple customers share the same infrastructure, but their data and applications are kept isolated from each other.  Examples of public cloud providers are include:   * **Amazon Web Services (AWS)** * **Microsoft Azure** * **Google Cloud Platform (GCP)** * **IBM Cloud** * **Oracle Cloud**   **Key Features of Public Cloud:**   * **Shared Resources**: Resources are shared among multiple customers, which helps reduce costs. * **Scalability**: Public clouds offer massive scalability, making it easy to scale up or down as your needs change. * **Pay-as-you-go**: You pay only for the resources you use, making it cost-efficient for businesses with fluctuating or unpredictable needs. * **Managed by Providers**: The service provider takes care of the hardware, infrastructure, and security, so you don’t have to.   **When is a Public Cloud Appropriate?**   * **Cost-Effective for Small to Medium Businesses**: Public clouds are great for organizations that need to save on IT costs. They don’t need to invest in physical infrastructure and can instead use resources on demand. * **Scalability and Flexibility**: If a company’s needs change frequently, like in retail during holiday sales or for startups that experience fast growth, public clouds offer a flexible solution. * **Quick Setup and Minimal Maintenance**: For businesses that don’t want to manage IT resources themselves, public clouds are perfect. The provider takes care of infrastructure and updates. * **Non-Sensitive Data**: Organizations that don’t handle highly sensitive or regulated data might prefer the public cloud due to its lower cost and easy accessibility.   **Real-World Example: Online Retail Business**   * **Scenario**: A small online retailer needs to store product information, process orders, and manage website traffic. * **Why Public Cloud Works**: The retailer can use a public cloud like **Amazon Web Services (AWS)** or **Google Cloud** to store inventory data, handle website traffic, and scale up during busy seasons like Black Friday or holiday shopping. * **Benefits**: The retailer doesn’t need to invest in servers or manage infrastructure. The public cloud can scale quickly to handle traffic spikes and offers a pay-as-you-go model, saving money during quieter months.   **Other Examples of Organizations That Might Use a Public Cloud:**   * **Startups**: New businesses that need a cost-effective, scalable solution to handle website hosting, data storage, and application deployment. * **Media Companies**: Organizations that require large amounts of storage and high computing power to manage and distribute video content. * **Software Developers**: Developers who want to test and deploy applications without managing the underlying infrastructure. * **Educational Institutions**: Universities or online courses that need to offer web-based services, content, and collaboration tools to students and staff. |
| Private Cloud | A **Private Cloud** is a cloud environment used exclusively by one organization. It’s hosted either on the company’s own premises or by a third-party provider, but the key difference is that the resources (like servers, storage, and networking) are not shared with other organizations.  **Key Features of Private Cloud:**   * **Dedicated Resources**: All computing resources are used only by your organization, offering more control over performance and security. * **Customization**: The private cloud can be tailored to meet the specific needs of the organization, including hardware configurations, security measures, and more. * **Enhanced Security**: Since the cloud is not shared with other organizations, it can provide stronger security and compliance features.   **When is a Private Cloud Appropriate?**   * **Security and Compliance Needs**: Organizations that handle sensitive or regulated data (like healthcare or finance) may prefer a private cloud for better control over security and compliance. * **Custom Requirements**: Companies that have very specific computing or resource needs (e.g., high-performance computing or custom software) may choose a private cloud. * **Limited Budget or Scale**: Larger organizations with enough IT resources and budget may choose a private cloud to have full control over their infrastructure while maintaining flexibility.   **Real-World Example: Healthcare Organization**   * **Scenario**: A hospital needs to store and process sensitive patient data in compliance with strict healthcare regulations (like HIPAA in the U.S.). * **Why Private Cloud Works**: The hospital could set up a private cloud to securely store patient records, images, and other sensitive information. It gives the hospital control over the infrastructure, ensures data security, and allows them to meet compliance requirements. * **Benefits**: The hospital would have complete control over who accesses the data, how it is stored, and the level of security applied. Additionally, they could customize their cloud setup for specific medical applications and high-performance needs (like processing medical imaging).   **Other Examples of Organizations That Might Use a Private Cloud:**   * **Financial Institutions**: Banks or investment firms that need to protect customer data and comply with regulations. * **Government Agencies**: Agencies that deal with sensitive government data and need high levels of security and control. * **Large Enterprises**: Big companies with specific IT needs that want to control the cloud infrastructure and have the resources to manage it. |
| Hybrid Cloud | A **Hybrid Cloud** is a cloud environment that combines both **private cloud** and **public cloud** services, allowing data and applications to be shared between them. This setup gives organizations more flexibility, allowing them to run critical workloads in a private cloud while using the public cloud for less-sensitive applications, or scalability and additional capacity when needed.  **Key Features of Hybrid Cloud:**   * **Flexibility**: You can use the best of both worlds: store sensitive data in the private cloud and run less sensitive applications in the public cloud. * **Scalability**: You can scale workloads easily using the public cloud while keeping critical data and operations in the private cloud. * **Cost Efficiency**: You can reduce costs by using public cloud resources for non-sensitive tasks while maintaining secure operations in a private cloud. * **Seamless Integration**: Hybrid clouds are designed to allow easy movement of workloads between the private and public cloud as needed, depending on demand.   **When is a Hybrid Cloud Appropriate?**   * **Need for Flexibility**: Organizations that require a mix of private and public cloud for different workloads, such as handling sensitive data securely and scaling up for high-traffic periods, can benefit from hybrid clouds. * **Security and Compliance**: Companies with strict regulatory requirements can keep sensitive data in a private cloud while using public cloud resources for less-sensitive tasks. * **Scaling on Demand**: When an organization needs to scale quickly (e.g., during seasonal spikes in demand), they can use the public cloud for extra capacity while keeping their core systems in the private cloud. * **Gradual Transition to the Cloud**: Organizations that want to move some services to the cloud but aren’t ready to fully embrace the public cloud can use a hybrid model.   **Real-World Example: Financial Institution**   * **Scenario**: A bank handles sensitive customer data and must comply with strict regulations around data privacy and security. * **Why Hybrid Cloud Works**: The bank can store highly sensitive financial data and transactions in a private cloud, where they have full control and can ensure compliance. For less-sensitive applications (like customer support chatbots or analytics tools), the bank can use the public cloud to scale as needed during peak times or reduce costs during low-demand periods. * **Benefits**: The bank ensures that customer data is secure and compliant, while still enjoying the cost savings and scalability of the public cloud for non-sensitive tasks.   **Other Examples of Organizations That Might Use a Hybrid Cloud:**   * **Healthcare Providers**: Hospitals or clinics that handle patient data and need to comply with strict healthcare regulations (like HIPAA) could use a hybrid cloud to store patient records securely in a private cloud while using public cloud resources for things like telemedicine or research data analysis. * **Retailers**: E-commerce businesses that experience high traffic during seasonal sales (e.g., Black Friday) might use a hybrid cloud to handle peak traffic by temporarily scaling out to the public cloud while keeping their regular operations secure in a private cloud. * **Government Agencies**: Governments with sensitive data and strict security regulations might use a hybrid cloud to keep certain information in a private cloud while using the public cloud for less critical operations like public-facing websites or non-sensitive data storage. |
| Community Cloud | A **Community Cloud** is a cloud computing environment that is shared by several organizations with common concerns, such as industry requirements, security, or regulatory compliance. The cloud infrastructure is shared between these organizations, but it is designed to meet the specific needs of the community.  **Key Features of Community Cloud:**   * **Shared Infrastructure**: Multiple organizations (often within the same industry or with similar interests) share the cloud infrastructure, which is managed by a third-party provider or by the community itself. * **Cost Sharing**: Since the infrastructure is shared, the cost of maintaining the cloud is divided between the organizations, making it more cost-effective than a private cloud. * **Common Goals or Needs**: The organizations in the community cloud share common goals, such as compliance with regulations, data privacy standards, or industry-specific needs. * **Collaboration**: Community clouds can be used to support collaboration and data sharing between organizations in the same sector.   **When is a Community Cloud Appropriate?**   * **Industry-Specific Requirements**: When organizations in the same industry have similar regulatory, compliance, or security needs. * **Collaboration Needs**: When organizations need to collaborate closely, share data, or perform joint activities in a secure and controlled environment. * **Cost Sharing**: When multiple organizations want to benefit from the cost efficiency of the cloud, but still need a more private or customized solution compared to a public cloud. * **Compliance and Security**: When organizations need a cloud that can meet strict regulatory and compliance requirements but don’t have the resources to set up a private cloud on their own.   **Real-World Example: Healthcare Sector**   * **Scenario**: Several hospitals and healthcare providers want to store and share patient data securely while adhering to healthcare regulations like HIPAA (Health Insurance Portability and Accountability Act) in the U.S. * **Why Community Cloud Works**: These healthcare organizations can share a community cloud that meets the specific compliance and security requirements for the healthcare industry. The cloud can be customized to ensure privacy, secure patient data, and facilitate collaboration between hospitals for research or shared medical records. * **Benefits**: By using a community cloud, these healthcare providers save on costs, ensure compliance with healthcare regulations, and can securely share data and collaborate on medical research and treatments.   **Other Examples of Organizations That Might Use a Community Cloud:**   * **Government Agencies**: Multiple government departments or agencies with similar needs for data privacy, security, and compliance could use a community cloud to share resources, collaborate on projects, or store sensitive government data securely. * **Educational Institutions**: Universities or research institutes in the same country or region might use a community cloud for collaborative research, sharing educational resources, and handling student or faculty data securely, all while meeting the required regulatory standards. * **Financial Institutions**: Several banks or credit unions in the same region could use a community cloud to share data, collaborate on industry standards, or process financial transactions securely and in compliance with financial regulations. |

# 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 |
| Unauthorized Access to Computer Material | Accessing computer systems or data without permission. | A hacker accessing a company’s customer database without authorization. |
| Unauthorized Access with Intent to Commit Further Offenses | Accessing a computer system to commit further illegal activities. | A cybercriminal who hacks into a bank’s system with the intent to transfer money to their own account or commit fraud. The unauthorized access is done specifically to facilitate further illegal activities, such as stealing money. |
| Unauthorized Modification of Computer Material | Modifying, deleting, or corrupting computer data or systems without authorization. | A hacker who installs a malware program on a company's computer system, deleting files or modifying the data to disrupt business operations. For instance, they may change financial data to cover up fraudulent activities. |

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 |
| The Police and Justice Act 2006 made amendments to the Computer Misuse Act 1990, extending the scope of computer crime and adding new powers to address evolving technology and cybercrime threats. The act introduced three key powers that enhanced the original law and provided law enforcement with greater tools to fight cybercrime. Here are three additional powers introduced by the 2006 Act: |
| 1. Power to Search and Seize Devices: Law enforcement can search premises and seize devices if they suspect computer misuse.   Example: If the police believe someone is involved in hacking or distributing malicious software, they can legally search the person’s home or business and seize devices that may contain evidence of the crime, such as computers or storage devices.   1. Offense of Possessing or Accessing Articles for the Purpose of Computer Misuse: It is illegal to possess tools or software intended for computer crimes, even without committing the crime.   Example: If someone possesses hacking software or malware, even if they haven’t used it to break into systems yet, they can still be prosecuted. For example, a person who downloads a program designed to hack into computers, but has not yet used it, can be charged under this law.   1. Extended Powers for Law Enforcement to Access Data: Police can demand suspects decrypt or provide passwords for seized devices to access data.   Example: If the police seize a laptop from a suspect, and the data on it is encrypted, they can require the suspect to provide the password or decryption key. Failure to comply could lead to further legal consequences, such as obstruction of justice charges. |
|  |

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. |
| 1. Personal Identification Information:   This can include an employee's full name, date of birth, and contact details (address, phone number, and email).  Example: A company may store an employee’s full name and contact details for payroll, tax, and communication purposes. |
| 1. National Insurance Number   Reason for Storage: Required by HMRC to ensure correct tax and National Insurance contributions are paid.  Example: The employer uses this number to report tax and social security contributions to HMRC. |
| 1. Employment terms and conditions (for example, pay, hours of work, holidays, benefits, absence)   This includes records of perks and allowances the employee receives as part of their employment, such as healthcare, pension schemes, life insurance, employee discounts and holidays, sick leave, maternity/paternity leave, and any other absence types.  Example: The company provides a private health insurance scheme and contributes 5% of the employee's salary to a pension plan. The company tracks an employee's leave to ensure accurate compensation and legal compliance, like ensuring statutory sick pay is provided when needed. |

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| Give three more examples of data that an employer can only store if they first get the employee’s permission. |
| 1. Biometric Data: For security, access control, or attendance tracking.   Example: Using fingerprint or facial recognition for building access or attendance. |
| 1. Religion: To monitor diversity or provide specific accommodations.   Example: Disclosing religion for requesting religious holidays or dietary needs. |
| 1. Health and Medical conditions: To provide reasonable accommodations or manage sick leave.   Example: Medical condition or disability information for workplace accommodations. |

Conduct further research to answer the below questions.

|  |  |
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| Question | Answer |
| Provide one example of: Copyright infringement | **Copyright infringement** occurs when someone uses copyrighted material (such as music, books, software, or images) without the permission of the copyright holder, or in a way that violates the rights granted to the copyright holder.  **Example:**  **Using copyrighted music in a YouTube video without permission**: An individual creates a video and adds a popular song to the background. However, they do not have permission from the artist or the record label that owns the copyright for the song. This is a form of copyright infringement because the individual is using the copyrighted music without authorization.  In this case, the copyright holder (the artist or record label) could take legal action to have the video taken down, or the video may be flagged and monetized by the copyright holder, preventing the person from earning revenue from it. |
| Provide one example of: Plagiarism | **Plagiarism** is the act of using someone else's work, ideas, or words without giving them proper credit, and presenting it as one's own.  **Example:**  **Copying a paragraph from an online article and submitting it as part of a school essay**: A student finds a well-written article on the internet, copies a paragraph from it, and includes it in their essay without citing the source. The student claims the work as their own, failing to give credit to the original author.  In this case, the student is committing plagiarism because they have used someone else's words and ideas without proper acknowledgment. |
| What are two consequences of copyright infringement and software piracy? | **1. Legal Trouble:**   * **Copyright Infringement**: If you use someone’s work (like music or books) without permission, you could get sued and have to pay a fine or even go to court. * **Software Piracy**: Using or sharing software without paying for it can lead to fines and legal problems.   **2. Reputation Damage:**   * **Copyright Infringement**: If people find out you’ve stolen someone’s work, they may not trust you, and it could harm your reputation. * **Software Piracy**: If a business is caught using illegal software, it could lose clients or partners who don’t want to work with an unethical company. |
| Give three possible consequences for individuals when using pirated software | **1. Legal Penalties:**   * Using pirated software can lead to fines or legal action. Individuals could be sued by the software company for violating copyright laws.   **2. Security Risks:**   * Pirated software often contains malware, viruses, or spyware that can damage your computer, steal personal information, or cause other security issues.   **3. Lack of Support and Updates:**   * Pirated software doesn’t receive official updates or technical support. This means you miss out on bug fixes, new features, or security patches, making the software less reliable and potentially unsafe. |

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

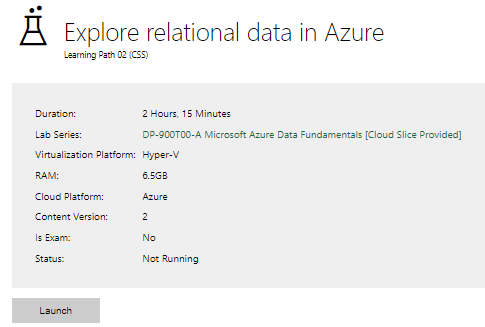
7. Consumer Rights Act 2015

* 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 |
| 1 | Unauthorised modification of computer material is illegal |
| 1 | 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 |
| Not illegal | 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 |
| 1 | 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

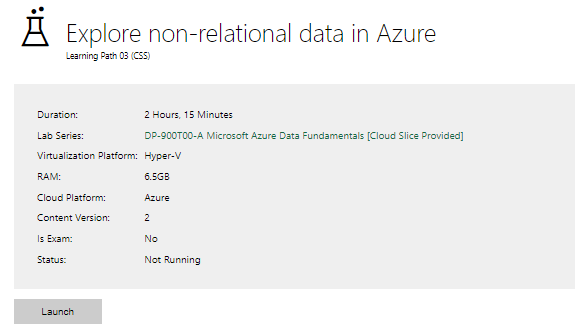
Please complete the below lab (3) *‘Explore relational data in Azure’* and paste evidence of the completed lab in the box provided.



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| Completed lab | Azure Portal Services:    Creating Azure SQL – SQL database: |

# Day 3: Task 2

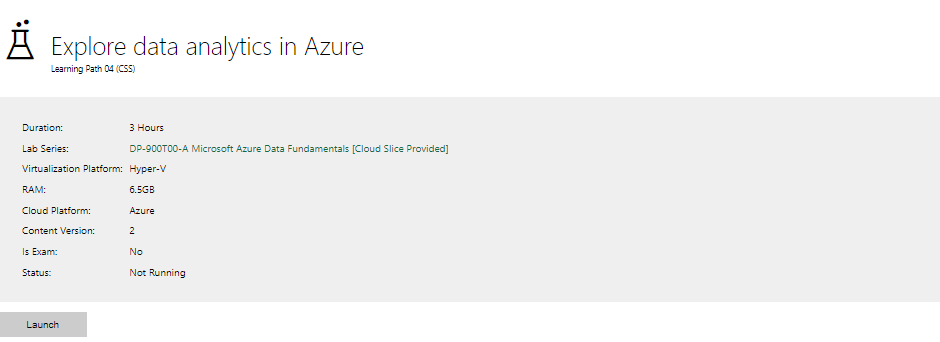
Please complete the below lab (4) *‘Explore non-relational data in Azure’* and paste evidence of the completed lab in the box provided.



|  |  |
| --- | --- |
| Completed lab | Create Resource:      Create Storage account:      Data Storage- Container      Storage Browser:    Blob Container – Data – Add directory    Create products directory:    Uploaded product1.json file    Data Storage – container – product\_data folder is created      Explore Azure Data Lake Storage Gen2    Product2\_json file uploaded in Storage Browser – Blob container -data folder      Explore Azure Files  Data Storage – File Shares        **File shares**, open your new **files** share:      Click on Connect: **Connect** pane, note that there are tabs for common operating systems (Windows, Linux, and macOS) that contain scripts you can run to connect to the shared folder from a client computer.    Data Storage – Tables:        After table created – select **Storage browser – Tables**    Click on Product table – Add Entity    Add Entities – Name and Price with type and values    After adding entities in the products table Timestamp column has been created.    Adding another entity as below:      After inserting the new entity, verify that a row containing the discontinued product is shown in the table.  You have manually entered data into the table using the storage browser interface. In a real scenario, application developers can use the Azure Storage Table API to build applications that read and write values to tables, making it a cost-effective and scalable solution for NoSQL storage.  Creating Resource for Azure Cosmos DB:    Create an account for Azure Cosmos DB for NoSQL :        Cosmos DB account – Data Explorer    Launch quick start – New Container      Can see now Sample DB database and its Sample Container:    List of the items in the container in JSON format  Creating New Item: Using some JSON script    And click save seeing added metadata properties automatically:    **Data Explorer** page select the **New SQL Query** - SELECT \* FROM c results which includes the full JSON representation of all items.    Running the query –  SELECT \*  FROM c  WHERE CONTAINS(c.name,"Helmet")  to run the revised query and review the results which includes JSON entities for any items with a **name** field containing the text "Helmet".    End the lab |

# Day 3: Task 3

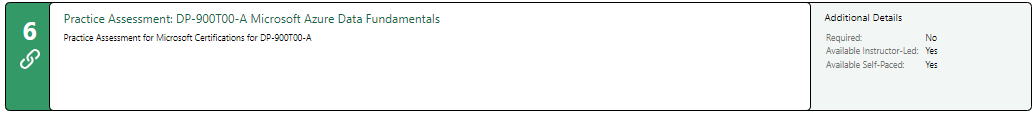
Please complete the below lab (5) ‘Explore data analytics in Azure’ and paste evidence of the completed lab in the box provided.



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| Completed lab | **NOTE:**  I am seeing error in the skillable for this task (will will discuss with Dan and try to sort it out asap). |

# 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.



|  |  |
| --- | --- |
| 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.

|  |
| --- |
| **Proposal for Data Management and Analysis at "Paws & Whiskers" Using Microsoft Azure**  **1. Introduction** "Paws & Whiskers" is a growing pet shop with a focus on improving business operations by transitioning to Microsoft Azure for data storage, analysis, and reporting. The company is currently managing data manually or in spreadsheets, which can be inefficient as the business expands. This proposal outlines the recommended approach for data laws and regulations, Azure services, data types, data modelling, storage formats, and additional considerations for improving data handling.  **2. Data Laws and Regulations**  As "Paws & Whiskers" stores and processes customer data, it is essential to ensure compliance with various data protection laws and regulations to protect customer privacy and avoid legal repercussions. The key regulations include:  **• General Data Protection Regulation (GDPR) Compliance:** The GDPR is a regulation that governs the collection, storage, and processing of personal data within the European Union (EU) and European Economic Area (EEA). It applies to any business that collects data on individuals located within the EU, regardless of where the company is based. For "Paws & Whiskers," this means:   * Obtaining explicit consent from customers before collecting their personal information (e.g., email addresses, phone numbers, etc.). * Ensuring the right to access, rectification, and deletion of customer data upon request. * Ensuring data is stored securely, with appropriate access controls in place. * Reporting any data breaches to relevant authorities within 72 hours.   **• Data Protection Act (DPA) 2018:** The DPA 2018 is the UK’s implementation of the GDPR and governs the processing of personal data. It also provides specific rights to individuals regarding their data. "Paws & Whiskers" must adhere to the following principles:   * Data must be collected for a legitimate purpose and not processed for any incompatible purposes. * Personal data must be accurate, and any inaccuracies must be corrected. * Data must be stored securely and only for as long as necessary to fulfill the purposes for which it was collected.   **• Other Industry Standards and Regulations:**   * **PCI DSS (Payment Card Industry Data Security Standard)**: If "Paws & Whiskers" processes payments from customers, PCI DSS compliance is required. This involves secure handling of payment information and encrypted transactions to protect against fraud and data breaches. * **Health Insurance Portability and Accountability Act (HIPAA)**: If any customer data is related to pet health, it may fall under healthcare regulations depending on the jurisdiction. This requires additional safeguards for sensitive health information.   **3. Azure Service Recommendations**  Microsoft Azure offers a broad range of services that are suitable for data management, analysis, and reporting. Below are the key Azure services that would benefit "Paws & Whiskers" in their transition.  **• Data Storage:**   * **Azure Blob Storage:** Ideal for storing unstructured data, such as images, videos, or logs, which may be part of the pet inventory or sales records. Blob storage offers scalability and cost efficiency for large datasets. * **Azure SQL Database:** A fully-managed relational database suitable for storing structured data, such as customer profiles, transaction history, and product details. It supports SQL queries for easy data retrieval and is integrated with Azure security features.   **Benefits:**   * Scalability: Both Blob Storage and SQL Database scale according to business needs, ensuring flexibility as the company grows. * Security: Azure provides encryption at rest and in transit, meeting compliance standards such as GDPR.   **• Data Analysis Tools:**   * **Azure Synapse Analytics:** For analysing large datasets, such as sales trends, inventory patterns, and customer buying behaviour. Synapse integrates data lakes, data warehouses, and big data analytics, providing an end-to-end analytics solution. * **Azure Machine Learning:** A powerful tool for predictive analytics, useful for customer behaviour analysis. It can be used to predict customer purchasing patterns or optimize inventory management.   **• Data Integration and Automation:**   * **Azure Data Factory:** This service can automate the data ingestion process, such as pulling sales and inventory data from various sources into Azure SQL Database or Blob Storage. It streamlines data workflows and allows for easier integration with third-party systems.   **4. Data Types and Data Modelling**  To manage and analyse the data effectively, it is crucial to define the types of data "Paws & Whiskers" will work with and the modelling approach to structure this data.  **• Data Categories:**   * **Customer Demographics:** Information such as names, email addresses, phone numbers, and location. * **Transaction History:** Data on products purchased, amounts, dates, and payment methods. * **Pet Inventory:** Details about the pets in the store, including breed, age, health status, and availability. * **Product Categories:** Information on products available in the store, such as food, toys, accessories, etc.   **• Data Modelling Approach:**   * **Relational Model:** The relational model is a suitable approach for storing structured data like customer details, transaction history, and product information. The key tables may include:   + **Customer Table:** Customer ID (Primary Key), Name, Email, Address   + **Product Table:** Product ID (Primary Key), Name, Category, Price   + **Transaction Table:** Transaction ID (Primary Key), Customer ID (Foreign Key), Product ID (Foreign Key), Date, Payment Method   + **Inventory Table:** Product ID (Primary Key), Quantity Available, Location   For more complex datasets and analytics, a **Data Warehouse** approach might be adopted using Azure Synapse Analytics to centralize data from multiple sources and support advanced reporting.  **5. Data Storage Formats and Structures in Azure**  Data formats and structures play a crucial role in the efficiency of data handling, security, and compliance.  **• Data Formats:**   * **CSV (Comma Separated Values):** Suitable for raw data imports from external systems or spreadsheets. * **JSON (JavaScript Object Notation):** Best for structured data, such as customer profiles and transaction records. JSON's flexibility in representing hierarchical data makes it ideal for managing various data types. * **Parquet:** A columnar storage format optimized for large datasets and analytics workloads. It is ideal for structured data used in Synapse Analytics.   **• Data Security and Encryption:**   * **Azure Encryption:** All data stored in Azure is encrypted at rest using Azure Storage encryption. Additionally, data in transit is encrypted via HTTPS. * **Access Control:** Azure Role-Based Access Control (RBAC) can be used to manage permissions, ensuring that only authorized users can access sensitive data. Multi-Factor Authentication (MFA) should be enforced for additional security.   **6. Additional Considerations**  **• Backup and Disaster Recovery:**   * **Azure Backup:** Ensure data resilience by setting up automated backups of critical data, such as customer records and transaction history. Azure Backup offers secure, long-term storage with easy retrieval. * **Azure Site Recovery:** For disaster recovery, Azure Site Recovery ensures business continuity by replicating virtual machines and data to a secondary location.   **• Data Visualisation:**   * **Power BI:** Power BI can be integrated with Azure data sources to create real-time dashboards and reports for "Paws & Whiskers." This will enable management to monitor sales, customer trends, and inventory status easily.   **• Future Scalability:**   * Azure services are designed to scale seamlessly. As "Paws & Whiskers" expands, services like Azure SQL Database and Blob Storage can scale without the need for major infrastructure changes. Furthermore, machine learning and big data analytics capabilities can grow with the business, allowing for more complex analysis as the data volume increases.   **7. Conclusion**  Transitioning to Microsoft Azure offers "Paws & Whiskers" the opportunity to streamline its data management processes, ensure compliance with data protection regulations, and gain valuable insights through advanced data analysis tools. By adopting the right Azure services for data storage, analysis, and security, the company can improve operational efficiency and make data-driven decisions that drive business growth. |

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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:

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| **ionInformation** |

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.**