

# **Data Technician**

### Name:

### **Course Date:**

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### Day 1: Task 1

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

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

Cloud computing is transforming a lot of industries by offering scalable, cost-effective, and flexible solutions. Here are a few real-world examples of what cloud computing can do for us:

### 1. Data Storage and Backup

• **Example:** Google Drive, Dropbox, and iCloud let you store documents, photos, and videos in the cloud, making them accessible from any device. These services also offer automatic backup, reducing the risk of losing important data due to device failures.

### 2. Remote Work and Collaboration

Example: Tools like Google Workspace (Docs, Sheets, etc.) or Microsoft 365 allow teams to work together in real time, no matter where they are. Multiple people can collaborate on documents, spreadsheets, and presentations simultaneously, making remote work more efficient

### 3. E-commerce and Online Services

 Example: Companies like Netflix, Spotify, and Amazon rely heavily on cloud computing to stream content to millions of users. The cloud ensures they can scale up or down to handle varying levels of demand, such as during peak usage times like holidays or special events.

### 4. Machine Learning and Al

 Example: Google Cloud, AWS, and Azure provide powerful AI and machine learning tools in the cloud. Companies can use these tools for tasks like predicting customer behavior, analyzing large

What can cloud computing do for us in the real-world?

datasets, or developing autonomous systems, without needing to own expensive hardware.

### 5. Health and Medical Records

 Example: Cloud platforms can securely store patient records and make them easily accessible to authorized healthcare professionals. This improves efficiency and collaboration across hospitals and clinics, reducing errors and ensuring patients receive timely care.

### 6. Smart Homes and IoT (Internet of Things)

• **Example:** Devices like smart thermostats (e.g., Nest), smart speakers (e.g., Amazon Alexa), or security cameras use cloud computing to process data and provide insights in real time. The cloud stores user preferences, sensors, and other data to make these devices smarter and more responsive.

### 7. Gaming

 Example: Services like Google Stadia, Xbox Cloud Gaming, and NVIDIA GeForce Now let gamers play high-end video games without needing powerful consoles or PCs. The game runs on a server in the cloud, and users stream the gameplay to their devices.

### 8. Disaster Recovery

 Example: Businesses can use cloud services to store backup copies of critical systems and data. In the event of a natural disaster or cyberattack, they can quickly recover by spinning up virtual machines in the cloud, minimizing downtime.

### 9. Scalable Business Solutions

• **Example:** Startups and small businesses can use cloud computing to access enterprise-grade software for accounting, customer relationship management (CRM), and project management without needing to invest heavily in hardware or software licenses.

### 10. Software as a Service (SaaS)

• **Example:** Instead of installing software on your computer, you can use applications like Salesforce, Zoom, and Adobe Creative Cloud, which are hosted in the cloud. This allows for automatic updates, collaboration, and access from anywhere.

### 1. Cost Efficiency

- Reduced Capital Expenses: Cloud computing eliminates the need for businesses to invest heavily in physical infrastructure like servers and storage devices. Instead, companies pay only for the resources they use, often on a subscription or payper-use basis.
- Lower Maintenance Costs: Cloud providers handle the maintenance, updates, and security of their platforms, reducing the burden on your IT staff and infrastructure.

### 2. Scalability

- Easily Scale Resources: With cloud services, businesses can quickly scale their infrastructure up or down based on demand. For example, an ecommerce business can increase its server capacity during peak shopping periods (like Black Friday) and reduce it afterward.
- **Growth Without Limits**: As your business grows, cloud platforms offer the flexibility to scale operations without worrying about hardware limitations. This is particularly beneficial for startups or companies that expect rapid growth.

### 3. Remote Access and Flexibility

- Work from Anywhere: Cloud computing enables employees to access business applications, data, and systems from anywhere with an internet connection. This is especially helpful for businesses with remote workers, global teams, or a hybrid work model.
- **Faster Collaboration**: Teams can collaborate in realtime using cloud-based tools like Google Workspace, Microsoft Teams, or Slack, regardless of their physical

# How can it benefit a business?

location.

### 4. Disaster Recovery and Business Continuity

- Backup and Recovery: Cloud services usually come with built-in backup solutions. In case of a disaster (like a natural calamity or cyberattack), businesses can quickly recover their data and systems from the cloud, reducing downtime.
- Data Redundancy: Cloud providers typically store copies of your data across multiple locations, ensuring that if one data center goes down, your business can still function smoothly.

### 5. Security and Compliance

- Advanced Security Features: Many cloud providers offer top-tier security measures, such as encryption, firewalls, and multi-factor authentication, which might be out of reach for smaller businesses trying to manage their own IT infrastructure.
- Compliance with Regulations: Cloud services often help businesses meet industry-specific compliance requirements (like GDPR, HIPAA, etc.) by providing features like data encryption and audit logs.

### 6. Access to Cutting-Edge Technologies

- Al and Analytics: Cloud platforms like AWS, Google Cloud, and Microsoft Azure provide access to machine learning, artificial intelligence, and advanced data analytics tools. Businesses can use these tools to gain insights from their data, predict trends, or optimize operations.
- **No Need for Expensive Hardware**: Businesses can run high-performance applications in the cloud, such as 3D modeling or video rendering, without investing in powerful (and expensive) on-premise hardware.

### 7. Improved Collaboration and Communication

 Real-time Collaboration: Cloud-based tools like Google Docs or Microsoft 365 allow multiple team members to edit documents, share files, and communicate in real time. This reduces the need for back-and-forth emails and streamlines workflows.

 Unified Communication: Cloud-based communication systems like Zoom, Slack, or Microsoft Teams integrate chat, video calls, and file sharing, making internal communication more efficient.

### 8. Automatic Software Updates

- Stay Current Without Effort: Cloud-based applications are automatically updated, meaning businesses don't have to manually install patches or worry about security vulnerabilities. This saves time and ensures that systems are always up to date.
- Access to the Latest Features: With cloud software, businesses can quickly adopt the latest features and innovations without the hassle of manual updates.

### 9. Environmental Benefits

 Energy Efficiency: By using shared data centers in the cloud, businesses contribute to reducing the overall carbon footprint. Cloud providers typically invest in energy-efficient technologies and renewable energy, making cloud computing more sustainable than traditional IT infrastructure.

### 10. Faster Time to Market

- Rapid Prototyping and Development: Developers can quickly spin up cloud environments for testing, staging, and production, allowing for faster deployment of applications and features.
- Flexibility in Testing: Cloud resources allow businesses to test new ideas or products with minimal upfront investment, reducing the risk of costly mistakes.

# What's the alternative to cloud computing?

### 1. On-Premises Computing

What It Is: The business owns, operates, and maintains its own hardware and software infrastructure. Servers, databases, and other systems are physically located on-site or in a company-owned data center.

### **Key Features**:

- Full control over hardware, software, and security.
- All data is stored on-site, reducing reliance on third-party providers.
- Typically requires a dedicated IT team for maintenance, security, and updates.

### Benefits:

- Control: You have complete control over your infrastructure, security measures, and how data is managed.
- Customization: Hardware and software can be tailored to specific needs.
- Data Privacy: Sensitive or proprietary data may be more secure because it's not stored on external servers.

### Drawbacks:

- High Initial Costs: Significant upfront costs for purchasing and maintaining hardware and software.
- Ongoing Maintenance: Requires an in-house IT team to manage, update, and secure systems.
- Scalability Limitations: Scaling can be slow and costly because adding new hardware is required for increased demand.
- Disaster Recovery: Backup and recovery solutions can be expensive and complex to implement.

**Use Case**: On-premises computing is often preferred by businesses with strict security or regulatory requirements, such as financial institutions, healthcare organizations, and government agencies.

### 2. Hybrid Cloud

What It Is: A combination of on-premises infrastructure and cloud services, allowing data and



applications to be shared between them. This approach gives businesses the flexibility to keep some resources in-house while taking advantage of the cloud for others.

### **Key Features**:

- Critical or sensitive data can be kept onpremises.
- Non-sensitive workloads or data can be handled by the cloud.
- More flexibility in how resources are allocated across on-premises and cloud environments.

### **Benefits**:

- Best of Both Worlds: Leverages the scalability and flexibility of the cloud while maintaining control over sensitive or high-performance workloads.
- Cost Efficiency: Businesses can reduce their on-premises infrastructure by offloading some services to the cloud.
- Business Continuity: If there is a failure in the on-premises system, the cloud can handle the load temporarily.

### **Drawbacks**:

- Complex Management: Managing both environments (cloud and on-premises) can be more complex and require sophisticated integration.
- Cost: While hybrid systems provide flexibility, they can also be more expensive than purely cloud-based or purely on-premises solutions.

**Use Case**: Hybrid cloud is great for businesses that need to maintain certain legacy systems or regulatory compliance but want the flexibility of cloud-based computing for other applications.

### 3. Colocation



What It Is: Colocation involves renting space in a third-party data center to house your business's servers and hardware. The business still owns the equipment, but the data center provides the space, power, cooling, and network connectivity.

### **Key Features**:

- You own the hardware but outsource the physical environment (power, security, and infrastructure).
- The data center typically provides high levels of security and redundancy.

### Benefits:

- Control: You retain control over your hardware and software configurations.
- Reduced Overhead: Offloads the need to manage physical infrastructure like cooling, electricity, and internet connectivity.
- Scalability: Easier to scale than on-premises systems without needing to build your own data center.

### Drawbacks:

- Cost: While cheaper than building a private data center, colocation can still be expensive due to rental fees and operational costs.
- Maintenance: You're still responsible for maintaining and upgrading your hardware.

**Use Case**: Colocation is often used by businesses that need high performance, security, and reliability but want to avoid the upfront costs of building and maintaining their own data centers.

### 4. Edge Computing

**What It Is**: Edge computing involves processing data closer to where it's generated, at the "edge" of the network, rather than relying on a central cloud server or data center. This approach is used for applications

that require low latency or real-time processing.

### **Key Features**:

- Data is processed locally on devices or nearby edge servers instead of in centralized data centers.
- Often used for IoT (Internet of Things) devices, autonomous vehicles, and real-time analytics.

### Benefits:

- Low Latency: Minimizes delays by processing data closer to the source.
- Efficiency: Reduces bandwidth usage by processing data locally rather than sending it to a central cloud server.
- Real-Time Processing: Enables real-time or near-real-time decision-making, critical for things like autonomous systems or remote monitoring.

### **Drawbacks**:

- Complexity: Managing edge devices and local data processing can be complex.
- Limited Resources: Edge devices may have limited computing power compared to centralized cloud or on-premises infrastructure.

**Use Case**: Ideal for industries like manufacturing, transportation, and healthcare, where low-latency and real-time data processing is critical.

### 5. Private Cloud

**What It Is**: A private cloud is a cloud infrastructure that's dedicated solely to one business, either hosted on-premises or by a third-party provider. It offers many of the benefits of cloud computing but with the added control and security of on-premises systems.

### **Key Features**:

Only one business can access and manage the



cloud infrastructure.

 The cloud can be hosted in a private data center or externally.

### Benefits:

- Security: More control over data security and privacy.
- Customization: Cloud resources can be customized to meet specific business needs.
- Performance: Often higher performance compared to public clouds because resources are dedicated to one organization.

### Drawbacks:

- Cost: Private clouds can be more expensive than public cloud services.
- Complexity: Requires more effort to set up, manage, and maintain compared to public cloud options.

**Use Case**: Ideal for large organizations with strict security and compliance requirements, such as government agencies, financial institutions, or large enterprises.

What cloud providers can we use, what are their features and functions?

### 1. Amazon Web Services (AWS)

- Overview: AWS is the largest and most widely used cloud platform. It offers a vast range of cloud services, from computing and storage to machine learning and loT.
- Key Features:
  - Compute: Elastic Compute Cloud (EC2) provides scalable computing capacity.
  - Storage: Amazon S3 for scalable storage,
     Elastic Block Store (EBS) for persistent storage,
     and Glacier for long-term archival.
  - Databases: Managed relational databases with Amazon RDS, NoSQL with DynamoDB, and Amazon Redshift for data warehousing.
  - AI/ML: AWS provides a suite of Al and machine learning tools, including Amazon

- SageMaker for building, training, and deploying models.
- Networking: Virtual Private Cloud (VPC),
   Content Delivery Network (CloudFront), and
   Direct Connect for secure networking.
- Security: AWS Identity and Access
   Management (IAM), encryption services, and
   compliance tools for industry standards (GDPR,
   HIPAA, etc.).
- Developer Tools: AWS CodePipeline, AWS CodeDeploy, and other DevOps tools for continuous integration and deployment (CI/CD).
- Analytics: Amazon Athena (serverless analytics), Kinesis (real-time data processing), and QuickSight (BI tools).

### • Strengths:

- Comprehensive: Offers the widest range of services across compute, storage, database, Al, analytics, and more.
- Scalability: Highly scalable and elastic, making it ideal for startups to enterprises.
- Global Reach: Data centers in multiple regions worldwide, ensuring low-latency and data sovereignty.
- **Ideal For**: Enterprises, tech startups, developers, and organizations needing flexible and scalable infrastructure.

### 2. Microsoft Azure

- Overview: Microsoft Azure is a powerful cloud platform that integrates well with existing Microsoft services like Windows Server, Active Directory, and Office 365. It's often preferred by businesses that rely on Microsoft's ecosystem.
- Key Features:
  - Compute: Virtual Machines, Azure Functions (serverless), and App Services for web apps and APIs.
  - Storage: Blob Storage for unstructured data,



- Disk Storage for VMs, and Azure Files for file-sharing.
- Databases: Azure SQL Database (managed relational database), Cosmos DB (NoSQL), and Azure Database for PostgreSQL/MySQL.
- AI/ML: Azure Machine Learning for building, training, and deploying machine learning models, along with cognitive services for prebuilt AI functionalities like image recognition and language processing.
- Networking: Azure Virtual Network (VNet), Load Balancer, VPN Gateway, and ExpressRoute for private network connections.
- Security: Azure Active Directory for identity management, Azure Security Center for threat protection, and Azure Key Vault for secret management.
- Analytics: Azure Synapse Analytics (data warehousing), Azure Data Lake (big data), and Power BI (business intelligence).
- Developer Tools: Azure DevOps for CI/CD pipelines, GitHub integration, and Azure Kubernetes Service (AKS) for containerized applications.

### Strengths:

- Integration with Microsoft Products:
   Seamless integration with Microsoft software like Office 365, SQL Server, and Dynamics.
- Hybrid Solutions: Azure is particularly strong in hybrid cloud solutions, making it suitable for businesses that want to mix on-premises and cloud infrastructure.
- Enterprise-Focused: Known for enterprisegrade security and compliance, which makes it popular with large corporations and public sector organizations.
- **Ideal For**: Enterprises, businesses relying on Microsoft products, and those requiring hybrid cloud solutions.

### 3. Google Cloud Platform (GCP)



- Overview: Google Cloud is known for its highperformance computing, big data, and machine learning capabilities. It's widely used for data-heavy operations, analytics, and modern app development.
- Key Features:
  - Compute: Google Compute Engine (VMs), App Engine (serverless), and Kubernetes Engine for containerized applications.
  - Storage: Google Cloud Storage for scalable object storage, Persistent Disks for VM storage, and BigQuery for data analytics.
  - Databases: Cloud SQL (managed SQL databases), Cloud Firestore and Bigtable for NoSQL databases, and Cloud Spanner (globally distributed SQL database).
  - AI/ML: Google Cloud AI tools, including TensorFlow, AutoML, and AI Hub, plus pretrained models for vision, speech, and language.
  - Networking: Google Cloud VPC, Cloud Load Balancing, and Cloud CDN for content delivery.
  - Security: Identity and Access Management (IAM), Cloud Key Management, and Security Command Center.
  - Analytics: BigQuery for fast SQL-based analytics, Dataflow (streaming analytics), and Dataproc for big data processing.
  - Developer Tools: Google Cloud Build for CI/CD, Cloud Functions for serverless, and Google Kubernetes Engine (GKE) for container orchestration.

### • Strengths:

- Data Analytics: Google is a leader in data analytics and machine learning, with products like BigQuery and TensorFlow.
- AI/ML: Powerful tools for machine learning, making it ideal for companies focused on AI and data science.
- Cost Efficiency: Competitive pricing, especially for storage and data-heavy workloads.
- Ideal For: Data-driven businesses, startups, AI and

machine learning projects, and developers.

### 4. IBM Cloud

- Overview: IBM Cloud is known for its enterprisegrade solutions, especially for hybrid cloud environments and industries like banking, healthcare, and manufacturing.
- Key Features:
  - Compute: IBM Cloud Virtual Servers, Bare Metal Servers, and Cloud Functions (serverless).
  - Storage: IBM Cloud Object Storage, Block Storage, and File Storage.
  - Databases: IBM Db2, Cloudant (NoSQL), and PostgreSQL.
  - AI/ML: IBM Watson AI for natural language processing, machine learning, and cognitive computing.
  - Networking: IBM Cloud VPC, Load Balancer, and Direct Link for dedicated connections.
  - Security: IBM Cloud Identity and Access Management (IAM), Key Protect for encryption, and Cloud Security Advisor.
  - Blockchain: IBM Blockchain for building and deploying blockchain solutions.
  - Developer Tools: IBM Cloud Continuous Delivery (CI/CD), Kubernetes, and Cloud Foundry for app development.

### • Strengths:

- Al and Cognitive Services: IBM Watson is a leader in Al, making IBM Cloud great for cognitive and NLP applications.
- Hybrid Cloud and Mainframe: IBM excels at integrating traditional on-premises systems with the cloud, which is useful for legacy systems in enterprise environments.
- Industry-Specific Solutions: Provides tailored solutions for industries like finance, healthcare, and manufacturing.
- Ideal For: Large enterprises, Al-driven applications,



businesses needing hybrid cloud solutions, and industries like finance and healthcare.

### 5. Oracle Cloud

- Overview: Oracle Cloud is primarily focused on enterprise software solutions, particularly around databases and business applications.
- Key Features:
  - Compute: Oracle Cloud Infrastructure (OCI),
     Oracle Cloud Functions (serverless), and
     Autonomous Linux.
  - Storage: Oracle Cloud Object Storage, Block Volumes, and File Storage.
  - Databases: Oracle Autonomous Database (self-driving database), Oracle MySQL, and NoSQL database.
  - AI/ML: Oracle AI and machine learning tools for predictive analytics and automation.
  - Networking: Oracle Cloud Networking for private cloud, load balancing, and content delivery.
  - Security: Oracle Cloud Security, IAM, encryption, and compliance with industry standards.
  - Developer Tools: Oracle Developer Cloud
     Service, Kubernetes, and DevOps integrations.

### Strengths:

- Enterprise-Focused: Oracle Cloud is heavily used by enterprises that rely on Oracle software and databases.
- Autonomous Database: Offers self-managing databases that handle maintenance, patching, and tuning automatically.
- Integration with Oracle Software: Best for organizations already using Oracle's business applications and databases.
- **Ideal For**: Enterprises with heavy reliance on Oracle software, especially in the financial, retail, and

manufacturing sectors.

### 6. Alibaba Cloud

- Overview: Alibaba Cloud is a rapidly growing provider, particularly in Asia. It offers a range of cloud computing services with a strong focus on ecommerce and big data solutions.
- Key Features:
  - Compute: Elastic Compute Service (ECS),
     Container Service for Kubernetes, and
     Serverless Function Compute.
  - Storage: Object Storage Service (OSS), Apsara
     File Storage, and Hybrid Cloud Storage.
  - Databases: ApsaraDB for MySQL, Redis, and PolarDB for enterprise databases.
  - AI/ML: Alibaba Cloud Machine Learning Platform for AI and data analytics.
  - Networking: Virtual Private Cloud (VPC), Alibaba Cloud CDN, and Direct Connect.
  - Security: Alibaba Cloud Security services, including Web Application Firewall (WAF), DDoS protection, and Identity and Access Management (IAM).

### Day 1: Task 2

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

Cloud Offerings		
laaS	Provides	Amazon EC2 (Elastic Compute Cloud) —

# (Infrastructure as a service)

virtualized computing resources over the internet, such as virtual machines, storage, and networking.

You can rent virtual servers to run applications, host websites, or develop software, without having to invest in physical hardware.

# PaaS (Platform as a service)

Provides a platform and environment for developers to build, deploy, and manage applications without worrying about the underlying infrastructure (hardware and operating systems).

Google App Engine — A platform for building and hosting web applications in Google's data centers. It abstracts away the infrastructure and lets developers focus purely on the code.

# SaaS (Software as a service)

Delivers software applications over the internet, usually on a subscription basis, eliminating the need for businesses to install, manage, or maintain

A CRM (Customer Relationship Management) software delivered via the cloud, which allows businesses to manage customer relationships, sales, and marketing without installing software locally.

software.	

### Day 1: Task 3

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

### **Public Cloud**

A public cloud is a cloud computing model where services (like computing power, storage, and applications) are provided by a third-party cloud provider over the internet. These services are available to anyone who wants to use them, typically on a pay-as-you-go basis. Public clouds are managed by the provider, who is responsible for the infrastructure, security, and maintenance. Examples of public cloud providers include Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP).

Key advantages of public clouds include costeffectiveness, scalability, and ease of use, making them ideal for businesses and individuals who need flexible and on-demand resources without managing physical hardware.

A private cloud is a cloud computing environment that is used exclusively by a single organization. It can be hosted either on-premises (within the organization's own data centers) or by a third-party provider, but the infrastructure is dedicated to one client only. This type of cloud offers more control over the environment, including data security, privacy, and compliance, as the resources are not shared with other organizations.

### **Private Cloud**

Key advantages of private clouds include:

Greater Control: The organization has full control over the infrastructure and the security policies.

Customizability: The cloud environment can be tailored to meet specific business needs, such as high-performance computing or regulatory compliance.

Security and Compliance: Since it's dedicated to one organization, private clouds provide enhanced security, which is crucial for industries with strict

data protection regulations (e.g., finance, healthcare).

A hybrid cloud is a combination of both public and private cloud environments, designed to work together. This model allows businesses to take advantage of the scalability and cost-effectiveness of public clouds while maintaining control over sensitive data or critical workloads through a private cloud.

In a hybrid cloud setup:

Public cloud services can be used for non-sensitive or less-critical workloads (e.g., web hosting, data analytics) that benefit from scalability and cost efficiency.

### **Hybrid Cloud**

Private cloud resources are used for sensitive applications or data that require enhanced security, privacy, or compliance (e.g., financial records, proprietary applications).

Key benefits of a hybrid cloud include:

Flexibility: Organizations can move workloads between the public and private clouds as needed, optimizing for cost, performance, and security.

Scalability: Public cloud resources can be leveraged to scale operations during peak demand, while maintaining private infrastructure for sensitive or regulatory-sensitive data.

Risk Management: Hybrid clouds allow businesses to keep sensitive data in a private environment, while still benefiting from public cloud for less-critical operations.

### **Community Cloud**

A community cloud is a shared cloud infrastructure used by multiple organizations with common goals, such as similar security or regulatory requirements. It combines the benefits of cost-sharing with the ability to tailor the cloud environment to meet the specific needs of the participating organizations. It is ideal for industries like healthcare, government, or education, where collaboration is needed but with a focus on security, compliance, and industry-

### Day 2: Task 1

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

Unauthorized Access to Computer Material	A student guesses a teacher's password and logs into the school system to view exam questions.	
Unauthorized Access with Intent to Commit or Facilitate a Crime	A hacker breaks into a bank's system intending to transfer money into their own account.	
Unauthorized Acts with Intent to Impair, or with Recklessness as to Impairing,	A disgruntled employee installs a virus on their company's network to crash the system.	

the	
Operation of	
a Computer	

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.

### 1. Increased Penalties for Hacking (Section 35)

- The maximum sentence for **unauthorized access (hacking)** was increased from **6** months to **2** years in prison.
- The penalty for unauthorized access with intent to commit further offenses increased from 5 years to 10 years.

**Example:** A hacker breaking into a company's database now faces harsher penalties

### 2. Criminalization of Denial-of-Service (DoS) Attacks (Section 36)

• The amendment made **DoS attacks illegal**, meaning that deliberately overwhelming a system to crash it is now a crime.

**Example:** A person flooding an online banking system with traffic to make it unusable can now be prosecuted.

### 3. Offenses for Creating and Supplying Hacking Tools (Section 37)

• It became illegal to **create, supply, or obtain hacking tools** with intent to commit cybercrime.

**Example:** A person selling malware or password-cracking software to criminals can now be charged.

Look at the below website to answer the questions:



# keep-about-me

https://www.gov.uk/personal-data-my-employer-can-

Conduct further research to answer the below questions.



# Provide one example of: Copyright infringement

A person downloads and shares a newly released movie on a torrent website without permission from the copyright owner. This violates copyright law because the movie is being distributed without authorization.

# Provide one example of: Plagiarism

A student copies paragraphs from an online article into their essay without citing the source and submits it as their own work. This misrepresents someone else's work as their own, which is plagiarism.

# What are two consequences of copyright infringement and software piracy?

### 1. Legal Consequences

- Individuals or businesses caught infringing copyright can face fines, lawsuits, or even imprisonment depending on the severity of the offense.
- Companies like Microsoft and Adobe actively pursue legal action against those who distribute or use pirated software.

**Example:** A business using unlicensed copies of Microsoft Office could be fined or sued for violating copyright laws.

### 2. Security Risks and Malware Infections

- Pirated software often comes from untrusted sources, increasing the risk of viruses, malware, or spyware that can steal personal data or damage systems.
- Many illegal downloads bypass security updates, leaving users vulnerable to cyber threats.

**Example:** A person downloads a cracked version of Photoshop, only to find their computer infected with

ransomware, locking their files until they pay a hacker.

# Give three possible consequences for individuals when using pirated software

### 1. Legal Consequences

- Using pirated software violates copyright law, which can result in fines, lawsuits, or even criminal charges in some cases.
- Some countries have strict anti-piracy laws, and software companies actively track illegal usage.

**Example:** A person caught using a pirated version of Microsoft Office could face a hefty fine or legal action from Microsoft.

### 2. Security Risks (Viruses & Malware)

- Pirated software is often downloaded from untrusted sources, increasing the risk of malware, ransomware, or spyware infecting the system.
- Hackers use cracked software to spread viruses that can steal personal data, such as bank details or passwords.

**Example:** Someone downloads a pirated version of Photoshop, only to find their computer infected with a keylogger that steals their online banking details.

### 3. Lack of Updates and Support

- Pirated software does not receive official updates, leaving it vulnerable to security risks and performance issues.
- Users also cannot access customer support if they encounter problems.

**Example:** A person using a pirated version of Windows is unable to install security updates, making their computer more vulnerable to cyberattacks.

Listed below are some laws which we have covered today:

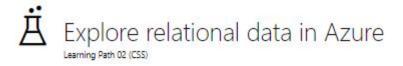
- 1. Computer Misuse Act 1990
- 2. Police and Justice Act 2006 (Computer Misuse)
- 3. Copyright, Designs and Patents Act 1988
- 4. Copyright (Computer Programs) Regulations 1992
- 5. The Health and Safety (Display Screen Equipment) Regulations 1992
- 6. Data Protection Act 2018
- 7. Consumer Rights Act 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 Legal	It is illegal to create or use a hacking tool for penetration testing
6	Personal data may only be used for specified, explicit purposes
5	Employers must provide their computer users with

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



Duration: 2 Hours, 15 Minutes

Lab Series: DP-900T00-A Microsoft Azure Data Fundamentals [Cloud Slice Provided]

Virtualization Platform: Hyper-V

RAM: 6.5GB

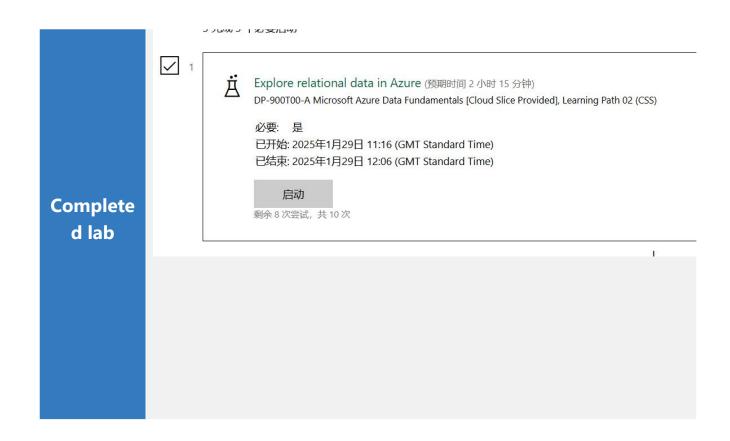
Cloud Platform: Azure

Content Version: 2

Is Exam: No

Status: Not Running

Launch



### 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.

# Explore non-relational data in Azure

Duration: 2 Hours, 15 Minutes

Lab Series: DP-900T00-A Microsoft Azure Data Fundamentals [Cloud Slice Provided]

Virtualization Platform: Hyper-V
RAM: 6.5GB
Cloud Platform: Azure
Content Version: 2
Is Exam: No

Status: Not Running

Launch





Explore data analytics in Azure (预期时间 3 hours)

DP-900T00-A Microsoft Azure Data Fundamentals [Cloud Slice Provided], Learning Path 04 (CSS)

必要: 是

已开始: 2025年1月29日 16:02 (GMT Standard Time) 已结束: 2025年1月29日 16:57 (GMT Standard Time)

启动

剩余9次尝试,共10次

### $\downarrow$

### Complete d lab





Practice Assessment: DP-900T00-A Microsoft Azure Data Fundamentals 细节  $\lor$ 

必要: 否

已开始: 2025年1月30日 11:59 (GMT Standard Time)

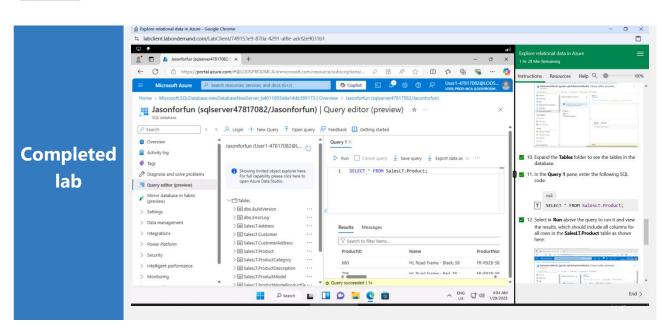
启动

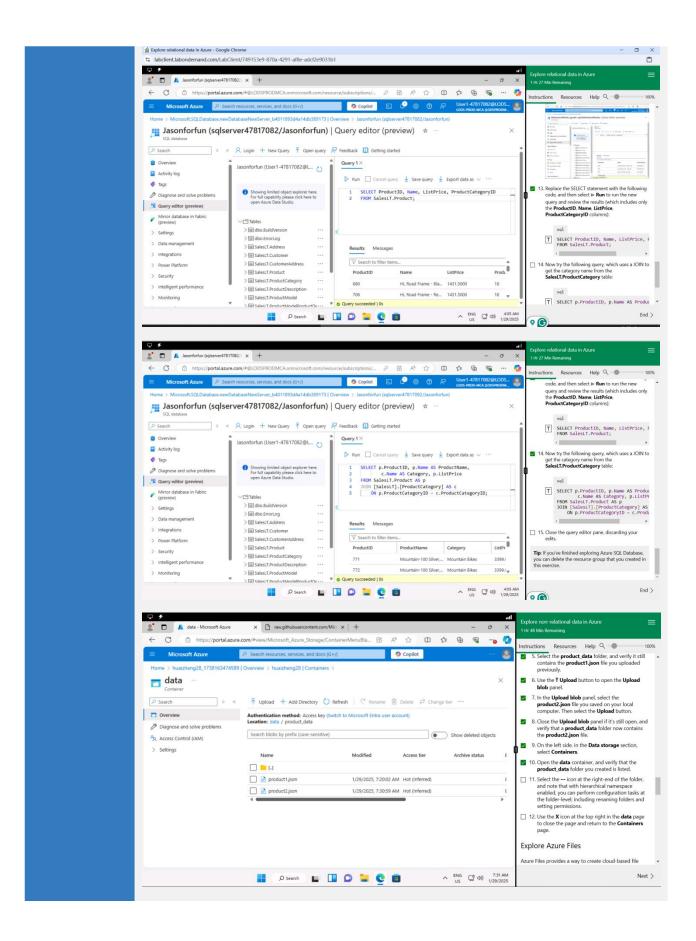
### Day 3: Task 3

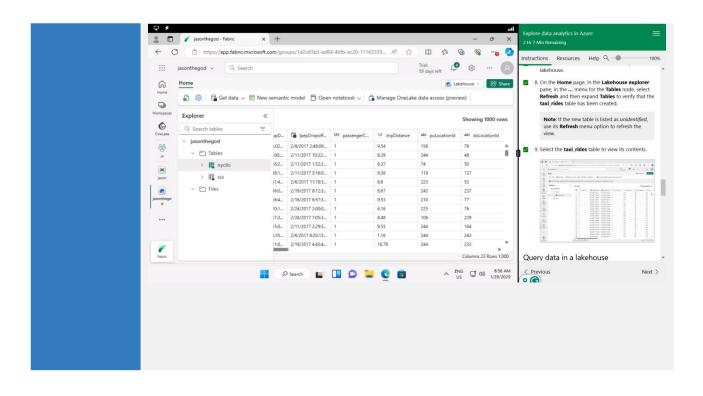
Please complete the below lab (5) 'Explore data analytics in Azure' and paste evidence of the completed lab in the box provided.







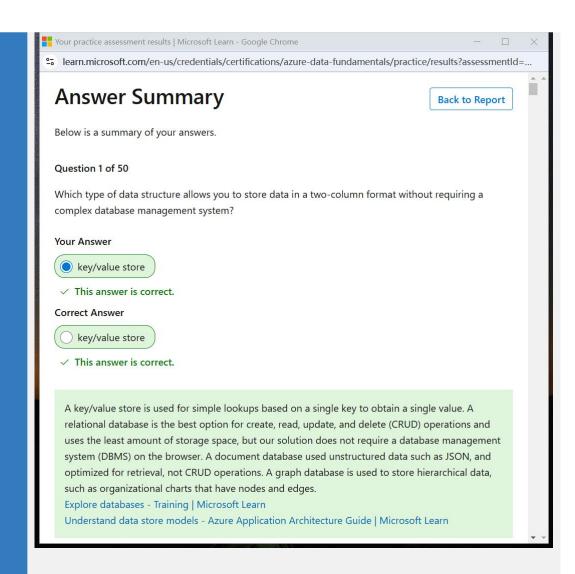




### Day 4: Task 1

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.

### 1. Data Laws

Given the needs of storing and processing customer data, "Paws & Whiskers" has to follow the General Data Protection Regulation(GDPR) by these following clauses in the **Article of Lawfulness, Fairness and Transparency**:

- a. Personal data must be processed lawfully, fairly, and transparently.
- b. Organizations must inform individuals about how their data is collected, stored, and processed.

And these clauses in the **Article of Lawful Basis for Processing**:

Processing of customer data must be based on a legal basis, such as:

- a. Consent (explicit permission from the customer).
- b. Contractual necessity (e.g., fulfilling an agreement).
- c. Legal obligation (e.g., tax compliance).
- d. Legitimate interests (e.g., fraud prevention).

And the requirements in the Data Protection Act(DPA) 2018 can be summarized as following points:

- a. Only collect necessary data with a legal basis.
- b. Store data securely with encryption and access controls.
- c. Do not store data longer than needed (retention policies).
- d. Allow individuals to access, correct, or delete stored data.
- e. Report data breaches within 72 hours.

### 2. Azure Service Recommendations

Considering the needs of Data Storage, Data Analysis, Data Integration and Automation, Microsoft Azure Services are recommended. For Data Storage, Azure Blob Storage, Azure SQL Database and Azure Lake Storage are suitable in this scenario. **Azure Blob Storage** is winning for its comprehensive support to hot, cool and archive tiers for cost optimization and its large-scale object storage. The currently manually collected data in "Paws & Whiskers" can be transferred into unstructured data and stored in Azure Blob Storage. The storage can also integrate with Azure Al and Machine Learning for advanced processing. **Azure SQL Database** is best for data like sales transactions, customer details, product inventory, that is, structured data. It is well managed and scalable, which reduces maintenance efforts. Also, it allows querying with SQL, making it easier to analyze trends. There must be historical data in "Paws & Whiskers", in this case, **Azure Data Lake Storage** is suitable. It is ideal for big data storage, including raw sales

data, customer interactions, and marketing insights. It can store structured and unstructured data (e.g., sales history, customer feedback, marketing campaigns). It is Optimized for advanced analytics with Azure Synapse Analytics or Power BI.

### 3. Data Types and Data Modelling

"Paws & Whiskers" will need to work with various types of data to optimize its operations and drive business growth. Sales data, including transaction records, payment details, and sales trends, will help analyze customer purchasing behavior and forecast demand. Customer data, such as profiles, purchase history, and loyalty program details, will enable personalized marketing and improved customer retention. Efficient inventory management will require tracking product catalogs, stock levels, supplier details, and expiration dates. The business will also handle employee and operational data, including staff schedules, performance metrics, and payroll records, to enhance workforce management. Marketing and engagement data, such as email campaigns, social media interactions, and ad performance, will help track customer engagement and optimize promotional efforts. Additionally, financial data, including revenue, expenses, and tax records, will be essential for maintaining profitability and compliance. Managing supplier and vendor data, such as contracts, product sourcing, and order tracking, will streamline the supply chain. Finally, website and online store data, including online orders, user behavior, and product reviews, will enhance the digital shopping experience. By effectively collecting, storing, and analyzing these data types, "Paws & Whiskers" can make informed decisions, improve efficiency, and enhance customer satisfaction.

To structure the data for "Paws & Whiskers," a relational model (OLTP) can be used for transactional data, and a data warehouse approach (OLAP) would be ideal for analytical purposes. In the relational model, several key tables are required, including Customers, Products, Sales Transactions, Sales Details, Inventory, Suppliers, Employees, and Marketing & Customer Engagement. These tables will store data such as customer profiles, product information, sales transactions, inventory stock levels, supplier details, and employee records, with relationships between them maintained through foreign keys. For example, the Sales Transactions table would link to the Customers and Products tables, while the Inventory table would track product stock levels. The data warehouse approach would be optimized for analysis, using fact tables like Sales Fact and dimension tables such as DimCustomers, DimProducts, DimEmployees, and DimDate. This design allows for easy reporting and analysis of sales trends, customer behavior, and inventory management. The relational model would be stored in an Azure SQL Database, while the data warehouse could be implemented in Azure Synapse Analytics for efficient querying and business intelligence.

### 4. Data Storage Formats and Structures

For "Paws & Whiskers," a pet shop that handles sales, customer, inventory, and marketing data, Azure storage solutions and formats should be chosen based on the nature of the data and its intended use. For raw data imports, such as bulk uploads of

sales transactions or inventory lists, CSV format would be a good choice due to its simplicity and ease of use for batch processing. JSON format would be ideal for structured customer data (e.g., customer profiles, loyalty points, and product catalogs) because it allows for a flexible and readable format that can store hierarchical information, such as pet types or product categories, which might evolve over time. For analytics, particularly sales and inventory data, Parquet format is highly recommended due to its columnar storage which optimizes performance for querying large datasets—particularly for analytics workloads in Azure Synapse Analytics or Azure Databricks. This format is ideal for aggregating sales trends, analyzing customer behavior, or performing stock level analysis. If the shop plans to collect log data or real-time event data (such as user interactions or inventory updates), Avro format could be beneficial for its compactness and support for schema evolution, making it suitable for streaming data in Azure Event Hubs or Azure IoT Hub. By using these formats in conjunction with Azure services like Azure Blob Storage or Azure Data Lake Storage, "Paws & Whiskers" can streamline data storage, reduce costs, and enable fast, efficient analytics and reporting.

To secure data for "Paws & Whiskers" and ensure compliance with data privacy regulations like GDPR, Azure provides several built-in encryption features and access controls. Azure Storage and Azure SQL Database both offer encryption at rest by default using Azure Storage Service Encryption (SSE) and Transparent Data Encryption (TDE), which protects customer, sales, and inventory data stored in Blob Storage and SQL databases. For additional security, Azure Key Vault can be used to manage encryption keys, allowing the business to control key rotation and access policies. For data in transit, Azure ensures encryption using TLS/SSL for data transfers to protect sensitive information during transmission, such as customer details or payment information. Access controls can be enforced with Azure Active Directory (AAD) to implement rolebased access control (RBAC), ensuring that only authorized personnel can access specific datasets. For example, customer data can be restricted to marketing teams, while inventory and financial data could be limited to operational and finance staff. Moreover, Azure Managed Identity can be used for secure application-to-application authentication, minimizing the need for hardcoded credentials. Implementing audit logs and activity monitoring through Azure Monitor ensures that all access and actions on sensitive data are logged for compliance and security purposes. By using these Azure features, "Paws & Whiskers" can safeguard customer and business data, ensure privacy, and adhere to regulatory requirements.

### 5. Additional Considerations

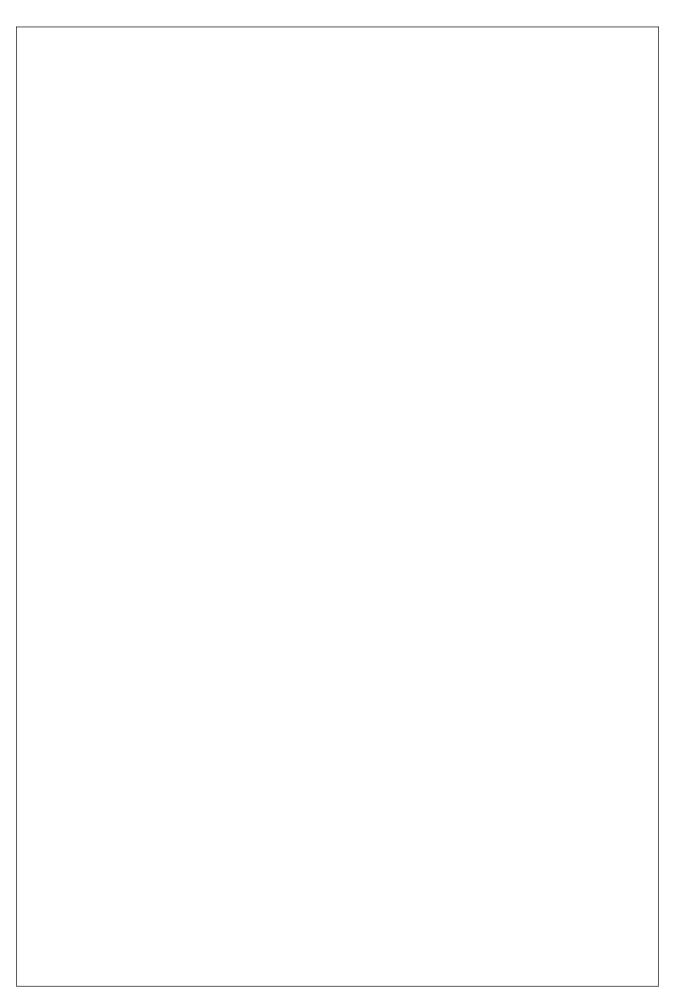
To enhance data handling and efficiency for "Paws & Whiskers" in Azure, several considerations should be made. For Backup and Disaster Recovery, implementing Azure Backup and Azure Site Recovery is crucial for protecting against data loss and ensuring business continuity. Azure Backup can be configured to regularly back up important data, such as sales transactions, customer profiles, and inventory records, to a secure location in Azure. This ensures that recent data is always protected and can be quickly restored if needed. Azure Site Recovery offers disaster recovery capabilities by

replicating data and applications to a different region, ensuring that the business can quickly recover from regional outages or other disasters. This approach minimizes downtime and safeguards against potential data loss, providing a reliable backup plan for critical data.

For Data Visualization, integrating Power BI within Azure can help "Paws & Whiskers" gain valuable insights into sales, customer trends, and inventory management. Power BI can be connected to Azure Synapse Analytics or Azure SQL Database to create real-time, interactive dashboards that provide management with up-to-date visualizations. These dashboards could display key metrics like daily sales performance, top-selling products, customer purchase patterns, and stock levels, enabling management to make datadriven decisions. With Power BI, the pet shop can easily track business performance, identify trends, and uncover opportunities for optimization in operations, leading to more informed strategic decisions.

Future Scalability is another important consideration for the pet shop as it grows. Azure offers a range of scalable services that can accommodate larger datasets and more complex analyses as the business expands. For example, Azure Synapse Analytics and Azure Data Lake Storage can seamlessly scale to handle the increasing volume of sales, customer, and inventory data. Azure's elastic computing resources allow "Paws & Whiskers" to quickly adjust their infrastructure, ensuring that they only pay for what they use while maintaining high performance. As the business grows, they can also leverage Azure Machine Learning for more advanced analytics, such as demand forecasting, customer segmentation, and predictive modeling. With Azure's flexible and scalable services, the business can easily scale its data infrastructure and analytics capabilities without any disruptions to daily operations, supporting their growth and future needs.

By incorporating these Azure features, "Paws & Whiskers" can ensure robust data protection, gain actionable business insights, and scale its operations effectively to meet the demands of a growing business.



## **Course Notes**

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

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

### **END OF WORKBOOK**

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

Please send your completed work booklet to your trainer.