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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 allows business and individuals to access data, software, and the computing power over the internet without owning the underlying infrastructure. Examples of cloud services include: Google Drive to allow individuals to store, back up and share photos and documents across multiple devices with others. Spotify and Netflix provide access to music, shows and movies which are stored in the cloud. |
| How can it benefit a business? | Cloud computing benefits business as it greatly reduces costs, increasing flexibility, improving collaboration through scalable, pay-as-you-go services, usng automatic updates and gives users remote access to data. Another beneft is that it gives users access to data at anytime and from anywhere as everything is stored on the internet. |
| What’s the alternative to cloud computing? | Alternatives to cloud computing include edge computing and fog computing. Edge computing process and stores data closer to the source (e.g., on or near the device) rather than sending it all to a central cloud server, which can reduce latency and the volume of data sent to the cloud. Fog computing involves distributing data processing and storage across devices in a local network, providing an intermediate layer between devices and the cloud. |
| What cloud providers can we use, what are their features and functions? | |  |  |  |  | | --- | --- | --- | --- | | Features | AWS | Azure | GCP | | Computing | Provides processing power for applications, including virtual servers (Amazon EC2) and serverless options (AWS Lambda). | Azure Virtual Machines: Provides on-demand access to virtualized servers, allowing users to run any workload with full administrative access. | Offers virtual machines, containers (e.g., Google Kubernetes Engine), and serverless options to handle diverse workloads. | | Storage | Offers various solutions for data, such as file, block, and object storage systems. | Offers various storage options, including Blob, File, and Queue storage, for unstructured data, file shares, and messaging. | Offers various solutions including object, file, and block storage to meet different data needs. | | Database | Includes services for both modern and traditional databases, such as Amazon DynamoDB and Amazon Aurora. | A managed relational database service. | Features tools like BigQuery (a serverless data warehouse) and Cloud Dataflow for data processing and analytics. | |

Day 1: Task 2

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

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| Cloud Offerings | Explain what it is | When / how might you use this service in the real-world? |
| IaaS (Infrastructure as a service) | Infrastructure as a Service (IaaS) is a business model that delivers IT infrastructure like compute, storage, and network resources on a pay-as-you-go basis over the internet. It is a cloud computing model that provides on-demand servers, storage, and networking without the need for physical hardware. | IaaS can offer virtual servers and machines that users can provision, such as Amazon EC2, Google Compute Engine, or Microsoft Azure Virtual Machines. |
| PaaS (Platform as a service) | Platform as a service (PaaS) is a cloud computing model that provides developers with a platform to build, deploy, and manage applications without worrying about the underlying infrastructure. It allows developers to focus on writing code, while the cloud provider handles the infrastructure, maintenance, and scalability. | Examples of Platform as a Service (PaaS) include AWS Elastic Beanstalk, Google App Engine, Microsoft Azure App Service, and Heroku, which provide a cloud-based environment with operating systems, web servers, and development tools for creating and running custom applications. |
| SaaS (Software as a service) | SaaS provides people and businesses with cloud-based software accessible from anywhere. Its subscription pricing model helps organizations scale efficiently, reduce costs, and stay current with the latest features and security updates. | Common SaaS use cases span business management and operations, collaboration and communication, and data analytics and business intelligence. |

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 model in which third-party providers deliver computing resources—such as servers, storage, networking, and applications—over the internet to multiple customers on a shared infrastructure. It operates on a pay-as-you-go model, allowing businesses and individuals to access scalable and cost-effective IT services without the need for on-premises hardware.  Examples of public clouds include major providers like Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP), which offer computing resources like servers and storage over the internet to the general public. Consumers also use public cloud services, with examples including online services like Gmail and Google Drive. |
| Private Cloud | In a private cloud, a single organization controls and maintains the underlying infrastructure to deliver the IT resources.  An example of a private cloud is a bank using its own on-premises data center to host customer financial data, ensuring it complies with strict regulations and maintains high levels of security and control. Another example is a virtual private cloud (VPC) like Amazon Virtual Private Cloud, which provides a logically isolated section of the Amazon Web Services (AWS) public cloud for a single organization to host its resources. |
| Hybrid Cloud | A hybrid cloud is a setup where a company uses both the public and private cloud. It is an IT infrastructure design that integrates a company’s internal IT resources with third-party cloud provider infrastructure and services. With a hybrid cloud, you can store your data and run your applications across multiple environments.  An example is how media streaming services, such as Netflix, use public cloud infrastructure for streaming and content delivery but a private cloud for big data analysis and storing sensitive user data. |
| Community Cloud | A community cloud is a cloud infrastructure in which multiple organizations share resources and services based on common operational and regulatory requirements.  The COVID-19 pandemic has pushed the world to use a remote work setup across many industries. It has left sectors such as education and healthcare scrambling to move completely online, which they were not ready for. This accelerated cloud adoption, with Gartner predicting that worldwide public cloud adoption will increase by 18% in 2021. |

Day 2: Task 1

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

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| Area | Description | Example |
| Unauthorised access to computer material | This is commonly known as hacking, where somone has the intention to gain access to another's computer, data or programs with the owner's permission. The breacher is aware that they are gaining access without permission ad that they are causing the computer to perform the function. | Examples of unauthorized access to computer material include hacking into someone's online account, such as a social media or bank account, to steal data, accessing private information without permission, installing malware to gain remote control of a device, or using someone else's login credentials to read their messages. |
| Unauthorised access with intent to commit further offences | Someone gains unauthorized access to a computer system with the intent to commit, or facilitate the commission of, another crime, such as fraud or theft. | Examples of this include gaining access to an online bank account with the intent to steal funds. Accessing sensitive information from a computer with the purpose of blackmail. Infiltrating a network to obtain confidential data for future fraudulent activities. |
| Unauthorised modification of computer material | Someone accesses a computer and then performs an action that modifies its contents. This can involve altering, deleting, or corrupting data or programs without permission. Introducing viruses, editing files or any act that modifies a computer's operation. | Examples of this can be an employee altering financial records in a company database, a person using a friend's login to deleete or corrupt their files, installing viruses or other malware to destroy or modify data on a computer system. |

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

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| Description |
| Making, obtaining or supplying articles for use in computer misuse. This power criminalizes the creation, distribution or aquisition of software, hardware or other  articles such as hacker tools and malware that can be used to commit computer misuse offenses. This can be unauthorised access of denial-of-service attacks. |
| Improved Investigation Powers. This act provided law enforcement agencies with new tools and powers to invstigate computer misuse offences more effectively. This allowed them to tackle the increasing complexity and nature of cybercrime. |
| Extended Extra-Territorial Jurisdiction. This act expanded the existing provisions for prosecuting UK nationals who commit computer misuse offenses when they are physically outside the UK, even if the act has no other link to the UK. This allows the UK to take action against its own citizens for cybercrimes committed abroad, provided the act was also an offense in the country where it took place. |

Look at the below website to answer the questions:

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

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| Write down three items of data which a company can store about an employee. |
| Work experience  Companies keep employee work experience data, including past roles, qualifications, and training, to manage the employment relationship and meet legal requirements. This data is typically stored for the duration of employment and for a set period afterward to comply with laws, handle potential claims, and support business needs like payroll and performance management. |
| National Insurance number  Companies must keep an employee's National Insurance Number (NINO) for payroll and tax purposes, as it's a legal requirement to record and report it to the tax authority. Employers need the NINO to accurately record National Insurance contributions, ensure employees receive their state benefits, and maintain accurate tax records for HMRC. Employers must keep these records securely for at least three years after the tax year they relate to and must also protect the employee's data. |
| Employment history with the organisation  Companies must keep employment history data securely and for as long as necessary for specific purposes, such as meeting legal and tax obligations. While no single retention period exists, data like salary, personnel files, and right-to-work checks often need to be kept for a minimum of six years after employment ends. A clear data retention policy is essential, outlining which records are kept, why, and for how long to ensure data protection compliance and reduce risk. |

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| Give three more examples of data that an employer can only store if they first get the employee’s permission. |
| Political membership or opinions  Employers in the UK can only collect or process employee data on political opinions under strict conditions, such as explicit consent or a specific legal justification, because it is considered "special category data" under the UK GDPR. Employers must meet a lawful basis and, in most cases, an additional condition from Schedule 1 of the Data Protection Act 2018 to process this sensitive information, which includes political opinions, trade union membership, race, religion, and health. |
| Biometrics, for example if your fingerprints are used for identification  Employers can keep your biometric data like fingerprints, but they need to follow strict data protection rules. This includes getting your explicit consent, which is often the only lawful basis, and ensuring there are no less intrusive alternatives, like a key card or PIN. |
| Health and medical conditions  Employers can keep employee health information but must ensure it is kept secure, confidential, and used only for necessary purposes under data protection laws (like UK GDPR) and the Equality Act 2010. |

Conduct further research to answer the below questions.

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| Question | Answer |
| Provide one example of: Copyright infringement | Vdeo game developers may replicate game mechanics from other games without permission. This can include copying the gameplay, interface, or other elements that make a game unique. For example, the game “Fortnite” was accused of copying gameplay elements from the game “PlayerUnknown’s Battlegrounds.” |
| Provide one example of: Plagiarism | Copying someone else's text without referencing or citing quotation marks. Someone can submit another's work as their own. |
| What are two consequences of copyright infringement and software piracy? | One consequence are legal penalties. This can be fines or imprisonment for individuals and businesses. Some pirated software will have malware, viruses are adware bundled inside. This can lead to to security breaches and damage systems. |
| Give three possible consequences for individuals when using pirated software | Individuals can face penalties when using unlicensed software as this is a violation of copyright laws. This can lead to fines. Using pirated software is also a potential security risk as many pirated software will have malware, viruses are spyware bundled in them. Some cracked or unlicensed versions of software may lack updates. This means the user may not have all the essential features to use the software efficiently. |

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’.

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| **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 |
| 1 | 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 |
| Not illegal | 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 |  |

Day 3: Task 2

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



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| Completed lab |  |

Day 3: Task 3

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



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| Completed lab | Part 1  Part 2  Part 3 |

Day 4: Task 1

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



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| Result |  |

Day 4: Task 2

***1. Scenario Background***

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

***2. Data Laws and Regulations***

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

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

***3. Azure Service Recommendations***

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

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

***4. Data Types and Data Modelling***

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

* **Data Categories**: Identify key data types, such as customer demographics, transaction history, pet inventory, and product categories.
* **Data Modelling Approach**: Outline how you would structure this data using a relational model or a data warehouse approach, considering factors like tables, entities, relationships, and primary keys.

***5. Data Storage Formats and Structures in Azure***

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

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

***6. Additional Considerations***

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

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

**Submission Guidelines:**

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

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| For any business, managing data is very important. It is crucial that the data collected is accurate. Since "Paws and Whiskers" currently use spreadsheets to manually collect data, there may be some errors such as inaccuracies or mistakes due to human error. It is also very time-consuming and inefficient to manually enter data into spreadsheets as this can be a very tedious task and requires staff to perform repetitive actions. Another form of inefficiency is spreedsheets are usually single files, this only lets one person edit the data at a time. This does not allow many staff to edit the data at the same time. For example, many sales could be made at a similar time frame and the spreedsheets do not allow multiple users to input the new sales.  Microsoft Azure can be a great tool for business to use to organise their data more efficiently. Is it a cloud computing platform that business can use with many advantages. Some of these advantages include cost-effectiveness, enhanced security and AI-powered tools. Azure can also handle much larger datasheets than applications like Microsoft Excel.  **Data Laws and Regulations**  As a business, it is important to comply with data laws set out by the governement. Examples of these laws and regulations include: General Data Protection Regulation (GDPR) and Data Protection Act (DPA) 2018.  The General Data Protection Regulation requires organizations to adhere to six data protection principles when processing personal data:   * Lawfulness, Fairness, and Transparency: Data processing must be lawful, fair, and transparent. * Purpose Limitation: Data should only be collected for specified, explicit, and legitimate purposes. * Data Minimization: Data collected must be adequate, relevant, and limited to what is necessary. * Accuracy: Personal data must be accurate and kept up to date. * Storage Limitation: Data should only be retained for as long as necessary. * Integrity and Confidentiality: Data must be processed securely, protecting it from unlawful processing, loss, or destruction.   GDPR requires that any storage and processing of customer information (personal data) must be done lawfully, fairly, and transparently, for specific, legitimate purposes, and only for as long as necessary. "Paws & Whiskers" must have a lawful basis to process data, like consent or a contract, and they need robust security measures to protect it. Customers also have rights, including the right to access, correct, and erase their data, and companies must be able to demonstrate their compliance with GDPR principles.  Data Protection Act 2018 alongside the UK GDPR, requires "Paws & Whiskers" to be transparent about data collection, collect only necessary personal data for specific, lawful purposes, and ensure it is accurate, up-to-date, and stored securely. They must also provide clients with access to their data, store it for no longer than necessary, and have security arrangements for data handling to protect against breaches.  Here are some examples of personal data which "Paws & Whiskers" will want to look into:   * Customer names, addresses, and contact details. * Client email addresses and phone numbers. * Records of services provided to pets and their owners. * Financial details related to payments for services.   **Microsoft Azure Recommendation**  How "Paws & Whiskers" can use Azure Data Storage:  Microsoft Azure can provide "Paws & Whiskers" with scalable and secure data storage for various needs, from customer records and inventory to long-term backups. Azure offers tiered storage solutions, like such as Blob Storage for frequently used information, all protected with advanced encryption and security measures. This cloud-based approach allows "Paws & Whiskers" to manage growing data volumes without massive on-premises infrastructure costs, while enabling flexible access to data for improved customer experiences and operational efficiency.   * Customer & Loyalty Data: Store detailed customer information, purchase history, and pet preferences to personalize offers and improve customer experiences. * Inventory & Sales Data: Keep track of stock levels, sales trends, and supplier information to optimize operations and predict demand. * Financial Records: Securely store financial transaction data for reporting and auditing purposes. * Backups & Archiving: Retain multi-year backups of critical systems and data at a low cost, in compliance with data retention policies. * Digital Assets: Store photos and videos of products, or even digital media created for marketing campaigns.   How "Paws & Whiskers" can use Microsoft Azure Machine Learning:  Microsoft Azure Machine Learning can benefit "Paws & Whiskers" by enhancing customer experiences through personalized recommendations, optimizing operations with predictive analytics for inventory and appointments, and improving customer engagement with AI-powered search for pet care information. It enables the business to understand customer needs better and streamline daily tasks, leading to increased efficiency and customer satisfaction.  For Customers & Sales   * Personalized Product Recommendations: Machine Learning models can analyze customer purchase history and preferences to suggest relevant pet food, toys, or accessories, boosting sales. * Targeted Marketing: By identifying patterns in customer behavior, the platform can help segment customers and deliver personalized marketing campaigns, increasing their effectiveness. * Improved Customer Service: AI-powered chatbots can handle common customer queries, provide instant support, and direct customers to the right resources, freeing up staff.   How "Paws & Whiskers" can use Microsoft Azure Data Factory:  "Paws & Whiskers" can use Microsoft Azure Data Factory to automate data processes by creating pipelines to extract, transform, and load data from various sources like sales systems, inventory databases, and online customer interactions into a central location, such as a data warehouse or Azure Synapse Analytics. This allows them to analyze customer purchasing patterns, optimize inventory management, personalize marketing campaigns, and gain deeper business insights for improved decision-making and operational efficiency.  **Data Types and Data Modelling**  "Paws & Whiskers" can use Microsoft Azure Data Factory to process data categories such as customer data (purchase history, loyalty program info), inventory data (stock levels, supplier details), sales data (transaction records, POS data), and marketing data (campaign results, website analytics). These categories can be integrated from different sources like point-of-sale systems, e-commerce platforms, and marketing tools for analysis and automation.  "Paws & Whiskers" can use Azure Data Factory for a data modeling approach such as a data warehousing/data lake architecture. This involves using Azure Data Factory to extract customer, sales, and inventory data from various sources (like point-of-sale systems or online stores), transform it into a standardized format, and load it into a centralized data store like Azure Synapse Analytics or Azure Data Lake Storage. Within the data store, a semantic model can be built using tools like Power BI or Azure Analysis Services to represent the data logically for business analysis.  **Data Storage Formats and Structures in Azure**  "Paws & Whiskers" can use Azure Data Factory to create data formats by building pipelines to copy and transform data from various sources like point-of-sale systems or inventory databases into a desired format, for example a more efficient Parquet file in Azure Blob Storage. This involves using the "Copy Activity", defining linked services and datasets for the source and destination, and leveraging built-in transformation capabilities or data flows for tasks like combining data from multiple tables into a single file.  "Paws & Whiskers" can secure data with Azure Data Factory by using built-in encryption for data at rest and in transit, implementing role-based access control (RBAC) and managed identities for least privilege access, and storing sensitive credentials in Azure Key Vault. For enhanced security with on-premises data, "Paws & Whiskers" should use Azure Private Link for secure network connections and install self-hosted integration runtimes on secure Azure Virtual Machines.  **Additional Considerations**  "Paws & Whiskers" can use Microsoft Azure's Azure Backup to protect its data from incidents like hardware failure or ransomware by backing up on-premises data, and Azure Site Recovery to create a disaster recovery plan for its servers. This allows the business to have a simple, cost-effective, and secure way to recover from data loss and continue operations by failing over to the cloud in case of an outage.  Power BI is a good tool for the business to create dashboards by connecting to and cleaning data, building visualizations like sales charts and stock levels, and then publishing these to the Power BI service. "Paws & Whiskers" can create interactive dashboards that track key metrics like sales performance by product category, customer repeat purchases, inventory levels, and even profit margins on different brands.  Here are some methods "Paws and Whislers" can visualise data:   * Sales performance: Bar charts to compare sales by product category, or use clustered column charts to show the relationship between total sales and repeat purchases. * Customer analysis: Visualize customer demographics using a pie chart or a bar chart to show sales by customer segment. * Geographic trends: Use a map to show where customers are located or where sales are strongest.   Microsoft Azure's flexible infrastructure to scale operations by leveraging Azure Monitor for automated scaling, Virtual Machine Scale Sets (VMSS) to quickly add compute resources, and Azure Kubernetes Service (AKS) for containerized applications. Azure allows dynamic adjustment of cloud resources to match demand, providing cost-effective scalability for growing businesses, seasonal peaks, and for deploying AI-powered features like personalized recommendations and customer chatbots. |

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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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| **Additional Information** |

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

**END OF WORKBOOK**

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

**Please send your completed work booklet to your trainer.**