2016 Suite

OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 3**

Cambridge TECHNICALS 2016

IT

Unit CC*

(*Formerly Unit 25)

Cloud technology

R/615/1132

Guided learning hours: 90

Version 2: September 2016

ocr.org.uk/IT

LEVEL 3

UNIT CC*: Cloud technology
***Formerly known as Unit 25**

R/615/1132

Guided learning hours: 90

Essential resources required for this unit:
Access to cloud-based services:

- IaaS/PaaS: Microsoft Azure, Amazon Web Services (AWS) and Google Compute
- SaaS: Microsoft Office 365 (admin portal), Google Apps, Microsoft Office Online
- Mobile Device Management: Microsoft Intune
- Cloud storage: OneDrive, Box.com, Google Drive

Most Cloud Technology providers have a free trial period or can provide extended educational trials.

This unit is externally assessed by an OCR- set and marked examination.

UNIT AIM

The way in which we interact with IT systems has changed. The explosion of mobile devices such as phones and tablets has led to the need for an IT infrastructure that can support these technologies, i.e. the cloud.

In this unit you will learn the basic concepts of cloud technology as it exists in an international setting. You will know the specific terminology and its application in the continued shift into the cloud, where costs are billed like electricity and reflect monthly usage levels rather than the traditional upfront cost of new servers and storage for a data centre. Migration into the cloud also poses issues for business culture, legal requirements and security.

This unit is mandatory in both specialist pathways in the Level 3 Extended Diploma. This unit is integral to any unit where you are expected to demonstrate your knowledge and understanding of cloud technologies and how this infrastructure supports IT-related activities.

TEACHING CONTENT

The teaching content in every unit states what has to be taught to ensure that learners are able to access the highest grades. Anything that follows an i.e. details what must be taught as part of that area of content. Anything that follows an e.g. is illustrative.

For externally assessed units, where the content contains i.e. and e.g. under specific areas of content, the following rules will be adhered to when we set questions for an exam:

- a direct question may be asked about unit content that follows an i.e.
- where unit content follows an e.g. a direct question will not be asked about that example.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
1. Understand the characteristics and context of cloud technology and why it is used	1.1 Cloud technology characteristics and terms, i.e. • Elasticity • Ubiquitous access • Rapid deployment • On-demand self-service • Resource pooling • Pay-as-you-grow • Multi-tenancy • Automation • Chargeback • Cloud bursting • Minimal management effort	Learners need to have an understanding of the terms used within cloud technology and the characteristics associated with them. An example would be the term 'elasticity'; characteristics of elasticity could include: • adaptable to changing workloads • provisions and de-provisions of resources – available resources match the demand as closely as possible.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	1.2 Cloud models, i.e. • Private • Public • Hybrid • Community Cloud models functionality, i.e. • A private cloud is used by a specific organisation; can be hosted at the organisation's premises or at a remote location (or even a third party) • Public clouds are used by multiple organisations and are typically hosted by a particular cloud vendor • Hybrid cloud is where an organisation utilises certain services on the public cloud, but has a private cloud for sensitive services/data • Community clouds are designed for organisations working in a particular industry (e.g. financial) in order to take advantage of services that would benefit them all (e.g. credit checking) Location of each cloud model, i.e. • On-premises • Off-premises Technical differences between private and public types of clouds, i.e. • Private cloud requires in-house infrastructure including hardware, software and networking components; a suite of software known as a 'Stack' would be required to operate it • Public cloud would just require a good internet connection and devices to access the service(s)	Learners need to be able to identify and understand the different cloud models currently available. Learners may find it beneficial to use diagrams to illustrate the different models that demonstrate who has access to them. For each of the cloud models, learners need to understand how it functions and which types of organisation would utilise it. They would also need to consider why different organisations would use specific cloud models. It is also important that learners understand where each of the cloud models are located, i.e. on or off the premises of the user. Technical differences between private and public cloud types is also an area that learners need to understand, including how they are structured and whether or not there are any considerations that need to be given. The combination of the above areas will ensure that the learners have a good understanding of the characteristics and context of cloud technology and why it is used.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	1.3 Types of organisation that would benefit from cloud technology, i.e. • Start-ups with little capital • Small businesses • Organisations with varying levels of workforce, e.g. the company may take on more employees at peak times of the year (such as Christmas) to handle the increased workload • Mobile/global workforce • Online retail • Marketing agency Reasons, i.e. • Lack of capital • Need to be flexible as business growth is uncertain • The work that the organisation does would be seasonal, hence the varying user population • The organisation's workforce would be spread globally and need to collaborate on joint projects • The organisation was 'born online' and thus has no fixed premises on which to host IT infrastructures 1.4 Types of organisation that may not benefit from cloud technology, i.e. • Military • Intelligence services • Health service • Research and development facility Reasons, i.e. • Security of information • Sensitivity of information	Learners need to be able to consider the benefits to different organisations of using cloud technology. In order to do this, they need to consider the different types of organisation that could embrace cloud technology and the reasons that they would use it. These reasons will link to the possible benefits felt by different organisation types. It is important that learners also understand that there are some organisations that would not benefit from using cloud technology, and this is usually based on the issues surrounding the security and senility of information should a breach occur. Learners should consider the different organisational types and be able to provide valid reasons for cloud technology not to be used. This could link with the cyber

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	• Potential disclosure of customer data • Lack of willingness to change • Internal processes do not align with cloud services • Perceived lack of technical knowhow • Already have considerable investment in own traditional IT infrastructure 1.5 Organisational roles and responsibilities when using cloud technology, i.e. • Capacity planners (responsible for costing the resource allocations with the cloud service assessments in order to apply chargeback costs to businesses) • Network operation centre staff (responsible for monitoring and managing cloud resources) • Vendor management staff (negotiate service-level contracts with the cloud vendor, update and extend them to meet changes over time) • Support desk staff (aid users during transfer from traditional IT to cloud services, provide client support and manage incidents and problems) • Cloud architect (expert responsible for the transition of organisations from using traditional IT to cloud technology, highly technical across several areas, e.g. networking, virtualisation, sound understanding of legislation requirements) • Cloud service manager (involved in service retirement, renewal, ordering	security unit where they consider what the issues could be. Learners should be able to identify the organisational roles involved in using cloud services, as well as explain the responsibilities of each role.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	and requesting procedures as well as tracking total cost of cloud ownership)	
2. Understand the business benefits of cloud services	2.1 Similarities and differences between cloud technology and outsourcing, i.e. • Ownership • Usage • Service levels • Costs	Learners need to understand that utilising cloud technology in some ways is similar to outsourcing your IT service. You don't own the servers, platforms or even the technicians that operate it. However, with outsourcing you don't have the flexibility that cloud technology brings and would be paying a fixed monthly cost, whereas with cloud technology you have a 'pay as you grow' model. Learners need to be able to compare cloud technology with outsourcing and consider the benefits and limitations of each.
	2.2 Business considerations when implementing cloud services, i.e. • Scalability • Security • Hardware independence • Variable cost • Time to market • Distribution over the internet (ease of access)	Learners need to understand that businesses must consider a number of factors before implementing cloud services. They need to understand why businesses are obliged to make these considerations.
	2.3 How cloud technology enhances business value, i.e. • Upfront (capital) expenditure is minimised • Variable (operating) cost is predictable • Reduces integrity risks – data backup is available • Ability to monitor access and data usage • Ease of providing access to users and partners to data in the cloud • Redundancy links that will allow for increased	Learners need to understand how cloud technology can reduce the pain of using IT for business, allowing them to concentrate on using IT effectively to enhance their business and meet their customer expectations.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	availability 2.4 Business benefits of service models, i.e. • Improvement of speed of internal development and deployment (developers do not need to worry about the platform or infrastructure prior to development) • Reduce reliance on internal technical skills (deployment is on demand and does not require consideration being given to procurement of hardware/software and installation/commissioning) • Simplified interface for user groups • Service designed around the needs of users (self-dash service models enable user experience provision and used to be considered when determining which platform to adopt)	Learners need to understand the benefits of different service models to businesses. They need to be able to identify the different benefits and explain how these are advantageous to businesses.
3. Understand the requirements of cloud services	3.1 Cloud service models, i.e. • Software-as-a-Service (SaaS) (e.g. Microsoft Office 365, Google Apps for Work/Google Docs, Zoho, Microsoft Dynamics CRM) • Platform-as-a-Service (PaaS) (e.g. Google App Engine, Force.com, Microsoft Azure) • Infrastructure-as-a-Service (IaaS) (e.g. Microsoft Azure, Amazon Web Services, Google Compute) • Communication-as-a-Service (CaaS) (e.g. Microsoft Skype, Google Voice) • Anything (or everything)-as-a-Service (Xaas)	Note: some cloud platforms such as Microsoft Azure work across the different service models. New platforms are emerging all the time so use the ones that are current.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	3.2 Accountabilities and responsibilities based on cloud service model, i.e. • IaaS – Organisation is responsible for virtual server creation, deploying updates and managing the cloud infrastructure. Cloud vendor is responsible for underlying hardware and physical datacentre infrastructure. From this the organisation can create their applications and deploy related services. • PaaS – The cloud vendor provides the platform to develop on and the organisation is responsible for developing their applications and deploying their services. • SaaS – The cloud vendor provides the applications and services that the organisation consumes as is. 3.3 Organisations' internal skills requirements to support their cloud model (SaaS, PaaS, IaaS), i.e. • Technical Skills • Project management skills • Vendor management skills • Data integration skills • Business and financial skills • Security and compliance skills	This builds on 3.1 where learners focus on what the cloud provider is responsible for and what the business is responsible for, e.g. updates to cloud-based servers within an IaaS environment could be the responsibility of the business (dependent on the service agreement). In a SaaS model the cloud vendor takes care of hardware and operating system maintenance. It is important that learners can explain the responsibilities and accountabilities for each service model. Learners need to be able to identify and describe the internal organisational skills required to support the selected cloud model. Examples are as follows: Technical skills are required to move away from 'installing' to 'provisioning'. This means that an initial set of information is provided (e.g. drive space, memory, credentials and OS) from which the service is created (e.g. virtual server). Needed with all cloud management/support roles, however, the cloud architect is the overall expert. Project management skills are required to deliver the

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
		transition from using traditional IT to using cloud services. These are skills that the cloud architect, the cloud service manager and the capacity planner should all have. Vendor management skills are required for the understanding of SLAs and negotiation contracts. These are skills that the cloud service manager and any vendor management staff should have. Data integration requires high level skills to take data from disparate sources and consolidate them into one database (e.g. big data). These are skills that the cloud architect should have. Business and financial skills are the lifeblood of how to use the cloud, as there are always on-going and potentially increasing costs as the business grows. These are skills that capacity planners, vendor management and cloud service management staff should all have. Security and compliance skills involve ensuring that the cloud service and the way in which the organisation interacts with it does not compromise data security in terms of any legal or compliance regulations. At various levels, these are skills that all staff should have.
	3.4 Technology that make cloud services possible, i.e. • Hardware (required to make the cloud operate), i.e. o Servers	Learners should understand that the cloud does not operate in isolation and there is underlying technology that powers the various cloud services. Learners need to be able to identify the technology required and explain

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	o Components, e.g. ▪ Hard drive/solid state drive (SSD) ▪ Central processing unit (CPU) ▪ Random access memory (RAM) o Storage, e.g. ▪ Network attached storage (NAS) ▪ Storage area network (SAN) ▪ Just a bunch of disks (JBOD) ▪ Redundant array of independent disks (RAID) • Networking (allows cloud availability), i.e. o Devices, e.g. ▪ Switch ▪ Router o Protocols, e.g. ▪ Internet Protocol Suite (TCP/IP) o Services, e.g. ▪ Domain Name System (DNS) ▪ Dynamic Host Configuration Protocol (DHCP) o Availability, e.g. ▪ Bandwidth ▪ Internet access ▪ Quality of service (QoS) • Software (drives the cloud enabling users to access the service), i.e. o Operating systems (e.g. Linux, Windows) o Databases (e.g. MySQL) o Applications (e.g. web browser, word processing, graphic design, customer relationship manager (CRM)) o Authentication, e.g.	how they support cloud operation. The cloud operates across multiple geo-located datacentres. These need to be powered appropriately to keep the cloud running and cooled to ensure that they don't overheat. Datacentre power distribution units and elements such as hot and cold aisles should be mentioned.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	▪ User account credentials ▪ Multifactor authentication (MFA) • Virtualisation (the building block of cloud services enabling scale and growth), i.e. o Hypervisor o Virtual machines (VM) o Network virtualisation • Orchestration (ensures continuation of service), i.e. o Managing the starting and stopping of server clusters • Datacentre components, i.e. o Power (e.g. hot and cold aisles) o Cooling	
4. Understand the features of cloud storage	4.1 Cloud storage services, i.e. • Consumer storage service options, i.e. o OneDrive o Dropbox o Google Drive • Corporate storage services, i.e. o One Drive for Business o Box.com Synchronisation/upload tools, i.e. • Desktop downloads • Dedicated app on mobile device Benefits, i.e. • Ability to roll back to previous version • Track editing/access	Learners need to understand cloud storage services, and that they should only store company data into the service provided for them. Learners need to be able to identify the different storage services and who would use them, as well as how data is synchronised/uploaded and the data available. They should also be able to describe the benefits of cloud storage. Cloud storage solutions have a background running service that enables data on your device to be automatically synchronised to the cloud. If synchronisation is interrupted, it can cause a failure of upload. This requires troubleshooting. Tools are built into the cloud storage service such as 'version history', which allows you to track who made edits to the file and enables you to roll back to a previous version if needed.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	4.2 Integration of SaaS with storage, i.e. • Cloud vendor storage services are often integrated with their SaaS productivity suite, which allows the file to be edited via the browser version or the desktop/mobile application • If the provider does not have its own productivity suite, it may have an add-on that allows you to use another vendor's SaaS application	Learners need to understand how SaaS integrates with storage (e.g. the ability to edit files on Google Drive with Google Apps, or how Box.com integrates with Microsoft Office Online and with an add-on can integrate with desktop applications too).
	4.3 Permission levels, i.e. • None (private) • Public • Shared o Edit o View	It is important that learners understand that permission and access levels must be assigned to users on a cloud service. Learners should consider the different permission/access levels and in what circumstances they would be used.
	4.4 Data deduplication to reduce capacity usage, e.g. • A lot of data on cloud services is replicated, such as emails that have been forwarded to several people in an organisation; data deduplication enables the removal of duplicated files and thus decreases storage space needed	Learners need to know that data duplication can reduce storage capacity, and this needs to be considered as part of cloud storage use. Learners also need to consider the different situations that can cause duplication of data.
	4.5 Migrating/integrating data hosted in-house to a cloud-based service, i.e. • Software tools o Command line utilities (requires expertise) (e.g. AzCopy) o Command line interface (CLI) (can be automated and highly repeatable) (e.g. PowerShell cmdlets/scripts)	Learners need to know that there are vendor and third party software tools that can be used to upload data into the cloud services. Learners need to be able to decide which approach is best for different organisations and their associated scenarios. Learners would benefit from researching the different methods available and comparing the advantages and

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	o File transfer protocol (FTP) o Graphical utilities (e.g. Storage explorer) o Cloud portal site (can be cumbersome and is a manual task) (e.g. Azure portal page) • Send hard drive/data physically to the cloud vendor's local data centre (used when an organisation wishes to absolve themselves of the responsibility of uploading their own data): o Azure import export service o AWS import/export snowball	disadvantages of each.
5. Understand the deployment requirements for cloud-based services for organisations	5.1 Considerations for adopting cloud services, i.e. • Whether or not the service model is appropriate for the organisation's needs • Whether or not the vendor's cloud deployment model meets the organisation's needs and regulatory requirements • Whether or not change in security from organisational to cloud data centre hosting has any impact on legal or regulatory requirements • Whether or not the cloud vendor has an established track record in providing the service with a guaranteed uptime • Can the cloud service scale to meet the organisation's future expansion plans • Whether or not the cloud vendor has sufficient redundancy • Can the performance metrics of the cloud service be monitored by the business • Will the cloud service be affordable during both peak and off-peak hours	Learners need to understand when adopting cloud services a number of considerations should be taken into account. This is particularly important where an external provider is being used. They need to understand that moving to the cloud changes the way a business operates and brings with it an extra layer of complexity related to security, compliance, and availability. Within the considerations, an exit plan should also be discussed as a way to back out if the cloud vendor does not meet its side of the contractual obligations.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	• Whether or not the cloud vendor's systems are protected in a secure and stable facility • Whether or not the organisation's infrastructure is suitable to allow reliable access to cloud-based services • Whether or not there is a sound exit plan if the cloud vendor fails to uphold the contract 5.2 Cloud readiness assessment, i.e. • Set up a pilot programme • Identify cloud service opportunities based on business needs • Review results from pilot • Modify any technical and financial elements to enable adoption 5.3 Role of IT department when choosing cloud services, i.e. • Advise on application lifecycle • Help to understand performance metrics • Help to understand the provider's quality of service	Learners need to understand what is meant by 'cloud readiness' and its importance prior to going all-in to a cloud service. They need to know the process to follow and what should be considered at each stage, and also how an organisation may have to react to the outcome of the assessment. It is useful for them to understand that applications that are easy to migrate and have some business value are the most suitable for a cloud technology pilot. Following the pilot, the organisation may have to change their financial planning model, as the focus will be on operating expenditure. IT will also transform, as they would be concerned more with supporting and managing the service rather than dealing with maintenance. Learners need to understand that the most significant change associated with cloud is that IT becomes a consultant to the business to help it make the right decisions when taking up the cloud service.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
		This would involve the application lifecycle; an example could be that Office is on a 3-year refresh cycle, so the organisation after 3 years will be forced to upgrade to the latest version. The cloud service brings its own jargon when talking about availability and performance. IT can decipher this information and help the business to understand how well the cloud service will perform in their organisation. Related to performance metrics, the quality of service (QoS) that the cloud provider is able to deliver can also be demystified by the IT department.
	5.4 Service Level Agreements (SLA) A breakdown of services provided and excluded, and it should include: • Costs for services • Duration of the agreement • Responsibilities of the customer and the service provider • Availability and performance requirements • Service monitoring and reporting • Remediation and liability for service disruption • Dispute resolution procedures • A mechanism for reviewing and updating the SLA, including a change control process Cloud SLA should also include: • Data location • Service multitenancy	Learners need to understand that SLAs are basically contracts between the provider and the subscriber. As well as knowing what should be included in SLAs, they should also understand the following: • ICO guidance on usage of cloud services states that the written terms and conditions need to be obtained by the subscriber. This helps to ensure that both sides know and understand their responsibilities. • With the cloud, the SLA needs to be further enhanced to focus on issues such as location of data, which could have consequences for the subscriber if data is transmitted outside of the EEA.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	• Transparency (data breach notifications) • Disaster process recovery notification • Legal data release notification • Data ownership	
6. Know regulatory issues that impact cloud technology	6.1 Data transference, i.e. • Data Protection Act and its bearing on cloud technology • Transfer of data within the European Economic Area (EEA) • Transfer of data to the United States • Transfer of data to other parts of the world • Subject to local regulations • Privacy and Electronic Communications Regulations • Consequences of a data breach	It is important that learners know that the transfer of data must comply with regulatory requirements, and how these can impact on cloud technology. Learners need to realise that depending on where the data is being transferred to, the regulatory requirements within different countries must also be considered. The following are examples of types of regulatory requirements: • The Data Protection Act dictates that personal data 'shall not be transferred to any country or territory outside the European Economic Area (EEA) unless that country or territory ensures an adequate level of protection for the rights and freedoms of data subjects in relation to the processing of personal data.' • Transfer of data to the US was previously under the self-regulated Safe Harbour scheme, which was invalidated by the Court of Justice of the European Union (CJEU) in October 2015. A new EU-US privacy shield framework is due to be released. In the interim period, the ICO is allowing the use of Safe Harbour. • Local regulations: If the data is transferred to a

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
		cloud vendor's US data centre, then it could be subject to the US Patriot Act.
	6.2 Information Security i.e. • Computer Misuse Act • Official Secrets Act	Learners need to know about the legislation relating to information security and how this can impact on how information is handled via cloud services. For example, under the Computer Misuse Act, information should not be tampered with by cloud services and any changes that are not configurable from the interface should be flagged up to the cloud vendor. Another example of legislation is the Official Secrets Act, which focuses on stopping the disclosure of sensitive data (e.g. warship designs, location of military installations). A cloud-based system would need to ensure that these secrets are not leaked deliberately or accidentally.
7. Know about impact, risks and security issues related to cloud technology	7.1 Impact of cloud adoption on business processes, i.e. • Financial model transition from capital expenditure (Capex) to operating expenditure (Opex) • Data ownership • Skills required within the organisation (potential for employee redundancies) • Responsibilities when outages are experienced • Protection against external exposure • Employee access and storage of company data on personal devices, including use of MDM (Mobile Device Management) • Managing multiple cloud service providers, including	Learners need to understand that business processes must be adapted for the cloud. Learners need to know that with the cloud service taking away the physical infrastructure of servers, there is a potential for the 'middle tier' of IT to be made redundant. There will be a need for frontline support staff and the cloud architecture but the server administrator role will continue to diminish. Learners need to be aware that bring your own device (BYOD) is a concern in terms of how data on a cloud service could lead to a data breach. Learners would benefit from having knowledge of Mobile Device Management (MDM) solutions such as Microsoft Intune,

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	the use of SSO (Single-Sign-On) • Managing users and their rights across services • Privacy 7.2 Performance of the service, i.e. • Network latency • Available bandwidth • User access method (i.e. wireless) 7.3 Risks, i.e. • Customer data being exposed • Data integrity (e.g. data that is transmitted down a channel can sometimes be corrupted; this could be due to incomplete transmission, by accident or maliciously) • Lock in with a cloud provider (e.g. there could be increased reliance and if the vendor increases prices the organisation may feel obliged to pay it as they don't think they can leave) • Providers going out of business • Data ownership (e.g. it needs to be made clear in the SLA that the data, although hosted by a cloud vendor, belongs entirely to the organisation)	which allows the management of company data on users' personal devices. Learners need to know that if the use of several cloud-based services from different vendors is taken up, this leads to a sprawl of user identifies and necessitates tracking of what they have access to. Learners would benefit from knowing about Single-Sign-On (SSO) and how this could aid an organisation. It is important that learners know that the performance of the service should be regularly monitored if service degradation is experienced. This could be due to network links on the subscriber side or the provider side. It is therefore important to check the latency, bandwidth and access method on the subscriber side prior to contacting the provider. Learners need to understand that with cloud services offering ubiquitous access (anytime, anyplace, anywhere), the points of exposure are increased. It is important for learners to consider the risks associated with cloud services and the impact that these may have on organisations.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	• Service Level Agreements • Interfaces change (e.g. cloud services are in constant flux so there is a risk that the interface could change on a daily basis; having a clear road map from the vendor and a transitional phase (both are available simultaneously) between the interfaces can help to alleviate this issue • Availability (unforeseen downtime) • Lack of internet connection • Insider threats (e.g. disgruntled or opportunistic employees (that may be leaving the organisation) who can access and download data from the cloud service from anywhere) • External threats (i.e. hacking) • Accidental exposure via multitenancy (e.g. hacking or data leaks via multitenancy issues) • Shadow IT (e.g. departments within a business bypass their IT department and use cloud-based services instead) 7.4 Security, i.e. • Data encryption (in transit/in rest) • User account management • User permissions management • User devices/points of access • Validating security of provider • Multiple data access points (i.e. mobile devices) • User accessing organisational services using public places/public Wi-Fi • Shoulder surfing when users are accessing data from the cloud	This is about cloud security, although it will overlap with general cyber-security. The emphasis here must be on security in relation to the cloud as opposed to general security of the system.

Learning outcomes The learner will:	Teaching content Learners must be taught:	Exemplification
	Security differences between cloud models (public, private, hybrid, community), i.e. • Multitenancy issues • Data segregation • Network isolation • Laws and regulations 7.5 Incident management principles, i.e. • First response • Identify • Report to responsible person • Data/device preservation • Documentation	Learners need to understand that these are important issues and they have an impact on ensuring that data from one cloud tenant doesn't leak into another tenant's service. Learners need to know that if an incident occurs with the cloud service, it is most likely that the support desk staff will become aware first. They need to follow an established set of steps to gather information and ensure that the responsible person is aware. Additionally, any data or device involved needs to be isolated and preserved. Documentation needs to be kept and updated to track the incident from first contact to resolution.

LEARNING OUTCOME (LO) WEIGHTINGS

Each Learning Outcome in this unit has been given a percentage weighting. This reflects the size and demand of the content you need to cover and its contribution to the overall understanding of this unit. See table below:

LO1	17-21%
LO2	14-17%
LO3	24-30%
LO4	8-10%
LO5	13-16%
LO6	3-4%
LO7	4-5%

ASSESSMENT GUIDANCE

All Learning Outcomes are assessed through externally set written examination papers, worth a maximum of 70 marks and 1 hour 30 minutes in duration.

This is not a knowledge-based assessment where learners are only expected to recall information. There is an expectation that learners will have a thorough understanding of the unit content and how it is applied throughout industry practice across all sectors and sizes of organisations. Unlike many other multiple choice models, there will be questions in the summative assessment that require the demonstration of knowledge as well as the application of understanding in a variety of familiar and unfamiliar contexts. It is therefore important that your delivery model for the unit supports the level of knowledge and understanding required from the learners, as well as the different styles of multiple choice questions they will need to answer.

SYNOPTIC ASSESSMENT

For the assessment of this unit, learners will be required to draw on knowledge and understanding from units from across the complete range of units in the pathway that they have followed. The knowledge and understanding required to be drawn from other units is listed below.

Links between this unit and other units

This unit and specific LO	Name of other unit and related LO
LO1: Understand the characteristics and context of cloud technology and why it is used	*Unit 4 Computer Networks* LO1 Understand the concept of networks LO2 Be able to plan computer networks to meet client needs LO3 Be able to present network solutions to clients *Unit 5 Virtual and Augmented Reality* LO1 Understand virtual and augmented reality and how they may be used *Unit 6 Application Design* LO1 Understand how applications are designed *Unit 9 Product Development* LO2 Be able to design products that meet identified client requirements *Unit 11 Systems Analysis and Design* LO4 Be able to create logical and physical designs for specified business systems *Unit 12 Mobile Technology* LO2 Be able to determine solutions for the use of mobile technologies *Unit 16 Developing a Smarter Planet* LO1 Understand what is meant by a Smarter Planet LO2 Be able to propose ways to extend the scope of the Smarter Planet *Unit 17 Internet of Everything* LO1 Understand what is meant by the Internet of Everything (IoE) *Unit 18 Computer Systems – Hardware* LO2 Be able to propose a computer system for identified business requirements *Unit 19 Computer Systems – Software* LO1 Understand different software installations and their purpose LO2 Be able to implement software installations and upgrades to meet specified user requirements *Unit 20 IT Technical Support* LO1 Understand the role of technical support *Unit 24 Enterprise Computing* LO1 Understand the concept of enterprise computing systems LO2 Be able to investigate business requirements for an enterprise computer solution LO3 Be able to develop enterprise computing solutions to meet business requirements

This unit and specific LO	Name of other unit and related LO
LO2: Understand the business benefits of cloud services	*Unit 4 Computer Networks* LO1 Understand the concept of networks LO2 Be able to plan computer networks to meet client needs LO3 Be able to present network solutions to clients *Unit 5 Virtual and Augmented Reality* LO1 Understand virtual and augmented reality and how they may be used *Unit 6 Application Design* LO1 Understand how applications are designed LO2 Be able to investigate potential solutions for application developments *Unit 9 Product Development* LO2 Be able to design products that meet identified client requirements *Unit 11 Systems Analysis and Design* LO4 Be able to create logical and physical designs for specified business systems *Unit 12 Mobile Technology* LO2 Be able to determine solutions for the use of mobile technologies *Unit 16 Developing a Smarter Planet* LO1 Understand what is meant by a Smarter Planet LO2 Be able to propose ways to extend the scope of the Smarter Planet *Unit 17 Internet of Everything* LO1 Understand what is meant by the Internet of Everything (IoE) *Unit 18 Computer Systems – Hardware* LO2 Be able to propose a computer system for identified business requirements *Unit 19 Computer Systems – Software* LO1 Understand different software installations and their purpose LO2 Be able to implement software installations and upgrades to meet specified user requirements *Unit 20 IT Technical Support* LO1 Understand the role of technical support *Unit 21 Big Data Analytics* LO1 Understand the scope of Big Data *Unit 24 Enterprise Computing* LO1 Understand the concept of enterprise computing systems LO2 Be able to investigate business requirements for an enterprise computer solution LO3 Be able to develop enterprise computing solutions to meet business requirements

This unit and specific LO	Name of other unit and related LO
LO3: Understand the requirements of cloud services	*Unit 4 Computer Networks* LO1 Understand the concept of networks LO2 Be able to plan computer networks to meet client needs LO3 Be able to present network solutions to clients *Unit 6 Application Design* LO1 Understand how applications are designed LO2 Be able to investigate potential solutions for application developments *Unit 9 Product Development* LO2 Be able to design products that meet identified client requirements *Unit 11 Systems Analysis and Design* LO4 Be able to create logical and physical designs for specified business systems *Unit 12 Mobile Technology* LO2 Be able to determine solutions for the use of mobile technologies *Unit 16 Developing a Smarter Planet* LO1 Understand what is meant by a Smarter Planet LO2 Be able to propose ways to extend the scope of the Smarter Planet *Unit 17 Internet of Everything* LO1 Understand what is meant by the Internet of Everything (IoE) *Unit 18 Computer Systems – Hardware* LO2 Be able to propose a computer system for identified business requirements *Unit 19 Computer Systems – Software* LO1 Understand different software installations and their purpose LO2 Be able to implement software installations and upgrades to meet specified user requirements *Unit 24 Enterprise Computing* LO1 Understand the concept of enterprise computing systems LO2 Be able to investigate business requirements for an enterprise computer solution LO3 Be able to develop enterprise computing solutions to meet business requirements

This unit and specific LO	Name of other unit and related LO
LO4: Understand the features of cloud storage	*Unit 7 Data Analysis and Design* LO1 Understand the purpose and stages of data analysis and *Unit 9 Product Development* LO2 Be able to design products that meet identified client requirements *Unit 10 Business Computing* LO2 Be able to capture and store data for analysis *Unit 11 Systems Analysis and Design* LO4 Be able to create logical and physical designs for specified business systems *Unit 12 Mobile Technology* LO2 Be able to determine solutions for the use of mobile technologies *Unit 16 Developing a Smarter Planet* LO1 Understand what is meant by a Smarter Planet LO2 Be able to propose ways to extend the scope of the Smarter Planet *Unit 17 Internet of Everything* LO1 Understand what is meant by the Internet of Everything (IoE) *Unit 18 Computer Systems – Hardware* LO2 Be able to propose a computer system for identified business requirements *Unit 19 Computer Systems – Software* LO1 Understand different software installations and their purpose LO2 Be able to implement software installations and upgrades to meet specified user requirements *Unit 21 Big Data Analytics* LO1 Understand the scope of Big Data *Unit 24 Enterprise Computing* LO1 Understand the concept of enterprise computing systems LO2 Be able to investigate business requirements for an enterprise computer solution LO3 Be able to develop enterprise computing solutions to meet business requirements

This unit and specific LO	Name of other unit and related LO
LO5: Understand the deployment requirements for cloud-based services for organisations	*Unit 7 Data Analysis and Design* LO4 Be able to present data analysis design solutions to stakeholders *Unit 9 Product Development* LO2 Be able to design products that meet identified client requirements *Unit 10 Business Computing* LO2 Be able to capture and store data for analysis *Unit 11 Systems Analysis and Design* LO4 Be able to create logical and physical designs for specified business systems *Unit 12 Mobile Technology* LO2 Be able to determine solutions for the use of mobile technologies *Unit 16 Developing a Smarter Planet* LO1 Understand what is meant by a Smarter Planet LO2 Be able to propose ways to extend the scope of the Smarter Planet *Unit 17 Internet of Everything* LO1 Understand what is meant by the Internet of Everything (IoE) *Unit 18 Computer Systems – Hardware* LO2 Be able to propose a computer system for identified business requirements *Unit 19 Computer Systems – Software* LO1 Understand different software installations sand their purpose LO2 Be able to implement software installations and upgrades to meet specified user requirements *Unit 24 Enterprise Computing* LO1 Understand the concept of enterprise computing systems LO2 Be able to investigate business requirements for an enterprise computer solution LO3 Be able to develop enterprise computing solutions to meet business requirements

This unit and specific LO	Name of other unit and related LO
LO6: Know regulatory issues that impact on cloud technology	*Unit 7 Data Analysis and Design* LO4 Be able to present data analysis design solutions to stakeholders *Unit 9 Product Development* LO2 Be able to design products that meet identified client requirements *Unit 10 Business Computing* LO4 Be able to present data analysis outcomes *Unit 11 Systems Analysis and Design* LO4 Be able to create logical and physical designs for specified business systems *Unit 12 Mobile Technology* LO2 Be able to determine solutions for the use of mobile technologies *Unit 16 Developing a Smarter Planet* LO1 Understand what is meant by a Smarter Planet LO2 Be able to propose ways to extend the scope of the Smarter Planet *Unit 18 Computer Systems – Hardware* LO2 Be able to propose a computer system for identified business requirements *Unit 19 Computer Systems – Software* LO1 Understand different software installations and their purpose LO2 Be able to implement software installations and upgrades to meet specified user requirements *Unit 24 Enterprise Computing* LO1 Understand the concept of enterprise computing systems LO2 Be able to investigate business requirements for an enterprise computer solution LO3 Be able to develop enterprise computing solutions to meet business requirements

This unit and specific LO	Name of other unit and related LO
LO7: Know about impact, risks and security issues related to cloud technology	*Unit 7 Data Analysis and Design* LO4 Be able to present data analysis design solutions to stakeholders *Unit 9 Product Development* LO2 Be able to design products that meet identified client requirements *Unit 10 Business Computing* LO4 Be able to present data analysis outcomes *Unit 11 Systems Analysis and Design* LO4 Be able to create logical and physical designs for specified business systems *Unit 12 Mobile Technology* LO2 Be able to determine solutions for the use of mobile technologies *Unit 16 Developing a Smarter Planet* LO1 Understand what is meant by a Smarter Planet LO2 Be able to propose ways to extend the scope of the Smarter Planet *Unit 18 Computer Systems – Hardware* LO2 Be able to propose a computer system for identified business requirements *Unit 19 Computer Systems – Software* LO1 Understand different software installations and their purpose LO2 Be able to implement software installations and upgrades to meet specified user requirements *Unit 24 Enterprise Computing* LO1 Understand the concept of enterprise computing systems LO2 Be able to investigate business requirements for an enterprise computer solution LO3 Be able to develop enterprise computing solutions to meet business requirements

Synoptic assessment grid

Core unit	Core taught content	Assessment criteria in this unit
Unit 1 Fundamentals of IT	LO3 Understand business IT systems	LO1 Understand the characteristics and context of cloud technology and why it is used LO2 Understand the business benefits of cloud services LO3 Understand the requirements of cloud services LO4 Understand the features of cloud storage LO5 Understand the deployment requirements for cloud-based services for organisations
Unit 1 Fundamentals of IT	LO5 Understand ethical and operational issues and threats to computer systems	LO5 Understand the deployment requirements for cloud-based services for organisations LO6 Know the regulatory issues that impact on cloud technology LO7 Know about impact, risks and security measures related to cloud technology
Unit 2 Global Information	LO1 Understand where information is held globally and how it is transmitted	LO1 Understand the characteristics and context of cloud technology and why it is used LO2 Understand the business benefits of cloud services LO3 Understand the requirements of cloud services LO4 Understand the features of cloud storage
Unit 2 Global Information	LO3 Understand the use of global information and the benefits to individuals and organisations	LO1 Understand the characteristics and context of cloud technology and why it is used LO2 Understand the business benefits of cloud services LO3 Understand the requirements of cloud services LO4 Understand the features of cloud storage
Unit 2 Global Information	LO4 Understand the legal and regulatory framework governing the storage and use of global information	LO5 Understand the deployment requirements for cloud-based services for organisations LO6 Know the regulatory issues that impact on cloud technology LO7 Know about impact, risks and security measures related to cloud technology
Unit 3 Cyber Security	LO1 Understand what is meant by cyber security LO2 Understand the issues surrounding cyber security LO3 Understand measures used to protect against cyber security incidents	LO5 Understand the deployment requirements for cloud-based services for organisations LO6 Know the regulatory issues that impact on cloud technology LO7 Know about impact, risks and security measures related to cloud technology

MEANINGFUL EMPLOYER INVOLVEMENT - a requirement for the Extended Diploma (Tech Level) qualification

The 'Diploma' qualifications have been designed to be recognised as Tech Levels in performance tables in England. It is a requirement of these qualifications for centres to secure for every learner employer involvement through delivery and/or assessment of these qualifications.

The minimum amount of employer involvement must relate to at least one or more of the elements of the mandatory content (this unit is a mandatory unit in the Digital Technician and Application Data Technician pathways), although we encourage you to find ways in which to engage with employers for other units as well.

Eligible activities and suggestions/ideas that may help you in securing meaningful employer involvement for this unit are given in the table below.

Please refer to the *Qualification Handbook* for further information, including a list of activities that are not considered to meet this requirement.

Meaningful employer engagement	Suggestion/ideas for centres when delivering this unit
1. Learners undertake structured work experience or work placements that develop skills and knowledge relevant to the qualification.	Learners could be on work placement with an organisation that uses cloud services. This could be from a technical or an application point of view.
2. Learners undertake project(s), exercises(s) and/or assessments/examination(s) set with input from industry practitioner(s).	Centres could have support from industry practitioners in the development of learners' knowledge of how cloud services are deployed in industry.
3. Learners take one or more units delivered or co-delivered by an industry practitioner(s). This could take the form of master classes or guest lectures.	Industry practitioners could be invited to aspects of the unit content.
4. Industry practitioners operating as 'expert witnesses' that contribute to the assessment of a learner's work or practice, operating within a specified assessment framework. This may be a specific project(s), exercise(s) or examination(s), or all assessments for a qualification.	Not applicable for an examined unit unless incorporated into a project delivery approach.

You can find further information on employer involvement in the delivery of qualifications in the following documents:

- Employer involvement in the delivery and assessment of vocational qualifications
- DfE work experience guidance.

To find out more
ocr.org.uk/IT
or call our Customer Contact Centre on **02476 851509**

Alternatively, you can email us on **vocational.qualifications@ocr.org.uk**

LLOYD'S REGISTER · LRQA
ISO 9001
UKAS MANAGEMENT SYSTEMS
001

A DIVISION OF CAMBRIDGE ASSESSMENT

OCR
Oxford Cambridge and RSA

OCR is part of Cambridge Assessment, a department of the University of Cambridge.