OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 3**

IT

Cambridge
TECHNICALS
2016

Unit CC – Cloud technology
DELIVERY GUIDE

Version 2

CONTENTS

INTRODUCTION

This Delivery Guide has been developed to provide practitioners with a variety of creative and practical ideas to support the delivery of this qualification. The Guide is a collection of lesson ideas with associated activities, which you may find helpful as you plan your lessons.

OCR has collaborated with current practitioners to ensure that the ideas put forward in this Delivery Guide are practical, realistic and dynamic. The Guide is structured by learning outcome so you can see how each activity helps you cover the requirements of this unit.

We appreciate that practitioners are knowledgeable in relation to what works for them and their learners. Therefore, the resources we have produced should not restrict or impact on practitioners' creativity to deliver excellent learning opportunities.

Whether you are an experienced practitioner or new to the sector, we hope you find something in this guide which will help you to deliver excellent learning opportunities.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resources.feedback@ocr.org.uk.

OPPORTUNITIES FOR ENGLISH AND MATHS SKILLS DEVELOPMENT AND WORK EXPERIENCE

We believe that being able to make good progress in English and maths is essential to learners in both of these contexts and on a range of learning programmes. To help you enable your learners to progress in these subjects, we have signposted opportunities for English and maths skills practice within this resource. We have also identified any potential work experience opportunities within the activities. These suggestions are for guidance only. They are not designed to replace your own subject knowledge and expertise in deciding what is most appropriate for your learners.

English   123 Maths   Work

Please note
The activities suggested in this Delivery Guide **MUST NOT** be used for assessment purposes. The timings for the suggested activities in this Delivery Guide **DO NOT** relate to the Guided Learning Hours (GLHs) for each unit.

Assessment guidance can be found within the Unit document available from www.ocr.org.uk. The latest version of this Delivery Guide can be downloaded from the OCR website.

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.

The activities within this teaching and learning resource must not be used for summative assessment purposes. As part of our teaching we expect support to be given to your learners; such support is not permissible for summative assessment and is likely to be considered malpractice.

Unit CC Cloud technology	
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
LO6	Know the regulatory issues that impact cloud technology
LO7	Know about impact, risks and security issues related to cloud technology

To find out more about this qualification please go to: http://www.ocr.org.uk/qualifications/cambridge-technicals-it-level-3-certificate-extended-certificate-introductory-diploma-foundation-diploma-diploma-05838-05842-2016-suite

Cambridge
TECHNICALS
2016

2016 Suite

- **New suite for first teaching September 2016**
- **Externally assessed content**
- **Eligible for Key Stage 5 performance points from 2018**
- **Designed to meet the DfE technical guidance**

RELATED ACTIVITIES

The Suggested Activities in this Delivery Guide listed below have also been related to other Cambridge Technicals in IT units/Learning Outcomes (LOs). This could help with delivery planning and enable learners to cover multiple parts of units.

This unit (Unit CC)	Title of suggested activity	Other units/LOs	
LO1	Pitch perfect – choosing the right cloud model Private vs public Convincing the customer Knowing when it's not right Roles and responsibilities	Unit CC Cloud technology	LO2 Understand the business benefits of cloud services
LO2	Business considerations Benefits from service models Harnessing service models	Unit CC Cloud technology	LO1 Understand the characteristics and context of cloud technology and why it is used
LO3	Skills requirements	Unit CC Cloud technology	LO1 Understand the characteristics and context of cloud technology and why it is used
	Hardware and networking	Unit 4 Computer networks	LO2 Be able to plan computer networks to meet client requirements
		Unit 18 Computer systems – hardware	LO3 Be able to build or upgrade computers
	Cloud software	Unit 19 Computer systems – software	LO2 Be able to implement software installations and upgrades to meet specified user requirements
LO4	Setting permissions	Unit 1 Fundamentals of IT	LO5 Understand ethical and operational issues and threats to computer systems
		Unit 3 Cyber security	LO3 Understand measures used to protect against cyber security incidents
LO5	Performance metrics	Unit 4 Computer networks	LO3 Be able to present network solutions to clients
		Unit 19 Computer systems – software	LO3 Be able to conduct system maintenance using utility software
	Inspecting SLAs	Unit 20 IT technical support	LO1 Understand the role of technical support
LO6	Data Protection Act and cloud Data transference to the US Privacy and Electronic Communications Regulations Computer Misuse Act Official Secrets Act	Unit 2 Global information	LO4 Understand the legal and regulatory framework governing the storage and use of global information
LO7	Cloud adoption impact	Unit 24 Enterprise computing	LO3 Be able to develop enterprise computing solutions to meet business requirements
	Service performance	Unit 4 Computer networks	LO2 Be able to plan computer networks to meet client requirements LO4 Be able to plan maintenance activities for computer networks
	Risk assessment	Unit 2 Global information	LO6 Understand the principles of information security
		Unit 3 Cyber security	LO3 Understand measures used to protect against cyber security incidents
	Cloud security	Unit 2 Global information	LO6 Understand the principles of information security
		Unit 3 Cyber security	LO1 Understand what is meant by cyber security LO2 Understand the issues surrounding cyber security
	Incident response	Unit 2 Global information	LO6 Understand the principles of information security
		Unit 3 Cyber security	LO3 Understand measures used to protect against cyber security incidents LO4 Understand how to manage cyber security incidents

KEY TERMS

Explanations of the key terms used within this unit, in the context of this unit	
Key term	**Explanation**
Anything (or Everything) as a Service (XaaS)	This is a catch-all term used to describe the continual expansion of different types of services that can be delivered by the cloud.
Capital Expenditure (Capex)	Capital expenditure is used to create future benefit to the organisation through the purchase of assets (e.g. servers, devices, software etc). This is a one-off cost that means that the organisation would own the asset outright.
Community cloud	Community clouds are for the use of a group of related organisations which is often hosted by one of the members (similar to a private cloud) but accessed remotely by the other members of the community (similar to a public cloud).
Compliance	Compliance is an adherence to the relevant legislation, policies, and standards.
Google Drive	This is an SaaS storage service delivered by Google.
Hybrid clouds	These are a combination of private, community or public clouds. This model requires more management than the other models but can offer greater flexibility for the organisation.
Incident	This is an event that impacts the organisation's service where confidentiality, integrity or availability has been compromised.
Infrastructure as a Service (IaaS)	IaaS represents cloud resources provided at its base levels i.e. storage, database, servers, networking etc. This gives the organisation the most flexibility but requires more management and technical ability.
Integrity	To have integrity, the data needs to be protected from unauthorised changes.
Operating expenditure (Opex)	Operating expenditure is the day-to-day expenses that relate to the cost of doing business. For example, utilities, consumables, and subscriptions.
Platform as a Service (PaaS)	PaaS are cloud services provided at a developmental level for application development and hosting. Organisations tend not to care about the underlying infrastructure, being more concerned about having the resources available to allow them to focus on the services needed for their business.
Privacy	In regards to data, this concerns the requirements of secrecy when personal identifiable information is collected and stored.
Private cloud	A private cloud is created, owned, and managed by a single organisation usually in their own data centre. This is often comparable to traditional IT systems.
Public cloud	Public cloud services are provided by third party organisations and are available to any individual or organisation. Public clouds remove the cost barrier faced by start-up organisationswhen they want to use enterprise-grade software and solutions.
Scalability	This represents the capability of being able to grow or decrease a resource's usage based on the need.
Security	Policies, processes, and measures that are used to protect the confidentiality, integrity and availability of systems.
Service Level Agreement (SLA)	An SLA is a contract between customers and a service provider. This agreement defines the levels of service, culpability, and any penalties.
Software as a Service (SaaS)	SaaS provides complete applications to the cloud service consumer. Organisations and individuals can utilise these services with limited or no technical ability. However, customisations are either limited or not possible at all.
Stack	A cloud computing stack is an integration of the three main service models i.e. SaaS, PaaS, and IaaS.
Vendor lock-in	This is a situation where an organisation has to use a technology or service from a particular vendor to avoid incurring significant costs tif they were to use an alternative product/service.

MISCONCEPTIONS

Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	**How can this be overcome?**	**Resources which could help**
All 'as a service' acronyms refer to cloud computing	It is important to note that lately a lot of IT-related thought leaders are using 'as a service' to explain a concept that is available on demand. For example, 'Crime as a Service'. This misconception could be overcome by discussing with the learners that they should critically analyse whether the acronym refers to cloud computing or is simply being used to express a certain concept. If there is any uncertainty, it is best to refer to the standard service models listed by NIST.	NIST National Institute of Standards and Technology The NIST Definition of Cloud Computing http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf
A public cloud platform provides only one kind of service model	Both Microsoft Azure and AWS provide IaaS and PaaS models. When demonstrating cloud services, it is important to highlight which service model(s) they fit into, especially if they provide multiple service models.	IBM IaaS PaaS SaaS - Cloud Service Models https://www.ibm.com/cloud-computing/learn-more/iaas-paas-saas/
Private cloud is the same as having a data centre/server room on-site	NIST defines cloud computing as having five characteristics: on demand self-service; broad network access; resource pooling; rapid elasticity or expansion; and measured service. The misconception could be overcome by asking learners whether a data centre/server room on-site would meet these requirements. This could be linked to the discussion of the Azure Stack/Open Stack.	Network World Gartner: 5 things a private cloud is NOT http://www.networkworld.com/article/2159885/cloud-computing/gartner--5-things-a-private-cloud-is-not.html
Sensitive governmental organisations will never use the cloud	In 2016, the UK Ministry of Defence (MoD) began using Microsoft cloud services. When discussing the types of organisations and their suitability for using cloud services, it is important to pinpoint constraints of the organisation. For example, the MoD required the cloud data centre to be based in the UK (amongst other constraints).	ComputerWeekly MoD becomes first tenant in Microsoft's UK Azure datacentre http://www.computerweekly.com/news/450303820/MoD-becomes-first-tenant-in-Microsofts-UK-Azure-datacentre

Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	**How can this be overcome?**	**Resources which could help**
Cloud computing is always cheaper than traditional IT	Since cloud computing relies upon a subscription model (hence transferring the cost from Capex to Opex), it may seem that cloud computing is cheaper than traditional IT solutions. However, over time the cost adds up. This misconception could be overcome by demonstrating the cost of setting up a cloud computing server on a public cloud such as Azure or AWS. Alternatively, the pricing calculators can be used. It might be worth getting half of the group to cost up the price of a server and estimate the cost of running it for three years, and then do a comparison with Microsoft and Amazon. The aim is for the learners to understand the total cost of ownership (TCO).	Microsoft Azure Pricing calculator https://azure.microsoft.com/en-gb/pricing/calculator/ Amazon Web Services (AWS) Simple monthly calculator https://calculator.s3.amazonaws.com/index.html
Data transference from the UK to the rest of the world	At the time of writing (2016), the effect of Brexit is not yet known. The previous Safe Harbor has been determined defunct and has been replaced by the EU-US Privacy shield. Tutors should be mindful of the changes and keep up to date with any changes and guidance from the Information Commissioner's Office.	Information Commissioner's Office (ICO) https://ico.org.uk/

SUGGESTED ACTIVITIES

LO No:	1
LO Title:	Understand the characteristics and context of cloud technology and why it is used

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Deciphering cloud terminology	When learning about cloud computing there are a lot of new terms that the learners need to understand. The tutor could prepare a matching activity where half of the learners are given a key cloud term (e.g. elasticity, ubiquitous access, rapid deployment etc) and the other half of the learners have the definition of the terminology. Learners could then seek out a partner who has the right key cloud term that would match the definition. Once learners have found their partner, they would sit next to each other. The tutor could then get learners to report back to the group and clarify any terminology that they don't understand. The tutor could use illustrations to bring the concepts to life when going through the terminology. Useful resource: IBM Cloud computing defined: Characteristics & service levels https://www.ibm.com/blogs/cloud-computing/2014/01/cloud-computing-defined-characteristics-service-levels/	30 minutes	
Pitch perfect – choosing the right cloud model	It is important that learners are able to clearly articulate themselves when discussing cloud models as choosing a wrong model could have significant impacts on an organisation. The tutor could split the learners into groups and assign each group a cloud model: for example, private, public, hybrid and community. The learners could then research each cloud model and find out how it works (functionality), its usual location (on or off premises) and provide examples of each model (e.g. Azure, AWS, Google etc) and where it has been implemented (e.g. NHS). The learners could record their findings on a flip-chart sheet and present them to the rest of the group.	2 hours	Unit CC LO2

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Private vs public	It is important that the learners understand the technical differences between private and public cloud. The tutor could illustrate the requirements of a private cloud using a whiteboard. They could also navigate to the Azure Stack and/or the OpenStack web pages to demonstrate their technical requirements. In contrast, learners could sign up to a public cloud service (e.g. Azure, AWS, Google Compute). This could enable learners to prepare the cloud service for later activities. If signing up isn't possible, the tutor could demonstrate a public cloud service (e.g. sign up/sign in and set up a virtual machine). The tutor could ask learners questions about the impact on an organisation that uses a public cloud when it has low bandwidth or has lost full internet connectivity. Useful resources: Microsoft Azure Azure Stack Technical Preview https://azure.microsoft.com/en-gb/overview/azure-stack/try/ OpenStack What is OpenStack? https://www.openstack.org/software/ Amazon Web Services AWS Educate https://aws.amazon.com/education/awseducate/	2 hours	Unit CC LO2

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Convincing the customer	For this role play activity, the tutor could create a range of fictional organisations that could benefit from using cloud technology. These organisations could mirror different types of businesses e.g. start-ups, small businesses, online e-commerce store etc. Tutors could provide a list of prompt questions for these organisations, for example: • What would be the benefit of us moving to the cloud? • How much will it cost? • Where would our data be kept? • What would happen if our business grows? • Do we need a dedicated IT technician after it has been deployed? One half of the group could act as the representatives of these organisations. The other half of the group could act as cloud consultants and try to convince the organisation as to why it could benefit from using cloud technology.	1 hour	Unit CC LO2
Knowing when it's not right	There are some instances where it is not suitable for an organisation to use cloud technology. In this activity, learners explore some such organisations and the reasoning behind this. Learners could research organisations where cloud technology is not suitable. They could use a named organisation to create a poster or fact sheet on the reasons why this organisation cannot utilise cloud technologies (e.g. security of information, internal investments in own technology, internal processes etc).	1 hour	Unit CC LO2
Roles and responsibilities	The tutor could provide a list of roles that are involved in using and servicing cloud-based technologies. The learners could use this list to define their responsibilities within a cloud-technology context. Learners could use online job sites to create a list of responsibilities. They could then use this to create a job description for a particular role.	2 hours	Unit CC LO2

SUGGESTED ACTIVITIES

LO No:	2		
LO Title:	**Understand the business benefits of cloud services**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Are we outsourcing?	Moving towards cloud computing is similar to outsourcing. Learners could research outsourcing (in an IT context). For example, they could research Infosys' Global Delivery Model (GDM) and the cloud services that it provides. The tutor could ask learners to consider ownership, usage, service levels and associated costs for outsourcing. The learners could outline the similarities and differences of cloud computing and outsourcing in a slide presentation or a poster.	1 hour	
Limitations	Learners could investigate the limitations of outsourcing and cloud computing. For example, if the platform being used is not highly customisable then the cloud solution may not meet the organisation's needs. Learners could feed back their findings to the rest of the group.	30 minutes	
Business considerations	The tutor could present to learners a fictional organisation and the cloud service that it is considering (e.g. cloud-based storage). They could ask learners to come up with a list of issues the organisation could consider when implementing cloud services (e.g. scalability, security etc). For each consideration, the learners could create a question to ask. The tutor could play the role of a cloud consultant, and the learners could take turns in asking the tutor their questions.	1 hour	Unit CC LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Cloud enhancing the business	Learners could explore a range of case studies – print or online articles or videos. Learners could select one or two organisations and create a presentation where they explain how cloud technology enhanced the businesses' operations. For example, reduction of capital expenditure, ease of access, reduction of data integrity risks etc. Useful resources: Microsoft Azure Azure case studies https://azure.microsoft.com/en-gb/case-studies/ Microsoft lists a range of case studies that showcase the success of its Azure cloud service. Amazon Web Services All Customer Success Stories https://aws.amazon.com/solutions/case-studies/all/ Amazon lists a range of case studies that showcase the success of its AWS cloud service. Google Cloud Platform Google Cloud Platform Customers https://cloud.google.com/customers/ Google lists a range of case studies that showcase the success of its Google Compute cloud service.	2 hours	
Benefits from service models	Cloud computing service models help to improve the overall operational efficiency of a business. Learners could research the benefits of service models and then create a fact sheet.	1 hour	Unit CC LO1
Harnessing service models	In this role play activity, the tutor could assign an organisation type to half of the group. This organisation could benefit from cloud technology but needs to be convinced of the business benefits of service models. Learners, acting as representatives of the organisation, could be produce a list of questions such as: • How would cloud technology improve our platform development activity? • What new skills do we need in our organisation? • How much up-skilling would be required for our end users? The other half of the group could act as cloud consultants and try to answer the questions.	30 minutes	Unit CC LO1

SUGGESTED ACTIVITIES

LO No:	3		
LO Title:	Understand the requirements of cloud services		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Deciphering four-letter-acronyms (FLAs)	The IT industry is notorious for a range of three-letter-acronyms (TLAs). With the advent of cloud technologies, we have seen an abundance of four-letter-acronyms (FLAs). Learners could be provided with a list of cloud service model acronyms (e.g. IaaS, PaaS, SaaS, CaaS, XaaS). Tutors could ask learners to: • find out what each acronym stands for • identify upcoming service models (e.g. BPaaS – Business Process as a Service, or WaaS – Windows as a Service) and categorise these as types of XaaS. Learners could present their findings as a poster or a fact sheet. Useful resource: DZone / Cloud Zone Life full of -aaS (a.k.a. The list of -aaS.) https://dzone.com/articles/life-full-aas-aka-list-aas List of 'as a service' acronyms.	30 minutes	
Service model showcase	Learners could select a commercial cloud platform and identify which service model it belongs to (e.g. Office 365 is considered as SaaS). They could create a presentation about this cloud platform and present it to the rest of the group.	1 hour	
Pizza as a Service	The tutor could introduce the Pizza as a Service infographic to explain the accountabilities/responsibilities for each service model. Learners could use this infographic as the inspiration to create their own infographic (e.g. Curry as a Service). Useful resource: Albert Barron Pizza as a Service https://www.linkedin.com/pulse/20140730172610-9679881-pizza-as-a-service Article on LinkedIn. The Pizza as a Service graphic is available across the web, but this is the original article.	1 hour	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Skills requirements	Using various job sites, learners could investigate the skills and duties needed to support the different cloud service models. Once learners have identified the skills/duties they could categorise them as: technical, project management, vendor management, data integration, business and financial, security and compliance skills. Learners could present their findings to the rest of the group.	1 hour	Unit CC LO1
Hardware and networking	Under the guidance of the tutor, learners could set up a network that enables the operation of a private cloud. They will require the hardware components listed in the specification. These include servers, storage and networking devices. Learners could use pre-existing servers or build their own from computer components. The system requirements from the Azure Stack or OpenStack could be used. There is potential for this activity to be built into meaningful employer engagement, where a representative from a data centre company (e.g. Rackspace) could come and talk to learners about their set-up. Or alternatively, tutors could organise a visit to a data centre (e.g. KCOM in Hull).	2 hours	Unit 4 LO2 Unit 18 LO3
Cloud software	Building on the previous activity, learners could deploy the Stack software. Once the cloud is operational, they could use the web interface to deploy virtual machines. If the activity above is skipped, then learners could use a commercial cloud platform (Azure, AWS, Google Computer etc) and deploy virtual machines. There is potential for this activity to be built into meaningful employer engagement. This could also include a talk from a managed services organisation. Or, as part of their work experience, learners could deploy virtual machines.	2 hours	Unit 19 LO2

SUGGESTED ACTIVITIES

LO No:	4		
LO Title:	**Understand the features of cloud storage**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Cloud storage synchronisation	This activity is best completed on one of the virtual machines that the learner has created on their chosen cloud platform. In the following example, OneDrive has been used but Dropbox or Google Drive could also be used. Learners could sign up for cloud storage (e.g. OneDrive). If they are using a Windows 10 virtual machine they will already have a OneDrive folder on the machine. Learners could create a basic Notepad file and save it in the OneDrive folder. In the notifications area, they could inspect the synchronisation tool. Once synchronisation is complete, the file should appear on the web portal. They could repeat the exercise by creating a file on the web portal and it should appear in the OneDrive folder when synchronisation is complete.	1 hour	
Rolling back	Learners could edit the file created in the previous activity and once synchronisation is complete, they will notice that their file has also changed on the web portal. Learners could right-click on the file and select the version history. They could roll back to the previous version of the file. This is one benefit of cloud storage. The tutor could direct learners to explore and investigate other benefits e.g. tracking editing.	30 minutes	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Storage and SaaS	Cloud vendors have integrated their SaaS services with their storage services; this adds to the issue of 'vendor-lock in'. In the following example, OneDrive has been used but Dropbox or Google Drive could also be used. Learners could sign into the OneDrive account and click on the tile in the top left-hand corner. This shows a range of applications including Microsoft Word, Excel, PowerPoint etc. Learners could select the Word tile to open the application. Learners could create a blank document and type any text in. Learners could save the file and will note that the default save location is the OneDrive location. Once they have saved the file, learners could view the local OneDrive folder on the Windows 10 machine to see the file once replication has completed. (Note: If the Windows 10 machine does not have Microsoft Word, they will not be able to open the file.) Useful resource: Microsoft Use OneDrive with Office https://support.office.com/en-gb/article/Use-OneDrive-with-Office-b1c976de-ef52-4d53-950f-d48f2c6427df Web page which guides you through the steps for using OneDrive.	30 minutes	
Setting permissions	In this example, OneDrive has been used but Dropbox or Google Drive could also be used. Learners could sign into the OneDrive account and find a file that they have previously created. They could right-click on the file and select and click Share. They could then explore the different settings. Learners could also select the Manage Permissions option and send the link to another learner.	30 minutes	Unit 1 LO5 Unit 3 LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Multiple copies	It is important that learners understand the concept of data deduplication. Although in the cloud storage is limitless, due to the pay-as-you-grow model, the more data that is used, the more the organisation pays. If a private cloud scenario is used, the Systems Administrator would constantly have to add storage. However, it is likely that some files are copies of each other. Hence data deduplication helps to alleviate storage pressures for multiple copies of the same file. Learners could research data deduplication and how it can be enabled on Windows Server and/or Linux server systems. Learners could present their findings to the rest of the group. Some learners could deploy a Server VM in their cloud and configure data deduplication. Useful resource: Microsoft Data Deduplication Overview https://technet.microsoft.com/en-us/windows-server-docs/storage/data-deduplication/overview This web page explains how data deduplication works in Windows Server systems.	1 hour	
Migrating data	The tutor could present a scenario where a company is migrating from a traditional IT infrastructure to a cloud infrastructure, and therefore has to migrate its data from its on-site server to the cloud. Learners could be split into groups and the tutor could assign each group a different type of cloud system that the company could migrate to (e.g. AWS, Azure etc). Learners could research the various options for migrating the data and feed back their findings to the whole group. Useful resources: Microsoft Azure Use the Microsoft Azure Import/Export Service to transfer data to Blob storage https://docs.microsoft.com/en-us/azure/storage/storage-import-export-service The Microsoft method of sending a hard drive to its data centre. Amazon Web Services AWS Snowball https://aws.amazon.com/snowball/ The Amazon method of sending a hard drive to its data centre. Google Cloud Platform Offline Media Import / Export https://cloud.google.com/storage/docs/offline-media-import-export The Google method of sending a hard drive to its data centre.	1 hour	

SUGGESTED ACTIVITIES

LO No:	5		
LO Title:	Understand the deployment requirements for cloud-based services for organisations		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Is an organisation ready for the cloud?	Working in small groups, learners could create a 'health check' sheet that could be used to evaluate whether an organisation is ready for the cloud. The tutor could provide a scenario of a fictional organisation that is considering moving to the cloud. Learners could use this information together with a chosen cloud service provider (e.g. AWS etc) and go through the 'health check'. Learners could present their findings to the whole group.	1 hour	
Technical audit	It is important that learners understand the need to carry out an in-depth technical audit of an organisation's existing infrastructure. Learners could create an audit sheet that could be used to carry out a technical audit. Learners could use their own institution as an example and carry out a technical audit. For example, the audit could cover internet bandwidth, existing software, existing hardware, number of users, peak times, storage requirements.	1 hour	
Cloud exit plan	Learners could investigate what is needed for cloud exit planning. This could include: technical audit, roadmap, timescales, off-boarding, exit cost analysis and support in on-boarding to a new supplier (if they want to use a different cloud provider). Learners could create a poster or a fact sheet to present their findings. Useful resource: TechTarget Build a cloud exit strategy in three steps http://searchcloudcomputing.techtarget.com/tip/Build-a-cloud-exit-strategy-in-three-steps Article by Tom Nolle on how to build a cloud exit strategy.	1 hour	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Assessing cloud readiness	Learners could create a flow diagram of the elements that are needed within a cloud readiness assessment. The specification has four overarching bullet points, but the learners could research and expand these points to create an in-depth diagram. Useful resources: IBM Five steps to a cloud readiness assessment https://www.ibm.com/blogs/cloud-computing/2015/08/five-steps-to-a-cloud-readiness-assessment/ An article which details how to do a cloud readiness assessment. Amazon Web Services AWS Cloud Adoption Framework https://aws.amazon.com/professional-services/CAF/ Amazon's framework is highly detailed, but could be good for stretching learners.	1 hour	
Performance metrics	The IT department can help when choosing a cloud service. One of its roles is to help with understanding performance metrics. Learners could sign on to the cloud system and locate the metrics of any service that they have been running and decipher what it tells them. This could include reading data from the chart or inspecting logs. They could report their findings to the rest of the group. Useful resources: Microsoft Azure Overview of Metrics in Microsoft Azure https://docs.microsoft.com/en-us/azure/monitoring-and-diagnostics/insights-how-to-customize-monitoring A tutorial on how to use metrics in Azure. Amazon Web Services Using Amazon CloudWatch Dashboards http://docs.aws.amazon.com/AmazonCloudWatch/latest/monitoring/CloudWatch_Dashboards.html Tutorials on how to use CloudWatch on AWS.	30 minutes	Unit 4 LO3 Unit 19 LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Inspecting SLAs	The tutor could provide learners with a set of sample service level agreements (SLAs). The tutor could direct learners to find out key information from the agreements such as cost, reporting requirements, data location, disaster recovery process etc. Useful resources: Wired Service Level Agreements in the Cloud: Who cares? https://www.wired.com/insights/2011/12/service-level-agreements-in-the-cloud-who-cares/ An article which outlines what should be included in SLAs for cloud services. Microsoft Azure Service-level Agreements https://azure.microsoft.com/en-gb/support/legal/sla/ Microsoft Azure SLAs. Amazon Web Services Amazon EC2 Service Level Agreement https://aws.amazon.com/ec2/sla/ AWS EC2 SLA. Google Cloud Platform Google Compute Engine Service Level Agreement (SLA) https://cloud.google.com/compute/sla Google Compute SLA.	30 minutes	Unit 20 LO1

SUGGESTED ACTIVITIES

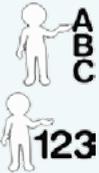| LO No:	6		
LO Title:	**Know the regulatory issues that impact cloud technology**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Data Protection Act and cloud	Learners could research how the Data Protection Act (DPA) impacts on the use of cloud services for an organisation. They could also investigate how the DPA relates to data transference in the European Economic Area (EEA) and whether there are any current events that could impact the organisation in the future. Learners could report their findings to the rest of the group. Useful resources: Information Commissioner's Office (ICO) Guide to data protection https://ico.org.uk/for-organisations/guide-to-data-protection/ Guidance from the ICO for the practical implementation of the Data Protection Act. Learners should pay attention to the data transference section. legislation.gov.uk Data Protection Act 1998 http://www.legislation.gov.uk/ukpga/1998/29/contents Full text of the Data Protection Act 1998. GOV.UK Data protection https://www.gov.uk/data-protection/the-data-protection-act Summary guidance from the UK government on the impact of the Data Protection Act.	1 hour	Unit 2 LO4

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Data transference to the US	Learners could research the regulations that govern the transference of data to the US (where most cloud vendors are based). They could research the impact of the dissolution of the Safe Harbor scheme and how the EU-US privacy shield operates. Learners could also investigate whether any current events would have an impact. Learners could present their findings to the rest of the group. Useful resources: Information Commissioner's Office (ICO) Data transfers to the USA and Safe Harbor – interim guidance https://ico.org.uk/media/for-organisations/documents/1560653/data-transfers-to-the-us-and-safe-harbor-interim-guidance.pdf A guide that details the transition from Safe Harbor to the EU-US Privacy shield. European Commission The EU-U.S. Privacy Shield http://ec.europa.eu/justice/data-protection/international-transfers/eu-us-privacy-shield/index_en.htm Privacy Shield Framework https://www.privacyshield.gov/welcome The official website which has the latest up-to-date information.	1 hour	Unit 2 LO4

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Privacy and Electronic Communications Regulations	Learners could research how the Privacy and Electronic Communications Regulations could impact an organisation (e.g. if they are using cookies on their website). Learners could list different reasons why an organisation might need to obtain certain data to help their business (e.g. traffic data helps them to understand which products the customers are browsing). Learners could report their findings to the group. Useful resources: The Privacy and Electronic Communications (EC Directive) Regulations 2003 http://www.legislation.gov.uk/uksi/2003/2426/contents/made Full text of the Privacy and Electronic Communications Regulations. Information Commissioner's Office (ICO) Guide to Privacy and Electronic Communications Regulations https://ico.org.uk/for-organisations/guide-to-pecr/ An easy to read guide to the Privacy and Electronic Communications Regulations.	30 minutes	Unit 2 LO4
Data breach consequences	Learners could research the impact of a data breach on an organisation and what it needs to do to be prepared for such a breach. Learners could also find out the monetary impact (i.e. fines) on an organisation. They could create a fact sheet or a poster to highlight their findings. Useful resource: Information Commissioner's Office (ICO) Security breaches https://ico.org.uk/for-organisations/guide-to-pecr/communications-networks-and-services/security-breaches/ A web page that outlines what an organisation needs to do if a breach occurs.	1 hour	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Computer Misuse Act	Although the Computer Misuse Act does not mention cloud services, it could still be applicable especially if the organisation is using a private cloud. Learners could read the Act and draw conclusions on how it could impact on an organisation that uses cloud services. Learners could report their findings to the group. Useful resources: legislation.gov.uk Computer Misuse Act 1990 http://www.legislation.gov.uk/ukpga/1990/18/contents Full text of the Computer Misuse Act 1990. BBC Bitesize Computer Misuse Act http://www.bbc.co.uk/schools/gcsebitesize/ict/legal/1dataandcomputermisuserev1.shtml A summary of the Computer Misuse Act.	1 hour	Unit 2 LO4
Official Secrets Act	The UK government is using cloud services. This includes the Ministry of Defence. Hence the Official Secrets Act is applicable to the cloud. Learners could read the Act and draw conclusions on how it would impact on an organisation that uses cloud services. Learners could report their findings to the group. Useful resource: legislation.gov.uk Official Secrets Act 1989 http://www.legislation.gov.uk/ukpga/1989/6/contents Full text of the Official Secrets Act.	1 hour	Unit 2 LO4

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SUGGESTED ACTIVITIES

LO No:	7
LO Title:	**Know about impact, risks and security issues related to cloud technology**

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Capex and Opex	The tutor could provide learners with several problems that illustrate the cost of ownership and include capital expenditure (Capex) and operating expenditure (Opex). Learners could answer these problems to understand the true cost of cloud vs traditional IT. Useful resource: Wired The Total Cost of Ownership: In-House vs. Cloud-Based Development Environments http://insights.wired.com/profiles/blogs/the-total-cost-of-ownership-in-house-vs-cloud-based-development This article by Ville-Veikko Helppi focusses on moving software development to cloud platforms.	1 hour	
Cloud adoption impact	Learners could research the impact of cloud adoption on an organisation. For example, skills requirements, data ownership, multiple cloud service management, outages etc. Learners could present their findings as a poster or a fact sheet. Useful resource: Information Commissioner's Office (ICO) Guidance on the use of cloud computing https://ico.org.uk/media/for-organisations/documents/1540/cloud_computing_guidance_for_organisations.pdf A document which details the considerations of cloud computing. From this, the impact can be inferred.	1 hour	Unit 24 LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to

Service performance	Learners could use a range of network testing tools that will indicate bandwidth and latency. Using these tools, they could read and interpret the results and feed back their findings to the rest of the group.
	
	Examples of tools learners could use:
	• TamoSoft® Throughput Test
	  http://www.tamos.com/products/throughput-test/
	• TotuSoft LAN Speed Test Overview
	  http://www.totusoft.com/lanspeed1_doc
	• What is iPerf/iPerf 3? (for Linux)
	  https://iperf.fr/
	• Speedtest.net
	  http://www.speedtest.net/
		1 hour	Unit 4 LO2, LO4

Risk assessment	The tutor could provide learners with an example of a fictional organisation that is moving to the cloud. Learners could carry out a formal risk assessment for the organisation and consider whether it is a low, medium, or high risk. They should be able to articulate avoidance and contingency elements. Useful resources: Microsoft Cloud Computing: Risk Assessment for the Cloud https://technet.microsoft.com/en-us/library/hh750397.aspx An article from Microsoft TechNet Magazine explaining risk assessment for cloud computing. GOV.UK Cloud Security Guidance: Risk Management https://www.gov.uk/government/publications/cloud-security-guidance-risk-management/cloud-security-guidance-risk-management Details best practice on risk management for cloud services. ISACA Cloud Risk—10 Principles and a Framework for Assessment http://www.isaca.org/Journal/archives/2012/Volume-5/Pages/Cloud-Risk-10-Principles-and-a-Framework-for-Assessment.aspx Outlines a framework for cloud risk assessment.	1 hour	Unit 2 LO6 Unit 3 LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Cloud security	Learners could explore the security issues applicable to working with cloud services. They could examine the differences in security requirements for different cloud models. Learners could report their findings via a presentation to the rest of the group. Useful resources: GOV.UK Summary of Cloud Security Principles https://www.gov.uk/government/publications/cloud-service-security-principles/cloud-service-security-principles A web page detailing cloud security principles. National Cyber Security Centre Cloud Security Collection https://www.ncsc.gov.uk/guidance/cloud-security-collection A collection of articles, guides and documents related to cloud security.	1 hour	Unit 2 LO6 Unit 3 LO1, LO2

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Incident response	It is important that learners understand what to do when there is a security incident (e.g. data breach). Learners could create a flow diagram of the elements that are needed for an efficient incident response. The specification lists five bullet points, but the learners could research and expand these points to create an in-depth diagram. Useful resources: AlienVault Incident Response Process & Procedures https://www.alienvault.com/resource-center/ebook/insider-guide-to-incident-response/incident-response-process-and-procedures This online guide lays out incident response visually in an infographic format. CREST Cyber Security Incident Response Guide https://www.crest-approved.org/wp-content/uploads/2014/11/CSIR-Procurement-Guide.pdf A document discussing incident response. Cloud Security Alliance Incident Response https://cloudsecurityalliance.org/wp-content/uploads/2011/09/Domain-9.docx A downloadable Word document explaining incident response. Network World Best practices for incident response in the age of cloud http://www.networkworld.com/article/3116011/cloud-computing/best-practices-for-incident-response-in-the-age-of-cloud.html An article by Rishi Bhargava detailing best practice.	1 hour	Unit 2 LO6 Unit 3 LO3, LO4

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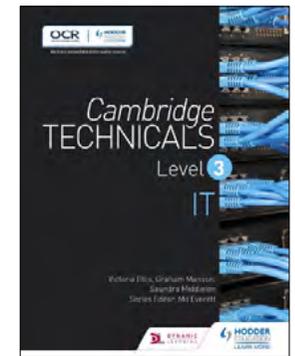
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