Unit 47: IT Virtualisation

Unit code: A/601/1933
QCF Level 5: BTEC Higher National
Credit value: 15

- **Aim**

To provide learners with an understanding of the principles of virtualisation and the deployment of virtual server and desktop environments as a commercial or personal technology option.

- **Unit abstract**

As technology has evolved, the need to create virtual systems to simulate the behaviour of a real environment has become a primary objective. In having a virtual environment, an information technology professional may use virtualisation to plan a server deployment, test an application or operating system update, as well as test software created in a development environment.

The power of virtualisation has reached a stage where many commercial environments use virtualisation to run seemingly live arrays of servers to ensure redundancy, reliably, security and a lower cost of hardware ownership. It has become possible with the development of server virtualisation environments to have one hardware platform deliver many servers or remote workstations.

There are many hardware and software virtualisation solutions offered by different vendors. This unit allows the learner to access either desktop based virtualisation or server-based virtualisation, or possibly both. In delivery, there are many free to education as well as commercially available offerings.

Creating a virtualisation environment will require an understanding of the host system and its limitations as well as the requirements of the guest operating system. This unit will encourage the learner to explore how this may be accomplished and implement a viable system for commercial or personal use.

- **Learning outcomes**

**On successful completion of this unit a learner will:**

1. Understand the commercial impact and potential of virtualisation
2. Be able to design virtualisation deployments
3. Be able to implement virtualisation deployments
4. Be able to manage virtualisation environments.
Unit content

1 **Understand the commercial impact and potential of virtualisation**

*Scalability*: methods eg simplicity of server addition, rapid deployment, rapid development

*Redundancy*: methods eg mirroring, server image backup, load balancing, reduction of points of failure

*Support*: centralisation of services, testing of resources

*Environmental*: server deployment; remote desktop; desktop; web based

*Solutions*: server based eg VMWare ESXi, ESX, Citrix; desktop based eg parallels, QEMU, virtual PC, VM-Ware Player, VMWare fusion

*Technology*: hypervisor; abstraction; virtual drivers; network connection eg NAT, bridged; environments for developers; arrays of servers; cloud computing; server solutions; web servers

*Cost*: reduction of hardware cost of ownership; reduction of upgrade costs; larger platforms for many servers

2 **Be able to design virtualisation deployments**

*Needs analysis*: user requirement; corporate requirement; processor load assessment; storage; guest operating system requirement; host operating system requirement; solution needs eg application, development, testing, sandbox, interactivity

*Hardware requirements*: compatibility; storage availability; memory allocation eg host system, guest system, number of instances in use; processor capability; network bandwidth

*Selection of virtualisation solution*: eg server based, desktop based, free, commercial

*Deployment image requirement*: memory required for efficient operation; software eg applications to be installed, updates to be installed, antivirus; addressing eg conformance with host environment; operating system selection eg local need, application requirement

*Environmental*: interaction eg network addressing, access to local storage, access to remote storage, user allocation, membership of directory services
3 Be able to implement virtualisation deployments

*Implementation*: tasks eg testing of updates, desktop users, alternate operating systems, sandbox

*Virtualisation environment*: installation eg hardware, environment software, registration of environment with host operating system, addressing of environment with network

*Image environment creation*: establishment of virtual storage requirements eg size, dynamic, fixed; establishment of base memory requirements; network communication; location of image

*Image*: installation eg from ISO, from remote image, pre-existing image, web install

*Image adaptation*: installation of updates; task specific software eg antivirus, applications, development environments

*Testing*: tasks eg producing documentation, system compatibility, hardware and software systems

4 Be able to manage virtualisation environments

*User access*: setting of virtual image privilege levels eg user, administrator, read rights, write rights, execution rights

*Environment*: testing eg access, usability, performance, compatibility

*System*: monitoring eg performance; memory use; speed; network access times; load and degradation on host environment

*Update*: maintain image; installation/removal of features; virtual disk management
## Learning outcomes and assessment criteria

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<th>Learning outcomes</th>
<th>Assessment criteria for pass</th>
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<td><strong>On successful completion of this unit a learner will:</strong></td>
<td><strong>The learner can:</strong></td>
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| **LO1** Understand the commercial impact and potential of virtualisation | 1.1 evaluate current virtualisation solutions  
1.2 discuss the potential benefits of virtualisation  
1.3 discuss the current technology requirements for implementing virtualisation |
| **LO2** Be able to design virtualisation deployments | 2.1 complete a needs analysis for a virtualisation deployment  
2.2 design a virtualisation solution for a given virtualisation deployment |
| **LO3** Be able to implement virtualisation deployments | 3.1 maintain a virtualisation solution  
3.2 systematically test the virtualisation environment  
3.3 document and analyse test results |
| **LO4** Be able to manage virtualisation environments | 4.1 monitor the virtualisation environment  
4.2 maintain a virtualisation environment  
4.3 critically review and analyse findings. |
Guidance

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

The learning outcomes associated with this unit are closely linked with:

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This unit has links to the Level 4 and Level 5 National Occupational Standards for IT and Telecoms Professionals, particularly the areas of competence of:

- Disaster Recovery
- Availability Management.

Essential requirements

As recommended in the delivery guidance, a centre delivering this unit must have access to suitable virtualisation resources to deliver this unit. There are many free and open source desktop and server solutions and there is no perceived limitation on any centre. The primary focus is practice based and therefore this unit cannot be delivered in a theoretical context.

Learners must have access to facilities, which allow them the opportunity to fully evidence all of the criteria of the unit. If this cannot be guaranteed then centres should not attempt to deliver this unit.

The learner will need to create a virtualisation environment. For server based solutions, this must be on a hardware system capable of supporting a system such as VM Ware ESXi or any other equivalent. For desktop based solutions, the underlying host operating system must have sufficient memory and storage resources to support one or more images in residence.

There are many potential virtualisation solution and implementation approaches, all having different complexities and technological needs as well as outcomes.

If the centre is using a real environment in which to host the virtualisation solution, the legal implications of how this may affect the owners of the real network, as well as the implications for the learner and the academic centre, must be considered.

Implementation of the virtualisation environment must be tested systematically and procedurally based on the technology used in the design solution. The final solution implemented may be on a live system, but ideally should be tested in a segregated ‘sandbox’ environment.
Resources

Books

Websites
www.networkworld.com/links/Research/Storage/Virtualization/index.html

Employer engagement and vocational contexts

Liaison with virtualisation and server deployment/management from local or national organisations would enhance the delivery of this until. If the learner is employed, a contextual assessment based on their working environment with the support of their supervisory management would be of considerable value. Care must be taken to ensure any real work projects are not detrimental to their employer or employment.