

SYSTEM VIRTUALIZATION

UNIT CODE: 0612 551 15A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Perform System Virtualization

Unit Duration: 220 Hours

Unit Description

This unit covers the competencies required to perform system virtualization. It involves Setting up Software Based Virtualization, Setting up virtual Machines, Allocating Virtual resources, Installing Virtual machine Operating systems and Managing Virtual Storage.

Summary of Learning Outcomes

LEARNING OUTCOMES	DURATION (HOURS)
1. Setup Software-Based Virtualization	45
2. Setup virtual Machines	25
3. Allocate Virtual Resources	25
4. Install Virtual machine operating systems	45
5. Manage Virtual Storage	80
TOTAL	220

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Set up Software Based Virtualization.	1.1. Virtual System Machine Monitor 1.1.1 Introduction to software Based Virtualization 1.1.2 benefits of virtualization 1.1.3 Types of virtualization 1.1.3.1 Hardware 1.1.3.2 Software 1.1.3.3 network and storage 1.1.4 Types of hypervisors 1.1.4.1 Virtualbox 1.1.4.2 VMware	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study

	1.1.4.3 Proxmox 1.1.4.4 Openvx 1.1.4.5 Type 1: bare-metal 1.1.4.6 Type 2: hosted 1.1.5 Setting up hypervisors 1.2. Software containerization 1.2.1 Definition of containerization 1.2.2 Benefits of containerization 1.2.2.1 Portability 1.2.2.2 Scalability 1.2.2.3 Fault tolerance 1.2.2.4 Agility 1.2.3 Application areas of containerization 1.2.3.1 Cloud migration 1.2.3.2 IoT devices 1.2.3.3 Adoption of micro-service architecture 1.2.4 Types of container technology 1.2.4.1 Kubernetes 1.2.4.2 Docker 1.2.4.3 Docker swarm 1.2.4.4 Apache mesos 1.2.4.5 Linux 1.3. Virtual Machine Setup (VMs) 1.3.1 Creating and managing virtual machines 1.3.2 Allocating resources (CPU, memory, storage and network) to VMs 1.3.3 VM migration 1.3.4 Backup and restoration of VM 1.3.5 Configuring Virtual networks 1.3.6 Security consideration for hypervisors and VMs	
2. Setup virtual Machines	2.1 Virtual Machines Configuration 2.1.1 Installing and configuring type 1 and type 2 hypervisors 2.1.2 Creating virtual machines 2.1.3 Introduction to Docker platform 2.2 Virtual Machine resource allocation 2.3 Dockers configuration 2.3.1 Setting up and configuring Docker 2.3.2 Introduction to container orchestration	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study

3. Allocate Virtual resources	3.1 Virtual Machine Resources 3.1.1 Key concepts 3.1.2 Types of Virtual Machine Resources 3.1.2.1 RAM 3.1.2.2 Storage space 3.2 Docker Images 3.2.1 introduction and importance of Docker images 3.2.2 Components of Docker images 3.2.2.1 Layers 3.2.2.2 Base image 3.2.2.3 Dockerfile 3.2.2.4 Image ID 3.2.2.5 tags 3.2.3 Container orchestration tools 3.3 Docker Commands 3.3.1 Introduction to Docker Commands 3.3.2 Docker image sub commands 3.3.2.1 Docker build 3.3.2.2 Docker pull 3.3.2.3 Docker rm 3.3.2.4 Docker commit 3.3.3 Docker image structure 3.3.4 Creation of docker image	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study ● Written tests ● Case study
4. Install Virtual machine Operating systems	4.1 Virtual Machine – Operating System 4.1.1 Introduction to Virtual machine operating systems 4.1.2 Types of virtual machine operating system 4.1.2.1 Windows 4.1.2.2 Linux 4.1.2.3 MAC 4.1.3 Installation of virtual machine operating system process 4.2 Virtual Machine Parameters 4.2.1 Introduction to virtual machine parameters specifications 4.2.2 Virtual machines configuration parameters 4.2.2.1 Name and folder 4.2.2.2 Host /cluster 4.2.2.3 Resource pool 4.2.2.4 Data store 4.2.2.5 Hardware machine version 4.2.2.6 Guest operating system	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study

	4.2.2.7 Memory 4.2.2.8 CPUs 4.2.2.9 Network 4.3 Virtual Network Configuration 4.3.1 Introduction to Virtual network configuration 4.3.2 Components of virtual networking 4.3.2.1 Virtual network Interface Card 4.3.2.2 Virtual switch 4.3.2.3 Virtual router 4.3.2.4 Virtual segmentation 4.3.3 Types of virtual networking 4.3.3.1 Host Only Network 4.3.3.2 Network address translation Network 4.3.3.3 Internal network 4.3.3.4 Bridged Network 4.3.4 Virtual networking in cloud environment 4.3.4.1 AWS 4.3.4.2 Vnet 4.3.4.3 Azure 4.3.4.4 Google cloud 4.3.5 Benefits of virtual networking 4.3.6 Challenges of virtual networking	
5. Manage virtual Storage	5.1 Introduction to virtual storage 5.1.1 Types of virtual storage 5.1.1.1 Block storage 5.1.1.2 Software define storage(SDS) 5.1.2 Storage virtualisation techniques 5.1.2.1 Host based 5.1.2.2 Array based 5.1.2.3 Network based 5.2 Virtual Disks 5.2.1 Introduction to virtual disk 5.2.2 Types of virtual disks 5.2.2.1 Thick Provisioning 5.2.2.2 Thin provisioning 5.2.3 Virtual disk management techniques 5.2.3.1 Resize virtual disks 5.2.3.2 Snapshots and storage 5.2.3.3 Storage allocation strategies 5.2.3.4 Disk defragmentation 5.2.4 Storage technologies in virtual environments 5.2.4.1 Storage area networks 5.2.4.2 Network attached storage	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study

	5.2.4.3 Software defined storage 5.2.5 Backup and disaster recovery for virtual disks 5.2.5.1 Regular backups 5.2.5.2 Disaster recovery 5.2.6 Storage best practices for virtual disks 5.2.6.1 Regular monitoring 5.2.6.2 Optimize storage tools 5.3 Cloud Storage Configuration 5.3.1 Introduction to cloud storage configuration for remote access 5.3.2 Types of cloud storage configurations 5.3.3 Setting up remote access to cloud storage 5.3.4 Access control and authentication 5.3.5 Configuring cloud storage for file sharing 5.3.6 Using virtual private networks for cloud storage access 5.3.7 Configuring cloud storage access for remote access 5.3.7.1 Remote desktop solutions 5.3.7.2 Mobile device access 5.3.7.3 Remote video and media access 5.3.8 Compliance and data governance for remote access to cloud storage 5.3.9 Monitoring and auditing remote access to cloud storage	
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Suggested Methods of delivery

- Role playing
- Viewing of related videos
- Group discussions.
- Instructor led facilitation using active learning strategies.
- Projects.
- Demonstrations.
- Site visits.

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/Specifications	Quantity	Recommended Ratio (Trainee: Item)
A	Learning Materials			

1.	Textbooks		13 pcs	2:1
2.	Installation manuals			
3.	Flip Charts			
4.	PowerPoint presentations	For trainer's use		
B	Learning Facilities & infrastructure			
5.	Lecture/theory room		1	25:1
6.	Laboratory		1	25:1
C	Consumable materials			
7.	Printing papers		1 ream	1:20
8.	Toners/Cartridges		2 pcs	13:1
9.	Assorted colour of whiteboard markers			
D	Tools and Equipment			
10.	Computers		25 pcs	1:1
11.	Projector		1 pc	25:1
12.	Flash drives		25 pairs	1:1
13.	External CD/DVD drives		13 pcs	2:1