

DATABASE ADMINISTRATION

UNIT CODE: 0612 551 14A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Perform Database Administration

Unit Duration: 220 Hours

Unit Description

This unit covers the competencies required to Perform Database Administration. It involves installing database, designing database and backing up database.

Summary of Learning Outcomes

LEARNING OUTCOMES	DURATION (HOURS)
1. Install Database	30
2. Design Database	160
3. Backup Database	30
TOTAL	220

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Install Database	1.1 Database software installation and configuration 1.1.1 Introduction to database software installation and configuration 1.1.2 Meaning of database software installation and configuration 1.1.3 Advantages of database software 1.1.4 Application of database software 1.1.5 Types of database software 1.1.5.1 Access 1.1.5.2 SQL 1.1.5.3 MySQL 1.1.5.4 Oracle 1.1.5.5 PostgreSQL 1.1.5.6 MongoDB 1.1.5.7 Redis	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study

	1.1.5.8 MariaDB 1.1.6 Database software installation process 1.1.7 database software configuration process 1.1.8 best practices in database configuration 1.2 Database resource allocation 1.2.1 Introduction to database systems 1.2.2 Database system resource allocation 1.2.2.1 CPU allocation 1.2.2.2 Memory allocation 1.2.2.3 Disk storage allocation 1.2.2.4 Network bandwidth allocation 1.3 Performing database testing 1.3.1 Introduction to database testing 1.3.1.1 Microsoft SQL Server 1.3.1.2 DTM Data generator 1.3.1.3 HammerDB 1.3.2 Types of database testing 1.3.2.1 Functional 1.3.2.2 Data integrity 1.3.2.3 Performance 1.3.2.4 Stress and load 1.3.2.5 security 1.3.3 Database testing techniques 1.3.3.1 White-box 1.3.3.2 Black-box 1.3.3.3 Query 1.3.3.4 Data validation 1.3.4 Database testing tools 1.3.4.1 Apache Jmeter 1.3.4.2 DBFit 1.3.4.3 SQLTest 1.4 Database storage mechanism 1.4.1 Understanding storage architecture 1.4.2 Database Indexing 1.4.3 Partitioning and shading 1.4.4 Database retrieval and performance optimization 1.4.4.1 Creating database queries 1.4.4.2 Query optimization techniques 1.4.4.3 Indexing strategies for efficient retrieval 1.4.4.4 Caching mechanisms 1.5 Database performance monitoring and optimization	
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	1.5.1 Setting up and configuring database monitoring tools (Solarwinds, PRTG, Nagios, NewRelic) 1.6 Data Migration 1.6.1 Collecting and visualizing performance data 1.7 Database installation Troubleshooting	
2. Design Database	2.1 Database Structure 2.1.1 Introduction to database structures 2.1.2 Data modelling concepts 2.1.2.1 Conceptualization 2.1.2.2 Entity-Relationship (ER) diagrams 2.1.2.3 Normalization and Demoralization 2.1.3 Database approaches 2.1.3.1 Flat table schema 2.1.3.2 Normalized schema 2.1.3.3 Star schema 2.1.3.4 Hierarchical schema 2.1.3.5 Document database schema 2.2 Database security 2.2.1 Fundamental principles of database security 2.2.1.1 Confidentiality 2.2.1.2 Integrity 2.2.1.3 Availability 2.2.1.4 Accessibility 2.2.1.5 Reliability 2.2.2 Implementing database security measures 2.2.2.1 User authentication and access control 2.2.2.2 Encryption 2.2.2.3 Password 2.2.2.4 Database auditing and monitoring 2.2.2.5 Software updates and patching 2.2.2.6 Database backup and recovery. 2.3 Database storage 2.3.1 Meaning database storage 2.3.2 Types of database storage 2.3.2.1 Internal 2.3.2.2 external 2.3.3 Storage optimization strategies 2.3.3.1 RAID	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study

	2.3.4 I/O considerations	
3. Backup Database	3.1 Database Backup 3.1.1 Types of database backup 3.1.1.1 Full backup 3.1.1.2 Incremental backup 3.1.1.3 Differential backup 3.1.2 Backup location and storage 3.1.3 Backup scheduling 3.1.3.1 Automated backups 3.1.3.2 Time window considerations 3.1.4 Backup tools 3.1.4.1 Native database tools 3.1.4.2 Third party tools 3.2 Backup storage and management 3.2.1 Backup storage strategy 3.2.2 Backup policy 3.2.3 Database storage best practices 3.2.3.1 Use compression 3.2.3.2 Database Storage monitoring and maintenance 3.3 Database Backup security 3.3.1 Testing backup and restore processes 3.3.2 Disaster recovery and redundancy 3.3.3 Database storage setup requirement 3.3.4 Data redundancy and replication	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study ● Written tests ● Case study

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