

COMPUTERISED DATABASE SYSTEMS MANAGEMENT

ISCED UNIT CODE: 0612 451 09A

TVET CDACC UNIT CODE: ICT/CU/SD/CR/04/5/MA

Relationship to Occupational Standards

This unit addresses the Unit of Competency: **Manage Computerized Database System**

Duration of Unit: 340 Hours

UNIT DESCRIPTION

This unit covers the competencies required to manage computerized database system. It involves, designing database system, creating database system, Manipulating Computerized Database, managing database security and performing database maintenance

Summary of Learning Outcomes

Learning Outcomes	Duration (Hours)
1. To design database system	60
2. To create database system	100
3. To manipulate computerized database	90
4. To manage database security	50
5. To perform database maintenance	40
TOTAL	340

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Design database system	1.1. Identification of Database design approaches 1.1.1. Design approaches 1.1.1.1. Top – down design method 1.1.1.2. Bottom – up design method 1.1.1.3. Centralized design 1.1.1.4. Decentralized design 1.2. Identification of database design tools 1.2.1. Types of design tools 1.3. Database structures. 1.3.1. Database structure 1.3.2. Database models 1.3.2.1. Record-based model ● Hierarchical models ● Network Models ● Relational Models 1.3.2.2. Object-based data models ● Entity-Relationship (ER) ● Semantic ● Functional ● Object-oriented 1.3.2.3. Physical data models ● unifying model and ● the frame memory 1.3.3. Database schema 1.4. Database design architecture 1.4.1. Schema design 1.4.2. Database management system architecture 1.4.3. Data Warehousing and Big Data Architecture	❖ Practical Activities ❖ Project work ❖ Demonstration ❖ Group Work ❖ Observation ❖ Third Party report ❖ Portfolio of Evidence ❖ Written tests

	1.4.3.1. Multi-user DBMS architectures 1.4.3.2. Web service and service oriented Architectures 1.4.3.3. Distributed DBMS 1.4.4. Data Warehousing and Big Data Architecture 1.5. Database normalisation. 1.5.1. Types of normalisations 1.5.2. Process of normalization 1.6. Entity Relationship diagrams 1.7. Database design report 1.7.1. Key components of database design report	
2. Create database system	1.1. Database management software identification 1.1.1. Selecting Appropriate DBMS 1.2. Database development environment configuration. 1.2.1. Setting Up the Environment 1.2.2. Development Tools 1.3. Database objects 1.3.1. Tables 1.3.2. Indexes 1.3.3. Tools 1.3.4. Stored procedures and functions 1.4. Data attributes. 1.4.1. Types of attributes 1.5. Data relationships. 1.5.1. Types of relationships 1.5.1.1. One to one	❖ Practical Activities ❖ Project work ❖ Demonstration ❖ Group Work ❖ Observation ❖ Third Party report ❖ Portfolio of Evidence ❖ Written tests

	1.5.1.2. One to many 1.5.1.3. Many to many 1.6. Workplace safety and health practices 1.6.1. Importance 1.6.2. Digital safety 1.7. E-waste storage and disposal 1.8. E-waste management 1.8.1. Storage and Disposal 1.8.2. Erasure	
3. Manipulate computerized database	2.1. Database business rules 2.1.1. Unique constraints 2.1.2. Referential integrity 2.2. Inserting data into database 2.3. Insert statement in SQL 2.4. Data retrieval from the database 2.4.1. Selecting data from database 2.5. Data modification using queries. 2.5.1. Updating data in database 2.5.2. Modifying queries in database 2.6. Data deletion 2.6.1. Deleting data in table 2.6.2. Dropping database	❖ Practical Activities ❖ Project work ❖ Demonstration ❖ Group Work ❖ Third Party report ❖ Portfolio of Evidence ❖ Written tests
4. Manage database security	4.1 Database security risks identification 4.1.1 Common security risks 4.1.1.1 Unauthorized Access 4.1.1.2 SQL Injection Attacks 4.1.1.3 Data Leakage 4.1.1.4 Insider Threats 4.1.1.5 Weak Authentication and Access Control 4.1.1.6 Inadequate Patching	❖ Practical Activities ❖ Project work ❖ Demonstration ❖ Group Work ❖ Observation ❖ Third Party report ❖ Portfolio of Evidence ❖ Written tests

	4.1.1.7 Malware 4.2 Identification of database security control measures 4.2.1 Control measures 4.2.1.1 Access Control and Authentication 4.2.1.2 SQL Injection Prevention 4.2.1.3 Encryption 4.2.1.4 Regular Security Audits and Monitoring 4.2.1.5 Patching and Updates 4.2.1.6 Data Masking and Anonymization 4.2.1.7 Backup and recovery plans 4.2.1.8 User Activity Logging 4.2.1.9 Firewalls 4.3 Database security control measures implementation. 4.3.1 Policy Development 4.3.2 Access Management 4.3.3 Configuration Hardening 4.3.4 Testing 4.4 Carrying out Monitoring and auditing of database security 4.5 Performing database security documentation 4.5.1 Database maintenance schedule preparation 4.6 Training database users 4.6.1 End Users 4.6.2 Application Programmer or Specialized users or Back-End	
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	Developer 4.6.3 System Analysts 4.6.4 Database Administrator (DBA) 4.6.5 Temporary Users or Casual Users	
5. Perform database maintenance	5.1 Database maintenance schedule preparation 5.1.1 Maintenance plans 5.1.2 Daily tasks 5.1.3 Weekly tasks 5.1.4 Monthly tasks 5.1.5 Quarterly tasks 5.1.6 Annual tasks 5.1.7 Database maintenance schedule preparation 5.1.7.1 Key elements in preparation of maintenance schedule 5.2 Database performance monitoring 5.2.1 Resource Utilization 5.2.2 Query Performance 5.2.3 Transaction Log Monitoring 5.2.4 Connection Monitoring 5.2.5 Alerting Systems 5.3 Database performance optimization 5.3.1 Query Optimization 5.3.2 Indexing Strategy 5.3.3 Partitioning 5.3.4 Configuration Tuning 5.3.5 Archiving 5.4 Database maintenance report generation 5.4.1 Report components 5.4.2 Report generation process	❖ Practical Activities ❖ Project work ❖ Demonstration ❖ Group Work ❖ Observation ❖ Third Party report ❖ Portfolio of Evidence ❖ Written tests

Suggested Delivery Methods

1. Instructor led facilitation using active learning strategies
2. Demonstration by trainer
3. Practical work by trainees
4. Viewing of related videos
5. Field Visits
6. Group Work
7. Role plays
8. Group projects

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommend ed Ratio (Item: Trainee)
A	Learning Materials			
	Internet connection	✓ For each compute	1	1:1
2.	Flip charts	A1	1	1:25
3.	Textbooks	For reference	3	3:25
B	Learning Facilities & infrastructure			
4.	Computer Laboratory	To accommodate 25 Learners	1	1:25
5.	Theory Room	furnished with 25 Arm-chairs and a suitable trainer's table	1	1:25
C	Consumable materials			
6.	Printing papers	A4	2 Reams	1:12
7.	Toner / Ink bottles	For printers	2 pcs	1:12
8.	White board markers	Assorted colors	20	4:5
D	Tools and Equipment			
9.	Computers	✓ Genuine Windows/Linux ✓ Genuine Microsoft office Software ✓ Google Workspace	25	1:1

		Account ✓ Antivirus Software ✓ Suitable IDE		
10.	External storage media	HDD / SSD / Flash	1	1:25
11.	Printer	Working printer	2	1:12
12.	1 Smart-board / Smart TV / Projector (with screen)	Where available	1	1:25
13.	Whiteboard/Chalkboard	4 X 8 Feet	1	1:25