

## DATABASE MANAGEMENT SKILLS

**UNIT CODE:** ICT/CU/CS/CR/05/6/A

### Relationship to Occupational Standards

This unit addresses the unit of competency: Understand Database Management Skills

**Duration of Unit:** 160 hours

### Unit Description:

This unit covers the competencies required to demonstrate database management skills. It involves understanding database fundamentals, designing a database, using Structured Query Language, understanding design of object oriented databases, understanding indexing and hashing and understanding database applications.

### Summary of Learning Outcomes:

By the end of the unit, the trainee should be able to:

1. Understand Database fundamentals
2. Design a database
3. Use Structured Query Language
4. Understand the design of object oriented databases
5. Understand indexing and hashing
6. Understand database applications

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Understand database fundamentals	<ul style="list-style-type: none"><li>• Definition of database</li><li>• Database terminologies<ul style="list-style-type: none"><li>✓ Table</li><li>✓ Database engine</li><li>✓ Records</li><li>✓ Field</li></ul></li><li>• Reasons of using databases</li><li>• Definition of relational model</li><li>• Relational Modelling Concepts<ul style="list-style-type: none"><li>✓ Relations/tables</li><li>✓ Attributes/Columns</li><li>✓ Domain</li><li>✓ Tuples/Rows</li><li>✓ Primary Key</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Oral tests</li><li>• Written tests</li><li>• Practical tests</li></ul>

	<ul style="list-style-type: none"> <li>✓ Foreign Key</li> <li>• Properties of a relation/table</li> <li>• Comparison of RDBMS products <ul style="list-style-type: none"> <li>✓ Oracle</li> <li>✓ MS SQL server</li> <li>✓ My SQL</li> <li>✓ Ms Access</li> </ul> </li> <li>• Installation of MS SQL server</li> <li>• MS SQL server interface</li> <li>• Properties of MS SQL server Database</li> <li>• Prescribe RDBMS product for a simulated environment</li> <li>• Database security <ul style="list-style-type: none"> <li>✓ Definition</li> <li>✓ Access control</li> <li>✓ Authentication</li> <li>✓ Integrity control</li> <li>✓ Backup</li> </ul> </li> </ul>	
<p>2. Design a database</p>	<ul style="list-style-type: none"> <li>• Phases of database Design <ul style="list-style-type: none"> <li>✓ Conceptual database design (ERM Modeling)</li> <li>✓ Logical database design</li> <li>✓ Physical database design</li> </ul> </li> <li>• Entity modelling <ul style="list-style-type: none"> <li>✓ Components</li> <li>✓ Designing Entity Model using UML (Unified Modelling Language)</li> </ul> </li> <li>• Normalisation <ul style="list-style-type: none"> <li>✓ Definition</li> <li>✓ Demonstration of normalisation</li> </ul> </li> <li>• Validating model according to the requirements / specified transactions (CRUD matrix)</li> </ul>	<ul style="list-style-type: none"> <li>• Oral tests</li> <li>• Written tests</li> <li>• Practical tests</li> </ul>

<p>3. Use Structured Query Language (SQL)</p>	<ul style="list-style-type: none"> <li>• SQL <ul style="list-style-type: none"> <li>✓ Definition</li> <li>✓ Characteristics</li> <li>✓ Components</li> </ul> </li> <li>• Data definition queries <ul style="list-style-type: none"> <li>✓ CREATE</li> <li>✓ DROP</li> <li>✓ ALTER</li> </ul> </li> <li>• Demonstration of CREATE TABLE statement</li> <li>• Demonstration of CREATE TABLE constraints: <ul style="list-style-type: none"> <li>✓ PRIMARY KEY</li> <li>✓ FOREIGN KEY</li> <li>✓ NOT NULL</li> <li>✓ CHECK</li> <li>✓ UNIQUE</li> <li>✓ DEFAULT</li> </ul> </li> <li>• Editing table schema using SQL ALTER statement <ul style="list-style-type: none"> <li>✓ Adding an attribute</li> <li>✓ Dropping an attribute</li> <li>✓ Modifying attribute domain</li> </ul> </li> <li>• Dropping table using SQL DROP TABLE statement</li> <li>• Data manipulation query statements <ul style="list-style-type: none"> <li>✓ INSERT</li> <li>✓ SELECT</li> <li>✓ UPDATE</li> <li>✓ DELETE</li> </ul> </li> <li>• Data Manipulation Query Statements <ul style="list-style-type: none"> <li>✓ Retrieving records using SELECT statement</li> <li>✓ Insertion of records using INSERT INTO statements</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Practical tests</li> <li>• Oral tests</li> <li>• Written tests</li> </ul>
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	<ul style="list-style-type: none"> <li>✓ Deleting records using DELETE statement</li> <li>✓ Updating records using UPDATE. SET statement</li> <li>• SQL Joins <ul style="list-style-type: none"> <li>✓ Definition of a join</li> <li>☐ Types of joins</li> </ul> </li> <li>• Create and query a database from a validated ER model.</li> <li>• Creating a simple join</li> </ul>	
4. Understand design of object oriented databases	<ul style="list-style-type: none"> <li>• Object oriented database <ul style="list-style-type: none"> <li>✓ Definition</li> <li>✓ Comparison with other types of databases</li> </ul> </li> <li>• Object oriented database concepts <ul style="list-style-type: none"> <li>✓ Classes</li> <li>✓ Objects</li> <li>✓ Attributes</li> <li>✓ Inheritance</li> </ul> </li> <li>• Implementation of Object Oriented Database Concepts from a set of requirements</li> <li>• Creation of views and triggers.</li> </ul>	<ul style="list-style-type: none"> <li>• Practical tests</li> <li>• Oral</li> <li>• Written tests</li> </ul>
5. Understand indexing and hashing	<ul style="list-style-type: none"> <li>• Indexing and hashing <ul style="list-style-type: none"> <li>✓ Definition of indexing and hashing</li> <li>✓ Types of indexing</li> <li>✓ Types of hashing</li> </ul> </li> <li>• Demonstration of indexing <ul style="list-style-type: none"> <li>✓ Dense index</li> <li>✓ Sparse index</li> </ul> </li> <li>• Demonstration of hashing <ul style="list-style-type: none"> <li>✓ Static hashing</li> <li>✓ Dynamic hashing</li> </ul> </li> <li>• Implementation of indexing and hashing in an existing database</li> </ul>	<ul style="list-style-type: none"> <li>• Practical tests</li> <li>• Oral</li> <li>• Written tests</li> </ul>

6. Understand database applications	<ul style="list-style-type: none"> <li>• Decision support system</li> <li>• Data mining</li> <li>• Features of Distributed Databases</li> <li>• Features of Data warehouses</li> <li>• Features of Spatial and geographical databases</li> <li>• Features of Multi-media databases</li> <li>• Mobility and personal databases</li> <li>• Design and implementation of data warehouses</li> </ul>	<ul style="list-style-type: none"> <li>• Practical tests</li> <li>• Oral</li> <li>• Written tests</li> </ul>
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### **Suggested Methods of Instruction**

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised practical database design and SQL projects
- Visiting expert from the ICT sector;
- Industrial visits

### **Recommended Resources**

#### **Tools**

- Microsoft Office with MS Visio Modelling tool

MS SQL server software

#### **Equipment**

- Computers

#### **Materials and supplies**

- Instructional material
- Stationery

#### **Reference materials**

- Trainer – recommended resources including web resources
- SQL Server technical documentation