Suggested Teaching Guidelines for

Data Collection and DBMS (Principles, Tools & Platforms)
PG-DBDA March 2024

Duration: 44 classroom hours + 46 Lab hours

Objective: To reinforce knowledge of RDBMS and facilitate hands-on experience on SQL &NoSQL.

Prerequisites: Knowledge of Object-Oriented concepts.

Evaluation method: Theory exam– 40% weightage
Lab exam – 40% weightage
Internal exam – 20% weightage

List of Books / Other training material

Text Book :

1. Textbook of RDBMS, Vidya H Bankar,Techtree Educations,1st edition.

Reference:

1. MongoDB in Action by DreamTech
2. MongoDB - The definitive guide - by Oreilly
3. The Definitive Guide –MongoDB by Kristina Chodorow
4. MongoDB Aggregation Framework Principles and Examples by John Lynn
5. Getting Started with NoSQL by Gaurav Vaish
6. Database System Concept by Henry Korth, S.Sudarshan & Abraham Silberschatz
7. Relational Database Design and Implementation: Clearly Explained, Third Edition
8. Beginning Database Design Solutions
9. Database Modeling and Design: Logical Design, Fifth Edition
10. Introduction to Database Management System

Note: Each session having 2 Hours

Session 1:
Lecture

- Database Concepts (File System and DBMS)
    - What is file system, its need?
    - What is DBMS, its need
    - Codd's 12 rules for RDBMS

Lab Assignment:

- Read and understand the concepts of File System, DBMS & RDBMS.

Session 2:
Lecture

- Database Storage Structure
    - Table Space
    - Control File
    - Data file
- Structured and Unstructured Data

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- Introduction to Data Collection like what is data collection.
- The tools and how data can be gathered in a systematic fashion

Lab Assignment:

- Read and understand the related chapters.

Session 3:
Lecture

- Introduction to SQL
- DDL Commands
- DML & DCL Commands

Lab Assignment:

- DDL Commands: Create/Alter/Drop/Grant/Revoke
- DML Commands: Select/Insert/Update/Delete/Truncate
- DCL Commands: RollBack Commit
- Create new User named ‘dbda’ ,Grant all the privileges and Perform followingQueries.
- Create Table ‘Books’ using proper data types which contain columns(name, author,price, writer)

Session 4:
Lecture

- Grouping Things Together (Group by, Having)
- Sorting Data (Order By)
- Advance Subqueries (Correlated Sub query, Outer Joins)

Lab Assignment:

- Queries containing Group By, Having Clause,
- Order by
- Correlated Queries, SubQueries, Outer Joins
- Find out number of employees in each department using employee table anddepartment table
- Print the employee names who have ‘A’ as first letter and ‘N’ as last letter in theirname.
- using customers and product table, write sql query to find the salespersons andcustomers he handles, print customer name, city, salesman, commission.

Session 5 & 6:
Lecture

- Constructs in SQL
- Data collection
- Designing Database Schema
- Normal Forms and ER Diagram
- Relational DB modelling
- Stored Procedures
- Gathering Data in Systematic fashion

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Session 7:
Lecture

- Views
- Triggers
- Window Function
- Case statement

Lab Assignment:

- Read and understand the related chapters.
- Create View to find employee Who have highest salary, Print name, salary, department number and department name.

- Create View to fine salesperson who handles a customers who make highest number of orders, return order date, salesperson ID, name.

Session 8 & 9 :
Lecture

- Data Ware Housing Concepts and Introduction to Tools
- Tools related to Data Warehousing
- Different algorithms related to Data Warehouse
- Importance and its Applications

Lab Assignment:

- Read and understand the related chapters.

Session 10:
Lecture

- NOSQL
    - Introduction to NoSQL
    - Difference between a RDBMS and a NoSQL database
    - Understanding the Storage Architecture
    - Working with Column-Oriented Databases
    - Document Store Internals

Lab Assignment:

- Read and understand the related chapters.

Session 11:
Lecture

- Practical Design of NoSQL
- NOSQL
    - Schema structure for Oracle NoSQL database
    - Changing Document Databases
    - Schema Evolution in Column-Oriented Databases
    - Data Evolution in Key/Value Stores

Lab Assignment:

- Practice Questions including Column-Oriented Databases

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Session 12:
Lecture

- Introduction to MongoDB (NoSQL)
    - Performing CRUD Operations
    - Creating Records
    - Accessing Data
    - Updating and Deleting Data
    - Working with Language Bindings
    - Querying NoSQL Stores
    - Similarities Between SQL and MongoDB Query Features
    - Accessing Data from Column-Oriented Databases Like HBase
    - Querying Redis Data Stores

Lab Assignment:

- Read and apply CRUD Operations.

Session 13 &14:
Lecture

- Introduction to MongoDB
    - What are MongoDB Internals
    - Essential Concepts behind a Database Index
    - Indexing and Ordering in MongoDB
    - Creating and Using Indexes in MongoDB

Lab Assignment:

- Practice to create and using Indexes in MongoDB

Session 15:
Lecture

- MongoDB Queries
    - Create Operations
    - Read Operations
    - Data Aggregation Operations
    - Update Operations

Lab Assignment:

- Insert, Find, FindOne, logical Operators, Distinct, Group, Upsert, Update, Remove.
- Create database using MongoDB query.
- Create table books using MongoDB query.
- Write a MongoDB query to find the restaurants who achieved a score more than 90 using Restaurants collection.
- Write a MongoDB query to find the restaurants which do not prepare any cuisine of 'American' and achieved a score more than 70 and located in the longitude less than -65.754168 using Restaurants collection.
- Write a MongoDB query to find the restaurants which do not prepare any cuisine of 'American ' and achieved a grade point 'A' not belongs to the borough Brooklyn. The document must be displayed according to the cuisine in descending order

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Session 16 & 17:

Lecture

- Data Model XML
- Querying and transformation
- Tools - OLTP and OLAP

Lab Assignment:

- Read and understand the related chapters

Session 18:

Lecture

- Introduction to Cassendra
- Comparison between Cassendra and MongoDB
- Architecture
- Cqlsh
- Shell Commands

Lab Assignment:

- Read and understand the related chapter

Session 19:

Lecture

- Table Operation (Create, Alter, Drop, Truncate, Index creation, Index deletion, Batch)

Lab Assignment:

- Read and understand the related chapters

Session 20 & 21:

Lecture

- CRUD Operation
    - Create
    - Update
    - Read
    - Delete
- CQL Types
    - CQL Datatypes
    - CQL Collections
    - User Defined Datatypes

Lab Assignment:

- Read and understand the related chapters
- Create Table employees using CQL commands.
- Update employee's total salary to 20000 whose commission is '0'
- Create following tables using collections in Cassandra.
    1. Teachers and subjects.
    2. Books and Authors.
- Insert a value in employee table, update salary of employee whose id is 03 and change the

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names of employees into upper case whose name start with 'N'.(Perform all operations in single Query using Batch)
- Print all values present in Books table.

Session 22:
Lecture
- Data Driven Decisions
- Enterprise Data Management
    - Data Preparation
    - Data Cleaning

Lab Assignment:
- Read and understand the related chapter