Suggested Teaching Guidelines for

Data Collection and DBMS (Principles, Tools & Platforms)

PG-DBDA Aug 19

Duration: 34 class room hours + 36 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. MongoDB in Action by DreamTech

Reference:

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

Note: Each session having 2 Hours

Session 1 & 2:

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 3:

Lecture

- Database Storage Structure
  - Table Space
  - Control File
  - Data file
- Structured and Unstructured Data
- 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 4:
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

Session 5:
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

Session 6:
Lecture

- Data Ware Housing Concepts and Introduction to Tools
  - Algorithms for Data Ware House

Lab Assignment:

- Read and understand the related chapters.

Session 7:
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 8:
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

Session 9:

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 10:

Lecture

- Introduction to MongoDB
  - What is 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 11:

Lecture

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

Lab Assignment:

- Insert, Find, FindOne, logical Operators, Distinct, Group, Upsert, Update, Remove.

Session 12:

Lecture

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

Lab Assignment:

- Read and understand the related chapters

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Session 13:

Lecture

- Data Management
  - Data Preparation
  - Data Cleaning

Lab Assignment:

- Read and understand the related chapters

Session 14:

Lecture

- Introduction to Cassendra
- Comparison between Cassendra and MongoDB

Lab Assignment:

- Read and understand the related chapters

Session 15, 16 & 17:

Lecture

- Graph database – neo4j
- In-memory databases - MemSQL, VoltDb
- Introduction to HTAP and sciDB

Lab Assignment:

- Read and understand the related chapters