

## Suggested Teaching Guidelines for **Database Technologies – PG-DAC February 2019**

**Duration:** 30 classroom hours + 30 lab hours (60hrs)

**Objective:** To introduce the student to RDBMS and Facilitate Hands On Experience on (Object Relational Database)

**Prerequisites:** Knowledge of programming in C++ Clarity 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. MySQL Developer's Library by Paul DuBois / Pearson

#### Reference:

1. Professional NoSQL [eBook] by Shashank Tiwari / Wiley
2. Mysql: The Complete Reference 1st Edition by Vikram Vaswani / Mcgraw Hill Education
3. MySQL High Availability 1st Edition by Charles Bell O'reilly
4. Oracle 9i DBA Certification Guide
5. Oracle 9i Beginners Guide PL/SQL Guide – Orilley's
6. Creating your MySQL Database: Practical Design Tips and Techniques by Marc Delisle / Packt Publishing
7. High Performance MYSQL, 3rd Edition by SCHWARTZ / Shroff Publishers
8. MURACH'S MYSQL by Joel Murach / Shroff Publisher
9. MySQL Cookbook: Solutions for Database Developers and Administrators by DuBois / O'Reilly Media
10. Nosql for Dummies by Fowler Adam Fowler / John Wiley & Sons
11. Beginning Databases with PostgreSQL: From Novice to Professional 2nd Revised edition by Richard Stones Neil Matthew Stones Matthew / Apress
12. Practical PostgreSQL 1st Edition by Joshua Drake John Worsley / O'Reilly

#### Session 1:

##### Lecture

- Introduction to DBMS – What is DBMS, Its need
- Areas where DBMS are used
- Types of DBMS:  
Introduction to Hierarchical Model, Network and Relational Models,  
Object Oriented Database
- Data models (conceptual physical and logical)

#### Assignment – Reading:

Read and understand Chapters for the next session

#### Session 2:

##### Lecture:

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- Data Integrity & integrity rules
- Codd's 12 rules for a Relational Database (conclusion)
- Need for Normalization.

### Assignment – Reading:

Read and understand Chapters for the next session

### Session 3:

#### Lecture:

- Various normalization forms 1st normal form, 2nd normal form
- 3rd normal form,
- Introduction to 4th, BCNF, etc
- Need for De-normalization

### Assignment – Reading:

Read and understand Chapters for the next session

### Session 4:

#### Lecture:

- DDL Commands
- DML & DCL Commands
- Inbuilt Functions

### Assignment – Lab:

SQL Practice Questions Including:-

DDL Commands: Create/Alter/Drop/Grant/Revoke

DML Commands: Select/Insert/Update/Delete/Truncate

DCL Commands: RollBack Commit

Number Functions: -

Single Value Functions: NVL, ABS, CEIL etc

Group Value Functions: AVG, COUNT, MAX etc

### Assignment – Reading:

Read and understand Chapters for the next session

Case study on Oracle Architecture

### Session 5:

#### Lecture:

- Grouping Things Together (Group By, Having Clause)
- Advance Sub-queries (Correlated Sub query, Outer Joins)
- Set Operators (UNION, UNION ALL, INTERSECT, MINUS)

### Assignment – Lab:

SQL Practice Questions:-

Queries containing Group By, Having Clause,

Correlated Queries, SubQueries, Outer Joins and Set Operators

### Assignment – Reading:

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Read and understand Chapters for the next session

### **Session 6**

#### **Lecture:**

- Types of Views
- Creating Complex View
- Using Temporary Tables
- Family Trees & Connect BY

#### **Assignment – Lab:**

SQL Practice Questions Including  
Creating Simple/Complex Views,  
Creating Temporary Tables,  
Use of Connect by Clause

#### **Assignment – Reading:**

Read and understand Chapters for the next session

### **Session 7**

#### **Lecture:**

- Introduction to MySQL Programming
- Exceptions

#### **Assignment – Lab:**

SQL Practice Questions covering MySQL programming & Exceptions

#### **Assignment – Reading:**

Read and understand Chapters for the next session

### **Session 8**

#### **Lecture:**

- Cursors
- Procedures
- Functions

#### **Assignment – Lab:**

SQL Practice Questions covering Cursors, Procedures & Functions

#### **Assignment – Reading:**

Read and understand Chapters for the next session

### **Session 9**

#### **Lecture:**

- Triggers
- Indexes

#### **Assignment – Lab:**

SQL Practice Questions covering index and Triggers

#### **Assignment – Reading:**

Read and understand Chapters for the next session

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### **Session 10**

#### **Lecture:**

- Clusters
- Snapshots

#### **Assignment – Lab:**

SQL Practice Questions including Index, clusters, snapshots

#### **Assignment – Reading:**

Read and understand Chapters for the next session

### **Session 11 & 12: NO SQL**

#### **Lecture:**

- Introduction to No SQL database
- Data Persistence on Server-Side via NoSQL
- Does not use SQL-like query language (which supports the idea of "tables")
- Longer persistence
- Store massive amounts of records
- Many systems are optimized for retrieval (query) and appending (write) operations
- Systems can be scaled
- High availability
- Semi-structured data
- Support for numerous concurrent connections
- Indexing of records for faster retrieval
- Difference between a RDBMS and a No SQL database
- Understanding the Storage Architecture
  - Working with Column-Oriented Databases
  - Document Store Internals

#### **Assignment – Lab:**

Practice Questions including SQL write Operations.

#### **Assignment – Reading:**

Read and understand Chapters for the next session

### **Session 13 & 14:**

#### **Lecture: NO SQL**

- How to Configure and access the store using the Admin Console
- Performing CRUD Operations
  - Creating Records
  - Accessing Data
  - Updating and Deleting Data
- Working with Language Bindings
- Querying NoSQL Stores
- NoSQL database MongoDB
- The big ideas: documents, collections
- MongoDB is a document-based database system

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- The abstract idea of a document - data encapsulation into some file format. In the case of MongoDB, JSON is used.
- If you are familiar with relational databases and SQL, then analogies: tables => collections; records (or rows) => documents
- Each document can have different fields from other documents
- All documents must have an \_id field
  - Similarities Between SQL and MongoDB Query Features
  - Accessing Data from Column-Oriented Databases Like HBase
- Schema structure for Oracle NoSQL database
  - Changing Document Databases
  - Schema Evolution in Column-Oriented Databases
  - Data Evolution in Key/Value Stores
- What is MongoDB Internals
- Essential Concepts behind a Database Index
- Indexing and Ordering in MongoDB
- Creating and Using Indexes in MongoDB

### Assignment – Lab:

Practice Questions including CRUD Operations  
 MongoDB Operations  
 Practice Questions including Column-Oriented Databases  
 Selecting a database to use  
 Showing all collections in database  
 Finding / querying documents in a collection  
 Inserting documents into a collection  
 Deleting documents in a collection  
 Update documents in a collection  
 Practice to create and using Indexes in MongoDB

### Session 15

#### Lecture:

- What is BigData
- Using MySQL as a NoSQL Solution
- Mostly Immutable Data Stores
- Migrating from RDBMS to NoSQL

### Assignment – Lab:

Practice how to Migrating from RDBMS to NoSQL.