IT214 (Winter ’2024)

Database Management Systems

pm jat @ daiict

Learning Objectives

- Database and DBMS concepts
- Relational Theory
- Querying Relational Database using Relational Algebra and SQL
- Design and Implement Relational Databases at logical level
- Create Triggers and Stored Procedures
- Physical storage of databases and Indexing
- Appreciate issues related to concurrent transaction processing
- Appreciate how SQL queries are executed in a typical RDBMS

Texts

- Not any specific. My notes, though bit concise, should be able to take care.
- You can however refer any of following standard texts-
  - **Database Systems: The Complete Book** by Hector Garcia-Molina, Jeffery Ullman, and Janiffer Widom,
    Pearson Education
  - **Fundamentals of Database Systems** by Ramez Elmasri and Shamkant B. Navathe, Pearson Education
  - **Database System Concepts** by Avi Silberschatz,
    Henry F. Korth, S. Sudarshan, Tata McGraw-Hill
  - **Database Management Systems** by Raghu Ramakrishnan and Johannes Gehrke, Tata McGraw-Hill

Evaluation for Grade

- Evaluation Strategy:
  - **Exams, lab, and projects that measures how good you have learned the required concepts, and learned to apply the concepts in real cases.**
- Marks Distribution
  - Four Mid-Term Exams: 40%
  - Database Project: 15%
  - Lab Evaluation: 15%
  - End Semester examination: 30%

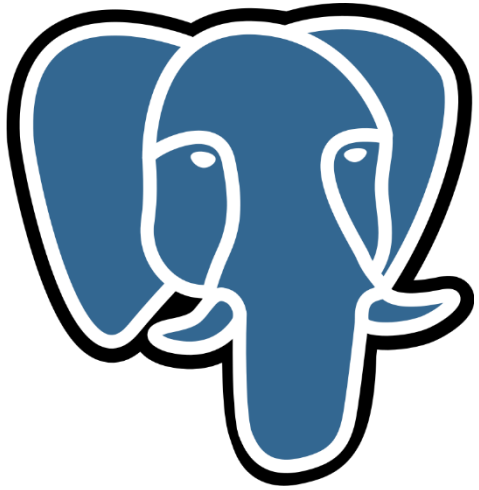
Tentative Lab Plan

- DBMS Server: **PostgreSQL** (10.100.71.21)
- Lab Exercises (no of labs)
  - Practice Relational Algebra and SQL – 4 weeks
  - Entity Relationship Diagrams – 2
  - Normalization – 1
  - Stored Procdedure-1
  - Query Execution – 1
  - Transaction Processing – 1
- Group database projects – starts from 5th week. Go up to end of semester; will have certain mile stones (separate document contains more description about projects)

Attendance Policy

- If Attendance is below 80%
  - All exam marks shall be reduced to a fraction of the percentage of presence in lectures!

Why PostgreSQL?



- Declared as “top developer choice” in 2023 by “devclass.com”
- Developed at the University of California, Berkeley by Michael Stonebraker (Turing Award winner for Ingres/Postgres) in the mid 80s.
- Originally created as Ingres, later became “POST Ingres” -> Postgres PostgreSQL
- “**The world's most advanced open source database**”, punchline on its website
  - Most Comprehensive, Most Extensible, True Object Relational
- One of the most ANSI compliant RDBMS
- Extensible - Custom Data types, add functions, plug-in, and even programming languages (for writing stored procedure and so)
- Large number of stored procedure languages: C, PL/PgSQL, PL/perl, PL/Python, PL/Tcl, and PL/Java
- Large number of client interfaces: C, C++, Java, PHP, Perl, Python, Ruby

Why PostgreSQL?

- Features
  - Object Relational: Objects as data type, Inheritance and Overriding support
  - Large number of data types: uuid, monetary, enumerated, geometric, binary, network address, bit string, text search, xml, json, array, composite, etc.
  - Allows creating new types
  - Large text fields, no limit on rowsize
  - True support of ACID properties
  - Indexing: partial, expression based, function based
  - Materialized view
- Continue reading at: https://www.compose.com/articles/what-postgresql-has-over-other-open-source-sql-databases/