Spring 2023

CS 331: Database System Design & Mgmt

Syed Asim Abbasi

CS331 -Database System Design & Management

Instructor: Dr. Abbasi (Syed Asim H. Abbasi)

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Office Hours: Right after the lecture

Academic Integrity and NJIT Honor Code:

Please familiarize yourself with Code of Student Conduct

https://www.njit.edu/doss/policies/conductcode/article1.php

Violations of the Code of Student Conduct will be dealt with seriously and reported immediately to the Dean of Students.

Policy on Collaboration:

Students found cheating, plagiarizing, or collaboration (collaboration is allowed for those working together in approved team projects) will be immediately referred to the Dean of Students and the NJIT Committee on Professional Conduct and subject to Disciplinary Probation, a permanent marking on the record, possible dismissal, and an 'F' grade in the course. All submitted assignments will be checked for similarities, and plagiarism and guilty students identified.

Course Description:

The course focuses on relational databases covering topics needed for designing and implementing a database system. The topics include, relational model, ER diagram, data-normalization forms, relational algebra, the relational database query language SQL, Petabyte level database design & management, indexes and database programming, Cross-tab Queries, Pivot tables etc. Oracle Database, MS SQL Server, No-SQL databases, MS Access, MS Excel, VBA, ODBC/JDBC -tools/examples will be presented/discussed in the course.

Lectures Plan:

Lec#1 Getting Ready - Essential Concepts

RAM, ROM, OS File System, HDD, RAID, Table/Row/Column, Data-types, Spreadsheet, Relational Algebra Video, FTP, Networking/IP/Port, Index, Datacenter, Fundamental Software Terms and Concepts

Assignment #1: Selecting computer components needed to build the server from scratch and adding to the shopping cart of newegg.com website. Finally printing the shopping cart to PDF file and emailing to the professor - abbasi@njit.edu Please make sure the components compatibility and proper wattage selection of power supply.

Lec#2 Database Concepts

Instance, Database, SQL, Visualizing the complete database environment, Database in Action, Database Networking, ODBC, Introduction to RDBMS & non-RDBMS Database Products in Market

Lec#3 Database Concepts II

Lec#4 SQL I – Setting Up Environment

Assignment #2: Download Oracle Client and connect Oracle SQL Developer with Oracle Database on NJIT's Prophet Server.

Lec#5 SQL II – SQL Concepts Part 1

Online Midterm Exam

Lec#6 SQL III – SQL Concepts Part 2

Lec#7 Database Analytics & Knowledge Discovery - Getting Ready I

Assignment #3: Submitted via Email

In-class database design on paper and later implementation (including ER Diagram)

Lec#8 Database Analytics & Knowledge Discovery - Getting Ready II

Visual SQL Design Environment, Writing Complex SQL Statements, Data Import/Export & Various Tools and Formats

Project Description:

Establishing linked tables in MS Access database via ODBC Interface to "Course" (SID / System Identifier) Oracle Instance on Prophet.njit.edu host/server. Using these linked tables, demonstrating data manipulation and providing validation using SQL Developer interface.

For MAC Users: Create one parent table and two child tables. Populate them with few records (not more than 5) and demonstrate the working of CASCADE DELETE and CASCADE UPDATE (not supported by Oracle, therefore, just explain verbally on the day of demonstration) using Oracle SQL Developer.

Lec#9 Database Analytics & Knowledge Discovery

From SQL to Reports, Pivot Tables, Cross-tabs, Matching Tables, Finding Duplicates

Lec#10 All Remaining Concepts

Relational Algebra: Selection, Projection, Cross-product, Set-difference, Union, Divide; 1,2,3 Tier Systems Concepts, Concepts and Design of Database Driven Web Applications; Intranet, Extranet, Internet, Firewall

Online Final Exam

Lec#11 Project Live Demo / Future Direction

About Grading

- Assignments 10%
- Mid-term 35%
- Final 35%
- Project 20%

300-level classes:

- A <= 20% (e.g. in a 100 students class, top 20 will get A grade)
- B+<= 20%
- B <= 20%
- C+/C/D/F/W the rest of the class