Software Engineering Internship

Day #4

July 2024

Agenda

- Thursday
  - Introduction to SQL
  - Directus CMS (self-directed learning)
- Friday
  - Work on presentations
  - Present
  - Review the week & talk about next week

Introduction to SQL

What is SQL?

SQL stands for Structured Query Language.

It is used for managing and manipulating relational databases.

SQL is the standard language for relational database management systems.

What is a Database?

A database is a structured collection of data.

Databases store information in tables, which consist of rows and columns.

Each table is related to others through unique keys.

Relational Database

Relational databases organize data into tables.

Tables can be linked using keys (primary and foreign keys).

Examples of relational database systems: MySQL, PostgreSQL, SQLite, SQL Server.

Basic SQL Commands

SELECT: Retrieve data from a database.

INSERT: Add new data to a table.

UPDATE: Modify existing data in a table.

DELETE: Remove data from a table.

CREATE: Create new tables and databases.

DROP: Delete tables and databases.

```sql
-- Creating a table
CREATE TABLE Students (
    StudentID int,
    FirstName varchar(255),
    LastName varchar(255),
    Age int
);

-- Inserting data
INSERT INTO Students (StudentID, FirstName, LastName, Age)
VALUES (1, 'John', 'Doe', 18);

-- Selecting data
SELECT * FROM Students;

-- Updating data
UPDATE Students
SET Age = 19
WHERE StudentID = 1;

-- Deleting data
DELETE FROM Students
WHERE StudentID = 1;
```

Benefits of Using SQL Databases

Structured Data: Organizes data into tables for easy management.

Data Integrity: Ensures accuracy and consistency of data.

Scalability: Handles large volumes of data efficiently.

Flexibility: Supports complex queries to extract meaningful insights.

Common SQL Database Management Systems

MySQL: Popular open-source relational database management system.

PostgreSQL: Advanced open-source database known for its robustness.

SQLite: Lightweight, serverless database used in many applications.

SQL Server: Microsoft's relational database management system.

Practical Applications of SQL

Web Development: Storing and retrieving user data, content management.

Data Analysis: Extracting and analyzing data for business insights.

Finance: Managing financial transactions and records.

Healthcare: Storing patient records and medical histories.

Introduction to Joins

Joins: SQL operations used to combine data from two or more tables.

Types of joins include INNER JOIN, LEFT JOIN, RIGHT JOIN, and FULL JOIN.

Joins use keys to match rows between tables.

See: https://en.wikipedia.org/wiki/Join_(SQL)

SQL Join Example

```
-- Students table
SELECT * FROM Students;

-- Courses table
SELECT * FROM Courses;

-- INNER JOIN example
SELECT Students.StudentID, Students.FirstName, Courses.CourseName
FROM Students
INNER JOIN Courses ON Students.StudentID = Courses.StudentID;

-- LEFT JOIN example
SELECT Students.StudentID, Students.FirstName, Courses.CourseName
FROM Students
LEFT JOIN Courses ON Students.StudentID = Courses.StudentID;
```

Types of Joins

INNER JOIN: Returns only the matching rows from both tables.

LEFT JOIN (or LEFT OUTER JOIN): Returns all rows from the left table and the matched rows from the right table. Non-matching rows from the right table will have NULL values.

RIGHT JOIN (or RIGHT OUTER JOIN): Returns all rows from the right table and the matched rows from the left table. Non-matching rows from the left table will have NULL values.

FULL JOIN (or FULL OUTER JOIN): Returns all rows when there is a match in either table. Non-matching rows will have NULL values for columns of the other table.

Directus CMS

Directus

- Personal Directus instances
  - https://canelo-directus.infrastructuresquad.com
  - https://lexi-directus.infrastructuresquad.com
  - https://santi-directus.infrastructuresquad.com
- Documentation:
  - https://docs.directus.io/getting-started/introduction.html