Welcome to the Databases Lecture

The session will start shortly...

CoGrammar

Johannesburg Team Housekeeping

- Please be mindful and respectful to everyone in this supportive learning environment. Mutual respect and tolerance are fundamental values we uphold.
- There are no bad or silly questions—feel free to ask anything! You can ask Sashlin or myself questions at any time, regardless of the situation. Even if you find yourself in a dire situation—like stuck in quicksand—you're still welcome to ask us a question (though we recommend calling or shouting first!).
- A few additional reminders for onsite behavior:
    - Keep shared spaces tidy—clean up after yourself in the break areas.
    - Please mute your devices during sessions to minimize distractions.
    - Avoid making personal phone calls in common areas—use designated quiet zones if you need to step away.
- Additionally, please remember to put any dishes in the sink before 2 p.m., as Lizbeth will have already finished for the day. If you’re feeling unwell, kindly inform Ingrid or myself via email.

Learning Objectives

- Understand the concept of databases and relational databases .
- Perform basic operations within databases.
- Analyze how relational databases are used to manage data.

What is a Database ?

- A **database** is an organized collection of data stored electronically.
- **Databases** allow us to:
  - Store large amounts of information efficiently.
  - Quickly retrieve specific pieces of data.
  - Organize and manipulate data in ways that help solve real-world problems.

Types of Databases

- There are different types of databases, but the most common type is the **relational database**.
- **Relational Database**: Stores data in tables (rows and columns), where each table represents a group of related information (e.g., one table for students, another for courses).
- **Non-relational Database**: Stores data in a more flexible format (e.g., JSON, NoSQL). Often used in big data and real-time applications.

What is a Relational Database

- A **relational database** stores data in a series of tables.
  - Each table represents a specific type of data (e.g., a table for students, a table for classes).
- Each **row** in a table is a record, and each **column** is a field (e.g., student name, ID, or grade).
- Relational databases allow us to establish relationships between different tables using keys.

Tables & Keys

- **Tables**: Data is stored in rows and columns, similar to how you would organize information in a spreadsheet.
  - **Rows** represent individual records (e.g., a student's information).
  - **Columns** represent attributes or fields (e.g., name, age, or ID number).

Tables & Keys

- **Keys**: special fields that help us uniquely identify records and link tables
  - **Primary Keys:** A unique identifier for each record in a table (e.g., Student ID).
  - **Foreign Keys:** A field that links one table to another (e.g., linking Student ID in the “Students” table to the “Courses” table).

Example Breakdown

- Let’s say you are running a school’s database system. You have two main tables:

    1. **Students Table**: Stores each student’s personal details, like name, student ID, and age.

    2. **Courses Table**: Stores information about courses, like course name and course ID.

Example

- In the “Students” table:

Student ID	Name	Age
001	John Doe	16

- In the “Courses” table:

Course ID	Student ID	Course Name
C101	001	Math

Why Use Relational Databases ?

- **Efficiency**:
  - Relational databases minimize duplication of data.
- **Consistency**:
  - Changes made to a piece of data in one place (like updating a student's name) are automatically reflected in all related tables, ensuring the data stays consistent.
- **Querying**:
  - Relational databases allow you to query (ask questions of) the data easily.

SQL

- **SQL (Structured Query Language):** The language used to interact with relational databases.
- **With SQL, you can:**
  - **CREATE** tables to store new information.
  - **INSERT** data into tables.
  - **SELECT** data to retrieve information.
  - **UPDATE** data to change records.
  - **DELETE** data that is no longer needed.

Q & A SECTION

Please use this time to ask any questions relating to the topic, should you have any.

Thank you for attending