



Course: Data Base
Semester: 1st term 2025/2026

Lecturers: Dr. Nehal El Azaly, Dr. Dina Abdelhafiz

Tutorial 3: **Introduction to Database** **Review on Lectures 1, 2, 3, and 4**

Part 1 – Introduction to Databases

- Databases store organized data or related data in tables. Each table has columns (fields) and rows (records).
- Databases can be easily accessed, managed, and updated.
- In Microsoft Access, a database consists of multiple tables, each representing a real-world entity.
- Design View allows users to define the structure of tables, including field names, data types, and field properties.
- The Relationship Window is a graphical interface that displays how tables are connected in Microsoft Access.

Example:

- A 'Students' table might contain fields like StudentID, Name, and Age.
- Each row represents one student's information.

Part 2 – Components of a Database Management System (DBMS)

- The Database Management System (DBMS).
- A DBMS is software that helps store, retrieve, and update this data easily.
- DBMS Software such as MySQL, Oracle, and Access.

DBMS components (hardware, software, data, and users):

- Data – the information stored in tables.
 - Hardware – physical devices storing the data.
 - Software – the DBMS itself, such as Microsoft Access.
 - Users – database designers, developers, and end-users
-
- Relationships define how tables in a database are connected.
 - They reduce redundancy and ensure consistency.
 - Primary Key PK : Unique identifier for each record. Must not be blank (empty field) and must be given.
 - Foreign Key FK: Links data between tables. Key that exist as primary key in another table.





- Relationship window a graphical interface in Access that allows linking tables.
- A junction table is used to implement many-to-many relationships. It connects two tables using foreign keys from both.

Example:

- Students(StudentID PK)
- Courses(CourseID PK)
- Enrollments(StudentID FK, CourseID FK)

Each record in Enrollments links one student to one course.

- Referential integrity ensures data consistency across related tables by preventing orphan records. For example, Access prevents deleting a customer record if that customer has orders.

Example:

ID (PK)	Name	Age
1	Ahmed	22
2	Sara	21

- The three relationship types introduced were:

Type	Description	Example
One-to-One	Each record in Table A matches one in Table B	Employee → ID Card
One-to-Many	One record in A matches multiple in B	Customer → Orders
Many-to-Many	Multiple records in A match multiple in B	Students ↔ Courses

Relationship

One-to-One Relationship

Primary Key uniquely identifies each record in a table. It cannot contain duplicates or null values.

Foreign Key is a field in one table that refers to a Primary Key in another, establishing a relationship.

- Definition: **Each record in one table corresponds to only one record** in another.
- Example: Each employee has one assigned company car.

One-to-Many Relationship

- Definition: A single record in one table relates to multiple records in another.
- Example: One Customer can have many Orders.





Many-to-Many Relationship

- **Definition:** Multiple records in one table relate to multiple records in another.
- **Example:** Students can register in many Courses; each Course can have many Students

Part 6-- Applying Constraints

1. Creating a NOT NULL Constraint

The **NOT NULL** constraint ensures that a field must always have a value — it cannot be left empty.

2. Creating a UNIQUE Constraint

The **UNIQUE** constraint ensures that all values in a field are different (no duplicates)

['Indexed: Yes (No Duplicates)' property in Design View]

3. Creating a Validation Rule

The validation constraint restricts the values that can be entered into a field.

- Validation Rule: ="Male" Or "Female"

