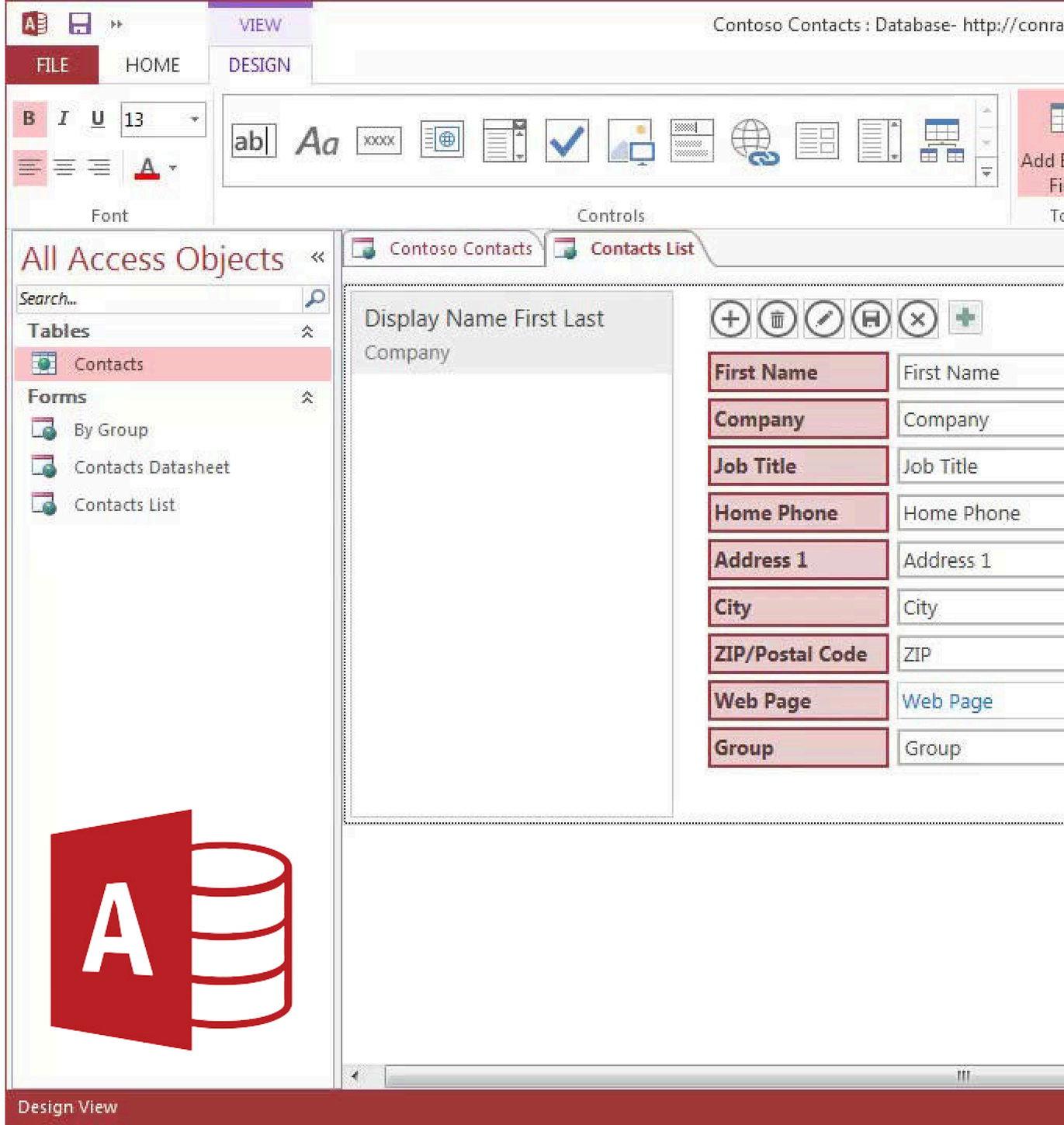
CHAPTER 18

Data Manipulation

Microsoft® Access 2016



Data Manipulation

Is the process of **importing, organizing, and transforming** raw data to make it more useful and insightful. This includes **creating and managing relationships** between different data tables, cleaning the data to correct errors and standardize formats, and using queries to filter and sort the data according to specific criteria.

Create a Database

It is a structured collection of data stored in tables, designed to be easily accessed, managed, and manipulated through a graphical user interface.

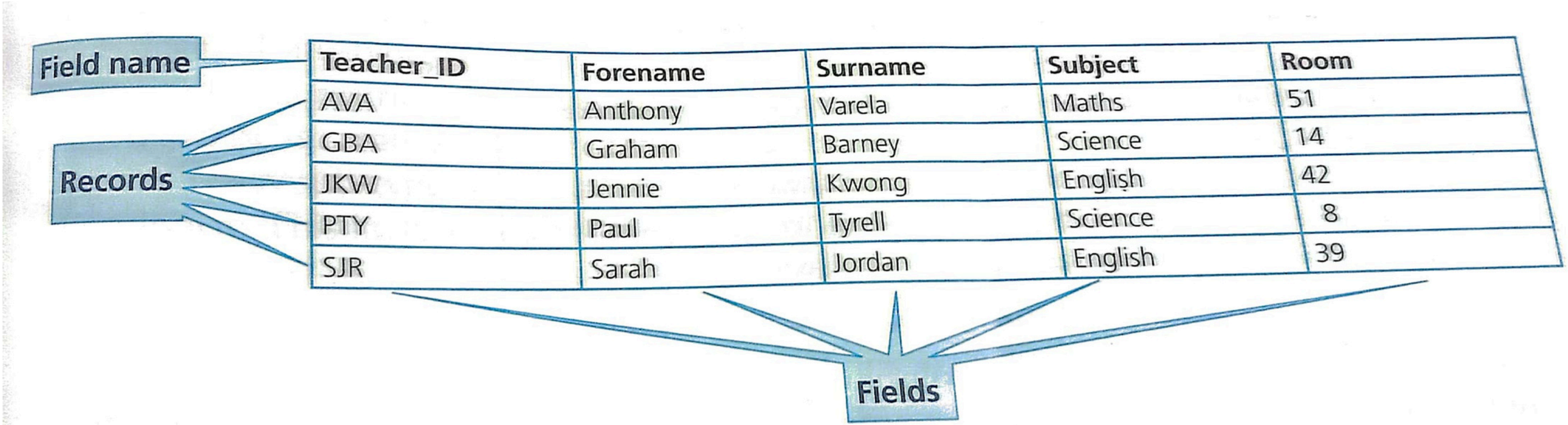
Example

A database for a small business, you might have tables for **Customers, Orders, Products, and Suppliers**. These tables can be linked by common fields like **CustomerID and ProductID,** enabling complex queries and reports. Users can create forms for data entry, such as a form to **input new customer information**, and generate reports to analyze sales trends or inventory levels.

The database will be store by using:

- **Field** - is a single item of data, such as FirstName, Date of Birth.
- **Record** - is a collection of fields, such as the information about one person or one item that may contain different data types
- **File** - is an organised collection of records, usually where all the records are organized so that they can be stored together.

Example



Teacher_ID	Forename	Surname	Subject	Room
AVA	Anthony	Varela	Maths	51
GBA	Graham	Barney	Science	14
JKW	Jennie	Kwong	English	42
PTY	Paul	Tyrell	Science	8
SJR	Sarah	Jordan	English	39

Example

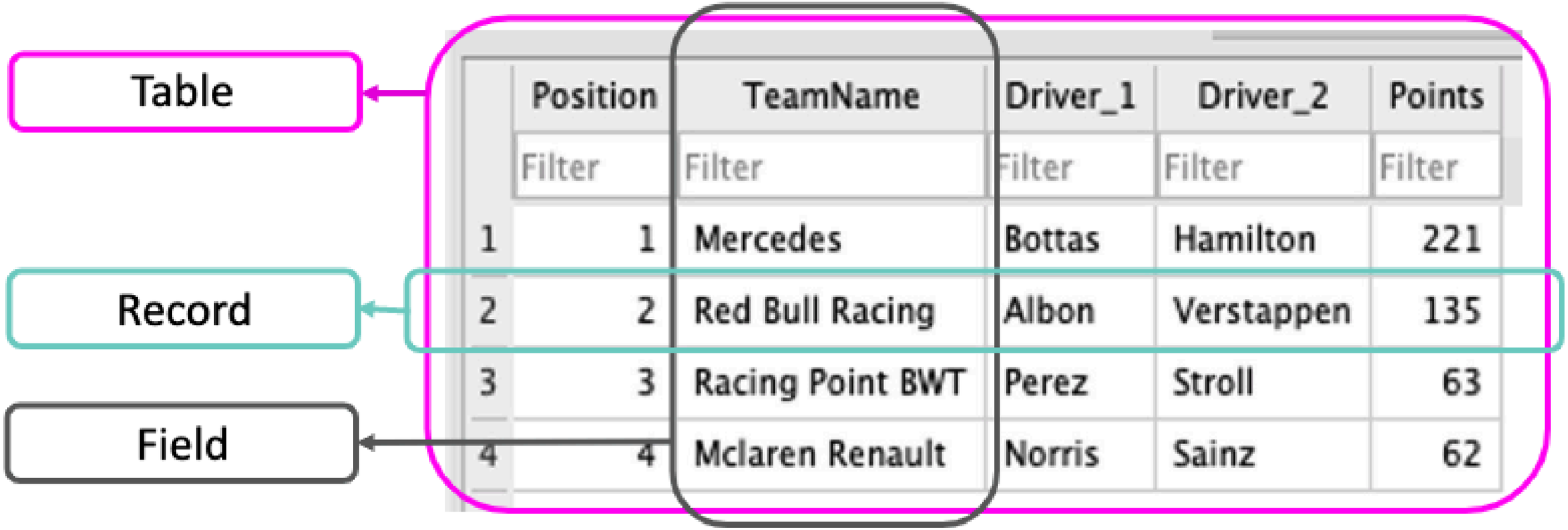
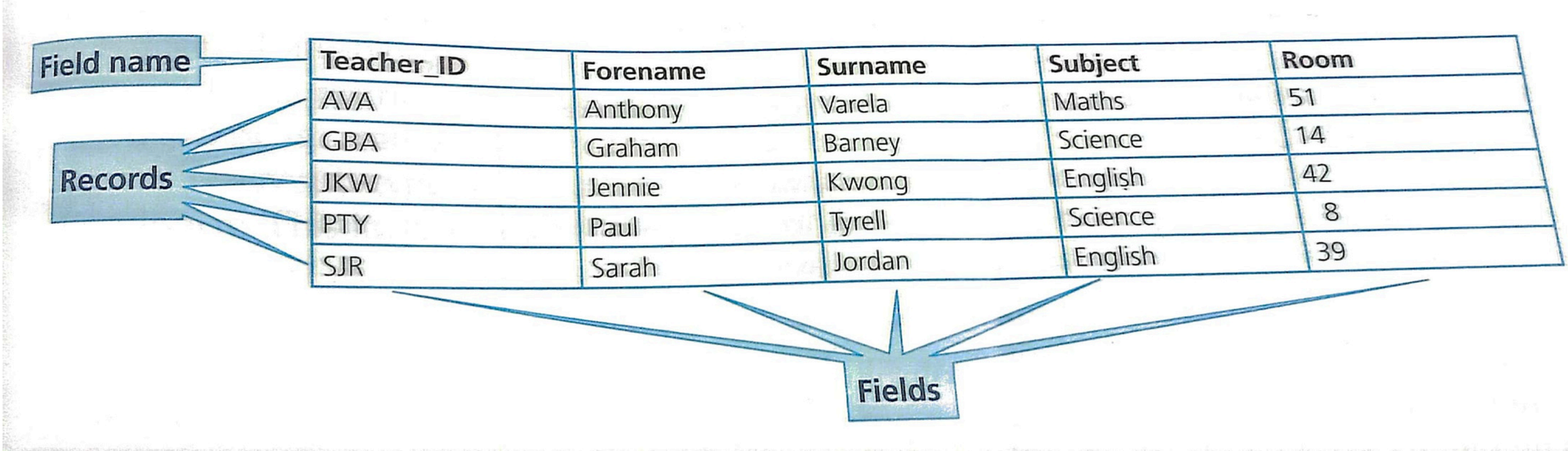


Table
Record
Field
Position
TeamName
Driver_1
Driver_2
Points
Filter
Filter
Filter
Filter
Filter
1 1 Mercedes Bottas Hamilton 221
2 2 Red Bull Racing Albon Verstappen 135
3 3 Racing Point BWT Perez Stroll 63
4 4 Mclaren Renault Norris Sainz 62

Two types of Database

1. **FLAT FILE DATABASE**
    - Is a database stores its data in one table, which is organized by rows and columns.

Flat-file database



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- consist of one table, which is organized by rows and columns.

Two types of Database

2. **RELATIONAL DATABASES**

- Is a database stores data in more than one linked table, stored in a file.
- Each table will have a key field. Most tables will have a primary key field that holds unique data (no two records are the same in this field)

Key fields (Primary and Foreign Key)

2. **PRIMARY KEY**

- It is a unique identifier for each record in a database table. It ensures that **no two rows** have the same value in that column and it **cannot contain NULL values**. Each table can only have **one primary key**, which is used to uniquely identify each record.

Key fields (Primary and Foreign Key)

1. PRIMARY KEY

📋 Table 1: Students

StudentID (PK)	Name	Grade
1	Maria Santos	10
2	John Reyes	11
3	Anna Villanueva	12

> ✅ `StudentID` is the **Primary Key**. It uniquely identifies each student.

Key fields (Primary and Foreign Key)

2. **FOREIGN KEY**

- It is a field in one table that refers to the primary key in another table. It is used to create a relationship between two tables and allows data to be linked across them. It can duplicate values and can be NULL, it must match an existing value in the referenced table's primary key column.

Key fields (Primary and Foreign Key)

2. **FOREIGN KEY**

📋 Table 2: Enrollments

EnrollmentID (PK)	StudentID (FK)	Subject
101	1	Computer Science
102	2	Math
103	3	English
104	1	Science

🔗 `StudentID` here is a **Foreign Key** that refers to `StudentID` in the **Students** table.

It shows which student is enrolled in which subject.

Relational database

Teacher_ID	Forename	Surname	Subject	Room	Student_ID	Student_FName	Student_SName
AVA	Anthony	Varela	Maths	51	G12345	Jasmine	Hall
AVA	Anthony	Varela	Maths	51	G12346	James	Ling
AVA	Anthony	Varela	Maths	51	G12348	Addy	Paredes
AVA	Anthony	Varela	Maths	51	G12349	Hayley	Lemon
AVA	Anthony	Varela	Maths	51	G12351	Jennie	Campbell
GBA	Graham	Barney	Science	14	G12345	Jasmine	Hall
GBA	Graham	Barney	Science	14	G12348	Addy	Paredes
GBA	Graham	Barney	Science	14	G12349	Hayley	Lemon
JKW	Jennie	Kwong	English	42	G12345	Jasmine	Hall
JKW	Jennie	Kwong	English	42	G12349	Hayley	Lemon
JKW	Jennie	Kwong	English	42	G12351	Jennie	Campbell
PTY	Paul	Tyrell	Science	8	G12346	James	Ling
PTY	Paul	Tyrell	Science	8	G12351	Jennie	Campbell
SJR	Sarah	Jordan	English	39	G12346	James	Ling
SJR	Sarah	Jordan	English	39	G12348	Addy	Paredes

Relational database

Teachers' table

Teacher_ID	Forename	Surname	Subject	Room
AVA	Anthony	Varela	Maths	51
GBA	Graham	Barney	Science	14
JKW	Jennie	Kwong	English	42
PTY	Paul	Tyrell	Science	8
SJR	Sarah	Jordan	English	39

Relational database

Students' table

Student_ID	Student_FName	Student_SName	English	Maths	Science
G12345	Jasmine	Hall	JKW	AVA	GBA
G12346	James	Ling	SJR	AVA	PTY
G12348	Addy	Paredes	SJR	AVA	GBA
G12349	Hayley	Lemon	JKW	AVA	GBA
G12351	Jennie	Campbell	JKW	AVA	PTY

Data Types and Sub Types

2. **RELATIONAL DATABASES**

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