

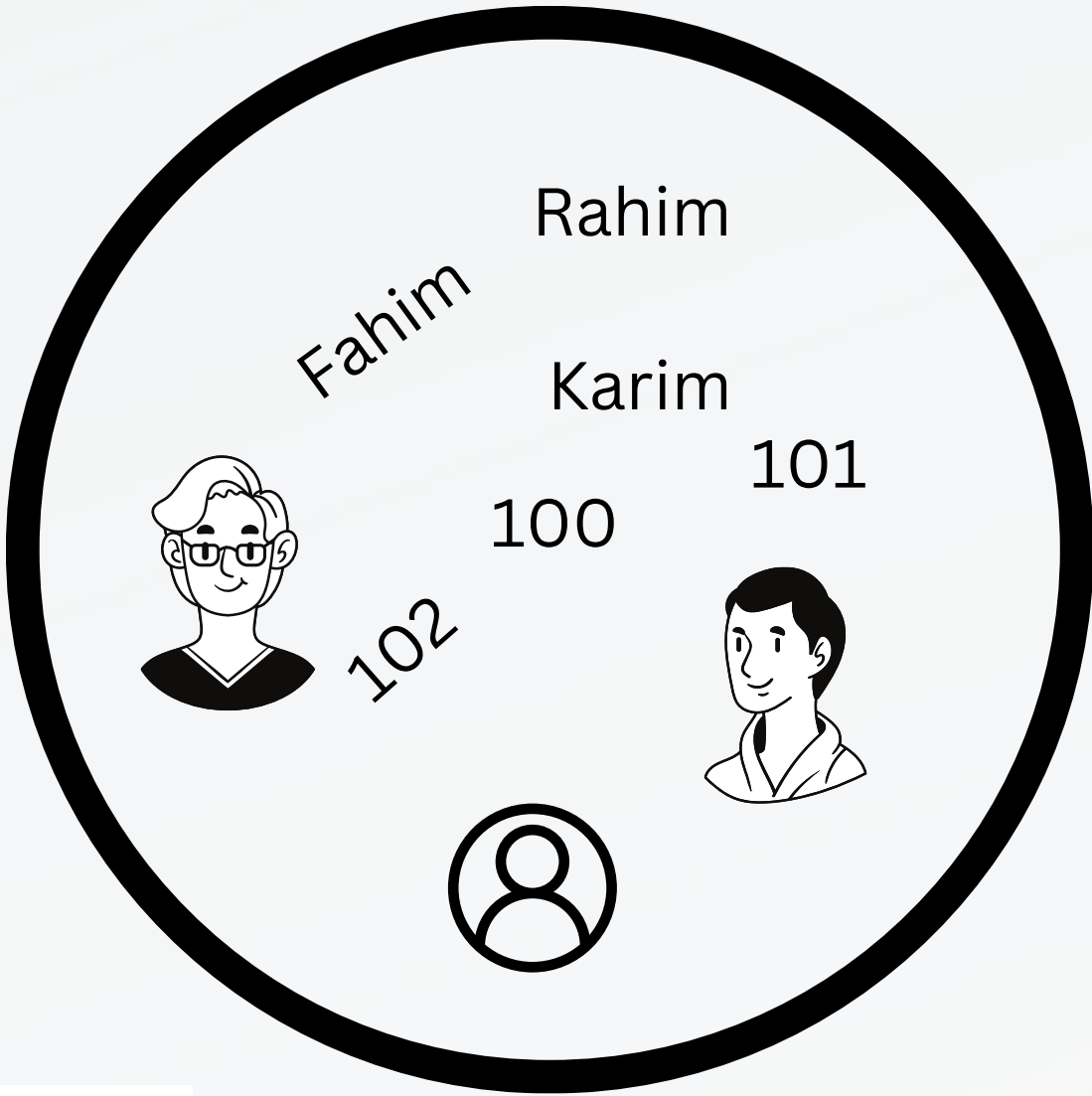


OUTLINES

- What is SQL, its applications, and types of databases (Relational vs. Non-relational)
- Setting up MySQL or SQL server
- Tables, Rows, Columns, and Keys (Primary, Foreign, Composite)
- SELECT statements, filtering with WHERE
- functions like COUNT(), SUM(), AVG(), MIN(), and MAX() | IN, NOT IN, AS

DATA VS INFORMATION

Data



Processing



information

Name	Roll	Image
Rahim	100	
Karim	101	
Fahim	102	

DATABASE

A database is an organized collection of structured information, or data, typically stored electronically in a computer system.

It is also used to organize the data in the form of a table, schema, views, and reports, etc.

For example:

The college Database organizes the data about the **admin, staff, students and faculty etc.**

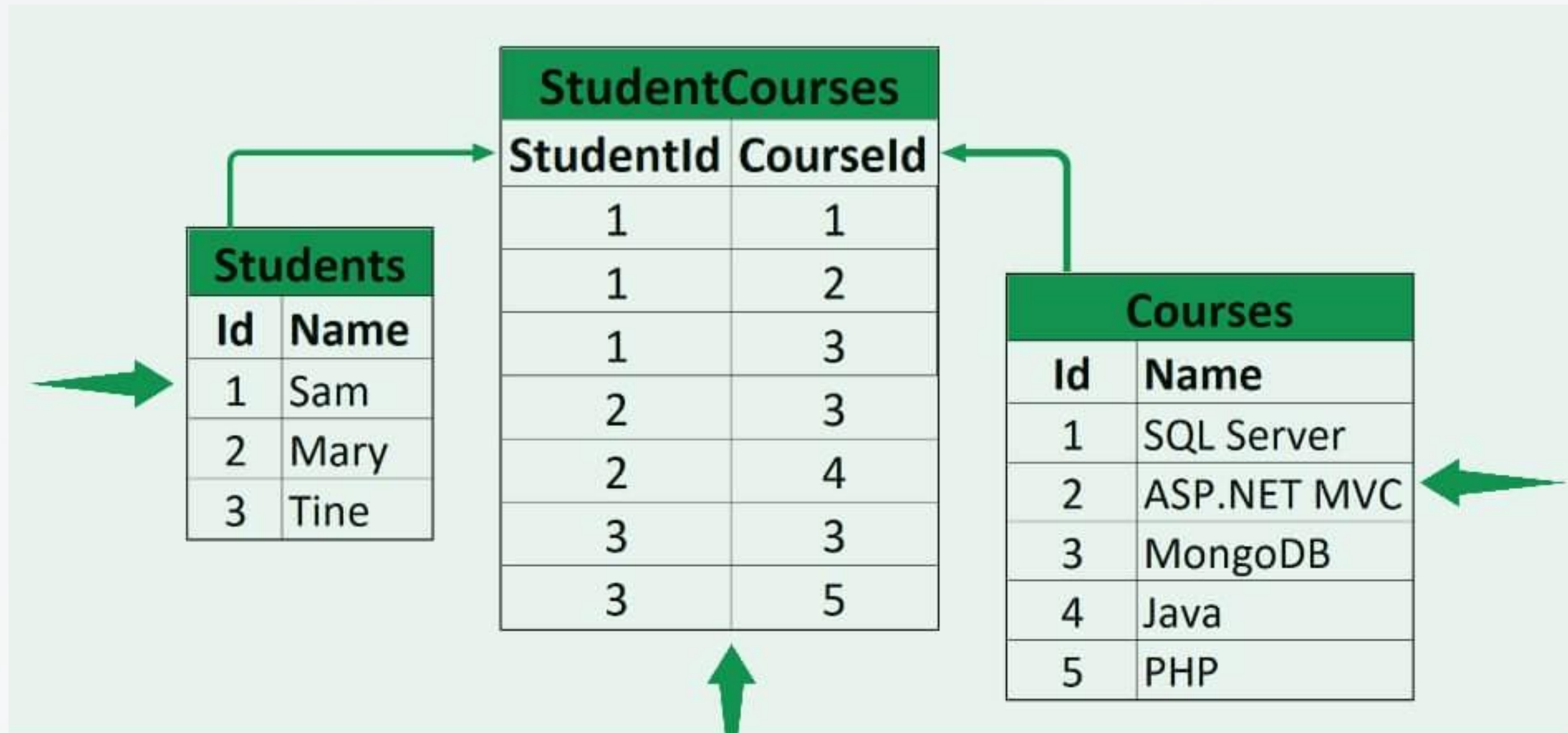
DATABASE

Two types of Database

1. Relational Database
2. Non Relational Database

DATABASE

Relational Database :



DATABASE

Non Relational Database :



Relational

Posts (id, Title)

1	Title
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Comments

01	1	Comment 1
02	1	Comment 2

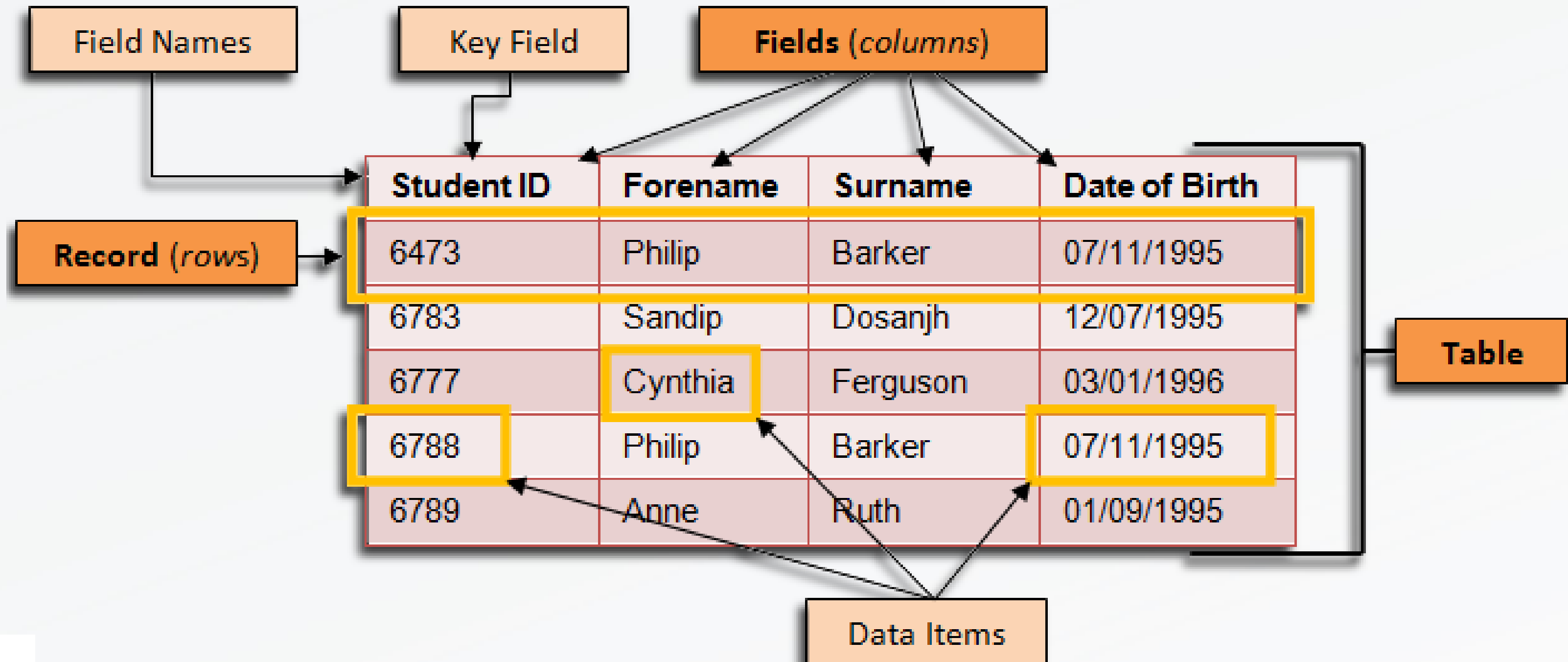
Non-relational

Posts (id, Title, Comments/Image)

1	Title	Comment 1
		Comment 2
		Comment 3
2	Title 2	Image

DATABASE

Elements of Database :



DATABASE

Keys :

It is used to uniquely identify any record or row of data from the table.

It is also used to establish and identify relationships between tables.

Types of Keys :

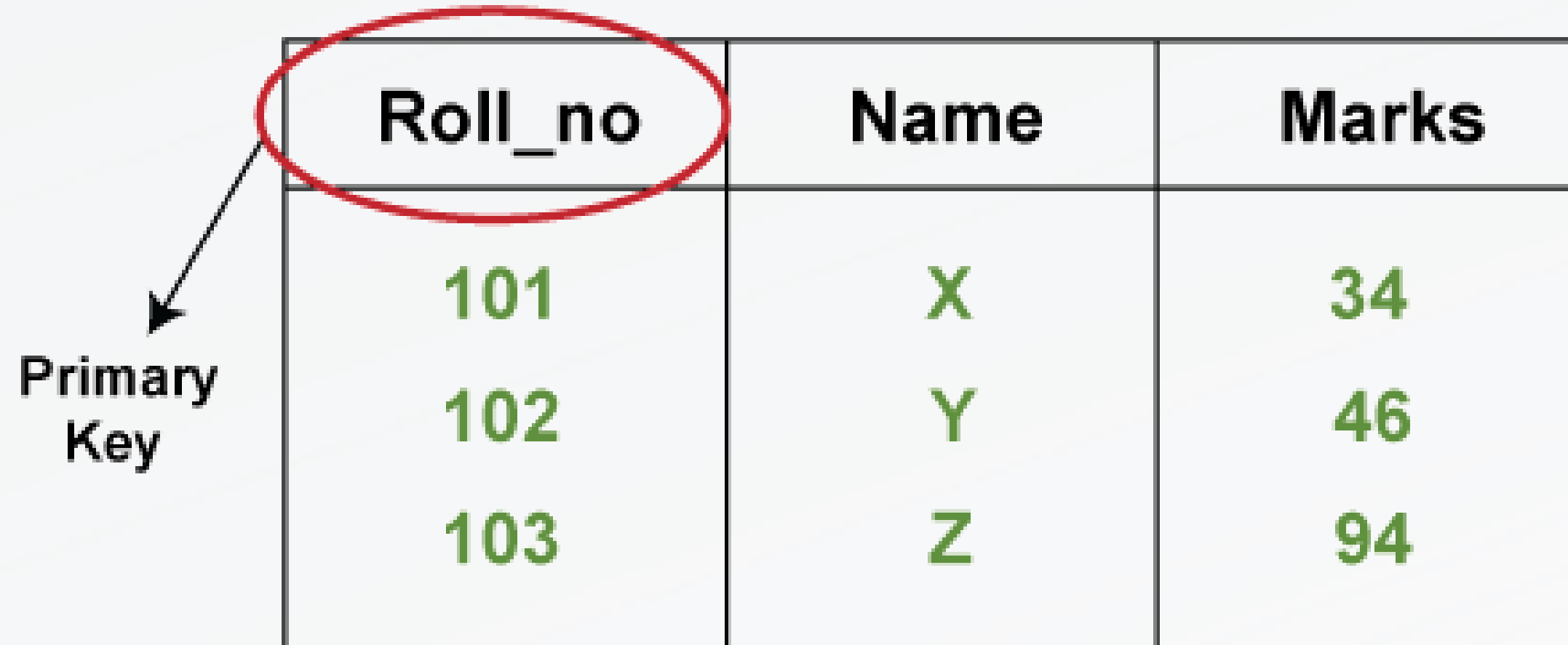
- 1.Primary key
- 2.Foreign key
- 3.Composite key

DATABASE

Primary Key :

A primary key is the column or columns that contain values that uniquely identify each row in a table. A database table must have a primary key for Optim to insert, update, restore, or delete data from a database table.

STUDENT_DETAILS



Roll_no	Name	Marks
101	X	34
102	Y	46
103	Z	94

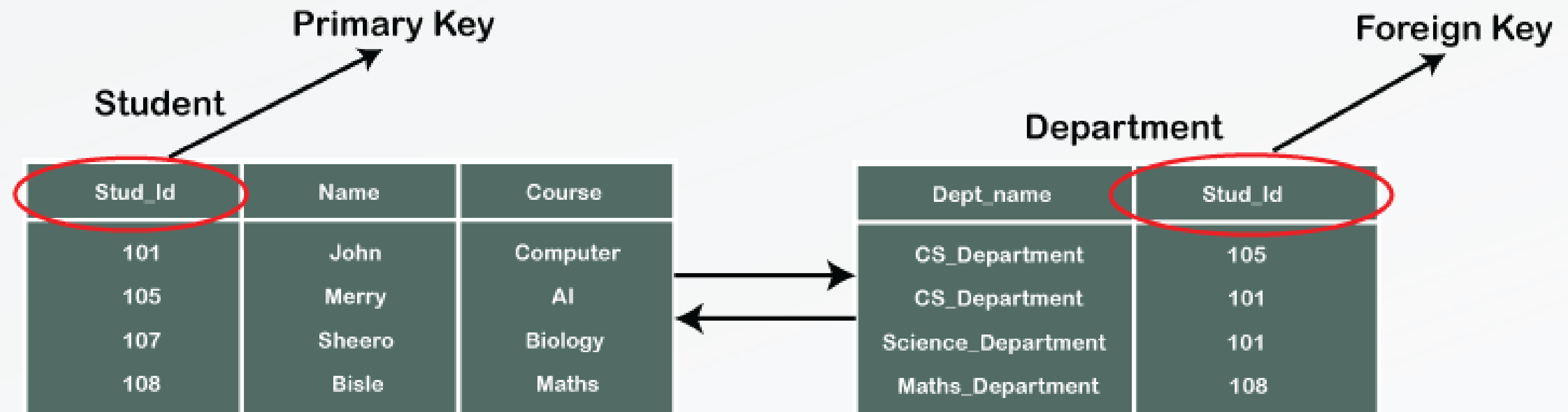
DATABASE

Foreign Key :

A FOREIGN KEY is a field (or collection of fields) in one table, that refers to the PRIMARY KEY in another table.

Child table --> The table with the foreign key

Parent table ---> The table with the primary key



DATABASE

Composite Key :

A composite key is a candidate key that consists of two or more fields that together uniquely identify a table.

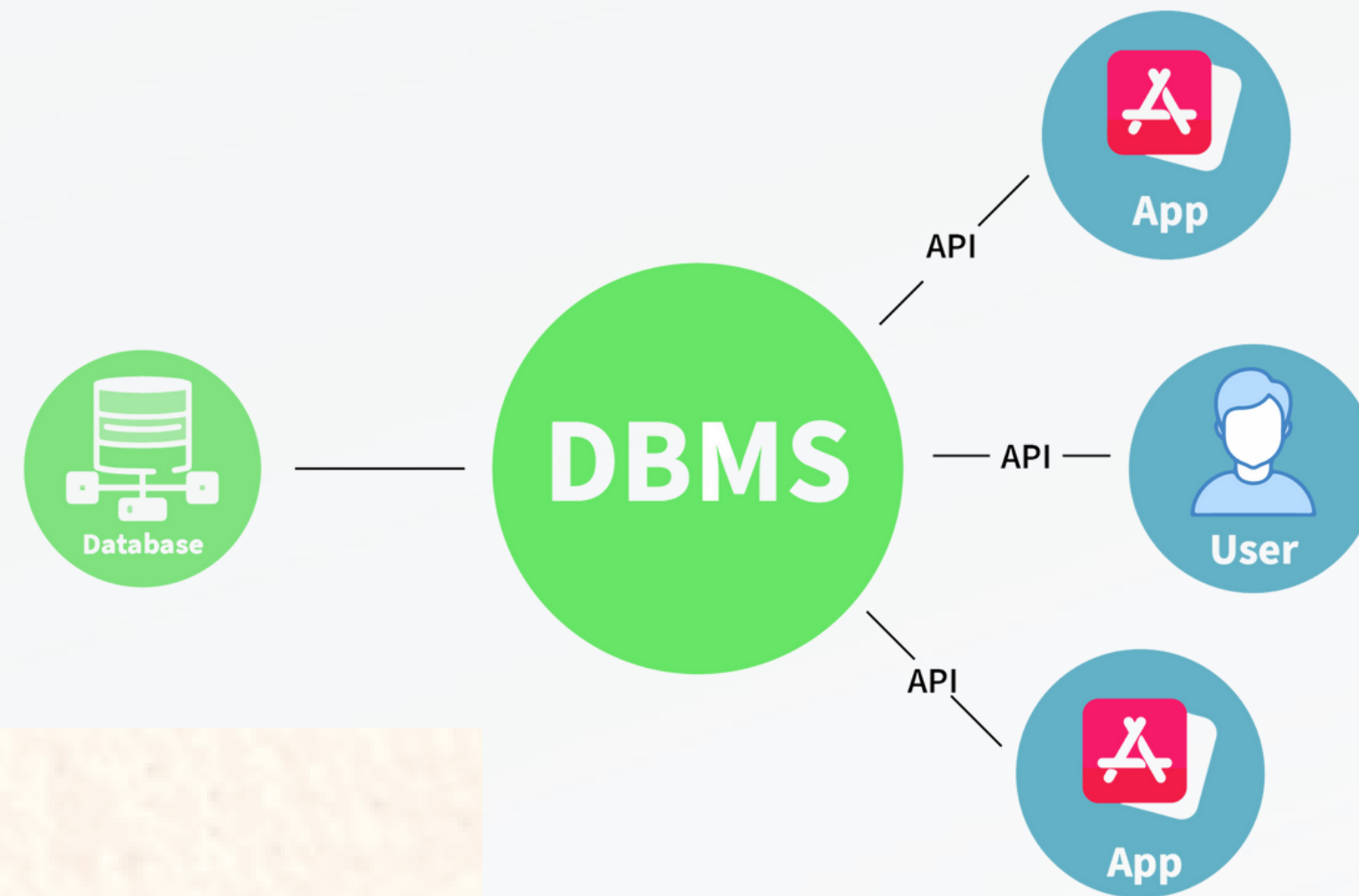
Composite Key
A

Cust_Id	Order_Id	Prod_code	Prod_name
001	121	P 12	P
003	123	P 10	Q
005	125	P 3	R

DBMS

A database management system (DBMS) is a software tool that enables users to manage a database easily.

It allows users to access and interact with the underlying data in the database.



DBMS

Advantages :

- 1.Data modeling
- 2.Data storage and retrieval
- 3.Concurrency control
- 4.Data integrity and security
- 5.Backup and recovery:

Difference between DBMS vs RDBMS

DBMS	RDBMS
DBMS stores data as a file.	RDBMS stores data in tabular form.
Data elements need to be accessed individually.	Multiple data elements can be accessed at the same time.
There is no relationship between data.	Data is stored in the form of tables which are related to each other.
Normalization is not present.	Normalization is present.
It deals with a small quantity of data.	It deals with a large amount of data.

SQL

Structured Query Language (SQL) is a standardized programming language that is used to manage relational databases and perform various operations on the data in them.

SQL Syntax:

Some Important SQL commands:

- **SELECT** - extracts data from a database
- **UPDATE** - updates data in a database
- **DELETE** - deletes data from a database
- **INSERT INTO** - inserts new data into a database
- **CREATE DATABASE** - creates a new database
- **ALTER DATABASE** - modifies a database
- **CREATE TABLE** - creates a new table
- **ALTER TABLE** - modifies a table
- **DROP TABLE** - deletes a table
- **CREATE INDEX** - creates an index (search key)
- **DROP INDEX** - deletes an index

Create

```
CREATE DATABASE MyDatabase;
```

```
CREATE INDEX IndexName  
ON TableName(col1);
```

```
CREATE TABLE OurTable (  
    id int,  
    name varchar(12)  
);
```

Delete

```
DROP DATABASE OurDatabase;
```

```
DROP TABLE OurTable;
```

Update Table

```
UPDATE OurTable  
SET col1 = 56  
WHERE col2 = 'something';
```

Delete Records

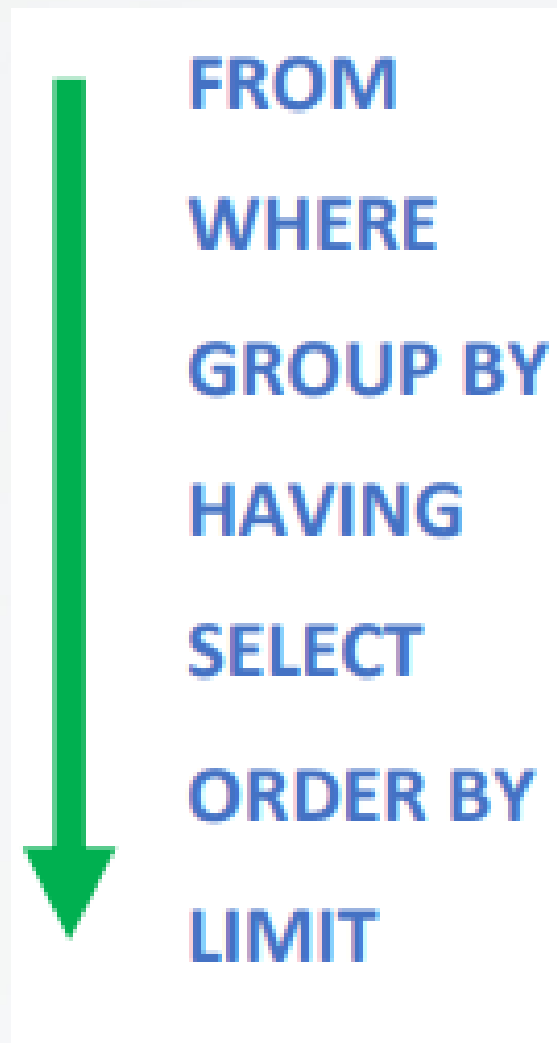
```
DELETE FROM OurTable  
WHERE col1 = 'something';
```

Add/Remove Column

```
ALTER TABLE OurTable  
ADD col5 int;
```

```
ALTER TABLE OurTable  
DROP COLUMN col5;
```

Order of Execution



Arithmetic Operators

Operator	Description
$\%$	Modulous $[A \% B]$
$/$	Division $[A / B]$
$*$	Multiplication $[A * B]$
$-$	Subtraction $[A - B]$
$+$	Addition $[A + B]$

Bitwise Operators

Operator	Description
\wedge	Bitwise Exclusive OR (XOR) $[A \wedge B]$
$ $	Bitwise OR $[A B]$
$\&$	Bitwise AND $[A \& B]$

Comparison Operators

Operator	Description
< >	Not Equal to [A < > B]
<=	Less than or equal to [A <= B]
>=	Greater than or equal to [A >= B]
<	Less than [A < B]
>	Greater than [A > B]
=	Equal to [A = B]

Compound Operators

Operator	Description
*=	Bitwise OR equals [A = B]
^-=	Bitwise Exclusive equals [A ^= B]
&=	Bitwise AND equals [A &= B]
%=	Modulo equals [A %= B]
/=	Divide equals [A /= B]
=	Multiply equals [A= B]
-=	Subtract equals [A-= B]
+=	Add equals [A+= B]

Logical Operators

The Logical operators present in SQL are as follows:

- AND
- OR
- NOT
- BETWEEN
- LIKE
- IN
- EXISTS
- ALL
- ANY

```
SELECT * FROM Employee_Info  
WHERE City='Dhaka' OR City='Khulna';
```