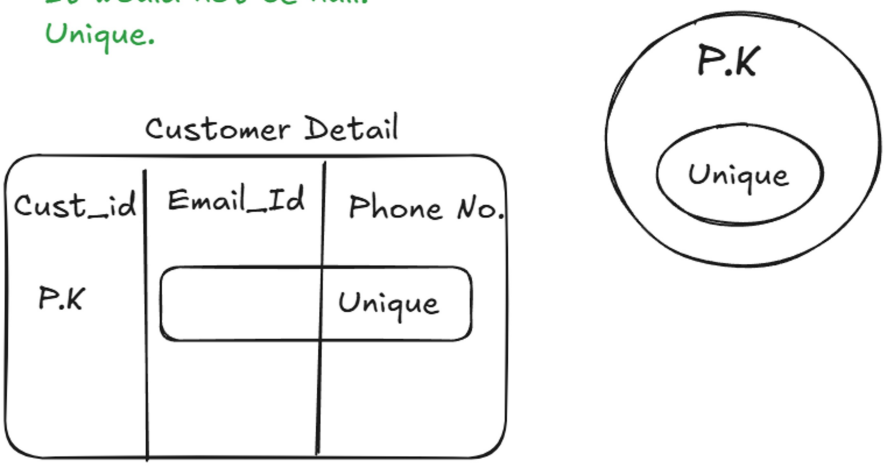
SQL Database Management - p4 - Lecture 7

SQL Database Management - p4

P.K vs Unique → no redundant data.

It would not be null.
Unique.




```
mysql> CREATE TABLE Patient(
    ->  patient_id int AUTO_INCREMENT,
    ->     firstName varchar(100),
    ->     lastName varchar(100),
    ->     birthDate Date DEFAULT '2000-01-01',
    ->     PRIMARY KEY(patient_id)
    -> );
Query OK, 0 rows affected (0.06 sec)

mysql> DESC Patient;
+------------+-------------+------+-----+------------+----------------+
| Field      | Type        | Null | Key | Default    | Extra          |
+------------+-------------+------+-----+------------+----------------+
| patient_id | int         | NO   | PRI | NULL       | auto_increment |
| firstName  | varchar(100) | YES  |     | NULL       |                |
| lastName   | varchar(100) | YES  |     | NULL       |                |
| birthDate  | date        | YES  |     | 2000-01-01 |                |
+------------+-------------+------+-----+------------+----------------+
4 rows in set (0.01 sec)
```

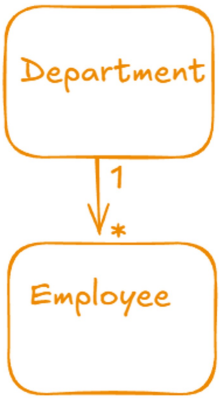
```
mysql> INSERT INTO Patient(patient_id , firstName , lastName , birthDate)
    -> VALUES(235543 , "Karan" , "Arora" , '1999-01-03');
Query OK, 1 row affected (0.01 sec)

mysql> SELECT * FROM Patient;
+------------+-----------+----------+------------+
| patient_id | firstName | lastName | birthDate  |
+------------+-----------+----------+------------+
|     235543 | Karan     | Arora    | 1999-01-03 |
+------------+-----------+----------+------------+
1 row in set (0.00 sec)

mysql> INSERT INTO Patient(firstName , lastName)
    -> VALUES("Manav" , "Sharma");
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM Patient;
+------------+-----------+----------+------------+
| patient_id | firstName | lastName | birthDate  |
+------------+-----------+----------+------------+
|     235543 | Karan     | Arora    | 1999-01-03 |
|     235544 | Manav     | Sharma   | 2000-01-01 |
+------------+-----------+----------+------------+
2 rows in set (0.00 sec)
```

SQL

Copy

```sql
-- Create the departments table
CREATE TABLE departments (
    department_id INT PRIMARY KEY,
    department_name VARCHAR(100)
);

-- Insert some departments
INSERT INTO departments (department_id, department_name) VALUES (1, 'Human Resources'),
(2, 'IT'), (3, 'Sales');

-- Create the employees table with a DEFAULT constraint on department_id
CREATE TABLE employees (
    employee_id INT AUTO_INCREMENT PRIMARY KEY,
    employee_name VARCHAR(100),
    department_id INT DEFAULT 1,  -- Default to Human Resources if not specified
    hire_date DATE,
    -- Add other relevant columns as needed
    FOREIGN KEY (department_id) REFERENCES departments(department_id)
);
DESC employees
-- Insert an employee without specifying department_id
INSERT INTO employees (employee_name, hire_date) VALUES ('John Doe', '2024-06-06');

-- Insert an employee specifying department_id
INSERT INTO employees (employee_name, department_id, hire_date) VALUES ('Jane Smith', 2,
'2024-06-06');
```

```
mysql> CREATE TABLE departments (
    ->     department_id INT PRIMARY KEY,
    ->     department_name VARCHAR(100)
    -> );
Query OK, 0 rows affected (0.07 sec)

mysql> DESC departments;
+-----------------+--------------+------+-----+---------+-------+
| Field           | Type         | Null | Key | Default | Extra |
+-----------------+--------------+------+-----+---------+-------+
| department_id   | int          | NO   | PRI | NULL    |       |
| department_name | varchar(100) | YES  |     | NULL    |       |
+-----------------+--------------+------+-----+---------+-------+
2 rows in set (0.02 sec)
```




```
mysql> SELECT * FROM departments;
+---------------+-----------------+
| department_id | department_name |
+---------------+-----------------+
|             1 | Human Resources |
|             2 | IT              |
|             3 | Sales           |
+---------------+-----------------+
```

```
mysql> CREATE TABLE employees (
    ->     employee_id INT AUTO_INCREMENT PRIMARY KEY,
    ->     employee_name VARCHAR(100),
    ->     department_id INT DEFAULT 1,  -- Default to Human Resources if not specified
    ->     hire_date DATE,
    ->     -- Add other relevant columns as needed
    ->     FOREIGN KEY (department_id) REFERENCES departments(department_id)
    -> );
Query OK, 0 rows affected (0.07 sec)

mysql> DESC employees;
+---------------+--------------+------+-----+---------+----------------+
| Field         | Type         | Null | Key | Default | Extra          |
+---------------+--------------+------+-----+---------+----------------+
| employee_id   | int          | NO   | PRI | NULL    | auto_increment |
| employee_name | varchar(100) | YES  |     | NULL    |                |
| department_id | int          | YES  | MUL | 1       |                |
| hire_date     | date         | YES  |     | NULL    |                |
+---------------+--------------+------+-----+---------+----------------+
4 rows in set (0.01 sec)
```

Foreign Key : Connected with Department.

In order to join we must have pair of P.K & F.K

P.K 1

department_id	department_name
1	Human Resources
2	IT
3	Sales

P.K * F.K

employee_id	employee_name	dpt_id	hire_date
1	John Doe	1	2024-06-06
2	Jane Smith	2	2024-06-06

dpt_id === 1 [default]

```
FOREIGN KEY (department_id) REFERENCES departments(department_id)
```

3. Unique Key Constraint

A Unique Key constraint ensures that all values in a column or a set of columns the entire table. It is used to prevent duplicate values in the specified columns integrity.

Consider an employee management system with two tables: `employees` and `employees` table has a column called `email` that must be unique for each em duplicate email addresses.

```sql
-- Create the employees table
CREATE TABLE employees (
    employee_id INT AUTO_INCREMENT PRIMARY KEY,
    employee_name VARCHAR(100),
    email VARCHAR(255) UNIQUE,  -- Enforcing unique email addresses
    hire_date DATE,
    -- Add other relevant columns as needed
);
```

```
CREATE TABLE employees (
    employee_id INT AUTO_INCREMENT PRIMARY KEY,
    employee_name VARCHAR(100),
    email VARCHAR(255) UNIQUE,  -- Enforcing unique email addresses
    hire_date DATE
);
```

```
mysql> DESC employees;
+---------------+--------------+------+-----+---------+----------------+
| Field         | Type         | Null | Key | Default | Extra          |
+---------------+--------------+------+-----+---------+----------------+
| employee_id   | int          | NO   | PRI | NULL    | auto_increment |
| employee_name | varchar(100) | YES  |     | NULL    |                |
| email         | varchar(255) | YES  | UNI | NULL    |                |
| hire_date     | date         | YES  |     | NULL    |                |
+---------------+--------------+------+-----+---------+----------------+
4 rows in set (0.00 sec)
```

```
mysql> INSERT INTO employees(employee_name , email)
    -> VALUES("Deepika" , "deepika123@gmail.com");
Query OK, 1 row affected (0.01 sec)

mysql> SELECT * FROM employees;
+-------------+---------------+----------------------+-----------+
| employee_id | employee_name | email                | hire_date |
+-------------+---------------+----------------------+-----------+
|           1 | Deepika       | deepika123@gmail.com | NULL      |
+-------------+---------------+----------------------+-----------+
1 row in set (0.00 sec)

mysql> INSERT INTO employees(employee_name , email)
    -> VALUES("Bikash" , "barik.bikash@gmail.com");
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM employees;
+-------------+---------------+----------------------+-----------+
| employee_id | employee_name | email                | hire_date |
+-------------+---------------+----------------------+-----------+
|           1 | Deepika       | deepika123@gmail.com | NULL      |
|           2 | Bikash        | barik.bikash@gmail.com | NULL      |
+-------------+---------------+----------------------+-----------+
2 rows in set (0.00 sec)

mysql> INSERT INTO employees(employee_name , email)
    -> VALUES("Bikash" , "barik.bikash@gmail.com");
ERROR 1062 (23000): Duplicate entry 'barik.bikash@gmail.com' for key 'employees.email'
mysql>
```

3

```
mysql> INSERT INTO employees(employee_name , email)
    -> VALUES("Bikash" , "barik.bikash@gmail.com");
ERROR 1062 (23000): Duplicate entry 'barik.bikash@gmail.com' for key 'employees.email'
mysql> INSERT INTO employees(employee_name , email)
    -> VALUES("Bikash" , "barik.bikash123@gmail.com");
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM employees;
+-------------+---------------+--------------------------+-----------+
| employee_id | employee_name | email                    | hire_date |
+-------------+---------------+--------------------------+-----------+
|           1 | Deepika       | deepika123@gmail.com     | NULL      |
|           2 | Bikash        | barik.bikash@gmail.com   | NULL      |
|           4 | Bikash        | barik.bikash123@gmail.com | NULL      |
+-------------+---------------+--------------------------+-----------+
3 rows in set (0.00 sec)
```

Add - Matrimonial Ad.

Check Constraint

- Age : > BETWEEN 21 AND 35.
- Status : UNMARRIED

Job Status -

- Age limit
- Attempt Limit

4. Check Constraint

A Check constraint is used to limit the values that can be placed in a column. It ensu
values in a column satisfy a specific condition, thus maintaining data integrity and va

Consider a company's employee database with a table called `employees`. Suppose v
ensure that the salary of an employee is always greater than 0 and that the age of an
within a specific range (e.g., 18 to 65). We can use a Check constraint to enforce thes

SQL

```sql
-- Create the employees table with CHECK constraints
CREATE TABLE employees (
    employee_id INT AUTO_INCREMENT PRIMARY KEY,
    employee_name VARCHAR(100),
    age INT,
    salary DECIMAL(10, 2),
    hire_date DATE,
    -- Add other relevant columns as needed
    CHECK (age BETWEEN 18 AND 65),  -- Age must be between 18 and 65
    CHECK (salary > 0)              -- Salary must be greater than 0
);
```

```
mysql> CREATE TABLE employees(
    ->  emp_id int PRIMARY KEY auto_increment,
    ->     emp_name varchar(100),
    ->     age int,
    ->     salary Decimal(10,2),
    ->     hire_date DATE,
    ->     CHECK (age >=18 AND age <=65),
    ->     CHECK (salary > 0)
    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> DESC employees;
+-----------+---------------+------+-----+---------+----------------+
| Field     | Type          | Null | Key | Default | Extra          |
+-----------+---------------+------+-----+---------+----------------+
| emp_id    | int           | NO   | PRI | NULL    | auto_increment |
| emp_name  | varchar(100)  | YES  |     | NULL    |                |
| age       | int           | YES  |     | NULL    |                |
| salary    | decimal(10,2) | YES  |     | NULL    |                |
| hire_date | date          | YES  |     | NULL    |                |
+-----------+---------------+------+-----+---------+----------------+
```

```
mysql> INSERT INTO employees(emp_name , age , salary)
    -> VALUES("Danish" , 22 , 10000000.50);
Query OK, 1 row affected (0.01 sec)

mysql> SELECT * FROM employees;
+--------+----------+------+-------------+-----------+
| emp_id | emp_name | age  | salary      | hire_date |
+--------+----------+------+-------------+-----------+
|      1 | Danish   |   22 | 10000000.50 | NULL      |
+--------+----------+------+-------------+-----------+
1 row in set (0.00 sec)

mysql> INSERT INTO employees(emp_name , age , salary)
    -> VALUES("Bapun" , 29 , 25000000.00);
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM employees;
+--------+----------+------+-------------+-----------+
| emp_id | emp_name | age  | salary      | hire_date |
+--------+----------+------+-------------+-----------+
|      1 | Danish   |   22 | 10000000.50 | NULL      |
|      2 | Bapun    |   29 | 25000000.00 | NULL      |
+--------+----------+------+-------------+-----------+
2 rows in set (0.00 sec)

mysql> INSERT INTO employees(emp_name , age , salary)
    -> VALUES("XYZ" , 77 , 1121211.00);
ERROR 3819 (HY000): Check constraint 'employees_chk_1' is violated.
mysql> INSERT INTO employees(emp_name , age , salary)
    -> VALUES("XYZ" , 19 , -1121211.00);
ERROR 3819 (HY000): Check constraint 'employees_chk_2' is violated.
mysql>
```

5. Not Null Constraint

The `NOT NULL` constraint in SQL ensures that a column cannot have a `NULL` value. This constraint is used to enforce that specific columns always contain valid data, which is essential for maintaining data integrity.

Consider a customer relationship management (CRM) system with a table called `customers`. In this table, we want to ensure that the customer's name and email are always provided, as they are critical pieces of information.

```sql
-- Create the customers table with NOT NULL constraints
CREATE TABLE customers (
    customer_id INT AUTO_INCREMENT PRIMARY KEY,
    customer_name VARCHAR(100) NOT NULL, -- Customer name must always be provided
    customer_email VARCHAR(255) NOT NULL, -- Customer email must always be provided
    customer_phone VARCHAR(15),
    customer_address VARCHAR(255),
    -- Add other relevant columns as needed
);
```

DESC customers;

P.K == auto_increment
NOT NULL -- Default

```
insert into customers (customer_phone, customer_address) values (123456789, 'Delhi');
```

Action Output

	Time	Action	Message
43	21:32:47	desc customers	5 row(s) returned
44	21:36:23	insert into customers (customer_id, customer_name, customer_email, customer_phone, customer_address) v...	Error Code: 1136. Column count doesn't match value count at row 1
45	21:36:40	insert into customers (customer_name, customer_email, customer_phone, customer_address) values ('Bikas...	1 row(s) affected
46	21:36:52	select * from customers LIMIT 0, 300	1 row(s) returned
47	21:37:28	insert into customers (customer_phone, customer_address) values (123456789, 'Delhi')	Error Code: 1364. Field 'customer_name' doesn't have a default value

```
mysql> CREATE TABLE customers (
    ->     customer_id INT AUTO_INCREMENT PRIMARY KEY,
    ->     customer_name VARCHAR(100) NOT NULL,
    ->     customer_email VARCHAR(255) NOT NULL,
    ->     customer_phone VARCHAR(15),
    ->     customer_address VARCHAR(255)
    -> );
Query OK, 0 rows affected (0.03 sec)

mysql> DESC customers;
+------------------+--------------+------+-----+---------+----------------+
| Field            | Type         | Null | Key | Default | Extra          |
+------------------+--------------+------+-----+---------+----------------+
| customer_id      | int          | NO   | PRI | NULL    | auto_increment |
| customer_name *  | varchar(100) | NO   |     | NULL    |                |
| customer_email*  | varchar(255) | NO   |     | NULL    |                |
| customer_phone   | varchar(15)  | YES  |     | NULL    |                |
| customer_address | varchar(255) | YES  |     | NULL    |                |
+------------------+--------------+------+-----+---------+----------------+
5 rows in set (0.00 sec)
```

```
mysql> INSERT INTO Customers(customer_name , customer_email)
    -> VALUES("Bikash" , "barik.bikash@gmail.com");
Query OK, 1 row affected (0.01 sec)

mysql> SELECT * FROM Customers;
+-------------+---------------+------------------------+----------------+------------------+
| customer_id | customer_name | customer_email         | customer_phone | customer_address |
+-------------+---------------+------------------------+----------------+------------------+
|           1 | Bikash        | barik.bikash@gmail.com | NULL           | NULL             |
+-------------+---------------+------------------------+----------------+------------------+
1 row in set (0.00 sec)

mysql> INSERT INTO Customers(customer_name , customer_email)
    -> VALUES("Vinay" , "vinay.kumar@gmail.com");
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM Customers;
+-------------+---------------+------------------------+----------------+------------------+
| customer_id | customer_name | customer_email         | customer_phone | customer_address |
+-------------+---------------+------------------------+----------------+------------------+
|           1 | Bikash        | barik.bikash@gmail.com | NULL           | NULL             |
|           2 | Vinay         | vinay.kumar@gmail.com  | NULL           | NULL             |
+-------------+---------------+------------------------+----------------+------------------+
2 rows in set (0.00 sec)

mysql> INSERT INTO Customers(customer_name ,customer_phone)
    -> VALUES("XYZ" ,  9810367287);
ERROR 1364 (HY000): Field 'customer_email' doesn't have a default value
mysql>
```

```
mysql> CREATE TABLE customers (
    ->     customer_id INT AUTO_INCREMENT PRIMARY KEY,
    ->     customer_name VARCHAR(100) NOT NULL  DEFAULT "Unknown",
    ->     customer_email VARCHAR(255) NOT NULL DEFAULT "unknown@gmail.com",
    ->     customer_phone VARCHAR(15),
    ->     customer_address VARCHAR(255)
    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> DESC CUSTOMERS;
+------------------+--------------+------+-----+-------------------+----------------+
| Field            | Type         | Null | Key | Default           | Extra          |
+------------------+--------------+------+-----+-------------------+----------------+
| customer_id      | int          | NO   | PRI | NULL              | auto_increment |
| customer_name *  | varchar(100) | NO   |     | Unknown           |                |
| customer_email * | varchar(255) | NO   |     | unknown@gmail.com |                |
| customer_phone   | varchar(15)  | YES  |     | NULL              |                |
| customer_address | varchar(255) | YES  |     | NULL              |                |
+------------------+--------------+------+-----+-------------------+----------------+
5 rows in set (0.00 sec)
```

```
mysql> INSERT INTO Customers(customer_name ,customer_phone)
    -> VALUES("XYZ" , 9812238731);
Query OK, 1 row affected (0.01 sec)

mysql> SELECT * FROM Customers;
+-------------+---------------+--------------------+----------------+------------------+
| customer_id | customer_name | customer_email     | customer_phone | customer_address |
+-------------+---------------+--------------------+----------------+------------------+
|           1 | XYZ           | unknown@gmail.com | 9812238731     | NULL             |
+-------------+---------------+--------------------+----------------+------------------+
1 row in set (0.00 sec)
```

```
mysql> CREATE TABLE customer (
    ->     customer_id INT AUTO_INCREMENT PRIMARY KEY,
    ->     customer_name VARCHAR(100) NOT NULL  DEFAULT "Unknown",
    ->     customer_email VARCHAR(255) NOT NULL DEFAULT "unknown@gmail.com",
    ->     customer_phone VARCHAR(15),
    ->     customer_address VARCHAR(255)
    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> DESC customer;
+------------------+--------------+------+-----+-------------------+----------------+
| Field            | Type         | Null | Key | Default           | Extra          |
+------------------+--------------+------+-----+-------------------+----------------+
| customer_id      | int          | NO   | PRI | NULL              | auto_increment |
| customer_name    | varchar(100) | NO   |     | Unknown           |                |
| customer_email   | varchar(255) | NO   |     | unknown@gmail.com |                |
| customer_phone   | varchar(15)  | YES  |     | NULL              |                |
| customer_address | varchar(255) | YES  |     | NULL              |                |
+------------------+--------------+------+-----+-------------------+----------------+
5 rows in set (0.00 sec)
```

```
mysql> CREATE TABLE Product (
    ->     product_id INT AUTO_INCREMENT PRIMARY KEY,
    ->  product_name VARCHAR(100) NOT NULL  DEFAULT "Unknown"
    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> DESC product;
+--------------+--------------+------+-----+---------+----------------+
| Field        | Type         | Null | Key | Default | Extra          |
+--------------+--------------+------+-----+---------+----------------+
| product_id   | int          | NO   | PRI | NULL    | auto_increment |
| product_name | varchar(100) | NO   |     | Unknown |                |
+--------------+--------------+------+-----+---------+----------------+
2 rows in set (0.00 sec)
```

```
mysql> CREATE TABLE Territory (
    ->     territoryKey INT AUTO_INCREMENT PRIMARY KEY,
    ->  Continent VARCHAR(100) NOT NULL  DEFAULT "Unknown",
    ->     Country VARCHAR(100) NOT NULL  DEFAULT "Unknown",
    ->     Region VARCHAR(100) NOT NULL  DEFAULT "Unknown"
    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> DESC Territory;
+-------------+-------------+------+-----+---------+----------------+
| Field       | Type        | Null | Key | Default | Extra          |
+-------------+-------------+------+-----+---------+----------------+
| territoryKey | int         | NO   | PRI | NULL    | auto_increment |
| Continent   | varchar(100) | NO   |     | Unknown |                |
| Country     | varchar(100) | NO   |     | Unknown |                |
| Region      | varchar(100) | NO   |     | Unknown |                |
+-------------+-------------+------+-----+---------+----------------+
4 rows in set (0.00 sec)
```

```
mysql> CREATE TABLE Sales(
    ->  customerID INT,
    ->     productID int ,
    ->     territory_Key int ,
    ->     Quantity int,
    ->  order_date DATE,
    ->  FOREIGN KEY(customerID) REFERENCES customer(customer_id),
    ->     FOREIGN KEY(productID) REFERENCES Product(product_id),
    ->  FOREIGN KEY(territory_Key) REFERENCES Territory(territoryKey)
    -> );
Query OK, 0 rows affected (0.04 sec)

mysql> DESC Sales;
+--------------+------+------+-----+---------+-------+
| Field        | Type | Null | Key | Default | Extra |
+--------------+------+------+-----+---------+-------+
| customerID   | int  | YES  | MUL | NULL    |       |
| productID    | int  | YES  | MUL | NULL    |       |
| territory_Key | int  | YES  | MUL | NULL    |       |
| Quantity     | int  | YES  |     | NULL    |       |
| order_date   | date | YES  |     | NULL    |       |
+--------------+------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```