

Amrit Science Campus (ASCOL)

Assignment : Database Management System

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Database and Database Management System

- ❖ **Database:** A **database** is an organized collection of structured data stored electronically. It allows for efficient data storage, retrieval, and management, typically in tables. For examples: MySQL, Oracle, MongoDB
- ❖ **Database Management System (DBMS):** A **DBMS** is software that manages databases, providing tools for defining, querying, updating, and securing data. It acts as an interface between the database and users or applications, ensuring data integrity, security, and efficient access. For examples: SQL Server, PostgreSQL, MongoDB

Constraints

Constraints in a database are rules applied to columns in a table to enforce data integrity, accuracy, and reliability. They ensure that the data entered into the database adheres to certain conditions or rules.

Types of Constraints:

1. **Primary Key Constraint:**
 - Ensures each row in the table is unique and not null.
 - Example: PRIMARY KEY (ID)
2. **Foreign Key Constraint:**
 - Enforces a link between two tables by ensuring the value in a column matches a value in the referenced table.
 - Example: FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)
3. **Unique Constraint:**
 - Ensures that all values in a column or a set of columns are unique across the table.
 - Example: UNIQUE (Email)
4. **Not Null Constraint:**
 - Ensures that a column cannot contain NULL values.
 - Example: Name VARCHAR(100) NOT NULL
5. **Check Constraint:**
 - Ensures that all values in a column satisfy a specific condition.
 - Example: CHECK (Age >= 18)
6. **Default Constraint:**
 - Assign a column default value if no value is specified during data insertion.
 - Example: Salary DECIMAL(10, 2) DEFAULT 50000

Primary key

A **primary key** is a column or a combination of columns in a database table that uniquely identifies each row in that table. It ensures that no two rows have the same primary key value, maintaining the integrity and uniqueness of the data.

Key Characteristics:

- **Uniqueness:** Each value in the primary key column(s) must be unique.
- **Not Null:** A primary key cannot contain NULL values.
- **Single or Composite:** It can be a single column (e.g., ID) or a combination of columns (composite key, e.g., FirstName + LastName).

Example:

In a Student table:

```
CREATE TABLE Student (  
    UserID INT PRIMARY KEY,  
    Username VARCHAR(50),  
    Email VARCHAR(100)  
);
```

Foreign Key

A **foreign key** is a column or a set of columns in a database table that creates a relationship between two tables. It links the data in one table (the child table) to a primary key or unique key in another table (the parent table), enforcing referential integrity.

Key Characteristics:

- **Relationship:** The foreign key establishes a link between the child table and the parent table.
- **Referential Integrity:** Ensures that the values in the foreign key column must match values in the primary key or unique key column of the parent table, or be NULL.
- **Cascading Actions:** When a referenced row in the parent table is updated or deleted, the changes can cascade to the child table, depending on the defined rules.

Example:

In an Orders table, where each order is linked to a customer:

```
CREATE TABLE Orders (  
    OrderID INT PRIMARY KEY,  
    OrderDate DATE,  
    CustomerID INT,  
    FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)  
);
```

Few Commands of SQL

1. To Create a database:

- CREATE DATABASE databasename;
- Example: CREATE DATABASE college;

2. To Delete a database:

- DROP DATABASE databasename;
- Example: DROP DATABASE college;

3. To Create a Table:

- CREATE TABLE table_name(
 column1 datatype,
 column2 datatype,
 colulmn3 datatype,

);
- Example: CREATE TABLE student(
 Roll_no int primary key,
 Name varchar(50),
 Class int,
 College_name varchar(40)
);

4. To Delete a Table:

- DROP TABLE table_name;
- Example: DROP TABLE student;

5. To Alter Table:

- The ALTER TABLE statement is used to add, delete or modify columns in an existing table. Also used to add and drop various constraints on an existing table.

For adding primary key

```
ALTER TABEL table_name ADD PRIMARY KEY column_name;
```

For adding foreign key

```
ALTER TABEL table_name ADD FOREIGN KEY(column_name) REFERENCES  
table_name(column_name);
```

For changing datatype

```
ALTER TABEL table_name ALTER COUMN column_name TYPE new_data_type;
```

(like this...)

6. To display the schema of table

- desc table_name;

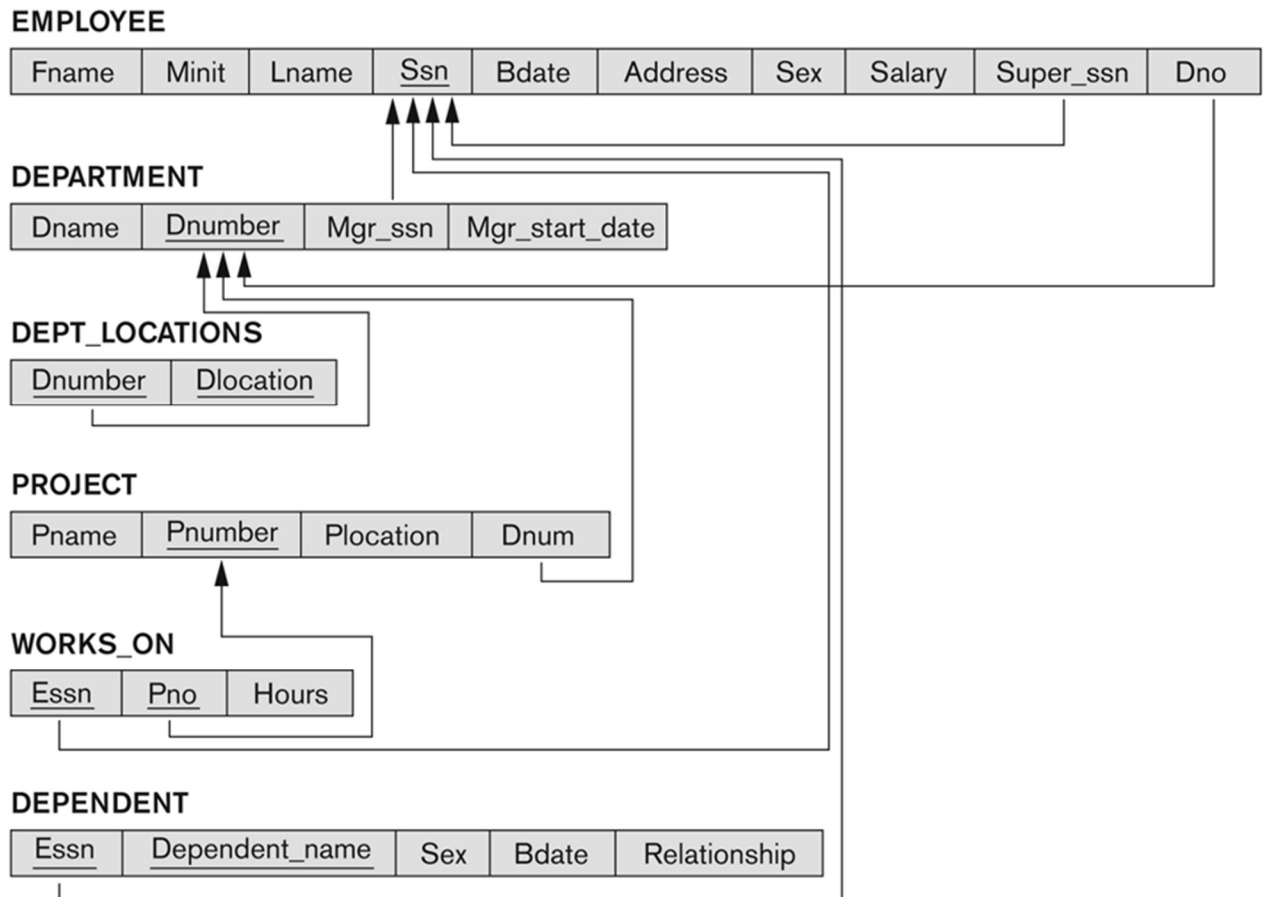
7. To display the data of table

- select * from table_name;

QN:

Figure 5.7

Referential integrity constraints displayed on the COMPANY relational database schema.



SQL:

```
create database arjun_company;
use arjun_company;
create table employee(Fname varchar(30), Minit varchar(40), Lname
varchar(40),Ssn int primary key, Bdate date, Address varchar(60), Sex
varchar(7), Salary decimal(6,2), Super_ssn int, Dno int);

create table department(Dname varchar(30),Dnumber int primary
key,Mgr_ssn int, Mgr_start_date date,
foreign key(mgr_ssn) references employee(ssn) on delete set NULL);

alter table employee add foreign key(Dno) references
department(Dnumber) on delete set NULL;
alter table employee add foreign key(Super_ssn) references
employee(ssn) on delete set NULL;

create table project(Pname varchar(50),Pnumber int primary key,
Plocation varchar(50),Dnum int,
foreign key(Dnum) references department(Dnumber) on delete set NULL);

create table works_on(Essn int, Pno int, Hours decimal(5,2),primary
key(Essn,Pno),
foreign key(Essn) references employee(ssn) on delete cascade,
foreign key(Pno) references project(Pnumber) on delete cascade);

create table dependent(Essn int, dependent_name varchar(50),Sex
varchar(7),Bdate date,Relationship varchar(40),primary
key(Essn,Dependent_name),
foreign key(Essn) references employee(ssn) on delete cascade);

create table dept_locations(Dnumber int,Dlocation varchar(40), primary
key(Dnumber,Dlocation),
foreign key(Dnumber) references department(Dnumber));
```

Schema:

```
MariaDB [(none)]> show databases;
```

Database
arjun
arjun_company
company
csit_arjun
information_schema
mysql
performance_schema
phpmyadmin
test

```
9 rows in set (0.001 sec)
```

```
MariaDB [(none)]> use arjun_company;  
Database changed
```

```
MariaDB [arjun_company]> desc employee;
```

Field	Type	Null	Key	Default	Extra
Fname	varchar(30)	YES		NULL	
Minit	varchar(40)	YES		NULL	
Lname	varchar(40)	YES		NULL	
Ssn	int(11)	NO	PRI	NULL	
Bdate	date	YES		NULL	
Address	varchar(60)	YES		NULL	
Sex	varchar(7)	YES		NULL	
Salary	decimal(6,2)	YES		NULL	
Super_ssn	int(11)	YES	MUL	NULL	
Dno	int(11)	YES	MUL	NULL	

```
10 rows in set (0.011 sec)
```

```
MariaDB [arjun_company]> desc department;
```

Field	Type	Null	Key	Default	Extra
Dname	varchar(30)	YES		NULL	
Dnumber	int(11)	NO	PRI	NULL	
Mgr_ssn	int(11)	YES	MUL	NULL	
Mgr_start_date	date	YES		NULL	

```
4 rows in set (0.010 sec)
```



```
MariaDB [arjun_company]> desc department;
```

Field	Type	Null	Key	Default	Extra
Dname	varchar(30)	YES		NULL	
Dnumber	int(11)	NO	PRI	NULL	
Mgr_ssn	int(11)	YES	MUL	NULL	
Mgr_start_date	date	YES		NULL	

```
4 rows in set (0.010 sec)
```

```
MariaDB [arjun_company]> desc dependent;
```

Field	Type	Null	Key	Default	Extra
Essn	int(11)	NO	PRI	NULL	
Dependent_name	varchar(50)	NO	PRI	NULL	
Sex	varchar(7)	YES		NULL	
Bdate	date	YES		NULL	
Relationship	varchar(40)	YES		NULL	

```
5 rows in set (0.010 sec)
```

```
MariaDB [arjun_company]> desc dept_locations;
```

Field	Type	Null	Key	Default	Extra
Dnumber	int(11)	NO	PRI	NULL	
Dlocation	varchar(40)	NO	PRI	NULL	

```
2 rows in set (0.008 sec)
```

```
MariaDB [arjun_company]> desc dept_locations;
```

Field	Type	Null	Key	Default	Extra
Dnumber	int(11)	NO	PRI	NULL	
Dlocation	varchar(40)	NO	PRI	NULL	

```
2 rows in set (0.008 sec)
```

```
MariaDB [arjun_company]> desc project;
```

Field	Type	Null	Key	Default	Extra
Pname	varchar(50)	YES		NULL	
Pnumber	int(11)	NO	PRI	NULL	
Plocation	varchar(50)	YES		NULL	
Dnum	int(11)	YES	MUL	NULL	

```
4 rows in set (0.014 sec)
```

```
MariaDB [arjun_company]> desc works_on;
```

Field	Type	Null	Key	Default	Extra
Essn	int(11)	NO	PRI	NULL	
Pno	int(11)	NO	PRI	NULL	
Hours	decimal(5,2)	YES		NULL	

```
3 rows in set (0.013 sec)
```