Applying Constraints and DDL commands

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Data Integrity through constraints

- A constraints refers to condition or limitation we apply on any column so that only correct information will be entered in table.

- MySQL allows to apply constraint by two methods

  - At the time of table creation

  - After table creation

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Types of constraints

- **<u>PRIMARY KEY :</u>** ensures unique value in any column also forces data entry mandatory. Only one primary key can be applied in one table

- **<u>UNIQUE :</u>** also allows unique value in any column but it allows NULL values and can be applied to n times

- **<u>NOT NULL :</u>** it will make data entry mandatory for applied column i.e. NULL will not be allowed

- **<u>DEFAULT :</u>** it allows to specify any value which will be automatically inserted in applied column if we not specify applied column at the time of data entry using INSERT

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Types of constraints

- **CHECK :** allows to specify range of values that can be entered in applied column like salary must be greater than 2000, marks must be greater than 0 or dept must be in given list of values etc.
- Note: in mysql the database engine will ignore the check   constraints.

- **FOREIGN KEY:** allows to establish relationship between 2 tables. Foreign key column will be dependent on PRIMARY KEY column of another table and allows to enter only those values in foreign key whose corresponding value exists in PRIMARY KEY

Examples of Constraint

```
mysql> create table ABCLtd(empno int primary key, name varchar(20) not null,
    -> dept varchar(20) default 'marketing', salary int);
Query OK, 0 rows affected (0.23 sec)

mysql> insert into ABCLtd values(1,'Freddy','Sales',60000);
Query OK, 1 row affected (0.08 sec)
```

Now lets check PRIMARY KEY is working or not by inserting duplicate empno

```
mysql> insert into ABCLtd values(1,'Albert','IT',50000);
ERROR 1062 (23000): Duplicate entry '1' for key 'PRIMARY'
```

Now lets check NOT NULL is working or not by inserting NULL value in name column

```
mysql> insert into ABCLtd values(2,NULL,'IT',50000);
ERROR 1048 (23000): Column 'name' cannot be null
```

Examples of Constraint

```
mysql> select * from ABCLtd;
+--------+--------+--------+--------+
| empno  | name   | dept   | salary |
+--------+--------+--------+--------+
|      1 | Freddy | Sales  |  60000 |
+--------+--------+--------+--------+
```

Now let us check how **DEFAULT constraint to use. (Remember to use DEFAULT CONSTRAINT, The applied column name will not be used with INSERT**

```
mysql> insert into ABCLTd(empno,name,salary) values(2,'Greg',80000);
Query OK, 1 row affected (0.03 sec)

mysql> select * from ABCLtd;
+--------+--------+-----------+--------+
| empno  | name   | dept      | salary |
+--------+--------+-----------+--------+
|      1 | Freddy | Sales     |  60000 |
|      2 | Greg   | marketing |  80000 |
+--------+--------+-----------+--------+
```

Default value 'Marketing' is automatically inserted

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How to apply foreign key

```
mysql> select * from ABCLtd;
+--------+--------+-----------+--------+
| empno  | name   | dept      | salary |
+--------+--------+-----------+--------+
|      1 | Freddy | Sales     |  60000 |
|      2 | Greg   | marketing |  80000 |
+--------+--------+-----------+--------+
```
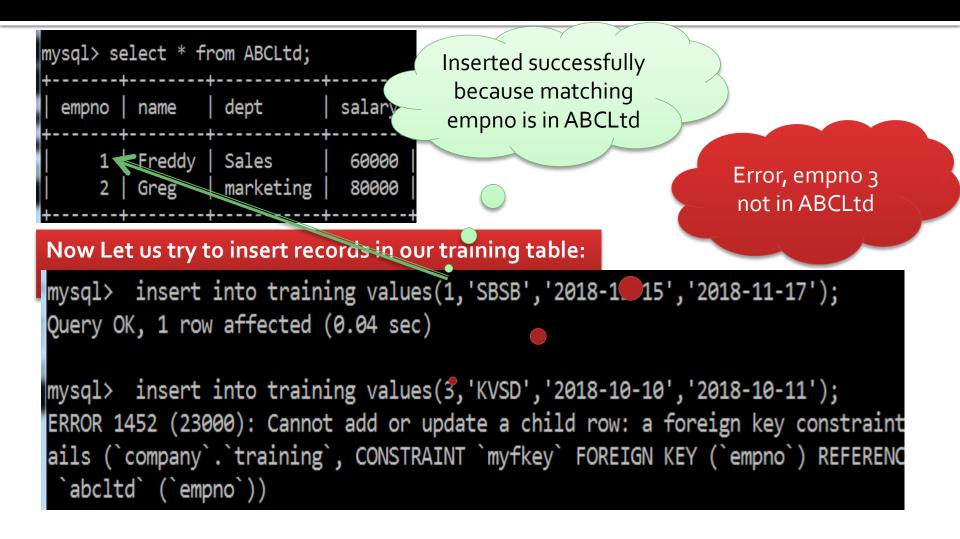
Create another table to store training details of employee as-

mysql> create table training(empno int, trainingname varchar(20),startdate date, enddate date, constraint myfkey foreign key(empno) references ABCLtd(empno));

How to apply foreign key

```
mysql> select * from ABCLtd;
+--------+--------+-----------+--------+
| empno  | name   | dept      | salary |
+--------+--------+-----------+--------+
|      1 | Freddy | Sales     |  60000 |
|      2 | Greg   | marketing |  80000 |
+--------+--------+-----------+--------+
```

Inserted successfully because matching empno is in ABCLtd

Error, empno 3 not in ABCLtd

Now Let us try to insert records in our training table:

```
mysql>  insert into training values(1,'SBSB','2018-11-15','2018-11-17');
Query OK, 1 row affected (0.04 sec)


mysql>  insert into training values(3,'KVSD','2018-10-10','2018-10-11');
ERROR 1452 (23000): Cannot add or update a child row: a foreign key constraint
ails (`company`.`training`, CONSTRAINT `myfkey` FOREIGN KEY (`empno`) REFERENC
 `abcltd` (`empno`))
```

FOREIGN KEY OPTION

- **Note: after foreign key is applied, we cannot delete any record or update primary key value in master table because its related records will be in foreign key table**

- 2 main options available while applying foreign key:
  1. <u>**ON DELETE CASCASE :**</u> it means if any record from master table is deleted its related records in foreign key table will also be deleted
  2. <u>**ON UPDATE CASCADE:**</u> it means if primary key value in master table is changed then it will be automatically reflected in foreign key table

COLUMN LEVEL VS TABLE CONSTRAINTS

- Column level constraint is given with column definition

Example: create table visitor(vid int primary key, vname varchar(20));

With column definition

- Table level constraints are given after all column definition.

Example: create table visitor(vid int primary key, vname varchar(20), primary key(vid));

ASSIGNING NAME TO CONSTRAINTS

- MySQL allows us to give names to constraints to that when error occurs due to constraint violation then this name will appears to help us in identifying for which column this error occurs.

Example:**mysql> create table training(empno int, trainingname varchar(20),startdate date, enddate date, constraint myfkey foreign key(empno) references ABCLtd(empno));**

Viewing Table structure

- MySQL allows us to get the structure of table like list of columns, data type, size and key information of table using DESC / DESCRIBE command
- Example

```
mysql> desc ABCLtd;
+--------+-------------+------+-----+-----------+-------+
| Field  | Type        | Null | Key | Default   | Extra |
+--------+-------------+------+-----+-----------+-------+
| empno  | int(11)     | NO   | PRI | NULL      |       |
| name   | varchar(20) | NO   |     | NULL      |       |
| dept   | varchar(20) | YES  |     | marketing |       |
| salary | int(11)     | YES  |     | NULL      |       |
+--------+-------------+------+-----+-----------+-------+
4 rows in set (0.08 sec)
```

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CREATING TABLE FROM EXISTING TABLE

- Python allows us to create either fresh table of table based on existing table. Now we will see how we can create table based on existing table like backup of a table or copy of a table.

- **Full Copy**

  - Create table XYZLtd as select * from ABCLtd;

- **Selected Column copy**

  - Create table ABCCorp as select empno, name, salary from ABCLtd;

- **Selected Record Copy**

  - Create table ITTable as select * from ABCLtd where dept='IT';

DDL Command - ALTER

- ALTER TABLE command allows us to perform the following operations:
  - *Adding new column in existing table*
  - *Dropping existing column from table*
  - *Modifying column definition in table*
  - *Changing the name of column*
  - *Adding or dropping constraint after table creation.*

ALTER TABLE – ADDING NEW COLUMN

```
mysql> desc ABCLtd;
+--------+-------------+------+-----+-----------+-------+
| Field  | Type        | Null | Key | Default   | Extra |
+--------+-------------+------+-----+-----------+-------+
| empno  | int(11)     | NO   | PRI | NULL      |       |
| name   | varchar(20) | NO   |     | NULL      |       |
| dept   | varchar(20) | YES  |     | marketing |       |
| salary | int(11)     | YES  |     | NULL      |       |
+--------+-------------+------+-----+-----------+-------+
4 rows in set (0.08 sec)
```

After new column is added, if you select record it will display NULL in that column for previous record, we have to update it using **UPDATE** command

```
mysql> ALTER TABLE ABCLtd add designation varchar(20);
Query OK, 2 rows affected (0.36 sec)
Records: 2  Duplicates: 0  Warnings: 0

mysql> desc ABCLtd;
+-------------+-------------+------+-----+-----------+-------+
| Field       | Type        | Null | Key | Default   | Extra |
+-------------+-------------+------+-----+-----------+-------+
| empno       | int(11)     | NO   | PRI | NULL      |       |
| name        | varchar(20) | NO   |     | NULL      |       |
| dept        | varchar(20) | YES  |     | marketing |       |
| salary      | int(11)     | YES  |     | NULL      |       |
| designation | varchar(20) | YES  |     | NULL      |       |
+-------------+-------------+------+-----+-----------+-------+
```

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ALTER TABLE – DROPPING COLUMN

```
mysql> desc ABCLtd;
+-------------+-------------+------+-----+-----------+-------+
| Field       | Type        | Null | Key | Default   | Extra |
+-------------+-------------+------+-----+-----------+-------+
| empno       | int(11)     | NO   | PRI | NULL      |       |
| name        | varchar(20) | NO   |     | NULL      |       |
| dept        | varchar(20) | YES  |     | marketing |       |
| salary      | int(11)     | YES  |     | NULL      |       |
| designation | varchar(20) | YES  |     | NULL      |       |
+-------------+-------------+------+-----+-----------+-------+
```

ALTER TABLE ABCLtd drop designation;

```
mysql> desc ABCLtd;
+--------+-------------+------+-----+-----------+-------+
| Field  | Type        | Null | Key | Default   | Extra |
+--------+-------------+------+-----+-----------+-------+
| empno  | int(11)     | NO   | PRI | NULL      |       |
| name   | varchar(20) | NO   |     | NULL      |       |
| dept   | varchar(20) | YES  |     | marketing |       |
| salary | int(11)     | YES  |     | NULL      |       |
+--------+-------------+------+-----+-----------+-------+
4 rows in set (0.08 sec)
```

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ALTER TABLE – MODIFYING COLUMN

```
mysql> desc emp;
+--------+-------------+------+-----+---------+-------+
| Field  | Type        | Null | Key | Default | Extra |
+--------+-------------+------+-----+---------+-------+
| empno  | int(11)     | YES  |     | NULL    |       |
| name   | varchar(30) | YES  |     | NULL    |       |
| salary | int(11)     | YES  |     | NULL    |       |
| deptno | int(11)     | YES  |     | NULL    |       |
+--------+-------------+------+-----+---------+-------+
4 rows in set (0.05 sec)

mysql> alter table emp modify name varchar(40);
Query OK, 13 rows affected (0.27 sec)
Records: 13  Duplicates: 0  Warnings: 0

mysql> desc emp;
+--------+-------------+------+-----+---------+-------+
| Field  | Type        | Null | Key | Default | Extra |
+--------+-------------+------+-----+---------+-------+
| empno  | int(11)     | YES  |     | NULL    |       |
| name   | varchar(40) | YES  |     | NULL    |       |
| salary | int(11)     | YES  |     | NULL    |       |
| deptno | int(11)     | YES  |     | NULL    |       |
+--------+-------------+------+-----+---------+-------+
4 rows in set (0.01 sec)
```

ALTER TABLE – CHANGING COLUMN NAME

```
mysql> desc emp;
+--------+-------------+------+-----+---------+-------+
| Field  | Type        | Null | Key | Default | Extra |
+--------+-------------+------+-----+---------+-------+
| empno  | int(11)     | YES  |     | NULL    |       |
| name   | varchar(40) | YES  |     | NULL    |       |
| salary | int(11)     | YES  |     | NULL    |       |
| deptno | int(11)     | YES  |     | NULL    |       |
+--------+-------------+------+-----+---------+-------+
4 rows in set (0.01 sec)

mysql> ALTER TABLE EMP CHANGE NAME ENAME VARCHAR(40);
Query OK, 0 rows affected (0.14 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> DESC EMP;
+--------+-------------+------+-----+---------+-------+
| Field  | Type        | Null | Key | Default | Extra |
+--------+-------------+------+-----+---------+-------+
| empno  | int(11)     | YES  |     | NULL    |       |
| ENAME  | varchar(40) | YES  |     | NULL    |       |
| salary | int(11)     | YES  |     | NULL    |       |
| deptno | int(11)     | YES  |     | NULL    |       |
+--------+-------------+------+-----+---------+-------+
4 rows in set (0.01 sec)
```

ALTER TABLE – CHANGING ORDER OF COLUMN

```
mysql> DESC EMP;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| empno   | int(11)     | YES  |     | NULL    |       |
| ENAME   | varchar(40) | YES  |     | NULL    |       |
| salary  | int(11)     | YES  |     | NULL    |       |
| deptno  | int(11)     | YES  |     | NULL    |       |
+---------+-------------+------+-----+---------+-------+
4 rows in set (0.01 sec)

mysql> ALTER TABLE EMP MODIFY DEPTNO INT FIRST;
Query OK, 13 rows affected (0.30 sec)
Records: 13  Duplicates: 0  Warnings: 0

mysql> DESC EMP;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| DEPTNO  | int(11)     | YES  |     | NULL    |       |
| empno   | int(11)     | YES  |     | NULL    |       |
| ENAME   | varchar(40) | YES  |     | NULL    |       |
| salary  | int(11)     | YES  |     | NULL    |       |
+---------+-------------+------+-----+---------+-------+
4 rows in set (0.02 sec)
```

IN PLACE OF "FIRST" WE CAN ALSO USE "AFTER COLUMN NAME" FOR E.G. TO SET DEPTNO AFTER ENAME **ALTER TABLE EMP MODIFY DEPTNO INT AFTER ENAME**

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ALTER TABLE – ADDING CONSTRAINT

```
mysql> DESC EMP;
+--------+-------------+------+-----+---------+-------+
| Field  | Type        | Null | Key | Default | Extra |
+--------+-------------+------+-----+---------+-------+
| empno  | int(11)     | YES  |     | NULL    |       |
| ENAME  | varchar(40) | YES  |     | NULL    |       |
| DEPTNO | int(11)     | YES  |     | NULL    |       |
| salary | int(11)     | YES  |     | NULL    |       |
+--------+-------------+------+-----+---------+-------+
4 rows in set (0.02 sec)

mysql> ALTER TABLE EMP ADD PRIMARY KEY(EMPNO);
```

In this way we can add any constraint

```
mysql> DESC EMP;
+--------+-------------+------+-----+---------+-------+
| Field  | Type        | Null | Key | Default | Extra |
+--------+-------------+------+-----+---------+-------+
| empno  | int(11)     | NO   | PRI | 0       |       |
| ENAME  | varchar(40) | YES  |     | NULL    |       |
| DEPTNO | int(11)     | YES  |     | NULL    |       |
| salary | int(11)     | YES  |     | NULL    |       |
+--------+-------------+------+-----+---------+-------+
4 rows in set (0.01 sec)
```

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ALTER TABLE – DROPPING CONSTRAINT

```
mysql> DESC EMP;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| empno   | int(11)     | NO   | PRI | 0       |       |
| ENAME   | varchar(40) | YES  |     | NULL    |       |
| DEPTNO  | int(11)     | YES  |     | NULL    |       |
| salary  | int(11)     | YES  |     | NULL    |       |
+---------+-------------+------+-----+---------+-------+
4 rows in set (0.01 sec)

mysql> ALTER TABLE EMP DROP PRIMARY KEY;
Query OK, 13 rows affected (0.26 sec)
Records: 13  Duplicates: 0  Warnings: 0

mysql> DESC EMP;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| empno   | int(11)     | NO   |     | 0       |       |
| ENAME   | varchar(40) | YES  |     | NULL    |       |
| DEPTNO  | int(11)     | YES  |     | NULL    |       |
| salary  | int(11)     | YES  |     | NULL    |       |
```

ALTER TABLE – DROPPING CONSTRAINT

While dropping Primary Key, if it is connected with child table, it will not gets deleted
By default, however if you want to drop it we have to issue following commands

ALTER TABLE EMP DROP PRIMARY KEY CASCADE

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DROPPING TABLE

- ## DROP TABLE[IF EXISTS] tablename
- ## Example
  - ### Drop Table emp;
  - ### Drop table if exists emp;