DBMS - Experiment 4

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Apply various Integrity Constraints.

Theory:

MySQL CONSTRAINT is used to define rules to allow or restrict what values can be stored in columns. The purpose of inducing constraints is to enforce the integrity of a database.

MySQL CONSTRAINTS are used to limit the type of data that can be inserted into a table.

MySQL CONSTRAINTS can be classified into two types - column level and table level.

The column level constraints can apply only to one column whereas table level constraints are applied to the entire table.

MySQL CONSTRAINT is declared at the time of creating a table as well as at when altering a table.

MySQL CONSTRAINTs are:

- NOT NULL
- UNIQUE
- PRIMARY KEY
- FOREIGN KEY
- CHECK
- DEFAULT

CONSTRAINT	DESCRIPTION
NOT NULL	In MySQL NOT NULL constraint allows to specify that a column can not contain any NULL value. MySQL NOT NULL can be used to CREATE and ALTER a table.
UNIQUE	The UNIQUE constraint in MySQL does not allow to insert a duplicate value in a column. The UNIQUE constraint maintains the uniqueness of a column in a table. More than one UNIQUE column can be used in a table.
PRIMARY KEY	A PRIMARY KEY constraint for a table enforces the table to accept unique data for a specific column and this constraint creates a unique index for accessing the table faster.
FOREIGN KEY	A FOREIGN KEY in MySQL creates a link between two tables by one specific column of both tables. The specified column in one table must be a PRIMARY KEY and referred by the column of another table known as FOREIGN KEY.
CHECK	A CHECK constraint controls the values in the associated column. The CHECK constraint determines whether the value is valid or not from a logical expression.

DEFAULT	In a MySQL table, each column must contain a value (including a NULL). While inserting data into a table, if no value is supplied to a column, then the column gets the value set as DEFAULT.

Syntax

At the time of table creation:

CREATE TABLE [*table_name*]

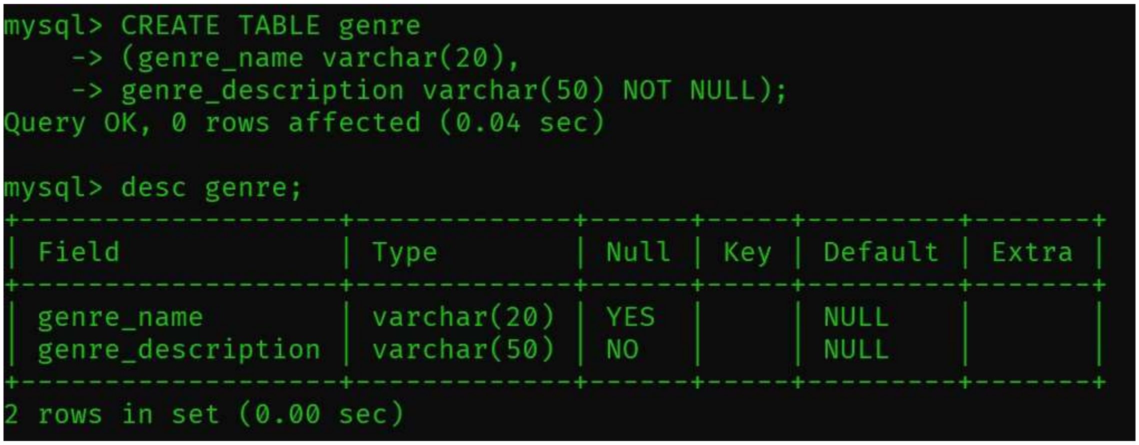
([*column_name*] [*data_type*] ([*size*]) [*column constraint*] ….

[*table constraint*] ([[*column name*] ……])

……);

1. NOT NULL

CREATE TABLE genre
(genre_name varchar(20),
genre_description varchar(50) NOT NULL);

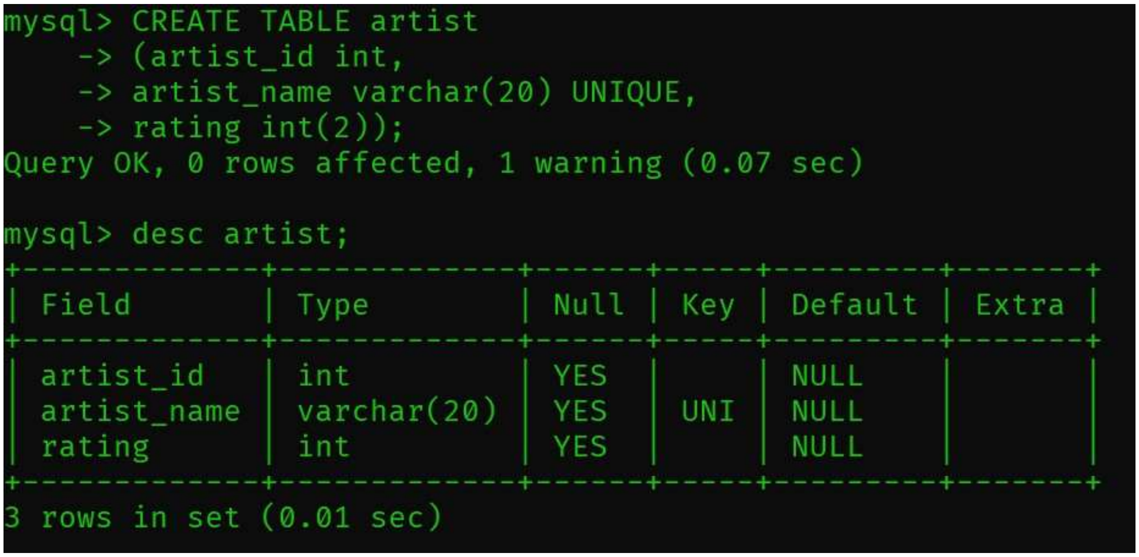


```
mysql> CREATE TABLE genre
    -> (genre_name varchar(20),
    -> genre_description varchar(50) NOT NULL);
Query OK, 0 rows affected (0.04 sec)

mysql> desc genre;
+-------------------+-------------+------+-----+---------+-------+
| Field             | Type        | Null | Key | Default | Extra |
+-------------------+-------------+------+-----+---------+-------+
| genre_name        | varchar(20) | YES  |     | NULL    |       |
| genre_description | varchar(50) | NO   |     | NULL    |       |
+-------------------+-------------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```

2. UNIQUE

CREATE TABLE artist
(artist_id int,
artist_name varchar(20) UNIQUE, rating
int(2));

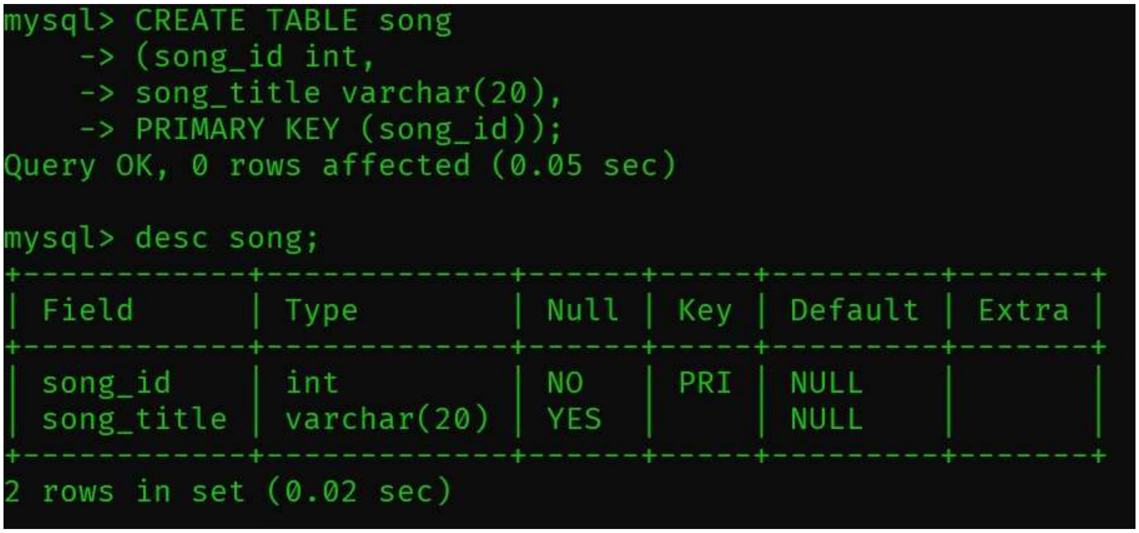


```
mysql> CREATE TABLE artist
    -> (artist_id int,
    -> artist_name varchar(20) UNIQUE,
    -> rating int(2));
Query OK, 0 rows affected, 1 warning (0.07 sec)

mysql> desc artist;
+-------------+-------------+------+-----+---------+-------+
| Field       | Type        | Null | Key | Default | Extra |
+-------------+-------------+------+-----+---------+-------+
| artist_id   | int         | YES  |     | NULL    |       |
| artist_name | varchar(20) | YES  | UNI | NULL    |       |
| rating      | int         | YES  |     | NULL    |       |
+-------------+-------------+------+-----+---------+-------+
3 rows in set (0.01 sec)
```

3. PRIMARY KEY

CREATE TABLE song
(song_id int,
song_title varchar(20),
PRIMARY KEY (song_id));

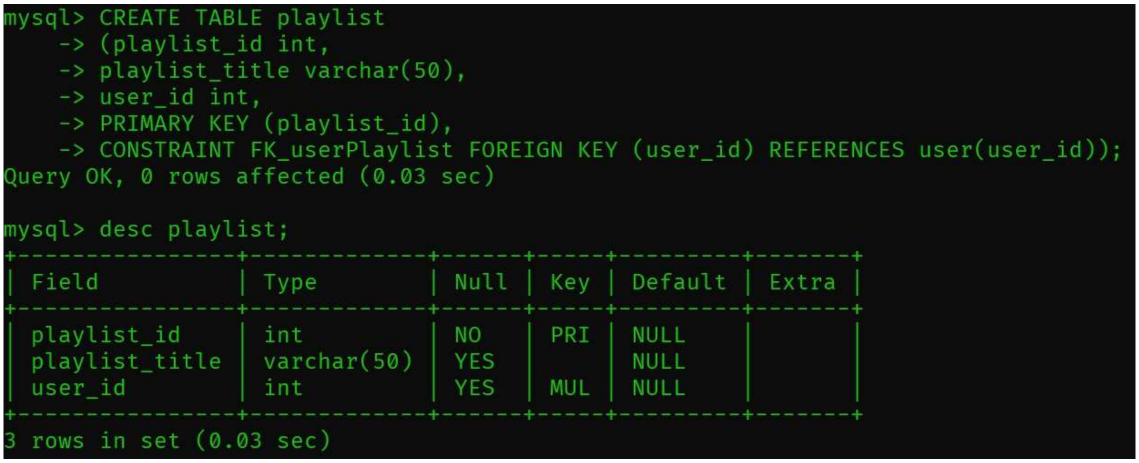


```
mysql> CREATE TABLE song
    -> (song_id int,
    -> song_title varchar(20),
    -> PRIMARY KEY (song_id));
Query OK, 0 rows affected (0.05 sec)

mysql> desc song;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| song_id    | int         | NO   | PRI | NULL    |       |
| song_title | varchar(20) | YES  |     | NULL    |       |
+------------+-------------+------+-----+---------+-------+
2 rows in set (0.02 sec)
```

4. FOREIGN KEY

CREATE TABLE playlist
(playlist_id int, playlist_title
varchar(50), user_id int,
PRIMARY KEY (playlist_id),
CONSTRAINT FK_userPlaylist FOREIGN KEY (user_id)
REFERENCES user(user_id));

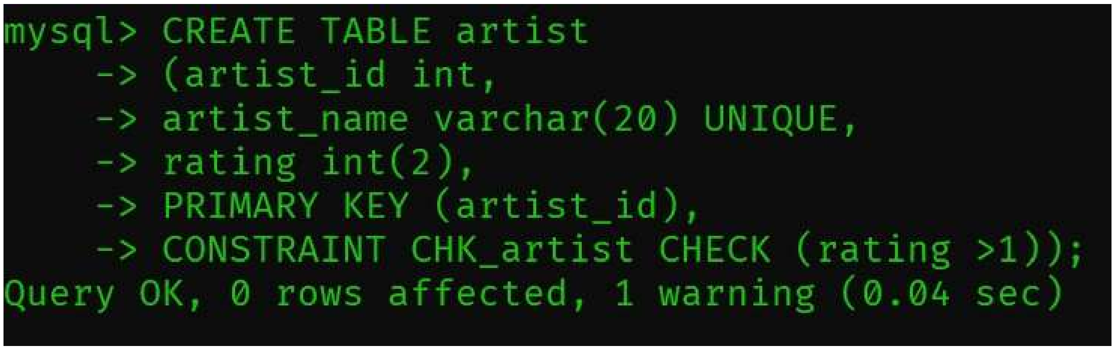


```
mysql> CREATE TABLE playlist
    -> (playlist_id int,
    -> playlist_title varchar(50),
    -> user_id int,
    -> PRIMARY KEY (playlist_id),
    -> CONSTRAINT FK_userPlaylist FOREIGN KEY (user_id) REFERENCES user(user_id));
Query OK, 0 rows affected (0.03 sec)

mysql> desc playlist;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| playlist_id    | int         | NO   | PRI | NULL    |       |
| playlist_title | varchar(50) | YES  |     | NULL    |       |
| user_id        | int         | YES  | MUL | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
3 rows in set (0.03 sec)
```

5. CHECK

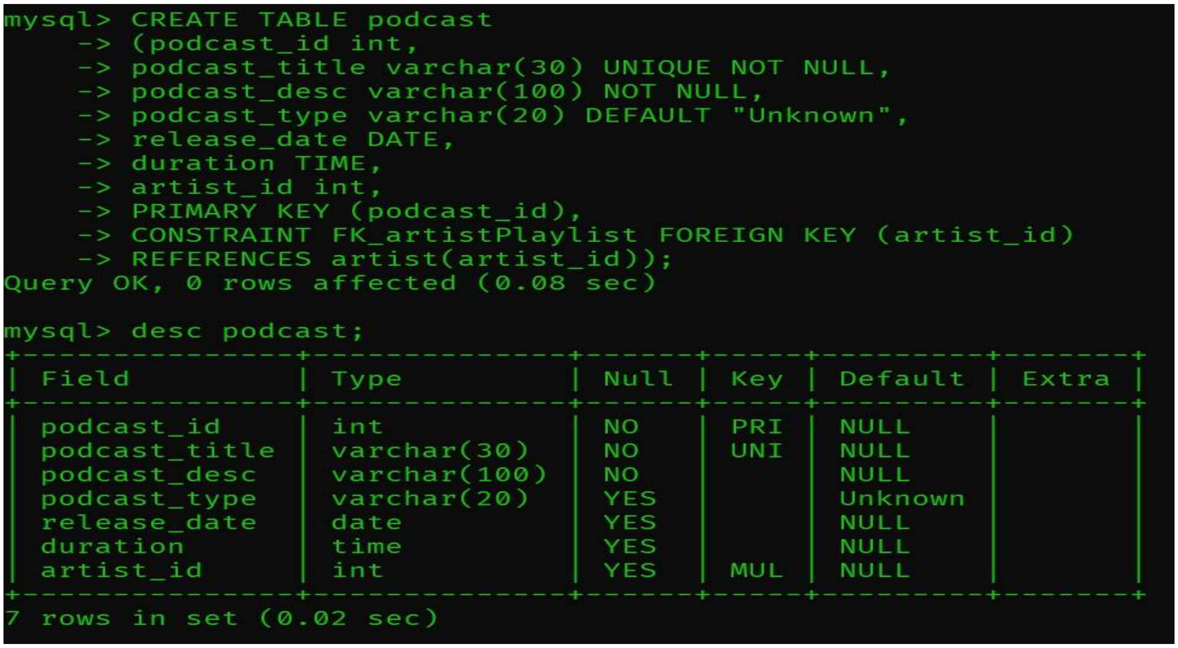
CREATE TABLE artist
(artist_id int,
artist_name varchar(20) UNIQUE, rating
int(2),
PRIMARY KEY (artist_id),
CONSTRAINT CHK_artist CHECK (rating >1));



```
mysql> CREATE TABLE artist
    -> (artist_id int,
    -> artist_name varchar(20) UNIQUE,
    -> rating int(2),
    -> PRIMARY KEY (artist_id),
    -> CONSTRAINT CHK_artist CHECK (rating >1));
Query OK, 0 rows affected, 1 warning (0.04 sec)
```

6. DEFAULT

```
CREATE TABLE podcast
(podcast_id int,
podcast_title varchar(30) UNIQUE NOT NULL,
podcast_desc varchar(100) NOT NULL, podcast_type
varchar(20) DEFAULT "Unknown", release_date
DATE,
duration TIME,
artist_id int,
PRIMARY KEY (podcast_id),
CONSTRAINT FK_artistPlaylist FOREIGN KEY (artist_id)
REFERENCES artist(artist_id));
```



```
mysql> CREATE TABLE podcast
    -> (podcast_id int,
    -> podcast_title varchar(30) UNIQUE NOT NULL,
    -> podcast_desc varchar(100) NOT NULL,
    -> podcast_type varchar(20) DEFAULT "Unknown",
    -> release_date DATE,
    -> duration TIME,
    -> artist_id int,
    -> PRIMARY KEY (podcast_id),
    -> CONSTRAINT FK_artistPlaylist FOREIGN KEY (artist_id)
    -> REFERENCES artist(artist_id));
Query OK, 0 rows affected (0.08 sec)

mysql> desc podcast;
+---------------+--------------+------+-----+---------+-------+
| Field         | Type         | Null | Key | Default | Extra |
+---------------+--------------+------+-----+---------+-------+
| podcast_id    | int          | NO   | PRI | NULL    |       |
| podcast_title | varchar(30)  | NO   | UNI | NULL    |       |
| podcast_desc  | varchar(100) | NO   |     | NULL    |       |
| podcast_type  | varchar(20)  | YES  |     | Unknown |       |
| release_date  | date         | YES  |     | NULL    |       |
| duration      | time         | YES  |     | NULL    |       |
| artist_id     | int          | YES  | MUL | NULL    |       |
+---------------+--------------+------+-----+---------+-------+
7 rows in set (0.02 sec)
```

At the time of table alteration:

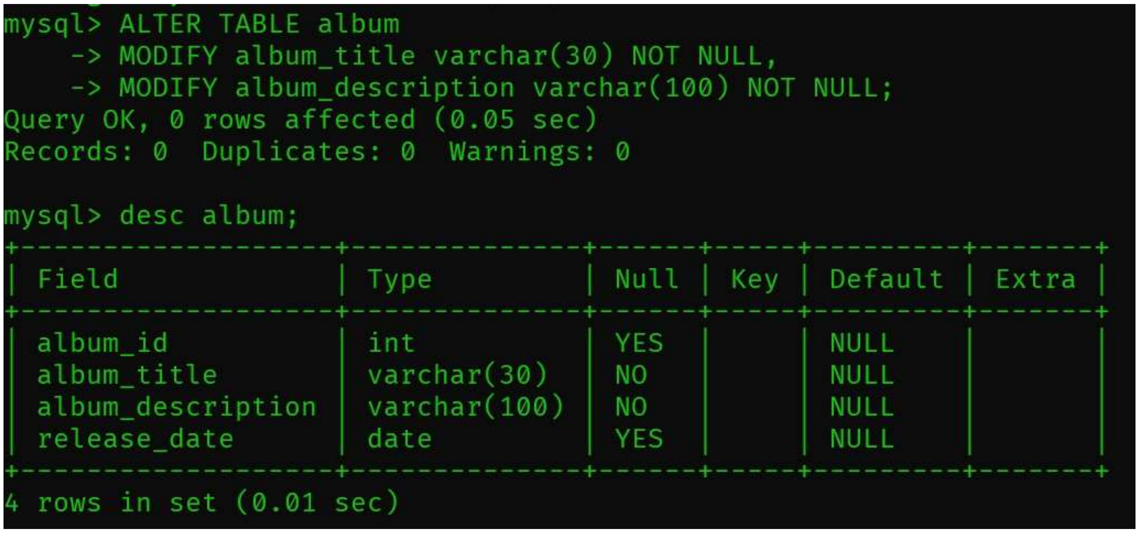
ALTER TABLE [*table_name*]

ADD CONSTRAINT/MODIFY *column_name* [*constraint name*] ……])

……);

1. NOT NULL

ALTER TABLE album
MODIFY album_title varchar(30) NOT NULL,
MODIFY album_description varchar(100) NOT NULL;

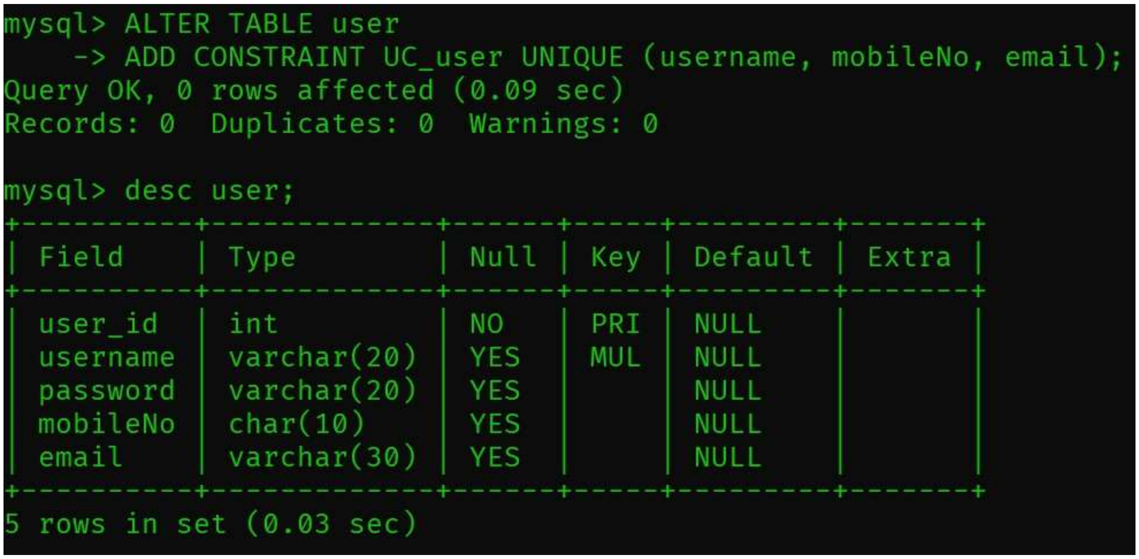


```
mysql> ALTER TABLE album
    -> MODIFY album_title varchar(30) NOT NULL,
    -> MODIFY album_description varchar(100) NOT NULL;
Query OK, 0 rows affected (0.05 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> desc album;
+-------------------+--------------+------+-----+---------+-------+
| Field             | Type         | Null | Key | Default | Extra |
+-------------------+--------------+------+-----+---------+-------+
| album_id          | int          | YES  |     | NULL    |       |
| album_title       | varchar(30)  | NO   |     | NULL    |       |
| album_description | varchar(100) | NO   |     | NULL    |       |
| release_date      | date         | YES  |     | NULL    |       |
+-------------------+--------------+------+-----+---------+-------+
4 rows in set (0.01 sec)
```

2. UNIQUE

ALTER TABLE user
ADD CONSTRAINT UC_user UNIQUE (username, mobileNo, email);

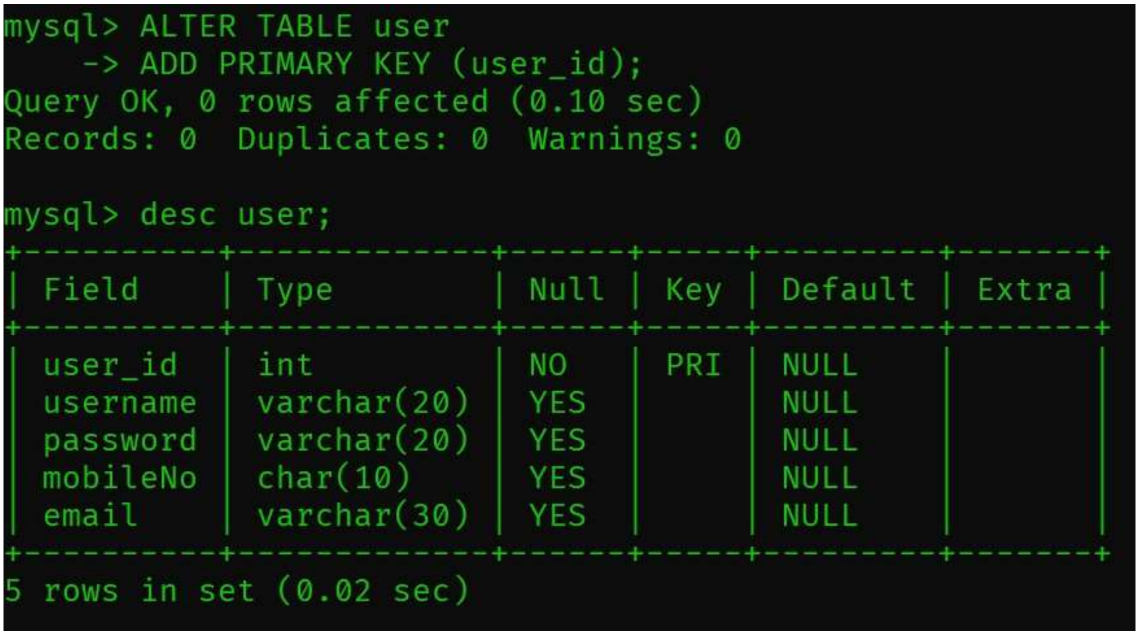


```
mysql> ALTER TABLE user
    -> ADD CONSTRAINT UC_user UNIQUE (username, mobileNo, email);
Query OK, 0 rows affected (0.09 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> desc user;
+----------+-------------+------+-----+---------+-------+
| Field    | Type        | Null | Key | Default | Extra |
+----------+-------------+------+-----+---------+-------+
| user_id  | int         | NO   | PRI | NULL    |       |
| username | varchar(20) | YES  | MUL | NULL    |       |
| password | varchar(20) | YES  |     | NULL    |       |
| mobileNo | char(10)    | YES  |     | NULL    |       |
| email    | varchar(30) | YES  |     | NULL    |       |
+----------+-------------+------+-----+---------+-------+
5 rows in set (0.03 sec)
```

3. PRIMARY KEY

ALTER TABLE user
ADD PRIMARY KEY (user_id);

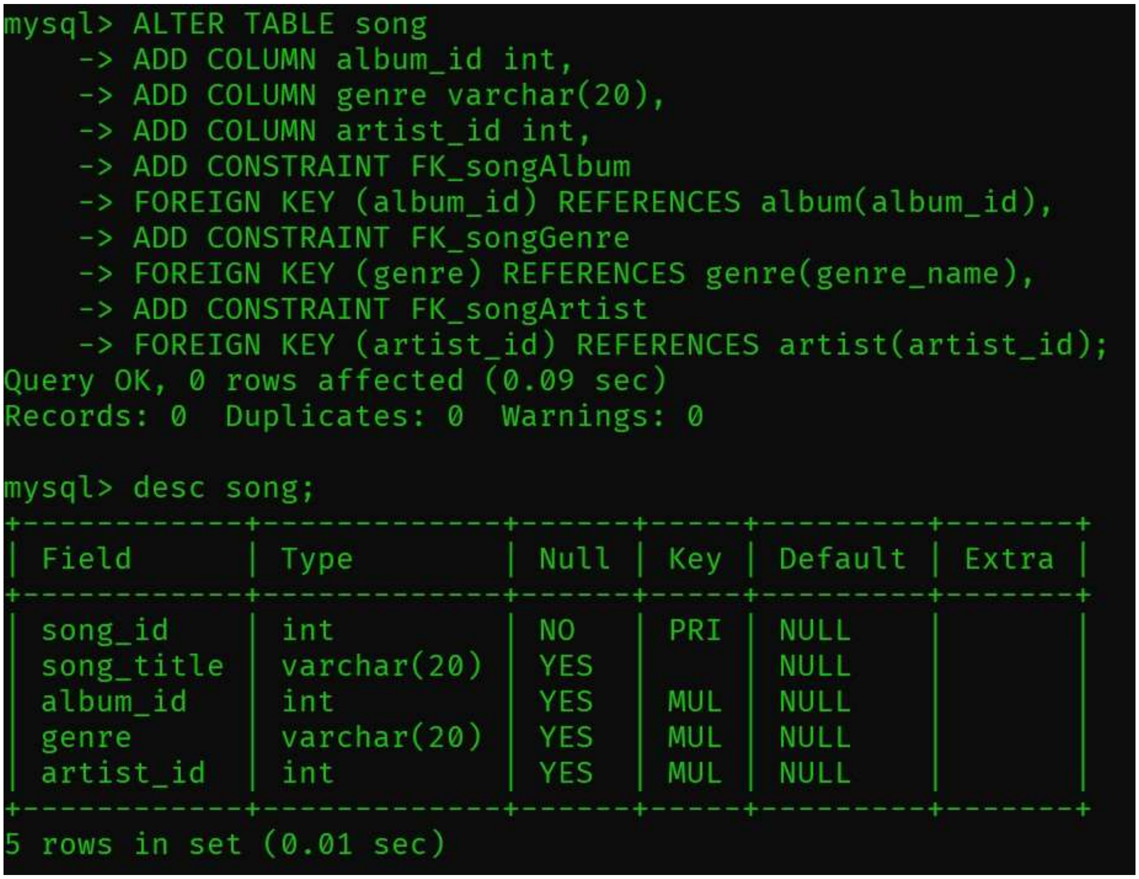


```
mysql> ALTER TABLE user
    -> ADD PRIMARY KEY (user_id);
Query OK, 0 rows affected (0.10 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> desc user;
+----------+-------------+------+-----+---------+-------+
| Field    | Type        | Null | Key | Default | Extra |
+----------+-------------+------+-----+---------+-------+
| user_id  | int         | NO   | PRI | NULL    |       |
| username | varchar(20) | YES  |     | NULL    |       |
| password | varchar(20) | YES  |     | NULL    |       |
| mobileNo | char(10)    | YES  |     | NULL    |       |
| email    | varchar(30) | YES  |     | NULL    |       |
+----------+-------------+------+-----+---------+-------+
5 rows in set (0.02 sec)
```

4. FOREIGN KEY

```
ALTER TABLE song
ADD COLUMN album_id int,
ADD COLUMN genre varchar(20),
ADD COLUMN artist_id int,
ADD CONSTRAINT FK_songAlbum
FOREIGN KEY (album_id) REFERENCES album(album_id),
ADD CONSTRAINT FK_songGenre
FOREIGN KEY (genre) REFERENCES genre(genre_name),
ADD CONSTRAINT FK_songArtist
FOREIGN KEY (artist_id) REFERENCES artist(artist_id);
```

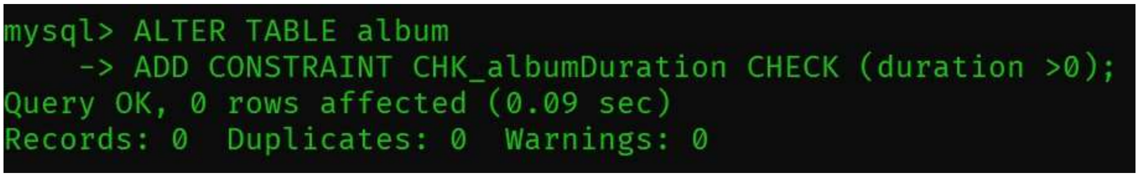


```
mysql> ALTER TABLE song
    -> ADD COLUMN album_id int,
    -> ADD COLUMN genre varchar(20),
    -> ADD COLUMN artist_id int,
    -> ADD CONSTRAINT FK_songAlbum
    -> FOREIGN KEY (album_id) REFERENCES album(album_id),
    -> ADD CONSTRAINT FK_songGenre
    -> FOREIGN KEY (genre) REFERENCES genre(genre_name),
    -> ADD CONSTRAINT FK_songArtist
    -> FOREIGN KEY (artist_id) REFERENCES artist(artist_id);
Query OK, 0 rows affected (0.09 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> desc song;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| song_id    | int         | NO   | PRI | NULL    |       |
| song_title | varchar(20) | YES  |     | NULL    |       |
| album_id   | int         | YES  | MUL | NULL    |       |
| genre      | varchar(20) | YES  | MUL | NULL    |       |
| artist_id  | int         | YES  | MUL | NULL    |       |
+------------+-------------+------+-----+---------+-------+
5 rows in set (0.01 sec)
```

5. CHECK

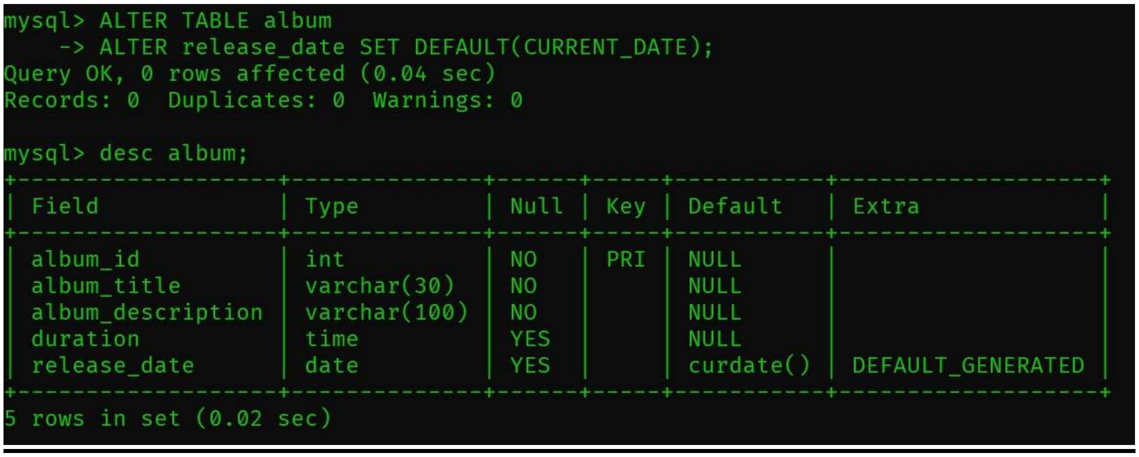
ALTER TABLE album
ADD CONSTRAINT CHK_albumDuration CHECK (duration >0);



```
mysql> ALTER TABLE album
    -> ADD CONSTRAINT CHK_albumDuration CHECK (duration >0);
Query OK, 0 rows affected (0.09 sec)
Records: 0  Duplicates: 0  Warnings: 0
```

6. DEFAULT

ALTER TABLE album
ALTER release_date SET DEFAULT(CURRENT_DATE);



```
mysql> ALTER TABLE album
    -> ALTER release_date SET DEFAULT(CURRENT_DATE);
Query OK, 0 rows affected (0.04 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> desc album;
+-------------------+--------------+------+-----+-----------+-------------------+
| Field             | Type         | Null | Key | Default   | Extra             |
+-------------------+--------------+------+-----+-----------+-------------------+
| album_id          | int          | NO   | PRI | NULL      |                   |
| album_title       | varchar(30)  | NO   |     | NULL      |                   |
| album_description | varchar(100) | NO   |     | NULL      |                   |
| duration          | time         | YES  |     | NULL      |                   |
| release_date      | date         | YES  |     | curdate() | DEFAULT_GENERATED |
+-------------------+--------------+------+-----+-----------+-------------------+
5 rows in set (0.02 sec)
```

Conclusion:

All the mandatory and domain specific constraints are applied on database while creating a table as well as when modifying the columns of the existing tables.