DBMS ASSIGNMENT 5

Schema Creation & Constraints

Name: Bhaskar Subhash Pardeshi
MIS: 111703041
Branch: Computer
Year: TY
Batch: T3

A. Modify the trains schema which we saw earlier to create constraints to check the following:

- The value of timein is always less than or equal to timeout

  Queries:

  -- Add the constraint to enforce the required condition

  ALTER TABLE trainhalts

  ADD CONSTRAINT `timein_less_timeout`

  CHECK (cast(timein as float) < cast(timeout as float));

  -- Display the added constraint from the information schema

  SELECT *

  FROM information_schema.table_constraints

  WHERE table_name = "trainhalts";

  Note: The ‘timein’ and ‘timeout’ values are **typecasted** to ‘float’ before comparison as varchar comparison is different than actual float comparison

  Results:

  (After adding the constraint)

```
MariaDB [railway]> ALTER TABLE trainhalts
    -> ADD CONSTRAINT `timein_less_timeout`
    -> CHECK (cast(timein as float) < cast(timeout as float));
Query OK, 19 rows affected (0.961 sec)
Records: 19  Duplicates: 0  Warnings: 0

MariaDB [railway]> SELECT *
    -> FROM information_schema.table_constraints
    -> WHERE table_name = "trainhalts";
+--------------------+-------------------+--------------------+--------------+------------+-----------------+
| CONSTRAINT_CATALOG | CONSTRAINT_SCHEMA | CONSTRAINT_NAME    | TABLE_SCHEMA | TABLE_NAME | CONSTRAINT_TYPE |
+--------------------+-------------------+--------------------+--------------+------------+-----------------+
| def                | railway           | PRIMARY            | railway      | trainhalts | PRIMARY KEY     |
| def                | railway           | timein_less_timeout | railway      | trainhalts | CHECK           |
+--------------------+-------------------+--------------------+--------------+------------+-----------------+
2 rows in set (0.002 sec)
```

- When a train is removed from service, all its halts should be deleted

  Queries:

  -- Add the foreign key constraint

  ALTER TABLE trainhalts

  ADD CONSTRAINT `trainhalts_fk`

  FOREIGN KEY (id) REFERENCES train(id) ON DELETE CASCADE;

  -- Display the added constraint

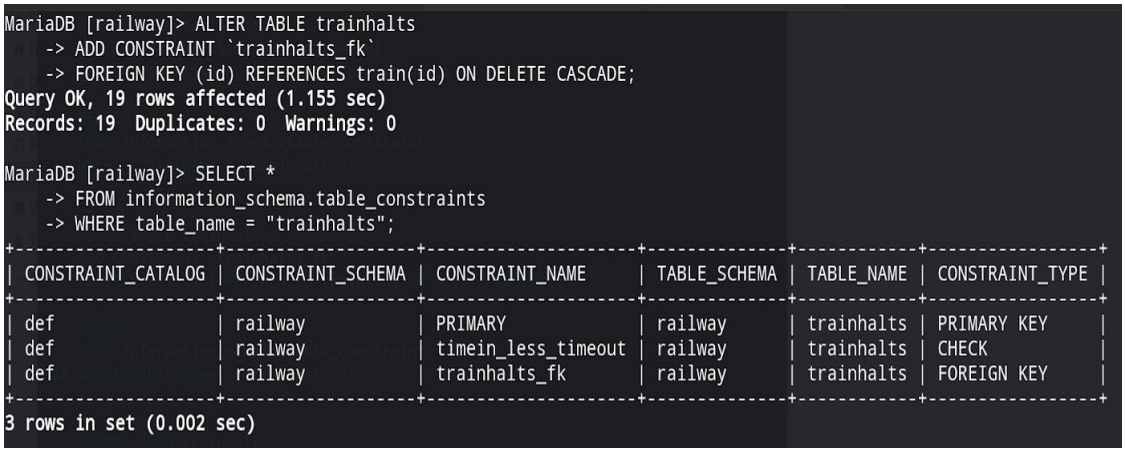
  SELECT *

  FROM information_schema.table_constraints

  WHERE table_name = "trainhalts";

  Results:

  (After adding the constraint)



```
MariaDB [railway]> ALTER TABLE trainhalts
    -> ADD CONSTRAINT `trainhalts_fk`
    -> FOREIGN KEY (id) REFERENCES train(id) ON DELETE CASCADE;
Query OK, 19 rows affected (1.155 sec)
Records: 19  Duplicates: 0  Warnings: 0

MariaDB [railway]> SELECT *
    -> FROM information_schema.table_constraints
    -> WHERE table_name = "trainhalts";
+--------------------+-------------------+--------------------+--------------+------------+-----------------+
| CONSTRAINT_CATALOG | CONSTRAINT_SCHEMA | CONSTRAINT_NAME    | TABLE_SCHEMA | TABLE_NAME | CONSTRAINT_TYPE |
+--------------------+-------------------+--------------------+--------------+------------+-----------------+
| def                | railway           | PRIMARY            | railway      | trainhalts | PRIMARY KEY     |
| def                | railway           | timein_less_timeout | railway      | trainhalts | CHECK           |
| def                | railway           | trainhalts_fk      | railway      | trainhalts | FOREIGN KEY     |
+--------------------+-------------------+--------------------+--------------+------------+-----------------+
3 rows in set (0.002 sec)
```

- Insert inconsistent data and verify the constraints

  Queries:

  -- Query not satisfying the constraint of halt time

  INSERT INTO trainhalts

  VALUES ("KP11", "10", "KYN", "22.12", "12.51");

  -- Query satisfying the constraint of halt time

  INSERT INTO trainhalts

  VALUES ("KP11", "10", "KYN", "10.22", "12.51");

  -- Display the trainhalts before removing a train from service

  SELECT *

  FROM trainhalts;

  -- Delete a train named “KP11”

  DELETE FROM train

  WHERE id = "KP11";

  -- Display the trainhalts after removing a train from service

  SELECT *

  FROM trainhalts;

Results:

(After running the query not satisfying the constraint)

```
MariaDB [railway]> INSERT INTO trainhalts
    -> VALUES ("KP11", "10", "KYN", "22.12", "12.51");
ERROR 4025 (23000): CONSTRAINT `timein_less_timeout` failed for `railway`.`trainhalts`
```

(After running the query not satisfying the constraint)

```
MariaDB [railway]> INSERT INTO trainhalts
    -> VALUES ("KP11", "10", "KYN", "10.22", "12.51");
Query OK, 1 row affected (0.068 sec)
```

(Trainhalts before deleting a train)

```
MariaDB [railway]> SELECT *
    -> FROM trainhalts;
+------+-------+--------+--------+---------+
| id   | seqno | stcode | timein | timeout |
+------+-------+--------+--------+---------+
| A65  |     0 | CST    | NULL   | 20.52   |
| A65  |     1 | BYC    | 21.00  | 21.01   |
| A65  |     2 | DR     | 21.10  | 21.11   |
| A65  |     3 | KRL    | 21.22  | 21.23   |
| A65  |     4 | GPR    | 21.28  | 21.29   |
| A65  |     5 | TNA    | 21.49  | 21.50   |
| A65  |     6 | DL     | 22.13  | 22.14   |
| A65  |     7 | KYN    | 22.22  | 22.23   |
| A65  |     8 | AMR    | 22.36  | NULL    |
| KP11 |     0 | CST    | NULL   | 20.23   |
| KP11 |     1 | BYC    | 20.31  | 20.32   |
| KP11 |     2 | DR     | 20.41  | 20.42   |
| KP11 |     3 | GPR    | 20.52  | 20.53   |
| KP11 |     4 | GPR    | 20.52  | 20.53   |
| KP11 |     5 | DR     | 20.41  | 20.42   |
| KP11 |     6 | GPR    | 20.58  | 20.59   |
| KP11 |     7 | TNA    | 21.21  | 21.22   |
| KP11 |     8 | DL     | 21.45  | 21.46   |
| KP11 |     9 | KYN    | 21.54  | NULL    |
| KP11 |    10 | KYN    | 10.22  | 12.51   |
+------+-------+--------+--------+---------+
20 rows in set (0.001 sec)
```

(Delete the train named “KP11”)

```
MariaDB [railway]> DELETE FROM train
    -> WHERE id = "KP11";
Query OK, 1 row affected (0.119 sec)
```

(Trainhalts after deleting a train)

```
MariaDB [railway]> SELECT *
    -> FROM trainhalts;
+-----+-------+--------+--------+---------+
| id  | seqno | stcode | timein | timeout |
+-----+-------+--------+--------+---------+
| A65 |     0 | CST    | NULL   | 20.52   |
| A65 |     1 | BYC    | 21.00  | 21.01   |
| A65 |     2 | DR     | 21.10  | 21.11   |
| A65 |     3 | KRL    | 21.22  | 21.23   |
| A65 |     4 | GPR    | 21.28  | 21.29   |
| A65 |     5 | TNA    | 21.49  | 21.50   |
| A65 |     6 | DL     | 22.13  | 22.14   |
| A65 |     7 | KYN    | 22.22  | 22.23   |
| A65 |     8 | AMR    | 22.36  | NULL    |
+-----+-------+--------+--------+---------+
9 rows in set (0.001 sec)
```

B. Write SQL Create table statements to create the following schema. Include all appropriate primary and foreign key declarations. Choose appropriate types for each attribute:

- remotecentre(centreId, college, town, state)

  Queries:

```
CREATE TABLE remotecentre (
        `centreId` CHAR(7),
        `college`  VARCHAR(32),
        `town`     VARCHAR(32),
        `state`    VARCHAR(32),
        CONSTRAINT `remotecentre_pk_fmt`
        CHECK (centreId REGEXP "^CTR-[0-9]{3}$"),
        CONSTRAINT `remotecentre_pk`
        PRIMARY KEY (centreId)
);
```

  Note: Here primary key ‘centreId’ is of format “CTR-<num><num><num>”

- person(ID, name, email)

  Queries:

  CREATE TABLE person (

  `ID` CHAR(7),

  `name` VARCHAR(64),

  `email` VARCHAR(128),

  CONSTRAINT `person_pk_fmt`

  CHECK (ID REGEXP "^PER-[0-9]{3}$"),

  CONSTRAINT `person_email_fmt`

  CHECK (email REGEXP

  "^([a-zA-Z0-9]+\.[a-zA-Z0-9]+|[a-zA-Z0-9]+)@[a-zA-Z0-9]+\.[a-zA-Z.]+$"

  ),

  CONSTRAINT `person_pk`

  PRIMARY KEY (ID)

  );

  Note: Here primary key 'ID' is of the format "PER-<num><num><num>"

  The email attribute is of the format "bhaskar.pardeshi@gmail.com"

- programme(progId, title, fromdate, todate)

  Queries:

  ```
  CREATE TABLE programme (
          `progId`      CHAR(8),
          `title`       VARCHAR(64),
          `fromdate` DATE,
          `todate`      DATE,
          CONSTRAINT `programme_pk_fmt`
          CHECK (progId REGEXP "^PROG-[0-9]{3}$"),
          CONSTRAINT `programme_pk`
          PRIMARY KEY (progId)
  );
  ```

  Note: Here primary key ‘progId’ is of format “PROG-<num><num><num>”

- coordinator(ID, progId, centreId)

  Queries:

```
CREATE TABLE coordinator (
        `ID`        CHAR(7),
        `progId`    CHAR(8),
        `centreId` CHAR(7),
        CONSTRAINT `coordinator_pk`
        PRIMARY KEY (ID, progId, centreId),
        CONSTRAINT `coordinator_fk1`
        FOREIGN KEY (ID) REFERENCES person (ID) ON DELETE
CASCADE,
        CONSTRAINT `coordinator_fk2`
        FOREIGN KEY (progId) REFERENCES programme (progId) ON
DELETE CASCADE,
        CONSTRAINT `coordinator_fk3`
        FOREIGN KEY (centreId) REFERENCES remotecentre (centreId)
ON DELETE CASCADE
);
```

- participant(ID, progId, centreId)

  Queries:

  CREATE TABLE participant (

  `ID` CHAR(7),

  `progId` CHAR(8),

  `centreId` CHAR(7),

  CONSTRAINT `participant_pk`

  PRIMARY KEY (ID, progId, centreId),

  CONSTRAINT `participant_fk1`

  FOREIGN KEY (ID) REFERENCES person (ID) ON DELETE CASCADE,

  CONSTRAINT `participant_fk2`

  FOREIGN KEY (progId) REFERENCES programme (progId) ON DELETE CASCADE,

  CONSTRAINT `participant_fk3`

  FOREIGN KEY (centreId) REFERENCES remotecentre (centreId) ON DELETE CASCADE

);

Results:

(After running all the above create table commands)

```
MariaDB [Events]> source ./ass5b.sql
Query OK, 0 rows affected, 1 warning (0.253 sec)

Query OK, 0 rows affected, 1 warning (0.234 sec)

Query OK, 0 rows affected, 1 warning (0.291 sec)

Query OK, 0 rows affected, 1 warning (0.379 sec)

Query OK, 0 rows affected, 1 warning (0.323 sec)
```

(Displaying all tables)

```
MariaDB [Events]> show tables;
+------------------+
| Tables_in_Events |
+------------------+
| coordinator      |
| participant      |
| person           |
| programme        |
| remotecentre     |
+------------------+
5 rows in set (0.001 sec)
```

(Display the details of “remotecentre” table)

```
MariaDB [Events]> describe remotecentre;
+----------+-------------+------+-----+---------+-------+
| Field    | Type        | Null | Key | Default | Extra |
+----------+-------------+------+-----+---------+-------+
| centreId | char(7)     | NO   | PRI | NULL    |       |
| college  | varchar(32) | YES  |     | NULL    |       |
| town     | varchar(32) | YES  |     | NULL    |       |
| state    | varchar(32) | YES  |     | NULL    |       |
+----------+-------------+------+-----+---------+-------+
4 rows in set (0.002 sec)
```

(Display the details of “person” table)

```
MariaDB [Events]> describe person;
+-------+-------------+------+-----+---------+-------+
| Field | Type        | Null | Key | Default | Extra |
+-------+-------------+------+-----+---------+-------+
| ID    | char(7)     | NO   | PRI | NULL    |       |
| name  | varchar(64) | YES  |     | NULL    |       |
| email | varchar(128)| YES  |     | NULL    |       |
+-------+-------------+------+-----+---------+-------+
3 rows in set (0.002 sec)
```

(Display the details of “programme” table)

```
MariaDB [Events]> describe programme;
+----------+-------------+------+-----+---------+-------+
| Field    | Type        | Null | Key | Default | Extra |
+----------+-------------+------+-----+---------+-------+
| progId   | char(8)     | NO   | PRI | NULL    |       |
| title    | varchar(64) | YES  |     | NULL    |       |
| fromdate | date        | YES  |     | NULL    |       |
| todate   | date        | YES  |     | NULL    |       |
+----------+-------------+------+-----+---------+-------+
4 rows in set (0.002 sec)
```

(Display the details of “coordinator” table)

```
MariaDB [Events]> describe coordinator;
+----------+---------+------+-----+---------+-------+
| Field    | Type    | Null | Key | Default | Extra |
+----------+---------+------+-----+---------+-------+
| ID       | char(7) | NO   | PRI | NULL    |       |
| progId   | char(8) | NO   | PRI | NULL    |       |
| centreId | char(7) | NO   | PRI | NULL    |       |
+----------+---------+------+-----+---------+-------+
3 rows in set (0.001 sec)
```

(Display the details of “participant” table)

```
MariaDB [Events]> describe participant;
+----------+---------+------+-----+---------+-------+
| Field    | Type    | Null | Key | Default | Extra |
+----------+---------+------+-----+---------+-------+
| ID       | char(7) | NO   | PRI | NULL    |       |
| progId   | char(8) | NO   | PRI | NULL    |       |
| centreId | char(7) | NO   | PRI | NULL    |       |
+----------+---------+------+-----+---------+-------+
3 rows in set (0.001 sec)
```