Project Assignment Report

In this report I will show my database design ,explain and analyze the decisions I made during creation of the database.

To start with, I created 6 tables in my sql to store the data of Stops, Trains, Routes and Schedules.

1)Stops table:

```
create table Stops (
    id              int             not null auto_increment,
    name            varchar(64)     not null unique,
    primary key(id)
);
```

Obviously, in this table I store the id auto increments of the Stop and also the unique name of it.

2) Trains table:

```
create table Trains (
    id              int             not null auto_increment,
    name            varchar(64)     not null unique,
    primary key(id)
);
```

The Trains table functions exactly in the same way as the Stops table. It also has id auto increments and the unique name of it.

3) Routes table:

```
create table Routes (
    id              int             not null auto_increment,
    name            varchar(64)     not null unique,
    primary key(id)
);
```

Routes is exactly the same as the previous two tables but as the Route can have arbitrary amount of stops and to store it in one table is not possible as we do not know beforehand how many stops it has and create columns for them. Therefore another table is mandatory to store its stops.

4) RoutesStops table:

```
create table RoutesStops (
    Rid             int             not null,
    Sid             int             not null,
    foreign key(Rid) references Routes(id) ON DELETE CASCADE,
    foreign key(Sid) references Stops(id) ON DELETE CASCADE
);
```

This table is used when we add stops for the route. When we want to add a route to a stop we give an id of route and id from stop as here we have foreigh key constraint before adding the data to table it checks if the given stop exists in Stop table and if given Route exists in route table. So we can not add a route to a stop if the stop does not exist and vice versa. In addition to this the cascade delete is ON and when we try to delete the route from the Routes table it also deletes the stops of the route because we don't need them anymore as the main route is removed.

5) Schedules table:

```
create table Schedules (
    id              int             not null auto_increment,
    Rid             int             not null,
    Tid             int             not null,
    time            time (0)        not null,
    primary key(id)
    foreign key(Rid) references Routes(id) ON DELETE CASCADE,
    foreign key(Tid) references Trains(id) ON DELETE CASCADE
);
```

The Schedule table has id, Rid(routeTd), Tid(trainId), and the time type which stores the time converted from unix time to human readable format (1641820361 converted = 4:13:00 PM). As in the previous table we have foreigh key constraints for Rid and Tid. The schedule as the Route can have arbitrary amounts of backup trains. Therefore we need another table to store the trains connected to schedule as backup.

6) Schedules Routes:

```
create table BackupTrains (
   sid            int             not null,
   Tid            int             not null
   foreign key(id) references Schedules(id) ON DELETE CASCADE,
   foreign key(Tid) references Trains(id) ON DELETE CASCADE
);
```

In BackupTrains we store an arbitrary amount of backup trains for schedule. The cascade delete is ON and when we try to delete the schedule from the Schedules table it also deletes the backup Trains of the Schedule because we don't need them anymore as the main Schedule is removed.