# ***Miniworld of Bus Travels***

## Introduction to our Miniworld:

This miniworld is a database of some bus travel agency (eg.:Meghana travels).This database contains information about the buses, seats available, drivers, ticket prices, routes, passengers and journeys of all the buses in some bus travel agency.

## Purpose of the Database:

The purpose of this database is to provide information to a travel agency about its working i.e., it will be useful for the agency to keep track of buses and their journeys.

## Users of the Database:

Employees and authorities of the travel agency are the users of the database. They can use the database for maintaining proper records of buses, number of tickets bought. Passengers are also users of this database since they can get information about prices, available buses in different routes from the database.

## Applications of the Database:

- Buses : Stores the information about the available buses in travel agency
- Drivers : Stores the data about drivers of buses in travel agency
- Ticket prices : Stores the information about prices of tickets for different types of seats and days
- Seats : Stores the information about seats in all buses
- Passengers : Stores the data about passengers
- Locations : Stores the data of different locations where bus services of travel agency are available
- Routes : Stores the information of different routes in which buses offer journeys
- Tickets : Stores the information about tickets sold by travel agency
    - This database can be used by employees and authorities of the travel agency to ensure its proper functioning by analysis of locations for which more passengers are buying tickets, types of seats that more passengers are interested in , days when more tickets are being bought.

- The database can also be used by passengers to know about the ticket prices, availability of buses in different routes etc. in order to plan a journey.

## Database requirements:

### Assumptions:

- Unique ID is given for each bus in the travel agency.
- Unique ID is given for each driver working in the travel agency.
- Unique ID is given for a passenger (given during his/her first journey)
- Assuming every location has a unique name
- Seat_ID is made by concatenating the Bus_ID with seat index so that there will be unique Seat_ID for all the seats(in all buses)
- Ticket Prices are the same for all normal days and differ only during festivals.
- Attribute "Middle stop" in "Routes" entity type is assumed to be the location where the bus halts for a long time during the journey.

## Entity types :

### Strong Entity Types :

#### 1. Buses :

- Bus_ID : Identification number assigned to bus
  [Key Attribute]
- Number_Plate : State, Number assigned,.. in number plate [Key Attribute, Composite Attribute]
- Availability of AC : Whether the bus is AC/non AC.
  [Domain: YES,NO]
- Color : Color of the bus [Multi-valued Attribute]
- Seater seats : Number of seater seats in the bus
- Sleeper seats : Number of sleeper seats in the bus
- Total : Total number of available seats in the bus
  [Derived attribute]

#### 2. Drivers:

- Driver_ID : Identification number assigned to driver [Key Attribute]
- Dr_Name : Name of the driver

- Year of joining : Year in which the driver joined the Travel Agency.
- Working_Experience : Number of years of experience in the Travel Agency, the driver had [Derived Attribute]
- Number of Journeys : Number of journeys for which the driver drove in the travel agency.

**3. Ticket prices:**

- Category of day : Normal day/special day (Ex: Festive Days) [Key Attribute]
- Price for sleeper : Price for a sleeper seat per an hour of the journey
- Price for seater : Price for a seater seat per an hour of the journey

**4. Seats:**

- Bus_ID : Identification number assigned to bus
  [Key Attribute]
- Seat_ID : String concatenation of Bus_ID and seat number.
  [Key Attribute]
- Type : Seated/Sleeper.
- View : Windowed/Middle/Aisle.

**5. Passengers:**

- Pr_ID : Identification number assigned to passenger
  [Key Attribute]
- Pr_Name : Name of the passenger
- Age : Age of the passenger
- Gender : Gender of the person
- Journeys : Number of Journeys

**6. Locations:**

- Name : Name of the location where services of bus travel agency are available
  [Key attribute]
- PIN : PIN code of the location
- District : District of the location
- State : State of the location

**Weak Entity Types:**

**1. Routes:**

- Starting place : Starting place of the journey
- Middle stop : Halting places where bus stops for quite longer time [Multi-valued Attribute]
- Final destination : Final destination of journey

**2. Tickets:**

- Pr_ID : Identification number assigned to the passenger.
- Pr_Name : Name of the passenger
- Bus_ID : Identification number of the bus the passenger will be traveling on.
- Driver_ID : Identification of driver who will drive the bus.
- Date : Date of journey
- Starting place : Starting place of journey of the passenger
- Dropping place : Destination of journey of the person

**Entity with two Key attributes:**

- Buses

## Relationship types :

1. Belong to :
    - Buses, Seats(Seats belong to buses)
    - Degree=2
    - (min,max) constraint => (1,1),(1,1)
    - Participation constraint => Total participation
2. Bought by:
    - Tickets,Passengers (Tickets bought by passengers)
    - Degree=2
    - (min,max) constraint => (1,N),(1,1)
    - Participation constraint => Total participation

3. Allotted to
    - Buses,Tickets (Buses allotted to tickets)
    - Degree=2
    - (min,max) constraint => (1,1),(1,N)
    - Participation constraint => Total participation

4. Booked for
    - Tickets,Seats (Tickets booked for Seats)
    - Degree=2
    - (min,max) constraint => (1,1),(1,1)
    - Participation constraint => Total participation
5. Connect
    - Locations,Routes (Routes connect locations)
    - Degree=2
    - (min,max) constraint => (1,N),(1,N)
    - Participation constraint => Total participation

**Degree > 3 relationship types :**

1. Journey
    - Drivers drive Buses on a Route ; Tickets for this Route
    - Degree = 4
    - Min-max Constraint = (1,N):Drivers,(1,N):Buses,(1,1):Route,(1,M):Tickets
    - Participation constraint => Total participation

**Functional Requirements:**

**Retrieval :**

- **Selection :** Retrieve complete data tuples of buses registered in Telangana state (from number plate of bus)
- **Projection query :**
  1) List names of drivers who have a Driver_ID that ends in '0'.
  2) List names of passengers Journeys>2
- **Aggregate :** Highest number of journeys by a single passenger

- **Search :** Search for Pr_IDs having subpart “123”
- **Analysis :**
    1. Average number of tickets bought by passengers between ages 30-40 in the year 2021.
    2. Total number of AC Buses which have traveled to Kakinada.

**Modifications:**

- **Insert :** Inserting a new tuple into Buses.

  **Possible violations:**

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|---|
| Domain constraint => If the attribute Availability of AC is given any value other than YES/NO.<br>Key constraint => If the Bus_ID of the new tuple is already an existing one<br>Entity Integrity => If the Bus_ ID of the new tuple is NULL |

- **Delete :** Deleting the Passenger tuple with Pr_ID=”1234567890”(some existing Pr_ID)

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| Referential integrity will be violated:There are tuples in Tickets that may refer to this tuple |

- **Update :** Updating Price for sleeper,Price for seater.

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| Acceptable Updation |