NEXTRAIL

Replacing IRCTC sem by sem

DBMS | CSE202

Group 23

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Abstract

The Indian Railways has been an integral part of the Indian Economy since it's dawn. The whole ecosystem of Railways generates tons of data daily which needs to be structured and queried properly for a better user experience in terms of both comfort, easy, and speed and for better RnD for further development of such an integral part of the out country. This is where we come in with NEXTRAIL.

The user gets to book tickets with ease while choosing whatever class they wish to book while paying with their choice of payment method securely, choose their choice of meals, cancel current tickets, view previous tickets, view their current tickets status and get technical help whenever they require.

The tech-team can with ease update the schedules of existing trains, add new trains or delete existing trains. Further the workforce on field like the catering services would be able to fetch passenger preferences for better productivity.

Further, all the data that we collect and generate is kept in a structured manner that can be used by RnD teams for research purposes.

Stake-Holders & Queries

Admin / Tech-Support

These are the stake holders responsible for handling and the maintenance of our database. They will have the ability to modify, add, delete trains and their schedules further resolve queries by users.

- Add or delete a train
- Add or delete a station
- Cancel a train for a day
- Change the schedule/re-route a train
- Change fare per kilometre

User / Passenger

Users are the ones interacting with the database. Firstly the user would have to Register and then after logging in they are the ones booking tickets for passenger, querying for the status of a ticket, cancelling existing tickets, checking previously booked tickets. Passengers are the ones travelling and thus the User must provide data of the Passengers but primarily only the Users will be interacting with our database.

- Registering and logging in
- Querying for available trains in a given route
- Booking, Cancelling, querying for the Status of a Ticket
- Getting tech-issues resolved by Tech-Support (Though not a query on the data-base)

Financial Instruments

These would be the gateways like RazorPay, UPI, Credit/Debit Card providers like VISA/MasterCard/Rupay. Every booking made by the User will be going through this which would generate a Receipt which could be looked up by them, users, and even Admins.

- Querying Fare/Cost of a ticket

Ministry of Indian Railways

This stake holder even though not directly querying or adding to the database on a lower level, but is the upper body making decisions about what new Trains to add, what Trains to delete, increase seats, fairs, etc.

On field Workers

This can be multiple stake holders like Caterers on etc, they can query the needed information about the passengers before hand to ensure efficiency, For example when a user books tickets for some passengers, they fill out the meal preferences of the passengers, then the Caterers can query the meal preference of passengers to pre-cook the required meals to ensure maximum efficiency and minimal waste

- Querying passenger information

Entities, Relationships & ER diagram

Entities

1. **User_Account**
    - user_id (Primary Key)
    - user_name
    - name
        - *first_name*
        - *middle_name*
        - *last_name*
    - address
        - *first_line*
        - *second_line*
        - *PIN*
    - age
    - phone_no **(Multivalued Attribute)**

2. **Credentials**
    - user_name **(Primary Key)**
    - passcode

3. Passenger (Weak Entity)

- pnr**(Discriminator attribute)**
- pname
- gender
- age
- meal_option
- stat

4. Ticket

- pnr **(Primary Key)**
- user_id
- train_id
- boarding_time
- boarding_from
- going_to
- fare() **(Derived Attribute)**
- booking_details

5. Receipt

- receipt_no **(Primary Key)**
- transaction_time
- payment_mode
- pnr
- user_id

6. Adm

- user_name **(Primary Key)**
- passcode

7. Seat_No

- num **(Primary Key)**

8. Train

- id **(Primary Key)**
- train_name
- src
- destination
- train_type

9. Class_Layout

- class_type **(Primary Key)**
- class_name
- capacity

10. Station

- st_code **(Primary Key)**
- st_name

Aggregations

1. **Seat Details** - formed by Train, Class_Layout, Seat_No
2. **Admin Permissions** - formed by Train, Seat_No, Class_Layout, Station

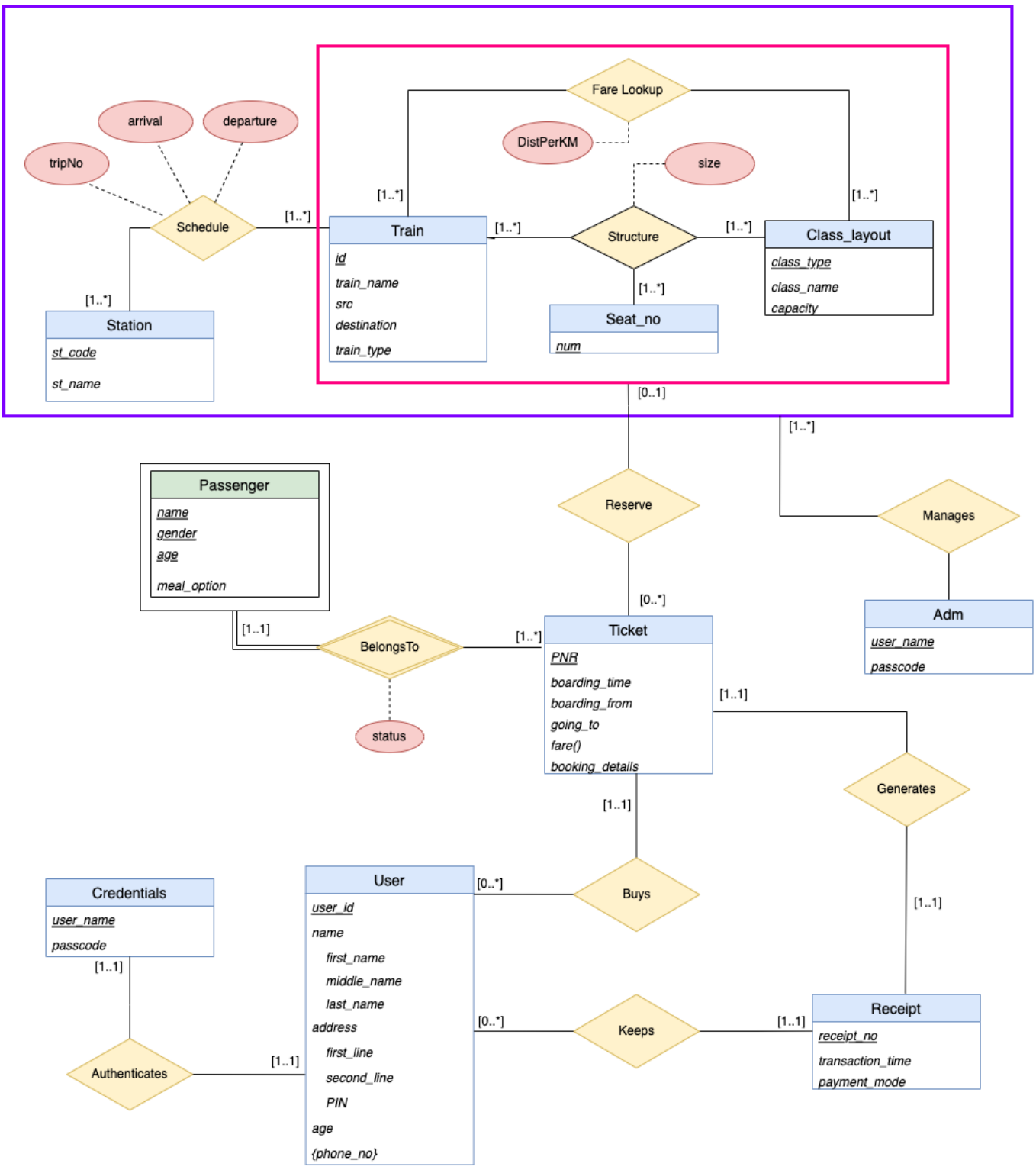
Relations

- **Authenticates**
- **Buys**
- **Keeps**
- **Generates**
- **Manages**
- **Reserves**
- **Belongs To** *has descriptive attributes*
    - status
- **Structure** *has descriptive attributes*
    - size
- **Fare Lookup** *has descriptive attributes*
    - additional_cost
- **Schedule** *has descriptive attributes*
    - arrival
    - tripNo
    - departure

Relationships

- Credentials “Authenticates” User_Account *(One to One)*
- User_Account “Buys” Ticket *(Many to One)*
- *Ticket “Belongs To” Passenger (One to Many) (Identifying Relationship)*
- User_Account “Keeps” Receipt *(One to Many)*
- Ticket “Generates” Receipt *(One to One)*
- Ticket “Reserve” Seat Details *(One to Many)*
- Adm “Manages” Admin Permissions
- Train “Structure” Class_Layout *(Many to Many)*
- Train “Structure” Seat_No (Many to Many)
- Seat_No “Structure” Class_Layout (Many to Many)
- Train “Fare Lookup” Class_Layout *(Many to Many)*
- Train “Schedule” Station *(Many to Many)*

ER Diagram


Fare Lookup
DistPerKM
size
arrival
departure
tripNo
Schedule
[1..*]
[1..*]
Train
id
train_name
src
destination
train_type
[1..*]
Structure
[1..*]
Class_layout
class_type
class_name
capacity
[1..*]
[1..*]
Station
st_code
st_name
[1..*]
Seat_no
num
[0..1]
[1..*]
Passenger
name
gender
age
meal_option
Reserve
Manages
[0..*]
[1..1]
BelongsTo
[1..*]
Ticket
PNR
boarding_time
boarding_from
going_to
fare()
booking_details
Adm
user_name
passcode
status
[1..1]
Generates
[1..1]
Credentials
user_name
passcode
[1..1]
User
user_id
name
first_name
middle_name
last_name
address
first_line
second_line
PIN
age
{phone_no}
[0..*]
Buys
[1..1]
Authenticates
[1..1]
[0..*]
Keeps
[1..1]
Receipt
receipt_no
transaction_time
payment_mode

Database Scheme, Integrity constraints & Data population

User_Account

user_id	int not null
user_name	varchar (20) not null unique
first_name	varchar (20) not null
middle_name	varchar (20) null
last_name	varchar (20) null
first_line	varchar (255) not null
second_line	varchar (255) null
PIN	int not null 99999< PIN < 1000000
age	int null >= 18
phone_no	varchar (10) null

Primary Key - user_id

Foreign Key - user_name *references* Credentials (user_name)

Credentials

user_name	varchar (20) null
passcode	varchar (20) not null length(Passcode) > 7

Primary Key - userName

Primary Key - None

Passenger

pnr	varchar (10) null
pname	varchar (30) not null
gender	varchar (10) not null Gender in ('Male', 'Female', 'Other')
age	int not null >= 0
stat	varchar (20) null stat in ('Confirmed', 'Waiting', 'Cancelled')

Primary Key - (pnr, pname, gender, age)

Foreign Key - pnr *references* Ticket(pnr)

Ticket

pnr	varchar (10) null
user_id	int null
train_id	varchar (6) not null
boarding_time	DATETIME null
boarding_from	varchar (10) not null
going_to	varchar (10) not null
fare	int null
mealOption	varchar (10) null
booking_details	varchar (255) null

Primary Key - pnr

Foreign Key - going_to *references* Station (st_code)

boarding_from *references* Station (st_code)

train_id *references* Train(id)

user_id *references* User_Account(user_id)

Receipt

receipt_no	int null
transaction_time	DATETIME default now () null
payment_mode	varchar(20) null payment_mode in ('UPI', 'Credit Card', 'Debit Card', 'Bank Transfer')
pnr	varchar(10) not null
user_id	Int

Primary Key - receipt_no

Foreign Key - pnr *references* Ticket(pnr)

user_id *references* User_Account(user_id)

Adm

user_name	varchar (20) null
passcode	varchar (30) null length(passcode) > 7

Primary Key - user_name

Foreign Key - None

Seat_no

num	int null

Primary Key - num

Foreign Key - None

Train

id	int null
train_name	varchar(30) not null
src	varchar (10) not null
dest	varchar (10) not null
type	varchar (30) not null

Primary Key - id
Foreign Key - src *references* Station(st_code)
destination *references* Station(st_code)

Class_Layout

class_type	varchar (20) null
class_name	varchar (30) not null
capacity	int not null
cost_per_km	decimal (3,2) not null

Primary Key - class_type

Foreign Key - None

Station

st_code	varchar(10) null
st_name	varchar(30) not null

Primary Key - st_code

Foreign Key - None