

Project Name: Pakistan Smart Bus Assistant

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Technology Stack: React.js + Django REST + MySQL

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1 Project Overview

Pakistan Smart Bus Assistant is a public transport management system for local city bus services in Pakistan. The system helps commuters to:

- Search bus routes.
- View route schedules.
- Check bus capacity status.
- Receive schedule-based notifications.
- Submit complaints or feedback.

The admin can:

- Manage buses, routes, schedules, fares.
- Handle complaints.
- Send important notifications to users.

The system is built without GPS dependency, focusing fully on scheduled and admin-based real-time updates.

2 System Functional Flow

2.1 User Flow

- User Registration / Login (JWT Authentication)
- Select Source & Destination
- View matching routes and available scheduled times
- View bus occupancy status (Empty / Medium / Full)
- Receive notifications based on schedule timings
- Submit complaints or feedback

2.2 Admin Flow

- Admin Login (Secure Access)
- Manage Routes (Add / Edit / Delete)
- Manage Buses (Add / Edit / Delete)
- Manage Schedules (Departure Time, Weekdays)
- Update Bus Capacity Status
- Manage Fares
- Handle Complaints
- Send Notifications to users

3 System Architecture

Layer	Technology
Frontend	React.js + Tailwind CSS
Backend API	Django REST Framework
Database	MySQL (XAMPP)
Authentication	JWT (JSON Web Tokens)
Notifications	Django Cron Jobs
Hosting	Railway / Render / AWS

4 Core Modules Summary

Module	User Panel	Admin Panel
Authentication	✓	✓
Route Search	✓	✓ (Manage)
Capacity Status	✓	✓
Fare Display	✓	✓
Notifications	✓	✓
Complaints	✓	✓
Bus Management	✗	✓

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Database Design

5.1 Users Table

Field	Type
id	INT (PK)
name	VARCHAR
email	VARCHAR (Unique)
phone	VARCHAR
password	VARCHAR (hashed)
is_admin	BOOLEAN

5.2 Buses Table

Field	Type
id	INT (PK)
bus_number	VARCHAR
plate_number	VARCHAR
capacity	INT
current_occupancy	ENUM('Empty','Medium','Full')
is_active	BOOLEAN

5.3 Routes Table

Field	Type
id	INT (PK)
name	VARCHAR
start_point	VARCHAR
end_point	VARCHAR
total_distance_km	FLOAT

Field **Type**

estimated_time_min INT

5.4 Schedules Table

Field **Type**

id INT (PK)

bus_id Foreign Key (Buses)

route_id Foreign Key (Routes)

departure_time TIME

weekdays VARCHAR (e.g. "Mon,Tue,Wed")

5.5 Fares Table

Field **Type**

id INT (PK)

route_id Foreign Key (Routes)

fare_amount FLOAT

5.6 Complaints Table

Field **Type**

id INT (PK)

user_id Foreign Key (Users)

bus_id Foreign Key (Buses)

description TEXT

status ENUM('Pending','Resolved','Closed')

created_at TIMESTAMP

5.7 Notifications Table

Field **Type**

id INT (PK)

message TEXT

created_at TIMESTAMP

6 Key Benefits of MVP v3

- Zero dependency on GPS / Driver App in starting phase
 - Fully useful & practical for city commuters
 - Very fast development timeline
 - Highly scalable backend for future upgrades
 - Easy to integrate driver app & GPS in future versions
 - Professional architecture for stakeholders, universities or investors
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7 Future Scope (Optional after MVP success)

- Driver App for live location tracking
 - Real-time ETA calculation
 - Multiple city support
 - Admin analytics dashboard
 - Ratings & reviews for routes
 - Multilingual interface
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Problems Faced by Locals	Solutions Provided by the Application	Benefits for Locals
Bus timings are uncertain	Pre-loaded schedule system with route and time search	Users will know exact bus schedules
Heavy rush during morning and return hours	Admin updates occupancy status (Empty / Medium / Full)	Users can check bus capacity beforehand and avoid crowded buses
Uncertainty about which buses are available	Complete bus directory searchable by source and destination	Eliminates confusion; all routes clearly visible
No timely updates due to traffic	Schedule-based predictive notifications	Smart alerts such as "Your Bus will leave in 30 mins"
No system for filing complaints	In-app complaint and feedback submission	Complaints reach the admin directly
No clarity on fare charges	Fare management system based on routes	Users know fare in advance; no surprise charges
Lack of reliable data without GPS	Admin-controlled manual real-time status updates	Reliable information even without GPS dependency

