SMART INDIA HACKATHON 2025

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- **Problem Statement ID – 25013**
- **Problem Statement Title-** Real-Time Public Transport Tracking for Small Cities
- **Theme- Transportation & Logistics**
- **PS Category- Software**
- **Team ID - CodeCrafters**

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UDAAN - A Web App

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How it Addresses the Problem:

- It provides a single, centralized platform for all travel planning, eliminating the need to guess bus schedules or find last-mile transport.
- Shows a clear breakdown of time and money for each journey, reducing wasted time and financial uncertainty for commuters.
- It promotes the use of public and shared transport by making these systems more predictable, and convenient and reliable.

Innovation and Uniqueness:

- It is a multimodal solution that integrates and optimizes routes across public and private shared transport, a unique approach for small-city markets.
- Its design is optimized for low-bandwidth environments, addressing a key technological constraint in tier-2 towns.
- The "least-cost" algorithm is tailored to the specific needs of these commuters, who often prioritize balancing time and cost rather than just speed.

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TECHNICAL APPROACH

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Technologies:

Backend:

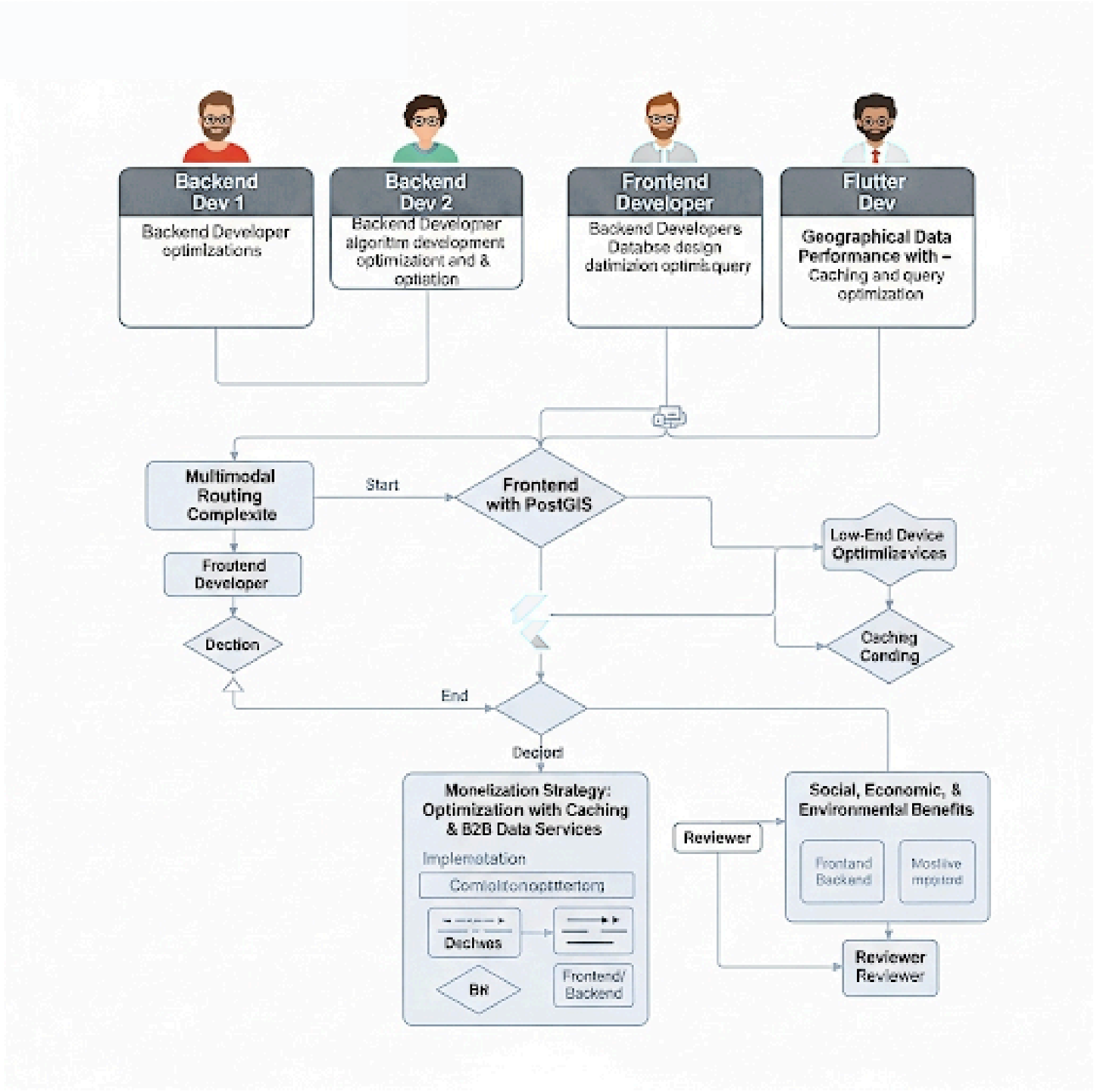
- Python with Django REST Framework (DRF): To build a scalable and secure API.
- PostgreSQL with PostGIS: To efficiently store and query geographical data like bus stops and routes.

Mobile App:

- Flutter (Dart): For a single codebase that runs on both Android and iOS, saving time and resources.

Mapping:

- OpenStreetMap (OSM) API: Provides free and detailed map data.
- Flutter Map Framework: To render the maps in the mobile app.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FEASIBILITY AND VIABILITY

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Feasibility Analysis:

- Market Need: Over 60% of commuters in small cities lack reliable transport information. This creates a clear demand for a solution that provides predictability and convenience.
- Technological Soundness: The proposed technology stack—DRF for the backend, Flutter for the app, and PostGIS for geographical data—is well-established and robust.

Potential Challenges & Strategies:

- Challenge: Multimodal Routing Complexity.
  - Strategy: A robust graph-based algorithm to efficiently combine and weigh different transport types.
- Challenge: Geographical Data Performance.
  - Strategy: Use PostGIS with proper indexing (GIST indexes) on all geographical columns to ensure that spatial queries are fast and scalable. Frequent performance testing to optimize slow queries.
- Challenge: Low-End Device Optimization.
  - Strategy: Minimal animations and a focus on core functionality. Implement caching and lazy loading for map data to reduce memory usage and ensure a smooth user experience.

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IMPACT AND BENEFITS

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Potential Impact & Benefits:

- Commuters (Social): Enhances daily life by reducing uncertainty and wasted time. This makes public transport a more reliable and less stressful option, improving overall commuter experience.
- Local Economy (Economic): The app provides a platform for shared transport providers (rickshaws, shared cabs) to gain more business, creating economic opportunities for drivers and increasing efficiency in the local transport market.
- Environment (Environmental): By making public and shared transport more convenient and predictable, the solution encourages a shift away from personal vehicles, which helps reduce traffic congestion, carbon emissions, and air pollution.
- Urban Planning (Social/Economic): The aggregated, anonymized data on travel patterns can be used by municipal corporations and transport authorities to make informed decisions for urban planning, such as optimizing bus routes and identifying areas needing better connectivity.
- Safety (Social): A structured system for shared transport can enhance commuter safety, as it provides a digital trail for journeys and can lead to improved accountability for drivers.

References and Research

- Urban Mobility India Report 2024. Ministry of Housing and Urban Affairs.
  - Source: http://mohua.gov.in/
- World Bank Reports on Sustainable Urban Transport. The World Bank.
  - Source: https://www.worldbank.org/en/country/india/overview
- Reports from the Centre for Science and Environment (CSE).
  - Source: https://www.cseindia.org/
- Publications from the Institute for Transportation and Development Policy (ITDP).
  - Source: https://www.itdp.org/