SOFTWARE REQUIREMENT SPECIFIATION

BinGo: Real-Time Waste Collection

Arul Prasanth K,
2023239001,
Computer Science

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1. INTRODUCTION

1.1 Purpose

The purpose of this Software Requirement Specification (SRS) document is to provide a complete and detailed description of the functional and non-functional requirements of **BinGo**, a real-time waste collection and recycling tracking mobile application. This document serves as a formal reference for system design, development, testing, and validation.

The BinGo application aims to address inefficiencies in traditional waste management systems by enabling citizens to request waste pickup services, track collection vehicles in real time, and promote recycling through digital monitoring and role-based access control.

1.2 Document Conventions

- **Citizen (User)** – Individual requesting waste pickup services
- **Worker** – Waste collection personnel responsible for pickups
- **Admin** – Authority responsible for monitoring and managing the system
- **System** – Refers to the BinGo application

1.3 Intended Audience and Reading Suggestions

- **Citizens** – To understand service usage and features
- **Waste Collection Workers** – To understand task handling and system interaction
- **Administrators** – To understand monitoring and control mechanisms
- **Project Evaluators** – To assess system completeness and feasibility
- **Developers** – To use this document as a development guideline

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1.4 Project Scope

The scope of the BinGo project is to design and develop a **mobile-based waste management system** that improves operational efficiency, transparency, and citizen participation.

Core Functionalities

- Waste pickup request submission
- Waste type selection (organic, recyclable, e-waste)
- Real-time vehicle tracking
- Status notifications
- Worker task management
- Administrative monitoring and analytics

Limitations

- Requires internet connectivity
- Live tracking depends on GPS availability

Benefits

- Reduces manual coordination
- Improves transparency
- Encourages responsible waste disposal

1.5 References

1. Pressman, R.S., *Software Engineering: A Practitioner's Approach*, McGraw Hill
2. Sommerville, I., *Engineering Software Products*, Pearson Education
3. Silberschatz et al., *Database System Concepts*, McGraw Hill
4. React – https://www.youtube.com/watch?v=TtPXvEcE11E
5. Python FastAPI - https://www.youtube.com/watch?v=02dzgC_Ba70&list=PLsyeobzWxl7qF4ASwCZZDXor_Y0YJ3Qfc

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2. OVERALL DESCRIPTION

2.1 Product Perspective

BinGo is a **client–server based mobile application** consisting of:

- Mobile client developed using **React Native (Expo)**
- Backend server developed using **FastAPI (Python)**

- Relational database using **PostgreSQL**
- Real-time communication via WebSockets

2.2 Product Features

Citizen Features

- User registration and login
- Waste pickup request with GPS location
- Waste type classification
- Live vehicle tracking
- Pickup status notifications
- Request history

Worker Features

- Secure login
- View assigned pickup requests
- Update pickup status
- Share real-time location

Admin Features

- View all pickup requests
- Assign workers
- Monitor worker performance
- Generate operational reports

2.3 User Classes and Characteristics

Citizens

- Urban residents
- Require convenient waste disposal
- Expect transparency and tracking

Workers

- Municipal waste staff
- Use GPS-enabled smartphones
- Responsible for timely updates

Administrators

- Municipal authorities
- Monitor performance and efficiency

2.4 Operating Environment

- Android/iOS smartphones
- Minimum 2GB RAM
- GPS-enabled devices
- 4G/5G internet connectivity

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3. SYSTEM FEATURES

3.1 User Registration and Authentication

- Users can register using email or phone number
- Secure authentication using JWT
- Password reset functionality

3.2 Waste Pickup Request Management

- Users can submit pickup requests
- System captures GPS location
- Users can select waste category

3.3 Real-Time Tracking System

- Workers share live GPS location
- Users can track assigned vehicles

- Status updates are reflected instantly

3.4 Worker Task Management

- Workers receive task assignments
- Can update pickup status
- Location tracking enabled during tasks

3.5 Administrative Control

- Admin can monitor all activities
- Assign or reassign workers
- View analytical summaries

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4. EXTERNAL INTERFACE REQUIREMENTS

4.1 User Interface

- Login & Registration Screen
- Home Dashboard
- Pickup Request Screen
- Live Tracking Screen
- History & Profile Screen

4.2 Worker Interface

- Task Dashboard
- Map Navigation Screen
- Status Update Screen

4.3 Hardware Interfaces

- GPS-enabled smartphones

- Mobile camera (optional future enhancements)

4.4 Software Interfaces

- Google Maps API
- Push Notification Service
- RESTful Backend APIs

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5. NON-FUNCTIONAL REQUIREMENTS

5.1 Performance Requirements

- Support concurrent users
- Real-time updates within 2–3 seconds
- Optimized mobile performance

5.2 Safety Requirements

- Secure data handling
- Backup and recovery mechanisms

5.3 Security Requirements

- Encrypted communication
- Role-based access control
- Secure authentication mechanisms

5.4 Usability Requirements

- Simple and intuitive UI
- Minimal learning curve
- Mobile-friendly design

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6. OTHER REQUIREMENTS

6.1 Legal Requirements

- Compliance with data privacy guidelines
- User consent before accessing location data

6.2 Operational Requirements

- High system availability
- Regular data backups
- Minimal downtime

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7. CONCLUSION

This Software Requirement Specification defines all functional and non-functional requirements of the **BinGo** application. The document provides a comprehensive foundation for system design and development and ensures that the project meets academic standards while addressing a real-world problem effectively.