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Software Requirements Specification (SRS) for Locate a Socket

1. Introduction

1.1 Document Purpose

This Software Requirements Specification (SRS) document establishes the functional and nonfunctional requirements for the Locate a Socket web application. This document serves as a comprehensive guide for software developers, system architects, testers, project managers, and stakeholders involved in the design, development, implementation, and maintenance of the electric vehicle charging station locator system.

1.2 Product Scope

Locate a Socket is a location-based web application designed to address the growing demand for accessible electric vehicle charging infrastructure. The application provides electric vehicle drivers with real-time information about charging station locations, availability status, pricing, and secure payment processing capabilities. The platform operates through web browsers and mobile interfaces, enabling users to efficiently plan their journeys while ensuring convenient access to charging facilities along their routes.

1.3 Document Overview

This document comprehensively outlines the software requirements for Locate a Socket, encompassing system overview, functional specifications, non-functional requirements, and implementation constraints. The document structure includes:

- Section 2: Overall system description including product perspective, core functions, user characteristics, constraints, and fundamental assumptions

- Section 3: Detailed specific requirements covering external interfaces, functional requirements, and non-functional specifications

- Section 4: Supporting information including references and additional documentation

1.4 Definitions, Acronyms, and Abbreviations

- **EV**: Electric Vehicle

- **GPS**: Global Positioning System

- **API**: Application Programming Interface

- **UI**: User Interface

- **UX**: User Experience

- **SSL**: Secure Socket Layer

- **PCI-DSS**: Payment Card Industry Data Security Standard

- **kWh**: Kilowatt-hour **AC**:

- Alternating Current **DC**:

- Direct Current

2. Overall Description

2.1 Product Perspective

Locate a Socket operates as a comprehensive web-based platform that integrates multiple external systems including GPS navigation services, charging station databases, payment processing systems, and real-time availability monitoring. The system interfaces with charging station operators' APIs to provide accurate, up-to-date information about station status, pricing, and availability. The application leverages cloud-based infrastructure for scalability and reliability while maintaining compatibility across various devices and browsers.

2.2 Product Functions

The Locate a Socket application delivers the following core functionalities:

- Real-time charging station location discovery and mapping

- Advanced route planning with charging stop optimization

- Live availability status monitoring and reservation capabilities

- Comprehensive charging station information including connector types, power ratings, and pricing

- Secure payment processing for charging sessions

- User account management and charging history tracking

- Rating and review system for charging stations

- Push notifications for charging session updates and promotional offers

- Multi-language support for international users

- Integration with popular navigation applications

2.3 User Characteristics

Electric Vehicle Drivers: Primary users who require charging services during their journeys. These users typically possess basic to intermediate technical skills and expect intuitive, reliable mobile and web interfaces for quick access to charging information.

Charging Station Operators: Business entities that manage charging infrastructure and require administrative access to update station information, monitor usage patterns, and manage pricing structures. These users possess advanced technical knowledge of charging systems and business operations.

System Administrators: Technical personnel responsible for platform maintenance, user support, and system optimization. They require comprehensive technical expertise in web applications, database management, and system integration.

Guest Users: Individuals who access basic functionality without registration, requiring minimal technical proficiency while seeking quick access to charging station locations and basic information.

2.4 Constraints

- Must ensure compatibility with major web browsers including Chrome, Firefox, Safari, and Edge
- Mobile responsiveness required for iOS and Android devices
- Compliance with payment processing regulations including PCI-DSS standards
- Integration capabilities with existing charging network APIs and protocols
- Real-time data synchronization dependent on third-party charging station APIs
- Geographic coverage limited to regions with participating charging station partners Performance
- optimization required for varying internet connection speeds

2.5 Assumptions and Dependencies

- Users maintain stable internet connectivity for real-time data access
- Charging station operators provide accurate, timely API data updates
- Third-party payment processors maintain consistent service availability
- GPS services remain accessible and accurate for location-based functionality
- Users possess compatible devices with modern web browser capabilities
- Charging station partners maintain standardized data formats and communication protocols

3. Specific Requirements

3.1 External Interfaces

User Interface: Responsive web application optimized for desktop and mobile browsers, featuring intuitive navigation, interactive maps, and streamlined user workflows for efficient charging station discovery and payment processing.

Hardware Interfaces: Compatible with GPS-enabled devices, smartphones, tablets, and desktop computers. Integration capabilities with vehicle infotainment systems and charging station hardware for seamless user experience.

Software Interfaces: Integration with mapping services (Google Maps, OpenStreetMap), payment gateways (Stripe, PayPal), charging station operator APIs, and navigation applications for comprehensive functionality.

Communication Interfaces: RESTful API architecture supporting third-party integrations, push notification services for mobile alerts, and email communication for account management and transaction confirmations.

3.2 Functional Requirements

User Registration and Authentication: Users must create accounts using email addresses or social media authentication (Google, Apple ID). The system implements secure authentication protocols including OAuth 2.0 and multi-factor authentication options for enhanced security.

Location Services and Search: The application provides GPS-based location detection and allows users to search for charging stations by address, city, or points of interest. Advanced filtering options include connector type, power rating, availability status, and price range.

Route Planning and Optimization: Users can input destinations and receive optimized routes incorporating necessary charging stops based on vehicle range, current battery level, and charging station availability along the planned route.

Payment Processing and Management: Secure payment system supporting credit/debit cards, digital wallets, and charging network-specific payment methods. Users can store payment methods, view transaction history, and receive detailed billing information.

Real-time Availability Monitoring: The system displays current charging station availability, estimated wait times, and allows users to reserve charging slots when supported by station operators.

User Reviews and Ratings: Integrated review system enabling users to rate charging stations, provide feedback on service quality, and access community-generated insights for informed decision-making.

3.3 Non-Functional Requirements

Performance: The system must support concurrent access by up to 50,000 users while maintaining response times under 3 seconds for search queries and 1 second for map loading.

Security: Implementation of AES-256 encryption for sensitive data, secure HTTPS connections, and compliance with PCI-DSS standards for payment processing. User authentication data protected through industry-standard hashing algorithms.

Availability: The service maintains 99.5% uptime with robust error handling, automated failover mechanisms, and comprehensive monitoring systems to ensure continuous service availability.

Usability: The interface adheres to WCAG 2.1 accessibility standards, ensuring compatibility with assistive technologies. Key functions accessible within two clicks from the main interface, with intuitive navigation suitable for users of varying technical proficiency levels.
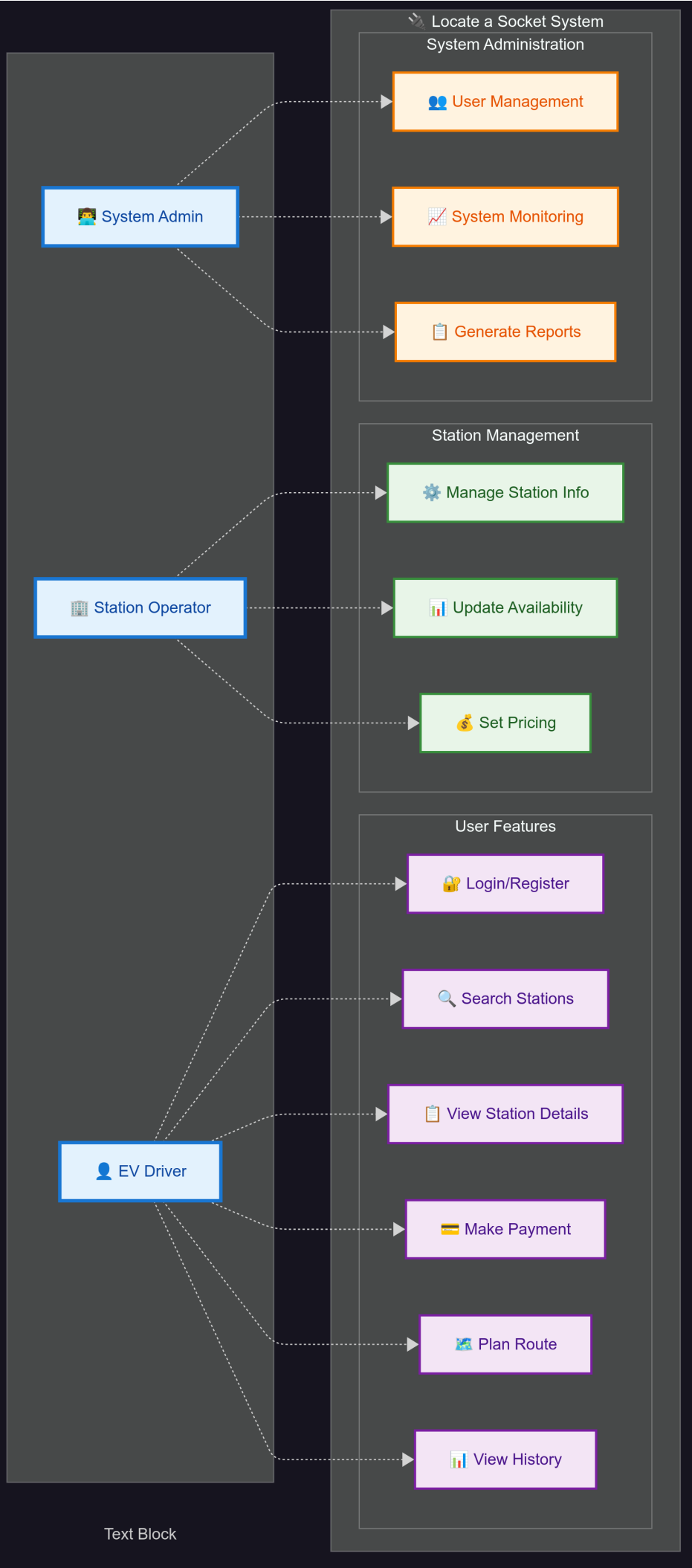
4. Supporting Information

Use Case Descriptions

Actors:

- **EV Driver**: Main user who searches for and uses charging stations

- **Station Operator**: Manages charging station information and availability **System**

- **Admin**: Maintains the overall system

Core Use Cases:

1. **Login/Register**: User authentication and account creation

2. **Search Stations**: Find charging stations by location

3. **View Station Details**: Check station information, pricing, and availability

4. **Make Payment**: Process charging session payments

5. **Manage Station Info**: Operators update station details

6. **Update Availability**: Real-time status updates

7. **System Administration**: Platform maintenance and monitoring

📡 Locate a Socket System

System Administration

- 👥 **User Management**
- 📈 **System Monitoring**
- 📋 **Generate Reports**

Station Management

- ⚙️ **Manage Station Info**
- 📊 **Update Availability**
- 💰 **Set Pricing**

User Features

- 🔐 **Login/Register**
- 🔍 **Search Stations**
- 📋 **View Station Details**
- 💳 **Make Payment**
- 🗺️ **Plan Route**
- 📊 **View History**

👨‍💼 **System Admin**

🏢 **Station Operator**

👤 **EV Driver**

Text Block

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6. Update Availability: Real-time status updates
7. System Administration: Platform maintenance and monitoring