**UIT2501 – Principles of Software Engineering and Practices**

**Assignment -1**

***Software Requirements Specification (SRS Document)- Railway Tracking and Arrival Time Prediction System (RTATPS)***

**1. Introduction**

**1.1 Purpose**

This document outlines the requirements for the Railway Tracking and Arrival Time Prediction System (RTATPS). The system’s purpose is to provide real-time train scheduling information, including estimated arrival and departure times, as well as delay alerts, enhancing travel planning for passengers and streamlining operational processes at railway stations.

**1.2 Scope**

The Railway Tracking and Arrival Time Prediction System (RTATPS) will:

* Provide up-to-date train schedule information, including arrival times and delays.
* Enable administrators to update train schedules and inform users of delays.
* Allow station masters to make location-specific adjustments to train arrival times.
* Offer passengers easy access to information via an intuitive interface.

**1.3 Definitions, Acronyms, and Abbreviations**

* **Admin**: Manages train schedules and sends delay notifications.
* **Station Master**: Station staff authorized to update station-specific arrival times.
* **User**: Any individual accessing train schedule information.
* **RTATPS**: Railway Tracking and Arrival Time Prediction System.

**1.4 Overview**

This document details the requirements for RTATPS, including its functionality, performance goals, and interface design. The structure is as follows:

1. System overview and user requirements.
2. Detailed functional and non-functional requirements.
3. External interfaces and system features.

**2. Overall Description**

**2.1 Product Perspective**

RTATPS is a standalone system accessible via web and mobile platforms. It connects admins, station masters, and passengers to a central server, which processes and distributes real-time train scheduling data, including delay notifications.

**2.2 Product Functions**

The main functions supported by RTATPS include:

1. **Admin Functions**:
   * Add, update, and delete train schedules.
   * Announce departure times and delays.
2. **Station Master Functions**:
   * Secure login for updating train arrival times specific to each station.
   * Provide users with station-specific train schedule information.
3. **User Functions**:
   * Access real-time train schedules, including arrival and departure times.
   * Receive notifications for delays and schedule changes.
   * Subscribe to updates for selected stations or trains.

**2.3 User Characteristics**

* **Admin**: Familiar with train scheduling, responsible for managing delays and announcements.
* **Station Master**: Authorized personnel for updating station-specific train arrival times.
* **User**: Passengers looking for real-time train schedule information.

**2.4 Constraints**

* The system requires stable internet connectivity for real-time data updates.
* It must handle high data loads without significant delays in retrieving information.

**2.5 Assumptions and Dependencies**

* The system will primarily be accessed on internet-connected devices.
* Admins and station masters will use unique, secure login credentials.

**3. Specific Requirements**

**3.1 Functional Requirements**

**3.1.1 Admin Module**

* **FR-1**: Enable admins to add, update, and remove train schedules.
* **FR-2**: Allow admins to broadcast delay notifications.
* **FR-3**: Notify relevant stations of schedule changes.

**3.1.2 Station Master Module**

* **FR-4**: Provide secure login for station masters.
* **FR-5**: Allow station masters to update arrival times specific to their station.
* **FR-6**: Ensure stations display only relevant train information.

**3.1.3 User Module**

* **FR-7**: Allow users to view real-time arrival and departure schedules.
* **FR-8**: Notify users of delays and schedule changes.
* **FR-9**: Enable users to subscribe to notifications for specific trains.

**3.1.4 Notifications and Alerts**

* **FR-10**: Send real-time alerts to users for delays and schedule changes.
* **FR-11**: Enable users to customize alerts for specific trains or stations.

**3.1.5 Authentication and Access Control**

* **FR-12**: Restrict specific functionalities to authorized admins and station masters.
* **FR-13**: Require secure login credentials for all users.

**3.2 Non-Functional Requirements**

**3.2.1 Performance Requirements**

* **NFR-1**: Support up to 500 concurrent users.
* **NFR-2**: Update the system within 3 seconds of any schedule change.

**3.2.2 Reliability Requirements**

* **NFR-3**: Ensure system uptime of 99.9%.
* **NFR-4**: Maintain consistent and accurate data across all modules.

**3.2.3 Usability Requirements**

* **NFR-5**: Design an intuitive, user-friendly interface for all users.
* **NFR-6**: Support multiple languages to enhance accessibility.

**3.2.4 Security Requirements**

* **NFR-7**: Encrypt all login credentials.
* **NFR-8**: Implement strict role-based access controls.

**3.2.5 Maintainability Requirements**

* **NFR-9**: Structure the system to support modular updates with minimal downtime.
* **NFR-10**: Provide comprehensive documentation for troubleshooting.

**3.2.6 Scalability Requirements**

* **NFR-11**: Enable easy addition of new stations.
* **NFR-12**: Accommodate an increasing number of users and stations while preserving performance.

**4. System Features**

**4.1 Real-Time Data Propagation**

* Display and continuously update train status information, ensuring synchronized information at all stations.

**4.2 Role-Based Access Control**

* Restrict update privileges to authorized admins and station masters only.

**4.3 Mobile and Web Accessibility**

* Offer a responsive web interface and mobile-compatible application for user convenience.

**5. External Interface Requirements**

**5.1 User Interfaces**

* **Admin Panel**: Web interface for admins to manage train schedules.
* **Station Master Interface**: Web or desktop interface for station-specific schedule updates.
* **User Interface**: Mobile and web platforms for users to access schedules and receive notifications.

**5.2 Hardware Interfaces**

* High-availability servers to process and distribute data.
* User devices with internet access.

**5.3 Software Interfaces**

* REST API for communication between admin, station master, and user modules.
* Database for managing train schedules, delay notifications, and user preferences.

