PRINCIPLES OF SOFTWARE ENGINEERING LAB

CASE STUDY: RAILWAY TIME TRACKING AND PREDICTION SYSTEM

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1)𝙄𝙉𝙏𝙍𝙊𝘿𝙐𝘾𝙏𝙄𝙊𝙉

The Railway Time Tracking and Prediction System is a software application designed to track the arrival and departure times of trains, and to predict their arrival times at various stations. The system will be used by railway staff and passengers to improve efficiency, reduce waiting times and improve passenger experience.

1.1 𝙋𝙐𝙍𝙋𝙊𝙎𝙀

The purpose of this document is to provide a detailed description of the Railway Time Tracking and Prediction System, including its requirements, functional and non-functional specifications, and design constraints.

1.2 𝑺𝑪𝑶𝑷𝑬

The Railway Time Tracking and Prediction System will be a web-based application that will be used by railway staff and passengers to track the arrival and departure times of trains, and to predict their arrival times at various stations. The system will be designed to operate on desktop and mobile devices, and will be accessible through a web browser.

1.3 𝙋𝙍𝙊𝘽𝙇𝙀𝙈 𝘿𝙀𝙁𝙄𝙉𝙄𝙏𝙄𝙊𝙉

The railway transportation system is an integral part of the transportation infrastructure, providing a vital mode of transportation for people and goods across countries. However, the railway system is often faced with the challenge of maintaining schedules, managing delays, and providing accurate information to passengers and staff.

The current system used by railways to track trains and their arrival and departure times relies on manual reporting, which is often time-consuming and prone to errors. This lack of accurate and timely information can cause delays, frustration among passengers, and decreased efficiency for railway staff.

Additionally, predicting the arrival times of trains at various stations is a complex task that requires the use of historical and real-time data. The current methods used to predict train arrival times often rely on estimates and assumptions, resulting in unreliable and inaccurate predictions.

The Railway Time Tracking and Prediction System is designed to address these challenges by providing a modern, web-based application that can accurately track train schedules and predict their arrival times at various stations. By providing real-time information to passengers and staff, the system aims to reduce delays, improve efficiency, and enhance passenger experience.

1.4 𝙎𝙔𝙎𝙏𝙀𝙈 𝙊𝙑𝙀𝙍𝙑𝙄𝙀𝙒

The Railway Time Tracking and Prediction System is a web-based application designed to track the arrival and departure times of trains and predict their arrival times at various stations. The system is intended for use by railway staff and passengers, and is accessible through a web browser on desktop and mobile devices.

The system is composed of several modules that work together to provide accurate and timely information on train schedules and performance. These modules include:

1.Train Scheduling Module: This module allows railway staff to schedule trains by specifying the arrival and departure times at each station.

2.Train Tracking Module: This module tracks the location and status of each train, including the estimated arrival and departure times at each station. This module uses GPS and other sensors to provide real-time information on train movements.

3.Prediction Model Module: This module uses historical data and real-time data to predict the arrival time of trains at various stations. The prediction model takes into account factors such as train speed, distance, and weather conditions to provide accurate predictions.

4.Notification Module: This module provides notifications to passengers and railway staff of any delays or changes to train schedules. Notifications can be sent through email, SMS, or push notifications.

5.Reporting Module: This module provides reports to railway staff on train performance, including on-time performance, average speed, and delays. These reports can be customized and generated on-demand.

6.User Management Module: This module provides user management capabilities, including the ability to create and manage user accounts, and to assign different levels of access to different users.

The system is designed to be scalable and secure, with a backup and recovery mechanism in case of system failure. It integrates with other railway systems, such as ticketing and reservation systems, to provide a seamless user experience.

Overall, the Railway Time Tracking and Prediction System aims to provide a modern, efficient, and reliable solution to the challenges faced by railway transportation systems.

1.5 𝙍𝙀𝙁𝙀𝙍𝙀𝙉𝘾𝙀𝙎

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2) 𝙊𝙑𝙀𝙍𝘼𝙇𝙇 𝘿𝙀𝙎𝘾𝙍𝙄𝙋𝙏𝙄𝙊𝙉

2.1 𝑷𝑹𝑶𝑫𝑼𝑪𝑻 𝑷𝑬𝑹𝑺𝑷𝑬𝑪𝑻𝑰𝑽𝑬

The Railway Time Tracking and Prediction System is a standalone web-based application that is designed to be integrated with other railway systems, such as ticketing and reservation systems. The system is intended to be used by railway staff and passengers, and is accessed through a web browser on desktop and mobile devices. The system is composed of several modules that work together to provide accurate and timely information on train schedules and performance.

2.2 𝙋𝙍𝙊𝘿𝙐𝘾𝙏 𝙁𝙐𝙉𝘾𝙏𝙄𝙊𝙉

1. Train Scheduling: Allow railway staff to schedule trains by specifying the arrival and departure times at each station.
2. Train Tracking: Track the location and status of each train, including the estimated arrival and departure times at each station.
3. Prediction Model: Use historical data and real-time data to predict the arrival time of trains at various stations.
4. Notification: Provide notifications to passengers and railway staff of any delays or changes to train schedules.
5. Reporting: Provide reports to railway staff on train performance, including on-time performance, average speed, and delays.
6. User Management: Provide user management capabilities, including the ability to create and manage user accounts, and to assign different levels of access to different users.

2.3 𝙐𝙎𝙀𝙍 𝘾𝙃𝘼𝙍𝙀𝘾𝙏𝙀𝙍𝙄𝙎𝙏𝙄𝘾𝙎

The Railway Time Tracking and Prediction System is intended for use by railway staff and passengers. Railway staff are expected to have a basic understanding of computer systems and web applications. Passengers are expected to have access to a web browser on their desktop or mobile device.

2.4 𝘾𝙊𝙉𝙎𝙏𝙍𝘼𝙄𝙉𝙏𝙎

The Railway Time Tracking and Prediction System is subject to the following constraints:

1. Data availability: The system relies on real-time and historical data to provide accurate predictions and notifications. Data availability and quality are critical to the performance of the system.
2. Internet connectivity: The system requires internet connectivity to access and transmit data. Any interruption in internet connectivity can affect the performance of the system.
3. Hardware and software requirements: The system requires a minimum set of hardware and software requirements to function properly. These requirements include web browsers, servers, and databases.

2.5 𝘼𝙎𝙎𝙐𝙈𝙋𝙏𝙄𝙊𝙉𝙎

The following assumptions are made for the Railway Time Tracking and Prediction System:

1. The system has access to accurate and timely data on train schedules, locations, and performance.
2. The system is deployed on a reliable and secure infrastructure that can handle the expected load.

2.6 𝘿𝙀𝙋𝙀𝙉𝘿𝙀𝙉𝘾𝙄𝙀𝙎

The Railway Time Tracking and Prediction System is dependent on the following systems:

1. Train scheduling system: The system relies on accurate train schedules to track and predict train movements.
2. GPS and other sensors: The system relies on GPS and other sensors to track train movements and provide real-time data.
3. Internet connectivity: The system requires internet connectivity to access and transmit data.