~ Train Management System ~

Fliers

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1. Introduction

From the invention of trains to this day, trains are easily one of the most effective ways of traveling "something". It does not matter whether it is coal or people, trains can be used to provide a road of connection between different accommodations. Although there are many alternate ways to trains nowadays, such as cars and planes, trains are one of the cheapest traveling options. However, they are not used in Turkey as commonly as they are used in Europe. The main reason for being unpopular in such a highly populated country is, to us, the complexity of railroads and difficulties to reach train ticket buying systems. Therefore, we decided to develop a mobile program that will ease customers' access to tickets and train schedules and help train companies to maintain their vehicles and keep track of consumer statistics. The main aid of the program is going to be automatization of train scheduling and ticket purchasing processes. This program will be used by both train companies and customers. Companies will use it to keep track of the general quality of trains, and individual wagons, railroads, and consumer reflections. Customers will use it mainly for finding correct vehicles and buying tickets, but it will also provide an interactive platform for users that they can share their traveling experiences with the community to promote new travel locations and let companies develop themselves in areas that they are lacking quality. It will also provide a system to use in the pricing of train tickets, possibly different maps for different train types, a restrictive algorithm that will reduce the number of train accidents, and so on. The application will run on mobile phones to increase accessibility at any time, in any place.

2. Details

The program offers different features for companies and customers. While many features are provided, the main utility of the program, which makes it unique, is an automated scheduling and ticket purchasing system. The automated system schedules timetables for companies based on their capacity and passenger density. Also, each company can customize the timetable according to their preferences. This service will save companies from predicting future passenger activity and scheduling a timetable accordingly and let them focus on other areas

while having this task done. The ticket purchase system works by taking customer's preferences and finding the most accurate trip. Customers will benefit from the automatic purchasing system since it brings the effort to find the most accurate ticket to an end. Also, passengers who use train travel regularly will not need to buy tickets by hand for each trip. Earning discount points after ticket purchases is another reason for customers to use this program.

In addition to that, companies can use the program to maintain their systems while customers use it to share their opinions. Additional features are listed below in three different sections as features for companies, features for customers, and features that both users can use:

2.1 Features That Will Be Used by Companies

- Companies can keep track of statistics such as passenger density within trains, train density within lines, customers' travel location choices, passenger happiness after trips, the revenue of last week, number of transported passengers in last week, etc. The system will also evaluate machinists' performances by keeping records of arrival times, departure times, train speed between stations, etc. to provide companies further information about their services.

- Companies can determine the prices of tickets for each journey, they can also assign default ticket prices for particular lines. They also can find contracts. A company that needs its goods to be transported to a port can open a request with the information about goods and dates. Train companies can offer deals and then one of them takes the job. Revenue from transportation is also added to the budget. Companies can follow their budget/economic condition through the system. Revenue from tickets will be added to their budgets automatically by the system. Fuel expenses will be automatically subtracted from the budget.

- A map of lines will be provided by the system. Companies can add/remove/modify lines using the map and assign trains to those lines. Trains on a trip can be tracked on the map. If multiple trains are detected to pass from the same rail simultaneously, the system slightly changes the departure times of trains accordingly to prevent possible accidents.

- Companies can add/remove wagons to/from their property and form trains with added wagons. Later, existing wagons can be assigned to other trains. Then, they can check the technical conditions of these trains. The system will notify companies in case of any problems with vehicles. Also, companies will be able to see periodic warnings about the maintenance of vehicles.

2.2 Features That Will Be Used by Customers

- There will be two alternative ways to buy a ticket. The traditional way will let customers search through multiple train services with different departure times and purchase a ticket for the seat they choose. Alternatively, a second new way will be more useful when purchasing tickets for two or more people. The system will find the best ticket option after the customer enters preferences for the journey (price, date, departure point, services, option to sit together if multiple tickets are bought, sitting in the reverse direction, etc.). With this way, a seat where two friends sit next to each other and does not go in diverse direction will be found automatically by the system, making the process of choosing a seat a lot easier.

- Passengers will be able to change for another train if their route requires it. The system will compare scores, given by customers, and planned trips of all train companies to automatically suggest multiple tickets if the customers cannot reach to their destination with a single train. The tickets will be available online and accessible through the mobile app. In this way, customers will not need to print out their tickets to paper and a QR code generated by the app will be enough. Customers will be able to buy tickets

together with a return ticket. In case of a problem, customers will be able to use the refund mechanism for tickets through the app.

- Customers will gain discount points each time they purchase a ticket through the system. These discount points will later be used to buy tickets for travels or get discount codes to be used at the train's cafeteria. These discounts will stimulate more people to choose trains as their preferred travel option, which will decrease the harm over nature caused by individuals traveling with personal vehicles.

- Passengers will be able to give feedback and share their experiences during or after the trip. Given feedback will be available to all users, including both train companies and customers. Customers will have the opportunity to consider the feedback before they purchase a ticket, which will decrease the time consumption of customers while choosing a train company. Additionally, according to what average score over five is given to train companies by customers, the system will suggest the best train company depending on the destination point of the customer. Customers will be able to access records of their past trips at any time and edit their given points and previous feedback.

2.3   Features That Will Be Used by Both Users

- General statistics about trips, such as the latest added lines, most visited stations, most visited cities, most preferred companies, etc., will be accessible by all users. Both users will receive notifications about new lines, oncoming scheduled trips, important weather conditions on lines, etc.

2.4   Comparison with Current Applications

Apart from its usefulness, this program will stand out with the creative features that it offers. Unlike the similar apps, it will allow companies to manage their pricing policies, employees and trains' conditions on its interface. It will help them make these decisions with providing the necessary data that it collects. According to the data, it will be able to advice more and less frequent services to certain places. Therefore, it will be much preferable than the other apps with making possible to regulate trains, train lines and customers on the same simple app which doesn't appear in any similar app.

3.   Summary & Conclusions

This report demonstrates the features and possible usage options of the program that will be developed, specifically, for train companies and customers. It is important to note that there are some programs that is used for some of these purposes already. Currently existing and popular alternatives, such as Trainline[1] and Wanderu[2], mostly prioritize customers and only provide a ticket purchasing system.

In addition to what is served by these programs, this program will offer several features for train companies to maintain their systems, vehicles, and lines and follow passenger feedback on the same program without having difficulties. Our program will be usable by both companies and customers. The novel system features will be helpful for companies by automatically assigning departure times for trains and determining destination points randomly according to generalizations made by recent passenger frequency data. This will also benefit customers as there will be more frequent train trips at times when customers are in need. Also, freight train companies will be able to find contracts on the program. Train lines will be viewed on a map to show the routes clearly to the customers and help companies manage them. Combining all possible actions regarding trains and train passengers in one program lets us keep customers

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[1] *Search, compare & buy cheap train & bus tickets.* (n.d.). Trainline. https://www.thetrainline.com/.

[2] *Search & compare cheap bus and train tickets*. (n.d.). Wanderu. https://www.wanderu.com/.

and companies closer, which will lead companies to develop themselves. Furthermore, purchasing train tickets will be much more comfortable and less complicated thanks to the ability to access different companies from a single program. In conclusion, it can be said that the main focus of this program will be the optimization and automatization of currently used methods in train transportation and to prevent train accidents.

Combining new possibilities and technologies with a relatively old concept that played a huge role in the Industrial Revolution, so called trains, may create huge differences on how we prefer to travel and may have some unpredictable results. Yet, we hope that this new program will eventually benefit community and prevent train accidents and such problems that cost both human lives and money.