CS353 - Database Systems

Project Proposal

Group 4

Online Ticket Purchasing App for Transportation

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3 March 2023

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1. Introduction

This project proposes to implement an online ticket purchasing application for transportation in Turkey. With this website, travel companies will be able to register and manage available trips and travelers will be able to reserve and purchase tickets for their desired transportation method. Admins, on the other hand, will be able to manage all accounts and generate statistical reports. Second section of this report further explains the details of the project and the role of its database. Third section of this report contains the exact specifications and properties of the proposed application, as well as its limitations. Fourth and last section of the report contains the E/R diagram which shows the entities and relations of the planned database. It is important to note that the requirements, properties and entities proposed in this report are not finalized and they might be subject to change with further progress in the project.

2. Project Description

The application proposed in this project is a web based transportation application. This application allows the travelers to search and filter the results of a transportation type they choose. Results can be filtered with respect to departure point/city, destination, date, price and company. Travelers can reserve or purchase tickets. Purchasing immediately reduces the balance of the traveler while reserving a seat doesn't require payment. A traveler can see their reserved and purchased travels in their calendar, and plan their trips. Travelers also can see their past purchases. A traveler can comment on and rate the quality of their transportation, however it is only possible after arrival. Travelers can access these comments and ratings on the pages of the travel companies. Company pages can be accessed through searching or directly from a fare that the company is providing. Company pages include information about the company as well as the available fares they are currently providing. Companies themselves register these fares to the system. Registry can only be made by companies that are approved by an admin. Company accounts can be created by companies, however accounts that are pending validation from an admin will not show up in user searches nor will they be able to register. Admins are responsible for validating companies and overseeing the system in general. For this purpose, admins are able to create system reports that include information about the sales, popularity of

transportation types, most popular companies, fares etc. and archive the information in these reports. Admins also has the ability to create coupon codes. Coupon codes can be used while purchasing for discounts. Coupon codes may have specific conditions, such as limited number of use, specific transportation types or expiration dates. Travelers can use a coupon they own that they redeemed before using it or use the code while purchasing a ticket. Balance reduction will be made with the discounted price if a coupon is used. Implementation of this web based application will require the use of a database system for the reasons stated below. A general overview of how the DBMS will be used in the implementation will be given after.

a. Why use database

The application proposed by this project uses a database to efficiently and securely access and manipulate large amounts of data. This data consists of user information, information of different types of transportation methods, reservations, purchases, fares and travel companies. Since customers are able to search, filter, reserve and purchase seats for different types of transportation methods, it is crucial for the application to efficiently access and manipulate these data. This requirement for efficiency makes the use of a DBMS the more reasonable approach over the use of other data storing methods such as spreadsheets. The highly connected nature of the data, such as the customers, companies, individual fares and seats all being related to each other, makes DBMS a good method of data storage as relational structuring is common and easy to implement in these systems. This structure makes DBMS a good choice for reduced redundancy in data storage as well, as unnecessary repetition of data that would be stored in simpler data storage systems will not be stored. Another reason to use DBMS in this application is to provide security, since personal information of customers will be stored in the application. DBMS makes it possible to grant access to sensitive information only when needed and only to the parties that are trusted.

b. How to use the database

Information about users, companies, trips, individual fares, seats, reservations, purchases, discount coupons, admins, reports and the relationships between these entities will be stored in a database. Then these data will be managed by the DBMS, and used by the application to provide functionality.

3. Project Requirements

a. Functional Requirements

Application:

- There will be 4 different transportation methods: Plane, train, bus, and boat travel.
- Travelers must be able to see all active rides in the specified methods in different pages in the application.
- There must be filtering and sorting options when rides are being displayed. Filtering and sorting can be done by min-max price, dates, locations, etc.
- When a ticket is sold, the number of empty seats in that ride should be updated accordingly. Likewise, when a ticket is cancelled the seat should become empty again.
- After each ticket sale, a unique reservation number should be created for that purchase and this number should be accessible by the company that made the sale, the traveler that purchased the ticket and the admin.
- Travelers should receive an email after a purchase including the details of their ride.

Companies:

- Companies must have profile pages that show information about past and current travels, ratings and comments on past travels, information on hub and destination locations and their most purchased travels.
- Companies must be able to register rides, fares and timetables for rides.
- Companies must be able to update these attributes to delay, cancel or change rides and fare.

- Companies must be able to see the number of purchases and customer details for each travel.
- Companies are notified when a purchase is cancelled.

Travelers:
- Users must create profiles to purchase tickets, but looking through the site does not require a user profile
- Travelers must have a user profile page where they can see their active and past rides, and their purchase history.
- Travelers can have the option to rate and comment on past travels.
- Travelers must have a balance page where their current balance is displayed.
- Travelers can buy or reserve a ticket. When a traveler buys a ticket, the amount is deducted from their balance instantly, when a traveler reserves a ticket they can pay the amount at a later date, or the amount will be automatically deducted from their balance at the time of departure.
- Travelers can cancel their tickets. When a ticket is cancelled the amount is loaded back into the traveler's balance.
- Travelers can input their reservation number to see their travel details.
- Travelers should be notified (via email) when a travel is cancelled or delayed by the company.
- Travelers can see and use their coupons when purchasing rides.
- Travelers can see their active and expired coupons on a separate page where they can also enter coupon codes to register their coupons into the system.

Admin:
- Admins must be able to see company and traveler details, all ticket purchases and all ride creations.
- Admins must be able to access all past and current ride information to create detailed reports.

- Admins must validate companies to add them to the system and must be able to remove companies in case of any misconduct
- Admins must be able to see all comments to all rides, be able to filter and sort them to create reports, delete comments or ban users accordingly.
- Admins can create coupons with varying attributes such as number of use, transportation type, expiration date, etc.
- Admins can create system-wide reports automatically that gets all-time stats such as total sales, total rides, total coupons used, etc. which are then stored in the database. Other specific reports may not be stored in the database to ensure performance.

b. Non-functional Requirements

- The database should be optimized well enough to prevent long waiting times/loading screens for the user (with the exception of those that happen because of slow internet connection).
- The web application should be designed in a way to support a sufficient number of users (which can be determined during the implementation and updated later). With this in mind, the website should also continue working when there are many user requests happening at the same time.
- The web application should offer a stable and consistent user interface regardless of the user device, operating system or the browser.
- Considering that the web application will run on modern web browsers, it shouldn't require too much hardware performance. Website will be designed to be suitable for low end hardware too, so it can be universally accessible.
- It is of utmost importance for the web application to be secure and private. User data should be invisible to third parties.
- A two factor authentication system can be offered as an option to the purchase users, for further improved security.

c. Limitations

Application:

- Account emails and passwords must be unique.
- Application should not display out of date travels.
- When a bus, train, boat or plane is fully reserved for a travel, another user should not be able to buy a ticket for that travel.
- For travel, a seat should only be reserved by one person.

Companies:

- Companies should be validated by administrators. Unvalidated companies should not be able to register rides, fares and timetables for rides.
- Companies should not see traveler information such as card number, balance etc.
- Companies cannot delete other companies accounts and travelers accounts.
- Companies should not have the right to buy any tickets. For example, companies should not buy tickets on behalf of travelers.
- Companies cannot comment about other companies.

Travelers:

- Each user should have a password and an email address to login.
- Password length should be at least 6 characters and it should contain at least one uppercase letter.
- Travelers should not see other travelers' accounts. They can only view company pages.
- Travelers should not be able to add a transportation method and timetables
- Travelers can only comment about the company that travelers use and, they can only comment after travel.

- Only the travelers registered in the system database can make purchases.
- Travelers should not be able to buy a ticket for past trips.
- Travelers should not be able to reserve for a past trip.

Admin:
- Admin cannot view credit card information. Admin cannot view credit card information of users
- Admin should be able to delete toxic comments.

4. E/R Diagram

User
email
password
phone

Traveler
balance
age
TCK
full name
  name
  surname

Company
company-name
website
foundation-date
about

validation-date

validate

Administrator
username
last-login-time
report-date
income

generate-report

register

review

comment
rating

reserved

purchased

used-status

has

Seat
seat-number
price

travel-seat

Travel
PNR
transport-type
travel-date
travel-time

Report
report-id
report-date
total-sales
total-reviews
total-travels
total-company
pending-company
total-travelers
total-bus
total-train
total-plane

Sale Coupons
coupon-id
sale-rate
coupon-name
expiration-date
generation-date

departs-from

arrives-to

Terminal
id
name
city
zipcode
type