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Software Engineering 2: My Taxi Service **R**equirements **A**nalysis and **S**pecification **D**ocument

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1 INTRODUCTION

1.1 Description of the given problem

We will project My Taxi Service, an online service that will provide passengers an easy and reliable way to access taxi service, while allowing taxi drivers to organize themselves and make their job simple.

There will be two types of users: passengers and taxi drivers.

Passengers who wants to access the service should register in the system by providing information like name, address, phone number and e-mail. Once registered passengers will be able to:

- Request a taxi by specifying a valid location, the system will confirm the request by sending the user a code;
- Make a reservation for a taxi, in this case the passenger must provide the destination too, the reservation must be done at least 2 hours before the ride. If the reservation is successful the system will start searching for a taxi ten minutes before the meeting time.
- Enable taxi sharing option, meaning that he wants to share the ride with others and thus the cost of the ride. When making a reservation the user can decide to share the ride. Other passengers can view the shared rides and decide to join the ride. the system will create a path for a taxi.

To taxi drivers will be provided a different account with different functionalities. They will be able to set their availability, if they are available the system can call them to go to a specified location to pick up a passenger, a call that drivers can accept or refuse.

The system will optimize taxi queues by dividing the city in different zones of 2 km square size, and will assign to each zone a certain number of taxis organized in a queue. Each request is forwarded to the first taxi in the queue associated to the zone from which the request come.

1.2 Actors

- Visitor: a non registered user can only see the main page, log-in page and registration page. He can register himself by the compilation of the registration form.
- Passenger: a passenger has already an account, he can log-in in the system. After that he can call for a taxi using the apposite form.

- Taxi-Driver: a taxi driver has an account provided by the company. From this account he can manage his profile, set his availability, accept or refuse a call from the system.

1.3 Goals

Here's the list of the goals of our application

- [G1] Allow a visitor to register in the system and adding/managing his information.
- [G2] Allow a user to log in to application, either he is a passenger or a taxi driver.
- [G3] Allow a passenger to make a request for a taxi.
- [G4] Allow a passenger to make a reservation for a taxi and share the ride if he wants.
- [G5] Allow a passenger to join a shared ride.
- [G6] Allow a passenger to cancel a reservation/shared ride.
- [G7] Allow a user to leave a shared ride.
- [G8] Allow a user to leave a shared ride.
- [G9] Allow a taxi driver to accept or refuse a call for a taxi-request from the system.
- [G10] Provide a fair management of taxi queues.

1.4 Glossary

We will give a specific definition of some crucial terms that we are going to often use in our documentation of the project to prevent some ambiguity of the natural language.

Visitor Every person that visits the website or downloads the application before registration. Registered users are seen as Visitors before the login.

Users Every single person registered in the Database of the service. It includes Passengers and Drivers

Passengers Clients registered in the database, they can only request a taxi and reserve one.

Drivers Taxi Owners registered in the database, they can set their availability depending on their needs and answer or refuse calls from the system.

Request When a Passenger uses the service to find a ride, he makes a Request. He must insert where he needs to go. The Request is sent to the available drivers who can accept or refuse it. It's the interaction that connects passenger and driver.

Reservation When a passenger uses the service to reserve a taxi so he's sure that the taxi will be available when he will need it.

1.5 Domain Properties

We suppose that ——andreciao—-

- Once a request is done, it cannot be deleted.
- If a passenger makes a request and the request is accepted, he will show up at the established location in time.
- If a driver accepts a request, he will show up at the established location in time.
- If a passenger joins a shared ride, he will take part to the ride.
- A passenger will not ask for a taxi in any way at a certain time if he knows there will be a conflict in schedules.

1.6 Assumptions

- Users cannot have more than one request open at the same time.
- Reservations must be done at least two hours before the ride.
- Users cannot make requests if a reserved ride is taking place within 30 minutes.
- Reservations can be cancelled at most 30 minutes before the scheduled time.

- There will be a notification by e-mail and through the application 10 minutes before a reserved ride, when the server makes the request for him/them.
- There will be a notification sent to the current members of a shared ride when a new passenger joins the ride.
- Shared rides are reservations with the sharing option active.
- Every taxi has an attribute that shows the maximum capacity of the vehicle.
- A taxi will be placed in queue associated to a zone only if his driver notified the system he is available.
- A driver will be associated to only one taxi, this means that a taxi can't be driven by two different drivers.

1.7 Identifying Stakeholders

There are two big main Stakeholders for this project:

1. **Public Transport Administrators**
   Every city that hasn't got a good and reliable management of taxi queues is a possible stakeholder. Cities that have got a fair management of taxi queues but without web application or application are also possible stakeholders.
2. **Private Taxy Companies**
   Big taxy companies working on one or more cities may need our system to grant a more powerful service to passengers.

For all these stakeholders we need to focus on the city mapping to be able to show a project for their own city, once the queues are created the main focus will be the creation of the network and /todo

1.8 Proposed System

The application we will project can be implemented as an enterprise application based on the web, with a Client-Server architecture. The server will run the logic and generates web pages, a database system will be used to record information of the users. On the other side there will be several clients connecting using a web browser and a graphical user interface, or using a mobile application.

1.9 Future Possible Implementation

2 REQUIREMENTS

2.1 Functional Requirements

By analyzing the goals we came up with a list of requirements in order to achieve them:

- [G1] Allow a visitor to register in the system and adding/managing his information.
  - [R1] The system will provide a registration functionality.
  - [R2] System should check that user name must be unique, there cannot be two users with the same user name in the system.
  - [R3] System will not allow visitors to see other pages than the login page.
  - [R4] System will grant visitors access only to registration functionality.
- [G2] Allow a user to log in to application, either he is a passenger or a taxi driver.
  - [R1] The system will provide a log-in functionality.
  - [R2] System will check that the tuple username-password inserted by the user exists in the database.
- [G3] Allow a passenger to make a request for a taxi.
  - [R1] The system will not grant access to this functionality if the user is not logged in.
  - [R2] The system will forward a taxi request to a driver only if:
    - The passenger provides a valid location for a taxi.
    - Passenger is not waiting for another taxi called by a previous request.
    - Passenger does not have a reserved ride occurring within thirty minutes.
- [G4] Allow a passenger to make a reservation for a taxi and share the ride if he wants.
  - [R1] The system won't grant access to this functionality if the user is not logged in.

  - [R2] The system will accept the reservation if the passenger:
    * Specifies starting position, destination and leaving time of the ride
    * Completes the reservation two hours before the ride occurs.
    * Did not make a reservation for a ride that occurs thirty minutes before or after the requested time.
  - [R3] If a user wants to share a ride the system will permit him to enable sharing option at the moment of the reservation, then wait until the taxi is full or until 10 minutes before the scheduled time for other users to join the ride and finally compute a path for the ride.
  - [R4] If the reservation is successful the system will call for a taxi via a normal request 10 minutes before the scheduled time, send a notification to the passenger, calculate the length and the cost of the ride and communicate it to all participants and to the taxi driver as well.

- [G5] Allow a passenger to join a shared ride.
  - [R1] The system won't grant access to this functionality if the user is not logged in.
  - [R2] If a passenger wants to join a shared ride the system will ask him the starting position and destination he's headed, show all the possible non full rides heading in the same direction, wait for user decision and then add the user to the shared ride.

- [G6] Allow a passenger to cancel a reservation/shared ride.
  - [R1] System will not allow a passenger to cancel a ride if it will occur in less than thirty minutes.
  - [R2] The system will reject a cancel request of a shared ride if someone has already joined it.

- [G7] Allow a user to leave a shared ride.
  - [R1] The system will allow a passenger to leave a shared ride if it won't occur within fifteen minutes.

- [G8] Allow a taxi driver to set his availability.
  - [R1] System will provide an interface to taxi drivers where they can notify the system that they are able to take care of a request.

- [G9] Allow a taxi driver to accept or refuse a call for a taxi-request from the system.
  - [R1] When a request occur the system will show a screen to the driver in which he can accept or refuse the call.
- [G10] Provide a fair management of taxi queues.
  - [R1] The system will divide the city in zones of two squared kilometers and will assign to each of them a certain number of taxis organized in a queue.
  - [R2] The system knows at every time which taxis are assigned to a zone by using a gps system installed on the vehicles.
  - [R3] When a request arrive from a zone the system will call the first taxi in the queue associated to that zone.
  - [R4] If a taxi refuse a request the system will place it at the and of the queue and forward the request to the second tax in the queue.

2.2 Non Functional Requirements

2.2.1 Performance Requirements

Performance should be high to guarantee usability knowing that there will be a lot of real time request and computation. We assume that the response time of application is close to zero so the speed of the whole system depends only on user's internet connection.

2.2.2 Software System Characteristics

2.2.2.1 Availability Everyone should be able to access the application online everytime, this means that a dedicated server could be necessary.

2.2.2.2 Maintainability The application will be accurately documented to help future developers in maintain and apply changes to the code.

2.2.2.3 Portability The application should be compatible to all major hardware and software platform present on the market.

2.2.2.4 User friendliness The application does not expect an expert user so the interface will be simple and intuitive.

2.2.3 Data integrity, consistency and availability

The data should be always accessible. They should also be duplicated in case of a system fault to prevent data losses.

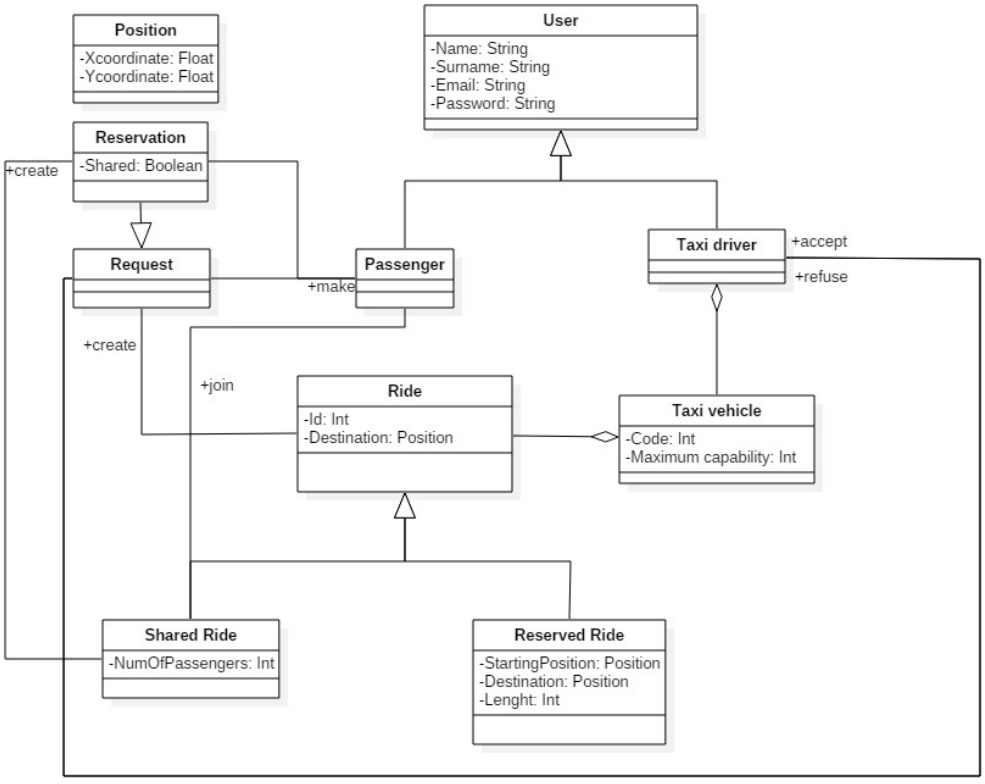
3 SCENARIO IDENTYFING

4 UML MODELS

4.1 Use case diagram

4.2 Use case Description

4.3 Class Diagram



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5 ALLOY MODELLING

5.1 Alloy Code

5.2 Alloy Worlds

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6 USED TOOLS