**POLITECNICO DI MILANO**
**Computer Science and Engineering**
**Project of Software Engineering 2**


# myTaxiService

# Design Document
## Ver. 1.1
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## TABLE OF CONTENT

## Change History:

**v. 1.1**: added some extensions about the admin, modified the high level architecture diagram, corrected some grammatical errors.

# 1. INTRODUCTION

## 1.1 Purpose

The purpose of this document is to provide documentation for the design and implementation of the myTaxiService's modules system. Both high-level requirements and implementation details are documented here to ensure successful completion of the project and continuity for future project development.

## 1.2 Scope of this document

This document is intended to be a detailed design supplement to the *Requirements Analysis and Specification Document* (RASD), and therefore does not replace it. This document will provide detailed specifications for designing, implementing, and configuring software for myTaxiService system, but will not include end-user documentation.

## 1.3 Definitions, Acronyms, Abbreviations

| Term | Description |
|---|---|
| USER | For user we mean a person already registered in the system. A user has a profile that includes the following information: Name, Surname, Email, Username, Password, Payment Card and optionally a Picture. |
| TAXI DRIVER | A taxi driver is a person that works for taxi company and drives the taxi during his worktime. A taxi driver has the capability of accept or decline the calls. |
| GUEST | A guest is a person who hasn't signed up yet. Guests have less power in the system |

| | |
|---|---|
| | than users, they don't have the users' skills, and the only function they can use is to sign up. |
| CALL | Each request done by a user for a ride (real time, shared or single). |
| TAXI RIDE | Represents the service done by the taxis to accommodate one or more user calls, to each taxi ride is associated a route that will be followed by the taxi. |
| ROUTE | Is the path between the source and the destination |
| TAXI ALLOCATION | When a user call a taxi with the app the taxi driver first in the queue of his zone receive a notification and have to accept or decline the call, if accept the call finish when taxi driver bring the user at the destination, but if he declines, the call pass through the queue until one taxi driver accept it. |
| TAXI DRIVER STATE | Represents the status of the taxi driver, it can be: Available, Busy or Not Available. |
| ADMIN | The admin is the person who controls the correct execution of the service, he can add new taxi or new taxi drivers and he can see all the actual information about the zones. In particular he can set up the preferred number of taxis for each zone and see the statistics reported by the system about the request rate of each zone |

## 1.4 References

- RASD
- Specification Document: Assignments 1 and 2.pdf
- DD T TOC.pdf
- IEEE Standard for information technology-System design-Software Design Descriptions
- Software Engineering: Principles and Practice (Hans Van Vliet)

## 1.5 Document Structure

The section 2 explains the components in which the system will be divided and how they interact, the sequence diagrams of the main use cases and the type of architecture that will be used.

The section 3 presents the most significant algorithms, while in Section 4 are presented some mockups for the interface that will be seen by the taxi drivers.

In section 5 the components presented in section 2 are associated with the requirements presented in the RASD.

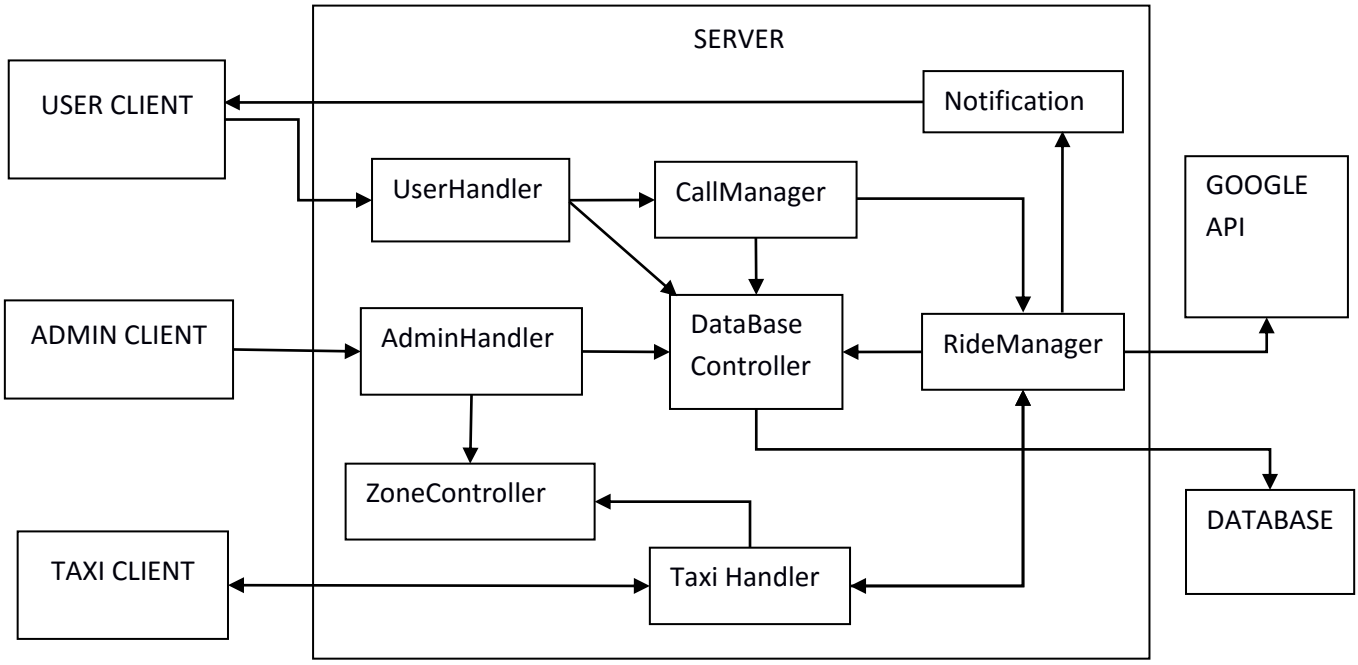
# 2. ARCHITECTURAL DESIGN

## 2.1 Overview

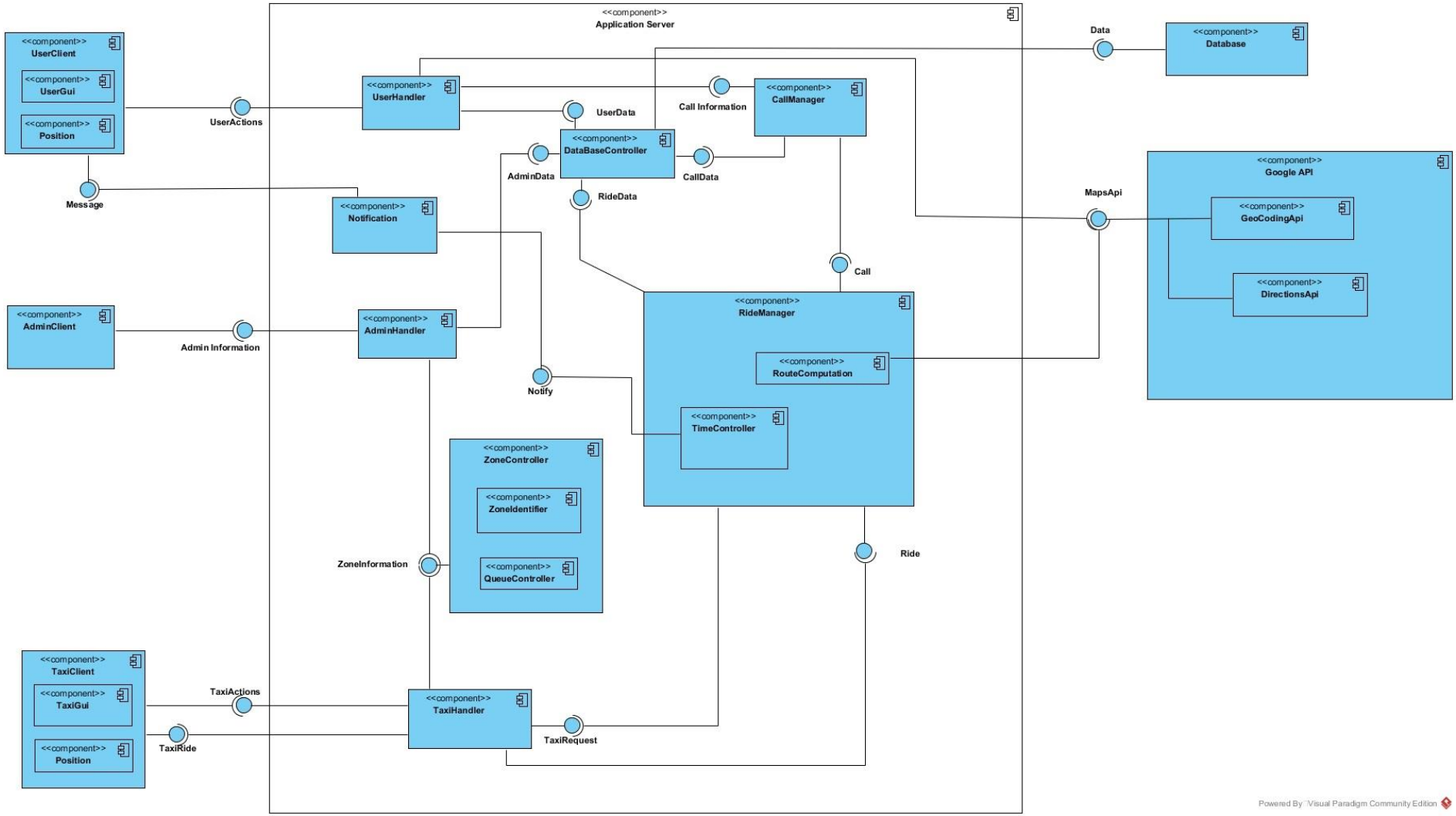
Our architectural design is based on a top down approach, first of all we have identified all the basic components necessary to perform the high level functions of the application, after that we identified, for each of the component found, all the subcomponents needed to perform the component functionalities.

## 2.2 High level components and their interaction

We have decided to divide the system in the following subsystems:



## 2.3 Component view



DESCRIPTION OF THE COMPONENTS:

- **UserHandler**:
  - **Provided Interfaces**: UserActions
  - **Required Interfaces**: UserData, CallInformation, MapsApi

  Description:

  It's the controller for the user clients, it provides the switching of the client requests toward the components necessary to satisfy the specific request. In particular it interacts with different components: with the **DataBaseController** component to permit the update of the user profile data, with the **CallManager** component to which it forwards the call coming from the users and with the **GoogleApis** component to obtain the information regarding the position of the client like the actual address of the client given his GPS coordinates.

- **CallManager**:
  - **Provided Interfaces**: CallInformation
  - **Required Interfaces**: CallData, Call

  Description:

  It takes care of calls processing and the consecutive forwarding to the **RideManager** component in order to get a Ride corresponding to each call. After that it provides saving the call information in the database and remains available for the client to send the all the call details that he requires.

- **RideManager**:
  - **Provided Interfaces**: Call, Ride,
  - **Required Interfaces**: Notify, RideData, MapsApi, TaxiRequest

  Description:

  It takes care of associating a Ride for each call received from the CallManager component and creating a route for that ride using the **RouteComputation** component witch is set to communicate with Google geolocation api. Its work includes fiding the best way to join different Rides to create a shared route following the time requirements imposed by the users during the reservation phase (MaxDelay). In the requirements we have some time constraints concerning the allocation of taxis (10 min before the ride) or the notifications to send to the clients, so it is necessary the **TimeController** component witch takes care of measuring the actual time and synchronizing the different actions in respect to a given timetable.

- **Notification**:
  - **Provided Interfaces:** Notify

- **Required Interfaces:** Message

Description:

It takes care of sending the notifications to the client when asked by the TimeController component in the RideManager by using the client application or by sending emails.

- **ZoneController**:
  - **Provided Interfaces:** ZoneInformation

Description:

It provides all the necessary information about the zones like returning the zone corresponding to a given address or returning the number of taxis for each zone. To do that it needs the **QueueController** module which provides all the typical operations on the queues, in particular it provides to the TaxiHandler component the first taxi in the queue of a given zone to which will be sent the request for a ride.

- **TaxiHandler**:
  - **Provided Interfaces**: TaxiActions, TaxiRequests
  - **Required Interfaces:** TaxiRide, Ride

Description**:**

It's the controller for the taxi clients, so it takes care of processing all the requests coming from the taxi and if necessary forward them to the RideManager component for example to modify the status of a ride or notifying the get on or the get off of a passenger. On the other side it provides allocating a taxi for the ride requests coming from the RideManager component by interacting with the ZoneController component and forwarding the ride request to the correct taxi client.

- **TaxiClient:**
  - **Provided Interfaces:** TaxiRide
  - **Required Interfaces:** TaxiActions

Description:

Represents the application for the Taxi clients. It needs some mandatory components to respect the requirements. First of all the **TaxiGUI** component which allows the taxi drivers to interact with the system to accomplish some basic operations like accepting or refusing the rides or to notifying the get on and get off of the passengers or changing the taxi status. It also needs the **TaxiPosition** component which gets the position information using a GPS sensor.

- **UserClient**:
  - **Provided Interfaces:** UserActions
  - **Required Interfaces:** Message

Description:

Represents the application for the user clients. There are different necessary component to satisfy the requirements of the taxi service: the userGUI component which allows the user to interact with the system by sending requests to the server and receiving notifications; the Position Component that takes care of providing the position information of the client using a gps sensor in case of mobile application or through network localization in case of web application.

- **AdminHandler**:
  - **Provided Interfaces:** AdminInformation
  - **Required Interfaces:** AdminData

Description:

It's the controller for the admin client. It interacts with the ZoneController to show the zone information to the admin and allows him to modify the zone parameters if needed. It can also access the database to see and modify other types of data (Future Implementation)

- **AdminClient**:
  - **Required Interfaces:** AdminInformation

Description:

This component allows the AdminClient to view all the information about the zones and modify the number of taxis for each zone.

- **GoogleApi**:
  - **Provided Interfaces:** MapsApi

Description:

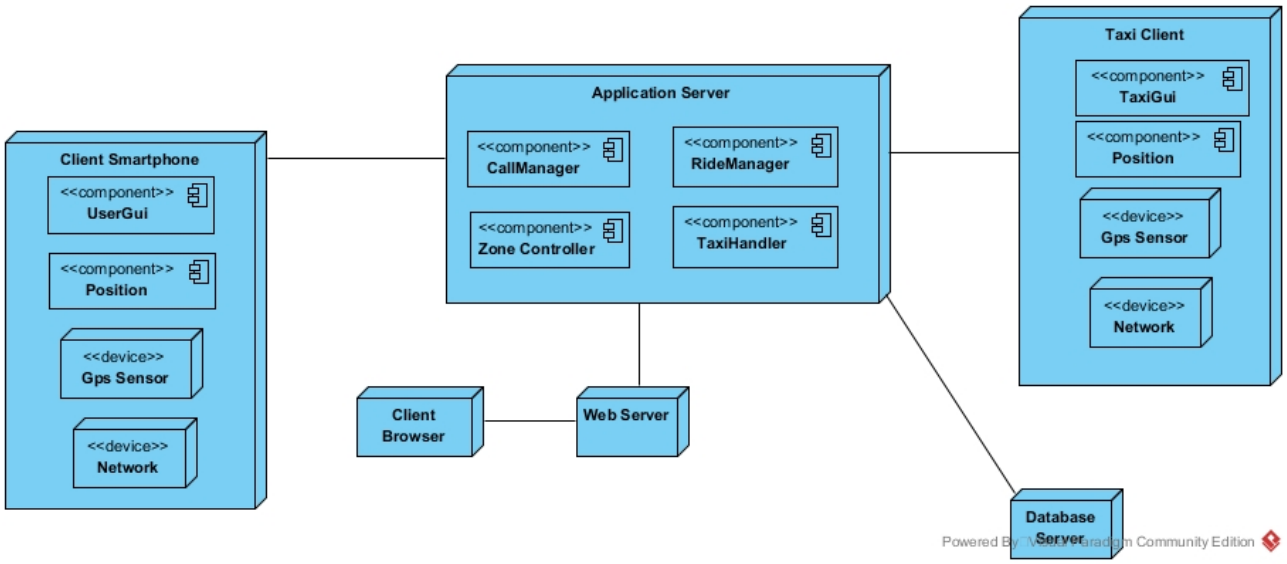
Provides all the maps processing services of Google maps, in particular contains the **DirectionsApi** component which returns the fastest or the shortest path that passes through a given set of addresses and the **GeocodingApi** component which returns the address corresponding to some GPS coordinates an vice versa.

- **DataBaseController**:
  - **Provided Interfaces:** RideData, CallData, RideData, AdminData
  - **Required Interfaces:** Data

Description:

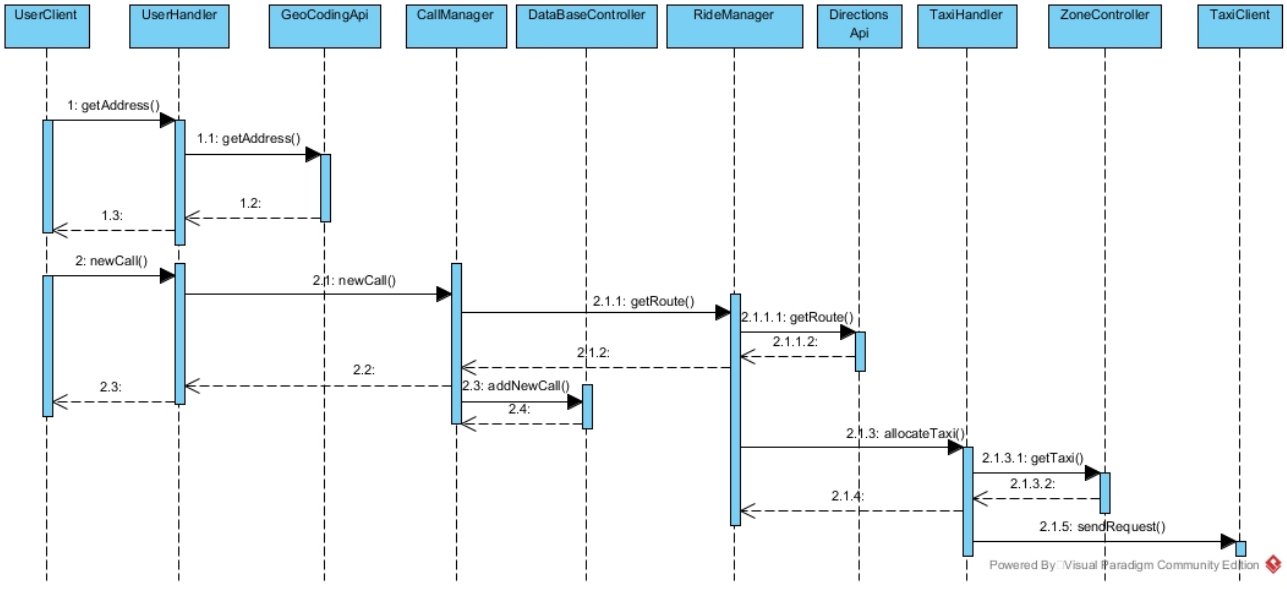
It takes care of sending all the query requests to the Database in order to provide to the other components the adding or the updating of the data.

## 2.4 Deployment view

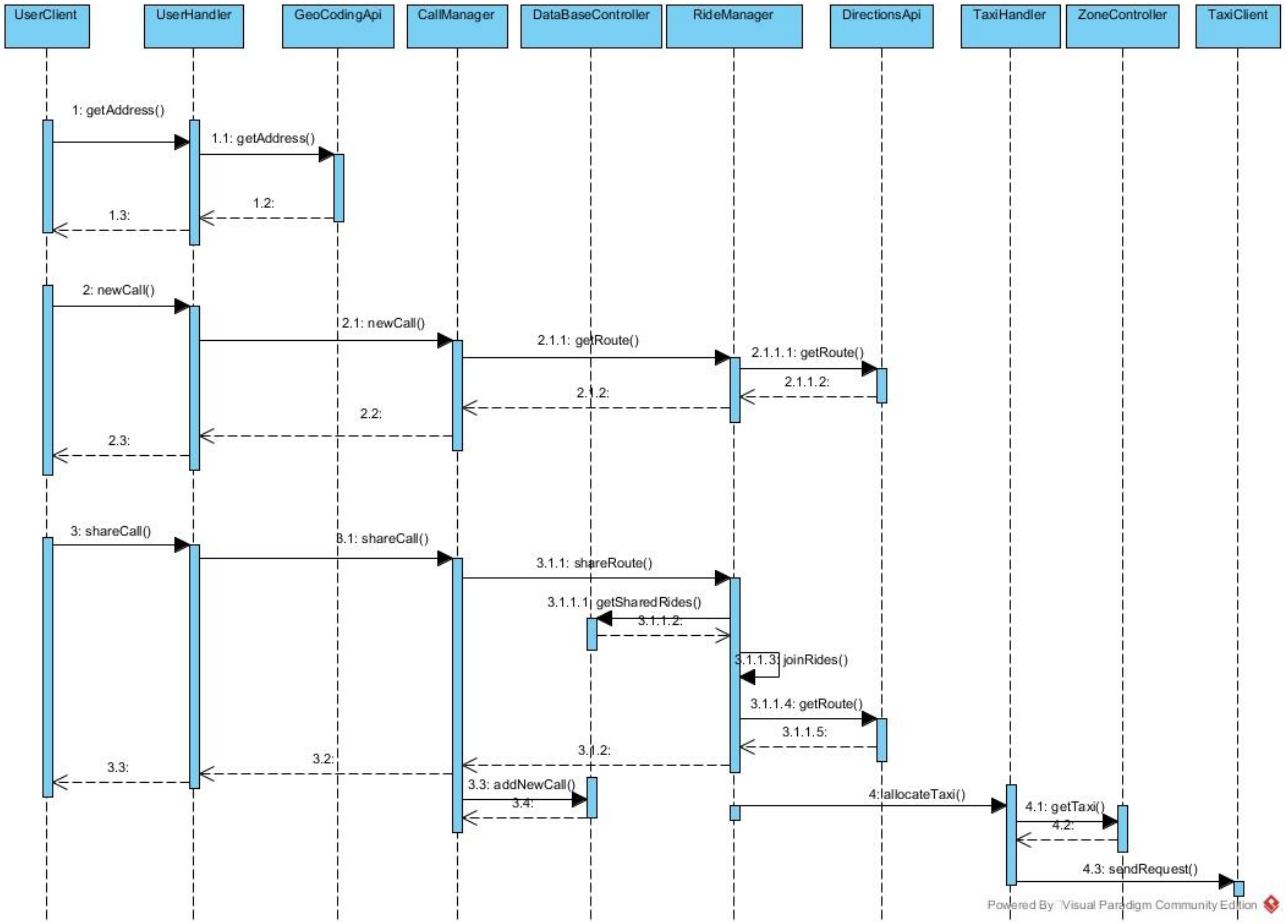



## 2.5 Runtime view

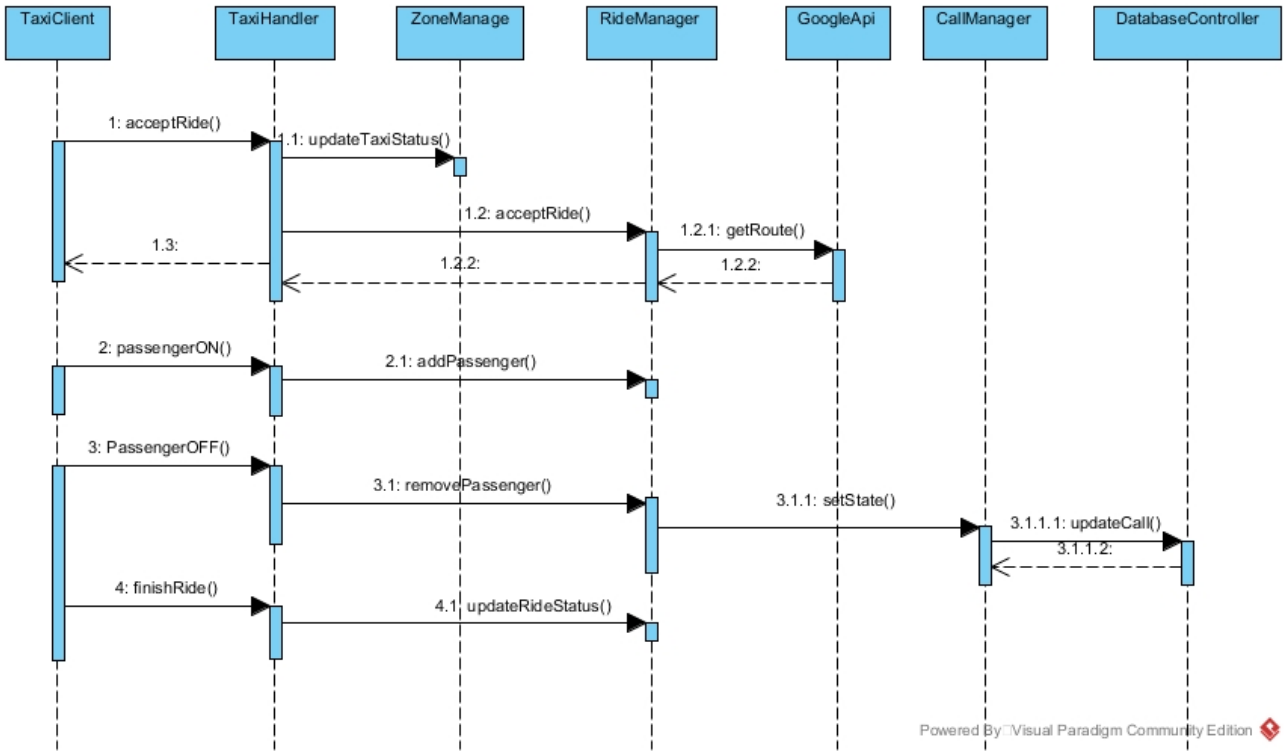
The following sequence diagram describes the elaborating process of a Real Time Call from the client request to the receiving of the ride to the taxi:




The following sequence diagram describes the elaborating process of a Reservation Call from the client request to the receiving of the ride to the taxi:




The following sequence diagram describes the process of serving a ride by a taxi from the fase of accepting the ride to the end of the ride.



## 2.6 Component interfaces

This sections includes the description of the provided interfaces of each component in a pseudo language.

**UserHandler**:

- UserActions:
    - Boolean login(Username, Password)
    - Boolean registration(User Info)
    - Route newCall(CallData)
    - Address getLocalAddr(gps Coordinates)
    - UserInfo getUserInfo(User ID)
    - Boolean updateUserInfo(UserInfo)
    - CallList viewHistory (User ID)
    - Route getRoute(Call ID)
    - Addr getTaxiPosition(Call ID)
    - CallInfo getCallInfo(Call ID)
    - Boolean removeCall(CallID)

**CallManager:**

- CallInformation:
    - CallList vewHistory(User ID)
    - Route newCall(CallData)
    - Route getRoute(Call ID)
    - Addr getTaxiPosition(Call ID)
    - CallInfo getCallInfo(Call ID)
    - Boolean removeCall(Call ID)
    - Void shareCall(Call ID, maxDelay)

**RideManager**:

- Call:
    - Route getRoute(CallInfo)
- Ride:
    - Void passengerOff(User ID, Taxi ID, Ride ID)
    - Void passengerOn(User ID, Taxi ID, Ride ID)
    - Route acceptRide(Ride ID, Taxi ID, TaxiPosition)
    - Void refuseRide(Ride ID, Taxi ID)
    - Void UdateRideStatus(Ride Info)

**TaxiHandler**:

- TaxiActions:
    - Void passengerOff(User ID, Taxi ID, Ride ID, GpsCord)
    - Void passengerOn(User ID, Taxi ID, Ride ID, GpsCord)
    - Route acceptRide(Ride ID, Taxi ID, TaxiPosition)

    - Void refuseRide(Ride ID, Taxi ID)
    - Void finishRide(Ride ID, Taxi ID)
    - Void setState(Taxi ID, State)
- TaxiRequest:
    - TaxiID allocateTaxi(RideInfo)
    - GpsCord getPosition(TaxiID)

**AdminHandler**:

- AdminInformation:
    - ZoneList getZones()
    - Void setZoneInfo()
    - ZoneInfo getZoneInfo(ZoneID)
    - Void setPriority(ZoneID)
    - Void setTaxiNmber(ZoneID)
    - Void newTaxi(Taxi)
    - Void updateTaxiInfo(TaxiInfo)
    - Void newTaxiDriver(TaxiDriver)
    - Void updateTaxiDriverInfo(TaxiDriverInfo)
    - TaxiDriverInfo getTaxiDriverInfo(TaxiDriverID)
    - TaxiInfo getTaxiInfo(TaxiID)
    - Void AssociateTaxi(TaxiDriverID,TaxiID)

**ZoneController**:

- Zone:
    - Zone  getZone(Address)
    - ZoneInfo getZoneInfo(ZoneID)
    - Taxi getTaxi(Zone ID)
    - Void addTaxi(Zone ID)
    - Void updateTaxiStatus(Taxi ID)
    - Zone getTaxiZone(Taxi ID)
    - ZoneList getZones()
    - Void setZoneInfo()
    - Void setPriority(ZoneID)
    - Void setTaxiNmber(ZoneID)

**Notification**:

- Void sendNotification(User ID, Notification)
- Void sendEmail(User ID,Notification)

**DatabaseController**:

- UserData:
    - Boolean newUser(UserInfo)
    - Boolean updateProfile(UserInfo)

    - Boolean removeProfile(User ID)
- RideData:
    - Boolean updateRideStatus(RideInfo)
    - RideList getSharedRides(Zone, TimeInterval)
- CallData:
    - Boolean addNewCall(CallInfo)
    - Boolean updateCall(CallInfo)
- AdminData:
    - Void newTaxi(Taxi)
    - Void updateTaxiInfo(TaxiInfo)
    - Void newTaxiDriver(TaxiDriver)
    - Void updateTaxiDriverInfo(TaxiDriverInfo)
    - TaxiDriverInfo getTaxiDriverInfo(TaxiDriverID)
    - TaxiInfo getTaxiInfo(TaxiID)
    - Void AssociateTaxi(TaxiDriverID,TaxiID)

**GoogleApi**:

- MapsApi:
    - Addr getAddr(Gps Cordinates)
    - GpsCord getPosition(Addr)
    - Route getRoute(AddrList)

**UserClient**:

- InputMessages:
    - Void sendNotification(Notification)

**TaxiClient:**

- TaxiRide:
    - Void sendRequest(Ride)
    - GpsCoord getPosition(TaxiID)

## 2.7 Selected architectural styles and patterns

**Architecture style**: 4-Tier

For our software we chose 4 different layers in which we separate the different logical parts:

- ▶ Presentation layer
- ▶ Web layer

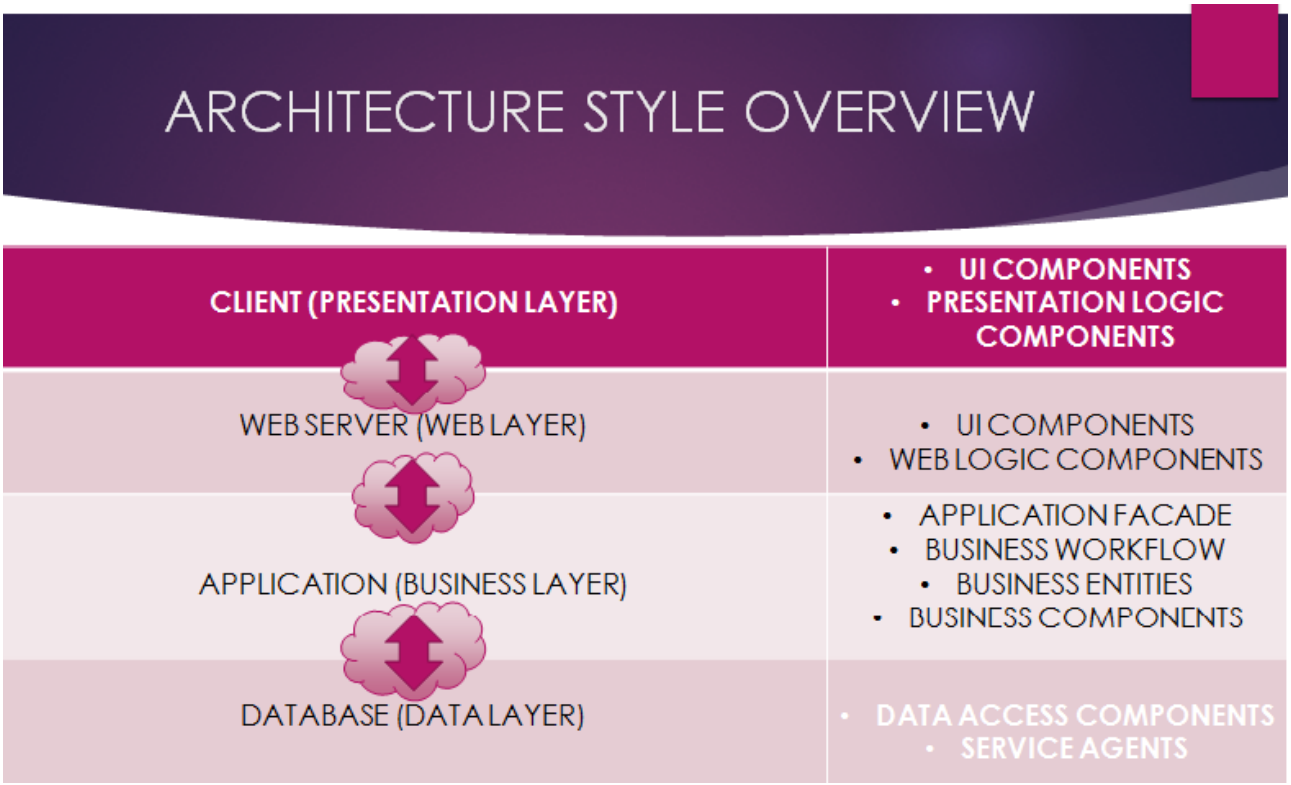
▶ Business layer

▶ Data layer

We have segregated functionality into separate segments with each segment being a tier located on a physically separate computer and communication between tiers is made through network.

The main benefits of the 4-tier architectural style are:

- **Maintainability**, because each tier is independent of the other tiers, updates or changes can be carried out without affecting the application as a whole;
- **Scalability**, because tiers are based on the deployment of layers, scaling out an application is reasonably straightforward;
- **Flexibility**, because each tier can be managed or scaled independently, flexibility is increased;
- **Availability**, applications can exploit the modular architecture of enabling systems using easily scalable components, which increases availability.




➢ **Presentation layer:**

This layer contains the user oriented functionality responsible for managing user interaction with the system, and consists of components that provide a common bridge into the core business logic encapsulated in the business layer passing through Web layer.

It is composed by:

- **UI-Components** that are the application's visual elements used to display information to the user and accept user input;
- **Presentation logic components** is the application code that defines the logical behavior and structure of the application in a way that is independent of any specific user interface implementation.

➢ **Web layer**

This layer defines and implements the web service, it has two main components:

- **UI components** : provide a presentation graphic for the browser requests and a small part of the web logic for the actions that a client can do (e.g. : tell at the web logic components that the user wants do a registration);
- **Web logic components**: It is a component that knows the structure of the web data and business data and matches them for the management of the requests and the replies.

➢ **Business layer**

This layer implements the core functionality of the system, and encapsulates the relevant business logic.

It is composed by:

- **Application façade** provides a simplified interface to the business logic components, It reduces dependencies because external callers do not need to know details of the business components and the relationships between them;
- **Business logic** is defined as any application logic that is concerned with the retrieval, processing, transformation, and management of application data;
- **Business entities** that encapsulate the business logic and data necessary to represent real world elements within your application;
- **Business workflow** components define and coordinate long running and multistep business processes.

➢ **Data layer**

This layer provides access to data hosted within the boundaries of the system, and data exposed by other networked systems; perhaps accessed through services. The data layer exposes generic interfaces that the components in the business layer can consume.

It is composed by:

- **Data access components** abstract the logic required to access the underlying data stores;
- **Service agents**: when a business component must access data provided by an external service, you might need to implement code to manage the semantics of communication with that particular service. In our case we manage data provided by GoogleMapsApi.

**Matching our Application with Architecture style**

- **Presentation layer** : in this layer the three types of users (user, taxi, admin) can access to the graphical part and to the functions implemented through that.

- **Web layer**: in this layer is contained the **web server**, it receive request from clients(browser) and make a response at them through the network. It is a bridge between user and application, adapts the data structure and manages the requests and the replies between the presentation layer and business layer.

- **Business layer**: here there is the main core software application (a small example of code in algorithm part). In this layer :
    - are managed all the system's requests made by clients (USER, TAXI AND ADMIN);
    - Are stored all the data structures (ZONE, TAXI, USER, RIDE, CALL ,…);
    - are managed all database communications with a call to the data layer;
    - are managed the communications with external software(in our case with Google Api for the route of a ride);
    - Is decided the workflow of a reply or internal procedure between components.

- **Data layer** : here there are the software modules to access the physical database:
  - it dialogs only with the business layer and reply only at it;
  - it knows the structure of the tables in the db and match the logical data structures with them (e.g. : data fields in a logical structure with their respective fields in a certain table);
  - It manages all the queries at the db and their replies for the business layer (e.g. : store/read data of a clients, data of a ride, …).

# 3. ALGORITHM DESIGN

### Matching between calls

```
/*
PercorsoGmaps è una classe delle api di googlemaps che permette di memorizzare
un percorso tra due punti.

PercorsoGmaps CreaPercorso(Position StartPoint,Position EndPoint) è un metodo
chiamato dalla funzione fornito dalle api di google il quale dati due punti ti
ritorna il percorso più veloce con i relativi dati tra di essi.

Assumiamo che la classe Call creata da noi abbia all'interno i campi :
StartPoint, EndPoint, StartTime, EndTime, durata, maxovertime e PercorsoGmaps.

ArrayCall è un array di call shared appartenneti alla stessa zona in cui si
cerca di unirne il piu possibile.

il metodo MatchingSharedCalls viene chiamato ogni volta in cui si aggiunge una
shared call all'array.
*/

PercorsoGmaps[] MatchingSharedCalls(Call* ArrayCall)
{
        //variabile in cui vengono memorizzati tutti i percorsi delle call unite
        PercorsoGmaps[] percorsi = new PercorsoGmaps();

        //ordino le calls secondo l'ora di partenza in modo crescente

        for(int i=0;i<ArrayCall.size()-1;i++)
        {
                for(int j=i+1;j<ArrayCall.size();j++)
                {
                        if(ArrayCall[j] != NULL)
                        {
                                if(ArrayCall[i].StartTime >
ArrayCall[j].StartTime)        //ipotizzo che il confronto delle date tenga
conto sia del giorno che dell'ora
                                {
                                        call* temp = ArrayCall[i];
```

```
                                        ArrayCall[i] = ArrayCall[j];
                                        ArrayCall[j] = temp;
                                }
                        }
                }
        }

        //controllo quali call sono integrabili, se una call non è integrabile
con la successiva allora non lo sarà nemmeno con tutte le altre

        int IndiceControllo = 0;

        while(i<ArrayCall.size())
        {
                int i=IndiceControllo;
                int j = i+1;
                while(j<ArrayCall.size())
                {
                        PercorsoGmaps PercorsiUniti =
CreaPercorso(Arraycall[i].StartPoint,ArrayCall[j].EndPoint);
                        if((Arraycall[i].durata + ArrayCall[i].maxovertime) <=
PercorsiUniti.durata)  //i due percorsi sono unibili
                        {
                                for(int z=j+1;z<ArrayCall.size();z++) //provo ad
unire altre call
                                {
                                        PercorsoGmaps temp =
CreaPercorso(Arraycall[i].StartPoint,ArrayCall[z].EndPoint);
                                        for(int k=0;k<z;k++)
                                        {
                                                Boolean compatibili = true;
                                                if((ArrayCall[k].durata +
ArrayCall[k].maxovertime) <= temp.durata)
                                                {
                                                        //è compatibile con tutte
le precedenti
                                                }
                                                else
                                                {
                                                        //almeno una delle
precedenti non è compatibile con il nuovo percorso
                                                        compatibili = false;
                                                }
                                        }

                                        if(compatibili) // se sono compaitibili
allora provo ad unire un'altra call e mi salvo l'attuale
                                        {
                                                PercorsiUniti = temp;
                                        }
                                        else //se non sono compatibili con il
nuovo percorso esco direttamente dal ciclo for
                                        {
                                                z = ArrayCall.size();
                                        }
                                        IndiceControllo = z;
                                }
                                percorsi.insert(PercorsiUniti);

                        }
```

```
                        else    //i due percorsi non sono unibili e quindi il
percorso i non è unibile di conseguenza con nessun'altro da j in poi
                        {
                                IndiceControllo++;
                        }
                }
        }

        return percorsi;
}
```

### Thread that controls the departure of the taxies

```
/*
sarà una classe runnable il cui compito è quello di allocare un taxi disponibile
10 minuti prima della partenza della corsa shared facendo un controllo ogni 10
secondi

suppongo che abbia la visibilità sull'array ritornato da MatchingSharedCalls
(chiamato percorsi)
*/

void ControlSharedRide()
{
        Date[] alloca = new Date(); //memorizza all'interno le date (giorno ora
e minuti) ai quali dovrà chiamare il metodo per allocare il taxi

        while(true)
        {
                //prima controllo se ci sono state delle modifiche nei percorsi

                if(percorsi.size() == alloca.size())
                {
                        //non ci sono stati cambiamenti
                }
                else
                {
                        for(int i=0; i<percorsi.size();i++)
                        {
                                date.insert(percorsi[i].StartTime-10);
        //ipotizzando che il tempo sia in minuti
                        }
                }

                //controllo se devo allocare un taxi e nel caso rimuovo la corsa
perchè già gestita

                for(int i=0; i<percorsi.size();i++)
                {
                        if(date[i].equalsTo(System.CurrentDate))
                        {
                                AllocaTaxi(percorsi[i]);
                                percorsi.removeElementAt[i];
                                alloca.removeElementAt[i];
                        }
                }

                Thread.sleep(10000); //lo metto in attesa per 10 secondi
        }
}
```

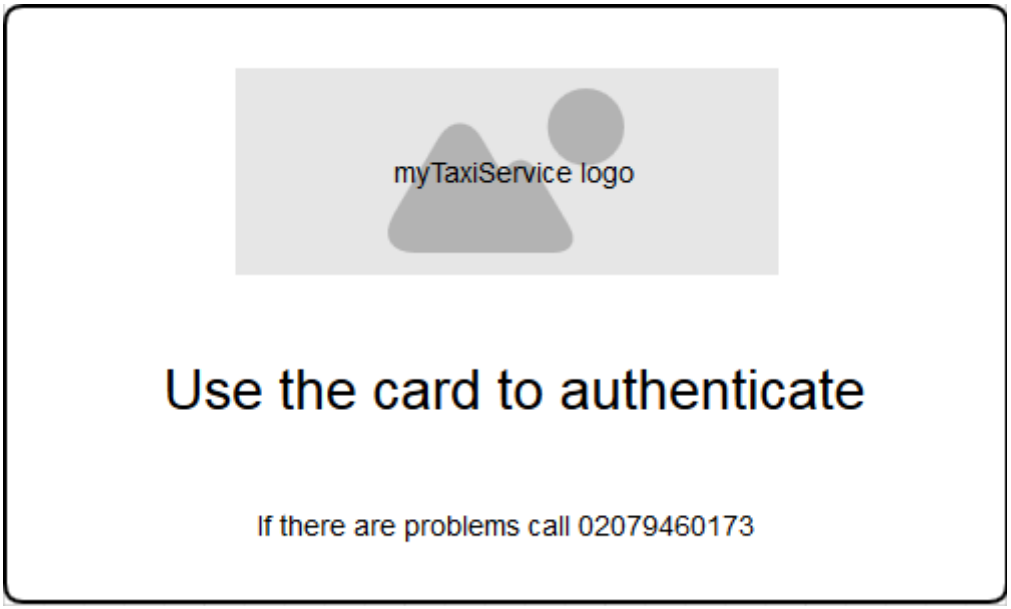
### Algorithm which with the position returns the corresponding zone

```
/*
utilizza una libreria esterna che disegna segmenti e crea esagoni cosi da sapere
se un punto è interno o no

la nostra mappa è suddivisa in zone esagonali che ricoprono l'intera città

i punti relativi ai vertici dei segmenti di una zona sono memorizzati in un file
testuale
*/

int GetZoneFromPosition(Position pos)
{
        FileReader f = new FileReader("vertici.txt");

    BufferedReader b = new BufferedReader(f);

        while(s!=EOF)
        {
                int numZone = 1;
                String s = b.readLine();
                CreaEsagono(s, numZone); //la funzione CreaEsagono prende in
ingresso una stringa con le posizioni dei vertici e l'id da assegnare alla
figura disegnata
                numZone++;
        }

        Return GetIDIn(pos); //la funzione GetIDIn trova a quale esagono
appartiene il punto individuato da Pos e ne restituisce l'id
}
```

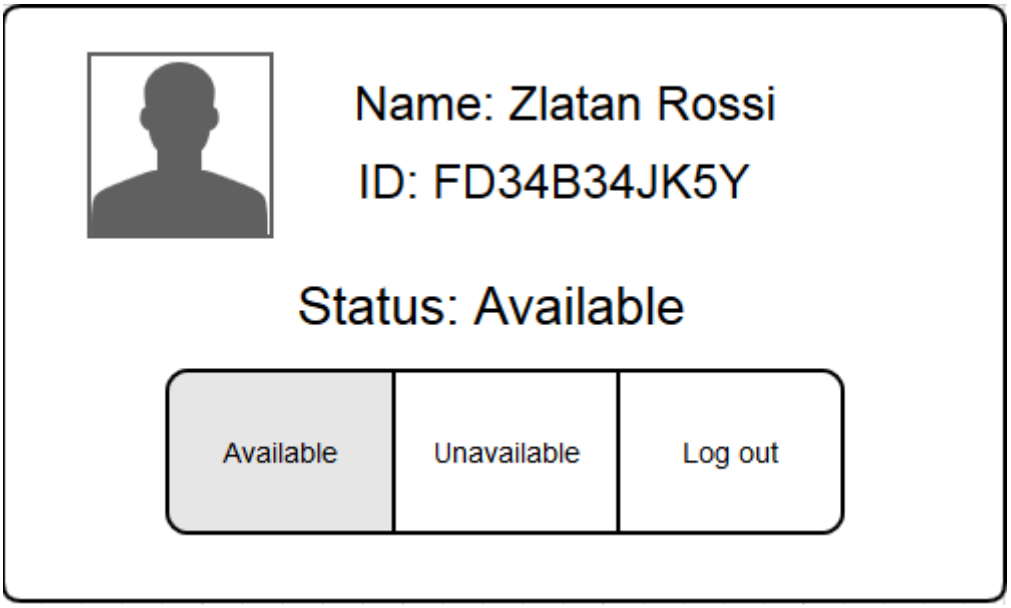
## 4. USER INTERFACE DESIGN

Here there are some mockups that give an idea of how the application will appear on the taxi. Some mockups instead relating to the application users are in the RASD.

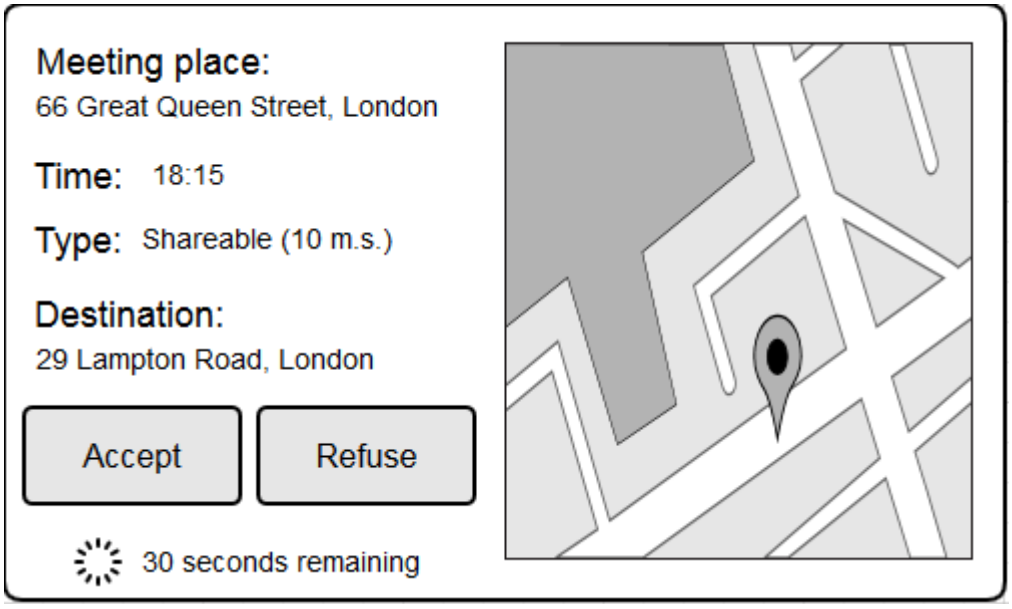
Login screen



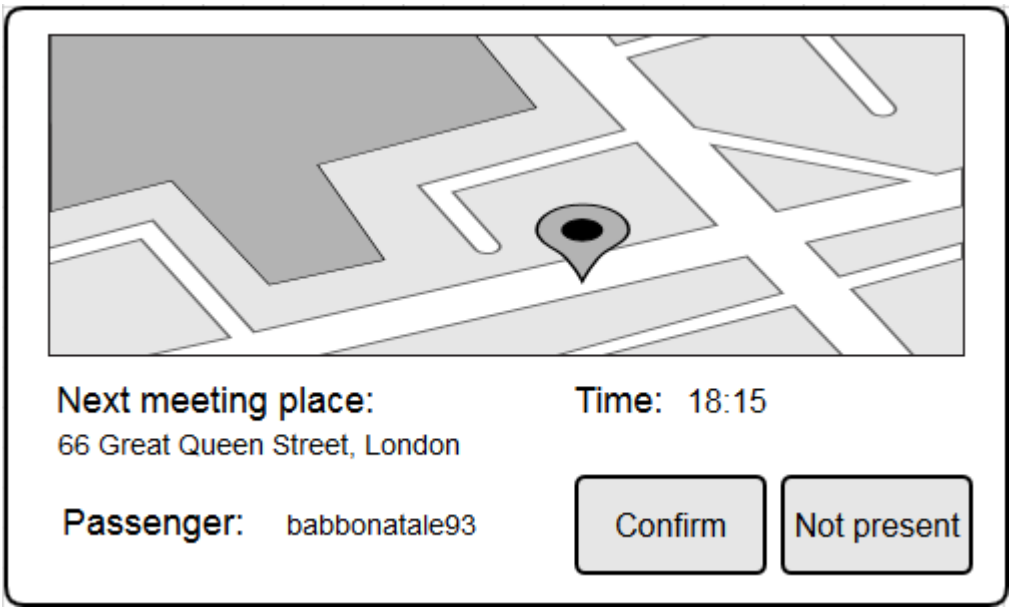

Status screen



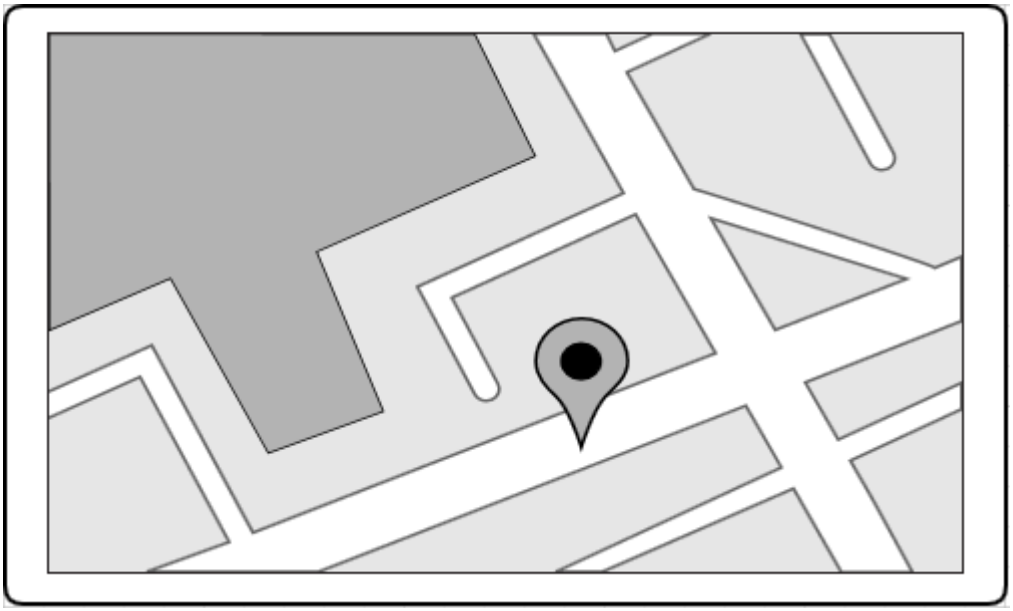

Request screen




Next meeting screen




Fullscreen map



Next destination screen

# 5. REQUIREMENTS TRACEABILITY

| Requirement | Component |
|---|---|
| The system should require the user to fill in the following fields:<br>– Meeting address<br>– Destination address | User GUI |
| The system should allocate a taxi for the request | CallManager<br>RideManager<br>TaxiHandler<br>ZoneController |
| The system should create a path for the ride and send it to the taxi | RideManager<br>GoogleApi<br>TaxiHandler<br>ClientTaxi |
| The system should send to the user the code of the taxi that has taken<br>on the ride and the waiting time | RideManager<br>CallManager<br>UserHandler<br>UserClient |
| The system, to create a new reservation, should require the user to fill<br>out the following fields:<br>– Meeting Time<br>– Meeting address<br>– Destination Address<br>– Travel mode<br>– Repetition (No/Daily/Weekly/Monthly) | UserGui |
| The system should compute the duration of a ride and the expected<br>arrival time | RideManager<br>GoogleApi |
| The system should accept the reservation verifying that it's not in conflict with other scheduled reservations of the user. | CallManager<br>RideManager |
| The details of the new reservation are stored only if the reservation is<br>Accepted | CallManager<br>DataBaseController |
| The system 10 minutes before de meeting time mast allocate a taxi for<br>the reservation. | RideManager(TimeController)<br>TaxiHandler<br>ZoneController<br>ClientTaxi |
| The system should ask to each user that wants to share a ride, the<br>maximum delay on the estimate arrival time that he wants to accept for<br>sharing the ride. | UserGUI |
| The system mast be able to join different paths to create a single paths<br>that passes in all the start and destination | RideManager<br>GoogleApi |

| | |
|---|---|
| addresses of each path. | |
| The system should require the user to fill in the following fields:<br>– E-mail with confirmation<br>– Password with confirmation<br>– Surname and Name<br>– Preferred payment way(credit card or paypal) | UserGUI |
| The system should require the user to insert a list of the zone from he often takes a taxi | UserGUI<br>UserHandler |
| The system uses the email as the user identifier | CallManager |
| The subscription is accepted only if all the fields have been fulfilled and<br>the email doesn't already exists in the database of the registered users | UserGui<br>UserHandler<br>CallManager<br>DataBaseController |
| The system stores all the user information only if the subscription is accepted | UserGui<br>UserHandler<br>DataBaseController |
| The system should send a welcome email to the user with all the<br>necessary information to use the service. | Notification |
| The system must require the user to fill out the following fields:<br>– E-mail used in the subscription phase<br>– Password used in the subscription phase | UserGui |
| The login is accepted only if the password inserted corresponds with the<br>email in the database of the registered users. | UserGui<br>UserHandler<br>DataBaseController |
| The user can have access to the service only if the login is accepted | UserGui<br>UserHandler<br>DataBaseController |
| Every time a taxi passes from a zone A to a zone B then a taxi in the zone B moves towards the zone A. | RideManager<br>TaxiHandler<br>ZoneController |
| the system should send the details of a ride request to the first taxi in the<br>queue of the zone that contains the start address of the ride:<br>– Tracking number of the ride.<br>– Path of the ride.<br>– Path to reach the start address<br>– Call type (Real Time or Reservation).<br>– Travel Mode (Single or Shared). | RideManager<br>TaxiHandler<br>ZoneController<br>ClientTaxi |
| The system should pass the ride request to the next taxi in the queue only if the taxi driver has refused the request or it passes more than 30 seconds from the arrival of the request. | TaxiHandler<br>RideManager<br>ZoneController |
| The system should pass the ride request to the next taxi in the queue only if the taxi driver has | RideManager(TimeController)<br>TaxiHandler<br>ZoneController |

| | |
|---|---|
| refused the request or it passes more than 30 seconds from the arrival of the request. | ClientTaxi |
| If the taxi driver refuses the request or he takes more than 30 seconds to accept it, the system should remove his taxi from the head and place it in the tail of the queue. | RideManager(TimeController)<br>TaxiHandler<br>ZoneController<br>ClientTaxi |
| If no taxis are available in the zone the system should pass the request to the first taxi in the queue of a near zone. From the various near zones the system should choose the one in which the position of the first taxi in the corresponding queue is as near as possible to the call start address. | RideManager(TimeController)<br>TaxiHandler<br>ZoneController<br>ClientTaxi |
| The system should calculate the average number of ride request per hour for each zone (request rate). | CallManager |
| The system should be able to show to the taxi administrator a table with the<br>following information:<br>- Actual number of taxi for each zone<br>- Priority of the zones<br>- Request rate for each zone. | ZoneController<br>AdminHandler<br>ClientAdmin |
| The system should display to the user a calendar with the scheduled reservations. | CallManager<br>UserHandler<br>UserClient(UserGUI) |
| The system should ask the user to select the day in which he wants to<br>schedule a new reservation or see the details of once already scheduled | CallManager<br>UserHandler<br>UserClient(UserGUI) |
| The system, to create a new reservation, should require the user to fill out<br>the following fields:<br>– Meeting Time<br>– Meeting address<br>– Destination Address<br>– Travel mode<br>– Repetition (No/Daily/Weekly/Monthly) | CallManager<br>UserHandler<br>UserClient(UserGUI) |
| The system should compute the duration of a ride and the expected<br>arrival time | RideManager<br>GoogleApi |
| The details of the new reservation are stored only if the reservation is accepted | CallManager<br>DataBaseController |

## 6. USED TOOLS

Microsoft Office: to write this document.
Gliffy.com: to create the sequence diagrams.
moqups.com: to create the mockups.

### Hours of work:

Simone Rosmini about 24 hours
Vincenzo Viscusi about 24 hours
Matteo Zambelli about 24 hours