

REPUBLIC OF TURKEY  
YILDIZ TECHNICAL UNIVERSITY  
DEPARTMENT OF COMPUTER ENGINEERING



GEZİ-YORUM

13011036 – Tarık Nural  
13011035 – Murat Baki Yücel

SENIOR PROJECT

Advisor  
Assist. Prof. Dr. Ahmet Tevfik İNAN

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Tarık Nural  
Murat Baki Yücel

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## LIST OF ABBREVIATIONS

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STS	Spring Tool Suit
JSON	Java Script Object Notation
AWS	Amazon Web Services
RDS	Relational Database Service
Js	JavaScript
LOOP	Microsoft's Location and Obsevation Platform
Play Store	Google Play Store
GPS	Geographic Positioning System
VCS	Version Control System
AWS	Amazon Web Services

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# ABSTRACT

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## Gezi-Yorum

Tarık Nural  
Murat Baki Yücel

Department of Computer Engineering  
Senior Project

Advisor: Assist. Prof. Dr. Ahmet Tevfik İNAN

The goal of this project is to record travel routes of people's trips using mobile device location and to add and edit media on the route. A system will be developed that can be used to organize trips not only as a person but also as a team, as well as what transport vehicles are used for transportation. If the trip organized as a team, the users will be able to share their in-team location via the internet so that team members can follow each other. It is intended that a route created and shared by a user or a team can be examined by other users. Other users may choose the route they are reviewing as their route and they can start trips on this route as personal trip or as a team trip. The system to be designed will be guidance in this case. The system will need to create a social media environment to increase interaction between users. Friendship and tracking system between users will be designed. In addition personalized news flow which includes shared trips by user's friends and popular trips, will be provided. The person will be provided with a customized news flow that will be compiled around the person, compiled on popular routes and in the circle around friends. As a result of the project, a mobile application will be developed that stores route data of a trip and media like photos, videos, audio files tagged on the route, also will provide service to interact people with shared data. Sharing trips is an additional workload for travelers. This application will offer users a practical solution to save the spent time on sharing a trip on any social media environment or on the internet. In addition, the application will generate convenience not only for travelers but also for people who want to share their daily life. It will also provide an open environment for the interaction of people as it is considered to be a social media environment within the application.

**Keywords:** Trip, Tracker, Advisor, Social Media, Gallery Editor

# ÖZET

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Tarık Nural  
Murat Baki Yücel

Bilgisayar Mühendisliği Bölümü  
Bitirme Projesi

Danışman: Yrd. Doç. Dr. Ahmet Tevfik İNAN

Bu projenin hedefi insanların gezilerinin mobil cihaz konum verileri kullanılarak gezi güzergâhının kaydedilmesi ve güzergâh üzerinde medya ekleyip düzenlenmesini sağlamaktır. Gezilerin sadece kişiler olarak değil, takım hâlinde de düzenlenebilmesi, ayrıca yapılacak gezilerde varsa kullanılan ulaşım araçlarının neler olduğunu algılayabilecek bir sistem geliştirilecektir. Takım olarak düzenlenen gezilerde kullanıcılar, takım üyelerinin birbirini takip etmesi amacıyla takım içi konum paylaşımını internet bağlantısı olması şarıyla internet aracılığı ile yapabilecektir. Bir kullanıcının veya takımın oluşturduğu bir güzergâhı, diğer kullanıcıların da inceleyebilmesi hedeflenmektedir. Diğer kullanıcılar inceleme yaptığı güzergâhı kendi güzergâhı olarak belirleyebilir veya bu güzergâh üzerinde takım gezisi yapmak isteyebilir. Tasarlanacak sistem bu durumda belirlenen güzergâhı târif edici olacaktır. Sistemin kullanıcılar arasında etkileşimi artırmak amacıyla bir sosyal medya ortamı oluşturması gerekecektir. Kullanıcılar arası arkadaşlık ve takip sistemi tasarlanacaktır. Ayrıca kişiye kendi çevresinden tavsiye edilender, uygulama içinde bulunan popüler güzergâhlar ve arkadaş çevresindeki geziler derlenerek özel bir haber akışı içerisinde sunulacaktır. Proje sonucunda bir gezinin rotasını, rota üzerine etiketlenen fotoğraflarını, videolarını, ses dosyalarını saklamaya imkan veren ve bunları diğer kullanıcıların etkileşimine açabilen bir mobil uygulama geliştirilecektir. Gezilerin herhangi bir sosyal medya ortamında veya internet üzerinde paylaşılması ve paylaşmak amacıyla düzenlenmesi geziciler için ek iş yükü teşkil etmektedir. Bu uygulama, kullanıcılarına gezi sürecinin paylaşımında sarf edilen efordan tasarruf ettirecek pratik bir çözüm sunacaktır. Ayrıca uygulama sadece gezicileri değil günlük hayatını paylaşmak isteyen insanlar içinde kolaylık üretecektir. Ayrıca uygulama içinde bir sosyal medya ortamının da olması düşünüldüğü için kişilerin etkileşimine

açık bir ortam sağlayacaktır.

**Anahtar Kelimeler:** Gezi, Takip, Öneri Sistemi, Sosyal Medya, Galeri  
Düzenleyici

# 1 Introduction

---

On this project our purpose is to save navigation data which represents latitude, longitude and altitude provided by GPS of users and show the route of a trip on the map. There will be a mobile application and server side application to provide some features, lets users to share trips, review trips, communicate and socialize with each others. Various media records such as photos, videos and sound records recorded from mobile device during the trip will be shown on the route. There will be a team trip option for the trips which includes more than one member. Team trip option lets every team member to see any team member's location simultaneously if there is an internet connection. In order to determine travelling method, using the temporal data changes of the navigation data taken from the satellite, average and instant speed will be calculated. As result, trip type will be labelled as vehicle trip, walking trip, running trip or cycling trip using calculated speed data. If the system is operating in the guiding mode, the route that the user or team wants to go will be described by system to user. In order to provide interaction between users a social media environment will be designed. People will be able to establish their friendship here. In the news flow, there will be a timeline section. Posts which are shared by friends of users will be shown there. The trips can be liked by other users in the news flow, it can be saved for future review, it can be suggested for other friends to visit, or the users can follow trips they like from its content by downloading it on their own mobile device.

## 1.1 Literature Review

Our purpose to realize that project is to simplify planning, recording and sharing of a trip for traveler. We know that it is not easy to organize photos and media taken on a trip and sharing them on Facebook. In any marketplaces including play store and appstore there are a lot of applications for tracking and travel planning but most of them only saves location data and do not include media or user notes. There are only a few remarkable application which saving location data, media and also

providing a social media environment. However there is no application that provides trip tracking, organizing media, following other person's route, sharing memories and also doing all of these with friends at the same time.

## **1.2 Objective of the Thesis**

For travelers it is not easy to organize media and associate media with saved locations. Also if trip has been organized with more than one person it is also difficult to merge media and organize additional material prior to share on any social media environment or on the internet. It's important to say that every member of team has him/her own memory which is important and it must be saved.

## **1.3 Hypothesis**

To do that it is necessary to store locations data, store media and associate them with their location, and store them with everything in a trip. So that people can remember everything in a trip.

## 2 General Information

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The main purpose of this section to review projects that are already developed by others which is related with ours.

### **2.1 Trip Tracker(Android application)**

Trip Tracker[1], a Microsoft Garage project, is a free application that automatically records your drives, runs, walks, and bike rides. This application has developed with LOOP[2]. Without that feature this application can only track, save user's location and show saved data on the map.

### **2.2 Route Tracker(Android application)**

Route Tracker[3] is a GPS application for tracking/loading routes in your android mobile phone that gives you a real time response on your location. It supports GPX tracks file import, GPX/KML/google map embedded HTML file export, sync workouts with RunKeeper account, auto-Lap for each mile/kilometer, audio reminder for auto lap time reminding, vibration for auto lap, sharing to friends, open street view for record locations, duration, distance, pace and calories indication. This application could only track, save user's location and show saved data on the map.

### **2.3 Polarsteps - Travel Tracker(Android and Ios application)**

Polarsteps[4] can provide tracking location of user, can show media as just photo and video on the trip path. They are claim to low power consumption. In this application it is not possible to organize team trips. User can use this application only for their personal trips. This application also provides a social media platform. Social media plataform could only usable for sharig trips and comment on shared content. It is not possible to download and track any shared route.

## 2.4 Maps (Android and Ios application)

Google Maps[5] can save user's location continuously. In this application there is no start trip option. This application determines trip kind automatically. In purpose this application not developed for tracking, developed for navigate users. User can watch his/her activity on the menu named 'TimeLine' (in Turkish 'Zaman Çizelgesi'). On users timeline media such as photos and videos shown not audio or any other medias. In this application there is no social media or sharing trip option.

Gezi Yorum offers an extended trip tracking and organizing system. Gezi Yorum will include all of the features of the applications listed above and in addition Gezi Yorum will be able to organize team trips and following member on a trip. Table on below shows specifications of applications.

**Table 2.1** Specifications of Applications

Specification	Trip Tracker	Route Tracker	Polarsteps	Maps	Gezi Yorum
Record trip	+	+	+	+	+
Show Trip on map	+	+	+	+	+
Trip type	+	+	+	+	+
Step counting	-	-	-	-	+
Media on location	-	-	+	-	+
Social media	-	-	+	-	+
Personal Trip	+	+	+	-	+
Team Trip	-	-	-	-	+
Location sharing	-	-	-	-	+



This system needs requirements listed below:

- This system needs real time location of user. So this system needs to run on mobile devices.
- This system must provide interaction within users. So to provide interaction of multiple mobile devices this system needs a server side application.
- In process of development to provide version controlling Git must be used as VCS.

### 3.1 Technic Feasibility

As technical feasibility study, the software and hardware needs for the project is defined on the following sections.

#### 3.1.1 Software Feasibility

In this project a web and a mobile application will be developed. The following software technologies will be used.

#### Mobile Side Development

The tools and development environments used for mobile side development of the project are mentioned below.

- **Android:** Android is a mobile operating system based on the Linux kernel. Its source code is licensed under open source licenses and it is developed by Google and Open Handset Alliance. The top layer of Android's architecture is called The Application Framework layer and it provides many higher-level services to applications in the form of Java classes. Android was chosen over iOS because of publishing problems, restrictions and lack of design guidelines that come with iOS[6].
- **Android Studio:** Android Studio is the official IDE for Android application

development, based on IntelliJ IDEA. Android Studio offers some advantages over Eclipse, such as Gradle based flexible build system, advanced layout editor, built-in Git source control and Maven library support[7].

- **Android Sqlite Database:** SQLite is a opensource SQL database that stores data to a text file on a device. Android comes in with built in SQLite database implementation. SQLite supports all the relational database features[8].
- **Android Emulator:** Android emulator lets prototype, develop and test Android applications without using a physical device[9].
- **Google Map API:** Google Maps APIs give developers several ways of embedding Google Maps into web pages or retrieving data from Google Maps, and allow for either simple use or extensive customization[10].

## **Server Side Development**

The tools and development environments used for server side development of the project are mentioned below.

- Java EE:
- Eclipse:
- Sublime Text:
- MySQL Workbench:
- STS:
- Google Map API:

### **3.1.2 Hardware Feasibility**

The minimum and recommended hardware requirements for each program/IDE and a system requirement compilation for development is shown in Table 3.1 based on the requirements.

For this project we selected to rent a cloud computing system for make this project scalable. Scaleway[11] provides cloud computing services. Scaleway can provide

multiple datacenters on different locations and developer tools on the machines. We selected scaleway for renting cloud server(s). Starter package is enough for this project at startup.

**Table 3.1** Scaleway package options

Specification	Starter	C2	ARM64	C1
CPU	2x86 64bit	8x86 64bit	8xARMv8	4xARMv7
RAM	2GB	32GB	8GB	2GB
Storage	50GB SSD	50GB SSD	200GB SSD	50GB SSD
Number of public IPv4	1	1	1	1
Bandwidth	200Mbit/s	800Mbit/s	200Mbit/s	200Mbit/s

**Table 3.2** Minimum System Requirement for Mobile Application Development

Software	CPU	RAM	Storage
Linux OS[12]	1GHz	512 MB	8 GB
Android Studio[13]	1.6GHz	3 GB RAM	8GB(500MB for IDE, 7.5 GB for SDK)
Android Emulator[13]	unknown	1GB	1.5 GB

**Table 3.3** Minimum System Requirement for Server Side Application Development

Software	CPU	RAM	Storage
Windows OS[14]	1GHz	2 MB	20 GB
Eclipse[13]	1.5GHz	1 GB RAM	1 GB
MySQL[15]	2 core	2GB	800 MB
MySQL Workbench[15]	unknown	4GB	200 MB

**Table 3.4** Android Hardware Requirements

	Minimum	Recommended
CPU	1 Ghz	2 Ghz
RAM	512 MB	2 GB
Storage	2 GB	8 GB

### 3.1.3 Communication Feasibility

Media files and path files are separately stored on users android device. It so hard to send all of trip data one by one to one device to another without any loss. So we thought about that to compressing all files in a zip file before sending from mobile device to web server or vice versa. So we sended all data in one file. Also we will use less data bandwidth with compress all files in a zip file. The Internet is the main communication technology used in this project. The anticipated communication variables are shown in Table 3.5.

$$I = G * F + E * D + C * B + A$$

**Table 3.5** Communication parameters

Description	Symbol	Values
Average Path Size	A	50 kB
Average Video Size	B	10 MB
Average Video Number Per User	C	4
Average Photo Size	D	2 MB
Average Photo Number Per User	E	20
Average Sound Record Size	F	1 MB
Average Sound Record Number Per User	G	1
Average Number Of Members in Trip	H	2
Average Trip Data Size on Mobile(Unzipped)	I	81 MB
Average Trip Data Size on Web(Unzipped)	J	162 MB
Average Trip Data Size on Mobile(Zipped)	K	113 MB
Average Number of Upload Rate	L	25/month
Average Number of Download Rate	M	50/month
Average Size of Uploaded Trips	N	2 GB
Average Size of Downloaded Trips	O	8 GB
Supposed Number of Users	P	100
Average Zip Compression Ratio	R	30%[16]
Server Data Rate Per Month	S	10 GB

$$J = I * H$$

$$K = I * (1-R)$$

$$N = I * L$$

$$O = J * M$$

$$S = O + N$$

Based on the calculations above, the monthly data size will be around 10 GB.

Scaleway provide 2 GB ram and 50 GB storage with expandable options. As a result these properties are sufficient.

### 3.2 Labor Force Feasibility

There are two people needed for developing mobile and server side of system concurrently.

### 3.3 Time Feasibility

Gantt diagram shown below.

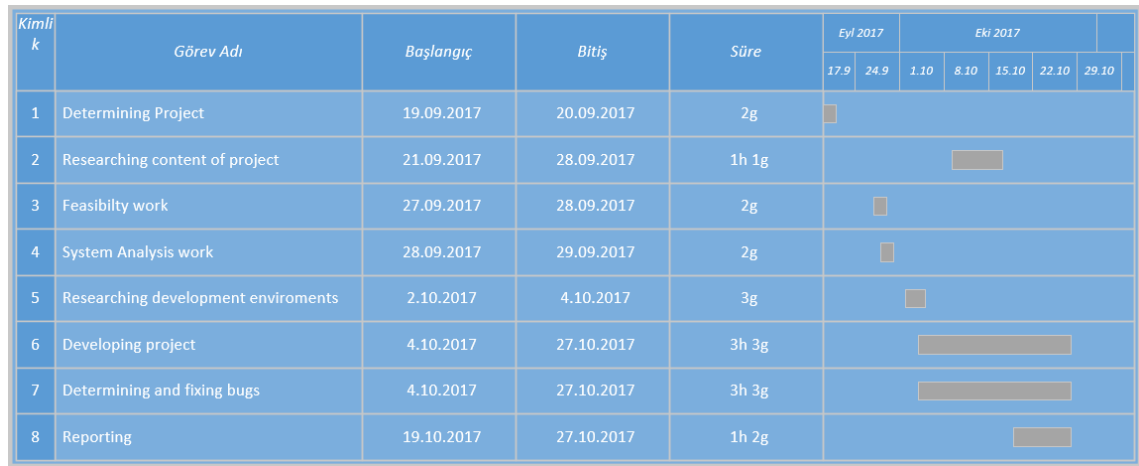


Figure 3.1 Gantt Diyagramı Zaman Çizelgesi

### 3.4 Legitimate Feasibility

Software which is used within the project does not face any legal issues. All of the software used in the project contain license requirements. Users are responsible for all shared content. The users are responsible of their well being. So any misusing of any sharing content is their risk. So sharing and publishing content is on their own risk.

### 3.5 Economic Feasibility

The salary determined by the government of the Republic of Turkey for engineers is 3.500 TL[17]. The amount of assumed work days in a month is 21 days. The individual and general cost of the personnel and features the cost of hardware and software used for development are shown below.

**Table 3.6** Personnel cost table

	<b>Time(Day)</b>	<b>Price(TL/Day)</b>	<b>Total(TL)</b>
System Programmer	37	170 TL	6.290 TL
System Analyst	29	170 TL	4.930 TL
System Designer	10	170 TL	1.700 TL
Project Coordinator	4	170 TL	680,TL
General Total:	13.600 TL		

**Table 3.7** Hardware and software used for development cost table

<b>Components</b>	<b>Price</b>
Eclipse [18]	Free
Android Studio [7]	Free
2* Dell Vostro 5468	662 TL
General Mobile GM6 [19]	375 TL
2* Github Account	Free
Scaleway Server	15TL/monthly
General Total:	1.112 TL

The cost of computers used in the development process is 1318 TL[20]. In the process 2 computer were used. A computer can be used for 2 years so 48 months in average lifetime. From here, we will find the cost of computer as 662TL. General Mobile GM6 used in the development process is 900 TL[19]. It can be used for 12 months in average lifetime. From here we will find the cost of phone as 375 TL. Considering these expenditures, the cost of development of our project is X TL.

**Table 3.8** Total Cost Table For Gezi-Yorum

<b>Cost</b>	<b>TL</b>
Hardware	5.000,00 TL
Project Team	16.000,00 TL
Google Map API	15,00 TL
AWS	60,00 TL
<b>Toplam</b>	<b>21.075,00 TL</b>

## 4 System Analysis

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Project details and descriptions of modules in this section. This project will contains a mobile application which saves user location, media files and organize an event with other people, and a serves side application which provides users to interact, sharing saved contents and access shared contents.

Mobile application will saved location, notes and media files also location of media files to storage when user started trip tracking feature of mobile application. Before starting a trip user can choose some of his/her friends to organize a trip with them on the both online and offline modes. If searching friend is not listed on offline mode, user can add friend when internet connection provided. If a person added a trip, this person will give a notification which asks user to accept joining or reject joining to trip. If user accepted invitation he/she can join trip as a member. Invitor is accepted as leader of team. During the trip all user's behavior saved seperately. If location sharing feature opened any member of this team can watch other members location. But as we mentioned this feature requires internet connection. At the end of trip when user want to share his/her trip data and all of the data shared by other members will be merged. All users can select sharing data seperately. As a result anyone could wants to store a picture but don't want to share.

In order to save location on background Android application will use a location saving service. Using service is a must because, Android services provides to execute a process for long time on the background. User can watch his/her location path on map during trip. If user wants to track a path which is shared from other people user can track the path by looking at map.

Modules created by project team as follows:

- User register and login module
  - User login module
  - User register module

- Trip search module
- Timeline preparing module
- Location and media save module
- Feature extraction module
- Trip management module
- Notification sender module
- Trip upload and download module
- Team data merging module



## 4.1 Backend UML and Database Diagrams

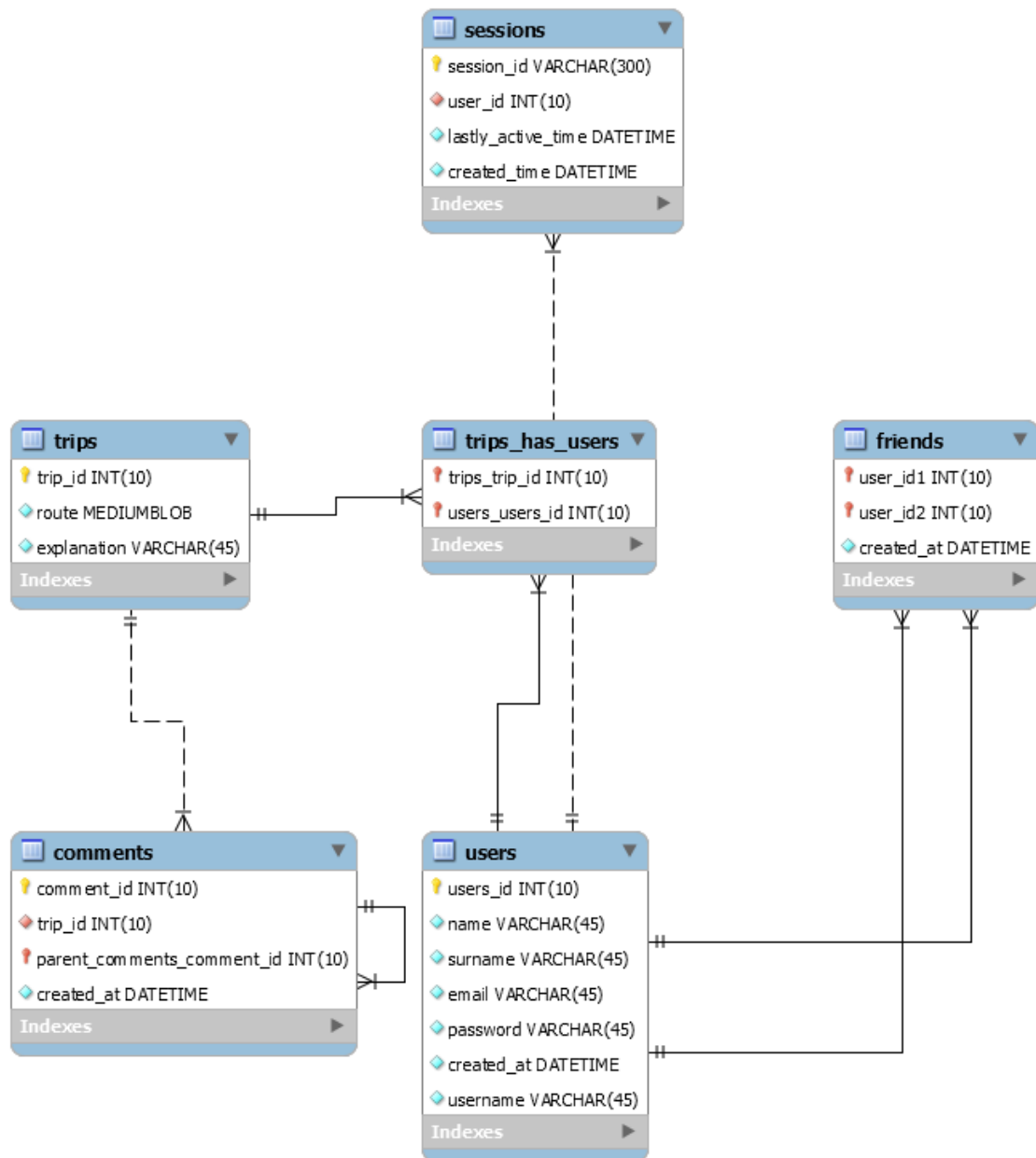


Figure 4.1 Database design pattern

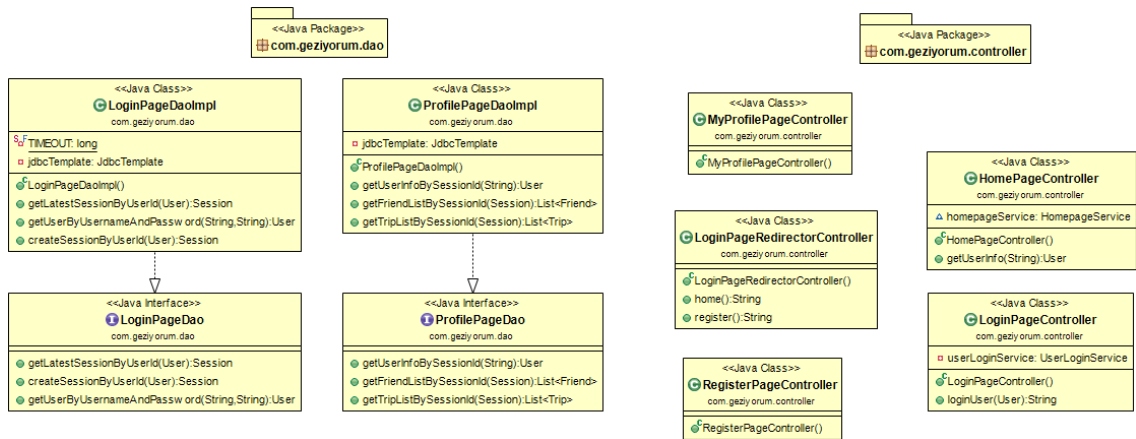


Figure 4.2 Backend implementation MVC UML-1

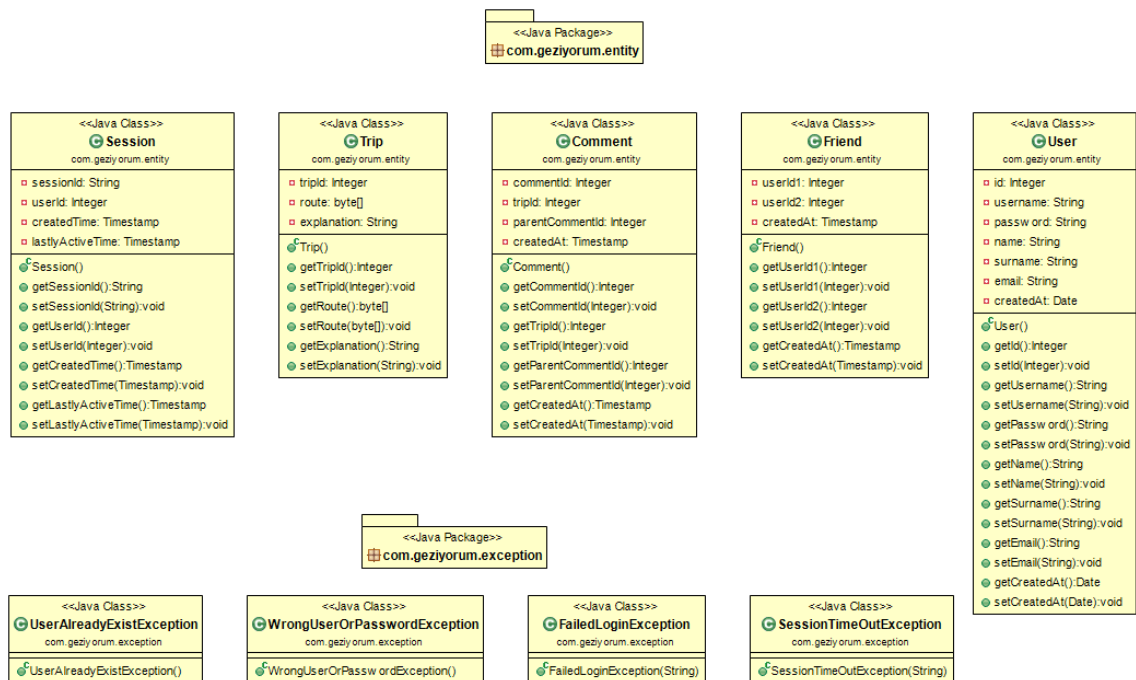
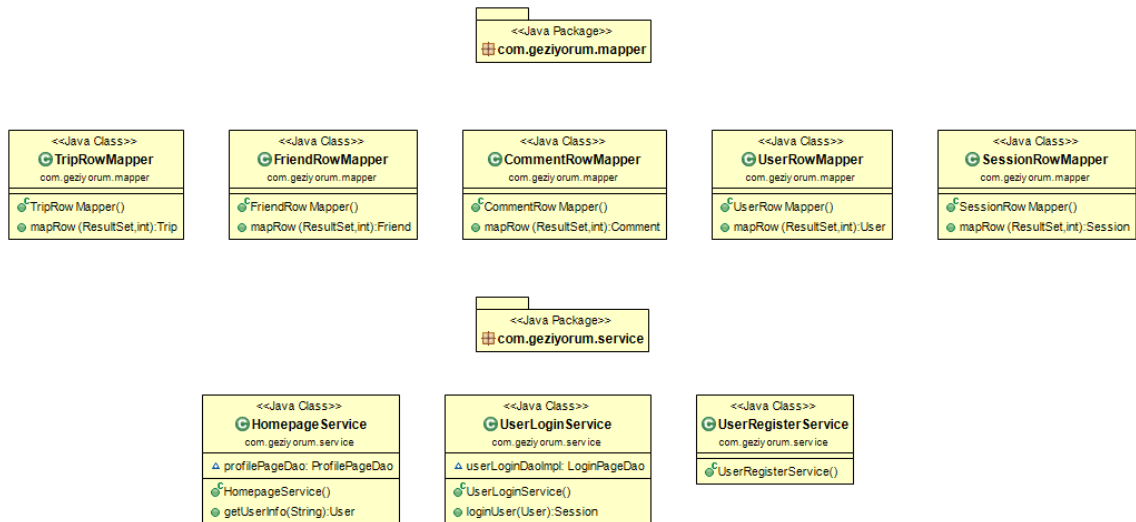


Figure 4.3 Backend implementation MVC UML-2



**Figure 4.4** Backend implementation MVC UML-3

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## Curriculum Vitae

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### FIRST MEMBER

**Name-Surname:** Tarık Nural

**Birthdate and Place of Birth:** 07.01.1995, İstanbul

**E-mail:** tariknural00@gmail.com

**Phone:** 0535 261 1429

**Practical Training:** SSI SCHAEFER  
ARÇELİK A.Ş

### SECOND MEMBER

**Name-Surname:** Murat Baki Yücel

**Birthdate and Place of Birth:** 04.01.1996, Kayseri

**E-mail:** bakiyucel38@gmail.com

**Phone:** 0507 915 8686

**Practical Training:** Pronic Yazılım  
Kartaca Bilişim

### Project System Informations

**System and Software:** Windows, Linux, Java, Android Studio, MySQL, Android, Spring Boot, Javascript, AngularJS, Mocha and Chai, Bootstrap, CSS, Android Emulator, Postman, JUnit, Google Map API, Mail Service, Android Phone, Git

**Required RAM:** 1GB-512MB

**Required Disk:** 512MB-2GB