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Intelligent Mobile Bus Ticketing System

Supervised by

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Implemented by

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Project Idea

- Developing a payment method for means of transportation based on cellphones. The passenger downloads an application on his cellphone and creates an account on it. The passenger's account could be charged with balance then his/her phone could be passed over a reader on several types of public transportation to deduct the fare.

- The system is an application belonging to the realm of *Internet of Things* (IoT).

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Problem Significance

Problems Targeted

- Driver distraction
- Safety of passengers
- Arrival delay
- Slow process of ticketing
- Non trackable transactions
- Tickets production costs
- Change problems
- Ticket loss

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Problem Significance

Why and How to Solve It

- **Why?**
  - Safety of passengers
  - Increase transactions speed
  - Reduce arrival delay
- **How?**
  - Utilize a single compact device
  - Easier usage more flexibility

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Problem Significance

Previous Solutions

1. Existence of driver assistant

- **Advantages:**
  - Less distraction on the driver
  - Arrival delay is minimized
- **Disadvantages:**
  - Low reliability and efficiency
  - Other subproblems aren’t solved yet

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Problem Significance

Previous Solutions

2. Rechargeable and non-rechargeable transportation cards

- **Advantages:**
  - Saves time and effort
- **Disadvantages:**
  - Several cards distracts the holder
  - Hard to track
  - Still subproblems targeted aren’t solved yet

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Problem Significance

Our Digital Solution

- **Advantages:**
  - No distraction on the driver
  - No arrival delay
  - No change problem
  - No payment delay
  - Saving ticket production

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System analysis and Design

System Architecture

- The system architecture used with imobuts is the well-known MVC architecture. The reasons for using it is the need of having a single back-end with multiple frond-end devices that depends on that back-end.

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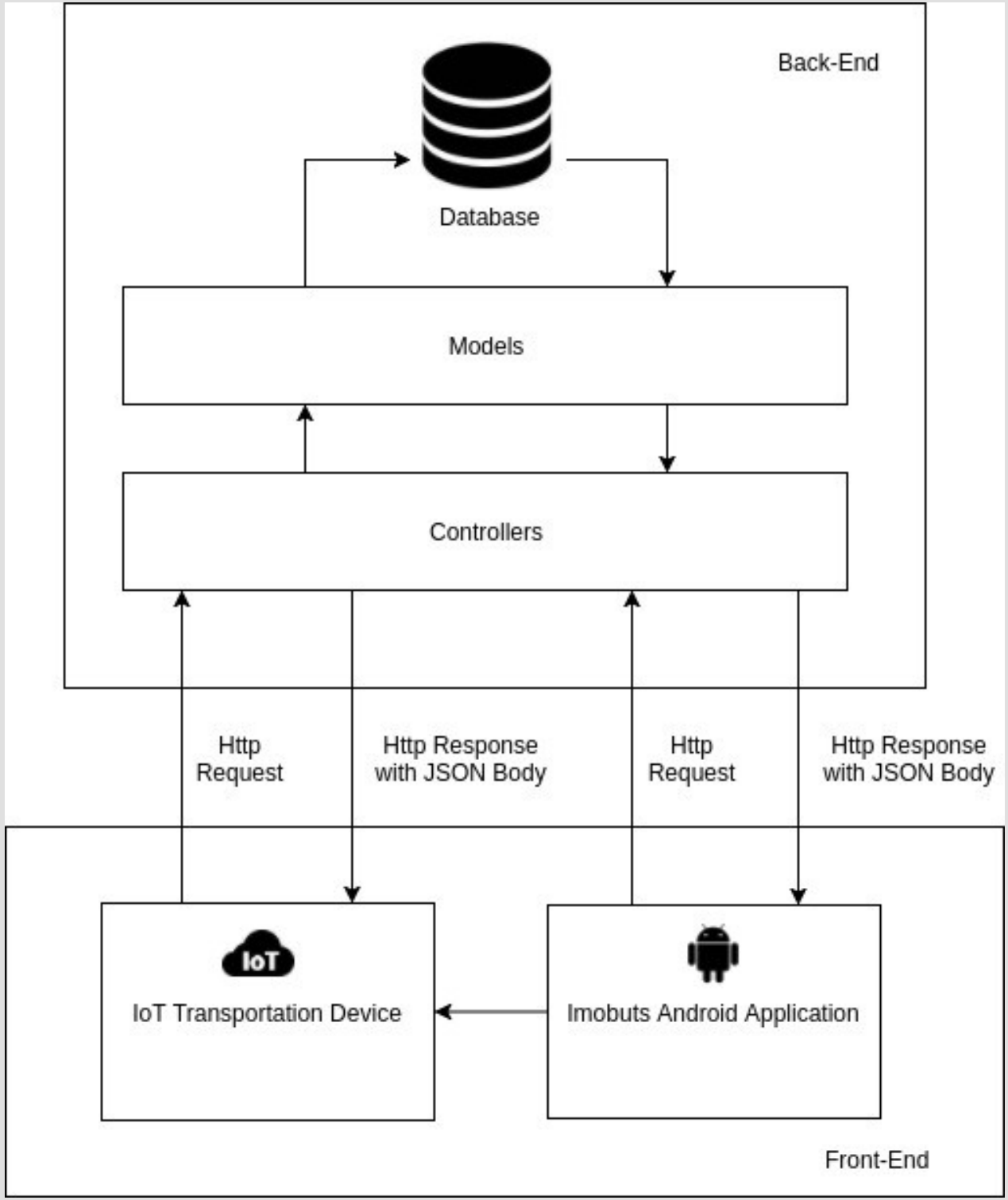
System Architecture



System analysis and Design

Stakeholders

- Passenger (Main user)
- Vehicle driver
- System owner

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System analysis and Design

Functional Requirements

- Sign up
- Sign in
- Logout
- Forget password
- View profile
- Edit profile
- Charge
- View tickets
- View ticket details
- Cut ticket

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System analysis and Design

Non-Functional Requirements

- Security
- Usability
- Performance
  - Response time
  - Accuracy
- Reliability
- Robustness

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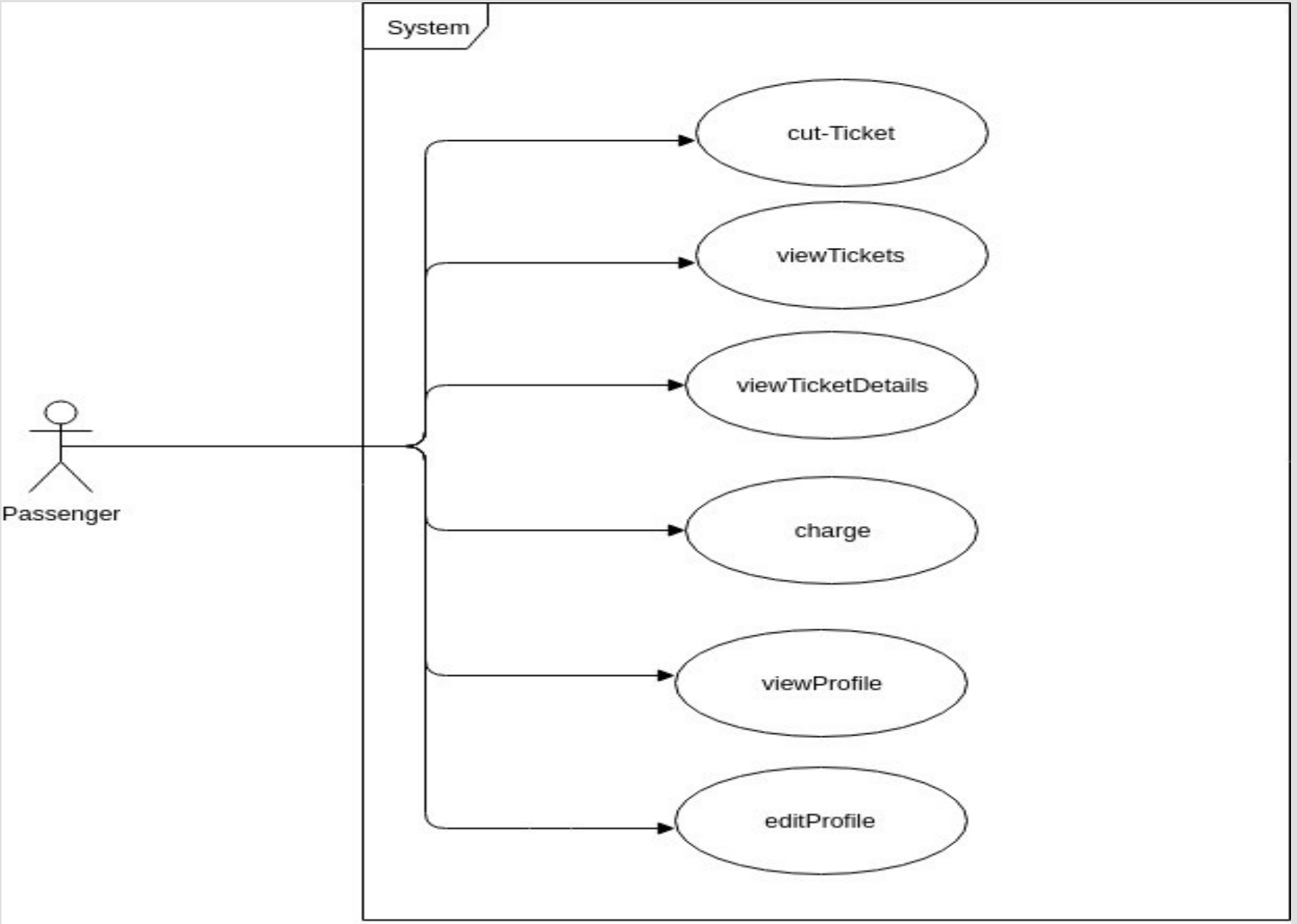
Usecase Diagram



Use Case Diagram
Figure 1

System analysis and Design

Use Case Tables

1. cutTicket:

Use Case ID:	002	
Use Case Name:	cut-Ticket	
Actors:	User "Passenger" - IoT Device	
Pre-conditions:	User already logged in & in tickets view & NFC is ON	
Post-conditions:	Ticket is sent to user with balance updated	
Flow of events:	**User Action**	**System Action**
	1- User clicks on "cut-ticket" button	
		2- System asks user to pass the mobile before the corresponding IoT device
	3- user passes mobile before the corresponding IoT device	

System analysis and Design

Use Case Tables

1. cutTicket:

		4- System sends both balance, userId to the corresponding IoT device that sends (balance, user-Id , fees of this transportation) to the server where balance is updated (deducting the value of transportation fare) and ticket is sent to the user.
Exceptions:	**User Action**	**System Action**
	1- User has INVALID balance	
		2- IoT denies the Permission for cutting ticket
Includes:	-	
Notes and Issues:	-	

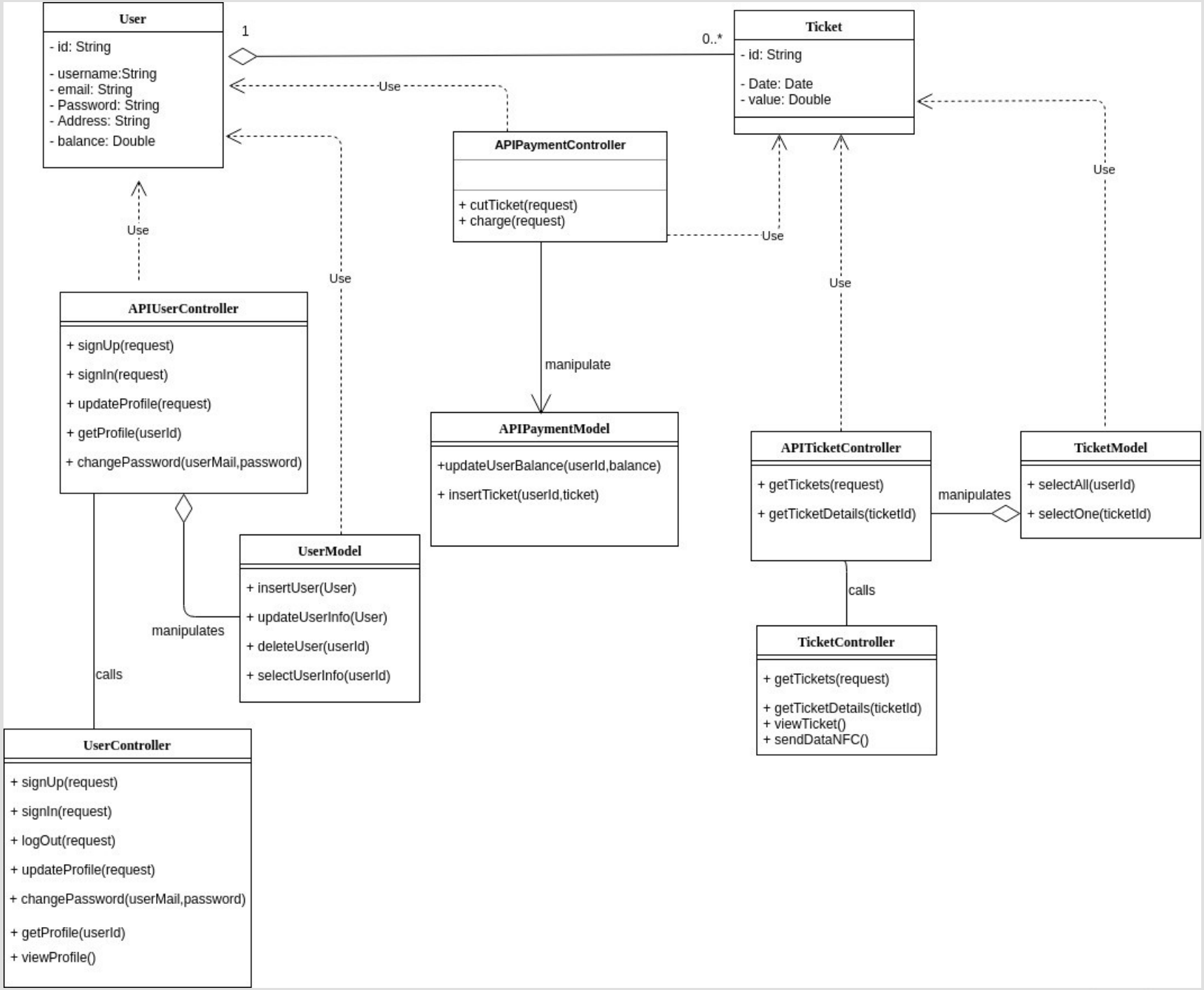
System analysis and Design

Use Case Tables

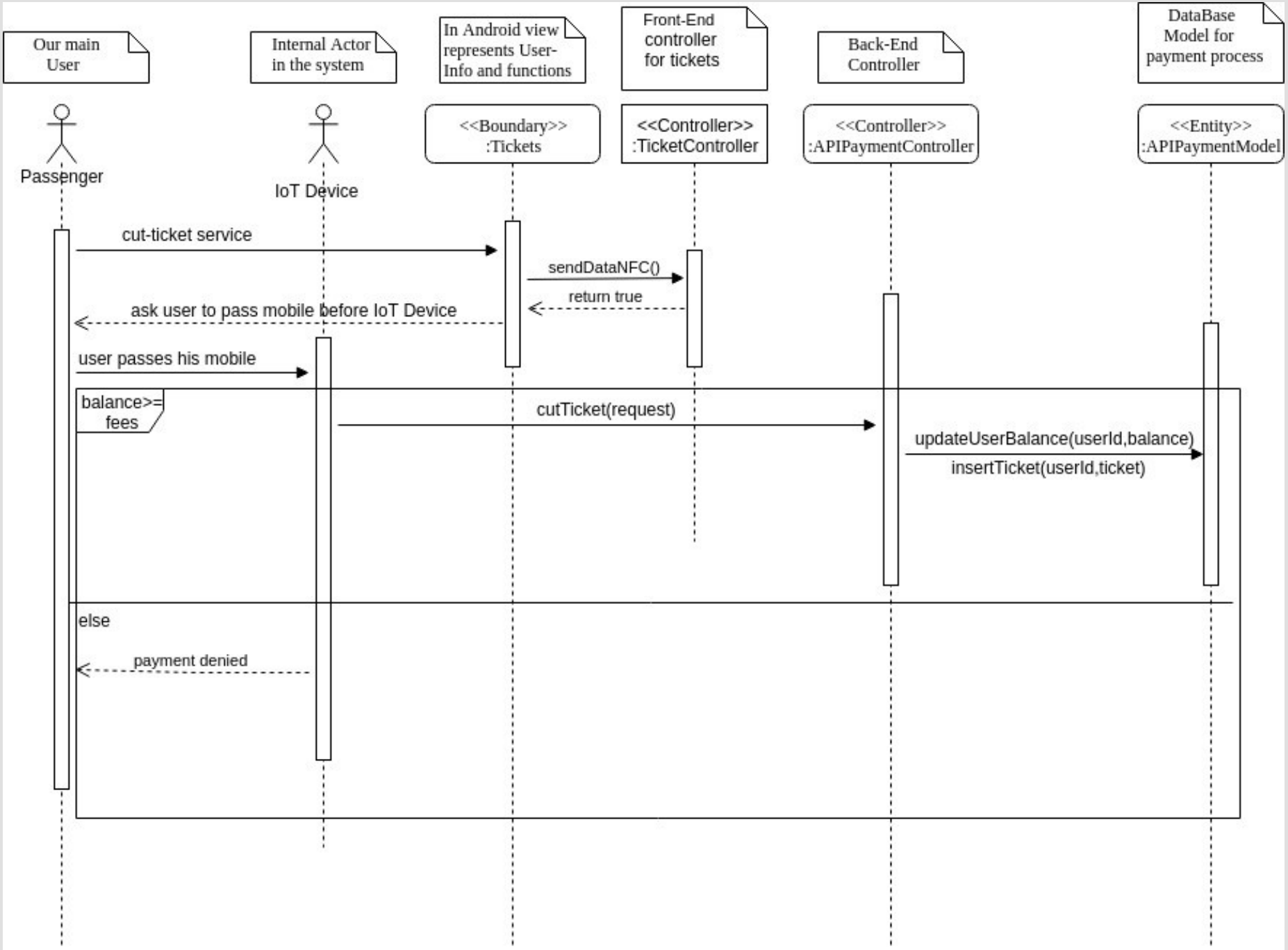
2. viewTicketDetails:

Use Case ID:	003	
Use Case Name:	viewTicketDetails	
Actors:	User “Passenger”	
Pre-conditions:	User already logged in and all tickets are shown up	
Post-conditions:	Details of selected ticket are shown up	
Flow of events:	**User Action**	**System Action**
	1- User clicks on one of the tickets shown up.	
		2- Ticket-Details are shown up
Exceptions:	**User Action**	**System Action**
	-	
		-
Includes:	-	
Notes and Issues:	-	

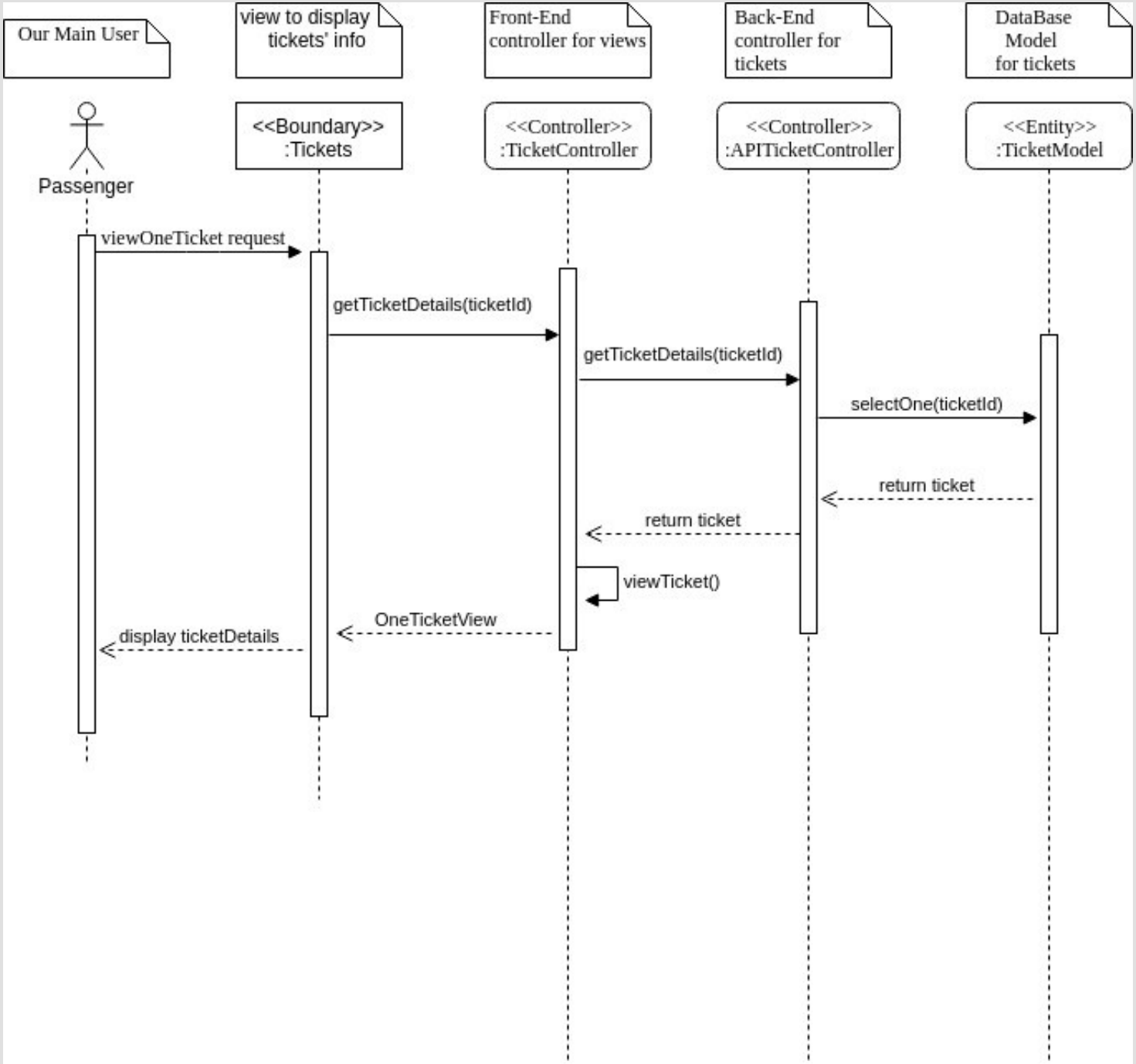
Class Diagram



1. cutTicket:


Our main User
Internal Actor in the system
In Android view represents User-Info and functions
Front-End controller for tickets
Back-End Controller
DataBase Model for payment process
Passenger
IoT Device
<<Boundary>> :Tickets
<<Controller>> :TicketController
<<Controller>> :APIPaymentController
<<Entity>> :APIPaymentModel
cut-ticket service
sendDataNFC()
return true
ask user to pass mobile before IoT Device
user passes his mobile
balance>= fees
cutTicket(request)
updateUserBalance(userId,balance)
insertTicket(userId,ticket)
else
payment denied

2. viewTicketDetails:



Time Plan

Previous 4 Months

	Task Name	Duration	Start	Finish	Au	Sep 3	Sep
1	**Project Initiation**	121 d	09/15/17	02/01/18			
2	**Explore the Problem**	13d	09/15/17	09/28/17			
3	Understand the problem and previous solutions	1w	09/15/17	09/20/17			
4	Creating a survey to collect data	1w	09/23/17	09/28/17			
5	Understand our solution and its benefits	1w	09/23/17	09/28/17			
6	**Understand Methodologies**	18d	09/30/17	10/19/17			
7	IoT techonolgy	3w	09/30/17	10/19/17			
8	Android	2w	09/30/17	10/12/17			
9	NFC research	2w	09/30/17	10/12/17			
10	**NFC prototype**	12d	10/14/17	10/26/17			
11	Sending text via NFC to another mobile	1w	10/14/17	10/19/17			
12	Send phone number via NFC to another mobile and give a response	1w	10/21/17	10/26/17			
13	**Mock-up and Prototypes**	11d	10/28/17	11/08/17			
14	Android mockup	1w	10/28/17	11/02/17			
15	**IoT proof of concepts**	11d	10/28/17	11/08/17			
16	Light one light without input sensors	1w	10/28/17	11/02/17			
17	Light leds based on input sensors	1w	11/02/17	11/08/17			

Time Plan

Previous 4 Months

18	**Work on documentation**	2d	11/18/17	11/19/17				
19	Collecting data from survey	1d	11/18/17	11/18/17				
20	Fill the documentation (Definition, solution, scope)	1d	11/19/17	11/19/17				
21	**Techonology next step**	12d	11/21/17	12/04/17				
22	Learning laravel	2w	11/21/17	12/04/17				
23	Access API via board	2w	11/21/17	12/04/17				
24	**Technology practice**	18d	12/07/17	12/27/17				
25	Laravel proof of concepts(generating tickets, charge simulation,..etc	3w	12/07/17	12/27/17				
26	Android layouts	3w	12/07/17	12/27/17				
27	Go deeper in IoT	3w	12/07/17	12/27/17				
28	**System Analysis and Design**	13d	01/18/18	02/01/18				
29	Determine functional, non-functional requirements	1d	01/18/18	01/18/18				
30	Establish use cases	2w	01/20/18	02/01/18				
31	Establish class diagram	1w	01/20/18	01/25/18				
32	Establish sequence diagram	2w	01/20/18	02/01/18				

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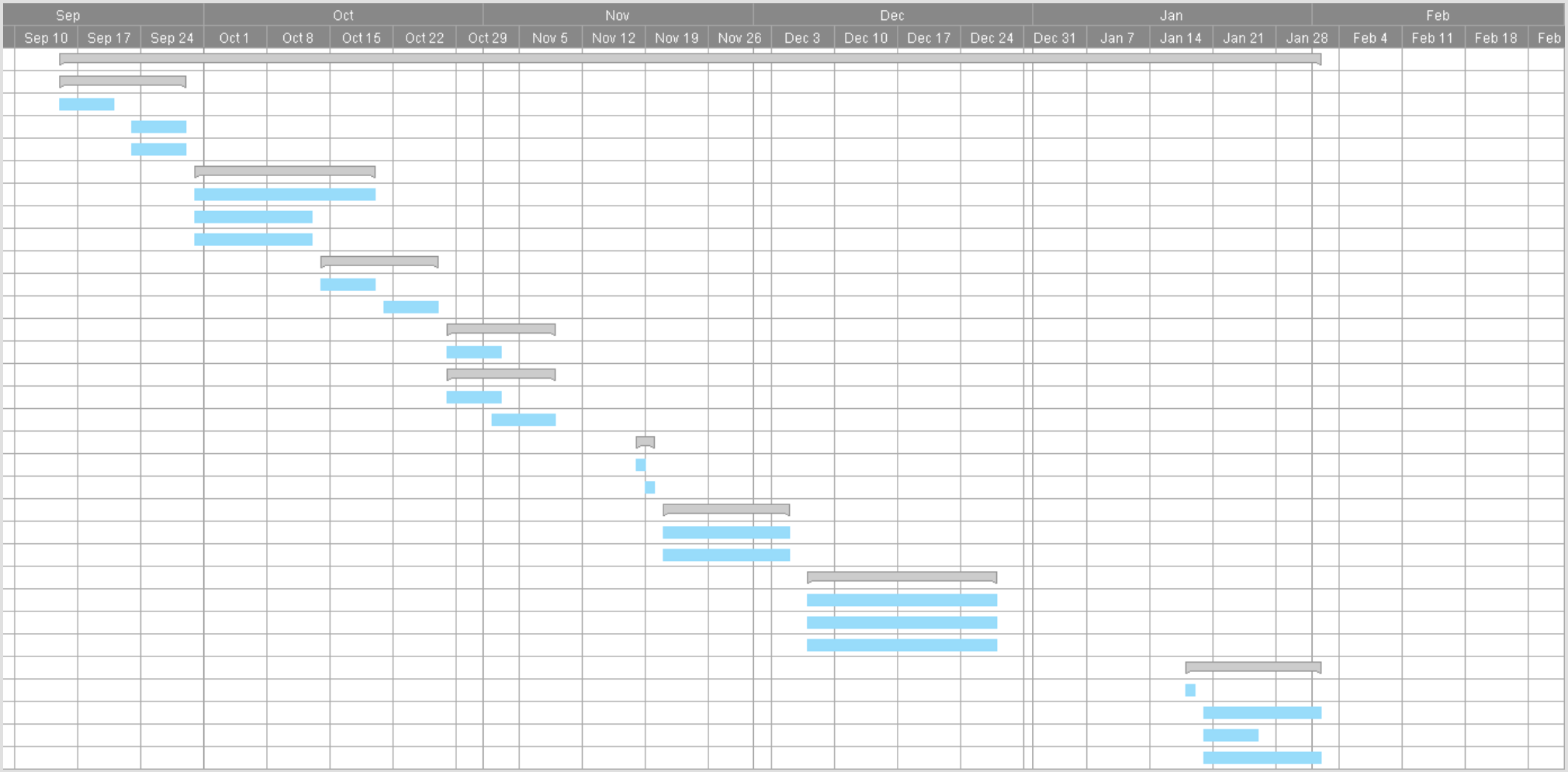
Time Plan

Previous 4 Months



Time Plan

Next 4 Months

	Task Name	Duration	Start	Finish	Jan	Fe
1	**Software**	4m	02/10/18	05/31/18		
2	**Sprint 1 (Sign Up - Sign In - Forget Password)**	1w	02/10/18	02/15/18		
3	**Android**	1w	02/10/18	02/15/18		
4	Android Layout	1d	02/10/18	02/10/18		
5	API Calls Classes	4d	02/11/18	02/14/18		
6	Testing	1d	02/15/18	02/15/18		
7	**Laravel**	1w	02/10/18	02/15/18		
8	Service Parameters and Return(JSON)	1d	02/10/18	02/10/18		
9	Service Implementation	4d	02/11/18	02/14/18		
10	Testing	1d	02/15/18	02/15/18		
11	**Sprint 2(view Profile - Edit Profile)**	1w	02/17/18	02/22/18		
12	**Android**	1w	02/17/18	02/22/18		
16	**Laravel**	1w	02/17/18	02/22/18		
20	**Sprint 3(view Tickets - view Ticket Details)**	1w	02/24/18	03/01/18		
21	**Android**	1w	02/24/18	03/01/18		
25	**Laravel**	1w	02/24/18	03/01/18		

Time Plan

Next 4 Months

29	**Sprint 4 (Cut Ticket)**	2w	03/03/18	03/15/18		
30	**Android**	2w	03/04/18	03/15/18		
33	**Laravel**	2w	03/03/18	03/15/18		
37	**Sprint 5 (Charge)**	2w	03/17/18	03/29/18		
38	**Android**	2w	03/18/18	03/29/18		
41	**Laravel**	2w	03/17/18	03/29/18		
45	**Sprint 6 (Extra Features)**	2m	03/31/18	05/31/18		
60	**Hardware**	29d	02/10/18	03/15/18		
61	Connect NFC component to Galileo board	1w	02/10/18	02/15/18		
62	Send a Piece of Data from Smartphone to Galileo Board Through	2w	02/17/18	03/01/18		
63	Send data across online API actual Testing	2w	03/03/18	03/15/18		

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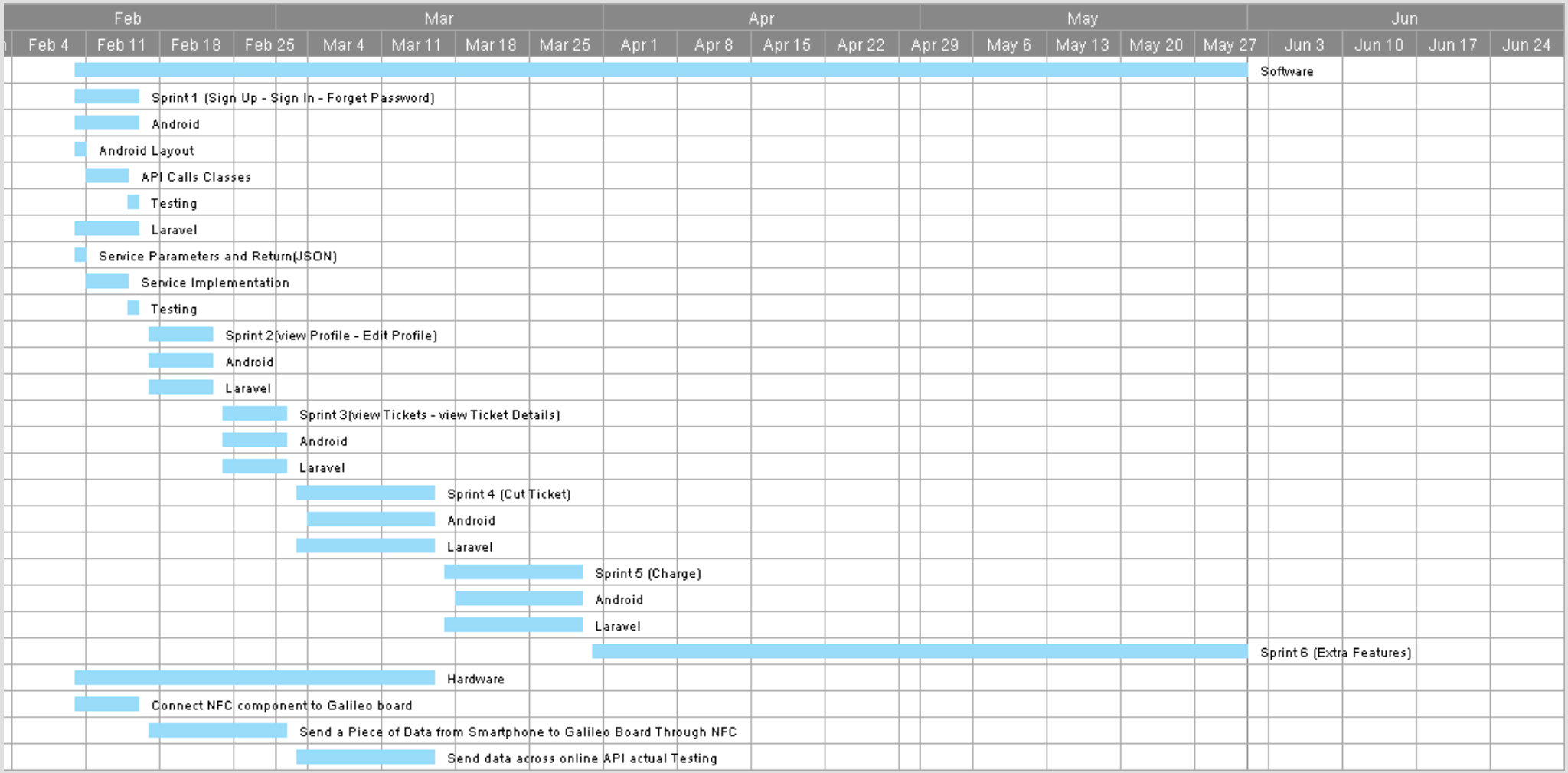
Time Plan

Next 4 Months



Conclusion

- The point problems solved by such projects must not seem a life or death problems but not improving the system can lead to that in the future.

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