



E-SCOOTER PROJECT

Current Name: EGO-SCOOTER

GROUP 4

TEAM MEMBERS:

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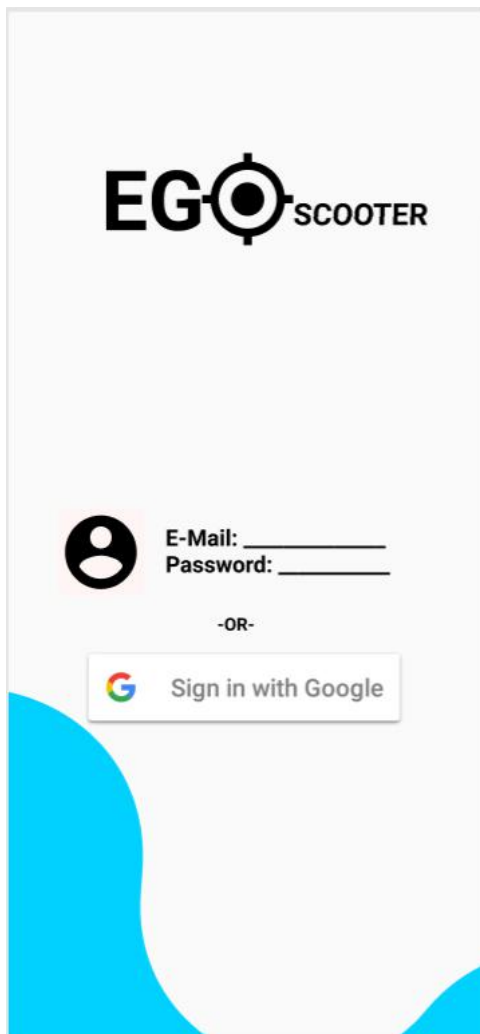
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Business Description:

Our development team seeks to create an easy solution for inner-city transportation that is both quick, easy and safe. Our current project name will be “EGO-SCOOTER”. Inner city transportation is rarely thought about, despite the rapid change and technological progress in every other area of life. We want to keep up this trend and finally bring an end to primitive walking, with this brand-new technological advancement. The scooters will be distributed throughout the city and soon change it's landscape. The rechargeable and environmentally friendly lithium-ion batteries in the scooters can cover a range of 25km while operating at a maximum speed of 20km/h. We hope to revolutionize personal transportation and help reduce car traffic, reduce traffic accidents, reduce time spent traversing the mortal planes- and most importantly bring a new fresh and fun way to explore YOUR city

UI PROTOTYPE:

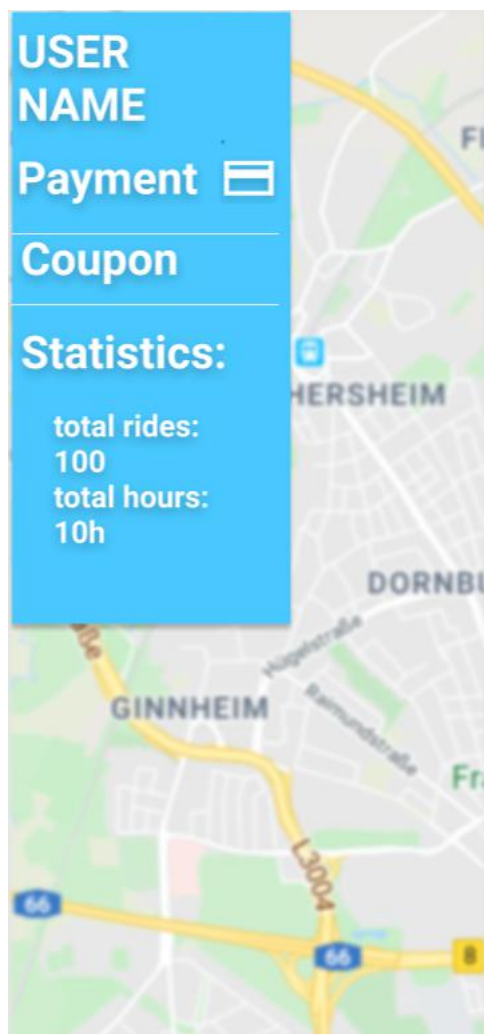
Start Screen



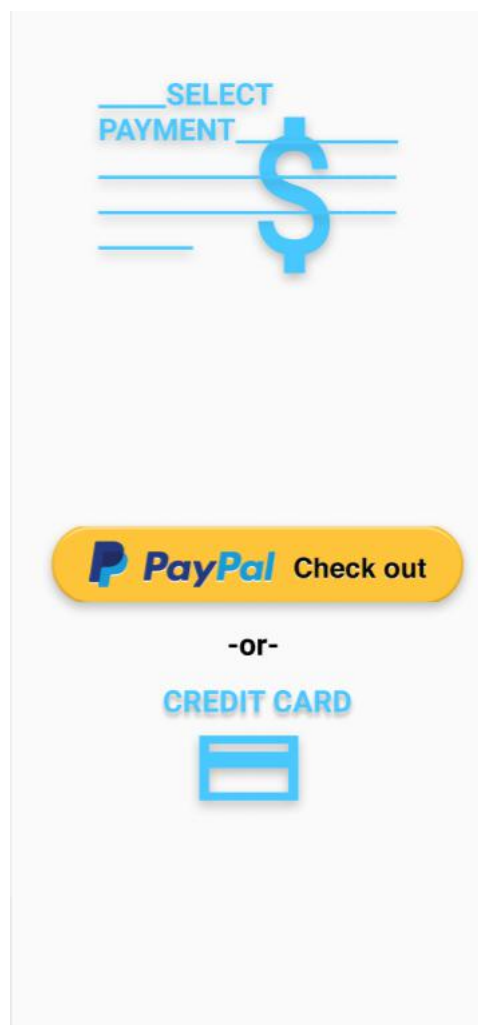
Main Screen



Drop Down menu opened



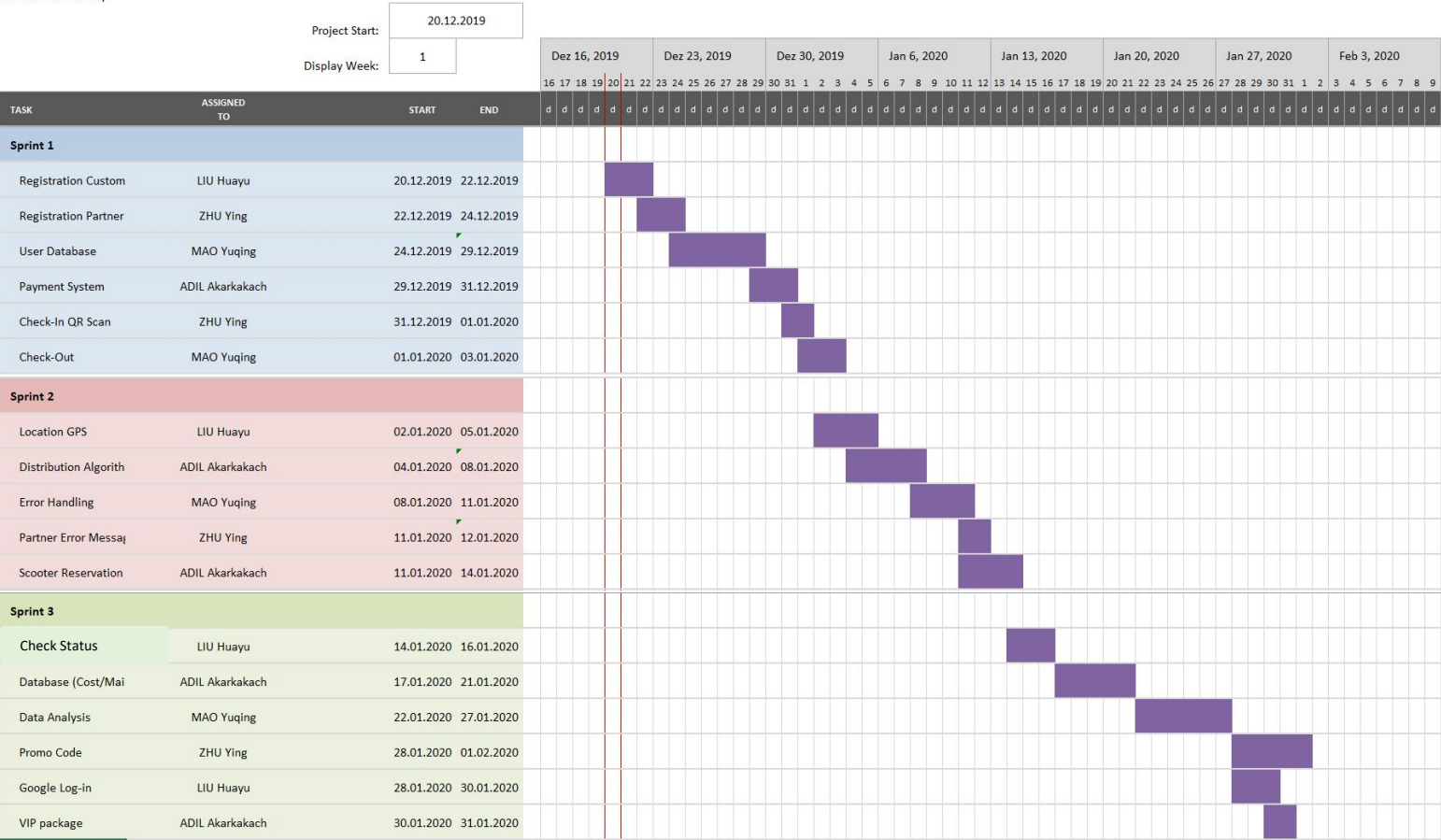
Payment Option Screen



Planning:

EGO-Scooter

B-Mobile Group



	ID	Requirements	Estimated time	Principal
1. Sprint	1	New customer register	2d	LIU Huayu
	2	Partner registration	2d	ZHU ying
	3	User database	5d	MAO Yuqing
	4	Paypal/credit card	2d	ADIL
	5	Check-in(scan QR code)	3d	LIU Huayu
	6	Check-out(in APP)	2d	ZHU ying
2. Sprint	7	Location check	3d	MAO Yuqing
	8	Distribution algorithm	4d	ADIL
	9	Report error	1d	LIU Huayu
	10	Partner report alert	2d	ZHU ying
	11	Reservation of e-scooter	3d	ADIL
3. Sprint	12	Check Status	2d	LIU Huayu
	13	Company database for cost and maintenance	4d	ZHU ying
	14	Data analysis (cost, profit and service optimasition)	4h	MAO Yuqing
	15	Promo Codes	2d	ADIL
	16	Alternative google log_in	1d	LIU Huayu
	17	Book VIP package	2h	ZHU ying

ID	User Stories
1	As a new customer I want to register a new account in this APP.
2	As a partner,I want to register a new account in this APP.
3	As a partner,I want to operate all the informations of users.
4	As a customer,I have two kinds of payment by Paypal or by credit card.
5	As a customer,I check in by scanning the QR code, and then i can use the e-scooter.
6	As a customer,When I don't use the e-scooter, I need to lock the e-scooter and check out on the APP.
7	As a customer,I can find the closest e-scooter available to me on the map provided by the APP.
8	As a partner,I can use the distribution algorithm to find out if there is a need to increase or decrease the number of e-scooter placed in the area the next day.
9	As a customer,I can give feedback to the partner when I encounter a problem with the e-scooter.
10	As a partner,when I receive a report that the scooter is broken, I can recycle the broken scooter for repair as soon as possible and then put it back into use.
11	As a customer,I can book the e-scooter in advance, the location of the e-scooter will disappear on the map after booking, only I can see where I booked the e-scooter.
12	As a customer, I can see the status (charge and availability) of e-scooters in my vicinity
13	As an administrator,I can keep track of relevant data
14	As an executibe, I can keep track of costs and profits
15	As a customer, I can make use of free rides
16	As a customer,I can log in with a Google account.
17	As a customer,I can book VIP package.

ID	Rationale/Buisness Value
1	so that I can use this APP more conveniently.
2	so that I can use this APP more conveniently.
3	so that I can easily perform related user data maintenance.
4	various payment methods provide convenience to customer.
5	so that I can use e-scooter.
6	so that I can end my use.
7	so that I can find the closest e-scooter to use.
8	so that I can Improve the efficiency of using e-scooters.
9	so that I can improve the quality of service
10	so thatI can ensure customers have enough unbroken e-scooters to use.
11	so that I can make sure that when I arrive at the location shown on the map, there will be a e-scooter available.
12	so that I can use the services conveniently
13	so that relevant data is never lost/stored correctly
14	so that I can adjust prices and services
15	to get a footing in the market advertisment is important
16	Provides convenience to me without having to register for a new account.
17	so that I can get more discounts on the price of renting a e-scooter than the ordinary user.

Sprint Reviews:

Sprint 1 (20.12.19-03.01.20):

Registration:

Planning the registration processes proved to be more difficult than estimated. Some discussion arose about how to distinguish a regular user from a partner. We decided on a separate registration process for partners. The main idea being that partners can see exclusive information (error reports for example) about e-scooters and also need no extra payment for rides, so that they can do their work recharging and maintaining the e-scooters more easily.

Databases:

We unanimously decided to limit its content to the basic registration data, user ID and location. The main concern was for this sprint to ensure a working database architecture that can be maintained and adjusted for later developments easily. This basic database should be more than sufficient for the beta release of the application.

Payment and use:

We discussed payment option and later opted to also include credit card payment. In some countries paypal is not common (China for example). E-scooters should be accessible to all tourists and locals, we decided.

Scanning a QR code: Each e-scooter has its unique ID that has to be attributed to each unique e-scooter. The scooter, we thought, could be identified by a QR sticker. The advantage is that the scooters ID can always be scanned no matter if the e-scooter is charged or not. So we decided as a team to use a QR code system.

Checking out should be equally simple by just pressing an in-app button, that locks the scooter up. It is very important to keep this step as simple as possible (for the user).

Sprint retrospect (by Liu Huayu):

We were very pleased with our progress. The estimated time was chosen generously and despite some delays we finished everything in the planned time frame. In the sprint we mainly used brainstorming as our means of gathering ideas. There was a language barrier that could be bridged by cooperation and clever use of a translation service. Overall communication could be further improved by applying more clear and concise leadership by the scrum master. Some delays could have been prevented if the tasks would have been made more clearly. The creation of the diagrams also messed with our estimate as some functionalities had to be first correctly understood to be applied. In the upcoming sprints creation of the diagrams would be far quicker, probably even exceeding our estimates. Brainstorming proved to be effective and will be applied to the next sprints as well.

Sprint 2 (02.01.20-14.01.20):

GPS:

For the map we looked for a free GPS service and finally decided to use www.gps-server.net. It was very important to us to have reliable GPS as this was the backbone of the entire project. www.gps-server.net provides us with all functionalities that we looked for and also the most important feature: it could be modified and fed with our data.

Distribution Algorithm:

It is obviously of this algorithm and cross communication with the GPS provider was difficult to realize. Finding a metric on which this algorithm should choose the final locations led to many heated discussions in the development team.

Report System:

We decided on a standard report ticket system. Inspiration for this could be found everywhere and we decided not to reinvent the wheel and just stick to this very basic idea.

Reports are sent out to all partners by a notification dispatcher, again a very basic idea that we quickly came to consensus about.

E-Scooter reservation:

We were not sure in the beginning whether this functionality was needed. But we opted for it as we imagined a scenario in which a user walks towards an e-scooter just to have it taken away in the last second. The map also has to update accordingly, greying out reserved e-scooters. Problems that could arise: users could reserve multiple e-scooters to damage the service. Despite that we decided in favor of this function as we deemed it a very low risk. Each user could only reserve 1 e-scooter at a time and also only for a fixed time frame. The first version of the application should be released with this function. Patches could be implemented if unforeseen events occur.

Sprint retrospective (by Adil Akarkach):

We started our second sprint with a lot more efficiency. Creating diagrams became routine work. Communication was also improved by using a famous chat service to send around files that could be edited by multiple people at once. These files made it easier to compile the progress and work-flow of other team members. A substantial improvement to the first sprint. Brainstorming now often consisted of splitting the work up between team members and having it reviewed by the rest of the team (more checks and balances). Those files could be edited by every other team member. They were usually loose excel files that would not find their way into the final documentation- they could much rather be seen as the byproduct of a

brainstorming session. This is to be implemented in the next sprint session as well. This sprint was not without its difficulties. Sometimes misunderstandings happened (naming conventions were not properly enforced for example). This time a lot more clearly direction and planning went into the working progress, yet for the next sprint longer meetings and more peer reviewed work has to be implemented, to ensure integrity.

Sprint 3(14.01.20-31.01.20):

Map design:

The map has to keep the user updated. We decided to color code the availability of e-scooters on the map (green available/grey in use).

Data Analysis:

We deemed setting up a database as a main collection of all relevant business information necessary. What constitutes relevant information had to be discussed which lead to delays. The database should finally collect payment data, maintenance costs and use frequency.

Data analysis is always one of the most difficult parts. We thought about outsourcing this to a contractor. The application would be operational for testing with or without data analysis. But for a company to return the highest possible profits this is still very important.

Coupons and bonuses:

To get a footing in the market we decided to occasionally reward coupon codes for free rides. This kind of partnership was swiftly agreed upon because- as our research showed, this was a significant incentive for customers to use one app over another without this option.

VIP accounts: A new model that would revolutionize inner city transportation. With a VIP-account (monthly fee) the user could access all e-scooters without worry, as long as subscription lasts. This was controversial. In the first version of this application this should definitely be implemented. This is a low priority item and more of a testing ground idea. Might be rolled out in the final version

Sprint retrospective (by Mao Yuqing):

The time constraint was pressing. We did not take editing of the documents and error correction into account. Over-all creation of the relevant diagrams and use cases proved to be routine work at this point- at least when it came to the technical skills with the software. The actual contents especially when it came to small inconsistencies proved time consuming to fix. We used word to compile our results into one final document. A mistake as word is notoriously inconsistent (incredibly unstable formatting). Small changes that accumulated over the course of the last sprints took hours to fix. A remedy for this would be to use a) a better text editor and b) to plan out the format of the document before adding in the details.

Allocation:

	ID	Requirements	Functional/Nonfunctional	Use Case	Use Cse Diagram
1. Sprint	1	New customer register	F	MAO Yuqing	MAO Yuqing
	2	Partner registration	F	ZHU ying	ZHU ying
	3	User database	N		
	4	Paypal/credit card	F	ADIL	ADIL
	5	Check-in(scan QR code)	F	LIU Huayu	LIU Huayu
	6	Check-out(in APP)	F	ZHU ying	ZHU ying
2. Sprint	7	Location check	F	MAO Yuqing	MAO Yuqing
	8	Distribution algorithm	N		ADIL
	9	Report error	F	LIU Huayu	LIU Huayu
	10	Partner report alert	F	ZHU ying	ZHU ying
	11	Reservation of e-scooter	F	ADIL	ADIL
3. Sprint	12	Check Status	F	MAO Yuqing	MAO Yuqing
	13	Company datebase for cost and maintenance	N		
	14	Data analysis (cost, profit and service optimasition)	N		
	15	Promo Codes	F	ADIL	ADIL
	16	Alternative google log_in	F	LIU Huayu	LIU Huayu
	17	Book VIP package	F	ZHU ying	ZHU ying

	ID	Requirements	User Story	Sequence Diagram	Activity Diagram
1. Sprint	1	New customer register	MAO Yuqing	MAO Yuqing	MAO Yuqing
	2	Partner registration	ZHU ying	ZHU ying	ZHU ying
	3	User database	MAO Yuqing		
	4	Paypal/credit card	ADIL	ADIL	ADIL
	5	Check-in(scan QR code)	LIU Huayu	LIU Huayu	LIU Huayu
	6	Check-out(in APP)	ZHU ying	ZHU ying	ZHU ying
2. Sprint	7	Location check	MAO Yuqing	Mao Yuqing	MAO Yuqing
	8	Distribution algorithm	ADIL		
	9	Report error	LIU Huayu	LIU Huayu	LIU Huayu
	10	Partner report alert	ZHU ying	ZHU ying	ZHU ying
	11	Reservation of e-scooter	ADIL	ADIL	ADIL
3. Sprint	12	Check Status	MAO Yuqing	Mao Yuqing	MAO Yuqing
	13	Company datebase for cost and maintenance	ZHU ying		
	14	Data analysis (cost, profit and service optimasition)	MAO Yuqing		
	15	Promo Codes	ADIL	ADIL	ADIL
	16	Alternative google log_in	LIU Huayu	LIU Huayu	LIU Huayu
	17	Book VIP package	ZHU ying	ZHU ying	ZHU ying

USE CASES:

ID	1
Use Case Name	New Customer Registration
Primary Actor	Customer
Further Actors	Admin
Stakeholder Interest	Customer: needs to create an account to get past the log-in screen and use the services Admin: needs a database of customers, to provide services for
Trigger	Filling in the needed information and pressing "register".
Pre-Conditions	communication with the server is possible and the checks for errors in registration are set in place.
Post-Conditions	Access to the main functionalities of the app are granted
Basic Course (Success Scenario)	The customer creates a valid account.
Alternative Course	registration process is repeated: Case1: The customer entered a weak password Case2: the customer entered an already used e-mail address.

ID	2
Use Case Name	Partner Registration
Primary Actor	Partner
Further Actors	Admin
Stakeholder Interest	Partners: need special access with information granted only to them to do maintenance and distribution of the scooters Admin: Preventing fraudulent registrations
Trigger	Partners have used the partner registration tab in the app
Pre-Conditions	The entire project needs to be operational.
Post-Conditions	none
Basic Course (Success Scenario)	Partners have an account that distinguishes them from ordinary users.
Alternative Course	registration process is repeated: Case1: The partner entered a weak password Case2: the partner entered an already used e-mail address.

ID	4
Use Case Name	Payment Method/PayPal
Primary Actor	Customer
Further Actors	PayPal
Stakeholder Interest	PayPal: by being used as the primary payment method in many applications, PayPal gains influence and grows. Customer: is provided with an easy and quick payment method.
Trigger	User selected an e-scooter
Pre-Conditions	The e-scooter GPS map was accessed by a logged-in user, who furthermore decided on a particular scooter by scanning its QR code.
Post-Conditions	The e-scooter is now unlocked and operational. It has to also track the distance and be lockable again.
Basic Course (Success Scenario)	The user saves the PayPal information in his/her customer account and can pay with just one convenient click
Alternative Course	The user does not have PayPal. No other payment method is offered except for the occasional vouchers.

ID	4
Use Case Name	Credit Card Payment
Primary Actor	Customer
Further Actors	none
Stakeholder Interest	Customer can pay with credit card
Trigger	Selecting the payment method
Pre-Conditions	Server communication
Post-Conditions	Credit card account properly billed
Basic Course (Success Scenario)	In the best case the payment will be just as quick as PayPal and the customer can unlock the e-scooter
Alternative Course	Case1: Credit Card balance is exceeded: scooter stays locked and warning message is sent Case2: Credit Card information is false: Scooter stays locked and user account gets suspended

ID	5
Use Case Name	User Check-In/QR Scan
Primary Actor	Customer Partner
Further Actors	none
Stakeholder Interest	Customer: can access a unique e-scooter and pay for its use Partner: can scan in the QR codes for free rides
Trigger	User is asked to scan in QR code (instructions on a plate on the e-scooter) and clicks on the "scan" button
Pre-Conditions	Customer gave permission to the app to use the camera.
Post-Conditions	Payment with PayPal is presented as an option and the e-scooter is correctly identified for use.
Basic Course (Success Scenario)	User can intuitively select an e-scooter after being guided to it by the GPS maps routing option.
Alternative Course	Unsuccessfully scanning the code. Case 1: a malicious agent vandalized the QR plate. In this case a partner reports this to the admin. Case 2: it is too dark. User is prompted to use the flashlight after 3 unsuccessful attempts

ID	6
Use Case Name	Customer Check-out
Primary Actor	Customer
Further Actors	Partners
Stakeholder Interest	Customer: after a ride the customer can place the e-scooter anywhere in the city for convenience Partners & Customers: profit from keeping track of the new e-scooters locations via GPS map.
Trigger	The customer finishes his/her ride and pushes the “stop-ride” button on the scooter
Pre-Conditions	The user must have had unlocked an e-scooter
Post-Conditions	The e-scooter is now on a new location and the GPS map is updated. The e-scooter is also set to “locked” and can now be seen on the GPS map.
Basic Course (Success Scenario)	The customer has a good ride and does not need to worry about returning the e-scooter to a specific location. The GPS map is updated accordingly and partners restore a better distribution of the e-scooters after every recharging.
Alternative Course	Case1: the customer forgets to lock the e-scooter. In the worst case another agent may continue to ride it and the customer gets billed unfairly. A safety measure is that every idle e-scooter is set to locked automatically after 5 minutes of no use.

ID	7
Use Case Name	Location check
Primary Actor	Customer
Further Actors	none
Stakeholder Interest	Customers need to see the closest locked and loaded e-scooter in their proximity
Trigger	The user activates GPS on their device and taps on the e-scooter icon
Pre-Conditions	GPS from the provider "gps-server.net" is properly configured and the customer is logged in
Post-Conditions	The user sees a shortest route to the next available scooter
Basic Course (Success Scenario)	The user is directed to the next e-scooter.
Alternative Course	The e-scooter is snatched by another customer. The map gets updated and the user can select the next closest - scooter.

ID	9
Use Case Name	Report error
Primary Actor	Partner
Further Actors	User, System
Stakeholder Interest	<p>Partner: can report errors directly to the admin</p> <p>User: no duty to report errors but has in theory the same possibility to do so</p> <p>System: receives all the error reports and saves them</p>
Trigger	User or partner leave a report comment
Pre-Conditions	Scanned in the QR code of an e-scooter and found it non-functional
Post-Conditions	E-scooter will be retrieved and checked by partner and either replaced or fixed
Basic Course (Success Scenario)	Error is reported and saved to the system. The broken e-scooters will then be exchanged for new ones
Alternative Course	none

ID	10
Use Case Name	Partner report alert
Primary Actor	Partner
Further Actors	System
Stakeholder Interest	Partner: receives information where a failed e-scooter is located
Trigger	System distributes reported e-scooter information to all partners automatically
Pre-Conditions	Systems database must contain the information
Post-Conditions	Delete item from database after the problem is fixed
Basic Course (Success Scenario)	The message of a reported e-scooter reaches all partners to ensure functionality for all customers
Alternative Course	none

ID	11
Use Case Name	Reservation of e-scooter
Primary Actor	Customer
Further Actors	none
Stakeholder Interest	Customer: can reserve an e-scooter and make it impossible for another person to unlock it. The e-scooter can not be snatched away
Trigger	Customer taps on e-scooter icon displayed on the map
Pre-Conditions	Map is showing proper locations of active e-scooters
Post-Conditions	E-scooter the customer reserved is greyed out for all other users
Basic Course (Success Scenario)	The customer can select any e-scooter in his/her proximity and reserve it for themselves
Alternative Course	none

Use Case ID	12
Use Case Name	Check Status
Primary Actor	Customers
Further Actors	Partners
Stakeholder Interest	Customers, Partners: Get all information to optimally use the application
Trigger	User exits log-in screen and enters main screen
Pre-Conditions	<div>GPS is working correctly</div> <hr/> <div>implemented e-scooter database: IDs, current location, status, charge</div> <hr/> <div>e-scooter communicates with servers</div> <hr/> <div>User Location data is correctly transmitted</div>
Post-Conditions	Visual display of charge availability of scooters in the proximity
Basic Course (Success Scenario)	The users sees the status of e-scooters in a set radius around their location
Alternative Course	None

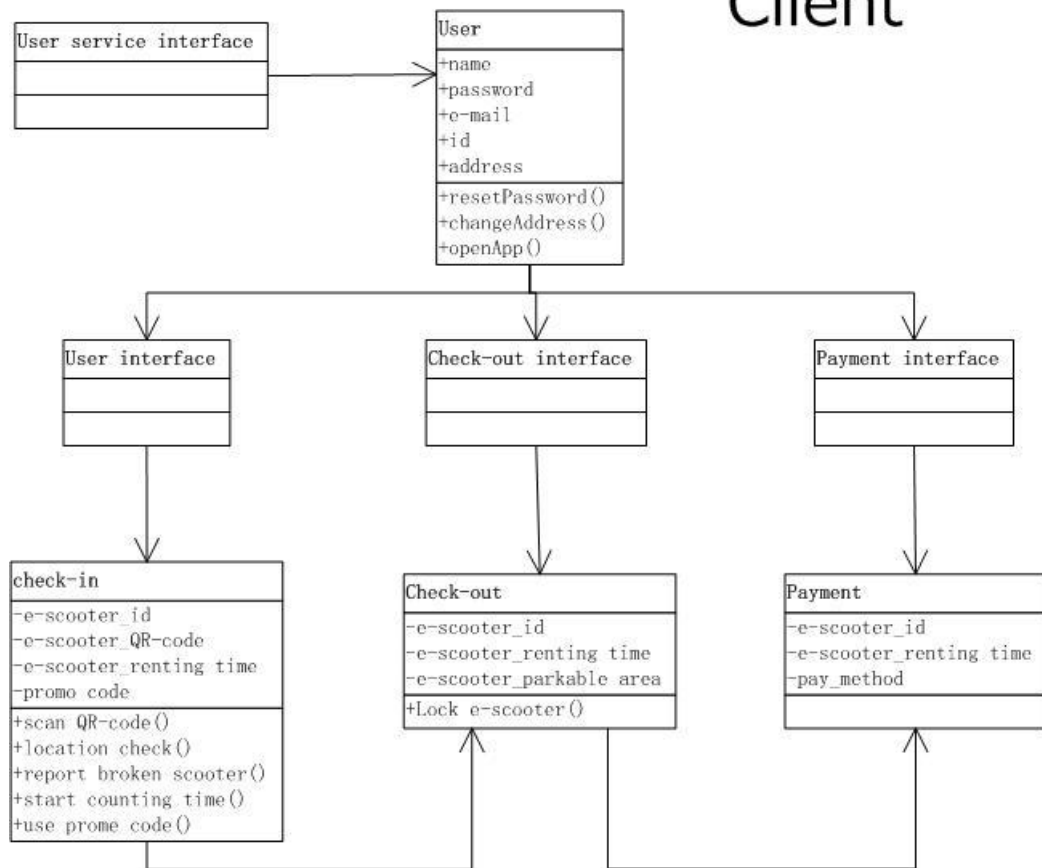
ID	15
Use Case Name	Promo Code
Primary Actor	Customer
Further Actors	Company
Stakeholder Interest	Company: for promotion purposes, coupons are granted for special events. Customer: enjoys a free ride
Trigger	Customer types promo code into the promo bar
Pre-Conditions	Promo Codes must have been validated by the company's marketing department and created by the Company's IT department
Post-Conditions	Promo code is now disabled in customers account (a code can only be used once)
Basic Course (Success Scenario)	Promo is typed in and the customer is rewarded a free ride. The system can not be abused
Alternative Course	Case1: Promo invalid, no free ride granted Case2: Promo is expired or has already been used, no free ride granted Case3: fraud, user account is suspended

ID	16
Use Case Name	Alternstive google log_in
Primary Actor	Customer
Further Actors	none
Stakeholder Interest	Customer: another way to log in app
Trigger	Customer uses app as a new user, he could have another way to register and log in directly
Pre-Conditions	Customer is given permssion by Party 3 platform(eg:google)
Post-Conditions	Customer can use app successfully
Basic Course (Succes Scenario)	User can log in app, and also there is not a unique way to login.
Alternative Course	Unsuccessfully login. Case 1:The network is bad ,so that it couldn't log in. Case 2:Response time too long ,restart log in.

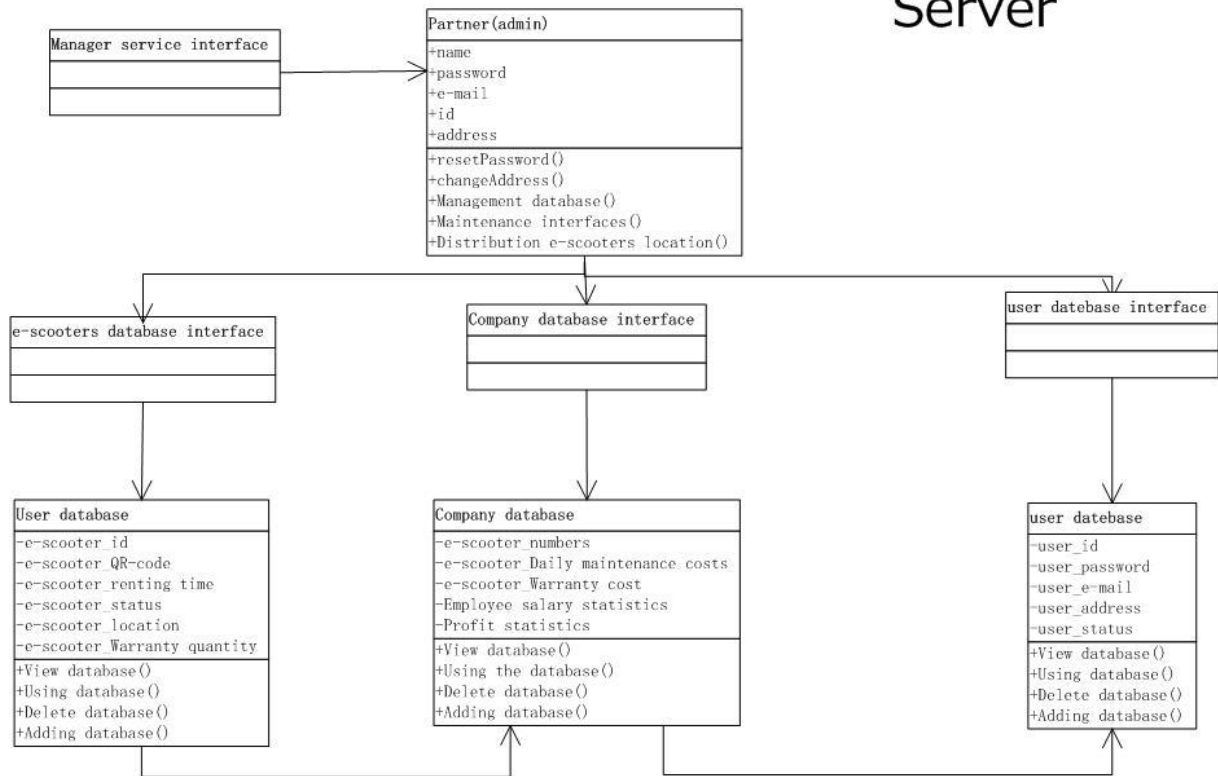
ID	17
Use Case Name	Book VIP package
Primary Actor	Customer
Further Actors	Company
Stakeholder Interest	Customer: Have discount riding the E-scooter Company Attract more customer.
Trigger	Customer orders the VIP package in app.
Pre-Conditions	Customer log in successfully, and have effective payment.
Post-Conditions	Customer becomes VIP and could use VIP package
Basic Course (Success Scenario)	Customer gets a VIP package and can ride E-scooter cheaper.
Alternative Course	Failed use VIP package. There is a deadline, need a voucher.

DIAGRAMS:

Class Diagram:

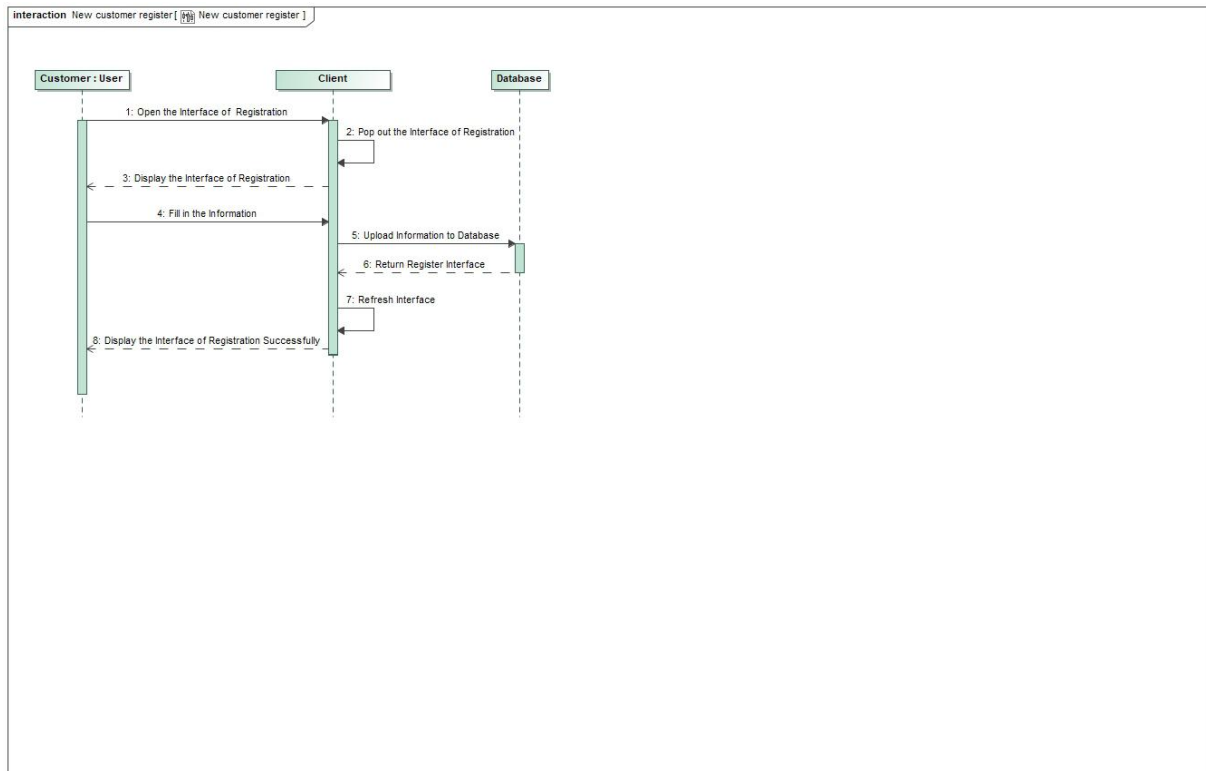


Server

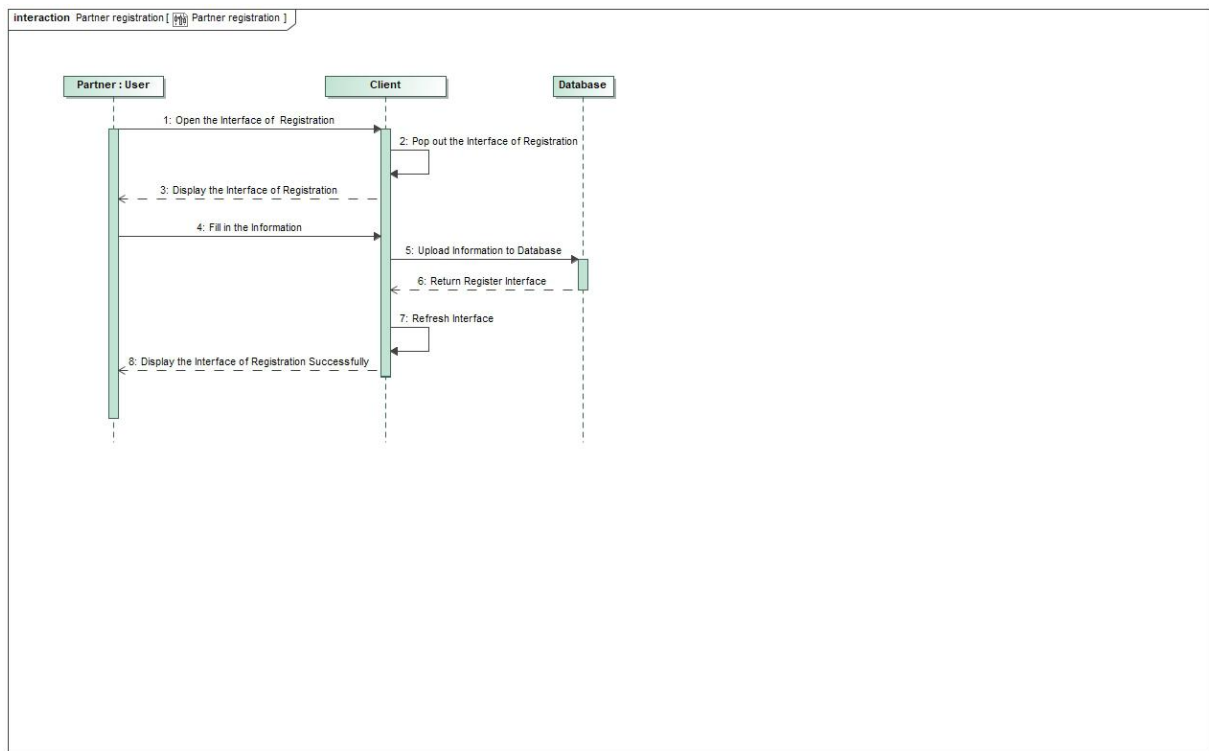


Sequence Diagrams:

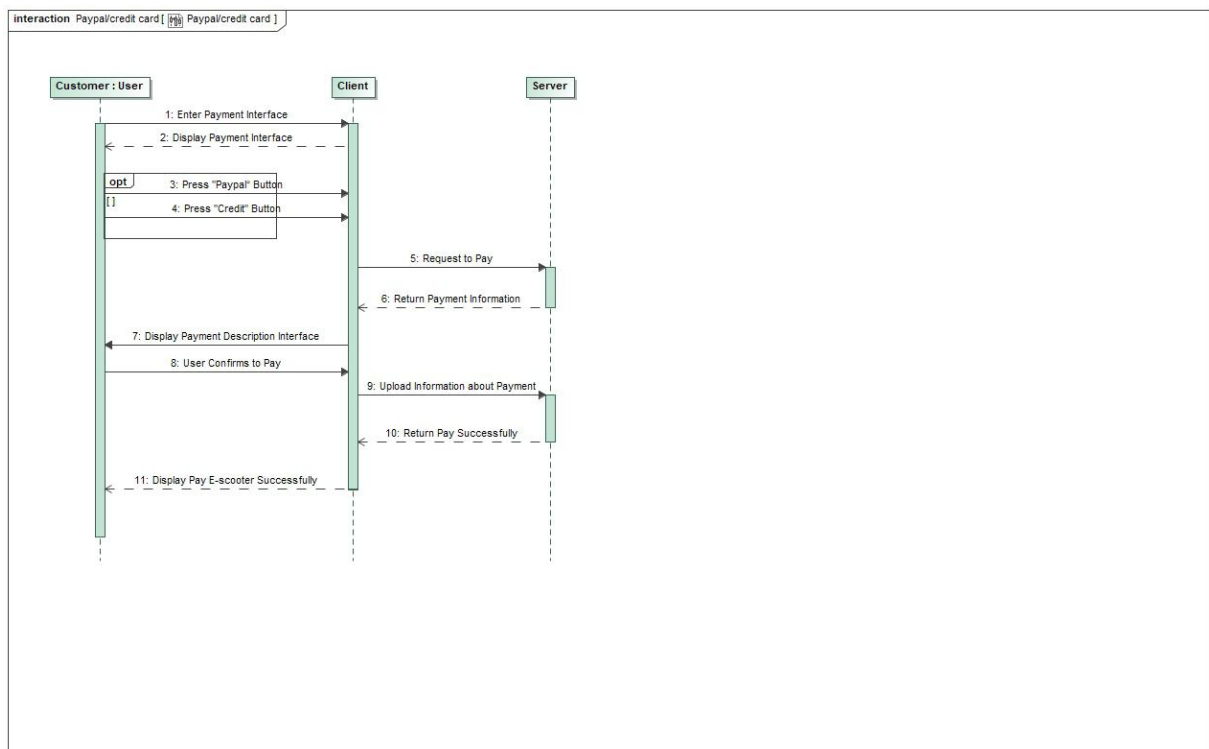
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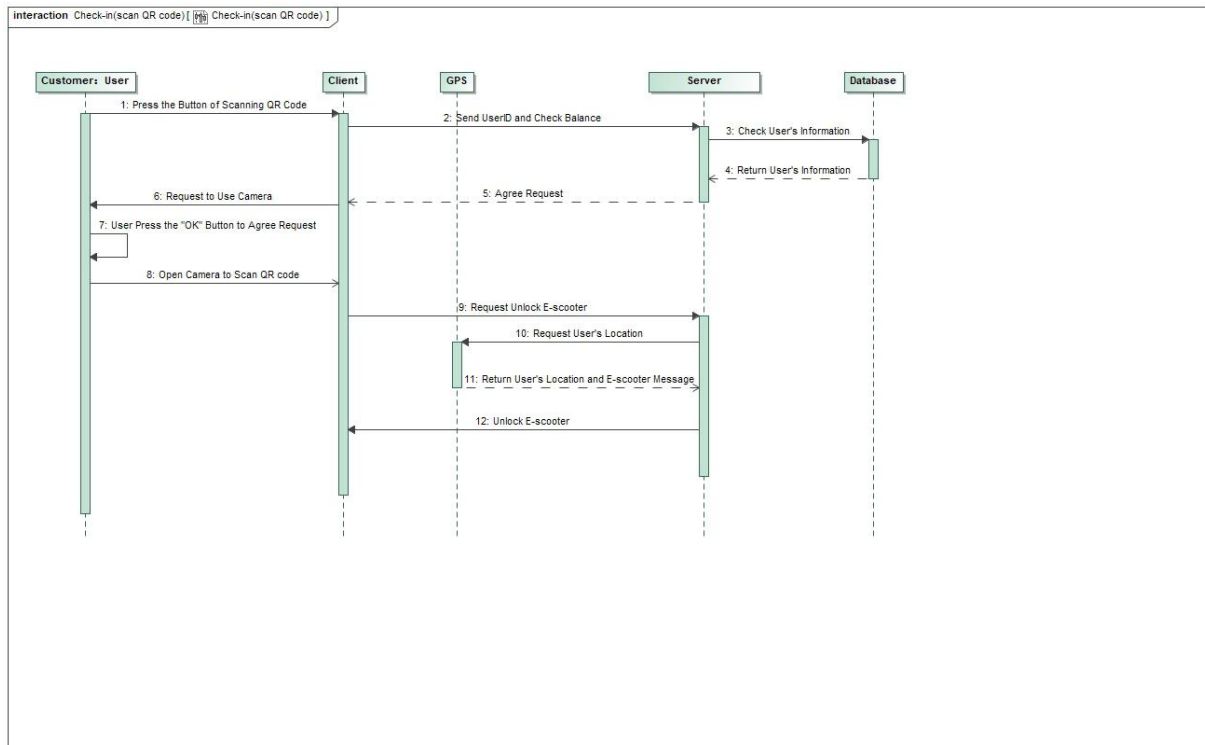
2 Partner registration:



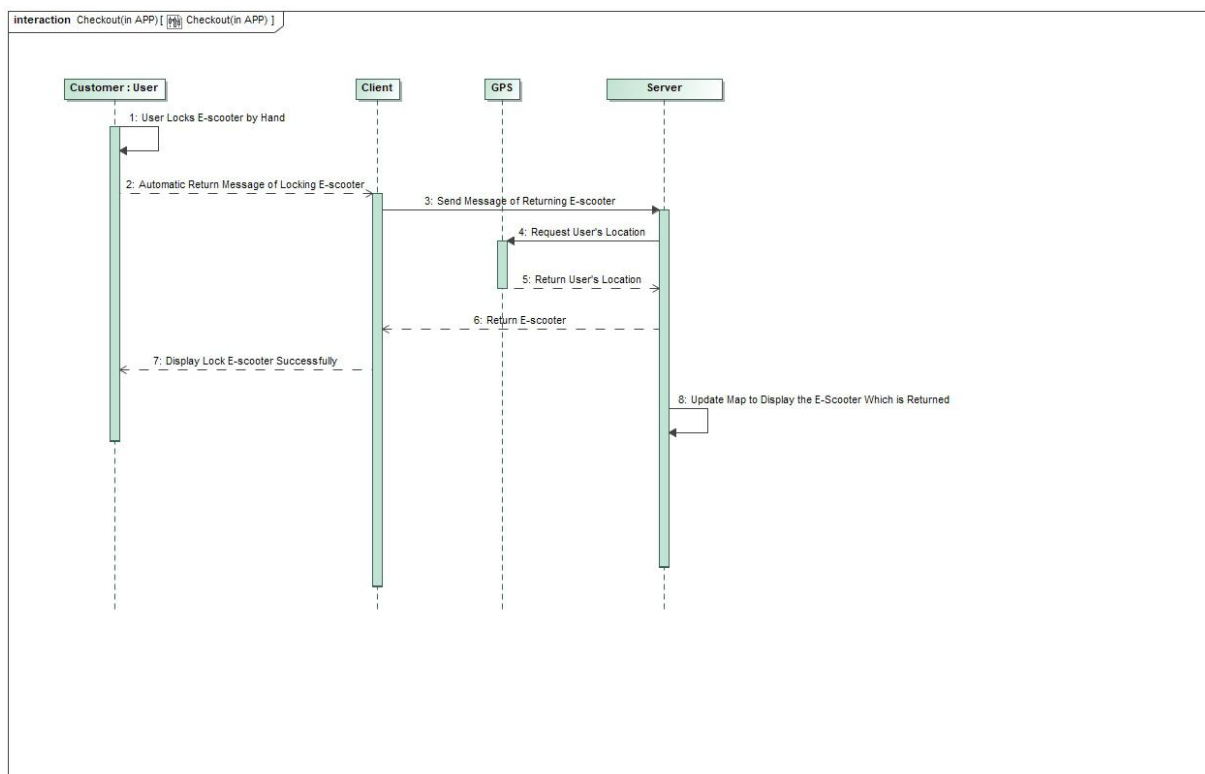
4 PayPal/credit card:



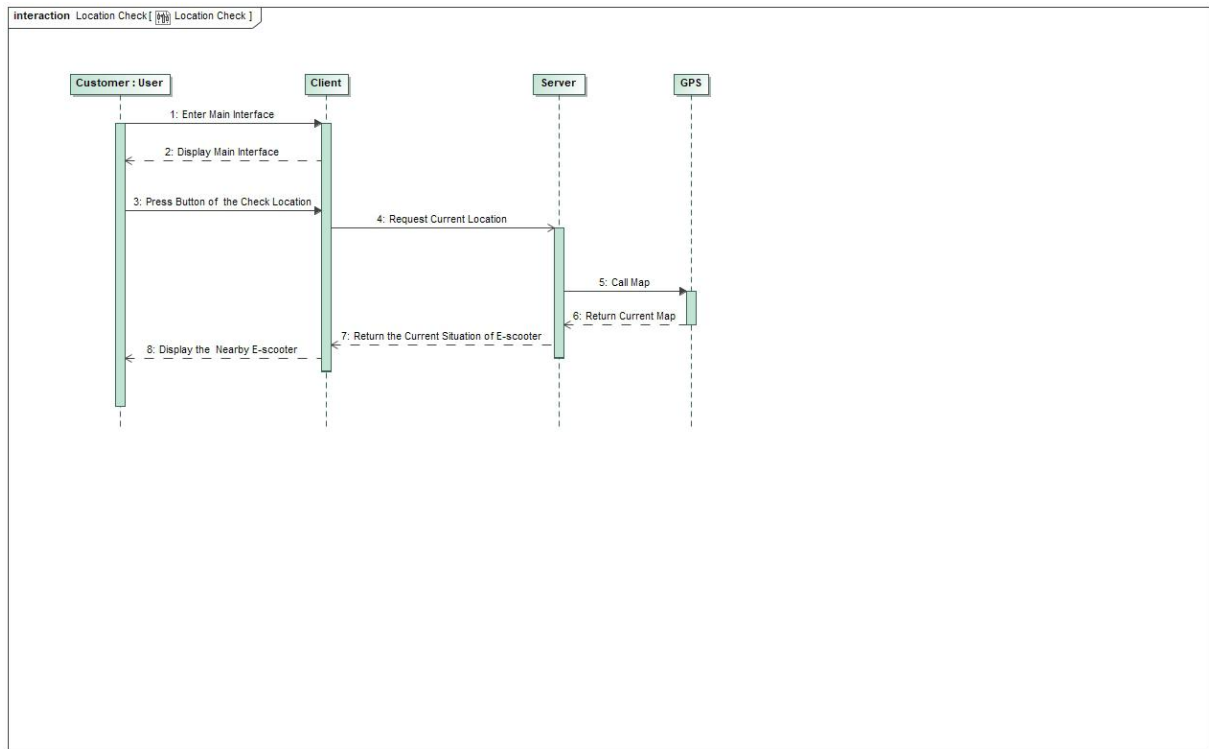
5 Check-in(scan QR code):



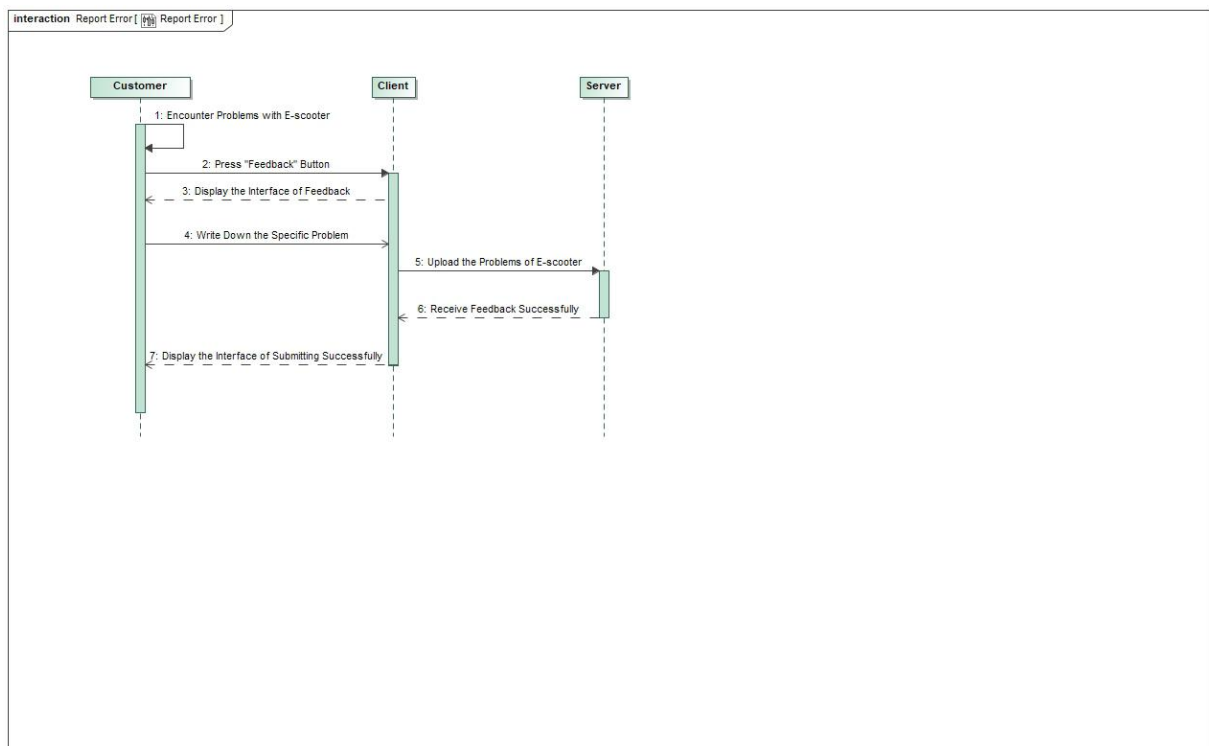
6 Check-out(in APP):



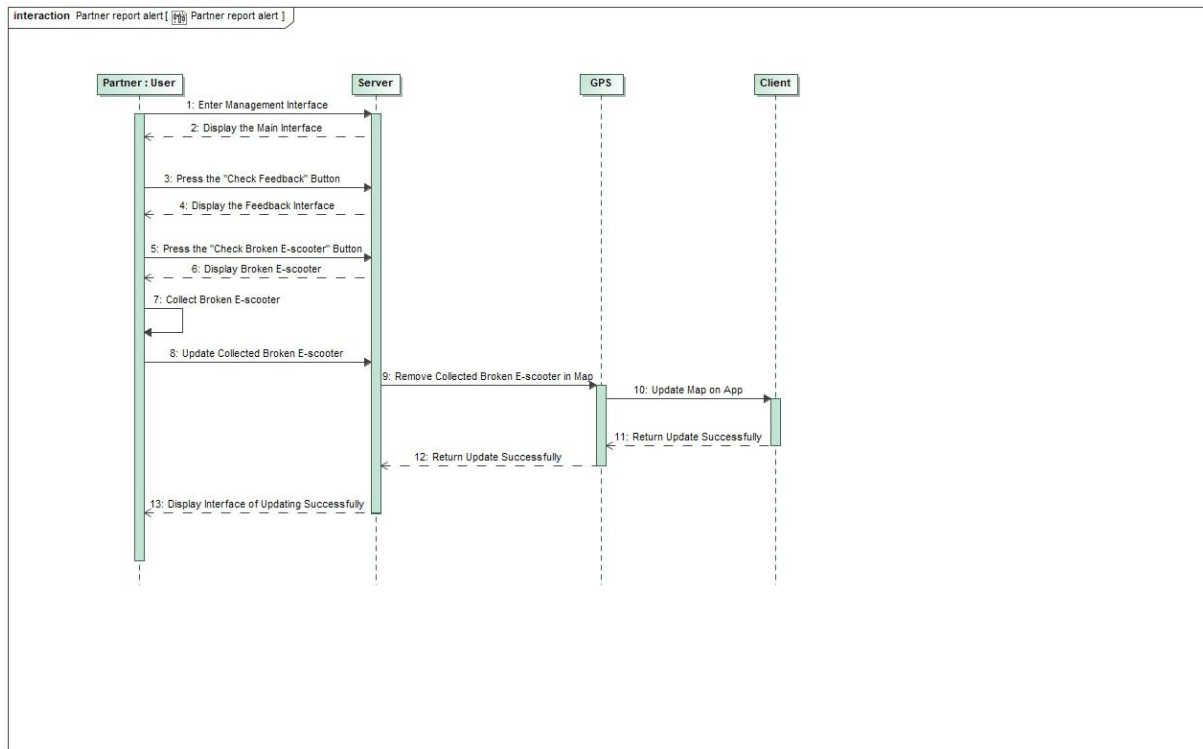
7 Location check:



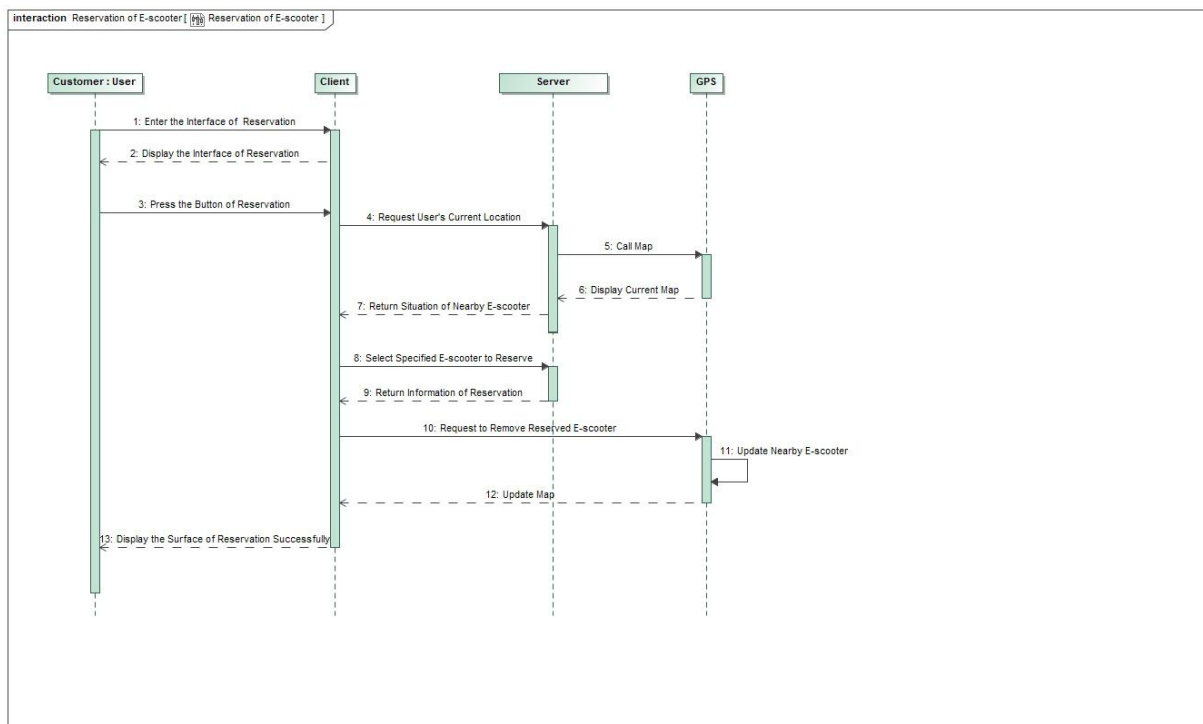
9 Report error:



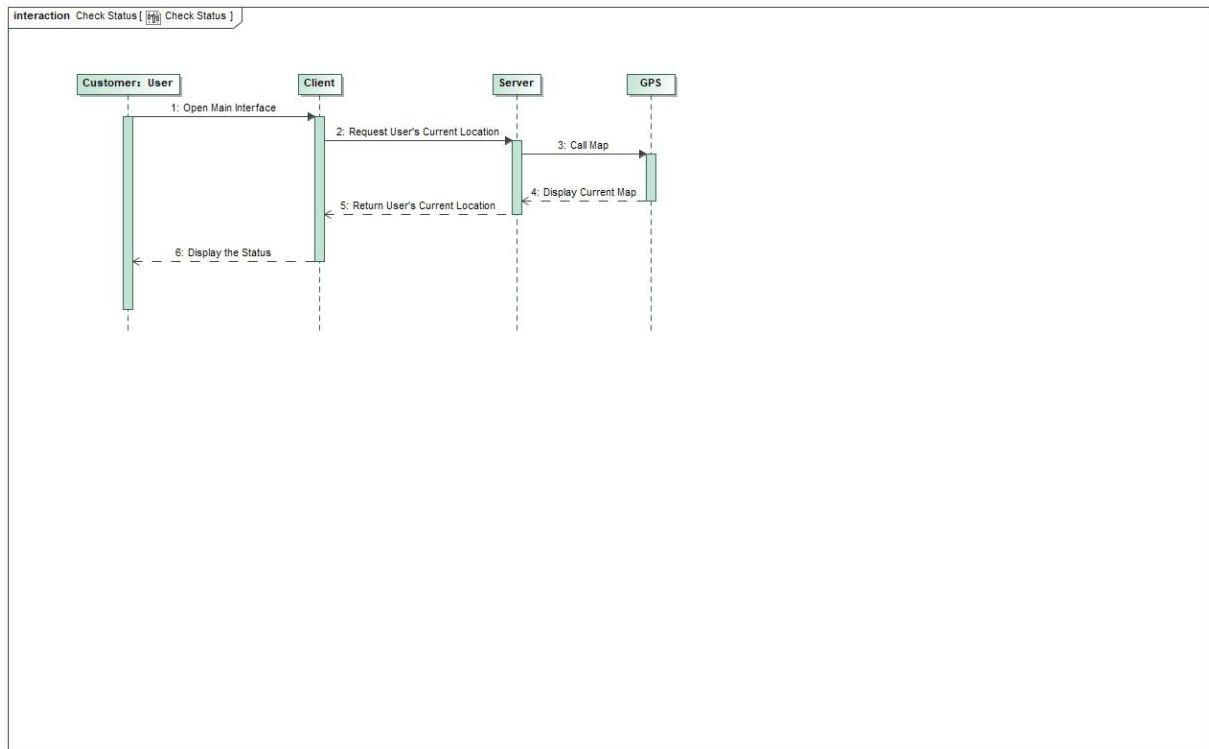
10 Partner report alert:



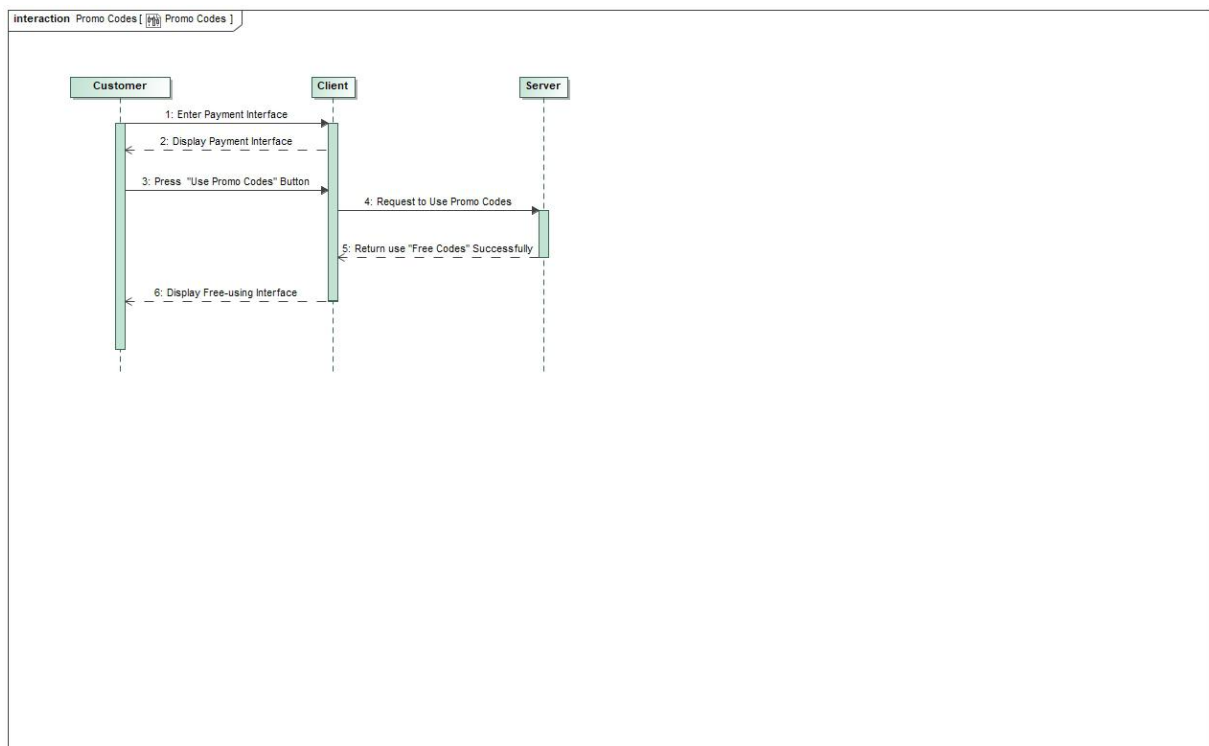
11 Reservation of e-scooter:



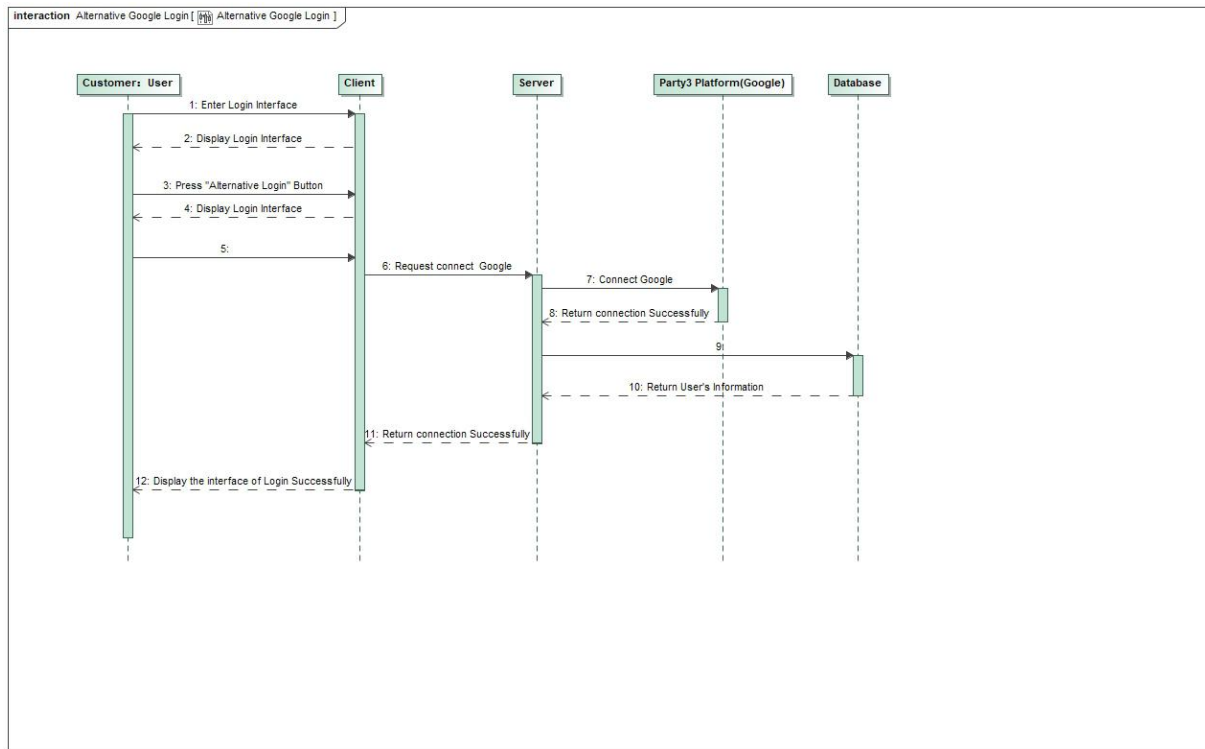
12 Check Status:



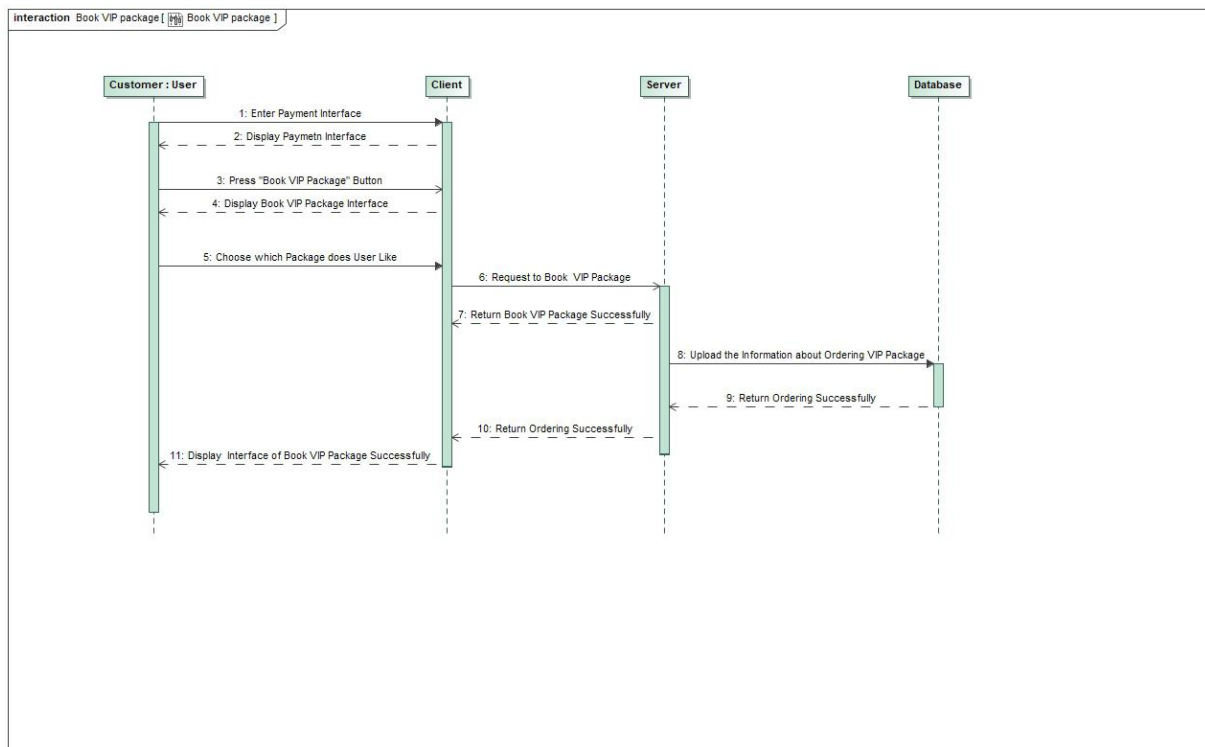
15 Promo Codes:



16 Alternative google login:



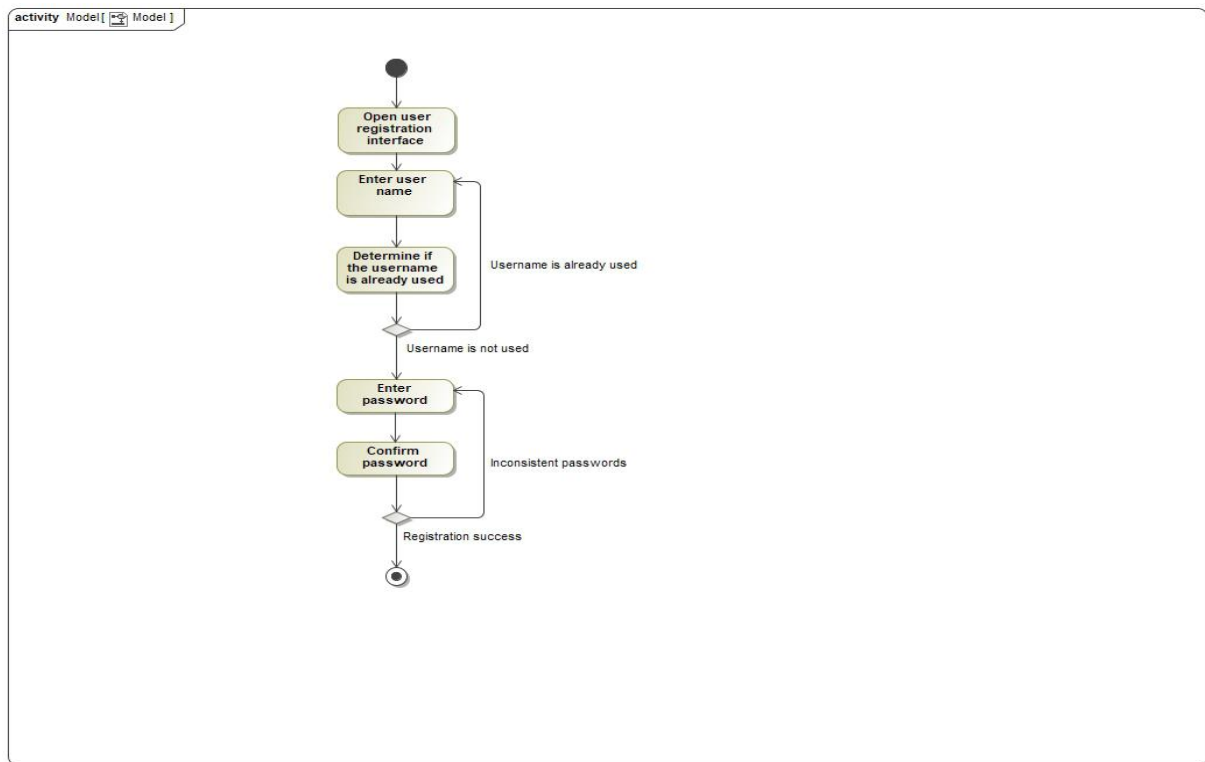
17 Book VIP package:



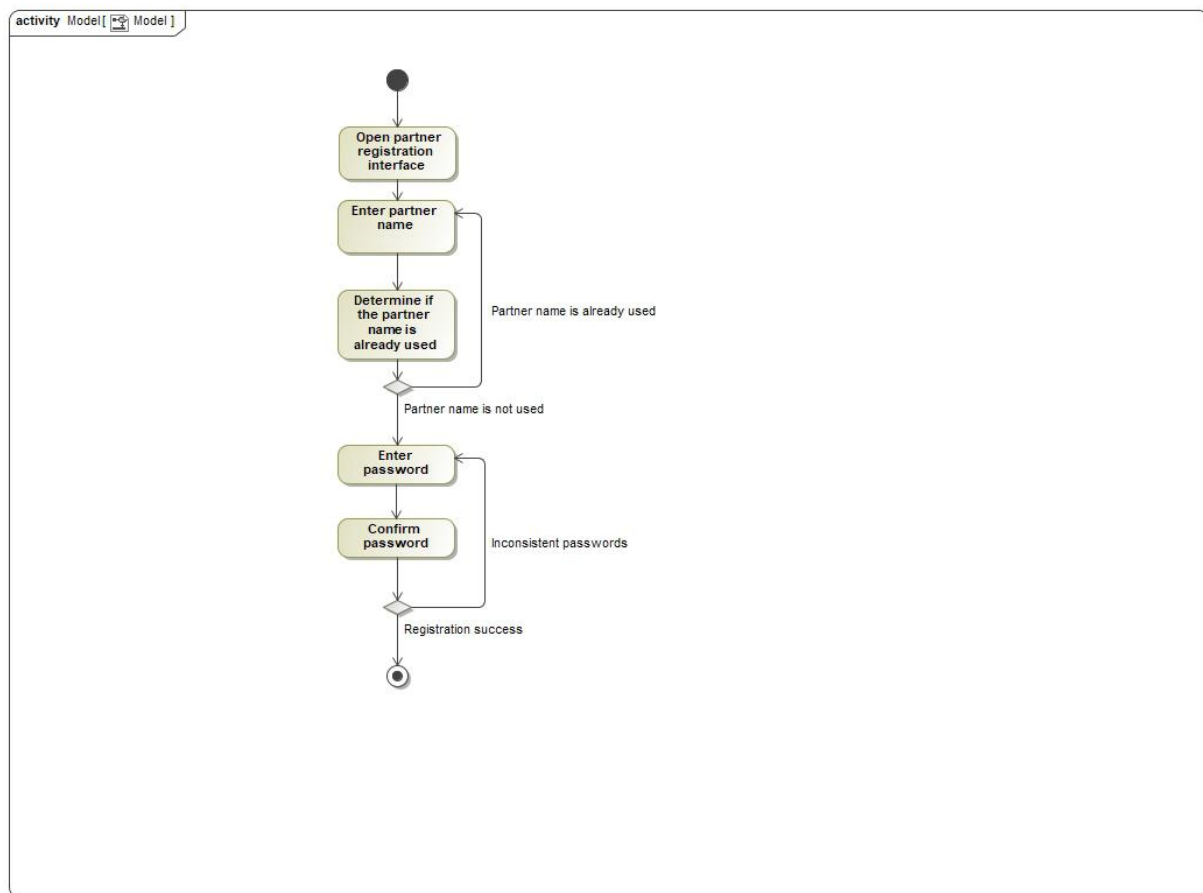
Notes :The number represents backlog items' ID.

Activity Diagram:

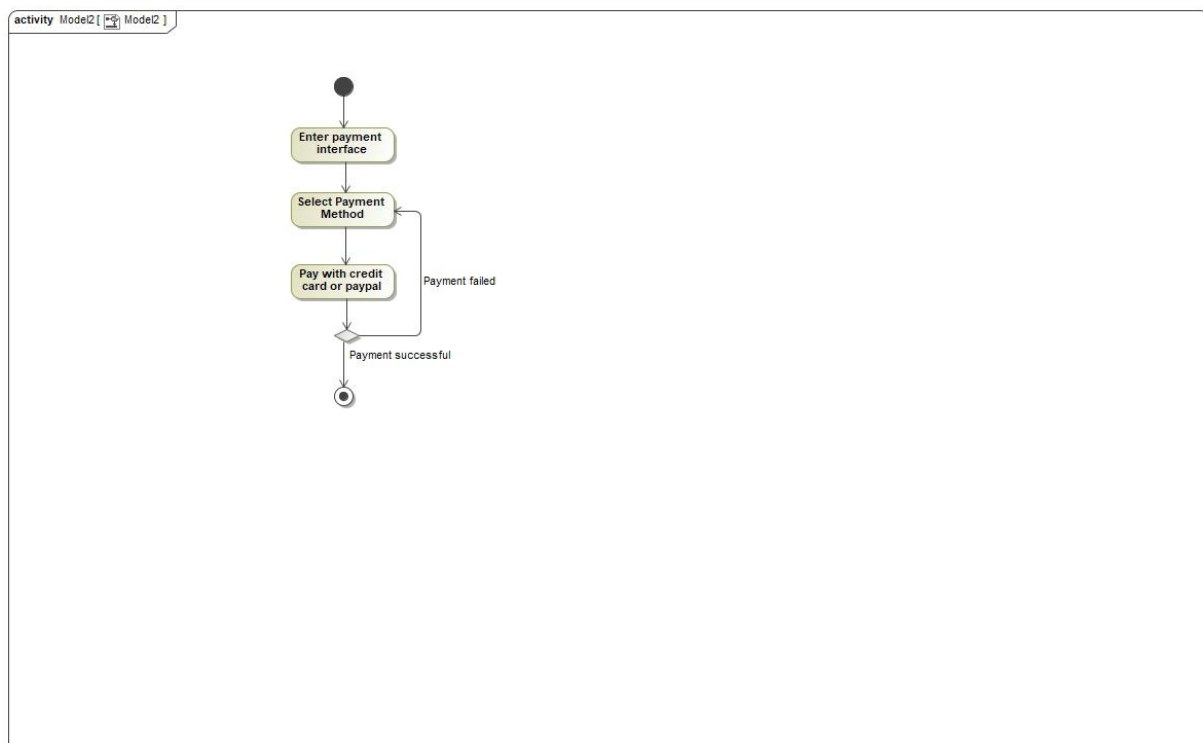
1 New customer register:



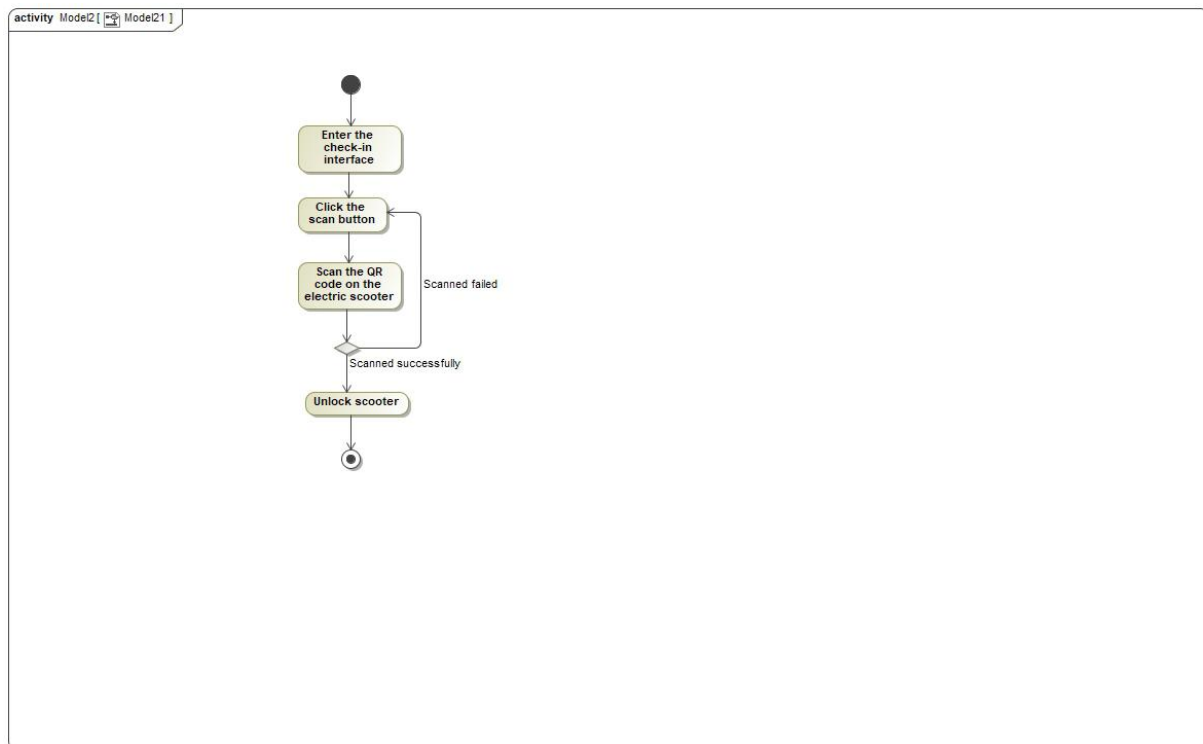
2 Partner registration:



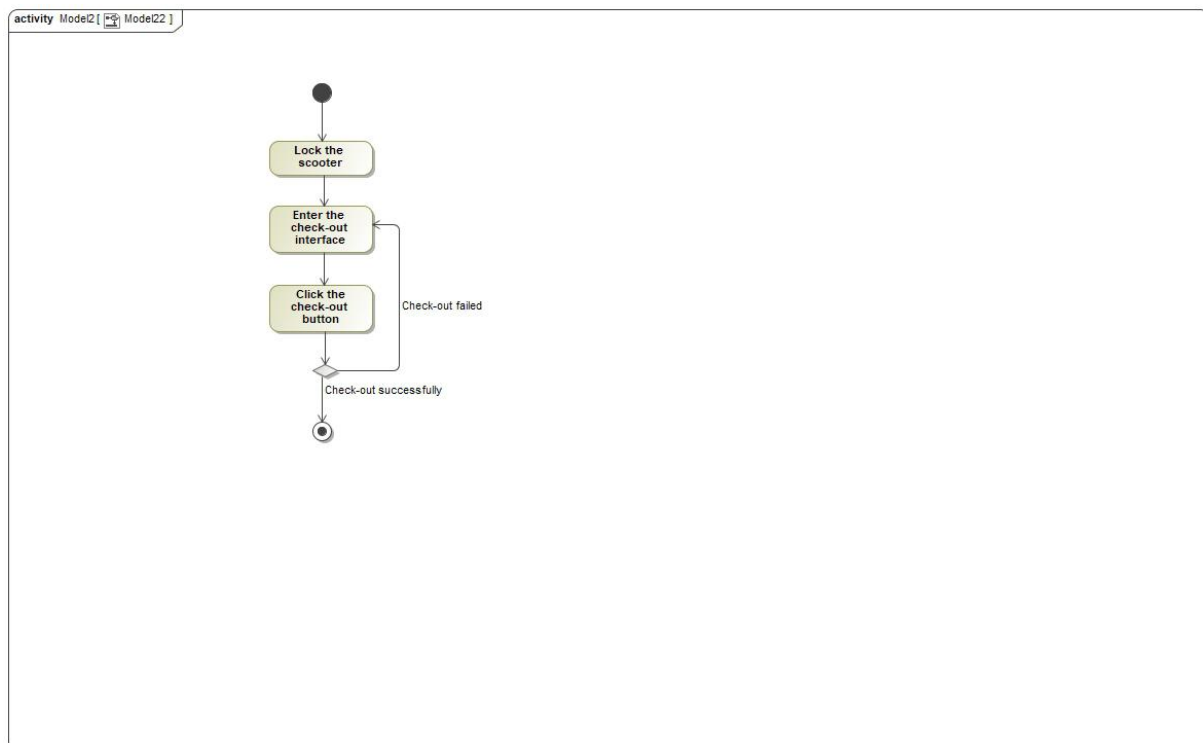
4 PayPal/credit card:



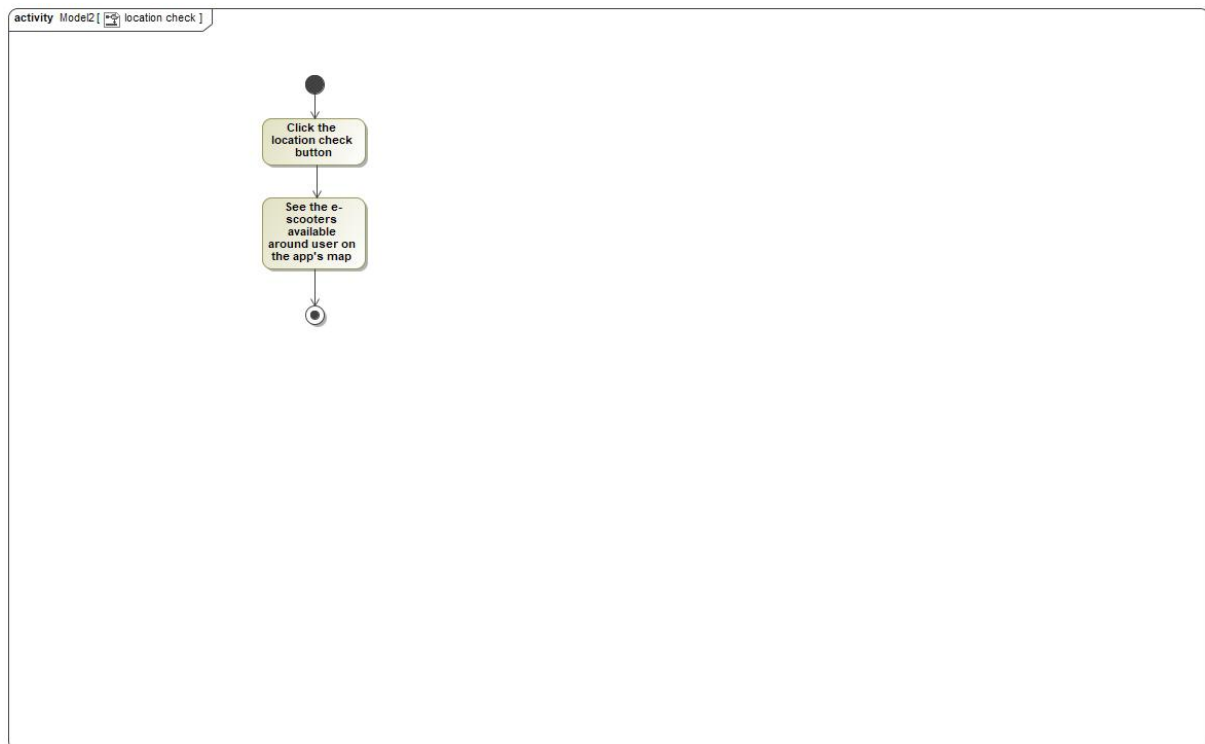
5 Check-in(scan QR code):



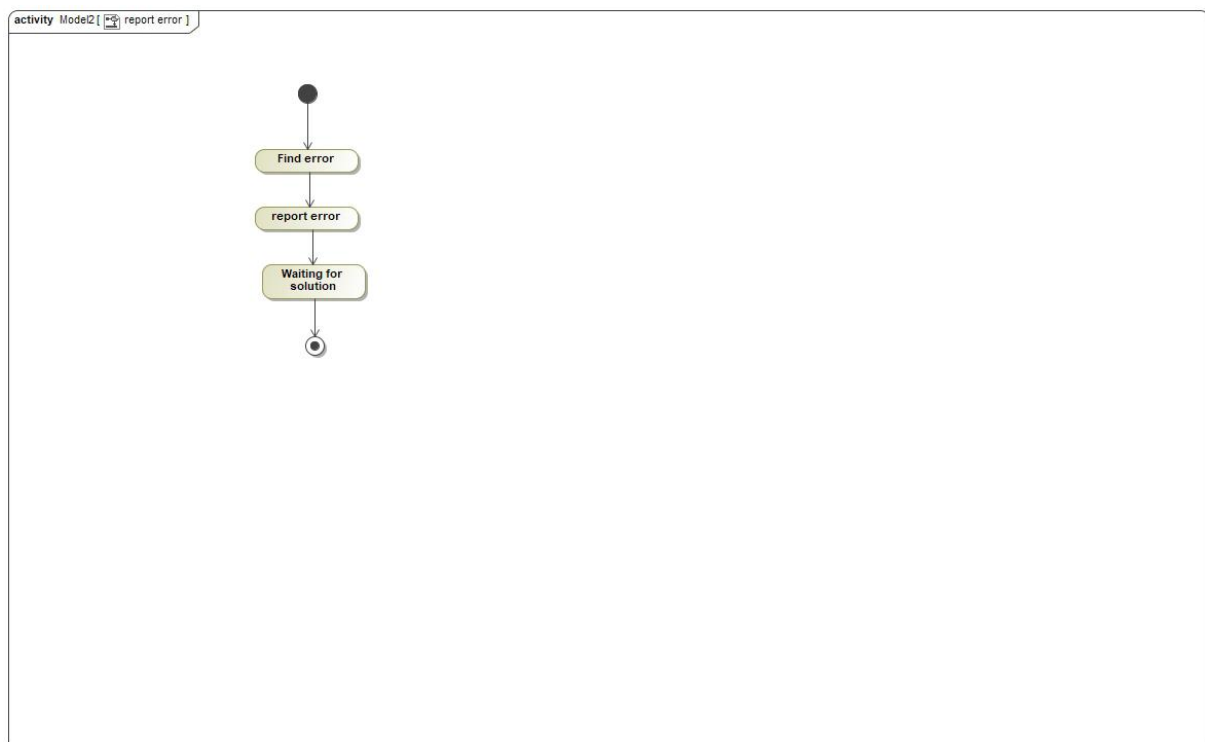
6 Check-out(in APP)



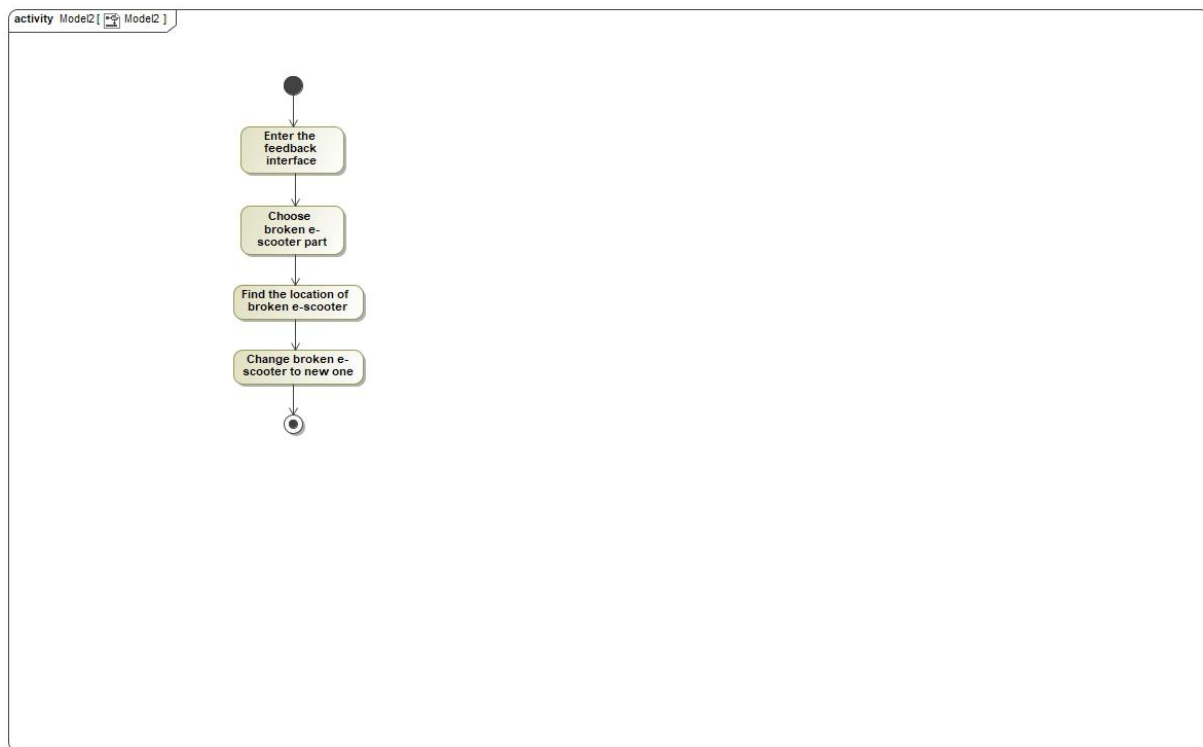
7 Location check:



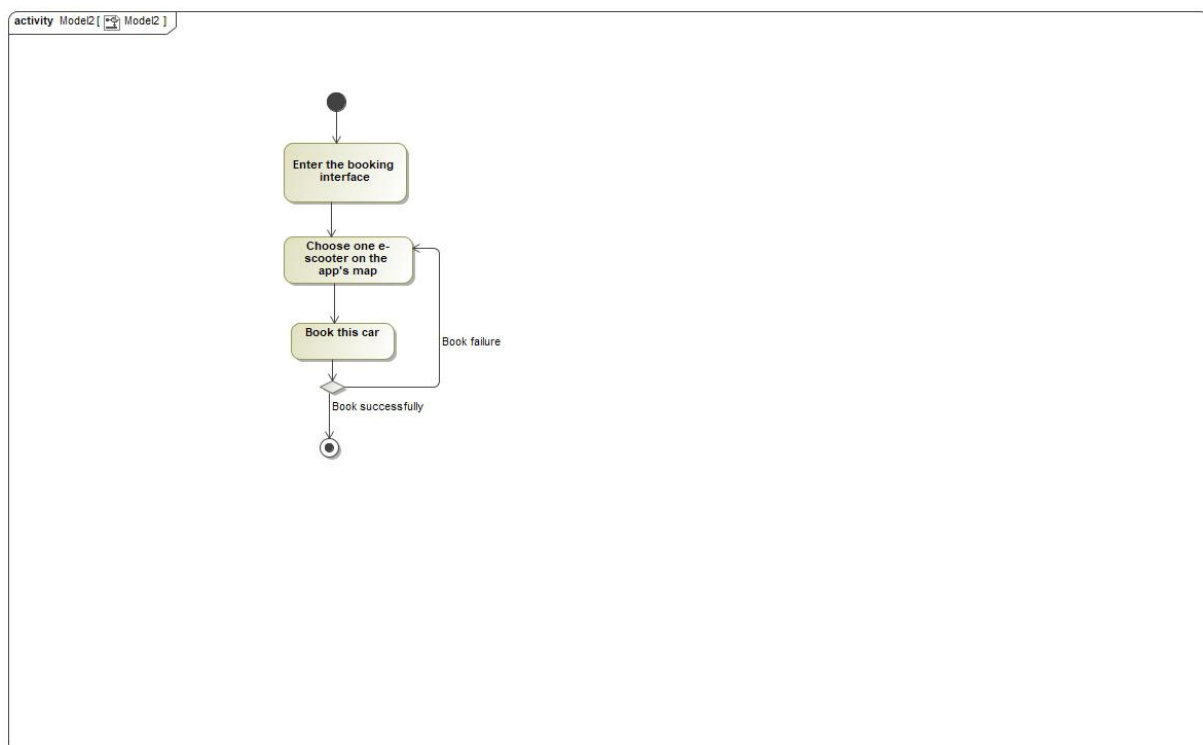
9 Report error:



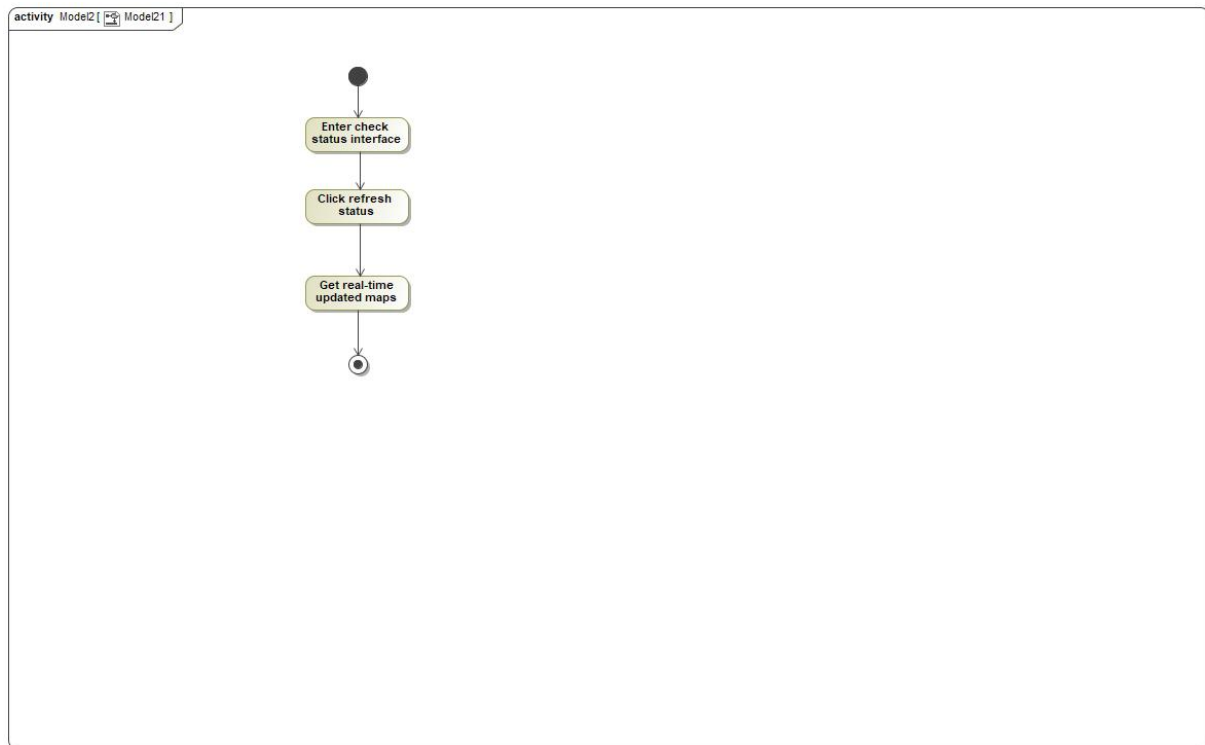
10 Partner report alert:



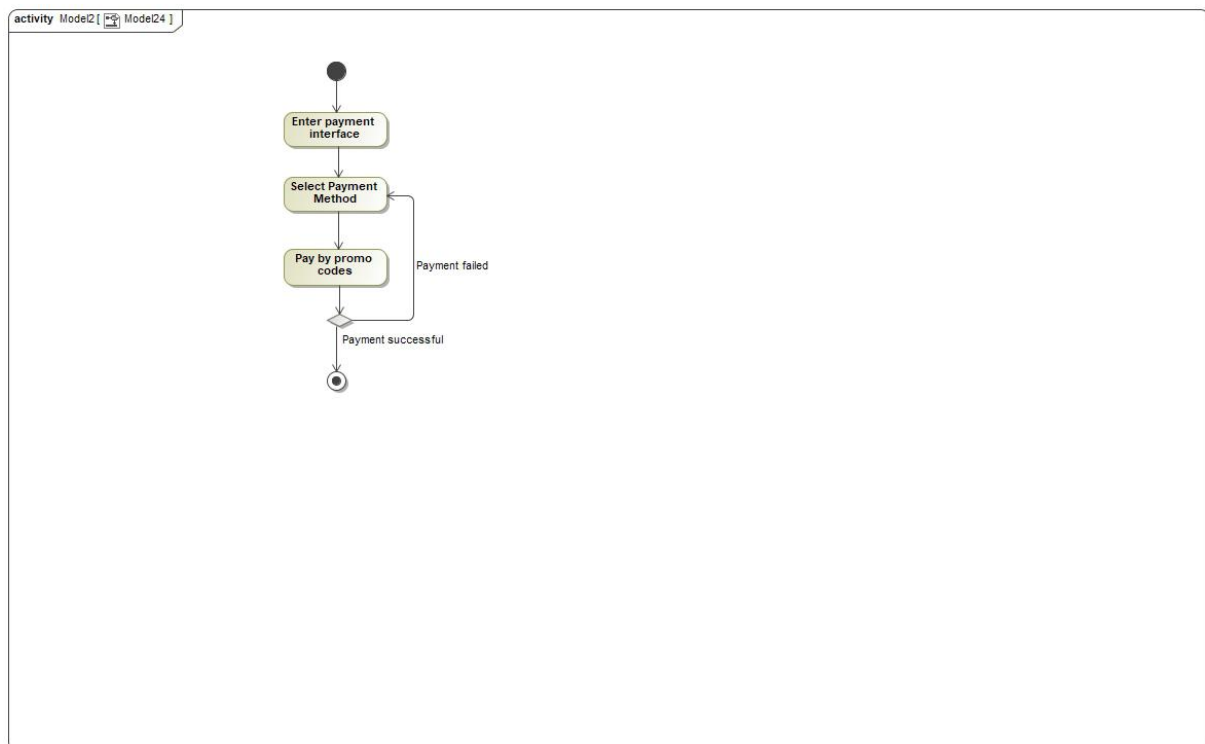
11 Reservation of e-scooter:



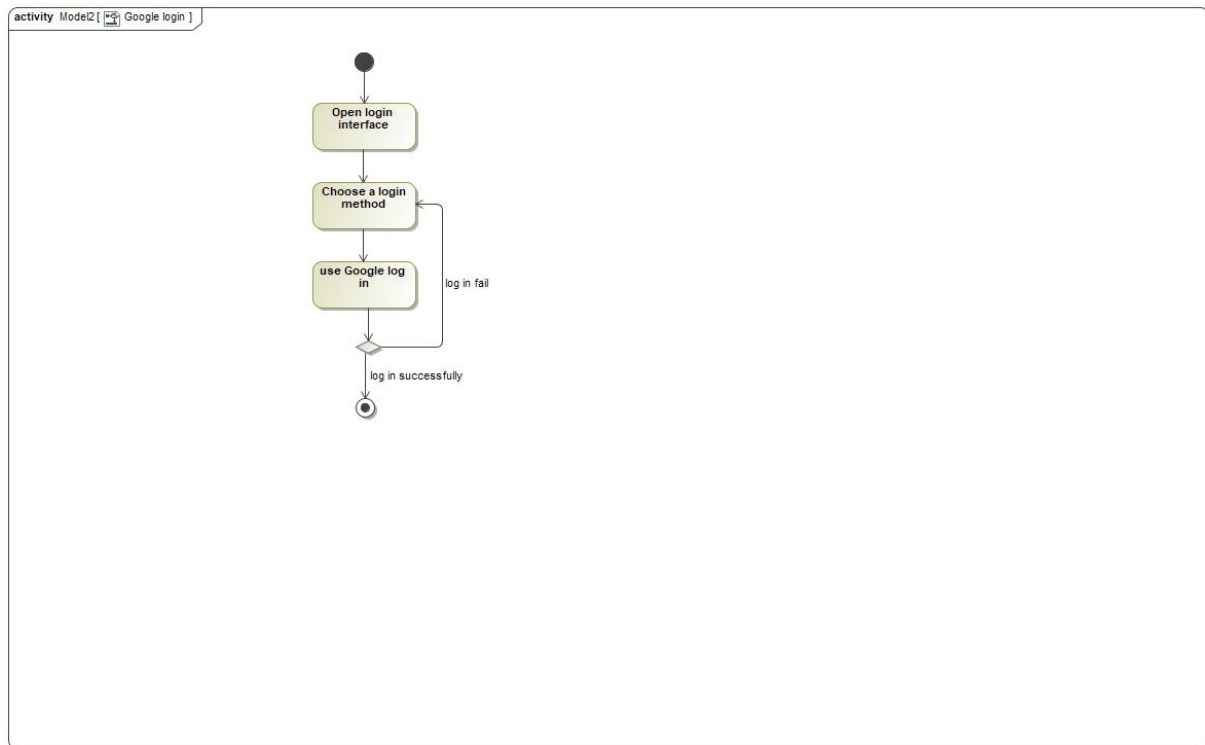
12 Check Status:



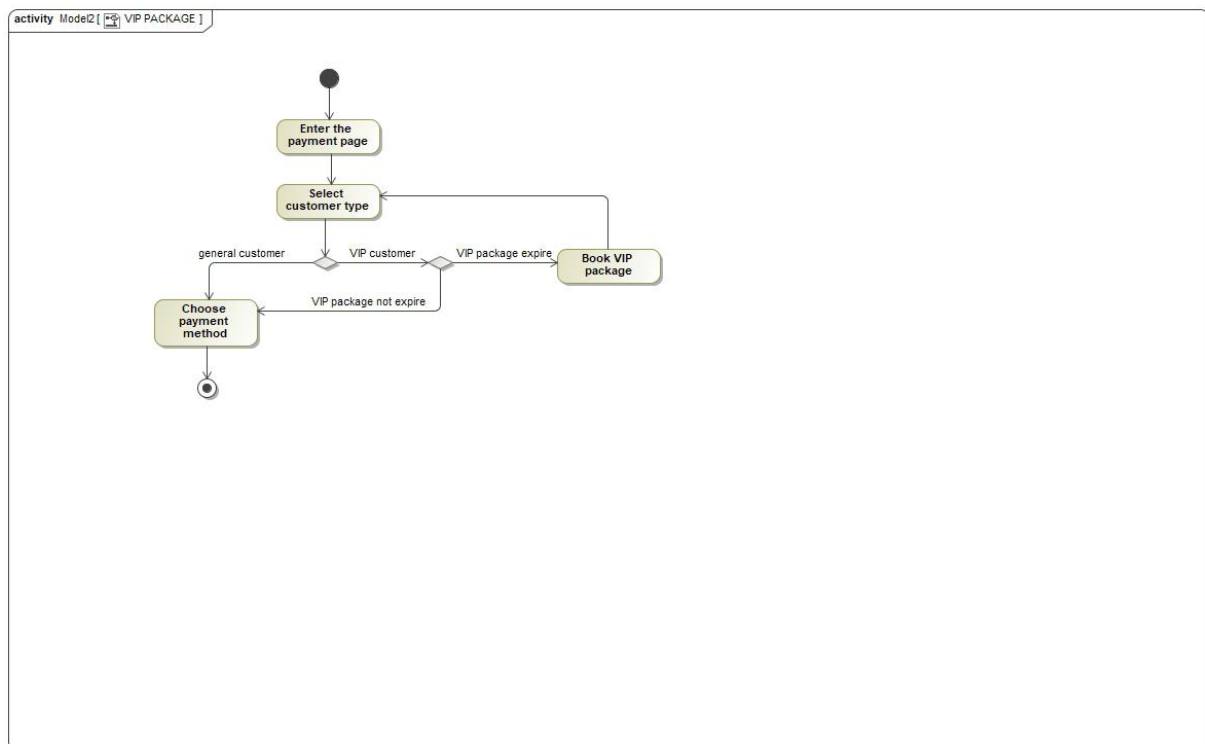
15 Promo Codes:



16 Alternative google login:

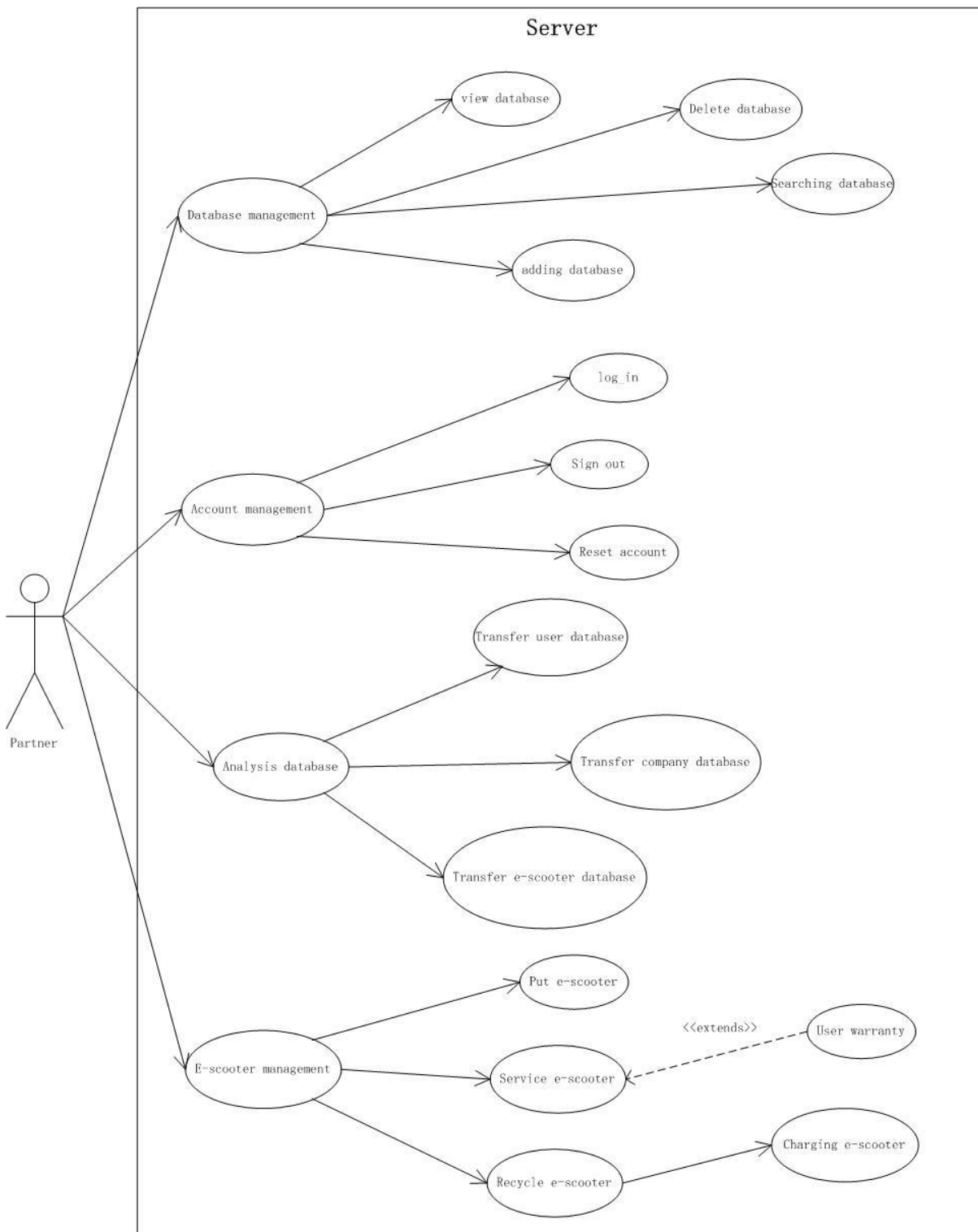


17 Book VIP package:



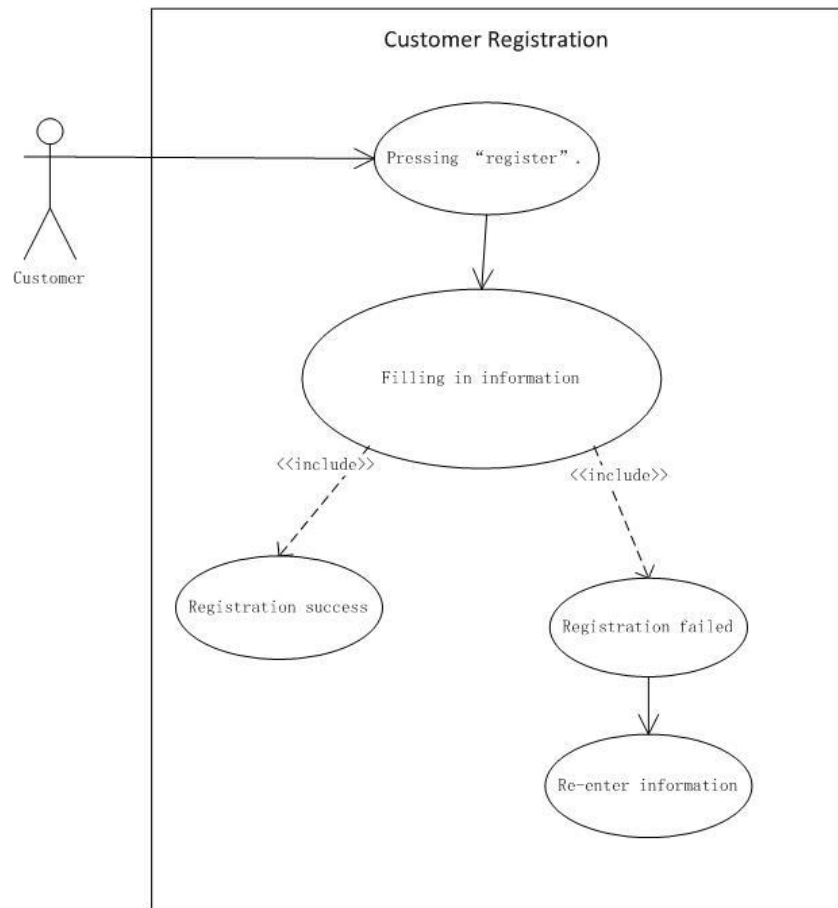
Notes: This activity diagram covers most functionalities and is therefore sufficient. The number represents backlog items' ID.

Use Case Diagrams:

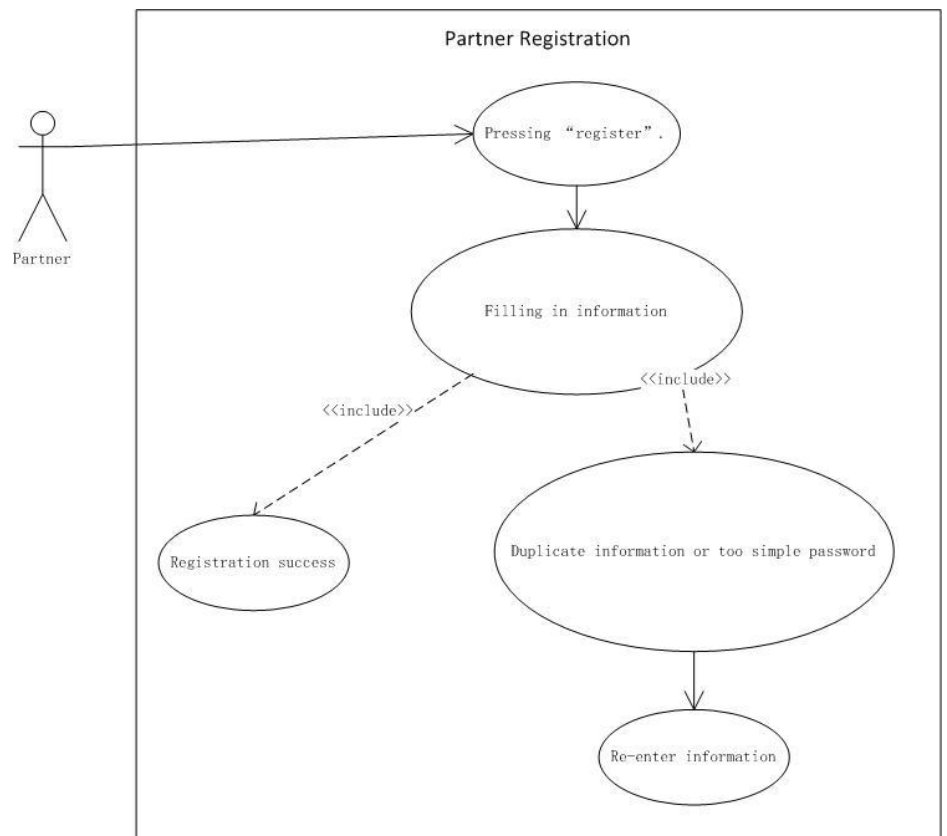


The server-side UML includes every back-end item on the backlog. That means all databases are included (user database, company database). The analyzation of costs and profits is done server-side, by hidden back-end calculations (covered in backlog item: company database). This diagram also shows the communication of the server with the e-scooters (covered in the backlog item: location check, report broken scooters & partner report alert).

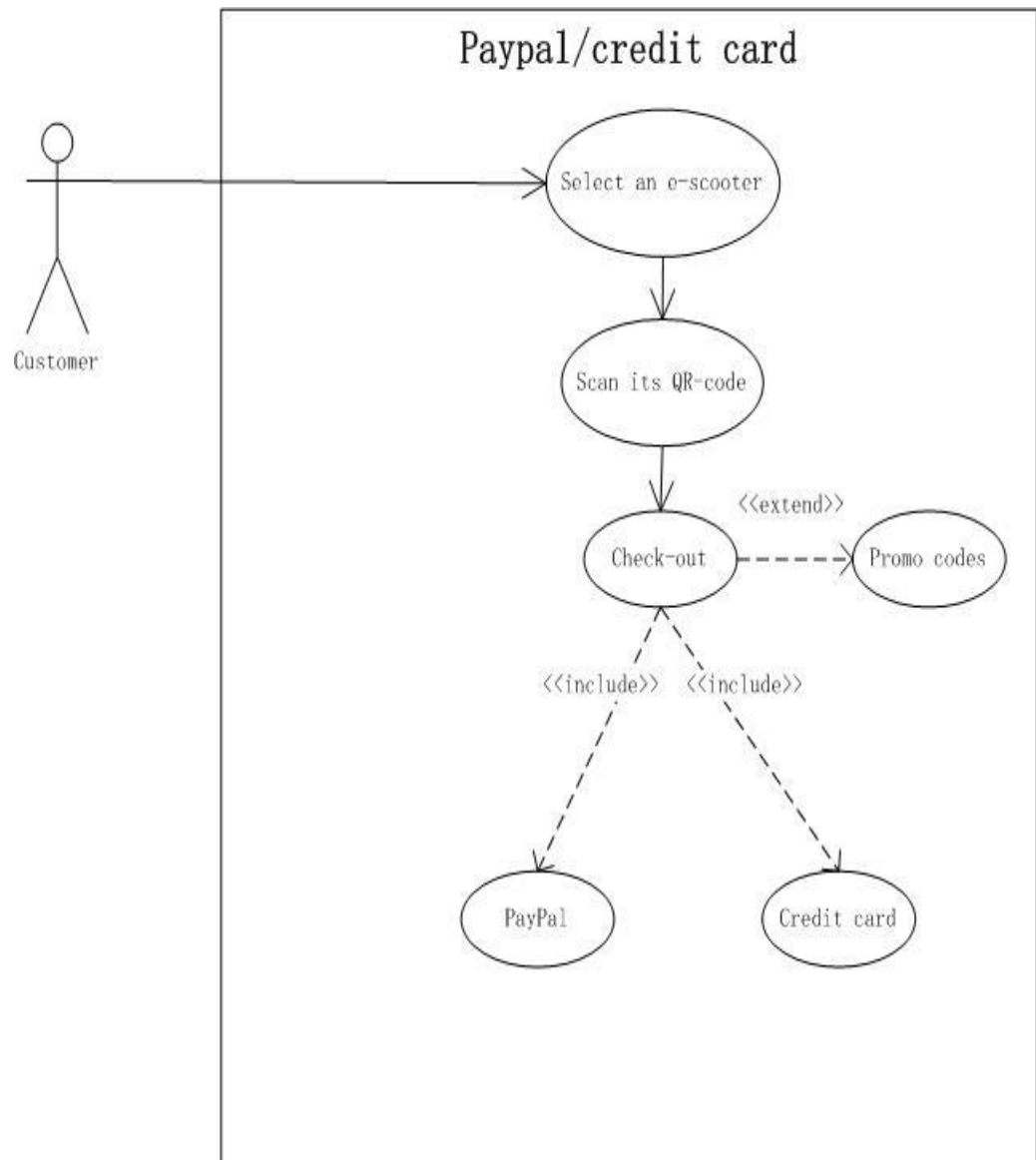
1.Customer Registration



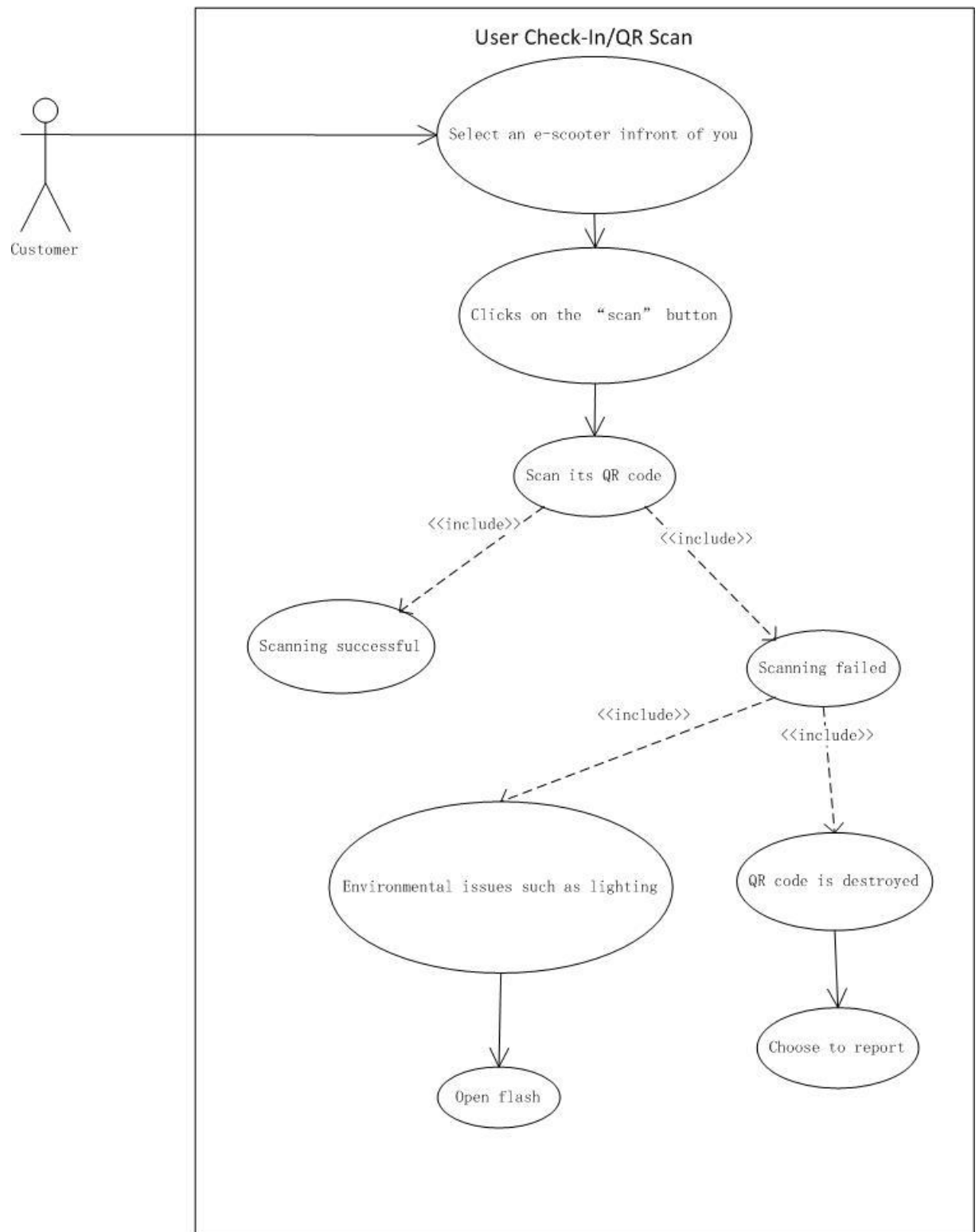
2.Partner Registration



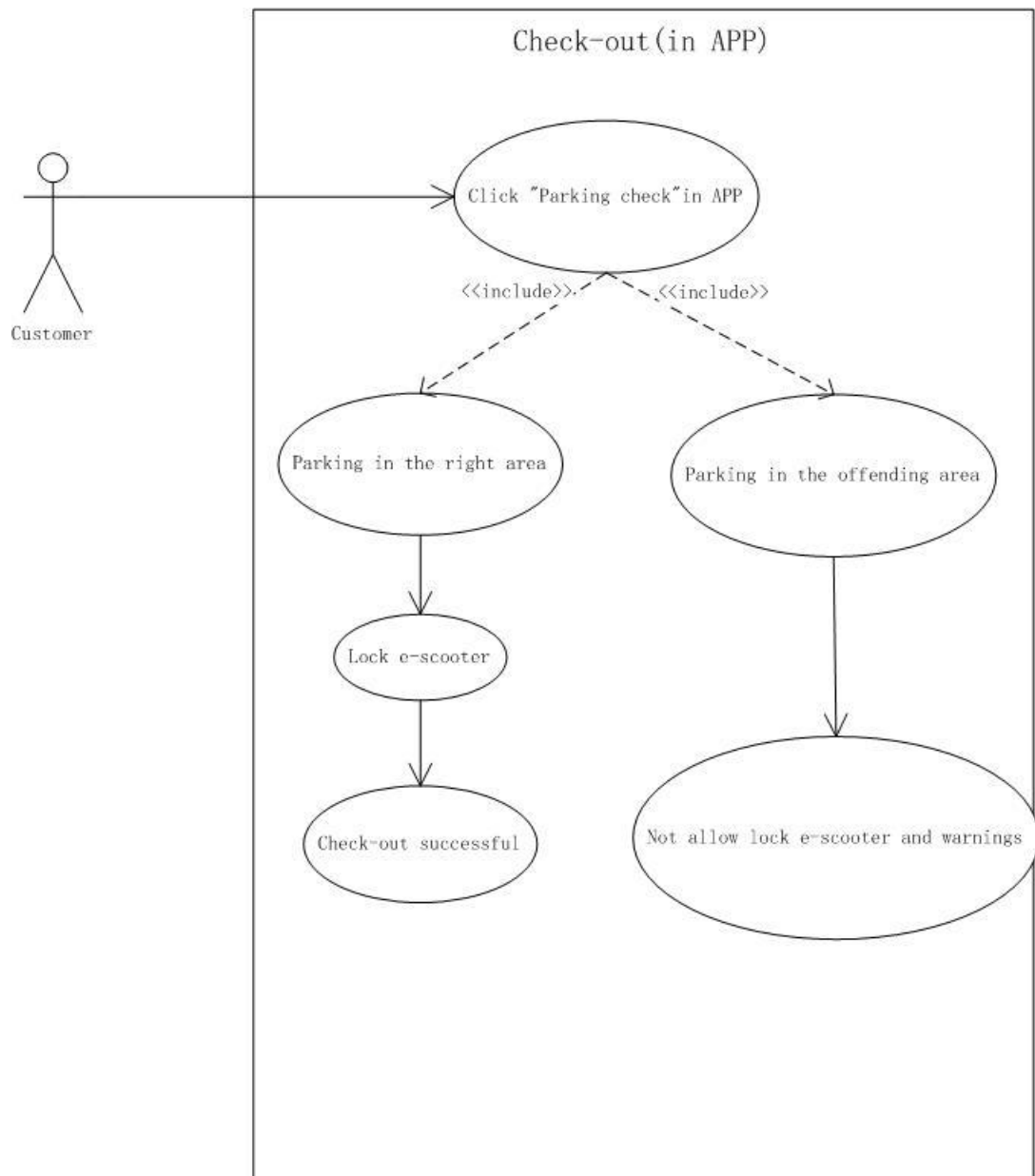
4. Paypal/credit card



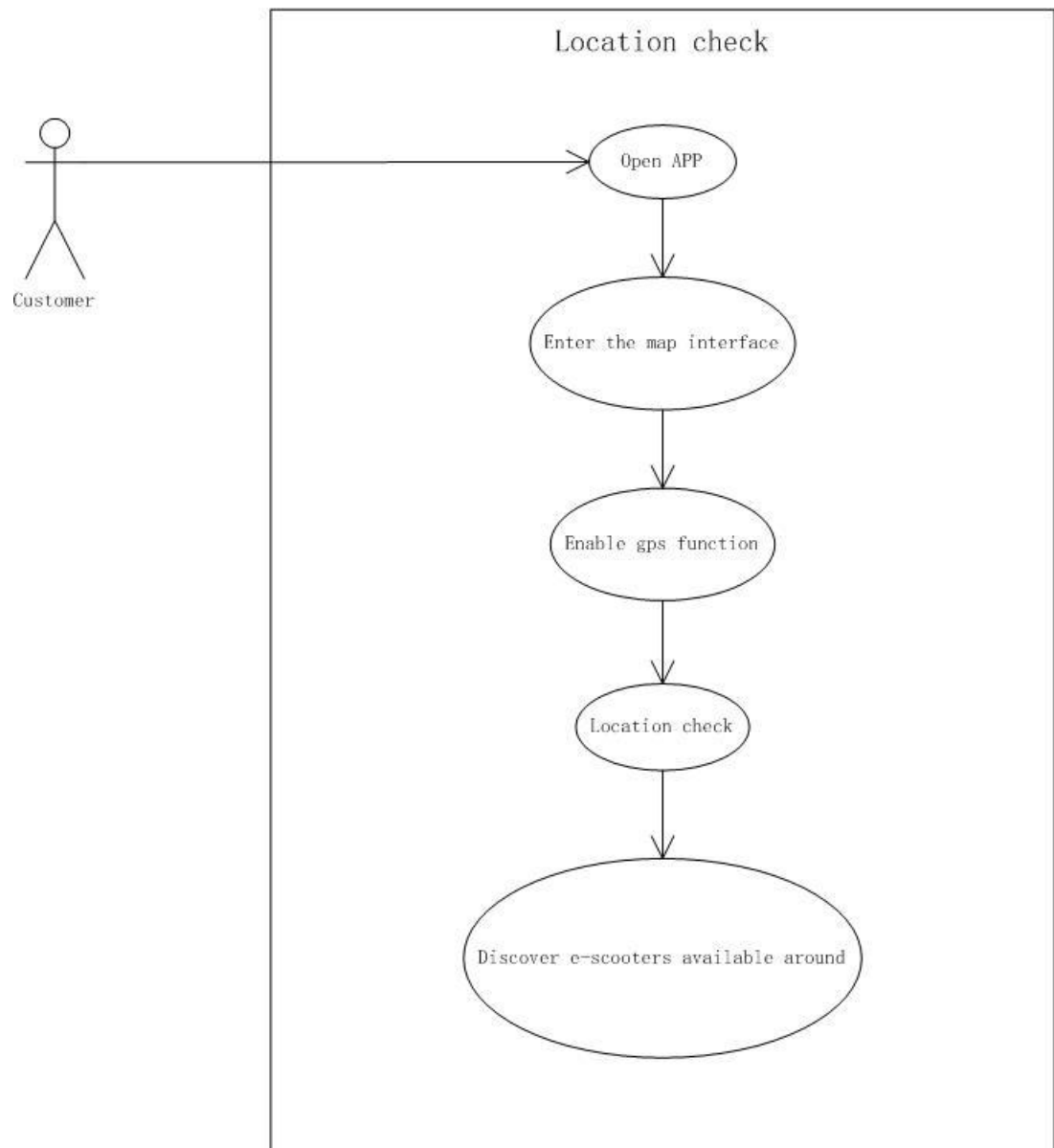
5.check-in



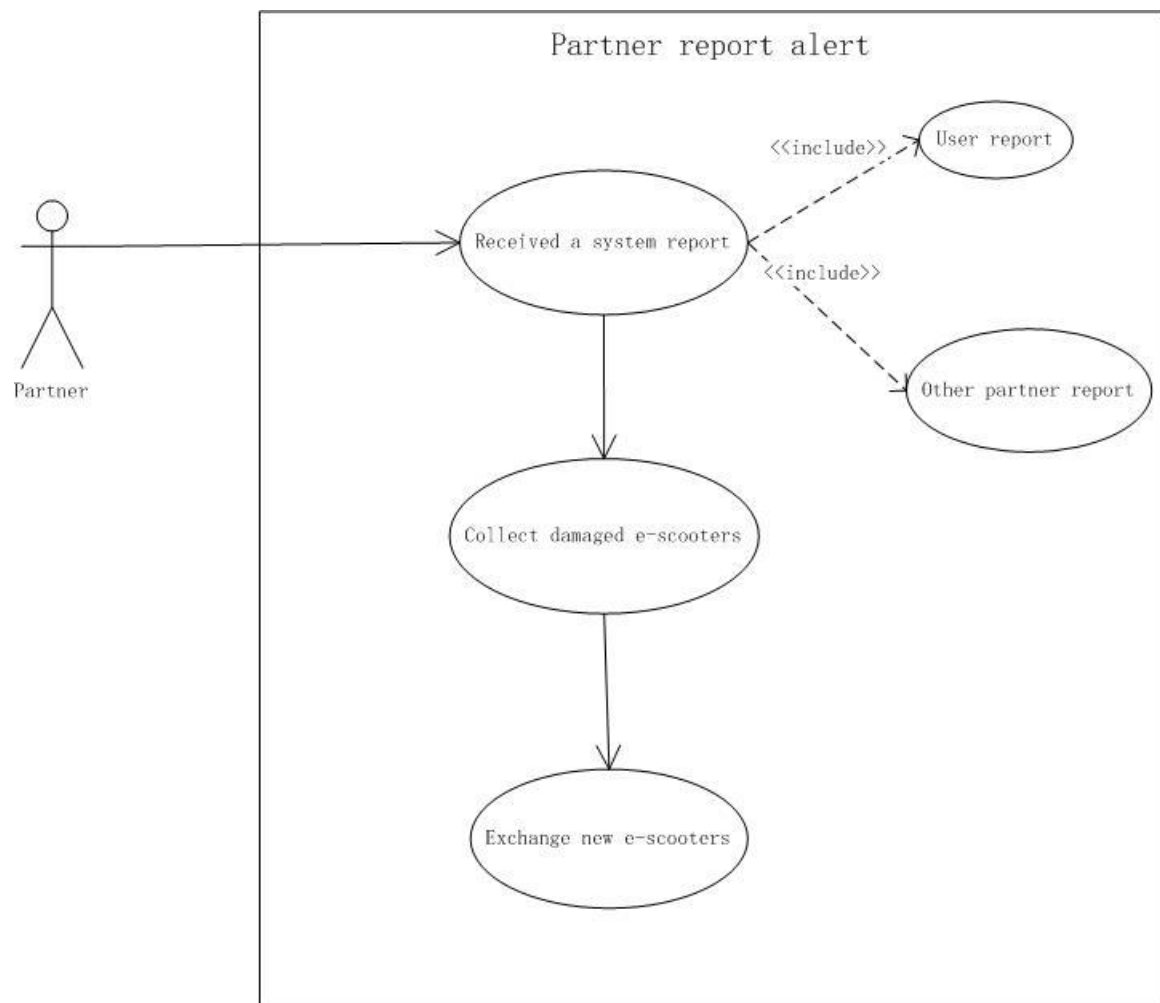
6.Check-out



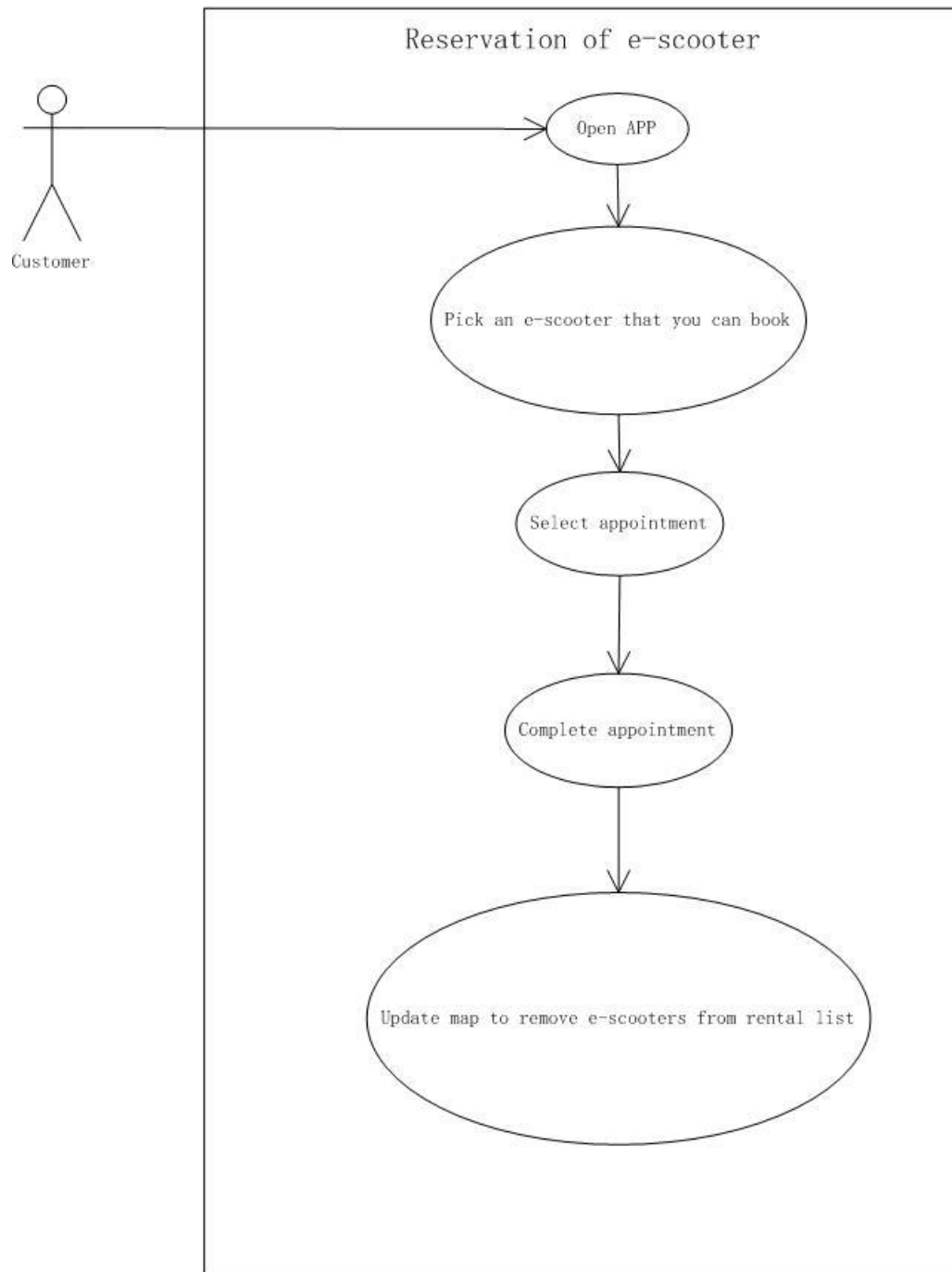
7.Location check



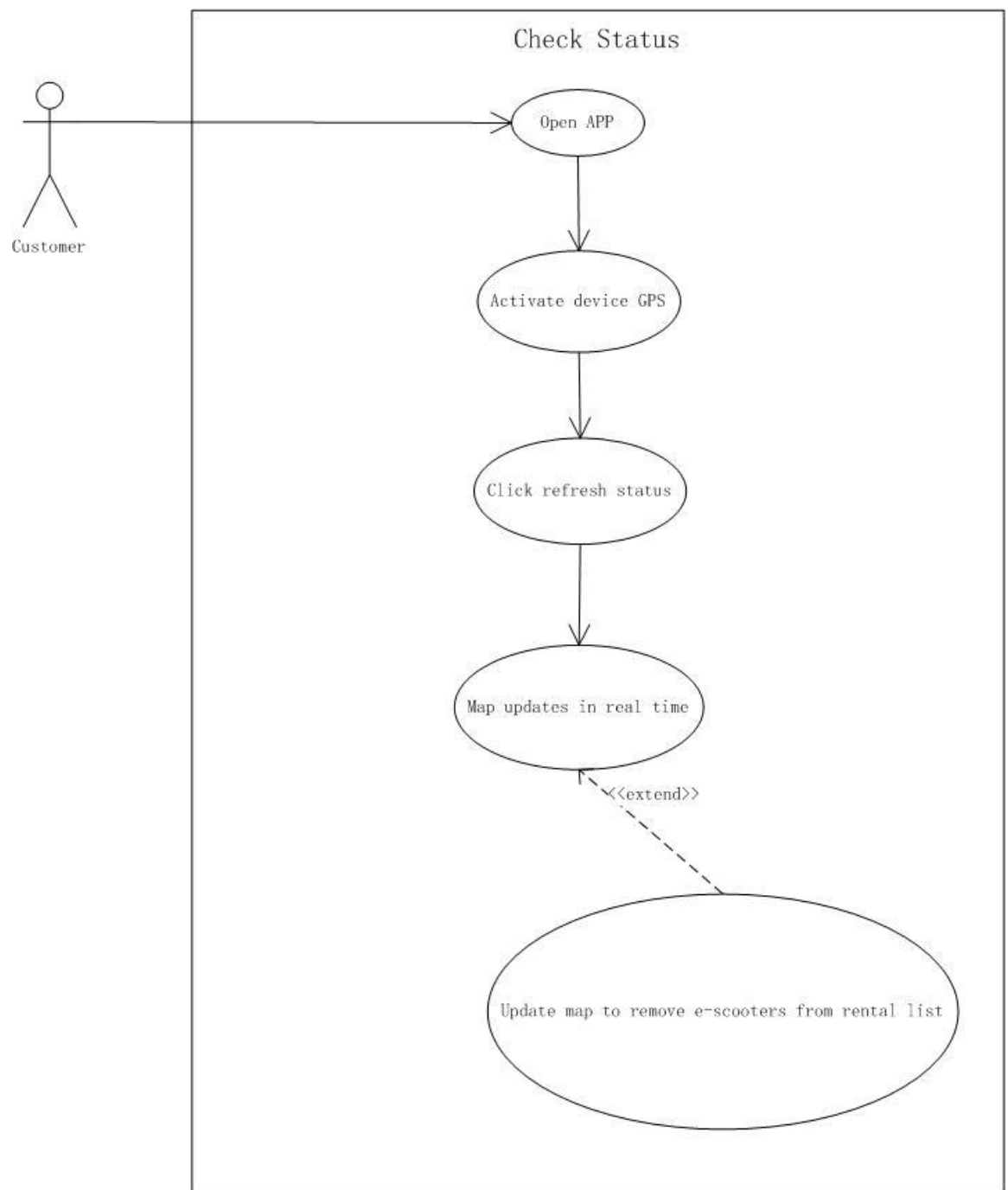
10.Partner report alert



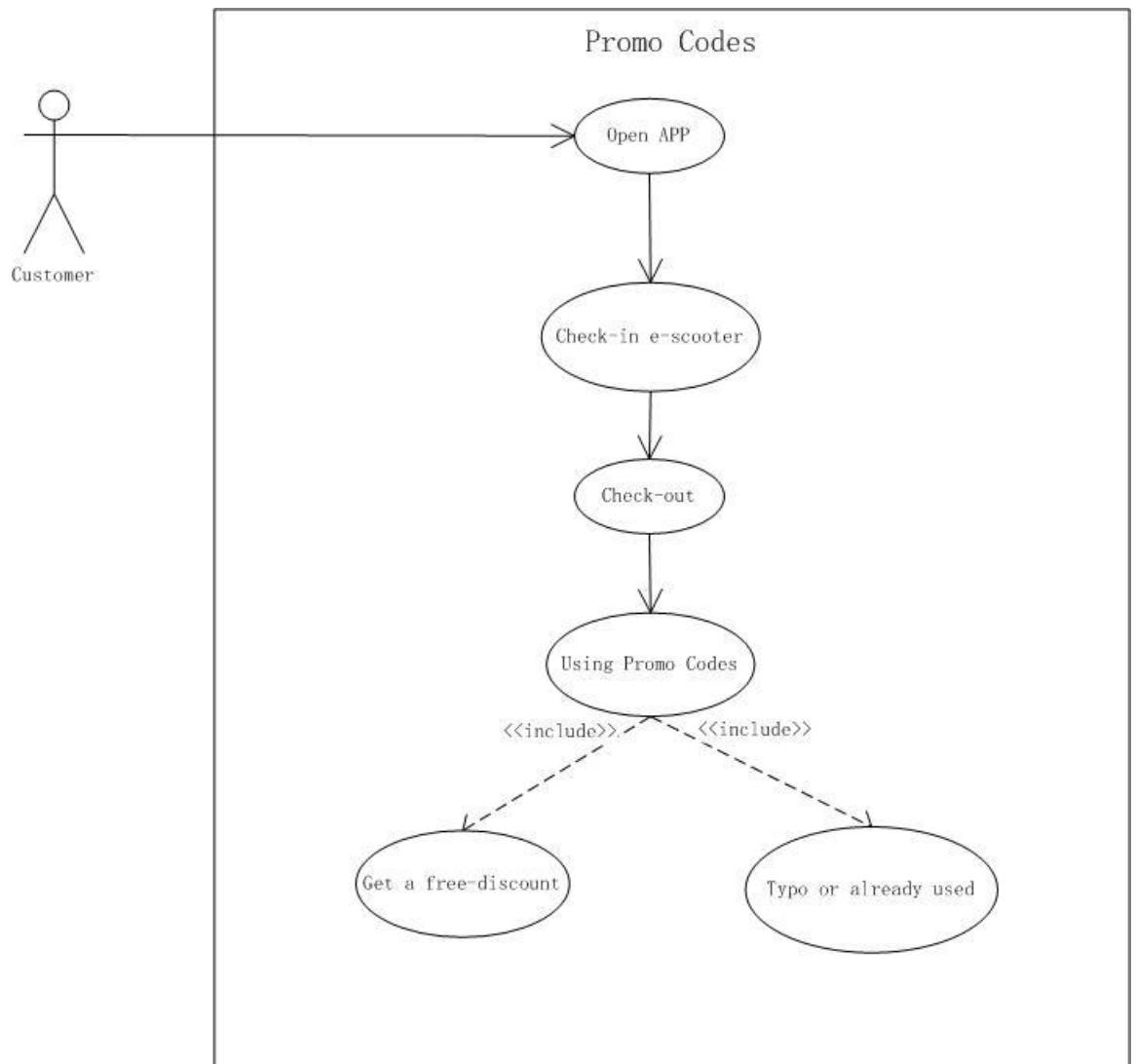
11.Reservation of e-scooter



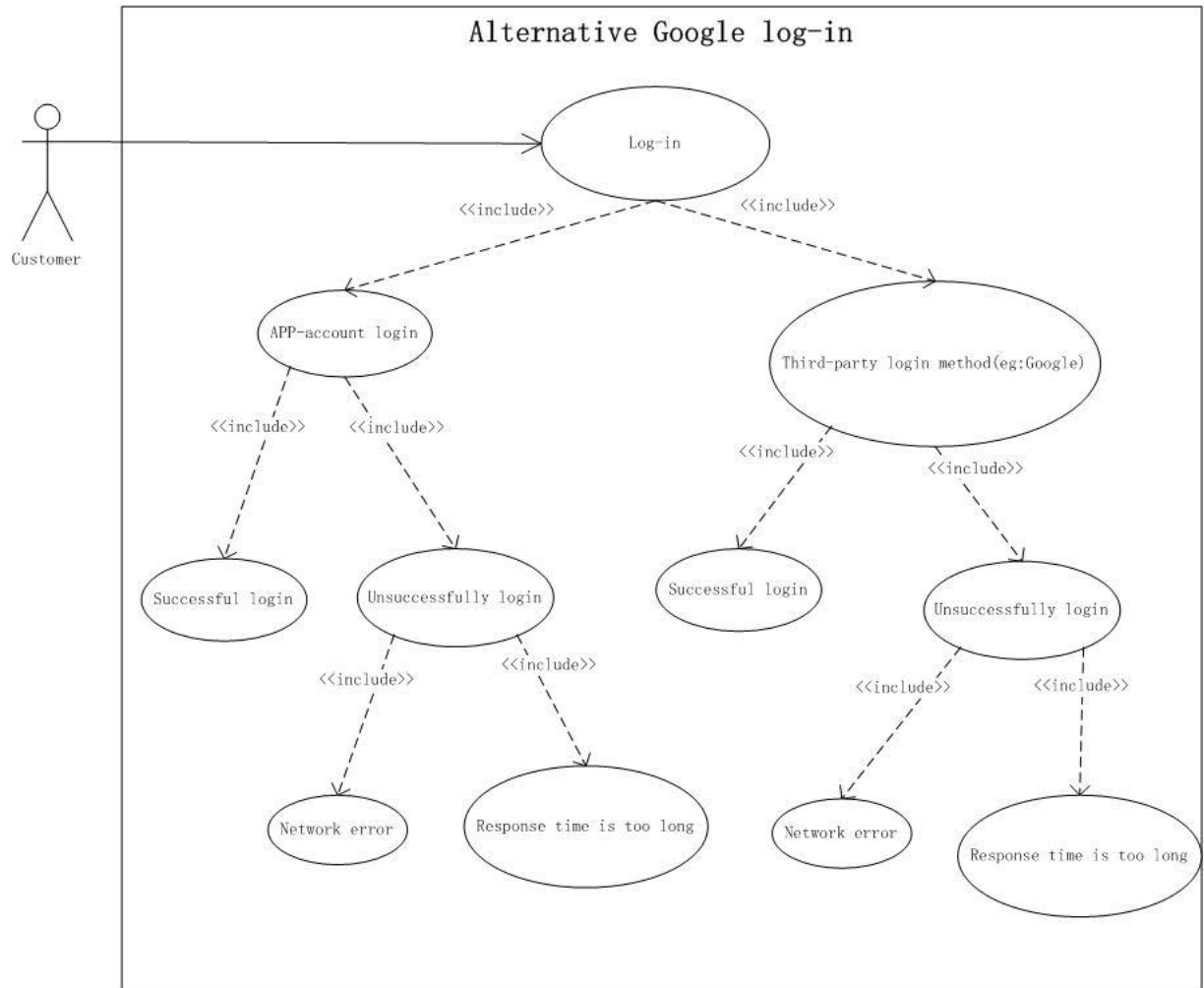
12.Check Status



15.Promo Codes



16.Google log-in



17.Book VIP package

