

ACME

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1 Introduction

ACME (Aston Car Management Enterprises) is a car rental that offers rentals, primarily but not exclusively, to people in the Aston area. This includes a range of customers from working individuals to the large student population the city has. The company currently uses email and telephone for both customer requests and internal communications.

However the company has realised that the current system is outdated and not a good user experience for the customer. In addition to this the profits of the company have been on a slow decline as newer competition has risen, taking away some of ACMEs customer base.

The aim of this report is to come up with ways in which this problem can be tackled, coming up with a design that can be implemented. This report discuss the stakeholders, business goals and current situation ACME is in. From this use cases and requirements will for the new system will be designed, followed by both activity and sequence diagrams to demonstrate how the system could work on a lower level. Finally the report will evaluate the suggested design, offering additional changes that could be made in the future.

2 Overview

Currently ACME uses an outdated paper-based approach, communicating with customers and other staff members using a combination of telephone and email. The current system has numerous problems such as:

1. Due to the paper-based approach important details such as details about orders, cars and accounting can often go missing causing issues for both customers and internal staff.
2. Backups of data are difficult and time consuming due to the paper-based approach and their risk management for the same reason is near non-existent.
3. Customer experience is not optimal due to the updates coming through telephone calls or email only.

In addition to this, the system does not contribute to ACMEs current business goals, which are:

1. **Increase profits/customers** - ACME has been seeing a decrease in profits and customers and wants to increase these.
2. **Improve documentation resilience and navigability** - Documents often go missing and are hard to find, by moving away from a paper based system ACME hopes to make this issue less of a problem.
3. **Cater to the student demographic** - ACME wants to take advantage of the large student population in the area, with both Aston and Birmingham university being near by. They are willing to offer better deals to students and offer alternative payment methods to target this demographic.
4. **Automate/speed up time intensive tasks** - Due to the current system, data input is slow and taking and editing rentals is also slow. With a new system ACME hopes this will speed things up, potentially requiring less staff, which will also help increase their profits.

2.1 Propose changes

In order to fulfill the above business goals ACME has decided to upgrade its outdated system with a new automated, digital system. The new system will no longer use paper based records, instead opting for a digital solution, which can either be in the cloud or on a prem server. The solution should not remove any of the current functionality of the system. However can replace them for more modern alternatives. Some of the planned replacements include:

1. A new system where users can sign up and book rentals, without direct interaction from staff members. This includes a new payment system where

customers will be able to pay through the new application immediately without going into the store. The details of both customers and order will be stored in the new database. These changes will help ACME to achieve business goals 1, 3 and 4.

2. A new system for staff to add/edit/delete cars in the system, these details will also be stored in a database. This will help to reach business goals 2 and 3, by speeding up internal workings due to switching to a database instead of the old paper based system. It may also indirectly help with business goal 1 as staff will have more time to do more important things for the company. Another potential is that the number of staff needed could be reduced due to the optimisation, however this would need to be thought about due to potential ethical issues.
3. As part of increasing profits and catering to the student demographic, ACME has made a bold plan to try and incorporate cryptocurrency payments into its new system. Cryptocurrency adoption in the UK has been growing in popularity, doubling since 2019 [1]. In addition to this a survey done in Germany showed that '18-to 27-year old survey respondents were three times more likely to own a digital currency' [2] and BanklessTimes wrote an article summarising a Finder report that showed 38% of all cryptocurrency holders in the UK were between the ages of 18-34 [3].

Age Group	Adoption Rate
18-34	38%
34-54	43.5%
55+	20%

Table 1: Table showing adoption rate based on age in the UK [3]

2.2 Software development model

The software development lifecycle (SDLC) usually consists of between 5-7 phases. This isn't a strict rule however with names changing and certain phases often not being included. The figure below shows the SDLC I will be following, **Appendix A** shows a full 7 stage model.



Figure 1: Figure showing the phases of SDLC. [4]

1. **Plan** - The planning phase involves, what the project is going to be, the requirements of the project, identifying stakeholders and any feasibility studies that need to be done.
2. **Design** - This phase can include graphical UI/UX designs, but also designs of the software. This can be done using UML.
3. **Develop** - Write the code that the plan
4. **Test** - Write tests for the written code and perform manual testing.
5. **Deploy** - Deploy to cloud/on prem infrastructure.
6. **Review** - Review the new features/changes added and start the cycle again.

This report covers only covers the plan and some design aspects of the SDLC. Using an SDLC includes benefits such as helping understand requirements, identify risks [6] and speed up delivery of a project. Imagine skipping the plan and design phase above, jumping straight into development. The developers would not know what the system should look like and deliver a subpar final product

For this project I would recommend the use of the agile framework. This methodology is described as:

'The Agile methodology is a project management approach that involves breaking the project into phases and emphasizes continuous collaboration and improvement. Teams follow a cycle of planning, executing, and evaluating.' [7]

By this description our phase mappings would be, Planning = (Plan, Design), Executing = (Develop, Test and Deploy) and Evaluating = (Review). The agile manifesto describes the key concerns of agile.

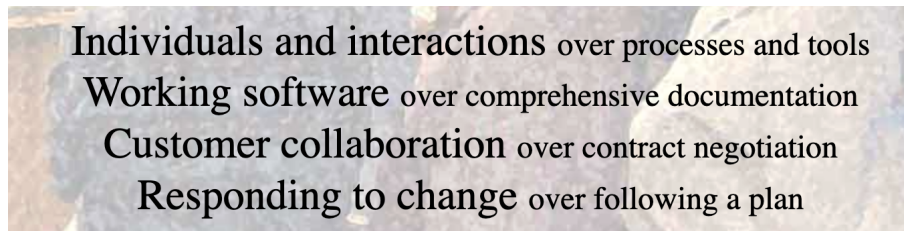


Figure 2: Agile methodology key principles [8]

Business goals 1 and 3 lend themselves to a more agile approach. Approaches such as waterfall can be *'largely dependent upon how much work is done upfront, especially research'* [9]. This research can take a lot of time, and with new students starting in 3 months, a large opportunity could be missed. This point is also linked to the agile manifestos 'Working software over comprehensive documentation' idea. In addition to this, ACME wants to be gain its old customer base back, agile encourages 'Customer collaboration'. Anthill reported that *'71% of customers feel frustrated when an experience is impersonal or company focussed.'* [10]. By interfacing with the customer/user of the application ACME could build good will with it's customer as well as make a better product for the target audience in the long run.

3 Stakeholders and Use Cases

Before writing requirements it's important to know the stakeholders of the company, as well as who will be affected by the changes that are planned. In this section I will identify stakeholders, plot out some use cases using UML use case diagrams and finally talk about potential conflicts of interest between stakeholders.

3.1 Identifying stakeholders

To help identify stakeholders I have created a viewpoint diagram that can be seen in the below figure.

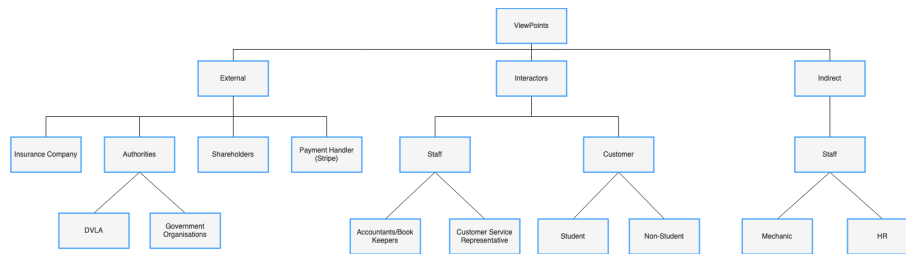


Figure 3: Viewpoint diagram to help identify stakeholders.

I have broken down the stakeholders into 3 categories, External, Interactors and Indirect, which describe their exposure to the new systems.

External - This group of people will not part of ACMEs staff, however do have an interest/role in the system/company. Insurance, and both stakeholders under 'Authorities' are needed for the system to function, insurance for the cars, and authorities to check the details of a car and renter are valid. The payment handler, I give the example of Stripe [11] will also be a part of the system but will not directly interact with it. Finally shareholders of a company always have an interest in change due to the expectation of profit.

Interactors - Interactors are people who will use the new system directly. I have separated these out into staff and customers. Customer is separated into two smaller classes, student and non-student. I did this to reflect one of the business goals of ACME, which is to *cater to the student demographic*, in addition to this stakeholder potentially getting benefits due to their situation. The other branch of interactors is staff. These are the people within the company who will interact with the new systems, like adding cars to the database (Customer Service Representative) and being able to easily query order/financial information (Finance/Accounting).

Indirect - These are employees of ACME who will not directly interact with the new interfaces. Their jobs will stay the same as prior. Despite this I thought it a good idea to mention them as they could be the target for future upgrades

to systems. In addition to this the due to the increased productivity of the new system, a mechanic may be expected to do more work, which may not be feasible.

3.2 Use case diagrams

Taking the above stakeholders I have created a use case diagram to show their roles in the system. I will discuss each actor individually here but a full use case diagram can be seen in **Appendix B**, including crossovers between actors.

3.2.1 Customer Service Representative

The CSR refers to the member of staff that interfaces with the customer. They will be able to do all the same activities they did before, however now using the updated system. I have decided to continue to allow telephone bookings and enquiries to be made. Most likely the new system will be adopted by most people, however for people who aren't comfortable with *'21% of Britain's population lack basic digital skills'* [12].

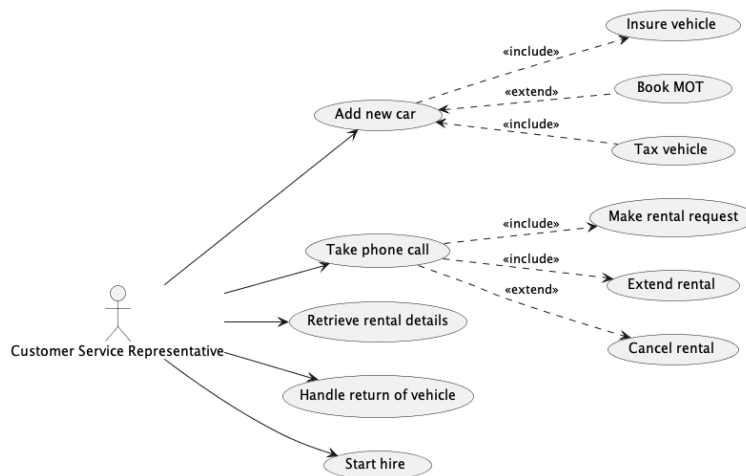


Figure 4: Use case diagram for customer service representative.

3.2.2 Customer

I put students into a more general category of customer for the sake of the use case. Although they may be able to do different actions in the future that is not the current scope of this. The customer can still extend, cancel and pay for rental, as well as, of course renting and returning a car. They will now also be able to login/register on the new system, meaning they will no longer have to give their details multiple times. They will also be able to browse all available cars for rental on the new system.

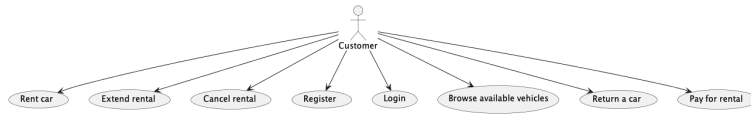


Figure 5: Use case diagram for customer.

3.2.3 Finance/Accounting

The finance/accounting department are responsible for generating tax information. This has been an issue in the past where receipts and order details have gone missing. The new system hopes to fix this by allowing all this data to be inputted into a database. From this the department will be able generate earning reports and profits and loss statements. This help ACME towards business goal 4.

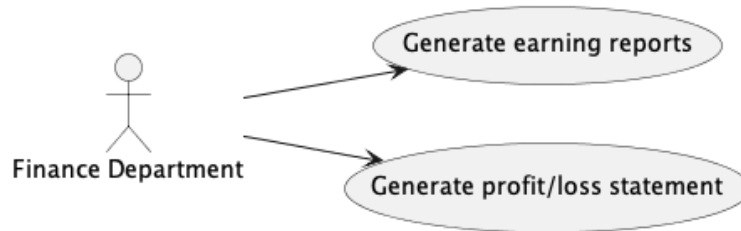


Figure 6: Use case diagram for finance/accounting department.

3.2.4 Insurance Company

The insurance company is an external stakeholder that ACME staff will have to interact with. They are responsible for insuring the cars and are linked to the Customer Service Representative in this task.

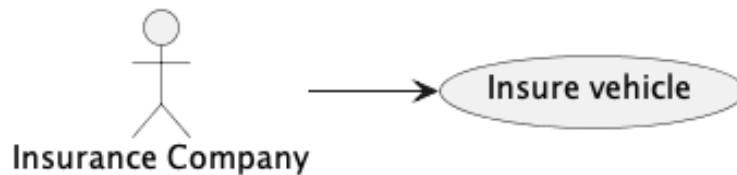


Figure 7: Use case diagram for insurance company.

3.2.5 Mechanic

The mechanic is in charge of making sure the cars are suitable to rent. For this reasons a mechanic can service a car, and repair cars when needed. In some cases parts will have to ordered in when repairing a car, so an optional include

has been added to generate a receipt for these costs. This would currently be done paper based, however this could be rolled into the new system to make all expenses/profits being in the same place, making it easier to do things such as tax returns and profit/loss accounts.

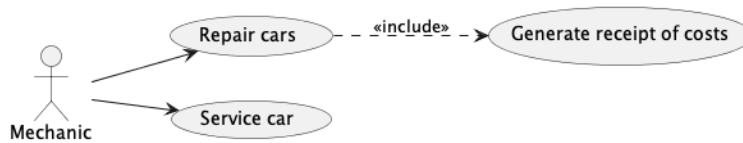


Figure 8: Use case diagram for mechanic.

3.2.6 Payment Service (Stripe)

The payment service is solely responsible for handling payments. They can take a payment for an order and they can validate a payment. When validating a payment there is a chance that it fails, therefore they must inform us if this happens.



Figure 9: Use case diagram for payment service provider.

3.3 Use case considerations

Text here

4 Requirements

Requirements

5 Design

Design Intro here

5.1 Adding a new user

Text

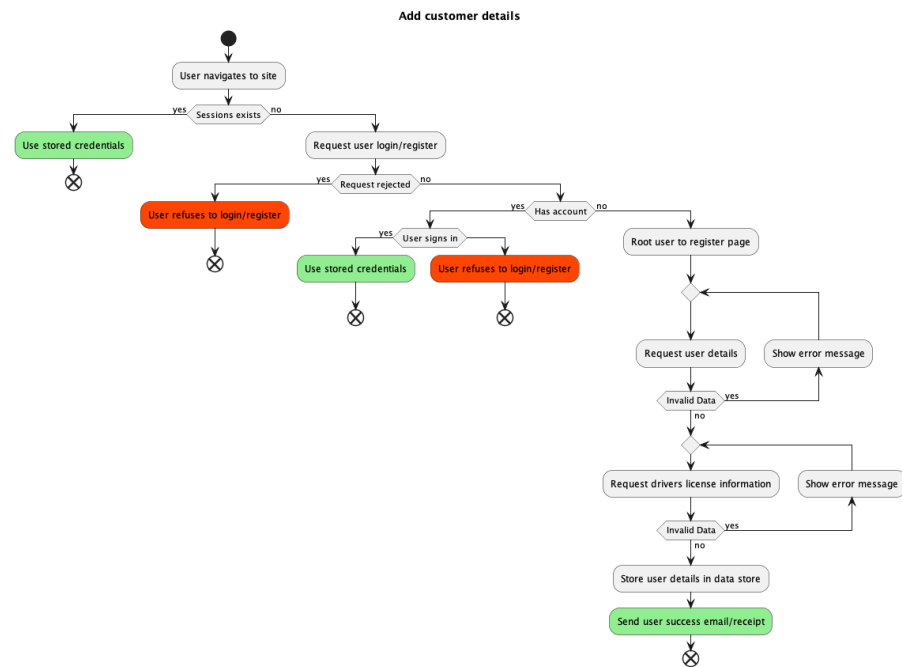


Figure 10: Activity diagram for adding a new user, this includes sign in/up.

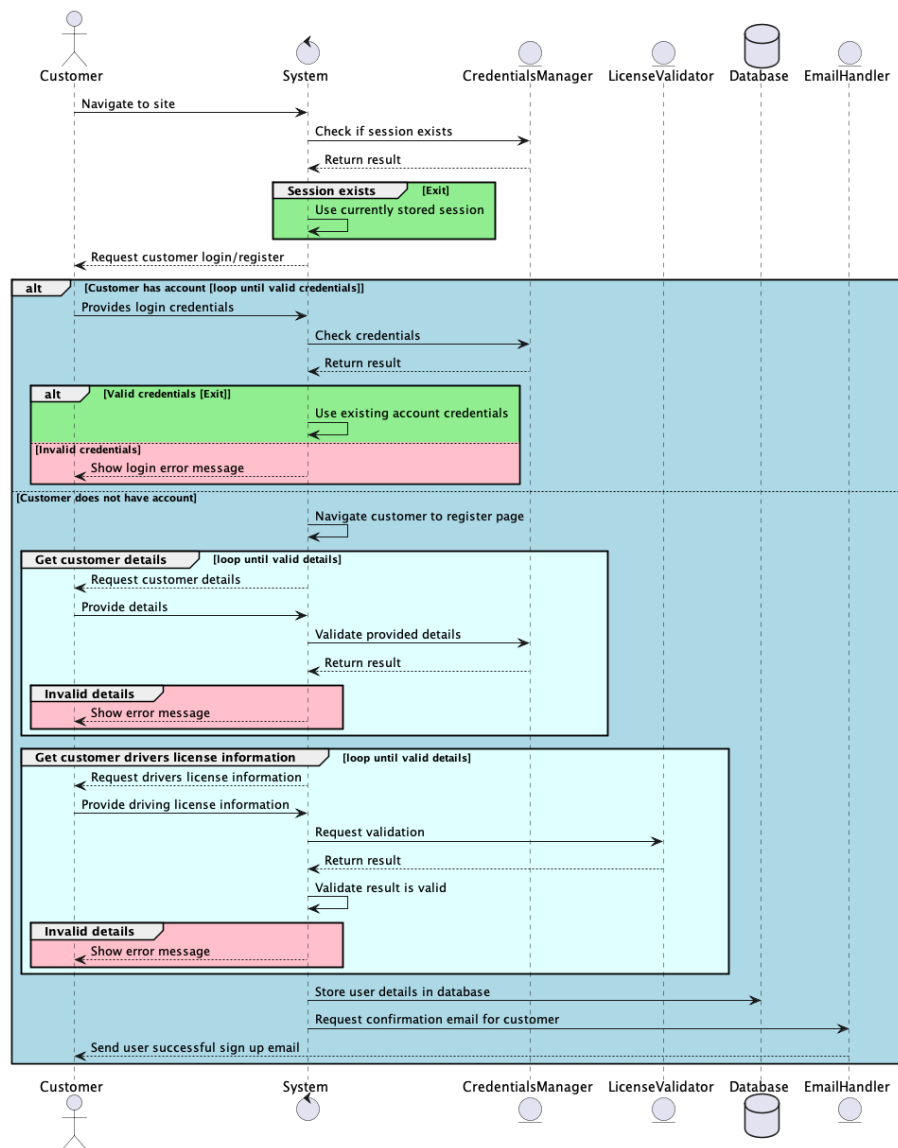


Figure 11: Sequence diagram for adding a new user, this includes sign in/up.

5.2 Taking a payment

Text

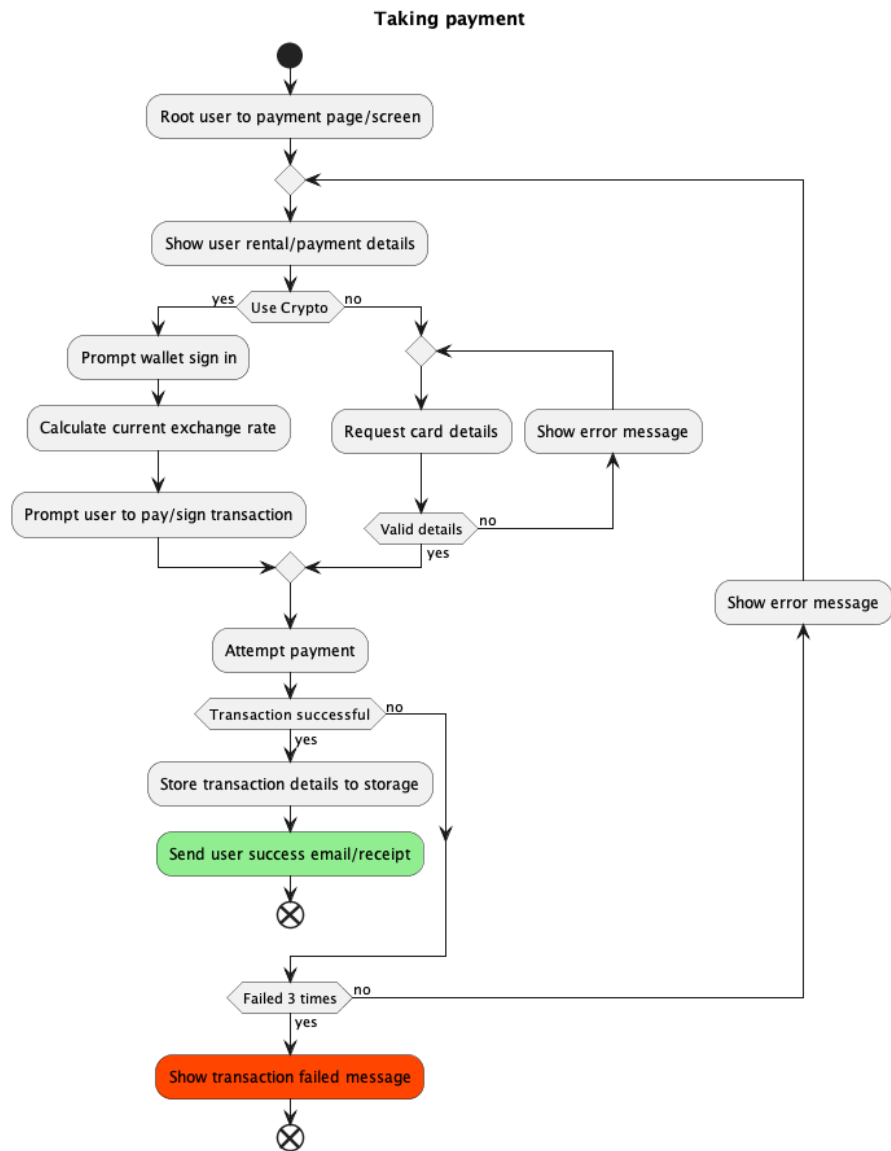


Figure 12: Activity diagram for taking a payment.

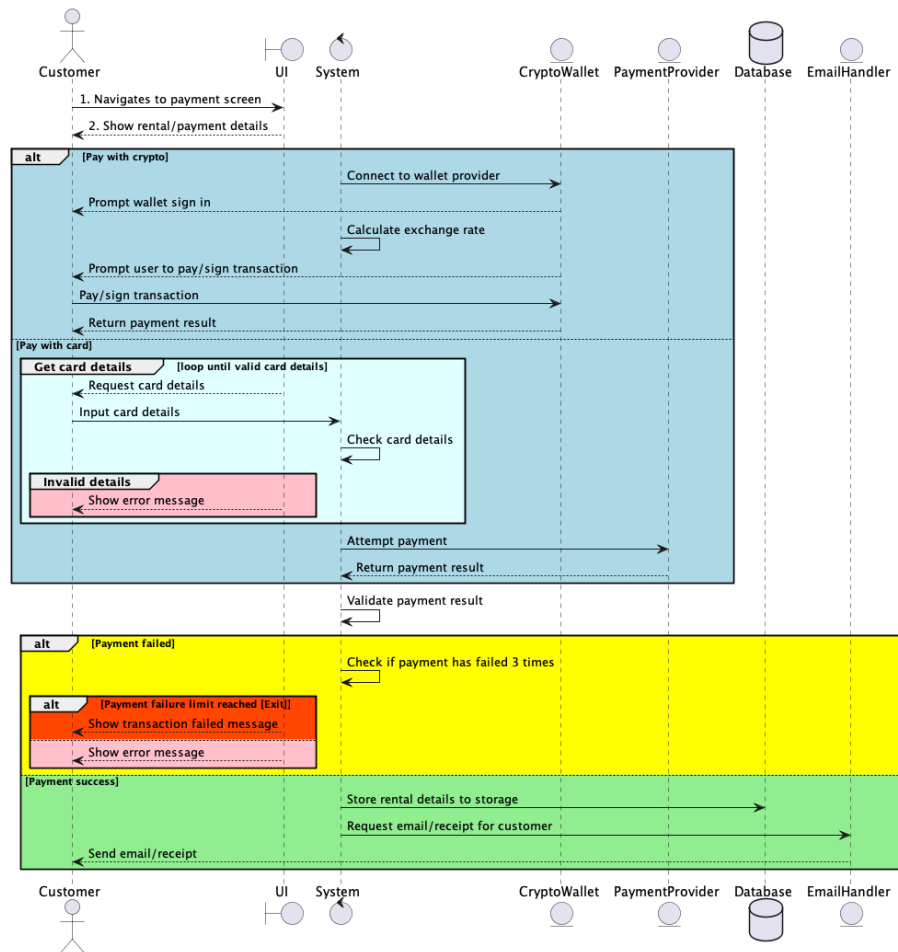
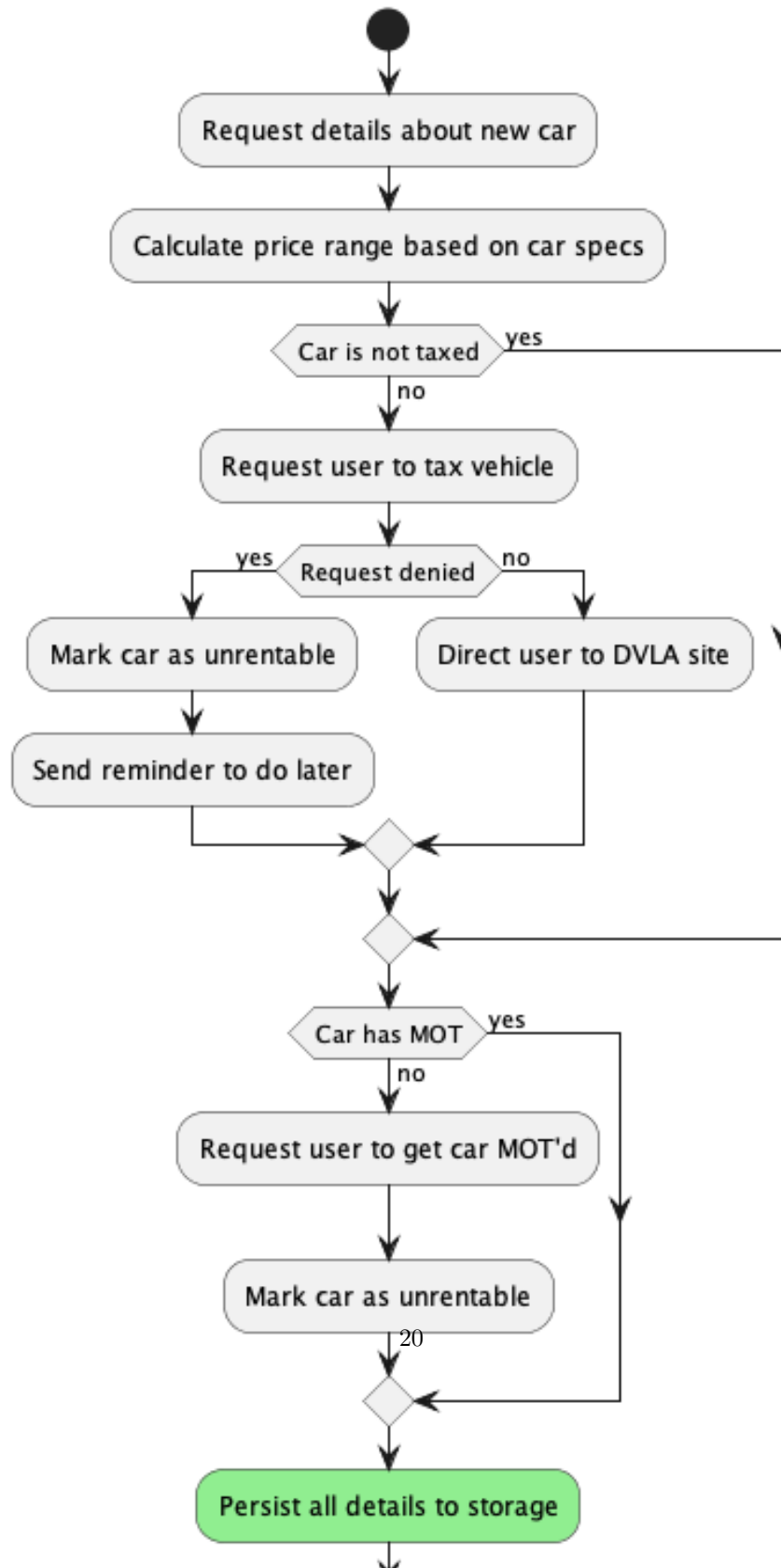


Figure 13: Sequence diagram for taking a payment.

5.3 Adding a new car

Text

Adding a new car to the system



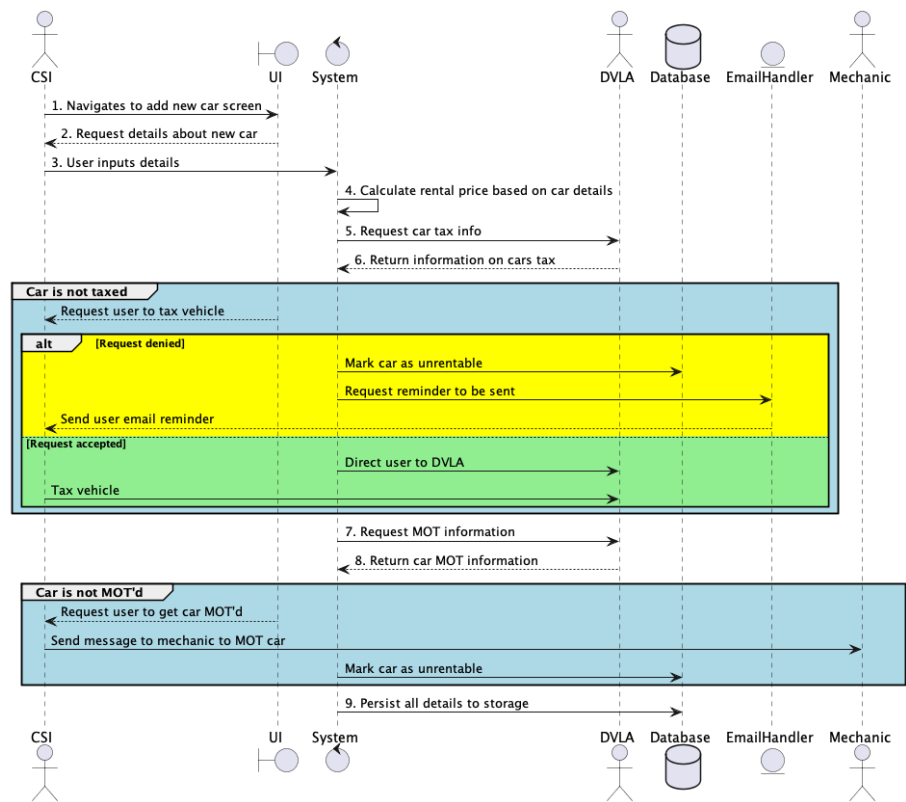


Figure 15: Sequence diagram for adding a new car to the system.

6 Conclusion

Conclusion

7 References

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8 Appendix

8.1 Appendix A - An example of a 7 phased SDLC

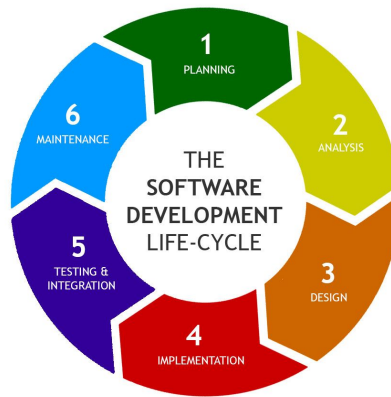


Figure 16: SDLC with 7 phases [5]

8.2 Appendix B - Use case diagram with all actors

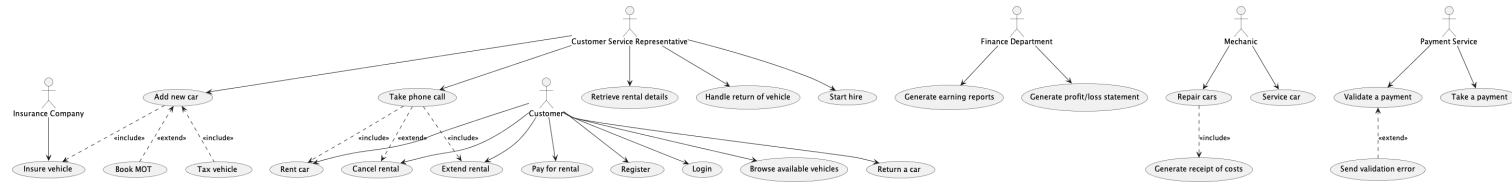


Figure 17: Full use case diagram, showing all actors.