Software Architecture Document

Version 2.0

for

Vehicle Renting System

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Document history

Date	Version	Description	Author
06/10/2019	V2	missing parts and format	all team members
05/10/2019	V1	Use Case realization and sequence diagrams	all team members

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1. Introduction

Vehicle Rental System is a web application which includes reserving ,renting and returning vehicles. The Software Architecture Document is needed on developing the web application, the significant decisions are captured here in the Software Architecture Document, it is the map

of the software. We use it to see and understand the software's modules and components before digging into the code.

Purpose

The Software Architecture Document provides a comprehensive architectural overview of the system, using a different architectural views to show different aspects of the system, the 4+1 view model that contains logical view for the designers to design a system that will provide the proper functionality for the end user, development view for programmers that basically deals with source code, executable files and component diagram for the implementation, process view for integrators that focus on how the system components communicate during the run time, physical view for deployment managers that considered with the physical connections between these components, and use case views the audiences are all the stakeholders of the system including the end users that illustrates the different scenarios and paths for the user to interact with the system.

Scope

The Software Architecture Document applies to all stakeholders that meant to design and implement the functionality of the clerk in our vehicle rental system.

Definitions, acronyms, and abbreviations

Provides the definitions of all terms, acronyms, and abbreviations required to properly interpret the Software Architecture Document.

project's Glossary

Abbreviation	Definition
SAD	Software Architecture Document, is a set of practices, techniques and types of representations used by software architects to record a software architecture. It is a modeling activity (Software architectural model). Architecture models can take various forms, including text, informal drawings, diagrams or other formalisms (UML).

UML	Unified Modeling Language, is a standardized modeling language enables developers to specify, visualize, construct and document the artifacts of a software system.
UC	Use Case, is a list of actions or event steps typically defining the interactions between a role (an actor in UML) and a system to achieve a goal. The actor can be a human, machine or other external system.

2. Architectural representation

Describe the top-level architectural style of the system and the view model you will adopt. Additionally describe what each individual view will provide. Many enterprise software systems are modeled using the 4+1 view illustrated in Figure 1.

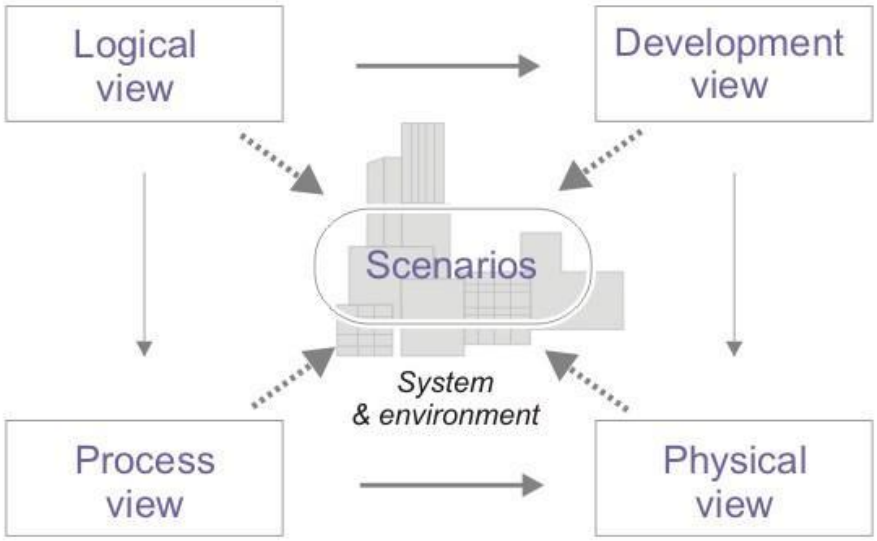


Figure 1: The 4+1 view model.

1. **Logical view** :It supports and provides clarification for the functional requirements, what services the system should provide to its end users, in this phase we try to get better knowledge of problem by talking to domain experts and other stakeholders, whatever decision taken here are independent of implementation decision. We elucidate logical view using Class diagram.

2. **Development view** :The development view focuses on organization of software modules in actual software. the software is organised as layers, each layer providing service to layer

above it. we allocate effort required for development and maintenance in this view. it is represented using package diagram.

3. **Process view** : It is a dynamic view and it focuses on what will happen during run-time and also on non-functional requirements like performance. It addresses issues of concurrency and distribution, fault tolerance, process synchronization etc. It is explained using activity diagram.

4. **Physical view**:It focus on mapping software on to existing hardware.All Non functional requirements are taken care off in this view like performance, scalability etc. Its represented using deployment diagram.
5. **Use case view** (also known as Scenarios) : This view shows the interactions between actors/objects and the processes. In this view, we use a set of use cases or scenarios to depict the description of the system architecture.

6. **Data view** (optional): Audience: Data specialists, Database administrators. Describes the architecturally significant persistent elements in the data model . Related Artifacts: **Data model**.

7. Architectural requirements: goals and constraints

Requirements are already described in SRS. In this section describe *key* requirements and constraints that have a significant impact on the architecture.

Functional requirements (Use case view)

Refer to Use Cases or Use Case scenarios which are relevant with respect to the software architecture. The Use Cases referred to should contain central functionality, many architectural elements or specific delicate parts of the architecture.

The overview below refers to architecturally relevant Use Cases from the Use Case Model (see references).

Use cases realization

Source	**Name**	**Architectural relevance**	**Addressed in:**
Use case UC1 in SRS	View Catalog	Clerk: Wants to view the vehicle CatLog	9.4.1 (Use case realization) UC1

Source	**Name**	**Architectural relevance**	**Addressed in:**
Use case UC2 in SRS	View Vehicle Details	Clerk: Wants to view the vehicle CatLog and view a particular vehicle detail	9.4.2 (Use case realization) UC2

Source	**Name**	**Architectural relevance**	**Addressed in:**
Use case UC3 in SRS	Sorting/Filtering	Clerk: Wants to search the desired vehicle based on Sorting and filtering criteria	9.4.3 (Use case realization) UC3

Source	**Name**	**Architectural relevance**	**Addressed in:**
Use case UC4 in SRS	create Client	Clerk: wants to create a new client record.	9.4.4 (Use case realization) UC4

Source	**Name**	**Architectural relevance**	**Addressed in:**
Use case UC5 in SRS	Edit Client	Clerk: Wants to edit the existing client record	9.4.5 (Use case realization) UC5

Source	**Name**	**Architectural relevance**	**Addressed in:**
Use case UC6 in SRS	Delete Client	Clerk: Wants to delete a client	9.4.6 (Use case realization) UC6

Source	**Name**	**Architectural relevance**	**Addressed in:**
Use case UC7 in SRS	makeReservationOrRental	Clerk: Requested to create a reservation or rental	9.4.7 (Use case realization) UC7

Source	**Name**	**Architectural relevance**	**Addressed in:**
Use case UC8 in SRS	Cancel/Return	Clerk: Requested to cancel a reservation/return a rental	9.4.8 (Use case realization) UC8

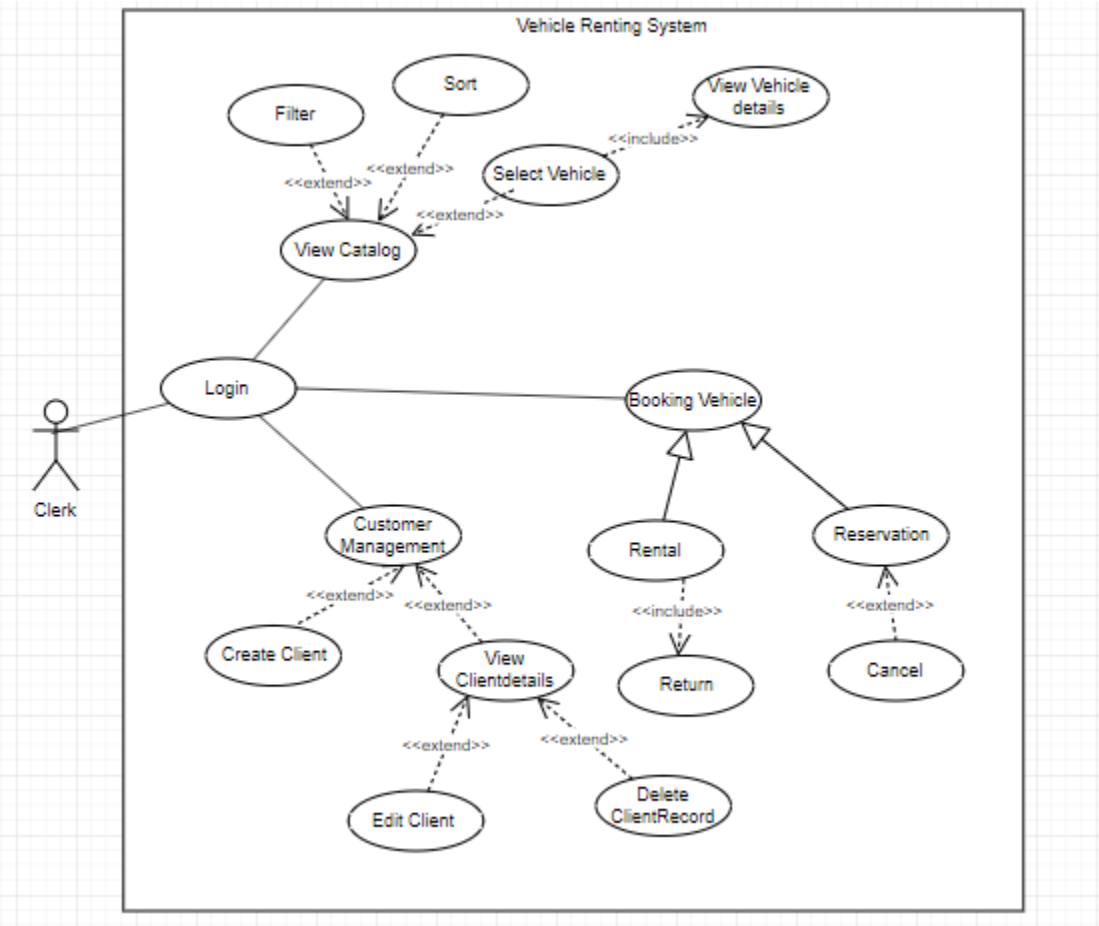
Non-functional requirements

Describe the architecturally relevant non-functional requirements, i.e. those which are important for developing the software architecture. Think of security, privacy, third-party products, system dependencies, distribution and reuse. Also environmental factors such as context, design, implementation strategy, team composition, development tools, time to market, use of legacy code may be addressed.

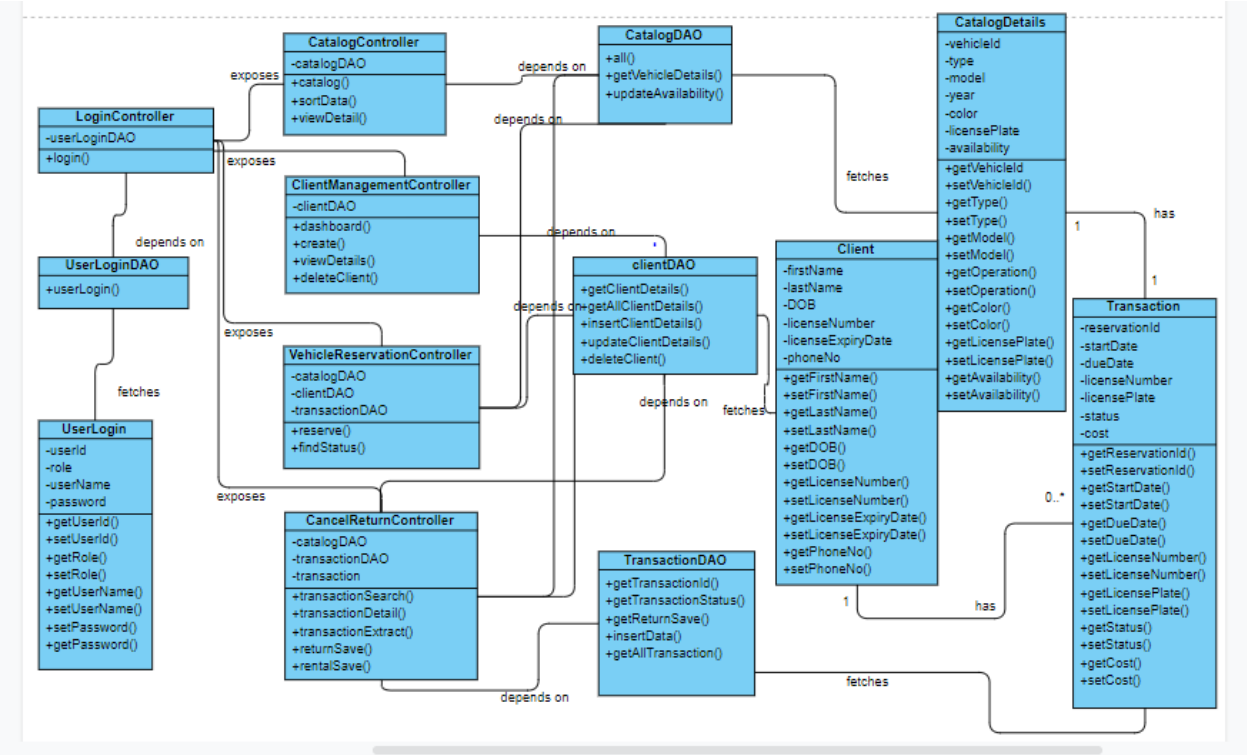
Usually, the non-functional requirements are already in place and can be referenced here. This document is not meant to be the source of non-functional requirements, but to address them. Provide a reference per requirement, and where the requirement is addressed.

8. Use case view (Scenarios)

The scenarios (or functional view) represent the behavior of the system as seen by its actors. Use case scenarios describe sequences of interactions between actors and the system (seen as a black box) as well as between the system and external systems the *UML use case diagram* is used to capture this view.



9. Logical view



9.1 Layers, tiers etc.

Describe the top-level architecture style. Deploy a *UML class diagram*.

9.2 Subsystems

Describe the decomposition of the system in subsystems and show their relation.

9.3 Architecturally significant design packages

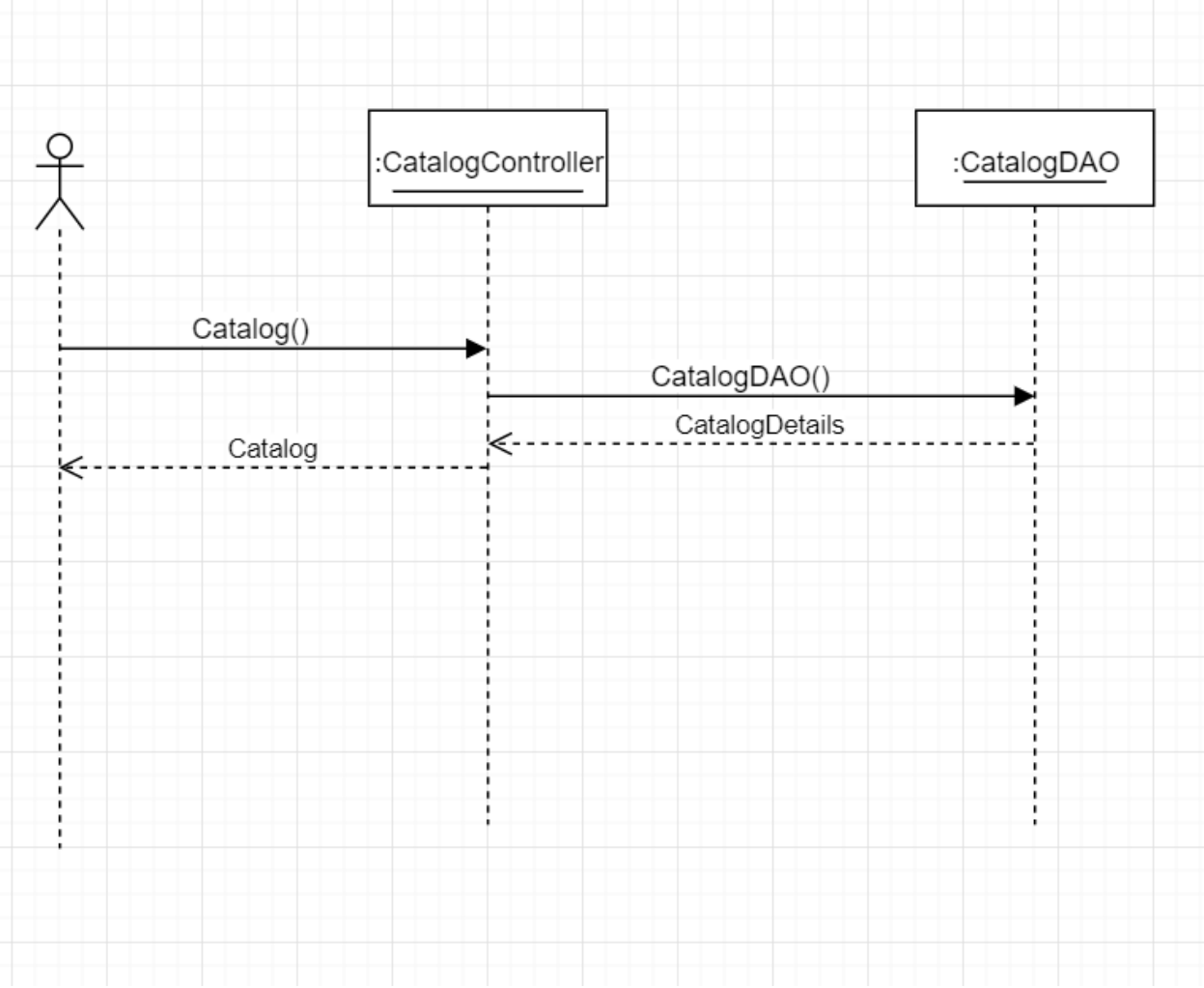
Describe packages of individual subsystems that are architecturally significant. For each package, include a subsection with its name, its brief description, and a diagram with all significant classes and packages contained within the package.

9.4 Use case realizations

In this section you have to illustrate how use cases are translated into *UML interaction diagrams*. Give examples of the way in which the Use Case Specifications are technically translated into Use Case Realizations, for example, by providing a sequence-diagram. Explain how the tiers communicate and clarify how the components or objects used realize the functionality.

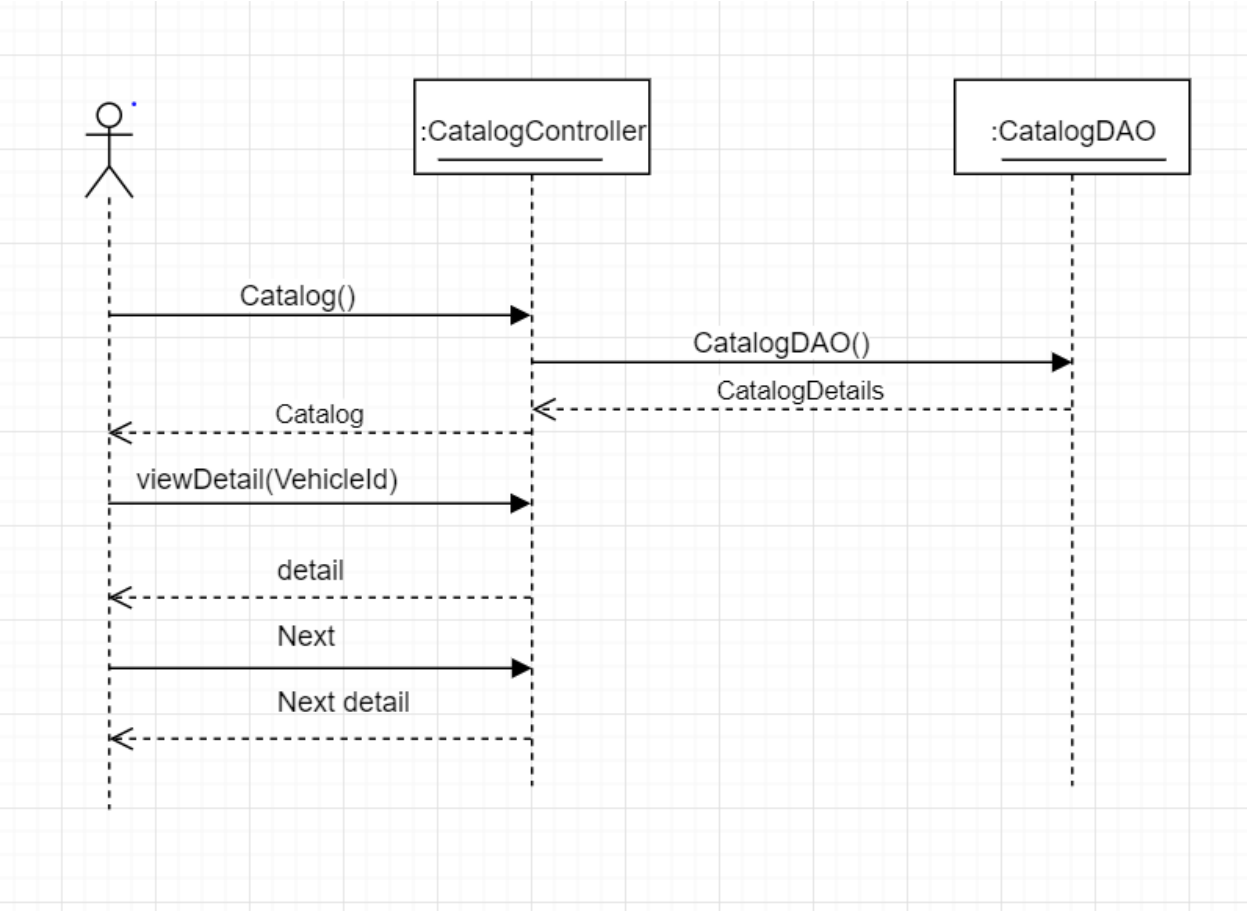
9.4.1 UC1: 1. The instance of List<Catalog> cl is created.

2. cl was associated with Vehicle details table.



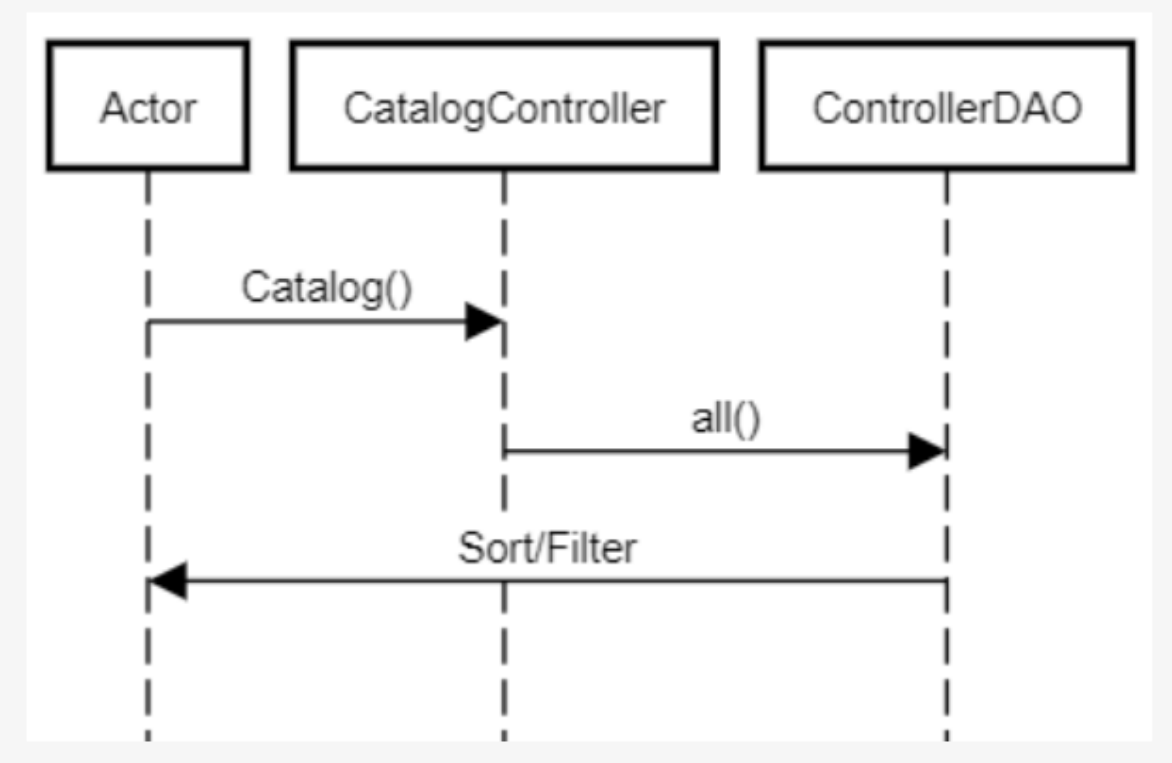
9.4.2 UC2: 1. he instance of List<Catalog> cl is created.

2. cl was associated with Vehicle details table.



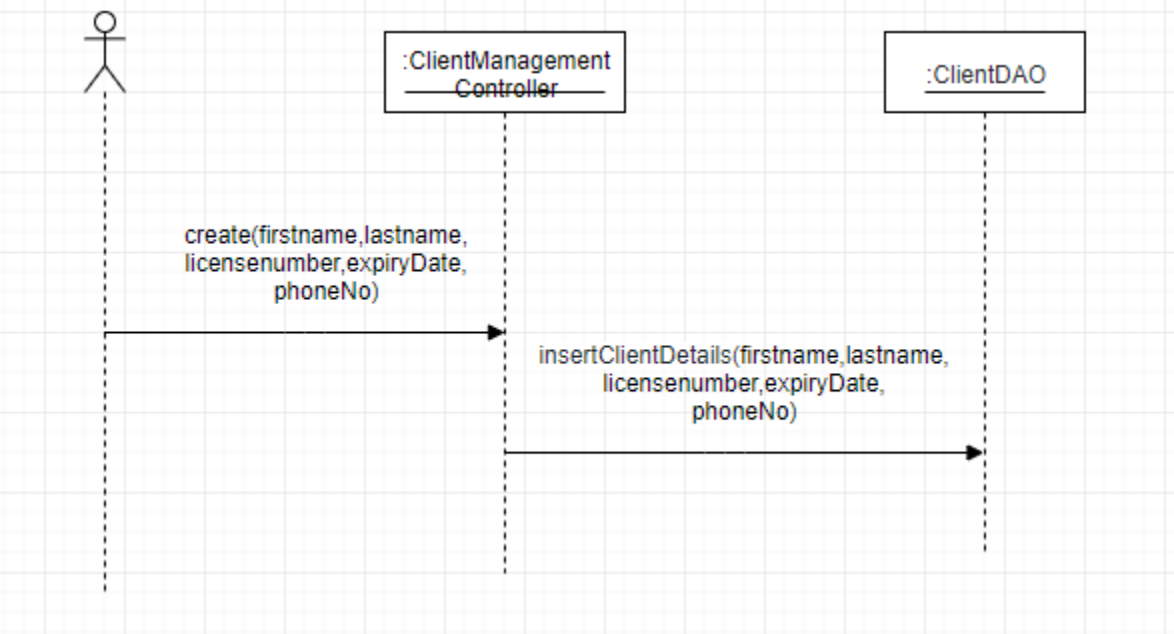
9.4.3 UC3: 1. The instance of catalog is created

2. cl is associated with vehicle sorting/filtering details



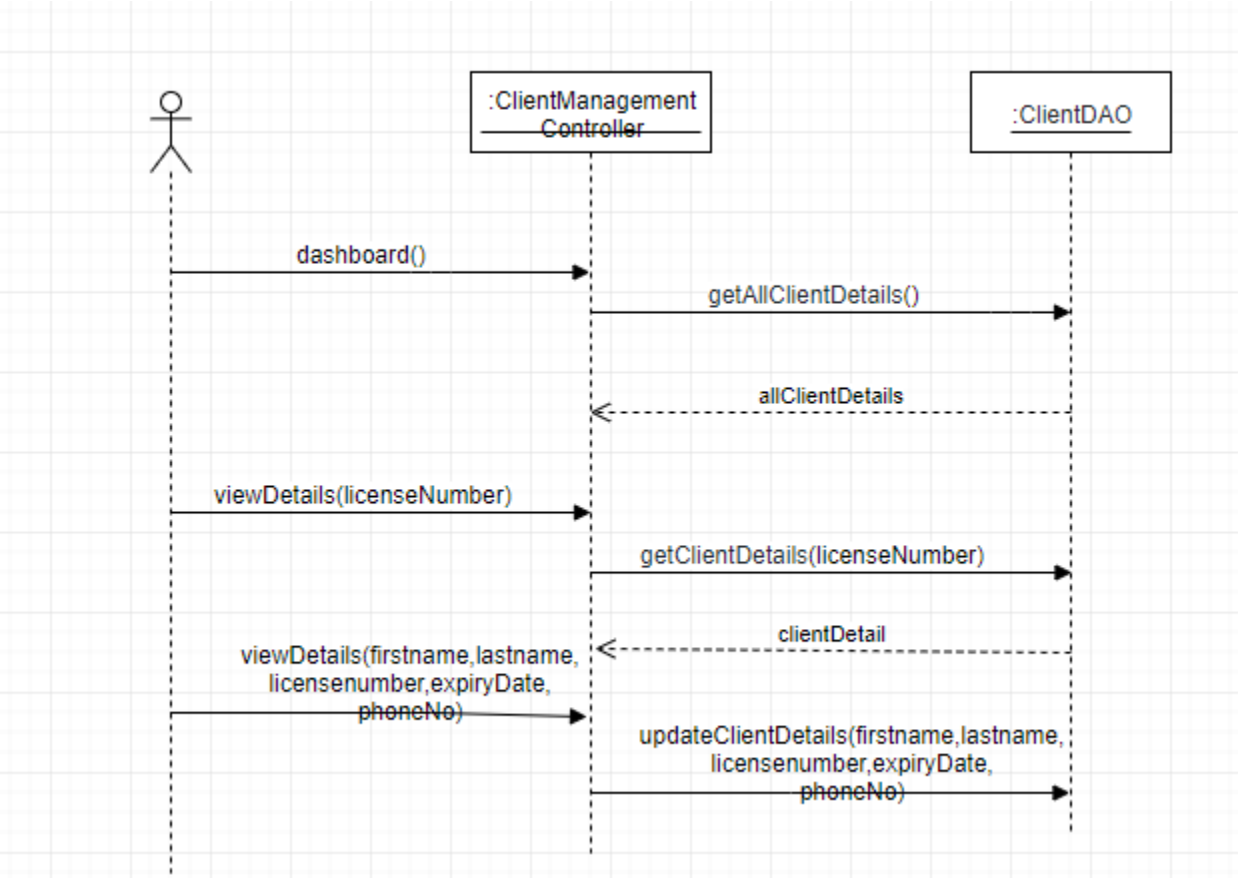
9.4.4 UC4: 1.With all the details instance of client will be created.

2.The details in the client instance will be added into database.



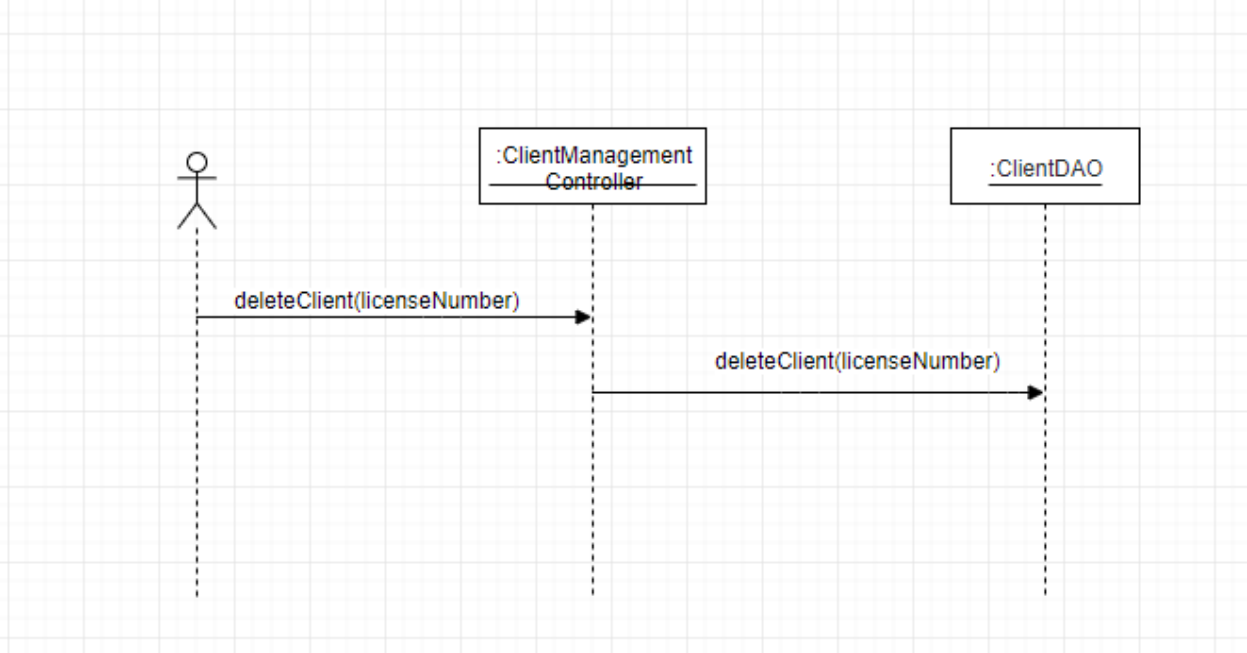
9.4.5 UC5: 1.With all the modified details instance of client will be created.

2.The details in the client instance will be added into database.



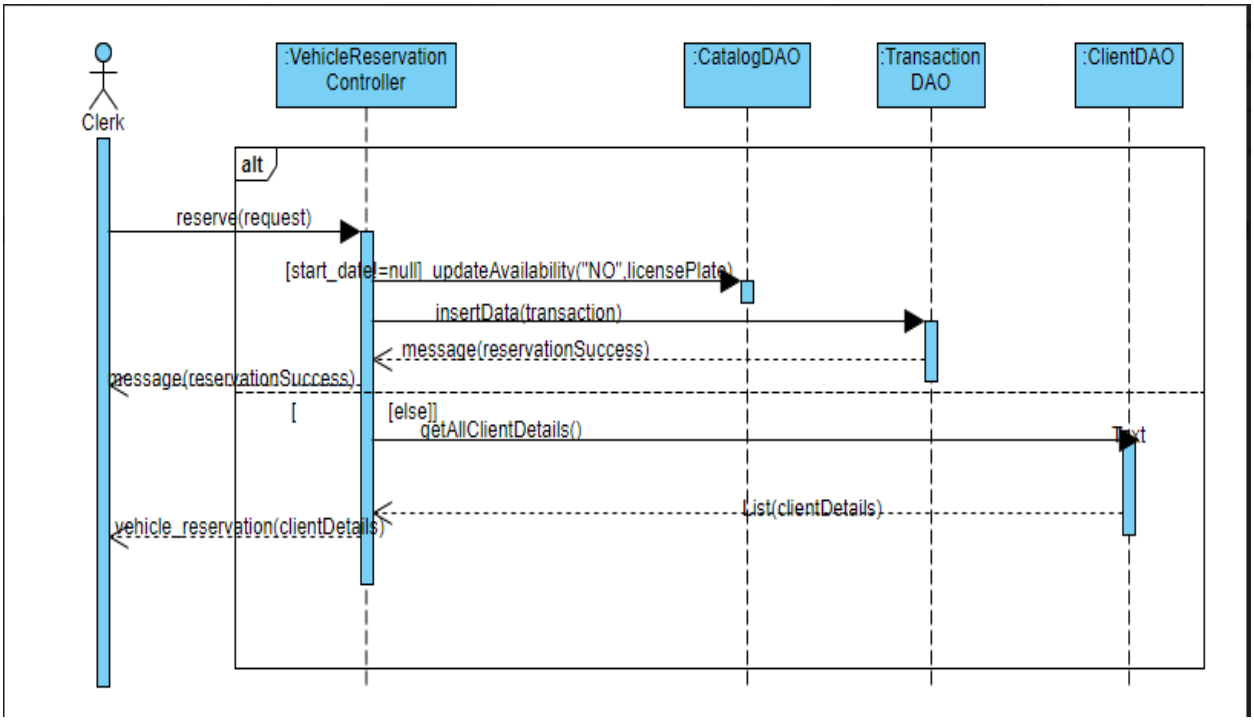
9.4.6 UC6: 1,The instance of client will be deleted.

2,client record will be deleted from the database.



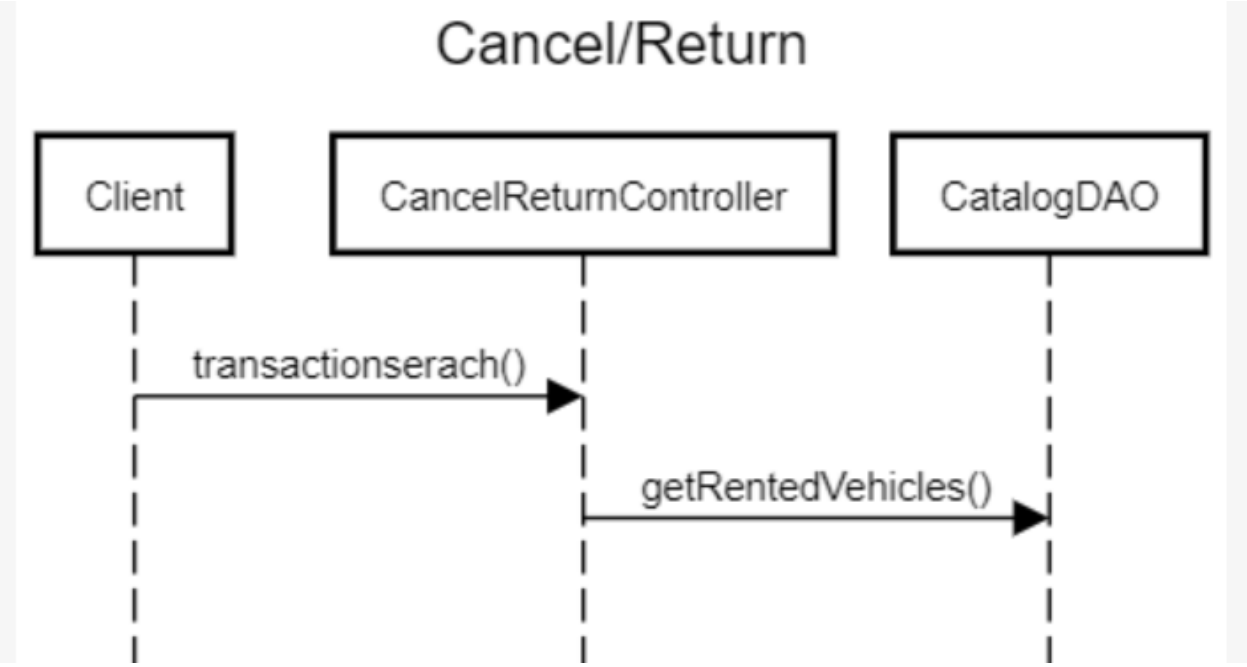
9.4.7 UC7: 1. A reservation/rental record will be created.

2. The vehicle availability will be changed to “NO”.

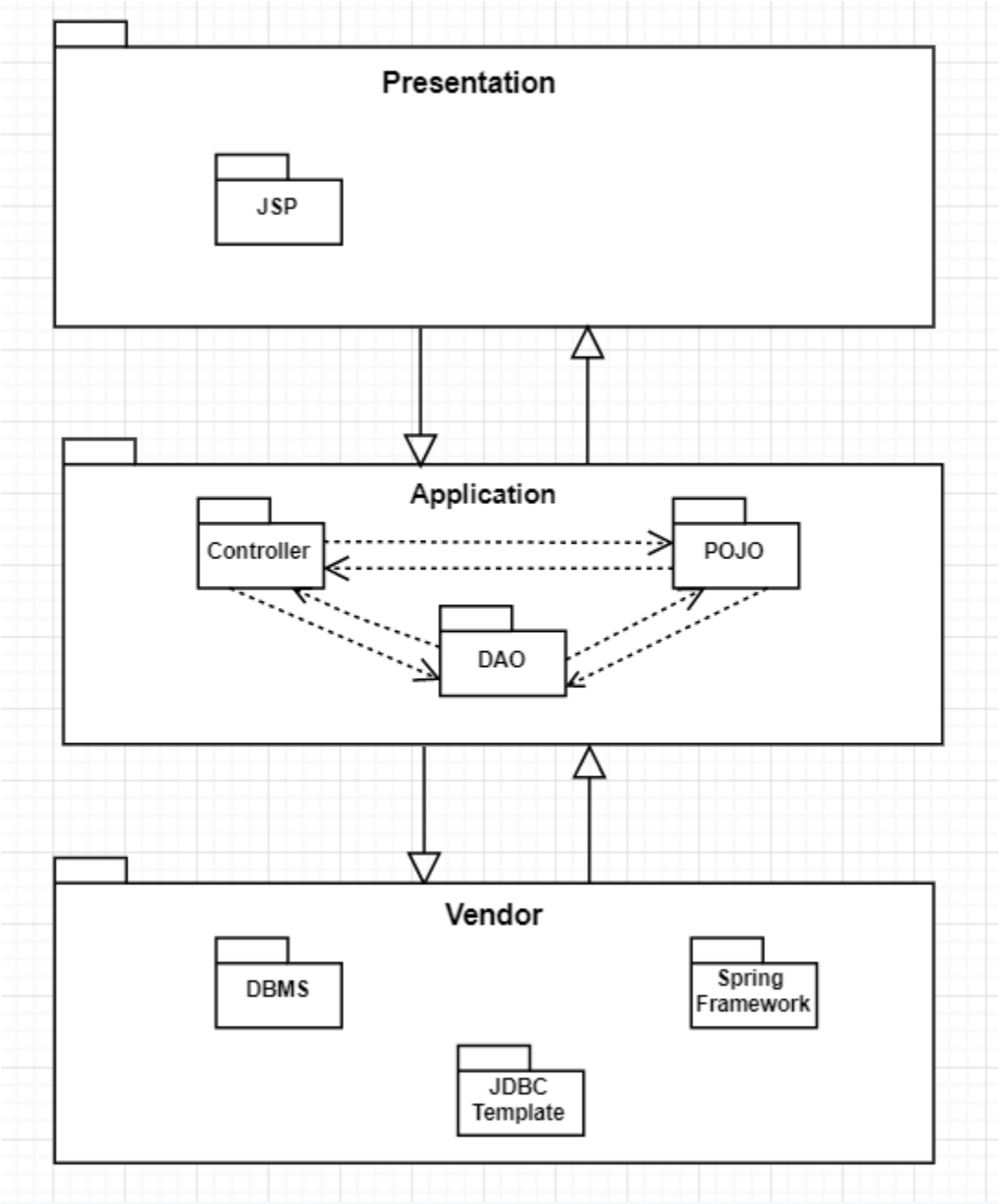


9.4.8 UC8: 1. A Cancel/return record will be created.

2. The vehicle availability will be changed to “YES”.



10. Development (Implementation) view



Reuse of components and frameworks

Describe any third-party or home-made components and frameworks that will be reused.

11. Process view

The process view deals with the dynamic aspects of the system, explains the system processes and how they communicate, and focuses on the runtime behavior of the system.

12. Deployment (Physical) view

The deployment (or physical) view illustrates the physical components of the architecture, their connectors and their topology. Describe the physical network and hardware configurations on which the software will be deployed. This includes at least the various physical nodes (computers, CPUs), the interaction between (sub)systems and the connections between these nodes (bus, LAN, point-to-point, messaging, SOAP, http, http). Use a *UML deployment diagram* to capture this view.

Name	**Type**	**Description**
Name of the node.	Node type.	Technical specifications.

13. Data view (optional)

An enterprise software system would additionally require a data view. The data view describes the data entities and their relationships. Deploy an *Entity-Relationship* (ER) *Model* to represent this view. Note that the ER model is not part of the UML specification. Additionally you can deploy a UML class diagram to represent the data view where classes would correspond to data entities.

14. Quality

A description of how the software architecture contributes to the quality attributes of the system as described in the ISO-9126 (I) standard. **For example**: The following quality goals have been identified:

Scalability:

- Description : System's reaction when user demands increase
- Solution : The system supports several workload management techniques.

Reliability, Availability:

- Description : Transparent failover mechanism, mean-time-between-failure
- Solution: All possible error exceptions are handled to check that all inputs are in the correct formats using try-catch mechanism and supported by several test cases.
-

Portability:

- Description : Ability to be reused in another environment
- Solution : The system is designed to be easily moved from one computing environment to another, such as browsers and different operating systems.

Security:

- Description : Authentication and authorization mechanisms
- Solution : The system has a login form to verify if the clerk has the authorization for using the system or not, it only allows the registered predefined clerks to use the application, so no malicious or theft could occur.