Route Navigator Design Manual

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Introduction

This report is to outline the design of the Route Navigator.

The document contains the following sections:

- System Architecture - The high level system architecture
- Components - Components which are used in this project
- Tools and Technologies - The tools and technologies which are used to implement features for this project
- System Sequence Diagrams - Diagrams which show the flow of data through each of the use cases listed in the Functional Specification
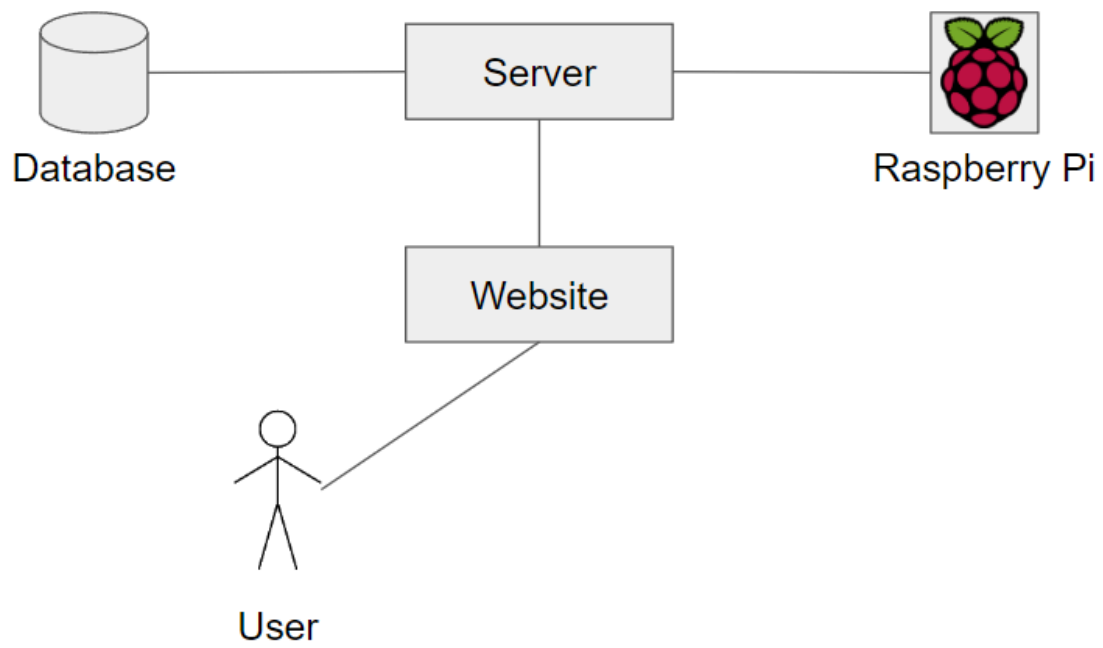
System Architecture

Figure 1, System Architecture

Components

Raspberry Pi 4B

The computer which controls the **Sunfounder PiCar-V**, allows for communication between the server and the car.

Sunfounder PiCar-V

The vehicle which the users are going to control by sending commands to the server and the server sending the commands to the **Raspberry Pi**.

RPLidar A2M8

The device which scans 360 degrees around it firing light beams which return the distance and angle where the light beam has hit. Hundreds of light beams are fired per scan.

It is used to estimate the position and orientation of the **Sunfounder PiCar-V.**

Tools and Technologies

Typescript

TypeScript is a strongly typed programming language that builds on JavaScript, giving you better tooling at any scale. (Typescript, 2012)

Svelte

Svelte is a frontend component framework which uses a compiler to turn components into HTML, Javascript and CSS. Since it uses a compiler, the web application is built beforehand unlike during runtime where it could slow the application down.

It is used as an alternative to React. The syntax of Svelte is simple and the compiled web application is quick

C++

C++ is a "cross-platform language that can be used to create high-performance applications", (W3Schools, 1999). It is an object oriented language which allows for developers to create classes similar to Java. When building the application, the C++ code gets compiled into machine code.

This is the backend language of the Route Navigator. The language is extremely quick and allows a higher level of control over the car.

Xmake

Xmake is a cross-platform build utility which uses Lua as its language, (Xmake, 2016). It allows developers to include packages made by other developers similar to Vcpkg and is a build system similar to CMake with Lua as its syntax.

Xmake allows developers to easily switch C++ versions and supports many platforms.

Drogon

Drogon is a C++ web framework that is asynchronous and fast, (Drogon, 2018). It is ranked 43 on the Techempower web frameworks, (Techempower, 1997).

The syntax of Drogon is modern and primarily uses C++ 17.

MariaDB

MariaDB is a relational database. "It's made by the original developers of MySQL and guaranteed to stay open source", (MariaDB, 2009)

MariaDB is a replacement for MySQL and has more up to date features.
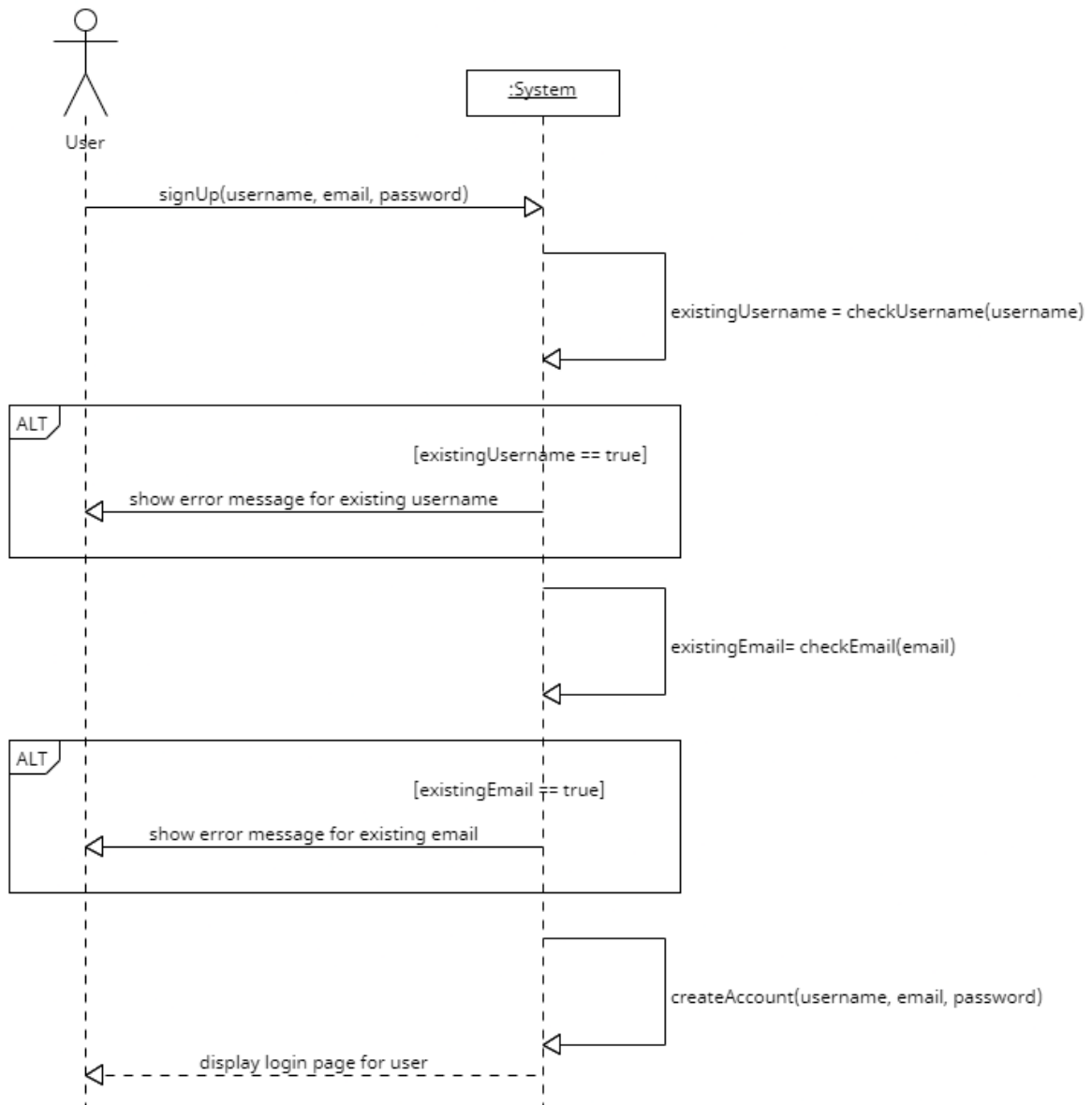
System Sequence Diagrams

Sign Up

Figure 2, Sign Up System Sequence Diagram

Login
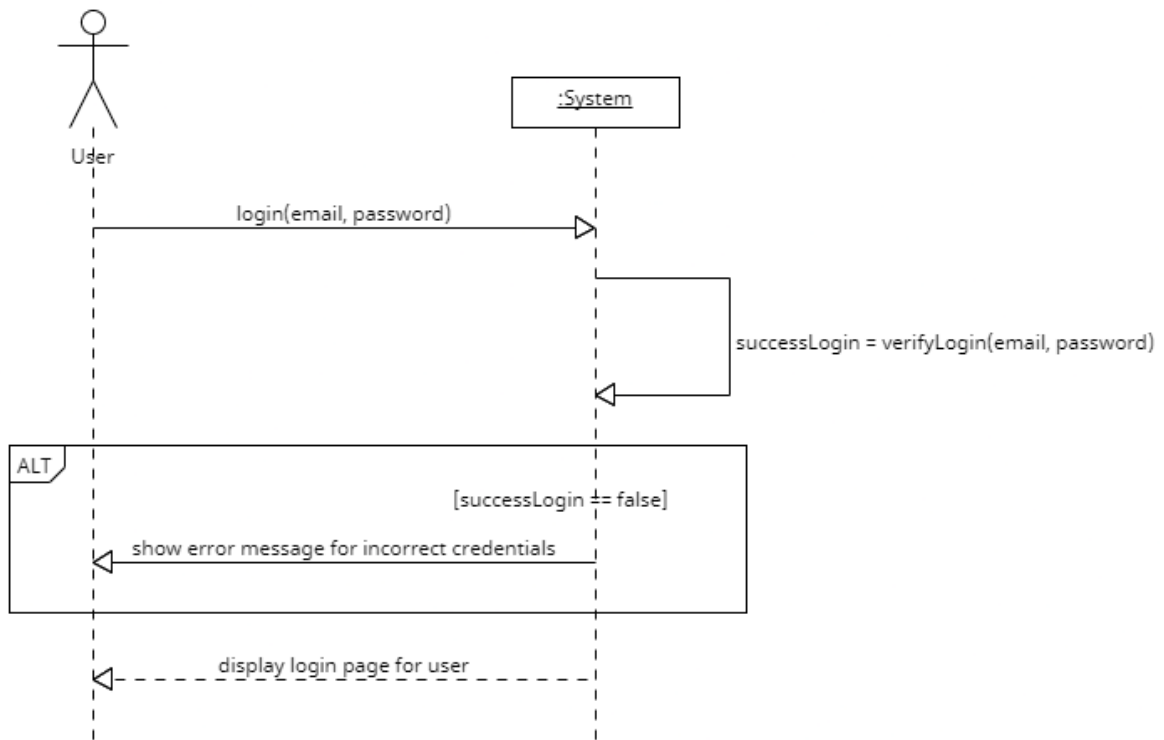
Figure 3, Login System Sequence Diagram
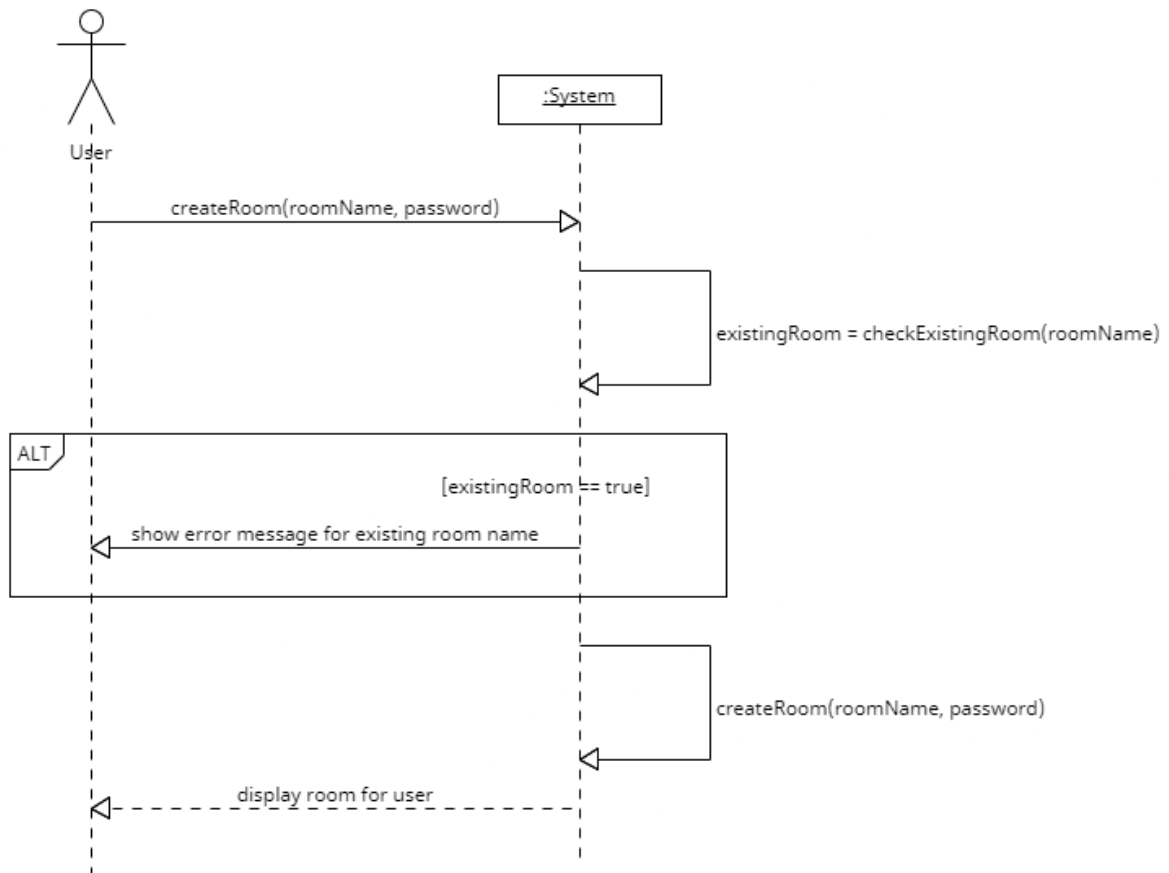
Create Room

Figure 4, Create Room System Sequence Diagram
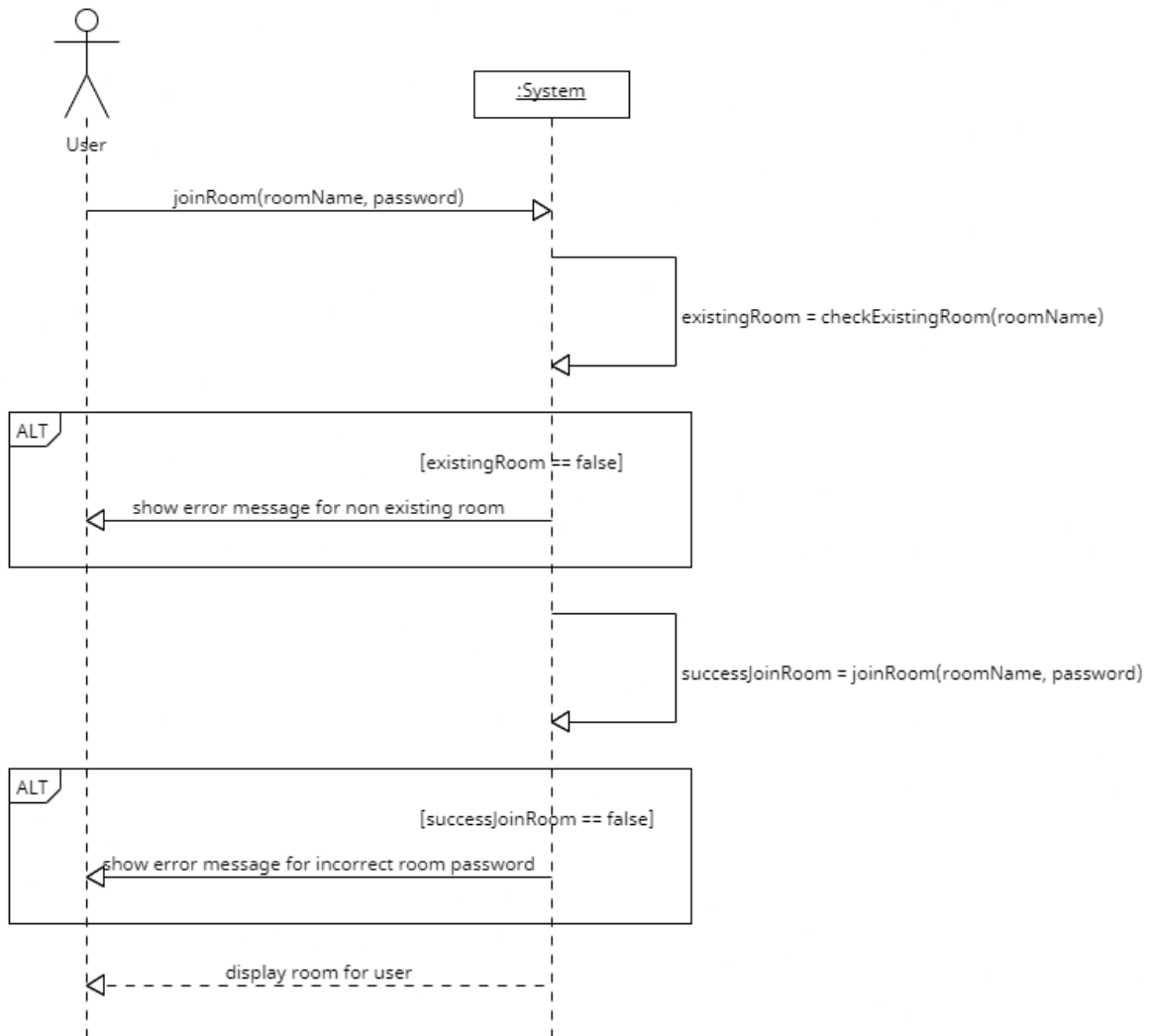
Join a Room

Figure 5, Join Room System Sequence Diagram
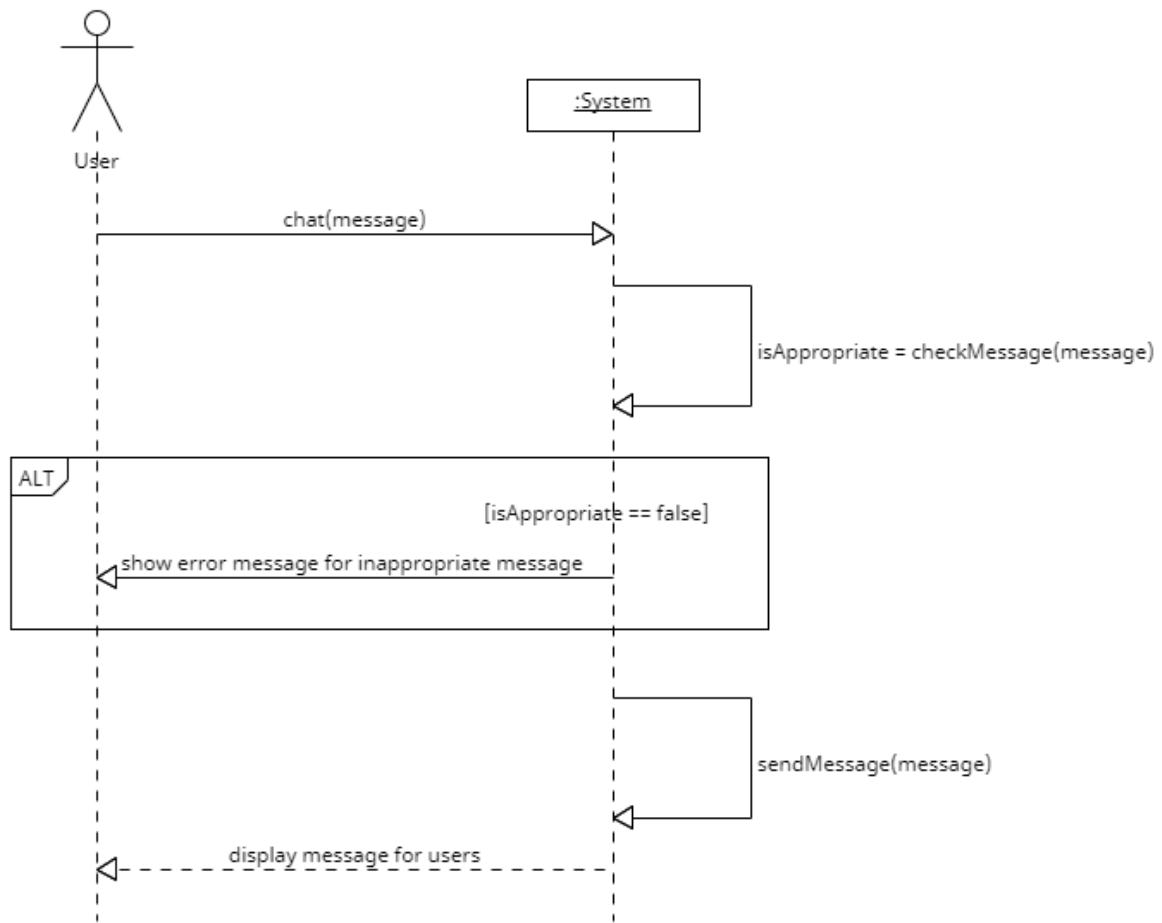
Chat in Room

Figure 6, Chat in Room System Sequence Diagram
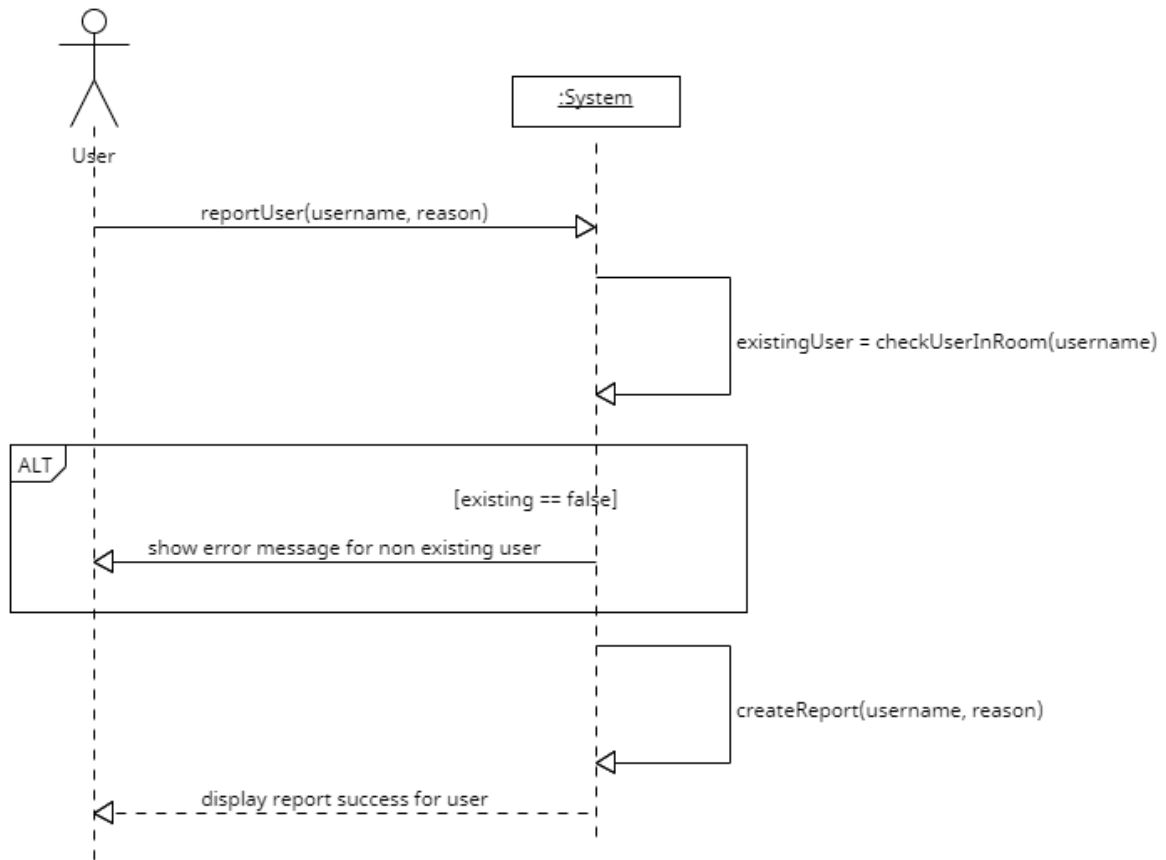
Report User from Room

Figure 7, Report User from Room System Sequence Diagram
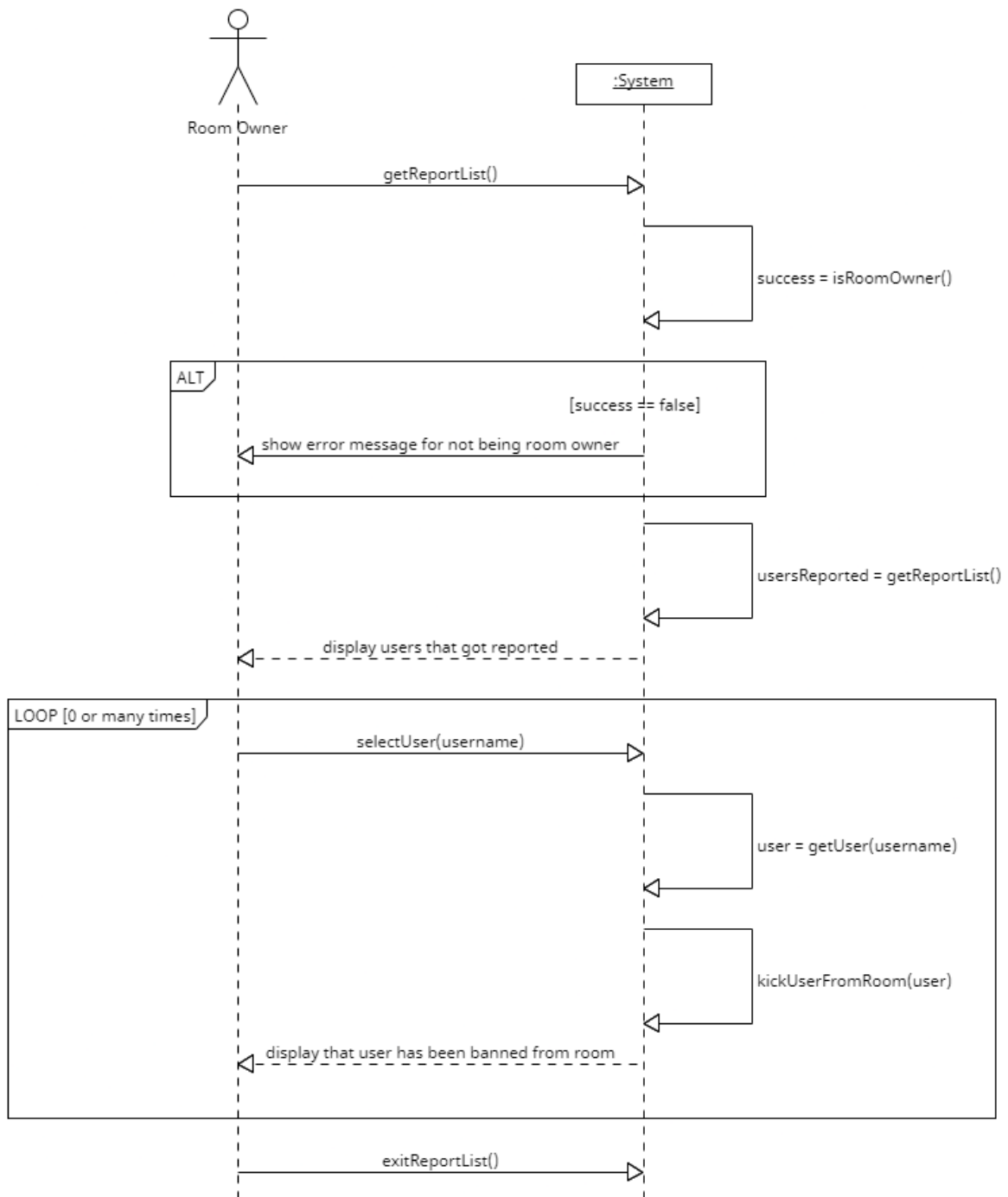
Ban User in Room

Figure 8, Sign Up System Sequence Diagram
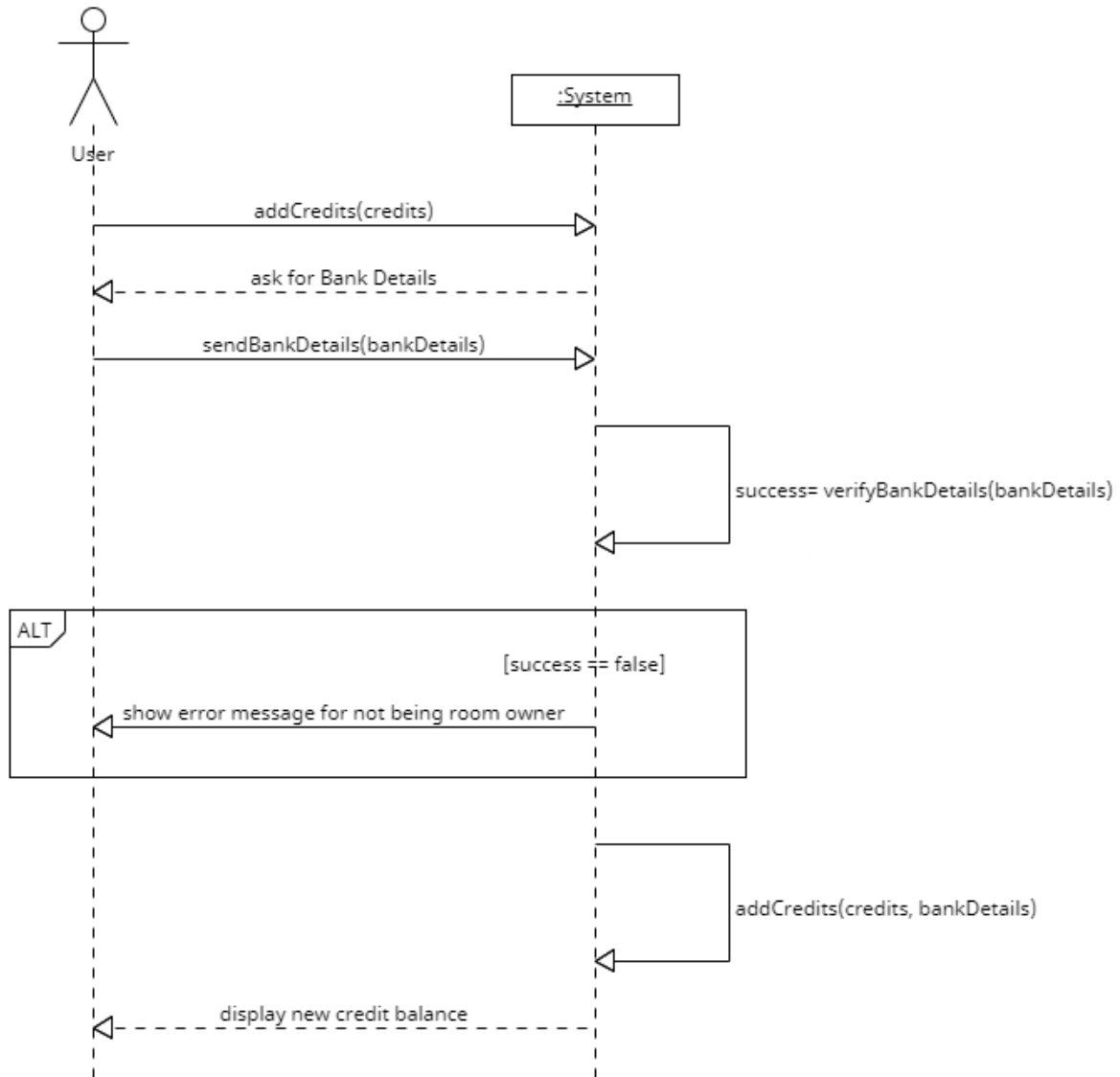
Add Credits

Figure 9, Sign Up System Sequence Diagram
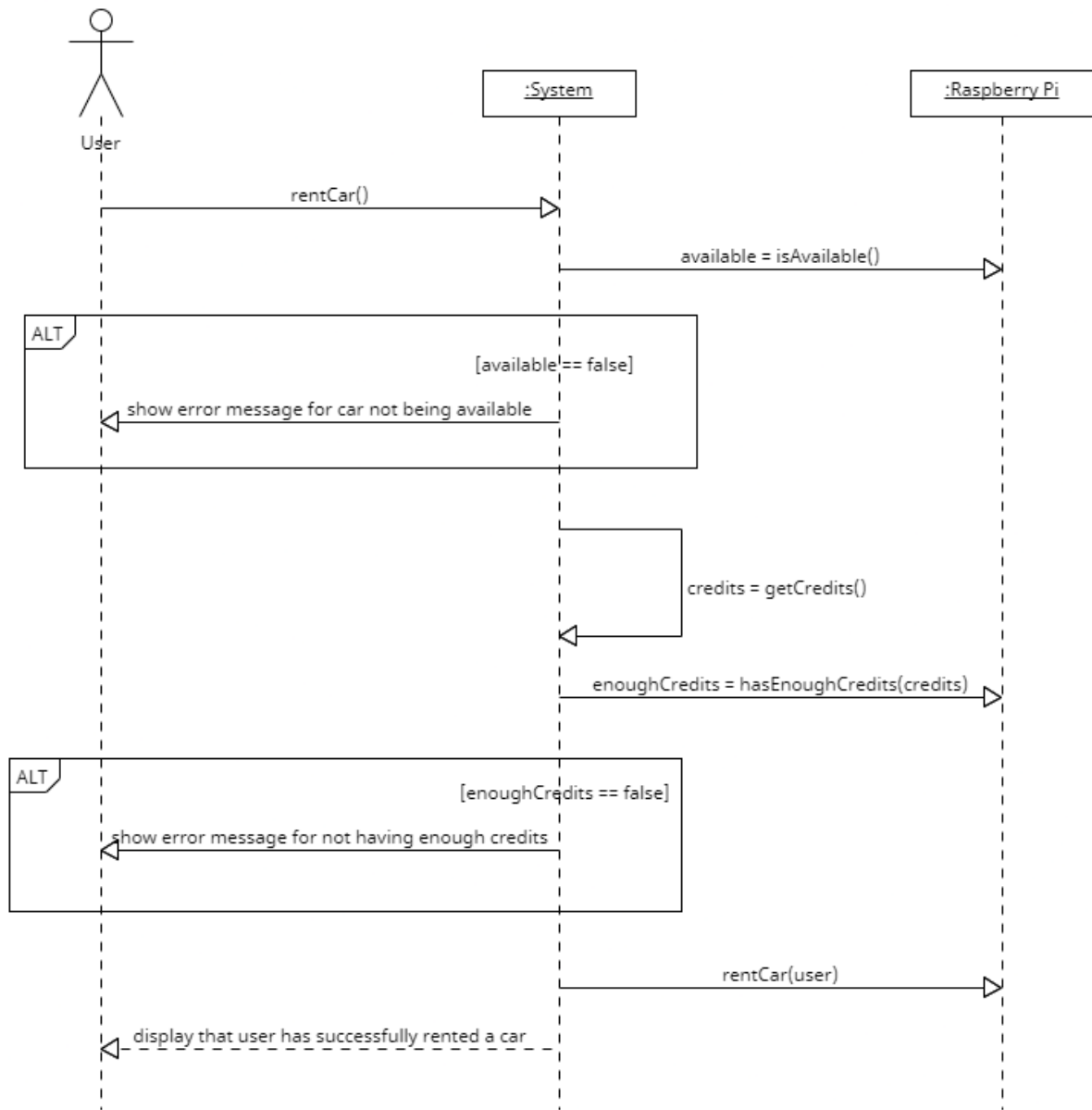
Rent Car

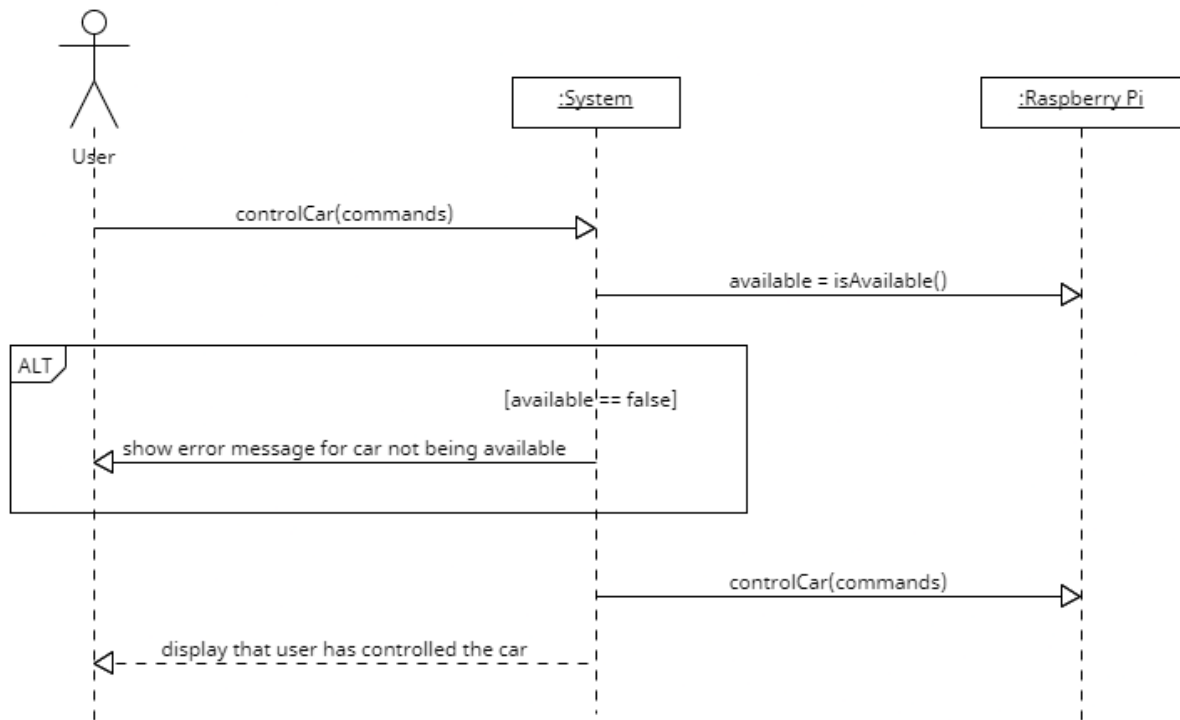Figure 10, Sign Up System Sequence Diagram

Control Car

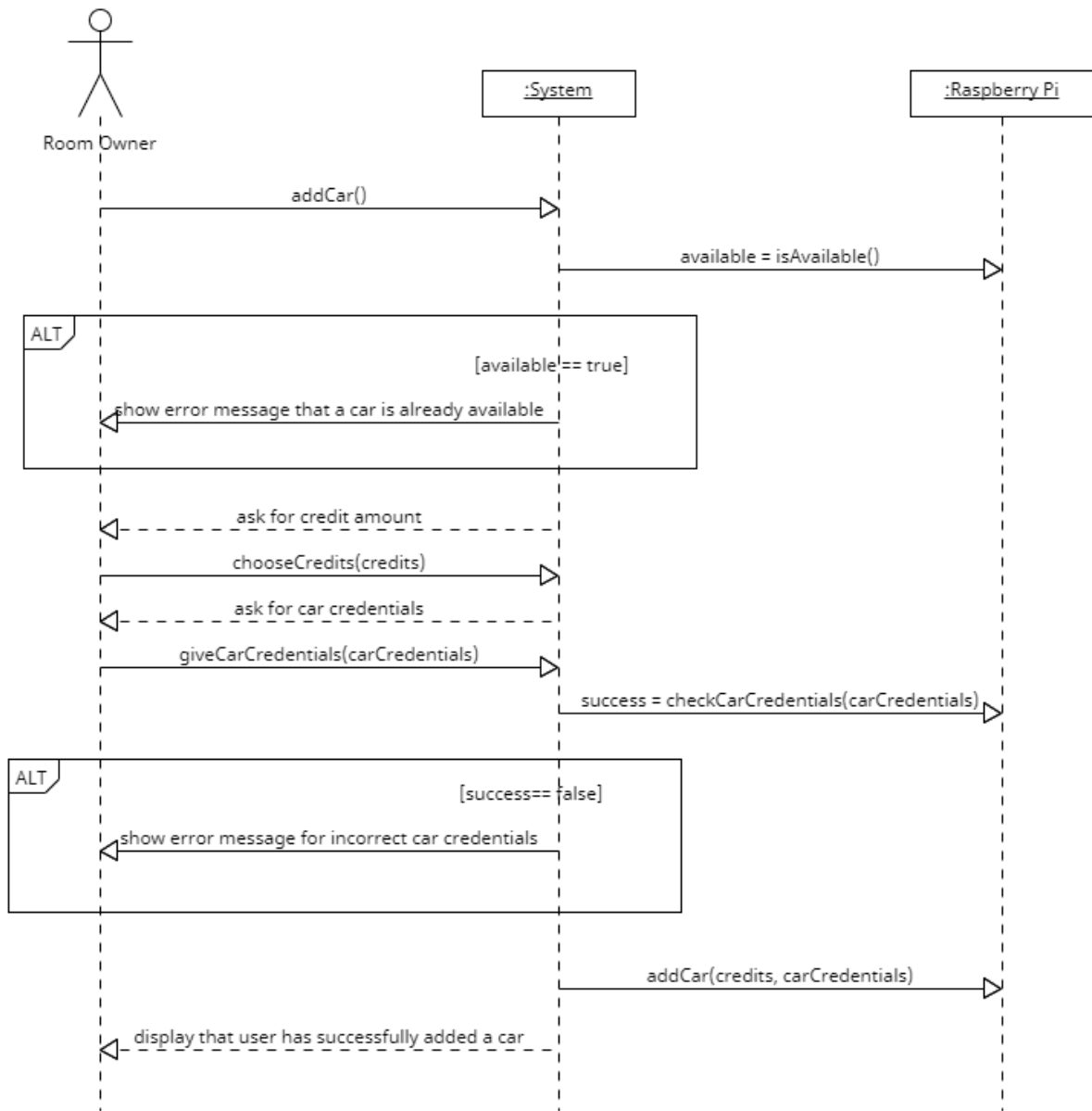Figure 11, Sign Up System Sequence Diagram

Add Car

Figure 12, Sign Up System Sequence Diagram

Bibliology

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