POLITECNICO
MILANO 1863

DD

Design Document

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CONTENTS

1 INTRODUCTION

1.1 Purpose

The purpose of the project CLup (Customer Line-up) is to develop a digital system of lining up that saves people from having to stand outside of stores for hours, avoids crowds inside the store, and, more in general, allows to regulate the influx of people in the stores.

The idea is to create a digital version of the traditional mechanism of lining up that is easy to use by everyone. In this way, the system would help to deal with the strict rules imposed by the government due to the global pandemic.

The system should give customers the possibility to line up from their home and approach to store only when their number is close to being called. This mechanism should avoid the situation in which the customers wait for their shift in the proximity of the store that is not an acceptable scenario in a lockdown situation.

1.2 Scope

The software should represent a digital alternative to the situation in which people retrieve a physical number that gives their position in the queue when they want to enter a store.

CLup should provide three main features:

- **Lining up**: allows customers to line up from their homes and avoids crowds outside the stores. It should include a notification system that alerts people when their number is close to being called. These alerts should consider the time customers need to get to the shop from the place they currently are and should be based on precise estimation of the waiting time. Moreover, CLup must provide effective fallback options for people who do not have access to the required technology.
- **Booking**: allows customers to book a visit to the supermarket. Since the time that it takes to visit a supermarket is not uniform, the system should give to user the possibility to specify an estimation of the duration of the visit. Alternatively, it might infer this information analysing the previous visits, if any.
- **Suggestion**: suggests different time slots for visiting the store (also on different days) to deal better with the restriction in the number of people inside the store. Alternatively, the system should propose other available supermarkets to the customers and alerts them in case a new time slot becomes available (e.g. after the deleting of a booking by another customer).

The customer that wants to use the service must be registered. Thanks to this, the system would be able to track the lining up, the booking, and the duration of the previous visits and use this information to manage better the influx of people and estimates with acceptable accuracy the waiting time.

1.3 Definitions, Acronyms, Abbreviations

1.3.1 Definitions

Time slot	Period or day that can be chosen for a booking by the customers.
Store data	Data about the store like the number of people allowed, opening and closing times, address, name, and photo.
Reservation	A word that might indicate either a booking or a lining up in a specific store.
Active reservation	Lining up or booking that is not yet expired. It means that the reservation has been taken but customers still have to wait for their shift.
Store manager	Manager, cashier, or generic employee of a store.
Available shop	A shop that has at least one free time slot.

1.3.2 Acronyms

CLup	Customer Line-up
RASD	Requirements Analysis and Specification Document
SSL	Secure Sockets Layer
TLS	Transport Layer Security
UI	User interface

1.3.3 Abbreviations

W.n	World phenomena n-th
S.n	Shared phenomena n-th
G.n	Goal n-th
R.n	Requirement n-th
U.n	Use cases n-th

1.4 Revision history

DATE	DESCRIPTION
29/12/2020	First version. Mock-ups and their descriptions.

1.5 Reference Documents

- *Requirement Engineering and Design Project: goal, schedule, and rules*
- *I&T assignment goal, schedule, and rules*
- Slides of the course *Software Engineering 2*

1.6 Document Structure

The document is composed of the seven following chapters:

- **Chapter 1**:
- **Chapter 2**:
- **Chapter 3**:
- **Chapter 4**:
- **Chapter 5**:
- **Chapter 6**:
- **Chapter 7**:

2 ARCHITECTURAL DESIGN

2.1 Overview: High-level components and their interaction

2.2 Component view

2.3 Deployment view

2.4 Runtime view

2.5 Component interfaces

2.6 Selected architectural styles and patterns

2.7 Other design decisions

3 USER INTERFACE DESIGN

3.1 Mock-up

In this section of the document, it is provided an overview of how the *User Interface* (UI) of the system will look like. Let us assume that the application is divided into several pages dedicated to the different main functionalities. The following images show an idea of these pages.

Figure 1: Initial Page mock-up

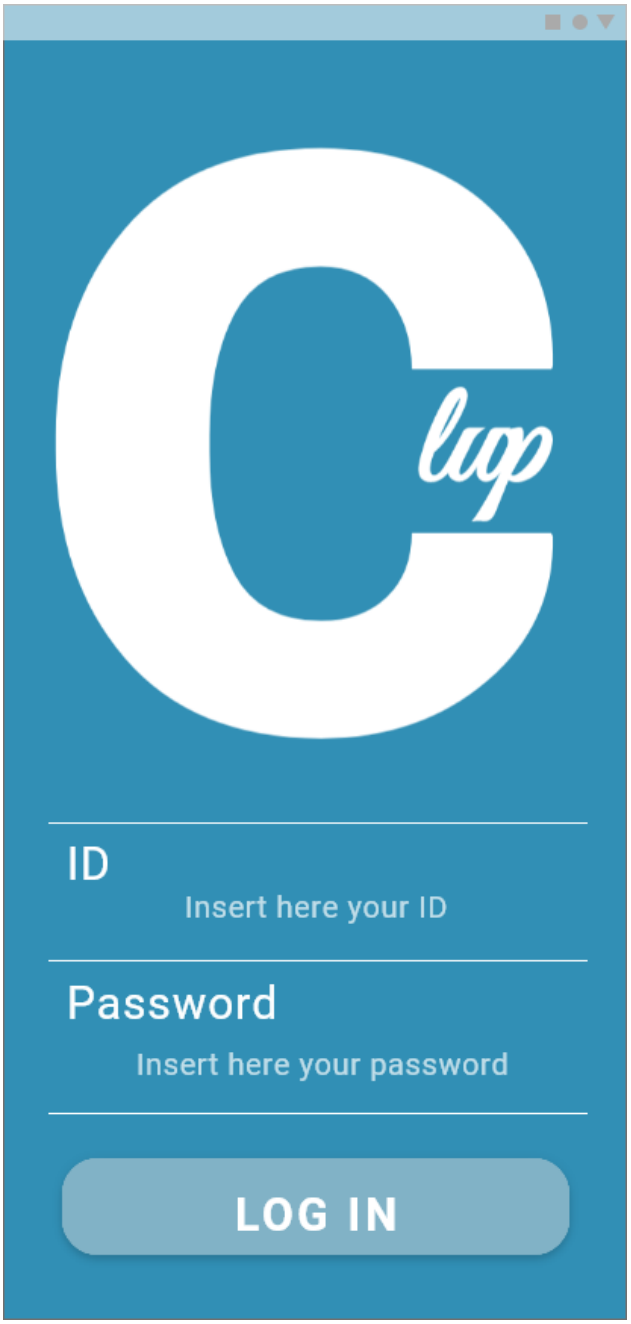

Figure 2: Login Page mock-up

Figure 1 represents the page that CLup shows to users during their very first access. On this page, actors are able to reach the Login Page if they are already registered to the platform or create a new account if it is the first time that they use the software.

Figure 2 illustrates the page that allows users to insert their credentials and then access the functionality of CLup.

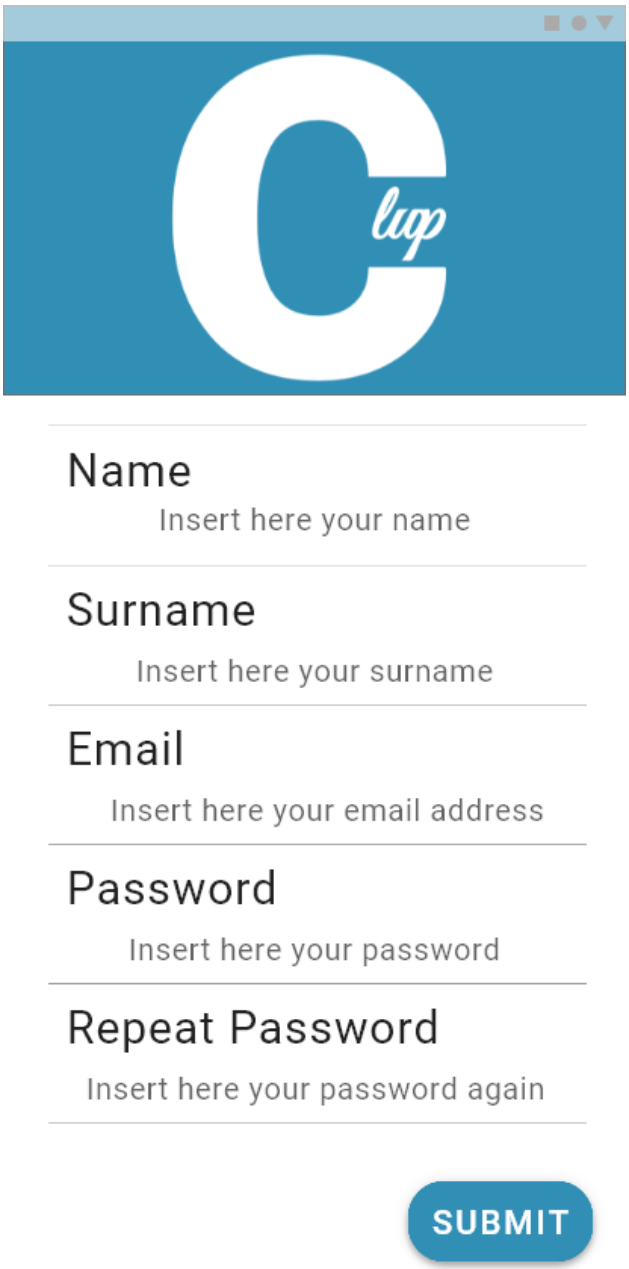

Figure 3: Sign Up Page mock-up

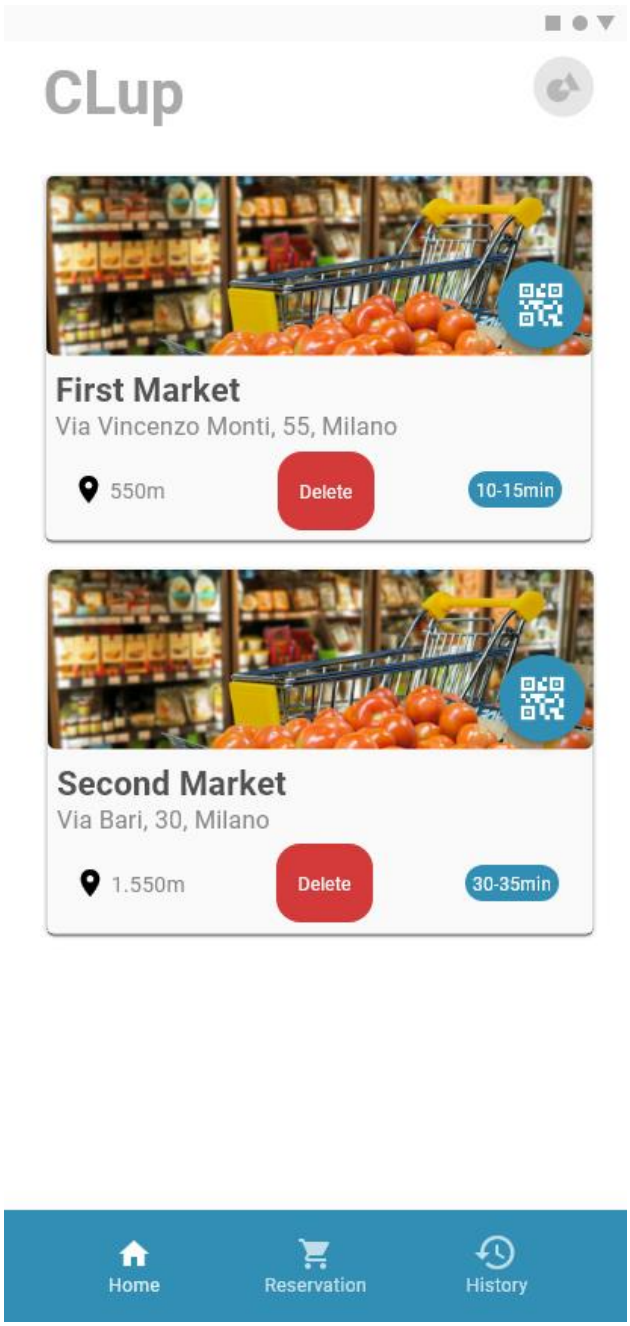

Figure 4: Home Page mock-up

As anticipated before, users can also submit their data and create a new account that allows access to the platform. The user profile is used to associate to each user the list of reservations (both active and non-active) and the duration of the previous visits to the stores used to improve the automatic estimation of the waiting time. An idea of the dedicated page is provided in *Figure 3*.

Due to the focus on privacy, the required data are only the essential ones. They are:

- Name
- Surname
- Email

- Password
- Confirm password (to prevent typing mistakes)

Moreover, *Figure 4* depicts a mock-up of the Home Page of the application. It contains the main features like the list of active reservations with the possibility to delete them or to see the expected waiting time and some data about the shops. Furthermore, on this page, the user can open and use the QR code associated with each reservation.

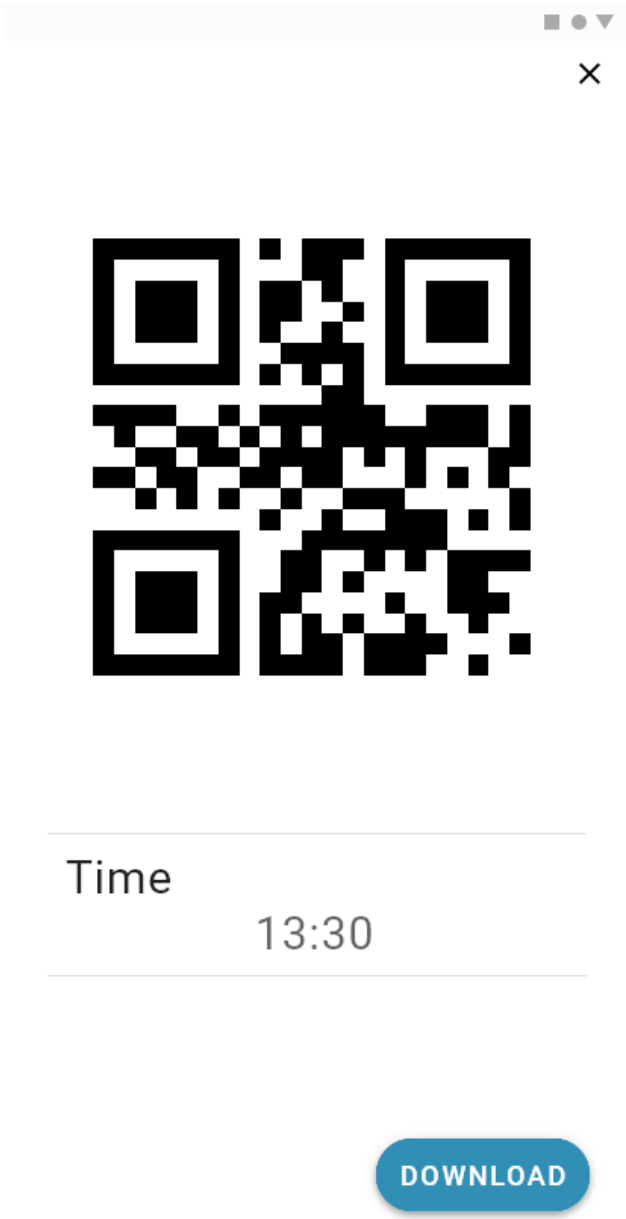

Figure 5: QR Page mock-up

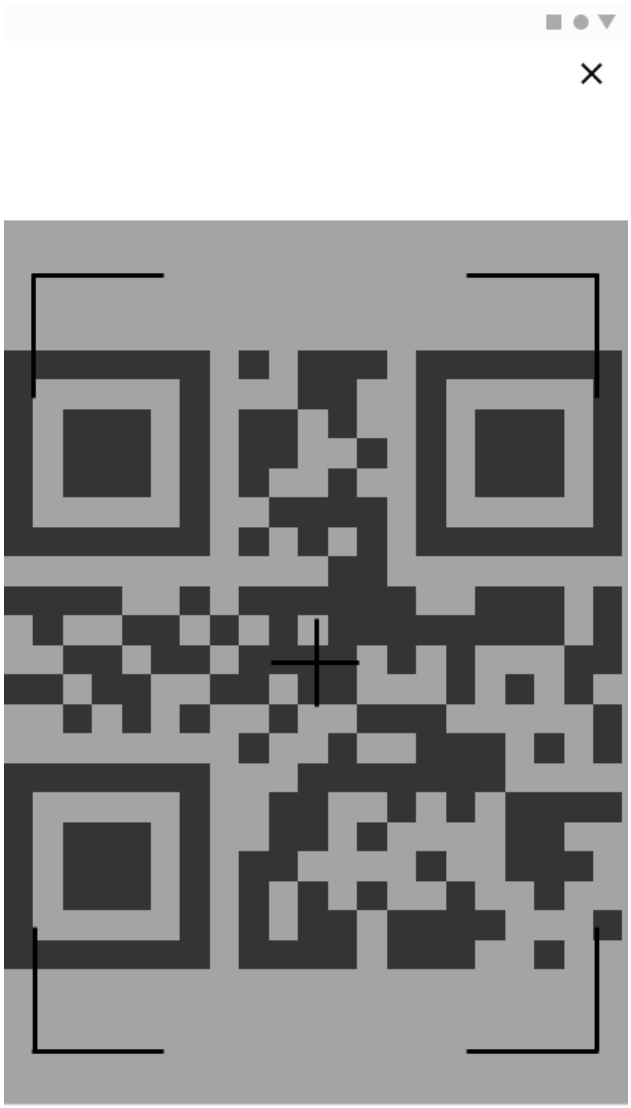

Figure 6: QR Scanner Page mock-up

On the left (*Figure 5*) a sketch of the page that shows the QR code associated with each reservation. Thanks to this page, the customers can scan their code when they enter and exit the store as expected. Here, it is provided also an indication of the expected waiting time or the expected time slot. Moreover, as specified during the phase of requirements definition, specific functionality is provided to allow downloading the QR code in the PDF format to make easier the printout.

On the right (*Figure 6*), a possible UI of the QR code scanner. This functionality is accessible only to store managers and not to customers. Here, the store manager can scan the QR code shown by the customer to authorize the entering to or the exit from the store.

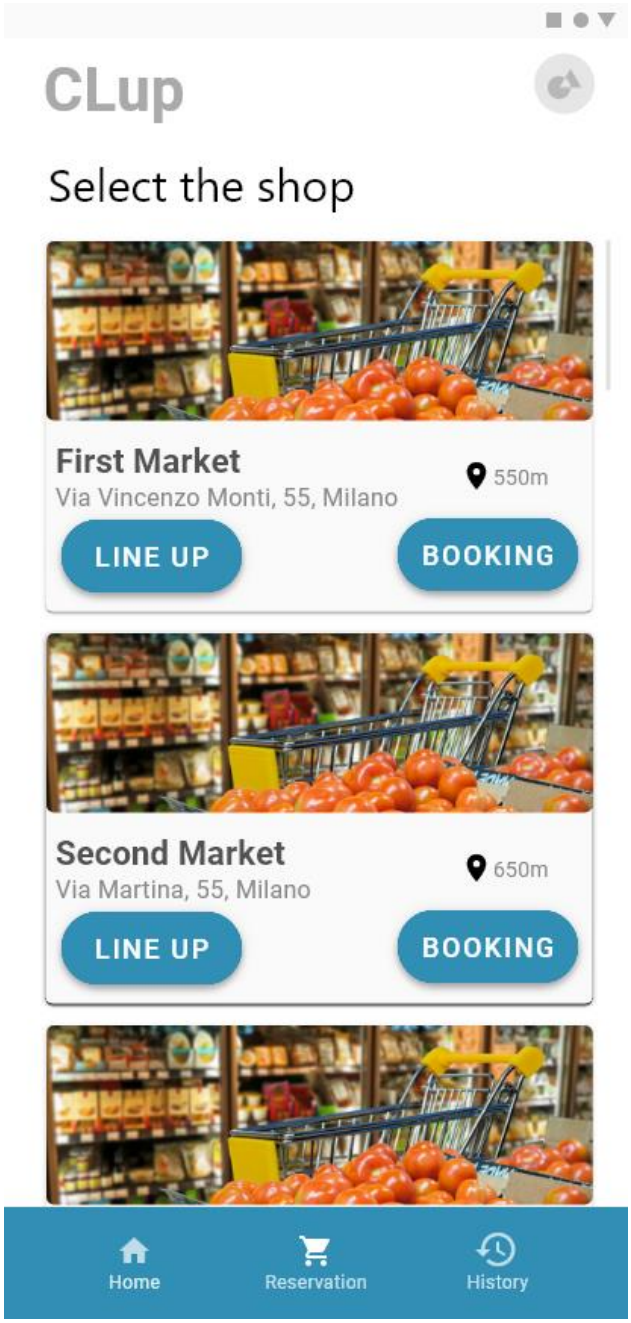

Figure 7: Select Shop mock-up

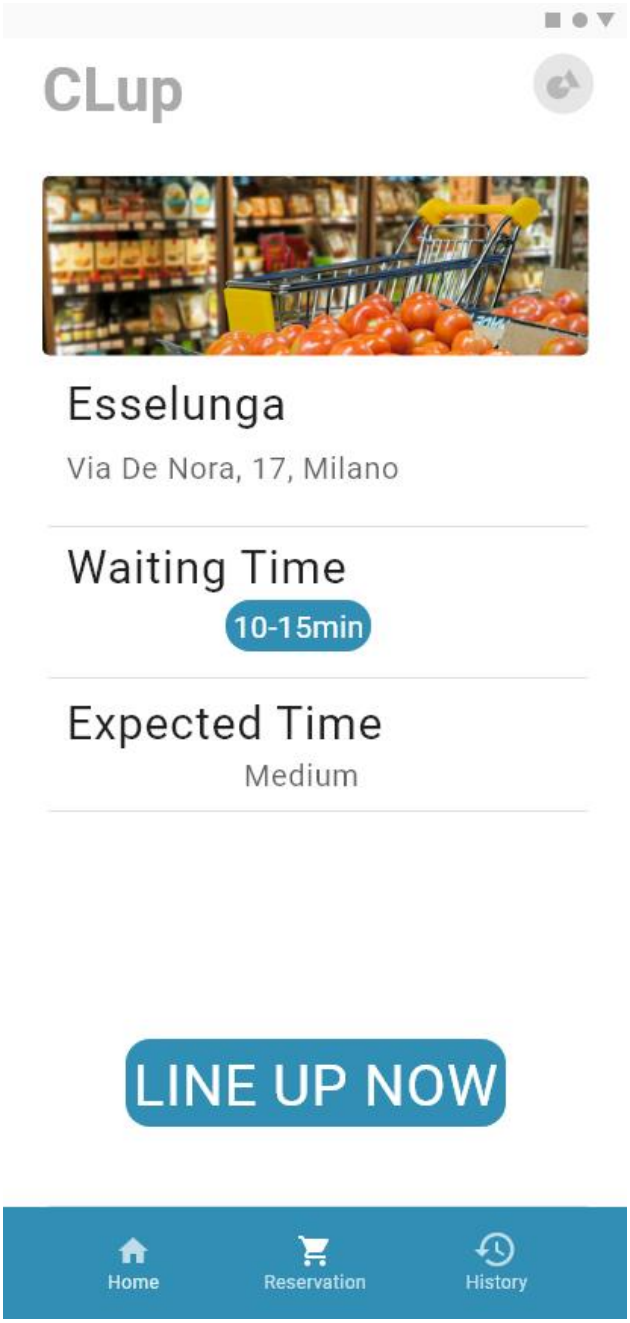

Figure 8: Line Up Page mock-up

Figure 7 represents the Reservation Page that contains the list of active shops to permit customers to select the desired one. Each card of each store contains some information about the supermarket (e.g. position, photo) and the links to access lining up and booking functionalities. The choice is possible only for the customers but not for the store managers.

Figure 8 shows the Line Up Page. Here, some information is provided like the name and position of the store and the expected waiting time. Moreover, actors must specify an estimation of the duration of the visit that is used by the system to better infer the waiting time.

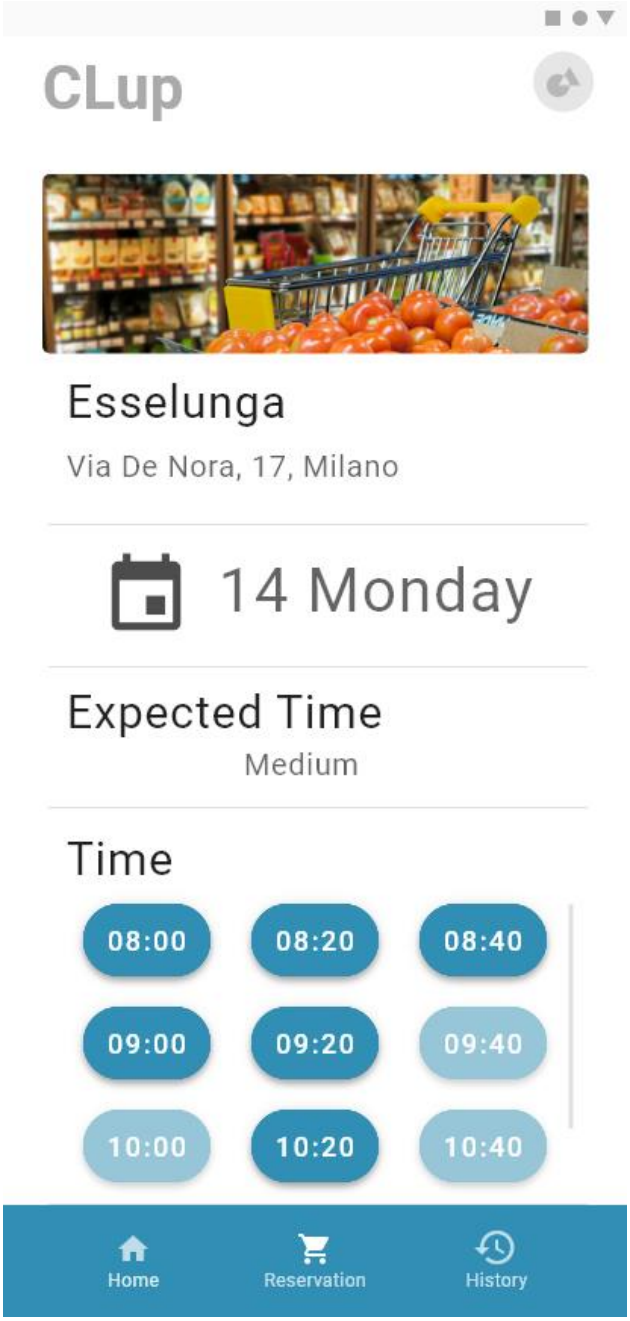

Figure 9: Booking Page mock-up

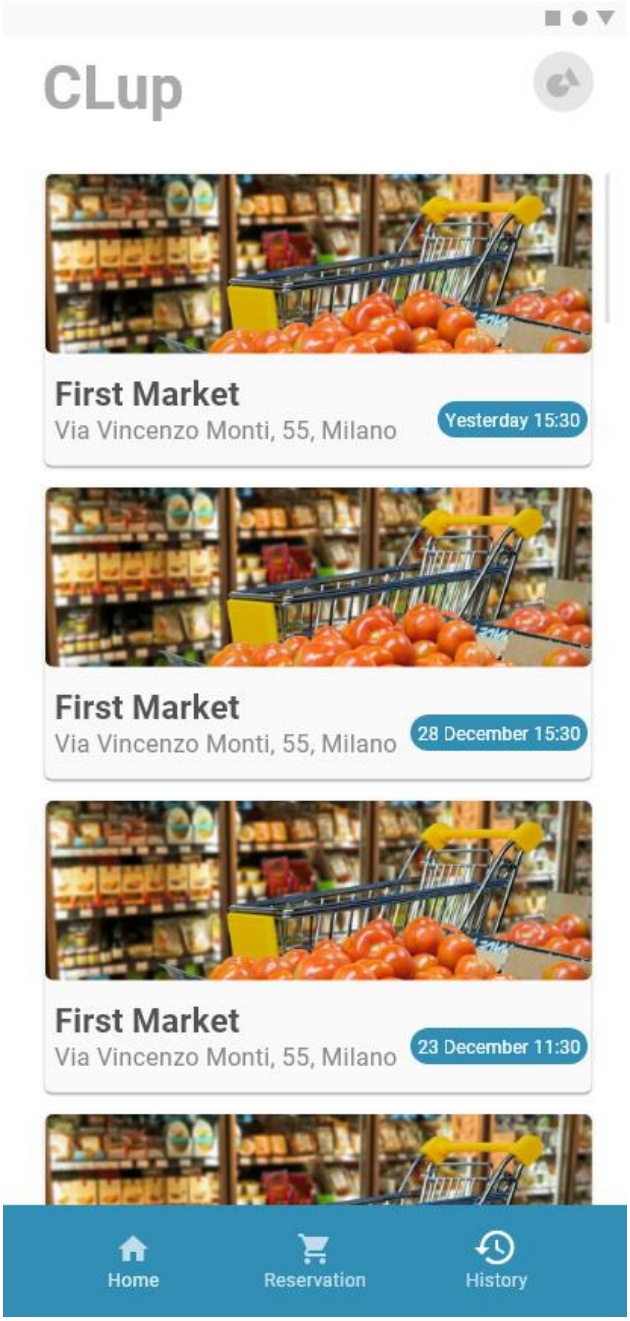

Figure 10: History Page mock-up

On the left (*Figure 9*) a representation of how the Booking Page will look like. This page should contain the general data about the shop and allows to select the date and the time slot that is desired by the customer. Customers must also specify the expected duration of the visit. As explained in the RASD document, this functionality is accessible only by the customers.

On the right (*Figure 10*) it is shown a possible design of the History Page. Here, customers can access information about expired reservations with the indication of the shop (and its general data), the date and time of the reservation.

4 REQUIREMENTS TRACEABILITY

4.1 xxx

5 IMPLEMENTATION, INTEGRATION AND TEST PLAN

6 EFFORT SPENT

This section shows the amount of time that each member has spent to produce the document. Please notice that each section, diagram, and specification is the result of coordinated work. The column *Member* specifies only the main contributor (or contributors, if more than one) for each topic but should not be interpreted as a lack of participation by other team members for that topic.

TOPIC	MEMBER	HOURS
Mock-up	Digregorio	2.5h
Creation of the document and integration of mock-ups	Digregorio	3h
Component definition and sketch of Component Diagram	Digregorio, Massaro, Tamma	4h
Component Diagram improvements	Tamma	3.5h

7 REFERENCES

- The diagrams have been made with: https://www.visual-paradigm.com/ and https://lucid.co/it
- The mockups have been made with: Adobe XD
- Alloy Language Reference: https://alloytools.org/download/alloy-language-reference.pdf
- Alloy Tools: https://alloytools.org/tutorials/day-course/
- Sequence Diagram Reference: https://www.uml-diagrams.org/sequence-diagrams-reference.html
- *UML - Imparare a descrivere sistemi orientati agli oggetti graficamente e in modo standard*, APOGEO, Enrico Amedeo