STRUTTURA

1. INTRODUCTION

- Purpose: here we include the goals of the project
- Scope: here we include an analysis of the world and of the shared phenomena
- Definitions, Acronyms, Abbreviations
- Revision history
- Reference Documents
- Document Structure

2. OVERALL DESCRIPTION (This section does not state specific requirements.)

- Product perspective: here we include scenarios and further details on the shared phenomena and a domain model (class diagrams and statecharts)
- Product functions: here we include the most important requirements **(solo some "high level requirements", quindi qui farei una parafrasi di quello che il sistema deve fare)**
- User characteristics: here we include anything that is relevant to clarify their needs **(QUA GLI ACTORS e i loro need)**
- Assumptions, dependencies and constraints: here we include domain assumptions

3. SPECIFIC REQUIREMENTS: Here we include more details on all aspects in Section 2 if they can be useful for the development team.

- External Interface Requirements
    - A.1 User Interfaces
    - A.2 Hardware Interfaces
    - A.3 Software Interfaces
    - A.4 Communication Interfaces

- Functional Requirements: Definition of use case diagrams, use cases and associated sequence/activity diagrams, and mapping on requirements (è BENE AVERE UN SEQUENCE DIAGRAM PER OGNI USE CASE)
- Performance Requirements
- Design Constraints
    - D.1 Standards compliance
    - D.2 Hardware limitations
    - D.3 Any other constraint
- Software System Attributes
    - E.1 Reliability
    - E.2 Availability
    - E.3 Security
    - E.4 Maintainability
    - E.5 Portability

4. FORMAL ANALYSIS USING ALLOY: This section should include a brief presentation of the main objectives driving the formal modelling activity, as well as a description of the model itself, what can be proved with it, and why what is proved is important given the problem at hand. To show the soundness and correctness of the model, this section can show some worlds obtained by running it, and/or the results of the checks performed on meaningful assertions.

5. EFFORT SPENT: In this section you will include information about the number of hours each group member has worked for this document.

6. REFERENCES

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1.1. Purpose

The aim of CLup is to provide a reliable solution to the problem of people gathering inside and outside stores.

To face the problem, the application focuses on its principal causes, which are the management of people inside the store, that often leads to overcrowding, the effectiveness of standard queuing systems and the way people are allowed to access the store.

In particular, the main goals that CLup aims to achieve, summarized in the table below, are the following:

- Prevent the store from being overcrowded, in order to avoid indoor gatherings while maximizing its occupancy, by means of a better access management system
- Reduce the possibility of queues forming outside the store, providing an effective way to virtualize them
- Provide a more efficient way to access stores, reducing the overall time spent waiting to enter

1.1.1. Goals

G1	Prevent the store from being overcrowded while maximizing its occupancy
G2	Reduce the possibility of queues forming in front of the stores
G3	Provide a more efficient way to access the stores

1.2. Scope

During the current situation of emergency, it is fundamental to prevent contacts among people. For this reason, governments impose strict rules concerning social distancing, both for indoor and outdoor contexts.

However, crowding management inside stores like supermarkets and grocery shops could be challenging. Currently, stores limit the maximum number of people allowed, and therefore long queues arise: entering a store for a few minutes might even require hours. Moreover, customers who see a crowded store might avoid lining up to save time and prevent contact with others.

CLup fits into this context allowing customers to remotely line up in a queue and being notified when they should head toward the store. Furthermore, it allows the customer to book a visit for a store on a specific day and time, which grants him priority over the queued customers.

CLup interacts with the outside world thanks to two distinct clients: one is an easy-to-use smartphone application designed for the customers, while the other is an administrative tool that allows store managers to add their shop to the system and modify some of its parameters.

Moreover, CLup also provides a physical proxy outside the stores as a fallback option for users who want to line up but do not have access to the application.

1.2.1. World phenomena

The following table illustrates the phenomena that happen in the real world and affect the system, which cannot control or detect them.

WP1	A person reaches the store
WP2	Some people gather in a specific area of the store
WP3	People wait in front of the store

1.2.2. Shared phenomena

The following table illustrates the phenomena that happen in the real world and can be observed or managed by the system.

SP1	A person joins the queue from the application

SP2	A person joins the queue using the physical proxy
SP3	An alert is sent to the customer when he should reach the store
SP4	A customer cannot reach the store in time anymore
SP5	A customer enters the store
SP6	A customer leaves the store
SP7	A customer books a visit to the store
SP7.1	A customer specifies the estimated duration of the visit
SP7.2	A customer specifies which kind of products wants to buy
SP7.3	Booking alternatives are suggested to the customer
SP8	The system notifies the customer about the desired stores when they become available.
SP9	The store manager specifies the maximum occupancy of the store

1.3. Definitions, acronyms, abbreviations

Mobile client	Also known as CLup client, app or smartphone app. It is the client used to access customer-side CLup functions.
Queue	Also known as access queue or virtual queue. It represents the set of customers who lined up through the app or the proxy.
One-Time Token	OTT

1.4. Revision history

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1.5. Reference documents

IEEE 29148-2018

IEEE 830-1998

1.6. Document structure

The reference structure used for the document is the one suggested by professor Matteo Rossi of Politecnico of Milan. It is derived from the one suggested by IEEE, which is used as a detailed reference source (IEEE standard for Software Requirements Specifications, IEEE 29148-2018).

Chapter 1 is an introduction to the software to be designed and developed and to the problem that it addresses. It presents the goals that should be achieved and an analysis of the context in which the system will be placed.

Chapter 2 is a more detailed description of the system to be realized, focused especially on a more detailed description of the context, e.g. presenting scenarios and the actors involved, on the product functions and on its requirements. Furthermore, it contains explicit constraints, dependencies and domain assumptions.

Chapter 3 includes specific requirements, with a level of detail sufficient to enable designers to design a system to satisfy those requirements, and testers to test that the system satisfies those requirements. It includes the description of all the functional and nonfunctional requirements, together with the description of the external interfaces, of the use cases and of eventual design constraints.

Chapter 4 is a formal analysis of the system using the Alloy model, showing also some worlds obtained running the model.

Chapter 5 contains a report on the effort spent by all the members of the group while writing the current document.

2. OVERALL DESCRIPTION

2.1. Product perspective

2.1.1. UML Class Diagram Description

CLup is intended to manage chains of stores or, alternatively, autonomous stores. Each chain is identified by a name and is associated with its stores.
Each store, which is composed of different product sections and visited by customers, has at least one manager who administers it. A store also maintains a queue of access requests and holds booked visits made by the customers.

Customers make an access request every time they line up, specifying the number of people who want to access the store. They can be distinguished according to whether they used the mobile client (i.e. the smartphone app) or the proxy. In the first case, they are identified by a unique ID and also have the possibility to make a booking. In the other case, they are identified by a unique access token generated whenever they line up.

Each booking includes information about a scheduled visit. They can be associated with store sections and are held by the store.

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2.1.2. UML Class Diagram