RASD - Requirement Analysis and Specification Document

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1 Introduction

1.1 Purpose

1.1.1 RASD Purpose

This document represents the Requirement Analysis and Specification Document (RASD). Goals of this document are to completely describe the system in terms of functional and non-functional requirements, analyse the real needs of the customer in order to model the system, show the constraints and the limit of the software and indicate the typical use cases that will occur after the release. This document is addressed to the developers who have to implement the requirements and could be used as a contractual basis.

1.1.2 Application Purpose

CLup - Customers Line Up - is born to help people in a crucial historic period, Covid-19 era, in which the daily life of all us changed drastically. One of these changes, and probably the most important one, is the social distancing to avoid the spread of pandemic.

Indeed, the specific goal of this project is to develop an easy-to-use application that, on the one side, allows store's managers to regulate the influx of people in the building and, on the other side, saves people from having to line up and stand outside of stores for hours on end, which are themselves a source of hazards.

The application would work as a digital counterpart to the common situation where people who are in line for a service retrieve a number that gives their position in the queue. This method of ticketing allows a person to approach the store in time and in a more safe mood, only when his/her number is going to be reached.

In particular, CLup will provide a real-time ticketing service which, on request, give to the customer the number associated to the current store's queue that the customer want to visit. The stores adopting CLup system, can also guarantee the possibility to hand out tickets on the spot; of course this two approaches are integrated in a unique queue, always managed by CLup. CLup will also allows customer to book a visit in advance to the store, specifying in many ways the times and modalities of his/her visit.

The application should be very simple to use, as the range of users include all demographics.

1.1.3 Goals

[G1] Allow a person to become a registered User providing some basic personal info (like Name, Surname etc.).

[G2] Allow a store's Visitor to pick up a Physical ticket from the store itself.

[G3] Allow a User to reserve in real-time a ticket for the current queue of a particular store:

- [G3.1] specifying the approximate expected duration of the visit.
- [G3.2] confirming the approximate expected duration of the visit suggested by the system (for User who is a long-term customer of a store).
- [G3.3] specifying the categories of items/service that they intend to buy.
- [G3.4] specifying the means of transport.

[G4] Allow a User to book a visit to a store:

- [G4.1] specifying the approximate expected duration of the visit.
- [G4.2] confirming the approximate expected duration of the visit suggested by the system (for User who is a long-term customer of a store).
- [G4.3] specifying the categories of items/service that they intend to buy.

[G5] Allow a User/Visitor to enter in the store within the use of QR code when it is his/her turn.

[G6] Allow a User to search and find available stores:

- [G6.1] within a certain distance from his/her current location for the real-time ticketing.
- [G6.2] without distance constraint for the booking option.

[G7] The system should provide Users/Visitors with a reasonably precise estimation of the waiting time associated to their respectively instant and physical tickets.

[G8] The system should alert in time a User to reach the store, for which he took the instant ticket, taking into account the time he need to get to the store from the place he currently is.

[G9] Allow a System Manager to do operations on the system for updating and maintenance:

- [G9.1] Allow a System Manager to add a store to the system.
- [G9.2] Allow a System Manager to delete a store from the system.

- [G9.3] Allow a System Manager to edit categories of items/services offered by a store.
- [G9.4] Allow a System Manager to edit timetable of a store.
- [G9.5] Allow a System Manager to edit maximum people capacity of a store.
- [G9.6] Allow a System Manager to see all the stores registered into the system, or search for a specific one using its commercial name.
- [G9.7] Allow a SM to edit the default permanence time of a store.

[G10] Allow a User/Visitor to see the current ticket number on the store's queue board.

1.2 Scope

CLup might be adopted by every type of stores all over the world. Of course, it will be mainly used by stores who sells necessities and who are subject to great turnover of people. A small shop will not benefit as much as a large one from the use of the application. Moreover, CLup is not intended for these activities, which already have a booking system, since it will need to be integrated with the existing system.

This project is strictly related with Covid-19 period, but nothing forbid that avoid a lot of queues and save a lot of time would be very fine for people. So, a pandemic is not the only scope of action of CLup.

The application mainly aims to simplify the access to stores for customers, and at the same time it aims to help owners managing people's flow in their business. In addition, CLup can be useful in the people day's planning, to improve their time management; thanks to the possibility of book a visit to the store in advance, to the real-time knowledge of queues in shops and of the travel time a person can decide whereas today is a good day to go shopping or not.

The protagonist of the CLup's scope are mainly people and stores. CLup should offer the possibilities to improve their relations and let positively grow the approach between customers and shops.

Where is true CLup also might offer the chance for the users to indicate the categories of products they are going to buy, in order to give the system a better "idea" of the time they will spent in the store, the improvement and management of the act of buy itself – such as for example indicate to the user the max quantity of a product available in the store - is completely outside from CLup's scope.

1.3 Definitions, Acronyms, Abbreviations

1.3.1 Definitions

1.3.2 Acronyms

- RASD: Requirement Analysis and Specification Document.
- API: Application Programming Interface.
- CLup: Customers Line-up.
- S2B: SoftwareToBe
- GPS: Global Positioning System
- UI: User Inteface

1.3.3 Abbreviations

- Gn: n-goal.
- Dn: n-domain assumption.
- Rn: n-functional requirement.

1.4 Revision History

1.5 Reference Documents

[1] R&DD Assignment AY 2020-2021

[2] M. Jackson, P. Zave, "Deriving Specifications from Requirements: An Example", Proceedings of ICSE 95, 1995

1.6 Document Structure

The RASD is composed by 6 parts:

1. In the first part an introduction to the problem is given listing all the identified goals, describing the scope of the project and providing some basic information to better understand the other sections of the document.
2. The second part consists of an overall description of the system including a product perspective (with scenarios, further details on the shared phenomena and a domain model), the main product functions (requirements), user's characteristics (to clarify his necessities) and all the fundamental domain assumptions (to complete the customers' specification given and considered true in the project development).

3. The third part develops all the most important aspects of Section 2 which can be useful for the development team. Indeed, it highlights all specific requirements identified, both functional and non-functional.

4. The fourth part contains a brief presentation of the main objectives driving the formal modelling activity, as well as a description of the project's Alloy model itself, what can be proved with it, and why what is proved is important. To show the soundness and correctness of the model, this section shows some worlds obtained by running it, and the results of the checks performed on meaningful assertions.

5. The fifth part is accessory and summarizes in detail the hours spent in the document production.

6. The sixth part is the last and is composed by all the references of the tools used to redact this document and its contents.

2 Overall Description

2.1 Product Perspective

The system will be developed from scratch. It will needs support only for the travel-time estimation, like a specific API provided by Google Maps (it will be more discuss in the DD document), but all the rest will be done without using other external System.

As already said, CLup offers the user the estimated waiting time to enter in a certain store. By entering the system, first of all he/she can choose between the 2 types of ticket: instant one or booked one; every ticket category is associated to a group of available stores for each user, relying on user's GPS position and country. Then by inserting store's name (and/or address if needed) in a search bar, user can select the desired store.

CLup can calculate how much time a person generally stays in the store, relying on average time (custom-fit to the person if they are usual ones) and info given by the user while booking or in real-time ticketing.

Thanks to the option to indicate the means of transport during a real-time ticketing, CLup will be able to give users alert when they need to leave to be in the store in time, relying on the GPS position provided by the user.

It's important to underline that from the system point of view the queues are managed like "static", thus when a ticket is created, the system decide "a priori" when it will be "called", and this does not change in future. It will be possible thanks to the precise estimation and manipulation of waiting times, permanence times, travel times and all the following assumptions/requirements in this document.

Instead, from the business owners' point of view, CLup give the possibility to edit timetables and maximum indicative amount of people at a given time, to better fit different situations (not by her/himself, only through a SM).

As is implicitly understood, the events catchable by CLup's system are the transmission of information from an user through the application, similarly the physical lining up by a visitor who interact through a ticket printer and the QR code scanning by an user/visitor using the QR code reader. Instead the events throwable by the system to the real world are the showing of the current ticket number in the queue board, and the notifications (like waiting time, response during registration etc.) and ticket provided to an user/visitor.

2.2 Product functions

2.3 User characteristics

2.4 Assumptions, dependencies, constraints

3 Specific requirements

4 Fromal analysis using Alloy

5 Effort Spent

6 References