POLITECNICO
MILANO 1863

Design and Implementation of Mobile Apps
- Polaris project VINCENZO MANTO
ROBERT MEDVEDEC

Design Document

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Authors:	VINCENZO MANTO, ROBERT MEDVEDEC
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1 Introduction

1.1 Purpose

This document provides a detailed view of the architecture and the user interface design of the ...

1.2 Scope

CLup is a simple application that helps store managers with handling large crowds inside their store and store customers with planning more efficient and safe grocery shops. The target audience for this application includes every person that shops for groceries in a store, which includes almost all demographics fall into this category.

Faced with a worldwide pandemic of the COVID-19 virus countries across the world imposed strict health measures in line with the recommendations of the WHO. To combat the spread of the virus, governments introduced decrees that limited the movement of the population to a certain degree. Only essential movement, such as: going to work, grocery shopping or outdoor exercise, was deemed acceptable. Although successful in the mitigation of the disease, the act put a serious strain on society on many levels. To help reduce the stress and anxiety, many aspects of everyday life involving close contact can be considered and improved upon.

This project aims to help with, and resolve the issues surrounding grocery shopping. As we all know, grocery shopping is an essential activity which involves close contact inside the store. Since the COVID-19 virus spreads mainly through airborne particles, this activity plays a key role in its mitigation. To reduce crowding inside the stores, supermarkets need to restrict access to their store and keep the number of people inside below the optimal maximum capacity.

The main idea is to enable store customers to enter a queue from home (or wherever they find themselves) through simple interaction with the application. Besides that, the application will give customers the option to "Book a visit" to the grocery store. This feature will allow them to view available time slots for their grocery shop, book the most convenient one, and optionally indicate an approximated duration of their visit to further improve the accuracy of the waiting time estimation of the system.

1.3 Definitions, Acronyms, Abbreviations

1.3.1 Definitions

- **Application**: a computer (mobile) program that is designed for a particular purpose.
- **QR code**: a machine-readable code consisting of an array of black and white squares, typically used for storing URLs or other information for reading by the camera or a scanner.
- **Smartphone**: a mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, internet access, and an operating system capable of running downloaded apps.
- **Google Maps**: a web mapping service developed by Google, used both as a standalone app and as an integrated mapping solution in most of the apps.
- **iOS**: operating system developed by Apple, used by their portable devices like iPads and iPhones.
- **Android**: most popular operating system for smartphones and tablets, developed by Google and partners.

1.3.2 Acronyms

- **RASD**: Requirement Analysis and Specification Document
- **COVID-19**: Virus responsible for the spread of the coronavirus disease 2019
- **CLup**: Customer Line-up
- **API**: Application programming interface, computing interface which defines interactions between multiple software intermediaries
- **WHO**: World Health Organization
- **GUI**: Graphical user interface
- **DB**: Database
- **REST**: Representational state transfer - software architectural style used in web services
- **DAO**: Data access object
- **JDBC**: Java Database Connectivity, API used in Java programming language

1.3.3 Abbreviations

- **Gn**: nth goal.
- **Rn**: nth functional requirement.
- **App**: Application.

1.4 Revision History

- **Version 0.1**: First .tex document created and added all together; 28th December 2021

1.5 Reference Documents

- nothing

2 Overall Description

Here you can see how to include an image in your document.

Here is the command to refer to another element (section, figure, table, ...) in the document: *As discussed in Section* **??** *and as shown in Figure 1, ...* Here is how to introduce a bibliographic citation [**?**]. Bibliographic references should be included in a `.bib` file.

Table generation is a bit complicated in Latex. You will soon become proficient, but to start you can rely on tools or external services. See for instance this https://www.tablesgenerator.com.

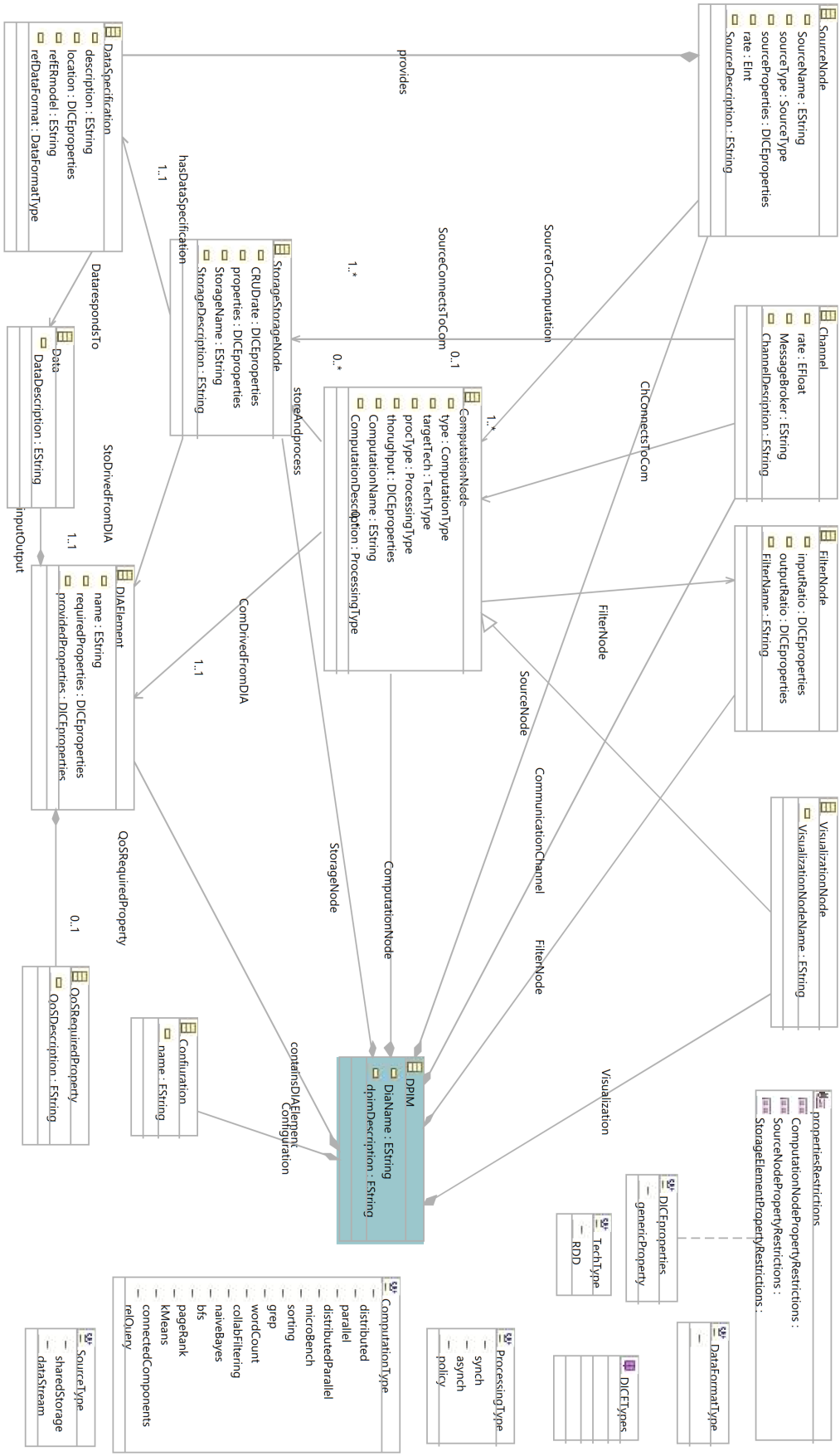

Figure 1: DICE DPIM metamodel.

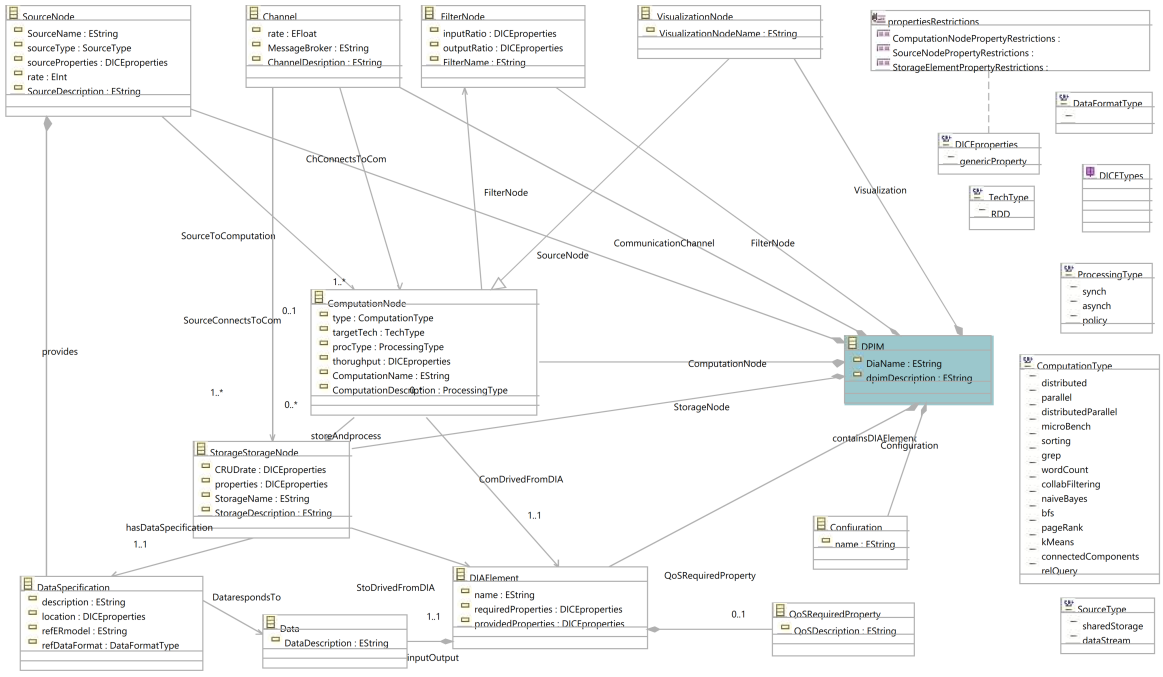

Figure 2: DICE DPIM metamodel in portrait form.

3 Architectural Design

3.1 External Interface Requirements

3.1.1 User Interfaces

The CLup application interface will have to serve two types of users: customers and store managers. Opening screen of the application allows the user to pick a store or to login as a store manager. Depending on the choice, another screen is presented. For a customer, a screen with the options to retrieve a ticket, book a visit or change the store. For a store manager, a screen containing their camera view, and buttons to confirm the scanned ticket, notify the system about a customer exit and to log out of the application.

3.1.2 Hardware Interfaces

Depending on the current user the CLup application will require access to some hardware interfaces. If the current user is a customer, the application will require the device's camera and if the current user is the store manager the GPS location data will be needed. The application will require no further hardware interfaces.

3.1.3 Software Interfaces

The CLup application will not require any specific software interfaces.

3.1.4 Communication Interfaces

The most important communication will occur between the device and the database. The decision on the specific communication interface which will be used depends on the database, and is, therefore, left to the developers.

3.2 Functional Requirements

G1 Allow a User to "line up"/retrieve a number.

G1.1 Allow a User to retrieve a number through the application.

R1 The user must be able to select a specific store in which they want to do the shopping.

R2 The user must be able to request a number and a ticket.

R3 The user must be able to receive a number and a ticket.

G1.2 Allow a User to retrieve a number physically from the printer.

R4 The user must be able to physically retrieve a ticket from the printer containing a number and a QR code.

D8 The user has internet connection for the device at all times.

G2 Allow a Store Manager to control the entrance of a User via QR code scanning.

R5 The store manager must be able to scan a QR code.

R6 The store manager must be informed by the application if a user tries to enter the store out of order.

R7 The store manager must be informed when the capacity of the store is full.

R8 The store manager must be able to alert the system whenever a customer exits the store.

D6 The system can correctly save data about enter and exit times of anonymous customers, in order to calculate estimated wait time.

D8 The user has internet connection for the device at all times.

G3 Allow a User to get precise calculations of the wait time.

R9 Allow the user to receive a precise estimation of wait time when retrieving a number.

R10 The system must provide the user with an estimation of wait time based on data.

D4 The system can use data about the registered user to calculate estimated wait time.

D6 The system can correctly save data about enter and exit times of anonymous customers, in order to calculate estimated wait time.

D8 The user has internet connection for the device at all times.

G4 Allow a User to get updates/notifications on the estimated wait time.

R11 The system must be able to update its estimated wait time in real time.

R12 The system must be able to send an update to the user in specific intervals regarding estimated wait time until it's their turn.

D4 The system can use data about the registered user to calculate estimated wait time.

D6 The system can correctly save data about enter and exit times of anonymous customers, in order to calculate estimated wait time.

D8 The user has internet connection for the device at all times.

G5 Allow a User to "book a visit" to the store.

G5.1 Allow a User to "book a visit" to the store without indicating the expected duration of the visit.

R13 The user must be able to request to see all the available timeslots in that specific store.

R14 The system must be able to provide the user with the list of all available timeslots upon the request.

R15 The user must be able to select a specific timeslot.

R16 The user must be able to receive a confirmation of his timeslot reservation, along with a number and a ticket.

R17 Allow the user to be at most five minutes late for his reservation before canceling his ticket.

G5.2 Allow a User to "book a visit" to the store with indicating the expected duration of the visit.

R18 The user must be able to specify expected duration of his visit to the store.

D3 The user's device provides accurate GPS information.

D7 The system can correctly save data to and pull data from available time slot schema in the database.

D8 The user has internet connection for the device at all times.

G6 Allow a Store Manager to login to his store manager account with credentials.

R19 The store manager must be provided with the login credentials upon request to the system administrator.

D1 The store manager's username must be unique.

D2 The store manager's password must be secure.

Requirement, [Rn]	Goals, [Gn]	Domains, [Dn]
R1	G1.1	D8
R2	G1.1	D8
R3	G1.1	D8
R4	G1.2	D8
R5	G2	D6, D8
R6	G2	D6, D8
R7	G2	D6, D8
R8	G2	D6, D8
R9	G3	D4, D6, D8
R10	G3	D4, D6, D8
R11	G4	D4, D6, D8
R12	G4	D4, D6, D8
R13	G5.1	D3, D7, D8
R14	G5.1	D3, D7, D8
R15	G5.1	D3, D7, D8
R16	G5.1	D3, D7, D8
R17	G5.1	D3, D7, D8
R18	G5.2	D3, D7, D8
R19	G6	D1, D2

Table 1: Mapping table

3.3 Performance Requirements

4 User Interface Design

Provide here information about how much effort each group member spent in working at this document. We would appreciate details here.

