SUPINFO Academic Dept.

SUPINFO International University

INSTITUTE OF INFORMATION TECHNOLOGY

Group Projects
M.Sc.1 - Project

Document content

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1 PROJECT OVERVIEW

The Supermarket 4.0

New technologies are developing and transforming our society. The retail industry will have to rely on what is known as **phygital** and customer experience. The supermarket of the future is also called "new retail".
To achieve this, the mobile applications, sensors, cameras and terminals of the sellers will provide valuable information.

The analytics and artificial intelligence will allow the processing of this mass of data in order to offer the appropriate products, make recommendations, manage stocks, facilitate payment, etc.

1.1 THE PHYGITAL

Allows companies in the sector to benefit from the advantages of traditional (physical) stores and e-commerce (digital). One of the applications is online shopping with in-store pick-up where interactive kiosks will be installed, intelligent robots that can inform customers, cameras that track customers' movements, their choice, the way of shopping, etc.

1.2 CUSTOMER EXPERIENCE

The analysis of customer data makes it possible to offer suitable promotions, purchase recommendations and even tailor-made offers. All in their smartphone directly, of course! In the future, there is no question of shopping without a smartphone, an essential accessory for going to the hyper or to the supermarket: from product information to payment itself, everything will go through the small terminal.

We can also improve the customer experience with new services, such as augmented reality, in addition to traditional services such as wifi.

1.3 CONNECTED SELLERS

The sellers will all be connected via a terminal, which will allow them to react more effectively with customers because they will be able to have access to all the information in the store and they can also directly order an item out of stock. This will restore a privileged relationship with customers;

1.4 CAMERA AND SENSOR REVOLUTION

Placed close to the shelves, the sensors and cameras will make it possible to signal a possible shortage of stock but not only because they will also be able to measure the frequentation of the shelves.

Beacons will make it possible to detect customers' smartphones via Bluetooth and thus track their movement and thus offer promotions and recommendations in real time.

2 PROJECT SPECIFICATIONS

The main goal of this project is a POC. You have to show the feasibility of the concept. you must provide a hardware and software platform to operate the entire system. Data from sensors installed on the shelves, stocks, users 'mobile applications, sellers' terminals, customer comments, etc. will be collected and centralized on a server. This requires an IS (Information System) with a robust and secure architecture.

The smartphone allows the customer to identify himself at the entrance of the store and the amount of purchases will be automatically deducted from the customer's account.

Big data analytics and artificial intelligence will allow the processing of this mass of information in order to extract valuable information in order to make better decisions to offer more personalized offers.

N.B. As a POC, the project statements are voluntarily open and wide to allow you to integrate other functionalities.

3 FUNCTIONAL ANALYSIS

You must start the project by analyzing the data to be managed, identifying the different data sources

3.1. DATA SOURCES AND FORMAT

Identify the different data sources:

- sensors
- cameras,
- smartphones
- terminals,
- user comments,
- etc.

Define data formats: Define the data formats to use: CSV, TXT, JSON, XML, media, etc.
You can consult the Opendatasoft platform : https://help.opendatasoft.com/platform/fr/index.html https://help.opendatasoft.com/platform/fr/exploring_catalog_and_datasets/index.html

3.2. DATA STRUCTURES

Define the data structures (Big Data) to store all generated data: Define the structures that will contain the data: Flat files, Relational database, NoSQL database such as MongoDB (https://www.mongodb.com) , Cassandra (http://cassandra.apache.org/), etc.
Define architecture supporting data structures:

- on-premise,
- cloud,
- mixte,

- etc.

Create an ETL (Extract Transform and Load) function to group and store collected data
Define the general architecture of the platform
Define data backup structures

3.3. DATA SECURITY

High availability and redundancy cannot prevent certain damage that your infrastructure may suffer. In case of ultimate emergency, you'll have to implement a backup plan in a third data center (server) located outside the company.

This backup must take place every day at 2AM and must include a dump of the entire database(s) and every file used.

The physical part of the saving is delegated to a third part who just asks you to copy every data that must be saved on a frontal server in his data center.

- Secure data by defining security rules
- Define the backup rules and frequency
- Define the rules to guarantee the availability of information

3.4. DATA SETS

As we cannot have sensors and cameras to retrieve data directly, we have to generate data of the same type.

Generate datasets for each data source and data type : https://help.opendatasoft.com/platform/en/

3.5. DATA PROCESSING, ANALYSIS & SERVICES

Define data processing models

- Batch mode
- Parallelism

Data analysis:

- Number of clients
- Total sales
- Products sold / by customers / by category /
- Out of stock
- Customer Comments
- etc.

User Account :

Create a user account with an ID and password: The user can create an account to be recognized in the system and the amount of his purchases will be debited directly.

List client transactions: The user can view all of his transactions

Implementation of Artificial Intelligence to better adapt to customer needs and offer personalized offers.

Implementation of Beacons will make it possible to detect customers' smartphones via Bluetooth and thus track their movement and thus offer promotions and recommendations in real time.

3.6. WEB INTERFACE

Define a web interface to manage the entire infrastructure. The web application allows users to graphically explore the content of the platform.

3.7. WEB ANIMATION

Visualize the functioning of the supermarket by simulating the operation of each function of the supermarket by making an animation comprising customers, product stocks, sales, orders, information, recommendations, promotions, etc.

4 SOFTWARE DEVELOPMENT

You are free to use any language/libraries/platform you want for the app. For the POC, it can be a command line tool or a full-fledged desktop/mobile application.

- processing
- analysis
- backup
- animation
- etc

5 DELIVERABLES

Students should include the following elements in their final delivery:

- A zip archive with the project source code. The source code must also come with the build system used (Project file, autotools, libraries, ...), if any.
- Project documentation.
- Technical documentation explaining your choices and/or implementation choices/details on the following items (at least):
- Selected solution
- Network map
- User manual

The first document is an academic document. Address the reader as a teacher, not a client. This document can be in French or in English, at your option. On the other hand, user manual must be understandable by the client.

6 GRADED ITEMS

The project will be graded as follows, on a 240/270 scale:

Specification & documentaion :30 points

- Detailed project specification (10 points)
- Documentation (10 points)
- User documentation (5 points)
- Technical documentation (5 points)

Architecture : 80 points

- Plateform architecture (60 points)
- Big Data architecture (10 points)
- Backup architecture (10 points)

Runing : 50 points

- Client account (10 points)
- Beacons (10 points)
- Artificial intelligence (10 points)
- Users can create accounts (5 points)
- Users transactions (10 points)
- Users can get details on a transaction (5 points)

Web Interface : 30 points

Robustness : 30 points

- There is a live network map (10 points)
- Supporting architecture (10 points
- The network can perform all needed tasks (10 points)

Artificial Intelligence : 10 points

- Algorithm for recommandation (10 points)

Animation :10 points

Security rules : 10 points

Bonus : 20 points

- Extra features done by the students (20 points