Things to be defined:

‘APP-NAME’

‘PRODUCT-NAME’ Example in the use case of a product being bought (such as a shirt or phone)

A picture containing logo

Description automatically generated

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| --- | --- | --- |
|  | DIMA – E-SHOPPING ‘APP-NAME’ | |
| Design Document | |
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8. Introduction
   1. Document Purpose

This document has the purpose to clearly define the functionalities that the system-to-be will provide, the goals it strives to achieve and indicate general use cases. It will also define the general behavior and specific limitations of the system. This document is primarily addressed to the programmers and mostly includes technical language.

* 1. Definitions

Users: Every person who uses our application.

Clients: All users except for vendors.

Vendor: An entity which can use the application to publish its products to be sold.

* 1. Application Purpose

Our application ‘APP-NAME’ has the specific purpose of creating a simple but slick , user-friendly interface which connects clients and the vendor allowing them to respectively buy and sell products. ‘APP-NAME’ does not try to encapsulate many different markets and show all of them in the same application but rather (…?)

‘APP-NAME’ allows the vendors to share their products with all the users of the application as to achieve a higher degree of publicity.

1. Overall description

With this project we attempt to create a user-friendly, adaptive, and reactive mobile application that connects clients and the vendor with one-another.

1. Application design
   1. Functionalities
   2. Interface design
   3. System Architecture
   4. S
2. Back-end implementation
   1. E-R Schema

Diagram, schematic

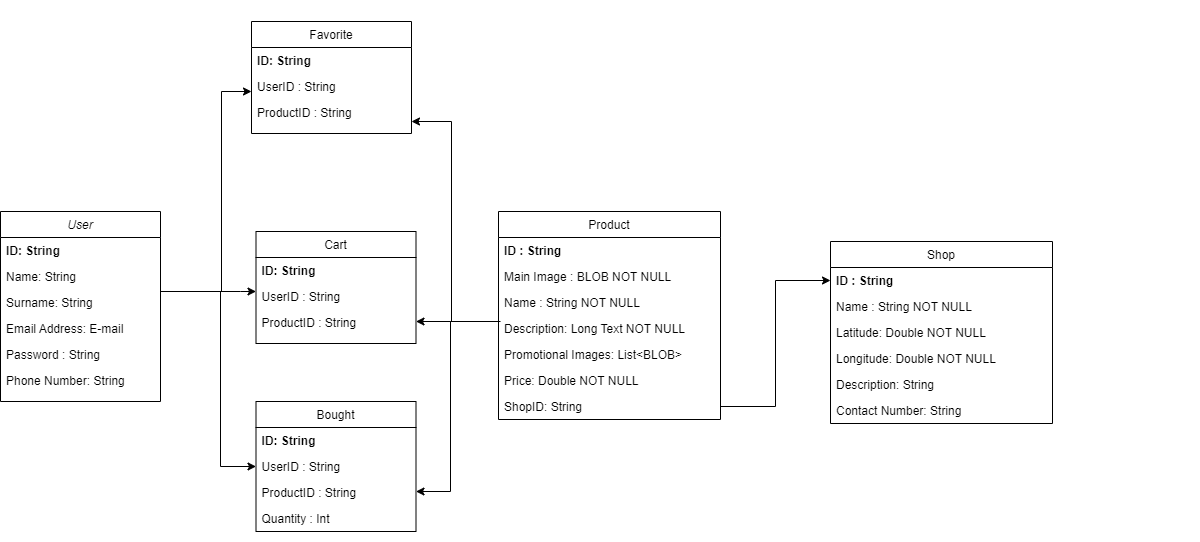
Description automatically generatedWith regards to the back-end we decided to use a document-oriented database with the help of Firebase’s [Realtime database](https://firebase.google.com/docs/database) with the objective to have an easy to use and responsive DBMS (more about it in the [external service’s section](#ExternalServicessection)). With it we will implement the following E-R scheme:

-Entities:

* Users: The persons who will use the application to buy products
  + Attributes: The most interesting attributes of the users are their personal data so as to allow us to identify different people from each-other. As such we can say that the user’s full name, email address, phone number and location are key attributes to store. This last attribute will also allow us to suggest close-by stores to the person’s current location.
* Products: The article to be sold
  + Attributes: The image of the product, its price, name, and descriptions all are key attributes.
* Shops: The (possibly many) vendor(s) which publish products.
  + Attributes: The shop’s location, name, description, and contact number are important attributes to allow the application to function correctly.

-Relationships:

* Bought: A relation between the user and product which counts how many times the product has been bought by the user. This could be useful for a future implementation of the recommender system.
* Cart: A relation between the user and product which stores in memory all the products which the users will possibly buy in the future.
* Favorite: A relation between the user and product which stores in the database all the products which the user really likes.
* Publishes: A relation between the shop and the product that is or was available to be bought.
  1. Logical Schema

As for the logical schema we decide to implement the following schema:

We have opted for this solution, following the requirements of the E-R schema, general rule of thumbs and common design patterns used for the creation of a database. The main problem with the database would be the conversion from the NoSQL, JSON-formatted text data to something that is application-usable for the on-app representation.

1. External Services and Libraries

Our ‘APP-NAME’ strives to be an intermediary for all clients and vendors, both with respect to their connection and their orders and payments. In that regard it needs to use external services which are ready off-the-shelf. Starting from:

-PayPal / Stripe, allows the users to pay for the products online safely and securely. It lets (…?)

-Firebase Authenticator provides the main identification method of all users, storing their email, password, and unique user-id. This last attribute is used as the key inside the Firebase Realtime Database to store all other information regarding the user’s relations with the products. Firebase authenticator was chosen to be used for its ease of use in helping build secure authentication systems, and to improve the authentication experience for end users.

-Google Maps contributes to the extension of the main functionality of our project. It allows users to find close-by shops with the help of the much popular interface that Google Maps provides.

-Firebase Realtime Database has been chosen as the storage platform and DBMS for its advantage in terms of scalability and security. In it we store everything shown in the [logical schema](#LogicalScheme). Since the Realtime Database stores the data in a NoSQL model, some slight modifications are needed to store the many-to-many relationships. For instance, we store in each user not only the information shown in the logical schema but also three other documents with key

\* ‘Bought’ to identify all the product ids of the products that the user bought,

\* ‘Favorites’ to identify all the liked products’ ids of each user

\* ‘Cart’ to identify all product ids of the soon-to-be-bought products. This is also stored in the database in case the user does not buy the product immediately and wants to continue shopping from another device.

All this information is stored in a document-based model, which need to be converted from a JSON-formatted text to our model’s objects as specified in section 3 of Application Design (…?).

Many libraries have been used to improve the look-and-feel of the application such as the provider package, which implements lazy loading of the product’s data and simplified resource management. Another one is the carousel slide, used in many parts of the application. This library allows for example to show the featured products in a more condensed way. ( and could be used to show different images of the same product…? )

1. Use Cases & Tests
   1. Use case full example

The first use case that comes to mind is of a person A. who wants to buy a ‘PRODUCT-NAME’. He first opens our application and sees in the carousel slide all the featured products. Since he is not interested in any of them, he searches the main screen’s list view to find the product he is searching for. Since he is not logged in and the recommender system cannot suggest any products for him, he uses the search bar to search for ‘PRODUCT-NAME’. In there he sees two products for which he is interested. He taps the first one and sees that it is not what he specifically wants. He taps the back button and taps the second item that interested him. This time, the product is of his liking, and he decides to buy it. A screen shows that he needs to log-in or register before going on with the purchase. After entering his personal information, location, and credit card details the order for the ‘PRODUCT-NAME’ is placed.

In the following sections we show all the sequence diagrams of this example.

* + 1. Client scrolling the homepage
    2. Client using the search bar
    3. Client buying a product
    4. Client logging in and registering
  1. Tests & Unit Testing

We have implemented many unit tests such as(…?). Furthermore, a usability evaluation has been carried out with user testing. Users showed that the interface was easy to use although some had problems with the fact that they could not navigate (…?) :

1. References
2. Etc…