Information System of Coffee Product Sales

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Abstract. Forced to develop the online component of the sales strategy, small and medium business requires well-designed information systems and technologies, that will fulfill all the needs and allow working in an actual – distant – business environment. Using digital platforms sometimes became a matter of need for coffee trading. Although digital marketplaces exist in a variety of branches, the specialized platform seems to be the better choice for coffee products sales because of its international specifics. Modeling the process of tasks performing in the information system of coffee products sales, its dynamic aspects, time-ordered interaction of objects in it, will allow designing thoroughly thought out information system, realized with actual software methods and means.

Keywords: marketplace, sales, system modeling, coffee product sales

INTRODUCTION

The existence of a coronavirus pandemic has increased the need for online business opportunities. Due to quarantine restrictions, people are less and less likely to leave home and spend more time in front of electronic device screens. On the one hand, this time of crisis has dealt a serious blow to small and medium-sized businesses. At the same time, the rapid development of contactless online shopping was stimulated. Digital marketplaces have become a key link in the online interaction between seller and buyer. Daily need products can be found in such marketplaces, including coffee industry products.

Coffee shop owners or ordinary coffee lovers are willing to pay for delicious and high-quality coffee. Green coffee beans are usually imported as raw material. Beans are fried, packed, and enriched with attributes of a particular brand. This way, the coffee can be stored for as long as possible and does not lose its original taste.

For coffee shops, one of the key aspects of success is finding the best coffee supplier. In general, there are two ways to solve this problem - to look for a coffee distributor abroad and import coffee beans, or to buy coffee in our country, but more likely at a higher price.

To choose the optimal coffee supplier, one needs to analyze different aspects, i.e. prices, reviews, coffee specie, etc. Mostly this kind of information is posted on the website of the manufacturer or the relevant Internet resource. But not every piece information is reliable and this kind of search requires a lot of time. To find a reliable coffee supplier, the well-known marketplaces should be used. However, such digital marketplaces are used mostly as an additional means.

The goal of this work is to create an information system as an online marketplace to support wholesale and purchase of coffee products. To achieve this goal, we shall start by performing such tasks:

1) to analyze ready-made solutions on the market, analyze their functionality, its advantages and disadvantages;

2) design a conceptual model of the information system that would meet the needs of relevant users and have the necessary functions;

3) choose methods and means for the system modeling considering its functionality.

The objective of the research is the process of developing a platform for the provision of e-commerce services. The subject of research is the methods and means of creating an information system for the sale of coffee products

THE CONCEPT OF THE *MARKETPLACE* AND ITS TYPES

More and more people are trying to virtualize their business to expand their target audience and maintain round-the-clock communication with the client, and digital platforms, i.e. marketplaces, are popular technologies for the purpose.

The digital marketplace is an online platform designed for interaction between sellers and buyers. The platform is usually provided with the means to create and place an order, it is possible to leave reviews about the product. A characteristic feature of marketplaces, which distinguishes them from ordinary online stores, is that the marketplace presents products from many sellers. Every year the popularity of digital marketplaces grows rapidly. According to information provided by the group of companies EVO, in 2018 the popularity of marketplaces increased by 30%, which in turn led to an increase in online sales by as much as UAH 50 billion [1].

By specialization, marketplaces as trading platforms are divided into specialized and general areas. Narrowly specialized marketplaces, as a rule, work in one market segment and offer narrower products (books, cosmetics,

household appliances). A wide range of products is available in classic marketplaces, and the audience of such resources is much larger than in specialized marketplaces.

Marketplaces can be classified by business segment: B2B (business to business), B2C (business to customer), C2C (customer to customer) [2]. When choosing an online platform, it is important not to make mistakes with the business segment. When it comes to wholesale sales, it is important to choose a technology that is focused not on the end-user (B2C), but the business (B2B) [1]. In Ukraine, one of the most striking examples of online trading platforms is Rozetka. Since 2013, the range of products on this site has grown from 160,000 units to more than 3.2 million. In 2018, the site was visited by more than 789 million users.

In [3, 4], different modern business frameworks were investigated, and their special features were explained concerning digital marketplaces. Various approaches of customer engagements to digital marketplaces as one of the modern sales platforms were discussed in [5]. Online platforms of different manufacturers of digital devices provide access to extensions of the basic operating system, and integration of such marketplaces is an objective in [6]. Marketplaces are also used in equity crowdfunding processes [7], and such a digital platform is understood as a natural mean. As an improvement of the digital marketplace, researchers introduce different socially engaged features, that enable customers to do share online shopping experience (in [8], authors describe augmented reality technique). A special kind of sales items i.e. data are arranged as a marketplace in [9], and such data marketplace is designed to fulfill the buyers` requirements, such as real-time operations, quick access to large data sellers within minutes, etc. To optimize the marketplaces` content, different algorithms are designed and used [10].

FEATURES OF THE COFFEE INDUSTRY

With the development of coffee culture, the first coffee shops (XVI century) began to open in the Middle East. In the 17th century, the first coffee shop was opened in Europe and the culture of coffee consumption began to integrate with people's ordinary lives. An interesting fact is that in Vienna the first coffee house "House under the Blue Bottle" was founded by a Ukrainian, Yuri Kulchytsky, in 1686. According to official data, the first coffee house in Ukraine was opened only in 1829, although in some sources you can find mentions of 1802.

Today, coffee has become one of the most popular drink in the world. People consume $ 2 billion in coffee each year. Although there are only a few basic coffees, there are many varieties of coffee according to the area where the coffee was grown and the area, the port where the trade takes place. Thus, the coffee variety is characterized by [11]:

- Country of origin and locality;
- Species or subspecies of coffee trees;
- Port, which is the starting point of coffee in other countries;
- Internal classification of coffee products in the country of origin;
- Features of the commercial trade of coffee products.

DEVELOPMENT OF THE COFFEE BUSINESS IN UKRAINE

In recent years in Ukraine, the culture of coffee consumption has been developing rapidly. Coffee shops have become not only a place to drink a cup of coffee but also a cozy place to socialize, share experiences, and even work. Today we can see the demand for the actual import of green coffee in Ukraine, as the country began to open many retail outlets, where roasters do business on roasting coffee. This approach is profitable, and the cost of coffee is much lower than importing roasted beans from abroad.

Although coffee culture is popularized unevenly in different countries, its development is divided into three waves [12].

- The first wave - the creation of large coffee brands and the distribution of coffee in retail outlets.
- The second wave - the creation of traditional coffee shops.
- The third wave - the creation of non-traditional establishments with alternative ways of making coffee.

According to a study by the International Coffee Organization in 2020, Ukraine ranks eleventh in terms of imports of green coffee in the world. Besides, there is a tendency to create third-wave cafes, i.e. the so-called unique establishments, which were formed not as a result of franchise agreements, but as a result of the implementation of a certain idea. Freshly ground coffee, expensive and high-quality equipment, and experienced coffee specialists are an integral part of such establishments. In some coffee shops, coffee is roasted, and customers can also buy freshly ground or freshly roasted coffee. Coffee culture is developing more rapidly in large cities such as Lviv, Kyiv, Dnipro, Odesa, etc., where the solvency of people is higher and there is a stable flow of tourists who can be attracted by the extraordinary presentation of coffee products.

Coffee enters the market through a distributor with whom a bilateral agreement is concluded (on various terms). The supplier can distribute coffee either directly from large factories, or by pre-order. Today in Ukraine there are about 10 large enterprises for roasting coffee, processing more than 200 tons per month, as well as 1,500 small companies that roast grain in small quantities [13].

We can easily order coffee on the Internet because coffee manufacturers sometimes have their online business cards, but, unfortunately, there is no single resource that would allow you to compare the prices of wholesale producers.

MODELING OF COMPONENTS OF THE INFORMATION SYSTEM

The main purpose of system analysis is to study its components, their behavior, and ways to improve the performance of all components to achieve goals [14]. The main process of the designed system is the organization of sales of coffee products (Fig. 1). The users of such an information system are the seller of coffee products and their buyers (for example, a coffee shop). The buyer searches for the product and manages the orders, the seller places the product on the platform. Account authorization is a mandatory element of this system.
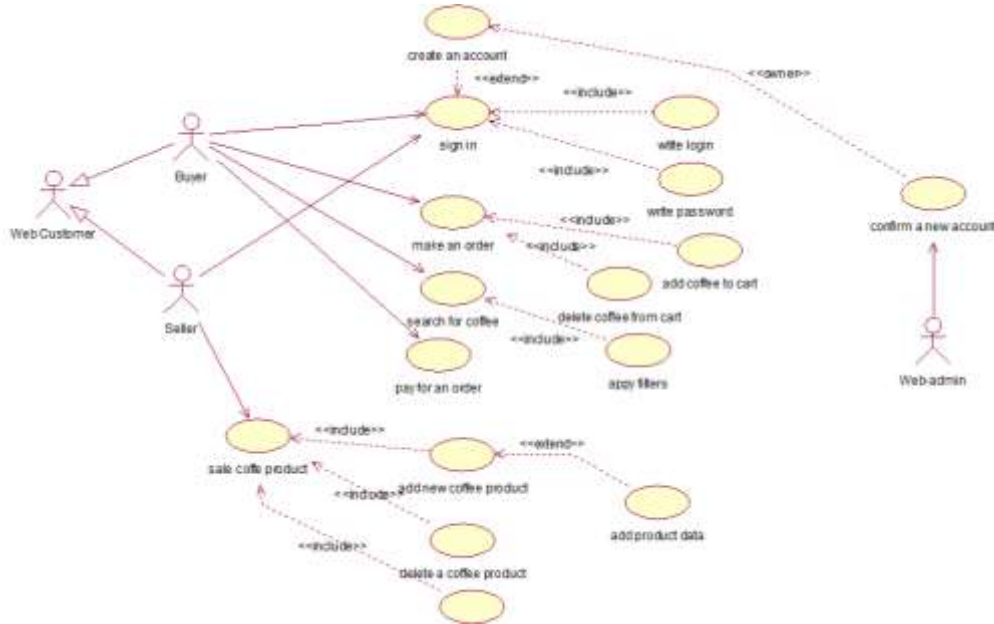

Fig. 1. Use case diagram of the tasks performing in the information system of coffee products sales

We present a model of the process of the buyer's activity in the system (Fig. 2). The buyer's goal is to order coffee. At the first stage, the buyer reviews the product and, if available, adds the appropriate coffee product to the basket. Only an authorized user can place an order. If all conditions are met, the user can place an order and pay its cost. If all operations are successful, the order information will be passed to the seller and the user will be able to log out.
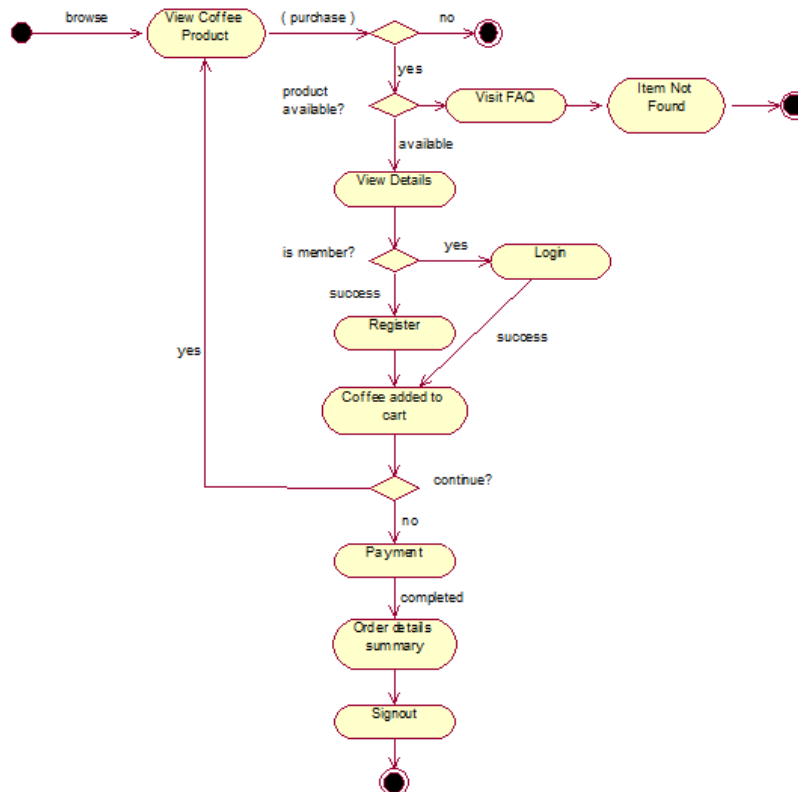

Fig. 2. General UML diagram of the information system of coffee products sales

The static model of the system structure is presented by a class diagram (Fig. 3). The main classes are web user, account, coffee product, shopping cart, order, order status, payment, payment method, and delivery method. In Figure 2, we see how each class interacts with each other, as well as what attributes each class has.
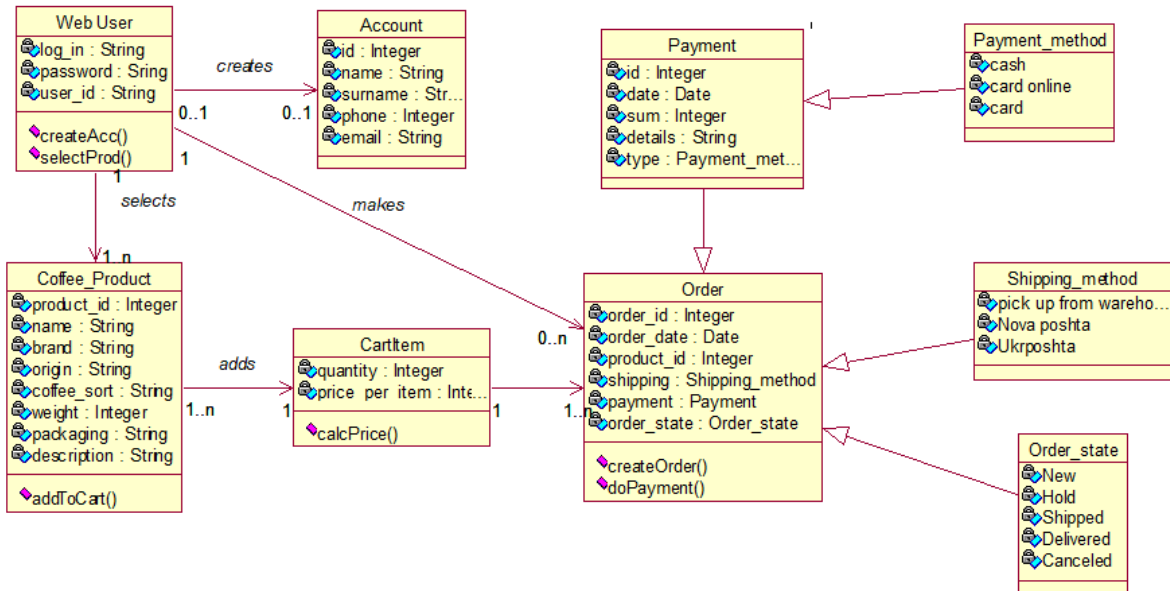

Fig. 3. UML diagram of classes of the information system of sale of coffee products

Figure 4 shows a time-ordered model of interaction of objects of the information system of the sale of coffee products. A prerequisite for interaction between seller and buyer within the marketplace is the presence of at least one product that will interest the buyer. Thus, first of all, the seller must log in and add the product to the presented information system. The second step is the authorization of the buyer, the choice of goods and order. The last stage of interaction is the delivery of goods to the consumer.

Designing an information system, there is a model of dynamics in it (Fig. 5). The state of the objects changes at the stage when the buyer adds the selected product to the basket. Then the order is processed. After the order is confirmed and paid, the customer has a choice – either to continue working on the site or to log out of the system.
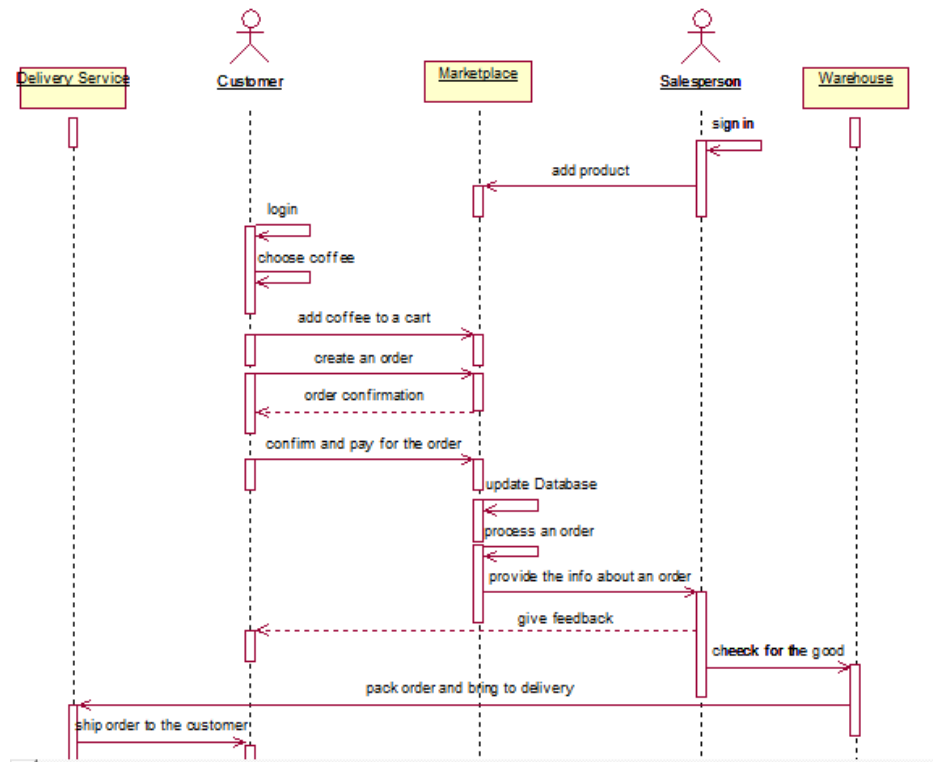

Fig.4 UML sequence diagram of the information system for the sale of coffee products
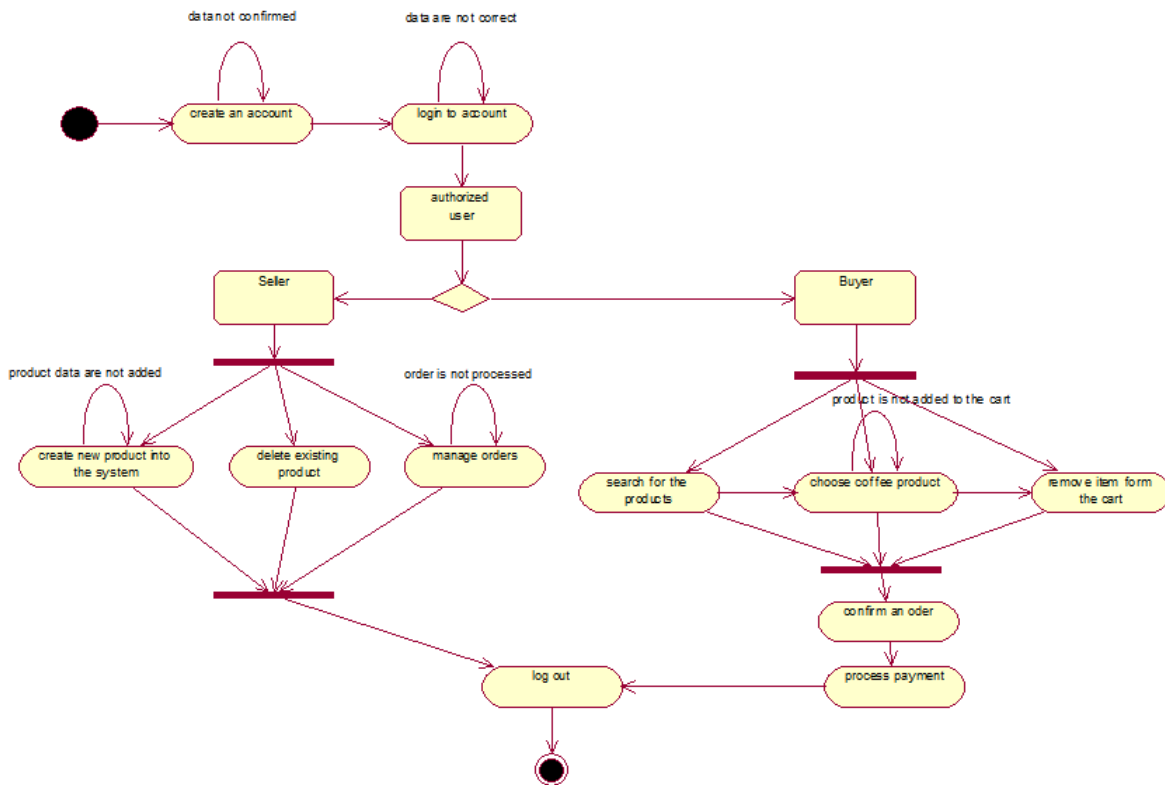
Fig.5 UML sequence diagram of the information system for the sale of coffee products

SOFTWARE METHODS AND TOOLS FOR INFORMATION SYSTEM DEVELOPMENT

The software interface of the site or application is an indicator of product quality and brand value. Also, a well-designed user interface will provide a certain level of loyalty to the target audience. As people's tastes change dynamically throughout the year, there is a need to regularly update the site, adding new components, such as product discounts and more. In this case, a very important aspect is not to harm the stability of the site and ensure the security of the structure. Having in mind the functionality of the designed system, it seems that the React JS library and its Atomic Design will best cope with the above-mentioned tasks.

Java Script is a relevant option for designing online information systems because the code of this language is interpreted and compiled at runtime, which allows immediate results in the browser window. JS can be also used to solve a wider range of tasks, using non-browser environments such as Node.js, Apache CouchDB, Adobe Acrobat, and more. React is a JavaScript library designed to work with user interfaces (UI). This library was developed by Facebook in 2011 and was used internally until the React source code was opened in 2013.

Atom is a free, open-source text editor based on Electron. In Atom, the user can easily create software using JavaScript, HTML, and CSS. It is important to note that the Atom platform has built development environments such as *Visual Studio Code* from Microsoft and *Nuclide* from Facebook [15]. Besides, the Atom text editor has a wide paradigm of built-in tools for checking code syntax for

languages such as JavaScript, Java, SQL, Perl, Python, etc. [15]. In the Atom environment, developers not only have access to Node.js, but can also use various JavaScript libraries, such as React, jQuery, and others [15]. Compared to other text code editors, Atom has advantages, including its freeware, modular structure, project manager, integrated with GitHub and built-in Git Control, uses its Chromium-based browser core [15].

Summarizing the above, we choose the following technical characteristics of software tools for the development of information systems for the sale of coffee products:

- Atom 1.52 open-source text editor;
- JavaScript scripting language;
- React 17.0 JavaScript library for user interface development;
- DBMS MySQL 5.7.

To work with React libraries in the Atom text editor, you first needed to install the React Plugin, which allows Atom to use JSX (Javascript Syntax eXtention) code.

SCHEME OF THE DATABASE OF THE DESIGNED INFORMATION SYSTEM

The first stage of information system development was the modeling and creation of a relational database. Thanks to database modeling, we will have a visual representation of data flows, which will allow us to accurately determine the goals of the system.
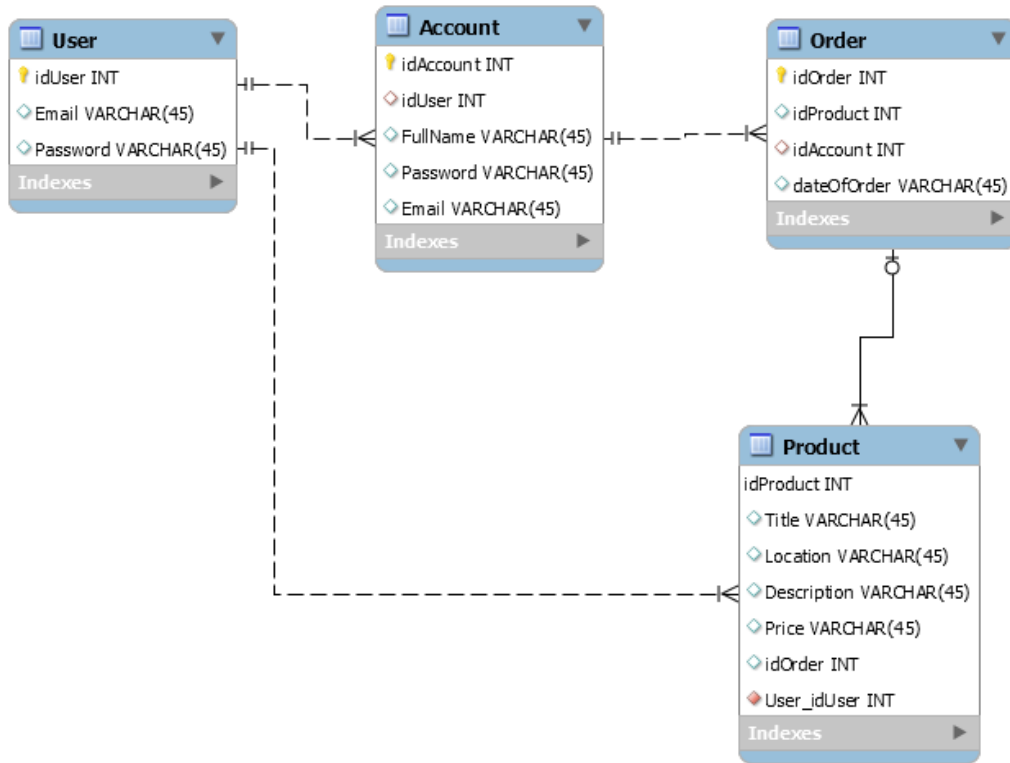
Fig.4. Database schema

The information system works in such a way that the user does not have to log in to his account to view the available products. However, authorization is required if the user wants to place an order. Once the selected products are in the cart, the user can place and pay for the order.

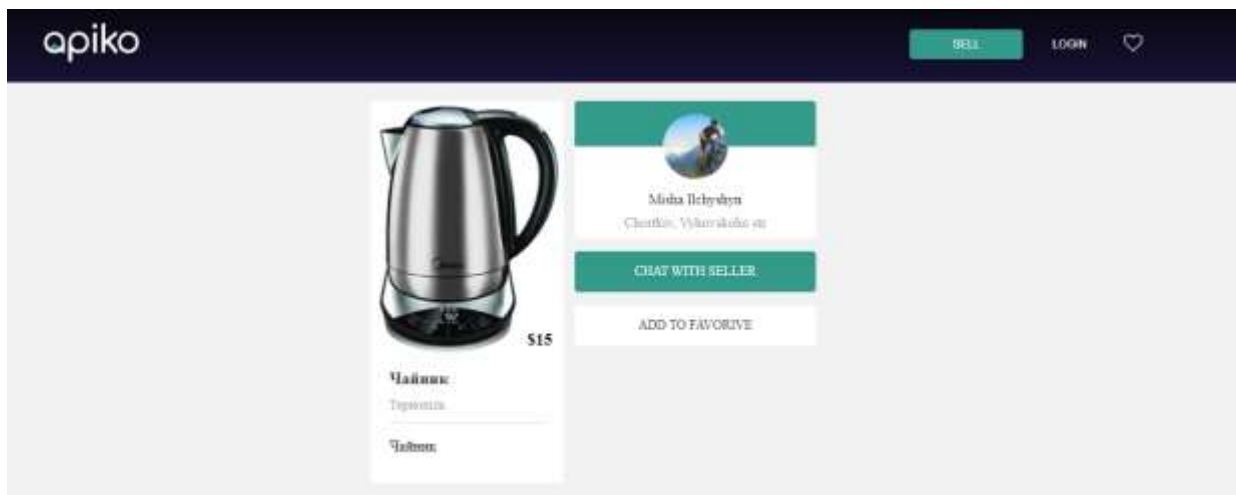Figure 5 shows the stage of selection of coffee products

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Fig. 5. The window with the selected product description

The frontend design of the system uses a restrained color scheme, provides easy access to the functionality of the system [16, 17]. The full implementation of these functions of the information system for the sale of coffee products will allow the creation of quality service for information technology support of the actual business process.

CONCLUSIONS

Digital marketplaces are now rapidly growing technology that allows small and medium businesses to survive nowadays. After analyzed theoretical and ready-made solutions of the digital marketplaces, an information system was designed for coffee products trading. Such a system has all the necessary functions, special for coffee sales, and is meant to support wholesale and purchase of coffee products.

Further research will be directed to the improvement of the designed system with intellectual components, that

will optimize the supply process, resource transportation, and allocation, etc.

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