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NAVIGATION SERVICE SEARCH FOR BLOOD AND ORGANS FOR PATIENTS

Pasternak I., Struk I. Navigation service search for blood and organs for patients. The purpose of this work is to develop a navigation web service to help find information and order medical products in emergency situations from neighboring medical institutions. This paper describes the problem of late receipt of medical products, solving this problem, finding the necessary method. The interface of the web-service has been developed.
Key words: web-service, medicine, emergency.

Пастернак І., Струк І. Навігаційна служба пошуку крові та органів для хворих. Метою даної роботи є розробка веб-сервісу навігації, який допоможе знайти інформацію та замовляти медичні вироби в екстрених ситуаціях із сусідніх медичних закладів. У цій роботі описана проблема несвоєчасного отримання медичних виробів, вирішення цієї проблеми, пошук необхідного методу. Розроблено інтерфейс веб-сервісу.
Ключові слова: веб-сервіс, медицина, невідкладна допомога.

Today, such standard and necessary devices as smartphones, computers, laptops, tablets and many other smart devices for various purposes have entered and are widely used in everyday life. These devices are the result of human activities to automate various technological processes. Today, one of the most common and accessible ways to automate various processes is to develop web-based software systems for process management. Modern web-based tools are used in practice to solve a variety of problems - from the management of complex technological equipment to the management of typical household appliances. There are many problems in the world of different nature, using the capabilities of web-based information systems, you can greatly facilitate their solution.

The practical value of this article is that a software product has been developed to automate the order and receipt of such medical products as organs or blood. The process of finding and ordering medical products often takes too long and it is a danger to human life. This service will allow more people to receive the necessary help in time.

During the development, an analysis of existing services used in medicine was conducted. The following two services are among the most common in practice: «NHS Blood and Transplant» and «Helsi». We will carry out the analysis on the basis of the specified means.

NHS Blood and Transplant is a web service which provide a blood and transplantation service to the NHS, looking after blood donation services in England and transplant services across the UK. This includes managing the donation, storage and transplantation of blood, organs, tissues, bone marrow and stem cells, and researching new treatments and processes. Figure 1 shows the NHS Blood and Transplant home page.
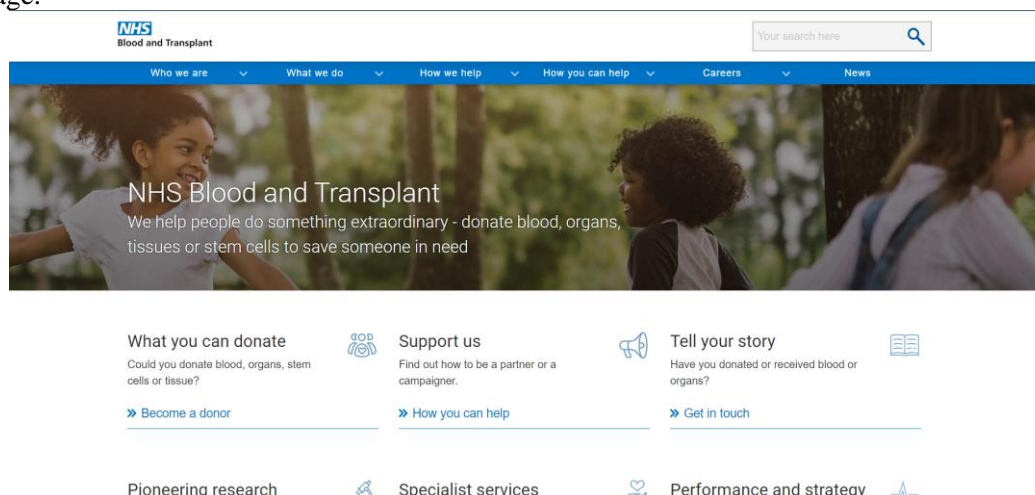

Fig. 1 – Home page of NHS Blood and Transplant home page.

NHS Blood and Transplant provide a safe, accessible and effective blood service for donors and patients. They are responsible for:

• Patient safety - fair, unbiased and compassionate matching and allocating of donated organs, tissue and stem cells

• Specialist support - dedicated clinical nurses and 24 hours support teams

• Community awareness - our campaign teams work tirelessly across the UK to encourage donations and enable us to offer more transplants

Also they have diagnostic and therapeutic services. These specialist services provide:

• Safe transfusion and transplantation therapies, including efficient, accurate and speedy patient and donor testing and matching

• High quality, cost effective, patient-focused, advanced diagnostic and therapeutic services for the NHS

• Fully accredited laboratories in Barnsley, Birmingham, Filton, Colindale, Newcastle, London, Tooting and Liverpool.

The advantages of the web service: convenient and intuitive interface, the ability to remotely record. The disadvantage is that the service takes place in England; there is no navigation part of the web service.

Helsi is a modern, convenient and reliable electronic medical system designed for patients, doctors, public and private medical institutions. This service is one of the most popular in Ukraine. The main page of the service is shown below:
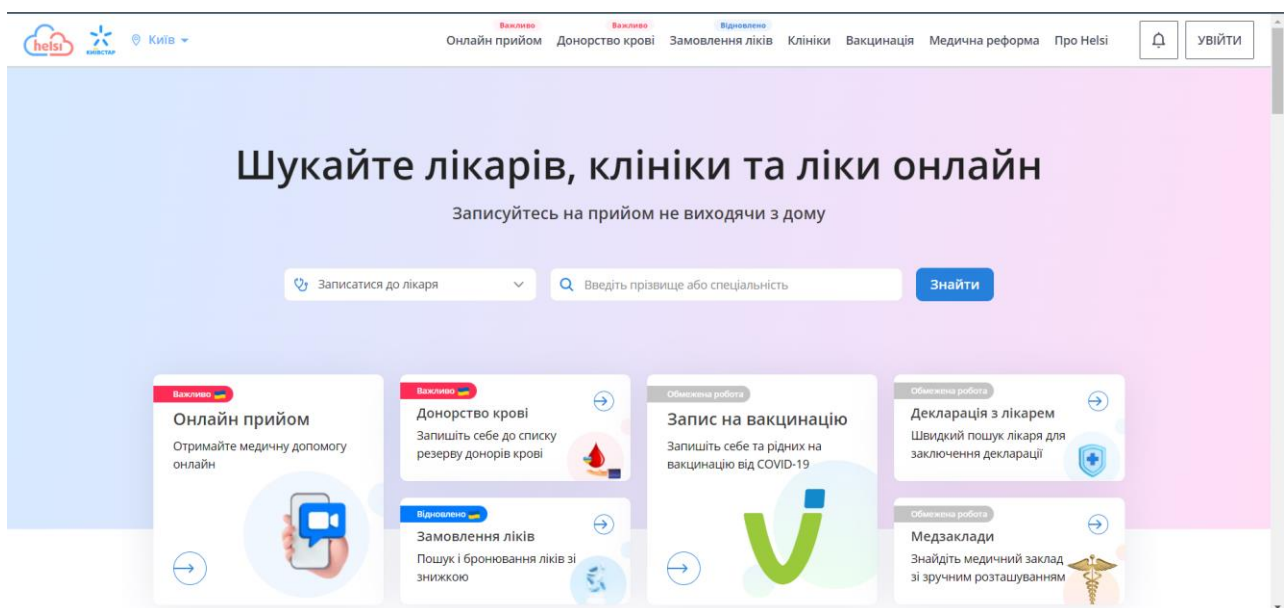

Fig. 2 – Helsi home page

Helsi provides such opportunities for patients like:
- Ability to easily find and choose your doctor;
- Quick registration for on-line reception of yourself and your family members;
- Access to your electronic medical card (EMC);
- Instant results of tests and diagnostics in the patient's office;
- Access to doctor's appointments and treatment plan.

Using Helsi doctors can convenient record a history of patients, prompt receipting of diagnostic results and tests, easily use of clinical protocols. Also the service provide blood donation.

The advantages are the same as advantages of the previous service. The disadvantage is the lack of search for organs for transplantation.

Unified Modeling Language (UML) was used to develop the software. This language is used to create a descriptive and graphical model of the software product.

One such chart is a precedent chart or usage chart. This is a diagram showing the relationship between the actor and the precedents in the system. Precedents describe the sequential actions performed

by a system so that the actor can get a certain result. This diagram helps to clearly see the functionality of the system.

Fig. 3 shows a use-case diagram showing precedents and the relationships between them that belong to the "User" actor. Among the functionalities:

- registration in the service
- access to the personal account
- the ability to view information, access to the rating of doctors and their personal information
- access to medical cards of patients and the ability to add new ones
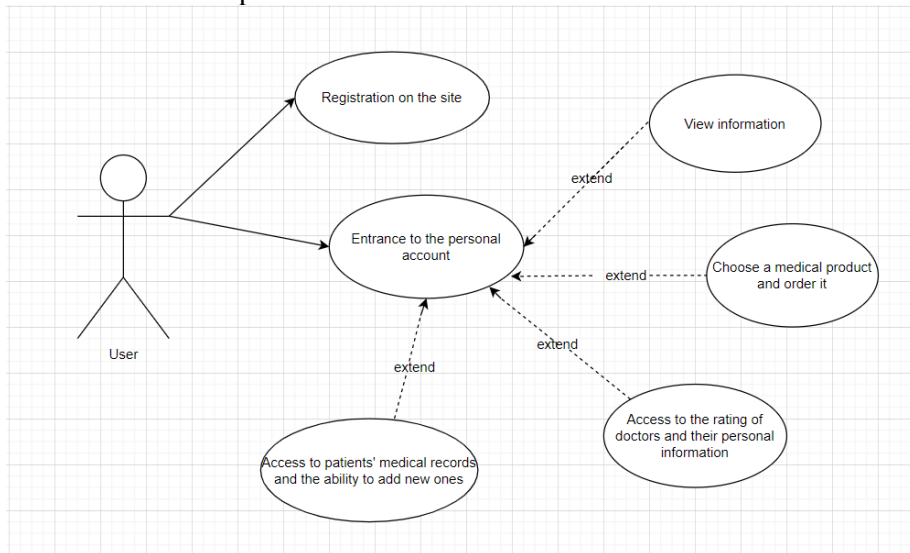- the choice of medical product and its order

Fig. 3 - Diagram of precedents for the actor User

Fig. 4 shows a diagram of the algorithm of the registration process in the service:
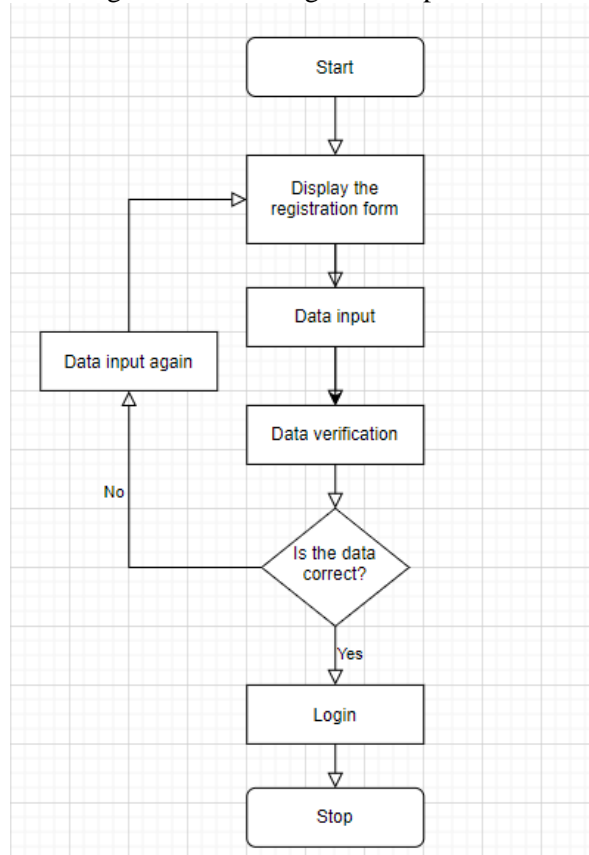

Fig. 4 - Diagram of the algorithm of the registration process

This diagram describes the sequence of processes during registration. When entering the service, the user, having chosen the registration, must enter the name and surname, the name of the completed higher education institution, e-mail address and password. This is followed by input validation (verification of the entered data). If the input is valid, registration takes place, otherwise the user will receive an error message about the invalidity of the input and will need to re-enter the data.

JavaScript programming language was chosen for software development. This programming language is a high-level language. Nowadays, JavaScript remains the only language that allows you to develop applications that run in the browser. The React library, HTML hypertext markup language, and CSS page style language were also used.

Therefore, using a class diagram, you can represent different classes, specifying their attributes and the methods that make up the service. The diagram also shows the static relationship between classes.

Figure 5 shows a UML diagram, namely a diagram of the classes of the navigation service search for blood and organs for patients.
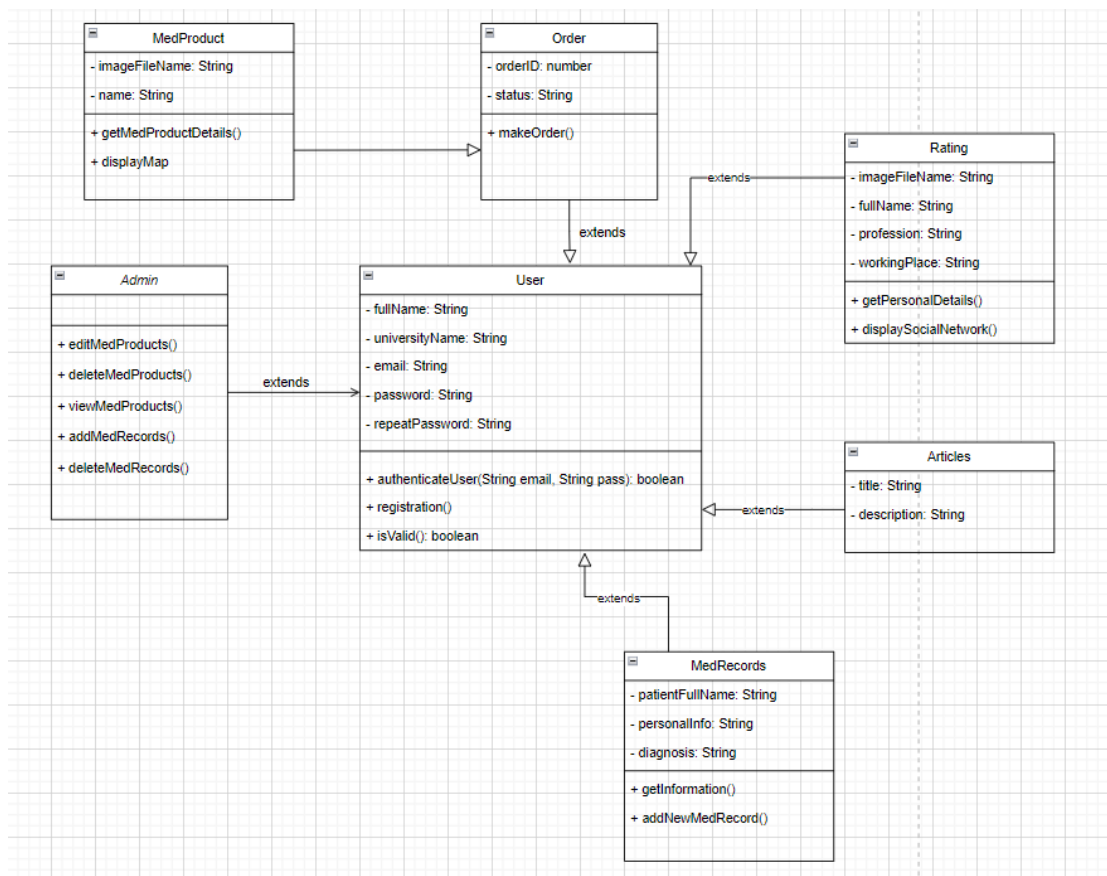

Fig. 5 - Diagram of classes

The main classes of the developed service include: Admin, User, Medical Records, Rating, Articles, Order and its component Medical Product.

The diagram shows the relationships that arise between classes, and each class contains the entities and properties that will be used in the development of the software product.

An important step in the development of a web service is the development of the user interface. After all, the interface is one of the most important components of any software product. This is what the user encounters when looking at the device or screen: the location of graphical interface elements, buttons and navigation. A person's desire to use a web service or application depends on how user-friendly the interface is.

When entering the web service, the user sees the "Home" page. Immediately the user can read the name of the web service and see the main image, which makes it clear why you need this software product. The buttons at the top Login and Registration are responsible for redirecting to the login page of the personal account and the ability to register in the system. After successful login or registration, the main functions of the software product become available for use.

Among the possibilities of this service is definitely the ability to order blood or an organ from a neighboring medical institution. After choosing a medical product, the doctor will be transferred to a page with a map, which will show exactly where the order is located territorially. After the order, information will be received on the account that the driver with the order has already left and how long to wait for arrival. There are also interesting articles from various fields of medicine. Another option for doctors is to review patients' medical records and add new medical records. And you can also view the rating of doctors in the city and go to the social network for better information.

Conclusion.

Blood donation is a major concern to the society as donated blood is lifesaving for individuals who need it. Blood is scarce. There is a shortage to active blood donors to meet the need of increased blood demand. Blood donation as a therapeutic exercise. Globally, approximately 80 million units of blood are donated each year. One of the biggest challenges to blood safety particularly is accessing safe and adequate quantities of blood and blood products.

As a result of scientific research, a web-based navigation service for searching for blood and organs for patients was developed. The analysis of analogues in the market is carried out, their pluses and minuses are defined. The diagrams of the service operation are also developed and the technologies of development of this software product are described.

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