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Ternopil Ivan Puluj National Technical University

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QUALIFYING PAPER

For the degree of

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(degree name)

topic: **Development of an information system for maintaining an electronic
patient card**

Submitted by: fourth year student 4, group ISN-42
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Ternopil, 2022

Ministry of Education and Science of Ukraine
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Faculty Computer Information Systems and Software Engineering
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ASSIGNMENT
for QUALIFYING PAPER

for the degree of _____ **Bachelor** _____
(degree name)

specialty _____ **122 «Computer Science»** _____
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student _____ **Usman Halimat** _____
(surname, name, patronymic)

1. Paper topic **Development of an information system for maintaining an electronic patient card**

Paper supervisor **Ph. D., Assoc. Prof., department Computer Science, Roman Zoloty**

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CHAPTER 1

CHAPTER 2

CHAPTER 3

Conclusions

5. List of graphic material (with exact number of required drawings, slides)

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Chapter	Advisor's surname, initials and position	Signature, date	
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ABSTRACT

Development of an information system for maintaining an electronic patient card // Qualification work of the educational level "Bachelor" // Usman Halimat // Ternopil Ivan Puluj National Technical University, Faculty of Computer Information Systems and Software Engineering, Department of Computer Science, group ISN-42 // Ternopil, 2022 // P. , Fig – , Table – .

Keywords: INFORMATION SYSTEM, ELECTRONIC CARD, DATABASE, DEVELOPMENT.

This thesis is devoted to the development of a prototype of the web-oriented information system "Electronic medical card of the patient". The study provides a general description of the electronic medical card, the architecture and development technology are selected. From a functional point of view, a list of functions of the software used is provided.

As a result of the study, a web-oriented information system "Electronic medical card of the patient" was developed. The developed system implements the functions of registration of the patient's card, as well as the possibility of making changes to the patient's card, if it is necessary to remove this card.

The information system is developed in the PHP programming language. MySQL was used for the database.

The calculation of efficiency from the system is carried out .

LIST OF CONVENTIONAL SYMBOLS OF ABBREVIATIONS AND TERMS

NA – (Neighbor Advertisement) representation of a neighbor.

RA – ("Router Advertisement") representation of the neighboring router.

RD – ("Router Discovery") search for a neighboring router.

NAT – ("Network Address Translation") conversion of network addresses.

CPU – CPU.

MitM – ("Man in the Middle") attack "man in the middle".

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INTRODUCTION

Electronic medical card – medical card of the medical institution in electronic (paperless) form.

The object of the study is the process of registering patients in the database of a medical institution.

The subject of the study is the automation of the patient registration process in the database of a medical institution.

The purpose of the work is to develop an automated system for registering patients in the database of a medical institution.

To achieve this goal, it is necessary to perform the following tasks:

- to characterize the basic principles of patient registration;
- analyze the state of automation in the medical field;
- formulate the basic requirements for an automated patient registration system;
- choose architecture and technology for the development of an automated system;
- determine the composition of the functional part of the automated system;
- determine the composition of the subsystems of the functional part of the automated system;
- identify software and hardware for solving the problem;
- develop a structure and determine the features of the implementation of information support of the system;
- develop a structure and determine the features of the implementation of algorithmic support;
- design the user interface.

1 MEDICAL CARD OF THE PATIENT AS AN OBJECT OF AUTOMATION

1.1 General characteristics of the patient's electronic medical record as an object of automation

Currently, automation of various industries is becoming widespread in the world. Medicine is not ignored. Over the past eight years, Ukraine has seen a positive dynamic of the development of the medical information systems market.

There are also other problems faced by the health care system, such as: a small budget, increased requirements for the health care system, frequent change of patients' place of residence, etc.

The use of information systems that will automate the work of hospitals will significantly increase not only the level of medical services and the quality of treatment but also the effectiveness of the use of medical resources.

Unsatisfactory is the situation with informing the city health departments, sanitary-epidemiological stations, and other institutions about the epidemiological situation or the current state of morbidity, the availability of free beds in hospitals, etc.

Due to the lack of modern technology, software, and means of communication, such information is incomplete and belated, which makes it impossible to promptly and adequately prevent threats, as well as respond to problems that arise in the work of medical institutions.

The patient's electronic medical record is the main component of the information system. The medical record stores all information about the patient - registration data, results of medical examinations, anthropometric measurements, laboratory examinations and various graphic data (ultrasound, X-ray, etc.).

The creation of an electronic medical record of the patient will significantly improve and speed up the work of medical institutions.

1.2 Analysis of the state of implementation of electronic medical records of patients

Most of the medical information systems that operate in medical institutions at present are morally and physically obsolete. By the number of implementations should be noted: "Med systems", SIET, Ukrmedsof, TherDep. Polish (ABG), Russian (Media log) and Turkish developers of medical information systems are also interested in the Ukrainian market. However, the cost of implementing these systems is much higher than that of similar Ukrainian systems. Most systems are built on the basis of client-server architecture, which provides a limited number of functions – mainly the preparation of statistical reports and standard forms of the Ministry of Health. phrases from reference books. This approach does not make it possible to carry out in-depth analysis in the future.

The disadvantage of these systems is the need to contact developers to make changes to the input and output forms. This is "Dr. Eleks" and "Emsimed." These systems are focused not only on public, but also on private medical institutions. They ensure the integration of the patient's electronic card with a variety of diagnostic equipment, as well as ensure the receipt of data directly from the laboratory analyzers. The introduction of medical data into the electronic history of the disease is carried out on the basis of protocols developed by expert doctors for medical information systems. The system is based on the idea of building medical examinations based on tree review templates. The system provides all information needs of medical, rehabilitation and diagnostic processes, research and educational and methodological work. Work on the creation of an information system in LLC "Eleks" began in 1990.

The first development of the company in the medical field was the Avalon system, implemented in a number of medical institutions in Ukraine obtained by the company's specialists while working on previous systems. MIS makes it possible to enter in optimal form, store and analyze not only the main patient data commonly used in the registry, but also all medical documentation, such as complaints, history

of life and diseases, objective examination data, functional and laboratory diagnostics, anthropometry, as well as data on medical appointment and their implementation during their stay in a medical institution.

The main component of storing patient data in the information system is an electronic medical card, in which all information is accumulated: data from medical examinations, anthropometric measurements, video control data, diaries of dynamic monitoring of the patient's condition, discharges and results of examinations of other clinics, multimedia data (radiographs, writing samples, photos) and other important data about patients about patients. Basic medical information, such as medical examination data and treatment results, is entered into an electronic map according to a specially developed unified medical terminology, which is organized into tree-like review templates - hierarchical structures consisting of primitives that form the logic of the medical examination. medicine deserves the direct attention of industry leaders and interested departments.

One of the priority directions of the development of the health care system is the creation of a single medical information space that will ensure the adoption of effective management decisions at all levels. This will make it possible to establish an effective accounting of the activities of medical institutions of the organization to carry out management at the modern level, timely receive information about advanced achievements in the field of medical science, use all medical information about the patient (for the entire period of his life), accumulated from all levels of medical care to achieve a better therapeutic effect.

1.3 Formation of requirements for a web-oriented Information system "Electronic medical card of the patient"

Despite the wide variety of software systems used for content management, the actual task remains the research, development and improvement of means of universal management of information objects of Web-resources, which will simplify

the creation of new resources for various purposes, as well as provide effective mechanisms for their maintenance and configuration. The educational publication considers the key principles of creating modern Web-oriented information systems.

Consider this problem to solve an automated system that implements information technology for performing established functions for with the help of personnel and a set of means, as well as, will allow people to register electronic medical cards.

The biggest problem that needs to be overcome in this automated system is the problem of registering patients in a medical institution.

In this case, the software web application should be made in a simple and at the same time understandable form that will be used for use, which will allow you to quickly navigate and work with the web application.

Also, a very important feature is cross-platform programming that will allow you to use the system on different browsers. The cross-platform view of the web application can only be achieved with the help of cross-browser CSS. Those who are familiar with HTML do not need to be told that this is a page layout language. But its creators decided to add tags responsible for appearance and design. That's just with this approach, the page code became too voluminous and almost unreadable. Naturally, this path went nowhere, so a comprehensive solution was made: HTML is responsible for page layout, CSS is responsible for visual design. Block page layout by CSS has several undeniable advantages. Firstly, the style of objects is separate from the HTML of the document, which significantly increases the readability of the code and allows you to quickly make visual changes. this approach is a different "understanding" of browsers. Some display the resource in the form in which the Webmaster sees it. But there are browsers that distort images, so with a large number of classes and selectors, it is necessary to use methods that will make the code cross-browser. To store the data that the user will fill in, we will use MySQL.

In addition, thanks to the use of the web application, the doctor will be able to register new patients from his smartphone, tablet, personal computer, or laptop quickly and conveniently, since the device data is always near the user.

Therefore, requirements are opportunities or conditions that the system or project must meet. The main task of the stage of determining requirements is to find, judge and fix what is really required of the system in a form that will be understandable to both customers and developers.

That is, it is necessary to develop the first package of requirements for the system. Further, in the development and testing of the web application, the needs will be clarified and supplemented. This approach will help to ensure the fulfillment of the user's requirements as accurately as possible, and is also one of the basic principles of a unified approach. In the project, we must monitor the harmony and minimalism of architecture using DRY, KISS. Should write as in a modern programming language, dividing into public resources and program files.

More detailed information about these approaches and development can be found in the following sections of this work.

So, based on the vision of the product, a number of high-level rules can be distinguished. These rules ensure the quality of the software. These include:

the software web application must perform its main function, namely the registration of the patient of the medical institution;

this system should be convenient for the user and meet his needs related to the scope of the web application;

The website should help people save their time as well as their economic situation. All other requirements that the software product itself details may change as part of a unified approach and iterative development. Therefore, it is advisable to consider the requirements under a certain system. One of these systems, which has proven itself well in the world practice of software development, is the FURPS+ system.

Its essence lies in the fact that the software application should be made on functional requirements that adapt to the capabilities of the system, as well as properties, which in turn are divided into requirements of convenience, reliability, performance, and support capabilities.

So, according to this model, the first package of requirements for the software product was drawn up:

- Requirements for functioning:
 - User management. The entire registration process should be convenient for custom input in order to fully control the user.
 - Personalization. To better differentiate information, you need to create a user personalization system.
 - Accessibility and reliability are especially important for web applications with a large number of users. Applications should be able to withstand heavy loads and are obliged to work even in non-standard situations.
 - Analysis of the site. The administrator should be able to perform and view the analyzed information in various formats.
 - Speed of the web application. The program must respond quickly to various requests.
 - Flexibility of system architecture. It should support the ability to change the content structure of the application without adversely affecting the second parts of this structure.
- Convenience of the web application:
 - Usability means that the user can work efficiently, conveniently and at the same time still enjoy the work of the program. Accessibility is part of usability.
 - People should easily understand what they need to do to get results without any problems.

Completeness and clarity.

- Reliability requirements:

- Frequency of failures. The frequency of failures should be minimized, in case of an error, the user should be presented with clear brief information about the problem and instructions for overcoming it.
- The process of interaction with the database should be designed in such a way that under no circumstances there is a loss of information or blocking it.
- Performance requirements:
 - Response time. The response time is minimized, or not more than 100ms. For some operations, a slightly increased response time is assumed.
 - Accuracy. The software system must accurately record all the data specified by the user and analyze them.
 - Availability. Work with the web application should be available to the user at any time.
 - Use of resources. the web application should be well indexed by Google analytics.
- Support capability requirements:
 - Configuration. The software system must support the configuration system in order to achieve better compliance with the needs of the user.
 - Online support for the web application. To answer questions, the program must contain the email address of the developers.

The main purpose of quality assurance, or rather, quality management of software, is to make costs and benefits transparent for all parties involved in the creation of software. The poor quality of the program in the long term causes additional costs. If these costs can be quantified, then it must be concluded that achieving better quality will lead to lower costs in the future. This is probably the

only way to get management or the client to consider allocating a budget for code refactoring.

Web-technology completely turned the idea of working with information, and with the computer in general "bottleneck" of the system - the interface with a person. The outdated mechanism of human interaction with the information system restrained the introduction of new technologies and reduced the benefits of their application, and only when the interface between man and computer was simplified to the naturalness of perception by an ordinary person, an unprecedented explosion of interest in the capabilities of computing followed.

The information available to Internet users is located on Web servers. Much of this information is organized in the form of websites. Each of them has its own address. To view websites on a user's computer, special programs called browsers are used.

2 DEVELOPMENT OF A WEB-ORIENTED INFORMATION SYSTEM "ELECTRONIC MEDICAL CARD OF THE PATIENT"

2.1 Architecture of the automated system

Looking at the basic rules for the development of a web application, the following architecture of an automated system will be formed.

The system will be developed using PHP program code. PHP (Hypertext Preprocessor) is a programming language that is very popular and has a common open-source destination.

PHP is oriented for the development of web applications. PHP applications are processed on the server and generate HTML, using the server settings, HTML files are processed by PHP processes. This programming language is easy to learn, but can satisfy a large number of problems of programmers of different levels.

In order to make the development of the prototype easier and faster, let's use the Laravel framework – a free, open-source PHP framework created by Taylor Orwell and designed to develop web applications in accordance with the model-view-controller template (MVC) (Fig. 2.1). Some of Laravel's features are a modular packaging system with a dedicated dependency manager, various ways to access relational databases, utilities that assist in application deployment and maintenance, and its focus on syntactic sugar.

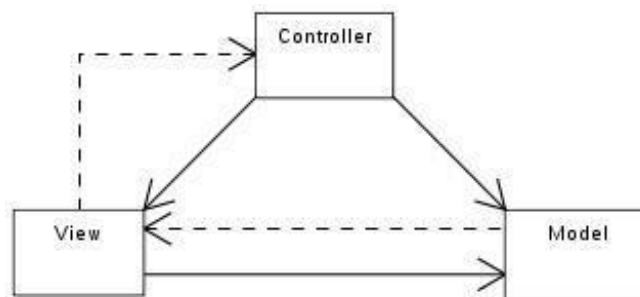


Figure 2.1 - pattern "Model-view-controller"

A model is a central component of an MVC template that displays application behavior that is independent of the user interface. The model refers to direct data management, logic, and application rules.

A view can be any representation of information received at the output, such as a graph or chart. At the same time, several views (representations) of the same information can coexist, for example, a bar chart for the company's management and a table for accounting.

Controller – receives input data and converts it into commands for a model or appearance.

For example, the user gets to the main page of the site that is logged. Let's say that the user wants to see the data that he indicated during registration. To verify the information, he will select the appropriate section of the site. The controller will receive the user's request, check it and then release the model, inviting the data that suits the request. Using this data, it will return the information to the template that corresponds to this category.

To develop a web application, we will use the Linux Ubuntu operating system. This operating system is based on Debian GNU/Linux. Ubuntu provides the user with a minimal set of general-purpose applications: multi-window desktop environment, internet viewing tools, email organization, office programs with the ability to read and record files in the formats used in the Microsoft Office program package, image editor, CD player etc. Specialized software required by more advanced users can be obtained from the relevant repositories. The server version of the system also includes the tools needed to organize a database server, Web server, e-mail server, etc.

To develop a prototype web-oriented information system the "patient's electronic

medical record" will require the following software: Apache HTTP Server, MySQL,

PHP, PhpMyAdmin, PhpStorm, Composer.

As a database, we will use MySQL. MySQL's free and fast open-source relational database was created as an alternative to commercial systems. This database is best suited to web applications.

After all, the speed of data processing in the amount of up to 500,000 records is the best. It has an open, free and free license, and is also most suitable for most hosting companies in Ukraine. It can be used on various platforms such as Unix, Windows, others. Multiple processes can read data from the same database without any problems at the same time. MySQL has dual licensing. MySQL may be distributed in accordance with the terms of the GPL license. However, under the terms of the GPL, if any program includes MySQL source code, then it must also be distributed under a GPL license. This may differ from the plans of developers who do not want to open the source text of their programs. For such cases, a commercial license is provided, which also provides high-quality service support.

Apache HTTP Server is a project developed by The Apache Software Foundation, which develops an open source cross-platform HTTP server. Apache supports half of the Internet, managing a large amount of data, performs up to 1,000 billion operations per second, and stores objects in each industry. Apache software projects are an integral part of almost any end-user computing device, from laptops to tablets and phones. The Apache code for projects is more than 6,000 volunteers and corporate employees on six continents. It is also included in the complex of server software like LAMP, as well as a popular solution for those who need a web server to de-bed PHP scripts, Perl and is the most convenient XAMPP. Apache can be implemented in four different ways:

default settings in the /var/www/html folder.

Access will be made to the address `http://localhost/`;

Setting up the main hosting, an example would be `http://localhost/phpmyadmin`;

using virtual hosts in a folder, example `http://mysite/` user Dir module in user folder

public HTML example: `http://localhost/~username;`

PHP is a component that processes code for content output. In general, it can use paper clips, connect to our MySQL database, so that we can display and transmit content to our web service. It is necessary to install auxiliary managers of peckets, in order for PHP to work with our Apache server and in order for MySQL to communicate with PHP without any problems: PHP, libapache2-mod-php, php-mcrypt, php-mysql.

In order for Apache to search for PHP files better when the directory is overgrown, rather than HTML files (at the moment, first of all, it will search for a file named `index.html`), you need to do the following, in the `/etc/apache2/mods-enabled/` folder, open the `dir.conf` file and replace the `index.html` with `index.php`. will do, you need to save the file, and restart the Apache server. To check that our PHP system is working and configured, we will make a simple papercase.

Let's call it `info.php`, and save it to the `/var/www/html` folder. To check you only need to open this page from a web browser. The page we see is shown in Fig. 2.2 .

This page carries information about our server from the PHP point.

PhpMyAdmin is an open source web application in PHP with a graphical web interface to administer a MySQL or MariaDB database. phpMyAdmin allows you to administer the MySQL server through the browser, run SQL queries, view and edit the contents of database tables. This program is very popular with web developers, as it allows you to manage the MySQL database without entering SQL commands through a friendly interface and from any computer connected to the Internet without the need to install additional software.

PHP Version 7.0.4-7ubuntu1	
System	Linux ubuntu-16-lamp 4.4.0-12-generic #28-Ubuntu SMP Wed Mar 9 00:33:55 UTC 2016 x86_64
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.0/apache2
Loaded Configuration File	/etc/php/7.0/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.0/apache2/conf.d
Additional .ini files parsed	/etc/php/7.0/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.0/apache2/conf.d/10-opcache.ini, /etc/php/7.0/apache2/conf.d/10-pdo.ini, /etc/php/7.0/apache2/conf.d/20-calendar.ini, /etc/php/7.0/apache2/conf.d/20-ctype.ini, /etc/php/7.0/apache2/conf.d/20-exif.ini, /etc/php/7.0/apache2/conf.d/20-fileinfo.ini, /etc/php/7.0/apache2/conf.d/20-ftp.ini, /etc/php/7.0/apache2/conf.d/20-gettext.ini, /etc/php/7.0/apache2/conf.d/20-iconv.ini, /etc/php/7.0/apache2/conf.d/20-json.ini, /etc/php/7.0/apache2/conf.d/20-mcrypt.ini, /etc/php/7.0/apache2/conf.d/20-mysql.ini, /etc/php/7.0/apache2/conf.d/20-pdo_mysql.ini, /etc/php/7.0/apache2/conf.d/20-phar.ini, /etc/php/7.0/apache2/conf.d/20-posix.ini, /etc/php/7.0/apache2/conf.d/20-readline.ini, /etc/php/7.0/apache2/conf.d/20-shmop.ini, /etc/php/7.0/apache2/conf.d/20-sockets.ini, /etc/php/7.0/apache2/conf.d/20-sysmsg.ini, /etc/php/7.0/apache2/conf.d/20-sysvsem.ini, /etc/php/7.0/apache2/conf.d/20-sysvshm.ini, /etc/php/7.0/apache2/conf.d/20-tokenizer.ini
PHP API	20151012
PHP Extension	20151012
Zend Extension	320151012
Zend Extension Build	API320151012.NTS
PHP Extension Build	API20151012.NTS
Debug Build	no
Thread Safety	disabled
Zend Signal Handling	disabled
Zend Memory Manager	enabled
Zend Multibyte Support	disabled
IPv6 Support	enabled
DTrace Support	enabled
Registered PHP Streams	https, ftps, compress.zlib, php, file, glob, data, http, ftp, phar
Registered Stream Socket Transports	tcp, udp, unix, udg, ssl, tls, tlsv1.0, tlsv1.1, tlsv1.2
Registered Stream Filters	zlib.*, string.rot13, string.toupper, string.tolower, string.strip_tags, convert.*, consumed, dechunk, convert.iconv.*, mcrypt.*, mdecrypt.*
<small>This program makes use of the Zend Scripting Language Engine: Zend Engine v3.0.0, Copyright (c) 1998-2016 Zend Technologies with Zend OPcache v7.0.6-dev, Copyright (c) 1999-2016, by Zend Technologies</small>	

Figure 2.2 – Main window PHP settings

PhpMyAdmin offers a wide range of documentation. The phpMyAdmin team will try to help if you encounter any problem. You can use different support channels To get help. PhpMyAdmin is also very deeply documented in a book written by one of the developers - Mastering phpMyAdmin to effectively manage MySQL, which is available in English and Spanish.

The main advantages of this system are that it is easy to use and in most cases allows you not to use SQL commands, so working with the database is more simple and suitable for people who superficially know MySQL. PhpMyAdmin can manage an entire MySQL server (requires a super user) as well as a single database. To perform the latter, you will need a properly configured MySQL user who can read or write only the desired database. Many people make it difficult to understand the concept of user management with respect to phpMyAdmin. When a user signs in to phpMyAdmin, that username and password are passed directly to MySQL. phpMyAdmin does not manage accounts on its own (except to manipulate MySQL

user account information). All users must be valid MySQL users. Since the phpMyAdmin interface is fully based in our browser, we need an Apache web server to install phpMyAdmin files.

PhpMyAdmin's development team makes a lot of effort to make phpMyAdmin as secure as possible. However, web applications such as phpMyAdmin can be vulnerable to a number of attacks, and new ways of exploitation are still being explored to perform somethings. This, for example, may be a piece of JavaScript code that would do any number of unpleasant things.

PhpStorm is an integrated development environment for PHP. It is an intelligent development environment with code analyzer, code error prevention and automated refactoring tools for PHP and JavaScript. PhpStorm is developed on the IntelliJ IDEA platform, written in the Java programming language.

It has a special and convenient backlight of the code. PhpStorm is ideal for working with Symfony, Drupal, WordPress, Zend Framework, Laravel, Magento, CakePHP, Yii and other frameworks.

The editor actually "gets" your code and deeply understands its structure, supporting all PHP language capabilities for modern and legacy projects. It provides the best code completion, refaction, error prevention on paper clips, etc. hundreds of checks take care of checking this code as you type, analyzing the entire project. PHPDoc support, code arranger and formatter, quick fixes and other features will help you write neat code that is easy to maintain.

Refixing your code securely with secure renaming, moving, deleting, hooding method, built-in variable, pushing items up or dragging items down, changing the signature, and many other refactoring.

Composer is an addiction manager for PHP. When a programmer writes his program, it somehow depends on other (third-party) libraries, such as various APIs, frames, libs that contribute "syntactic sugar", etc., composer allows you to correctly manage these dependencies: resolve conflicts, automatically load the correct namespaces, quickly charge the server, update, search, etc. all these dependencies it

stores in a folder with the project so it is the dependency manager, not the package manager who keeps dependencies in the system.

Composer performs the following problems:

Running a project with third-party libraries .

Some of your libraries depend on other libraries.

Find and upload the necessary versions of libraries to the project

2.2 Composition of the functional part

The functional part is a self-contained part of the system, which is separated on a certain basis, which meets the specific functions and tasks of management guidelines, methodical orientation of calculations of economic indicators and specialization of works. The automated information system (AIS) is distinguished by the functional part and part of the support, which are further divided into smaller elements of the subsystem.

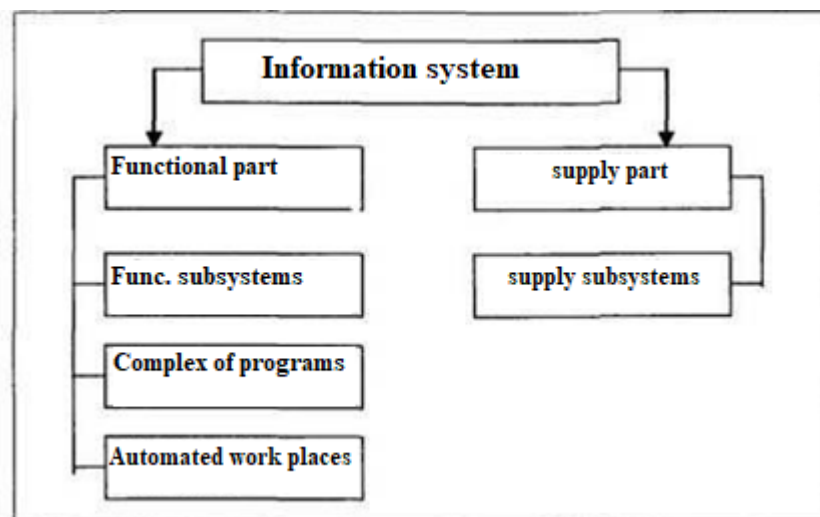


Figure 2.3 – Structure of Informarion system

The overwhelming part is the part that is responsible for the Fuchsia of the AIS. It is associated with the server and the object of content management.

1. purpose;

2. functions that are performed in the department;
3. functions that will process the information.

The main elements of the functional part of the AIS are: blocks, elements, complexes of the problem, individual tasks.

A functional subsystem is a frequently independent part of the system, according to the similarity of functional signs of control.

The functional structure of the AIS should consider the problems of information of end users that change in market conditions and reproduce the content, as well as the functions that govern a particular economic object.

A functional subsystem is a frequently independent part of the system, according to the similarity of functional signs of control.

The functional structure of the AIS should consider the problems of information of end users that change in market conditions and reproduce the content, as well as the functions that govern a particular economic object.

This task is fulfilled according to the concept of modularity of the AIS. Each application module of the system displays information policy. The main task in the development of this module should be to focus on the system on the automated activities of the object, and not on the implementation of local functional tasks. With this function, what is being done and the modules should be viewed from the point of view of the needs of our users, and not the software implementation. The complexity of our functional system is ensured for the integration of modules into one system.

The development of the functional part should be carried out in accordance with the requirements of the tasks for the system that is automated to the requirements for the development of the patient's medical card. We will select functions and highlight functional modules:

1. User management:
 - 1.1. Registration of new users;
 - 1.2. Remove users.
2. Records management:

- 2.1. Creating patient cards;
- 2.2. Creation of records of patient's data;
3. User information service:
 - 3.1. Informing about unfilled fields;
 - 3.2. Documentation on the use of an automated system.
4. Processing service:
 - 4.1. Creation of registration reports;

At the same time, both single-level, for example, and in two-level systems of decentralized data processing, functional elements of automated systems are functionally specialized ARM (FSAMM).

At the same time, both single-level, for example, and in two-level systems of decentralized data processing, functional elements of automated systems are functionally specialized ARM (FSAMM).

Given the above, AWP should be understood as a set of personal computer devices that, using the computing power of a large computer, allow the user to perform information services in the workplace to the extent and mode necessary to perform its functions.

In general, the implementation of functional tasks in the AIS can be considered as a sequence of actions with the information contained in the database, as well as the operation of input and output data.

Improvement and development of the functional part of the AIS takes place in the direction of development and implementation of new subsystems, media, tasks. At the same time, the change in the functional structure is associated with a change in the market environment, regulation, etc. Improving the functional data of the AIS ensures the full and effective performance of the functions performed by the automatic method in a, as well as increases the functional suitability of the AIS, which ultimately reflects the improvement in the management of the state's financial resources.

2.3 Composition of subsystems for providing the functional part

2.3.1 Software

Software is a set of software processing system programs and software documents necessary for the operation of these programs.

PHP is a commonly used scripting language designed first for web programmers and designed to create dynamic pages.

The NRC abbreviation comes from Hypertext Preprocessor, a hypertext processor. It can be implemented on most web servers, and on almost all operating systems.

PHP originally advocated a "Personal Homepage", although it was recently changed to "PHP: Hypertext Preprocessor". However, regardless of whether PHP is a major part of any dynamic web page.

PHP's development began in 1994 as a personal project by Rasmus Lerdorf, who created a series of Perl scripts, which he called "Individual Home Page Tools" to support his personal web page. In 1995, these tools were packaged and released as CGI files as "Personal Homepage/Translator Forms", which included supporting web forms and communicating with databases.

After it was released as a whole, PHP underwent rapid development and development, and the second version of PHP/FI was released two years later in November 1997. PHP 3 was released in 1998 with PHP 4 and PHP 5 in 2000 and 2004, respectively.

PHP 5 is a version currently in use on most websites and includes several new features such as object-oriented programming support, a sequential interface for database access, and several major improvements.

Although PHP remains under development, the current development process that will eventually lead to PHP 6 has been slower than anticipated.

due to the difficulty of adding Unicode support. In 2010, it was decided to move Unicode support to the branch, moving all other functions under development to the main PHP code case. However, in version 5.4, PHP has finally added unicode support without changing the major version.

PHP is released under a PHP license, which is similar to GNU's general public license, except that any derivative software may not be called "PHP" and not be named "PHP".

Currently, PHP has many applications, which makes it an excellent tool for solving any number of projects. Many major software products, such as WordPress and phpBB, use PHP to perform tasks such as starting a blog or forum. PHP also has unique capabilities, such as the ability to dynamically generate images in many formats and access databases in many different formats.

PHP also has the ability to be embedded directly into a web page or used from the command line, making it a powerful tool that can handle anything from displaying information extracted from a database to performing system jobs scheduled way.

It is important to remember that PHP is the previous processor, which means that any PHP scripts on the web page are executed before the page is displayed. is on the page without updating the entire page, but these technologies and methods are not covered by this article.

The most common use of PHP is to access the database, analyze the results from this database and display the results on the web page. That is why PHP is the last part of the general abbreviation "LAMP", which means "Linux, Apache, MySQL and PHP".

Apache server with PHP and MySQL, which allows you to create impressive reliable web pages and manage data.

It is important to note that anyone who regularly uses PHP is that PHP most often performs with the same rights as web server software.

In conclusion, PHP is a powerful language that has become one of the driving forces of the Internet, and anyone considering a career in web development should make PHP learning a top priority.

2.3.2 Hardware

Hardware is a complex of technical means that includes a cell: external devices, terminals, subscriber points, etc., which are necessary for the functioning of a particular system; the physical part of the photo.

According to the selected technologies, architecture, platforms, structures of the functional part and software, the following requirements are put forward to the hardware:

- PHP >= 7.0.0;
- OpenSSL PHP Extension;
- PDO PHP Extension
- Mbstring PHP Extension;
- Tokenizer PHO Extension;
- XML PHP Extension;

If we installed PHP locally and want to use the built-in PHP server to work with our program, we can use the `serve artisan` command.

Many new built-in motherboards with high-performance computing capabilities have become the norm in the Internet world. Whether you're using Raspberry Pi, Beagle bone, or many others, it's unusual to find network-built hardware that can support the functionality of a regional or simple server.

Many of these boards, one would expect, can interface through digital or analog pins to a myriad of sensors and actuators. But they also have RJ45 connectors connected to Ethernet controllers. And their operating system is capable of hosting server software (such as Apache) that includes PHP.

The Extract method extracts the desired set of points and processes the full access cycle through the executable. In fact, the executable file processes both the

sensor interface and the details of the source data transfer. In turn, the Sensor class can be used to output the data of the formatted sensor to a network request and, optionally, to perform additional processing.

One of the great advantages of Open Source software is that it provides the ability to adapt to new environments. Alas it was originally intended as a module for the Apache web server, PHP has since adopted the ISAPI standard, allowing it to work equally well with Microsoft's information server. As for hardware requirements, we have personally seen how PHP works on 100-MHz Pentium machines running Slackware Linux and Windows NT, respectively. Of course, a site that expected to receive thousands of requests a day needs faster equipment. Despite the fact that to compare a PHP site with a flat HTML site requires additional resources, the requirements are not sharply different.

Despite my example, you are not limited to Intel hardware. PHP works equally well on PowerPC and Sparc processors.

PHP still works best with the Apache web server. But now it works very well with IIS. It also folds as a module for a web server fhttpd. You can do PHP work with almost any web server using the CGI version, but I do not recommend this setting for production websites.

If you use Linux, we can easily find RPM for Apache and PHP, but this installation may not include any desired PHP function. I recommend this route as a very fast start. You can always go to assembling Apache and PHP from scratch later. PHP will be compiled on most versions of UNIX operating systems, including Solaris and Linux. If you have ever compiled the software that you found on the Internet, you will have a little problems with this installation.

PHP scripts are only text files, we can edit and create them, as well as HTML files. Of course, we can create files with a notebook and use ftp to download them one by one. But it's not perfect experiences. One handy feature of new editors is built-in FTP. These editors can open files on a remote Web server as a local drive. One click saves them to a remote web server.

Another feature you can enjoy is highlighting syntax. This causes PHP keywords to be colored to help you read the code faster.

So, as you can see for the work of the developed web application, we need the best hardware power, which allows us to use it on many hostings.

2.3.3 Other types of security

Other types of provision include organizational support, legal, linguistic and ergonomic.

Organizational support should be understood as the coordination of the place, time and purpose of joint work of individual performers, teams and technical means. It should be introduced and managed by certain rules of interaction that form the legal and moral code and form the legal framework. The fact that organizational support is based on legal acts of legal protection, and the legal provision is embodied in organizational support.

Organizational support of the information system includes a set of tools, methods and relevant personnel. It must provide:

- carrying out a feasibility study of the existing management system, selection and establishment of tasks for building an information system at the stage of development and implementation;
- regulation of the interaction of personnel with the ensemble by technical means and with each other in the process of solving control tasks, monitoring the effectiveness of the management system at the stage of functioning of the information system.

At the design stage, organizational support performs the following tasks:

- analysis of existing management systems and formulation of directions for improving their efficiency;
- selection and presentation of management tasks;
- formulation of requirements for the ensemble of technical means;
- development of organizational decisions on the composition, structure,

organization and methodology for solving management problems in the information system, the composition of working procedures and explaining their implementation.

At the stage of functioning of the information system, organizational support solves the following tasks:

- implementation of methods of management tasks;
- organization of personnel and ensemble of technical means of the information system;
- control and analysis of management efficiency;
- formation of proposals for the improvement and development of the information system.

The basis for the effective development of enterprises is the regulatory framework, based on a set of laws necessary for regulation and provision. Legal support is a set of generally recognized measures expressed in regulations that establish and establish the organization of the information system, its purpose, tasks, structure and functions (the legal status of the information system and its subdivisions) designed to regulate the creation and functioning of the information system. state bodies aimed at the implementation of laws and other regulations adopted by the authorities and management. The legal approach analyzes the place and role of the law in management, determines the content of the lawful executive and regulatory activities of public authorities and management bodies, makes recommendations for its improvement.

The functions of structural and legal management are performed in the form of normative legal acts, plans, regulations and methods, mandatory for all guests who determine various materials in the fields of planning and management. Normative legal acts are the configuration of expression and establishment of legal generally recognized measures, the totality of which forms the legal basis of management, which is hierarchical.

At the stage of functioning of the information system, legal support includes:

- the status of the information system in specific areas of public administration;
- legal position on the competence of the information system connections and the organization of their activities;
- rights, obligations and responsibilities of the information system personnel;
- legal status of certain types of management processes in the information system;
- the procedure for obtaining and using information in the information system, the procedure for its collection, registration, storage, transmission and processing;
- procedure for obtaining and using an ensemble of technical means, software, information and other types of support.

Linguistic support covers a set of scientific and technical terms of other linguistic means, rules for formalizing languages, methods of compressing the recording of information, means of human dialogue and computing system. Linguistic support includes:

- information languages for the description of structural units of databases of the information system (documents, indicators, details);
- languages of management, manipulation and exchange of data in the data bank of the information system;
- language means of information and search engines;
- language means of the computer-aided design system;
- dialog languages;
- dictionaries of terms and definitions.

Ergonomic support covers a set of methods and means designed to create optimal conditions for effective operation and training of operators from the staff of the information system. Ergonomic support includes:

- a set of documentation that contains ergonomic requirements for workplaces and carries out job expertise;

- a set of methods, educational and methodological materials and technical means of preparing personnel for work;
- a set of methods and means that provide professional selection.

In terms of ergonomic support at the stages of designing the information system, the degree and level of human participation in the management system, requirements for the form of presentation of information, the conditions of the environment of human activity, the procedure for work and rest of personnel, load standards and reliability of personnel are determined; requirements for technical means, methods of interaction between personnel and technical means.

In real information systems, the total number of types of security that support the sufficient and complete functioning of the organization may be less. Mandatory components of the information system are only subsystems of software and hardware.

2.4 Implementation of the prototype of the web-oriented information system "electronic medical card of the patient"

2.4.1 Structure and features of the implementation of information support

Information support is a set of design solutions by size, placement, forms of organization of information circulating in an automated system.

Information support largely determines the intelligence of the system, since it contains all the information used, operates it and carries out information exchange inside and outside the information system. Serious requirements are made for information support. The information must be reliable, timely, constantly updated, presented in a user-friendly form, accessible and complete. Incompleteness of information is often the reason for making irrational and untimely management decisions.

Information software contains not only a variety of data, but also a system of access to them, which is implemented by software. This shows the close relationship between the information and software that these tools provide.

Based on the results obtained in the previous sections, a prototype of an automated solution was created, developed using the Laravel framework, and a database for storing information created in the MySQL language.

To further work on the prototype application, you need to install the LAMP stack. LAMP is an open source free software acronym that includes the Linux operating system, Apache web server, MySQL database management system, and Perl/PHP/Python interpreter – the main components for building a viable multipurpose web server.

First you need to install the Apache web server. To do this, just use the Ubuntu apt package manager using the commands shown in Figure 2.4.

```
$ sudo apt-get update  
$ sudo apt-get install apache2
```

Figure 2.4 – Installing Apache

Next, you need to install MySQL. In order to download and install the software, it is enough to use a similar method, but using the command that can be seen in Figure 2.5.

```
$ sudo apt-get install mysql-server
```

Figure 2.5 – Installing MySQL

The next step will be to install PHP, as well as additional packages with which PHP will be able to work with the Apache server and communicate with MySQL. To establish these components, we use the command, kA is shown in Figure 2.6.

```
$ sudo apt-get install php libapache2-mod-php php-mcrypt php-mysql
```

Figure 2.6 – Installing PHP and helper packs

To work with MySQL, you need to install the phpMyAdmin web application (Figure 2.7).

```
sudo apt-get install phpmyadmin apache2-utils
```

Figure 2.7 – Installing the phpMyAdmin plugin

Next, you need to install Composer (Figure 2.8).

```
$ mv composer.phar /usr/local/bin/composer  
$ chmod +x /usr/local/bin/composer
```

Figure 2.8 – Composer Installation

The next step will be the installation of the Laravel framework itself. It uses Composer to manage dependencies, for this it is enough to use the create-project command (Figure 2.9).

```
composer create-project laravel/laravel {directory} "5.0.*" --prefer-dist
```

Figure 2.9 – Installing Laravel

After installing the framework, it is necessary to create a database in which patient data will be stored. Database creation takes place in phpMyAdmin (Figure 2.10).

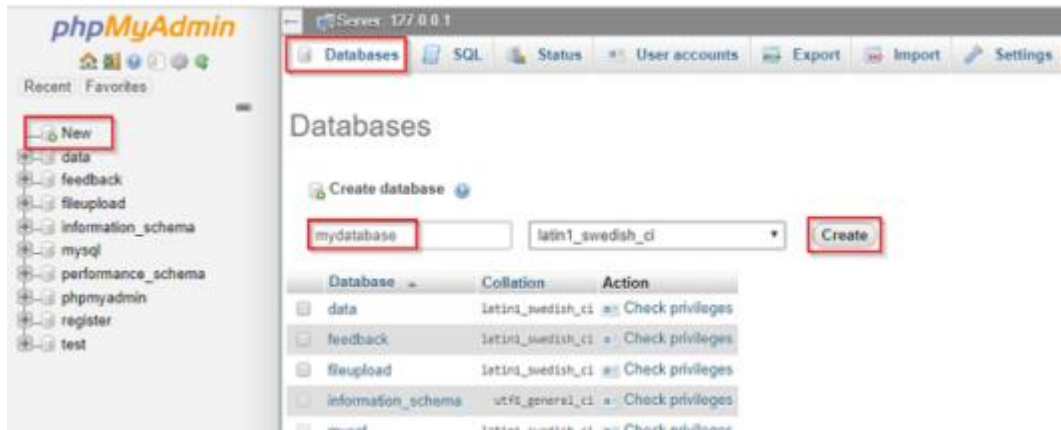


Figure 2.10 – Creating a database in phpMyAdmin

In order to create tables in the database, you can use the eloquent ORM object-relational display theme – a beautiful and simple implementation of ActiveRecord in Laravel to work with databases.

Listing 2.1 – An example of creating a user table

```

public function up()
{
    Schema::create('users', function (Blueprint $table) {
        $table->increments('id');
        $table->string('name');
        $table->string('email')->unique();
        $table->string('password');
        $table->rememberToken();
        $table->timestamps();
    });
}

```

The structure of this table is shown in Table 2.1. It includes information about the user's name and email address.

Table 2.1 – Structure and description of the application user table

Attribute Name	Data Type	Brief description
_ID	Integer	Primary key, unique identifier Rows
name	String	Username
email	String	Email user
password	String	Password
Remember token	String	Token
Created at	Timestamps	Creation Date
Updated at	Timestamps	Update Date

The profile table provides a perch to the user's office, according to his ID.

Listing 2.2 – Example of creating a profiles table

```

public function up()
{
    Schema::create('profiles', function (Blueprint $table) {
        $table->increments('id');

        $table->integer('user_id');
        $table->timestamps();
    });
}

```

This table contains the user ID and information about how to create and update this table. Details in Table 2.2.

Table 2.2 – Structure and description of the prototype profile table

Attribute Name	Data Type	Brief description
_ID	Integer	Primary key, unique identifier Rows
User id	Integer	User ID
Created at	Timestamps	Creation Date
Updated at	Timestamps	Update Date

The great advantages of the database structure are the lack of data redundancy. To do this, you need to distribute information from several separate thematically organized tables so that each fact is presented once.

Listing 2.3 – An example of a user table relationship to a profile

```
public function profile()
{
    return $this->hasOne(Profile::class, 'user_id', 'id');
}
```

Listing 2.4 – An example of a profile table relationship to users

```
public function user()
{
    return $this->belongsTo(User::class, 'user_id');
}
```

Since tables for users have already been created, you need to create a table in which data about specific patients will be stored (Table 2.3)

Table 3.3 – Structure and description of the table data_users prototype

Attribute Name	Data Type	Brief description
_ID	Integer	Primary key, unique identifier Rows
full name	String	Surname, first name, patronymic
sex	String	Gender
phone	String	Telephone
home	String	Place of residence
workplace	String	Place of work
position	String	Post
dispensary	String	Belonging or No patient to the dispensary group
preferential categories	String	Contingent of preferential categories
Preferential categories num	String	Preferential certificate number
disease	String	Disease
date	String	Date of registration, or withdrawal
User ID	Integer	User ID
Created at	Timestamps	Creation Date
Updated at	Timestamps	Update Date

2.4.2 Structure and features of the implementation of algorithmic support

An algorithm is a sequence, a system, a set of systematized rules for the implementation of a computational process, which necessarily leads to a solution a certain class of tasks after a finite number of operations. When writing computer programs, the algorithm describes the logical sequence of operations. For visual representation of algorithms often use flowcharts. Each algorithm is a list of well-defined instructions for solving a problem. Starting from its original state, the algorithm's instructions describe the calculation process, which occurs through a sequence of states that eventually end in the final state. The transition from one state to the next is not necessarily deterministic — some algorithms contain elements of randomness. To create a program to automate patient registration, a non-procedural SQL programming language was used.

The algorithm of the system with an employee of a medical institution is shown in Figure 2.11.

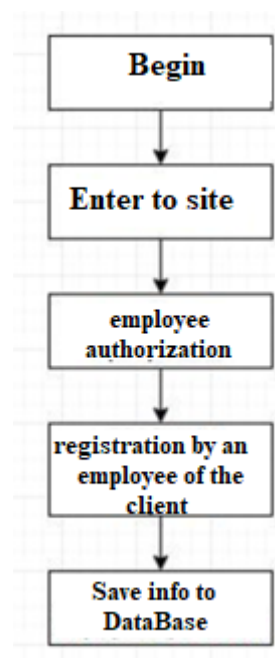


Figure 2.11 – Algorithm of the system with an employee of a medical institution

2.4.3 User interface and instructions for use The developed system can be divided into server and client parts

This distribution will describe the instructions for use and user interface. Before you log in, you must register. The registration window is shown below. In the field "Name" enters the name of the employee, in the field E-Mail Address entered e-mail addresses, respectively, in the password field entered password, and in the field Confirm Password – password confirmation.

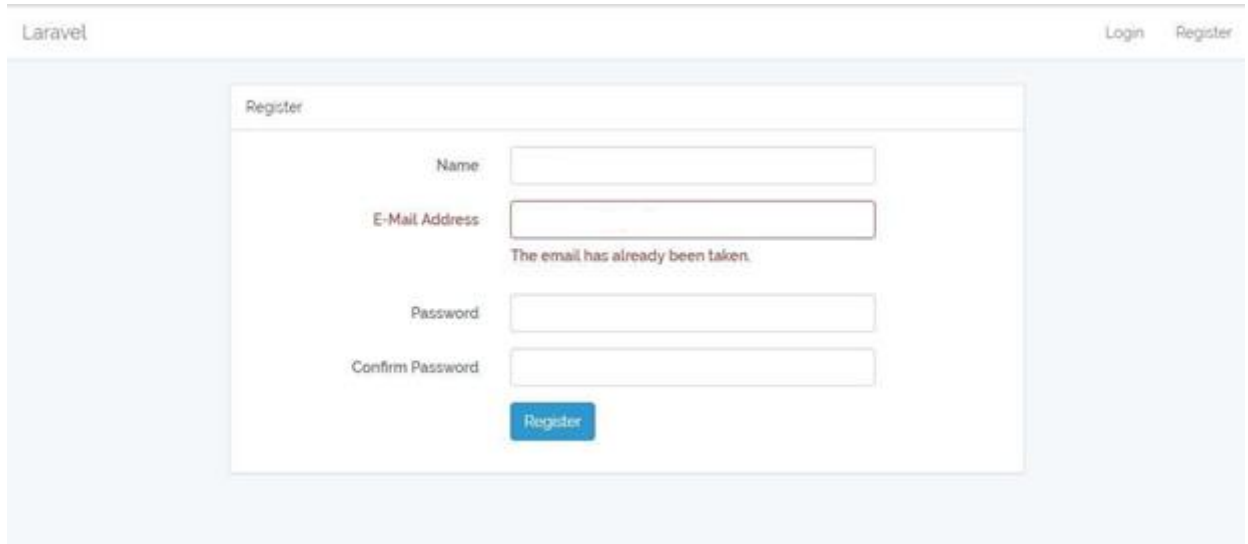


Figure 2.12 – Head page

The image shows a registration form titled "Register". The form is set against a light blue background. It contains four input fields: "Name", "E-Mail Address", "Password", and "Confirm Password". The "E-Mail Address" field is highlighted in yellow. Below the input fields is a blue "Register" button. In the top left corner, the word "Laravel" is visible, and in the top right corner, there are links for "Login" and "Register".

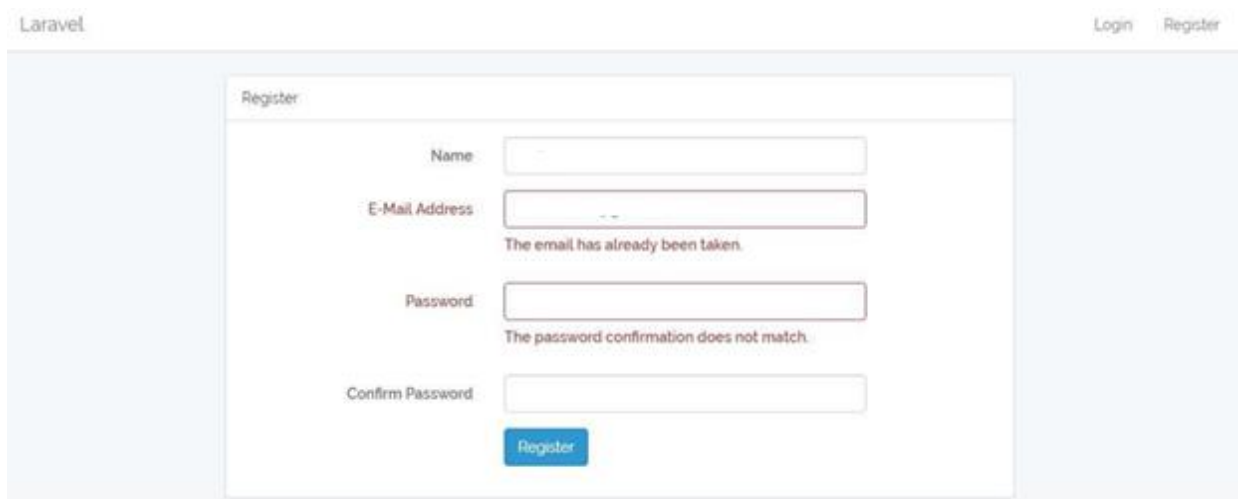
Figure 2.13 – Window of registration of a medical institution employee

If you enter an existing email address in the database, or incorrect password confirmation, the user will receive an error and will not be registered (Figure 2.14 – 2.15).



The screenshot shows a web browser window with the Laravel logo in the top left and 'Login Register' in the top right. The main content is a 'Register' form with the following fields: 'Name', 'E-Mail Address', 'Password', and 'Confirm Password'. A blue 'Register' button is at the bottom. Below the 'E-Mail Address' field, a red error message reads: 'The email has already been taken.'

Figure 2.14 – Enter an existing email address



The screenshot shows the same 'Register' form as in Figure 2.14. In addition to the error message under 'E-Mail Address', a new red error message appears below the 'Password' field: 'The password confirmation does not match.'

Figure 2.15 – Incorrect password confirmation

After successful registration, the user enters the profile page where the information regarding filling out the card is indicated, and the main menu is displayed (Figure 2.16). The main menu includes items such as "Profile", "Register the patient", "Patients", and the item of the authorized user, pressing on which you can log out of the system.

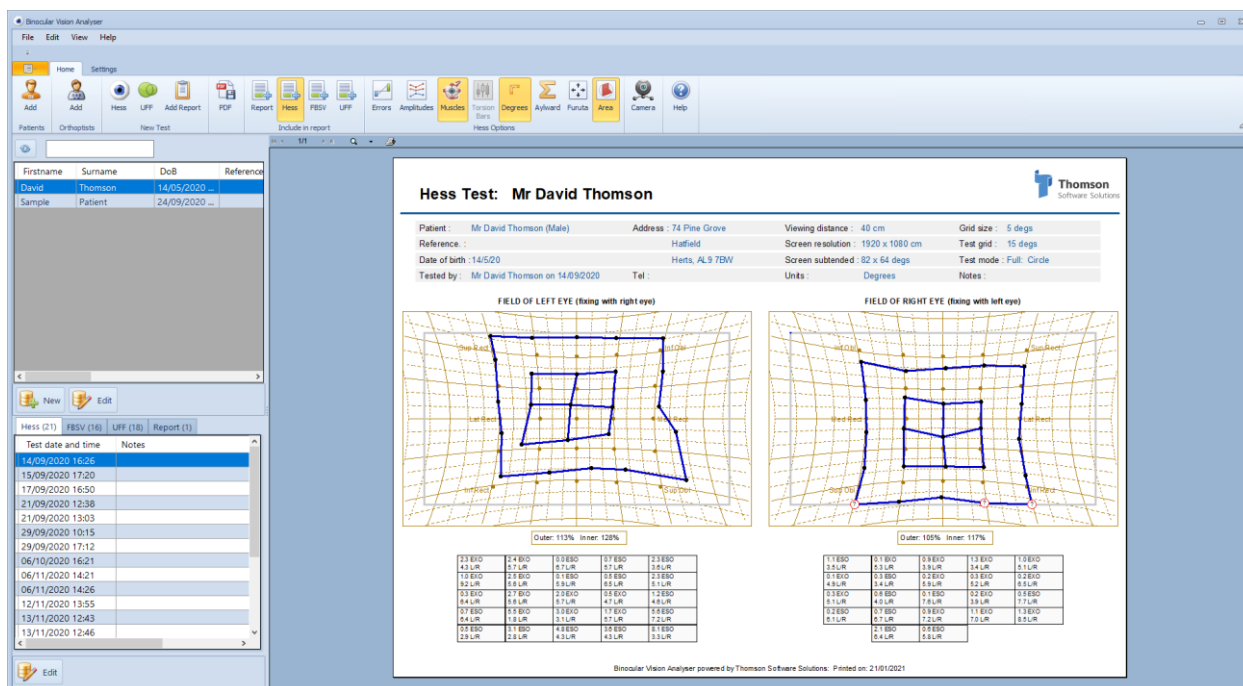


Figure 2.16 – Profile Page

When pressed on the item "Register a patient", the user gets to the patient registration page (Figure 2.17), where he has the opportunity to specify his data, namely:

- Surname, first name, patronymic;
- Gender;
- Phone number;
- Place of residence;
- Place of work;
- Position;
- Belonging or not of the patient to the dispensary group;
- Contingent of preferential categories;
- Number of preferential certificates;
- Diseases;
- Date of registration or withdrawal

Add new patient [X]

Organisation*: Male Female

Title*: Firstname*: Surname*:

Date of birth*: Reference:

Address1:

Address 2:

Town:

County: Postcode:

Tel: Mobile:

Email:

Figure 2.17 – Patient registration page

Main Profile RegisterPatient ListOfPatients Doctor

Registration was successful, the patient was entered into the database

Figure 2.18 – Successful registration of the patient

In order to view, edit or delete patient data, you must first go to the "Patients" page, the link to which is in the main menu. The Patient's page is shown in Figure 2.19.

Main Profile RegisterPatient ListOfPatients Doctor

Patient List

1	www Student	Male	+380681475234	Ternopil, Konovalcys, 18	TNTU	<input type="button" value="Show"/>	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
---	-------------	------	---------------	--------------------------	------	-------------------------------------	-------------------------------------	---------------------------------------

Figure 2.19 – Patients page

3 LIFE SAFETY, BASICS OF LABOR PROTECTION

Currently, the transition to IPv6 is a topical issue for almost all ISPs, businesses and institutions, which is why the workplace of a specialist in implementing a new solution can be considered the office space of the network technology department of any company.

In this section we will consider the room in which the solution developed in this work will be used. In this room, workers may be affected by adverse conditions such as high ambient temperatures, insufficient natural or artificial lighting, increased noise levels, and interactions with electrical appliances. Based on this, it is necessary to conduct an analysis of potential hazards to workers in the room.

3.1 Basics of labor protection

3.1.1 Characteristics of the organization of production, technology in terms of labor protection

The designed room is located on the fifth floor of a ten-storey building.

Consider the plan of the room, which is shown in Figure 3.1. Table 3.1 shows the characteristics of the cabinet. Table 3.1 shows the explication of the equipment.

The room is designed for four workstations, each equipped with a computer. The plan of the room is shown in Fig. 3.1, the explication of the equipment is given in table 3.2.

The room has one window facing northeast, which provides a coefficient of natural light of 1.5%. The window consists of six rectangular sections 80 centimeters long and 330 centimeters high, with a total area of 15.84 m². Additionally equipped with adjustable vertical peach blinds. Workplaces are located so that the window is located to the left of the employee.

Table 3.1 – Characteristics of the cabinet

The length of the room a, m	6,325
Width of the room b, Kyiv	6
Room height h, m	3,3
Room volume V, m ³	118,8
Room area S, m ²	36
Number of employees, pers.	4
Volume of premises per 1 employee, m ³ / person	29,7
Room area per 1 employee, m ² / person	9

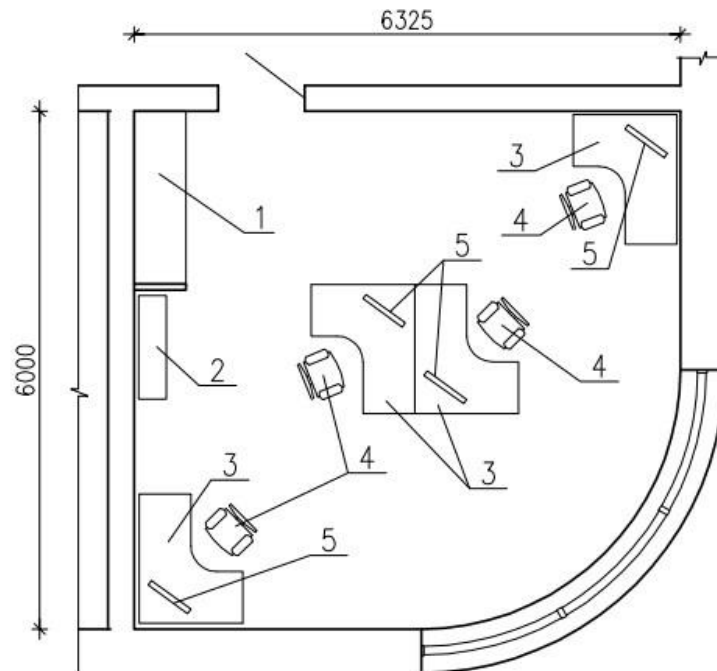


Figure 3.1 – Plan of the room

The floor in the room is flat, warm, impact resistant. An olive-colored carpet was chosen as the floor covering, which provides high sound absorption and no lint, which facilitates cleaning.

Table 3.2 – Explication of the equipment

№ поз.	Name	Overall dimensions l x b x h (cm)
1	The case is built in with section for clothes	200 x 60 x 330
2	Bookcase	120 x 32 x 185
3	Office desk for computer	150 x 120 x 80
4	Swivel office chair	46 x 46 x 52/85
5	Monitor	21"

The walls of the room meet the requirements of noise and heat protection. Covered with water-emulsion paint of light olive color. Easy to clean and wash.

The ceiling is covered with white water-based paint.

Entrance doors to the office are single metal-plastic with an insert of tinted glass, have a height of 205 and a width of 90 centimeters, open into the corridor. Near the front door there is a built-in wardrobe with a clothing section 330 cm high, 200 cm wide and 60 cm deep, designed for personal belongings of employees. There is also a first aid kit in the closet. Next to it is a bookcase 185 cm high, 120 cm wide and 32 cm deep. Above the door is a "split" air conditioner (not shown).

For each employee, the workplace is equipped with a computer desk 80 cm high, 150 cm long and 120 cm wide, and a swivel chair.

The area per employee is 9 m² (for PC rooms, the area per employee must be at least 6.0 m²). The volume of the room per employee is 29.7 m³ (for rooms with a PC, the volume of the room per employee must be at least 20 m³).

These characteristics meet the requirements of [14]. The color of the interiors meets the requirements of technical aesthetics.

3.1.2 Legislation on labor protection in the field of information technology

The Constitution of Ukraine includes among the social rights of everyone the right to health care, medical assistance and medical insurance (Article 49), appropriate, safe and healthy working conditions (Article 43). According to Article 12 of the International Covenant on Economic, Social and Cultural Rights, everyone has the right to medical care and medical treatment in the event of illness. Among the basic labor rights of employees of Art. 2 of the Labor Code of Ukraine indicates the right to healthy and safe working conditions. St. 6 of the Fundamentals of Ukrainian Legislation on Health Care enshrines the right to health care, which includes, inter alia, the right to safe and healthy working conditions.

State, public or other bodies, enterprises, institutions, organizations, officials and citizens are obliged to ensure the priority of health care in their own activities, not to harm the health of the population and individuals (Article 5 of the Fundamentals of Legislation Of Ukraine on health care). Noting the need to create safe and healthy working conditions in the process of employment, scientific and educational literature on labor law has always used the term "labor protection". The term "labor protection" is used in two senses: broad and narrow. As B.I. Prokopenko, in a broad sense, the concept of "labor protection" includes "those guarantees for workers that provide all the rules of labor law."

In a broad sense, labor protection is understood as a set of legal norms that cover the whole range of issues of labor application and belonging to various institutions of labor law (employment contract, working time and leisure time, etc.). These include rules prohibiting unjustified refusal to hire, restricting the transfer and dismissal of employees, setting working hours, regulating leisure time, and many others aimed at creating favorable general working conditions.

The term "occupational safety" in the narrow sense has always defined the creation of healthy and safe working conditions for workers. Law of Ukraine "On labor protection" of October 14, 1992 in Art. 1 defines labor protection as follows:

"Labor protection is a system of legal, socio-economic, organizational-technical and treatment-and-prophylactic measures and means aimed at preserving human health and ability to work." Based on the content of the law and other above-mentioned regulations, it is more appropriate, in our opinion, instead of the term "occupational safety" in the narrow sense to use the term "occupational health", because in fact the purpose of such measures is protection of the employee's health, preservation of his ability to work at work during the performance of duties.

Recently, health care requirements are often not met by companies of various legal forms that use the work of employees. Many business leaders are irresponsible about their responsibilities to create healthy and safe working conditions, and often consider these issues to be secondary.

This state of health care at work is explained primarily by the difficult economic situation of the state, as well as other objective and subjective reasons, which are the depreciation of fixed assets, the fact that there is no interest of owners to improve conditions without labor incomes, incompetence of the majority of personnel in health care issues, low labor and technological discipline, insufficient role of bodies of supervision and control over observance of the legislation on labor and health care in the process of work. More than 3.4 million people work in conditions that do not meet sanitary and hygienic standards. The security of workers with personal protective equipment does not exceed 40-50%. Annual payments for compensation for damage to life and health of workers reach UAH 400 million. Of particular concern is the growing number of accidents involving group accidents.

The main directions of social policy are the need to reform the labor protection system, the main purpose of which is to significantly reduce the level of occupational injuries and diseases, reduce the factors of harmful effects on workers and release workers from harmful and difficult working conditions. Although the main term uses the traditional term "labor protection", but in fact it is about the health and ability to work of workers.

To this end, it is envisaged: to complete the formation of the system of labor protection management at the regional and industrial levels for enterprises, institutions, organizations of all forms of ownership, activities; to review legislation and regulations on labor protection, taking into account the requirements of regulations of the European Union; to adopt legislative acts on high-risk facilities and on the safety of industrial products; to move to the territorial and sectoral principle of state supervision of health care in the labor process; ensure stable financing of health care measures, etc. Unfortunately, some of these measures remain on paper.

The most important norms on health protection of workers at work are enshrined in the Law of Ukraine "On Labor Protection" of October 14, 1992, in three chapters of the Labor Code (Chapter XI "Labor Protection", Chapter XII "Women's Labor", Chapter XIII "Youth Labor").), as well as in bylaws – regulations, rules, instructions, acts of social partnership, local regulations.

3.2 Life safety

3.2.1 Analysis of harmful and dangerous factors

Microclimatic conditions

Sanitary and hygienic standardization of microclimate conditions is carried out according to [15], which establish the optimal and permissible parameters of the microclimate depending on the total energy consumption of the organism during the work and the period of the year.

The work performed by the staff belongs to the physical work of the category "Light Ia" according to [15]. The optimal values of the microclimate characteristics are given in table 3.3.

Table 3.3 – Optimal microclimate indicators

Period of year Air temperature	° C Relative humidity	% Air velocity	m / s
Cold period of the year	22–24	60–40	0.1
Warm period of the year	23–25	60–40	0.1

The temperature of the internal surfaces of the working area (walls, floor, ceiling) of technological equipment (screens, etc.), external surfaces of the equipment should not exceed 2 °C beyond the optimum air temperatures for this category of work.

Air conditioning is used to maintain a favorable microclimate. For the designed room, the approximate power of the "split" air conditioner is – 5.8 kW. HITACHI RAS-18LH2 / RAC-18LH1 with the following characteristics meets this requirement:

- operating temperature range: from –10 °C to + 43 °C;
- cooling capacity: 4.89 – 4.91 kW;
- heat output: 5.70 – 5.72 kW;
- noise level during cooling (high / mid / low): 45/42/39/36 dB (A);
- noise level during heating (high / Wed / Low): 43/39/36/36 dB (A).

In the cold period of the year, in order to maintain a favorable microclimate, heating is provided from the roof boiler house located above the technical floor of the building. The heating system is two-pipe, with the top dilution of the heat carrier. Heating devices – Purmo panel radiators. To regulate the heat flow from the heater, a control valve with a thermostatic head is installed on the coolant line to the appliance.

Industrial lighting

Lighting in the office natural side and artificial general.

Lateral natural lighting should be provided through light slots oriented mainly to the north or northeast and provide a natural light factor (KPI) of 1.5% according to [16].

According to [16], the work performed in the room is classified as medium accuracy – work is performed with objects of recognition 0.5 mm-1 mm. The level of illumination in the workplace should be at least 300 lux.

Protection against industrial noise

Sources of noise in the room are computer cooling fans (maximum noise level – 35 dBA) and "split" air conditioner (maximum noise level – 45 dBA). Sound can be considered constant, as its level during the working day changes by no more than 5 dBA.

The allowable equivalent sound level according to [17] is as follows: for a computer programmer, the normalized sound pressure must not exceed 50 dBA. In this case, the total sound pressure level does not exceed the normalized value.

Protection against electromagnetic fields

The source of electrostatic field and electromagnetic radiation in a wide range of frequencies (over 50 Hz and infrared, radio frequency, infrared, visible, ultraviolet, X-ray) are personal computers.

3.2.2 Engineering solution

Calculate the level of lighting in the room. Artificial lighting should be carried out by means of 9 two-lamp lamps of the LD type placed in three rows from the FL40W / 635 lamp, with a power of 40 W, and a luminous flux of 2800 lm.

Figure 3.2 shows the plan of the room, taking into account the lighting system.

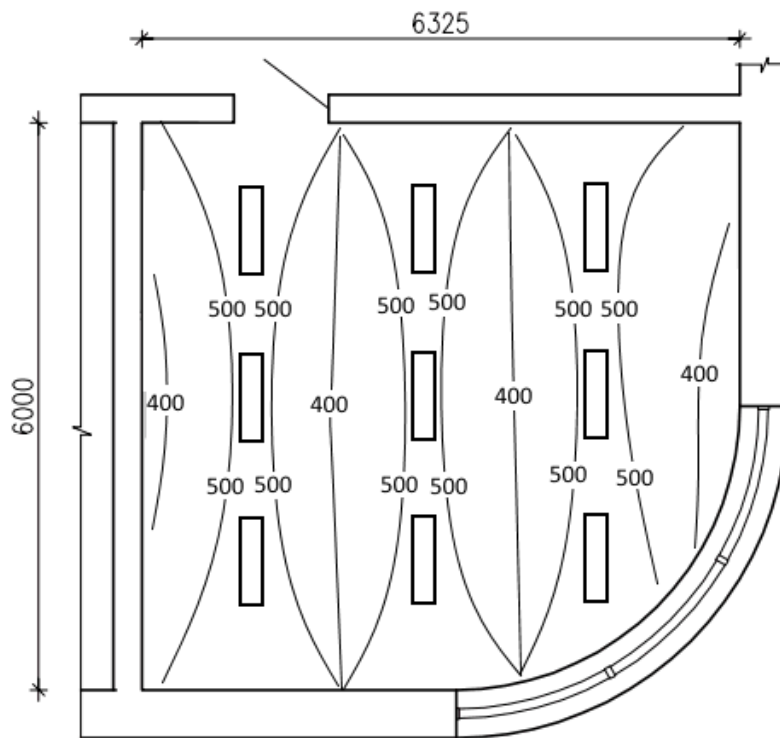


Figure 3.2 – Plan of the room with lighting

DIALux 4.9 software with a plug-in for Philips lighting systems was used to calculate indoor lighting.

Such artificial lighting will create an illumination of 381 lux and this value corresponds to the norm.

3.2.3 Electrical safety

According to [18], the degree of danger of electric shock to the room refers to the room without increased danger. The room has a 3-phase power supply with a voltage of 220 V, a frequency of 50 Hz and a maximum current of 32 A. Electricity consumers are four personal computers, air conditioning and lighting.

The mains is made of three conductors – phase, neutral, protective earthing conductor, which are conducted in the floor near the walls of the room, in flexible metal sleeves with taps up to four groups of sockets.

The use of a neutral conductor as a neutral protective conductor is prohibited, and it is not permissible to connect these conductors on the shield to a single contact terminal.

The building has a protective earthing, which is designed to protect people from electric shock and grounding of the lightning protection system, which serves to divert lightning current and protect equipment from lightning.

A group shield located in the room to which electrical installations, cables and wires with copper cores with a section diameter of at least 2.5 mm² are connected must be used.

The following technical protective measures of electrical safety must be carried out: working insulation of live parts and plastic boxes made of flame-retardant materials with moderate smoke-generating capacity. When connecting the electrical connector to the mains, the connection of the housing to the ground must be guaranteed. All electrical outlets must be marked with voltage.

3.2.4 Fire safety

The main causes that can lead to a fire in the room are: faults in electrical equipment – electrical insulation; malfunctions caused by mechanical damage, etc. ; malfunctions in computer technology, for example, short circuit, violation of the fire regime.

Items and materials that can burn: furniture – tables, chairs, cabinets, etc. ; paper – documentation, structural elements of the room – floor coverings, doors, window frames, structural elements of PCs and peripherals – printer cases, monitors, keyboards, etc.

According to [19], the premises belong to category "B" of fire safety, as it contains flammable materials such as paper and wood and no explosive materials.

Combined fire alarm sensors are installed in the room for timely fire warning. You can use the ACU-100 sensor, which signals an alarm after detecting visible smoke (optical sensor) or after registering a high temperature (thermal

sensor). The thermal sensor responds to exceeding the threshold temperature and its growth rate. The sensor transmits an alarm signal until its cause is eliminated (smoke, high temperature). In case of system operation, the signal should arrive to the next in the case.

According to [20], 2 fire extinguishers are installed in the room for every 20 m². The distance between the locations of fire extinguishers should not exceed 15 m. There are four carbon dioxide-bromoethyl fire extinguishers type VVB-3, which are suitable for extinguishing small sources of ignition, as well as electrical equipment up to 380V. Fire extinguishers work effectively at temperatures from –60 to +55 ° C.

3.3 Conclusion to the third section

This section of the thesis is devoted to the issue of labor protection, it considered the premises where the developed methodology will be used. The main harmful and dangerous factors for this room are considered, which include microclimate, lighting, noise, electrical safety, fire safety, as well as the level of electromagnetic radiation.

CONCLUSION

This thesis is devoted to the development of a prototype of the web-oriented information system "Electronic medical card of the patient". The study provides a general description of the electronic medical card, the architecture and development technology are selected. From a functional point of view, a list of functions of the software used is provided.

As a result of the study, a web-oriented information system "Electronic medical card of the patient" was developed. The developed system implements the functions of registration of the patient's card, as well as the possibility of making changes to the patient's card, if it is necessary to remove this card.

The information system is developed in the PHP programming language. MySQL was used for the database.

The calculation of efficiency from the system is carried out .

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