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DEVELOPMENT OF THE "ELECTRONIC REGISTRY SYSTEM"

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Abstract:

One of the problems of modern medicine organization is that there is no unity in it. Now patients can be registered in various medical institutions, each of them has its own paper history of the disease, while doctors who have only one of them, do not have complete information about the patient, because it is stored distributed. The introduction of a common knowledge base of people who seek help from professionals is required. There is also a problem of territorial distribution of laboratories in which tests are carried out, and medical institutions. This leads to delays in obtaining the required information. And such problems are not enough.

Keywords:

Web site, medical information system.

ACM Computing Classification System:

Enterprise computing, operations research, planning and scheduling, software system structures.

Introduction

Nowadays, computer technologies are increasingly used everywhere in all spheres of human activity. The most leading areas for the introduction of computer technology are accounting and warehouse-accounting programs.

Medicine is very lagging behind in the implementation of even the simplest innovations, for example, all accounting information is kept on paper. The reasons are that almost all medicine is funded by the state and in most cases, hospitals do not have enough funds to introduce computer systems for accounting and analysis, almost all medical equipment and software for it comes from abroad as humanitarian aid.

Private hospitals and clinics, if they acquire any software, then acquire it abroad, which is much more expensive than the development would cost from domestic producers, but faster than the development from domestic producers. But, nevertheless, medicine will soon affect computer progress, because in many medical studies one cannot do without a computer and special software for it, as well as special websites.

A lot of technologies are used to build websites, such as HTML, CSS, Flash, JavaScript, jQuery, PHP and others. No one of the sites is complete without HTML markup language and CCS stylesheets; they create the framework for the site being created [1].

Website development is needed for the timely submission of information to interested people in the hospital services [2].

The aim of this paper is to develop a dynamic website using modern web technologies designed for electronic registration in a medical facility. For this, the solution of the following main tasks is necessary:

1. Review of technologies for creating web sites.
   Description of technologies used in the development.
2. Selection of technologies for building a project,
   analysis of the main criteria and parameters for selection
3. Creating a design for the future project, site structure.
4. Software implementation.

1 Integrated Automation System of Medical Institutions

The organizational structure should effectively provide medical services, regardless of the use of new medical technologies. The management system must be competitive and profitable, even with the highest quality of treatment.

For such an organization without an information system, it is impossible to make operational decisions in the field of medicine and economics.

Information systems should be complex and include interconnected automated systems of medical institutions that solve problems in the following areas: administrative, medical, financial, economic and scientific [3].

This approach allows you to quickly analyze the financial condition of the company while improving the quality of medical care, through the acquisition of new medical equipment and the development of medical informatics.

Medical information systems can be divided according to the following criteria:

- Medical systems, which include scattered inconsistent programs
  that solve the narrow tasks of specialist doctors, such as radiologists, ultrasound, etc.
- Medical systems of the organization of office work of doctors
  and processing of medical statistics.

New requirements in healthcare, as well as the rapid development of computer technology, pose the challenge for software developers to create complex automation systems for medical institutions.

The development and implementation of such systems makes it possible to effectively solve the problems of integrating all available information sources, both medical and economic, and facilitate the work of medical personnel. This ensures the speed of processing information of various types, increasing the speed of decision-making.

2 Hospital information systems

The system for collecting and processing information in a modern hospital should perform many different functions, so they cannot be automated in a short time.

Attempts to create comprehensive automated hospital information systems at one software and hardware base ceased in the 1980s. Now the automation of information processing is provided by using a complex of interacting relatively autonomous information systems of individual departments or services.

The advantage of this approach is that the systems can be put into operation gradually, as financial possibilities allow and the degree of readiness of medical personnel to introduce such systems will increase. The life cycle of an automated information system consists of five main stages [4]:

- developing a system or acquiring a complete system;
- system implementation;
- software maintenance;
- system operation;
- dismantling the system.

The average lifespan of an automated information system is 10 to 15 years. Over the past thirty years there has been a tendency to reduce it.

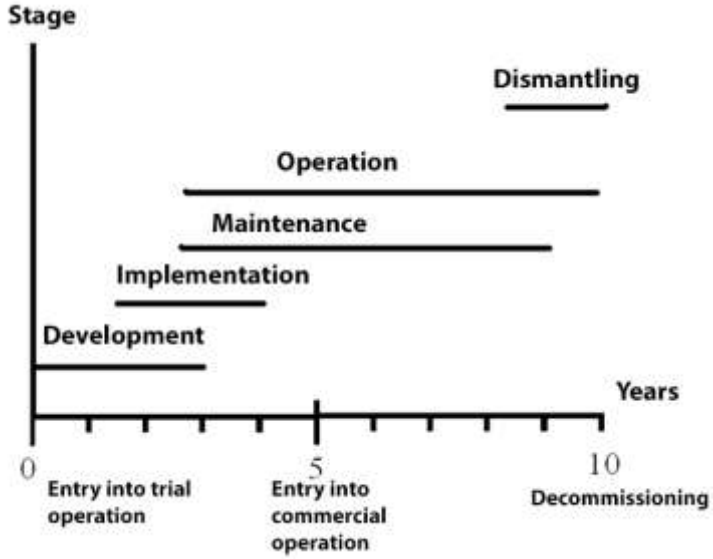

Fig.1. The life cycle of an automated information system.

3 Development of the system or the acquisition of the finished system

At the stage of developing an automated information system, a pre-project survey of existing data flows in an automated subdivision or hospital service is carried out. Then the technology of data acquisition and processing is designed. After that, software is developed that performs essential functions, and a project is being carried out to create or update hospital computer networks.

At the next stage, the developed software is implemented. This stage includes the creation or updating of computer networks (including the purchase or upgrading of computer equipment), the development or editing of reference and regulatory framework, training of medical personnel and accompanying programmers. The implementation phase is covered by the development phase.

When implementing developed or acquired software, design or development errors are identified. Over a long period of development, the working conditions of an automated unit or service may also change [5].

Errors and condition changes are corrected by programmers accompanying the information system software [6].

The automated information system is operated by its users with the help of specially designated personnel who maintain the computing networks used by the automated system, as well as its software and databases [7].

Operation of the system begins almost simultaneously with the maintenance of the software and lasts a little longer maintenance.

Upon expiration of the information system life cycle, it must be decommissioned, that is, dismantled. The decommissioning process includes the physical dismantling of obsolete components of computer networks, as well as specific preparatory operations that ensure the interaction of the system being dismantled with the one that is being replaced [8].

When replacing the old system with a new life cycles of both systems must be docked. Since the main condition for such a docking is the continuity of the line of operation, the result of the docking of life cycles must be as shown in Fig. 2.

The commissioning of the new system is marked on this figure with a dotted vertical line. This does not mean that the outdated system stops working: the process of dismantling it is still ongoing, for example, annual statistical reports are issued in the old system.

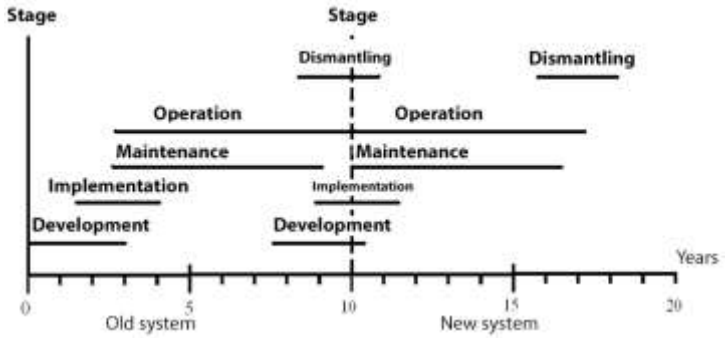

Fig.2. Connecting the life cycles of the old and new information systems.

4 The concept of "Electronic registry"

Electronic Registry - a program for recording clients to see a doctor or a private specialist. The system optimizes the work of the registry or secretary of the clinic, saving the secretary from paper journals. It gives you the opportunity to have an exact schedule of patients for doctors at any time, the ability to print schedules for each doctor, and also to collect statistics for further analysis of the work of the registry, marketing department, etc.

Some features of the Electronic Registry:

- Create a schedule of doctors and record patients for admission.
- Printout of the schedule for each doctor for a week or a month in advance.
- Transfer of records of doctors to the program
  and approval of enrolled through the Internet.
- Information about the free / busy time of each doctor can be displayed
  on the Internet on the customer's site.
- The patient can enroll independently by selecting a doctor, time
  and registering in the system.

5 Designing a Dynamic Site

At the design stage, the structure of the dynamic site is determined.
Designing a dynamic site is divided into several stages:

- analysis and design of the site structure;
- analysis and design of the site navigation system;
- analysis and design of the site content (the site);
- analysis and database design;
- description of the site functionality.

5.1 Designing a Dynamic Site

The structure of the site is a system of relative location and interrelations of files (pages) of the site. Often under the structure of the site is implied a block - site diagram.

There are several types of site structure:

1. Linear structure. Pages of the site are strictly one - for - one, convenient for creating a small by the number of pages of the site, with a small number of hyperlinks and consistent presentation of materials. Disadvantage: go to the next page only from the previous one.

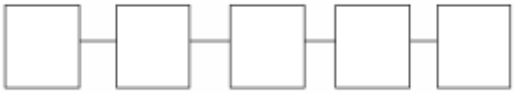

Fig.3. Linear structure.

2. Structure in the form of a lattice. It is based on building a site navigation system, when there is a mutual relationship between vertical and horizontal elements (pages) and the ability to quickly jump from one page to another without the need to visit intermediate pages. Disadvantage: an excessive increase in the number of hyperlinks and its use is limited for large sites, i.e. sites with a large number of pages.

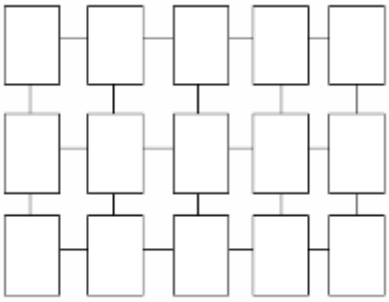

Fig.4. Structure in the form of a lattice.

The optimal site structure is the structure that meets the following criteria:

1. There is a main page, under which are the main sections of the site.
2. When clicking on one of the hyperlinks, the visitor goes to one of the main sections of the site, in which, similarly, hyperlinks can be placed on the other pages of this section.

When designing the structure of a dynamic site, it should be borne in mind that over time the amount of information on the site will grow and in order not to be spent on design in the future, the site structure will be optimized.

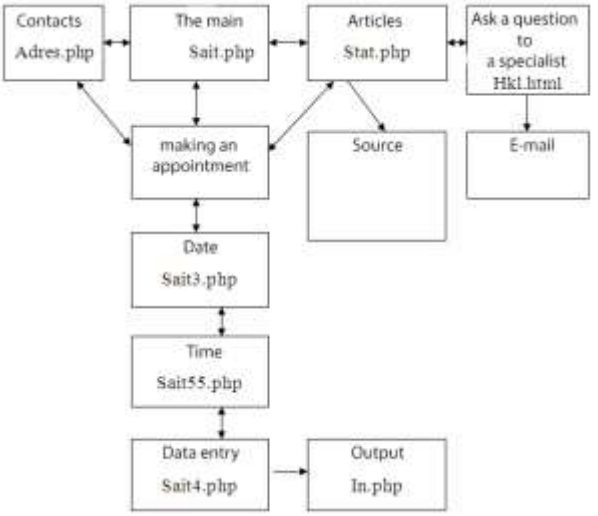

Fig.5. Structure of the dynamic site.

5.2 Dynamic Site Navigation System Design

Site navigation system - a set of text and graphic hyperlinks designed to search for information on the site. The best search engine will not be able to replace a well-constructed site navigation system.

How interesting and useful would not be the information posted on the site, the visitor will not be able to read it, if he can not find it on the site. This task should be solved by the site navigation system.

There are vertical, horizontal and combined site navigation. The dynamic site will use the combined navigation, the main horizontal menu will consist of the following items:

1. Home;
2. Articles;
3. Contacts;
4. Make an appointment;
5. Ask a question to a specialist.

5.3 Dynamic Site Functionality Modeling

Modeling is an important tool when building complex systems. Using modeling, you can design a system at an abstract level, while eliminating unnecessary details, having received information about its structure. At the initial stage, this is very useful, since, properly modeled structure of the system, can be applied during its creation.

Now for these tasks CASE - modeling tools (Computer Aided Software Engineering) are used, their occurrence is related to the need for tools that would allow to simulate the system / processes, as well as support known modeling standards.

One of the most famous CASE modeling tools is Rational Rose (RR). RR contains tools for modeling business processes, as well as tools for modeling databases, is a software implementation of a unified modeling language UML. UML (Unified Modeling Language) is a graphic description language for object modeling in the field of software development, designed to facilitate the work of the developer at all its stages.

In connection with the development of the UML language, developers began to present their models, which until then could only be understood by them, in general notations, thereby making a huge contribution to the development of object-oriented modeling.

The site will be designed using CASE - tool Rational Rose Real Time, a program that is an extension of the standard UML, the purpose of which is to simulate real-time systems.

5.4 Designing a Dynamic Site Database. Choosing a Data Model

There are several types of data models:

- Hierarchical model;
- Network model;
- Relational model.

The hierarchical model is a logical data model in the form of a tree structure, which is a set of elements arranged in order of their subordination from the general to the particular and forming an inverted tree (graph).

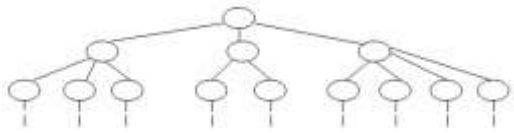

Fig.6. Hierarchical data model.

This model is characterized by such parameters as levels, nodes, and connections. The principle of the model is such that several nodes of a lower level are connected by means of communication with one node of a higher level. A node is an information model of an element located at a given hierarchy level.

The advantages of a hierarchical data model include efficient use of computer memory and good performance indicators for performing operations on data.

The disadvantage of the hierarchical model is its cumbersome to process information with quite complex logical connections.

A network model is a logical data model, representing their network structures of record types and the associated power relations one-to-one or one-to-many.

The difference between the network structure and the hierarchical one is that each element in the network structure can be associated with any other element.

The advantage of the network data model is the ability to effectively implement in terms of memory costs and efficiency.

The disadvantage of the network data model is the high complexity and rigidity of the database schema built on its basis.

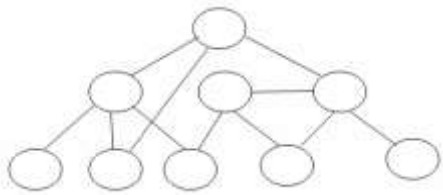

Fig.7. Network Data Model.

The most common acquired relational data model. A relational database is a repository of data organized in the form of two-dimensional tables. Any relational database table consists of rows (also called records) and columns (also called fields). The rows of the table contain information about the facts presented in it (or documents, or people, in a word, about similar objects). At the intersection of the column and row are specific values contained in the data table.

5.5 Physical Implementation of a Dynamic Site

Site links related to viewing news, articles, and achievements are of the form http://vdgkbn1.vv.si/view_cat.php?cat= number, where "cat" is a category, when choosing a post from any category, instead of a variable "cat", select the variable "id" - a unique key entry in the database.

When accessing the site, the following sequence of actions occurs:

1. The HTML document is being built, the style information is extracted from both external CSS files and style elements.
2. The presence of the id variable is checked.
3. A request to fetch data is sent, in accordance with the page id.
4. When forming the page, the title property is displayed, then meta. There is a connection to the file "pieces" of the php code, includ's.
5. Formed the contents of the page.

After the formation is completed, the page is sent to the client's browser.

5.6 Implementing a dynamic website design

The site design was created using the HTML5 hypertext markup language using CSS3 cascading style sheets. The design of the site is made in accordance with the recommendations of the W3C. The main recommendations are:

Do not use tags for positioning page elements for marking up tabular data. To specify the location, you should use special tags - containers, that is, tags </ div> and entered in HTML5 <article> </ article>, <section> </ section>, <nav> </ nav>, <footer > </ footer>.

When implementing the design of a dynamic site, non-catchy colors and textures were used. For better perception, text information is located on a white background. Information blocks are separated by color and display, which simplifies working with the site. Site navigation bar is located on top of the content block.

The site contains graphic inserts. What characterizes the hospital and its specialization. All images of the site are saved in pnp and jpg format, which reduces the download speed of the site and allows you to quickly obtain information even with a low-speed connection to the Internet.

Conclusion

In this paper, we analyzed the software development tools and selected tools for building the site. MySQL was chosen for working with the database. The main criteria for choosing an Apache web server were its prevalence among hosting providers, reliability and speed. Also in the chapter was described the physical design of the database. A database has been created in MySQL DBMS.

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