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3. MODELING OF INFORMATION TECHNOLOGY OF FORMATION REQUESTS FOR TECHNICAL SUPPORT BASED ON SYSTEM AND USER DATA

4. OCCUPATIONAL HEALTH AND EMERGENCY SAFETY

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2. Actuality

3. Purpose of work

4. Main part

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ANNOTATION

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The relevance of this work is that the solution to the problem irrational spending of working time of specialists and satisfactory quality maintenance allows to reduce the load on the working staff of the department technical support, reduce waiting time, increase employee confidence in department.

The object of research is the process of customer support.

The subject of research - the process of forming an application for technical support with taking into account the receipt of system and user data.

The purpose of this project is to develop information technology formation technical support requests in order to optimize the activities of the technical support department for improving the quality of its work and optimizing the cost of working time of employees.

LIST OF SYMBOLS, SYMBOLS, UNITS, ABBREVIATIONS AND TERMS

Services – Intangible economic activity is not stored and no ownership arises.

Company – A voluntary association formed and organized to conduct business.

Company application – Computer software used to perform a specific function.

Modern – A New Era of Different Ways of Working

Strategy – A Method Used to Perform Certain Tasks

Qualities – A unique feature of one object that distinguishes it from another.

Organization – A cooperative society with the same motives and goals.

Remote location – Anywhere with Internet access.

Access – Permission to website etc

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INTRODUCTION

Automation of technical support departments (OTPP) - a task on today it is known and widespread. We can talk about a huge number of successful implemented projects in different industries, in companies of different scales, with using various automation tools. When we talk about automation OTPP, we always mean the introduction of an automated tool from the group Help Desk software. In fact, the concept of HelpDesk has become an analogue the concept of OTPP, which suggests that currently most IT services in one way or another have revised their approach to the structure and processes of IT management. Support plays an important role in helping users. Modern, a comprehensive consulting service is a front office for the entire IT organization and can handle most user needs and requests without the help of professionals.

Customer support is the only point of contact with the IT organization that provides timely solution of their problems. In other words, if the customer service does not spend time for an endless search for professionals who can solve their problems. Often The help desk not only handles external requests from users, but these complaints were initiated within the IT organization, for example, incidents resolved automatically or manually by IT staff, identified or received service requests from other IT organizations of departments. The scientific problem is that Help Desk services are analogs software product of the master's thesis are only a way of transfer general information from the user about the application to the specialist. No software the analogue product does not have the functionality of transmitting system information that would provide the ability to identify the problem without the need for a specialist user's computer. The presence of such functionality would allow on average speed up the processing of applications and save time as specialist and user. The object of research is the process of user support. Subject research is the process of forming an application for technical support with taking into account the receipt of system and user data.

The relevance of this work is that the solution to the problem irrational spending of working time of specialists and satisfactory quality maintenance allows to reduce the load on the working staff of the department technical support, reduce waiting times, increase employee confidence in department.

After determining the relevance of the purpose of the diploma project:

development of information technology for the formation of technical support requests for the purpose optimizing the activities of the technical support department to improve its quality work and optimize the cost of working time of employees.

To achieve the goal the following tasks were identified in the project:

- Analysis of data and business processes of the subject area
- Database development
- Development of the system interface - Testing of the developed system

Research methods such as observation and comparison.

Scientific novelty is a criterion of scientific research that determines the degree transformation, addition and concretization of scientific data. Scientific novelty is means that others have not explored what results were achieved for the first time. Definition scientific novelty applies to the whole study as a whole.

There are 3 levels of scientific novelty:

- 1) transformation of known data, radical changes;
- 2) expanding and adding known data without changing their concept;
- 3) clarification of known data, dissemination of known results to a new class objects or systems [1].

The scientific novelty of the master's thesis belongs to the 2nd level, as the class objects and systems remained unchanged. Software product developed within the performance of the master's qualification work will be possible not just to receive application for technical support from the user, but also automatically read the information from his personal computer (list of processes, central load processor, current services, etc.).

The scientific novelty of the master 's thesis has a second form (Introduction of a new feature [1]), as the functionality of reading information from the user's computer is it is a new sign to the process of processing applications by services formed over the years HelpDesk.

In summary, the scientific novelty of the master's thesis is in the development of information technology taking into account system information when automated application for technical support, which will optimize identify the cause of the problem in most cases and, as a result, reduce it time to process the application. In addition, the program will have the maximum for the user simplified interface that will help to quickly understand the creation of the application users regardless of computer literacy.

1 SUBJECT AREA ANALYSIS

1.1 HelpDesk System Overview

Overview of possible alternatives The current section presents the results of a review of modern analogues. IN a list of analogues to be considered, so you can include the following information systems: 1. Jitbit HelpDesk; 2. Spiceworks; 3. GLPI; 4. Freshdesk Consider each system in detail .

Brief description of analogues Jitbit HelpDesk is used by companies such as VMware, Xerox, HP, Philips, Siemens and others. First of all Jitbit, it is a beautiful and user-friendly interface. Work with applications are nice. If we talk about the cost, the lower tariff plans do not withstand price competition with other HelpDesk systems. But even the cheapest version of On-Premise does not limit you in the number of agents and is worth it quite democratically. Jitbit is still more suitable for companies with a large number of specialists support at least more than 10.

Spiceworks - a free HelpDesk and accounting system designed mainly for IT support and runs locally on a Windows server with authorization at community.spiceworks.com. Spiceworks is unique product. On the one hand completely free, and on the other - made for people who do not want to spend time studying and installing, which can not be said about Request Tracker. If you are looking for HelpDesk for IT support work and don't want to spend a lot of time implementing, Spiceworks is perfect for you, installation and setup takes 10 minutes. But it will certainly have to sacrifice what is in similar systems.

GLPI is an ITSM software that helps you easily plan and manage changes in IT, effectively address problems when they arise, and resolve you get legal control over the company's IT budget and costs.

Freshdesk - HelpDesk service from the Indian company Freshdesk is one of first lines in the rankings. Using this software, It seems that developers have a long

time before starting to create Freshdesk studied the proposals of competitors and took into account most of their shortcomings [5].

A brief overview of the quality indicators that characterize the alternatives After analyzing the literature on HelpDesk services, the following were identified quality indicators: 1) Cost - determines how much the software costs (sign with the greatest weight); 2) Reception of requests - determines which way the reception will take place requests (sign with the least weight); 3) SLA policy - determines how time management is implemented queries (sign with the third most important weight); 4) Automation of queries - determines whether the implementation is automatic answer the most common questions of users (a sign of the second most important weight).

Justification of the method of choosing the appropriate option For the evaluation of alternatives and the choice of the optimal alternative can be decision support system (DSS) was used.

The Choice Decision Support System (DSS) is process-based Analytical Hierarchy (MAI) is a simple and handy tool that helps structure the problem, builds a set of options, chooses the characteristics of their factors, their importance, which provide alternatives for evaluation for each of the factors identified inaccuracies and contradictions in human reasoning (ODA) / experts rank alternative solutions, decide to analyze and justify the results. System based on the mathematical method of analysis of the hierarchies of Thomas Saati.

DSS is based on the process of analytical hierarchy, is simple and convenient tool for structuring the problem, building a set of options, choosing for characteristics of their factors, assessing the importance of these factors for alternatives for each of the factors of inaccuracies and contradictions Decision DM / expert found Turn alternatives, decision analysis and justification of results.

With the help of DSS you can solve the following typical tasks: - quality assessment of organizational, design and project decisions; - definition of investment policy in various areas; - placement tasks (location of dangerous and

dangerous industries, service points); - allocation of resources; - analysis of the problem by the method of economic efficiency; - strategic planning; - design and selection of equipment, goods; - choice of profession, place of work, choice of staff.

MAI solves poorly structured and unstructured problems. Method the solution of such problems is based on the system approach in which the problem is seen as the result of interaction and, moreover, as the interdependence of the set inhomogeneous objects, not only as an isolated and autonomous set [6].

Implementation of the procedure of evaluation of alternatives and selection of the optimal one alternatives For the most accurate identification of the weights of the matrix of pairwise comparisons is necessary build a table where information is collected on all the criteria of each alternative (Table 1.1):

Table 1.1 – Information on alternatives by criteria

Alternative cost	Cost	Reception requests	SLA policy	Automation work with requests
Jitbit HelpDesk	\$ 24.92 - \$ 249	E-mail	Deadline Not	available
Spiceworks	Free	Email	Manually	Missing
GLPI	€ 10 - € 1000	Software environment	Manually	Present
Freshdesk	Free for 3 users, then - \$ 16 - \$ 70	Software environment, telephone, social network, e-mail	Response time and execution	Missing
Diploma project	Free	Software environment	Response time and execution	Present

Based on the table, as well as the literature on HelpDesk services, construct a matrix of pairwise comparisons of all criteria (Fig. 1.1).

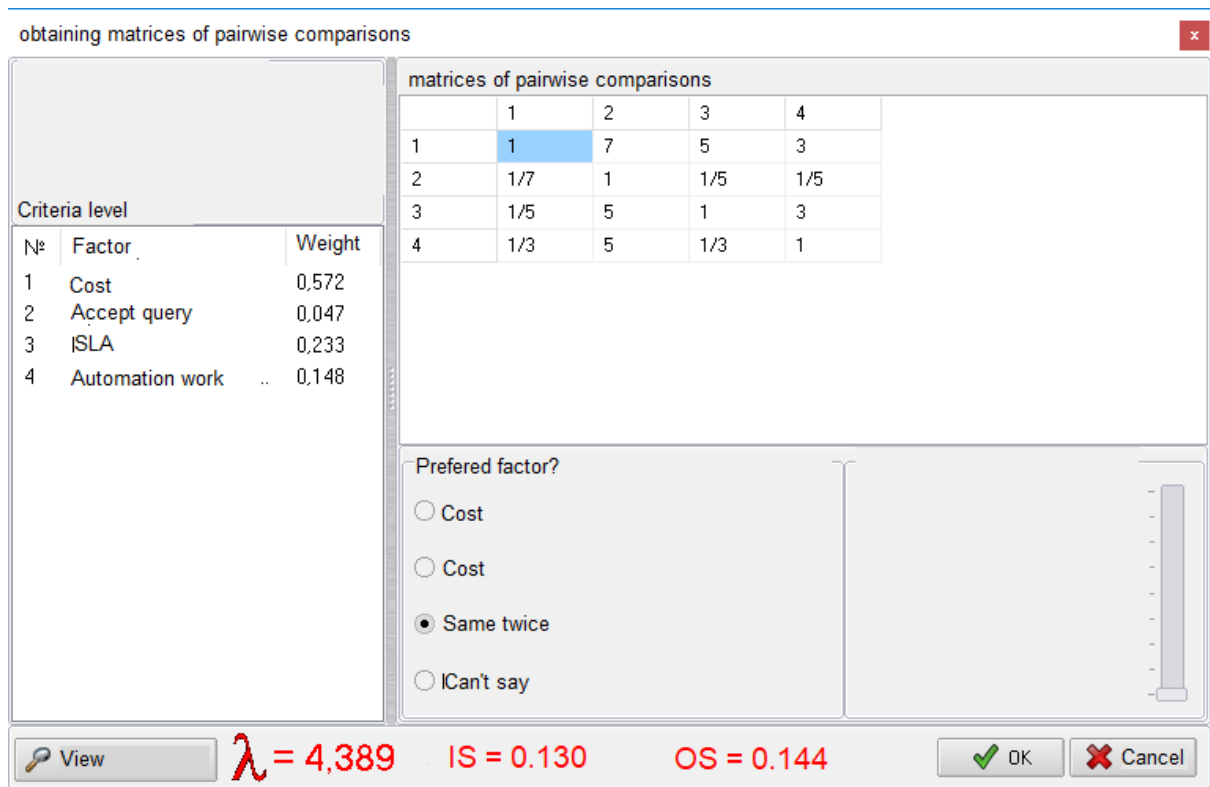


Figure 1.1 - Matrix of pairwise comparisons of all criteria.

Next is the construction of a matrix of paired comparisons for the level of all criteria: cost (Fig. 1.2), request reception (Fig. 1.3), SLA policy (Fig. 1.4) and automation work with queries (Fig. 1.5).

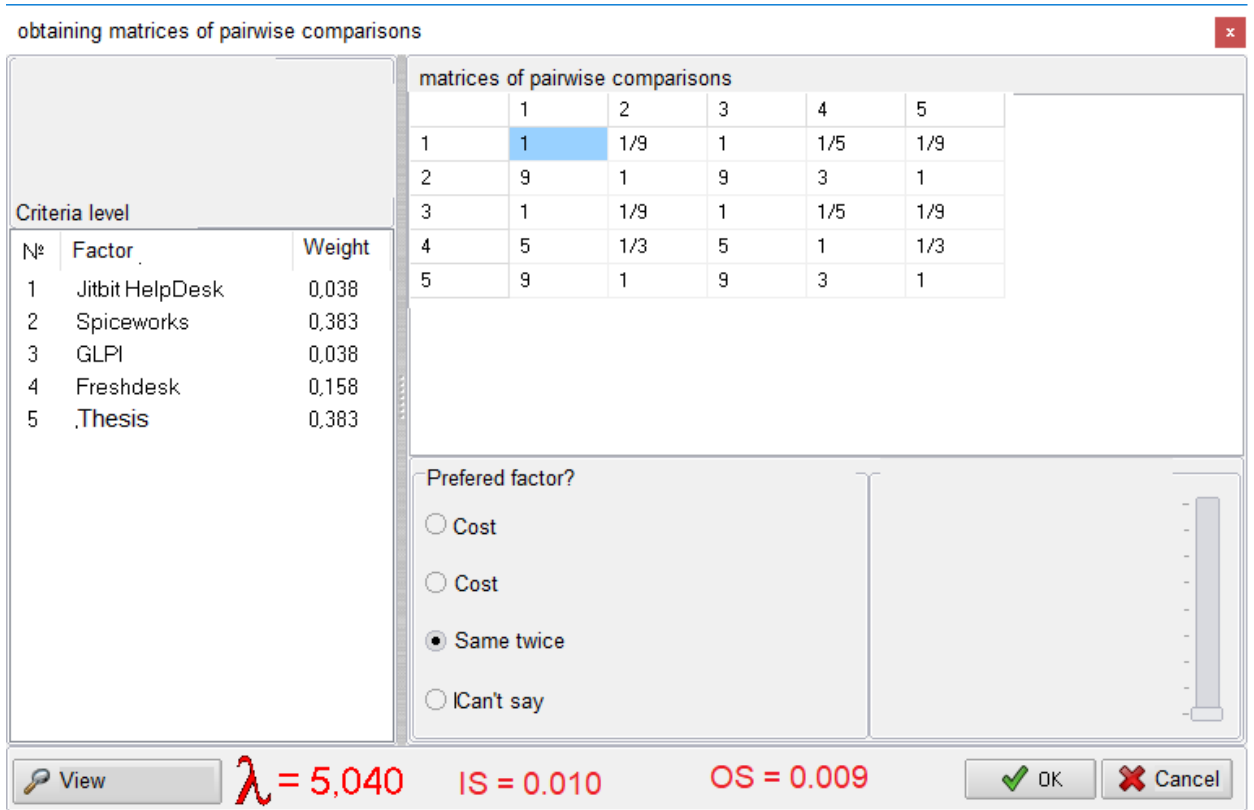


Figure 1.2 - Matrix of paired comparisons by the criterion "Cost"

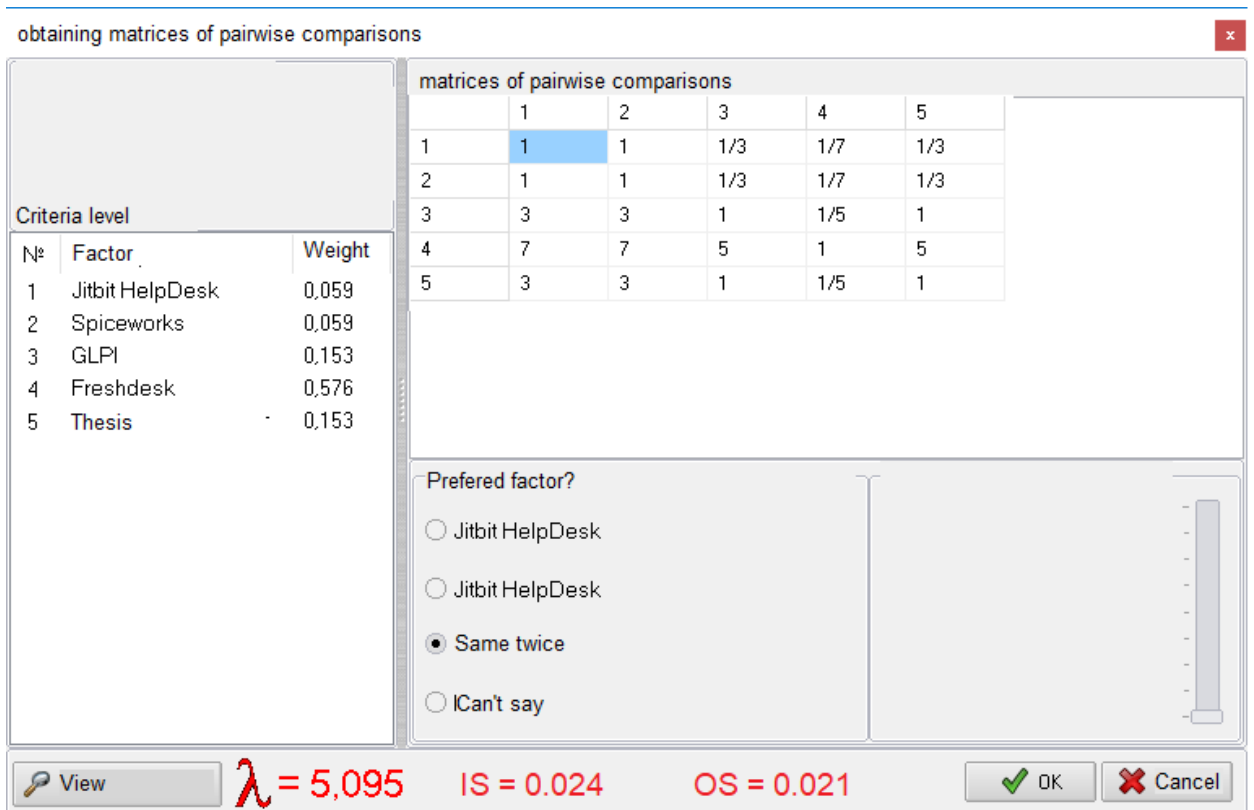


Figure 1.3 - Matrix of paired comparisons by the criterion "Acceptance of requests".

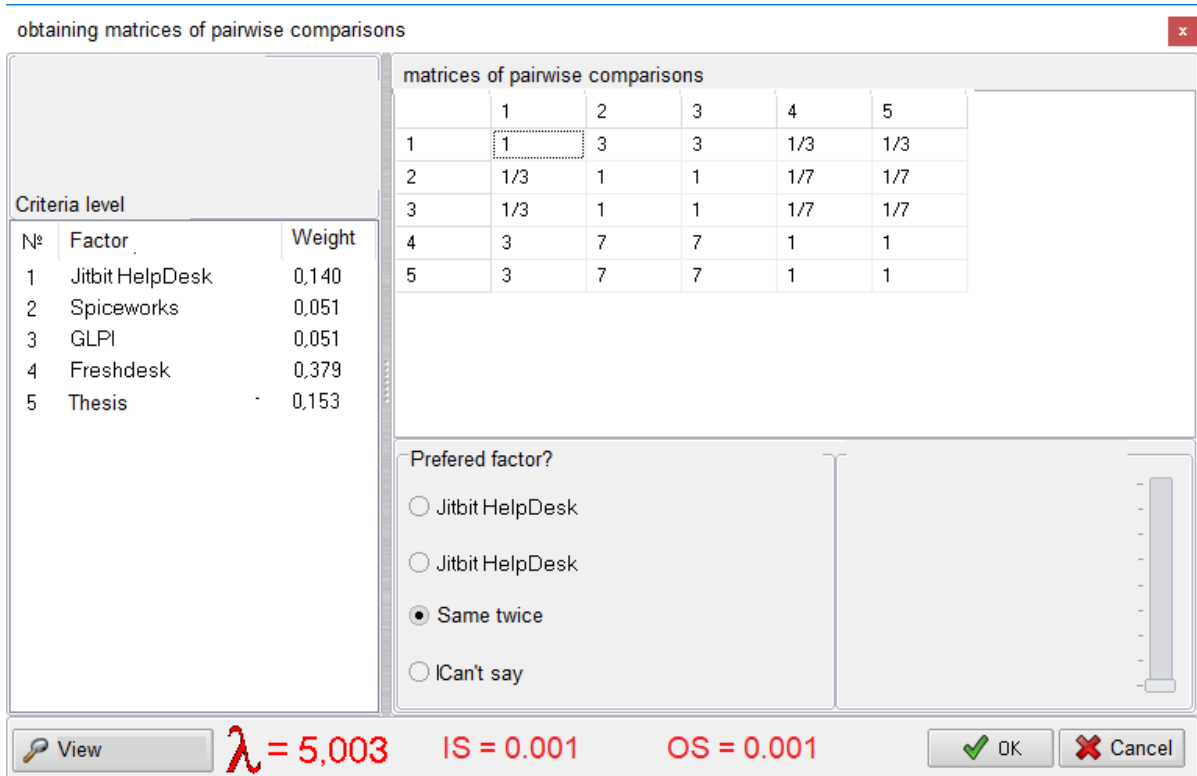


Figure 1.4 - Matrix of paired comparisons by the criterion "SLA Policy".

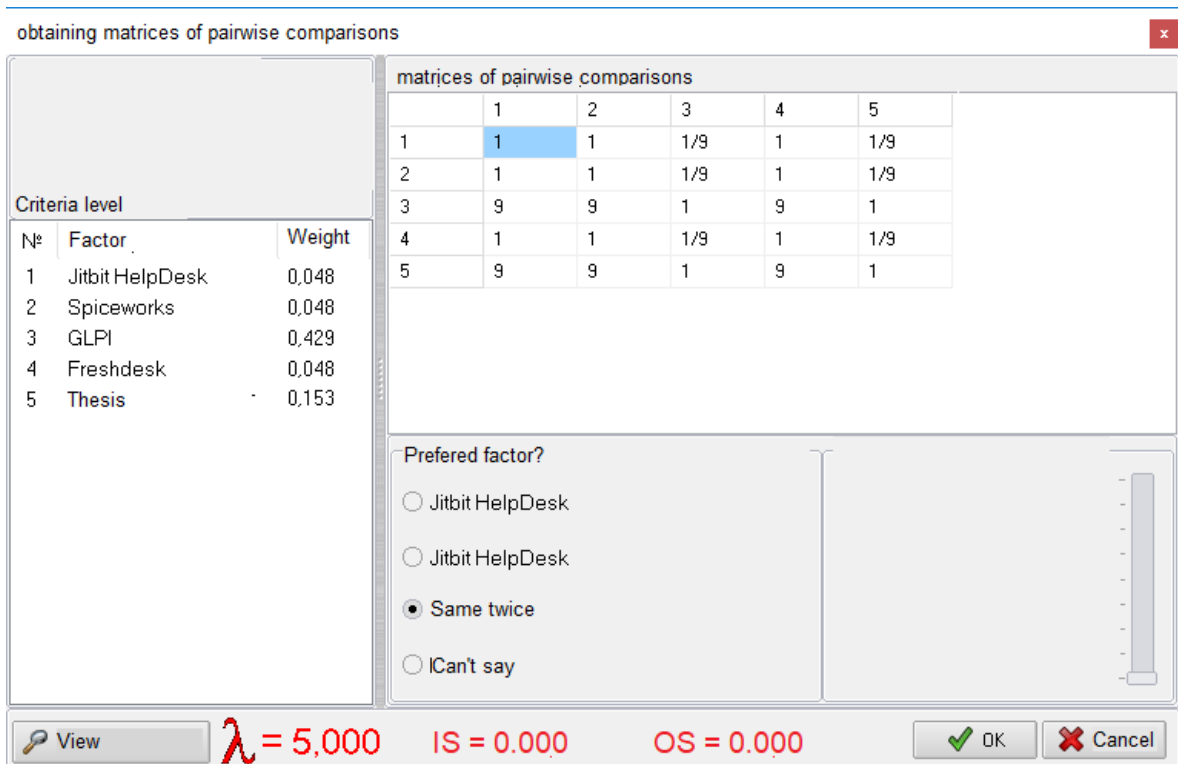


Figure 1.5 - Matrix of paired comparisons by the criterion "Automation of work with requests".

As a result, we obtain a diagram with the results of calculations (Fig. 1.6). As you can see, the software product of diploma design, which implements the developed information technology, which is the result of the diploma project is the most optimal among analogues according to these criteria .

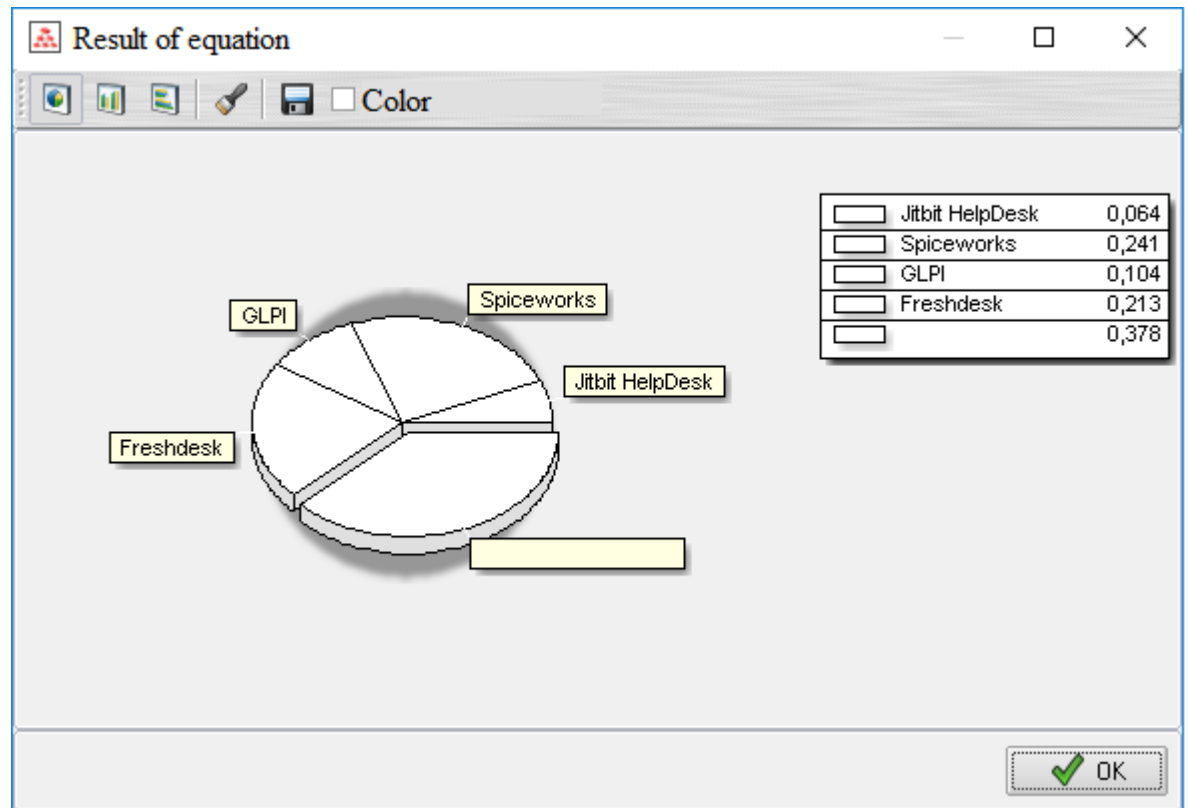


Figure 1.6 - Matrix of paired comparisons by the criterion "Acceptance of requests".

In this section, the HelpDesk system was considered as an information system technical support, solving user problems with computers, hardware and software. A review of the thematic literature was conducted, which helped to formulate functional requirements for the system to be developed .

An overview of possible alternatives provided an opportunity to evaluate modern software products and determine the required functionality to create a competitive software

2 STATEMENT OF THE PROBLEM AND METHODS OF RESEARCH

2.1 Purpose and objectives of the study

The purpose of this project is to develop information technology of formation technical support requests in order to optimize the activities of the technical support department for improving the quality of its work and optimizing the cost of working time of employees. A software product that implements the developed IT will improve the quality servicing applications received by the technical department of any company, reduce the cost of leisure time of professionals and make their work more efficient by obtaining a knowledge base that characterizes the system state of the computer user, which will optimize the identification of the cause of the problem in large the proportion of cases .

To achieve the goal of the work, the tasks due to necessity were identified analysis of data and business processes of the subject area, modeling and development of a database that will be used in the project, development intuitive system user interface and testing developed system .

2.2 Research methods

Choice of research methods The method of scientific research is a way of knowing objective reality .

The method is a certain sequence of actions, techniques, operations .

Observation is a type of cognition of the objective world based on appropriate perception of phenomena and objects by the senses, not taking into account in the process researcher. Comparison is the finding of differences between objects or finding them joint, carried out both with the help of special devices and for by the senses.

Mathematical model - an approximate description of any class of external phenomena world, expressed through mathematical symbolism. Analysis of a mathematical model allows to get into the essence of the studied phenomena. Mathematical model - a powerful method of learning about the outside world, as well as forecasting and management. The mathematical model will be determined using mass systems service. A queuing system (QMS) is a system that produces maintenance of incoming requirements. Maintenance of requirements in QMS is carried out service devices. In the process of registering requests for technical support there is one service element - dispatcher, the flow of applications is not limited in time and quantity. So let's take advantage single-channel SMO with unlimited queue length.

Conducting research Consider the model for the introduction of information technology in the enterprise to understand the need for process automation. According to observations, conducted during the year, working in PJSC "VNIDAEN" as an Office administrator applications, the average frequency of applications $\lambda = 5$ applications / hour, at the same time the manager comfortably handles a large number of requests $\mu = 6$ applications / hour, average service time of one employee who submitted an application $x = 1/5 = 0,167$ years. The manager works alone, so the number of channels $m = 1$.

Find the load on the QMS : $\rho = \lambda / (m\mu) = 0,83$.

Find the probability of a simple formula $P_0 = 1 - \rho$: $P_0 = 0,17$.

Find the average length of the queue by the formula:

$$\bar{q} = \frac{\rho^2}{2(1-\rho)}$$

We obtain: $q = 4.17$ applications .

The technical support department accepts all applicants for service (no service failures). Therefore $P_{otk} = 0$, $P_{obsl} = 1$.

Load factor: $U = \rho * (1 - P_{otk})$, $U = 0,83$;

Average number of service requests: $S = mU$, $S = 0.83$ applications;

Average number of applications in QMS: $k = q + S$, $K = 5$ applications;

SMO bandwidth: $G = \lambda(1 - P_{0TK})$, $G = 5$ applications / year;

Average time of the application queue:

$$\bar{w} = \frac{\bar{q}}{\gamma}$$

$W = 0,417$ hours;

Average time of stay of the application in SMO:

$$\bar{t} = \frac{\bar{k}}{\gamma}$$

$t = 0,5$ hour [10].

Processing of research results

Let's analyze the obtained characteristics of QMS.

The manager is loaded by 83%, ie busy with maintenance employees who turned to technical support for 83% of their total time work. For 17% of the time the dispatcher is idle due to lack of applications. Thus thus, the load of the manager is quite high. Such a download can be considered normal. However, further increase in load is undesirable .

Formulation of conclusions

On average, there are 4.17 applications in the queue, and 5 are in the queue for maintenance applications. The dispatcher serves an average of 5 requests per hour, ie all incoming applications. Time from informing the dispatcher about the received application to the beginning of its service (ie the time the application is in the queue) is an average of 0.417 years. Time from receipt of the application to the end of its service (time the application is pending a decision on execution) is an average of 0.5 years. If you compare this time with the length of the working day and take into account the fact that until the appearance of a specialist may take even more time, this figure can be considered unsatisfactory .

Based on the data obtained at the testing stage, a comparison will take place results before the implementation of the system and after its implementation .

Choice of implementation methods

Information support is implemented in the form of a database. To select the DBMS, it was analyzed several works on this topic. The first of them - Kornienko MM "Informatics. Databases. Database management systems "[11]. The publication contains basic theoretical information about databases, database management systems and information retrieval systems, stages of design and creation of databases and principles of working with them on the example of Microsoft Access database .

In addition, "MySQL. Handbook of language "[12]. This book, written by MySQL AB experts, is a guide to the SQL language. which used to organize queries to databases, as well as implementation features SQL standard in MySQL server. The book addresses the full range of issues that relate to the language structure, valid column types, operators, operations, and functions, as well as existing MySQL extensions: in addition, information is provided, designed for experienced programmers and administrators. As you know, MySQL takes leading positions among many open source database management systems code. Thanks to high productivity and simplicity of adjustment, a wide choice ARI interfaces, as well as functional means of working with networks, MySQL server became one of the most successful options for developing Web-applications that interact with databases. The book is designed for Web application developers and administrators of any qualification, as well as for students and teachers of relevant disciplines .

To solve this problem, the MySQL database - a free system was chosen open source database management, which was created as an alternative commercial systems .

Among the alternatives to writing the program code of the system interface was a cross-platform Java programming language [13], a programming language general-purpose C ++ [14] and object-oriented C # programming language .

Choosing a programming language was also a challenge. Accept the final The solution was helped by the analysis of the relevant literature on three options: C ++, Java, C #. "C ++ programming language. Special edition. " [15]. A book is written Björn Strastrup, author of the C ++ programming language, is a good presentation capabilities of this language. In addition to a detailed description of the actual language on the pages books can find approaches to solving complex problems of different complexity programming and design. Numerous examples have an appropriate style C ++ C kernel programming and a modern object-oriented approach to development PZ. The third edition of the bestseller was revised by the author. The result of this work has become more accessible to beginners. At the same time the text was enriched with programming techniques and information that can be useful even for experienced C ++ professionals. This special edition is different from the third with two new applications dedicated to localization and secure processing exceptions using the standard library), with many refinements elsewhere text, as well as correcting a large number of errors. The book is addressed programmers who use the C ++ programming language in their daily lives work. It will also be useful for students, teachers and anyone who wants to get acquainted with a description of the language .

Kay S. Horstmann, author and connoisseur of Java, in his book "Java SE 8. Introductory course." [13] highlights the most valuable of the new language tools in Java 8 as well considers those tools that were implemented in Java 7, but did not deserve proper attention of programmers. The author also provides practical recommendations and examples of code, demonstrating innovations in Java 8 .

Albahari Joseph's book "C # 3.0 Directory "[15], in turn, isdetailed programming guide in C # 3.0. implemented in Microsoft Visual Studio 2008. The first chapters are devoted entirely to the C # language, starting with the basics of syntax, types and variables and ending with more complex topics such as dangerous code or preprocessor directives .

When the methods of information system development are chosen, it is time to form the project as such. "The Project Management Life Cycle" [16] allows you to master the existing project management methodologies. The book describes 4 stages of the project life cycle: initiation, planning, implementation and closure. The author of the book writes clearly, professionally and clearly, which avoids the complex terminology that exists in this area. After developing a project, it is also important to test the product before making it available to the customer. The book "Pragmatic Unit Testing in C # with NUnit, 2nd Edition" [17] describes clear and proven ways to implement modular testing in the appropriate process, which leads to higher quality and fewer errors. Typically, software commands use device testing to both verify their code and to help them improve that code. This book is unique in that it covers two aspects: demonstrating to developers how to test and helping them determine what needs to be tested .

After analyzing the above programming languages, it was decided use the C # programming language because it is based on a rigorous component architecture and implements advanced code security mechanisms .

Almost all of the above methods have been included in the curriculum and therefore the use of these methods is based on a strong understanding of the advantages and disadvantages of the data .

methods and, as a consequence, after the analysis of alternatives - their choice for the implementation of the system interface .

3 MODELING OF INFORMATION TECHNOLOGY OF FORMATION REQUESTS FOR TECHNICAL SUPPORT BASED ON SYSTEM AND USER DATA

The three-level data scheme defines the tasks and stages of database design:

1. Stage of conceptual modeling;
2. Stage of logical modeling;
3. Stage of physical modeling [18].

3.1 Conceptual modeling

Characteristics of objects and attributes Conceptual or infographic modeling is the process of creating a model, which is used in information about the company and does not depend on the physical aspects of its presentation. The result of infographic modeling is to obtain semantic models that reflect the information content of a particular topic, i.e. conceptual data models for the analyzed part of the enterprise. In table 3.1 and table 3.2 stated characteristics of database objects and their attributes, respectively [18].

Links between database objects: - Author (author) creates Request (issue) - Request (issue) includes Processes (processes) - Request (issue) has Type Thus, the result of developing a conceptual model of the database shown in Fig. 3.1 .

Table 3.1 - Characteristics of database objects

Object name	Object characteristics
Author	Stores information about name, place of work and name the query authors' computer

Continuation of Table 3.1

Request (issue)	Stores all the information entered by the author in the form and additionally system data
Processes	Stores information about all processes that have been active in author when creating a query
Type	Stores information about query types

Table 3.2 - Description of object attributes

Attribute name	Attribute characteristic
author_id	An attribute that acts as the primary key of the author object and indicates its sequence number. Links the author and issue tables
computername	Author's computer name
name	Author's name
surname	Author's surname
thirdname	Author's middle name
organization	The author's place of work
department	Author's department
headline	Application description
description	Screenshot attached to the application
screenshot	Screenshot attached to the application
creation_date	Date of application creation

Continuation of Table 3.2

end_date	Closing date of the application
status	Application status (Open / Closed)
type_id	An attribute that acts as the primary key of a type object and indicates its sequence number. Associates type and issue tables
cpu	Boot the CPU of the author's computer at the time the application is created
ram	Download the author's computer RAM at the time the application is created
devmgmt	Device Manager screenshot
minidump	Minidump file
windowsupd	Log Windows update file
process_id	An attribute that acts as the primary key of the process object and identifies its sequence number. Links the process and issue tables
process_name	Name of the process
PID	PID process
status	Process status (Responding / Not responding)
username	The user who started the process

Continuation of Table 3.2

memory	The amount of memory the process uses
description	Process description
type_description	Application type (Normal / Urgent)

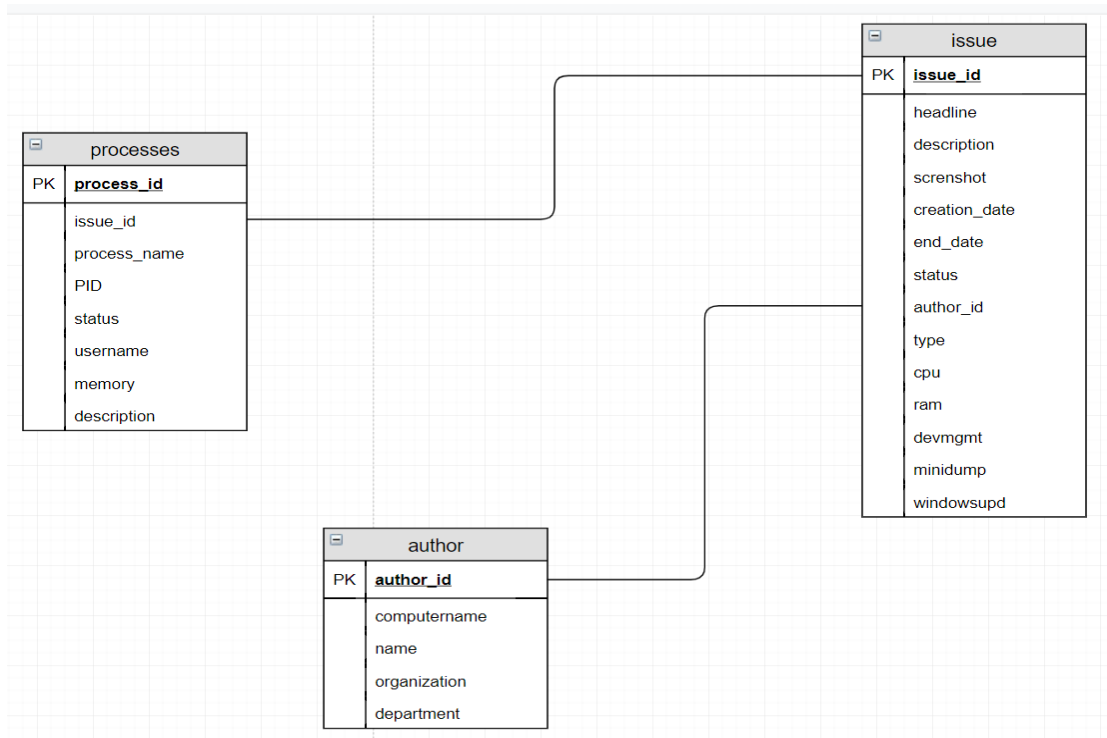


Figure 3.1 - Conceptual model of the database

3.2 Logical modeling

Logical modeling - the process of creating a model used in business information, taking into account the inverse model of data organization, but regardless of the type of target database and other physical aspects of implementation. In this phase, a logical data model is created at the level of the data model for part of the studied enterprise by refining and transforming the

conceptual model taking into account the characteristics of the selected data organization in the target database [18].

The result of developing a logical model of the database is shown in Fig. 3.2.

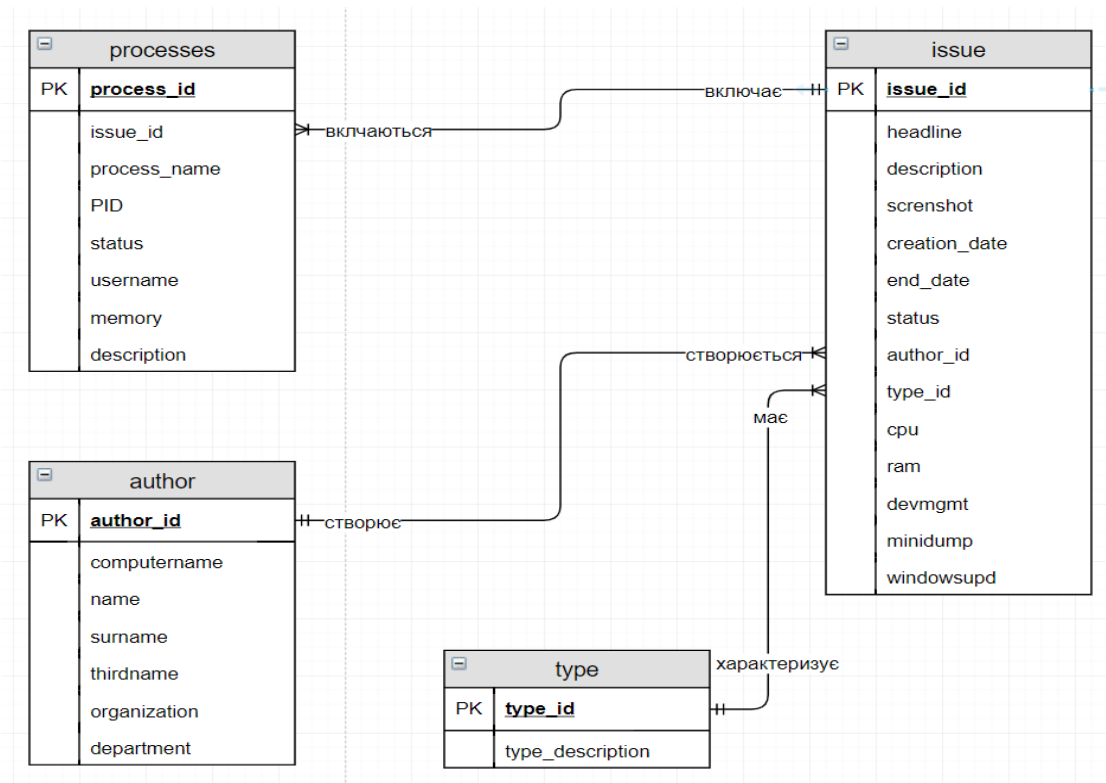


Figure 3.2 - Logical database model

Definition of primary and foreign keys: Application (issue): **issue_id** - primary, **author_id**, **type_id** - external; Processes (processes): **process_id** - primary, **issue_id** - external; Author (author): **author_id** - primary; Type: **type_id** - primary.

3.3 Physical modeling

Physical design creates a description of the implementation of the database on secondary storage devices, including storage structures and access methods for efficient data processing. The physical phase of the design allows you to choose a rational storage structure and access methods based on various methods and tools

provided to the developer of a particular database [18]. The results of the physical modeling are given in the database dump in Appendix B .

```

Creating a unique primary key index: CREATE UNIQUE INDEX
NDXCLASS ON ISSUE (issue_id); CREATE UNIQUE INDEX
NDXCLASSROOM ON PROCESSES (processes_id); CREATE UNIQUE
INDEX NDXHOURS ON AUTHOR (author_id); CREATE UNIQUE INDEX
NDXSCHEDULE ON TYPE (type_id);

```

3.4 Development of a diagram of use cases

Use case diagrams describe the relationships and dependencies between groups of use cases and the actors involved in the process. It is important to understand that usage diagrams are not intended to represent a project and cannot describe the internal system of the system. Usage diagrams are designed to simplify interaction with future users of the system and with customers, in particular, to determine the necessary functions of the system. In other words, usage diagrams indicate what the system should do without specifying the most commonly used methods. From the point of view of the current person, the case of use describes a group of actions in the system that lead to a specific result .

Usage options are a description of typical interactions between users of the system and the system itself, which reflect the external interface of the system and indicate the form that the system should perform .

An actor or actor is an external source that interacts with the system through a use case. Actors can be both real people and other computer systems or external events. Actors do not represent individuals or systems, but their roles. This means that when a person interacts with the system in different ways, he acts as several actors. For example, a person working in the support service and taking orders from customers will be displayed in the system as a "member of the support

department" and "member of the sales department". [19]. The developed diagram of use cases is shown in fig. 3.3 .

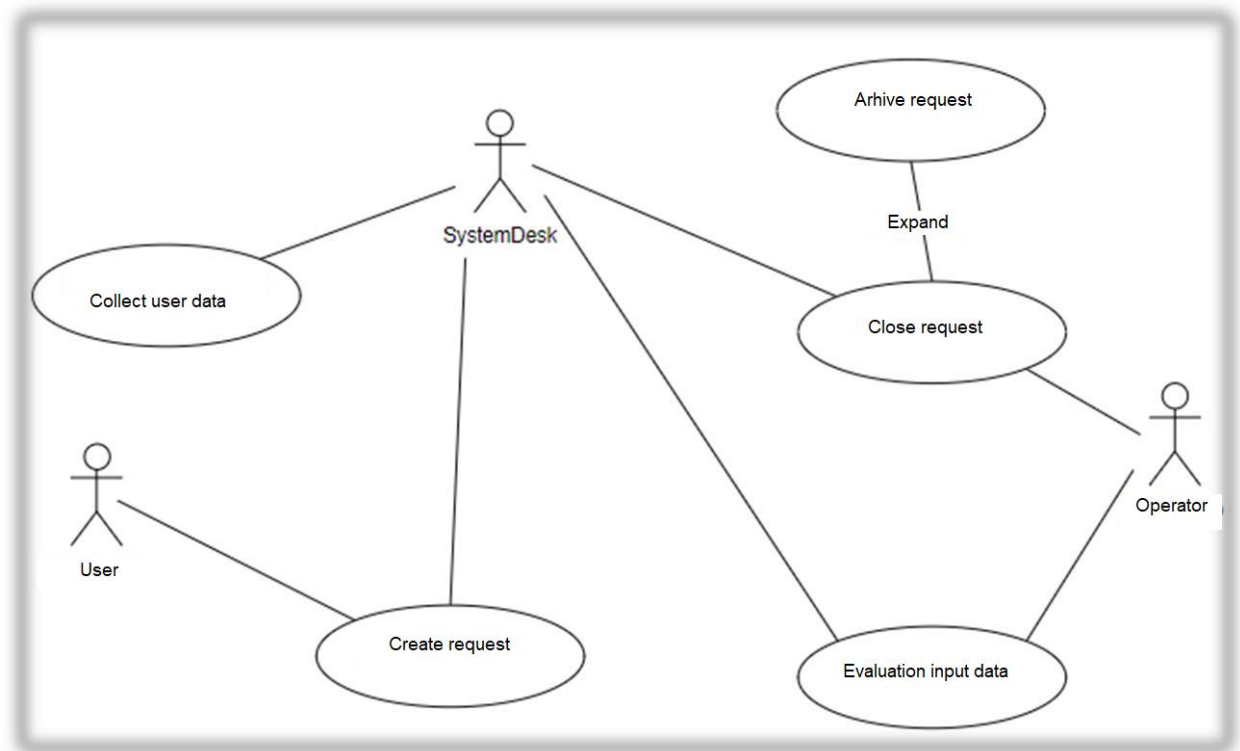


Figure 3.3 - Diagram of use cases

3.5 Development of IDEF0 and IDEF3 modeling notation diagrams

IDEF0 (Integration Definition for Function Modeling) - defined description notation business processes based on the SADT methodology [20] .

SADT [21] (Structured Analysis and Design Technique, structural technology analysis and design) - graphic symbols and a comprehensive approach to the description of systems. The development of SADT has its roots in 1969 and has been tested virtually in companies different industries .

IDEF0 is the result of software computerization of US GDP. Automation corporate activities required appropriate methods and tools. Before software development needed to be clearly and unambiguously described business

processes. Task programming tools can also be useful for administrative tasks. The note can be used for modeling of various automated and non-automated systems .

The idea of IDEF0 is that the mapping of business processes is presented in in the form of a rectangle with input and output arrows .

For IDEF0, the process page and the associated arrow are important: - left - arrow - business process input - information (document) that will be converted during the process; - the arrow turns out - the output of the business process - the transformed information (document); - At the top is the arrow - Business Process Management - Information or a document that defines how the business process will be executed, like enter output; - The end of the arrow is the mechanism of the business process - which converts the input data into conclusion: employee or technician. It is assumed that the mechanism does not changes during one process cycle .

The advantage of IDEF0 is that it shows the interaction of processes at all without redundancy details. The disadvantage of IDEF0 is the inability to see the algorithm of doing business processes. Some training is required to develop and read the notation .

The main consumers of IDEF0 are managers who need to see and understand communication processes without ignoring the details [20]. Context diagram and first level decompositions in the IDEF0 notation are shown in Fig. 3.4 and 3.5 respectively .

The IDEF3 notation should describe workflows. IDEF3 often used to create business models at the lowest level -describes the work performed in departments and workplaces.The main graphical objects of the model used in IDEF3 are squares and arrows. The first is used to describe functions (work, processes), the second - to represent the temporal sequence of functions or the sequence of functions due to the flow of material resources in the model .

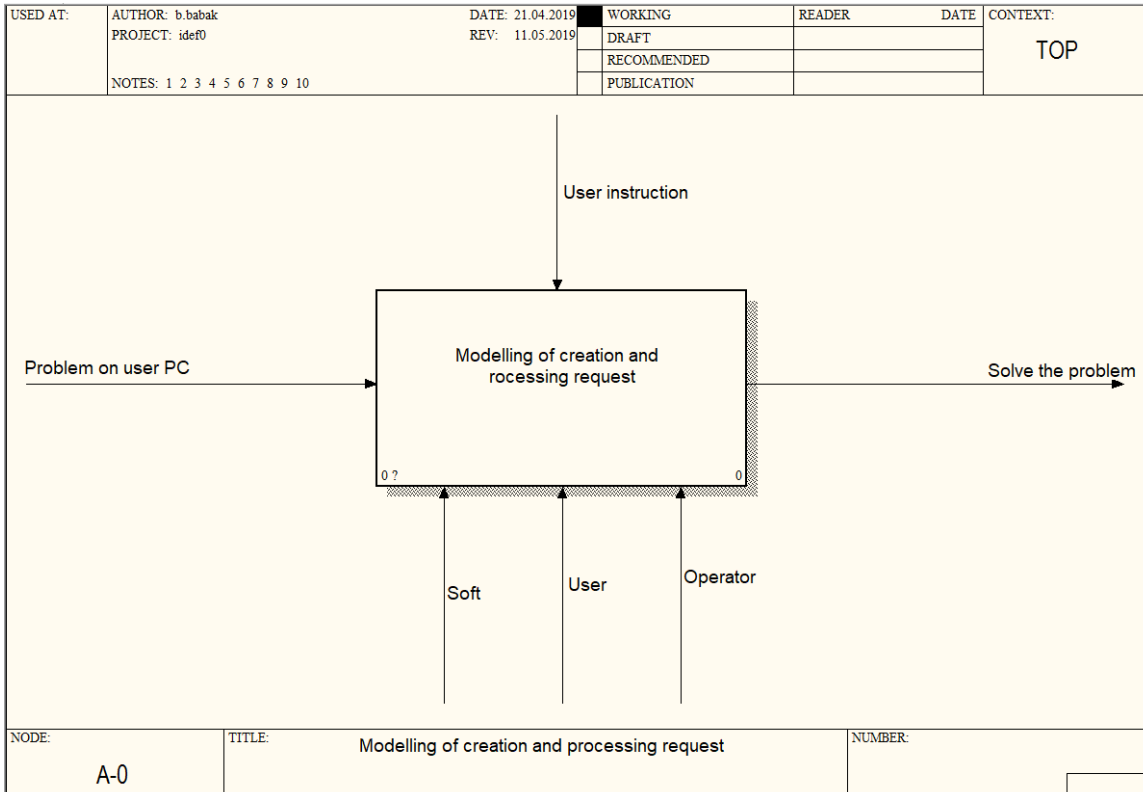


Figure 3.4 - Context diagram of the IDEF0 notation

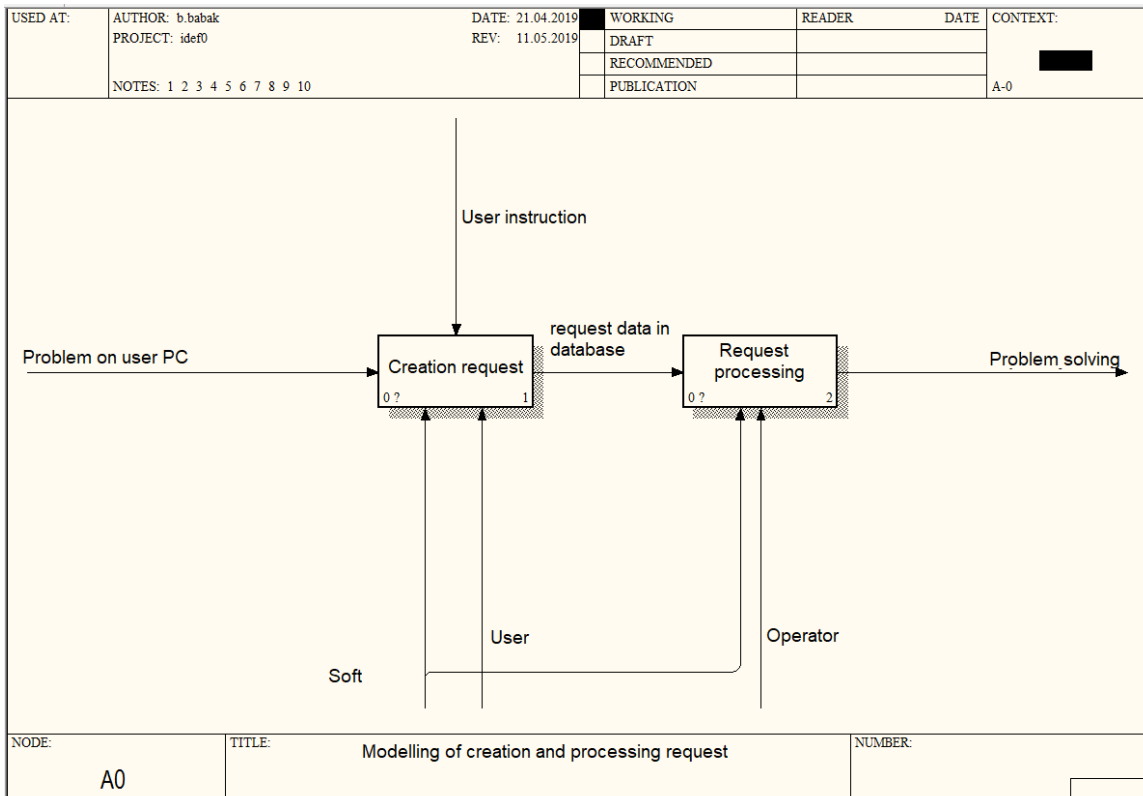


Figure 3.5 - The first level of decomposition of the IDEF0 notation

To avoid ambiguity in the description of workflows, the IDEF3 notation includes additional objects that serve to represent possible ramifications of workflows and to combine options under certain conditions. These objects are logical characters of three types: - operator "I"; - operator "OR"; - operator - excludes "OR" .

Unlike IDEF0 in IDEF3 notation, a four-sided page representing a function (work, process) is not used to bind inputs different types. In addition, only one arrow can enter and leave the square. Otherwise, the rules for creating charts in IDEF3 will be violated.

It is advisable to use the IDEF3 notation in relatively simple processes at the lower level of decomposition, ie processes at the workstation level. In this case, the process scheme can serve as a basis for creating documents governing the work of performers. Thus notations it is rather difficult to create the combined models which combine the description of working processes and processes of management of this work [20]. The decomposition of the second level processes in the IDEF3 notation is shown in Fig. 3.6– 3.7.

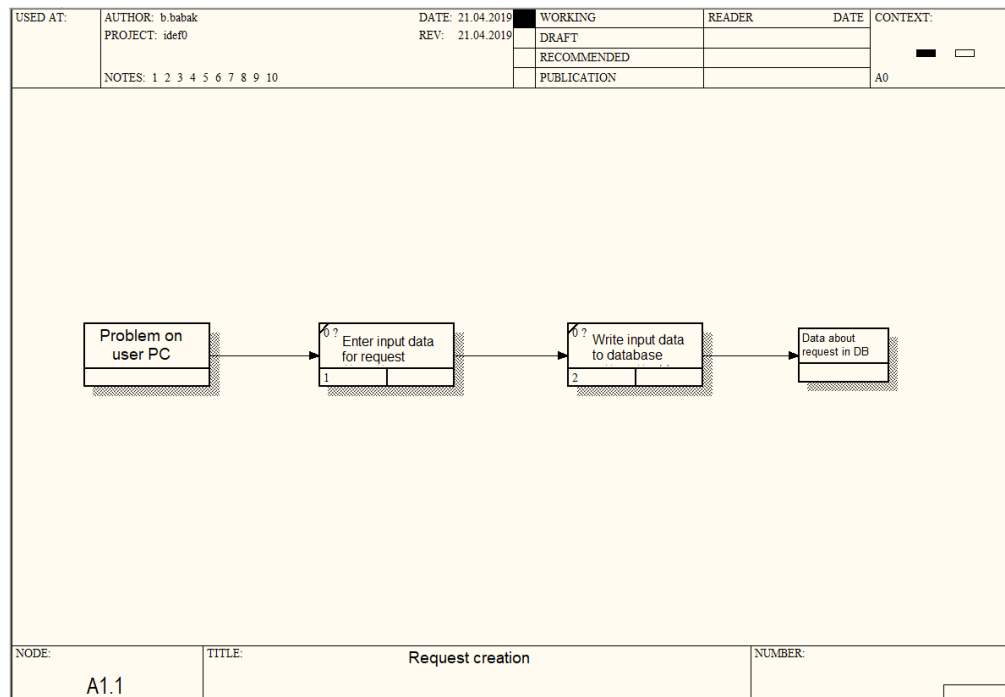


Figure 3.6 - Decomposition of the process "Create a query" notation IDEF3

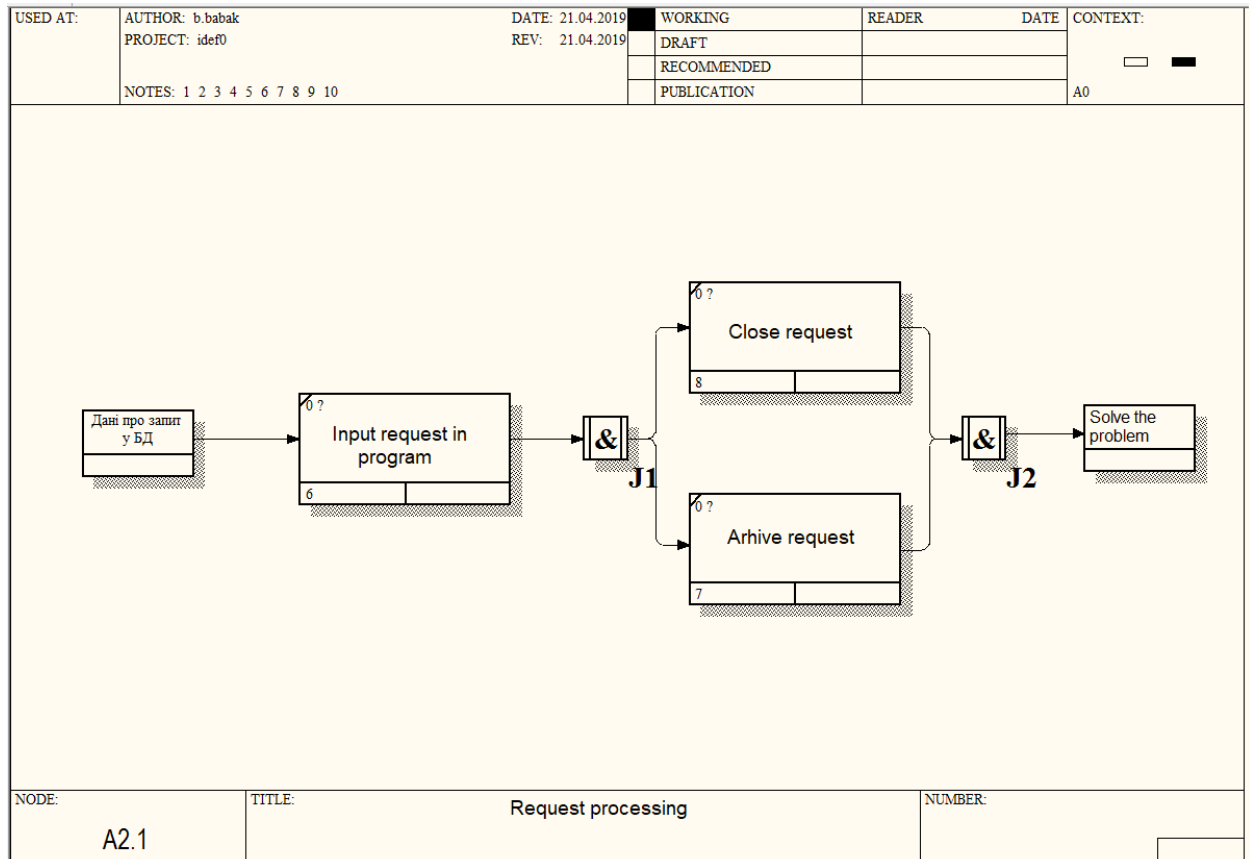


Figure 3.7 - Decomposition of the "Query Processing" process of IDEF3 notation

3.6 Development of information technology scheme

Information technology of diploma design is to take into account system information in the automated formation of the application for technical support, which will optimize the identification of the cause of the problem in most cases. The scheme of solving the problem in technical support (Fig. 3.8) contains input data (description of the problem by the user), data processing by the manager, obtaining a template solution to the problem or obtaining additional data (system data of the user's computer) to form a solution. Information technology of diploma design allows to automate the stage of obtaining additional data in a large

proportion of cases, on average speeding up the decision process application problems .

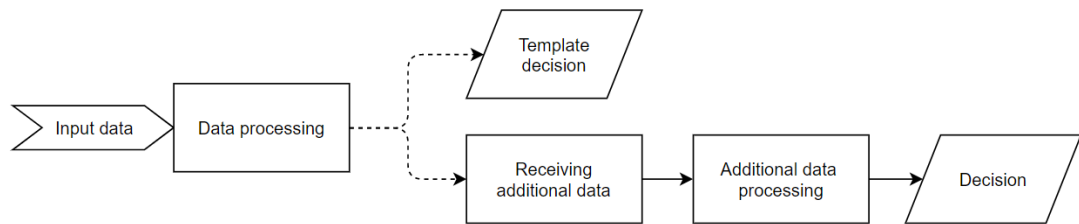


Figure 3.8 - Scheme of information technology

The architecture of the software product that implements the developed IT (Fig. 3.9) consists of a user interface SystemDesk, as well as an administrative application SystemDeskAdmin, which are connected to a single database. When problems arise, users create a request through the interface, which in turn enters as a record in the database and is finally displayed to the manager in incoming requests .

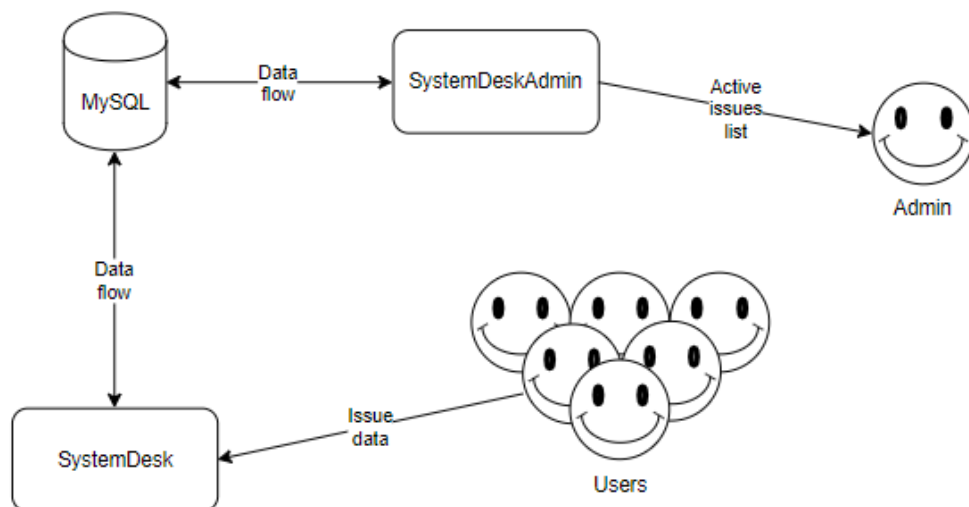


Figure 3.9 - Software product architecture

The third section describes the stages of conceptual, logical and physical modeling of data that contains the information needed for the schedule. The results are presented in the form of conceptual and logical data models. In database modeling, the main database objects and their attributes were selected, the

connections in the database were selected, and the primary and foreign keys were identified. It was analysis of data and business processes in notations IDEF0, IDEF3 and BPMN, which will determine the processes that will be automated during the project .

3.7 Database development

When creating tables used standard constructions of the SQL language, which are given in the Physical Modeling section of the previous section.

Data integrity is the reliability and accuracy of the information stored in the database data. Integrity constraints are rules that limit all possible states of the database data and the transition from one state to another. Thus, the limitations on integrity determines the set of "permissible" states and transitions between them. The database is located in integral condition, if it meets all the requirements for its integrity [22].

Thesis used data integrity for both objects and attributes and relationships. To implement the limitations of the integrity of the relationship between the relationship used foreign key restriction methods (NOT NULL indicates that connection is required) and the integrity of the connections. For the integrity of attributes, the values of data types and their sizes are defined, determining the need for values and setting conditions for attribute values.

The integrity of the primary key was applied to the integrity of the relationship (attribute the primary key is not NULL and cannot be duplicated in the relationship).

Scheme of the implemented database in the web application phpMyAdmin 3.5.1 with open code in PHP for the administration of MySQL database is shown in Fig. 3.10. Dump bases data are given in Annex B.

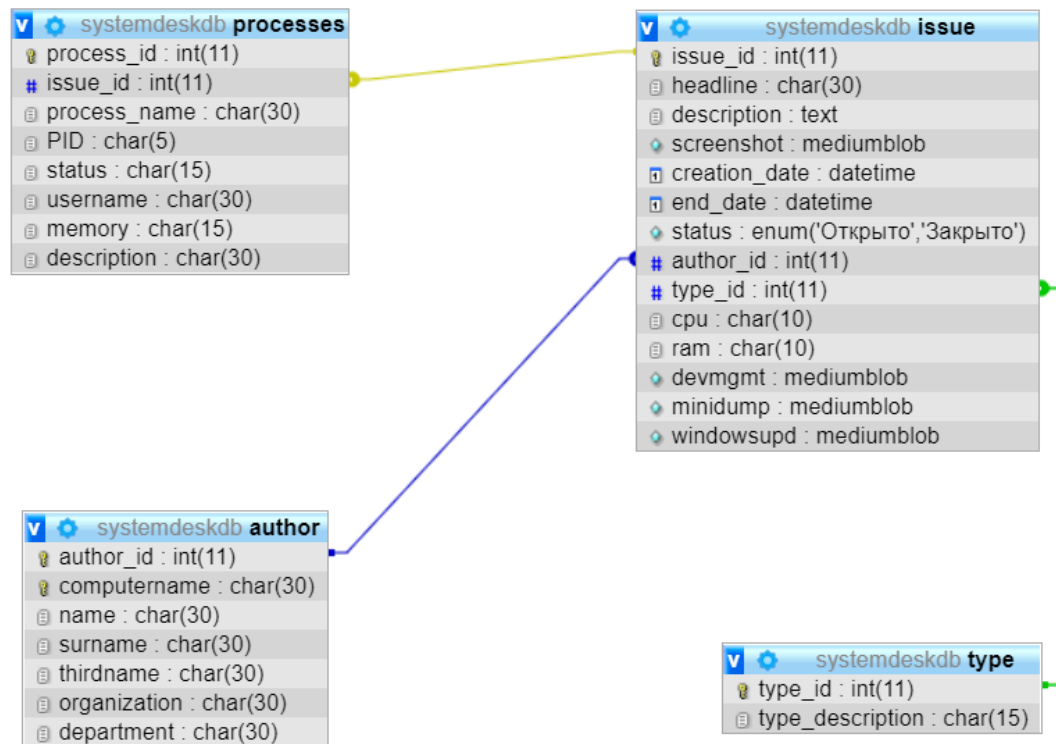


Figure 3.10 - Scheme of the developed database

3.8 Software product development

The next step after creating a database is to create a custom one interface - Windows Forms software application in C # programming language Microsoft Visual Studio 2010 platform. Windows Forms technology is a technology used in Visual C # to create intelligent Windows - based client programs that run in the .NET Framework. Windows Forms provides the following for the project components like dialogs, menus, buttons and many other controls that are part of the standard Windows UI. In essence, these controls are just classes from the .NET Framework library. Windows Forms Designer is used to create a user interface, and the user has access to other development time and time options.

Performance, which includes the following:

- ClickOnce Deployment.

- Great database support, thanks to the DataGridView control (Windows Forms).

- Toolbars and other custom items interface, which may have the appearance and behavior of Microsoft Windows XP, Microsoft Office or Microsoft Internet Explorer [23].

2 applications were developed - SystemDesk (custom) and SystemDeskAdmin (admin). The user application runs in the background (Fig. 3.11) and if necessary, the user can expand the window and enter the necessary data to create an application (Fig. 3.12). Detailed is displayed in the program settings user information stored in the user register (Fig. 3.13).

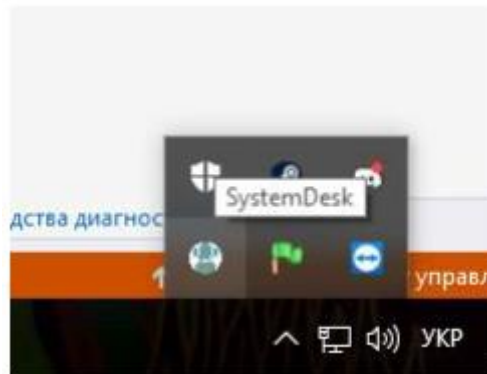
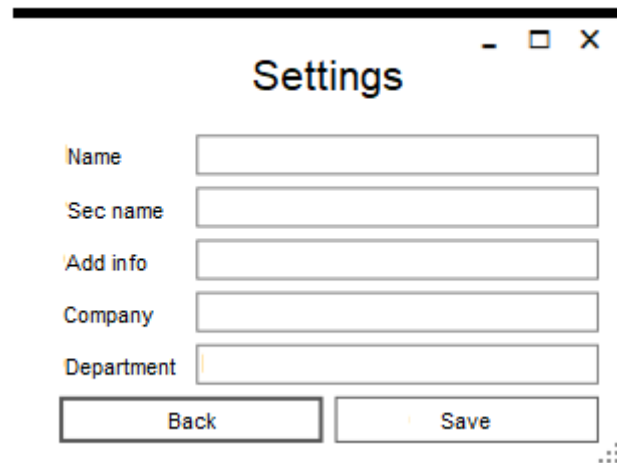


Figure 3.11 - Display the program in the tray

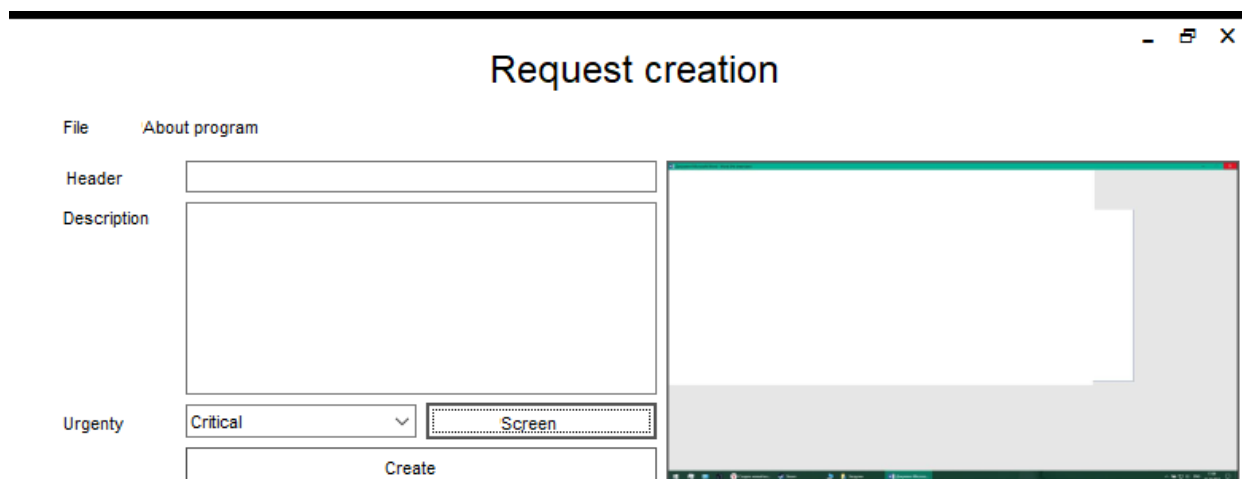
Figure 3.12 - Application form



The image shows a window titled "Settings" with a standard Windows-style title bar (minimize, maximize, close buttons). Below the title bar, there are five text input fields labeled "Name", "Sec name", "Add info", "Company", and "Department". At the bottom of the window, there are two buttons: "Back" and "Save".

Figure 3.13 - Settings window

The required fields to fill in the form "Creating an application" (Fig. 3.14) - is title, description of the problem, urgency of the application (ordinary and urgent) and opportunity take a screenshot with a feature similar to the Windows Tula Scissors (Fig. 3.15). After clicking on the "Create" button, the system information is also entered is added as an entry in the database (Fig. 3.16).



The image shows a window titled "Request creation" with a standard Windows-style title bar. Below the title bar, there is a menu bar with "File" and "About program". The main area contains several fields: "Header" (a single-line text input), "Description" (a large multi-line text area), "Urgency" (a dropdown menu currently showing "Critical"), and a screenshot area (a large rectangular area with a dashed border, containing a screenshot of a window). At the bottom, there is a "Create" button.

Figure 3.14 - Application creation form with entered data.

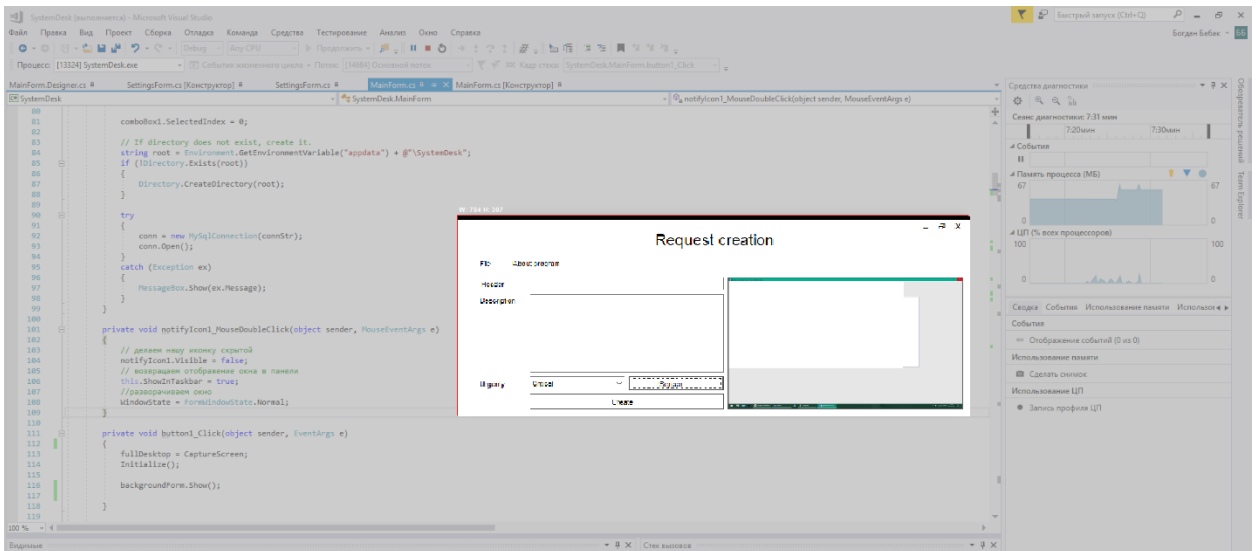


Figure 3.15 - Example of the functionality of creating a screenshot

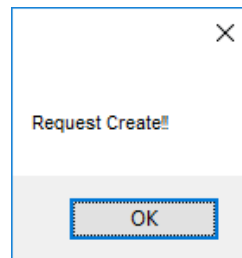


Figure 3.16 - Notification of the creation of the application

The SystemDeskAdmin admin application displays incoming open requests. By double-clicking, the manager can open detailed information about the application (Fig. 3.17).

Requests						
	issue_id	headline	description	creation_date	type_description	status
▶	2	Word not working	Hello, we have	21.04.2019 14:20	Immediately	Open
*						

Refresh Close request Archive

Figure 3.17 - Form of display of incoming applications

The form "Details of the application" (Fig. 3.18) includes basic information about the application entered by the user, a screenshot taken by the user and the system information that was automatically saved to the database. System information contains CPU and RAM downloads and the following files: screenshot Device Manager window, which is needed to verify that the connection is correct devices to your computer, a WindowsUpdateLog file that contains information about correctness of the operating system update, minidump file containing information about the critical shutdown of the computer, the so-called "blue screen".

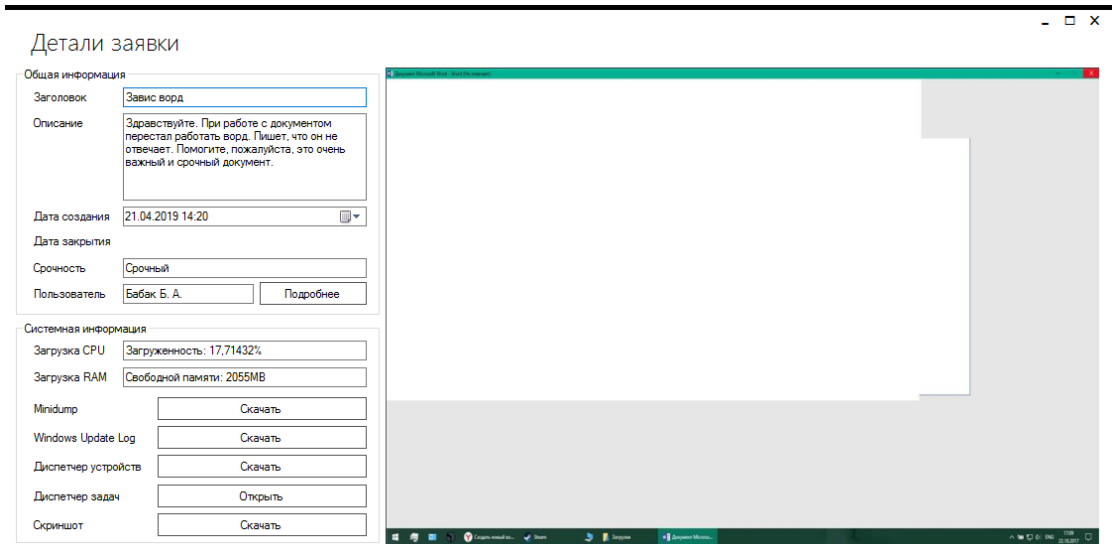


Figure 3.18 - Form of displaying the details of the selected application

All files together with the screenshot can be downloaded locally to the manager's computer for detailed verification (Fig. 3.19 – 3.21).

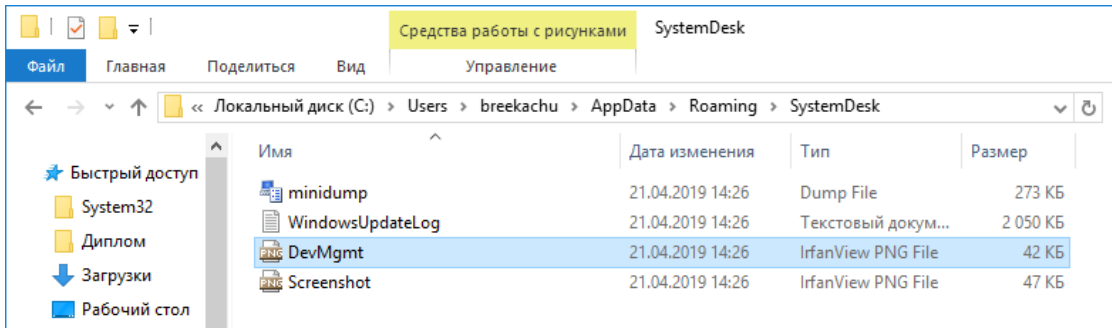


Figure 3.19 - Locally downloaded files from the database

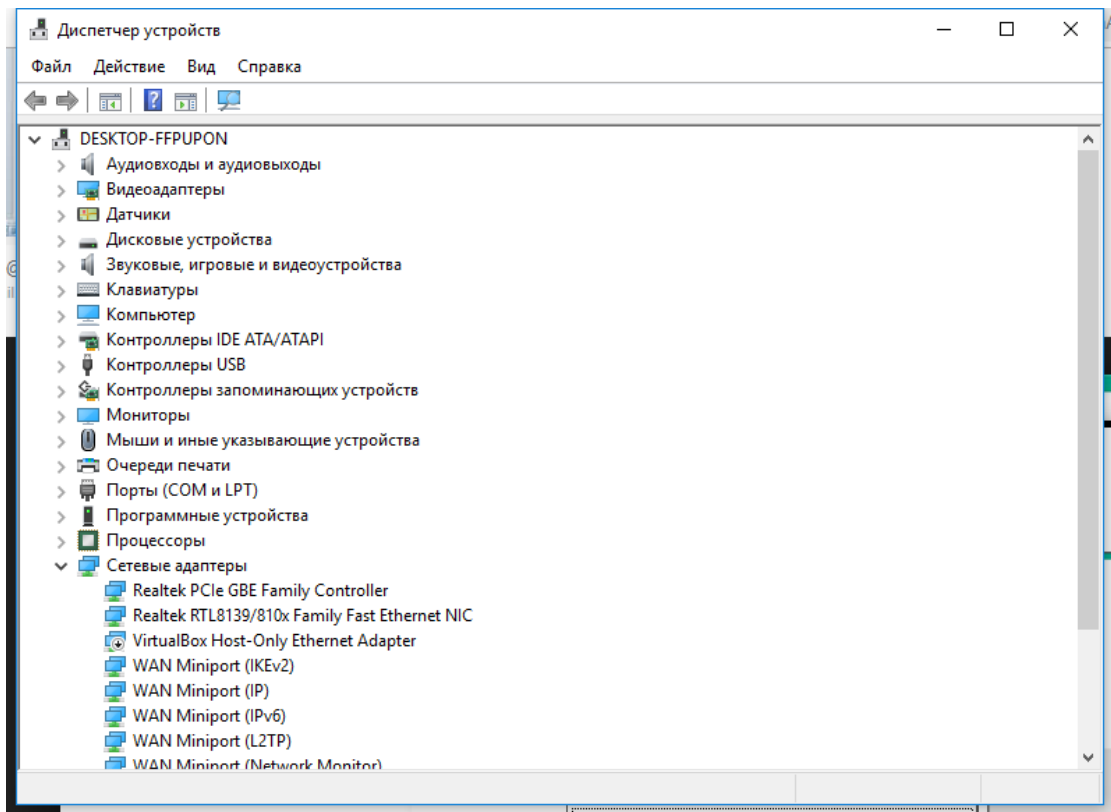


Figure 3.20 - Screenshot of the Device Manager window

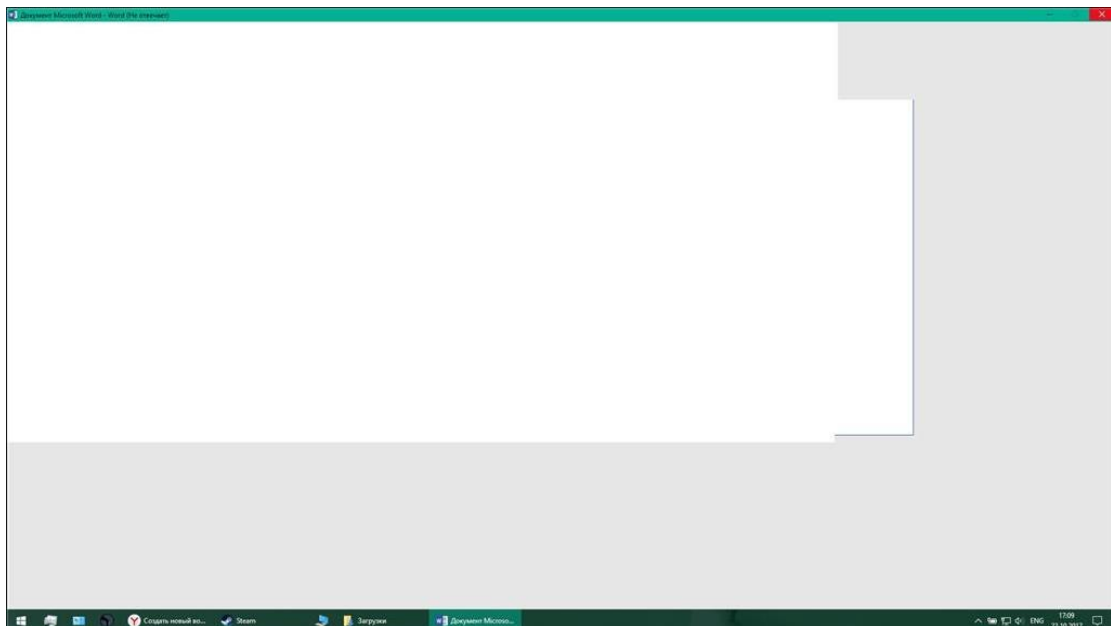
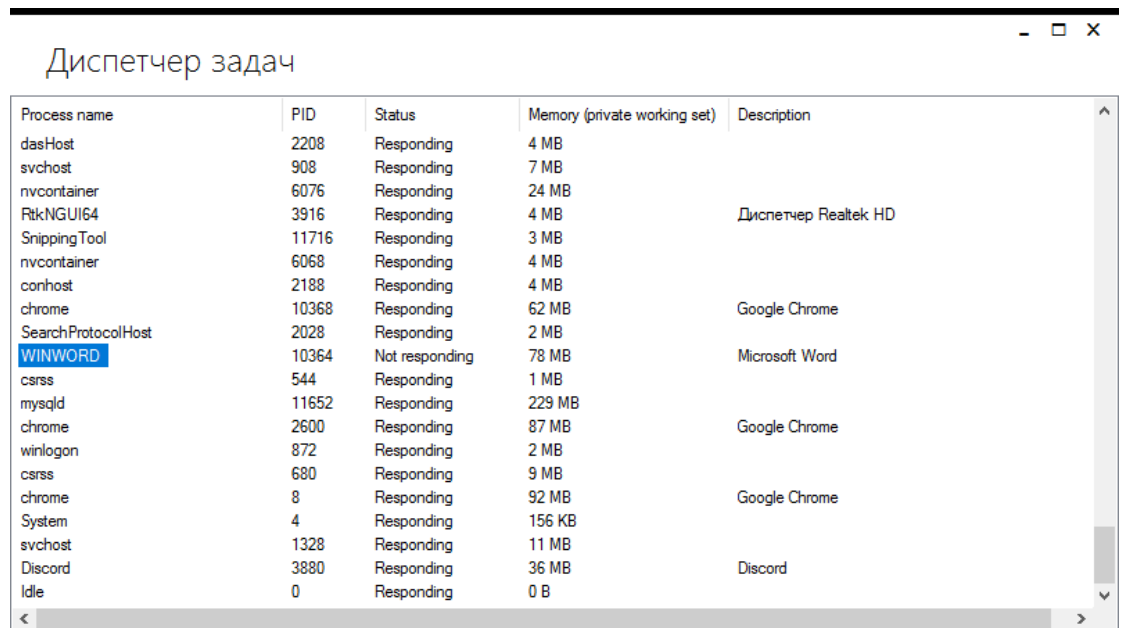


Figure 3.21 - Screenshot created in the custom application

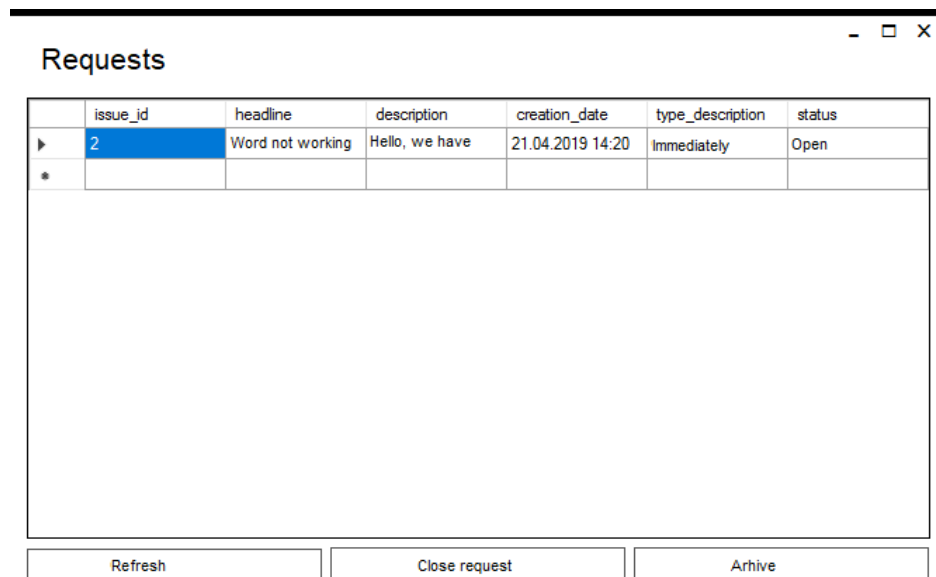
The manager also has the opportunity to view all the processes open to the user at the time of creating the request (Fig. 3.22).



Process name	PID	Status	Memory (private working set)	Description
dasHost	2208	Responding	4 MB	
svchost	908	Responding	7 MB	
nvcontainer	6076	Responding	24 MB	
RtkNGUI64	3916	Responding	4 MB	Диспетчер Realtek HD
SnippingTool	11716	Responding	3 MB	
nvcontainer	6068	Responding	4 MB	
conhost	2188	Responding	4 MB	
chrome	10368	Responding	62 MB	Google Chrome
SearchProtocolHost	2028	Responding	2 MB	
WINWORD	10364	Not responding	78 MB	Microsoft Word
csrss	544	Responding	1 MB	
mysqld	11652	Responding	229 MB	
chrome	2600	Responding	87 MB	Google Chrome
winlogon	872	Responding	2 MB	
csrss	680	Responding	9 MB	
chrome	8	Responding	92 MB	Google Chrome
System	4	Responding	156 KB	
svchost	1328	Responding	11 MB	
Discord	3880	Responding	36 MB	Discord
Idle	0	Responding	0 B	

Figure 3.22 - User Task Manager display form

After completing the work on the application, the dispatcher notices that the application is closed (Fig. 3.23), and the application in turn moves from the "Incoming applications" to the "Application archive" (Fig. 3.24).



issue_id	headline	description	creation_date	type_description	status
2	Word not working	Hello, we have	21.04.2019 14:20	Immediately	Open
*					

Refresh Close request Archive

Figure 3.23 - Form of incoming applications after closing a single application

Requests						
	issue_id	headline	description	creation_date	type_description	status
▶	2	Word not working	Hello, we have	21.04.2019 14:20	Immediately	Open
*						

Refresh Close request Archive

Figure 3.24 - Archive of closed applications

3.9 Development of the installation package

To use the system interface by the customer, was formed installation package by means of MS Visual Studio. In fig. 3.25 – 3.28 shows the process of installing the software application on the test computer.

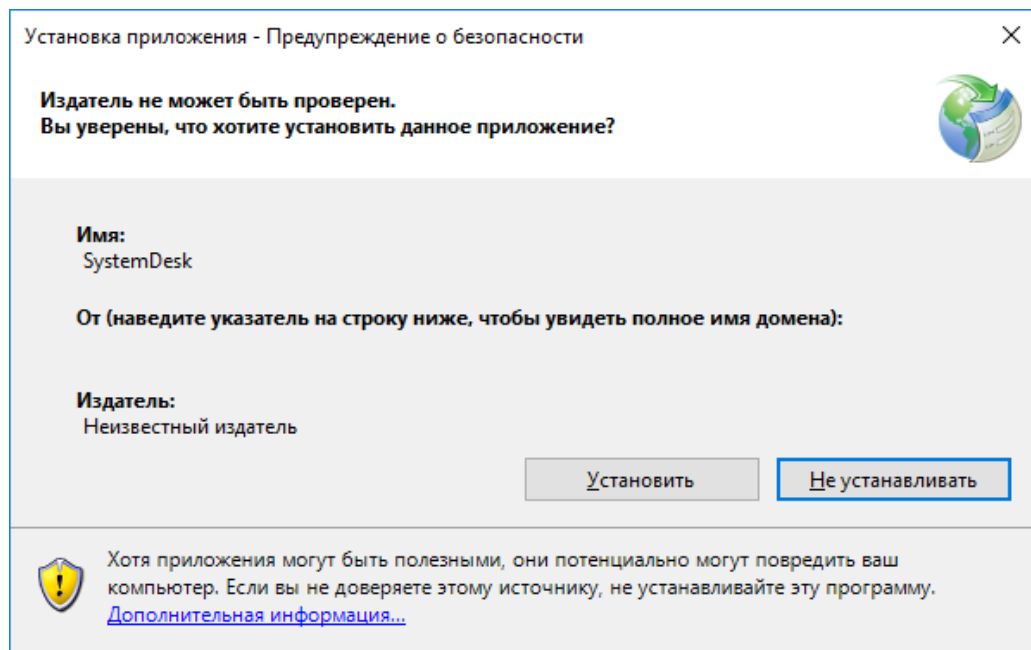


Figure 3.25 - SystemDesk installer window

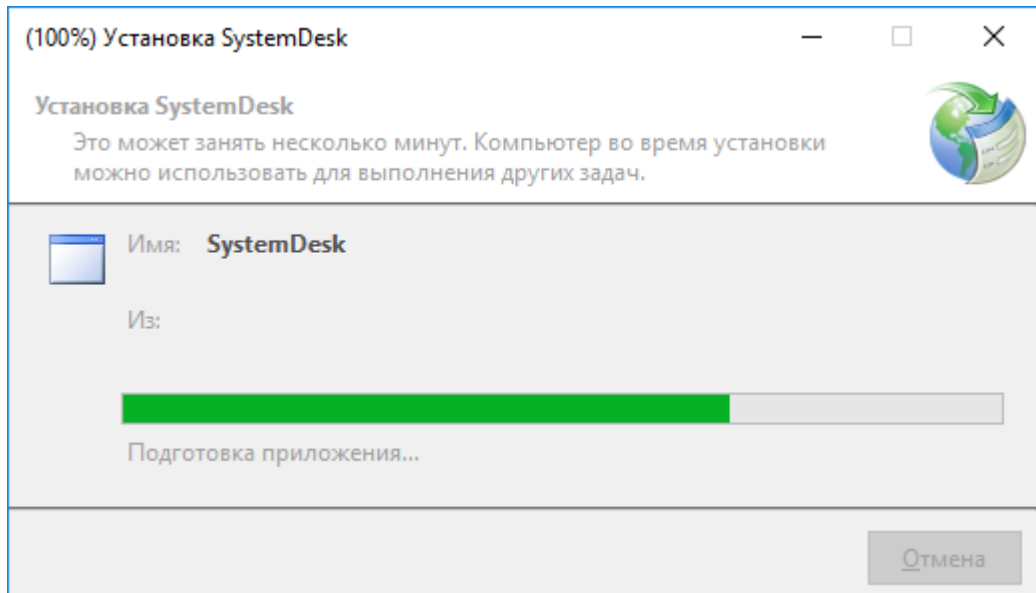


Figure 3.26 - SystemDesk installation process

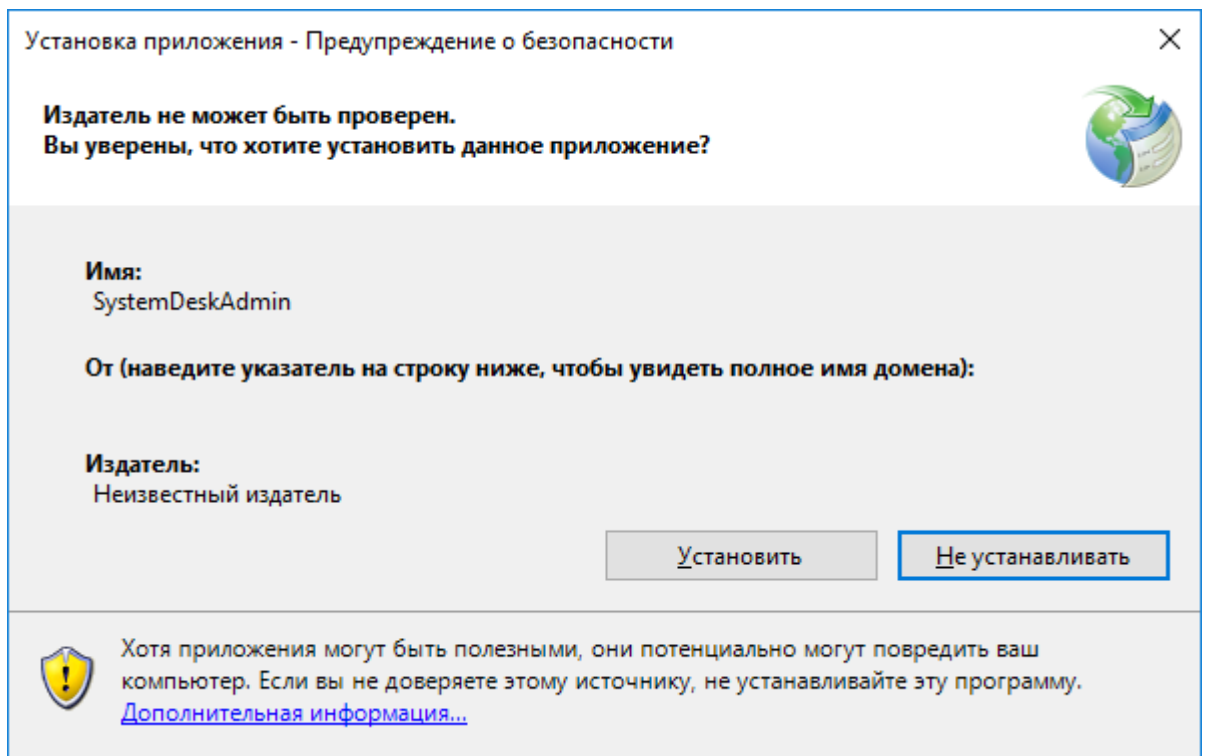


Figure 3.27 - SystemDesk installer window

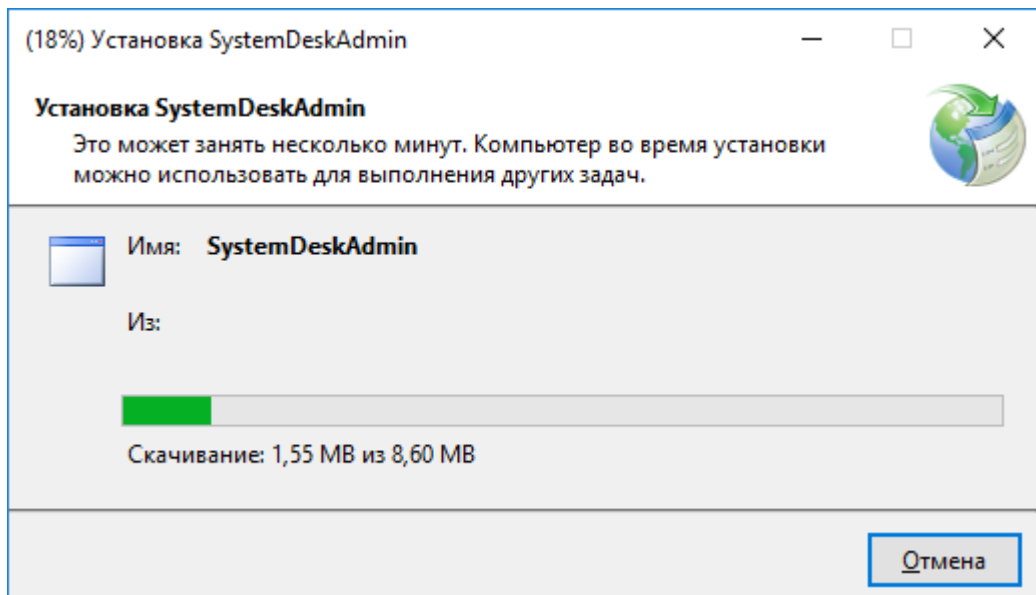


Figure 3.28 - SystemDesk installation process

The fourth section illustrates the implementation of a diploma design product that implements the developed information technology, a database for storing information about system objects and a user interface that allows the user to fully control the application by easily navigating between the main forms of the program. The program code of the implemented system interface is given in additional files of the diploma project on the disk.

4 OCCUPATIONAL HEALTH AND EMERGENCY SAFETY

4.1 Effects of electromagnetic radiation on the human body

A large body of literature exists on the response of tissues to electromagnetic fields, primarily in the extremely-low-frequency (ELF) and microwave-frequency ranges. In general, the reported effects of radiofrequency (RF) radiation on tissue and organ systems have been attributed to thermal interactions, although the existence of nonthermal effects at low field intensities is still a subject of active investigation. This chapter summarizes reported RF effects on major physiological systems and provides estimates of the threshold specific absorption rates (SARs) required to produce such effects. Organ and tissue responses to ELF fields and attempts to characterize field thresholds are also summarized. The relevance of these findings to the possible association of health effects with exposure to RF fields from GWEN antennas is assessed.

Nervous System

The effects of radiation on nervous tissues have been a subject of active investigation since changes in animal behavior and nerve electrical properties were first reported in the Soviet Union during the 1950s and 1960s.¹ RF radiation is reported to affect isolated nerve preparations, the central nervous system, brain chemistry and histology, and the blood-brain barrier.

In studies with in vitro nerve preparations, changes have been observed in the firing rates of *Aplysia* neurons and in the refractory period of isolated frog sciatic nerves exposed to 2.45-GHz microwaves at SAR values exceeding 5 W/kg.^{2,3,4} Those effects were very likely associated with heating of the nerve

preparations, in that much higher SAR values have not been found to produce

changes in the electrical properties of isolated nerves when the temperature was controlled.^{5, 6} Studies on isolated heart preparations have provided evidence of bradycardia as a result of exposure to RF radiation at nonthermal power densities,⁷ although some of the reported effects might have been artifacts caused by currents induced in the recording electrodes or by nonphysiological conditions in the bathing medium.^{8,9,10} Several groups of investigators have reported that nonthermal levels of RF fields can alter Ca²⁺ binding to the surfaces of nerve cells in isolated brain hemispheres and neuroblastoma cells cultured in vitro (reviewed by the World Health Organization¹¹ and in Chapters 3 and 7 of this report). That phenomenon, however, is observed only when the RF field is amplitude-modulated at extremely low frequencies, the maximum effect occurs at a modulation frequency of 16 Hz. A similar effect has recently been reported in isolated frog hearts.¹² The importance of changes in Ca²⁺ binding on the functional properties of nerve cells has not been established, and there is no clear evidence that the reported effect of low-intensity, amplitude-modulated RF fields poses a substantial health risk.

Results of in vivo studies of both pulsed and continuous-wave (CW) RF fields on brain electrical activity have indicated that transient effects can occur at SAR values exceeding 1 W/kg.^{13,14} Evidence has been presented that cholinergic activity of brain tissue is influenced by RF fields at SAR values as low as 0.45 W/kg.¹⁵ Exposure to nonthermal RF radiation has been reported to influence the electroencephalograms (EEGs) of cats when the field was amplitude-modulated at frequencies less than 25 Hz, which is the range of naturally occurring EEG frequencies.¹⁶ The rate of Ca²⁺ exchange from cat brain tissue in vivo was observed to change in response to similar irradiation conditions.¹⁷ Comparable effects on Ca²⁺ binding were not observed in rat cerebral tissue exposed to RF radiation,¹⁸ although the fields used were pulsed at EEG frequencies, rather than

amplitude-modulated. As noted above, the physiological significance of small shifts in Ca^{2+} binding at nerve cell surfaces is unclear.

A wide variety of changes in brain chemistry and structure have been reported after exposure of animals to high-intensity RF fields.¹⁹ The changes include decreased concentrations of epinephrine, norepinephrine, dopamine, and 5-hydroxytryptamine; changes in axonal structure; a decreased number of Purkinje cells; and structural alterations in the hypothalamic region. Those effects have generally been associated with RF intensities that produced substantial local heating in the brain.

Extensive studies have been carried out to detect possible effects of RF radiation on the integrity of the blood-brain barrier.^{20,21} Although several reports have suggested that nonthermal RF radiation can influence the permeability of the blood-brain barrier, most of the experimental findings indicate that such effects result from local heating in the head in response to SAR values in excess of 2 W/kg. Changes in cerebral blood flow rate, rather than direct changes in permeability to tracer molecules, might also be incorrectly interpreted as changes in the properties of the blood-brain barrier.

Effects of pulsed and sinusoidal ELF fields on the electrical activity of the nervous system have also been studied extensively.^{22,23} In general, only high-intensity sinusoidal electric fields or rapidly pulsed magnetic fields induce sufficient current density in tissue (around 0.1-1.0 A/m² or higher) to alter neuronal excitability and synaptic transmission or to produce neuromuscular stimulation. Somewhat lower thresholds have been observed for the induction of visual phosphenes (discussed in the next section) and for influencing the electrical activity of *Aplysia* pacemaker neurons when the frequency of the applied field matched the endogenous neuronal firing rate.²⁴ Those effects, however, have been observed only with ELF frequencies and would not be expected to occur at the higher frequencies associated with GWEN transmitters. Recent studies with human volunteers exposed to 60-Hz electric and magn.

Electromagnetic radiation can be classified into two types: ionizing radiation and non-ionizing radiation, based on the capability of a single photon with more than 10 eV energy to ionize oxygen or break chemical bonds. Ultraviolet and higher frequencies, such as X-rays or gamma rays are ionizing, and these pose their own special hazards: see radiation and radiation poisoning. By far the most common health hazard of radiation is sunburn, which causes over one million new skin cancers annually.

4.2 Types of hazards

Electrical hazards

Very strong radiation can induce current capable of delivering an electric shock to persons or animals.[citation needed] It can also overload and destroy electrical equipment. The induction of currents by oscillating magnetic fields is also the way in which solar storms disrupt the operation of electrical and electronic systems, causing damage to and even the explosion of power distribution transformers, blackouts (as occurred in 1989), and interference with electromagnetic signals (e.g. radio, TV, and telephone signals).

Fire hazards

Extremely high power electromagnetic radiation can cause electric currents strong enough to create sparks (electrical arcs) when an induced voltage exceeds the breakdown voltage of the surrounding medium (e.g. air at 3.0 MV/m). These sparks can then ignite flammable materials or gases, possibly leading to an explosion.

This can be a particular hazard in the vicinity of explosives or pyrotechnics, since an electrical overload might ignite them. This risk is commonly referred to as

Hazards of Electromagnetic Radiation to Ordnance (HERO) by the United States Navy (USN). United States Military Standard 464A (MIL-STD-464A) mandates assessment of HERO in a system, but USN document OD 30393 provides design principles and practices for controlling electromagnetic hazards to ordnance.

On the other hand, the risk related to fueling is known as Hazards of Electromagnetic Radiation to Fuel (HERF). NAVSEA OP 3565 Vol. 1 could be used to evaluate HERF, which states a maximum power density of 0.09 W/m^2 for frequencies under 225 MHz (i.e. 4.2 meters for a 40 W emitter)/

Biological hazards

The best understood biological effect of electromagnetic fields is to cause dielectric heating. For example, touching or standing around an antenna while a high-power transmitter is in operation can cause severe burns. These are exactly the kind of burns that would be caused inside a microwave oven.[citation needed]

This heating effect varies with the power and the frequency of the electromagnetic energy, as well as the distance to the source. A measure of the heating effect is the specific absorption rate or SAR, which has units of watts per kilogram (W/kg). The IEEE and many national governments have established safety limits for exposure to various frequencies of electromagnetic energy based on SAR, mainly based on ICNIRP Guidelines, which guard against thermal damage.

There are publications which support the existence of complex biological and neurological effects of weaker non-thermal electromagnetic fields, including weak ELF magnetic fields and modulated RF and microwave fields. Fundamental mechanisms of the interaction between biological material and electromagnetic fields at non-thermal levels are not fully understood.

Lighting.

Fluorescent lights.

Fluorescent light bulbs and tubes internally produce ultraviolet light. Normally this is converted to visible light by the phosphor film inside a protective coating. When the film is cracked by mishandling or faulty manufacturing then UV may escape at levels that could cause sunburn or even skin cancer.

LED lights.

High CRI LED lighting.

Blue light, emitting at wavelengths of 400–500 nanometers, suppresses the production of melatonin produced by the pineal gland. The effect is disruption of a human being's biological clock resulting in poor sleeping and rest periods.

EMR effects on the human body by frequency

Warning sign next to a transmitter with high field strengths

While the most acute exposures to harmful levels of electromagnetic radiation are immediately realized as burns, the health effects due to chronic or occupational exposure may not manifest effects for months or years.[citation needed]

Extremely-low frequency

High-power extremely-low-frequency RF with electric field levels in the low kV/m range are known to induce perceivable currents within the human body that create an annoying tingling sensation. These currents will typically flow to ground through a body contact surface such as the feet, or arc to ground where the body is well insulated.

Shortwave

Shortwave (1.6 to 30 MHz) diathermy heating of human tissue only heats tissues that are good electrical conductors, such as blood vessels and muscle. Adipose tissue (fat) receives little heating by induction fields because an electrical current is not actually going through the tissues.

4.3 Road Transport Safety

The basic strategy of a Safe System approach is to ensure that in the event of a crash, the impact energies remain below the threshold likely to produce either death or serious injury. This threshold will vary from crash scenario to crash scenario, depending upon the level of protection offered to the road users involved. For example, the chances of survival for an unprotected pedestrian hit by a vehicle diminish rapidly at speeds greater than 30 km/h, whereas for a properly restrained motor vehicle occupant the critical impact speed is 50 km/h (for side impact crashes) and 70 km/h (for head-on crashes).

As sustainable solutions for all classes of road have not been identified, particularly low-traffic rural and remote roads, a hierarchy of control should be applied, similar to classifications used to improve occupational safety and health. At the highest level is sustainable prevention of serious injury and death crashes, with sustainable requiring all key result areas to be considered. At the second level is real time risk reduction, which involves providing users at severe risk with a specific warning to enable them to take mitigating action. The third level is about reducing the crash risk which involves applying the road design standards and guidelines (such as from AASHTO), improving driver behavior and enforcement.

4.4 Conclusions

A serious workplace injury or death changes lives forever for families, friends, communities, and coworkers too. Human loss and suffering is

immeasurable. Occupational injuries and illnesses can provoke major crises for the families in which they occur. In addition to major financial burdens, they can impose substantial time demands on uninjured family members. Today, when many families are operating with very little free time, family resources may be stretched to the breaking point. Every person who leaves for work in the morning should expect to return home at night in good health. Can you imagine the knock on the door to tell you your loved one will never be returning home? Or the phone call to say he's in the hospital and may never walk again? Ensuring that husbands return to their wives, wives to their husbands, parents to their children, and friends to their friends that is the most important reason to create a safe and healthy work environment. But it isn't the only reason.

CONCLUSIONS

The purpose of the project is to develop information technology for query generation technical support in order to optimize the activities of the technical support department for improving the quality of its work and optimizing the cost of working time of employees.

Information technology of diploma design is to take into account the system information in the automated formation of the application for technical support, which will allow automate the stage of obtaining additional data in most cases, in on average speeding up the application process. To substantiate the relevance of IT development, the existing ones were analyzed analogues of systems / services according to four main criteria for HelpDesk services: cost, request reception, SLA policy and automation of requests.

To understand the need for process automation, the main ones were identified research methods: observation and comparison, the results of which showed that the load indicator of the manager and the processing time of applications is unsatisfactory, which means that the process needs automation. The analyzed literature led to the use of implementation methods, based on a stable understanding of the advantages and disadvantages of these methods. As a DBMS "MySQL" was chosen because it is characterized by high speed, stability and easy to use. The C # language was selected as the programming language that it is based on a rigorous component architecture and implements advanced code security mechanisms.

To justify the feasibility of creating a master's thesis was determined its value, which lies in the implementation of one of the possible solutions to the problem irrational spending of working time of specialists and satisfactory quality maintenance, which reduces the burden on the staff of the department technical support and reduce the processing time of requests to the technical department.

To determine the degree of transformation, addition, specification of scientific data was determined by the scientific novelty of the qualifying master's thesis, which is to develop information technology to take into account system information when automated application for technical support, which will optimize identify the cause of the problem in most cases and, as a result, reduce it time to process the application.

REFERENCES

- 1 The concept of scientific novelty. - Access mode:
<https://studfiles.net/preview/5331365/page:4/>
- 2 Helpdesk (Service Desk) systems. - Access mode:
<http://www.itsmonline.ru/helpdesk/>
- 3 Dione McBride. A Guide to Help Desk Technology, Tools & Techniques. - MI: Course Technology, 2000. - 358 p .
- 4 Donna Knapp. A Guide to Help Desk Concepts. - PA: Course Technology, 2003. - 351 p .
- 5 Comparison of HelpDesk systems. - Access mode:
<https://ergonotes.ru/sravneniy-sistem-helpdesk/>
- 6 Decision support system (DSS) "Choice". - Access mode:
<https://studfiles.net/preview/994349/page:6/>
- 7 Scientific research methods. - Access mode:
<http://idschool225.narod.ru/metod.htm>
- 8 General concepts of modeling.– Access mode: <https://studopedia.org/8-45254.html>
- 9 Queuing system.– Access mode: <https://lektsii.com/3-23174.html>
- 10 QMS with waiting (queue). - Access mode:
https://math.semestr.ru/cmo/cmo_length.php
- 11 Kornienko MM Informatics. Databases. Database management systems data./ MM Kornienko, ID Ivanov. - H .: Publishing House "Morning", 2009. - 48 p.
- 12 The company MySQL A.V. MySQL. Language guide: Per. from English - M: Williams Publishing House 2005. - 432 p .
- 13 Kay S. Horstmann. Java SE 8. Introductory course. - M .: "Williams", 2014. - 208 s .
- 14 Björn Strastrup. C ++ programming language. Special edition . - M .: Binom-Press, 2007. - 1104 p .

- 15 Albahari, J. C # 3.0. Directory: Per. From English / J. Albahari, B. Albahari . - 3rd type. - СПб .: БХВ-Петербург, 2009. - 944 с .: ил .
- 16 Westland, Jason. Project management life cycle: a complete step-by-step methodology for initiating, planning, executing and closing the project successfully / Jason Westland. - GL .: Bell & Bain, 2006. - 229 p .
- 17 Hunt A., Thomas A., Hargett M. Pragmatic Unit Testing in C # with NUnit. - 2 edition: Pragmatic Bookshelf, 2007 - 227 p .
- 18 Dunaev VV Databases. SQL language. - СПб .: БХВ-Петербург, 2006. - 288 с .: ил .
- 19 Orlov S.A. Software engineering. Textbook for universities. - St. Petersburg: Peter, 2016. - 640 p .
- 20 Repin VV, Eliferov VG Process approach to management .Modeling of business processes / Vladimir Repin, Vitaly Eliferov. - M. Mann, Ivanov and Ferber, 2013 - 544 p .
- 21 Vendrov AM CASE technologies. Modern methods and tools designing information systems / A.M. Buckets. - Moscow: Finance and Statistics, 1998. - 176 p .
- 22 Karpova TS Databases: models, development, implementation / TS Karpova. - СПб .: Питер, 2002. - 304с .: ил .
- 23 Nigel K., Ivien B., Glynn J., Watson K. C # and the .NET 4 platform for professionals .: Per. with English - М .: LLC "ID Williams », 2011. - 1440 p .: ill .
- 24 Khashchin SM Management of innovative projects: a textbook / Khashchin SM, Zozulya DM, Safonov AE - Rostov n / D: Publishing Center of DSTU, 2013 .- 226 p .
- 25 "Project management: practical aspects of strategy implementation regional development ", Rach VA, Rossoshanskaya OV, Medvedeva OM - KIS Publishing House, Conditions. printing. arch. 22.25 .
- 26 Mazur II, Shapiro VD, Olderogge NG M12 Project management: Учебное пособие / И.И. Mazur. - 2nd ed. - М .: Omega-L, 2004. - p. 664 .

27 Rogacheva EV Intellectualization of the knowledge base of Service Desk systems [Text] / EV Rogacheva, VV Lomakin // Young scientist. - 2012. - №2. - P. 63.

28 Kiryanov V. Integrated Service Desk interface based on technology Web-services // Byte, №6, 2007, pp. 72-76

29 Ivanov DB, Yurochkin AG Use of Service Desk systems to improve the quality of service support // Intellectualization of management in social and economic systems: Proceedings of Vseros. conf. Voronezh, 2008

30 High-level programming. Part 1. Visual environment Studio: methodical instructions to laboratory works / Sost. VI Kruchinin; Volgograd. state tech. un-t. - Volgograd, 2009. - 30 p .

31 High-level programming. Part 2. C # language: methodical instructions to laboratory works / Sost. VI Kruchinin; Volgograd . state tech. un-t. - Volgograd, 2009. - 31 p .

32 Pugachev S., Sheriev A., Kichinsky K. Development of applications for Windows in C #; BHV-Petersburg, 2013. - 416 p .

APPENDIX

Conference materials

**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ТЕРНОПІЛЬСЬКИЙ НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ
ІМЕНІ ІВАНА ПУЛЮЯ**

МАТЕРІАЛИ

ІХ НАУКОВО-ТЕХНІЧНОЇ КОНФЕРЕНЦІЇ

**«ІНФОРМАЦІЙНІ МОДЕЛІ,
СИСТЕМИ ТА ТЕХНОЛОГІЇ»**



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2021**

УДК 004:372.8

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МЕТОД ПОСЛІДОВНИХ ПОСТУПОК ДЛЯ ПОКРАЩЕННЯ РОБОТИ МЕРЕЖІ

UDC 004:372.8

M. Yanfai, U. Obinna, M. Niaradzai, R. Zoloty

CONSEQUENTIAL PROCEDURE FOR IMPROVING NETWORK OPERATION

Many decision-making tasks arising in the production, design of computer systems, economics and other areas of human activity can be reduced to building an appropriate mathematical model, calculating the objective function that evaluates the process of system operation, and finding its optimal (to determine can be considered the minimum) value.

As a rule, the constructed target functions are quite complex and can have a number of features, due to which their minimization is associated with significant computational difficulties. These features first of all include the property of multi-extremity.

Significant computational difficulties associated with minimization multi-extreme and other types of functions by standard methods, as well as the unconditional importance of these classes of problems for various practical applications (problems of optimal choice of technical, economic, environmental and other systems) makes very important the problem of creating an optimization method that can effectively solve these problems.

The most well-known methods for solving multicriteria optimization problems are:

- method of uniform optimization;
- the method of fair compromise;
- method of the main criterion;
- the method of successive actions;
- ideal point method;
- method of collapsing criteria.

Possible ways to solve the problems of multi-criteria optimization may be the use of different convolutions and methods of normalization. Also, one of the possible solutions to multicriteria optimization problems is to use evolutionary (genetic) algorithms.

Input testing from the literature was used when testing the subsystem. As a result, the structure of the studied network was optimized, which ensured its more efficient operation.

The structure of the subsystem for solving multicriteria optimization problems by the method of successive assignments has been developed, which includes the input data subsystem, the calculation subsystem, the data output subsystem and the interface.

A model for optimizing the structure of a computer network has been built, which may include such criteria as cost, reliability, bandwidth and failure rate with appropriate restrictions.

Література.

1. С.А.Исаев. Решение многокритериальных задач. Интернет-ресурс. <http://bspu.ab.ru/Docs/~saisa/ga/idea1.html>.
2. Розділ „Математика\Optimization Toolbox1. Интернет-ресурс. <http://www.matlab.ru/optimiz/index.asp>.
3. Е.В. Никольчев. Разработка многокритериальных систем управления динамическими объектами. Интернет-ресурс <http://do.sssu.ru/ito2001/mater/mgapi.html>.

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АСПЕКТИ ФОРМУВАННЯ ЗАПИТІВ ТЕХПІДТРИМКИ НА ПІДСТАВІ КОРИСТУВАЛЬНИЦЬКИХ ДАНИХ

UDC 004:372.8

M. Yanfai, U. Obinna, M. Niaradzai, R. Zoloty

ASPECTS OF FORMATION OF TECHNICAL SUPPORT REQUESTS ON THE BASIS OF USER DATA

Automation of technical support departments (OTPP) – a task on today it is known and widespread. We can talk about a huge number of successful implemented projects in different industries, in companies of different scales, with using various automation tools. When we talk about automation OTPP, we always mean the introduction of an automated tool from the group Help Desk software. In fact, the concept of HelpDesk has become an analogue the concept of OTPP, which suggests that currently most IT services in one way or another have revised their approach to the structure and processes of IT management. Support plays an important role in helping users. Modern, a comprehensive consulting service is a front office for the entire IT organization and can handle most user needs and requests without the help of professionals.

Customer support is the only point of contact with the IT organization that provides timely solution of their problems. In other words, if the customer service does not spend time for an endless search for professionals who can solve their problems. Often The help desk not only handles external requests from users, but these complaints were initiated within the IT organization, for example, incidents resolved automatically or manually by IT staff, identified or received service requests from other IT organizations of departments. The scientific problem is that Help Desk services are analogs software product of the master's thesis are only a way of transfer general information from the user about the application to the specialist. No software the analogue product does not have the functionality of transmitting system information that would provide the ability to identify the problem without the need for a specialist user's computer. The presence of such functionality would allow on average speed up the processing of applications and save time as specialist and user. The object of research is the process of user support. Subject research is the process of forming an application for technical support with taking into account the receipt of system and user data.

The relevance of this work is that the solution to the problem irrational spending of working time of specialists and satisfactory quality maintenance allows to reduce the load on the working staff of the department technical support, reduce waiting times, increase employee confidence in department.

To substantiate the relevance of IT development, the existing ones were analyzed analogues of systems / services according to four main criteria for HelpDesk services: cost, request reception, SLA policy and automation of requests. To understand the need for process automation, the main ones were identified research methods: observation and comparison, the results of which showed that the load indicator of the manager and the processing time of applications is unsatisfactory, which means that the process needs automation. The analyzed literature led to the use of implementation methods, based on a stable understanding of the advantages and disadvantages of these methods. As a DBMS "MySQL" was chosen because it is characterized by high speed, stability and easy to use. To justify the feasibility of creating a master's thesis was determined its value, which lies in the implementation of one of the possible solutions to the problem irrational spending of working time of specialists and satisfactory quality maintenance, which reduces the burden on the staff of the department technical support and reduce the processing time of requests to the technical department.

DUMP DATABASES

```

-- phpMyAdmin SQL Dump
-- version 4.8.3
-- https://www.phpmyadmin.net/
--
-- Host: 127.0.0.1:3306
-- Creation time: May 12 2019, 12:14
-- Server version: 5.6.41
-- PHP version: 5.5.38

SET SQL_MODE = "NO_AUTO_VALUE_ON_ZERO";
SET AUTOCOMMIT = 0;
START TRANSACTION;
SET time_zone = "+00:00";

/*!40101 SET @OLD_CHARACTER_SET_CLIENT=@@CHARACTER_SET_CLIENT */;
/*!40101 SET @OLD_CHARACTER_SET_RESULTS=@@CHARACTER_SET_RESULTS*/;
/*!40101 SET @OLD_COLLATION_CONNECTION=@@COLLATION_CONNECTION */;
/*!40101 SET NAMES utf8mb4 */;

--
-- Database: `systemdesktb`
--
-- -----
--
-- The structure of the table `author`
--
CREATE TABLE `author` (
  `author_id` int(11) NOT NULL,
  `computername` char(30) NOT NULL,
  `name` char(30) NOT NULL,
  `surname` char(30) NOT NULL,
  `thirdname` char(30) NOT NULL,

```

```

`organization` char(30) NOT NULL,
`department` char(30) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
--
-- Dump table data `author`
--
INSERT INTO `author` (`author_id`, `computername`, `name`, `surname`, `thirdname`,
`organization`, `department`) VALUES
(1, 'DESKTOP-FFPUPON', 'Bogdan', 'Babak', 'Aleksandrovich', 'Apptimized Operations',
'DevOps Engineers');
-----
--
--Table structure`issue`
--

-- CREATE TABLE `issue` (
`issue_id` int(11) NOT NULL,
`headline` char(30) NOT NULL,
`description` text NOT NULL,
`screenshot` mediumblob,
`creation_date` datetime NOT NULL,
`end_date` datetime NOT NULL,
`status` enum('Открыто','Закрыто') NOT NULL DEFAULT 'Открыто',
`author_id` int(11) NOT NULL,
`type_id` int(11) NOT NULL,
`cpu` char(10) NOT NULL,
`ram` char(10) NOT NULL,
`devmgmt` mediumblob NOT NULL,
`minidump` mediumblob NOT NULL,
`windowsupd` mediumblob NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
--
-- Dump table data `issue`
--
INSERT INTO `issue` (`issue_id`, `headline`, `description`, `screenshot`, `creation_date`,
`end_date`, `status`, `author_id`,
`type_id`, `cpu`, `ram`, `devmgmt`, `minidump`, `windowsupd`) VALUES

```


(2, 'Hang Ward', 'Hello. When working with the document, the word stopped working. He writes that he does not answer.

Please help, this is a very important and urgent document. ', BLOB ');

--

-- Table structure `processes`

--

```
CREATE TABLE `processes` (
  `process_id` int(11) NOT NULL,
  `issue_id` int(11) NOT NULL,
  `process_name` char(30) NOT NULL,
  `PID` char(5) NOT NULL,
  `status` char(15) NOT NULL,
  `username` char(30) NOT NULL,
  `memory` char(15) NOT NULL,
  `description` char(30) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
```

--

-- Dump table data `processes`

--

```
INSERT INTO `processes` (`process_id`, `issue_id`, `process_name`, `PID`, `status`,
`username`, `memory`, `description`)
```

VALUES

(1, 2, 'chrome', '6460', 'Responding', 'breekachu', '237 MB', 'Google Chrome'),

(2, 2, 'chrome', '9044', 'Responding', 'breekachu', '336 MB', 'Google Chrome'),

(3, 2, 'SearchUI', '7748', 'Responding', 'breekachu', '69 MB', 'Search and Cortana application'),

(4, 2, 'chrome', '6452', 'Responding', 'breekachu', '19 MB', 'Google Chrome'),

(5, 2, 'wmpnetwk', '8604', 'Responding', 'Unknown', '6 MB', ''),

(6, 2, 'ServiceHub.DataWarehouseHost', '7740', 'Responding', 'breekachu', '36 MB', 'ServiceHub.Host.CLR.x64'),

69(7, 2, 'explorer', '412', 'Responding', 'breekachu', '52 MB', 'Проводник'),

(8, 2, 'chrome', '6444', 'Responding', 'breekachu', '53 MB', 'Google Chrome'),

(9, 2, 'chrome', '6872', 'Responding', 'breekachu', '11 MB', 'Google Chrome'),

(10, 2, 'devenv', '4284', 'Responding', 'breekachu', '215 MB', 'Microsoft Visual Studio 2017'),
 (11, 2, 'chrome', '6436', 'Responding', 'breekachu', '177 MB', 'Google Chrome'),
 (12, 2, 'fontdrvhost', '10744', 'Responding', 'Unknown', '796 KB', ''),
 (13, 2, 'chrome', '5140', 'Responding', 'breekachu', '31 MB', 'Google Chrome'),
 (14, 2, 'chrome', '11172', 'Responding', 'breekachu', '300 MB', 'Google Chrome'),
 (15, 2, 'conhost', '11600', 'Responding', 'breekachu', '4 MB', ''),
 (16, 2, 'smss', '392', 'Responding', 'Unknown', '368 KB', ''),
 (17, 2, 'chrome', '2544', 'Responding', 'breekachu', '29 MB', 'Google Chrome'),
 (18, 2, 'ApplicationFrameHost', '10732', 'Responding', 'breekachu', '6 MB', ''),
 (19, 2, 'NvTelemetryContainer', '2972', 'Responding', 'Unknown', '4 MB', ''),
 (20, 2, 'svchost', '816', 'Responding', 'Unknown', '14 MB', ''),
 (21, 2, 'SearchFilterHost', '7280', 'Responding', 'Unknown', '1 MB', ''),
 (22, 2, 'chrome', '6412', 'Responding', 'breekachu', '83 MB', 'Google Chrome'),
 (23, 2, 'nvcontainer', '2100', 'Responding', 'Unknown', '7 MB', ''),
 (24, 2, 'svchost', '1236', 'Responding', 'Unknown', '20 MB', ''),
 (25, 2, 'atiesrxx', '1664', 'Responding', 'Unknown', '1 MB', ''),
 (26, 2, 'svchost', '2956', 'Responding', 'Unknown', '1 MB', ''),
 (27, 2, 'chrome', '7264', 'Responding', 'breekachu', '221 MB', 'Google Chrome'),
 (28, 2, 'VBCSCompiler', '7436', 'Responding', 'breekachu', '97 MB', ''),
 (29, 2, 'PerfWatson2', '4244', 'Responding', 'breekachu', '38 MB', 'PerfWatson2.exe'),
 (30, 2, 'sppsvc', '1656', 'Responding', 'Unknown', '5 MB', ''),
 (31, 2, 'WUDFHost', '1224', 'Responding', 'Unknown', '1 MB', ''),
 (32, 2, 'chrome', '11136', 'Responding', 'breekachu', '31 MB', 'Google Chrome'),
 (33, 2, 'chrome', '2512', 'Responding', 'breekachu', '84 MB', 'Google Chrome'),
 (34, 2, 'chrome', '5096', 'Responding', 'breekachu', '60 MB', 'Google Chrome'),
 (35, 2, 'svchost', '2940', 'Responding', 'Unknown', '98 MB', ''),
 (36, 2, 'svchost', '784', 'Responding', 'Unknown', '11 MB', ''),
 (37, 2, 'spoolsv', '2504', 'Responding', 'Unknown', '5 MB', ''),
 (38, 2, 'WmiPrvSE', '3364', 'Responding', 'Unknown', '4 MB', ''),
 (39, 2, 'ServiceHub.RoslynCodeAnalysisS', '8532', 'Responding', 'breekachu', '95 MB',
 'ServiceHub.Host.CLR.x86'),
 (40, 2, 'Open Server x64', '11548', 'Responding', 'breekachu', '10 MB', ''),
 (41, 2, 'chrome', '8960', 'Responding', 'breekachu', '36 MB', 'Google Chrome'),
 (42, 2, 'WmiApSrv', '2920', 'Responding', 'Unknown', '1 MB', ''),
 (43, 2, 'HelpPane', '11108', 'Responding', 'breekachu', '3 MB', 'Справка и поддержка
 Microsoft'),
 (44, 2, 'Discord', '5848', 'Responding', 'breekachu', '165 MB', 'Discord'),

(45, 2, 'chrome', '8948', 'Responding', 'breekachu', '52 MB', 'Google Chrome'),
(46, 2, 'amdow', '4552', 'Responding', 'breekachu', '2 MB', ''),
(47, 2, 'chrome', '1184', 'Responding', 'breekachu', '76 MB', 'Google Chrome'),
(48, 2, 'lsass', '752', 'Responding', 'Unknown', '6 MB', ''),
(49, 2, 'NVIDIA Web Helper', '8076', 'Responding', 'breekachu', '28 MB', 'NVIDIA Web Helper Service'),
(50, 2, 'LogWatNT', '6976', 'Responding', 'Unknown', '1016 KB', ''),
(51, 2, 'services', '744', 'Responding', 'Unknown', '3 MB', ''),
(52, 2, 'ServiceHub.Host.CLR.x86', '6344', 'Responding', 'breekachu', '52 MB', 'ServiceHub.Host.CLR.x86'),
(53, 2, 'chrome', '5476', 'Responding', 'breekachu', '347 MB', 'Google Chrome'),
(54, 2, 'ScriptedSandbox64', '14092', 'Responding', 'breekachu', '121 MB', 'ScriptedSandbox64.exe'),
(55, 2, 'Discord', '1040', 'Responding', 'breekachu', '24 MB', 'Discord'),
(56, 2, 'schtasks', '296', 'Responding', 'breekachu', '996 KB', ''),
(57, 2, 'Discord', '3312', 'Responding', 'breekachu', '7 MB', 'Discord'),
(58, 2, 'BPwin41', '7188', 'Responding', 'breekachu', '64 MB', 'BPwin Business Process Design'),
(59, 2, 'chrome', '7392', 'Responding', 'breekachu', '40 MB', 'Google Chrome'),
(60, 2, 'svchost', '2004', 'Responding', 'Unknown', '5 MB', ''),
(61, 2, 'chrome', '4588', 'Responding', 'breekachu', '66 MB', 'Google Chrome'),
(62, 2, 'sqlceip', '3292', 'Responding', 'Unknown', '29 MB', ''),
(63, 2, 'svchost', '2428', 'Responding', 'Unknown', '2 MB', ''),
(64, 2, 'conhost', '3780', 'Responding', 'breekachu', '4 MB', ''),
70(65, 2, 'chrome', '10184', 'Responding', 'breekachu', '173 MB', 'Google Chrome'),
(66, 2, 'conhost', '6304', 'Responding', 'breekachu', '4 MB', ''),
(67, 2, 'sihost', '3468', 'Responding', 'breekachu', '5 MB', ''),
(68, 2, 'httpd', '7164', 'Responding', 'breekachu', '22 MB', 'Apache HTTP Server'),
(69, 2, 'chrome', '9748', 'Responding', 'breekachu', '52 MB', 'Google Chrome'),
(70, 2, 'conhost', '6296', 'Responding', 'breekachu', '4 MB', ''),
(71, 2, 'NVDisplay.Container', '1544', 'Responding', 'Unknown', '8 MB', ''),
(72, 2, 'conhost', '9300', 'Responding', 'breekachu', '5 MB', ''),
(73, 2, 'chrome', '11020', 'Responding', 'breekachu', '23 MB', 'Google Chrome'),
(74, 2, 'svchost', '2828', 'Responding', 'Unknown', '5 MB', ''),
(75, 2, 'chrome', '7136', 'Responding', 'breekachu', '29 MB', 'Google Chrome'),
(76, 2, 'RuntimeBroker', '4116', 'Responding', 'breekachu', '13 MB', ''),
(77, 2, 'chrome', '3684', 'Responding', 'breekachu', '63 MB', 'Google Chrome'),
(78, 2, 'chrome', '10148', 'Responding', 'breekachu', '36 MB', 'Google Chrome'),

(79, 2, 'Locator', '2820', 'Responding', 'Unknown', '480 KB', ''),
(80, 2, 'wininit', '664', 'Responding', 'Unknown', '1012 KB', ''),
(81, 2, 'svchost', '1956', 'Responding', 'Unknown', '4 MB', ''),
(82, 2, 'dllhost', '3248', 'Responding', 'breekachu', '5 MB', 'COM Surrogate'),
(83, 2, 'dllhost', '4540', 'Responding', 'breekachu', '2 MB', 'COM Surrogate'),
(84, 2, 'ServiceHub.SettingsHost', '5832', 'Responding', 'breekachu', '50 MB',
'ServiceHub.Host.CLR.x86'),
(85, 2, 'chrome', '10136', 'Responding', 'breekachu', '30 MB', 'Google Chrome'),
(86, 2, 'ServiceHub.IdentityHost', '1368', 'Responding', 'breekachu', '22 MB',
'ServiceHub.Host.CLR.x86'),
(87, 2, 'chrome', '1072', 'Responding', 'breekachu', '153 MB', 'Google Chrome'),
(88, 2, 'NVDIspay.Container', '1932', 'Responding', 'Unknown', '4 MB', ''),
(89, 2, 'OriginWebHelperService', '2784', 'Responding', 'Unknown', '5 MB', ''),
(90, 2, 'svchost', '2352', 'Responding', 'Unknown', '2 MB', ''),
(91, 2, 'chrome', '10828', 'Responding', 'breekachu', '69 MB', 'Google Chrome'),
(92, 2, 'MsMpEng', '2776', 'Responding', 'Unknown', '193 MB', ''),
(93, 2, 'chrome', '9660', 'Responding', 'breekachu', '41 MB', 'Google Chrome'),
(94, 2, 'chrome', '10088', 'Responding', 'breekachu', '156 MB', 'Google Chrome'),
(95, 2, 'svchost', '2760', 'Responding', 'Unknown', '7 MB', ''),
(96, 2, 'SearchIndexer', '4912', 'Responding', 'Unknown', '44 MB', ''),
(97, 2, 'SystemDesk', '12668', 'Responding', 'breekachu', '165 MB', 'SystemDesk'),
(98, 2, 'NisSrv', '6196', 'Responding', 'Unknown', '8 MB', ''),
(99, 2, 'MSASCuiL', '5764', 'Responding', 'breekachu', '4 MB', 'Windows Defender
notification'),
(100, 2, 'PerfWatson2', '3608', 'Responding', 'breekachu', '34 MB', 'PerfWatson2.exe'),
(101, 2, 'AMDRSServ', '4468', 'Responding', 'breekachu', '115 MB', ''),
(102, 2, 'devenv', '4192', 'Responding', 'breekachu', '286 MB', 'Microsoft Visual Studio 2017'),
(103, 2, 'WmiPrvSE', '12164', 'Responding', 'Unknown', '2 MB', ''),
(104, 2, 'chrome', '4028', 'Responding', 'breekachu', '88 MB', 'Google Chrome'),
(105, 2, 'SystemSettings', '9124', 'Not responding', 'breekachu', '13 MB', 'Параметры'),
(106, 2, 'ShellExperienceHost', '12400', 'Not responding', 'breekachu', '22 MB', 'Windows Shell
Experience Host'),
(107, 2, 'taskhostw', '4976', 'Responding', 'breekachu', '3 MB', ''),
(108, 2, 'jucheck', '5836', 'Responding', 'breekachu', '3 MB', 'Java Update Checker'),
(109, 2, 'chrome', '1000', 'Responding', 'breekachu', '163 MB', 'Google Chrome'),
(110, 2, 'MSBuild', '9184', 'Responding', 'breekachu', '26 MB', 'MSBuild.exe'),

(111, 2, 'RadeonSettings', '7028', 'Responding', 'breekachu', '206 MB', 'Radeon Settings: Host Applicat'),

(112, 2, 'conhost', '13060', 'Responding', 'breekachu', '5 MB', ''),

(113, 2, 'ServiceHub.Host.Node.x86', '7456', 'Responding', 'breekachu', '24 MB', 'Node.js: Server-side JavaScript'),

(114, 2, 'chrome', '556', 'Responding', 'breekachu', '2 MB', 'Google Chrome'),

(115, 2, 'sqlwriter', '2948', 'Responding', 'Unknown', '1 MB', ''),

(116, 2, 'Memory Compression', '3136', 'Responding', 'Unknown', '2 MB', ''),

(117, 2, 'svchost', '980', 'Responding', 'Unknown', '5 MB', ''),

(118, 2, 'chrome', '6148', 'Responding', 'breekachu', '30 MB', 'Google Chrome'),

(119, 2, 'chrome', '7560', 'Responding', 'breekachu', '405 MB', 'Google Chrome'),

(120, 2, 'chrome', '5712', 'Responding', 'breekachu', '1 MB', 'Google Chrome'),

(121, 2, 'chrome', '3556', 'Responding', 'breekachu', '29 MB', 'Google Chrome'),

(122, 2, 'dwm', '536', 'Responding', 'Unknown', '77 MB', ''),

71(123, 2, 'svchost', '532', 'Responding', 'Unknown', '23 MB', ''),

(124, 2, 'POWERPNT', '10872', 'Responding', 'breekachu', '99 MB', 'Microsoft PowerPoint'),

(125, 2, 'atieclxx', '1820', 'Responding', 'Unknown', '2 MB', ''),

(126, 2, 'StandardCollector.Service', '11732', 'Responding', 'Unknown', '37 MB', ''),

(127, 2, 'svchost', '6128', 'Responding', 'breekachu', '6 MB', 'Хост-процесс для служб Windows'),

(128, 2, 'httpd', '6556', 'Responding', 'breekachu', '10 MB', 'Apache HTTP Server'),

(129, 2, 'ServiceHub.VSDetouredHost', '6980', 'Responding', 'breekachu', '97 MB', 'ServiceHub.Host.CLR.x86'),

(130, 2, 'chrome', '13444', 'Responding', 'breekachu', '13 MB', 'Google Chrome'),

(131, 2, 'Discord', '1804', 'Responding', 'breekachu', '64 MB', 'Discord'),

(132, 2, 'chrome', '6544', 'Responding', 'breekachu', '55 MB', 'Google Chrome'),

(133, 2, 'SppExtComObj', '7404', 'Responding', 'Unknown', '1 MB', ''),

(134, 2, 'jusched', '5248', 'Responding', 'breekachu', '1 MB', 'Java Update Scheduler'),

(135, 2, 'MpCmdRun', '6540', 'Responding', 'Unknown', '3 MB', ''),

(136, 2, 'svchost', '504', 'Responding', 'Unknown', '14 MB', ''),

(137, 2, 'ServiceHub.RoslynCodeAnalysisS', '12136', 'Responding', 'breekachu', '98 MB', 'ServiceHub.Host.CLR.x86'),

(138, 2, 'chrome', '10840', 'Responding', 'breekachu', '64 MB', 'Google Chrome'),

(139, 2, 'chrome', '5928', 'Responding', 'breekachu', '356 MB', 'Google Chrome'),

(140, 2, 'Discord', '6096', 'Responding', 'breekachu', '13 MB', 'Discord'),

(141, 2, 'conhost', '11696', 'Responding', 'breekachu', '5 MB', ''),

(142, 2, 'dasHost', '2208', 'Responding', 'Unknown', '4 MB', ''),

```
(143, 2, 'svchost', '908', 'Responding', 'Unknown', '7 MB', ''),
(144, 2, 'nvcontainer', '6076', 'Responding', 'breekachu', '24 MB', ''),
(145, 2, 'RtkNGUI64', '3916', 'Responding', 'breekachu', '4 MB', 'Диспетчер Realtek HD'),
(146, 2, 'SnippingTool', '11716', 'Responding', 'breekachu', '3 MB', ''),
(147, 2, 'nvcontainer', '6068', 'Responding', 'breekachu', '4 MB', ''),
(148, 2, 'conhost', '2188', 'Responding', 'breekachu', '4 MB', ''),
(149, 2, 'chrome', '10368', 'Responding', 'breekachu', '62 MB', 'Google Chrome'),
(150, 2, 'SearchProtocolHost', '2028', 'Responding', 'Unknown', '2 MB', ''),
(151, 2, 'WINWORD', '10364', 'Not responding', 'breekachu', '78 MB', 'Microsoft Word'),
(152, 2, 'csrss', '544', 'Responding', 'Unknown', '1 MB', ''),
(153, 2, 'mysqld', '11652', 'Responding', 'breekachu', '229 MB', ''),
(154, 2, 'chrome', '2600', 'Responding', 'breekachu', '87 MB', 'Google Chrome'),
(155, 2, 'winlogon', '872', 'Responding', 'Unknown', '2 MB', ''),
(156, 2, 'csrss', '680', 'Responding', 'Unknown', '9 MB', ''),
(157, 2, 'chrome', '8', 'Responding', 'breekachu', '92 MB', 'Google Chrome'),
(158, 2, 'System', '4', 'Responding', 'Unknown', '156 KB', ''),
(159, 2, 'svchost', '1328', 'Responding', 'Unknown', '11 MB', ''),
(160, 2, 'Discord', '3880', 'Responding', 'breekachu', '36 MB', 'Discord'),
(161, 2, 'Idle', '0', 'Responding', 'Unknown', '0 B', ''),
(501, 4, 'Idle', '0', 'Responding', 'Unknown', '0 B', '');
```

```
-----
--
--
-- Table structure `type`
--
CREATE TABLE `type` (
  `type_id` int(11) NOT NULL,
  `type_description` char(15) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8;
--
-- Dump table data `type`
--
INSERT INTO `type` (`type_id`, `type_description`) VALUES
(1, 'Ordinary '),
(2, 'Urgent');
--
-- Indexes of saved tables
--
```

```
--  
-- Table indexes`author`  
--  
ALTER TABLE `author`  
ADD PRIMARY KEY (`author_id`),  
ADD UNIQUE KEY `computername` (`computername`);  
--  
-- Table indexes`issue`  
--  
ALTER TABLE `issue`  
ADD PRIMARY KEY (`issue_id`),  
ADD KEY `author_id` (`author_id`),  
ADD KEY `type_id` (`type_id`);  
--  
-- Table indexes`processes`  
--  
ALTER TABLE `processes`  
ADD PRIMARY KEY (`process_id`),  
ADD KEY `issue_id` (`issue_id`);  
--  
-- Table indexes `type`  
--  
ALTER TABLE `type`  
ADD PRIMARY KEY (`type_id`);  
--  
-- AUTO_INCREMENT for saved tables  
--  
--  
-- AUTO_INCREMENT for tables `author`  
--  
ALTER TABLE `author`  
MODIFY `author_id` int(11) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=2;  
--  
-- AUTO_INCREMENT для таблицы `issue`  
--  
ALTER TABLE `issue`  
MODIFY `issue_id` int(11) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=3;
```

```

--
-- AUTO_INCREMENT for the table `processes`
--
ALTER TABLE `processes`
MODIFY `process_id` int(11) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=502;
--
-- AUTO_INCREMENT for the table `type`
--
ALTER TABLE `type`
MODIFY `type_id` int(11) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=3;

--
-- Restrictions on the foreign key of saved tables--
--

-- Table foreign key constraints `issue`
--
ALTER TABLE `issue`
ADD CONSTRAINT `c_type_id` FOREIGN KEY (`type_id`) REFERENCES `type`
(`type_id`) ON DELETE CASCADE ON UPDATE
CASCADE,
ADD CONSTRAINT `issue_ibfk_2` FOREIGN KEY (`type_id`) REFERENCES `type`
(`type_id`),
ADD CONSTRAINT `issue_ibfk_3` FOREIGN KEY (`author_id`) REFERENCES `author`
(`author_id`);

--
-- Table foreign key constraints `processes`
--
ALTER TABLE `processes`
ADD CONSTRAINT `processes_ibfk_1` FOREIGN KEY (`issue_id`) REFERENCES `issue`
(`issue_id`);
COMMIT;

/*!40101 SET CHARACTER_SET_CLIENT=@OLD_CHARACTER_SET_CLIENT */;
/*!40101 SET CHARACTER_SET_RESULTS=@OLD_CHARACTER_SET_RESULTS */;
/*!40101 SET COLLATION_CONNECTION=@OLD_COLLATION_CONNECTION */;

```


SOFTWARE CODE

SystemDesk

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Drawing.Imaging;
using System.IO;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using System.Diagnostics;
using System.Management;
using System.Dynamic;
using System.Management.Automation;
using System.Management.Automation.Runspaces;
using System.Runtime.InteropServices;
using MetroFramework;
using MetroFramework.Forms;
using MetroFramework.Drawing;
namespace SystemDesk
{
    public partial class MainForm : MetroForm
    {
        private static Image fullDesktop;
        private static Image partImage;
        private static Form backgroundForm;
        private static PictureBox pictureBox1;
```

```

private static Point mouseDownAt;
private static Point mouseIsAt;
private static bool isMouseDown = false;

private static Color backgroundColor = Color.DarkGray;
private static int backgroundAlpha = 150;
private static Color outlineColor = Color.Red;
private static int outlineWidth = 1;

 MySqlConnection conn;
string connStr = "server=localhost;database=systemdeskd;user=root;password=";

[DllImportAttribute("User32.dll")]
private static extern int FindWindow(String ClassName, String WindowName);

[DllImport("user32.dll")]
static extern bool SetForegroundWindow(IntPtr hWnd);

[DllImport("user32.dll")]
static extern bool GetWindowRect(IntPtr hWnd, out RECT lpRect);

[DllImport("user32.dll")]
private static extern bool PrintWindow(IntPtr hwnd, IntPtr hdcBlt, uint nFlags);

[DllImport("user32.dll")]
private static extern IntPtr GetForegroundWindow();

[StructLayout(LayoutKind.Sequential)]
public struct RECT
{
    public int Left; // x position of upper-left corner
    public int Top; // y position of upper-left corner
    public int Right; // x position of lower-right corner
    public int Bottom; // y position of lower-right corner
}

public MainForm()

```

```

{
InitializeComponent();
notifyIcon1.Visible = true;
WindowState = FormWindowState.Minimized;
this.notifyIcon1.MouseDoubleClick += new
MouseEventHandler(notifyIcon1_MouseDoubleClick);
comboBox1.SelectedIndex = 0;
string root = Environment.GetEnvironmentVariable("appdata") + @"\SystemDesk";
if (!Directory.Exists(root))
{
Directory.CreateDirectory(root);
}
try
{
conn = new MySqlConnection(connStr);
conn.Open();
}
catch (Exception ex)
{
MessageBox.Show(ex.Message);
}
}
private void notifyIcon1_MouseDoubleClick(object sender, MouseEventArgs e)
{
notifyIcon1.Visible = false;
this.ShowInTaskbar = true;
WindowState = FormWindowState.Normal;
}
private void button1_Click(object sender, EventArgs e)
{
fullDesktop = CaptureScreen;
Initialize();
backgroundForm.Show();
}
private static void Initialize()
{
backgroundForm = new Form();
}

```

```

backgroundForm.FormBorderStyle = FormBorderStyle.None;
backgroundForm.WindowState = FormWindowState.Maximized;
backgroundForm.Cursor = Cursors.Cross;

pictureBox1 = new PictureBox();
pictureBox1.Size = Screen.FromControl(backgroundForm).Bounds.Size;
pictureBox1.Location = new Point(0, 0);
pictureBox1.Image = fullDesktop;
pictureBox1.Paint += new PaintEventHandler(OnPaint);
pictureBox1.MouseDown += new MouseEventHandler(OnMouseDown);
pictureBox1.MouseMove += new MouseEventHandler(OnMouseMove);
pictureBox1.MouseUp += new MouseEventHandler(OnMouseUp);
backgroundForm.Controls.Add(pictureBox1);
}

private static void OnPaint(object sender, PaintEventArgs e)
{

    SolidBrush opaqueWhiteBrush = new SolidBrush(Color.FromArgb(backgroundAlpha,
backgroundColor.R, backgroundColor.G, backgroundColor.B));
    e.Graphics.FillRectangle(opaqueWhiteBrush, 0, 0, pictureBox1.Width, pictureBox1.Height);

    if (isMouseDown)

    {
        Rectangle pos = getMouseMoveRect;
        e.Graphics.DrawRectangle(new Pen(outlineColor, outlineWidth), new Rectangle(pos.X -
outlineWidth, pos.Y - outlineWidth, pos.Width + outlineWidth, pos.Height + outlineWidth));
        e.Graphics.DrawImage(partImage, pos.Location);
        string displayText = "W: " + pos.Width + " H: " + pos.Height;
        Font font = new Font("Arial", 10, FontStyle.Bold, GraphicsUnit.Pixel);
        e.Graphics.DrawString(displayText, font, Brushes.White, pos.X, pos.Y - font.Size - 6,
StringFormat.GenericDefault);
    }
}

private static void OnMouseDown(object sender, MouseEventArgs e)
{

```

```

if (e.Button == MouseButton.Right && !isMouseDown)
{
Application.Exit();
}
else if (e.Button == MouseButton.Left)
{
mouseDownAt = e.Location;
Cursor.Position = new Point(e.Location.X + 1, e.Location.Y + 1);
mouseIsAt = new Point(e.Location.X + 1, e.Location.Y + 1);
partImage = ((Bitmap)fullDesktop).Clone(getMouseMoveRect, fullDesktop.PixelFormat);
isMouseDown = true;
picbox1.Refresh();
}
}

private static void OnMouseMove(object sender, MouseEventArgs e)
{
if (isMouseDown)
{
mouseIsAt = e.Location;
Rectangle rect = getMouseMoveRect;
if (rect.Width != 0 && rect.Height != 0)
{
partImage = ((Bitmap)fullDesktop).Clone(rect, fullDesktop.PixelFormat);
picbox1.Refresh();
}
}
}

private static void OnMouseUp(object sender, MouseEventArgs e)
{
if (e.Button == MouseButton.Left)
{
bool hasMoved = false;
if (isMouseDown)
{
hasMoved = true;
isMouseDown = false;
}
}
}

```

```

/*SaveFileDialog sfd = new SaveFileDialog();
sfd.Filter = "PNG image (*.png)|*.png";
if (sfd.ShowDialog() == DialogResult.OK)
{
partIamge.Save(sfd.FileName, ImageFormat.Png);
}
else
{
hasMoved = false;
picbox1.Refresh();
}*/
if (hasMoved)
{
backgroundForm.Close();
}
}
}
private static Rectangle getMouseMoveRect
{
get
{
int x = 0;
int y = 0;
int width = 0;
int height = 0;
if (mouseIsAt.X > mouseDownAt.X)
{
x = mouseDownAt.X;
width = mouseIsAt.X - mouseDownAt.X;
}
else
{
x = mouseIsAt.X;
width = mouseDownAt.X - mouseIsAt.X;
}
if (mouseIsAt.Y > mouseDownAt.Y)
{

```

```

y = mouseDownAt.Y;
height = mouseIsAt.Y - mouseDownAt.Y;
}
else
{
y = mouseIsAt.Y;
height = mouseDownAt.Y - mouseIsAt.Y;
}
return new Rectangle(x, y, width, height);
}
}
private static Image CaptureScreen
{
get
{
Bitmap image = new Bitmap(Screen.PrimaryScreen.Bounds.Width,
Screen.PrimaryScreen.Bounds.Height);
using (Graphics g = Graphics.FromImage(image))
{
g.CopyFromScreen(Screen.PrimaryScreen.Bounds.X,
Screen.PrimaryScreen.Bounds.Y,
0, 0,
image.Size,
CopyPixelOperation.SourceCopy);
}
return image;
}
}
private void Form1_Activated(object sender, EventArgs e)
{
if (partImage != null)
{
pictureBox1.Image = partImage;
pictureBox1.SizeMode = PictureBoxSizeMode.StretchImage;
}
}
private void button2_Click(object sender, EventArgs e)

```

```

{
using (MySqlConnection con = new MySqlConnection(connStr))
{
try
{
DirectoryInfo dirInfo = new DirectoryInfo(Environment.GetEnvironmentVariable("appdata") +
@"\SystemDesk\");
foreach (FileInfo f in dirInfo.GetFiles())
{
f.Delete();
}
string minidumpname = "";
//get minidump file
if (IsDirectoryEmpty(Environment.GetEnvironmentVariable("windir") + @"\Minidump") ==
false)
{
var directory = new DirectoryInfo(Environment.GetEnvironmentVariable("windir") +
@"\Minidump");
var myFile = directory.GetFiles()
.OrderByDescending(f => f.LastWriteTime)
.First();
File.Copy(directory.ToString() + @"\" + myFile.ToString(),
Environment.GetEnvironmentVariable("appdata") +
@"\SystemDesk\" + Path.GetFileName(myFile.ToString()));
minidumpname = Path.GetFileName(myFile.ToString());
}
//get windows upfate log
RunspaceConfiguration psConfig = RunspaceConfiguration.Create();
var psRunspace = RunspaceFactory.CreateRunspace(psConfig);
psRunspace.Open();
using (Pipeline psPipeline = psRunspace.CreatePipeline())
{
Command command = new Command("Get-WindowsUpdateLog");
command.Parameters.Add("LogPath", Environment.GetEnvironmentVariable("appdata") +
@"\SystemDesk\WindowsUpdate.log");
psPipeline.Commands.Add(command);
var results = psPipeline.Invoke();
}
}
}
}
}

```



```

}
//get devmgmt.msc screenshot
ProcessStartInfo startInfo = new ProcessStartInfo();
startInfo.FileName = "mmc.exe";
startInfo.Arguments = "devmgmt.msc";
Process.Start(startInfo);
System.Threading.Thread.Sleep(3000);
System.Diagnostics.Process[] p = System.Diagnostics.Process.GetProcessesByName("mmc");
if (p.Length > 0)
{
SetForegroundWindow(p[0].MainWindowHandle);
}
var foregroundWindowsHandle = GetForegroundWindow();
var rect = new RECT();
GetWindowRect(foregroundWindowsHandle, out rect);
Rectangle bounds = new Rectangle(rect.Left, rect.Top, rect.Right - rect.Left, rect.Bottom -
rect.Top);
Bitmap bmp = new Bitmap(bounds.Width, bounds.Height);
using (Graphics g = Graphics.FromImage(bmp))
{
g.CopyFromScreen(new Point(bounds.Left, bounds.Top), Point.Empty, bounds.Size);
}
bmp.Save(Environment.GetEnvironmentVariable("appdata") + @"\SystemDesk\devmgmt.png",
ImageFormat.Png);
p[0].Kill();
//get cpu and ram usage
PerformanceCounter cpuCounter;
PerformanceCounter ramCounter;
cpuCounter = new PerformanceCounter("Processor", "% Processor Time", "_Total");
ramCounter = new PerformanceCounter("Memory", "Available MBytes");
string ram = ramCounter.NextValue() + "MB";
string cpu = cpuCounter.NextValue() + "%";
System.Threading.Thread.Sleep(1000);
cpu = cpuCounter.NextValue() + "%";
Image image = pictureBox1.Image;
MemoryStream memoryStream1 = new MemoryStream();
image.Save(memoryStream1, ImageFormat.Png);

```

```

byte[] imageBt = memoryStream1.ToArray();
Image devmgmt = Image.FromFile(Environment.GetEnvironmentVariable("appdata") +
@"\SystemDesk\devmgmt.png");
MemoryStream memoryStream2 = new MemoryStream();
devmgmt.Save(memoryStream2, ImageFormat.Png);
byte[] devmgmtBt = memoryStream2.ToArray();
FileStream fs = new FileStream(Environment.GetEnvironmentVariable("appdata") +
@"\SystemDesk\WindowsUpdate.log", FileMode.Open, FileAccess.Read);
long fileSize = fs.Length;
byte[] windowsupd = new byte[fileSize];
fs.Read(windowsupd, 0, Convert.ToInt32(fileSize));
fs.Close();
fs = new FileStream(Environment.GetEnvironmentVariable("appdata") + @"\SystemDesk\" +
minidumpname,
FileMode.Open, FileAccess.Read);
fileSize = fs.Length;
byte[] minidump = new byte[fileSize];
fs.Read(minidump, 0, Convert.ToInt32(fileSize));
fs.Close();
string computername = System.Environment.MachineName;
string headline = textBox1.Text;
string description = textBox2.Text;
DateTime creation_date = DateTime.Today;
int type_id = 0;
string author_id = "";
string issue_id = "";
if (comboBox1.SelectedIndex==0)
{
type_id = 1;
}
else
{
type_id = 2;
}
string sql = "SELECT author_id FROM author WHERE computername=" + computername +
""";
MySQLCommand oCmd = new MySQLCommand(sql, con);

```

```

con.Open();
using (MySqlDataReader oReader = oCmd.ExecuteReader())
{
while (oReader.Read())
{
author_id = oReader["author_id"].ToString();
}
con.Close();
}
sql = "INSERT INTO issue (issue_id, headline, description, screenshot, creation_date,
author_id, type_id, cpu, ram,
devmgmt, minidump, windowsupd)" + " VALUES (null, '" + headline + "', '" + description + "',
" + "@img" + "', " + "NOW()" + "',
" + author_id + "', " + type_id + "', " + cpu + "', " + ram + "', " + "@devmgmt" + "', " +
"@minidump" + "', " + "@windowsupd"
+ ")";
MySqlCommand cmd = new MySqlCommand(sql, con);
cmd.Parameters.AddWithValue("@img", imageBt);
cmd.Parameters.AddWithValue("@devmgmt", devmgmtBt);
cmd.Parameters.AddWithValue("@minidump", minidump);
cmd.Parameters.AddWithValue("@windowsupd", windowsupd);
con.Open();
cmd.ExecuteNonQuery();
con.Close();
Process[] processList = Process.GetProcesses();
ImageList Imagelist = new ImageList();
foreach (Process process in processList)
{
string status = (process.Responding == true ? "Responding" : "Not responding");
dynamic extraProcessInfo = GetProcessExtraInformation(process.Id);
string[] row = {
process.ProcessName,
process.Id.ToString(),
status,
extraProcessInfo.Username,
BytesToReadableValue(process.PrivateMemorySize64),
extraProcessInfo.Description

```

```

};
sql = "SELECT issue_id FROM issue WHERE description=" + description + """;
oCmd = new MySqlCommand(sql, con);
con.Open();
using (MySqlDataReader oReader = oCmd.ExecuteReader())
{
while (oReader.Read())
{
issue_id = oReader["issue_id"].ToString();
}
}
sql = "INSERT INTO processes (process_id, issue_id, process_name, PID, status, username,
memory,
description)" + " VALUES (null, " + issue_id + ", " + process.ProcessName + ", " +
process.Id.ToString() + ", " + status + ", " +
+ extraProcessInfo.Username + ", " + BytesToReadableValue(process.PrivateMemorySize64)
+ ", " +
extraProcessInfo.Description + ")";
cmd = new MySqlCommand(sql, con);
cmd.Parameters.AddWithValue("@img", imageBt);
cmd.ExecuteNonQuery();
con.Close();
}
MessageBox.Show("Заявка создана!");
}
catch (Exception ex)
{
MessageBox.Show(ex.Message);
}
}
}
public void renderProcessesOnListView()
{
Process[] processList = Process.GetProcesses();
ImageList Imagelist = new ImageList();
foreach (Process process in processList)
{

```

```

string status = (process.Responding == true ? "Responding" : "Not responding");
dynamic extraProcessInfo = GetProcessExtraInformation(process.Id);
string[] row = {
process.ProcessName,
process.Id.ToString(),
status,
extraProcessInfo.Username,
BytesToReadableValue(process.PrivateMemorySize64),
extraProcessInfo.Description
};
try
{
Imagelist.Images.Add(
process.Id.ToString(),
Icon.ExtractAssociatedIcon(process.MainModule.FileName).ToBitmap()
);
}
catch { }
ListViewItem item = new ListViewItem(row)
{
ImageIndex = Imagelist.Images.IndexOfKey(process.Id.ToString())
};
}
}
public string BytesToReadableValue(long number)
{
List<string> suffixes = new List<string> { " B", " KB", " MB", " GB", " TB", " PB" };
for (int i = 0; i < suffixes.Count; i++)
{
long temp = number / (int)Math.Pow(1024, i + 1);
if (temp == 0)
{
return (number / (int)Math.Pow(1024, i)) + suffixes[i];
}
}
return number.ToString();
}
}

```

```

public ExpandoObject GetProcessExtraInformation(int processId)
{
    string query = "Select * From Win32_Process Where ProcessID = " + processId;
    ManagementObjectSearcher searcher = new ManagementObjectSearcher(query);
    ManagementObjectCollection processList = searcher.Get();
    dynamic response = new ExpandoObject();
    response.Description = "";
    response.Username = "Unknown";
    foreach (ManagementObject obj in processList)
    {
        string[] argList = new string[] { string.Empty, string.Empty };
        int returnVal = Convert.ToInt32(obj.InvokeMethod("GetOwner", argList));
        if (returnVal == 0)
        {
            response.Username = argList[0];
        }
        if (obj["ExecutablePath"] != null)
        {
            try
            {
                FileVersionInfo info = FileVersionInfo.GetVersionInfo(obj["ExecutablePath"].ToString());
                response.Description = info.FileDescription;
            }
            catch { }
        }
    }
    return response;
}

private void настройкиToolStripMenuItem_Click(object sender, EventArgs e)
{
    SettingsForm settingsForm = new SettingsForm();
    settingsForm.Show();
}

private void oПрограммеToolStripMenuItem_Click(object sender, EventArgs e)
{
    AboutForm aboutForm = new AboutForm();
    aboutForm.Show();
}

```

```

}
public bool IsDirectoryEmpty(string path)
{
return !Directory.EnumerateFileSystemEntries(path).Any();
}
}
}
}

```

SystemDeskAdmin

```

using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.IO;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using MySql.Data.MySqlClient;
using System.Drawing.Imaging;
using MetroFramework;
using MetroFramework.Forms;
namespace SystemDeskAdmin
{
public partial class IssueForm : MetroForm
{
MySQLConnection conn;
string connStr = "server=localhost;database=systemdeskd;user=root;password=";
string issue_id = "";
string author_id = "";
Image devmgmt = null;
Image screenshot = null;
public IssueForm(string selectedissue)
{
InitializeComponent();
}
}
}

```

```

issue_id = selectedissue;
try
{
conn = new MySqlConnection(connStr);
}
catch (Exception ex)
{
MessageBox.Show(ex.Message);
}
}
private void IssueForm_Load(object sender, EventArgs e)
{
try
{
dateTimePicker1.Format = DateTimePickerFormat.Custom;
dateTimePicker1.CustomFormat = "dd.MM.yyyy HH:mm";
dateTimePicker2.Format = DateTimePickerFormat.Custom;
dateTimePicker2.CustomFormat = "dd.MM.yyyy HH:mm";
string sql = "SELECT * FROM issue WHERE issue_id=" + issue_id + "";
MySqlCommand oCmd = new MySqlCommand(sql, conn);
conn.Open();
using (MySqlDataReader oReader = oCmd.ExecuteReader())
{
while (oReader.Read())
{
textBox1.Text = oReader.GetString("headline");
textBox2.Text = oReader.GetString("description");
dateTimePicker1.Text = oReader.GetMySqlDateTime("creation_date").ToString();
if (oReader.GetMySqlDateTime("end_date").ToString() != "00.00.0000 0:00:00")
{
dateTimePicker2.Text = oReader.GetMySqlDateTime("end_date").ToString();
dateTimePicker2.Visible = true;
}
string type = oReader.GetString("type_id");
if (type == "1")
{
textBox3.Text = "Обычный";
}
}
}
}

```



```

}
else
{
textBox3.Text = "Срочный";
}
textBox5.Text = "Загруженность: " + oReader.GetString("cpu");
textBox6.Text = "Свободной памяти: " + oReader.GetString("ram");
author_id = oReader.GetString("author_id");
byte[] picbyte = oReader["screenshot"] as byte[] ?? null;
if (picbyte != null)
{
MemoryStream mstream = new MemoryStream(picbyte);
pictureBox1.Image = System.Drawing.Image.FromStream(mstream);
screenshot = System.Drawing.Image.FromStream(mstream);
pictureBox1.SizeMode = PictureBoxSizeMode.StretchImage;
}
picbyte = oReader["devmgmt"] as byte[] ?? null;
if (picbyte != null)
{
MemoryStream mstream = new MemoryStream(picbyte);
devmgmt = System.Drawing.Image.FromStream(mstream);
}
}
}
sql = "SELECT * FROM author WHERE author_id=" + author_id + "";
oCmd = new MySqlCommand(sql, conn);
using (MySqlDataReader oReader = oCmd.ExecuteReader())
{
while (oReader.Read())
{
string name = oReader.GetString("name");
string surname = oReader.GetString("surname");
string thirdname = oReader.GetString("thirdname");
textBox4.Text = surname + " " + name[0] + ". " + thirdname[0] + ".";
}
}
conn.Close();

```

```

    }
    catch (Exception ex)
    {
        MessageBox.Show(ex.Message);
    }
}

public bool ReadDBBlobToFile(MySqlDataReader parReader, string parFilePath, string
parColumnName)
{
    bool retResult = false;
    if (parReader == null)
    {
        throw new NullReferenceException("MySqlCommand is null");
    }
    int id = parReader.GetOrdinal(parColumnName);
    if (!parReader.IsDBNull(id))
    {
        string dir = Path.GetDirectoryName(parFilePath);
        if (string.IsNullOrEmpty(dir))
        {
            dir = Path.GetDirectoryName(Path.GetFullPath(parFilePath));
        }
        Directory.CreateDirectory(dir);
        using (FileStream fs = new FileStream(parFilePath, FileMode.OpenOrCreate,
FileAccess.ReadWrite))
        {
            using (BinaryWriter bw = new BinaryWriter(fs))
            {
                long currentIndex = 0;
                long len = 100;
                byte[] blob = new byte[len];
                long BytesReturned = parReader.GetBytes(id, currentIndex, blob, 0, (int)len);
                while (BytesReturned == len)
                {
                    bw.Write(blob);
                    bw.Flush();
                    currentIndex += len;
                }
            }
        }
    }
}

```

```
BytesReturned = parReader.GetBytes(id, CurrentIndex, blob, 0, (int)len);
}
if (BytesReturned > 0)
{
    bw.Write(blob, 0, (int)BytesReturned);
}
bw.Flush();
bw.Close();
}
fs.Close();
}
retResult = true;
}
else
{
    retResult = false;
}
return retResult;
}
private void button3_Click(object sender, EventArgs e)
{
    SaveFileDialog sfd = new SaveFileDialog();
    sfd.Filter = "PNG image (*.png)|*.png";
    if (sfd.ShowDialog() == DialogResult.OK)
    {
        devmgmt.Save(sfd.FileName, ImageFormat.Png);
    }
}
private void button4_Click(object sender, EventArgs e)
{
    string sql = "SELECT * FROM issue WHERE issue_id=" + issue_id + "";
    MySqlCommand oCmd = new MySqlCommand(sql, conn);
    conn.Open();
    using (MySqlDataReader oReader = oCmd.ExecuteReader())
    {
        while (oReader.Read())
        {
```

```

SaveFileDialog sfd = new SaveFileDialog();
sfd.Filter = "LOG file (*.log)|*.log";
if (sfd.ShowDialog() == DialogResult.OK)
{
string strFilename = sfd.FileName;
ReadDBBlobToFile(oReader, strFilename, "windowsupd");
}
}
}
conn.Close();
}
private void button2_Click(object sender, EventArgs e)
{
string sql = "SELECT * FROM issue WHERE issue_id=" + issue_id + "";
MySQLCommand oCmd = new MySQLCommand(sql, conn);
conn.Open();
using (MySQLDataReader oReader = oCmd.ExecuteReader())
{
while (oReader.Read())
{
SaveFileDialog sfd = new SaveFileDialog();
sfd.Filter = "DMP file (*.dmp)|*.dmp";
if (sfd.ShowDialog() == DialogResult.OK)
{
string strFilename = sfd.FileName;
ReadDBBlobToFile(oReader, strFilename, "minidump");
}
}
}
conn.Close();
}
private void button6_Click(object sender, EventArgs e)
{
SaveFileDialog sfd = new SaveFileDialog();
sfd.Filter = "PNG image (*.png)|*.png";
if (sfd.ShowDialog() == DialogResult.OK)
{

```

```
screenshot.Save(sfd.FileName, ImageFormat.Png);  
}  
}  
private void button1_Click(object sender, EventArgs e)  
{  
    AuthorForm authorForm = new AuthorForm(author_id);  
    authorForm.Show();  
}  
private void button7_Click(object sender, EventArgs e)  
{  
    TaskForm taskForm = new TaskForm(issue_id);  
    taskForm.Show();  
}  
}  
}
```