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Developing a program for prediction of internet using based on database

THESIS

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Abstract

Proposal provides information about the scientific work where will be analyzed and qualificated for system errors in Amdocs. This document will cover main information for the project realization like: the system of errors and their types, methods and detection-determination of system errors, structure and main processes in Amdocs, advantages and disadvantages of Amdocs. Task is clear: identify system errors then classify by types of errors where will include analyzes and solutions. The purpose is to evaluate the basis of a mathematical model and process automation. The last and main step of the task is about including attention to develop program qualification of errors: in the Amdocs system we had a lot of types of errors, thereby understand which type of a mathematical model and process automation will be used.

Аңдатпа

Усынылып жатқан Amdocs жүйесіндегі қателіктерге сараптама жасайтын және сарапталатын ғылыми жұмыс туралы ақпарат берілген. Бұл ғылыми іс-қағаз жобаны іске асыру үшін негізгі ақпаратты қамтиды: қателер жүйесі және олардың түрлері, жүйелік қателіктерді анықтау әдістері мен анықталуы, Амдокстын құрылымы мен негізгі процестері, сонымен қатар артықшылықтары мен кемшіліктері. Мақсат айқын көрінип тұр: жүйелік қателерді анықтау,одан кейін қателер түрлері бойынша жіктеу,сол кезде талдау мен шешімдер болады. Мақсаты - математикалық модель мен процесті автоматтандыру негіздерін бағалау. Тапсырманың соңғы және негізгі қадамдары қателіктердің бағдарламалық біліктілігін дамытуға көңіл бөлу болып отыр: Біздін Amdocs жүйесінде көптеген қателіктер болды, сол арқылы математикалық модель мен процесті автоматтандырудың қандай түрі қолданылатынын түсінуге болады.

Аннотация

В диссертации предоставлены информация о научной работе, которая будет проанализирована и квалифицирована на наличие системных ошибок в Amdocs. В этом документе будут освещены основные сведения для реализации проекта: система ошибок и их виды, методы и методы обнаружения-определения системных ошибок, структура и основные процессы в Amdocs, преимущества и недостатки Amdocs. Задача ясна: определить системные ошибки, затем классифицировать по типам ошибок, где будут содержаться анализы и решения. Цель - оценить основы математической модели и автоматизации процессов. Последний и главный шаг задачи - включить в нее внимание по развитию программной квалификации ошибок: в системе Amdocs было много типов ошибок, тем самым понятно, какой тип математической модели и автоматизации процессов будет использоваться.

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Contents

1. Introduction

1.1 Motivation

With the development of Internet technologies, each company got the opportunity to create its official representative office in the global network to solve various business problems.

For the implementation of most tasks, the creation of full-fledged web-application located on the server side, which in the course of their work access various server resources, including databases, is required.

The implementation of multifunctional web-applications requires a systematic approach, which provides for the determination of the necessary tools and technologies. When creating and choosing tools, as well as development technologies, the main criterion is the cost, speed and quality of development.

Therefore, an important task in the process of creating web-applications is to create a set of tools that accelerate the development process without compromising reliability and security.

Accelerating the process of developing web applications without compromising reliability and security is one of the key strategic tasks for any company in the field of web technologies.

The development of a set of language tools that act as a framework for creating applications provides centralized management, the implementation of a single development standard, and simplification of deployment, which significantly reduces the time spent on creating and maintaining a web application.

The problem of developing a universal description and analysis tool for further optimization of information systems has long been known.

It is very difficult to find an approach that would allow to describe and analyze information systems different in purpose and principle of work, because with the

growth of systems' complexity two main difficulties arise:

- Due to the scale, it is difficult to act with such systems (calculation of characteristics, design, management), to foresee the consequences of certain changes, to optimize the work of systems. Moreover, the quantitative growth of systems generates qualitative changes in their characteristics.

- Research and development of each complex system requires large expenditure of resources, involving large teams of developers.

1.2 Aims and Objectives

The purpose of the dissertation work is to develop and substantiate the method of analysis and optimization of corporate information systems using the tensor method of systems analysis, as well as to develop and use an automated means of analysis.

To analyze and optimize the business process, it is necessary to create a working group with the following minimum composition:

1. A business analyst (technologist) performing work in a business modeling system (for example, Business Studio or Microsoft Visio);

2. The owner of the business process (manager);

3. Expert, extensive experience in the business process;

4. Representatives of other divisions of the bank (for example, information technology department, service;

5. Personnel, product development department, etc.), depending on the chosen areas of optimization.

Methods of research. Theoretical and experimental researches based on the use of methods of system analysis, mass service theory, simulation modeling, theory of mathematical statistics, as well as applied programming were carried out to solve the set tasks and achieve the intended goal.

Scientific novelty:

1. The method on the basis of tensor method of analysis, allowing to carry out the analysis of complex information systems with a considerable quantity of components, is offered.

2. For the first time the possibility of application of the suggested method on the basis of the tensor method for the analysis of corporate information systems is shown.

3. For the first time the analysis of several corporate information systems with the application of the suggested method is carried out.

4. For the first time the method of optimization of the considered corporate information systems with the application of the suggested method is offered.

1.3 Existing literature

At present, a wide range of corporate information systems is being implemented and operated in all communications companies. In JSC Kazakhtelecom it is: Amdocs CRM, a system for managing relationships with clients.

The tasks of analyzing the work and optimizing the systems are topical, the successful solution of which increases the efficiency of using the systems when performing business processes and, ultimately, affects the business itself.

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The research and development of each complex system requires a lot of resources and a lot of development teams.

It became impossible to use the achieved results of analysis in new developments because the diversity of nature and types of complex systems made them

unique. Different research and calculation methods are being developed for each of them.

As the complexity grows, the role of the characteristics of information processes common for different systems grows, as they allow to obtain and use analogies between systems of different nature.

The main problem with the analysis of complex systems is the need to develop a single way of presenting and describing physical, technical, economic and other complex characteristics.

In the presented dissertation research for the description of corporate information systems, study of their characteristics and optimization it is proposed to use the tensor method of systems analysis, which allows presenting the system as a set of values convenient for analysis.

The author of the system analysis tensor method is an American scientist and engineer G.Kron. In his works he used tensor analysis and topology in the application to the theory of electrical networks.

Later G.Krohn published works devoted to the application of his proposed method to complex problems of various fields of science: molecular and quantum physics, mechanics of elastic systems and solid media, electrical engineering and electrodynamics, economics, etc.

G.Kron's tensor method was further developed in his works. Lebedyantsev [3], who found certain analogies in the theory of communication and the theory of electrical networks and used the tensor method to build a model of channels and networks of communication, determining the most important characteristics of these objects. M.N. Petrov [4] used the tensor method for the analysis of probability-time characteristics in communication networks. Later E.V. Verevkina, O.A. Koryakina, D.N. Levin, N.G. Trenogin applied these approaches to information networks, business processes, distributed information systems [5].

Close to the conducted researches were performed by D.Yu. Ponomarev [6]. Telecommunication and IP-networks were studied in his works with the help of tensor method. Modeling was carried out with the help of GPSS software package.

2. Chapter 2

2.1 Introductory section

In this chapter bases of construction and components of corporate information systems of the communication enterprise. as object of the subsequent researches are considered. It will be shown that corporate systems have complex structure of the interconnected elements, therefore for their studying specialised approaches are required.

The main methods of research of information systems parameters are numerical (measurement), analytical (description) and simulation modeling. Further, the use of these methods for the analysis of information systems is considered, as well as the concept of methods of system analysis of information systems is given.

2.2 Classification of existing corporate information systems

Corporate Information System (CIS) is an integrated system that automates business processes at all levels of the company, including business processes of management decision making. At the same time, the degree of business process automation is determined based on the maximum profit of the company.

The requirements for reliability of functioning and data safety are essential for corporate systems [7]. The Corporate Information System (CIS), as a rule, includes means for documentation support of management, information support of subject areas, communication software, means of organizing teamwork of employees and other auxiliary (technological) products. The integration of a large number of software products is a mandatory requirement for the CII.

The CIS s are divided into the following classes: ERP (Enterprise Resource

Planning System). Are intended for construction of a uniform information field of the enterprise (association of all departments and functions), effective management of all resources of the company connected with sales, manufacture, the account of orders [8].

CRM (Customer Relationship Management System). Customer Relationship Management Systems [9]. CRM-system helps to automate the work of the enterprise with clients, to create a client base and use it for efficiency. Success of the company depends on the ability to better understand customer needs and market trends, as well as to realize the opportunities that arise at different stages of interaction with clients.

Functions such as business process automation in relation to the client, control of all transactions (it is important to track the most important and complex transactions), continuous collection of information about clients and analysis of all stages of the implementation of transactions are the main functions of systems of this class.

WMS (Warehouse Management System). A control system that provides comprehensive automation of warehouse management processes. Necessary and effective tool of a modern warehouse. EAM (Enterprise Asset Management). System of enterprise fixed assets management. Represents the necessary tool in work of fund-intensive industries. Historically EAM-systems originated from CMMS-systems (repair management systems). Now EAM modules are also a part of large packages of ERP-systems (such as mySAP Business).

Suite, IFS Applications, Oracle E-Business Suite, etc.). HRM (Human Resource Management). Human Resource Management system is one of the most important components of modern management. The main purpose of such systems is to attract and retain valuable specialists for the enterprise. HRM systems solve two main tasks: streamlining all accounting and settlement processes related to personnel and reducing the percentage of staff leaving.

Functions of HRM-systems: personnel search, recruitment and selection, personnel evaluation, training and development, corporate culture management, staff motivation, work organization.

EDMS (Electronic Document Management System). It is a very important system at modern enterprises, as it allows to avoid using paper documents.

Information systems contain a certain set of resources, simultaneously pro-

vided to a large number of users.

The main resources are:

- Technical architecture or hardware (processors, memory of different types, channels, different network equipment, terminals, etc.);
- Software (application and system);
- Data.

There are special systems for analyzing the subject area, for analyzing the performance of hardware components, for designing data transmission networks. Such systems solve private tasks of designing or operation and are not suitable for the analysis of information systems as a whole.

At the same time insufficiently proved choice of architecture and a configuration of information systems can in the course of operation cause overloads of separate components, lead to inefficient use of resources, uncertain increase in cost or even to loss of working capacity of information systems.

2.3 Platform solutions for DBMS servers and application servers

Database and application servers are the core of any modern information system [10]. The main task of DBMS servers is ensuring the reliable storage of the information system data, while the task of application servers is ensuring the application work and user access to program and data interfaces.

Reliable storage includes supporting the user authentication procedures, backup copying means, transaction journaling technology (means of restoring the data to the state prior to a critical failure), cluster and parallel DBMS server organization technology. Providing the user access to the data means, first of all, supporting the SQL query language.

Besides, the DBMS servers support the server procedure components (stored procedures and database triggers), provide parallel processing of user queries and support data indexing for optimizing the data sampling speed. As is known, the SQL language consists of two parts. The first part is the DDL (Data Definition Language).

DDL language contains queries that modify the data dictionary, that is, the data structure (for example, the structure of tables or user credentials). Queries of this kind are necessary, but at designing of IC they can be not considered as at system work in industrial operation intensity of DDL queries is insignificant. The second part of SQL language is DML (Data Manipulation Language).

DML language contains operators, providing processing of the information stored in a database. Most often the following operators are used: Select (request for data selection from one or more tables), Insert (request for adding data to a table), Update (request for data modification), Delete (request for deleting records from tables).

The queries are transmitted through the corporate data transmission network channels from the client workstations to the DBMS and application servers, indicating the service intensity of these queries by the servicing devices (network components) or the cost of using the computer network.

Further the queries are processed by the DBMS server that selects or modifies the data. In doing so there is a concept of average query servicing time and service intensity.

In case of executing the data sampling commands the requested information is transmitted to the client workplaces; in case of executing the data modification commands the number of modified strings is transmitted. In this case the resource of a computer network is also used, but in another direction.

Intensity of service of inquiries by a corporate network is defined by use of this or that network technologies and protocols, restrictions of the equipment and restrictions of the environment of transfer.

In its turn, the DBMS server determines the user query service intensity by the following factors:

- Performance of hardware components of servers. Since the DBMS server is a software product working with on the basis of the computer, then the performance of the computer's computing complex has a decisive influence.

- Determining facts when assessing the performance of hardware components of the system are: the number of processors and their operating frequency, architecture and operating frequency of the system bus or switch, the performance (read / write speed) of disk drives and disk arrays.

- The performance of the operating system (OS). As a rule, DBMS servers work on computers controlled by any of the universal operating systems. In doing so the performance and program architecture of the operating system itself affect the user query processing intensity.

Nowadays operating systems of UNIX family of various manufacturers (Solaris, AIX, SCO UnixWare, HP-UP, Linux, BSD family, etc.) and OS of Microsoft company have the greatest distribution.

Though OS influences productivity of information system as a whole, authors of the majority of known analytical and imitation models of IC neglect this influence.

2.4 Distributed systems and databases

A distributed database is a group of databases located on several computers, which for user applications (application software) is one database. Each database is managed by its (local) DBMS server, at the same time they interact to ensure the integrity of the global distributed database [11].

In a "classic" distributed database all the objects (data) are represented in one copy (no copies). At the same time applications (i.e. programs and executable procedures) of a distributed database use distributed transactions to access both local and remote data, and modify the global database in real time.

In addition to the fact that the different nodes of the system may have different logically linked tables, each of the tables can be broken down into parts. In this case it is said that the database is fragmented.

A distinction is made between horizontal and vertical fragmentation. In case of horizontal fragmentation, different rows of the table appear on different nodes. In case of vertical fragmentation, different attributes of the same table may appear on different nodes. Fragmentation of tables is used because its application allows to place the data as close as possible to their potential users.

To improve the efficiency of the information system and to achieve better indicators of the average reaction time of the system, you can use replication (replication).

Replication is the process of copying changes in objects (tables, views, etc.) of a distributed database. Replication can significantly increase the efficiency of

data processing, as there is a possibility of alternative access to the data.

For example, an application can access a local database rather than a remote server, thereby reducing network load and speeding up data processing. On the other hand, an application can process data even in case the local database is unavailable, if other databases with copies (replicas) of required information are available.

The distributed DBMS systems classification can be performed in three directions: Autonomy shows the extent to which the DBMS servers included in a distributed system are connected with each other and are capable of processing the transactions without connection with other DBMS.

Distribution shows how many data copies exist in the system simultaneously. Heterogeneity shows how similar the used DBMS technologies, data normalization principles, query languages, transaction management protocols and network protocols are.

One of the most important problems when designing distributed information systems is the problem of optimal data distribution [12]. The criteria of optimal search can be providing minimum time of system's reaction and providing maximum reliability. The problem of placement can be supplemented by the problem of optimal fragmentation.

2.5 Building the IP of communication companies based on the NGOSS concept

NGOSS (New Generation Operations Support System), or Frameworx, is a TM Forum (TeleManagement Forum) concept for the telecommunications industry that describes an approach to the development, deployment and operation of application software for the communications industry.

The purpose of the concept is to define standards for operators' business processes, formats of provision of data used in management systems and interfaces with the environment, into which the solution is integrated [13].

The basis of the concept is formed:

- enhanced Telecom Operations business process map Map), which describes the structure of business processes of a telecommunications company;

- the Shared Information and Data model (SID), which is defines the approach to describing and using data, involved in the business processes of the communications company;
- TAM (Telecom Applications Map), which describes the typical structure of components of the enterprise information environment.connections;
- Technology Neutral Architecture and Contract Interface Definitions (CID), which define the principles of interaction and integration of applications, data and business processes in a distributed environment;
- a system of compliance control, which allows components to be tested for concept compliance.

The NGOSS concept, which includes eTOM, SID, TAM and TNA models, as well as the solution life cycle, represents a comprehensive methodology for the design, implementation, operation and development of communication enterprise systems.

With its help it is possible to integrate into a single architecture of business requirements and technical aspects of the communication enterprise, to automate business processes, to build a single information infrastructure focused on the performance of business tasks of the telecommunication company.

The use of NGOSS lifecycle tools and methodologies helps to achieve success in the effective management of a communications company.

However, the very possibility of using these tools largely depends on the company's readiness to perceive changes, readiness of the infrastructure to implement a common management information system, readiness of the personnel to implement, administer and use these tools in their activities. eTOM (Enhanced Telecom Operations Map) - Multi-level model of business processes - Enhanced Telecom Operations Map.

It is a base for analysis and design of business processes in the telecommunications industry and a reference point when designing and developing information systems. It is a reference model, or architecture of business processes, designed for communication service providers and their partners working in the telecommunications industry.

It is an integral part of the approach to development of operational support systems for NGOSS telecommunication corporations [14].

The eTOM is a structural model of business processes for telecommunication corporations - providers of communication services.

The purpose of eTOM is to create a common view of business processes typical for the entire industry and their subsequent standardization. The eTOM Business Process Map offers a structured set of business processes that determine the success of a telecom service provider.

In this case eTOM is a model for streamlining all business processes of the company, providing an opportunity to build a business process map and use it in the future at the required level of detail.

Thus, eTOM serves as a recommendation for process management, as a starting point for business process reengineering work. concluding agreements with suppliers and partners. The basis of the structural model is a hierarchical decomposition of processes, consisting of 4 levels.

Using eTOM gives:

- saving time and costs for developing the structure of business processes of the enterprise;
- solution of typical tasks of analysis and optimization of business processes;
- identification and elimination of duplicate processes with the same functionality;
- acceleration of new processes development;
- a basis for management of a set of IT-applications based on business needs;
- possibility of creation of accurate and qualitative models of streams of business processes;
- further application of knowledge in the field of business processes.

Application of technology eTOM at telecommunication enterprises allows to integrate among themselves many business processes of the companies connected with each other. The eTOM is used by Oracle, Amdocs, Agilent Technologies.

An example of eTOM implementation is the development of Vodafone global IT architecture, which was based on the eTOM structure adapted and reflecting

the specifics of the company. As the telecom industry develops in Russia, complex analysis and optimization of business processes of communication enterprises becomes more and more relevant.

2.6 Modern methods of system analysis of information systems

System analysis as a method.System analysis is a set of methods and means, allowing to investigate properties, structure and functions of objects, phenomena or processes as a whole, presenting them as systems with all complex interelement relationships [15.16].

The system analysis should be considered as activity on research of systems in some certain certain area, submitting to a number of principles:

- Identification of some object as a system: integrity of representation of the object, definition of purpose of the object, definition of integrative properties of the object, identification of structure and functions of the object.

- Formation of the system model.

- System model research to evaluate its properties and predict its behavior in the future.

Usually the system analysis is applied to the object selected by the analyst from the surrounding world as a system. Feature of application of methods of the system analysis to object "Information system" consists that the information system thus can act as really existing object or projected object.

In the first case methods and means of the system analysis are usually applied at the decision of problems of audit or optimisation of information systems. In the second case methods and means of the system analysis are applied as the basic principles of process of designing, defining its maintenance. It is necessary to consider information system as "system from the point of view of the system analysis".

Information system as a "system" in terms of system analysis. Integrity of IP representation the analysis of failures of projects of development and introduction of information systems shows that these failures are often connected with

absence of complete understanding of information systems and process of their development and introduction.

The engineers who are carrying out process of designing, can not represent information system as integral object. This situation is connected with the fact that in designing and introduction of IP specialists of different specialities are involved which even possessing high qualification in the field (software, information software, technical means and data transmission networks), pay insufficient attention to integral representation about IP that often leads to occurrence of the system errors which are shown only at a stage of pilot operation of IP.

A holistic view of IP can only be formed where salespeople, designers and developers work as one team and regularly exchange information on project progress. Such commands are formed only in those organisations in which processes of sales, designing and introduction of IP are operated by strict performance of orders and regulations.

Definition of purposefulness/appointment of designing of information system. Often, when analyzing the terms of reference, you can find statements that the purpose of creating an information system is to "create an information system".

As a rule, the concept of purpose is used to indicate the result of the system's development in a certain period of time, i.e., the definition of the purpose of IP is related to the purpose of IP.

At present, it is considered that the purpose of IP is to provide information and functional support to the activities for which IP is being developed. IP objectives capture quantitative and qualitative characteristics of IP that are oriented to the requirements of the supported activity. These requirements are fixed in the Terms of Reference (TOR) for IP development and implementation.

It should be noted that the TORs do not always clearly and unambiguously define the goals of IP development and implementation. They are often replaced by an indication of the purpose or are formulated in general terms.

In this case, the Executor, in order not to have any difficulties with the delivery of IP to the Customer, either independently decides on the meaning of IP parameters, or uses the ambiguity of the wording of the TOR for the development on the principle of "as will be".

Both in the first and in the second case, difficulties arising in the delivery of IP (under the TK), are the result of a system error made in determining the

appointment of IP.

Determination of integrative properties of the information system the integrative properties in the system analysis are understood as properties inherent in the system as a whole, but not inherent in its elements separately. Typically, the functional requirements contained in the TOR, determine the integrative properties of the information system.

Identification of the structure and functions of the information system.

A superficial understanding of the structure of an object reduces the concept of structure to a set of elements of the object and an indication of the links between them. Such understanding of the information system structure as a whole is correct, but does not exhaust the content of IP structure (within the framework of system analysis), knowledge of which is necessary for IP design.

The problem is to find a compromise between simplicity of description, which is one of the prerequisites for understanding, and the need to take into account the various characteristics of the system. To this end, the system analysis uses a conceptualization of the description of the structure of the system, which makes it possible to distinguish some levels of description (strata) [17].

A stratum is a certain abstract level of description that uses certain principles and concepts inherent in a given strategist. Usually strata are organized in a hierarchy.

The requirements for the system functioning on any strategist act as conditions or restrictions of the system functioning on the lower strata. The course of the real process is determined by the requirements to the system behavior on the upper strategist.

For proper functioning of the system on the given strategist, all lower strata should work correctly. This also defines the presence of the feedback between the lower strata and the higher strata. The stratified description of the system is set by the family of models, each of which describes the system behavior on a certain strategist.

The economic stratum includes a description of IP in terms of the role and impact of IP on the economic characteristics of the organization whose activities are to be maintained. The main indicators on this strategy are the Total Cost of Ownership (TCO) of IP (for the reporting period) and the overall functionality of the system.

Requirements from the economic stratum include general requirements for ensuring the functioning of IP within the business processes of the organization.

Requirements from the economic stratum are made in the form of requirements for IT services, which should support various functions of business processes.

Unfortunately, currently in the design practice in the TK the Customer often specifies requirements for the functioning of IP in too general a form. Moreover, it is not customary to specify in the TOR requirements for CERs, and in the Technical Project - the assessment of CERs, although with an increase in the degree of informatization of commercial and government structures there is an increase in customer interest in the total cost of ownership of both operating IPs and projected IP. The functional stratum includes a description of functional requirements for IP. The basic indicator on this strategist is a degree of coverage of set of processes of activity of the organization of the Customer by IT services and efficiency of processes of activity (in comparison with efficiency of these processes in the absence of IP support).

This page also includes a procedure for identifying functional IP subsystems. Requirements on the part of the functional page include substantive (with indication of values of indicators) requirements for IT services.

The information processing and management page includes the types of IP software accepted in design practice and their structure and characteristics: information software, linguistic software, software, organizational software, information security.

Requirements from the Information Processing and Management Country include requirements for IP hardware. The technical sheet includes technical software, data transmission facilities, and technical support facilities and organization.

The main indicators formed on this page are the indicators characterizing the quality of IP: system response time, volumes of stored information, system availability factor, fault tolerance.

As follows from the above, IP is a system from the point of view of system analysis. It is necessary to notice that for the systems concerning which the considerable experience of creation and operation is saved up, the system analysis seldom gives anything new, however performance of requirements of the system analysis in the course of designing guarantees from system errors which elimination

is expensive at a stage of industrial operation of system.

Danger of system errors consists that it is often found out that the system is not subject to correction and the only method of system modernisation is its complete redesign. Process of designing of IC (as well as other technical systems) can be considered in time as management "movement" of the project on some "trajectory".

In the foreign technical literature the term "road map" which describes such trajectory for IP designing and introduction is fashionable. IP design process is IP "object" management on this trajectory.

At the same time, IP as an object of management passes through the stages of "materialization" from the idea (at the stage of problem definition through design and implementation) to complete materialization at the stage of putting into industrial operation.

From the point of view of control theory, "controlled parameters" (parameters, which are changed for control purposes) and "observed parameters" (parameters, which are obtained as a result of control actions on the object) are always distinguished in the description of the object.

If some stratum or its component is not taken into account in the design process, its parameters implicitly move from the set of controllable parameters to the set of observable ones, the values of which can be evaluated only after IP creation. Thus, neglect of an economic stratum often leads to the creation of IP with an unacceptably high total cost of ownership for the Customer.

It should be noted that the use of methods of system analysis allowed to obtain significant quantitative results only in cases when the use of these methods is based on the choice of an appropriate mathematical model.

The latter statement does not mean that adequate mathematical IP models have been found at present. Quantitative results for IP have been obtained based on the application of queue theory (in the field of data model description), but it is difficult to imagine the possibility of writing a single mathematical IP model.

Models used for systems that are not described by mathematical models In accordance with the provisions of the system analysis, models are needed to describe the structure of the system, the mechanisms of functioning of the system, the behavior of the system (manifestation of functioning mechanisms in changing environment).

While developing such models, we had to agree with a number of limitations:

1. At present it is impossible to describe IP by a single mathematical model.

2. In contrast to mathematical models, IP modeling should use some elements of IP description in natural language. Such models are usually called semantic models due to the fact that the sense of model elements is determined by their names.

3. If modelling IC is possible, it is only by a set of connected models.

In connection with the resulted restrictions there was a necessity of the general definition of concept of model. Under model it is expedient to understand not empty set of some elements (base set of model) and the properties set on these elements (set of attributes) and the relations set on these objects (set of relations).

According to the set problem of modelling the environments of the modelling providing working out and support of the interconnected models (Integration Definition - IDEF, BPWIN, Oracle BPA, ARIS Sheer) have been developed.

As the basic form of representation of model the marked graphs (the graphs which elements are marked by their names) are accepted. In cases where it is necessary to represent only the structure of the object, it is not necessary to specify the attributes of elements.

And the elements of the basic set are not imposed any additional restrictions. In this case the model has a simple form. Depending on the content of the modeled area concrete names of elements and names of communications are used.

The meaning of elements, setting of their properties and fixation of relations between elements is determined by a concrete subject area and the purposes of modeling. Elements of base set are types and are set by unique names and instructions of semantics (meaning).

Also sets of instances of types (domains) are defined. Elements are represented by some graphic primitive things which form specifies an accessory to some class of types.

Links between elements are represented connecting elements by lines and also are set by the names fixing their roles and semantics (these names of connections can be not unique). All elements are represented by one graphic primitive.

If the structure is complex, then such a graph is explained by the table, in which the analyst makes all the necessary information.

Despite the simplicity, such models are useful in the process of IP design for discussion with the Customer of the project boundaries.

With the complication of the content of the subject of modeling it was necessary to reflect in the model a large number of elements, attributes of elements, relations of hierarchy and aggregation, to specify integrity limitations.

Therefore use of such simple models became inconvenient because of their invisibility, especially at modelling of structure of the information processed by IP. For example, it is known that trying to understand the structures of complex databases represented by a class system requires a lot of work.

Overcoming these difficulties led to the development of more complex types of information models: Entity-Relationship Model (ERM); relational model.

The modeling of the mechanism of functioning of the system required a deeper analysis of the concept of activity. Further we consider discrete systems, i.e. systems whose functioning can be represented by discrete processes. In general, the activity is divided into some areas of activity, characterized by performers, products/services and resources consumed.

Functioning of discrete systems is a set of interrelated processes. The basis of any process is the elements of activity carried out in a certain line of work. In this case, depending on the events occurring in the activity process, the process development may include branches controlled by operators OR or I.

The use of the given hierarchy of activity elements means consistent detailed elaboration of activity by levels. It is of interest to analyze the activity as a whole (without specifying the activity elements). For this purpose, the term "aggregate" is introduced, the basis of which can be any element of the activity.

Precondition of activity is a condition that initializes activity. Activity condition - fixation of activity end or some conditions, fulfillment of which determines branching of the process.

In addition to the activity element, the aggregate combines all the necessary components of the activity. The diagram of the unit shows the type of the unit.

Copies of the aggregate, which are linked together, form the process. The link between the postcondition and precondition shows the mechanism of functioning. The postcondition of the previous instance of the aggregate is the precondition of

the next instance of the aggregate.

The process is generated by recursive application of a rule. The model generated in this way is called the process model of activity. For business activity it is a business process model. The process is a stable purposeful set of interrelated activities (understood as aggregates), which by a certain technology converts inputs into outputs that are of value to the consumer.

2.7 Tensor analysis methods and their use to describe information systems

The process of describing heterogeneous systems with the help of universal notions of element and structure creates preconditions for the following generalization: a set of systems is, perhaps, a set of different manifestations of some generalized abstract system.

Consequently, the elements and structures of the systems under consideration are interconnected with each other in a certain way.

In this case, having on hands results of the analysis of one system, it is possible to apply them to other systems by means of some quantity of standard transformations as it is done in geometry at change of system of coordinates.

Then it makes sense to consider the generalised abstract complex system as the geometrical object placed in some multidimensional (in a general case - anisotropic) space, and all variety of existing systems - as projections of the given object in private systems of co-ordinates.

The theory of coordinate system transformations is considered within the framework of vector calculus. To describe complex systems, it is necessary to use a more general mathematical apparatus that allows to operate with generalized n-dimensional spaces and objects in them.

Such mathematical apparatus is tensor analysis, which generalizes vector calculus and matrix algebra in case of generalized abstract spaces.

Considering the generalized abstract system as a tensor, and set of complex systems subject to analysis as projections of this tensor, by means of property of linearity of tensor transformations it is possible, using results of research and calculation of one system, to receive results for other systems.

The author of the tensor method of systems analysis is an American scientist

and engineer G. Krohn. who used the tensor analysis in his application to the theory of electrical networks. G. Krohn concluded that the invariant of structure transformation is a linear form associated with each element of the network. For electrical circuits, the role of this form is played by the power dissipated on the circuit branches.

In an appendix to the theory of coupling, G. Krohn's tensor method was further developed in his works. Lebedyantsev, who found certain analogies in the theory of communication and the theory of electrical networks and used the tensor method to build a model of channels and networks of communication, determining the most important characteristics of these objects. M.N.Petrov used the tensor method for the analysis of probability-time characteristics in communication networks.

3. Chapter 3

3.1 Implementation and use of automation tools for parameter calculation and simulation modeling

The method of analysis of information systems based on the tensor method developed as part of the dissertation research allows to analyze complex systems with a large number of elements. However, manual processing of data and obtaining results is quite time-consuming and requires a lot of time.

At the same time, the tensor method of analysis is well subject to algorithmization, and if it is possible to automate the input of primary information about the system into a computer using one of the known programming languages, you can perform calculations and obtain the necessary results.

In this regard, the task was set to create a computer program that allows:

1. To make input of the information on model of investigated system.
2. To make loading of the information from known formats, in particular a format of program BPWin.
3. Perform automated calculation of system description parameters in terms of tensor analysis method.
4. Generate source information for simulation modeling.
5. To perform simulation modeling of the information system under study.

The use of existing universal packages for a given task is not justified, because they, as shown in Chapter 1, have a number of significant disadvantages.

In the course of the dissertation research, an automation tool, a program for calculating mass service network parameters based on tensor methods of systems analysis, was created. The program has a convenient user interface and implements the calculation functions of the developed method.

The simulation model and the program allowing to model process of passage of a stream of demands on devices of system (single-channel WMS with an unlimited turn, the law of distribution of times of service Poissonovsky), with possibility of branching, association of streams is created. The program provides an opportunity on the basis of of the simulation results to calculate the main characteristics of the SEM as well as to calculate some average SEM indicators.

With the help of the program a number of experiments for different systems have been carried out, the results of simulation modeling and calculation by analytical method have been obtained, on the basis of comparison of which the conclusions about possibility of application of the developed method for different variants of systems have been made.

The obtained results of modeling correspond to analytical models constructed with the use of tensor method of systems analysis. The results also correspond to those described in the sources [18].

The results of simulation modeling are the proof of reliability of analytical results obtained with the use of tensor method of systems analysis.

3.2 Description and optimization of information systems of communication enterprise using the tensor method

The tensor method of analysis and the approaches described in Chapter 2 were used to describe enterprise information systems. In this chapter various information systems of Amdocs providing communication services are reviewed.

The systems were described using the tensor method, their analysis was performed and optimization proposals were made.

The company's IT specialists developed and approved the eTOM business process map. Performance of the most important and time-consuming business processes is connected with various information systems implemented and oper-

ated in the company.

In terms of the proposed approach, information systems consist of the following types of objects:

- technical architecture (server equipment, data transmission networks);
- automated business processes of the company;
- integration architecture of information systems.

The tensor method of analysis is a powerful tool for studying the characteristics of information systems. Universality and commonality of the methods of use creates preconditions for wide application of the method in modern conditions.

The presented method of using the tensor method to describe and optimize complex processes and systems:

- internal integration of modern corporate enterprise management system;
- technical architecture of corporate management system by an enterprise;
- the business process of the organization;
- systems of support of operational and business activity of the company. allows to describe the system and processes taking place in it, and also to offer directions of optimization.

Use of means of automation (the developed program) allows to simplify considerably routine operations of calculation of parametres, considering that systems have very difficult structure with a considerable quantity of elements.

3.3 Formulating the task of program development

The method of analysis of information systems based on the tensor method developed as part of the dissertation research allows to analyze complex systems with a large number of elements. However, manual processing of data and obtaining results is quite time-consuming and requires a lot of time.

At the same time, the tensor method of analysis is well subject to algorithmization, and if it is possible to automate the input of primary information about

the system into a computer using one of the known programming languages, you can perform calculations and obtain the necessary results.

Based on the characteristics of different technologies, PL/SQL Developer - an integrated development environment for Oracle DBMS - was chosen to be more convenient, simple, efficient and free. Specific tasks include:

1. To enter information about the model of the system under study.
2. To load information from known formats, in particular the format of the program PL/SQL Developer.
3. Perform automated calculation of system description parameters in terms of tensor method of analysis.
4. To form the initial information to perform simulation modeling.
5. Perform simulation modeling of the information system under study.

3.4 Program interface and workflow process

According to the task in view, as part of the research was developed a computer program as a means of automating the description of systems using the tensor method.

The program is implemented in PL/SQL Developer development environment.In the process of the dissertation research, a means of automation - mass network parameter calculation program maintenance based on tensor methods of systems analysis. Program has a user-friendly interface and implements calculation functions of a developed method.

An imitation model and a program have been created, allowing for simulate the flow of requests through the devices of the system (single-channel WMS with unlimited queue, distribution law of the Poissonovsky service, with the possibility of branching, flow pools. The program provides an opportunity based on of the simulation results to calculate the main characteristics of the SEM as well as to calculate some average SEM indicators.

With the help of the program a number of experiments for different systems have been carried out, the results of simulation modeling and calculation by analytical method have been obtained, on the basis of comparison of which the

conclusions about possibility of application of the developed method for different variants of systems have been made.

The obtained results of modeling correspond to analytical models constructed with the use of tensor method of systems analysis. The results also correspond to those described in the sources. The results of simulation modeling are the proof of reliability of analytical results obtained with the use of tensor method of systems analysis.

4. Chapter 4

4.1 Technological solutions

In this chapter we will talk about technological solutions that we implemented at our system,method and the software created on its basis for the description of information systems using the tensor method allows to analyze complex systems with a large number of elements.

The received results of researches have practical value at construction, studying of characteristics and optimization of systems. The results obtained in the dissertation work and the developed program are used in the system.

4.2 Research method

The approach used in this study is to plan and create the following system or software according to user needs, this method is very suitable for use in the software development process to be built.

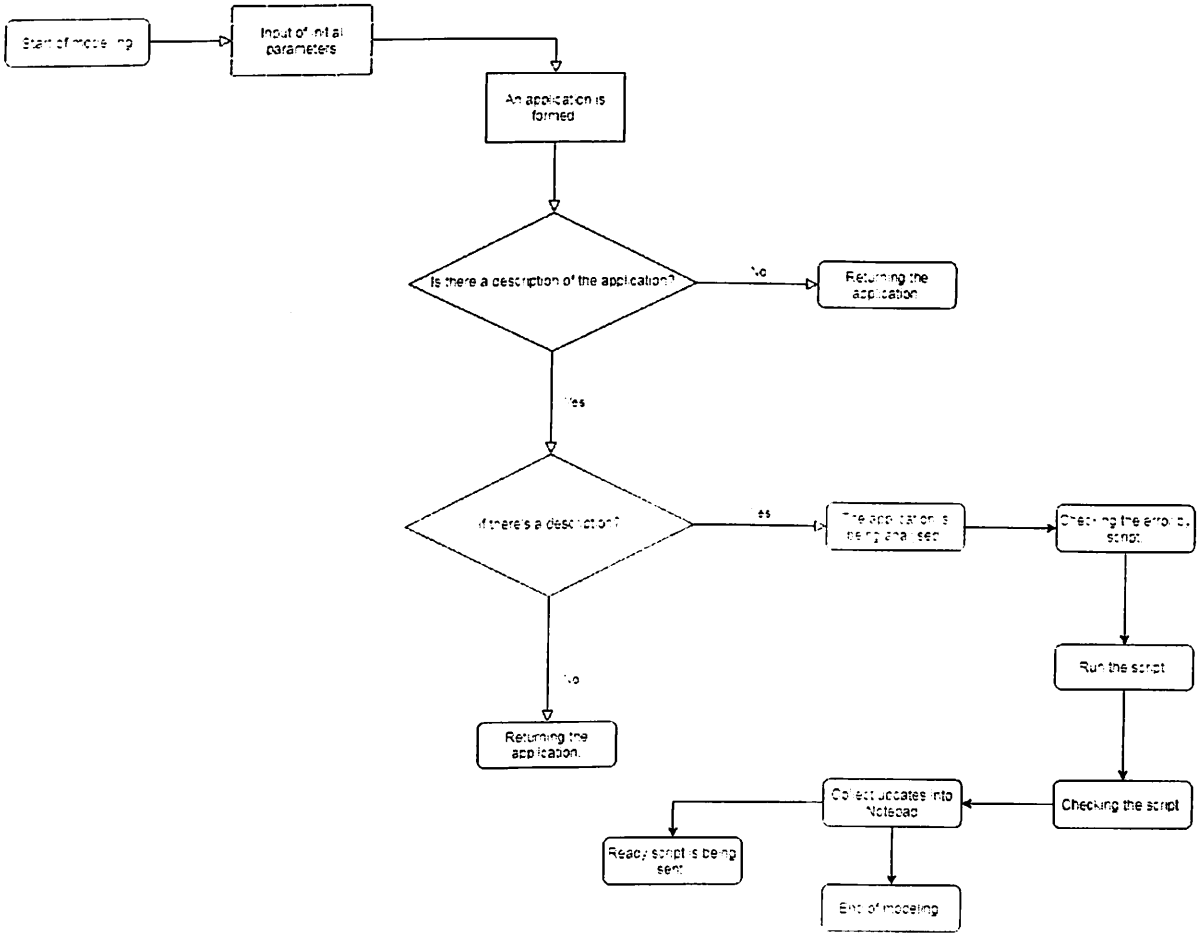
Waterfall models are more suitable for systems or software that is common. which means that the system can to identify all his needs from the start by general specifications.

Steps in the process model are the stages of new software development to be built. The details will be known from the process that the Developer should design or add to the drawing, or to delete data that the User does not need. Process is going to happen all the time to make the product fit with the wishes of the User.

This study uses the tensor method. This method provides systematic and consistent approaches to software development. The appearance of the tensor model is designed to help overcome the difficulties encountered in software development.

The step of model development is to determine the needs of the existing system

with the process of analysis and design, following the stages of research model development.



Picture 1. The block diagram of the simulation program is shown in the picture.

4.3 Modeling results:

In order to understand the accuracy and reliability of estimates, mathematical statistics use the concept of confidence interval. In our case, we are talking about the confidence interval when the accuracy of measurements is unknown.

At the same time, the value of the standard error is unknown in advance and instead of it the empirical standard - the standard deviation of values x1, x2, ..., xi , ..., xn (where n is the number of independent test results) from their average value x , is used that is a parameter estimation :

$$S = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

At the same time, the trust assessment will have the form:

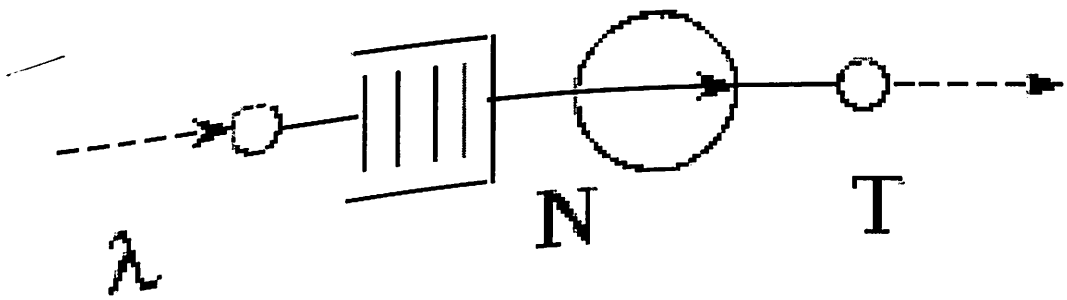
$$| a - \bar{x} | < t(\mathrm{P};k)\frac{s}{\sqrt{n}} \qquad (k = n-1)$$

where a is the true value of the measured value; P is the confidence probability; the multiplier t(P;k) depends on the number of measurements n and on the confidence probability P and is determined using the Student distribution, i.e., the probability distribution of the ratio (x-a)n/s.

The Student's distribution depends on the number of degrees of freedom k = n-1. The multiplier value t(P;k) for different levels of reliability and different degrees of freedom are given in the reference materials.

The system of service requests:

10 independent tests were conducted on 10,000 applications. The intensity of incoming applications and the intensity of service are subject to the Poisson Law of Distribution. Intensity of the incoming bid flow: 10 Erlang



Little's formula for the simplest element state - a bipolar single-phase network for the transmission of discrete messages:

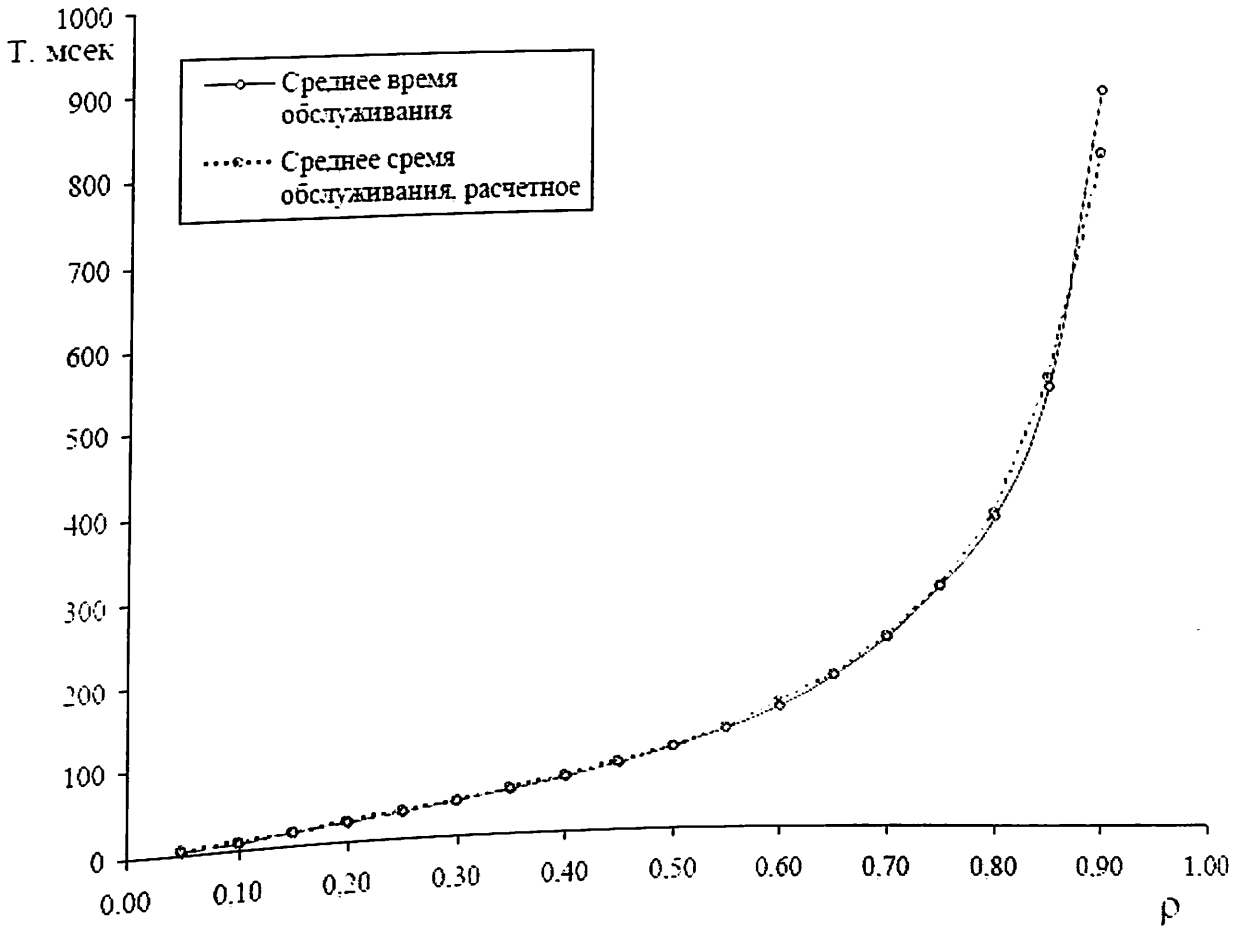
$$N = T \cdot \lambda$$

T - time of processing requests in the system (seconds); N - number of requests in the system (in queue and for service); A - intensity of requests (Erlang).

The results of the simulation and theoretical calculation (using the Little formula) of the maintenance time are shown in the table and as a graph in the figure. The calculated service time differs from of the simulation result by no more than the value of the confidence assessment, which confirms the correctness of the simulation model.

ρ	Среднее число заявок	Среднее время обслуживания, мс	Доверительная оценка	Среднее время обслуживания, расчетное
0.05	0.034	3,462	0.051	3,420
0.10	0.092	9,211	0.114	9,214
0.15	0.156	15,843	0.254	15,600
0.20	0.232	23,249	0.374	23,150
0.25	0.314	31,417	0.659	31,400
0.30	0.404	40,776	0.931	40,400
0.35	0.521	52,221	0.72	52,133
0.40	0.653	65,146	1.941	65,300
0.45	0.794	79,544	1.258	79,350
0.50	0.968	98,86	3.095	96,800
0.55	1.186	119,35	4.065	118,600
0.60	1.499	147,121	7.148	149,900
0.65	1.828	183,064	8.697	182,800
0.70	2.422	231,394	16.195	242,200
0.75	2.925	295,085	12.01	292,450
0.80	3.791	377,065	28.205	379,100
0.85	5.445	535,111	48.4	544,480
0.90	8.172	896,62	132.519	817,200

Picture 2. Emulation modeling results for the model.



Picture 3. System simulation results from one request.

In the process of the dissertation research, an automation tool was created - a program for calculating mass service network parameters based on tensor methods of systems analysis. The program has a convenient user interface and implements the calculation functions of the developed method.

4.4 Approach

According to the task in view, as part of the research was developed a computer program as a means of automating the description of systems using the tensor method.

The program is implemented in PL/SQL Developer development environment.

In the process of the dissertation research, a means of automation - mass network parameter calculation program maintenance based on tensor methods of

systems analysis.

Program has a user-friendly interface and implements calculation functions of a developed method.

4.5 Error system: Analysis and classification of system errors in Amdocs

- The system of errors and their types
- Methods and detection-determination of system errors
- Structure and main processes in Amdocs
- Advantages and disadvantages of Amdocs

The system of errors and their types:

- Error analysis
- Which Type is error
- Error information
- Choose solution for errors

Perform the analysis to get the information you need by looking at the results of the system requirements including the running system, Problems, Problem Links.

Advantages of Amdocs:

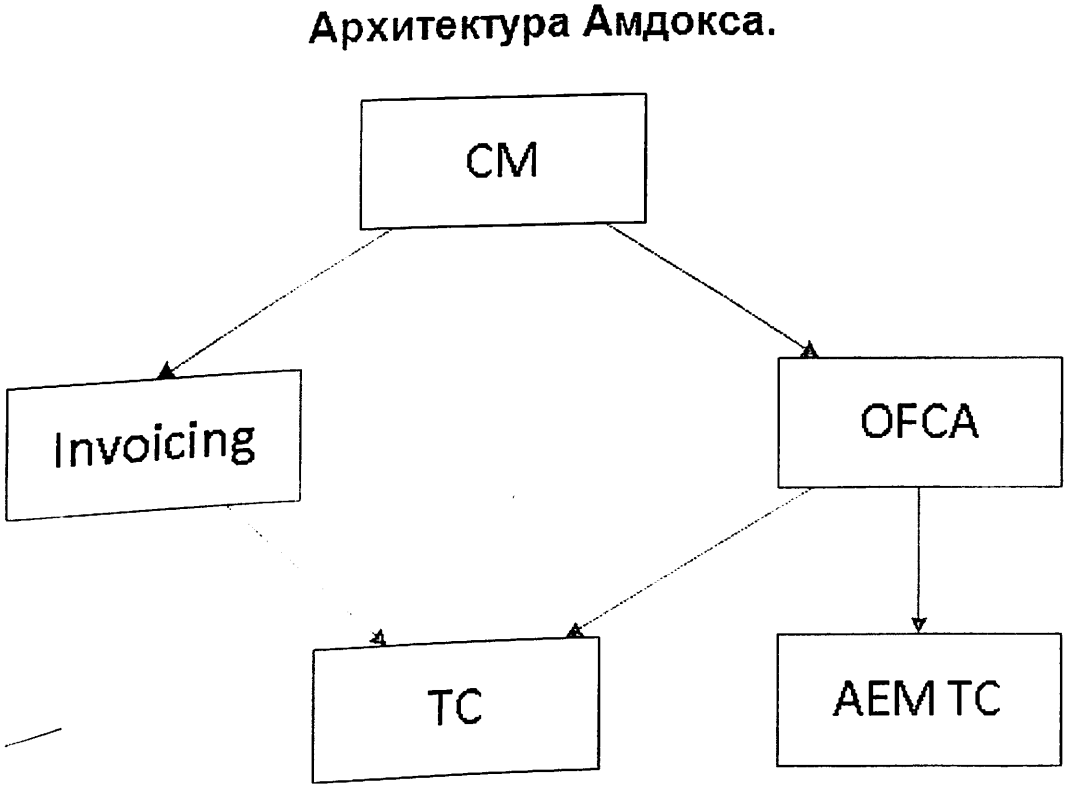
1. Generate receipts for services provided for subsequent payment
2. Create flexible settings for tariff plans and group services.
3. Keep a record of applications and work orders for technical units.
4. Choose solution for errors
5. Provide the user with the opportunity to pay for services using payment systems and bank cards.

Disadvantages of Amdocs:

1. Lack of an independent backup system.
2. Accounting of subscriber traffic by the billing system in the billing database.
3. Lack of testing of the system for errors.

4.6 Result and Discussion

Amdocs Digital Monetization is the leading solution for monetizing service provider offerings, ensuring their success in transforming to a digital telecom business.



Picture 2. Architecture of Amdocs.

Solutions for errors in the module Invoicing.Checks conducted in the Invoicing module are aimed at identifying incorrect cases of subscription fees, as well as their causes.

Inspections are carried out in four stages:

1. Collection of the number of charges;
2. Check for all charges for active services;

3. Check for the correctness of accrued accruals;

4. Check for compliance of accrued charges.

Creating scripts by errors:

There are cases when some charge gets into errors (rpr9-error-table)during transportation from the rpr9-usage-interf accetable of a branch to the tdr-branch table.It maybe because some value is incorrectly placed in the table.

To fix these errors, you need to generate scripts and send them to the branch offices. The branch office specialists will run the scripts and the errors will be corrected.

To generate scripts in PL/SQL Developer, run the following scripts:

1. Errors rpr9-error/Creation

2. Errors rpr9-error/ verification

- When running scripts from the "Create" folder, some error correction scripts will be generated.

- As a result of running scripts from the " Verification " folder, the generation results will be displayed.

- The obtained strings should be copied and pasted to files for each branch.

Proof: Example of line insertion (content of one of the files):

```
BEGIN
UPDATE DB.RPR9_USAGE_INTERFACE SET ABONENT_ID = '5-719' WHERE ID = 2834392240;
UPDATE DB.RPR9_USAGE_INTERFACE SET ABONENT_ID = '5-719' WHERE ID = 2834392243;
UPDATE DB.RPR9_USAGE_INTERFACE SET ABONENT_ID = '5-719' WHERE ID = 2834392246;
COMMIT;
-- AGREEMENT LEVEL
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TOWN_ID = 0 WHERE ID = 2832204092;
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TOWN_ID = 0 WHERE ID = 2834469265;
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TOWN_ID = 0 WHERE ID = 2834477045;
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TOWN_ID = 0 WHERE ID = 2834483693;
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TOWN_ID = 0 WHERE ID = 2834559448;
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TOWN_ID = 0 WHERE ID = 2834564660;
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TOWN_ID = 0 WHERE ID = 2834680001;
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TOWN_ID = 0 WHERE ID = 2834688840;
COMMIT;
END;
```

Picture 4. Find solutions for error.

Potential outcome of this dissertation wok is find identify system errors then classify by types of errors where will include analyzes and solutions So, in this work, implementation of create test case for each error then find solutions for error that give opportunities to develop a program.

5. Conclusion

The thesis is a scientific-qualification work, in which the author has set and solved an actual problem of development and justification of methods of description and analysis of information processes in corporate information systems using tensor method of analysis.

An automated analysis tool (program) is developed and used for practical purposes.

The decision of the given problem has the important theoretical and practical value for the analysis of corporate information systems for the purpose of optimization of process of their construction and operation.

The main results:

1. The method for investigation and calculation of information systems parameters based on tensor analysis methods is developed. Corporate information systems are considered as systems consisting of three types of objects:

- technical architecture (server equipment, networks);
- automated business processes of the company;
- external and internal integration architecture of systems.

2. The program performing calculations of indicators of models of information systems from the point of view of developed methodology is developed. The program provides information for subsequent simulation modeling and analysis of the possibility of optimization.

3. A system of simulation modeling is developed with the help of which the reliability of analytical results obtained using the tensor method of systems analysis is proved. The deviation of the results is within the confidence interval.

4. Several corporate information systems were investigated using the developed method based on the tensor method of analysis.

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A. Appendix A

A.1 Creating scripts by errors

There are cases when some charge gets into errors (rpr9 error table) during transportation from the rpr9 usage interface table of a branch to the tdr branch table. It may be because some value is incorrectly placed in the table.

To fix these errors, you need to generate scripts and send them to the branch offices. The branch office specialists will run the scripts and the errors will be corrected.

A.2 To generate scripts in PL/SQL Developer, run the following scripts:

1. Errors rpr9 error/Creation
2. Errors rpr9 error/verification

When running scripts from the "Create" folder, some error correction scripts will be generated. As a result of running scripts from the " Verification " folder, the generation results will be displayed. The obtained strings should be copied and pasted to files for each branch.

A.3 Proof

Example of line insertion (content of one of the files):

```
BEGIN
```

```
UPDATE DB.RPR9_USAGE_INTERFACE SET ABONENT_ID = '5-719' WHERE ID = 283

UPDATE DB.RPR9_USAGE_INTERFACE SET ABONENT_ID = '5-719' WHERE ID = 283

UPDATE DB.RPR9_USAGE_INTERFACE SET ABONENT_ID = '5-719' WHERE ID = 283


COMMIT;
-- AGREEMENT LEVEL
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TO
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TO
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TO
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TO
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TO
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TO
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TO
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TO
UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = 0, DEVICE_GROUP_ID = 0, TO
COMMIT;
END;
```

Next, you need text files with the results, merge them into archives, mark the archive with the branch number and send these scripts to the branches.

B. Appendix B

Run the script, after working on it we copy UPDATE to a file to send to the customer.

If after the customer's workout the error does not go away, we run the script again and look at the remaining field cases.

```
TOWN_ID (compare TOWN_ID_FILIAL and AMD_TOWN_ID),
DEVICE_GROUP_ID

DROP TABLE RPR_DKP_7_DEVICE PURGE;

CREATE TABLE RPR_DKP_7_DEVICE AS
SELECT E.ERROR, I.*
FROM DB.RPR9_ERROR@bittl07.reporter E,
DB.RPR9_USAGE_INTERFACE@bittl07.reporter I
WHERE 1=1
AND I.record_type NOT IN ('V', 'D', 'U')
AND E.RPR9_USAGE_INTERFACE_ID = I.ID
AND E.ERROR LIKE 'Ошибка определения device_id%';

SELECT 'UPDATE DB.RPR9_USAGE_INTERFACE SET DEVICE = '''|| A.DEVICE ||
S.Device as DEVICE_FILIAL,S.Town_Id as town_id_Filial,
'07'|| case when length (to_char(A.alien_town_id))=1 then '00'||to_cha
when length (to_char(A.alien_town_id))=2 then '0'||to_char(A.alien_tow
when length (to_char(A.alien_town_id))>2 then to_char(A.alien_town_id)
as AMD_TOWN_ID,s.id,S.ERROR,
S.System_Type_Id,S.*
FROM RPR_DKP_7_DEVICE S, AMD.SUBSCRIBER@BIMEG.AMDOCS A
WHERE 1=1
```

```
AND S.SUBSCRIBER_ID = A.ID
AND S.SUBSCRIBER_ID IN (
SELECT SUBSCRIBER_NO FROM prd1custc.SUBSCRIBER SS
WHERE 1=1);
```

If after the Device records have been uploaded, TOWN ID is changed, this situation usually appears after TOWN ID is changed.

1. for cases when TOWN ID (TOWN ID FILIAL) is full:

```
SELECT 'UPDATE DB.RPR9_USAGE_INTERFACE SET TOWN_ID = '''
||'07'|| case when length (to_char(A.alien_town_id))=1 then '00'||to_c
when length (to_char(A.alien_town_id))=2 then '0'||to_char(A.alien_tow
when length (to_char(A.alien_town_id))>2 then to_char(A.alien_town_id)
|| ''' WHERE ID = '|| S.ID || ';',S.SUBSCRIBER_ID,
S.Device as DEVICE_FILIAL,S.Town_Id as town_id_Filial,'07'||to_char(A.
S.System_Type_Id
FROM RPR_DKP_7_DEVICE S, AMD.SUBSCRIBER@BIMEG.AMDOCS A
WHERE 1=1
AND S.Device = A.DEVICE and A.END_DATE is null and A.cpl_source_id=7
AND S.SUBSCRIBER_ID IN (
SELECT SUBSCRIBER_NO FROM prd1custc.SUBSCRIBER SS
WHERE 1=1) and S.Town_Id<>0 ;
```

2. for cases when TOWN ID(TOWN ID FILIAL) = 0 or empty , parallel and UPDATE by DEVICE GROUP ID (script below)