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BALANCING THEORY
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PREREQUISITES FOR DEVELOPING A BUSINESS PROCESS AUTOMATION SYSTEM FOR AN IT ENTERPRISE

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Abstract.

The article examines the prerequisites for creating and implementing business process automation systems at information technology (IT) enterprises. The evolution of IT infrastructure management approaches from a resource-based model to a service-oriented concept (ITSM) based on the ITIL library of best practices is analyzed. The architectural features of building modern information systems, particularly the client-server architecture, as well as tools for modeling business processes and databases (ERwin, BPwin, PowerDesigner) are investigated. A comparative analysis of current ServiceDesk/HelpDesk software solutions available on the market (BPM'online service, ITSM 365, ServiceNow, ITSM InfraManager) is conducted, highlighting their advantages, disadvantages, and pricing characteristics. The necessity of developing affordable specialized automation systems for small IT businesses is substantiated.

Keywords: business process automation, IT enterprise, ITSM, ITIL, client-server architecture, ServiceDesk, small business.

1. Introduction

For a long time, the standard IT infrastructure model of enterprises was "resource-based," where a company owned its own hardware and software assets, as well as support staff, attempting to maximize their utilization efficiency. However, this approach was characterized by periodic redundancy or insufficiency of capacity, obsolescence of resources, a lack of flexibility, and non-transparent costs.

Today, a service-oriented approach is gaining rapid popularity — ITaaS (IT as a Service) or ITSM (IT Service Management), which focuses on client needs rather than the technologies themselves. Managing the internal operations of an IT enterprise within the framework of ITSM relies on a process-oriented approach. The methodological foundation for this is the ITIL library (v3, v4, ITIL 2019 Edition), which contains proven international practices for organizing IT processes. Implementing service and process approaches allows for the transformation of an IT enterprise's operations, ensuring that clients receive valuable results without facing additional risks and costs.

2. Research Aim and Objectives

The aim of the research is to analyze theoretical approaches, international standards, technical architectures, and current software solutions for automating IT infrastructure management processes in order to determine the prerequisites for developing an optimized system for IT enterprises.

To achieve this aim, the following objectives have been set:

- to review international standards and best practices in IT enterprise management.
- to investigate the features of a three-tier client-server architecture and the Android platform for mobile solutions.
- to analyze modern CASE tools used for designing information systems.
- to perform a comparative review and critical analysis of existing ServiceDesk automation systems available on the market.

3. Research Results and Discussion

For a long time, the standard IT infrastructure model could be described as "resource-based." With this approach, the company has its own assets in the form of equipment, software, and support staff, which it tries to use as efficiently as possible. This type of infrastructure is often characterized by redundancy or, conversely, insufficiency, and this state changes periodically. For example, a company receives a new server that has much greater capacity than employees are currently able to use. Over time, the information resources located on the server are updated, become more complex, and begin to use all available capacity. There is a need to update the resource base. The same situation occurs with software, which becomes obsolete over time, and with personnel who need to be trained to work with new "resources" [1-3].

One of the main tasks of business is to maximize profits and minimize costs. The standard, "resource-based" approach to organizing the IT infrastructure of an enterprise was not flexible enough and lacked cost transparency.

Recently, another approach to building an IT enterprise infrastructure – ITaaS (IT as a Service) – or ITSM (IT Service Management) – has been gaining increasing popularity. Management) – “IT service management”. In this operating model, the supplier provides IT services to the business. The consumers of such services are most often small or medium-sized businesses. ITSM, unlike the traditional approach, suggests paying more attention to the client and his needs, rather than to technologies.

Solutions created in accordance with the recommendations of ITIL v 3 and v4, including the latest update ITIL 2019 Edition - a collection of proven international practices for organizing IT processes, help to cope with all the difficulties in managing the information infrastructure of an IT enterprise and its personnel involved in the provision and support of services. The success of managing the infrastructure of an IT enterprise is largely determined by the experience of an internal unit or outsourcing company in this area.

The history of the service approach is taking It began in the 1980s in the UK. The quality of IT services provided to the British government was such that the Central Agency for Computing and Telecommunications (Central Computer and Telecommunications Agency – CCTA, currently called the Office of Government The then Office for Government Commerce (OGC) was tasked with developing guidelines for the efficient and cost-effective use of IT resources in UK ministries and other government agencies. The aim of the campaign was to develop a single, vendor-neutral approach. The result was the IT Infrastructure Best Practice Library. Library), which grew out of a collection of best practices that existed in the IT services industry at the time [4].

The ITIL library provides a detailed description of the most important activities in IT work, as well as a complete list of responsibilities, tasks, procedures and checklists of actions that can be adapted for any organization. Where possible, the activities are defined as processes that encompass IT service-oriented services. The broad subject area of the ITIL publications makes them useful to refer to regularly and use when setting goals for improving the IT organization.

Based on the ITIL library, some commercial companies have developed their own structured approaches to IT service management.

Among them is HP ITSM Reference Hewlett-Packard Company Model, IT Process

Model from IBM, MOF from Microsoft and many others. This was one of the reasons why the ITIL library has actually become the standard in describing the fundamental processes of IT Service Management (IT Service Management – ITSM). This adoption of ITIL directly reflects its philosophy and makes it an important area of knowledge, as it has served as an impetus for establishing uniformity in the IT industry, so necessary in today's distributed environment [5].

The service approach, unlike the resource approach, implies providing the Client (both internal and external) not with the resources and components themselves, but with the results of their use that are valuable to the Client.

A process approach is used to manage the internal activities of an IT enterprise in designing, creating, providing, and supporting IT services within the ITSM concept.

Both approaches – process and service – are key within the ITSM concept.

The ITIL glossary defines a service as a way of delivering value to customers by helping them achieve the end results that customers want without incurring specific costs and risks [5]. For example:

- the supplier of the goods may not be interested in how the customer uses the purchased goods and whether he gets the desired result;

- the service provider is always interested in the customer obtaining the desired result, and assisting him in this is the main task of the provider.

The generally accepted standards for building a successful IT enterprise infrastructure are:

- ITIL (IT Infrastructure Library) Library) – a library of best practices in IT service management;

- CobiT (Control Objectives for Information and Related Technologies) – a set of approaches to managing an IT enterprise;

- ISO 20000 is an international standard for auditing and certification of IT organizations.

CobiT is a set of core best practices in IT governance, auditing, and IT security, created by ISACA, the international professional association for information technology management and governance. CobiT provides an implemented set of information technology governance tools and organizes them around a logical structure of IT-related processes and mechanisms.

Management Objectives – provides a complete set of high-level requirements that must be considered by management to effectively manage each IT process.

Guiding principles – help assign responsibility, agree on goals, measure performance, and illustrate the relationship with other processes.

Maturity models – assess the maturity and capabilities of each process and help eliminate gaps in their organization.

ITIL – is a set of detailed practices for IT Service Management (ITSM – IT Service Management), which focuses on aligning IT services with business needs. In its current form (known as ITIL 2011), ITIL is published as a series of five core volumes, each covering a different phase of the ITSM lifecycle. Although ITIL supports ISO/IEC 20000 (formerly BS 15000), the international service management standard for IT service management, there are some differences between ISO 20000 and the ITIL framework.

ITIL describes processes, procedures, tasks and checklists that are not specific to an organization, but can be used by an organization to establish integration with the organization's strategy for delivering value and maintaining a minimum level of competence.

This allows an organization to establish a baseline against which to plan, implement, and measure practices. ITIL is used to demonstrate compliance and measure improvement.

The international standard ISO 20000 is based on ITIL materials. Unlike ITIL, the standard does not contain best practices, but requirements (norms) and a set of practical recommendations for implementing the requirements.

The ISO 20000 standard allows you to formally confirm the completeness and effectiveness of the implemented IT enterprise management system and obtain a certificate of conformity.

Based on the ISO 20000 standard, a qualification scheme for IT specialists and managers has been developed, and certification is being conducted [2].

The standards and practices discussed above have proven themselves over the years as a set of requirements and advice for organizing the infrastructure of an IT enterprise, which allows you to increase efficiency, create strong connections between business and IT, and reach a new level of service quality. While CobiT and ISO 20000 are designed for medium and large businesses, ITIL provides successful practices and advice that can be used even by small businesses.

Depending on the specific area of application, information systems can vary greatly in their functions, architecture, and implementation. However, at least two properties can be identified that are common to all information systems. First, any information system is designed to collect, store, and process information. Therefore, the basis of any information system is the environment for storing and accessing data. The environment must provide a level of storage reliability and access efficiency that is appropriate for the area of application of the information system.

Secondly, information systems are oriented towards end users who may be very far from the world of computers. For them, a terminal, personal computer or workstation is just a tool for their own professional activities. Therefore, an information system should have a simple, convenient, easy-to-learn interface that should provide the end user with all the functions necessary for his work, but at the same time not allow him to perform any unnecessary actions. Sometimes this interface can be graphical with menus, buttons, prompts, etc. In any case, the presence of developed interface tools is mandatory for any modern information system.

The E/AS system is a client-server application consisting of server software (hereinafter referred to as the server) and client software (hereinafter referred to as the client).

The set of server and client is called a domain. The client and server, in fact, are equal components (services) of work with system objects. They use a separate library that is connected for the operation of the server and client software. System objects are created on the basis of previously described classes and stored in the object database (OBD). Methods of objects can be described in any language that can be translated into bytecode, in which these methods are stored and used in the OBD.

The interaction between the server and clients is carried out using a specific protocol on top of the TCP/IP protocol. This protocol is used to obtain objects, call methods of objects on the server, or download bytecode of methods. Fig. 1 shows the client/server domain.

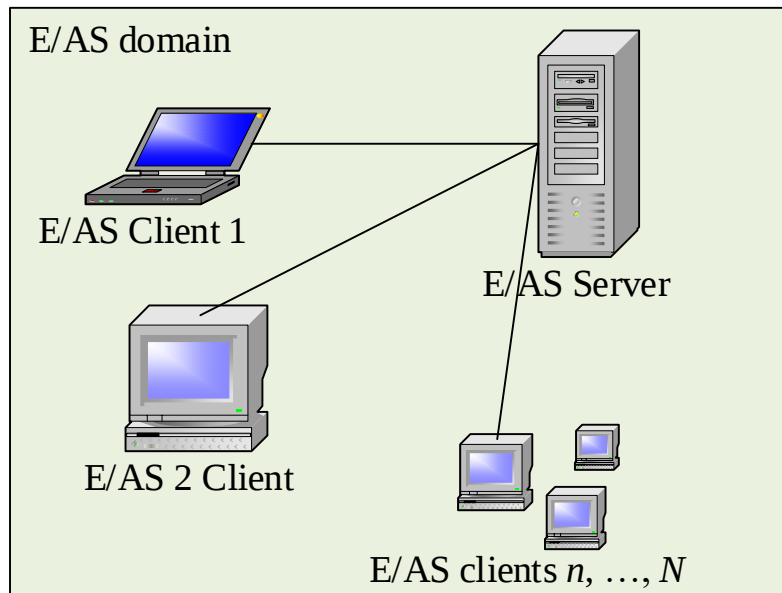


Figure 1 – E/AS client / server domain

Principles of client-server operation:

- after authentication, the client receives the form of his workspace. This is a form that contains all the necessary tools for the user to work in accordance with his access rights and privileges;
- when an employee requests a specific form, it is requested on the server. After receiving the form (and the necessary methods to work with it locally), it is addressed through the form driver;
- the operator works with data in the form and the events of working with the form are processed through the byte machine through local or server methods of working with the form and the object;
- in addition to the specified work with the form, the operator can obtain a printed form of the required document or report (by calling a specific method for generating printed forms). This document can be printed or exported to another program.

Client/server architecture involves the distribution of tasks and computational load across multiple computers connected to a network. The software of the information system implemented in this architecture is logically divided into server software, middle-level software, and client workstation software (clients). In this case, the client software is responsible for presentation functions and interaction with the user, the middle-level software is responsible for executing logical rules and processing information sent to or from the client, the server provides safe and reliable data storage and data retrieval on request.

If each level is represented by a separate software module, then we are dealing with a logical three-tier client/server architecture. Modules can be installed on three or more separate machines, or on two, depending on the circumstances.

Implementation of information systems in client/server architecture provides:

- reliability of information storage – you can no longer worry that hardware failures or erroneous actions of personnel will lead to data loss;

- information integrity – built-in mechanisms reduce the risk of collisions when entering and editing data;
- regulated access to information – each user can work only with the data to which he has been granted access, and only in the mode that corresponds to the rights granted to him;
- the ability to securely connect to global networks;
- multi-user mode of working with information, including remote users;
- high performance and reduced network load due to the distribution of processes between servers and workstations;
- minimizing network traffic;
- scalability – system performance increases in proportion to the number of processors and server RAM;
- optimization of the distribution of the computational load between the server and the client.

Trends in the development of modern information technologies lead to a constant increase in the complexity of information systems created in various sectors of the economy. Modern large IS projects are characterized, as a rule, by the following features:

- 1) complexity of the description (a fairly large number of functions, processes, data elements and complex relationships between them), which requires careful modeling and analysis of data and processes;
- 2) the presence of a set of closely interacting components (subsystems) that have their own local tasks and functional objectives (for example, traditional applications related to transaction processing and solving routine tasks, and analytical processing (decision support) applications that use unregulated queries to large amounts of data);
- 3) lack of direct analogues, which limits the possibility of using any typical design solutions and application systems;
- 4) the need to integrate existing and developing applications;
- 5) functioning in a heterogeneous environment on multiple hardware platforms;
- 6) disunity and heterogeneity of individual groups of developers in terms of their level of qualification and established traditions, the use of certain tools;
- 7) significant project duration, due, on the one hand, to the limited capabilities of the development team, and, on the other hand, to the scale of the customer organization and the varying degrees of readiness of its individual divisions for the implementation of IS.

For successful implementation, the design object (IS) must, first of all, be adequately described, complete and consistent functional and information models of IS must be built. The experience of IS design accumulated to date shows that this is a logically complex, laborious and time-consuming work that requires highly qualified specialists. However, until recently, IS design was performed mainly at an intuitive level using informal methods based on practical experience, expert assessments and expensive experimental tests of the quality of IS functioning. In addition, in the process

of creating and operating IS, the information needs of users may change or be clarified, which further complicates the development and maintenance of such systems.

No area of human activity supported by information technology can be imagined without the use of databases, which help to get quick access to information, thereby increasing work productivity. Client-server applications, which have recently become widespread, are built on the basis of databases. Internet and intranet applications can access databases, opening up wide opportunities for publishing information needed by a wide range of users.

With the development of computer technology and the emergence of CASE modeling (Computer Aided Software Engineering) there was a need for tools that would support modeling standards.

A modern database modeling tool must meet a number of requirements:

- allow the developer to focus on the modeling itself, and not on problems with the graphical display of the diagram. The tool should automatically place entities on the diagram, have advanced and easy-to-manage visualization tools and create model representations;

- the tool should check the diagram for consistency, automatically identifying and resolving inconsistencies. However, the tool should be configurable and, if desired, give the developer some freedom to decide on inconsistencies or deviations from the methodology;

- the modeling tool must support both logical and physical modeling;

- a modern tool should automatically generate a database on the destination DBMS.

All modern modeling tools to one degree or another satisfy the above general requirements. To solve the task in the thesis, the database modeling tool ERwin version 9.7, a product of the Logic Works company, is used. The choice of the tool is not accidental, because at the present time ERwin is the most powerful tool for developing data structures, both at the logical and physical levels. It should be noted that there are several modifications of ERwin, each of which, in addition to modeling, is designed to fulfill specific goals.

Consider ERwin 9.7/ERX, which is designed specifically for use with database management systems. The rest of the ERwin family is designed for use with client-side application development tools, such as Power Builder, Visual C++ and others. Logic Works ERwin 9.7 was released in 2017 and immediately received wide recognition from a wide range of users for the many improvements that were made to it compared to previous versions. This modeling tool fully supports the IDEF1X standard and is a leader in the database development tools market.

The work will also use the BPwin 4.0 software. BPwin is a powerful modeling tool used to analyze, document, and reorganize complex business processes. The model created with BPwin allows you to clearly document various aspects of the activity - the actions that need to be taken, the methods for their implementation, the resources required for this, etc. Thus, a holistic picture of the enterprise's activities is formed - from models of organizing work in small departments to complex hierarchical

structures. When developing software, business process models serve as an excellent means of documenting needs, helping to ensure high efficiency of investments in the IT sector. BPwin is also a powerful tool for modeling processes when creating corporate information systems (CIS).

In the modern approach to information systems development, the role of the design stage is difficult to overestimate. This creates a need for both a project description notation and the ability to read project documentation by all development participants - business analysts, IT analysts, and developers.

Power is well suited for solving these tasks. Designer 16.6, which has the following functionality:

- support for models and diagrams;
- support for UML methodologies, database modeling (CDM and PDM), data warehouse modeling (data warehouse diagram) and business process modeling;
- a single repository;
- support for team development.

Power Designer 16.6 offers:

- full support for all UML diagrams;
- own notation for describing business processes, easy to understand and use;
- a convenient tool for designing data and aligning it with the application object model;
- an integrated repository for team development.

Power Designer 16.6 focuses on developing a business process as the starting point for a project. The tool is quite easy to use and learn, which makes it cheaper to train staff and implement it in the enterprise.

For developers, the entire UML language toolkit with code generation in the most common development tools (Java, C#, .NET) is offered. At the same time, Power Designer 16.6 has a convenient generator of reports and design documents.

For database designers and developers, a familiar approach to design (conceptual and physical schema), support for more than 30 relational DBMSs, and reverse engineering are offered. engineering) and the alignment of the object model and the data model.

Android – free operating system for smartphones, tablets computers, e- books, digital players, handheld watches and others devices. Available support cars and household robots. Based on the kernel Linux and its own implementation virtual machinery Java from Google. First. was developed by the company Android Inc., which was later bought by Google. Later Google initiated creation of the Open alliance Handset Alliance (OHA), which is currently engaged in support and further development platforms. Android allows create Java - applications that manage device through the developed Google libraries.

Android OS works on virtual car JVM, which performs execution of bytecode instructions.

Bytecode is intermediate representation into which computer data can be translated program. Compared to source code, which is easy to create and read

bytecode is a human compact representation programs that passed syntactic and semantic analysis. It explicitly contains encoded types, areas visibility, etc. From a technical point of view, bytecode is machine - independent code. low level that generated by the compiler from the source code.

Java bytecode – set instructions executed JVM (Java Virtual Machine). Each bytecode opcode is one byte. Used in full of 256 possible values codes operations. 51 of them are reserved for future use.

Except Java, there is also the possibility creation applications in the language C ++ with the NDK package, however Google recommends use its only in extremes cases, for example, if necessary and low external settings some hardware parts of the device.

Applications under Android operating system are programs in non-standard bytecode for virtual machinery Dalvik, for them it was developed a format for instructions packages. APK. There are many tools for working on applications libraries: Bionic (library standard functions, incompatible with glibc); multimedia libraries based on PacketVideo OpenCORE (supports such formats such as MPEG -4, H.264, MP3, AAC, AMR, JPEG and PNG); SGL (two-dimensional rendering engine) graphics); OpenGL ES 1.0 ES 2.0 (3D engine) graphics); Surface Manager (provides applications with access to 2D / 3D); WebKit (ready-made engine for web browsers; handles HTML, JavaScript); FreeType (processing engine fonts); SQLite (lightweight DBMS, available to everyone applications); SSL (a protocol that provides secure data transmission over the network). Compared from ordinary applications Linux applications Android obey additional rules: Content Providers – exchange data between applications; Resource Manager – access to resources such as files XML, PNG, JPEG; Notification Manager – access to the status bar; Activity Manager – management active applications.

Google offers for free download Android application development environment Studio. Development Android applications can be conducted in the language Java (not lower) Java 1.5). There is Eclipse plugin – Android Development Tools (ADT), designed for Eclipse versions 3.3-3.7. There is also plugin for IntelliJ IDEA, which facilitates development Android applications, and for the environment developments NetBeans IDE, which, starting with version NetBeans 7.0, no longer experimental, though is not yet official. In addition, there is Motodev Studio for Android – a comprehensive environment developments based on Eclipse, that allows work directly from Google SDKs.

Android Studio is integrated environment development (IDE) for working with the Android platform

IDE was in the free access starting with version 0.1, published in May 2013, and then entered the beta testing stage, starting with version 0.8, which was released in June 2014. The first stable version 1.0 was released in December 2014, then discontinued support plugin Android Development Tools (ADT) for Eclipse.

Android Studio, based on software provision IntelliJ IDEA from companies JetBrains, and is the official name all about developments Android applications. This environment developments available for Windows, OS X and Linux.

Features of the Android Studio IDE:

- advanced layout editor: WYSIWYG, ability work with UI components using Drag-and- Drop function preview the layout on multiple configurations screen;
- from the tag applications, based on Gradle;
- different types of builds and generation of multiple. apk files;
- code refactoring;
- static code analyzer (Lint), which allows find problems performance, incompatibility versions and more;
- in built ProGuard and the signature utility applications;
- templates main layouts and components Android;
- support for Android application development Wear and Android TV;
- built-in Google support Cloud Platform, which includes integration with Google services Cloud Messaging and App Engine.

Over time, all autonomously developing systems move from order to disorder. This law of physics can be applied to management. Without the possibility of regulation, the work of departments becomes more chaotic, employee productivity decreases, which inevitably leads to loss of profit for the business. Any, even a small, division of the enterprise needs tools that allow it to put in order, structure and control activities. For this, the accounting department has databases in which the financial activities of the enterprise are recorded. The human resources department has an employee database and a directory of regulatory documents. Any, even a small IT enterprise, needs a system that streamlines the activities of employees.

The global software market has long offered various HelpDesk and ServiceDesk systems that allow to streamline and facilitate the work of an IT enterprise. Similar systems are just beginning to appear on the Ukrainian market, but several successful projects can already be identified that are able to compete with more mature, world-famous products [6, 7].

The product of the Ukrainian company Terrasoft is a system for organizing a single customer service center and internal business units of the enterprise, taking into account ITIL recommendations. The functionality for automating processes, as well as working with requests, problems, changes, service levels, configurations, knowledge and releases allows you to organize effective interaction with both external customers and internal divisions of the company (fig. 2) [8].

The system contains the following components:

- a database of contacts and customers with the function of automatically collecting information about customers from open sources;
- customer self-service portal;
- a communication panel that combines the functionality of an email client, Internet telephony, and a social network;
- register of appeals;

- knowledge base;
- service catalog;
- business process catalog;
- employee base.

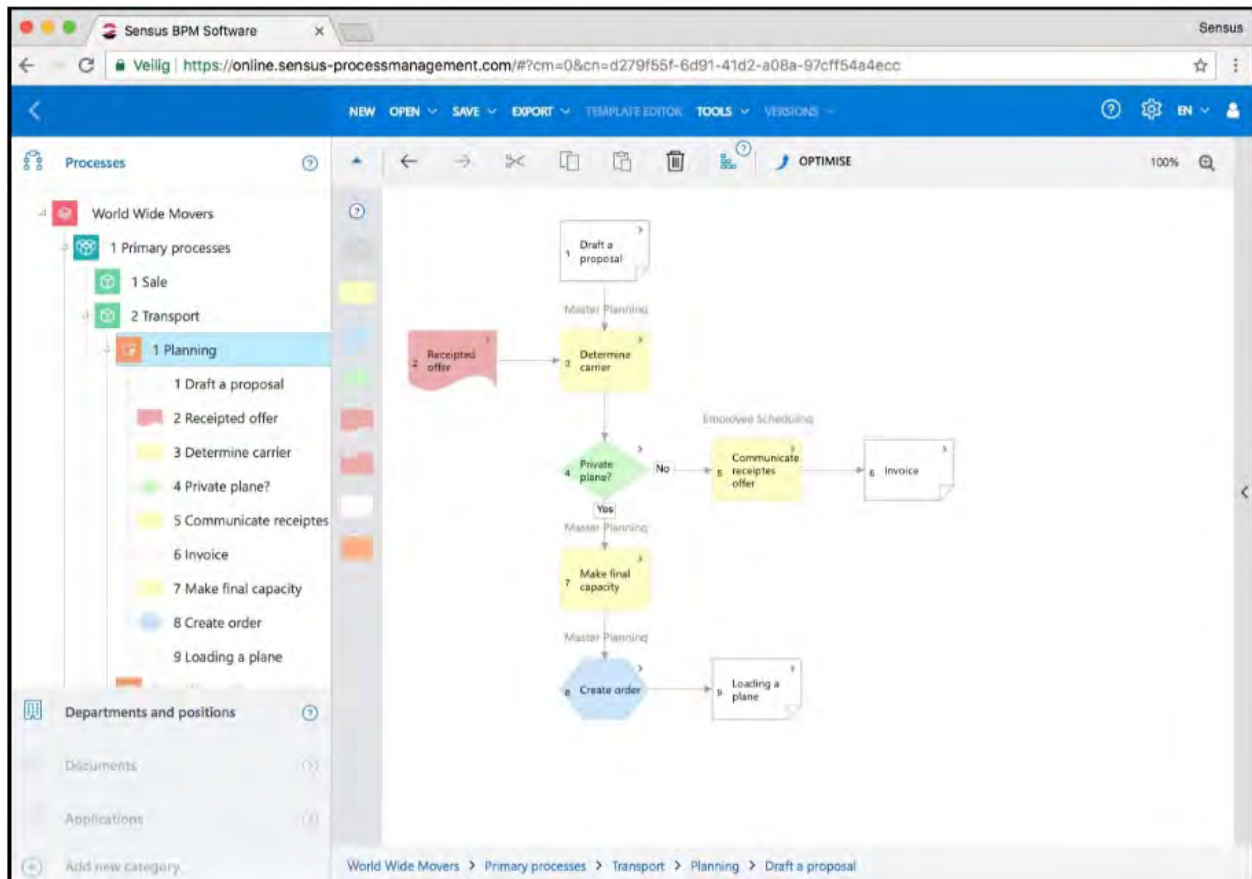


Figure 2 – BPM'online service self-service portal

Initially, this system was developed for small and medium-sized businesses, but gradually, during development, it turned into a large corporate system. The advantages of this solution are versatility and elements of artificial intelligence. Versatility allows the system to be used not only by IT companies, but also by others. Intelligent search and analysis simplifies work with new clients and contacts. The disadvantages include high cost, a large amount of unnecessary functionality, a large number of minor errors, and low performance indicators [8].

Cost: 34,200 UAH/year per employee.

Service for internal and external support. Represents the Naumen platform Service Desk, which is configured for small and medium businesses. Includes Service Desk, a self-service portal, personal accounts for business users, a catalog of services (external or internal), a knowledge base, a catalog of equipment, software and IT services, a scheme of internal tasks, as well as tools for managing changes, problems and configurations and a reporting module. Basic task systems – registration and tracking execution of customer orders with parallel accounting labor costs performers [9].

To the advantages given platforms can to attribute possibility integration with 1C, Active Directory, websites and various databases, availability mobile applications for working in the system, as well as the accounting system labor costs. Based on the basis of Naumen Service Desk, ITSM 365 is adapted to work with small and medium-sized businesses business and uses ten-year-old experience implementation ServiceDesk products on the Ukrainian and foreign markets (fig. 3) [9].

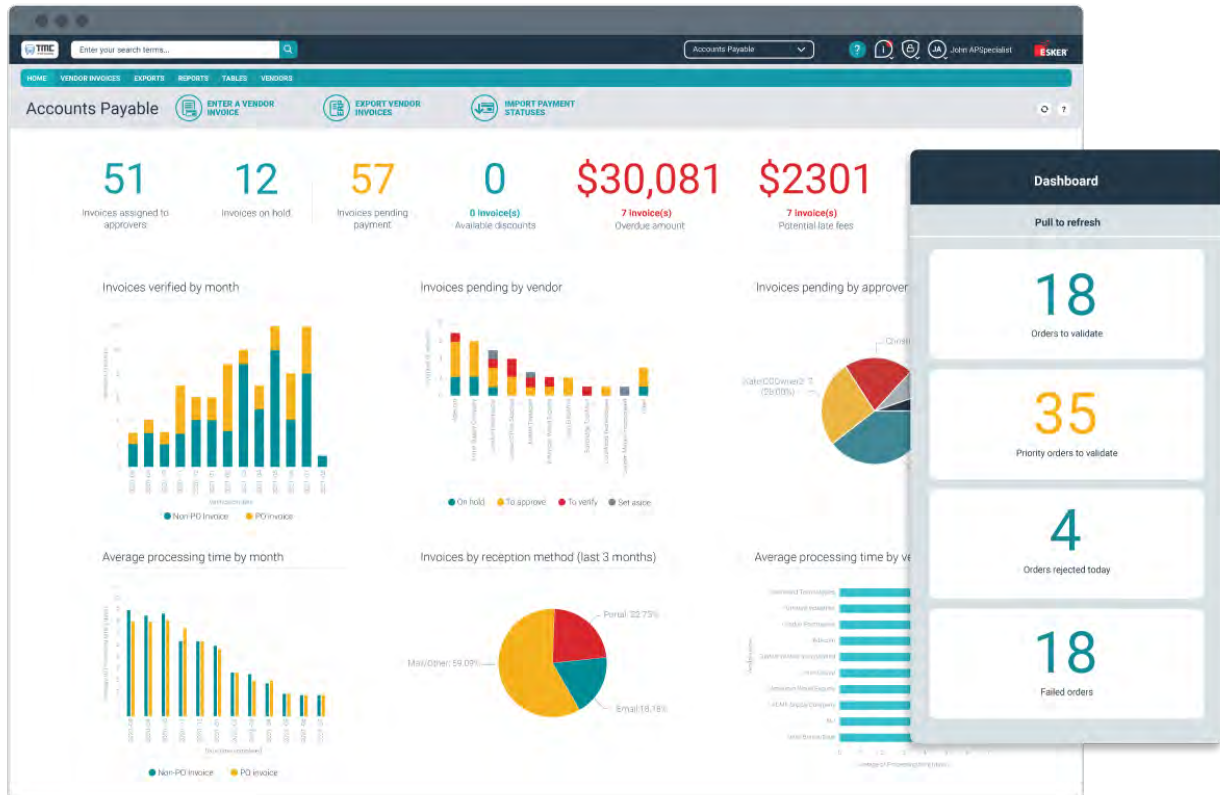


Figure 3 – One of the windows of the ITSM 365 system

To the minuses can to attribute relatively high cost supported packages settings interface and consultations developer, relatively small set opportunities systems, unattractive interface [9].

Cost: 12,000 UAH/ year per employee (without telephony, SSL support on the provided domain, individual interface settings, support manufacturer), 24,000 UAH/ year (without technical support) manufacturer), 48,000 UAH/ year (with technical support).

One of the most famous ServiceDesk products on the global market. This product goes beyond the scope of a regular Service Desk. In recent years, the company ServiceNow has slightly changed the vector of development of your product, which now goes beyond IT. Service allows manage by majority business lines. Processes that business uses for management, very similar to the processes that occur in an IT enterprise. They change only task, however architecture of m and g elements relationships and relationships between performer and consumer remain former. Complex of solutions allows manage an IT company: department personnel, finance, risks, development applications and many other areas.

The main The IT enterprise tool is the IT Operations Management (ITOM) component, which allows centralized manage appeals customers, track staff workload, to form performance reports different departments [10].

One of the key features of the system that distinguishes it from a number of competitors is the presence of artificial intelligence used in the platform. The portal offers the client to choose from the proposed lists the category that best suits his requests, offers a knowledge base for independent problem solving. If the participation of an IT specialist is necessary, it processes the request, eliminating unnecessary information (greetings, personal data, excessively detailed description of the problem), selects similar knowledge base articles and already completed requests by key parameters.

The advantages of this solution include versatility - the system allows you to organize the work of most company departments in one application. Artificial intelligence allows you to reduce the time for processing applications and partially automate the work of IT personnel. Compatibility with the most popular monitoring systems will significantly simplify tracking and incident prevention (fig. 4) [12].

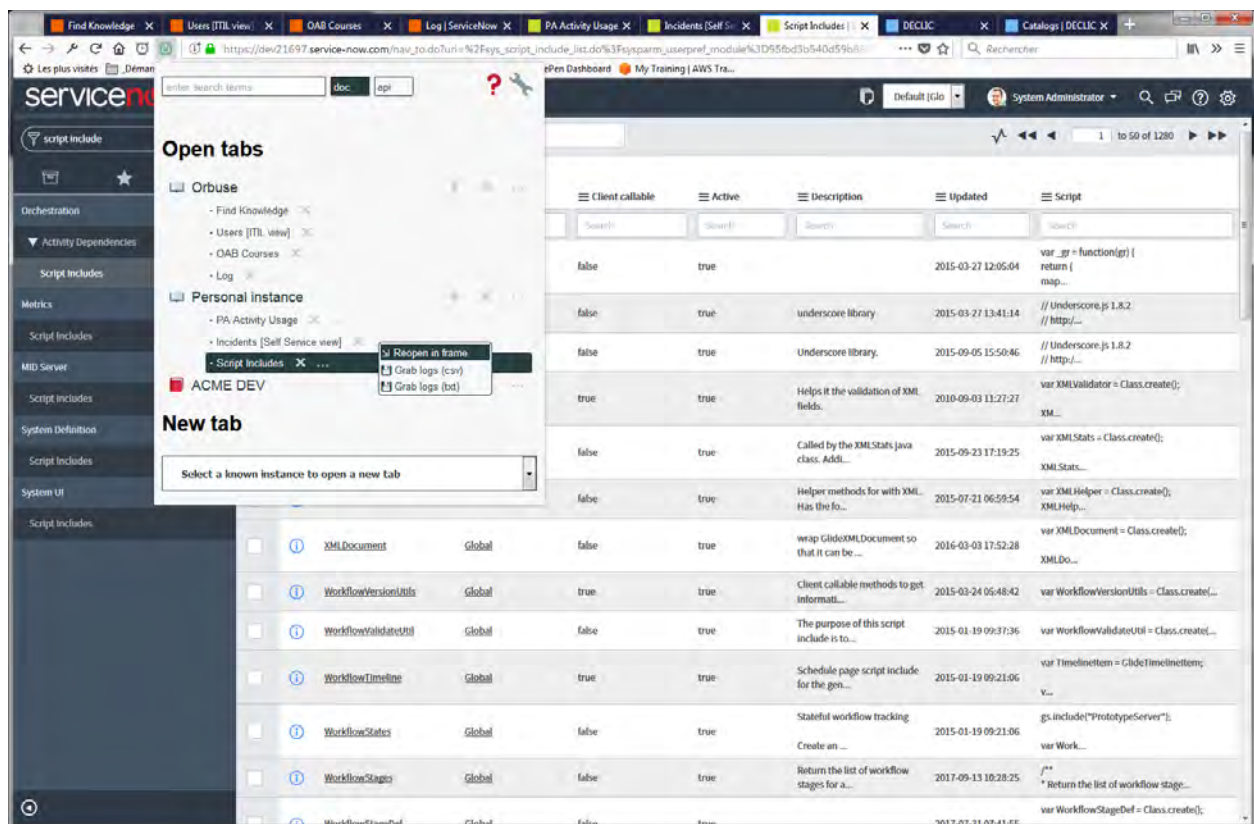


Figure 4 – ServiceNow application window

The disadvantages include the lack of a "boxed version" - the system works only on the servers of the company itself and distributor companies, which leads to a slowdown in the system response under high network loads, incorrectly selected network channel width or problems on the server side. In addition, the system has a high cost by the standards of the Ukrainian market.

The cost of solutions is calculated individually, depending on the set of selected components and starts from \$1,200 per year per user.

The product is built on the basis of Microsoft products. A comprehensive solution for automating IT activities and setting up IT processes in accordance with the global ITSM methodology. The product includes an application for the Windows OS, which is intended for IT specialists, as well as Web versions for both the client and IT company employees [7].

"ITSM InfraManager " performs the following functions (fig. 5):

- ServiceDesk (IT enterprise process management);
- cataloging services and SLAs;
- maintaining a personnel database and work schedule;
- generation of more than 80 types of reports;
- property accounting and automatic inventory;
- device monitoring;
- network and infrastructure documentation.

"InfraManager " is constantly evolving, complementing the system with new functions and capabilities.

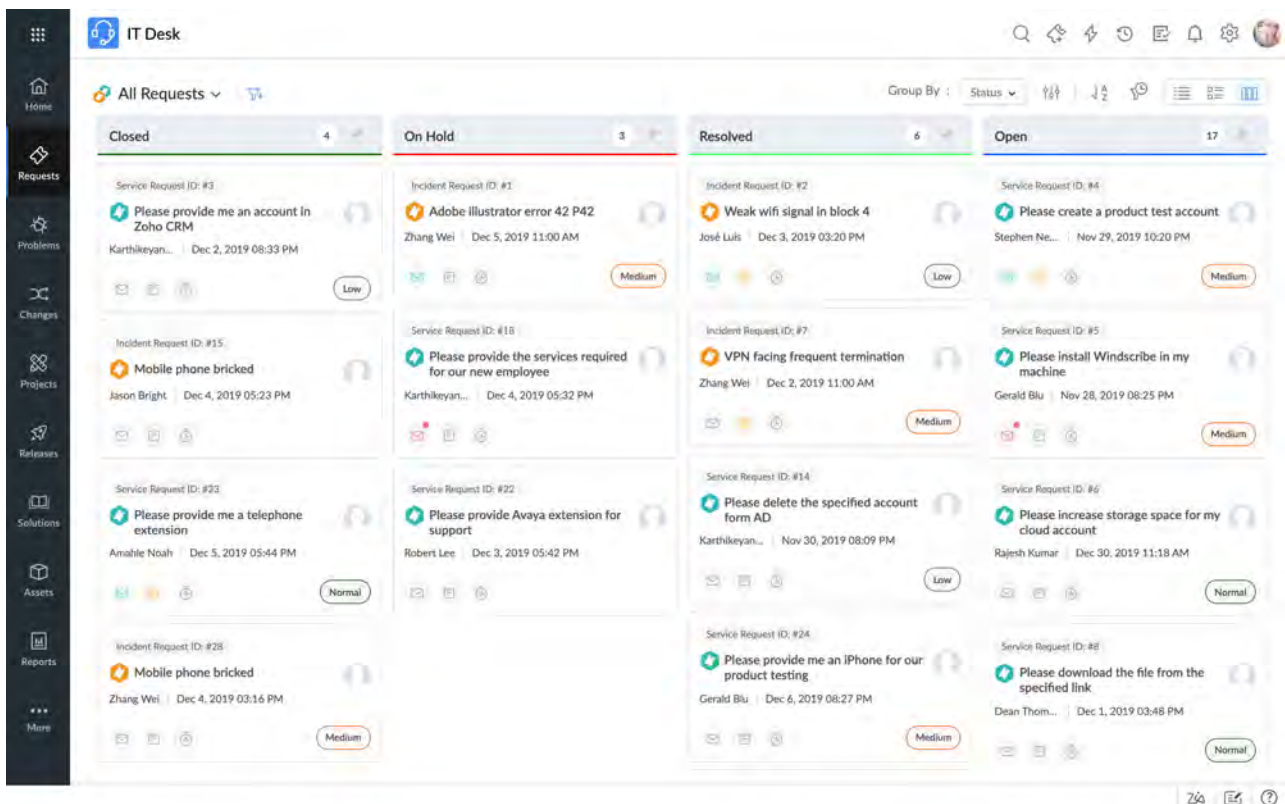


Figure 5 – InfraManager IT Professional Desktop Application

The advantages of the product include its relatively low cost – this solution is distributed in a “boxed” version, without an hourly subscription. The minimalistic interface of the program implies low system requirements for the specialist’s workplace [13].

The disadvantages include the unattractive interface of the desktop application, the lack of functionality offered by most competitors, and the inconvenient interface of the web application.

Cost: server license (includes 10 client licenses) – 150,000 UAH, client license – from 3,000 to 6,000 UAH, depending on the quantity.

All the products presented above offer a similar set of functions and components and are aimed primarily at centralizing and automating the work of an IT enterprise. Despite the variety of products presented on the ServiceDesk system market, most of them are designed for medium and large businesses. The pricing policy of manufacturers and distributors does not allow small companies with a staff of 5-10 employees and a small turnover to purchase the necessary product. Many small businesses completely refuse to use ServiceDesk systems or develop their analogues based on cheaper products (MS Access, Excel, Bitrix24) [11].

4. Conclusions

The conducted research confirms that the modern market of IT process management automation systems offers a wide range of functional solutions. However, the vast majority of products (such as ServiceNow or BPM'online) are oriented exclusively towards medium and large businesses.

The pricing policy of developers and distributors is unacceptable for small companies with a staff of 5–10 employees and a small financial turnover. Consequently, small enterprises are forced either to completely refuse the implementation of ServiceDesk systems or to create primitive alternatives based on non-specialized software (MS Access, Excel, etc.). Thus, there is a clear scientific and practical prerequisite for developing a flexible, functional, and economically affordable business process automation system tailored specifically to the needs of small IT businesses.

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DEVELOPING A CONTROLLED FRAMEWORK TO MEASURE LLM-AS-A-JUDGE EVALUATION BIAS IN LLM POWERED SAST TOOLS

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Large Language Models (LLMs) are transitioning from conversational assistants to multidimensional tools that can be used in number of different ways, in particular as automated Static Application Security Testing (SAST) tools capable of identifying and fixing software vulnerabilities. However, evaluating the performance of these LLM-based security tools at scale poses a challenge, as manual code review by human experts is slow, costly, and difficult to scale. One of the ways to circumvent this bottleneck is using an "LLM-as-a-Judge" paradigm, where a frontier model evaluates and scores the outputs of various SAST tools, including other LLMs [1].

Despite its potential efficiency boost, this paradigm introduces a vulnerability – LLM judges are not neutral arbiters. Prior research indicates that these models suffer from systemic behavioral flaws, including position bias, egocentric brand bias,

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