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Original Empirical Research

Typification of Projects for the Transition to Cloud Services

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Abstract

Introduction. Digital solutions make the operation of the company clearer, reduce staff costs, and provide data security. Various aspects of automation, digitalization and cloud technologies are described in the literature. The question is raised about the quality of the methodological basis for such transformations. Global and narrow technical approaches are presented. As a rule, materials are presented from the perspective of experts in the implementation of digital technologies. In this paper, for the first time, the author's scheme is proposed that can allow not only providers, but also their customers to navigate the upcoming transition to the cloud. The latter will receive systematic information on how to select a contractor and the most economically feasible option of cooperation.

Materials and Methods. The information model was based on the semantic network as a system of nodes, their characteristics and connections. Management of the cloud migration project and the migration itself were visualized. The contraction practice between providers and their customers was summarized. The specifics of the tasks of such projects were taken into account. The part of the subject area related to the implementation of a cloud service is algorithmic — a step-by-step transition to the cloud, a generalized scheme of the process taking into account the hierarchy of elements are presented.

Results. For the first time, a method of self-preparation of a company for the implementation of cloud solutions is proposed. The algorithm systematizes the cloud migration processes. The activities related to goal setting, audit, selection of cloud environment and services, calculation of the economic efficiency of the project, planning and implementation of migration, technical support and scaling of processes are described. The possibilities of determining the economic feasibility of measures for the transition to the cloud are shown. The costs of equipment, data storage and processing, software licenses, salaries, information security, etc., are taken into account. The amount received is compared to the providers' offers. For the final decision, the costs of infrastructure support are taken into account — by the customer or the outsourcer. The best option is selected. As a result, the customer gets the opportunity to work with better profitability and scale the project. Feedback is provided, and processes are adjusted, starting with IT reaudit.

Discussion and Conclusion. The proposed solution will give the customer's management a system view of the execution sequence when migrating to the cloud, the issues and tasks to discuss with a potential outsourcer. Providers can use the algorithm to typify and unify projects, which can eventually simplify the coordination of the list of services and the migration procedure with customers. In this way, the parties can free up significant resources in terms of time, labor and other costs. In addition, customers and providers can partially use the described semantic network to develop not only the organizational, but also the technical aspect of the project.

Keywords: digital transformation methodology, step-by-step transition to the cloud, cloud migration, profitability of cloud migration

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Оригинальное эмпирическое исследование

Типизация проектов перехода на облачные сервисы

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Аннотация

Введение. Цифровые решения позволяют сделать работу компании четче, сократить расходы на персонал, обеспечить безопасность данных. В литературе описаны различные аспекты автоматизации, цифровизации и облачных технологий. Ставится вопрос о качестве методологической основы таких преобразований. Представлены глобальный и узкий технический подходы. Как правило, материалы подаются с позиций специалистов по внедрению цифровых технологий. В данной работе впервые предлагается авторская схема, которая позволит ориентироваться в предстоящем переходе в облако не только провайдерам, но и их заказчикам. Последние получат систематизированные сведения о том, как выбрать подрядчика и вариант сотрудничества, наиболее целесообразный с экономической точки зрения.

Материалы и методы. Информационная модель строилась на базе семантической сети как система узлов, их характеристик и связей. Визуализированы управление проектом миграции в облачные сервисы и сама миграция. Обобщена практика заключения договоров между провайдерами и их заказчиками. Учтены особенности техзаданий таких проектов. Часть предметной области, касающаяся реализации облачного сервиса, алгоритмирована — представлен пошаговый переход в облако, обобщенная схема процесса с учетом иерархии элементов.

Результаты исследования. Впервые предложен метод самостоятельной подготовки компании к внедрению облачных решений. Алгоритм систематизирует процессы миграции в облако. Описаны мероприятия, связанные с целеполаганием, ИТ-аудитом, выбором облачной среды и сервисов, расчетом экономической эффективности проекта, планированием и реализацией миграции, техподдержкой и масштабированием процессов. Показаны возможности определения экономической целесообразности мероприятий по переходу в облако. Учитываются затраты на оборудование, хранение и обработку данных, лицензии на софт, зарплаты, обеспечение информационной безопасности и пр. Полученную сумму сравнивают с предложениями провайдеров. Для окончательного решения принимаются во внимание расходы на поддержку инфраструктуры — заказчиком или аутсорсером. Выбирается оптимальный вариант. В итоге заказчик получает возможность работать с лучшей рентабельностью и масштабировать проект. Предусмотрена отработка обратной связи и корректировка процессов, начиная с повторного ИТ-аудита.

Обсуждение и заключение. Предложенное решение даст менеджменту заказчика системное представление о том, в какой последовательности действовать при миграции в облако, какие вопросы и задачи обсуждать с потенциальным аутсорсером. Провайдеры могут применить алгоритм для типизации, унификации проектов, что в итоге упростит согласование с клиентами перечня услуг и порядка миграции. Таким образом стороны высвободят значительные ресурсы по времени, трудовым и иным затратам. К тому же заказчики и провайдеры могут отчасти задействовать описанную семантическую сеть, чтобы отработать не только организационную, но и техническую сторону проекта.

Ключевые слова: методология цифровых преобразований, пошаговый переход в облако, миграция в облако, рентабельность миграции в облако

Благодарности. Автор выражает благодарность редакции и рецензентам за внимательное отношение к статье и замечания, которые позволили повысить ее качество.

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Introduction. The current socio-economic environment creates conditions for automation and digitalization of the operation of enterprises and organizations. This is due, in particular, to a shortage of personnel, new requirements for the efficiency and sustainability of production and management processes. Various aspects of automation, digitalization and cloud technologies are being investigated. In [1], a global approach to the digitalization of entrepreneurial activity is considered. Paper [2] shows the need to move to new digital business models. Stepwise digital transformation of an enterprise involves the consistent development of different levels, which are described in [3]. In [4], the reconfiguration of management processes required for digitalization is investigated.

Main stages of digitalization are as follows:

– preliminary research — goal definition and modeling of business processes;

– selection and implementation of hardware, software and hardware-software solutions.

Organizations can carry out these procedures on their own, but in practice, they often turn to IT companies.

One of the priorities of digital transformation is the development of cloud technologies and services [5]. RF President Vladimir Putin set the task to provide the operation of cloud infrastructure in the country and develop domestic cloud technologies[1].

Adequate implementation of cloud services requires a high-quality methodological framework. In [6], a methodology for decision support in the selection of cloud IT services is proposed. However, the issue of algorithmization of the cloud transition has not been sufficiently studied, specifically, for customers of cloud services who do not work in tech sector. At the same time, they can plan and implement some migration activities themselves. The presented work fills this gap. Its objective is to form a standard structure for the project of cloud transition services in the context of digital transformation. The proposed solution will be the basis for the creation and implementation of such projects. In addition, it will allow you to collect, process and use analytics on the processes being implemented.

Materials and Methods. A semantic network is selected to build an information model and display knowledge in the subject area. It contains objects (nodes and connections) and relations between them. This visual structure simplifies the understanding and interpretation of knowledge. Figure 1 shows the semantic network of project management for the transition to cloud services.

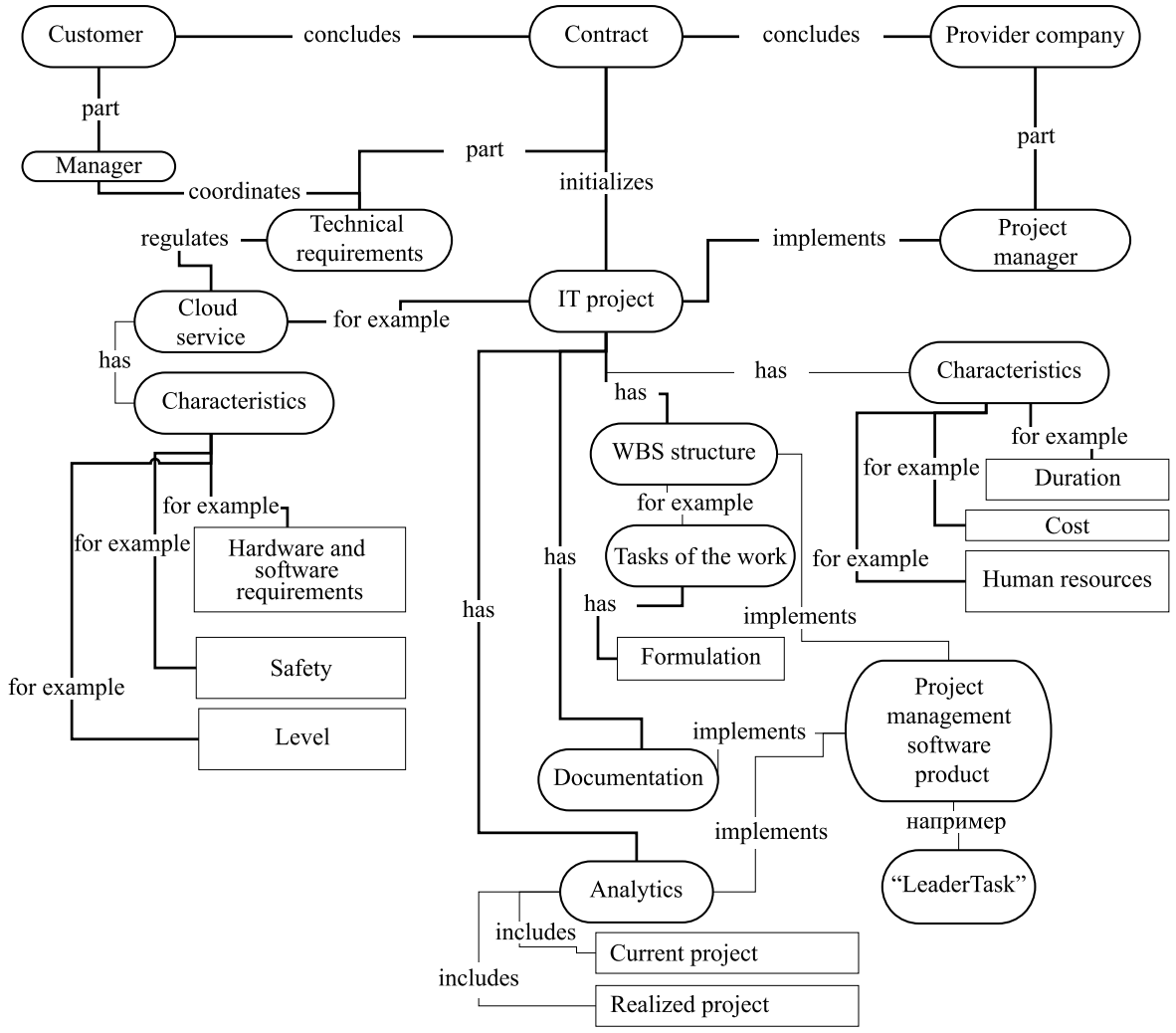

Fig. 1. Semantic network of project management for cloud transition:
— nodes; — characteristics; — connections between nodes

[1] *Putin set the task to support the development of domestic cloud technologies*. TASS. (In Russ.) URL: https://tass.ru/ekonomika/16418975 (accessed: 16.01.2024).

The provider of cloud solutions enters into an agreement with the customer. Technical requirements (TR) are drawn up, and an IT project is launched, which is managed by an expert from the provider company. TR regulate the content, composition and requirements for the service (cloud service). The cloud service has the following requirements:

– to the hardware and software (infrastructure placement, virtual resources, cloud services);

– to safety assurance;

– to technical support.

The customer's representative and the project manager from the provider determine the part that is outsourced and will be implemented within the framework of the IT project.

The part of the subject area related to the implementation of a cloud service requires more formalization. In this case, algorithmization makes it possible to describe a step-by-step cloud transition and show a generalized scheme of this process. In the algorithm:

– main processes and subprocesses of the implementation of cloud services are identified;

– sequence of transition between them is determined;

– connections that provide returning to previous stages to make other decisions are indicated.

To describe the technical specifications of the cloud transition, we have analyzed the best practices known from open sources, including scientific literature. The IT project management part is formalized using a semantic network.

The basic actions in the development of the project are taken into account:

– identification and analysis of requirements;

– clarification of the customer 's wishes;

– preparation of technical specifications.

Based on the project method, the basic tasks (jobs) that are required for the cloud transition are identified, and their hierarchy is built. The WBS structure of the project includes a list of tasks-jobs. Their duration, connections are specified, and resources are assigned for execution. When resources are loaded, it is possible to recalculate the duration of jobs. Then critical tasks are determined, whose total duration corresponds to the duration of the project as a whole.

Thus, the major features of the IT project are the following: duration, cost, labor resources. There are special software products for managing an IT project. As an example, these are “Jira” (created by the Atlassian company, Australia) [7] or the domestic analogue of “LeaderTask” (developer: Organizer LeaderTask, LLC) [8].

Note that the WBS structure is being built in the project management software product along with the tasks-jobs. The provider needs to unify the tasks-jobs. In a unified system, the provider, among other things, maintains owned project documentation. Analytics are also generated here to track the implementation of the project and its operation after going.

On the subnet “IT project has”, the requirement to unify the formulation and execution of tasks-jobs is identified. A possible option is proposed in this article. Cloud services are considered from the point of view of business development, increasing its competitiveness [9].

Research Results. Thus, professional providers offer ready-made cloud services, configure them and accompany the operation. However, the company can independently create, implement a solution and supervise its performance.

The project management methodology[2] [10] assumes the following stages: initialization, development, execution, and completion [11]. Note that the same tasks can be formulated variously, especially if the projects are realized by different managers. Typification of solutions reduces labor costs for the creation of project documentation, enhances its quality, and improves analysis.

Main steps for migrating to the cloud are listed below.

1. Defining goals.
2. Selecting a provider.
3. IT-audit. At this stage, the initial IT infrastructure is evaluated (efficiency, security, etc.).
4. Selecting the type of cloud environment and cloud services.
5. Cost-effectiveness analysis of the cloud transition.
6. Migration planning (a roadmap is drawn up, priorities, stages, deadlines, resources, budget are determined).
7. Migration (application dependency scheme is drawn up, cloud infrastructure is designed, test run is conducted, data is transferred to the cloud, and service is put into operation).
8. Operation monitoring and technical support.
9. Scaling.

The transition to cloud services can be represented as an algorithm (Fig. 2).

[2] *A Guide to the Project Management Body of Knowledge. PMBOK Guide*. Newtown Square, PA: Project Management Institute, Inc.; 2017. 579 p. URL: https://prothoughts.co.in/wp-content/uploads/2022/06/a-guide-to-the-project-management-body-of-knowledge-6e.pdf (accessed: 12.04.2024).

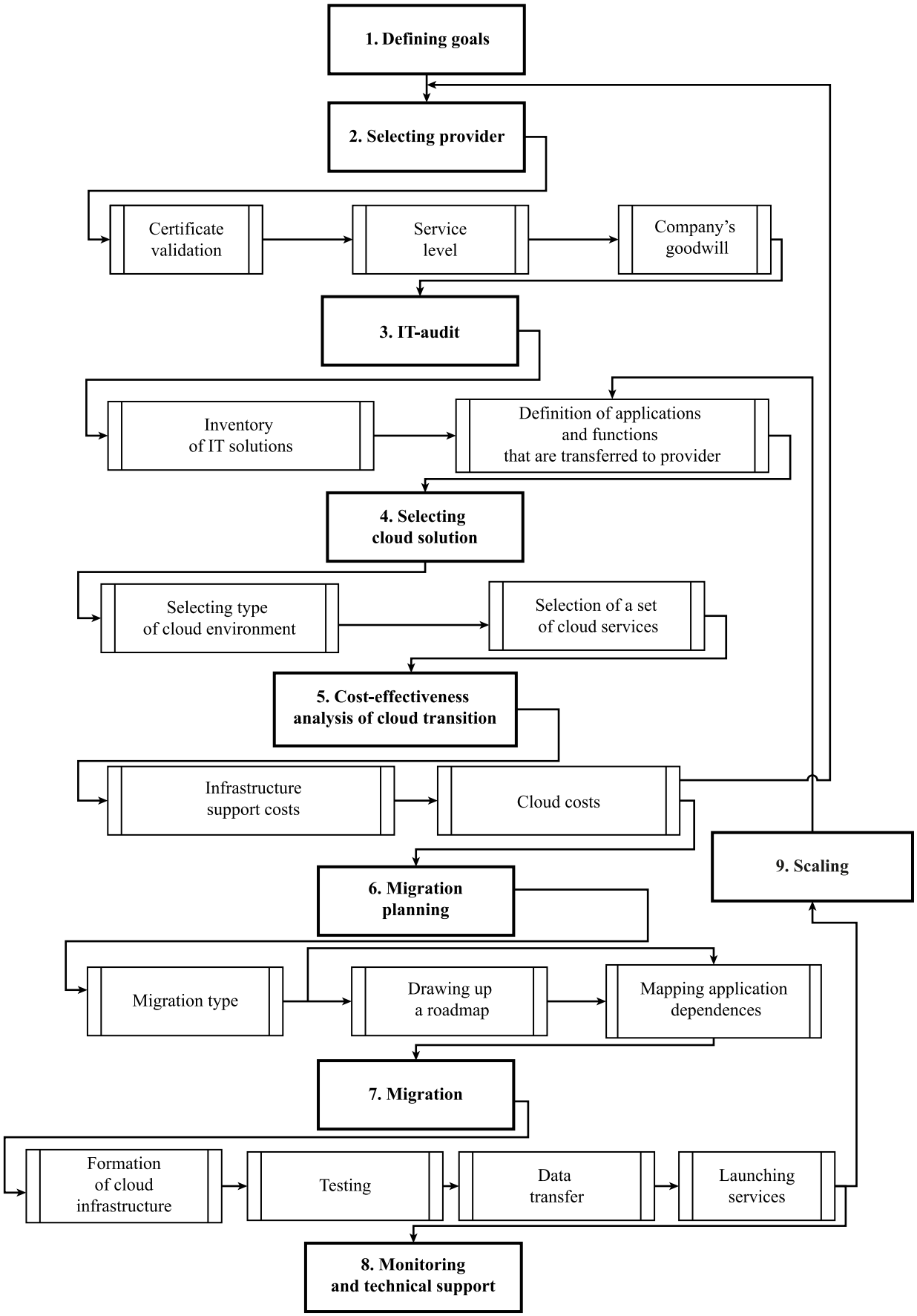

Fig. 2. Cloud transition algorithm:
— process; — subprocess; — transition to stage

We comment on the presented scheme.

1. The goal of cloud transition should be consistent with the company's business strategy. As noted above, the use of cloud services makes business more flexible and efficient.

Tasks in the project:

– negotiations with stakeholders and customers;

– formulation of the planned business result.

2. It is necessary to find out in advance whether a foreign company can be a partner in the project. In some cases, cooperation is possible only with domestic providers. Restrictions are related to the scope of the company's activities, top-secret information, processing of personal data, etc. In these cases, the provider must have a set of documents:

– license of the Federal Service for Technical and Export Control (FSTEC) for the technical protection of confidential information;

– FSTEC certificate;

– license of the Federal Security Service (FSB) for cryptography;

– FSB license to work with the national security information;

– FSTEC license for the protection of national security information;

– certificate of compliance when working with personal data.

Reference offers from cloud providers are as follows: implementation and maintenance of virtual machines, data centers, etc. However, the services of various companies differ in the nuances of settings, payment models, quality of service and user support.

If the partner's goodwill is important to the customer, he contacts an organization that is well known in the market.

At this stage, first of all, the certificate and license of the provider should be checked. Secondly, it is necessary to agree on the general characteristics of the service:

– hypervisor;

– reliability category of data centers according to the Uptime Institute standard;

– technical support terms;

– service level agreement;

– test access;

– payment model.

The above are the tasks in the project.

Hypervisor is software that is used by a cloud provider for virtualization. It allows for creating multiuser logically independent cloud environments.

The reliability of the data center infrastructure can meet the Uptime Institute standard [12] and, in some cases, it should be at least “Tier III” [13].

The service level agreement specifies the areas of responsibility of the customer and the client, and fixes guarantees for services. The terms and parameters of the test access are approved.

Various payment models for cloud services are practiced. The most common is hourly.

3. The customer's IT infrastructure, applications and their connections with the IT environment are analyzed. IT audit allows for determining which functions can be transferred to a cloud provider and which ones can be left in owned infrastructure. It is not uncommon for a customer to decide on a full transition to the cloud.

Tasks in the project include:

– conclusion of an IT audit contract;

– acquisition of information about the company's software;

– gathering information about the technical support of the enterprise;

– acquisition of information about the topology of the enterprise;

– building a business process model “as is”;

– building a business process model “as it will be”;

– compiling a list of functions that are transferred to the cloud provider;

– submission of the IT audit report.

4. A cloud solution is selected. First, you need to decide on the type of cloud environment [14]:

– IaaS (infrastructure as a service);

– PaaS (platform as a service);

– SaaS (software as a service).

Types of cloud environment differ in the elements that are transferred to the provider for maintenance (data, network, servers, operating systems, software, etc.) [15]. Elements of the environment may remain under the control of the customer's services.

Tasks in the project:

– select the type of cloud environment;

– define a set of cloud services.

5. Under the cloud transition, an enterprise needs to estimate the costs on operating a standard data center. It is about the costs of a data storage and processing system, communication equipment, software and hardware licenses, servers, salaries of IT specialists of the enterprise, information security, etc. The amount received is compared to the offers of cloud providers. They can do all these calculations.

The following costs are determined:

– for the support of the infrastructure by the client;

– for the selected type of cloud environment.

The above are the tasks of this stage of the project.

6. The selection of migration method depends on the scale, structure and IT infrastructure of the organization. Full migration is often recommended for small and medium-sized businesses, partial migration is practiced by large companies. Project deadlines range from a few weeks to a year. When switching to the cloud model, issues of supporting the access to data sources, using archiving and recovery tools, are being resolved.

There are tasks of this part of the project. You should create an application dependency map and determine the following:

– migration type;

– list of critical services;

– transfer time.

7. At the migration stage, much is determined by the individual characteristics of the customer, therefore detailed solutions are formed for specific conditions. Thus, for example, specifics of migrating physical infrastructure to a virtual environment and transferring existing virtual infrastructure depend on this.

Tasks in the project:

– transfer (installation from scratch; “hot” or “cold” backup);

– test run;

– application recycling (when required).

8. Problems are possible when using any resources. Cloud services are no exception. One of the central issues of their use is safety. As a rule, it is determined by the quality of interaction between the provider and the customer's employees. The basic task is continuous improvement and correction of shortcomings.

9. The diagram shows the scaling process separately — the development of the solution, its distribution (e.g., to other divisions of the customer). It is recommended to systematically work out the feedback. In this way, you can get information that will indicate the further direction of the project. In some cases, it is advisable to return to the previous steps of the algorithm — up to the third, i.e., IT audit.

Discussion and Conclusion. The cloud transition allows organizations to defend digital processes more flexibly and economically. The introduction of clouds can significantly reduce the cost of hardware, software, licenses, salaries, etc. The Russian cloud services market is developing. Numerous providers deliver services. The literature devoted to the study of these processes is published. Within the framework of this work, a scheme is visualized and explained. It can be the basis for starting a digital transformation of an enterprise. It gives management a systematic idea of what sequence to act in, what to pay attention to, which issues to discuss with the provider, and which issues to work out with their own specialists.

Providers can use the proposed algorithm to typify projects, coordinate the list of services with customers and the stages of transition to cloud technologies on-the-fly.

The unification of task complexes for each step of the described algorithm should provide an improvement in the quality of project documentation due to the elaboration of organizational solutions for the project. It should be noted that both customers and providers can partially take into account the presented material to design and coordinate the technical aspect of migration. Thus, organizational and management processes should be taken into account when forming approaches to data coordination and control in cloud solutions. In addition, information management technologies in cloud solutions that will enable migration between providers should be developed.

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