



APPLICATION OF CLOUD COMPUTING SERVICES IN BUSINESS

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ABSTRACT

Dynamism of all business processes and a huge amount of information of different nature are the main characteristics of today's business environment. They require the use of information technologies as an integral and essential part of the management strategy of companies. One modern and alternative approach to business management is the use of services based on cloud computing. The movement of the business to the cloud empowers companies to achieve significant economic benefits without investments in building their own IT infrastructure. The purpose of the current work is to present the nature and advantages of different types of cloud services. Popular cloud services for business are discussed.

Key words: cloud computing, cloud infrastructure, software as a service; platform as a service, infrastructure as a service

INTRODUCTION

Recently, cloud technologies are extremely popular. They are based on well-known technologies and upgrade and integrate them in a new way that improves the efficiency of their use.

Cloud technologies are seen more as a new business model, rather than a new technology. They offer attractive opportunities for acquisition and management of computing resources and software platforms and capabilities for promptly addition of new features according to changing needs. Cloud technologies allow companies to carry out their main functions in a new environment that provides a good basis for starting or expanding a business without large investments. There are opportunities for optimization of business processes and reducing the time to adapt and adjust to the changing market conditions. Technologies support the rapid growth of the business by ensuring access to virtually unlimited resources when they are needed. Based on the cloud technologies, companies can create a flexible strategy for development with maximal usage of resources, minimal efforts for their maintenance and effective implementation of business activities.

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1. NATURE OF CLOUD TECHNOLOGIES

Cloud computing is a model that provides a ubiquitous and convenient access to shared computing resources that can be quickly delivered to a large number of users (upon request) and activated with minimal management effort or assistance by the service providers (1).

In essence cloud computing is merging computational power of different hardware devices that can be shared and used by many users.

The main characteristics of cloud technologies that distinguish them from other technologies are (1, 2):

- **On-demand self-service.** Users can unilaterally declare and obtain computing resources when they need them. Cloud computing creates the illusion of infinite computing resources available on demand and eliminates the need to make preliminary plans for their long-term supply.
- **Permanent network access.** Computing resources are available anytime and anywhere over the network via standard mechanisms (standard Web protocols). These mechanisms allow and facilitate access to services regardless of the devices (mobile phones, tablets, laptops and workstations) and platforms.

- **Pooling and sharing of resources.**

Computing resources are pooled and can serve multiple users. They do not set aside between users in advance. Computing resources are distributed and assigned dynamically according to consumers' needs.

- **Elasticity (scalability).** Depending on the current needs, users can dynamically change (increase or decrease) the hired resources. The ability for scaling the rented infrastructure allows consumers to respond promptly to dynamically changing needs.

- **Pay-per-use.** Payment for cloud services depends on the consumption. It is determined by the level of users' activity – users pay for actual used resources.

The most important advantages of cloud infrastructure compared to the traditional one are:

- **Reducing the cost of creating and maintaining IT infrastructure.** Cloud computing model significantly reduces the initial expenses for purchasing hardware and software and later for their maintenance. There is no need to hire qualified IT staff to support and serve the equipment because the maintenance is a responsibility of the service provider.

- **Effective use of resources.** Cloud computing is based on virtualization, which assures the utilization of hardware capacity. Virtualization allows creation of many virtual machines on a small number of physical servers and the computational power is used more efficiently and economically. Virtual servers can serve large number of users, offering them opportunities to work with various applications.

- **Payment for actually used services.** For consumers it is of utmost importance that they pay only for actual consumption. They can request changes (on demand) to the necessary resources to meet the peaks or dips in their business, as payment changes according to their activity.

One of the key issues related to cloud computing is **a security and data protection**. For businesses deploying all their information to remote locations, which are shared with other users, is a risk. Despite the fears and contrary to the expectations, data in clouds are often better protected than if they are stored on local companies' servers and maintained by internal IT departments.

1.1. SERVICE MODELS

There are three basic service models (3):

- **Infrastructure as a service (IaaS).** Infrastructure as a service is a model that allows users to rent computing resources –

servers, storage, network equipment. The provider of IaaS owns and maintains the equipment. Users can install and use whatever software they need and they are responsible for managing applications and data.

- **Platform as a service (PaaS).** Platform as a Service is a model for providing a development environment for creating and launching web and mobile applications. The components of the environment are pre-configured and maintained by the service provider. This is a significant advantage that grants software developers flexibility during the development process of applications and releases them from obligations to manage the environment.

- **Software as a service (SaaS).** Software as a service is a model that allows users to use different applications as hosted services, rather than installing them on local computers. Software as a service offers a diverse range of software applications.

The three service models are interrelated. The choice of model influences the processes and activities that serves. SaaS model serves mainly end users (including businesses). PaaS interact with software developers (including software companies). IaaS model facilitates IT specialists in maintaining hardware resources.

1.2. DEPLOYMENT MODELS

There are different deployment models of cloud computing that can be implemented (4):

- **Public cloud** – the cloud infrastructure is available to a large group of users (general public). Resources can be used by any registered user and they are available over the Internet usually through web browsers.

- **Private cloud** – the cloud infrastructure is intended for use by a private organization or group. It is not shared with other users and is accessible only through the private network controlled and used by the organization. The private cloud has a higher level of security than a public cloud and most businesses prefer to use this deployment model because it guarantees greater reliability and security.

- **Hybrid cloud** – the cloud infrastructure is a combination of distinct cloud infrastructures. The hybrid model allows the deployment of information and applications with significant importance on a private cloud, while applications with lower security requirements and wider access can be deployed on a public cloud.

Besides the mentioned deployment models, there are also Community Cloud, Combined cloud, Cloud of Clouds.

2. CLOUD COMPUTING FOR BUSINESS

Cloud computing became a mandatory technology for each company. It has significant potential and provides effective business opportunities for organizations that adopted this approach.

Along with all the advantages associated with cloud computing, businesses can elicit additional benefits (5):

- **Reduced investments for building IT infrastructure and administrative costs for IT personnel.** Cloud technologies eliminate the need for significant capital investments – companies do not have to purchase expensive equipment (servers and network equipment) and software licenses. They can start their business by employing less computing resources and increase them only when their needs grow. There is a transformation of capital investments to operational expenses and thus eliminates the high barrier to entry in the business. Small and medium businesses can afford to hire resources and technologies, which can not buy, and start from equal positions with other competitors on the market.

- **Possibilities of using modern ICT,** which enable efficient management of business processes. Small businesses can not afford to buy the latest versions of the software and to pay licenses, but by cloud technologies they have up-to-date applications.

- **Scalability of the business.** From a business perspective cloud technologies allow companies not only to increase or decrease computing capacity, but also to expand their business processes and activities. The opportunities for fast and almost unlimited provision of computing power and software applications support the growth and expansion of the companies.

- **Adaptation and adjustment to the changing market conditions.** Today's economic situation and environment requires the ability to react quickly and respond to changing conditions and needs of consumers. Through cloud computing, companies can adapt processes, products and services to the new market circumstances quickly and they are more competitive.

3. CLOUD SERVICES FOR BUSINESS

3.1. CLOUD OFFICE SUITES

The advantages of cloud office suites compared to the traditional ones are:

- **Easy administration.** Office suites are accessible via web browser and can be used regardless of the operating system. There is no need to install the packages on the local devices and software versions are updated regularly by the service provider.

- **Reduced costs.** Companies do not need to pay legacy license fees. Usually, prices are per user per month, but sometimes there are annual plans with discounts.

- **Accessibility.** Documents are accessible anywhere at any time, from various devices (including mobile) with different operating systems and browsers.

- **Documents sharing and collaboration.** Cloud office suites give opportunities for documents sharing, joint simultaneous work on them with options for tracking changes. All these possibilities increase the office work productivity.

The most popular office suites are Google Apps for Work, Microsoft Office 365 and Zoho Docs.

Google Apps for Work (previously known as Google Apps for Business) is an office suite based on cloud technologies that includes additional features specific to business. Applications in the package can be grouped into four categories (7, 8): Communicate (Gmail, Hangouts and Calendar, Google+), Store (Drive), Collaborate (Docs, Sheets, Forms, Slides and Sites) and Manage (Admin and Vault). There is a free 30-day trial period (up to 10 users). There are different payment options with opportunities for flexible adding new user accounts – Flexible Plan (payment is for the services used during each month) and Annual Plan (the contract is for one year with discounts). Google Apps for Work provides opportunities for offline work – users can create and edit content even when they are not connected to the Internet and synchronize it later when they are online.

Microsoft Office 365 includes traditional office suites components and provides almost all features of standard office. Office 365 provides tools for collaboration and data sharing in real time – documents are stored in the cloud and everyone has access to their latest version. There are options for tracking changes and recovering older versions. The collaboration includes online meetings, portal for sharing corporate videos and etc. Microsoft Office 365 involves enterprise social network Yammer, which supports collaboration and cooperation among employees. There are various options for using Microsoft Office 365 – 3 Business plans and 3 Enterprise plans, which offer different functionality at different prices (9).

Zoho Office Suite is a free software package that includes applications for text processing, spreadsheets and presentations. There are opportunities for synchronizing files across

various devices and maintain different documents versions. Zoho supports all types of Microsoft Office documents, allows export to XML, PDF and LaTeX format. Zoho provides opportunities for sharing files, integration with Google Apps, task management. The package includes application Projects to facilitate projects work. Zoho offers real-time collaboration, such as online meetings, desktop sharing and a private social network Connect that allows employees to share data and collaborate with each other. The main Office Suite advantage is the availability of applications that are specific to business – marketing and finance tools, CRM system, human resources management and others (7, 10).

3.2. Cloud storage services

Cloud storage services allow companies to avoid buying additional hardware for data storage, maintenance in order to prevent data loss, regular activities in data backup. These cloud services enable data sharing between company's employees as well as between company and its partners – customers, suppliers, etc. The main advantages of cloud storage services are:

- **Access to data** anytime and anywhere regardless of hardware devices and software (most cloud solutions provide mobile access to stored data).
- **Data synchronization** between different devices and users.
- **Integration** to the operating system file managers.

Among the most popular cloud storage services are Dropbox, Box, Google Drive and OneDrive.

Dropbox is one of the most popular cloud storage services. Its main advantage is the ability to synchronize data between different devices. The service is available for both individual and business users. **Dropbox for Business** provides additional services such as improved data security by using cipher encryption for file data, unlimited storage, collaboration management tools (tracking data sharing process, restricting access to files or their sharing with external people who are not part of a business account), integration with other applications (over 300,000), etc. Users can connect and at the same time there is a separation between personal and work Dropbox (11).

Box is a cloud service that provides space for data storage – free with certain restrictions as well as paid versions, which are designed primarily for business users. **Box for Business**

offers opportunities for sharing workspace between multiple users. Box allows collaboration by ensuring the security and privacy of data by setting and assigning different permission levels to each collaborator. There are tools for controlling and managing content shared with external users and monitoring users' performance – what content they share and whom they work together. Box supports collaboration on projects by task management which allows assigning and tracking individual tasks to team members and reducing inefficient communication. Box provides opportunities for integration with different applications (12).

Google Drive is part of cloud solutions offered by Google and is not just a service for storing data, but also provides opportunities for real-time interaction. There is free service with some restrictions as well as paid services (**Google Drive for Work**) with unlimited space for data storing. Google Drive allows synchronization of information, which is accessible from different devices. Sharing information can be both internal (with colleagues) and external (with customers and partners), and is even possible with users who do not use Google Drive. Google Drive and Google Docs enable joint work on the same document simultaneously. There are tools for automatic updates and notification of changes in shared documents, tracking and maintaining a history of changes, management of different versions (8).

OneDrive is a Microsoft cloud service, which provides users storage space and remote data access. The service allows integration with Microsoft Office and Windows Phone and different options for uploading and accessing data – via Web, directly from Microsoft Office applications, through mobile apps. OneDrive offers a free personal disk space for data storing. **OneDrive for Business** is a service designed to organizations to store their information which can be accessed, shared and synchronized among many users. The storage service is part of Office 365 or SharePoint Server 2013, which also allows real-time collaboration on documents. OneDrive for Business provides tools for maintaining documents versions and reviewing and approving made changes (13).

3.3. CLOUD BUSINESS INFORMATION SYSTEMS

Today business information systems are an extremely important factor that provides the necessary information for decision-making. Companies implement various software

applications – from traditional (accounting, human resource, warehousing) programs to integrated software solutions (CRM, ERP, BI, etc.). Information systems are expensive software, which is a large investment for companies and requires proper IT infrastructure. More vendors offer cloud based versions of business information systems. Cloud solutions allow transforming the large investment cost into operating expenses, which is suitable for small and medium-sized companies and start-ups.

The advantages of cloud business information systems over the traditional ones are:

- **Flexibility and efficiency.** There is a lower cost for using the service (system) that can vary according to the consumption based on particular needs. Flexibility is in terms of functionality – at any time, companies can choose to add new services (modules) or abandon existing.
- **Improved connectivity.** Companies can quickly provide access to the system or certain modules to its partners in order to work collaboratively that improves cooperation.
- **Easier administration.** Administration and renewal of the system is a liability of the service provider that facilitates IT departments in companies and enables their optimization. Using cloud business information systems is accompanied by some problems. Cloud systems are not as comprehensive and functional as traditional solutions. There are difficulties in adapting cloud services to the specific business and its processes. The integration with already deployed applications (cloud, mobile and traditional), which have to operate in a dynamic environment, is complicated.

Despite these problems and shortcomings cloud systems are a good solution for small and medium companies. They are a not so expensive option for the use of modern business information systems. For companies that have already implemented business systems, a good decision is the integration between cloud and traditional applications. Businesses can add new modules with new functionalities, which are based on cloud technologies, to existing traditional systems. The process of upgrading systems allows easy implementation and expansion of functionality.

CONCLUSION

Cloud technologies are important part of business because they have the potential for flexibility, speed and efficiency of all business processes and activities. The transfer of business in clouds empowers companies to

achieve significant economic benefits without having to invest in building their own IT infrastructure. Cloud computing should not be regarded only as a means of achieving greater savings in terms of hardware and software. They are a prerequisite for building a strategy for business development that transforms the overall activity of companies and over time will lead to more effectiveness and flexibility.

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