

# Cloud Computing Application in Enterprise Information Systems

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**Abstract:** *This article examines the transformative impact of cloud computing on enterprise information systems, emphasizing its role in enhancing operational efficiency, scalability, and data availability in the digital business landscape. By leveraging a comprehensive review of scientific literature and specialized resources, the study explores cloud computing's capabilities to provide on - demand computing resources and services, thereby enabling businesses to eschew the capital and operational costs associated with maintaining physical IT infrastructure. Highlighting cloud computing's flexibility, the analysis delves into public, private, hybrid, and multi - cloud models, elucidating their applicability across different business contexts for improved data security, cost efficiency, and operational agility. The discussion extends to cloud computing's pivotal role in fostering innovation through the emerging technologies integration like the Internet of Things (IoT), serverless computing, and quantum computing, underscoring the strategic advantages businesses can harness to remain competitive and agile in a rapidly evolving digital economy.*

**Keywords:** cloud computing, clouds, modern technologies, enterprise information systems, IT

## 1. Introduction

Cloud computing is an integral element of digital business transformation, providing flexibility, scalability and the availability of any data and services. They allow companies to optimize operational processes and reduce IT infrastructure costs. This technology provides computing resources and services (such as servers, storage, databases, network components, software) over the Internet on a subscription or pay - as - you - go basis. Cloud solutions allow users to avoid the costs of purchasing and maintaining their own IT infrastructure, giving them the flexibility to use resources depending on their current needs and business scale. Cloud computing can be fee - paying or free, depending on the service's purpose, and for both private and commercial purposes. Thus, cloud computing offers resource scalability and elasticity to quickly expand or reduce computing power in response to changing business requirements. This provides businesses with agility and efficiency, improving their ability to innovate and compete in the marketplace. The cloud computing importance cannot be overstated as it provides centralized access to resources, improving business scalability and flexibility in the digital age.

The purpose of the work is to consider the possibilities of using cloud computing in enterprise information systems. To

achieve this goal, the author has studied materials from scientific articles, books and other specialized literature.

### 1) Cloud computing general characteristics

Cloud computing is a model for delivering a variety of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet (“cloud”) to offer faster innovation, flexible resources, and business or specific scalability projects. Cloud computing can be carried out on remote Internet servers, instead of using local servers or personal computers. Previously, people used to run applications or programs with software downloaded on their computers or servers located in their offices. Cloud computing can access the same applications over the Internet.

The basic idea of cloud computing is that most of the computing is done on remote servers. The data is stored and processed by remote servers, also known as cloud servers. This enables a local cloud - connected device to avoid dealing with a heavy computing load.

By remotely hosting software, platforms and databases, cloud servers free up memory and processing power on personal computers. Users can access cloud services securely using credentials provided by the cloud provider [1].

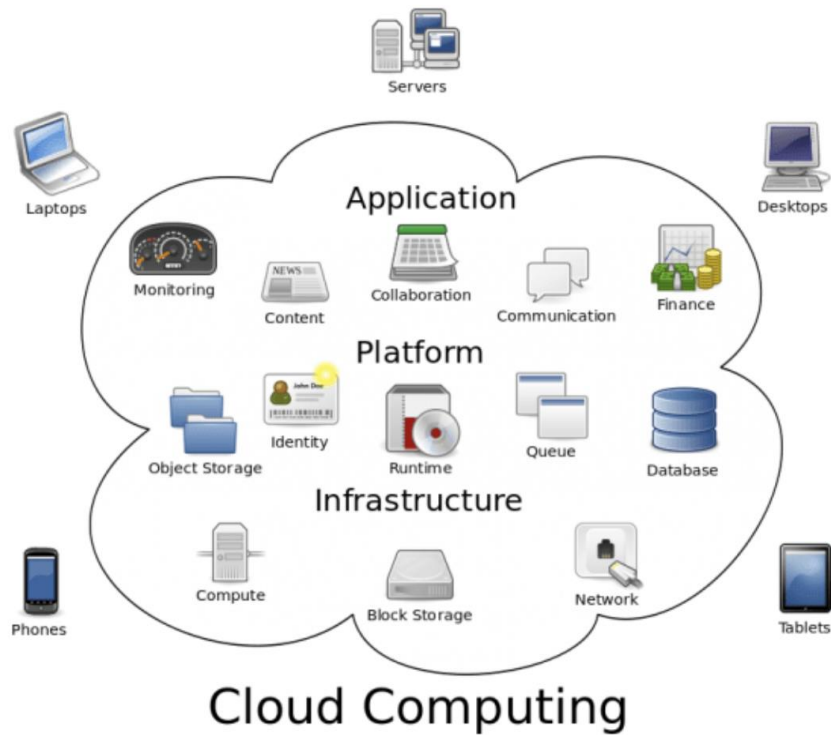


Figure 1: The cloud computing principle

2) Key reasons for the importance of cloud computing for business

Cloud computing plays an important role in enterprises. Cloud computing solutions make it easier for companies and developers to access data stored on the Internet or on a company's internal infrastructure. This technology eliminates the need to depend on hardware resources by relying solely on virtual machines.

- Extensibility. Cloud computing is a scalable process. The IT resources at the disposal of the IT sector have served as the basis for its prosperity for many years. Extensibility means the infrastructure can be expanded to handle growing amounts of data and resources for each application. Cloud computing is actively addressing this problem by helping developers improve their business competitiveness. This is a key aspect of meeting the changing demand for computing resources and development. Thus, the importance of cloud computing for business cannot be overestimated.
- Flexibility. Cloud computing promotes significant flexibility in the work of personnel and company services. This allows employees to be more productive and efficient as they can work from any place with access to enterprise resources via the Internet. This flexibility improves work - life balance and also allows companies to respond more quickly to market changes and customer needs. Hence, cloud computing plays a key role in improving business agility and flexibility. They enable companies and users to quickly adapt to changing market demands by offering scalable storage and computing solutions. Thanks to cloud services, small and medium - sized businesses can compete with large corporations by having access to advanced technologies without investing in expensive infrastructure. It also helps increase innovation as companies can experiment and launch new projects with minimal risk and cost. Overall, cloud computing is

transforming traditional approaches to doing business, making it more flexible, scalable and future - proof.

- Cost savings
- Cloud computing generally reduces IT infrastructure costs. The time required for calculations, data storage and networking costs are significantly reduced avoiding many costs. This also leads to significant results in reducing operating, maintenance and modernization costs.



Figure 2: An example of cost savings when using cloud computing

- Cloud computing provides a competitive advantage in large data analytics. Due to powerful cloud platforms, businesses can efficiently process, analyze and interpret huge amounts of information in real time. It quickly identifies trends, predicts changes in consumer preferences and makes more informed database decisions. In addition, cloud solutions simplify various data sources integration, which is especially important in growing business digitalization and interconnection. Using

advanced machine learning and artificial intelligence technologies, cloud platforms allow companies to process data, and extract valuable insights to develop innovative products and services. Thus, cloud computing improves the efficiency of current operations and opens up new opportunities for business growth and development. In the long term, this contributes to sustainable companies' development, strengthens their market position, and reduces the IT infrastructure cost of starting a business. Competitive advantages also include increased business agility, defensive strategies and strategic alliances. These factors work together to enhance competitiveness and long-term success in a rapidly changing business landscape [2, 3, 4].

3) Cloud service types

Here are different options for cloud solutions that are best suited for different business types.

- Public cloud. This is a set of technologies available to the provider's clients, representing a joint rental of computing power. For example, Amazon Web Services (AWS) provides a public cloud, allowing companies to create virtual servers. This ensures a relatively low cost since it is paid for actual use. Often, startups and small companies choose this solution to reduce time to product release with limited budgets, the main disadvantage is data security.

- Private cloud. This is a cloud infrastructure from cloud providers entirely owned and/or controlled by one specific company. A private cloud provides increased data protection compared to a public cloud, which is better for large IT companies and corporations, but comes at a higher cost and takes longer to deploy.
- Hybrid cloud. A model that involves the company's internal infrastructure and private external cloud resources. It controls sensitive data and flexibility in scaling capacity. However, maintaining a hybrid architecture requires increased costs and highly qualified specialists.
- Multi - cloud is a cloud service strategy in which a company uses two or more cloud services from different providers. Multicloud can include a combination of public and private cloud platforms, as well as cloud services that specialize in different aspects, such as computing, data storage or specific applications. Multi - cloud provides additional flexibility, but can complicate communication with providers and introduce the data loss risk when transferred between clouds. Managing a multi - cloud environment can be more complex, require companies to put more effort into integrating and securing different cloud platforms.

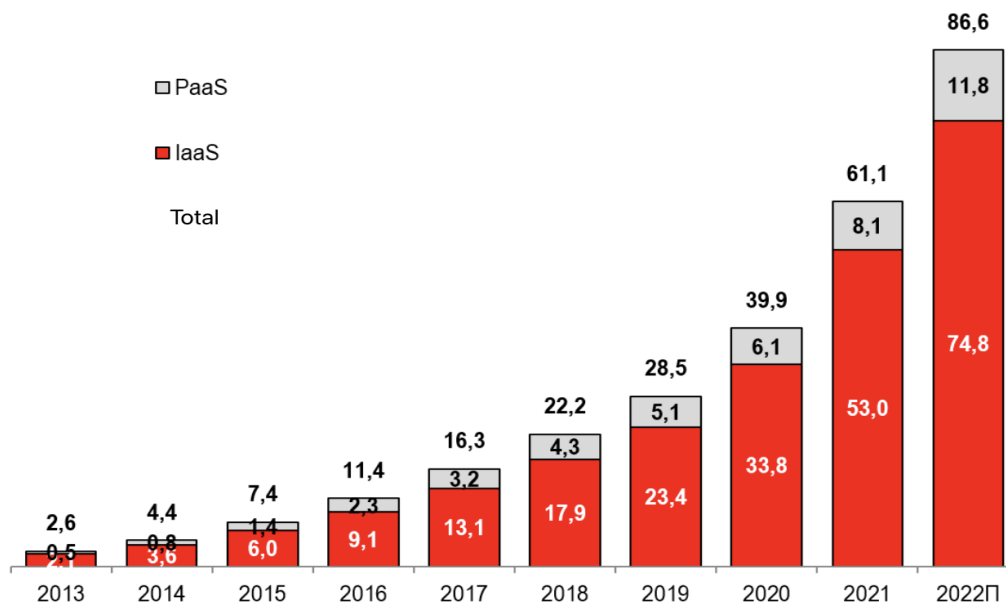


Figure 3: The cloud service market in the territory of the Russian Federation

- IaaS, or Infrastructure as a Service, is a form of cloud computing that provides core computing resources such as virtual machines, networking capabilities, data storage, and servers over the Internet on a pay - per - use basis. In this case, the providers do not develop enterprise applications and do not provide a platform for them. Their responsibility is limited to ensuring the server's security and modernization. Businesses manage the products hosted in the cloud. In fact, the provider's clients are the company's system administrators. The IaaS model is most often used in public clouds. The IBM Softlayer, GigaCloud, Hetzner Cloud platforms provide this infrastructure.
- PaaS—or Platform as a Service—is a form of cloud computing that provides users with an environment to develop, run, and manage applications without having to deal with the complexities of building and maintaining the underlying infrastructure, providing developers with the tools, necessary for quickly creating, testing and deploying applications. For example, the cloud platforms Microsoft Azure or Yandex. Cloud. They include software for application development, an analytics service, tools for automating work, etc. The PaaS model frees the customer from the need to administer the cloud infrastructure. The provider takes on these tasks, providing developers with ready - made tools and speeding up the work.

SaaS, or Software as a Service, is a software delivery model in which applications are available to users over the Internet, usually on a subscription basis. Instead of purchasing and installing software on local computers or servers, users access applications managed and served by the SaaS provider through a web browser. Both B2B clients and ordinary users can choose this model. SaaS is widespread in business and is a popular solution for many types of business applications, including office applications, customer relationship management (CRM), human resource management (HR), financial planning and many others. Examples of popular SaaS applications include Yandex. Disk, Google Workspace, Microsoft Office 365, Salesforce, Dropbox, etc.

#### 4) Comparison of cloud services with local hosting

At the initial stage of cloud computing, this direction became the object of many critics. However, many successfully implemented projects have significantly reduced the level of skepticism and critics have reconsidered the technology. Cloud solutions are superior to local servers by providing:

- 24 - hour access to information for every corporate user with an Internet connection;
- Instant connection to the storage from any device: PC, workstation, smartphone, tablet;
- Mobility: no connection to a specific workplace, the ability to connect from any place, holding online meetings;
- Low cost: companies do not need to purchase and maintain expensive equipment and software, technical staff to maintain local networks;
- Payment is only for the rental of computing power and software licenses (if provided);
- Flexibility: the cloud characteristics are determined in accordance with the client's current resource needs, with the possibility of individual management, changing costs as needed;
- Industrial - grade servers usage: this equipment is available only to large corporations and data centers, while for other companies such investments become prohibitively costly and ineffective;
- Solutions reliability: this model is significantly superior to local networks, servers and computers due to the highly professional equipment usage in a data center, user - friendly interface and information security tools.

Other cloud computing advantages include the ability to configure backups to remote storage, providing a high level of business protection.

Professional application of cloud technology practices is a key element in ensuring the high efficiency of all company departments, regardless of their size and functional characteristics. At the same time, the cloud service introduction brings noticeable advantages:

- IT Department: Cloud services simplify IT infrastructure management, ensuring ease of resource deployment, maintenance and scaling. They also reduce the purchasing cost and maintaining hardware and software.
- Manufacturing Department: Cloud solutions can optimize supply chains, inventory management and manufacturing by providing analytics and forecasting tools for more efficient production planning.

- Research and Development (R&D): Cloud platforms provide powerful computing resources for big data, machine learning and artificial intelligence, accelerating the research and development of new products and services.
- Sales and marketing department. Experts have access to the information they need on any device to instantly respond to problems, make changes, and optimize business decisions. Data analysis, customer behavior prediction and marketing strategy development become more detailed.
- HR department. Document flow is optimized, interaction with other departments is improved, and hiring and firing are simplified. Cloud technologies provide training and advanced training in a convenient format without interruption from work.
- Customer support. Customers obtain a self - service option, which reduces the load on operators. A centralized database maintains a complete sales history, integrating all transaction decisions between seller and buyer.

Thus, cloud services increase the company's efficiency, flexibility and competitiveness as a whole, and these are just general aspects. In practice, each company, especially large ones, has its own characteristics that complement the list of benefits from the implementation of cloud - based enterprise IT systems.

#### 5) Cloud computing innovative solutions

Cloud computing innovations represent the following solutions:

- Internet of Things (IoT). Internet - connected devices interact with each other and with control software, creating an autonomous loop. This enables real - time information exchange.
- Serverless computing. These solutions are becoming increasingly popular due to automatic scalability, no server hardware administration, and instant resource provisioning.
- Quantum computing. Quantum models, such as Microsoft Azure Quantum, are optimal for working with big data and are hosted in cloud services, providing access to powerful computing resources - this opens up new opportunities for experimenting with programs [6].
- Integration of Artificial Intelligence and Machine Learning: Cloud platforms implement AI and machine learning to automate processes, improve efficiency and create intelligent solutions.

The above innovations help businesses improve efficiency, reduce costs and stimulate innovative growth.

## 2. Conclusion

Thus, cloud technologies are an excellent solution that can significantly increase business profits in any industry and significantly reduce costs. Virtual services can effectively save both money and time by focusing on important projects. Regardless of the online solution model, cloud computing benefits both small and large businesses. The key advantages are as follows:

- Savings: To avoid costs for equipment, its maintenance and updating. Payment occurs only for actual resource usage.
- Scaling: To provide the ability to expand server capacity during periods of increased load, for example, on sales days. Storage size and processing power can also easily suit your needs.
- Availability: It guarantees access to work resources from any place, the time of which depends only on the Internet speed.
- Productivity: To organize the joint work of several employees, which improves the interaction of colleagues from different departments.
- Integration: To integrate into the organization's infrastructure and not require additional effort to customize to specific needs.
- New Horizons: To provide advanced tools and software that can solve a variety of business problems and optimize the company's infrastructure.
- Independence: To provide freedom of choice of hardware platform, allowing employees to use services from both work and personal computers and smartphones.
- Reliability: Large suppliers who own a data center's network operate stably, without critical failures and accidents, which ensures high reliability.
- Cloud server security is ensured through complex, multi-layered security measures that include data encryption, identity and access management, and regularly updating security systems to counter the latest threats. Cloud providers also adhere to strict compliance standards and conduct regular audits to ensure a high security level and reliability in data storage and processing.

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