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Denys Dolishniak
Svitlana Piddubchak

CLOUD COMPUTING AND ITS IMPACT ON MODERN SOFTWARE DEVELOPMENT

Vinnytsia National Technical University

Анотація

У цій статті досліджується вплив хмарних обчислень на сучасну розробку програмного забезпечення. Висвітлюються ключові аспекти використання хмарних технологій, такі як масштабованість, зниження витрат, безпека даних та прискорення процесу розробки. Розглядаються також моделі хмарних обчислень (IaaS, PaaS, SaaS), особливості їхнього використання та інтеграції у сучасні проєкти. Крім того, аналізуються виклики, зокрема питання конфіденційності, управління ресурсами, залежність від провайдерів хмарних послуг та регулювання з боку законодавчих органів. Наведено приклади успішного використання хмарних обчислень у різних сферах програмної інженерії, таких як фінанси, медицина, електронна комерція та розваги.

Ключові слова: хмарні обчислення, програмна інженерія, масштабованість, безпека, ефективність, IaaS, PaaS, SaaS.

Abstract

This article explores the impact of cloud computing on modern software development. It highlights key aspects of cloud technology usage, such as scalability, cost reduction, data security, and accelerated development processes. Additionally, it addresses potential challenges, including privacy concerns, resource management, dependency on cloud service providers, and regulatory compliance. The study also examines different cloud computing models (IaaS, PaaS, SaaS) and their integration into contemporary software projects. Examples of successful applications of cloud computing in various industries, including finance, healthcare, e-commerce, and entertainment, are provided.

Keywords: cloud computing, software engineering, scalability, security, efficiency, IaaS, PaaS, SaaS.

Introduction

Cloud computing has revolutionized modern software development by providing scalable and flexible solutions for businesses and developers. With the increasing demand for high-performance applications and cost-efficient infrastructure, cloud platforms offer various advantages over traditional on-premise solutions. Companies worldwide adopt cloud technologies to enhance collaboration, streamline development workflows, and optimize resource allocation.

Cloud computing allows organizations to access computing power, storage, and networking resources on demand without the need for significant upfront investments in hardware. It is categorized into three main models: Infrastructure as a Service (IaaS), which provides virtualized computing resources; Platform as a Service (PaaS), which offers a development environment for software creation; and Software as a Service (SaaS), which delivers applications over the internet. Understanding these models is crucial for businesses and developers seeking to maximize efficiency and innovation.

Despite the numerous advantages of cloud computing, there are also challenges, including concerns about data security, service reliability, compliance with regulations, and vendor lock-in. This paper aims to explore the role of cloud computing in modern software development, analyzing both its benefits and potential drawbacks.

Research Results

The study results indicate that cloud computing plays a crucial role in transforming software development processes. Key findings include:

Scalability and Flexibility – Cloud platforms provide dynamic resource allocation, allowing developers to scale applications effortlessly based on user demand. This is particularly beneficial for startups and enterprises with fluctuating workloads.

Cost Efficiency – Organizations save on infrastructure costs by leveraging pay-as-you-go cloud services, reducing expenses related to hardware procurement and maintenance. Companies no longer need to invest in expensive servers or dedicated data centers.

Enhanced Security – Leading cloud providers implement advanced security measures, such as encryption, intrusion detection, and multi-factor authentication, to protect sensitive data. However, businesses must also implement their own security policies to mitigate potential risks.

Accelerated Development and Deployment – Cloud-based development environments enable teams to collaborate in real time, integrate continuous deployment pipelines, and automated testing processes. DevOps practices thrive in cloud environments, allowing faster release cycles and higher software quality.

Cloud Computing Models:

IaaS (Infrastructure as a Service): Provides virtual machines, storage, and networking resources. Examples: AWS EC2, Google Compute Engine, Microsoft Azure Virtual Machines.

PaaS (Platform as a Service): Offers an environment for developers to build and deploy applications without managing underlying infrastructure. Examples: Google App Engine, AWS Elastic Beanstalk, Microsoft Azure App Services.

SaaS (Software as a Service): Delivers software applications over the internet, eliminating the need for local installation. Examples: Google Workspace, Microsoft Office 365, Salesforce.

Challenges and Risks:

Data Privacy and Security – Cloud providers handle large amounts of sensitive data, making security breaches a significant concern.

Service Outages – Downtime in cloud services can impact business operations, making redundancy and failover strategies crucial.

Regulatory Compliance – Different industries have strict regulations regarding data storage and processing (e.g., GDPR, HIPAA).

Vendor Lock-in – Companies relying on a single cloud provider may face difficulties migrating to alternative solutions.

Many companies, including Amazon Web Services (AWS), Microsoft Azure, and GoogleCloud Platform, have demonstrated the effectiveness of cloud computing in enhancing software development processes. Various industries leverage cloud computing for increased agility, innovation, and cost savings.

Conclusion

Cloud computing has significantly impacted modern software development by providing scalable, cost-effective, and secure solutions. The adoption of cloud-based models such as IaaS, PaaS, and SaaS has transformed how businesses and developers approach software engineering. While cloud computing offers numerous advantages, including scalability, flexibility, and improved collaboration, developers must also consider challenges such as data security, service availability, and regulatory compliance.

As technology continues to evolve, future advancements in cloud computing will focus on improving security, enhancing automation, and integrating artificial intelligence into cloud services. Organizations must stay informed about best practices and emerging trends to maximize the benefits of cloud computing in software development and maintain a competitive edge in the industry.

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Denys Dolishniak – student of group 2KN-23b, faculty of intellectual information technologies and automation, Vinnytsia National Technical University, Vinnytsia, e-mail: dolishnyak.denus@gmail.com
Supervisor: ***Svitlana Y. Piddubchak*** – a teacher of English, Foreign Languages Department, Vinnytsia National Technical University, Vinnytsia, e-mail: piddubchak@vntu.edu.ua

Долішняк Денис Романович – студент групи 2КН-23б, факультету інтелектуальних інформаційних технологій та автоматизації, Вінницький національний технічний університет, Вінниця, e-mail: dolishnyak.denus@gmail.com
Науковий керівник: ***Піддубчак Світлана Юріївна*** – викладач кафедри іноземних мов, Вінницький національний технічний університет, м. Вінниця, e-mail: piddubchak@vntu.edu.ua