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ANALYSIS OF DELIVERY MODELS IN CLOUD ARCHITECTURE

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ANNOTATION

The article presents the results of an analysis of various delivery models in cloud architecture. Common business scenarios for IaaS services are shown, and concepts of public cloud, private cloud, and hybrid cloud models are also introduced. The advantages of using IaaS infrastructure models and areas of their use are shown.

Keywords: *IaaS, SaaS, PaaS, AWS, testing and development, cloud architecture, data storage, archiving and recovery, web applications, high performance computing, benefits of IaaS.*

АНАЛИЗ МОДЕЛЕЙ ДОСТАВКИ В ОБЛАЧНОЙ АРХИТЕКТУРЕ

АННОТАЦИЯ

В статье представлены результаты анализа различных моделей доставки в облачной архитектуре. Показаны распространенные бизнес-сценарии для сервисов IaaS, также приведены понятия моделей публичного облака, частного облака и гибридного облака. Показаны преимущества использования моделей инфраструктуры IaaS и области их использования.

Ключевые слова: *IaaS, SaaS, PaaS, AWS, тестирование и разработка, облачная архитектура, хранение данных, архивирование и восстановление, веб-приложения, высокопроизводительные вычисления, преимущества IaaS.*

Introduction. Every cloud hardware and software component help developers provision virtual resources and deploy workloads in the cloud. There are many different types of cloud services that perform specialized cloud computing at different levels. The following components simplify cloud deployment.

Servers are powerful computers installed by the cloud service provider in different data centers. Each server can be equipped with multiple processor cores and large memory storage, providing reliable computing capabilities. Cloud service providers use groups of interconnected servers to provide a wide range of cloud computing services. Networking is the cloud's ability to connect multiple storage media, applications, microservices, and other workloads across multiple servers and data centers. To provide cloud connectivity, cloud service providers use networking equipment such as load balancers and network switches to enable you to establish communication links and manage traffic in the cloud environment. At the same time, developers use load balancing to reduce network latency and improve application performance as traffic demand increases [1].

Storage is space for permanent storage of data. It is hosted on a physical architecture to store cloud workloads. You can connect to cloud storage on any device with Internet access. Cloud storage is scalable, and if necessary, you can increase its size, change regional availability and type. For example, developers prefer block storage for cloud applications that require ultra-high read and write performance.

Software. Virtualized cloud infrastructure resources are accessed using GUI software. To make the cloud experience easier, developers are using virtual machines (VMs), analytics, data management tools, and more [2,3].

Research object and methods. What are delivery models in cloud architecture? Cloud architecture refers to the use of distributed computing resources to run web applications at scale. It helps organizations implement their cloud strategies using multiple cloud infrastructure delivery models.

Software as a service (SaaS) is a popular cloud computing service that allows users to access software through a browser. Developers create web applications and deploy them on cloud infrastructure. They then allow users to subscribe to the app for a fee. Because the developers manage the SaaS entirely, users don't have to update or troubleshoot the application if problems arise.

Using SaaS, users do not need to download and install applications on their devices. In contrast, a SaaS subscription gives you the flexibility to manage your software costs and avoid purchasing separate licenses.

Platform as a Service (PaaS) is a cloud computing model that provides developers with the resources they need to build, test, and deploy applications. Instead of handling platform development, database integration, containerization, and other software requirements themselves, developers subscribe to a PaaS.

The cloud service provider takes care of the development environment so that developers can focus on building the application. Moreover, software development teams can work more efficiently using PaaS compared to consolidating code across multiple machines [4,5].

Infrastructure as a Service (IaaS) provides organizations with a full range of cloud computing infrastructure as a paid service. This model provides access to cloud servers, storage media, network tools, operating systems and services owned by an external cloud service provider.

In addition to these cloud computing components, providers may also offer services such as serverless architectures, short message service (SMS), and DNS. With IaaS, organizations gain full control over the entire set of technologies that make up the physical cloud architecture.

What are cloud infrastructure adoption models? Organizations are using cloud infrastructure to expand software use cases beyond traditional computing environments. They choose different cloud infrastructure options according to their operational requirements.

The public cloud model enables organizations to use cloud computing in a multi-tenant environment. Instead of owning the underlying infrastructure, you rent cloud infrastructure from third-party providers.

Public cloud services provide companies with multiple options for accessing infrastructure. You may pay more for dedicated physical infrastructure: it is managed solely by the provider, but only you will have access to and use of it. Plus, you can choose the cost-effective option of accessing shared physical resources in the form of fully isolated virtual environments. You can take advantage of low-cost public cloud providers that provide elasticity, recovery, and availability.

A private cloud is a physical infrastructure owned and operated by a single organization. Organizations are creating on-premises with cloud environments. A private cloud is a physical infrastructure owned and operated by a single organization. Organizations are creating on-premises cloud environments in their data centers. Unlike a public cloud, private clouds do not share underlying physical resources with other users. Organizations are responsible for provisioning, managing, and maintaining all hardware and software components of a private cloud architecture. Moreover, the cost of creating and expanding private cloud environments is higher compared to public clouds. That’s why some organizations use a managed private cloud service to host internal workloads.

The hybrid cloud model allows an organization to use both private and public clouds simultaneously. The public cloud provides access to resources from different

geographical locations and makes it possible to share them. At the same time, a private cloud provides a self-managed infrastructure for storing sensitive data in an isolated environment [6,7].

Cloud architecture describes the methods, technologies, and platforms used by developers to design cloud applications. This includes microservices, APIs, containers, and resources that enable you to deploy, maintain, and scale services in the cloud. Cloud architecture can be thought of as a blueprint for how individual cloud technologies interact.

Meanwhile, the cloud infrastructure consists of physical resources and software components that ensure the operation of the created cloud service. Cloud infrastructure provides the computing power, connectivity, data storage, and other capabilities developers need to support cloud technologies.

Research results and their discussion. How can AWS meet your cloud infrastructure needs? Amazon Web Services (AWS) global cloud infrastructure is the most secure, comprehensive, and reliable cloud platform. We offer more than 200 full-featured services delivered from data centers around the world. Using AWS services, you can create a cloud infrastructure that meets all your requirements. For example, quickly launch an application with worldwide access and easily manage workloads, or deploy the application closer to end users to ensure latency of no more than a few milliseconds. With AWS, you can design, build, and manage a secure, highly available cloud architecture [8,9].

Infrastructure as a Service (IaaS) is a type of cloud computing service that provides core computing, storage, and networking resources on an on-demand, pay-as-you-go basis. IaaS is one of four types of cloud services, which also include software as a service (SaaS), platform as a service (PaaS), and serverless computing.

Migrating an organization’s infrastructure to an IaaS solution will help reduce the cost of maintaining local data centers, save on hardware, and gain real-time business intelligence. IaaS solutions allow you to flexibly scale IT resources as demand increases and decreases. They also help you quickly provision new applications and improve the reliability of your underlying infrastructure.

IaaS eliminates the cost and complexity associated with purchasing and managing physical servers and data center infrastructure. Each resource is provided as a separate component of the service, and you pay for a specific resource only as long as you need it. A cloud computing service provider, such as Azure, manages the infrastructure, and you purchase, install, configure, and manage your own software (including operating systems, middleware, and applications).

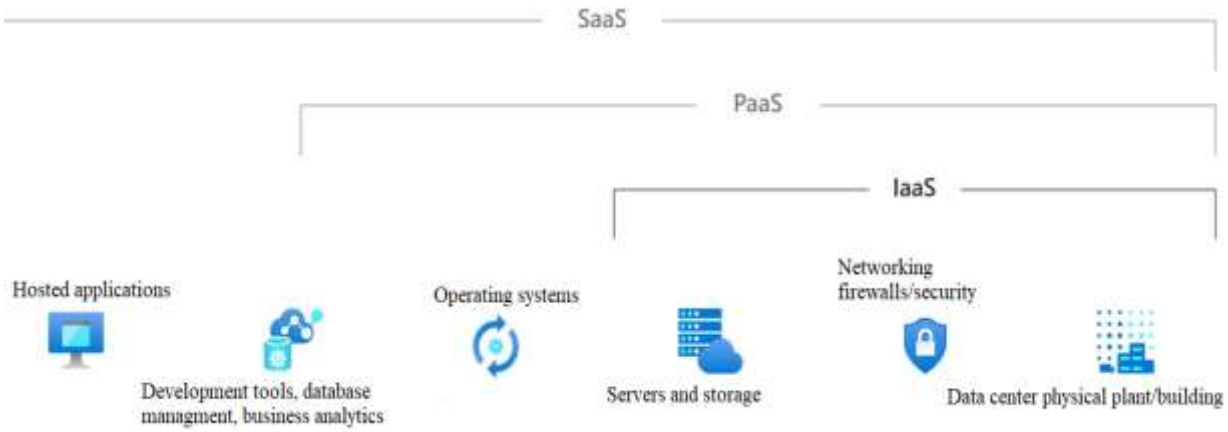

Fig.1. Common IaaS business scenario models

Scientific research results and conclusion. Lift-and-shift migration. This is the fastest and least expensive method of migrating an application or workload to the cloud. Without refactoring the underlying architecture, you can scale up, improve the performance and security of your application or workload, and reduce the cost of running it.

Testing and development. Your team can quickly spin up and tear down test and development environments, bringing new applications to market faster. IaaS allows you to scale up and down your test and development environments quickly and cost-effectively [10].

Data storage, archiving and recovery. Your organization eliminates the capital investment and hassle of data warehousing and storage management, which typically require highly trained data management and compliance professionals. IaaS allows you to cope with unpredictable demand and steadily growing data storage needs. It can also simplify the planning and management of backup and recovery systems.

Web Applications. IaaS provides the entire infrastructure to support web applications, including storage, web and application servers, and network resources. An organization can quickly deploy IaaS-based web applications and easily scale up and down the infrastructure when demand for applications becomes unpredictable.

High Performance Computing. High-performance computing on supercomputers, computer networks or clusters helps solve complex problems involving millions of variables and large volumes of calculations. Examples include earthquake and protein folding simulations, climate and weather change forecasts, financial modeling, and product design evaluation [11,12].

Final conclusion. Benefits of IaaS. Reduce capital investment and optimize costs. IaaS eliminates the cost of setting up and managing a physical data center, making it a cost-effective option for migrating to the cloud. Pay-as-you-go subscription models

from IaaS providers can help reduce hardware and maintenance costs so your IT department can focus on core business tasks.

Increase the scale and performance of IT workloads. IaaS allows you to scale globally to meet peak resource demand periods. This way, you can deliver IT resources to employees anywhere in the world faster and improve application performance.

Improved system stability, reliability and support capabilities. With IaaS, there is no need to maintain and update software and hardware or troubleshoot hardware problems. With proper agreement in place, the service provider ensures that the infrastructure is reliable and meets service level agreements [13,14].

Improved business continuity and disaster recovery. Implementing high availability, business continuity, and disaster recovery is costly because it requires many pieces of equipment and people. But with the right SLA in place, IaaS can help reduce these costs. It also helps you access applications and data as usual during a disaster or outage.

Increased security. With the right service agreement in place, your cloud service provider can offer a higher level of application and data security than you could provide on your own.

Help drive innovation and accelerate user access to new applications. With IaaS, once you decide to launch a new product or initiative, the necessary computing infrastructure can be provisioned in minutes or hours rather than days or weeks. And because you don’t have to set up the underlying infrastructure, IaaS allows you to deliver applications to users faster.

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