Types of cloud deployment

Z K Tavbulatova\textsuperscript{1}, K Zhigalov\textsuperscript{2,3}, S Yu Kuznetsova\textsuperscript{4} and A M Patrusova\textsuperscript{5}

\textsuperscript{1}Chechen State University, 32 Sheripov street, Grozny, Russia
\textsuperscript{2,3}V.A. Trapeznikov Institute of Control Sciences of the Russian Academy of Sciences, Moscow, Russia
\textsuperscript{3}Kh. Ibragimov Complex Institute of the Russian Academy of Sciences, Russia
\textsuperscript{4}Irkutsk National Research Technical University, 83, Lermontov Str., Irkutsk, 664074, Russia
\textsuperscript{5}Bratsk State University, 40, Makarenko Str., Bratsk, Russia

Abstract. As network data rates increase, so does the spread of virtualization. Each type of cloud fits better or worse to a certain task. The paper details the major types of clouds currently in use and their deployment models. The paper can be useful to both simple users and information security professionals to deploy both private home family clouds and cloud computing systems of large corporations.

1. Introduction
When choosing a specific cloud solution, it is essential to know its properties and characteristics, otherwise you risk spending significant information resources and not getting the result you need.

There are the following cloud types (Figure 1):
1. Private cloud – used in a single organization.
2. Community cloud – used by a certain consumer community to solve common problems.
3. Public cloud – used for free by a wide range of users.
4. Hybrid cloud – a combination of various cloud infrastructure solutions interconnected by standardized or private technologies that enable data and application sharing.

2. Results
Let us consider each cloud deployment model in more detail, highlight the advantages and disadvantages of each model, and perform a comparative analysis.

Private cloud is an IT infrastructure used for a single company with many departments, users, customers, and contractors that provides all information service needs. The ideal way to deploy a private cloud is to organize the cloud throughout the organization.

Private clouds are used in the company to achieve the following goals:
• To improve enterprise IT performance and optimization.
• To take advantage of the development and deployment of new products and services, drive goods and services into the consumer market, and increase consumer value [2].
• To change business models.
• To modify previously established business model standards to meet non-trivial needs.
Companiess need to choose a private cloud deployment model (Figure 2) if:
• the level of information security is quite high;
• data security and confidentiality requirements are high;
• creating a data center is a profitable business.

![Figure 1. Cloud deployment models]

Advantages of private clouds:

![Figure 2. Private cloud management diagram]
• It is possible to set up the highest protection and storage requirements.
• Improved performance and data transfer speed.
• Quick scaling of organization’s resources.
• Easy-to-use payment system can significantly reduce energy and maintenance costs of a private cloud system.

You can use one of the ready solutions shown in Table 1 to deploy a private cloud.

Table 1. Ready solutions for private cloud deployment

| Name                                           | Description                                                                 |
|------------------------------------------------|-----------------------------------------------------------------------------|
| Dell Active System                             | Family of integrated system for deployment and virtualization of a private cloud. |
| VCE vBlock                                     | Cloud infrastructure “out of the box”.                                       |
| Hewlett Packard Enterprise OpenStack Helion    | Complex for the creation of private cloud environment.                       |
| VMware vCloud Suite, VMware Integrated OpenStack | Software solutions for infrastructure services.                             |

Disadvantages of private clouds:
• Need to invest in hardware and licensed software.
• Cloud support requires administration costs.
• Significant risks include loss of health and data due to physical threats.
• Large number of human and material resources to create and maintain cloud performance.

Public cloud
The public cloud (Figure 3) is an IT infrastructure designed to provide resources to multiple companies. The owner of the resource is responsible for managing and maintaining the cloud. Users can manage and control hosted resources through the self-service portal thus eliminating the dependency on provider support.

Advantages of public clouds:
• Simple and efficient use.
• Unlimited amount of computing resources.
• High data security at physical and software levels through the use of large data centers.
• Fast and simple implementation of the new information system.
• Only Internet access is required.
• Flexible system of tariff plans for cloud use.
• Lower hardware and software costs.
• Enterprise stability increases with virtual infrastructure mirrors from different service providers.

You can use one of the ready solutions in Table 2 to deploy the public cloud.

| Name          | Description                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Windows Azure | Cloud infrastructure operating with various business applications, services and tasks in a cloud, allowing creating, deploying and managing applications under Microsoft control. |
| Google        | Free cloud service with a wide range of settings that perfectly works on smartphones with Android operating system.                              |
| AWS           | The best known cloud that uses several data processing centers located in different regions.                                                |

Disadvantages of public clouds:
• Inability to control the cloud by an organization.
• Complete dependence on the Internet.
• Inability to handle large amounts of data.
• Dependency on service provider.

**Hybrid cloud**

Hybrid Cloud (Figure 4) is an IT infrastructure that quickly increases the available processing power with provider resources, and moves loads from the local infrastructure to the cloud and back [3].

![Hybrid Cloud Diagram](image)

**Figure 4. Hybrid cloud**

A cloud is considered hybrid if:
• The company also has an external cloud.
• Public cloud contains client applications that are impractical to release from your own cloud.
• Critical data is in the inner cloud and the rest is in the outer cloud.
Advantages of hybrid clouds.
• An organization can easily expand resources anytime with additional cloud services.
• Data security
• Reduction of costs by transferring resources to cloud providers.
• Performance is improved by the ability to move the load from the private cloud to the public cloud.

You can use one of the ready solutions shown in Table 3 to deploy a hybrid cloud.

Table 3. Ready solutions for hybrid cloud deployment.

| Name          | Description                                                                 |
|---------------|-----------------------------------------------------------------------------|
| Windows Azure | Possibility of transferring private and public clouds into Azure system to create hybrid clouds, allows combining personal corporate infrastructure with that of the provider. |
| VMware        | Allows transferring data and applications between clouds without loss of data and functional, creating a single network, organizing a single cloud space, and supporting a single file catalog. |
| KROK          | Possibility of setting the intrinsic addressing, routing, combining private and public clouds into a single space, setting VPN between clouds, organizing public cloud self-service portal. |

Community cloud
The community cloud (Figure 5) allows remotely storing and accessing files on different computers.

The community cloud can be organized in cooperative ownership or by a cloud provider.

Cloud deployment methods

![Cloud deployment methods diagram](image)

Figure 5. Community cloud

Advantages of community clouds:
• Data availability from anywhere in the world.
• Low cost of resource utilization.

One of the ready solutions of community clouds is used for the community cloud.
• DropBox.
• Google Drive.
• Yandex Disk.

Disadvantages of community clouds:
• High cost of deploying and organizing the cloud.
• Low throughput.
• Low level of data protection.
• Limited data volume.

3. Conclusion

Each cloud deployment model has its own consumer. Community clouds are well suited for personal purposes. Hybrid clouds are a good solution for small businesses. For large organizations, private clouds are ideal for their data.

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