Infrastructure as a service (IaaS)

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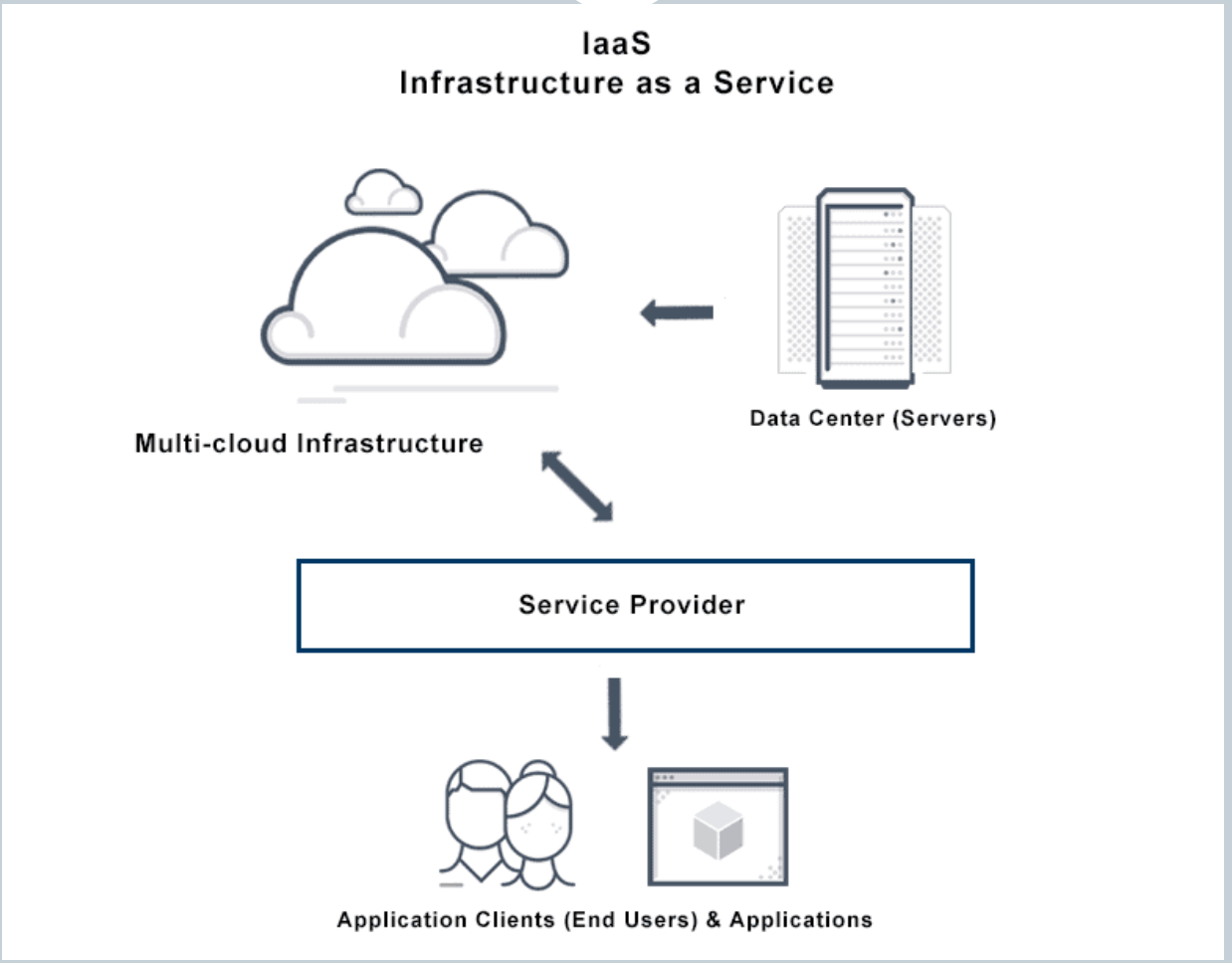
What is IaaS?

Infrastructure as a Service (IaaS) is a cloud computing service where enterprises *rent or lease servers for compute and storage in the cloud*. Users can run any operating system or applications on the rented servers *without the maintenance and operating costs* of those servers. Other advantages of Infrastructure as a Service include giving customers access to servers in geographic locations close to their end users. IaaS automatically scales, both up and down, depending on demand and provides guaranteed service-level agreement (SLA) both in terms of uptime and performance. It eliminates the need to manually provision and manage physical servers in data centers.\

Examples of IaaS:

Digital Ocean, Linode, Rackspace, Amazon Web Services (AWS), Cisco Metapod, Microsoft Azure, Google Compute Engine (GCE)

Infrastructure



How Does IaaS Work?

- Primarily, the provider is responsible for the physical environment. That is the operation, structure, and security of hardware resources. Put simply, the IaaS provider manages hard drives, servers, virtualization, networking, and storage.

Here is a detailed list of the responsibilities of the IaaS provider:

- **Create**, **maintain**, and **manage** data center infrastructure
- Provide **storage space** and **computing power** to the customer
- Provide **databases**, **servers**, and **network structures**
- Establish a **virtualized environment** where consumers can easily access the IaaS resources
- Offer a solution or platform that enables customers to **access**, **administer**, and **control** the virtualized IT infrastructure

Management of IaaS

IaaS

Servers and storage

Networking
firewalls/security

Data center physical
plant/building

Characteristics of IaaS

- Resources are available as a service
- The cost varies depending on consumption
- Services are highly scalable
- Typically includes multiple users on a single piece of hardware
- Provides complete control of the infrastructure to organizations
- Dynamic and flexible

When to use IaaS

- If it is **a startup or a small company,** IaaS is a great option because you don't have to spend the time or money trying to create hardware and software.

- IaaS is also beneficial for **large organizations** that wish to have complete control over their applications and infrastructures, but are looking to only purchase what is actually consumed or needed.

When to use IaaS

- For **rapidly growing companies**, IaaS can be a good option since you don't have to commit to a specific hardware or software as your needs change and evolve.

- It also helps if you are **unsure what demands a new application** will require as there is a lot of flexibility to scale up or down as needed.

Common IaaS business scenarios

- **Test and development:** Teams can quickly set up and dismantle test and development environments, bringing new applications to market faster. IaaS makes it quick and economical to scale up dev-test environments up and down.

- **Website hosting:** Running websites using IaaS can be less expensive than traditional web hosting.

Common IaaS business scenarios

- **Storage, backup, and recovery:** Organizations avoid the capital outlay for storage and complexity of storage management, which typically requires a skilled staff to manage data and meet legal and compliance requirements. IaaS is useful for handling unpredictable demand and steadily growing storage needs. It can also simplify planning and management of backup and recovery systems.

- **Web apps:** IaaS provides all the infrastructure to support web apps, including storage, web and application servers, and networking resources. Organizations can quickly deploy web apps on IaaS and easily scale infrastructure up and down when demand for the apps is unpredictable.

Common IaaS business scenarios

- **High-performance computing:** High-performance computing (HPC) on supercomputers, computer grids, or computer clusters helps solve complex problems involving millions of variables or calculations. **Examples include earthquake and protein folding simulations, climate and weather predictions, financial modeling, and evaluating product designs.**

- **Big data analysis:** Big data is a popular term for massive data sets that contain potentially valuable patterns, trends, and associations. Mining data sets to locate or tease out these hidden patterns requires a huge amount of processing power, which IaaS economically provides.

Advantages of IaaS

- **Eliminates capital expense and reduces ongoing cost.**
- **Improves business continuity and disaster recovery.**
- **Innovate rapidly.**
- **Respond quicker to shifting business conditions.**
- **Focus on the core business.**
- **Increase stability, reliability, and supportability.**
- **Better security.**
- **Gets new apps to users faster.**

Limitations of IaaS

- **Security:** While the customer is in control of the apps, data, middleware and the OS platform, security threats can still be sourced from the host or other VMs. Insider threat or system vulnerabilities may expose data communication between the host infrastructure and VMs to unauthorized entities.

- **Legacy Systems Operating in the Cloud:** While customers can run legacy apps in the cloud, the infrastructure may not be designed to deliver specific controls to secure the legacy apps. Minor enhancement to legacy apps may be required before migrating them to the cloud, possibly leading to new security issues unless adequately tested for security and performance in the IaaS systems.

Limitations of IaaS

- **Internal Resources and Training:** Additional resources and training may be required for the workforce to learn how to effectively manage the infrastructure. Customers will be responsible for data security, backup and business continuity. Due to inadequate control into the infrastructure however, monitoring and management of the resources may be difficult without adequate training and resources available in house.

- **Multitenant Security:** Since the hardware resources are dynamically allocated across users as made available, the vendor is required to ensure that other customers cannot access data deposited to storage assets by previous customers. Similarly, customers must rely on the vendor to ensure that VMs are adequately isolated within the multitenant cloud architecture.