What Is Infrastructure as a Service?

Infrastructure as a Service (IaaS) is a business model that delivers IT infrastructure like [compute](https://aws.amazon.com/what-is/compute/), [storage](https://aws.amazon.com/what-is/cloud-storage/), and network resources on a pay-as-you-go basis over the internet. You can use IaaS to request and configure the resources you require to run your applications and IT systems. You are responsible for deploying, maintaining, and supporting your applications, and the IaaS provider is responsible for maintaining the physical infrastructure. Infrastructure as a Service gives you flexibility and control over your IT resources in a cost-effective manner.

Why is Infrastructure as a Service important?

You can use IaaS to scale your compute capacity while reducing your IT expenditure. Traditionally, enterprises purchased and maintained their own computing devices in an on-premises data center. However, this often required a heavy up-front investment to handle only occasionally high workloads. For example, an e-commerce company gets three times more application traffic during the holiday season. To handle this traffic, they have to purchase additional server machines, which remain idle for the rest of the year.

To overcome this challenge, IaaS vendors maintain highly secure data centers with a large volume of hardware devices. They give you access to this cloud computing infrastructure on a pay-as-you-go basis. You get flexible and secure access to practically unlimited resources so that you can meet all your business, legal, and compliance requirements.

What are the benefits of Infrastructure as a Service?

The IaaS model offers benefits to modern enterprises like the following:

**Speed**

You can provision any number of resources within minutes, testing, and launching new ideas to market much faster. You can focus on your core business activities because others fully manage the IT infrastructure and computing resources.

**Performance**

Geographically distributed data centers can be used to scale up your applications in locations that are physically closer to your customers. This might not be possible on your own if you have a limited server capacity and geographic reach. IaaS solutions give you a lot more options that you can use to both increase compute performance and reduce network latency.

**Reliability**

IaaS vendors offer a highly reliable environment where replacement virtual machines can be rapidly and predictably commissioned.

**Back up and recovery**

IaaS vendors give you access to unlimited infrastructure for backup and disaster recovery. For example, you can duplicate your applications across multiple servers so that if one fails, another takes over. Similarly, you can sync data backups automatically and frequently to achieve redundancy and business continuity

**Competitive pricing**

Compute, storage, and networking can be used as you go and are instrumental to most other services.  Customers will pay only for the resources they use which encourages more efficient IT resource management and promote innovation by making cloud services affordable to small businesses.

What are the use cases of Infrastructure as a Service?

You can use infrastructure to improve operational efficiency and prioritize solution delivery over infrastructure management. An IaaS vendor can support you to improve customer experience with high-performing, fully managed infrastructure. Let’s look at some example use cases below.

High performance computing

Complex problems like analyzing large volumes of data or solving physics and chemistry equations require significant computational power. It is more efficient and cost-effective to solve these problems on IaaS infrastructure instead of running your own resources.

Website hosting

Organizations use infrastructure to host high performing web applications that are secure, scalable, and fully customizable to meet their content delivery needs. For example, [web hosting](https://aws.amazon.com/what-is/web-hosting/) can be used to build a range of websites, from simple information sites to complex data delivery systems.

Big data analytics

Companies analyze data to derive business intelligence and actionable insights. Cloud infrastructure includes data warehousing technology to store large volumes of data in an integrated way. An IaaS vendor supports [big data analytics](https://aws.amazon.com/what-is/data-analytics/) by providing services that you can use to manage data more efficiently.

App development

You can use cloud infrastructure to quickly set up separate test and development environments. You can experiment and test new ideas in isolation or create common development environments for the whole team.

How does Infrastructure as a Service work?

IaaS works on the principle of virtualization. An IaaS vendor lets you select the type and configuration of the infrastructure you require. The system then automatically creates digital versions of the underlying infrastructure. These virtualized computing resources mimic the behavior of physical resources. For you and your applications, everything works the same as it would on a physical device.

I​​aaS vendors also offer additional services to support infrastructure management. For example, you can use the services to do these tasks:

* View system logs and monitor performance
* Implement consistent security measures across all your infrastructure
* Configure policies that automate common infrastructure tasks, like backup and load balancing

What are the types of Infrastructure as a Service resources?

Infrastructure services can be classified into three broad categories.

Compute

[Cloud compute](https://aws.amazon.com/what-is/compute/) resources include central processing units (CPUs), graphical processing units (GPUs), and internal memory (RAM) that computers require to perform any task. Users request compute resources in the form of virtual machines or cloud instances. Cloud services then provision the required capacity, and you can run your planned tasks in this virtual environment.

Storage

IaaS vendors offer three types of data storage resources:

1. [Block storage](https://aws.amazon.com/what-is/block-storage/) stores data in blocks like an SSD or hard drive.
2. [File storage](https://aws.amazon.com/what-is/cloud-file-storage/) stores data as files like in a NAS.
3. [Object storage](https://aws.amazon.com/what-is/object-storage/) stores data as objects similar to those in object-oriented programming.

Networking

IaaS infrastructure also includes networking resources like routers, switches, and load balancers. IaaS models work by virtualizing the networking functions of these appliances in software.

How does Infrastructure as a Service compare to other traditional cloud service models?

There are three main cloud service models:

1. Infrastructure as a Service (IaaS)
2. Platform as a Service (PaaS)
3. Software as a Service (SaaS)

Platform as a Service

Platform as a Service (PaaS) provides hardware and software infrastructure that you can use to develop and maintain applications. The PaaS vendor hosts the hardware and the software development tools in its data center. You can build, test, run, and scale applications faster and at a lower cost by using PaaS than on your on-premises infrastructure.

[Learn more about Integrated Platform as a Service (iPaaS)](https://aws.amazon.com/what-is/saas/)

Software as a Service

Software as a Service (SaaS) provides the entire software application over the internet. You can use it to perform different tasks. The SaaS vendor hosts the hardware, the software tools, and the application itself in its data center

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Own IT | IaaS | PaaS | SaaS |
| Application | Y | Y | Y | Y |
| Data | Y | Y | Y | C |
| Runtime or software that runs the application | Y | Y | C | C |
| Middleware or software that monitors the application | Y | Y | C | C |
| Operating systems on which the application runs | Y | C | C | C |
| Virtualization technology | Y | C | C | C |
| Server machines | Y | C | C | C |
| Storage devices | Y | C | C | C |
| Network appliances | Y | C | C | C |

Cloud service models in practice

Let’s say you want to implement an email application in your organization. If you decide to manage your own infrastructure, you must do the following:

1. Purchase a physical server.
2. Install all the required software and operating systems on it
3. Write your email application code and install it on the server
4. Continuously maintain both hardware and software

On the other hand, you can choose from the following options.

***IaaS Approach***

An IaaS approach would be to utilize virtual cloud servers with operating systems pre-installed on them and install the application code and related software on the virtual machine.

***PaaS Approach***

A PaaS approach would be to run application code without provisioning or managing infrastructure and write and upload the application code as a .zip file.

***SaaS Approach***

A SaaS approach would be to utilize a secure, fully managed business email and calendar service. You don't have to write your own application code or even worry about provisioning cloud servers and cloud storage infrastructure.

How to choose

The choice between IaaS, PaaS, and SaaS offerings depends on your application requirements. One option is not necessarily better than the other. It depends on why you are running the application, your performance and configuration requirements, and who and where your users are.

How can you implement Infrastructure as a Service?

You can implement IaaS by selecting a suitable IaaS vendor and training your team members to use the services offered. Follow the steps below to achieve successful IaaS implementation.

Identify your requirements

It is important to understand your company’s underlying infrastructure requirements for the use cases you want to start with. For instance, web application hosting has different server and network resource requirements than big data analytics.

Select your team

If your organization is new to digital transformation, it is better to start with a small core team that will lead the change going forward. The team can solve a small problem and talk about their results to create awareness and enthusiasm about cloud computing.

Select your IaaS vendor

Different vendors have different levels of capabilities. Do your due diligence so that you don't run into problems later. It is always best to go with a well-established IaaS vendor who offers a range of services so that you can manage even changing requirements easily.

Migrate to the new infrastructure

Migration is an incremental process that needs planning to avoid disruption. You can also choose to run hybrid clouds where some applications, or even components of the same application, run on your on-premises infrastructure and other components run on the IaaS vendor’s infrastructure.

Why use AWS to meet your Infrastructure needs?

Though AWS does not offer a set of IaaS services, AWS is the world’s most comprehensive and broadly adopted cloud, offering over 200 fully featured services from data centers globally. Millions of customers—including the fastest-growing start-ups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster. This makes it faster, easier, and more cost effective to move your existing applications to the cloud and build nearly anything you can imagine. For example, you can use these services:

* [Amazon EC2](https://aws.amazon.com/ec2/) offers the broadest and deepest compute platform, and you can choose a processor, storage, networking, operating system, and purchase model.
* [Amazon S3](https://aws.amazon.com/s3/) offers an industry-leading object storage service that you can use to store and protect any amount of data for virtually any use case, such as cloud-native applications, data analytics, and mobile apps.
* [Amazon VPC](https://aws.amazon.com/vpc/) offers a logically isolated, fully customizable virtual network that you can use to define and launch AWS resources and to secure and monitor connections.
* a method of software delivery and licensing in which software is accessed online via a subscription, rather than bought and installed on individual computers.