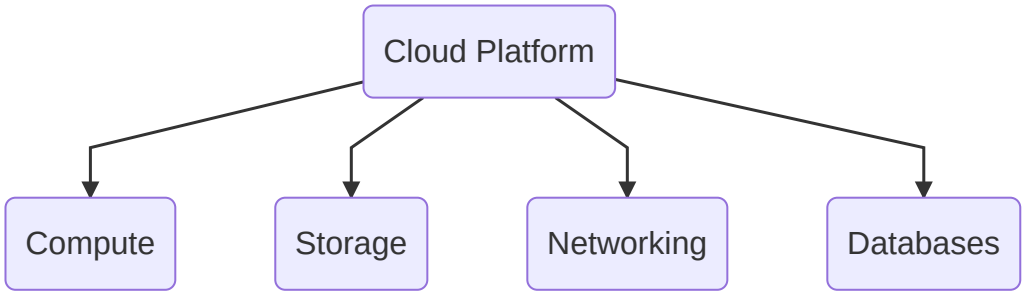
What is the cloud?



Cloud Computing Models

- Private
- Public
- Hybrid

Where did Cloud Computing come from?

Cloud computing comes from the term **virtualization**, the process of running the virtual instance of a computer in a layer abstracted from the actual hardware.

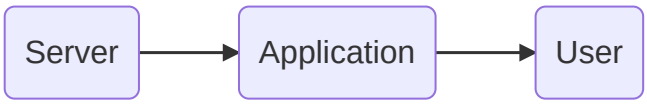
Cloud Computing Timeline

- **1963:** The Defense Advanced Research Projects Agency (DARPA) funded $2 million for a project that included developing a technology that allowed 2 or more people to use a computer simultaneously.
- **1969:** Joseph Carl Robnett Licklider, associated with ARPANET, discussed and brought forth the concept of the "Intergalactic Computer Network," which would connect people and data from anywhere at any time. This involves the birth of the internet.
- **1999:** Salesforce was very successful in using cloud computing, which they used to deliver software programs to customers over the internet so that they could use their marketing and CRM platform.
- **2002:** Amazon used the cloud computing model to provide capacity for their own infrastructure. In 2006, they launched Amazon Web Services - allowing other companies to take advantage.

Why do we use Cloud Computing?

- Speed to Market
    - On-Premises network (not a cloud network): All resources are owned, operated, and maintained within the organization's building or buildings. If the server goes down in this scenario, it could take weeks to get another server shipped in. Then you would have to attach the new server to your network, upload or install the software, install security patches, etc.
    - Hosted network: Organizations can rent access to resources from a specific organization. Note that the line is blurred between hosted and cloud services. In some cases, you know exactly where the services are hosted. However, in most cases, hosted services are somewhere within the cloud. If you had a server offering an application to

your internal or external customers over the internet, and the server went down, then you can literally have another server up within seconds with all of your software and those software dependencies already installed and ready to go. This dramatically decreases the downtime and impact to the customer, either you or the external customer.



Other Ways We Use the Cloud

- Quick updates and integration
- High availability and fault tolerance
- Unlimited storage

Why Should I Care about the Cloud

What's In It for Me?

- Very easy to use; you do not need to have a technical background
- Saves you a ton of money on logistics, providing the network, staffing, etc.
- Provides a guaranteed uptime of applications or services you use in the cloud, meaning that there is a service-level agreement that a cloud service provider can guarantee you when you use their services.
- Access to cloud collaboration tools (e.g. Zoom, Microsoft Teams, Google Meet, etc.)

Who Are the Different Cloud Vendors

Major Cloud Service Providers (Public Cloud space)

- Amazon Web Services (AWS)
- Microsoft Azure
- Google Cloud Platform (GCP)

More Cloud Providers (Private Cloud space)

- Red Hat
- Dell
- VMware

Isn't the Cloud Just Storage?

When You Think of the Cloud, You Might Think Storage

- Dropbox
- iCloud
- Google Drive

Cloud offers you services for your computing needs, networking, database solutions, and file storage. We're talking about tools like:

- Microsoft 365
- Google Workspace (formerly known as G Suite)

- QuickBooks

Platform as a Service (PaaS)

Platform as a Service (PaaS) is a service that offers a complete development and deployment environment in the cloud.

Can be offered in:

- Public cloud model
- Private cloud model
- Hybrid cloud model

You (the customer) manage the application and data on a platform, where the service provider manages the runtime, middleware, operating system, virtualization, servers, storage, and network. This provides a model where you only have to worry about deploying your app to the end user while everything else is taken care of.

Ordinary text - What you manage
Underlined text - What the service provider manages

Platform as a Service (PaaS)
Application
Data
Runtime
Middleware
Operating System
Virtualization
Servers
Storage
Networking

Middleware, in this context, is a generic name for software such as databases, application servers, or queuing systems. They're in the middle between the operating system and the application — not used directly by end users, but used to develop solutions for end users. If you're using a PaaS, middleware security is often a shared responsibility; the provider might keep the software up to date (or make updates easily available to you), but you retain the responsibility for security-relevant settings such as encryption.

PaaS examples

- Elastic Beanstalk (orchestration service offered by Amazon Web Services for deploying applications, orchestrating various AWS services)
- Google App Engine (for developing and hosting web applications in Google-managed data centers)
- Heroku (PaaS that supports several programming languages)

Software as a Service (SaaS)

Software as a Service (SaaS) is a way of delivering applications over the internet, as a service.

Everything is already managed for you. You do not have to manage anything at all. The service provider manages everything from the application, the data, the runtime, the middleware, the operating system, the virtualization, servers, storage, and networking.

Ordinary text - What you manage
Underlined text - What the service provider manages

Software as a Service (SaaS)
Application
Data
Runtime
Middleware
Operating System
Virtualization
Servers
Storage
Networking

SaaS examples

- Zoom (web conferencing software/service)
- Dropbox (file storage software/service)
- Mailchimp (email marketing software/service)
- Slack (instant messaging software/service)

Infrastructure as a Service (IaaS)

Infrastructure as a Service (IaaS) is a form of cloud computing that provides virtualized computing services over the internet. Virtualization uses software to create an abstract layer over a computer's hardware. What this does is it allows the elements like storage, processing power, etc. of the computer hardware to be divided and offered to its users as multiple computers.

As the user, you're responsible for the application, data, runtime, middleware, and operating system, while the service provider manages the virtualization, servers, storage, and networking. This leaves you plenty of room to tailor services offered in this model to your business needs.

Ordinary text - What you manage
Underlined text - What the service provider manages

Infrastructure as a Service (IaaS)
Application
Data
Runtime
Middleware
Operating System
Virtualization
Servers
Storage
Networking

IaaS examples

- Amazon Web Services (AWS)
- Google Cloud Platorm (GCP)
- Microsoft Azure

These platforms inherit the Infrastructure as a Service model and offer virtualization services and solutions.

Function as a Service (FaaS)

Function as a Service (FaaS) is a cloud computing service that allows you to execute code in response to events. It uses the serverless framework. Now, think of a function in programming, where the function takes data, processes it, responds, or returns a result. The same thing is happening here.

Now, with the FaaS model, you will be responsible for managing only the application. Everything else from the data to the network is managed by the service provider. All you have to do is focus on the code.

Ordinary text - What you manage
Underlined text - What the service provider manages

Function as a Service (FaaS)
Application
Data
Runtime
Middleware
Operating System
Virtualization
Servers
Storage
Networking

FaaS examples

- AWS Lambda (a serverless FaaS service specifically for the Amazon Web Services platform)
- Google Cloud Functions (a serverless FaaS service that is strictly for the Google Cloud Platform)
- Azure Functions (a serverless FaaS service that is strictly for the Microsoft Azure platform)

What is a Server?

A server is a computer or device that provides programmable service to another computer program and its user.

Different Types of Servers

- Database server
- Application server
- Web server

What is Serverless?

Serverless is a cloud computing execution model in which the cloud provider allocates machine resources on demand. The user creates the code that will allocate resources in response to certain event dependencies within that code. The user would never have to manage any resources at all. The provider will allocate everything you need in response to the activity within your code — or function.

What are some Cloud Computing Jobs?

Example Cloud Computing Roles

- Solutions Architect
- Cloud Engineer
- Cloud Operations Engineer
- Sales Engineer
- DevOps Engineer
- Cloud Support