# Introduction to cloud computing

What is cloud computing?

Cloud computing is a technology that allows users to access and use computing resources (such as servers, storage, databases, networking, software, analytics, and intelligence) over the internet, often referred to as "the cloud." Instead of owning and maintaining physical hardware and infrastructure, users can rent or lease these resources from a cloud service provider.

Key characteristics of cloud computing include:

**On-Demand Self-Service:** Users can provision and manage computing resources as needed, without requiring human intervention from the service provider.

**Broad Network Access:** Cloud services are accessible over the internet from a variety of devices, such as laptops, smartphones, and tablets.
**Resource Pooling**: Computing resources are pooled and shared among multiple users, with the provider dynamically assigning and reassigning resources based on demand. Users typically have little or no control over the specific physical location of the resources.
**Rapid Elastici**ty: Resources can be quickly scaled up or down to accommodate changes in demand. Users only pay for the resources they actually use.
**Measured Service:** Cloud computing resources are metered, and users are billed based on their usage. This pay-as-you-go model allows for cost efficiency and flexibility.

**Cloud computing services are generally categorized into three main models:**

**Infrastructure as a Service** (IaaS): Provides virtualized computing resources over the internet.

Users can rent virtual machines, storage, and networking components for example AWS EC2

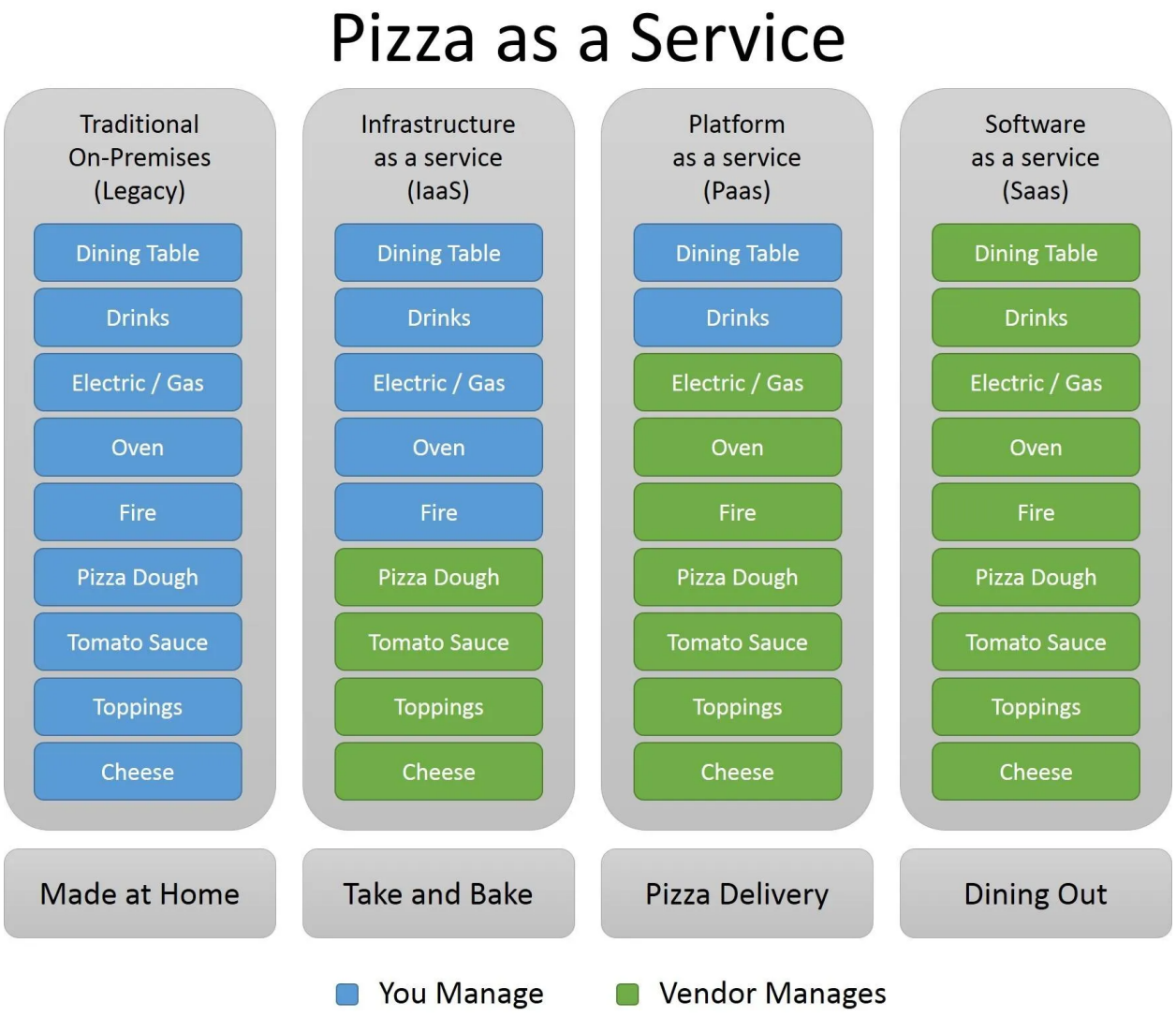
allows users to create and manage virtual servers in the cloud.

**Platform as a Service (PaaS):** Offers a platform allowing customers to develop, run, and manage applications without dealing with the complexity of underlying infrastructure. PaaS typically includes development tools, database management, and other application services. For example, the Google App Engine it developers to focus on writing code while the platform handles aspects like load balancing and database management.

**Software as a Service (SaaS)**: Ddelivers software applications over the internet on a subscription basis. Users can access these applications through a web browser without needing to install or maintain software locally. Popular cloud service providers include Amazon Web

aServices (AWS), Microsoft Azure, Google Cloud Platform (GCP), and others. Organizations and individuals leverage cloud computing to increase flexibility, scalability, and cost-effectiveness in managing their IT infrastructure and applications.

To understand this further, I am going to use the pizza as a service metaphor first introduced by Albert Barron.




Let's first look at the traditional on-premises world of content management systems. In the pizza world that translates into you doing everything yourself—everything from getting the ingredients together, to having the equipment needed to turn those ingredients into a cooked pizza, to supplying the dining table and beverages for your complete pizza dinner. If you're into creating your own home-grown CMS, I suppose you

could stretch the analogy to say that you've gone to the extreme of growing your own tomatoes, milking your own cows and kneading your own dough.

Think of "Take and Bake" or "Go Get that Frozen Pizza" as an analogy for Infrastructure as a Service. All you need worry about is the stuff needed to warm and serve that pizza. In the CMS world, IaaS usually means having the vendor take care of the hardware running the content management system, making sure the server, storage, load balancers, network and what-all are at peak performance.

With Platform as a Service, you don't even have to manage the underlying operating hardware or software. In the pizza world, all you need to do is set the table, because the pie will be delivered to you ready-to-eat. In the CMS world, the only thing you need to be concerned with is the CMS itself. The infrastructure and platform is taken care of by the vendor. And finally, we end up with Software as a Service. Pizza-wise, you're dining out and enjoying a thin-crust or deep dish Chicago-style pie. In CMS-land, you're free to concentrate on content for your website and your marketing initiatives, and don't have to worry about patches, security, and maintenance upgrades.

**History of cloud computing**

## 1950s - 1960s: Precursors and Early Concepts

- 1950s: The concept of utility computing emerges, where computing resources are provided as a metered service, similar to other utility services.
- 1960s: The development of mainframe computing allows multiple users to access a central computer simultaneously through time-sharing.

## 1970s - 1980s: Growth of Networking and Client-Server Architecture

- 1970s: IBM's VM (Virtual Machine) technology introduces the idea of running multiple operating systems on a single mainframe.
- 1980s: Client-server architecture gains popularity, with personal computers connected to servers in a networked environment.

## 1990s: Rise of the Internet and Application Service Providers (ASPs)

- The internet becomes more widely accessible, leading to the rise of Application Service Providers (ASPs), offering hosted software solutions.
- 1999: Salesforce.com pioneers the concept of delivering enterprise applications via a simple website.

## Early 2000s: Virtualization and Emergence of Cloud Services

- 2001: Amazon.com launches Amazon Web Services (AWS) to provide a suite of cloud services.
- 2002: VMware introduces server virtualization, allowing multiple virtual machines to run on a single physical server.
- 2006: AWS introduces Elastic Compute Cloud (EC2) and Simple Storage Service (S3), marking the beginning of modern cloud computing.

## Late 2000s: Expansion and Competition

- 2008: Google launches Google App Engine, a platform for building and hosting applications.
- 2010: Microsoft introduces Azure, its cloud computing platform, offering services such as virtual machines and storage.

## 2010s: Maturation and Proliferation

- Cloud computing becomes widely adopted, with the introduction of Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).
- 2013: Docker is released, popularizing containerization and simplifying application deployment.
- 2014: Kubernetes, an open-source container orchestration platform, is introduced by Google.
- 2015: Microsoft shifts its strategy under CEO Satya Nadella to become a cloud-first, mobile-first company.

## 2017 - 2020: Serverless Computing and Advanced Services

- 2017: Serverless computing gains traction with services like AWS Lambda.
- Cloud providers introduce advanced services such as machine learning, artificial intelligence, and edge computing.

## 2020s: Continued Innovation and Hybrid Cloud Adoption

- Cloud computing continues to evolve with a focus on edge computing, quantum computing, and advanced security features.
- Organizations increasingly adopt hybrid cloud solutions, combining on-premises infrastructure with public cloud services.

The detailed history of cloud computing reflects a journey from early concepts and technologies to the widespread adoption of cloud services across industries, impacting how businesses operate and innovate in the digital age. The ongoing evolution of cloud computing is shaped by technological advancements, changing business landscapes, and the constant pursuit of efficiency and scalability.