**What is cloud computing?**

**A beginner's guide**

Simply put, cloud computing is the delivery of computing services—servers, storage, databases, networking, software, analytics and more—over the Internet (“the cloud”). Companies offering these computing services are called cloud providers and typically charge for cloud computing services based on usage, similar to how you are billed for water or electricity at home.

**Uses of cloud computing**

You are probably using cloud computing right now, even if you don’t realize it. If you use an online service to send email, edit documents, watch movies or TV, listen to music, play games or store pictures and other files, it is likely that cloud computing is making it all possible behind the scenes. The first cloud computing services are barely a decade old, but already a variety of organizations—from tiny startups to global corporations, government agencies to non-profits—are embracing the technology for all sorts of reasons. Here are a few of the things you can do with the cloud:

* Create new apps and services
* Store, back up and recover data
* Host websites and blogs
* Stream audio and video
* Deliver software on demand
* Analyze data for patterns and make predictions

**Top benefits of cloud computing**

Cloud computing is a big shift from the traditional way businesses think about IT resources. What is it about cloud computing? Why is cloud computing so popular? Here are 6 common reasons organizations are turning to cloud computing services:

**1. Cost**

Cloud computing eliminates the capital expense of buying hardware and software and setting up and running on-site datacenters—the racks of servers, the round-the-clock electricity for power and cooling, the IT experts for managing the infrastructure. It adds up fast.

**2. Speed**

Most cloud computing services are provided self service and on demand, so even vast amounts of computing resources can be provisioned in minutes, typically with just a few mouse clicks, giving businesses a lot of flexibility and taking the pressure off capacity planning.

**3. Global scale**

The benefits of cloud computing services include the ability to scale elastically. In cloud speak, that means delivering the right amount of IT resources—for example, more or less computing power, storage, bandwidth—right when its needed and from the right geographic location.

**4. Productivity**

On-site datacenters typically require a lot of “racking and stacking”—hardware set up, software patching and other time-consuming IT management chores. Cloud computing removes the need for many of these tasks, so IT teams can spend time on achieving more important business goals.

**5. Performance**

The biggest cloud computing services run on a worldwide network of secure datacenters, which are regularly upgraded to the latest generation of fast and efficient computing hardware. This offers several benefits over a single corporate datacenter, including reduced network latency for applications and greater economies of scale.

**6. Reliability**

Cloud computing makes data backup, disaster recovery and business continuity easier and less expensive, because data can be mirrored at multiple redundant sites on the cloud provider’s network.

**Types of cloud services: IaaS, PaaS, SaaS**

Most cloud computing services fall into three broad categories: infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (Saas). These are sometimes called the cloud computing stack, because they build on top of one another. Knowing what they are and how they are different makes it easier to accomplish your business goals.

**Infrastructure as a service (IaaS)**

The most basic category of cloud computing services. With IaaS, you rent IT infrastructure—servers and virtual machines (VMs), storage, networks, operating systems—from a cloud provider on a pay-as-you-go basis.

**Platform as a service (PaaS)**

Platform-as-a-service (PaaS) refers to cloud computing services that supply an on-demand environment for developing, testing, delivering and managing software applications. PaaS is designed to make it easier for developers to quickly create web or mobile apps, without worrying about setting up or managing the underlying infrastructure of servers, storage, network and databases needed for development.

**Software as a service (SaaS)**

Software-as-a-service (SaaS) is a method for delivering software applications over the Internet, on demand and typically on a subscription basis. With SaaS, cloud providers host and manage the software application and underlying infrastructure and handle any maintenance, like software upgrades and security patching. Users connect to the application over the Internet, usually with a web browser on their phone, tablet or PC. To learn more, see

**Types of cloud deployments: public, private, hybrid**

Not all clouds are the same. There are three different ways to deploy cloud computing resources: public cloud, private cloud and hybrid cloud.

**Public cloud**

Public clouds are owned and operated by a third-party cloud service provider, which deliver their computing resources like servers and storage over the Internet. Microsoft Azure is an example of a public cloud. With a public cloud, all hardware, software and other supporting infrastructure is owned and managed by the cloud provider. You access these services and manage your account using a web browser.

**Private cloud**

A private cloud refers to cloud computing resources used exclusively by a single business or organization. A private cloud can be physically located on the company’s on-site datacenter. Some companies also pay third-party service providers to host their private cloud. A private cloud is one in which the services and infrastructure are maintained on a private network.

**Hybrid cloud**

Hybrid clouds combine public and private clouds, bound together by technology that allows data and applications to be shared between them. By allowing data and applications to move between private and public clouds, hybrid cloud gives businesses greater flexibility and more deployment options.

**How cloud computing works**

Cloud computing services all work a little differently, depending on the provider. But many provide a friendly, browser-based dashboard that makes it easier for IT professionals and developers to order resources and manage their accounts. Some cloud computing services are also designed to work with REST APIs and a command-line interface (CLI), giving developers multiple options.

# Terms for Cloud Computing

## business analytics tools

Tools that extract data from business systems and integrate it into a repository, such as a data warehouse, where it can be analyzed. Analytics tools range from spreadsheets with statistical functions to sophisticated data mining and predictive modeling tools.

## business intelligence (BI) tools

Tools that process large amounts of unstructured data in books, journals, documents, health records, images, files, email, video and so forth, to help you discover meaningful trends and identify new business opportunities.

## cloud

A metaphor for a global network, first used in reference to the telephone network and now commonly used to represent the Internet.

## cloud bursting

A configuration which is set up between a private cloud and a public cloud. If 100 percent of the resource capacity in a private cloud is used, then overflow traffic is directed to the public cloud using cloud bursting.

## cloud computing

A delivery model for computing resources in which various servers, applications, data and other resources are integrated and provided as a service over the Internet. Resources are often virtualised.

## cloud computing types

There are three main cloud computing types, with additional ones evolving—software-as-a-service (SaaS) for web-based applications, infrastructure-as-a-service (IaaS) for Internet-based access to storage and computing power, and platform-as-a-service (PaaS) which gives developers the tools to build and host Web applications.

## cloud service provider

A company that provides a cloud-based platform, infrastructure, application or storage services, usually for a fee.

## cloud storage

A service that lets you store data by transferring it over the Internet or another network to an offsite storage system maintained by a third party.

## computer grids

Groups of networked computers that act together to perform large tasks, such as analyzing huge sets of data and weather modeling. Cloud computing lets you assemble and use vast computer grids for specific time periods and purposes, paying only for your usage and saving the time and expense of purchasing and deploying the necessary resources yourself.

## elastic computing

The ability to dynamically provision and de-provision computer processing, memory and storage resources to meet changing demands without worrying about capacity planning and engineering for peak usage.

## infrastructure as a service (IaaS)

A virtualized computer environment delivered as a service over the Internet by a provider. Infrastructure can include servers, network equipment and software. Also called hardware as a service (HaaS).

## Microsoft Azure

The Microsoft cloud platform, a growing collection of integrated services, including infrastructure as a service (IaaS) and platform as a service (PaaS) offerings.

## middleware

Software that lies between an operating system and the applications running on it. It enables communication and data management for distributed applications, like cloud-based applications, so, for example, the data in one database can be accessed through another database. Examples of middleware are web servers, application servers and content management systems.

## platform as a service (PaaS)

A computing platform (operating system and other services) delivered as a service over the Internet by a provider. An example is an application development environment that you can subscribe to and use immediately. Azure offers PaaS.

## software as a service (SaaS)

An application delivered over the Internet by a provider. Also called a hosted application. The application does not have to be purchased, installed or run on users’ computers. SaaS providers were previously referred to as ASPs (application service providers).

## virtual machine

A virtual machine is a computer file, typically called an image, that behaves like an actual computer. In other words, creating a computer within a computer. It runs in a window, much like any other program, giving the end user the same experience on a virtual machine as they would have on the host operating system itself. The virtual machine is sandboxed from the rest of the system, meaning that the software inside a virtual machine can’t escape or tamper with the computer itself. This produces an ideal environment for testing other operating systems including beta releases, accessing virus-infected data, creating operating system backups, and running software or applications on operating systems they weren’t originally intended for.

Multiple virtual machines can run simultaneously on the same physical computer. For servers, the multiple operating systems run side-by-side with a piece of software called a hypervisor to manage them, while desktop computers typical employ one operating system to run the other operating systems within its program windows. Each virtual machine provides its own virtual hardware, including CPUs, memory, hard drives, network interfaces, and other devices. The virtual hardware is then then mapped to the real hardware on the physical machine which saves costs by reducing the need for physical hardware systems along with the associated maintenance costs that go with it, plus reduces power and cooling demand.

## virtualization

The act of creating a virtual rather than a physical version of a computing environment, including computer hardware, operating system, storage devices and so forth.

**Internet of Things**

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.