your "must-know" guide to the cloud

the basics and beyond

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an introduction to the cloud

From powering enterprise resource planning to enabling remote work, cloud computing — often referred to simply as "**the cloud,**" has practically become integral to the way most business is done. After decades of existence in one form or another, it's also deeply embedded into our daily lives.

Nonetheless, there's still a lot about the cloud that remains a mystery to many people. In this eBook, we cover some of the foundational elements of the cloud, as well as considerations for making the move to a cloud environment and the benefits of doing so.

cloud definition

The definition of the cloud, or cloud computing, varies, depending on who you ask. However, the National Institute of Standards and Technology (NIST) offers one that most everyone accepts.

"Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

The NIST further states that the cloud is composed of five essential characteristics, three service models, and four deployment models. The following sections discuss these components and a few other important considerations.

cloud characteristics

In simple terms, the cloud is a network of connected remote servers that operates as a single ecosystem. The National Institute for Standards and Technology (NIST) specifies that it's comprised of five essential characteristics, although not all of them may be included in every cloud solution:

On-demand self-service. This enables a customer to provision computing resources as needed.

Broad network access. The network can be public (the internet) or private (dedicated lines).

Resource pooling. A cloud provider's computing resources are pooled to serve multiple consumers using a multi-tenant model.

Rapid elasticity. Capabilities can be quickly and elastically provisioned to scale rapidly outward and inward based on demand.

Measured service. Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service.

the virtualization factor

Another characteristic commonly associated with the cloud is **"virtualization."** Virtualization is the creation of a virtual machine in which to execute workloads. Cloud environments can leverage virtualization as the basis for running services.

Virtualization software is used to run multiple virtual machines on a single physical server to provide the same functions as multiple physical machines. Known as a hypervisor, virtualization software performs the abstraction of the hardware to the individual virtual machines. It gives the illusion that it's running directly on the hardware.
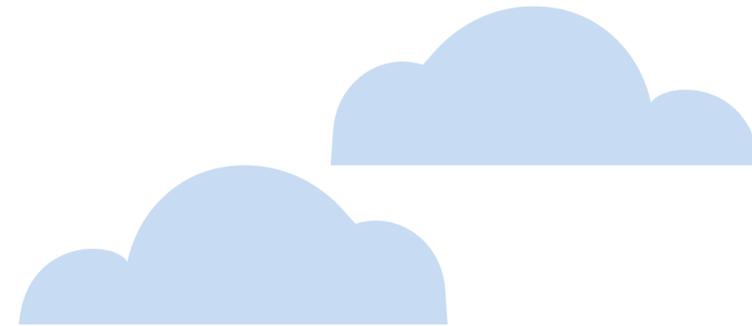
cloud deployment models

The cloud is also classified by how it's deployed. There's the:

Public Cloud. A public cloud, often referred to as a multi-tenant cloud, enables organizations and individuals to use computing resources as they would a utility. They pay only for what they use, and get the impression of unlimited capacity, available on demand. The cloud service provider (CSP) is responsible for maintaining the underlying infrastructure.

Private Cloud. A private cloud, also known as a single-tenant cloud, is deployed for the exclusive use of a single organization or individual. It's accessed from behind the organization's firewall. A private cloud may be owned, managed and operated by the organization or a third party.

the "other" clouds

Hybrid Cloud. This is a mixed computing environment in which applications are run using a combination of computing, storage, and services in different environments—public clouds and private clouds, including on-premises data centers or "edge" locations. You can migrate and manage workloads between these various cloud environments.

Multi-Cloud. This refers to the use of multiple cloud and storage services (usually from at least two cloud providers) as part of a single network. Applications can migrate between different cloud providers or to even operate concurrently across cloud providers. Using a multi-cloud strategy enables users to pick and choose the capabilities that best suit their business needs and minimize vendor lock-in.
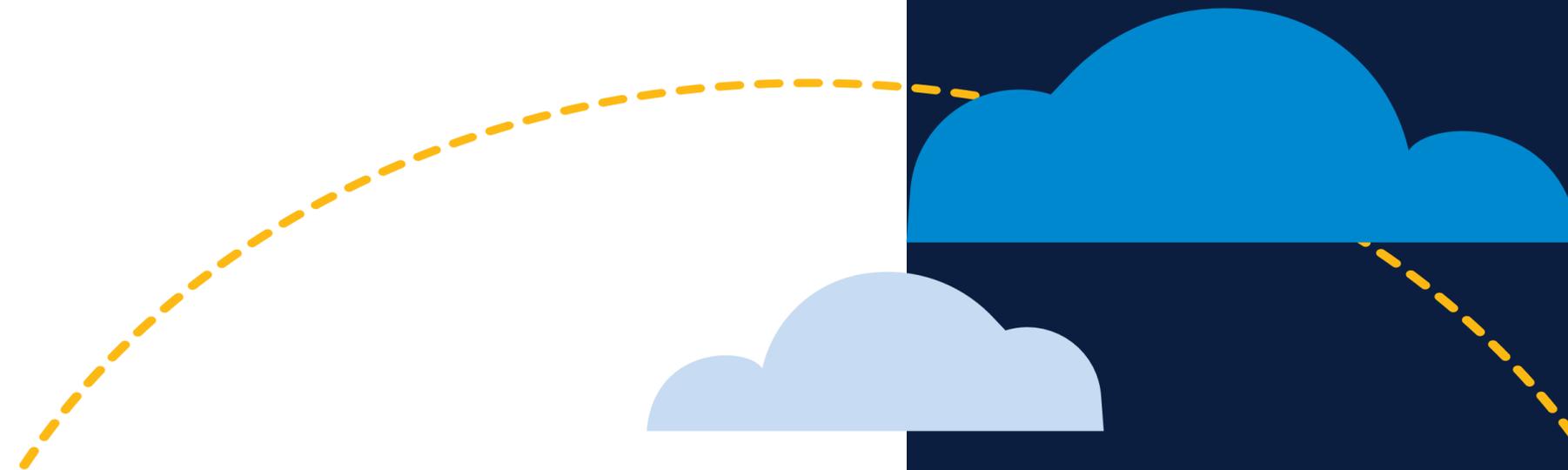
cloud service models

There are different cloud service delivery models, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service.

IaaS. This is the model that's behind public and private clouds. It provides network access to processing, storage, networks and other traditional computing resources that allow the customer to deploy and run arbitrary software. The customer doesn't manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications, as well as scaling. IaaS providers typically supply resources on-demand from their large resource pools installed in data centers. Pricing is typically on a usage or reservation basis.

PaaS. PaaS provides a software platform on which users can build their own applications while hosting them on the PaaS provider's infrastructure. The software platform is used as a development framework to build, debug and deploy applications. It often provides middleware-style services such as database and component services for use by applications.

SaaS. With SaaS, cloud providers install and operate application software in the cloud. The application is licensed to customers either as a service-on-demand, through a subscription, in a "pay-as-you-go" model, or at no charge when there is opportunity to generate revenue from streams other than the user.

everything as a service (XaaS)

Thanks to cloud technology, just about anything can be delivered "as a service." XaaS encompasses the many products, tools and technologies that vendors deliver to users as a service over a network — typically, the internet — as an alternative to providing them locally or on-site to an enterprise.

These "as a service" offerings are accessed as needed and financed using a pay-as-you-go cloud computing pricing model. They can scale up or down as needed with IT services delivered on demand by a managed service provider.
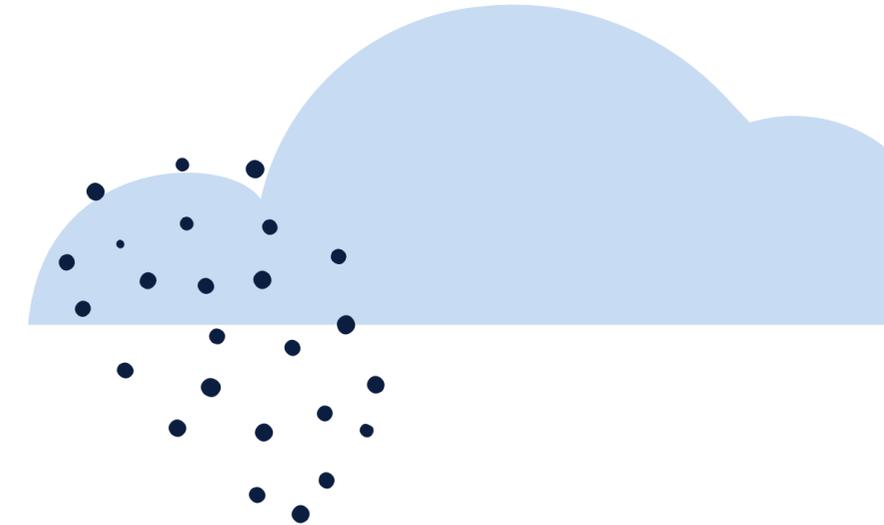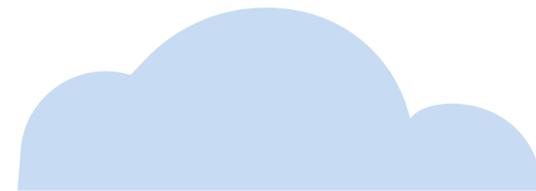
XaaS examples

Authentication as a Service (AaaS) uses cloud services for identity and access management.

Backup as a Service (BaaS) is a way of storing data remotely in the cloud and having the service provider provide and manage the necessary backup and recovery infrastructure, software, and support services.

Containers as a Service (CaaS) enables the deployment and management of containers using container-based virtualization.

Database as a Service (DBaaS) provides access to database platforms through the cloud.

Disaster Recovery as a Service (DRaaS) enables cloud providers to help organizations regain functionality after a disaster.

billing models

Just as there are different cloud deployment and service models, there are different ways of billing for cloud services. Each cloud service provider may also have its own variation on these billing models. The two most common billing models, particularly for IaaS, are utility billing and reservation billing.

Utility model. With utility billing, also referred to as "pay-as-you-go" billing, the customer only pays for the resources used, similar to how customers are charged for using electricity, water or other utilities. The idea is to pay for the actual use with no other commitments. Among the disadvantages of this model is that usage rates often quickly exceed planning parameters, so IT departments can be hit with a huge, unexpected bill.

Reservation model. With the reservation billing model, often referred to as the "use-it-or-lose-it" model, a customer pays for the reserved resources regardless of use. The resources are always there for the customer's usage. The reservation billing model requires a long-term commitment, but offers discounts based on various factors. As with the entire cloud ecosystem, cloud billing models continue to change to meet the needs of both customers and cloud service providers.

service level agreement (SLA)

One of the most important aspects of the cloud is the service level agreement. The service level agreement sets the expectation for how cloud resources will be delivered and guarantees that the expectation for uptime and reliability will be met. It creates a strong set of ground rules and specifies any exceptions. It includes the minimum acceptable level of service that must be maintained in worst-case scenarios.
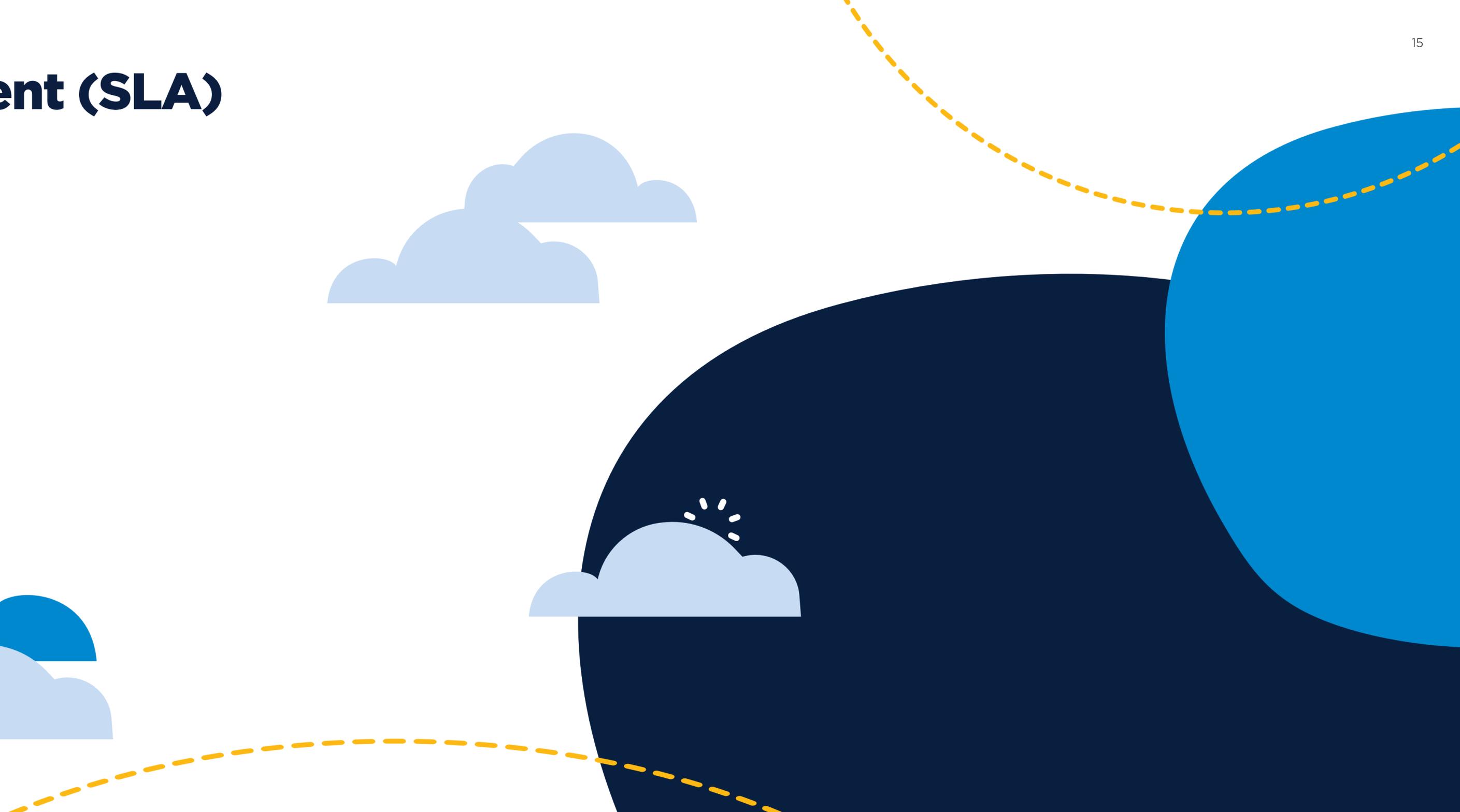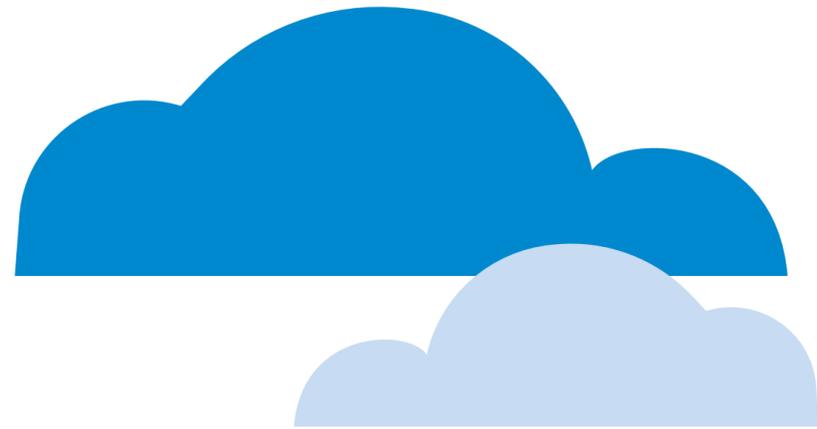
cloud benefits

The benefits you derive from the cloud will be largely dependent on your business needs. Nonetheless, the following are some of the benefits most organizations can expect.

+ Take advantage of accessibility anywhere, anytime and with any device.

+ Eliminate the need to invest in, maintain or manage most or all hardware (like servers and backup generators) and software, which reduces capital expenses and frees up IT staffs to focus on other priorities.

+ Enjoy higher performance, higher availability, and less downtime.

+ Experience greater reliability as cloud providers routinely upgrade, update, patch and test their systems to make sure their services perform as promised. They further guarantee the reliability of their services in SLAs.

+ Scale cloud resources up or down depending on need and demand.

+ Deploy applications quickly.

+ Experience greater security as cloud providers typically install and use advanced security measures to help ensure customers' data and applications are protected.

+ Ease compliance burden by leveraging the IT infrastructure and security protocols of cloud providers that maintain compliance with various regulatory requirements and industry standards.

+ More easily access new tools and technology to help innovate, providing room for ingenuity without the high upfront costs that would have been required otherwise.

+ Speed up development time, in turn reducing the time it takes to get your product to market.

+ Boost collaboration, efficiency and overall productivity because it provides easy access to shared files, compute resources, networks, and more.

+ Reduce environmental footprint by eliminating power-hungry on-premise data centers

Take advantage of the cloud's infinite data storage space and systems that can be activated remotely if necessary to ensure business continuity.
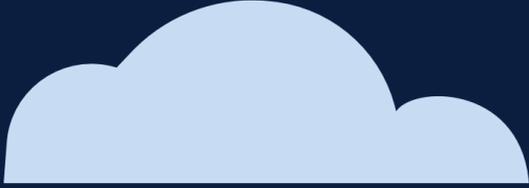
cloud migration

Getting started with a cloud service can be as simple as going to a provider's website, inputting the requested information and payment, and pressing "go." For most businesses, however, migrating even a few workloads involves much more. The following steps are typically involved.

+ Make the business case. Get executive buy-in and set realistic expectations.

+ Determine if you can handle the migration in-house or need to work with a migration partner.

+ Determine what will move. (Not all workloads can or should move to the cloud.)

+ Determine the migration approach.

+ Choose the cloud environment and deployment model.

+ Design and test the architecture.

+ Develop the migration plan, including timing and responsibilities.

+ Outline the migration steps and execute.

+ Gather and review lessons learned.

cloud security

Moving to the cloud means rethinking your IT security. The following are some of the important considerations.

+ Understand the division of responsibilities between your company and the CSP.

+ Know what security processes, technologies, and policies the CSP has to maintain a secure cloud environment.

+ Know your compliance requirements. (See the next section for more information.)

+ Plan to implement and/or insist on cloud and network security best practices such as using the zero-trust security model.

compliance in the cloud

One of the ways to help ease the burden of meeting various compliance requirements or industry standards in the cloud is to work with a cloud services provider (CSP) that is compliant with that particular requirement or standard.

CSPs that are PCI DSS certified or HIPAA compliant are good choices. PCI DSS and HIPAA both entail rigorous security requirements. A CSP that can meet them maintains a well-governed, high-quality IT infrastructure and has strong security processes and mechanisms in place. As such, CSPs can help their customers meet many of their own compliance requirements by leveraging the CSPs' audited and compliant infrastructure.

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cloud resources

Not surprisingly, there's a lot more to know about the cloud. US Signal offers a wide array of resources that can help, including blogs, case studies, eBooks and more.

The following are just a few you may find useful:

Why the Cloud is Critical for Healthcare: Trends and Drivers

The Benefits of the Cloud for Logistics Companies

The Cloud Helps AEC Firms Embrace Advanced Technologies

How Much Does It Cost to Move to the Cloud?

Cloud Migration: What Goes First?

Expand from Network Security to Cloud Security

The Cloud and Machine Learning

Time to Go Cloud Native

The Infrastructure and Service behind the Cloud

Private Cloud or Hosted Private Cloud?

Retail Cloud Services Offer a Competitive Edge

Use Colocation as Your Conduit to the Cloud

Cloud Migration Metrics: Measuring Success

10 Steps for More Successful Cloud Migrations

contact US!

If you're interested in learning more about the cloud, including the cloud services available at US Signal, let us know.

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