Cloud Computing Overview

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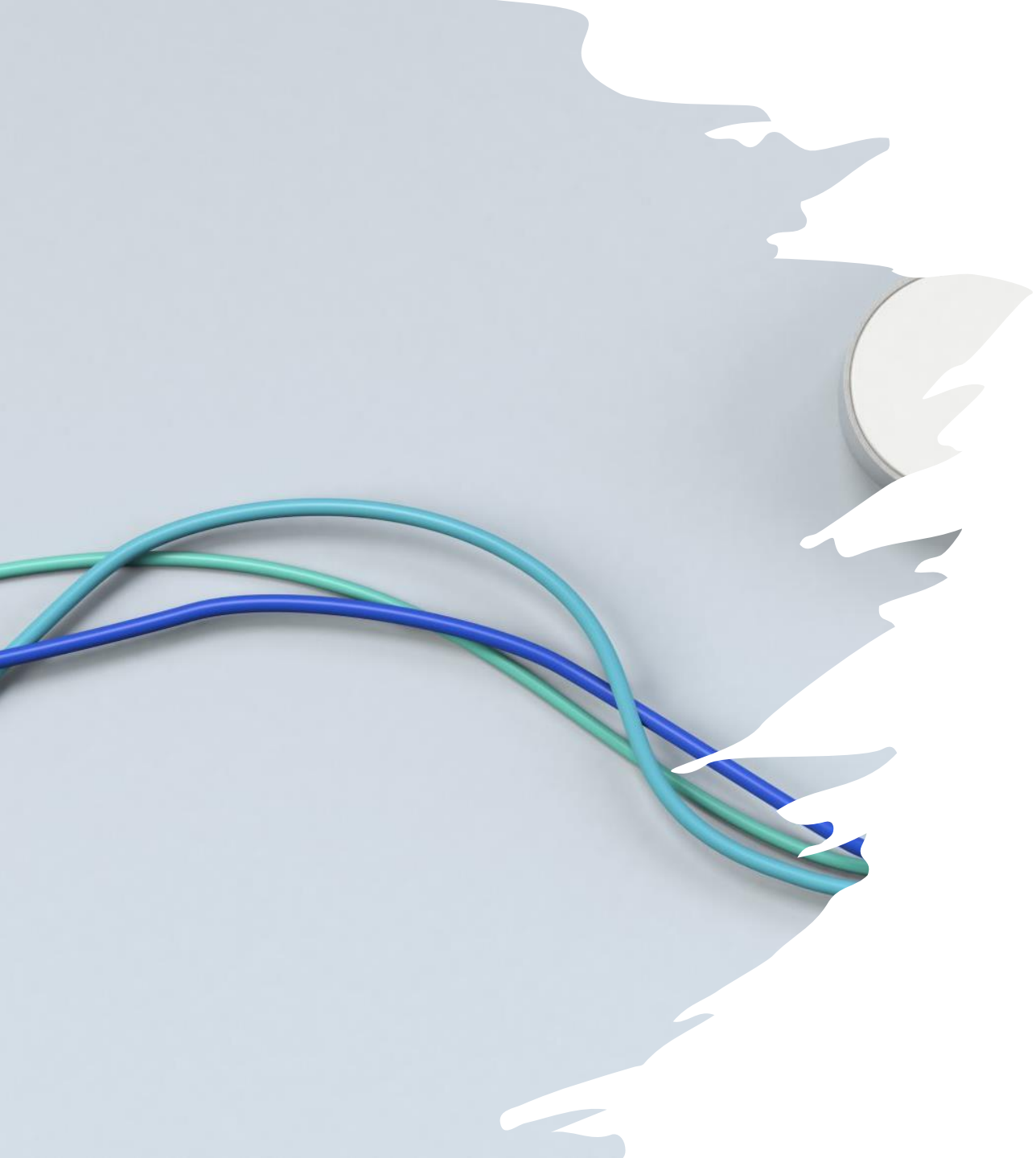
From Panic to Peace of Mind: An Introduction to Cloud Computing for Health Insurance Providers

The Health Insurance provider was introduced to your document management distributed system and felt overwhelmed by the complexity of managing IT infrastructure. They were concerned about the financial costs of implementing the system and finding staff with the necessary management skills. Seeking guidance, they reached out to you for help.

You reassured the client by explaining the benefits of cloud computing. You explained that they could rent server resources on-demand and use automated systems to replace the need for additional staff. You highlighted the advantages of cloud computing, such as improved reliability, scalability, and cost savings.

The Health Insurance provider was still hesitant, so you offered to give them this presentation to explain cloud computing in more detail.

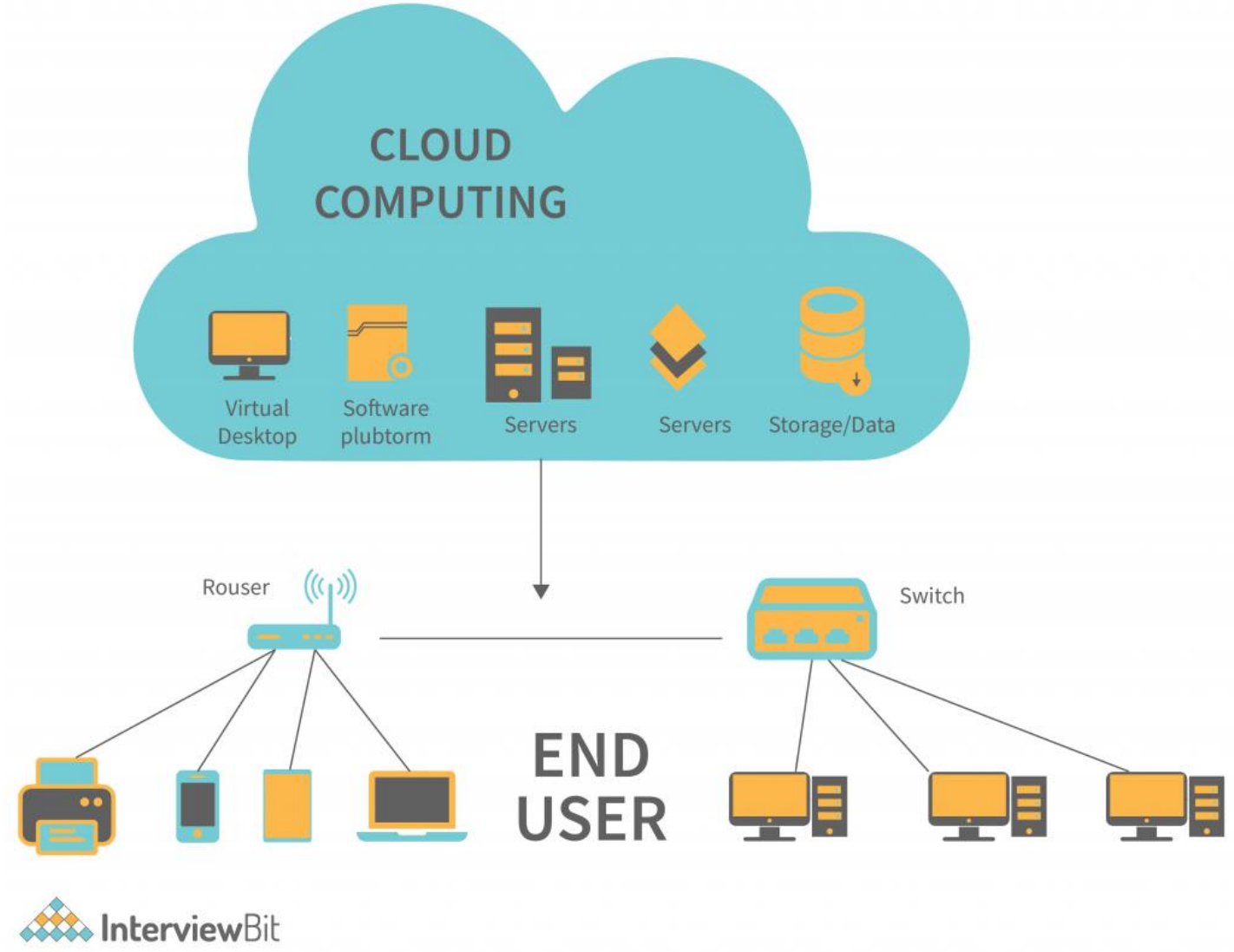


What is Cloud Computing?

Cloud computing is technologies that enable organizations to access computing services over the internet ("the cloud"), including servers, storage, databases, networking, software, analytics, and other information systems. It facilitates a new service-oriented consumption and delivery model of information systems, similar to utilities.

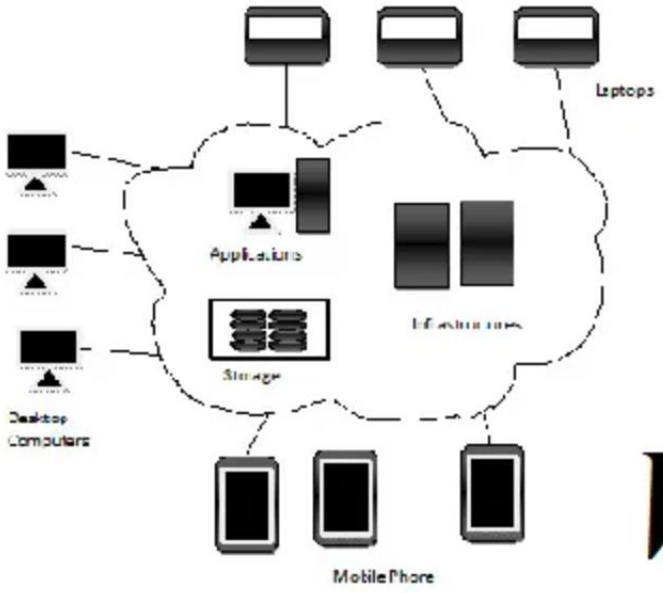
Cloud computing represents a new IT/IS outsourcing option for businesses that can help them reduce costs, improve efficiency, and enhance agility. By leveraging the cloud, organizations can enjoy the benefits of advanced technologies without extensive infrastructure and technical expertise.

Cloud Computing Architecture



Cloud computing Vs Distributed systems

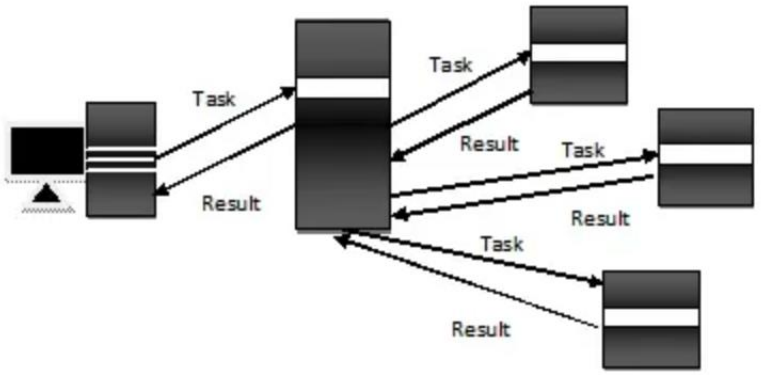
Cloud computing delivers computing services over the internet, while distributed systems are a network of interconnected computers that work together to perform a specific task.



Cloud Computing

VS

Distributed Computing



Technological Integration

The idea of computing-as-a-service dates back to the 1960s when IBM's Service Bureau provided computing resources sharing services due to the expensive nature of computers at that time.

However, the device-centric era dominated due to the exponential increase in price performance driven by Moore's Law, resulting in high cost and complexity of device management. The cheap and ubiquitous broadband networks of the 2000s have led to the emergence of cloud computing as a significant contender in the internet-dominated era.

Evolution of Cloud Computing

Initially, companies like Amazon, Google, and Microsoft developed large computing infrastructures to meet their business needs. However, the excess capacity during non-peak demand times, innovative resource scheduling, and economies of scale gave rise to a new business opportunity.

These companies began reselling their excess capacity as packaged, on-demand services using lightweight customer acquisition and provisioning models. Over time, cloud computing has emerged as a significant business in its own right, no longer just about excess capacity. The cloud computing industry is dominated by de-facto standards that have emerged from these computing services' rapid operationalization and commercialization.

Characterizing Cloud Computing

According to the US National Institute of Standards and Technology (NIST), cloud computing is defined as follows:

"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."

NIST notes that the cloud model fosters availability and comprises the following components:

Five Essential Characteristics

Four Deployment Models

Three Service Models

Five Essential Characteristics

1. On-Demand Self-Service

- A consumer can provision computing resources such as server time and network storage as needed without requiring human interaction with each service provider.

2. Broad Network Access

- Capabilities are accessible over the network via standard mechanisms that encourage use by heterogeneous thin or thick client platforms (e.g., mobile phones, laptops, and workstations).

3. Resource Pooling

- Using a multi-tenant model, the provider's computing resources are pooled to serve multiple consumers, with different physical and virtual resources dynamically assigned and re-assigned based on consumer demand. The customer has no control or knowledge over the exact location of the provided resources, but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Storage, processing, memory, and network bandwidth are examples of resources.

Five Essential Characteristics

4. Rapid Elasticity

- Capabilities can be elastically provisioned and released, in some cases automatically, to scale outward and inward in proportion to demand. To the consumer, the provisioning capabilities appear to be limitless and can be appropriated in any quantity at any time.

5. Measured Service

- Cloud systems control and optimize resource use automatically by leveraging metering capabilities at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the service provider and the service consumer.

Other Characteristics

Resiliency	• Since the size of a given cloud deployment, its service can withstand interruption or loss of some physical components without losing functionality.
Redundancy	• Increased availability and improved protection against loss or damage
Resolution	• Design and scale dictate the automatic and dynamic resolution of resource identities and addresses.
Ubiquity	• The cloud is expected to be available regardless of scope (public or private).

Four Deployment Models

Public

- Public cloud deployment allows anyone to access systems and services, making it less secure as it is open to everyone. The entity delivering the cloud services, not the consumer, provides the cloud infrastructure services. Public cloud hosting allows customers and users to access systems and services easily.

Private

- A private cloud deployment is the opposite of a public cloud deployment, as it is a single-customer model with no need to share hardware. The main difference between private and public clouds is in how the hardware is handled. Private clouds are often referred to as "internal clouds" and provide access to systems and services within a specific organization or border.

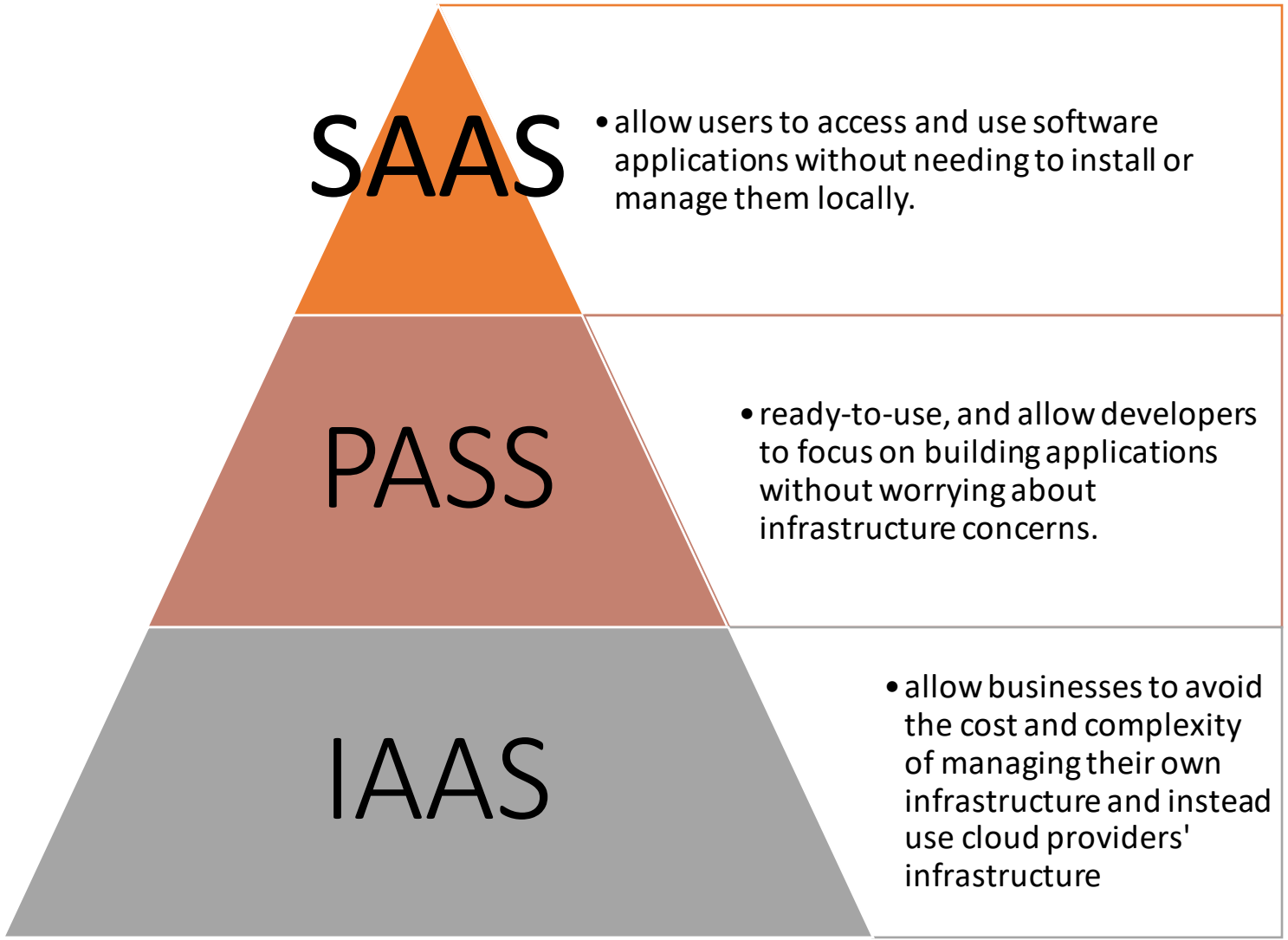
Community

- A community cloud deployment allows a group of organizations to access systems and services. This distributed system is created by integrating the services of different clouds to meet the specific needs of a community, industry, or business. Community clouds are typically managed by a third party or a combination of organizations within the community.

Hybrid

- A hybrid cloud deployment combines the benefits of public and private cloud solutions with a proprietary software layer. This allows organizations to host their applications in a secure environment while also taking advantage of the cost savings offered by public clouds. Hybrid clouds enable the movement of data and applications between different cloud deployment methods, making it possible to choose the most appropriate solution based on specific needs.

Three Service Models



Three Service Models

IAAS

- Infrastructure as a Service (IaaS) provides on-demand access to cloud-hosted physical and virtual servers, storage, and networking infrastructure for running applications and workloads in the cloud. Examples of IaaS providers include DigitalOcean, Linode, Rackspace, Amazon Web Services (AWS), Cisco Metapod, Microsoft Azure, and Google Compute Engine (GCE).

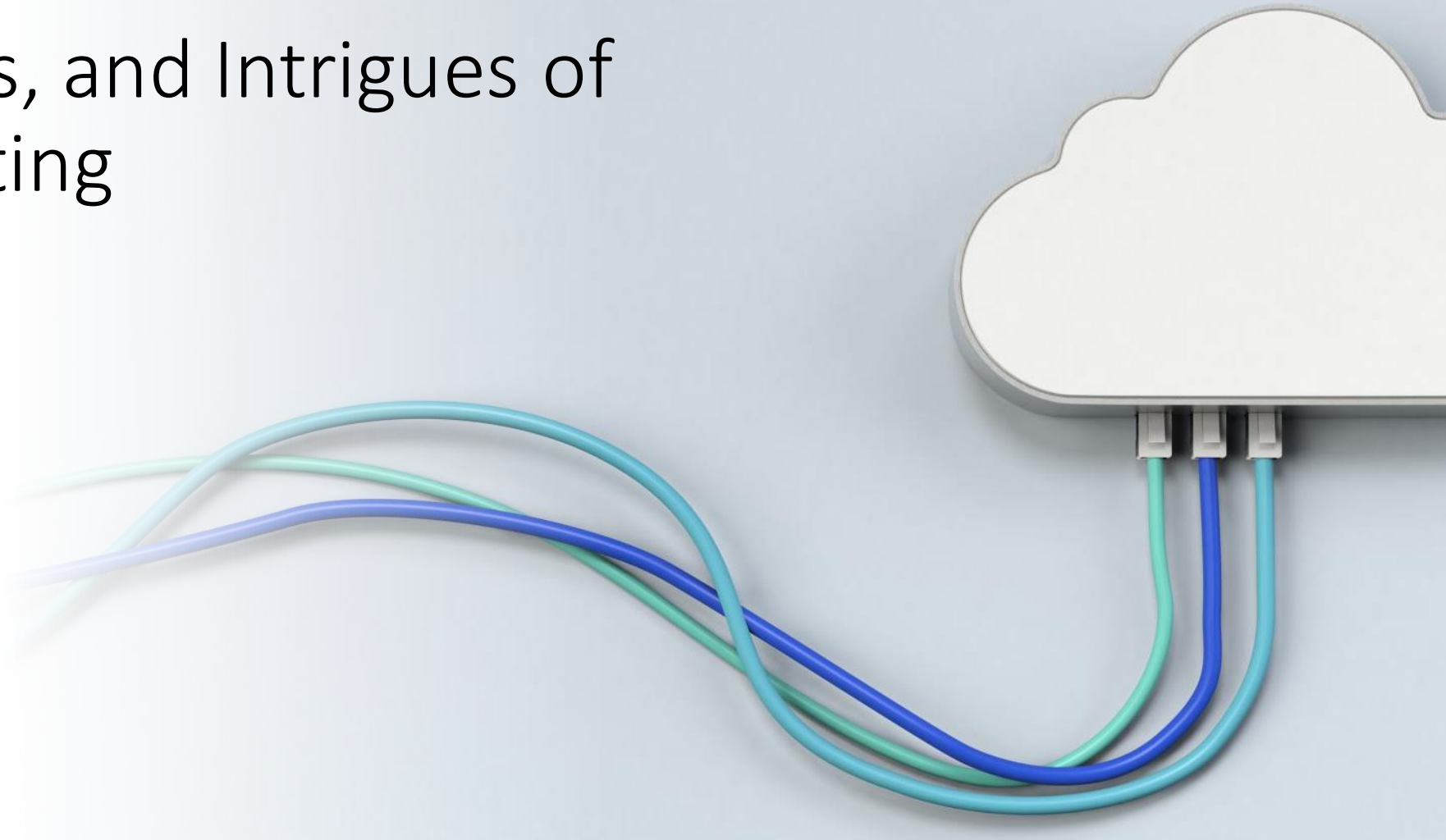
PAAS

- Platform as a Service (PaaS) provides on-demand access to a complete, cloud-hosted platform for developing, running, maintaining, and managing applications. PaaS solutions are ready-to-use, and allow developers to focus on building applications without worrying about infrastructure concerns. Examples of PaaS providers include AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, and OpenShift.

SAAS

- Software as a Service (SaaS) provides on-demand access to cloud-hosted, ready-to-use application software. SaaS solutions allow users to access and use software applications without needing to install or manage them locally. Examples of SaaS providers include Google Workspace, Dropbox, Salesforce, Cisco WebEx, Concur, and GoToMeeting.

The Pros, Cons, and Intrigues of Cloud Computing



The Pros of Cloud Computing

Customer Acquisition Simplified	• By offering per-usage tariffs on infrastructure or platforms, non-intermediated and automated self-provisioning over the internet, and homogenized packaging, pricing, and delivery of services. This makes it easier and more convenient for customers to access and use cloud computing services without negotiating complex pricing or managing the underlying infrastructure.
Demand elasticity	• Allows customers to get and pay for what they need when they need it, making it an operational expense rather than a capital expense. This approach enables low-risk experimentation or agile demand fulfilment for out-of-the-ordinary IT requirements.
Utility Pricing	• Customers pay only for the resources they use, ensuring that they don't pay for resources they are not using with consumer-style billing
Developer Ecosystem	• APIs, Tools. Low-friction entry points. Portability and extractability are theoretically simple, but this is only sometimes the case in practice.

The Cons of Cloud Computing

Security	• remains a key concern in cloud computing, with significant challenges related to the lack of transparency around data location, access permission, and soundness of security architectures. These challenges pose risks for cloud users and must be addressed to ensure the security and integrity of data in the cloud.
Missing or poor (SLAs)	• service-level agreements are a concern in cloud computing, as they establish clear commitments between the service provider and customer. While SLAs are common in the telecommunications industry and provide guarantees of certain standards, they may be lacking in cloud computing. They must be carefully considered to ensure appropriate service levels.
lacks industry standardization	• With no ISO, DMTF, IEEE, or other standard bodies establishing guidelines. Instead, de facto standards emerge based on commercial success. This creates challenges for cloud users and providers, who must navigate a complex and rapidly evolving landscape of technologies and standards.
lacks real contracts and guarantees	• Creating uncertainty around what happens if a provider goes bust or is bought out. This raises a range of legal issues that must be addressed to ensure the continuity and security of cloud services.

The Intrigues of Cloud Computing

Implications for Business

- Cloud computing is a disruptive innovation that challenges traditional business processes and IT/IS architectures. It presents a build-or-buy decision for businesses as another outsourcing option. These factors must be carefully considered when evaluating the impacts of cloud computing on business operations.
- IT/IS leaders and managers must consider cloud computing in their planning and strategy development. However, there are many fraudulent vendors who exploit unsuspecting or poorly educated CIOs through "cloud washing". Therefore, it is important for businesses to thoroughly evaluate potential cloud providers to avoid these risks.

Disrupting existing market

- Cloud computing is creating new markets and disrupting existing ones, such as proprietary infrastructure investment. While there are apparent disadvantages to cloud computing, such as security, reliability, and vendor lock-in, the disruptive innovation model shows that seemingly inadequate technologies can satisfy basic customer needs and eventually succeed over time

New Start-ups

- Cloud computing has enabled the creation of new businesses, whether entire new start-ups or new business units within existing companies, due to its low friction and low-cost acquisition model. This approach allows for a relatively risk-free trial-and-error approach to the marketplace without significant capital commitment needed to validate an idea. Published cloud tariffs also allow for rough cost estimates to be made, making it easier for businesses to plan and budget for cloud services.

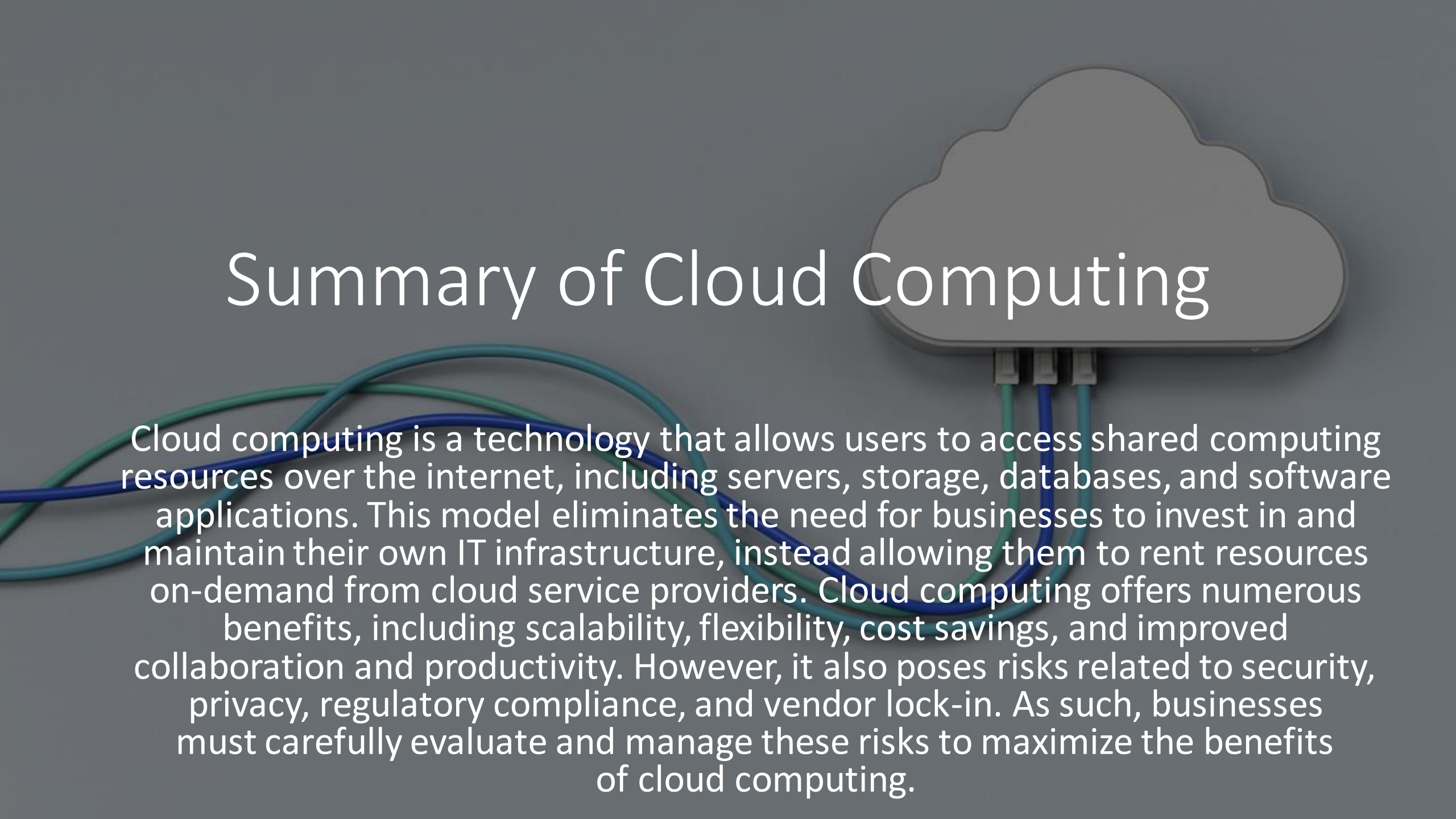
The Intrigues of Cloud Computing

Considerations for Staffing

- The adoption of cloud computing poses risks related to losing existing IT skills, which may not be a problem if they are not core to the business activity, but it is rarely that simple. Existing and new staff may require different kinds of training, and there may be pressures to reduce or redeploy headcount, risking the retention of key staff. These considerations may tempt managers to postpone important decisions around cloud computing.

Considerations for Staffing Market

- The adoption of cloud computing must consider the regulatory framework in which the business operates, such as in banking or pharmaceuticals, as well as customer attitudes towards their data. Additionally, businesses must consider their competitors' stance and relative adoption of cloud technology and whether this has led to any perceived advantages.



Summary of Cloud Computing

Cloud computing is a technology that allows users to access shared computing resources over the internet, including servers, storage, databases, and software applications. This model eliminates the need for businesses to invest in and maintain their own IT infrastructure, instead allowing them to rent resources on-demand from cloud service providers. Cloud computing offers numerous benefits, including scalability, flexibility, cost savings, and improved collaboration and productivity. However, it also poses risks related to security, privacy, regulatory compliance, and vendor lock-in. As such, businesses must carefully evaluate and manage these risks to maximize the benefits of cloud computing.