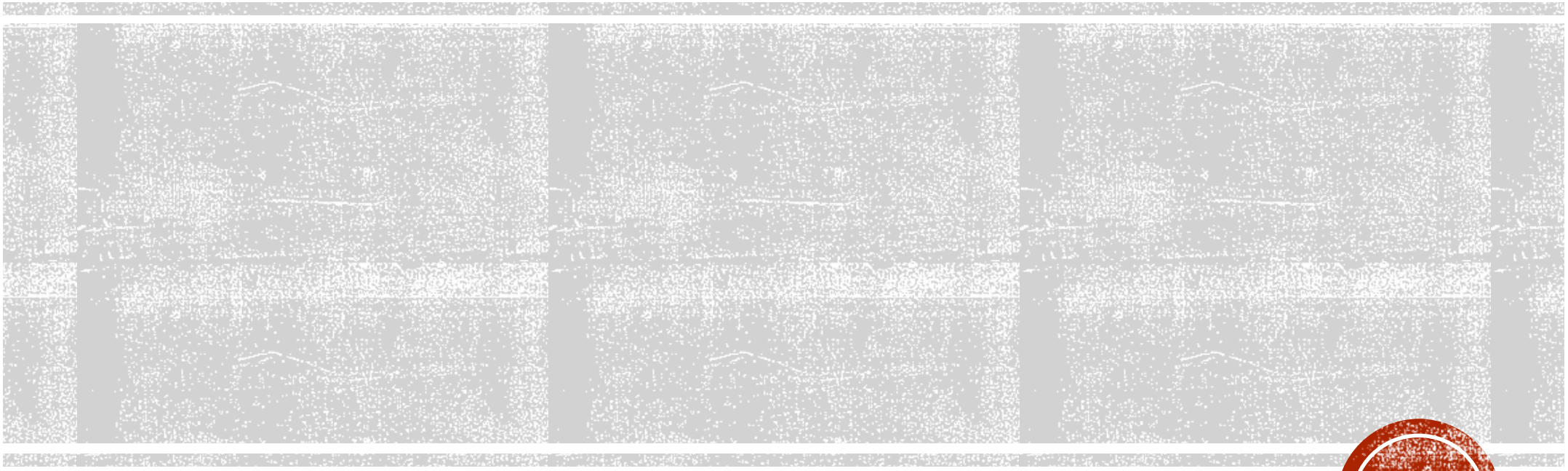
Introduction to Cloud Computing



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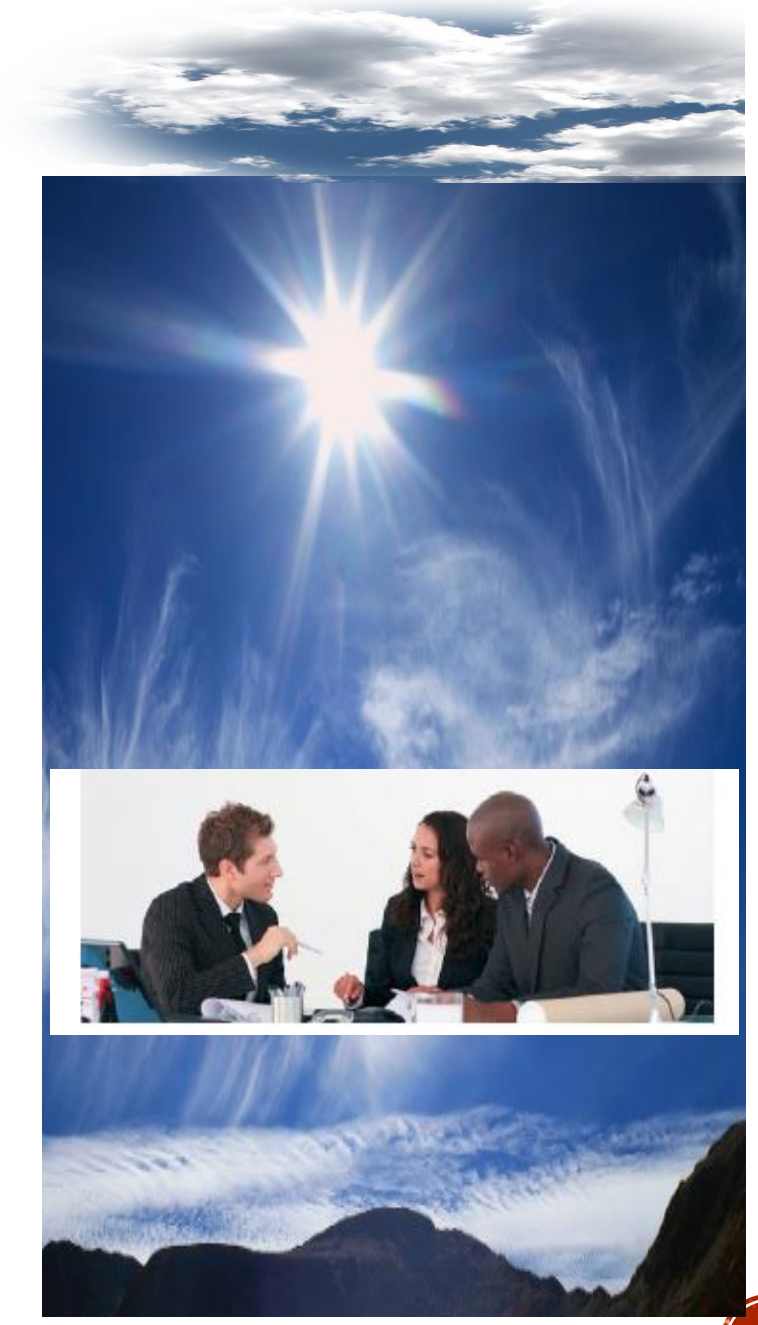


OBJECTIVES

After completing this talk, you should be familiar with:

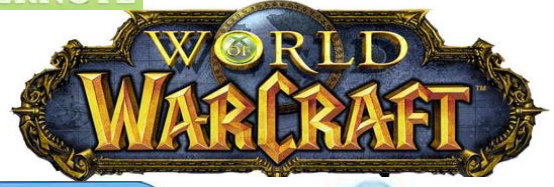
- Cloud computing definition
- Describing cloud computing in one sentence
- Factors that lead to the adoption of cloud computing
- Explaining cloud concepts such as, infrastructure as a service, platform as a service, and software as a service
- Business benefits of cloud computing for IT, application development, and testing
- Describing cloud computing deployment models
- Identifying cloud computing adoption risks
- Differentiating between traditional IT and cloud computing services.

ARE WE USING THE CLOUD YET?

Are we using the cloud yet?








What is Cloud Computing – Part1

Cloud computing is a new way of thinking when delivering IT enabled business services like application development and test.

Cloud is:

- A new consumption and delivery model inspired by consumer Internet services
- End-user focused

Cloud enables:

- Self-service
- Sourcing options
- Economies of scale

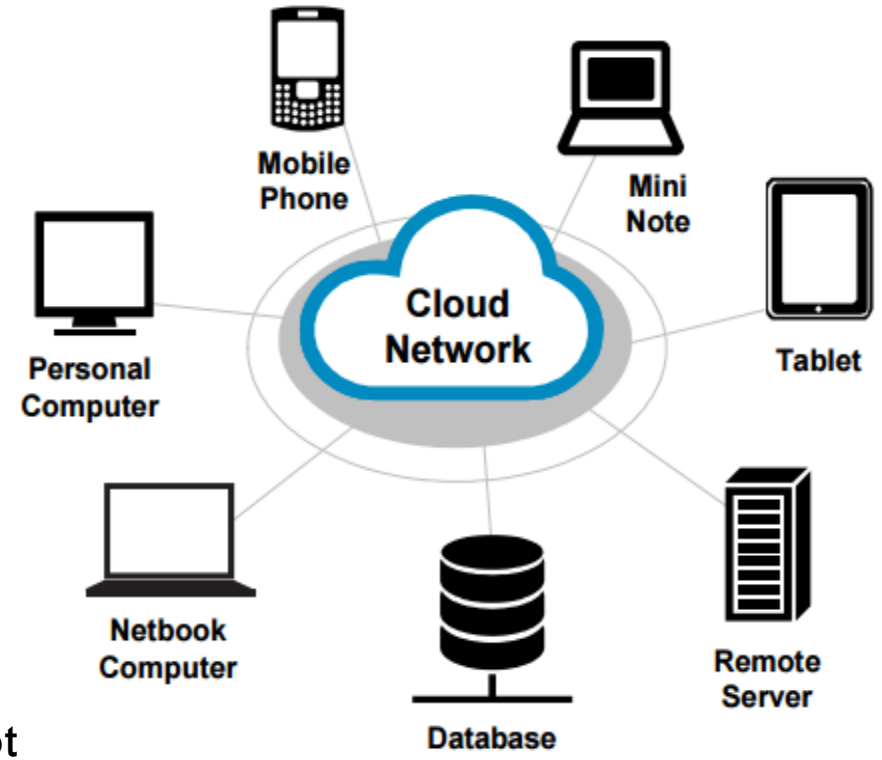
Cloud is essentially an IT consumption and delivery model that is optimized by workload

Cloud Computing Network

The network is critical to Cloud Computing

- Every cloud is some combination of a service and deployment model
- Regardless of the type of cloud, one fact remains true:

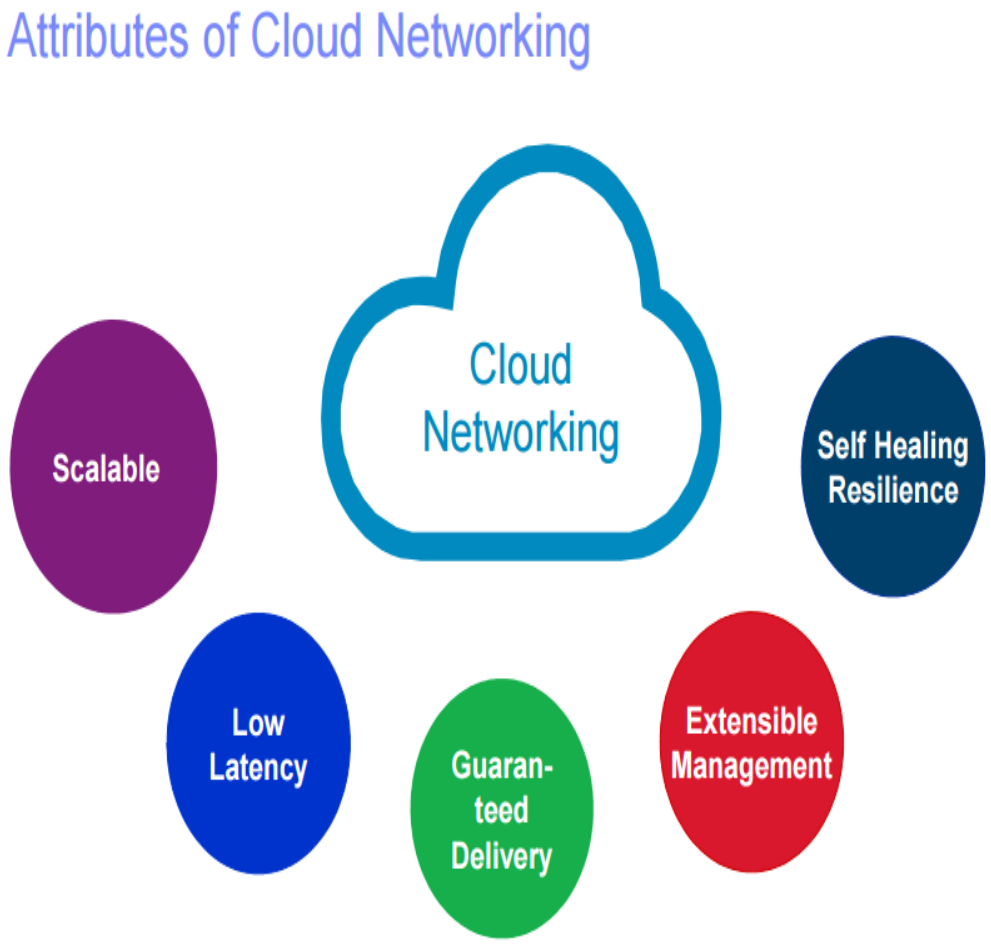
NO network means NO cloud



Without Network:

- Users cannot access their cloud services.
- Applications, data, and users cannot move between clouds.
- The infrastructure components that must work together to create a cloud cannot.

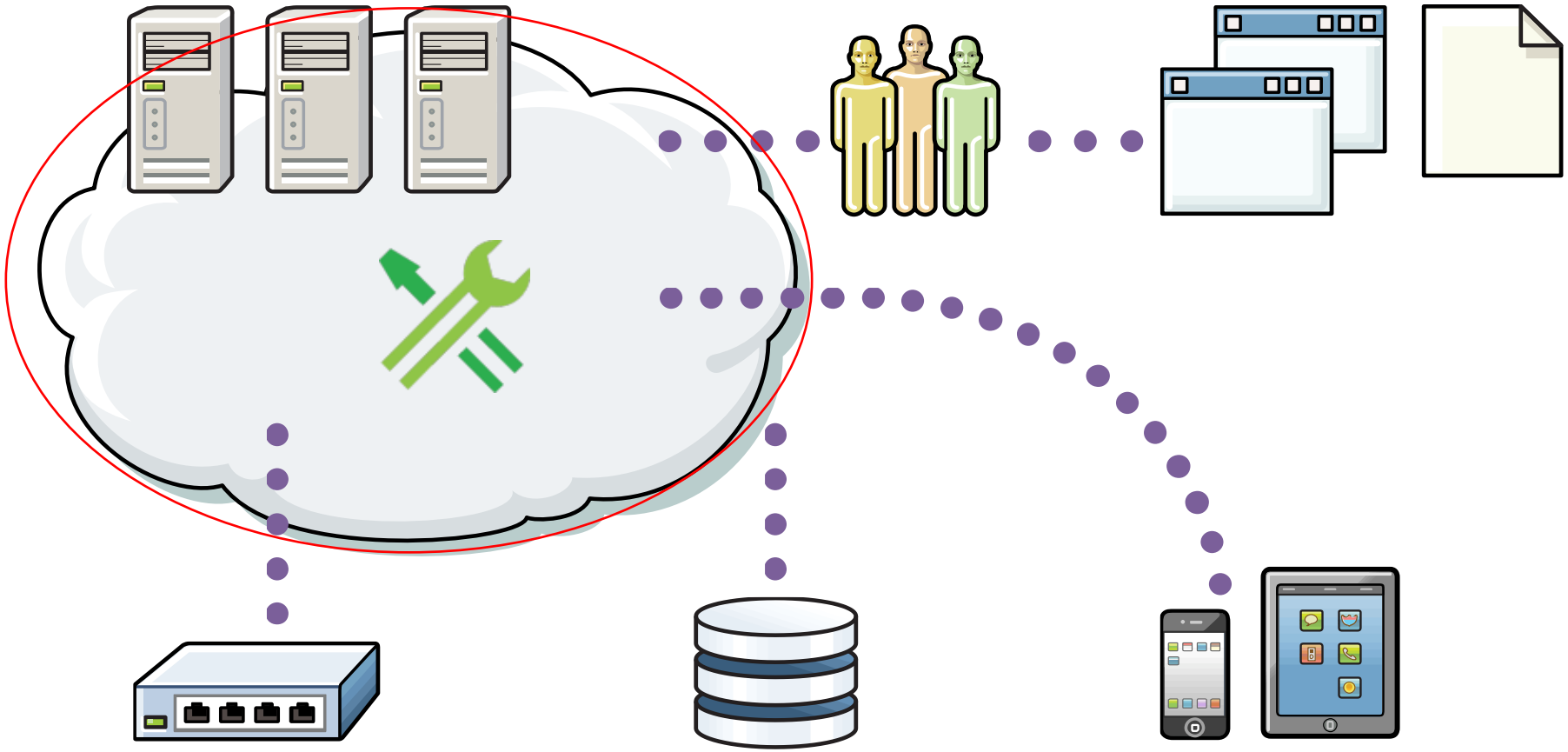
ATTRIBUTES OF CLOUD NETWORKING



- **Scalability:** The cloud network must scale to the overall level of throughput required to ensure that it does not become a bottleneck.
- **Low Latency:** The cloud network must deliver microsecond latency across the entire network fabric because low latency improves application performance and server utilization.
- **Guaranteed Performance**: The cloud network must provide predictable performance to service many simultaneous applications in the network, including video, voice, and web traffic.
- **Extensible Management**: Real-time upgrades and image/patch management in a large cloud-network is a daunting challenge to network administrators.
- **Self-Healing Resilience**: Cloud networks operate 24x7, so downtime is not an option. This requires a network architecture that offers self-healing and the ability for transparent in-service software updates.

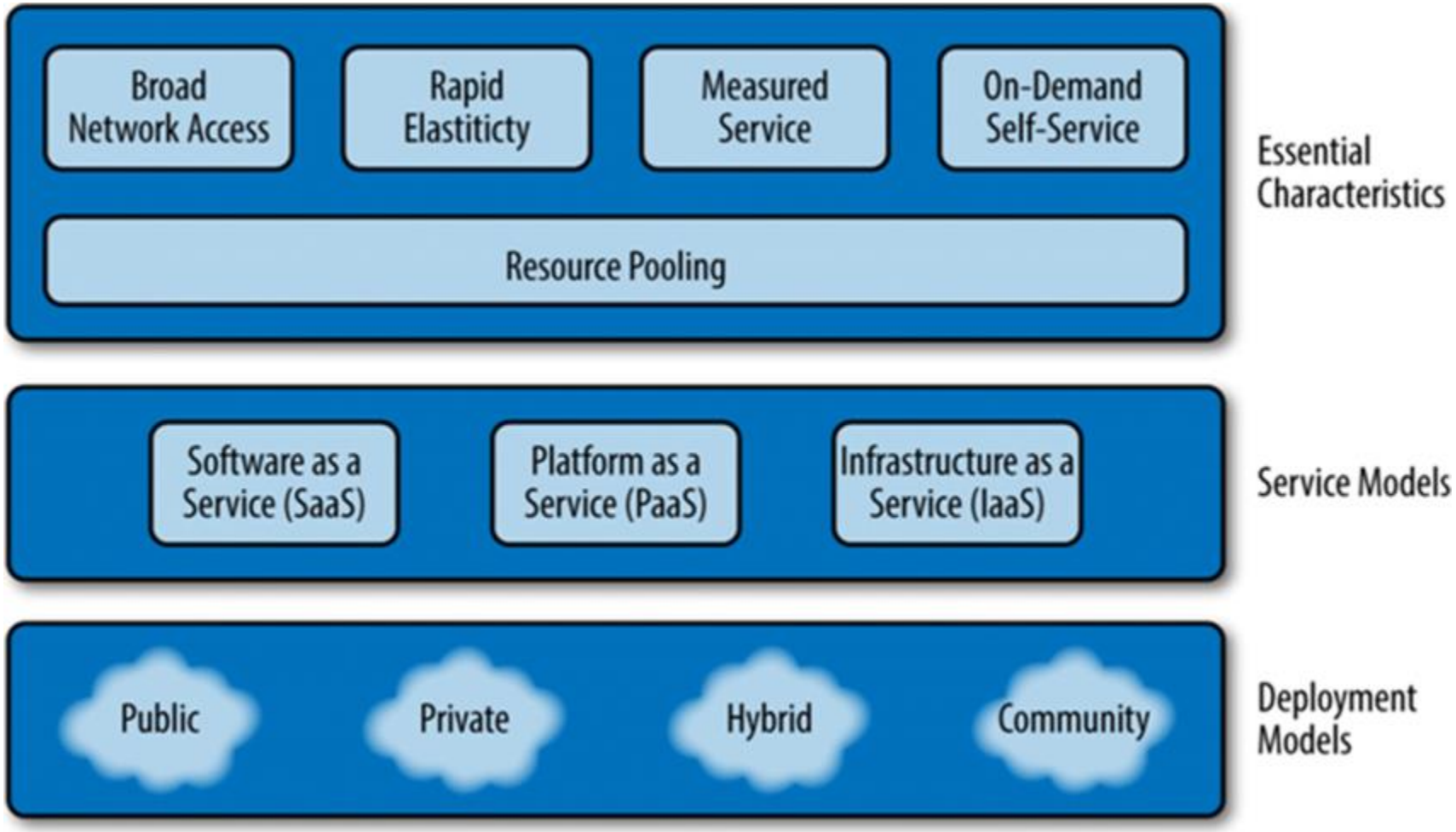
What is Cloud Computing – Part 2

- Computing power
- Applications



- Networking
- Data storage
- Services

VISUAL MODEL OF CLOUD COMPUTING DEFINITION



CLOUD COMPUTING: ESSENTIAL CHARACTERISTICS

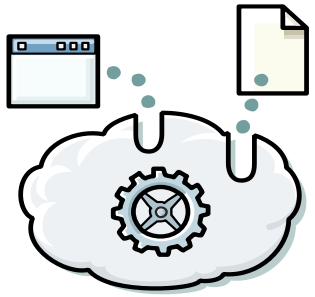
- **On-demand self service**
  - Users automatically access computing resources (e.g. servers, storage etc.) as needed.
- **Broad network access**
  - Services available over the network can be accessed using mobile/smart phones, tablets, laptops and desktops.
- **Resource pooling**
  - Computing resources (including memory and bandwidth) can be pooled to serve multiple customers at the same time.
  - Location independence

CLOUD COMPUTING: ESSENTIAL CHARACTERISTICS

- **Rapid elasticity**
  - Ability to quickly scale in/out service with demand, at any time.
- **Measured service**
  - Control, optimise services based on metering (i.e. pay-per-use pricing model)
  - Type of service include storage, processing, bandwidth etc.

CLOUD SERVICE MODELS

IaaS
Infrastructure as a service
- Provision servers
- Storage
- Networking resources



PaaS
Platform as a service
- Middleware platform
- Solution stack
- Both accessible over a network

SaaS
Software as a service
- Software
- Applications
- Or services that are delivered over a network

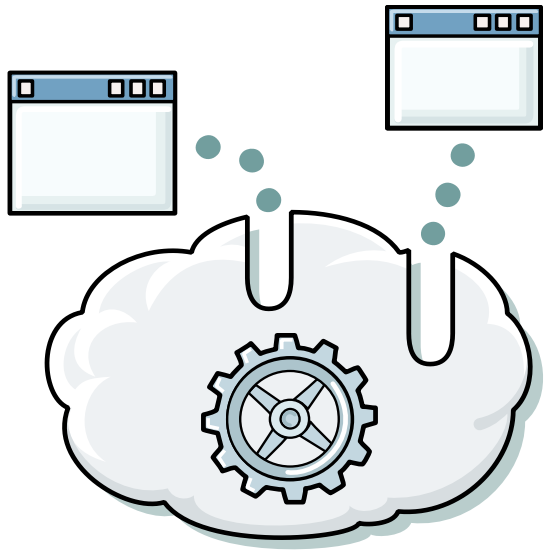
INFRASTRUCTURE AS A SERVICE (IAAS) ARCHITECTURE

- An infrastructure provider (IP) makes an entire computing infrastructure available “as a service”

- Manages a large pool of computing resources and uses virtualization to assign and dynamically resize customer resources
- Customers rent processing capacity, memory, data storage, and networking resources that are provisioned over a network

PLATFORM AS A SERVICE (PAAS) ARCHITECTURE

- Service provider (SP) supplies the software platform or middleware where the applications run
- Service user is responsible for the creation, updating, and maintenance of the application



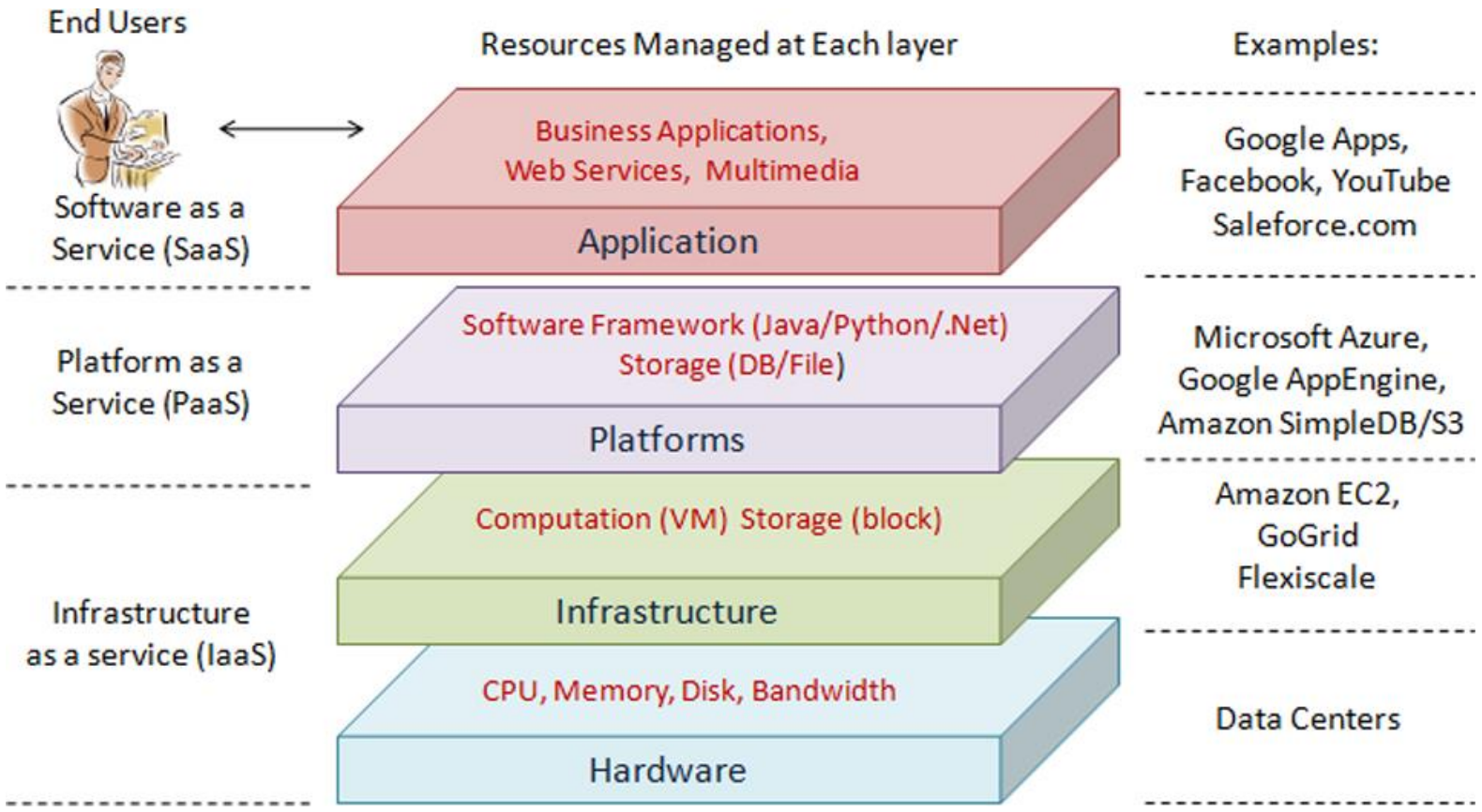
- The sizing of the hardware that is required for the execution of the software is made in an understandable manner

SOFTWARE AS A SERVICE (SAAS) ARCHITECTURE

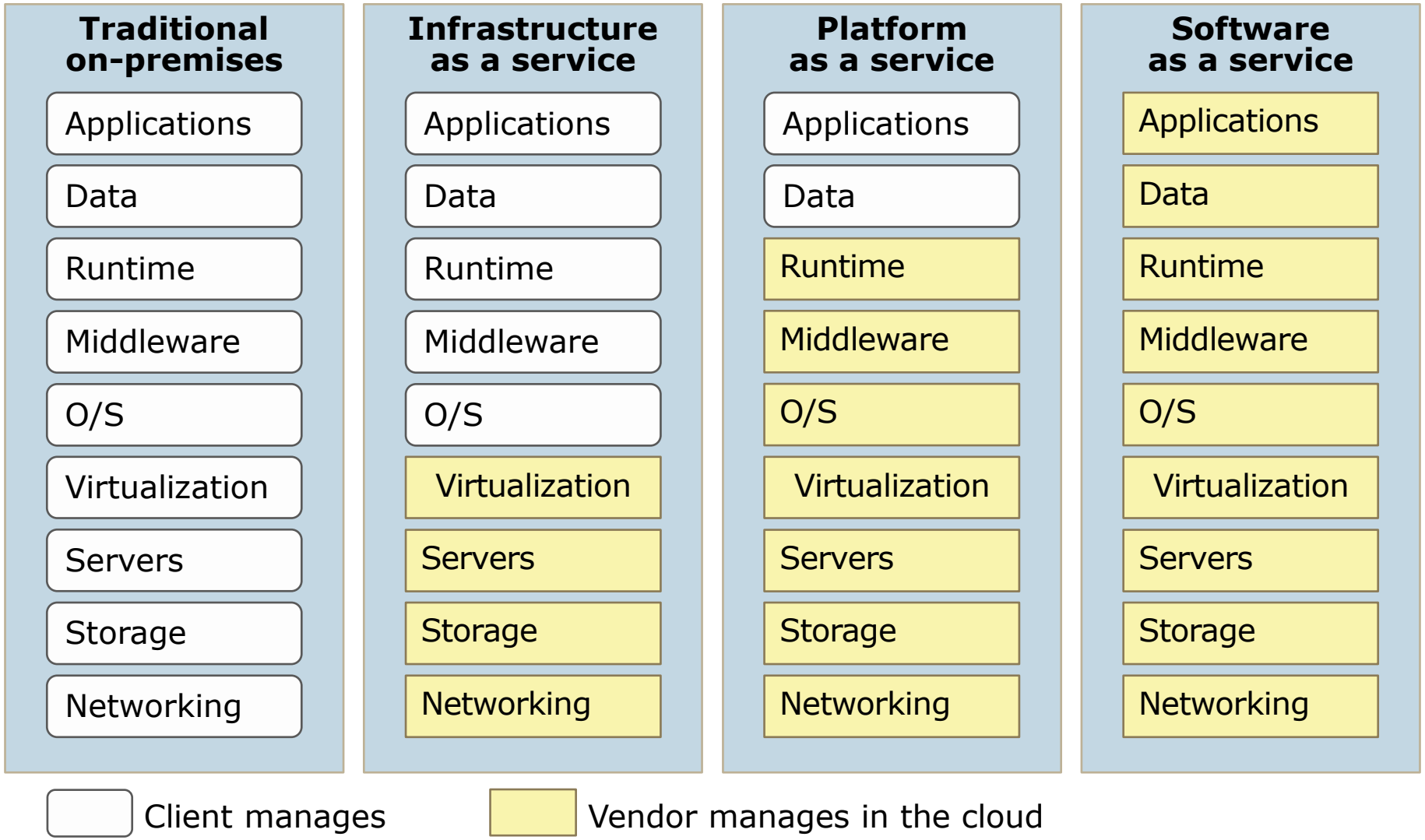
- Service provider (SP) is responsible for the creation, updating, and maintenance of software and application

- Service user accesses the service through Internet-based interfaces

CLOUD LAYER ARCHITECTURE



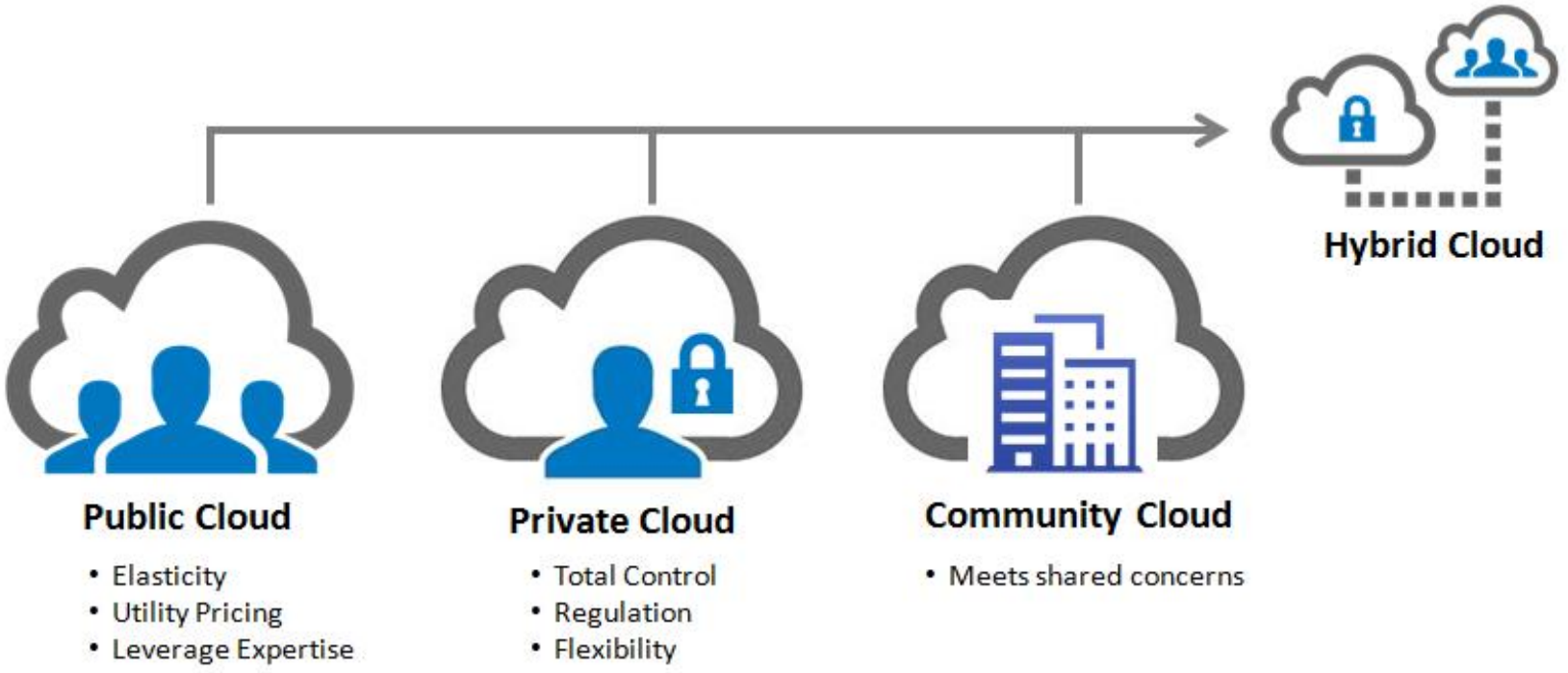
SPLIT OF RESPONSIBILITIES: PROVIDER-SIDE AND CONSUMER-SIDE



Cloud Deployment Models

Multiple clouds coexist:

- Private, public, community and hybrid



CLOUD DEPLOYMENT MODELS

Customers are choosing a variety of cloud models to meet their unique needs and priorities

Private cloud

On or off premises cloud infrastructure operated solely for an organization and managed by the organization or a third party

Public cloud

Available to the general public or a large industry group and owned by an organization selling cloud services.

Hybrid Cloud

Traditional IT and clouds (public and/or private) that remain separate but are bound together by technology that enables data and application portability

Community Clouds

Provisioned for exclusive use by specific consumers with shared concerns (e.g. security requirements, policy, and compliance considerations).

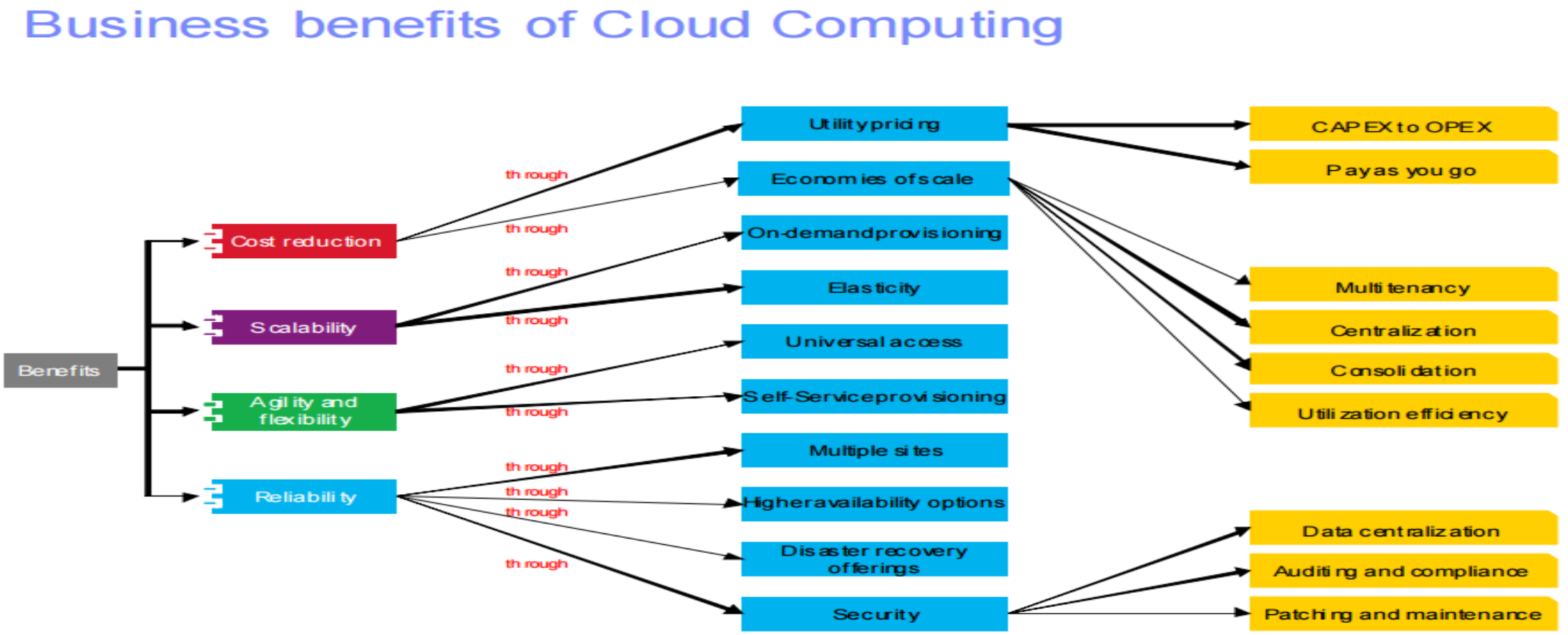
It may be owned, managed, and operated by one or more of the organizations in the community.

Traditional IT

Appliances, pre-integrated systems and standard hardware, software, and networking.

BUSINESS BENEFITS OF CLOUD COMPUTING

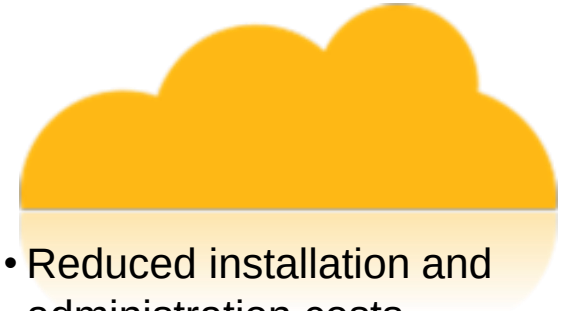
- Potential benefits of cloud computing from a business perspective.
  - Note, benefits will vary depending on several factors including use case, workload, cloud provider, capabilities, and so on.



The Importance of Cloud Computing for Development and Test

Traditional

High deployment costs to deliver software



- Reduced installation and administration costs
- Lower TCO by improved utilization of software assets

Control and governance chaos in software processes

- Better governance through standardized delivery of services
- Preconfigured software embodying best practices

Onramp and on-boarding of teams reduces time to software delivery

- Tools can be provisioned in minutes. No download, installation or setup.
- Self-administered portal to access to software resources for a globally distributed team

IT Benefits from Cloud Computing

Results from IBM cloud computing engagements

Increasing speed and flexibility	Test provisioning	Weeks	Minutes
	Change management	Months	Days/hours
	Release management	Weeks	Minutes
	Service access	Administered	Self-service
	Standardization	Complex	Reuse/share
	Metering/billing	Fixed cost	Variable cost
Reducing costs	Server/storage utilization	10–20%	70–90%
	Payback period	Years	Months

CURRENT THOUGHTS ON CLOUD COMPUTING ADOPTION RISKS

- Shifting computing power to the cloud brings many benefits.
  - such as: Cost savings, scalability, increased agility in software deployment etc.
- But don't ignore the risks

CATEGORIES OF CLOUD COMPUTING RISKS

Less Control

Many companies and governments are uncomfortable with the idea of their information located on systems they do not control. Providers must offer a high degree of security transparency to help put customers at ease.

Technology Immaturity

Lack of world-wide adopted Standards. Use of closed proprietary technologies. Lack of knowledge

Data Security

Migrating workloads to a shared network and compute infrastructure increases the potential for unauthorized exposure. Authentication and access technologies become increasingly important.

Vendor Lock-in

Interoperability constraints.
Low level of portability of application and services based on cloud.
Contract and exit strategies
Limitations on sharing or transferring data

Compliance

Complying with SOX, HIPAA
and other regulations may prohibit the use of clouds for some applications. Comprehensive auditing capabilities are essential.

Security Management

Providers must supply easy controls to manage firewall and security settings for applications and runtime environments in the cloud.

Reliability

High availability will be a key concern. IT departments will worry about a loss of service should outages occur. Mission critical applications may not run in the cloud without strong availability guarantees.

Cloud Computing Security Risks

SECURITY IS AMONG A TOP CONCERN WITH CLOUD COMPUTING...

People and identity
Mitigate the risks associated with user access to corporate resources

Data and information
Understand, deploy and properly test controls for access to and usage of sensitive data

Application and process
Help keep applications secure, protected from malicious or fraudulent use, and hardened against failure

Network, server and end point
Optimize service availability by mitigating risks to network components

Physical infrastructure
Provide actionable intelligence on the desired state of physical infrastructure security and make improvements

How can consumers think about their cloud journey?

Plan

- Understand strategic direction
- Analyze workloads (apps. data etc.)
- Determine delivery model
- Define architecture
- Build the business case

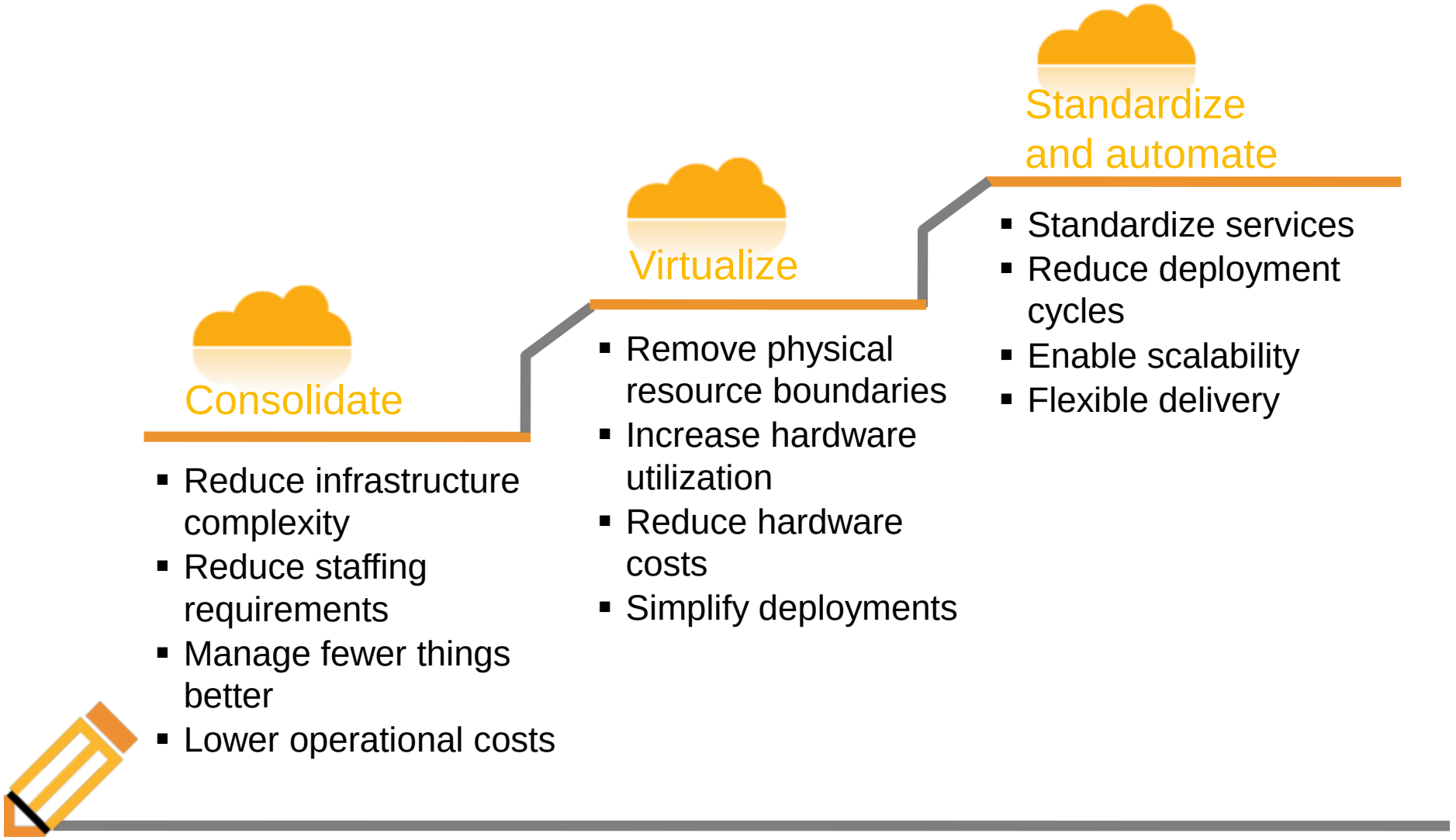
Build

- Design and construct
- Quality assurance (test)
- Security and compliance
- Lifecycle management

Deliver

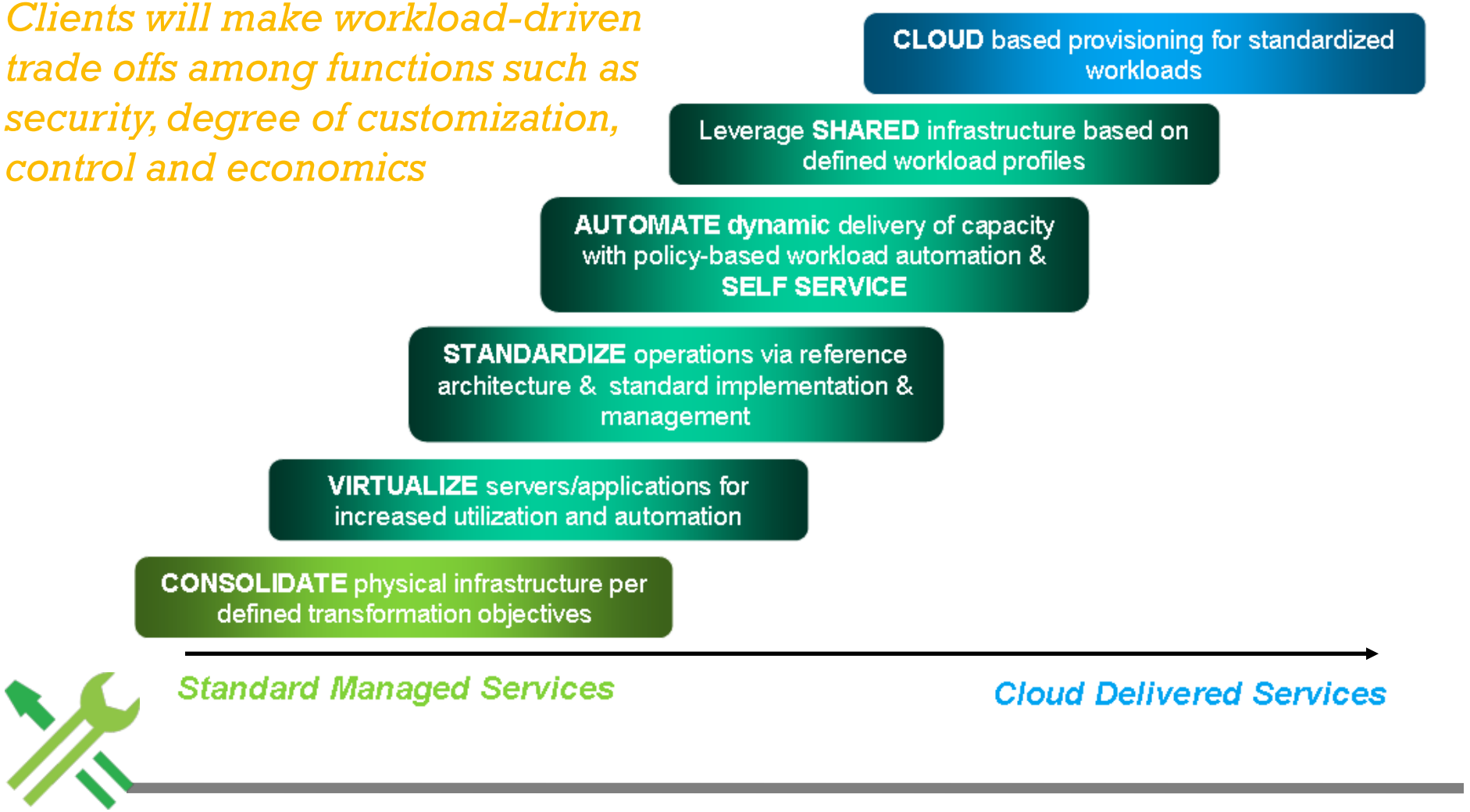
- Deploy
- Consume
- Manage
- Optimize

CREATE A ROADMAP FOR CLOUD AS PART OF THE EXISTING IT OPTIMIZATION STRATEGY



Movement from Traditional Environments to Cloud Can be in One Step or an Evolution

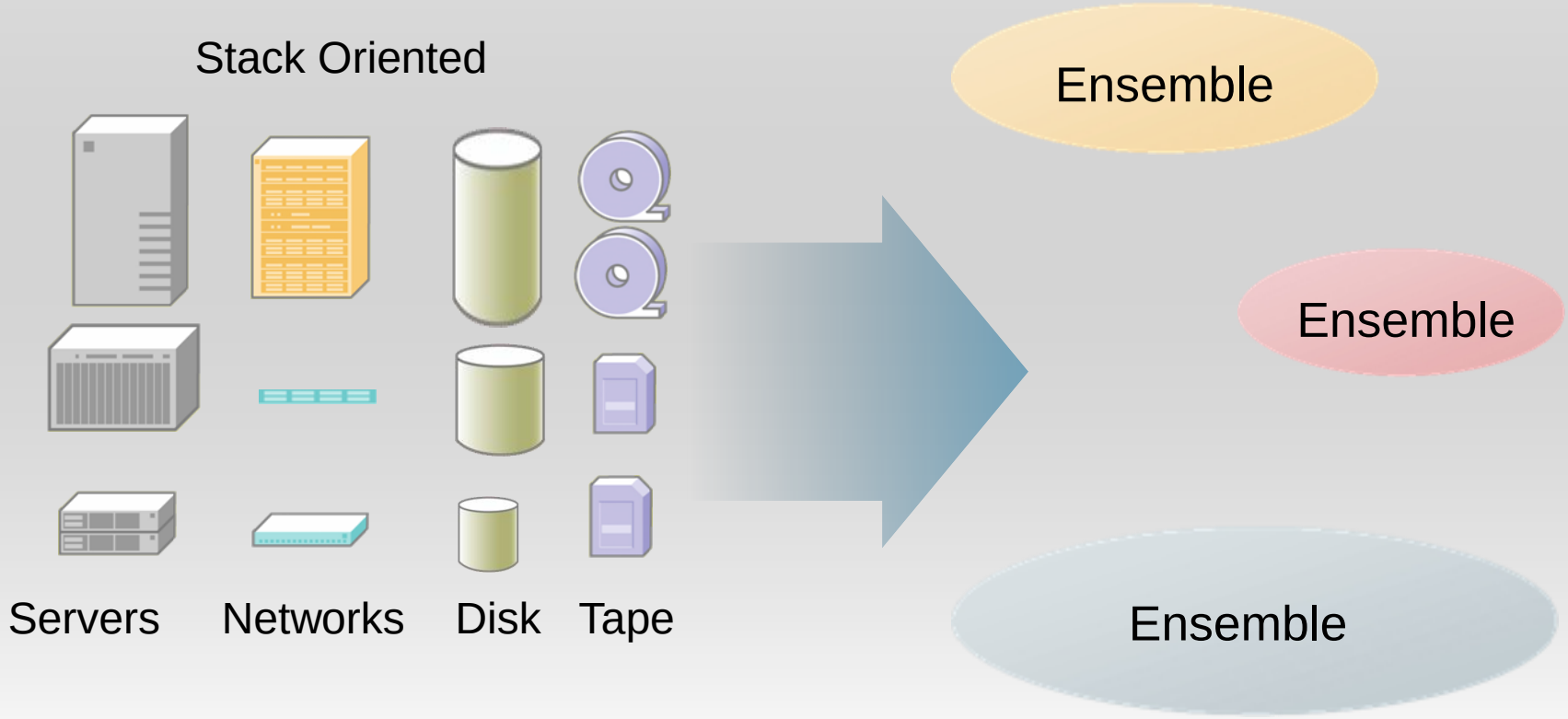
Clients will make workload-driven trade offs among functions such as security, degree of customization, control and economics



Cloud Computing Environment

A NEW MODEL FOR BUILDING CLOUD COMPUTING ENVIRONMENTS

Ensembles are scalable pools of computing power and storage that are manageable as single systems. They will replace multitudes of individual IT systems and reduce the labor required for physical systems management.



Summary

CLOUD IS AN OPPORTUNITY—WILL YOU BE ABLE TO TAKE ADVANTAGE?

- Technology is enabling a smarter planet
- We must face head-on the challenges to building an effective IT
- Cloud computing is one key way to address the challenges of a smarter planet

CONCLUSION

- Cloud fears largely stem from the perceived loss of control of sensitive data.
  - Current control measures do not adequately address cloud computing's third-party data storage and processing needs.
- Looking to the future, adoption of cloud computing by enterprises will be driven by several factors including user preferences and business priorities.
- Nonetheless, delays in adapting the current law to the cloud era may impede success of this technology