Introduction to Cloud Computing

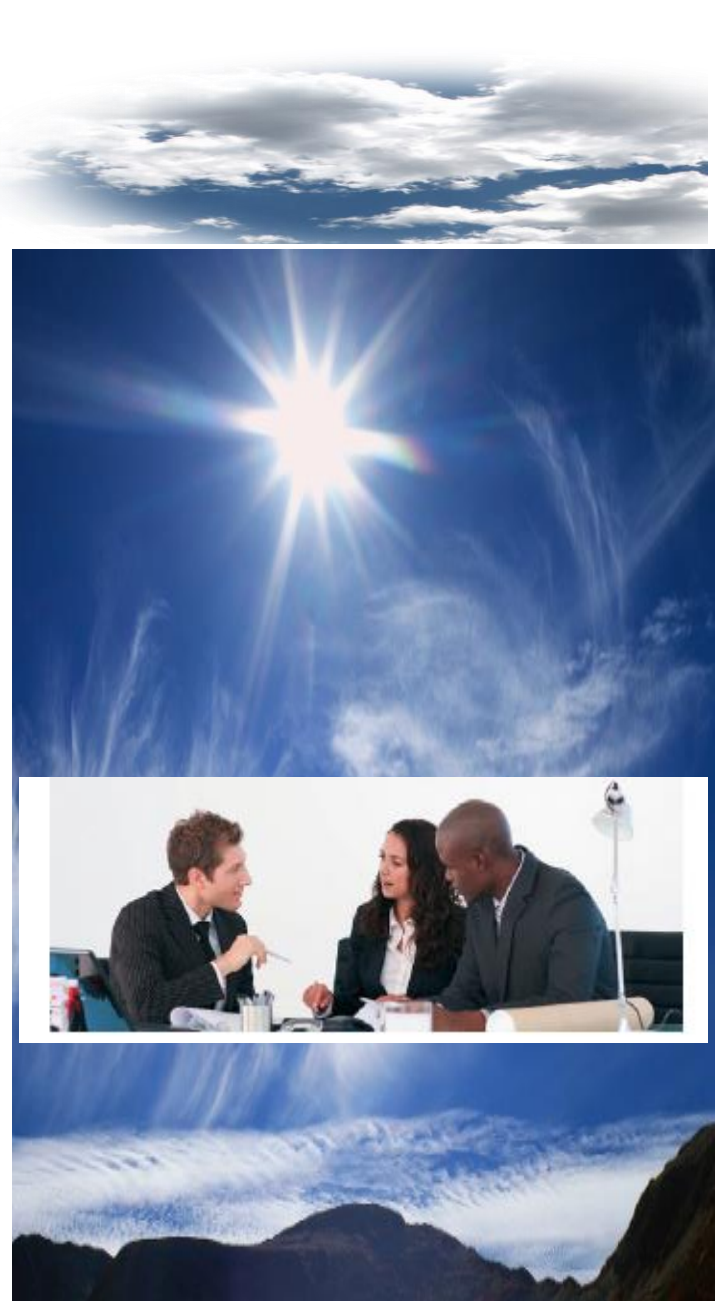## Part-1

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Introduction to Cloud Computing
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TABLE OF CONTENT

- Introduction to Cloud Computing

- Cloud Networks

- Cloud Service Models

- Cloud Deployment Models

- Conclusion

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

Cloud Computing provides us means of accessing the applications as utilities over the Internet. It allows us to create, configure, and customize the applications online.

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
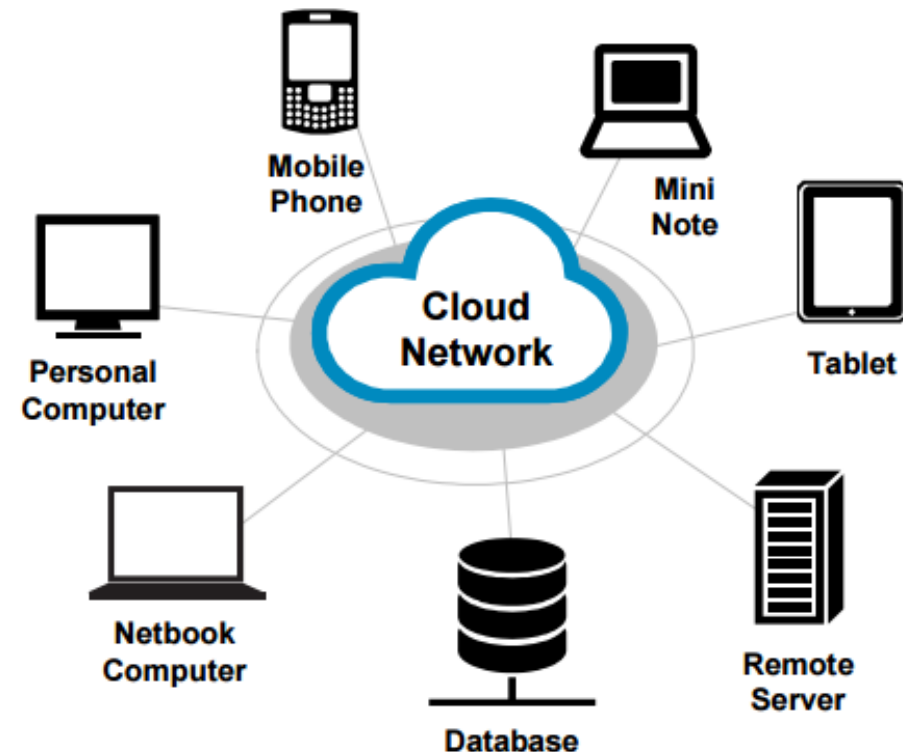
Cloud Computing Network

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:

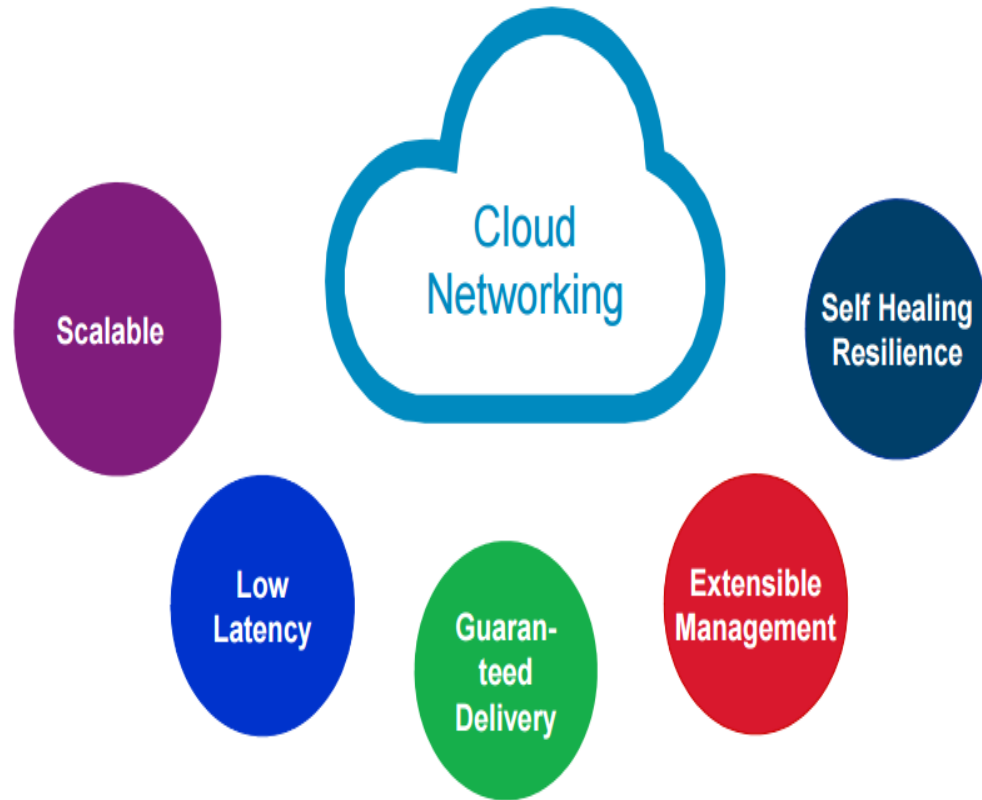## NO network means NO cloud

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.

Mobile Phone

Mini Note

Personal Computer

Cloud Network

Tablet

Netbook Computer

Database

Remote Server

ATTRIBUTES OF CLOUD NETWORKING

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.

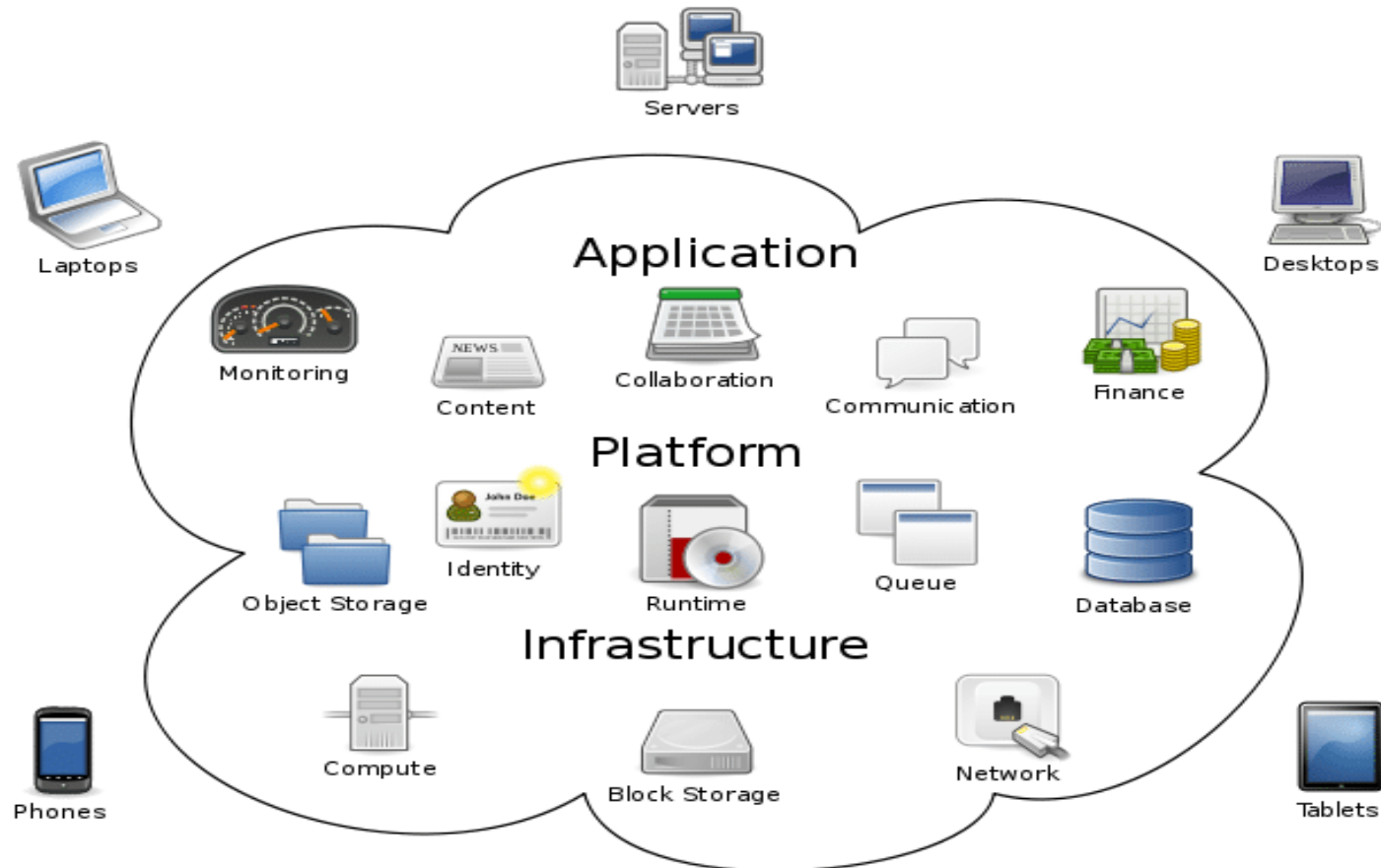# WHAT IS CLOUD COMPUTING

- Computing power
- Applications
- Networking
- Data storage
- Services
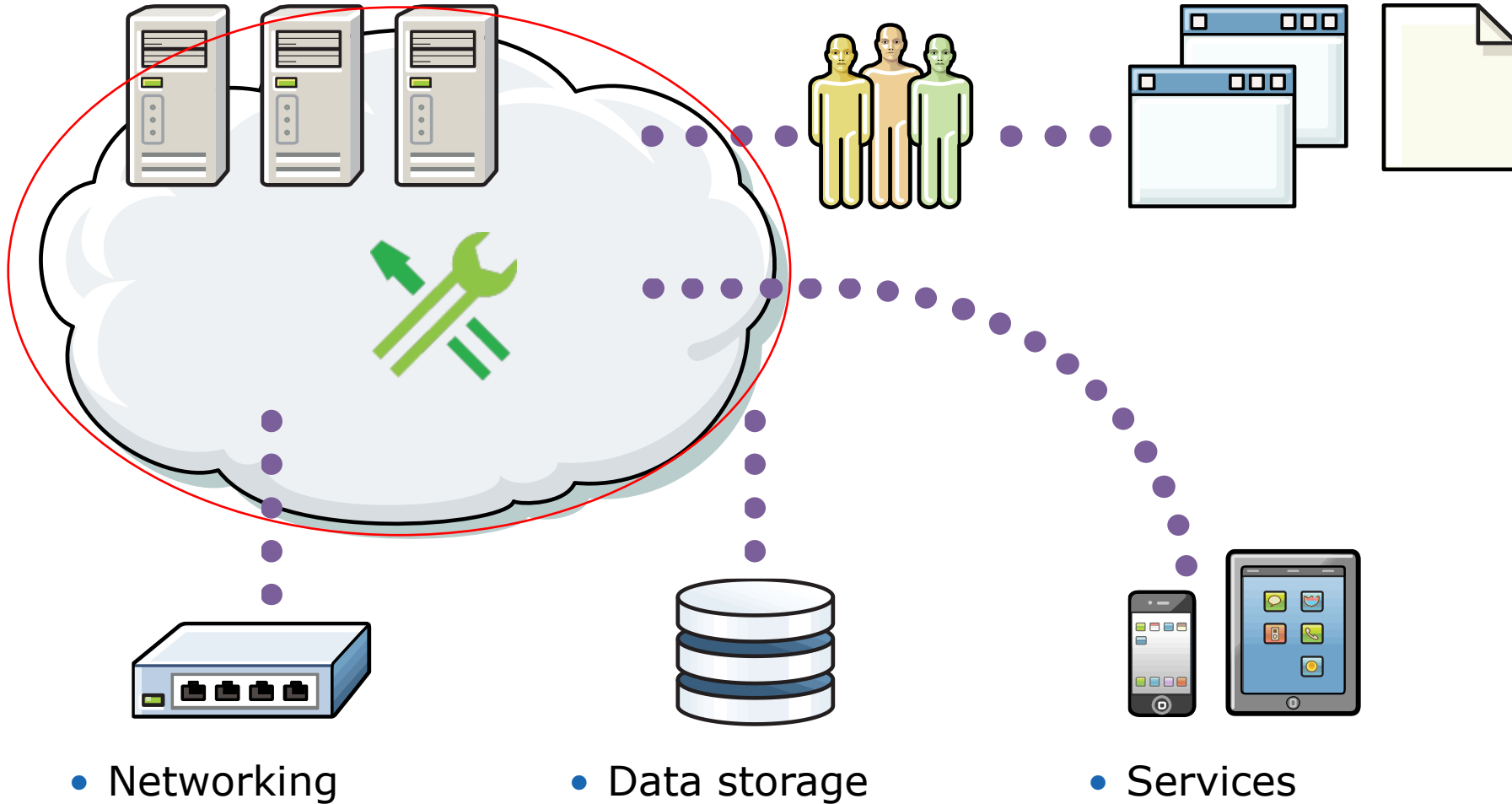
WHAT IS CLOUD COMPUTING

- *Cloud is something which present in remote locations.*

- *Cloud Computing refers to **manipulating, configuring,** and **accessing** the hardware and software resources remotely.*

- *It offers online data storage, infrastructure, and application.*

- *Cloud computing offers **platform independency,** as the software is not required to be installed locally on the PC.*

- *Hence, the Cloud Computing is making our business applications mobile and collaborative.*
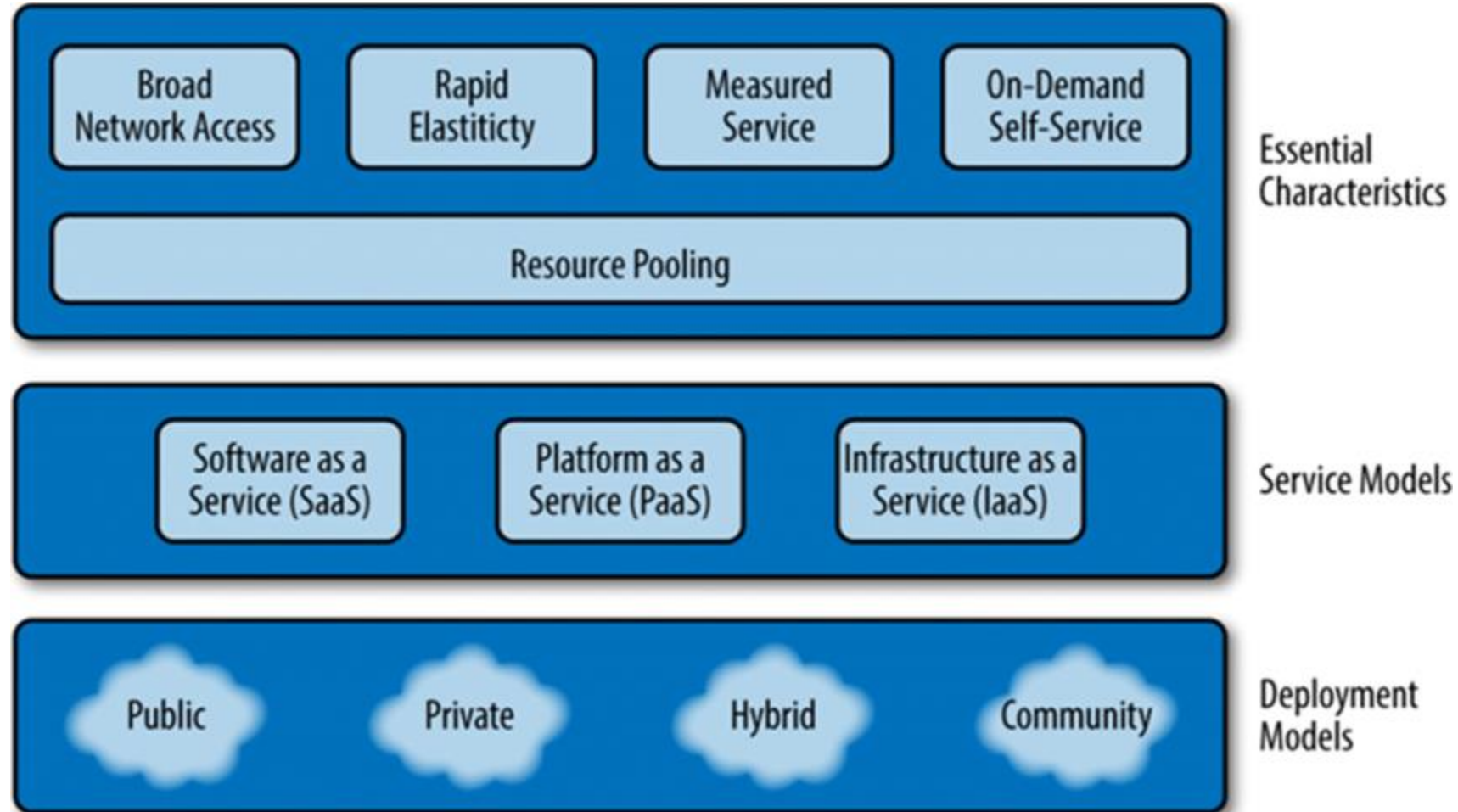
WHAT IS CLOUD COMPUTING

HOW CLOUD COMPUTING WORKS

- *The cloud has to be divided into different layers.*

- *These layers are the **front-end** and **back-end** layers.*

- *The Front-end layer is that part of the cloud with which users can interact with (user or computer system)*

- *For example, when we log in to our Gmail account, we see the UI (user interface) where everything works on event-driven buttons and graphics.*

- *The back-end is the system – it comprises hardware as well as software that delivers the back-end data from the database to the front end.*

- *All these features are functioned and managed by a central server.*

VISUAL MODEL OF CLOUD COMPUTING DEFINITION

Broad Network Access | Rapid Elastiticty | Measured Service | On-Demand Self-Service

Resource Pooling

Essential Characteristics

Software as a Service (SaaS) | Platform as a Service (PaaS) | Infrastructure as a Service (IaaS)

Service Models

Public | Private | Hybrid | Community

Deployment Models

BASIC CONCEPTS

There are certain services and models working behind the scene making the cloud computing feasible and accessible to end users. Following are the working models for cloud computing:
- *Service Models*
- *Deployment Models*

Service Models

Cloud computing is based on service models. These are categorized into three basic service models which are -
- *Infrastructure-as–a-Service (IaaS)*
- *Platform-as-a-Service (PaaS)*
- *Software-as-a-Service (SaaS)*

Anything-as-a-Service (XaaS) *is yet another service model, which includes Network-as-a-Service, Business-as-a-Service, Identity-as-a-Service, Database-as-a-Service or Strategy-as-a-Service.*
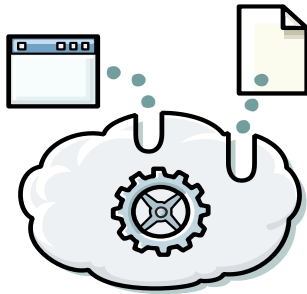
CLOUD SERVICE MODELS

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
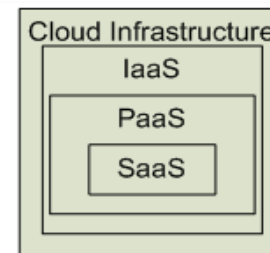- Or services that are delivered over a network

CLOUD SERVICE MODELS

	Software as a Service (SaaS)	Platform as a Service (PaaS)	Infrastructure as a Service (IaaS)

SalesForce CRM

LotusLive

Cloud Infrastructure — SaaS

Cloud Infrastructure — PaaS — SaaS

Cloud Infrastructure — IaaS — PaaS — SaaS
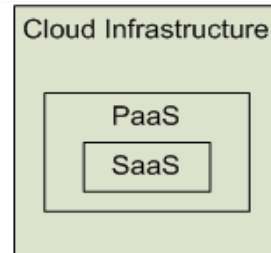
Software as a Service (SaaS)
Providers Applications

Windows Azure
The Future Made Familiar

Cloud Infrastructure — PaaS

Cloud Infrastructure — IaaS — PaaS
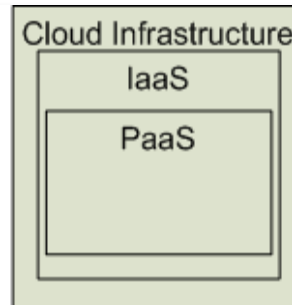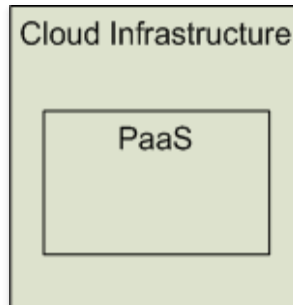
Platform as a Service (PaaS)

Deploy customer created Applications

amazon web services

rackspace HOSTING

Cloud Infrastructure — IaaS
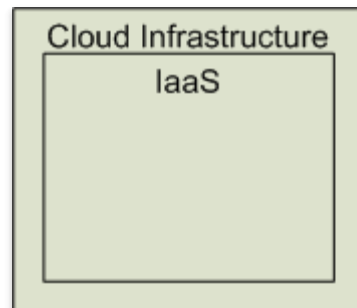
Infrastructure as a Service   (IaaS)

Rent Processing, storage, N/W capacity & computing resources

INFRASTRUCTURE AS A SERVICE (IAAS) ARCHITECTURE

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

- It is the most basic level of service. Each of the service models inherit the security and management mechanism from the underlying model

- 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.

- **IaaS** provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.

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.

- **PaaS** provides the runtime environment for applications, development and deployment tools, etc.
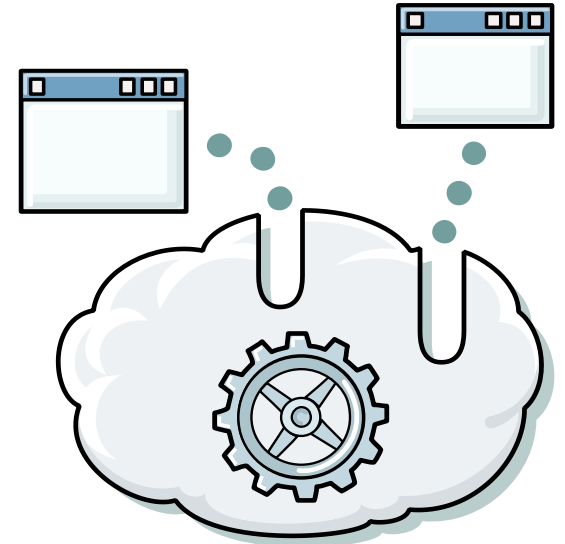
SOFTWARE AS A SERVICE (SAAS) ARCHITECTURE

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

- Service user accesses the service through Internet-based interfaces.

- **SaaS** model allows to use software applications as a service to end-users.

CLOUD LAYER ARCHITECTURE

End Users

Software as a
Service (SaaS)

Platform as a
Service (PaaS)

Infrastructure
as a service (IaaS)

Resources Managed at Each layer

**Business Applications,
Web Services, Multimedia**

Application

**Software Framework (Java/Python/.Net)
Storage (DB/File)**

Platforms

Computation (VM) Storage (block)

Infrastructure

CPU, Memory, Disk, Bandwidth

Hardware

Examples:

Google Apps,
Facebook, YouTube
Saleforce.com

Microsoft Azure,
Google AppEngine,
Amazon SimpleDB/S3

Amazon EC2,
GoGrid
Flexiscale

Data Centers

SPLIT OF RESPONSIBILITIES: PROVIDER-SIDE AND CONSUMER-SIDE

Traditional on-premises	Infrastructure as a service	Platform as a service	Software as a service
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
O/S	O/S	O/S	O/S
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

Client manages   Vendor manages in the cloud

21

CLOUD DEPLOYMENT MODELS

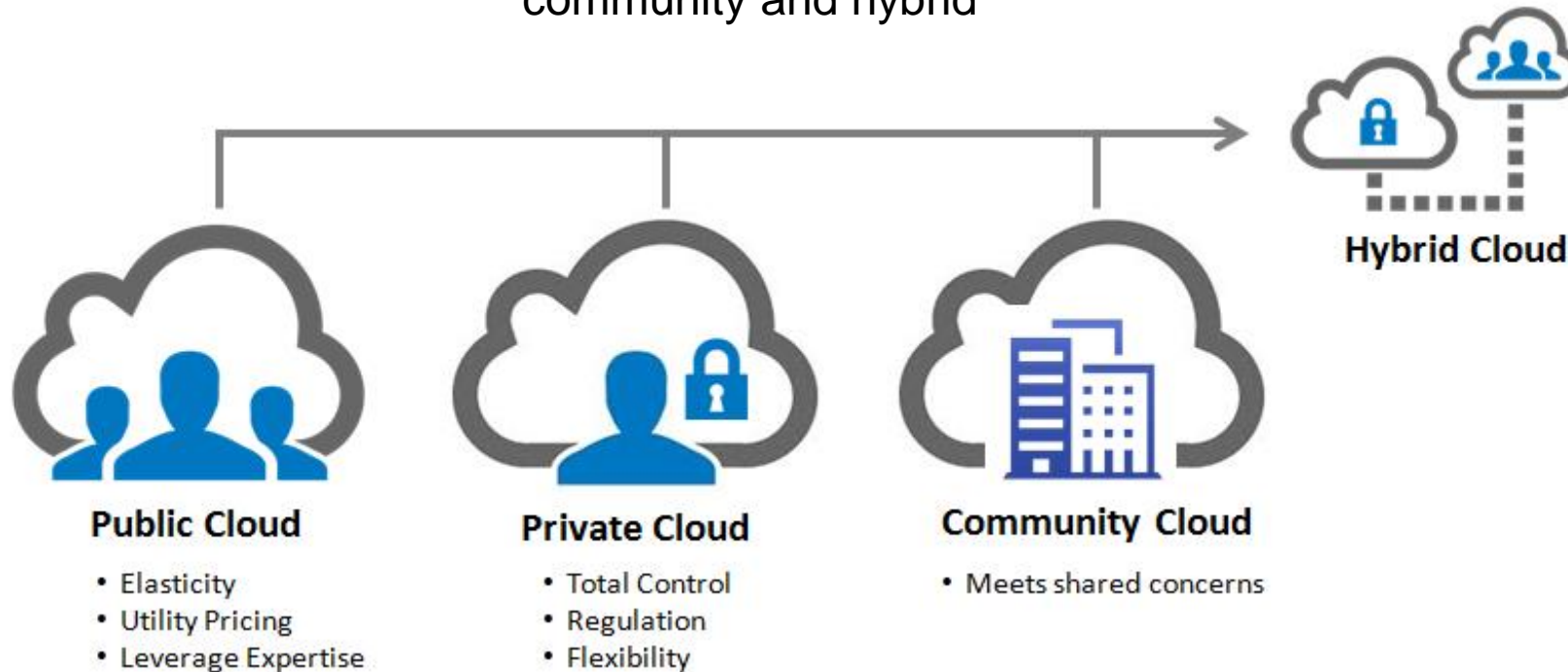**Deployment models define the type of access to the cloud, i.e., how the cloud is located?**

Multiple clouds coexist:
- Private, public, community and hybrid

Public Cloud
- Elasticity
- Utility Pricing
- Leverage Expertise

Private Cloud
- Total Control
- Regulation
- Flexibility

Community Cloud
- Meets shared concerns

Hybrid Cloud

CLOUD DEPLOYMENT MODELS

- **Public Cloud**

  - The **public cloud** allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness.

  - E g: Alibaba Cloud, Amazon Web Services(AWS), Google Cloud, IBM Cloud, and Microsoft Azure.

  Benefits:
  - Cost Effective- Share same resources to large number of customers.
  - Reliability: When ever one system getting any issue; easily managed (large number of resources from different locations)
  - Flexibility : Can integrate with other models.
  - Location Independence.
  - Utility Style costing–Pay-as-you-go.
  - Scalability

CLOUD DEPLOYMENT MODELS

- **Private Cloud**

  - The **private cloud** allows systems and services to be accessible within an organization. It is more secured because of its private nature.

  - Managed internally by the organisation or by trusted third party (Pay-as-you-go)
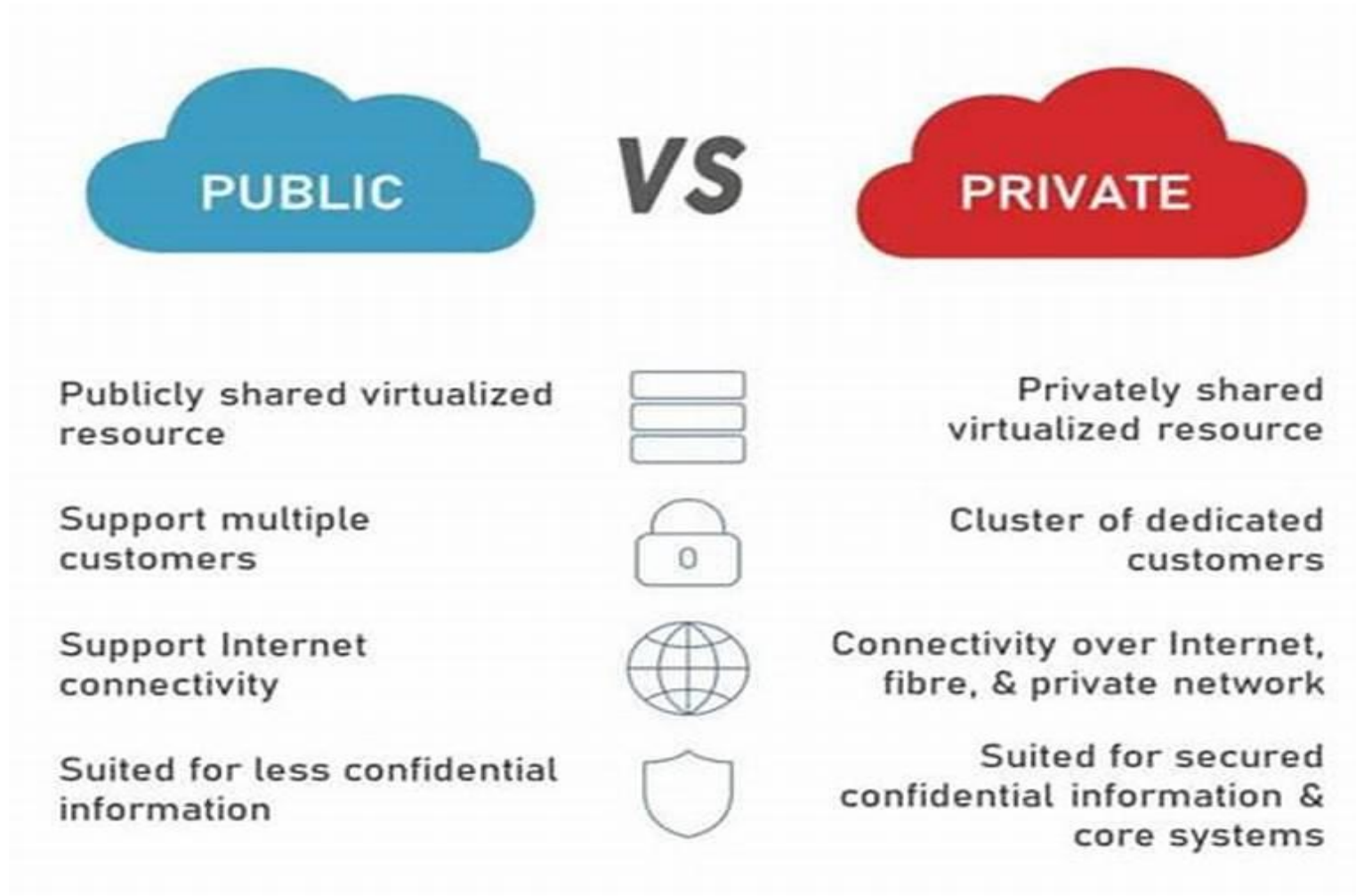 - Maintained privately.

  Benefits
  - High Security and Privacy.
  - More control.

  Disadvantages
  - Restricted area of operations (Cant be deployed globally).
  - Limited Scalability
  - Price

CLOUD DEPLOYMENT MODELS

PUBLIC VS **PRIVATE**

PUBLIC		PRIVATE
Publicly shared virtualized resource		Privately shared virtualized resource
Support multiple customers		Cluster of dedicated customers
Support Internet connectivity		Connectivity over Internet, fibre, & private network
Suited for less confidential information		Suited for secured confidential information & core systems

CLOUD DEPLOYMENT MODELS

Hybrid Cloud

- Mixture
- Critical activities: Private, Non Critical: Public.

Benefits

- Scalability
- Flexibility
- Cost Efficiency
- Security

Disadvantages

- Network issues, Infrastructure dependency.

CLOUD DEPLOYMENT MODELS

Community Cloud

- Community: Group of People System and Services to be accessible by a group of organisation.

Benefits

- Cost Effective

- Share among several organisation

- Security (less than Private and more than Public)

Disadvantages

- Network issues

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

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

Public cloud

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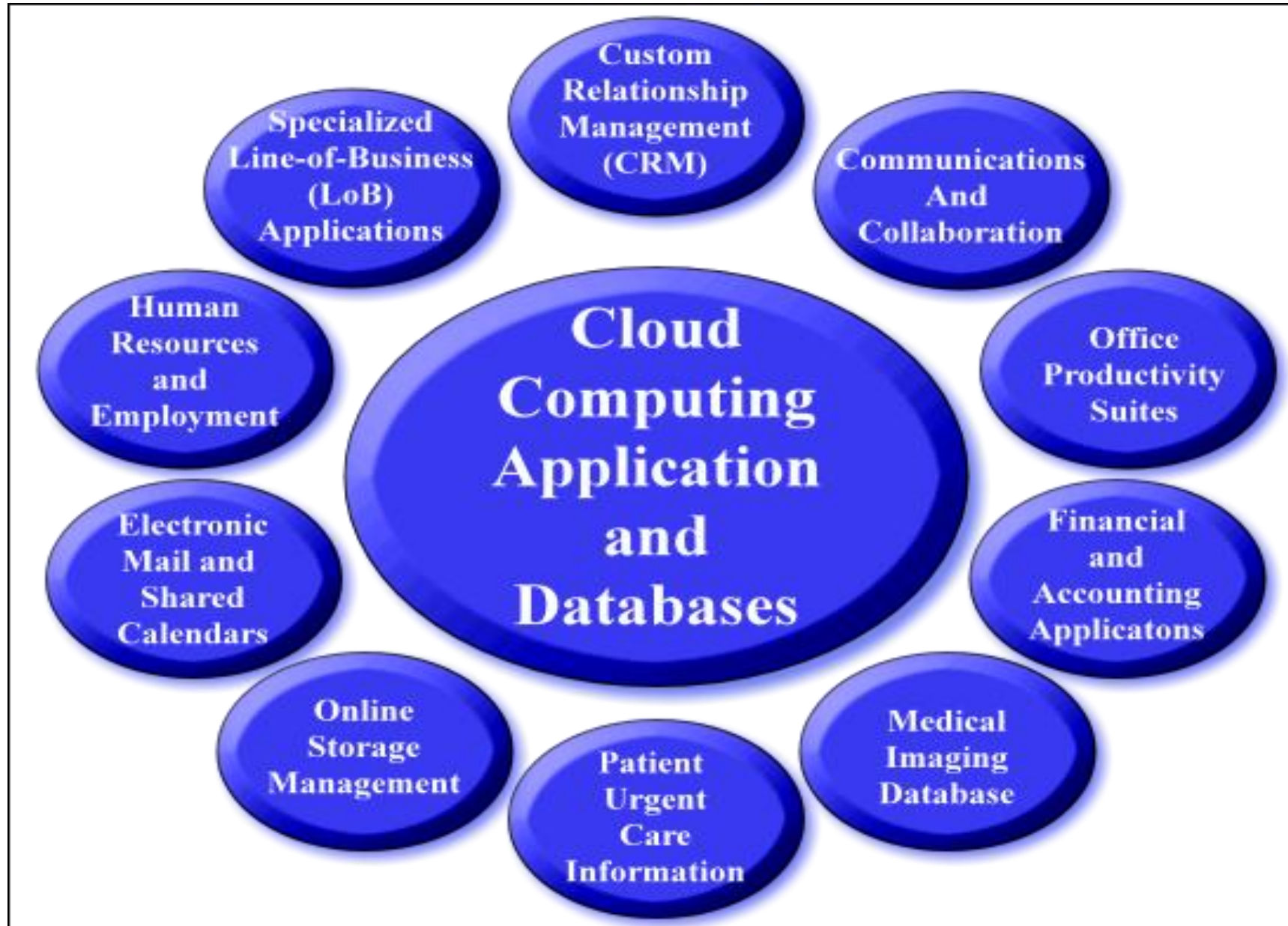
Traditional IT

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

APPLICATIONS

Cloud Computing is applied in almost all the fields like:

- Business – Google apps for business (Google Doc), Quick books (online accounting solutions, etc.)

- Data Storage and Backup Service Box.com (drag & drop), Mozy (backup), etc.

- Management- Toggl (tracks time period), Evernote (create, organise, and store different pieces of data), etc.

- Art–Moo(designs printing cards, postcards, etc.)

- Entertainment–Audio box (Streaming)

- Social Applications– Facebook, Twitter, etc

Cloud Computing Application and Databases

- Custom Relationship Management (CRM)
- Specialized Line-of-Business (LoB) Applications
- Communications And Collaboration
- Human Resources and Employment
- Office Productivity Suites
- Electronic Mail and Shared Calendars
- Financial and Accounting Applicatons
- Online Storage Management
- Patient Urgent Care Information
- Medical Imaging Database

Summary

- 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

THANK YOU