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FACULTY OF ENGINEERING & TECHNOLOGY
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Subject: Azure Fundamentals

Unit 1 : Cloud Concepts

Computer Science & Engineering

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DIGITAL LEARNING CONTENT

Outline

- **Introduction of Cloud Computing**
- **Cloud computing principles**
- **Azure Fundamentals, History, Characteristics**

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Azure Fundamentals Btech, 5th Semester

Prerequisite: Basic understanding of computer concepts and basic programming

Rationale: This course provides a broad introduction to Azure cloud , infrastructure , services, security and compliance ,also billing , pricing and support plans.

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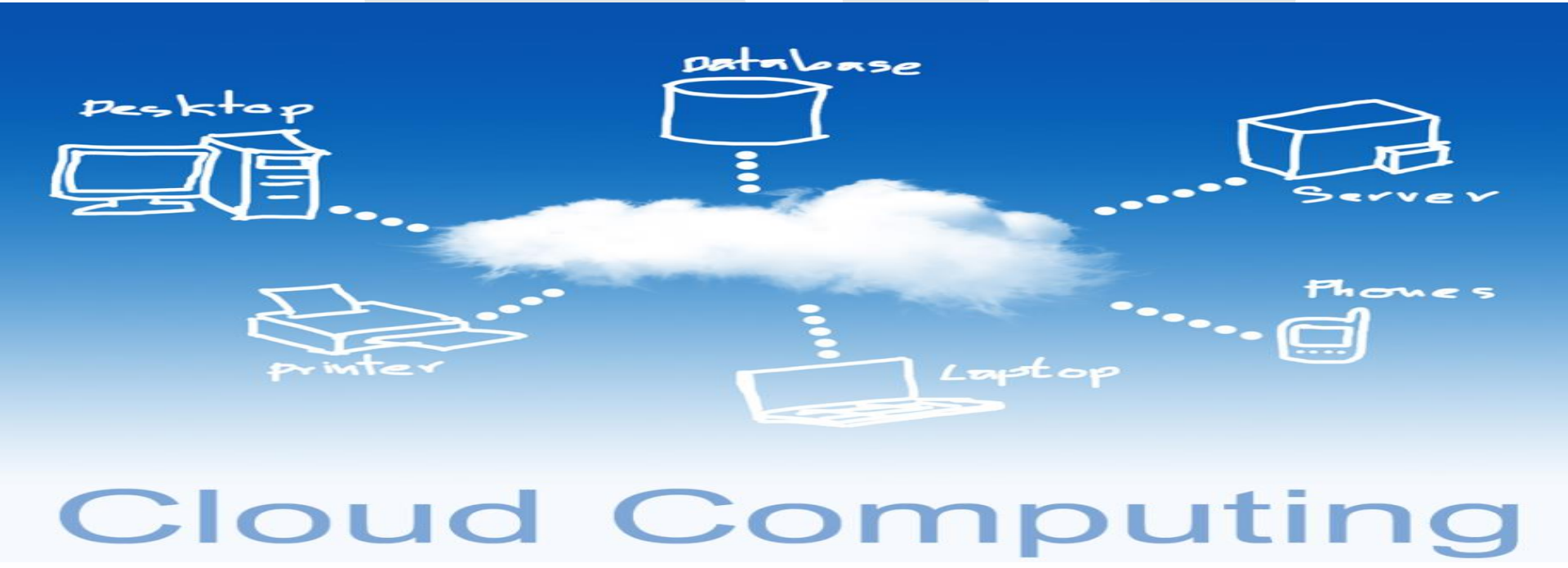
Introduction of Cloud Computing

Definition: Cloud computing refers to the on demand provision of computational resources (data, software) via a computer network, rather than from a local computer.



What is Cloud Computing

1. Cloud computing is the delivery of computing services over the internet. Computing services include common IT infrastructure such as virtual machines, storage, databases, and networking.

2. Cloud services also expand the traditional IT offerings to include things like Internet of Things (IoT), machine learning (ML), and artificial intelligence (AI).

3. Because cloud computing uses the internet to deliver these services, it doesn't have to be constrained by physical infrastructure the same way that a traditional data center is.

4. That means if you need to increase your IT infrastructure rapidly, you don't have to wait to build a new data center—you can use the cloud to rapidly expand your IT footprint.

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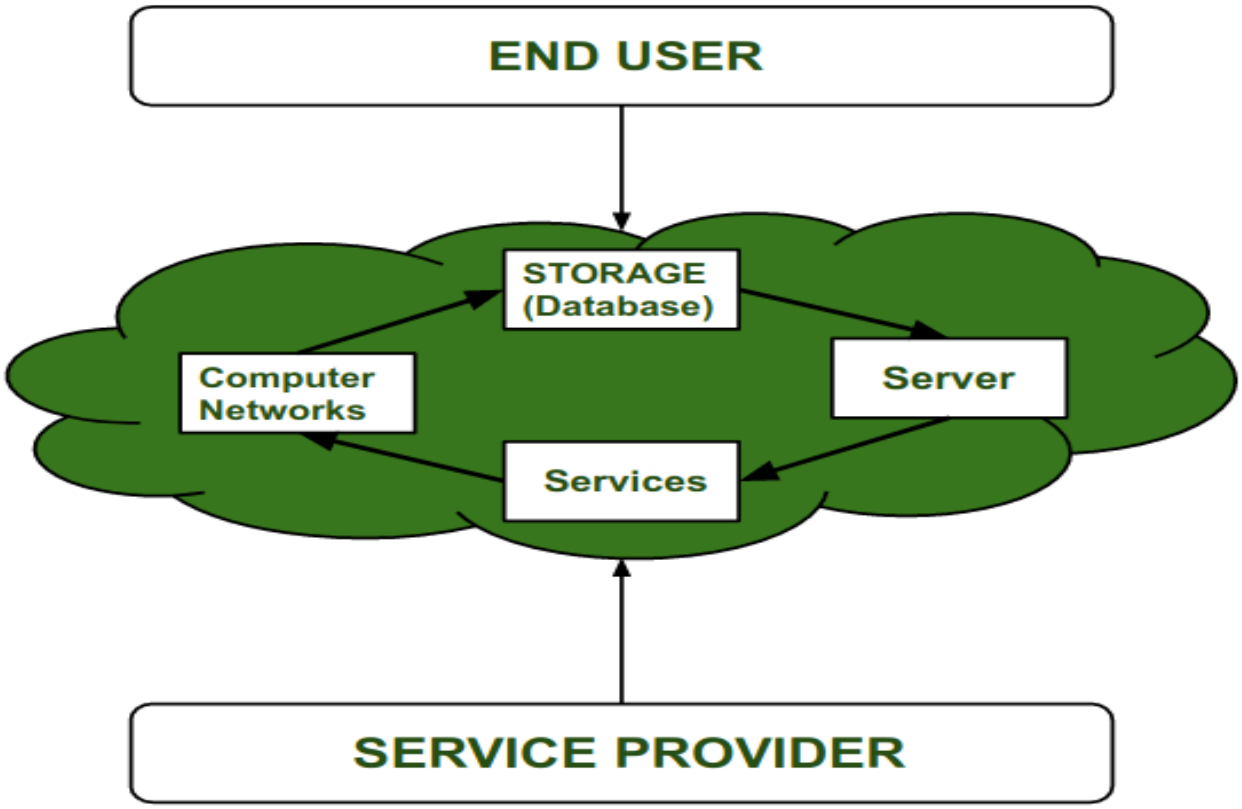
Introduction of Cloud Computing

- Microsoft Azure is a cloud computing platform with an ever-expanding set of services to help you build solutions to meet your business goals.
- Azure services support everything from simple to complex. Azure has simple web services for hosting your business presence in the cloud.
- Azure also supports running fully virtualized computers managing your custom software solutions.
- Azure provides a wealth of cloud-based services like remote storage, database hosting, and centralized account management.
- Azure also offers new capabilities like artificial intelligence (AI) and Internet of Things (IoT) focused services.

Introduction of Cloud Computing



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What is Azure Fundamentals?

- Azure Fundamentals is a series of three learning paths that familiarize you with Azure and its many services and features.

- Whether you're interested in compute, **networking, or storage services**; learning about cloud security best practices; or exploring governance and management options, think of Azure Fundamentals as your curated guide to Azure.

- Azure Fundamentals includes interactive exercises that give **you hands-on experience** with Azure. Many exercises **provide a temporary Azure portal environment** called the sandbox, which allows you to practice creating cloud resources for free at your own pace.

- Technical IT experience isn't required; however, having general IT knowledge will help you get the most from your learning experience.

HISTORY OF CLOUD COMPUTING

- Before emerging the cloud computing, there was Client/Server computing which is basically a centralized storage in which all the software applications, all the data and all the controls are resided on the server side.
- If a single user wants to access specific data or run a program, he/she need to connect to the server and then gain appropriate access, and then he/she can do his/her business.
- Then after, distributed computing came into picture, where all the computers are networked together and share their resources when needed.
- On the basis of above computing, there was emerged of cloud computing concepts that later implemented.
- At around in 1961, John MacCharty suggested in a speech at MIT that computing can be sold like a utility, just like a water or electricity. It was a brilliant idea, but like all brilliant ideas, it was ahead if its time, as for the next few decades, despite interest in the model, the technology simply was not ready for it.

HISTORY OF CLOUD COMPUTING

CLIENT SERVER COMPUTING

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DISTRIBUTED COMPUTING

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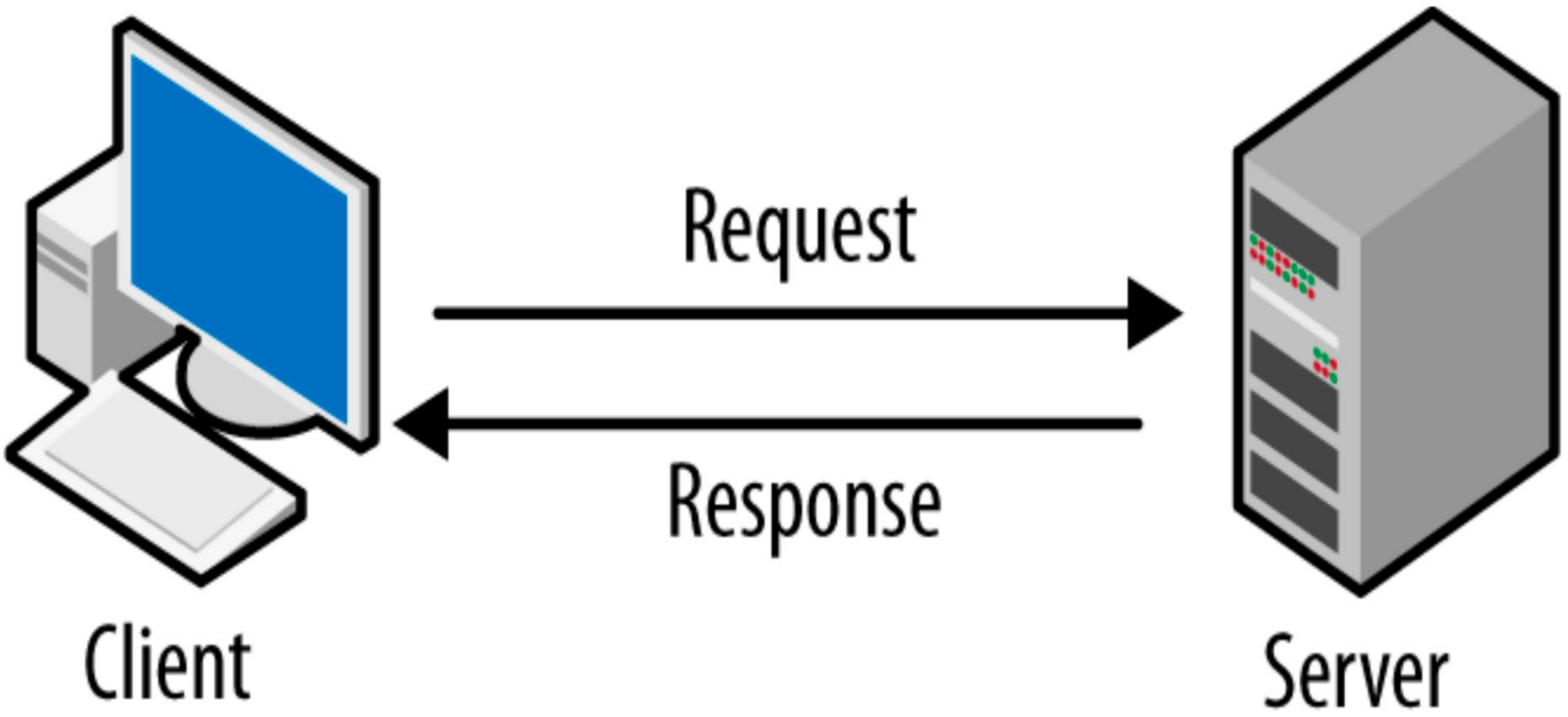
CLOUD COMPUTING

HISTORY OF CLOUD COMPUTING



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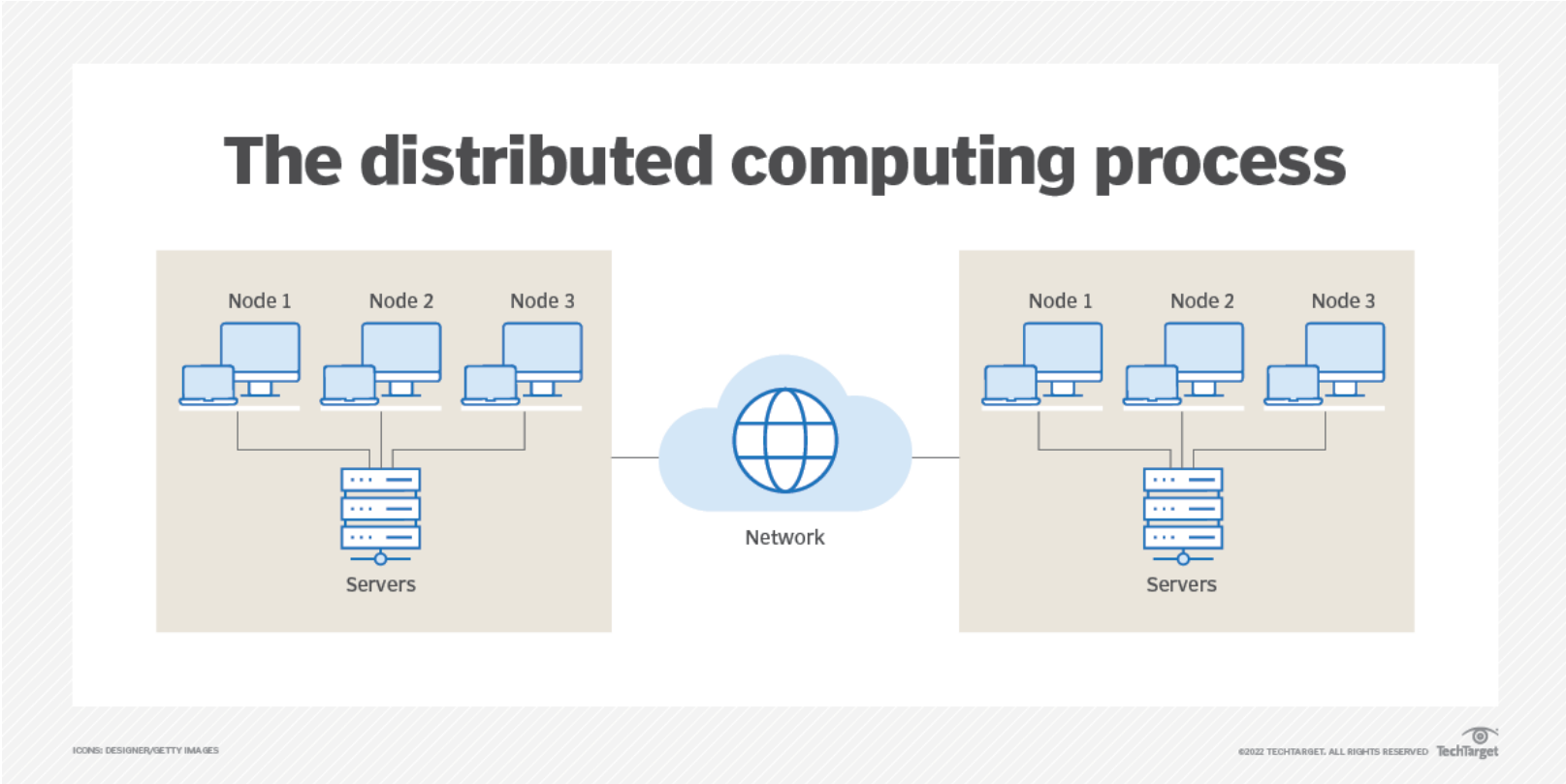
HISTORY OF CLOUD COMPUTING



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HISTORY OF CLOUD COMPUTING

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HISTORY OF CLOUD COMPUTING

- But of course time has passed and the technology caught that idea and after few years we mentioned that:

- In 1999, Salesforce.com started delivering of applications to users using a simple website. The applications were delivered to enterprises over the Internet, and this way the dream of computing sold as utility were true.

- In 2002, Amazon started Amazon Web Services, providing services like storage, computation and even human intelligence. However, only starting with the launch of the Elastic Compute Cloud in 2006 a truly commercial service open to everybody existed.

- In 2009, Google Apps also started to provide cloud computing enterprise applications.

- Of course, all the big players are present in the cloud computing evolution, some were earlier, some were later. In 2009, Microsoft launched Windows Azure, and companies like Oracle and HP have all joined the game. This proves that today, cloud computing has become mainstream.

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Characteristics of Cloud Computing

There are many characteristics of Cloud Computing here are few of them :

1.On-demand self-services: The Cloud computing services does not require any human administrators, user themselves are able to provision, monitor and manage computing resources as needed.

2.Broad network access: The Computing services are generally provided over standard networks and heterogeneous devices.

3.Rapid elasticity: The Computing services should have IT resources that are able to scale out and in quickly and on a need basis. Whenever the user require services it is provided to him and it is scale out as soon as its requirement gets over.

Common Characteristic

4.Resource pooling: The IT resource (e.g., networks, servers, storage, applications, and services) present are shared across multiple applications and occupant in an uncommitted manner.

5.Measured service: The resource utilization is tracked for each application and occupant, it will provide both the user and the resource provider with an account of what has been used.

6 Multi-tenancy: Cloud computing providers can support multiple tenants (users or organizations) on a single set of shared resources.

7 Virtualization: Cloud computing providers use virtualization technology to abstract underlying hardware resources and present them as logical resources to users.

Common Characteristic

8. Flexible pricing models: Cloud providers offer a variety of pricing models, including pay-per-use, subscription-based, and spot pricing, allowing users to choose the option that best suits their needs.

9. Security: Cloud providers invest heavily in security measures to protect their users' data and ensure the privacy of sensitive information.

10. Automation: Cloud computing services are often highly automated, allowing users to deploy and manage resources with minimal manual intervention.

11. Sustainability: Cloud providers are increasingly focused on sustainable practices, such as energy-efficient data centers and the use of renewable energy sources, to reduce their environmental impact.

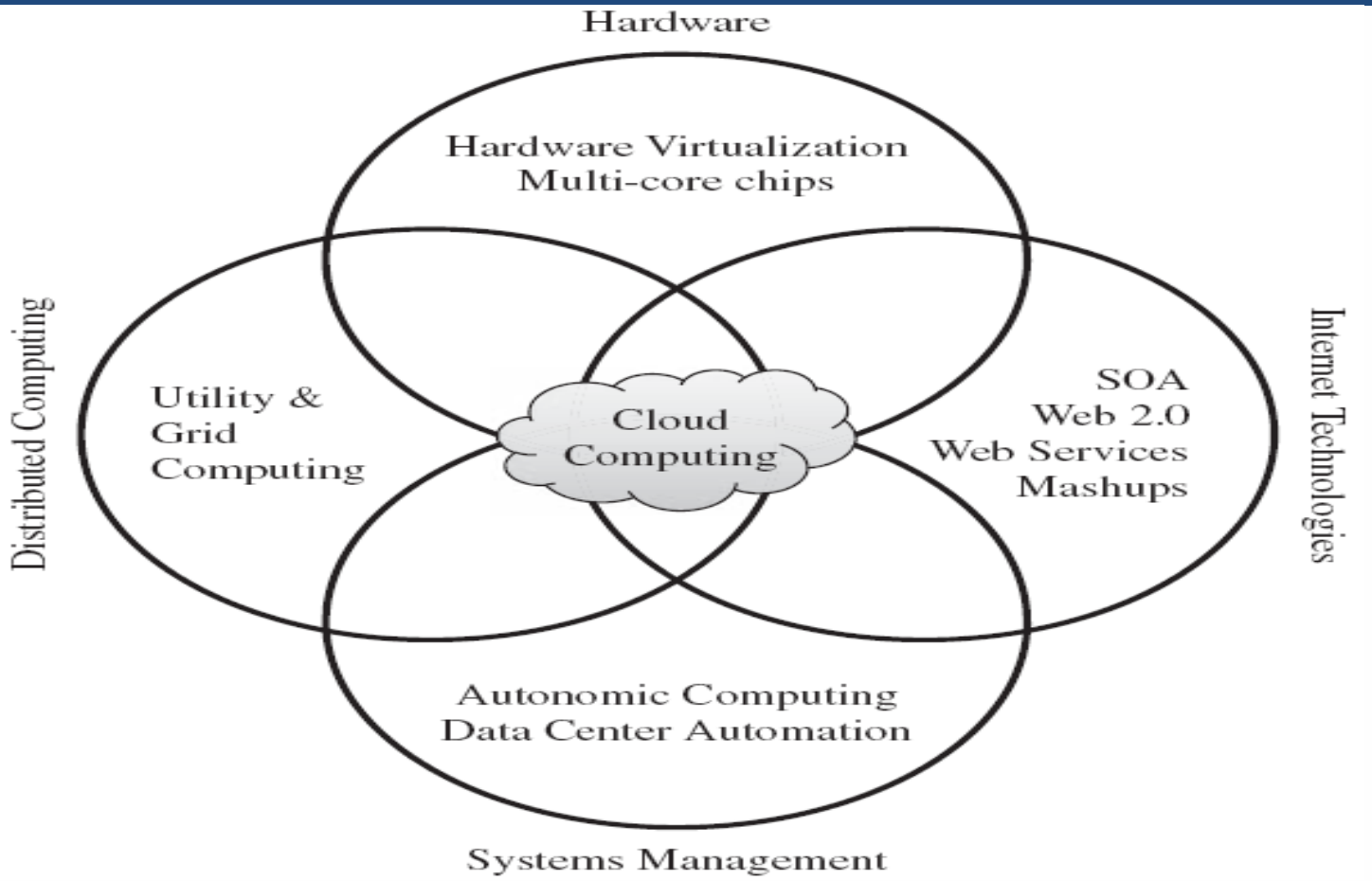
Advantages :

- It is easier to get backup in cloud.
- It allows us easy and quick access stored information anywhere and anytime.
- It allows us to access data via mobile.
- It reduces both hardware ad Software cost, and it is easily maintainable.
- One of the biggest advantage of Cloud Computing is Database Security.

Disadvantages :

- It requires good internet connection.
- User have limited control on the data.

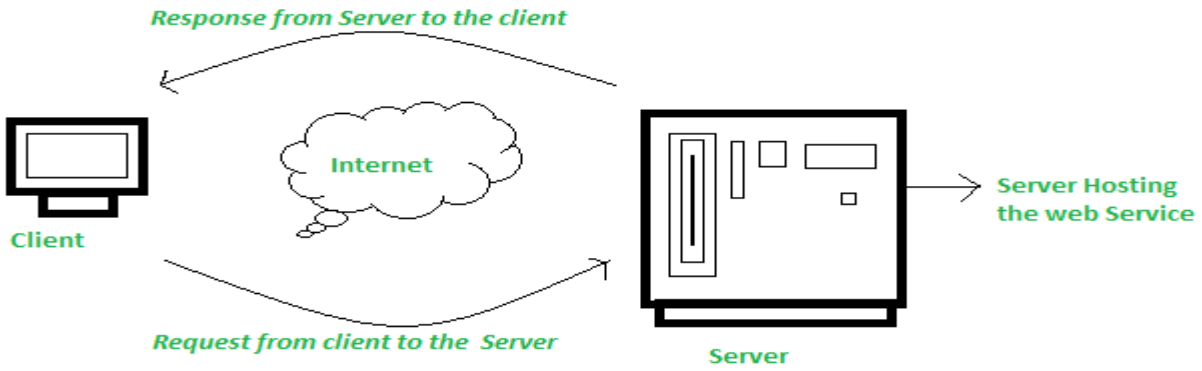
Roots of Cloud Computing



Internet Technologies

Web Service

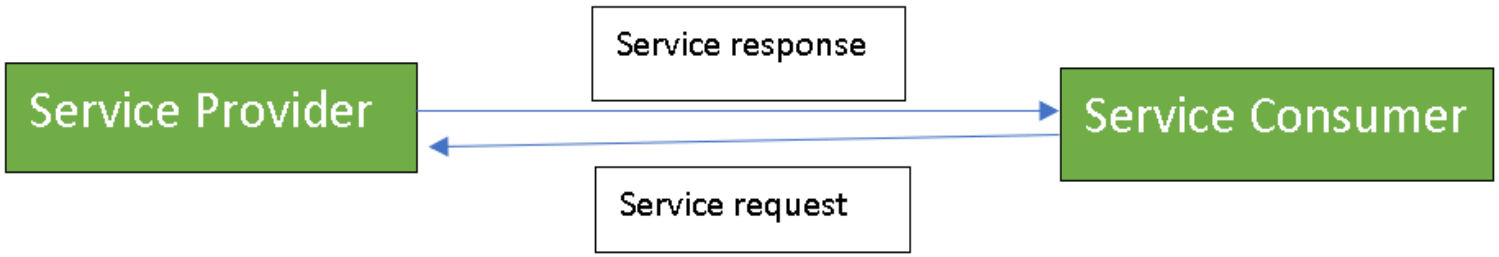
- applications running on different messaging product platforms
- enabling information from one application to be made available to others
- enabling internal applications to be made available over the Internet



Internet Technologies

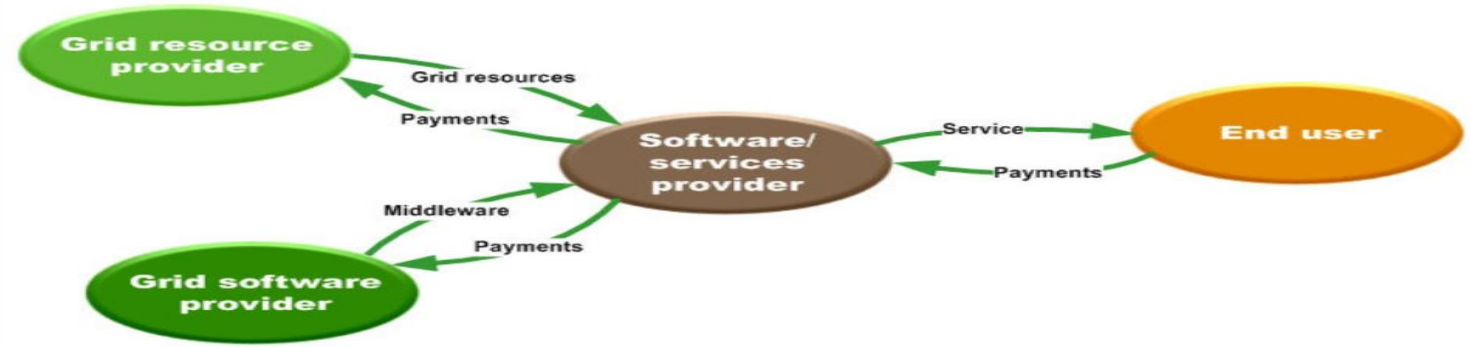
SOA (Service Oriented Architecture)

- Address requirements of loosely coupled, standards-based, and protocol-independent distributed computing
- WS ,HTTP, XML
  - Common mechanism for delivering service
- Applications is a collection of services that together perform complex business logic



Distributed Computing

1. Grid Computing
   - Aggregation of distributed resources
   - Transparently access
   - Problems
     - QoS, Lack of performance
     - Availability, Virtualization



Distributed Computing

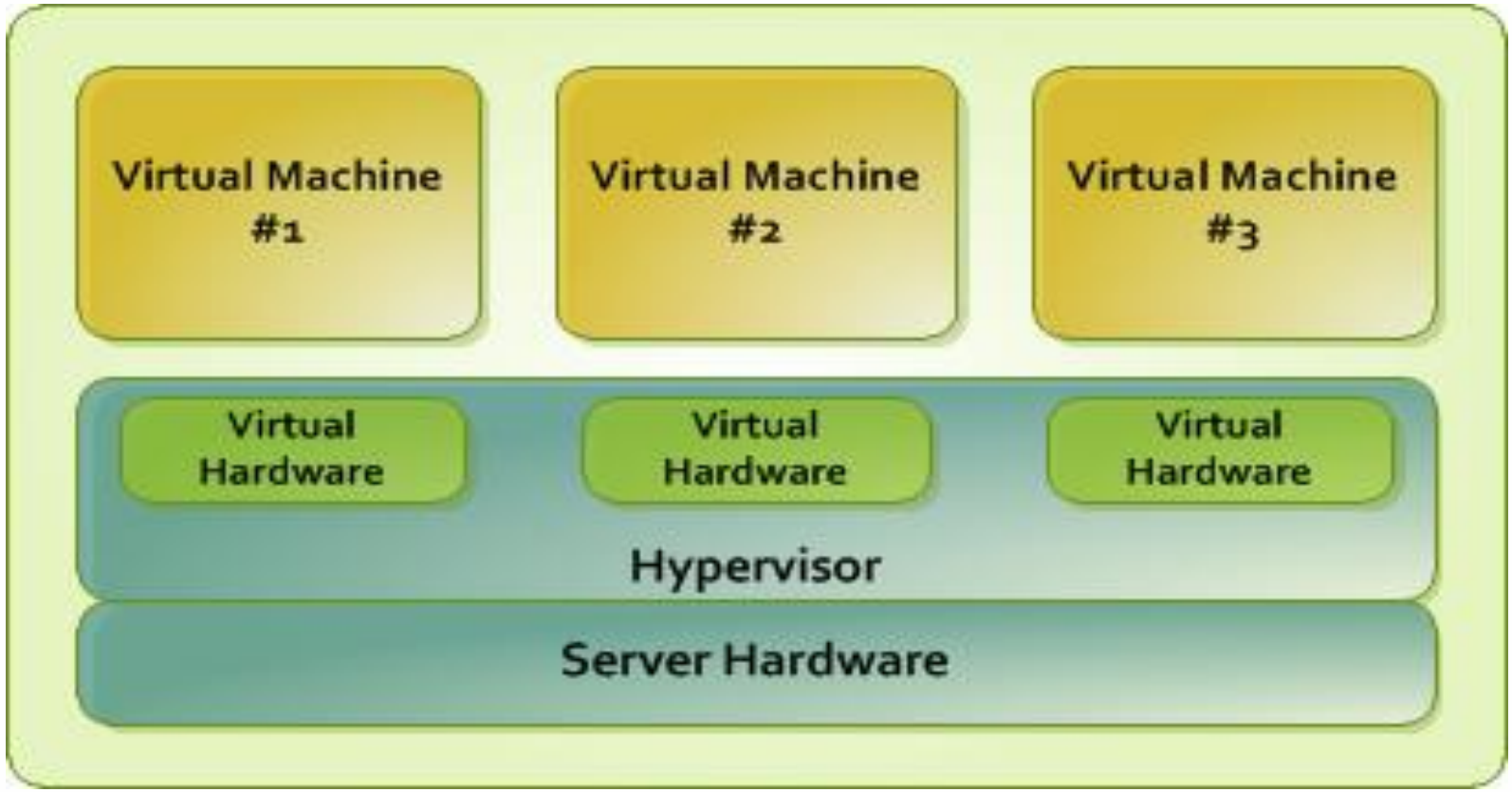
Utility Computing

- Assign a “utility” value to users
- QoS constraints (deadline, importance, satisfaction)

Hardware

- Hardware Virtualization
  - Overcome most operational issues of data center building and maintenance
  - Improving sharing and utilization of computer systems
  - Running multiple operating systems and software stacks on a single physical platform
  - Virtual machine monitor (VMM)
  - Mediates access to the physical hardware
  - Presenting to guest operating system a virtual machine (VM) is a set of virtual platform interfaces

Hardware


Virtual Machine #1
Virtual Machine #2
Virtual Machine #3
Virtual Hardware
Virtual Hardware
Virtual Hardware
Hypervisor
Server Hardware

Thank You!!!

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