

Unit-2

Introduction to cloud computing

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Cloud computing is more than a service sitting in some remote data centre. It's a set of approaches that can help organizations quickly, effectively add and subtract resources in almost real time.

Cloud computing in nutshell

- ✗ Technologies such as cluster, grid, and now, cloud computing, have all aimed at allowing access to large amounts of computing power in a fully virtualized manner.
- ✗ Consumers pay providers based on usage (“pay-as-you-go”), similar to the way in which we currently obtain services from traditional public utility services such as water, electricity, gas, and telephony.



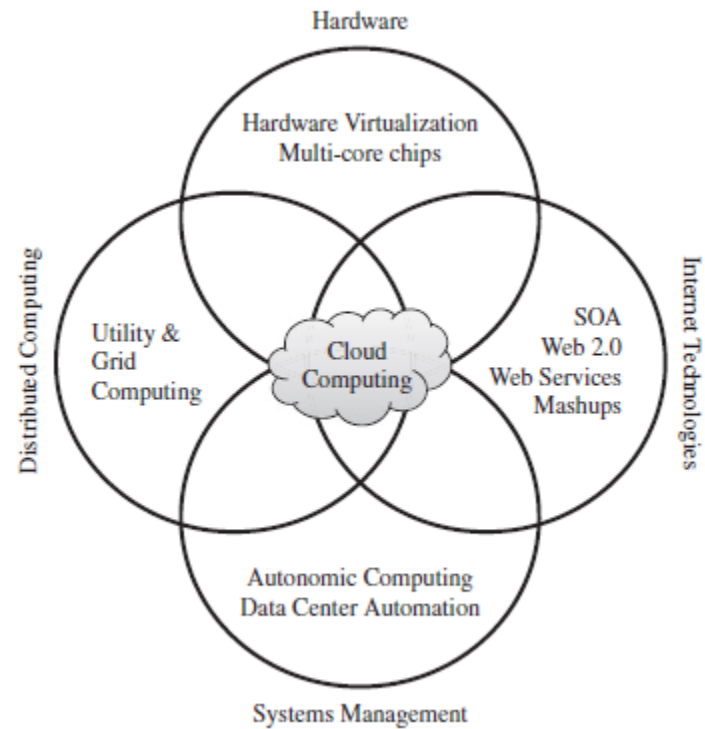
- ✗ Cloud computing has been coined as an umbrella term to describe a category of sophisticated on-demand computing services initially offered by commercial providers, such as Amazon, Google, and Microsoft.
- ✗ It denotes a model on which a computing infrastructure is viewed as a “cloud,” from which businesses and individuals access applications from anywhere in the world on demand
- ✗ The main principle behind this model is offering computing, storage, and software “as a service.”



Cloud computing is the result of many years of evolution dating back to the first computers. It is the natural progression from the centralized mainframe era, to the distributed client-server era enabled by the birth of personal computers, to the Internet era where the enterprise was able to connect to the rest of the world through a network of computers that spanned the globe.

(autonomic computing, data center automation).

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- ✗ Web services can glue together applications running on different messaging product platforms, enabling information from one application to be made available to others, and enabling internal applications to be made available over the Internet.
- ✗ The purpose of a SOA is to address requirements of loosely coupled, standards-based, and protocol-independent distributed computing.



- ✗ In the consumer Web, information and services may be programmatically aggregated, acting as building blocks of complex compositions, called service mashups. Many service providers, such as Amazon, del.icio.us, Facebook, and Google, make their service APIs publicly accessible using standard protocols such as SOAP and REST

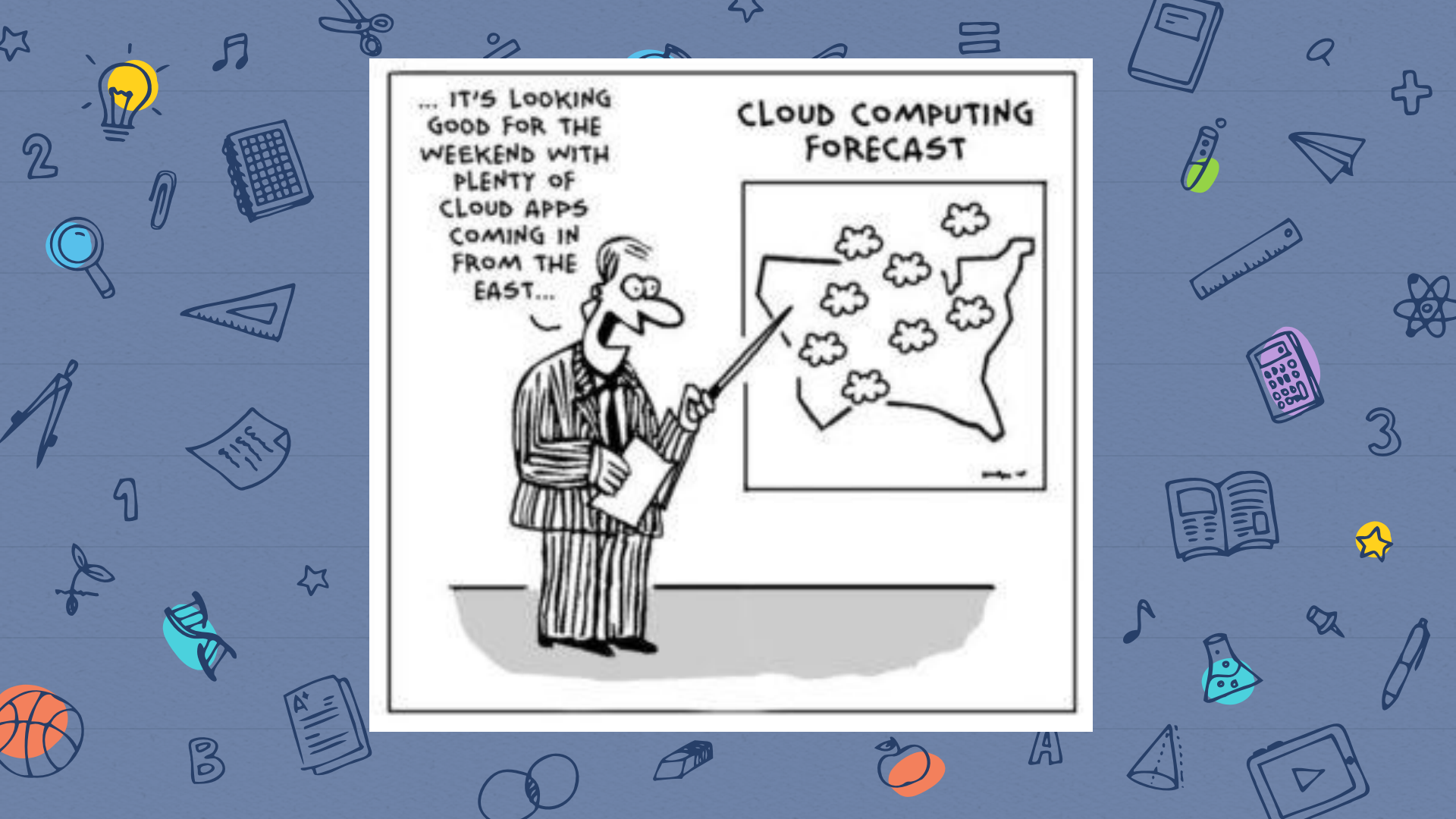
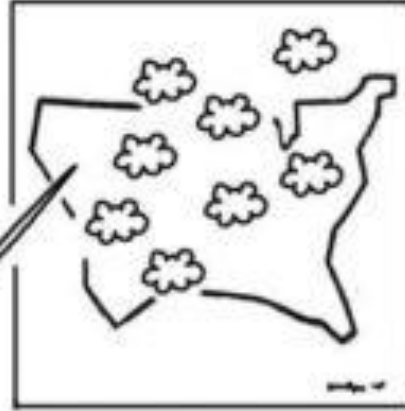
- ✗ A key aspect of the grid computing services in roots to cloud has been building standard Web services-based protocols that allow distributed resources to be “discovered, accessed, allocated, monitored, accounted for, and billed for, etc., and in general managed as a single virtual system.

- ✗ The idea of virtualizing a computer system's resources, including processors, memory, and I/O devices, has been well established for decades, aiming at improving sharing and utilization of computer systems.
- ✗ The advent of several innovative technologies—multi-core chips, paravirtualization, hardware-assisted virtualization, and live migration of VMs—has contributed to an increasing adoption of virtualization on server systems






... IT'S LOOKING
GOOD FOR THE
WEEKEND WITH
PLENTY OF
CLOUD APPS
COMING IN
FROM THE
EAST...

CLOUD COMPUTING FORECAST



Types of cloud

Service Class	Main Access & Management Tool	Service content
 SaaS	Web Browser	Cloud Applications Social networks, Office suites, CRM, Video processing
 PaaS	Cloud Development Environment	Cloud Platform Programming languages, Frameworks, Mashups editors, Structured data
 IaaS	Virtual Infrastructure Manager	Cloud Infrastructure Compute Servers, Data Storage, Firewall, Load Balancer

- ✗ Cloud computing services are divided into three classes, according to the abstraction level of the capability provided and the service model of providers, namely:

(1) Infrastructure as a Service

(2) Platform as a Service

(3) Software as a Service

- ✗ These abstraction levels can also be viewed as a layered architecture where services of a higher layer can be composed from services of the underlying layer.
- ✗ Cloud development environments are built on top of infrastructure services to offer application development and deployment capabilities; in this level, various programming models, libraries, APIs, and mashup editors enable the creation of a range of business, Web, and scientific applications.

Infrastructure-as-a-service

- ✗ *Infrastructure as a Service (IaaS)* is the delivery of computer hardware (servers, networking technology, storage, and data center space) as a service. It may also include the delivery of operating systems and virtualization technology to manage the resources.
- ✗ Dynamic scaling as applied to infrastructure means that the infrastructure can be automatically scaled up or down, based on the requirements of the application.

Platform-as-a-service

- ✗ With *Platform as a Service (PaaS)*, the provider delivers more than infrastructure. It delivers what you might call a *solution stack* — an integrated set of software that provides everything a developer needs to build an application — for both software development and runtime.
- ✗ PaaS can be viewed as an evolution of Web hosting. In recent years, Webhosting companies have provided fairly complete software stacks for developing Websites.



Software-as-a-service

- ✗ One of the first implementations of cloud services was *Software as a Service (SaaS)* — *business applications that are hosted by the provider and delivered as a service.*
- ✗ At the top of the stack is SaaS. SaaS is a complete application delivered as a service to the service consumer. The service consumer has only to configure some application-specific parameters and manage users.



Features of cloud

- ✗ Certain features of a cloud are essential to enable services that truly represent the cloud computing model and satisfy expectations of consumers, and cloud offerings must be

(i) self-service

(ii) per-usage metered and billed

(iii) elastic

(iv) customizable.

CLOUD INFRASTRUCTURE MANAGEMENT

- ✗ A key challenge IaaS providers face when building a cloud infrastructure is managing physical and virtual resources, namely servers, storage, and networks
- ✗ The orchestration of resources must be performed in a way to rapidly and dynamically provision resources to applications
- ✗ The software toolkit responsible for this orchestration is called a virtual infrastructure manager.



Features of infrastructure manager

- × **Virtualization Support**-The multi-tenancy aspect of clouds requires multiple customers with disparate requirements to be served by a single hardware infrastructure. Virtualized resources (CPUs, memory, etc.) can be sized and resized with certain flexibility.
- × **Self-Service, On-Demand Resource Provisioning**-Self-service access to resources has been perceived as one the most attractive features of clouds.



- × **Multiple Backend Hypervisors-** Different virtualization models and tools offer different benefits, drawbacks, and limitations. Thus, some virtual infrastructure managers provide a uniform management layer.
- × **Storage Virtualization-** Virtualizing storage means abstracting logical storage from physical storage. By consolidating all available storage devices in a data center



- × **Dynamic Resource Allocation-** Increased awareness of energy consumption in data centers has encouraged the practice of dynamic consolidating VMs in a fewer number of servers.
- × **High Availability and Data Recovery-** The high availability (HA) feature of VI managers aims at minimizing application downtime and preventing business disruption.

OF COURSE YOU
WANT TO KNOW
WHERE YOUR DATA
IS BEING STORED,
MADAM. LET ME
SEE - YOUR CLOUD'S
JUST PASSING OVER
PERU AT THE
MOMENT...

CLOUD
HELP DESK



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Characteristics of cloud

x 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.

x Broad network access:

The Computing services are generally provided over standard networks and heterogeneous devices.

× **Rapid elasticity:**

The Computing services should have IT resources that are able to scale out and in quickly and on as needed basis.

Whenever the user require services it is provided to him and it is scale out as soon as its requirement gets over.

× **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.



x 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. This is done for various reasons like monitoring billing and effective use of resource.

Typically have massive amounts of available space, which translates into easy scalability. Recommended for software development and collaborative projects.

Combine public clouds with private clouds to allow the two platforms to interact seamlessly. Recommended for businesses balancing big data analytics with strict data privacy regulations.



Types of Cloud Deployment

Usually reside behind a firewall and are utilized by a single organization.
Recommended for businesses with very tight regulatory requirements

A collaborative, multi-tenant platform used by several distinct organizations to share the same applications. Users are typically operating within the same industry or field.