

UNIT-2

INTRODUCTION TO CLOUD COMPUTING

CSE 423 LECTURE -3

CONTAINS

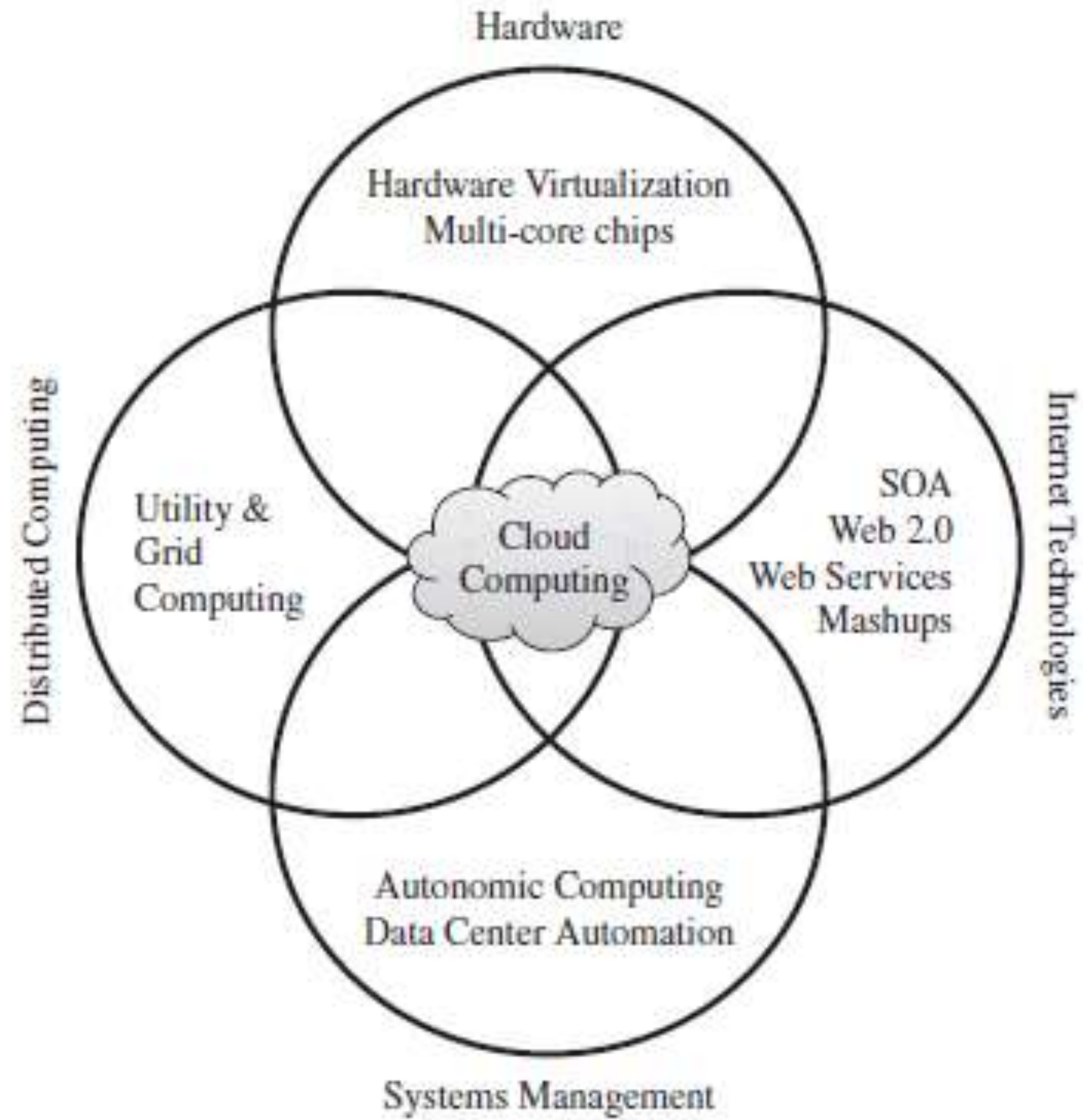
- Cloud Computing in a Nutshell
- Roots of Cloud Computing
- Layers and Types of Clouds
- Desired Features of a Cloud
- Cloud Infrastructure Management
- Examining the Characteristics of Cloud Computing

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.”

ROOTS OF CLOUD COMPUTING




- We can track the roots of clouds computing by observing the advancement of several technologies, especially in hardware (virtualization, multi-core chips), Internet technologies (Web services, service-oriented architectures, Web 2.0), distributed computing (clusters, grids), and systems management (autonomic computing, data center automation).
- This model brings benefits to both consumers and providers of IT services. Consumers can attain reduction on IT-related costs by choosing to obtain cheaper services from external providers as opposed to heavily investing on IT infrastructure and personnel hiring. The “on-demand” component of this model allows consumers to adapt their IT usage to rapidly increasing or unpredictable computing needs.
- 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.



Service Oriented Architecture

- ❑ In a Service Oriented Architecture, software resources are packaged as “services,” which are well-defined, self-contained modules that provide standard business functionality and are independent of the state or context of other services. Services are described in a standard definition language and have a published interface.
- ❑ Programmable Web is a public repository of service APIs and mashups currently listing thousands of APIs and mash ups.
- ❑ 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.

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

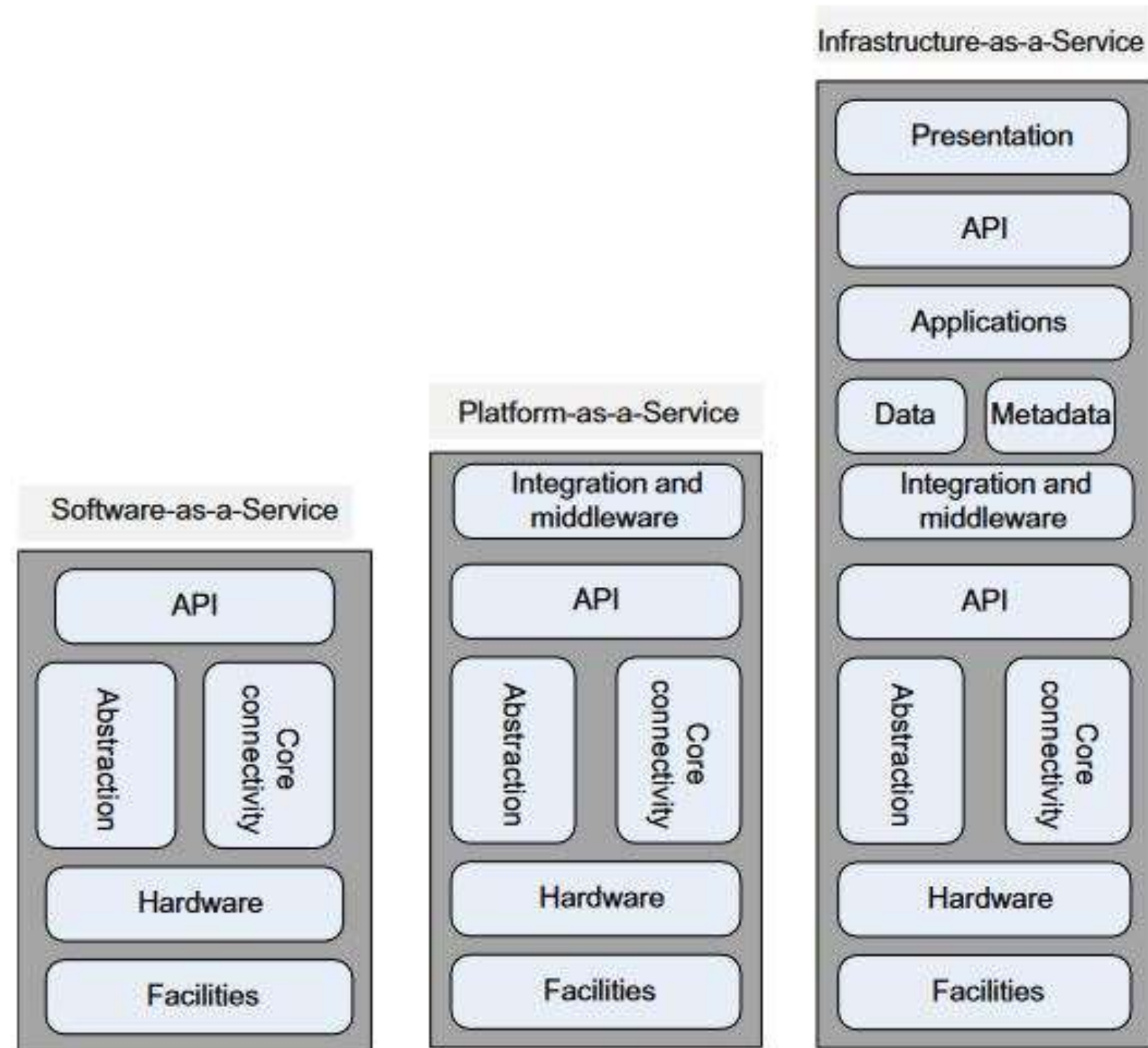
Infrastructure as a Service (IaaS) is the delivery of computer hardware (servers, networking technology, storage, and data center space) as a service. It may also include the delivery of operating systems and virtualization technology to manage the resources.

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.

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.

SaaS, PaaS and IaaS

The structure of the three delivery models, SaaS, PaaS, and IaaS. SaaS gives users the capability to use applications supplied by the service provider but allows no control of the platform or the infrastructure. PaaS gives the capability to deploy consumer-created or acquired applications using programming languages and tools supported by the provider. IaaS allows the user to deploy and run arbitrary software, which can include operating systems and applications



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.

CHARACTERISTICS OF CLOUD

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.

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.

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.

Public Cloud

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

Private Cloud

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

Hybrid Cloud

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.

Community Cloud

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.



Types of Cloud Deployment

THANK YOU