IaaS(M) → M stands for management layer

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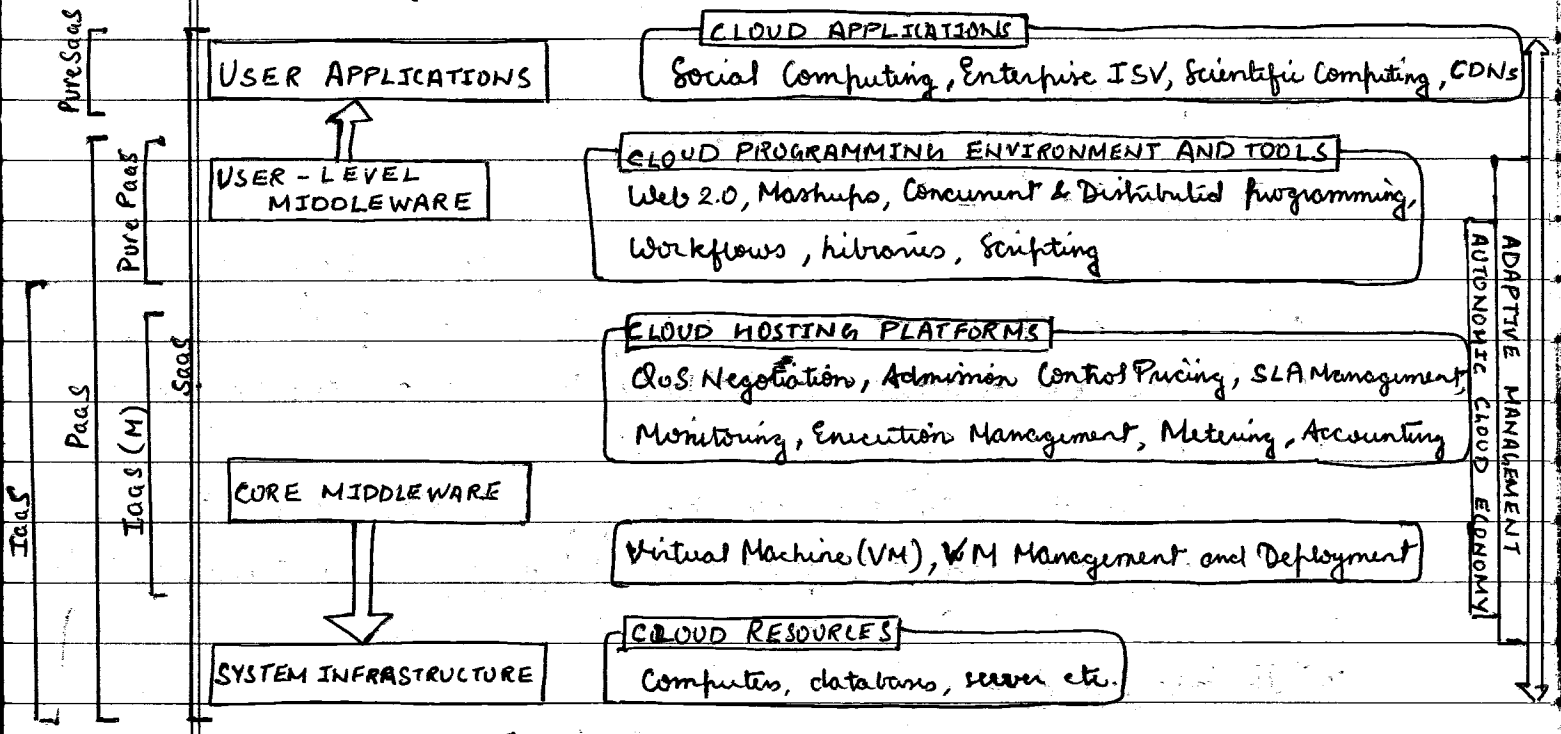
UNIT-II

CLOUD COMPUTING ARCHITECTURE –

① Cloud Reference Model –



THE CLOUD COMPUTING ARCHITECHTURE

There major categories used to classify cloud computing solutions are –

(1) **SaaS** –

Characteristics – Customers are provided with applications that are accessible anytime and from anywhere.

Product type – Web applications and services (Web 2.0)

Vendors and Products – SalesForce.com (CRM), Clarizen.com (project management), Google apps.

(2) **PaaS** –

Characteristics – Customers are provided with a platform for developing applications hosted in the cloud.

Product type – Programming APIs and frameworks development systems

Vendors & Products – Google AppEngine, Microsoft Azure, Data Synapse, Manjrasoft Aneka

(3) **IaaS / HaaS** –

Characteristics – Customers are provided with virtualized hardware and storage on top of which they can build their infrastructure.

Product type – Virtual Machine Management, Infrastructure Storage Management, Network Management.

Vendors and Products - Amazon EC2 and S3, Go Grid, Nirvanix.

(2) Types of Clouds -

There are four types of clouds.-

(1) Public Clouds -

The cloud is open to the wider public. They are a realization of the canonical view of cloud computing in which the services offered are made available to anyone, from anywhere, and at any time through the Internet.

A fundamental characteristic of public clouds is multitenancy. A public cloud is meant to serve a multitude of users, not single customer.

Eg - Amazon EC2 (IaaS), Google AppEngine (PaaS), Salesforce.com (SaaS)

(2) Private Clouds -

The cloud is implemented within the private premises of an institution and generally made accessible to the members of the institution or a subset of them.

Key advantages of using a private cloud are Customer Information Protection, Infrastructure ensuring SLAs (Service level Agreements) and Compliance with standard procedures & operations.

Eg - DataSynapse, Zimory Pools, Elastra and Aneka → PaaS

Eg VMWare, vCloud, KVM, Xen, OpenPEX, InterGrid → IaaS(M)

(3) Hybrid Clouds / Heterogeneous Clouds -

The cloud is a combination of public cloud and private cloud. It is most likely identifies a private cloud that has been augmented with resources or services hosted in a public cloud.

Key characteristics of hybrid cloud is dynamic provisioning which refers to the ability to acquire on demand virtual machines in order to increase the ~~capability~~ capability of the resulting distributed system and then release them.

Eg - OpenNebula, InterGrid, Aneka, Elastra CloudServer and Zimory Pools.

(4) Community Clouds -

The cloud is characterized by a multi-administrative domain involving different deployment models (public, private and hybrid), and it is specifically designed to address the needs of a specific industry.

Benefits of community clouds are openness, community, (no single point of failure) ↔ graceful failures, convenience and control and environmental sustainability.

Eg - Media Industry, Healthcare Industry, public sector, scientific research, energy and other core industries etc.

→ (3) Cloud Interoperability and Standards -

Cloud computing is a service-based-model for delivering IT Infrastructure and applications like utilities such as power, water and electricity. To fully realise this goal, introducing standards and allowing interoperability between solutions offered by different vendors are objectives of fundamental importance.

Vendor lock-in constitutes one of the major strategic barriers against the seamless adoption of cloud computing at all stages.

Open Virtualization Format (OVF) is an attempt to provide a common format for storing the information and metadata describing a virtual machine image.

A standardization process have been made by few organizations that are Cloud Computing Interoperability Forum (CCIF), the Open Cloud Consortium, and the DMTF Cloud Standards Incubator.

Open Challenges for industry and media

→ (4) Scalability and Fault Tolerance -

The ability to scale on demand beyond the limits of the existing in-house IT resources is known as cloud scalability. Various dimensions are performance, size and load.

The challenge in this case is designing highly scalable & fault-tolerant systems that are easy to manage & at the same time provide competitive performance

SOA → Services oriented architecture.

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CLOUD SOLUTIONS –

① Cloud Ecosystem –

It is a term used to describe the complete system of interdependent components that work together to enable cloud services.

In cloud computing, complete includes not only technical elements of cloud computing such as software and infrastructure, but also consultants, integrators, partners, third parties and anything in their environments that has a bearing on other components.

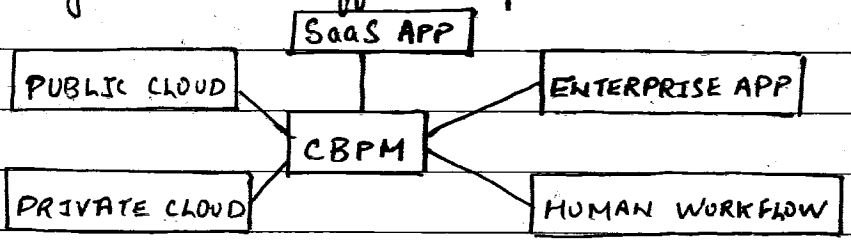
BUSINESS PROCESS (SOA)	Consultants, Integrators, partners, third parties.
APPLICATION SERVICES	Information, Visualization, Commerce, Accessibility
PLATFORM SERVICES	Device, Security, BOS, Collaboration, Utilities
INFRASTRUCTURE SERVICES	Standards, Tools, Server, Storage, Network

CLOUD COMPUTING ECOSYSEM

② Cloud Business Process Management (CBPM) –

BPM governs an organization's cross functional, customer-focused, end-to-end core business processes.

Its objective is to direct and deploy resources from across the organization into efficient process that create customer value.



The cloud environment could help BPM by –

(1) Integration of core process (2) Value focused efficiency
(3) Continuous Improvement (4) Cultural

③ Cloud Service Management –

It includes all of the service related functions that are necessary for the management and operation of those services required by or proposed to cloud consumers.

It can be described from the perspective of –

(1) Business Support -

It involves the set of business-related services dealing with client and supporting processes. It includes Customer management, contract management, inventory management, accounting and billing, reporting and auditing and pricing and billing rating.

(2) Provisioning and Configuration -

It includes rapid provisioning, resource changing, monitoring and reporting, metering and SLA (Service level Agreement) Management.

(3) Portability and Interoperability -

Portability - Customers are interested to know whether they can move their data or applications across multiple cloud environments at low cost and minimal disruption.

Interoperability - User are concerned about the capacity to communicate between or among multiple clouds.

CLOUD OFFERINGS -

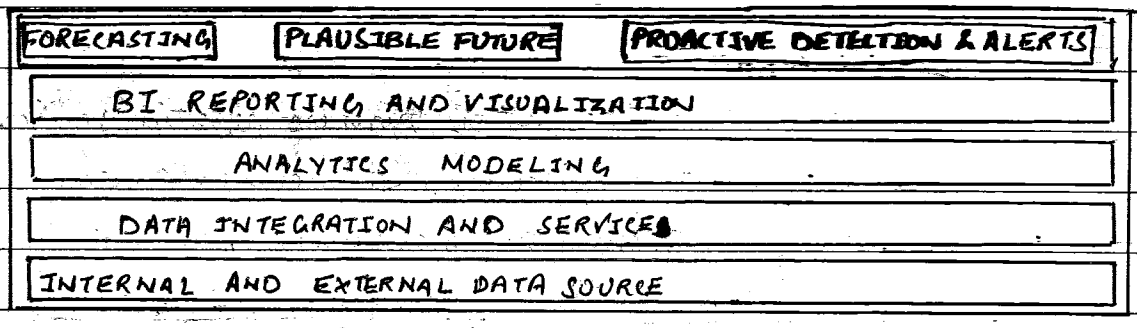
(1) Cloud Analytics -

It provides user with better forecasting techniques to analyze and optimize the service lines and provides a higher level of accuracy.

There are six elements of analytics that is data sources, data model, processing applications, computing power, analytics models and sharing or storage of results.

Cloud analytics is also called SaaS-based Business Intelligence (BI). Eg - hosted data warehouses, cloud based social media analytics etc.

Cloud analytics combine some or all the service models of cloud in delivering the solution.



CLOUD ANALYTICS

Cloud Business Analytics Competencies are -

(1) Cloud Business Analytic Strategy
(2) Business Intelligence and ~~performance management~~
(3) Analytics and Optimization
(4) Enterprise Information Management

② Testing Under Cloud - ~~It tests~~.

Testing under the cloud environment gives a good insight by decreasing the manual intervention and reducing the process in typical testing environment. By enabling access to resources and also when required, it reduces the cost, reduces test cycle, rationlize the testing environment and improve the service quality.

→ Four major objectives of cloud testing are -

(1) To assure the quality of cloud based applications
(2) To validate SaaS in a cloud environment
(3) To check the provided automatic cloud based functional services.
(4) To test cloud compatibility and interoperation ~~between~~ capability between SaaS and applications.

→ Advantages of Cloud based testing are

(1) Cost reduction regarding the quality of cloud.
(2) Test Cycle time can be minimized
(3) Less time spent on test environment creation.
(4) Helps to perform large scale and real-time online validation for internet based software in clouds due to on-demand test services.

③ Virtual Desktop Infrastructure (VDI) -

VDI provides end-user virtualization solutions. This is designed to help transform distributed IT architectures into virtualized, open-standard-based framework leveraging centralized IT services.

The notion behind the virtual desktop infrastructure is to run ~~desktop~~ desktop operating systems and applications inside virtual machines that reside on the servers in the data center. This is called virtual desktop. User access a virtual desktop through their desktop PC.

VDI ARCHITECTURE

The VDI architecture consists of Endpoint devices, the connection broker and VM hosting servers.

Advantages of VDI are-

(1) Cost Reduction
(2) Flexibility
(3) Security
(4) Availability
(5) Efficiency
(6) Rapid client development

VDI provides a enterprise level or grade solution & it introduces a new method of delivering and managing user desktop environments

Virtual Desktop Manager (VDM) helps user to connect their desktop to servers.