

Virtual appliance - software equivalent of a hard ware device.

eg. EC2 , VMware VCentor Server Appliance.

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Normal equation .

### Unit 3 Common Standards

#### • Open & cloud Consortium.

- non profit venture
- provides cloud computing and data common resources for scientific, environmental, med & healthcare research.
- OSDC (open science Data cloud) is one of the ~~notable~~ initiative which provides platform for researchers to share and analyze large datasets
- OSDC provide range of cloud-based services & tools to facilitate data intensive research
- OCC has particular focus on large data clouds.  
∴ developed "Marstone Benchmark"

#### • Open Virtualization Format

- Open standard for packaging virtual appliance consisting of 1 or more VM's

OVF is Defined by Distributed Management Task format (DMTF) and it has .ovf extension. file in it.

- OVF has meta data + additional info for deployment & operation of application.

## SHA - secure hashing algorithm

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• OVF package always contains Descriptor & may contain some other files.

Descriptor → - specifies virtual hardware requirement  
also includes info of →  
virtual disk, service, licence agreement  
instruction to start & stop VMs.  
has .ovf file extension.

manifest → SHA-1 digest of every file in package.  
for verification & corruption detection.  
has .mf extension.

Signature → digest of manifest signed with  
public key of X.509 also included.  
for verification of package author.  
has .cert extension

Virtual disks →

does not have a specified disk format  
OVF package has disk files & format is  
defined by product that exported the virtual disk.

e.g. ① VirtualBox produce packages with  
VMDK disk format.

② XenServer → Dynamic VHD format.

standards for app developers →

- AJAX →
  - async JS & XML
  - send & receive data b/w web browser & web server.
  - not a programming lang but development technique
  - responsive, no reload, XMLHttpRequest.
  - it's an open standard.

even though name suggest XML many developers prefer URL encoded data for request and JSON as response.

Benefits of ajax →

callbacks → retrieve or save data without posting entire page back to server.

making async calls,

Increased speed,

User friendly.

- JSON

easier to use with js

for transmitting data over a network connection

contains array

fast, less size

used in ajax

- XML

created by W3C

for more info about structure & meaning of data.

no array

slow, size ++

android development  
XML can be validated

## Atom & RSS -

web feed format for syndicating & distributing content from websites.

They allow user to subscribe to updates from their favorite website & receives notification whenever new content is published.

Atom → XML based web feed format

standardized way of representing & distributing web content

alternative of RSS & official standard of internet engineering task force (IETF)

Provides more structured & extensible format allowing publisher to include metadata such as author info, timestamps, categories & more.

RSS - Really simple syndication.

XML based webfeed format.

widely used since the late 1990s developed by net-scape.

Simple & more straightforward format.

It lacks some advance features but remains popular because of its simplicity.

RSS

Atom

Really Simple Syndication is a family of web feed formats that are used to publish frequently updated works.

RSS shows the date timestamp of data when the feed format was created & last updated.

RSS has more complicated aggregating & extracting process.

RSS does not distinguish a partial from an excerpt.

RSS has two main publishing protocols; Blogger protocol & ~~metadata~~ & MetaWeblog

Atom refers to pair of web feeds.

Atom shows the date timestamp when the website was last updated

Atom has an easier aggregating & extracting process.

Atom distinguishes a partial from an excerpt

Atom has one standardized protocol.

## Solution stack (LAMP & LAPP)

Solution stack is set of different programs and/or application software that are bundled together in order to produce a desired solution.

This may refer to any collection of unrelated applications taken together.

e.g. MEAN, mongo, express, Angular, Node.js  
e.g. web application → Angular + Rest API + Dev

LAMP → popular solution stack for building & deploying dynamic web sites & web apps.

Linux → open-source, OS, foundation of stack provides security, stability, flexibility.

Apache - Apache Http server → open source highly configurable, supports various functions and modules for enhancing web server functionality.

MySQL - RDBMS, robust, scalable soln for storing & managing data. open-source

PHP - open-source server side scripting language for web content generation. It allows developer to embed code in html to generate dynamic pages.

LAAPP → powerful alternative to LAMP (considered)

LAAPP Linux, Apache Http server, PostgreSQL, PHP/Perl or Python.

AWS is a cloud computing platform from Amazon that provides customers with a wide array of cloud services.

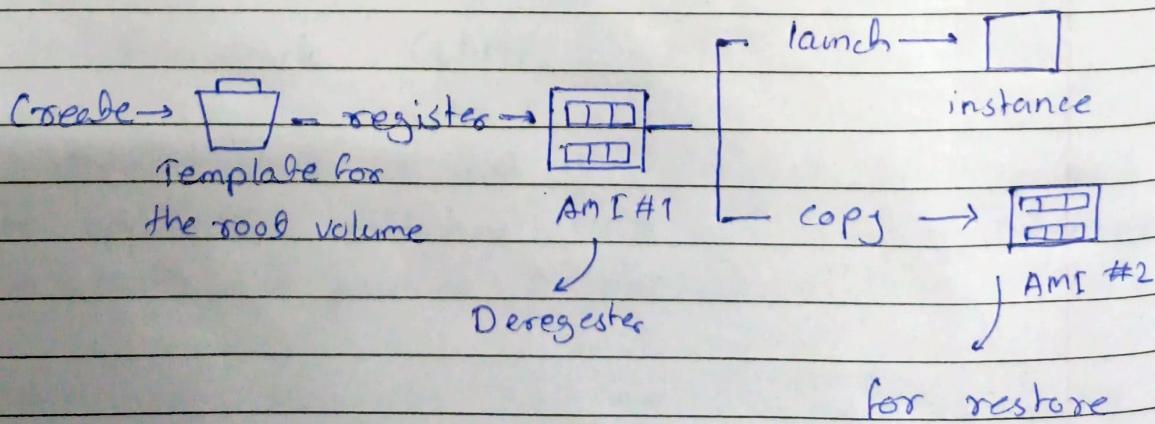
- Pay as per use
- AWS market place to accommodate 4 grow emerging market system.
- highly reliable, scalable, low cost infrastructure

AWS has infrastructure across 16 geographical regions & 42 availability zones.

adv → easy to use, speed agility,  
no capacity limits, pay per use.

disadv → security, Limitations of EC2,  
Technical support fee.

- AMI → Amazon machine image is template for software configuration.



AMI consist of 3 things →

Template → For root volume for instance.

Permission to launch → which account can use this ami to launch instance.

Block device mapping → specifies volume to attach to the instance during its launch time.

## Services offered by AWS

compute      Elastic Compute Cloud (EC2)  
 Lambda  
 Elastic Container Service

storage      Simple storage Service (S3)  
 Elastic block Storage (EBS)  
 Elastic file system (EFS)

Data Base      RDS (Relational Database)  
 Amazon dynamoDB  
 Amazon aurora

Network      Amazon VPN (Virtual private network)  
 VPC , Route 53

Management      Cloud watch , Aws cloud trail,  
 Aws identity & access management

analysis , AI MI , IOT

EC2 instances are EBS backed.

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## Configuring Amazon EC2 Linux instances.

### Step 1 Sign Up for AWS -

EC2 pay per use new user can get started with EC2 for free.

### Step 2 Create IAM User -

Create IAM user add user to IAM group with administrative permission.

U can then access AWS with special URL and credentials for the IAM user.

### Step 3 - Create a key pair

AWS uses public key cryptography to secure login info of our instance.

You specify name of key when creating or you launch our instance. Then provide private key when you login using SSH.

### Step 4 Create a Virtual Private Cloud (VPC)

It allows you to launch AWS resources into a virtual network.

The newer EC2 instance req that you launch our instance in a VPC.

If you have default VPC you can skip this.

### Step 5 - Create a security group.

It act as firewall for associated instances controlling both inbound & outbound traffic of instance.

## Step 6 launch instance.

- ① Open EC2 console
- ② choose launch instance
- ③ Choose AWS Machine Image (AMI)
- ④ select HVM version of Linux 2.
- ⑤ choose instance type t2.micro
- ⑥ Review & launch

in this step u can use default security group or select the one we created.

- ⑦ on review instance launch page choose launch
- ⑧ when prompted key pair choose existing keypair
- ⑨ A confirmation page lets you know that an instance is launching.
- ⑩ on the instance screen you can view the status of launch.

## Step 7 : connect to instance

u can connect to linux instance using SSH

## Step 8 cleanup yr instance.

### Amazon S3 bucket

in S3 a bucket is a container for storing objects. it is a fundamental concept in S3 and acts as a top-level container for your data.

dictionary of folder in file system where you can store and organize your files. which are referred as objects in S3.

you can store unlimited number of object in a bucket.

each object is identified by a unique key that includes the objects name and its location within the bucket.

### S3 provider

Dynamo DB

NoSQL database service  
schema-less

Amazon S3

object storing service not a database & does not have predefined schema.

for high performance & low latency applications  
fast and consistant  
read & write speed.

optimized for storing large scale of unstructured data.

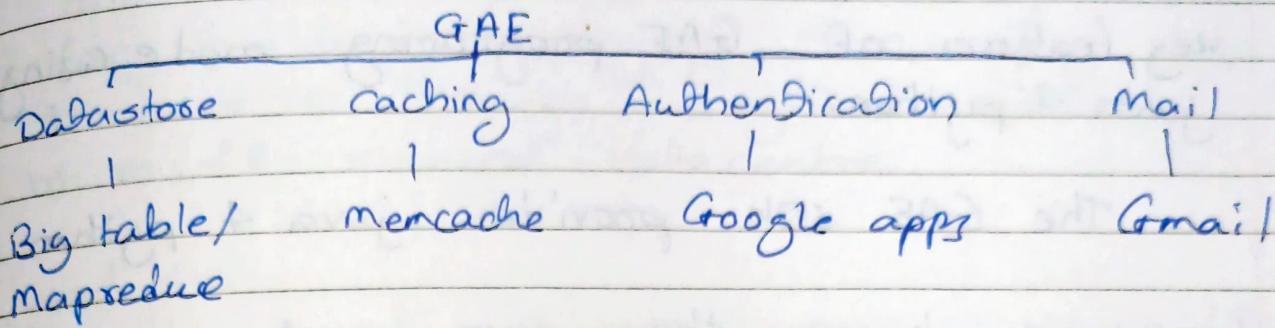
designed to scale automatically and handle millions of request

highly scalable can handle unlimited amount of data. However performance is measured in terms of throughput.

Provides data durability by replicating data across multiple AZs

S3 provides eleven 9's for object stored in it.

## Google App engine



GAE → PaaS for developing & hosting web app.

It enables developers to build their web applications on the same scalable system that powers google app.

Google provide both SaaS, PaaS <sup>doc, mail</sup> GAE soln in cloud computing

Services provided by appengine include.

- PaaS to build & deploy app.
- Hosting facility in Fully managed datacentres.
- Fully managed & flexible environment.

Features → auto scaling, authentication using google api, dynamic web services, support persistent storage with query access sorting.

Offers features for performing common operations

mail → mail api, send email msg.

mem cache → high retrieval speed, efficient work.

Img manipulation → manipulate images of ur application within the use of API u can resize crop & rotate images in JPEG & PNG format

run app using python or java.

key features of GAE programming mode using java & python.

- The GAE SDK provides java & python.
- languages have their own web servers applications that contains all Google's app engine services on local computers.
- GAE SDK has APIs & libraries including tools to upload applications.

*python* The main characteristics of GAE are its Datastore, configuration file app.yaml & how it serves an application.

*java* Java SDK has implemented JDO, JPA interface.

Java data object

java persistent api

App engine features.

Dynamic web serving,

Persistent storage with queries, sorting & transactions, automatic scaling & load balancing.

APIs for authentication & emails

Scheduled tasks for triggering events at specified times & regular intervals.

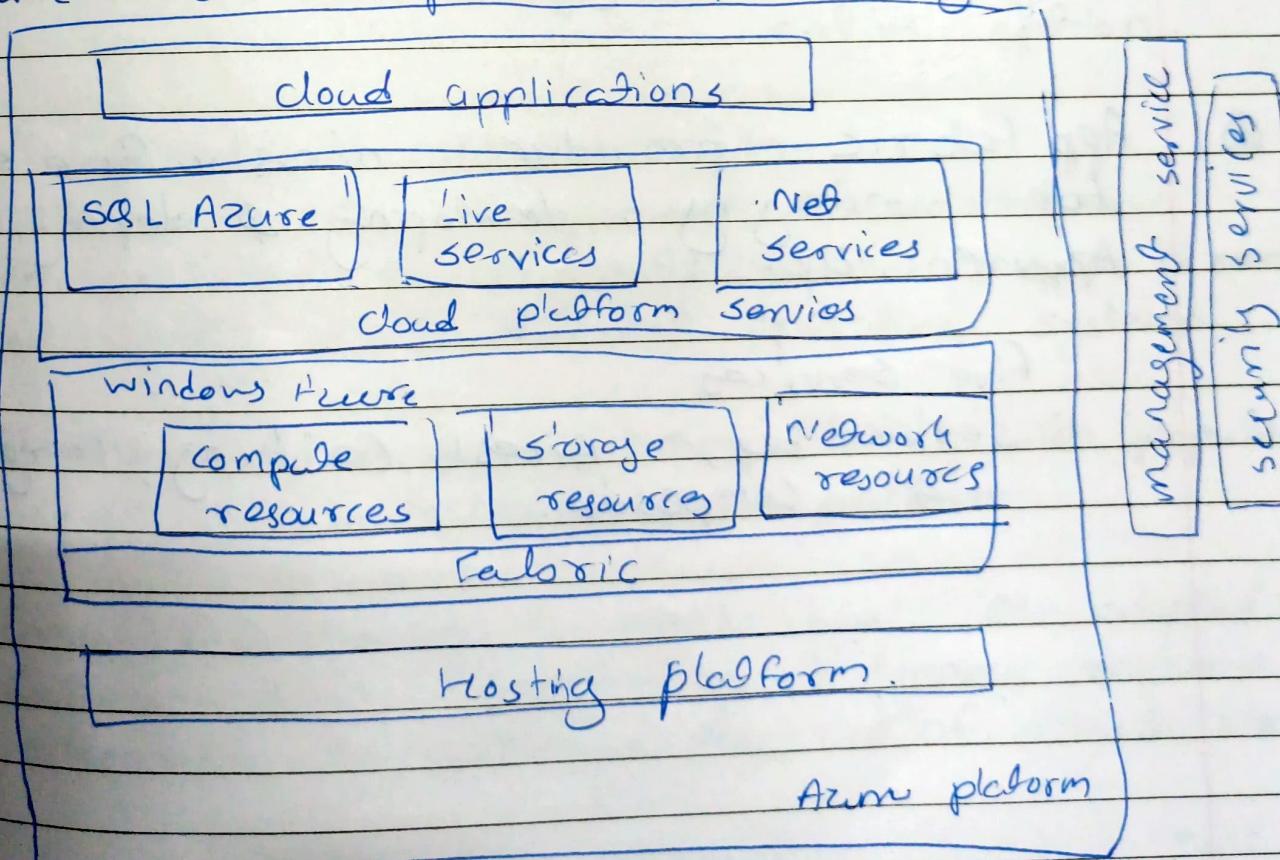
Azure is a cloud computing platform and infrastructure, created by Microsoft for building, deploying & managing applications & services through a global network of Microsoft-managed data centers.

used to -

- ① Build a web app that runs & stores its data in Microsoft data centers.
- ② Store data.
- ③ Create virtual machines.
- ④ Develop massively scalable apps.
- ⑤ Offers wide range of services.

Azure has 3 components app, storage & AppFabric

SDK  
App Dev  
App



## Azure Services

- ① Compute → hosting env. for managed code.  
3 types of roles:
  - a) Web roles used for web app programming  
4 supported by IIS7.
  - b) Worker roles used for background processing.
  - c) VM roles for migrating windows server application to Azure in easy way.
- ② Storage → 4 types:
  - a) Queues for managing blob webroles.
  - b) Tables for storing structured data. 4 worker roles.
  - c) BLOB → Binary large objects  
to store text, files or large data.
  - d) Windows Azure drive (VHD) to mount a page blob.
- ③ App fabric provider infrastructure service  
for managing, developing & deploying  
Azure apps.

Five services

Service bus, Access control, Identity, Integration  
& Composite.

## Virtualization Attack -

each layer can act as an vector to launch multiple attacks on the system.

∴ 4 types  
 ① service provider attack - If attacker has access to the Cloud hardware, he may run malicious application in system to damage VM.

### ② Hypervisor attack.

1. Install guest VM with malicious guest.
2. This will attack the hypervisor by changing its source code.
3. By doing this attacker gains access to memory of VM present in the system.

### ③ Virtual machine attack.

Attacker can install malicious program in different VM that can log keystroke & screen updates across virtual terminals.

### ④ Guest image attacks - Unnecessary guest OS images in cloud can result in different security issues.

get the last index & put it in last position

OAuth → (open authorization) - open standard framework that allows third-party applications to access the resources of a user without requesting user's credentials to be shared directly with the application.

It acts as trusted intermediary b/w user, app which want to access user data & app that hosts user data.

e.g. login with facebook on other games/websites

OAuth flow involves following steps.

- ① Client registration
- ② Authorization Request
- ③ User authentication ~~& content access~~
- ④ Authorization Grant
- ⑤ Access Token Request
- ⑥ Access Token Response
- ⑦ ~~Done~~ Done!!!