Unit 2:-

Cloud Infrastructure Components.

1. User Application & Services
2. Application development and management tools
3. Cloud Infrastructure management services
4. Networking
5. storage
6. Servers and virtualization
7. Data Center.

* Client security:-

=> Data center security
=> Access control
=> Threat prevention
=> Threat detection
=> Redundancy
=> legal compliance
=> Cloud security policy.

* Identity and access management (IAM)

=> managing a given set of user's digital identities and preveliges associated with each identity.

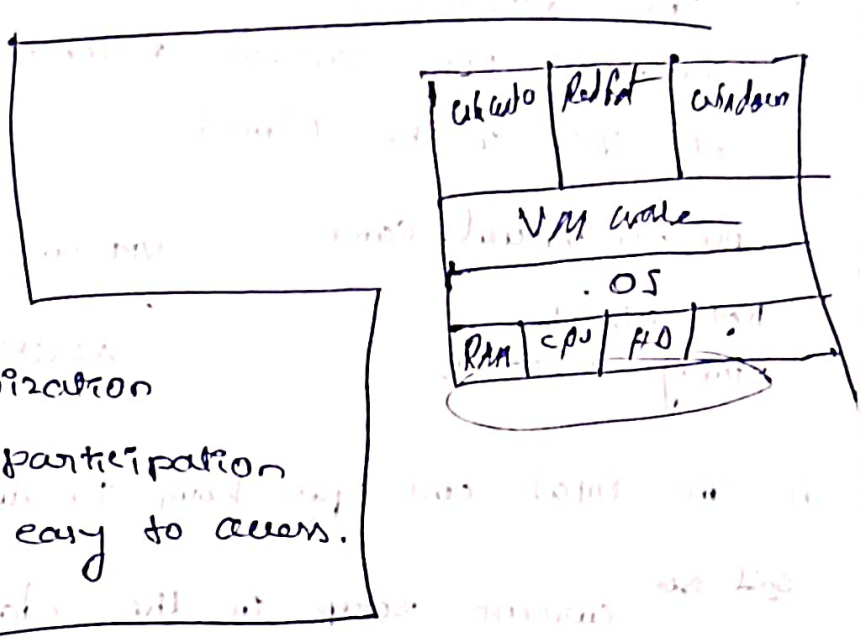
=> way to tell who a user is and what they are allowed to do.

=> Accessing management is the process of controlling and accessing the data.

* IAM Service Components

* collaboration within the cloud.

=> method of multiple collaboration where the multiple individuals may access, review and edit a document in real time.



* Benifits :-

=> Reduced investment
=> Scalability
=> Improved Organization
=> Highest levels of participation
=> Large files are easy to access.

* File system :-

=> A file system is a process of managing how and where data on a storage disk, which is also referred to as file management (or) FS.

=> It is a logical disk component that compresses files seperated into groups, which is known as directories.

* Distributed File System (DFS) :-

=> A file system that is distributed on multiple servers or multiple location.

=> store files and allowing programmers to access files from any network.

=> share data and resources by using a Common file system

=> Collection of workstations and mainframes are connected by a LAN.

① A Company is considering moving its entire data center infrastructure to a cloud provider offering Paas.

=) It has 50 physical servers

=) Utilization 30%.

=) The Company estimates that it can Consolidate its workload onto virtual machines (VMs) with an average of 70% in the cloud.

CPU : 4 virtual cores

RAM : 16 GiB.

storage : 200GiB.

VM cost = $0.05 per hour

Additional VM cost = $0.10/h

a) The total cost per hour to run the workload in cloud

Soln

Current setup in the data Center. :

- 50 physical servers
- Average utilization : 30%.

This means only 30% of resources are efficiently utilized.

- VM specifications
- CPU : 4 virtual cores
- RAM : 16GiB

The Company will Consolidate its workload onto VMs with an average utilization of 70% in cloud.

Core calculation :-

50 x 32 = 1600 . [Assuming each server has 32 cores]

1600 x 0.30 = 480 cores.

480/4 = 120 VMs.

RAM calculation :-

$50 \times 128 = 6400$ GB.

$6400 \times 0.30 = 1920$ GB

$1920 / 16 = 120$ VMs.

So, the Company needs 120 VMs.

Cost calculation :-

$0.05 \times 120 = \$6$

b) Total cost per month for additional storage. (50TB)

$0.10 per additional storage per month.

Total cost per month

$50 \times 1000 \times 0.10 = \$500$

c) Total cost per month for running the workload in clo including the cost of additional storage.

$24 \times 30 = 720$ hours/month.

$720 \times 6 = \$4320$

for additional storage $= \$500$

then $\$4320 + \$500 = \$4820$ per month.

(2) a) Total no. of cores available in the cloud Datacenter

- 32 cores per each server.
- 100 servers

Then

$100 \times 32 = 3200$ Cores.

b) maximum num of VMs that can be hosted in Datacenter

- Each VM = 2 cores
- Total no. of cores = 3200

max VMs = 3200/2 = 1600 VMs

Each server host up to 8 VMs -

100 servers = 800 VMs.

= 1600 - 800 VMs.

max Vms = 800 vms.

c) 70% avg utilization

30% of cores are typically idle.

=> 0.30 x 3200 = 960 idle cores

d) Accommodating 50 VMs each requiring 4 Cores and 16 GiB of RAM -

=> 50x4 = 200 cores.

=> 50x16 = 800 GiB.

or Check;

available cores = 3200

Required cores = 200

Available cores are sufficient

check RAM:

server has 128 GiB of RAM

100 x 128 = 12800 GiB

Required Ram is 800 GiB

(3) a) OTP valid time = 30 sec

user access Cloud service every 5 min

no. of OTPs needed by 1 hour = $\frac{60 \text{ min}}{5 \text{ min}}$

= 12 OTPs

b)

Users = 100000

12 OTPs one in 1 hours. per 1 User

then

100000 × 12 = 12,000,000 OTPs are accessed

c) percentage of OTP generation capacity utilized.

OTP generation 1000 per sec.

OTP generation for 1 hour = 1000 × 3600

= 36,000,00

percentage utilized = $\frac{12000000}{36000000} \times 100$

= 33.33

(4) a) 1TB data store for one node

There are 10 nodes

10 × 1TB = 10TB

3 × 10TB = 30TB.

b) 30% additional storage

$30 \times \frac{10}{100} = 3$ TB.

c) i) Each token = 1 KB. for one node

10 nodes = 10KB.

d)

33TB token storage

10KB for security tokens.

Overall KB to TB = $\frac{10}{(1024)^3}$ = 9.1×10^{-12} TB.

(7) 3 physical servers

- with 16 cores
- 64 GB of RAM
- type A VM : 2 cores with 4GB of RAM
- type B VM : 4 cores with 8 GB of RAM.

Total = $3 \times 16 = 48$ cores

(a) type A vm no. of vms hosted = $\frac{\text{no. of cores per server}}{\text{No. of cores per type A VM}}$

$= \frac{16}{2} = 8$ VMs

(b) type A VM requires 4 GB of RAM

$\frac{64}{16} = 4$ GB RAM Allocation for each core.

then for type B vm has 4 cores then

$4 \times 4 = 16$ GB of RAM is required.

(b)

cores : 16

RAM : 64 GB

cores Allocation of type A VMs = $\frac{16}{2} = 8$ VMs

RAM Allocation of type A VMs = $\frac{64}{16} = 16$ GB.

(8)

SAN consists 10 storage Nodes

each node consists 100 TB storage capacity

bandwidth = 8 Gbps Accessing time = 10ms

(a) Total storage capacity of the SAN

Capacity per node x No. of nodes = 100×10

$= 1000$ TB.

Bandwidth = 8 Mbps

Accessing time = 10 ms

Convert the file size into bits

$10\ GB = 10 \times 8\ Gb = 80 \times 10^9$ bits

Transfer time (T) = $\frac{80 \times 10^9}{8 \times 10^9}$ + Access time

$= 10 + 5$ ms

$= 10 + 0.005$ sec

$= 10.005$ sec.

(c) 5×10.005 sec

$= 50.025$ sec.

)

(a) Each node processes = 10 terabyte (TB)/per day

Data retention period is 30 days

Total daily data = no. of nodes × 1 TB

Assume N no. of

$= N$ TB.

Total data over 30 days = 30 × N TB (total daily data)

$= 30 \times N$ TB

(b) additional storage = 20%

$= 30 \times \frac{20}{100}$

$= 6$ TB.

Total encrypted Storage = Total data over 30 da

$= 30$ N TB + 6 TB

$= 36$ N TB.

(c) for one location = 36 N TB

for three locations = 36 N TB × 3

$= 108$ N TB