# Solution

**Q. Osica Inc. is an IaaS cloud service provider, who is planning to construct a new generation data center in Hyderabad in the year 2024 (Leap year). They use shipping containers for consolidating the data center that is a pre-packaged unit of management. You are given the following information for a viability study. Each shipping container has self-contained networking, servers, air conditioning units, and UPS. A container has 25 server racks, each with 15 servers. Each server has 64 CPU cores. It costs INR 500L to purchase and deploy one container (1L = INR 1,00,000). For each server, the electricity load consumed by the computing-related activities is 150W per hour. This load is constant and does not change based on the usage level of the servers. This load does not include non-computing related power usage, such as for AC, lighting, etc. Its costs INR 10L/month to rent a warehouse that can store up to 5 containers. The electricity board charges you INR 15 per KWh of power. A system administrator's salary is Rs. 1.5L per month and one system administrator can manage up to 5 containers. Assume that there are no additional charges for network bandwidth, taxes, security guard, etc. Say you plan to initially purchase 10 containers for the data center. Calculate the total cost spent in the first three months (January to March), including infrastructure cost.**

**Sol:** 1 container = 25 * 15 = 375 servers

10 containers = 375 * 10 servers = 3750 servers

Deployment cost of 10 containers = **5000 L**

Electricity consumption by 1 container = 375 * 150 W/hr

Cost of Electricity consumption by 1 container in 1 hour = (375 * 150) * (15/1000) = 843.75 INR

Warehouse cost to contain 10 containers for 3 months = 20 L * 3 = **60 L**

Administrator salary to monitor 10 containers = (1.5 L * 2) * 3 = **9 L**

Electricity consumption cost of 10 containers for 3 months (Jan – Mar 2024)

= (843.75 (INR/hr) * (31+29+31) * 24) * 10

= 18427500 INR

= **184.275 L**

Total cost = (5000 + 60 + 9 + 184.275) L

= **5253. 275 L**

**Q. The big apple mining company has two options to satisfy the requirements, which are given as follows.**

| Expenditure | On Premises | Cloud (Cost/Hour) |
|---|---|---|
| Servers Purchase Cost | $ 70,000 | $ 1 |
| Network | $ 60,000 | $ 2 |
| Storage | $ 65,000 | $ 5 |
| Power and cooling | $ 2 /hour | - |
| Management Cost | $ 2 /hour | $ 1 |

**Calculate the total cost and select the most suitable option.**

a) **Cost of cloud will be more than on premises after 2 year of service usage**

b) **Cost of cloud will be more than on premises after 3 year of service usage**

c) **Cost of cloud will be more than on premises after 4 year of service usage**

d) **Cost of cloud will be more than on premises after 5 year of service usage**

**Note: You need to provide answer based on year-wise evaluation. At the end of each year, the evaluation committee calculate the cost**

**Solution:**

Cloud cost of 1 year = 9 * 24 * 365 = 78840 $

On premises opex cost = 4 * 24 * 365 = 35040 $

On premises capex cost = (70000 + 60000 + 65000) $ = 195000 $

195000 + 35040 yr < 78840 yr

195000 < (78840 – 35040) yr

(195000 / 43800) < yr

4.45 < yr

Till 4$^{th}$ year, the cloud cost was less than the on-premises cost. The next evaluation will be done after completion of 5$^{th}$ year. The value of yr > 4.45 is 5. **The option (d) is satisfying this condition**.

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**Using data given in the table, how much saving will be done using the cloud after two years.**

**Sol:**

Cloud cost of 1 year = 9 * 24 * 365 = 78840 $

On premises opex cost = 4 * 24 * 365 = 35040 $

On premises capex cost = (70000 + 60000 + 65000) $ = 195000 $

Hence,

Cloud cost after 2 years = 78840 $ * 2 = 1,57,680

On premises cost after 2 years = 195000 $ + 35040 $ * 2 = 2,65,080

Total saving using the cloud after two years = 265080-157680 = 1,07,400 $

**Q. Consider a scenario where Mr. Glen, CEO of The Matrix Inc. wants to use a cloud service from AWS. The service level agreement guarantees negotiated between Matrix Inc and AWS prior to initiating business are as follows.**

- **Availability guarantee: 99.5% time over the service period**
- **Service Month: August**
- **Maximum service hours per day: 15 hours**
- **Cost: INR 1500 per day**

**Service credits are awarded to customers if availability guarantees are not satisfied. Monthly connectivity uptime service level are given as follows.**

- **Monthly uptime percentage < 99.5%, Service credit: 15%**
- **Monthly uptime percentage < 99%, Service credit: 25%**
- **Monthly uptime percentage < 90%, Service credit: 35%.**

**However, it was found that over the service period, the cloud service suffered five outages of durations: 1 hour 30 mins, 30 mins, 50 mins, 20 mins, and 120 mins, each on different days, due to which normal service guarantees were violated. If SLA negotiations are honored, compute the effective cost payable towards buying the cloud service.**

**Sol:**

Total outage = ( 90 + 30 + 50 +20 +120 ) min = 310 min

Total service time = 31 * 15 = 465 hours * 60 = 27,900 min

Actual service time = (27900 – 310) min = 27590 min

Availability percentage = (27590 / 27900) * 100 = 98.89%

Service credit will be applied = 25 %

Total cost needed to pay without SLA negotiation = 1500 * 31 = 46500 INR

Effective cost payable after negotiation = 46500 (1-0.25) = **34875 INR**

**Q. Which statement/s is/are correct about the IP address 10.15.5.215/23 in a subnet in a VPC? (Mark two)**

**Sol:**

Subnet masking for the IP address is

11111111.11111111.11111110.00000000 (255.255.254.0)

In one subnet with /23 subnet masking, we can generate $2^9 = 512$

The IP addresses that can be part of

1st subnet, 10.15.0.0/23, 10.15.0.0 – 10.15.1.255

2nd subnet, 10.15.2.0 – 10.15.3.255

3rd subnet, 10.15.4.0 – 10.15.5.255

The given IP address comes under 3rd subnet

So, the network address is 10.15.4.0, broadcast address is 10.15.5.255 (with a subnet making of 255.255.254.0)

**Q. The services; Cisco WebEx, Amazon EC2 service, Google App Engine, CloudFormation, and Dropbox service are**

Ans: SaaS, IaaS, PaaS, IaaC, and SaaS.

**Q. Hypervisors are running on server hardware directly is called as ..... and ..... Hypervisors are having the resources controlled by the host operating system. The example of a type 1 hypervisor is ..... and its opposite example of the hypervisor is .....**

**As per the above question, mark the possible correct option.**

Ans: Type 1, hosted, VMWare vSphere, VMWare Workstation

Note: This question is considered as multichoice question so, negative marking is not provided. If you have selected the correct answer, you will get marks.

**Q. Suppose a processor has 10 cores and each core can run 8 threads. If each thread can execute five instructions at the same time, then how many instructions can be executed in that processor?**

Ans: 400 or 50.

Note: If you have opted any of these, you will get marks.