



# 22AIE305

## Introduction to Cloud computing

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# Problem 1

Consider a scenario where company X wants to use a cloud service from provider P. The service level agreement (SLA) guarantee negotiated between the two parties prior to initiating business are as follows:

- Availability guarantee: 99.95% time over the service period
- Service period: 30 days
- Maximum service hours per day: 12 hours
- Cost: \$ 50 per day

Service credits are awarded to customers if availability guarantees are not satisfied. Monthly connectivity uptime service levels are given as:

Monthly Uptime Percentage	Service Credit
<99.95%	10%
<99%	25%

However, in reality, it was found that over the service period, the cloud service suffered five outages of durations: 5 hours, 30 minutes, 1 hour 30 minutes, 15 minutes, and 2 hours 25 minutes, 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.

# Problem 1 - answer

Service period duration = 30 days

Service duration/day = 12 hours

Total service uptime = (12\*30) hours  
= 360 hours

Cost = \$ 50 per day

Total cost (at the time-of-service negotiation) = \$(50\*30) = \$1500

Total downtime = (5 hours+30 minutes+1 hour 30 minutes+15 minutes+2 hours 25 minutes) = 9 hours 40 minutes

$$\text{Service availability} = \left( 1 - \frac{\text{Downtime}}{\text{Uptime}} \right)$$

*Service availability*

$$= \left( 1 - \frac{9 \text{ hours } 40 \text{ minutes}}{(360 - 9 \text{ hours } 40 \text{ minutes})} \right)$$

Service Availability % = 97.4%

Monthly uptime % =  $97.4 < 99\%$

Service credits available = 25% of total credit  
 $= 25/100 * \$1500 = \$375$

Effective cost payable towards buying the cloud service =  $(\$1500 - \$375)$   
 $= \$ 1125$

# Problem 2

An organization ABC needs to support a spike in demand when it becomes popular followed potentially by a reduction once some of the visitors turn away. The company has two options to satisfy the requirements which are given in the following table:

Expenditure	In-house server (INR)	Cloud server (INR)
Purchase cost	600000	-
Number of CPU cores	12	8
Cost/hour (over a three-year span)	-	42
Efficiency	40%	80%
Power and cooling (cost/hour)	22	-
Management cost (cost/hour)	6	1



- a) Calculate the price of a core hour on the In-house server and Cloud server over three years span.
- b) Calculate the total cost/effective hour for both options.
- c) Calculate the ratio of the total cost/effective hour for in-house to cloud deployment.
- d) If the efficiency of the in-house server is increased to 70%, which deployment will now better total cost/effective hour?

# Problem 2 - answer

$$\begin{aligned}\text{Cost/hour of in-house server (3 years)} &= 600000 / 3 * 365 * 24 \\ &= 22.83 \text{ INR}\end{aligned}$$

$$\begin{aligned}\text{a) Core hour on the In-house server} &= 22.83/12 \\ &= 1.9 \text{ INR}\end{aligned}$$

$$\begin{aligned}\text{Core hour on the Cloud server} &= 42/8 \\ &= 5.25 \text{ INR}\end{aligned}$$

$$\begin{aligned}\text{b) Cost/effective hour for in-house server} &= 22.83/40 * 100 \\ &= 57.075 \text{ INR}\end{aligned}$$

$$\begin{aligned}\text{Cost/effective hour for cloud server} &= 42/80 * 100 \\ &= 52.5 \text{ INR}\end{aligned}$$

$$\begin{aligned}\text{c) Total cost/effective hour for in-house} &= 57.075 + 22 + 6 \\ &= 85.075 \text{ INR}\end{aligned}$$

$$\begin{aligned}\text{Total cost/effective hour for cloud server} &= 52.5 + 1 \\ &= 53.5 \text{ INR}\end{aligned}$$

$$\begin{aligned}\text{Ratio (In-house/Cloud)} &= (85.075/53.5) \\ &= 1.59\end{aligned}$$

$$\begin{aligned}\text{d) Modified cost/effective hour for in-house} &= 22.83/70*100 \\ &= 32.61\end{aligned}$$

$$\begin{aligned}\text{Total cost/effective hour for in-house} &= 32.61 + 22 + 6 \\ &= 60.61 \text{ INR}\end{aligned}$$



# Namah Shivaya