

INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR

Date: 17-Feb-2016 AN, Time: 2Hrs, Full Marks: 50, Deptt: IT/CSE

Mid Spring Semester Examination 2016

Sub. No.: IT60020 Sub. Name: Cloud Computing

Answer ALL Questions

[Answer all parts of the same question together. Assumptions, if any, should be clearly mentioned]

Question 1: [6 + (3 + 6) = 15]

- A. Describe with the help of examples the various service models and deployment models of cloud computing. (Give one real example of each type of service model and one example situation where each type of deployment models could be used.)
- B. What is meant by “economies of scale” and how it plays an important role in determining whether an organization should move towards a cloud based solution instead of in-house solution.

Consider that the peak computing demand for an organization is 120 units. The demand as a function of time can be expressed as $55(1+e^{-t})$. Baseline (owned) unit cost is 125 and cloud unit cost is 200. In this situation is cloud cheaper than owning for a period of 100 time units?

Question 2: [2 + (2+2+2+2) + 10 = 20]

- A. Differentiate between cloud SLA and Web Service SLA.
- B. Define service level objectives (SLOs) and key performance indicators (KPIs). How are the KPIs measured? Give four metrics used for KPI measurement.
- C. Consider a scenario where a company X wants to use a cloud service from a provider P. The service level agreement (SLA) guarantees negotiated between the two parties prior to initiating business are as follows:
- Availability guarantee: 99.5% time over the service period
 - Service period: 30 days
 - Maximum service hours per day: 15 hours
 - Cost: INR 2500 per day
 - Service credits are awarded to customers if availability guarantees are not satisfied. Monthly connectivity uptime service level are given as:

Monthly Uptime Percentage	Service Credit
<99.5%	15%
<99%	25%

However, in reality it was found that over the service period, the cloud service suffered five outages of durations: **5 hrs, 30mins, 1hr 30mins, 5mins, and 2hrs 30mins**, 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.

Question 3: [3 + (3+4+5) = 15]

- A. Compare between Cloud Computing, Cluster Computing and Grid Computing.
- B. 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 servers (INR)
Purchase cost	70000	-
Cost/hour (over three year span)	-	7.00
Efficiency	40%	80%
Power and cooling (cost/hour)	30.00	-
Management cost (cost/hour)	20.00	1.00

- (i) Calculate the total cost/effective-hour for both options.
- (ii) If the company wants to make its service available to the customers throughout the day (for over three years) and aims at earning daily revenue of INR 3000, calculate the expected profits if either of the approaches are followed.
- (iii) Calculate the modified efficiency of the in-house server, so that the in-house cost is equal to the cloud cost.