ID: .....

Name: .....

AY2022-23 - Winter - 1st In-Semester Examination

IT457 – Cloud Computing

Max. Marks: 20	Time: 1 hour

Instructions:

1. *This exam has 13 questions in total. All questions are compulsory.*
2. *All questions are to be answered in the question paper itself.*
3. *For objective type questions,* ***circle (like, ©) the choice(s)*** *to mark your answer.*
4. *There could be* ***one or more*** *correct answers to the objective type questions. Marks will be awarded only if all correct answers are circled.*
5. *Write your ID on* ***all pages*** *of Question paper.*
6. *The marks for each question are mentioned alongside the question.*

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1. When we compare deployment of a web service on premises versus on cloud, which of the following is true.
   i. The lag strategy in on-premises results in customer satisfaction
   ii. The lead strategy in on premises results in overspending
   iii. The auto-scaling in cloud reduces long term cost
   iv. The cloud deployment results in lesser upfront cost

   (1)

2. A developer sitting in company office uses his company's email hosted on cloud for communication, uses a virtual machine for development work and writes code to connect to Github to do code commits via its command line interface. Which of the following describe the services used by developer most appropriately?
   i. Email – SaaS, VM – PaaS, GitHub – IaaS
   ii. Email – PaaS, VM – IaaS, GitHub – PaaS
   iii. Email – SaaS, VM – IaaS, GitHub – PaaS
   iv. Email – SaaS, VM – IaaS, GitHub – SaaS

   (1)

3. Which of the following is/are true for SSL Termination in Azure Application Gateway (AAG) service?
   i. AAG caches TLS session details and reuses these to improve performance for requests coming from same client
   ii. AAG can provide SSL termination and then re-encrypt with a different public key before sending traffic to the sever pool

iii. AAG can provide SSL termination to selected incoming requests based on the URI as it operates at OSI Level 7 (Application)

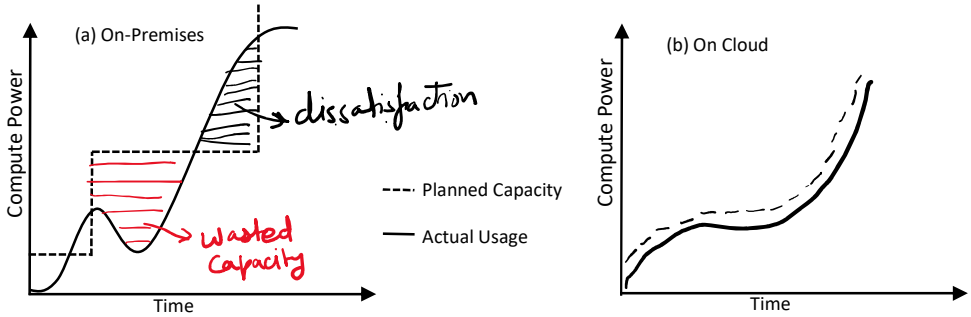
iv. AAG needs a certificate with public and private keys to provide SSL termination feature (1)

4. In a scenario where the application is deployed on multiple data centers, how is Azure's Cloud Witness service is helpful?
   i. Cloud Witness operates at TCP/IP level and hence can determine if a node of a cluster is up or down
   ii. Cloud Witness uses Azure as arbitration point, hence no need of witness to be deployed in separate data center
   iii. Cloud Witness provides service for Windows Server Failover Clustering using Azure for high availability
   iv. Cloud Witness has low cost because it uses low-cost blog storage in Azure (1)

5. In cloud platforms the term polyglot persistence refers to
   i. Use of mixed storage technologies in a cloud application/service
   ii. Use of on-premises and on-cloud data storage services
   iii. Use of RDBMS for on-premises and NoSQL for on-cloud services
   iv. Use of distributed file system for NoSQL DB for parallel processing (1)

6. Which of the following is/are true for Azure VM Scale Sets (VMSS)?
   i. The VMs in a VMSS are configured with increasing capability to provide scalability.
   ii. The VMs in a VMSS are configured identically to allow quick adding/deleting the VMs.
   iii. The VMs in a VMSS can be assigned single IP address to act as a single unit of grouped VMs for high availability.
   iv. A VMSS is most suitable when the workload is steady and predictable. (1)

7. To meet the in-bound internet traffic, the IT department of a software company installed on-premises hardware over the course of couple of years. You are hired by the company based on sound cloud computing skills that you demonstrated during the interview. Immediately you get to work and plot the following graph (a) of the Usage-vs-Capacity for the IT hardware.



In the meeting with IT head of the company to present your analysis, which areas of the graph (a) you will mark as
   i. Wasted capacity
   ii. Customer dissatisfaction

Shade these areas in the graph (a) itself. While the IT head appreciates your analysis, you are asked that if the company moves its hardware assets to the cloud, what would the same graph look like.

iii) Draw the same Usage-vs-Capacity curve, in graph (b) above, for the scenario when all assets are moved to the cloud.

(1 + 1 + 1 = 3)

8. Categorize the below mentioned activities into 'Scaling Up' (vertical scaling) and 'Scaling Out' (horizontal scaling) categories.
   i. A VM with configuration 4-Core CPU, 32GB RAM and 500GM Volume is upgraded to 4-Core CPU, 64GB RAM and 1TB Volume.
      Category: SU
   ii. A docker application service that was running in 2 containers is now running in 5 containers.
      Category: SO
   iii. Azure availability set that had 2 web servers is now managing 3 web servers.
      Category: SO
   iv. A SQL database service is upgraded from Standard tier to Premium tier.
      Category: SU

   (2)

9. An institute's IT dept uses Azure. It plans to create two virtual networks – one for VMs that will be used for student projects and other for VMs for faculty projects. The VMs will be frequently created and deleted as the need may arise. The SSDs that contain research data need to be preserved long term. From resource group (RG) perspective, what is the best way of grouping these resources – the two virtual networks (VNs), the VMs, the SSDs?
   i. Student VN + Student VMs + Student SSDs in one RG and Faculty VN + Faculty VMs + Faculty SSDs in 2nd RG
   ii. Student VN in separate RG, Student VMs in their own separate RGs, Student SSDs in their own separate RGs. Separate RGs for Faculty resources similarly.
   iii. Student + Faculty VNs in one RG, Student + Faculty VMs in 2nd RG, Student + Faculty SSDs in 3rd RG
   iv. All resources in one RG because that will reduce the cost of creating multiple RGs

   (1)

10. A Fault domain in an Availability Set is used to
    i. Isolate VMs source of hardware like NIC, Power supply etc.
    ii. Isolate VMs in groups so that only VMs in one group are upgraded together.
    iii. Indicate the VM Rack number where the fault has occurred to speed up repair.
    iv. Is a user group in Azure Data Centre that is responsible for repairing all hardware faults.

    (1)

11. Following are the resources that you are creating in an Azure Availability Set: Two servers, S1 & S2, for serving HTTP requests, two data base servers Db1 and Db2 for the databases and B1 & B2 servers for processing back-end/business jobs for the service. Which of the following combinations you would chose to make your application service resilient:
    i. S1, B1, Db1 in one Availability Set and S2, B2, Db2 in 2nd Availability Set.

    (1)

ii. S1, S2 in one Availability Set and B1, B2 in 2nd Availability Set and Db1, Db2 in 3rd Availability Set.

iii. S1, B1 in one Availability Set and S2, B2 in 2nd Availability Set and Db1, Db2 in 3rd Availability Set.

iv. None of the above.

12. In an e-commerce application that is deployed to cloud, the performance analysis reveals that for semi-static data the application always makes query to the DB which impacts the performance. This semi-static data is of two kinds – one, the data related to customer, like customer profile that is used by 'app service' code internally (let's call it DataA), two, the data related to orders from customers (let's call it DataB) that could be used by multiple services like payment services, logistics services, report generation services that run outside of the 'app service' process. Based on n-tier architecture, how can the application performance be improved for both DataA and DataB? (3)

A.

DataA and DataB are semi-static data, hence to speedup the performance, we can use the caching mechanism where this data will be saved. Every read-request will read data from cache and not go to DB, hene the response time will be faster. Every write/update request will update in both the cache and the DB.

DataA is used by components of application that run in-proc. Hence, the cache for such kind of data is created within the process memory using the framework/programming object like Hash tables.

DataB is used across the application boundary (ie by multiple apps), hence DataB should be cached in out-of-proc cache services in cloud, like RedisCache in Azure.

In case the DataA is expected to be extremely large that it may not fit in the proc memory, then using RedisCache could be considered as next available solution.

13. Provide brief note on each of the following routing methods of the Azure Traffic Manager.

A. Copy pasting from https://learn.microsoft.com/en-us/azure/traffic-manager/traffic-manager-routing-methods

a) Performance

(1 x 3 = 3)

Select Performance routing when you have endpoints in different geographic locations and you want end users to use the "closest" endpoint for the lowest network latency.

b) Weighted

Select Weighted routing when you want to distribute traffic across a set of endpoints based on their weight. Set the weight the same to distribute evenly across all endpoints.

c) Geography

Select Geographic routing to direct users to specific endpoints (Azure, External, or Nested) based on where their DNS queries originate from geographically. With this routing method, it enables you to be in compliance with scenarios such as data sovereignty mandates, localization of content & user experience and measuring traffic from different regions