Cairo University   **Faculty of Computers and Artificial Intelligence**

CS472 and SCS472 : Cloud Computing, MIDTERM EXAMINATION
Fall 2021 – CLOSED Book Exam –Total marks: 65– Duration: 60 mins
This exam comes in 4 pages

STUDENT NAME

STUDENT ID # _____

Part I: MCQ [10 marks]

1) Which of the following is specified parameter of SLA?
    a) Response times
    b) Responsibilities of each party
    c) Warranties
    d) All of the mentioned

2) **Which cloud is deployed when there is a budget constraint, but business autonomy is most essential?**
    a) Private cloud
    b) Public cloud
    c) Hybrid cloud
    d) Community cloud

3) **……….as a Service is a cloud computing infrastructure that creates a development environment upon which applications may be build**
    a) Infrastructure
    b) Software
    c) Platform
    d) All of the mentioned

4) **What is the number one concern about cloud computing?**
    a) Too expensive
    b) Security concerns
    c) Too many platforms
    d) Accessibility

5) **Point out the wrong statement :**
    a) in cloud computing user don't have to worry about data backup and recovery
    b) cloud computing can be used by small as well as big organisation
    c) Cloud offer almost unlimited storage capacity
    d) All applications benefit from deployment in the cloud

6) **Which of the following is true of cloud computing?**
   a) It's always going to be less expensive and more secure than local computing.
   b) You can access your data from any computer in the world, as long as you have an Internet connection.
   c) Only a few small companies are investing in the technology, making it a risky venture.

7) **SaaS supports multiple users and provides a shared data model through   model.**
   a) single-tenancy
   b) multi-tenancy
   c) multiple-instance
   d) all of the mentioned

Five Cloud Computing Characteristics

- On-Demand Self-Service
  - A consumer can provision computing resources as needed automatically without requiring service provider interaction
- Broad Network Access
  - Resources are available over the network and accessed through client platforms (e.g., mobile phones, tablets, laptops, etc...)
- Resource Pooling
  - Resources are pooled to serve multiple consumers using a multi-tenant model

8) **Cloud computing is also a good option when the cost of infrastructure and management is**
   a) low
   b) high
   c) moderate
   d) none of the mentioned

9) **"Cloud" in cloud computing represents what?**
   a) Wireless
   b) Hard drives
   c) People
   d) Internet
   We can accept b) as a correct answer

10) **What facet of cloud computing helps to guard against downtime and determines costs?**
   a) Service-level agreements
   b) Application programming interfaces
   c) Virtual private networks
   d) Bandwidth fees

Part II: Cloud Characteristics [15 marks]:

11) What are the characteristics of cloud architecture that separates it from traditional one? [2 marks]

Notes: Any two characteristics are enough and any other reasonable answer is accepted

- The hardware requirement is provided according to the demand cloud architecture.
- Cloud architecture is capable of scaling the resource on demand
- Cloud architecture is capable of managing and handling dynamic workloads without failure.

12) What are the business benefits involved in cloud architecture? [2 marks]

Notes: Any two benefits are enough and any other reasonable answer is accepted

- Zero infrastructure investment
- Just in time infrastructure
- More efficient resource utilization

13) Mention what is the difference between elasticity and scalability in cloud computing? [2 marks]

Scalability is a characteristics of cloud computing through which increasing workload can be handled by increasing in proportion the amount of resource capacity.

Whereas, elasticity, is being one of the characteristics that highlights the concept of commissioning and decommissioning of a large amount of resource capacity.

OR: Elasticity means provisioning and released to scale rapidly on demand.

14) Before going for cloud computing platform what are the essential things to be taken in concern by users?[[3 marks]

Cloud Obstacles & Opportunities

	Obstacle	Opportunity	
1	Availability/Business Continuity	Use Multiple Cloud Providers	
2	Data Lock-In	Standardize APIs; Compatible SW to enable Surge or Hybird Cloud Computing	Cloud Adoption
3	Data Confidentiality and Auditability	Deploy Encryption, VLANs, Firewalls	
4	Data Transfer Bottlenecks	FedExing Disks; Higher BW Switches	
5	Performance Unpredictability	Improved VM Support; Flash Memory; Gang Schedule VMs	
6	Scalable Storage	Invent Scalable Store	Cloud Growth
7	Bugs in Large Distributed Systems	Invent Debugger that relies on Distributed VMs	
8	Scaling Quickly	Invent Auto-Scaler that relies on ML; Snapshots for Conservation	
9	Reputation Fate Sharing	Offer reputation-guarding services like those for email	Policy/ Business
10	Software Licensing	Pay-for-use licenses	

15)…**automatic provisioning** … is the load estimation of the next business cycle in advance and ensuring that the resources available in the edge cloud can meet the load requirements." [1 mark]

16) Specify the main faults that may happen while trying to achieve the above goal. [2 marks]

provisioning to the peak load, which leads to low resource utilization
**Under-provisioning, which leads to low demands over time.**

17) Illustrate with example how can these faults happened and what are their consequences. [3 marks]
Any reasonable example is accepted.
E.g., ecommerce website has a peak demand in December due to the Christmas. If the provider supports the website with a high bandwidth that covers the peak demand then the there is a unused bandwidth during the whole year except in December.
In case of having an average bandwidth that cover the demands of the whole year, but in December the customers will be unsatisfied. Therefore, the demands on this website will be decreased over time.

- Controlling resource usage by leveraging a metering capability at some level of abstraction appropriate to the type of service or resource
- e.g. per hour processing, per day storage, active user accounts

(a) Provisioning for peak load (b) Underprovisioning 1 (c) Underprovisioning 2
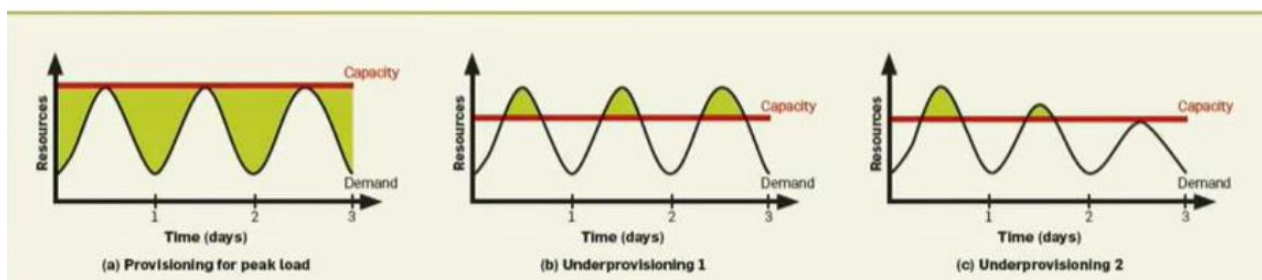
Part III: Cloud Service Model [14 marks]:
Though as-a-service types are growing by the day, there are usually three models of cloud service: Software-as-a-Service, Platform-as-a-Service, Infrastructure-as-a-Service.

18) Specify TWO advantages of using each one of these as-a-Service types. [6 marks]

- No downloads or installations on the client side is needed (SaaS)
- Reducing the time and money spent on tedious tasks such as managing, and upgrading software. (SaaS)
- Developers can customize apps without the headache of maintaining the software (PaaS)
- Significant reduction in the amount of coding needed (PaaS)
- Automation of business policy (PaaS)
- Resources can be purchased as-needed (IaaS)
- Clients retain complete control of their infrastructure (IaaS)
- Easy to automate deployment of storage, networking, servers, and processing power (IaaS)

19)Could you specify how the Interoperability and Customization be challenged for Software-as-a-Service type? [4 marks]

- **Interoperability.** Integration with existing apps and services can be a major concern if the SaaS app is not designed to follow open standards for integration. In this case, organizations may need to design their own integration systems or reduce dependencies with SaaS services, which may not always be possible.

- **Customization.** SaaS apps offer minimal customization capabilities. Since a one-size-fits-all solution does not exist, users may be limited to specific functionality, performance, and integrations as offered by the vendor. In contrast, on-premise solutions that come with several software development kits (SDKs) offer a high degree of customization options.

20)What is the term X-as-a-Service mean? State an example for it? [4 marks]

"X" as a Service

Other Service Models

- Database-as-a-Service
- Sensing-as-a-Service
- XaaS
  - "X" as a Service

Part IV: Virtualization [16 marks]:
21)How does the Virtualization support the reliability? [2 marks]

Any answer from the following is satisfied
- Virtualization provides on-demand *cloning* and *live migration* services which improve *reliability*.
- Emulating new hardware achieving reliability.
- Virtual machines can run on a shared infrastructure, so the hardware failure can't be noticed.

22)Illustrate the main functionalities of the hypervisors. [4 marks]

- However, the hypervisor is actually
    - ✓ **Controlling** the host processor and resources,
    - ✓ **Allocating** what is needed to each operating system in turn, and
    - ✓ **Making sure** that the guest operating systems (called Virtual Machines(VMs)) cannot disrupt each other.
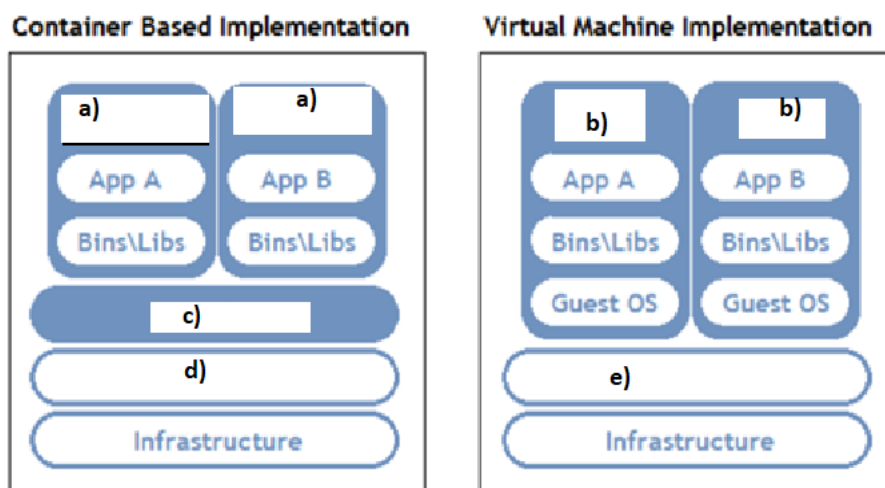
23)State the two types of virtualizations? Which one is most suitable for applying experimental use case? Why? [4 marks]

Full Virtualization
Para Virtualization - suitable for applying experimental use case.
Working on the host OS make it easy to install and remove the VM, so it is not a big deal to run the experiment many times.

24) In the following figure. Fill the missing names [6 marks]

Container Based Implementation

- a)
- App A
- Bins\Libs
- a)
- App B
- Bins\Libs
- c)
- d)
- Infrastructure

Virtual Machine Implementation

- b)
- App A
- Bins\Libs
- Guest OS
- b)
- App B
- Bins\Libs
- Guest OS
- e)
- Infrastructure

a) **Container.**

b) **Virtual machine.**

c) **Docker.**

d) **Host Operating System.**

e) **Hypervisor**

Part V: Commercial Cloud Services [10 marks]:

25) State Two main features that differentiate Elastic Cloud Computing (EC2)? [4 marks]

Note: Any three points are enough

-Web service for launching instances of an application under several operating systems.
- A user can load an EC2 instance with a custom application environment.
- A user can manage network's access permissions.
- A user can run the image using as many or as few systems as desired.

26) Illustrate how does the Amazon S3 work? [6 marks]

Note: Any three points are enough

- An object is stored in a bucket and retrieved via a unique, developer-assigned key; a bucket can be stored in a Region selected by the user.
- Supports a minimal set of functions: write, read, and delete; it does not support primitives to copy, to rename, or to move an object from one bucket to another.
- The object names are global.
- S3 maintains for each object: the name, modification time, an access control list, and up to 4 KB of user defined metadata.
- Authentication mechanisms ensure that data is kept secure.
- Objects can be made public, and rights can be granted to other users.
- S3 computes the MD5 of every object written and returns it in a field called ETag.
- A user is expected to compute the MD5 of an object stored or written and compare this with the ETag; if the two values do not match, then the object was corrupted during transmission or storage.