

MID-TERM EXAMINATION PAPER

FACULTY : **COMPUTER SCIENCE AND MULTIMEDIA**
COURSE : **BACHELOR OF INFORMATION TECHNOLOGY (BIT)**
YEAR/ SEMESTER : **THIRD YEAR / SIXTH SEMESTER**
MODULE TITLE : **CLOUD COMPUTING**
DATE : **4TH MARCH 2022**
TIME ALLOWED : **3 HOURS**
START : **6:30 AM – 9:30 AM**
SET : **B**

Instruction to candidates

1. This question paper has THREE (3) Section
2. Answer **ALL** questions in Section A, MCQ.
3. Answer **5** questions in Section B, MSAQ
4. Answer **2** questions in Section C, MEQ
5. No scripts or answer sheets are to be taken out of the Examination Hall.
6. For Section A, answer in the OMR form provided.

Do not open this question paper until instructed.

(Candidates are required to give their answers in their own words as far as practicable)

SECTION A

Multiple Choice Questions

(30*1=30)

1. Identify the deployment model among the following.
 - a. Private
 - b. Public
 - c. Hybrid
 - d. All of the above
2. Choose among the following which is related to services provided by the cloud.
 - a. Reliability
 - b. Sourcing
 - c. Ownership
 - d. AaaS
3. Cloud computing is a kind of abstraction which is based on the notion of combining physical resources and represents them as _____resources to users.
 - a. Real
 - b. Cloud
 - c. Virtual
 - d. None of the mentioned
4. Which of the following has many features of that is now known as cloud computing?
 - a. Web Service
 - b. Softwares
 - c. All of the mentioned
 - d. Internet
5. Which one of the following cloud concepts is related to sharing and pooling the resources?
 - a. Polymorphism
 - b. Virtualization
 - c. Abstraction
 - d. None of the mentione
6. Which one of the following can be considered as a utility is a dream that dates from the beginning of the computing industry itself?
 - a. Computing
 - b. Model
 - c. Software
 - d. All of the mentioned
7. Which one of the following is a phase of the Deployment process?
 - a. Selecting Cloud Computing Provider
 - b. IT Architecture Development
 - c. Business Architecture Development
 - d. Transformation Plan Development
8. This phase involves selecting a cloud provider based on the Service Level Agreement (SLA), which defines the level of service the provider receives.
 - a. Maintenance and Technical Service
 - b. Selecting Cloud Computing Provider
 - c. Both A and B
 - d. None of the above

9. Which of the following is an essential concept related to Cloud?
- a. Reliability
 - b. Abstraction
 - c. Productivity
 - d. All of the mentioned
10. Which one of the following is Cloud Platform by Amazon?
- a. Azure
 - b. AWS
 - c. Cloudera
 - d. All of the mentioned
11. Which one of the following statements is not true?
- a. The popularization of the Internet actually enabled most cloud computing systems.
 - b. Cloud computing makes the long-held dream of utility as a payment possible for you, with an infinitely scalable, universally available system, pay what you use.
 - c. Soft computing addresses a real paradigm in the way in which the system is deployed.
 - d. All of the mentioned
12. Which of the following statement is not true?
- a. Through cloud computing, one can begin with very small and become big in a rapid manner.
 - b. All applications benefit from deployment in the Cloud.
 - c. Cloud computing is revolutionary, even though the technology it is built on is evolutionary.
 - d. None of the mentioned
13. In the Planning Phase, which of the following is the correct step for performing the analysis?
- a. Cloud Computing Value Proposition
 - b. Cloud Computing Strategy Planning
 - c. Business Architecture Development
 - d. Both A and B
14. In which one of the following, a strategy record or Document is created respectively to the events, conditions a user may face while applying cloud computing mode.
- a. Cloud Computing Value Proposition
 - b. Cloud Computing Strategy Planning
 - c. Business Architecture Development
 - d. Planning Phase
15. Which one of the following refers to the non-functional requirements like disaster recovery, security, reliability, etc.?
- a. Service Development

- b. Quality of service
 - c. Plan Development
 - d. Technical Service
16. Cloud computing architecture is a combination of?
- a. service-oriented architecture and grid computing
 - b. Utility computing and event-driven architecture.
 - c. Service-oriented architecture and event-driven architecture.
 - d. Virtualization and event-driven architecture.
17. Through which, the backend and front-end are connected with each other?
- a. Browser
 - b. Database
 - c. Network
 - d. Both A and B
18. Which of the following is one of the backend's built-in components of cloud computing?
- a. Security
 - b. Application
 - c. Storage
 - d. Service
19. Which of the following provides the Graphic User Interface (GUI) for interaction with the cloud?
- a. Client
 - b. Client Infrastructure
 - c. Application
 - d. Server
20. Which one of the following technology works behind the cloud computing platform?
- a. Virtualization
 - b. SOA
 - c. Grid Computing
 - d. All of the above
21. Which one of the following is a kind of technique that allows sharing the single physical instance of an application or the resources among multiple organizations/customers?
- a. Virtualization
 - b. Service-Oriented Architecture
 - c. Grid Computing
 - d. Utility Computing
22. Which one of the following refers to the user's part of the Cloud Computing system?
- a. back End
 - b. Management
 - c. Infrastructure
 - d. Front End
23. Which one of the following can be considered as the example of the Front-end?
- a. Web Browser
 - b. Google Compute Engine
 - c. Cisco Metapod
 - d. Amazon Web Services
24. By whom is the backend commonly used?
- a. Client
 - b. User
 - c. Stockholders
 - d. Service Provider

25. Which one of the following statements is true about Virtualization?
- a. It provides a logical name for a physical resource, and on-demand provides an indicator of that physical resource.
 - b. In Virtualization, we analyze the strategy related problems that customers may face.
 - c. In Virtualization, it is necessary to compile the Multitenant properly.
 - d. All of the above
26. In Virtualization, which architecture provides the virtual isolation between the several tenants?
- a. IT Architecture
 - b. Multitenant
 - c. Deployment
 - d. Business Architecture
27. On which one of the following utility computing is based?
- a. Grid Computing Model
 - b. SOA Model
 - c. virtual isolation Model
 - d. Pay-Per-Use Model
28. In Grid Computing, which types of computer resources are there?
- a. heterogeneous dispersed.
 - b. geographically dispersed.
 - c. Both A and B
 - d. None of the above
29. Which one of the following given programs provides the isolation (abstraction) and partitioning?
- a. System hypervisor
 - b. Software hypervisor
 - c. Hardware hypervisor
 - d. Virtualization hypervisor
30. Which one of the following runs on Xen Hypervisor?
- a. Azure
 - b. AWS EC2
 - c. C AWS EC3
 - d. All of the above

SECTION B

Short Question Answer

Attempt any five (5) questions out of eight (8) questions

(5*6=30)

1. What do you mean by cloud? Describe the basic characteristics of the cloud.
2. What type of deployment models can be adopted in cloud computing? Describe each of them with a suitable example.
3. Discuss the capabilities that cloud users can get through Platform-as-a-service (PaaS). Also, mention the key characteristics of PaaS.
4. How grid computing differs from cloud computing? Justify what the elasticity and multitenancy properties of cloud computing mean?
5. What do you mean by virtualization? What is the role of virtualization in cloud computing?

6. What are the Managed Service Providers (MSP)? Discuss the evolution of MSP Model to Cloud Computing.
7. Discuss about disasters in cloud. How intrusions are detected in cloud?
8. Explain the different approaches for enforcing host security in a cloud environment.

SECTION C

Long Question Answer

Attempt any two (2) questions out of three (3) questions

(2*20=40)

Case Study is Compulsory

- a. How do the Jericho Cloud Cube model dimensions like parameterized, de-parameterized, and proprietary, open differentiate the cloud formations from each other?
 - b. Explain the service provided by the amazon EC2 service from user perspective.
- 2.
- a. Describe the services provided by the Monitoring-as-a-service (MaaS) vendors in cloud service systems.
 - b. Write short notes on (Any Two)
 - i. Risk Assessment in Cloud
 - ii. Role of open source software in cloud computing
 - iii. Grid Computing

3. Case Study. (20)

DTGOV – A Case Study Background

DTGOV is a public company that was created in the early 1980s by the Ministry of Social Security. The decentralization of the Ministry's IT operations to a public company under company law gave DTGOV an autonomous management structure with significant flexibility to govern and evolve its IT operations and structure.

At the time of its creation, DTGOV had approximately 1,000 employees, operational branches in 60 different localities nationwide, and operated two mainframe-based data centers. Over time, DTGOV has expanded to more than 3,000 employees with branch offices in 300 different localities. DTGOV now has three data centers running both mainframe and Intel x86 platform environments. Its main services are related to processing social security benefits across the nation.

DTGOV has enlarged its Government customer portfolio in the last two decades. It now serves other public sector organizations and provides basic IT infrastructure and services, such as server hosting and server co-location. Some of its customers have now outsourced the operation, maintenance and development of applications to DTGOV.

DTGOV has sizable customer contracts that encompass various IT resources and services. However, these contracts, services and the associated service levels are not standardised – negotiated service provisioning contracts are typically modified for each customer individually. DTGOV's operations are becoming increasingly complex and difficult to manage, which has led to inefficiencies and inflated costs.

The DTGOV Board of Management realised, some time ago, that the overall company structure could be improved by standardising its services portfolio. This standardisation implies the redesign and re-engineering of both IT Operational and Management models. This process has started with the standardisation of the DTGOV hardware platform through the creation of a clearly defined technological lifecycle, a consolidated procurement policy and the establishment of new acquisition practice.

Technical Infrastructure and Environment

DTGOV operates three data centers:

- One is dedicated solely to Intel x86 platform servers. These servers use Windows Server 2012 R2 (approximately 70%) and Red Hat Enterprise 5 (approximately 30%);
- The remaining two have both Mainframe and Intel x86 platforms. The Mainframe platforms are used exclusively for the Ministry of Social Security and are therefore not available for outsourcing. The Intel x86 platform servers in these data centers have the same mix as that of the first data center.

The data center infrastructure occupies approximately 1,860 square meters (20,000 square feet) of computer room space and hosts approximately 100,000 servers with different hardware types and configurations. The total storage capacity of DTGOV's data centers is 10,000 Terabytes (10 Petabytes). DTGOV's network has redundant high-speed data links (minimum speed of 100 Mbit/sec) connecting the data centers in a full mesh topology. Their Internet connection is considered to be provider-independent as their network connects to all major national telecom carriers. Server consolidation and virtualization project has been in place for five years and has had some success in considerably decreasing the diversity and number of hardware platforms. As a result, systematic tracking of the investments and operational costs related to the hardware platform has revealed significant improvement. However, there is still considerable diversity in the DTGOV software platforms and configurations due to the many different customer service level agreements and service customizations.

Business Goals and Strategy

A chief strategic objective of the standardization of DTGOV's service portfolio is to achieve increased levels of cost-effectiveness and operational optimization. An internal executive-level working party was established to define the directions, goals, and strategic roadmap for this initiative. The working party has identified cloud computing as a guidance option that offers an opportunity for further diversification, improvement of customer services, and customer portfolios.

The roadmap addresses the following key points:

- ***Business Benefits*** – Concrete business benefits associated with the standardization of service portfolios under the umbrella of cloud computing delivery models need to be defined. For example, how can the optimization of IT infrastructure and operational models result in direct and measurable cost reductions?
- ***Service Portfolio*** – Which services should become cloud based, and which customers should they be extended to?
- ***Technical Challenges*** – The limitations of the current technology infrastructure in relation to the runtime processing requirements of cloud computing models must be understood and documented. Existing infrastructure must be leveraged to the greatest extent possible in order to minimise up-front costs assumed by the development of the cloud based service offerings.
- ***Pricing and SLAs*** – An appropriate contract, pricing, and service level strategy have to be defined. Suitable pricing and SLAs must be developed to support the initiative.

One outstanding concern relates to changes to the current format of contracts and how they may impact business. Many customers may not want to – or may not be prepared to – adopt cloud contracting and services, delivery models. This becomes even more critical when considering the fact that 90% of DTGOV's current customer portfolio consists of public organizations, such as Government Departments, Government Agencies, and Community-based organizations and agencies, that typically do not have the autonomy or the agility to switch operating methods and models on short notice. Therefore, the migration process is expected to be long-term. This may add to DTGOV's risk if the roadmap is not clearly defined. A further outstanding issue relates to IT contract regulations in the Public Sector – existing regulations may become irrelevant or unclear when applied to cloud technologies.

Roadmap and Implementation Strategy

Several assessment activities were initiated to address the aforementioned issues. The first was a survey of existing customers to probe their level of understanding, on-going initiatives and plans regarding cloud computing. Most of the respondents were aware

of and knowledgeable about cloud computing trends, which was considered a positive finding. With these findings, the working party decided to:

1. Choose IaaS as the target delivery platform to start the cloud computing provisioning initiative;
2. Hire a consulting firm with sufficient cloud provider expertise and experience to correctly identify and rectify any business and technical issues that may afflict the initiative;
3. Deploy new hardware resources with a uniform platform into two different data centers, aiming to establish a new, reliable environment to use for the provisioning of initial IaaS-hosted services;
4. Identify three customers that plan to acquire cloud-based services in order to establish pilot projects and define contractual conditions, pricing, and service-level policies and models;
5. Evaluate service provisioning of the three chosen customers for the initial period of six months before publically offering the service to other customers.
6. As the pilot project proceeds, a new Web-based management environment is released to allow for the self-provisioning of virtual servers, as well as SLA and financial tracking functionality in real-time. The pilot projects are considered highly successful, leading to the next step of opening the cloud-based services to other customers.

Questions:

DTGOV, the department in our case study, wants to investigate moving to a service-based model where many of its services would be supplied to its clients as a service, in addition to its plans to move to an IaaS model (See the DTGOV Roadmap and Implementation Strategy (Erl, Mahmood, & Puttini, 2013, p. 19)). There are a number of infrastructure models that could possibly be used to achieve this. Some of these models are:

1. Local hosted infrastructure and applications;
2. Local hosted infrastructure with some SaaS applications;
3. Hybrid infrastructure (some locally hosted infrastructure with some IaaS) and applications;
4. Hybrid infrastructure and applications with some SaaS applications;
5. Full IaaS model with some with SaaS apps;
6. Full SaaS model. You are required to choose an infrastructure model that you think will achieve the DTGOV Roadmap;

Describe the benefits and drawbacks, excluding costs, of your chosen infrastructure model.

****BEST OF LUCK****