

The University of Fiji



Undergraduate Programme
Department of Computer Science and Mathematics
Semester 2 Year 2019

FINAL EXAMINATION PAPER

ITC334 CLOUD COMPUTING

Important Instructions to Students:

1. Read the questions, instructions carefully and answer the questions.
2. You are allowed an **extra 10 minutes reading time** (during this time, you are not allowed to write with pen) and **180 minutes (3 Hours) to complete this paper**.
3. Silent, non-programmable calculators are allowed, but not supplied.
4. Write all your answers in the answer booklet provided. If you need extra sheets, please ask from the supervisor. Write your name, course code and student identification number in the answer booklet and in the attendance sheet.
5. **This Final Course Examination Paper is worth 100 marks contributes 50% of the total course assessments.**
6. This paper contains two (2) sections A and B. Answer **ALL** questions in Section A and **only two (2)** questions in Section B.
7. Write all your answers legibly. The marker has the right to award zero for answers that are not legible.
8. This is a **Closed Book Examination**. The University views plagiarism, cheating and dishonest practice as serious offences and if found, offenders are penalized.

Examination Paper Content (Format):

<u>Section</u>	<u>Question</u>	<u>Content</u>	<u>Marks</u>	<u>Suggested Time</u>
A	1-33	Short Answer Questions	70	120 minutes
B	34-36	Essay Writing (<i>Answer only 2 questions</i>)	30	60 minutes
		TOTAL	100	180 Minutes

Section A – Short Answer Questions [70 Marks]

There are 33 questions in this section.

All questions are compulsory.

Chapter 1 – What is Cloud Computing? [6 marks]

1. Regardless of their form, cloud computing solutions have common characteristics. Briefly explain at least three characteristics. [3m]
2. Explain each of the following fundamental technologies that support cloud computing, with example. [3m]
 - a. Distributed application design
 - b. High-performance computing models
 - c. Edge devices

Chapter 2 – Cloud Models [4 marks]

3. Arrange the following in the correct order according to increasingly virtualized IT infrastructures in the cloud. [1m]
 - A. Distributed virtualization
 - B. Public clouds
 - C. Hybrid clouds
 - D. Traditional data center
 - E. Private clouds
 - F. Server virtualization
4. Given below are some of the organisational roles that arise when planning for cloud integration in the enterprise. What are the major responsibilities in each role? [3m]
 - a. Vendor management staff
 - b. Cloud architect
 - c. Cloud service manager

Chapter 3 – Service Models [6 marks]

5. Explain the term “Vendor Lock-in”, with an example. [2m]
6. Explain the term “Sharding”, with an example. [2m]

7. Traditional software application management follows a predictable process:

- A. Identify software meeting requirements.
- B. Perform capital acquisition for identified software.
- C. Install software to client computers.
- D. Patch software in maintenance cycle.
- E. Perform acquisition for software update.
- F. Install software update to client computers.
- G. Return to maintenance cycle until next software update.

In contrast SaaS application management requires only two steps for the consuming organisations. What are those two steps? [2m]

Chapter 4 – Current Cloud Technologies [6 marks]

8. Given below are three traditional applications. Write down the cloud equivalent of each application. [2m]

- a. Microsoft Office
- b. Adobe Photoshop
- c. Windows Server
- d. Server Virtualization

9. Briefly explain two major networking protocols used in cloud computing. [2m]

10. Discuss web access architecture. [2m]

Chapter 5 – Cloud Business Value [4 marks]

11. Explain how efficiency is increased and costs reduced through economies of scale. [2m]

12. What security benefits do cloud service providers gain through economies of scale? [2m]

Chapter 6 – Cloud Infrastructure Planning [10 marks]

13. Explain the following features of a cloud network – *scalability* and *resiliency*. [2m]

14. What is the function of each of the following OSI layers – *Session*, and *Network*? [2m]

15. What improvements does *IPv6* have over *IPv4*? [2m]

16. State benefits of cloud service automation over traditional data center resource allocation process. [2m]

17. What benefits can storage gateways provide? [2m]

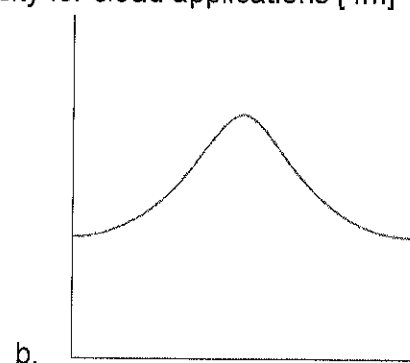
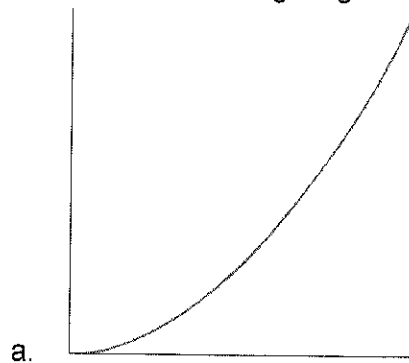
Chapter 7 – Strategies for Cloud Adoption [5 marks]

18. What is a service level agreement (SLA), and why is it important? [2m]

19. State at least three critical success factors in selecting a cloud service provider. [3m]

Chapter 8 – Applications in the Cloud [6 marks]

20. Explain each of following diagrams on patterns of elasticity for cloud applications [4m]



21. **Multiple-Choice Question:** What factors will you evaluate when deciding on selecting an IaaS provider for use? (Select all correct answers) [1m]

- A. Pricing Plans
- B. Service-level agreements
- C. Support
- D. Unstructured data

22. **Multiple-Choice Question:** What are the challenges that cloud-based applications face today? (Select all correct answers) [1m]

- A. Big data
- B. Compliance
- C. Number of data centers
- D. Security

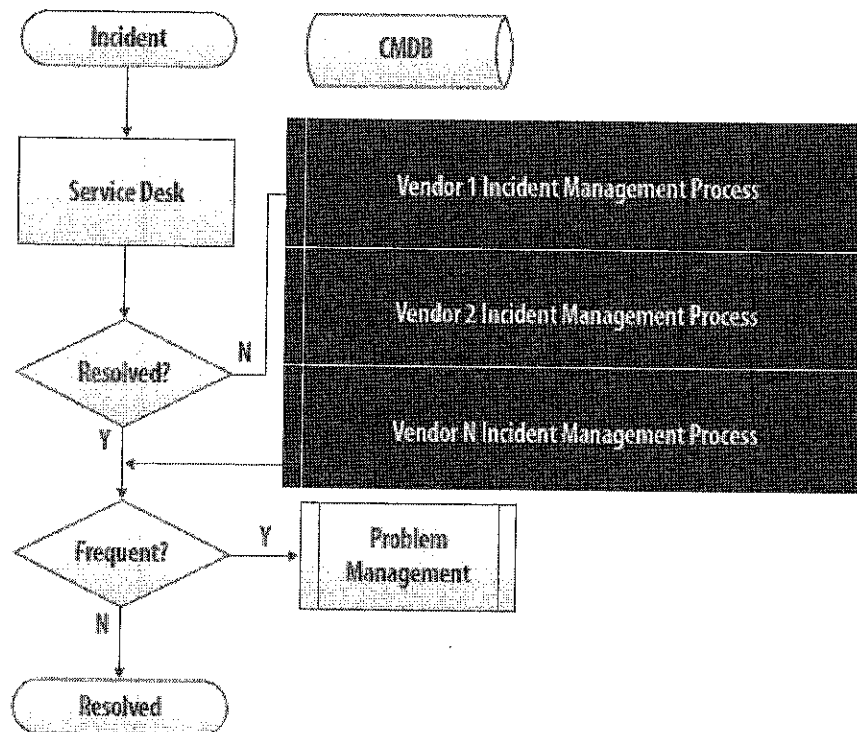
Chapter 9 – Cloud Service Rollout [5 marks]

23. One of the most important factors when deciding which vendor to use as a cloud service vendor is the ability to negotiate the legal terms of the service agreement. The service agreement must include a list of roles and responsibilities for both the customer and the cloud service vendor.

Multiple-Choice Question: Which of the following are the topics that must be covered when negotiating these terms? (Select all correct answers) [1m]

- A. Contract renewals
- B. Contractual protection
- C. Encryption
- D. Insurance

24. In relation to the figure given below explain issues of managing incident management process for the customer when applications have been migrated to the cloud vendor. [4m]

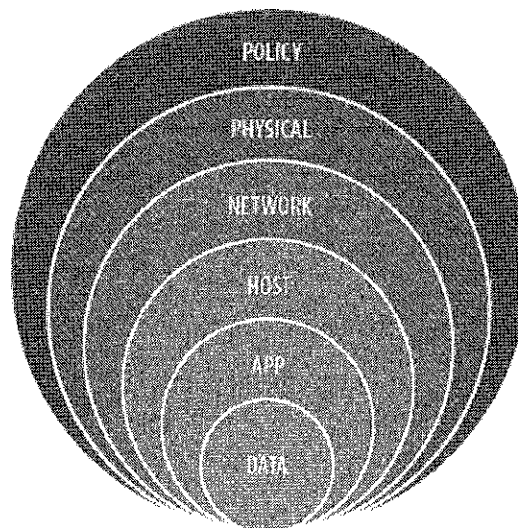


Chapter 10 – Cloud Service-Level Management [3 marks]

25. **Multiple-Choice Question:** Which ITIL volume provides guidance on the deployment of services into a production environment? [1m]
- A. Service Strategy
 - B. Service Design
 - C. Service Transition
 - D. Service Operation
26. What ITIL volume is missing from the options provided in question 25? Explain its purpose. [1m]
27. How do you calculate the overall availability of a service composed of three tiers, where each tier is 99.99% available? [1m]

Chapter 11 – Security in the Cloud [13 marks]

28. Explain the term “defense in depth” citing examples relating to each component of the diagram given below. [7m]



29. Explain the difference between *stateful packet filtering* and *stateless packet filtering* firewalls. [2m]
30. What are the appropriate mitigation to protect against:
- a. Malicious insiders [1m]
 - b. Data exposure and loss [1m]

31. The information security management system (ISMS) is a system of policies, processes, and controls to manage CIA, and is implemented using the Plan-Do-Check-Act (PDCA) process.

a. Arrange the following in order of the PDCA process: [1m]

- Change as necessary
- Design the system
- Evaluate the system
- Implement the controls

b. **Multiple-Choice Question:** Which of the following is not a task performed as part of "*Evaluate the system*" in PDCA process? [1m]

- A. Analyze metrics
- B. Make changes
- C. Monitor logs
- D. Select controls

Chapter 12 – Privacy and Compliance [6 marks]

32. Give examples of the following legal risks that should be considered by organizations considering adopting cloud services: [2m]

- a. Privileged information
- b. Personally identifiable Information (PII)

33. Explain the difference between "Federated Identity Management" and "Single Sign-On", with examples. [4m]

Section B – Essay Writing [30 Marks]

Questions 34 to 36 are worth 15 marks each.

Select and answer only two (2) questions.

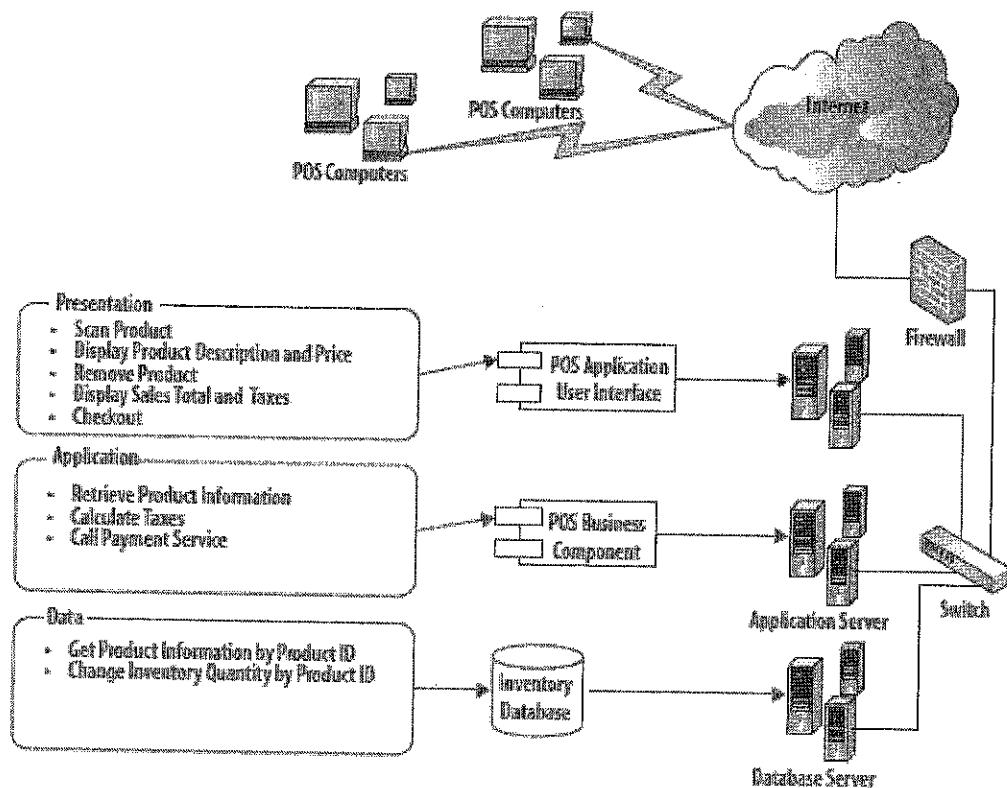
Write answers in essay format of about 200-300 words

34. NIST Special Publication 800-145 documents **three standard service models** for cloud computing. Critically explain each model. As part of your discussions, explain:

- resources found in each service mode,
- type of consumers for each service model,
- customer/organizational advantages
- how vendor responsibility varies between each service model, and
- how customer technical skills requirement varies between each service model.

You can also draw illustrations to support your explanations.

35. Critically explain what the network diagram given below represents, the technologies used to enforce CIA (confidentiality, integrity, availability), and how this model can be improved for cloud application. You can also draw the revised model to support your explanations.



36. Critically explain the risk management process, and some of risks associated with cloud computing.

End