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PES UNIVERSITY

PES University, Bengaluru

(Established under Karnataka Act No. 16 of 2013)

UE17CS352

DECEMBER 2021: END SEMESTER ASSESSMENT (ESA) B TECH VI SEMESTER

UE17CS352 – CLOUD COMPUTING

Time: 3 Hrs Answer All Questions Max Marks: 100

<table>
<tr><td>1</td><td>a)</td><td>If you are required to build a Cloud-Ready Application, how will you go about designing and building a cloud application architecture for private or public clouds? Explain 5 key steps.</td><td>10 (2M X 5 steps)</td></tr>
<tr><td></td><td>b)</td><td>Describe with the help of examples the various service models and deployment models of cloud computing.</td><td>7</td></tr>
<tr><td></td><td>c)</td><td>Let's say you are designing a network application. List down the REST operations that you would use to (i) get all devices (ii) create a new device (iii) update the device ID of the existing device.</td><td>3</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>2</td><td>a)</td><td>Consider an architecture which supports the following instructions

<table><tr><th>Instruction</th><th>Behaviour User Mode</th><th>Behaviour Privilege Mode</th></tr><tr><td>popf</td><td>generate a software or hardware int after moving to privilege mode</td><td>Not permitted</td></tr><tr><td>mask</td><td>will fail but generate no error</td><td>Turn off all interrupts before doing I/O</td></tr></table>
(i) Mention if each of these instructions is sensitive and if so whether it is behaviour or control sensitive.
(ii) Based on this data will you be able to design a trap-and-emulate hypervisor for this architecture. Justify your solution.</td><td>8 (4+4)</td></tr>
<tr><td></td><td>b)</td><td>Consider a situation where we you are required to apply any one of these types of virtualization
Full Virtualization, Bare Metal virtualization, Host based virtualization and Para Virtualization
to different implementation technologies. Mark the appropriate virtualization type for each requirement and justify your answer.

(i) Run some dedicated applications on the VMs created on the guest OS and run some other applications on the host OS directly
(ii) Run special APIs requiring substantial OS modifications in a VM
(iii) Run non-critical instructions on the hardware directly while critical instructions are discovered and replaced with traps into the VMM to be emulated by software.
(iv) Install the virtualization software directly on the hardware,</td><td>8</td></tr>
<tr><td></td><td>c)</td><td>List any 2 similarities and any 2 differences between Docker container and VM.</td><td>4</td></tr>
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3	a)	(i) What is genuinely unique and disruptive about Cinder in the cloud space? (ii) If you are responsible for capacity planning for volume block storage in the OpenStack cloud, what will be your approach?	8 (4+4)
	b)	To implement a scalability solution, identify the type of database scaling that you would use for the given scenarios: A. You have a car that can accommodate 5 people. You and 10 friends need to go for a vacation. (i) You buy or rent a bigger car but not use the existing car (ii You buy or rent another car and use the existing car as well B. You have a system with 2 CPUs, 1 GB RAM, 20 GB Hard disk (iii) You upgrade this system to 4 CPUs, 2 GB RAM, 40 GB Hard disk (iv) You buy a new system with 2 CPUs, 1 GB RAM, 20 GB Hard disk	4
	c)	Your network contains three servers named Server1, Server2, and Server3. All servers run your favourite OS. You need to ensure that Server1 can provide iSCSI storage for Server2 and Server3. What should you do on Server1?	4
	d)	Discuss some of the practical implications of the CAP Theorem.	4
4	a)	(i) What are the 3 main types of Storages used in OpenStack. Highlight the key differences among them. (ii) Explain your choice of Storage for each of these use cases: 1.Databases 2.Unstructured data like music or Video file 3.Large Data Sets 4.RAID Volumes	10 (6+4)
	b)	Consider you have 5-6 microservices for a single application performing various tasks, and all these microservices are put inside the containers. Explain with a block diagram how you will make sure that these containers communicate with each other using Orchestration.	10
5	a)	What is the purpose of Leader Election in Distributed computing? Explain briefly Bully Algorithm and Leader election in a Ring.	8
	b)	Explain the key benefits of Zookeeper. What are the common services offered by Zookeeper?	8
	c)	Explain any four techniques that make DevOps a successful methodology to develop and deliver software?	4