10CS/IS765

Seventh Semester B.E. Degree Examination, June/July 2023
Storage Area Networks

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting at least TWO full questions from each part.*

PART – A

1   a. A hospital uses an application that stores patient X-ray data in the form of large binary objects in an oracle database. The application is hosted on a UNIX server, and the hospital staff accesses the X-ray records through a GB Ethernet backbone. An EMC CLARiion storage array provides storage to the UNIX server, which has 6 TB of usable capacity. Explain the core elements of the data center, and key requirements for data center elements. What are the typical challenges the storage management team may face in meeting the service-level demands of the hospital staff?   **(12 Marks)**

   b. Consider a disk I/O system in which an I/O request arrives at the rate of 80 IOPS. The disk service time is 6ms.
      i)   Compute the following: utilization of I/O controller, total response time, average queue size and total time spent by a request in a queue.
      ii) Compute the preceding parameter if the service time is halved.   **(08 Marks)**

2   a. Describe RAID levels with reference to nested RAID, RAID 3, RAID 5 with neat diagram.   **(10 Marks)**

   b. With the neat diagram, explain the structure of read and write operations in cache.   **(10 Marks)**

3   a. Explain disk drive interface, with neat diagram.   **(05 Marks)**
   b. Describe SCSI – 3 architecture in detail with diagram.   **(05 Marks)**
   c. Explain FC connectivity with related diagram.   **(10 Marks)**

4   a. What are the factors affecting NAS performance?   **(04 Marks)**
   b. Draw and explain the components, the topologies and the protocol stack of iSCSI.   **(16 Marks)**

PART – B

5   a. Explain object storage and retrieval in CAS with suitable diagrams.   **(10 Marks)**
   b. Discuss storage virtualization types in detail and also discuss its challenges.   **(10 Marks)**

6   a. Describe the failure analysis in BC. Briefly explain BC technology solution.   **(10 Marks)**
   b. With a neat diagram, explain the steps involved in backup and restore operation.   **(10 Marks)**

7   a. A host generates 8000 I/Os at peak utilization with an average I/O size of 32 KB. The response time is currently measured at an average of 12 ms during peak utilizations. When synchronous replication is implemented with a fibre channel link to a remote site, what is the response time experienced by the host if the network latency is 6 ms per I/O?   **(04 Marks)**

   b. What is the importance of recoverability and consistency in local replication?   **(04 Marks)**

   c. Discuss the effects of a bunker failure in a three-site replication for the following implementations:
      i)   Multihop synchronous and disk buffered
      ii) Multihop synchronous and asynchronous
      iii) Multitarget   **(12 Marks)**

8   a. Write a note on risk traid. Explain in detail.   **(10 Marks)**
   b. Explain storage management activities in detail, with example.   **(10 Marks)**

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