

EE4217 Test 2011 Solution

1 a) What are the five core technology elements of the Data Center Infrastructure?.

[5 marks]

Ans:

The five core elements include:

- Applications – specialized and dedicated software to manipulate data typically stored in databases
- Databases – more commonly, Database Management Systems (DBMS), provide a structured way of storing data in logically organized tables with an interrelation between them. They optimize the storage and retrieval of data
- Servers/Operating systems – provide the computing platform required to run the applications and databases
- Networks – provide the data communication paths between clients and servers or between servers and storage
- Storage arrays – this is where data and information lives

[1 each total 5 marks =5/5]

1b) What are the seven requirements in the Data Storage element of a Data Centre?.

[7 marks]

Ans:

- Availability – Ensure that data is accessible at all times when needed. As seen earlier, loss of access to data can have significant financial impact on businesses.
- Security – Prevent unauthorized access to data. Mechanisms to allow servers to access only their allocated resources on storage arrays.
- Capacity – Ability to add storage capacity “on-demand”, without interruption to the business. If a database runs out of space on physical storage, it comes to a halt, thus impacting the business.
- Scalability – The storage solution should be able to grow with the business. As the business grows, more servers are deployed and new applications/databases developed.
- Performance – Service all the I/O requests at high speed. With the centralized model, several servers connect to one storage array. The

intelligence of the array, the processors, and architecture should enable optimal performance.

- Data Integrity – Throughout the I/O chain, checks have to be in place to ensure that data is not corrupted along the way. The storage system has to “guarantee” that the data that was sent to it was indeed the data that was written to disk and is available for retrieval when requested.
- Manageability – The operations and activities required to meet all of these requirements should be performed seamlessly and with minimal disruption to business activity.

[1 mark each total 7 marks]

1 c) While the requirements of Data Storage are applicable to all elements of the data center infrastructure. An intelligent storage arrays meet these critical requirements and various techniques and technology solutions can be deployed however the constraints existed that affect the select of methods. What are they?

[6 marks]

Ans:

- Cost
- Physical environment
- Maintenance and support
- Compliance – regulatory and legal
- Hardware and software infrastructure
- Interoperability and compatibility

[1 each total 6 marks]

1d) The goal of complete availability can be difficult to reach due to unplanned interruptions or planned maintenance and upgrade activities. For example, the amount of time needed for planned and unplanned interruptions can be limited as seen in the following, 99.0% = 3.7 days downtime per year and 99.9% = 9 hours downtime per year. Calculate the downtime required for 99.99%. What will you suggest to achieve a 99.99% downtime storage system?

[7 marks]

Ans:

99.99% is 5 min down time.

[3 marks/7 marks]

Use HA storage - highly available NAS system with advanced management and features critical to supporting high service levels, i.e.

- Supports global information access
- Improves efficiency
- Provides flexibility
- Centralizes storage
- Simplifies management
- Scalability
- High availability – through native clustering
- Provides security integration to environment (user authentication and authorization)

[4 marks/7 marks]

