

Storage Area Network (SAN) Interview Questions

Monday 20 February 2017

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41. what is SRDF ?

SRDF (Symmetrix Remote Data Facility) is a family of EMC products that facilitates the data replication from one Symmetrix storage array to another through a Storage Area Network or IP network. SRDF logically pairs a device or a group of devices from each array and replicates data from one to the other synchronously or asynchronously. An established pair of devices can be split, so that separate hosts can access the same data independently (maybe for backup), and then resynchronized.

In synchronous mode (SRDF/S), the primary array waits until the secondary array has acknowledged each write before the next write is accepted, ensuring that the replicated copy of the data is always as current as the primary. However, the latency due to propagation increases significantly with distance.

Asynchronous SRDF (SRDF/A) transfers changes to the secondary array in units called delta sets, which are transferred at defined intervals. Although the remote copy of the data will never be as current as the primary copy, this method can replicate data over considerable distances and with reduced bandwidth requirements and minimal impact on host performance. Other forms of SRDF exist to integrate with clustered environments and to manage multiple SRDF pairs where replication of multiple devices must be consistent (such as with the data files and log files of a database application).

42. Define RAID? Which one you feel is good choice?

RAID (Redundant array of Independent Disks) is a technology to achieve redundancy with faster I/O. There are Many Levels of RAID to meet different needs of the customer which are: R0, R1, R3, R4, R5, R10, R6. Generally customer chooses R5 to achieve better redundancy and speed and it is cost effective.

R0 – Striped set without parity/[Non-Redundant Array].

Provides improved performance and additional storage but no fault tolerance. Any disk failure destroys the array, which becomes more likely with more disks in the array. A single disk failure destroys the entire array because when data is written to a RAID 0 drive, the data is broken into fragments. The number of fragments is dictated by the number of disks in the drive. The fragments are written to their respective disks simultaneously on the same sector. This allows smaller sections of the entire chunk of data to be read off the drive in parallel, giving this type of arrangement huge bandwidth.

RAID 0 does not implement error checking so any error is unrecoverable. More disks in the array means higher bandwidth, but greater risk of data loss

R1 - Mirrored set without parity.

Provides fault tolerance from disk errors and failure of all but one of the drives. Increased read performance occurs when using a multi-threaded operating system that supports split seeks, very small performance reduction when writing. Array continues to operate so long as at least one drive is functioning. Using RAID 1 with a separate controller for each disk is sometimes called duplexing.

R3 - Striped set with dedicated parity/Bit interleaved parity.

This mechanism provides an improved performance and fault tolerance similar to RAID 5, but with a dedicated parity disk rather than rotated parity stripes. The single parity disk is a bottle-neck for writing since every write requires updating the parity data. One minor benefit is the dedicated parity disk allows the parity drive to fail and operation will continue without parity or performance penalty.

R4 - Block level parity.

Identical to RAID 3, but does block-level striping instead of byte-level striping. In this setup, files can be distributed between multiple disks. Each disk operates independently which allows I/O requests to be performed in parallel, though data transfer speeds can suffer due to the type of parity. The error detection is achieved through dedicated parity and is stored in a separate, single disk unit.

R5 - Striped set with distributed parity.

Distributed parity requires all drives but one to be present to operate; drive failure requires replacement, but the array is not destroyed by a single drive failure. Upon drive failure, any subsequent reads can be calculated from the distributed parity such that the drive failure is masked from the end user. The array will have data loss in the event of a second drive failure and is vulnerable until the data that was on the failed drive is rebuilt onto a

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replacement drive.

R6 - Striped set with dual distributed Parity.

Provides fault tolerance from two drive failures; array continues to operate with up to two failed drives. This makes larger RAID groups more practical, especially for high availability systems. This becomes increasingly important because large-capacity drives lengthen the time needed to recover from the failure of a single drive. Single parity RAID levels are vulnerable to data loss until the failed drive is rebuilt: the larger the drive, the longer the rebuild will take. Dual parity gives time to rebuild the array without the data being at risk if one drive, but no more, fails before the rebuild is complete.

43. What is the different between mirroring, Routing and multipathing?

Redundancy Functions Relationships Role Mirroring Generates 2 ios to 2 storage targets Creates 2 copies of data Routing Determined by switches independent of SCSI Recreates n/w route after a Failure Multipathing Two initiator to one target Selects the LUN initiator pair to use.

44. Briefly list the advantages of SAN?

SANs fully exploit high-performance, high connectivity network technologies
SANs expand easily to keep pace with fast growing storage needs
SANs allow any server to access any data
SANs help centralize management of storage resources
SANs reduce total cost of ownership (TCO).

iSCSI fundamentals:-

iSCSI is a protocol defined by the Internet Engineering Task Force (IETF) which enables SCSI commands to be encapsulated in TCP/IP traffic, thus allowing access to remote storage over low cost IP networks.

45. What advantages would using an iSCSI Storage Area Network (SAN) give to your organization over using Direct Attached Storage (DAS) or a Fibre Channel SAN?

iSCSI is cost effective, allowing use of low cost Ethernet rather than expensive Fibre architecture.

- Traditionally expensive SCSI controllers and SCSI disks no longer need to be used in each server, reducing overall cost.
- Many iSCSI arrays enable the use of cheaper SATA disks without losing hardware RAID functionality.
- The iSCSI storage protocol is endorsed by Microsoft, IBM and Cisco, therefore it is an industry standard.
- Administrative/Maintenance costs are reduced.
- Increased utilisation of storage resources.
- Expansion of storage space without downtime.
- Easy server upgrades without the need for data migration.
- Improved data backup/redundancy.

46. How many minimum drives are required to create R5 (RAID 5) ?

You need to have at least 3 disk drives to create R5.

47. What are the advantages of SAN?

Massively extended scalability
Greatly enhanced device connectivity
Storage consolidation
LAN-free backup
Server-less (active-fabric) backup
Server clustering
Heterogeneous data sharing
Disaster recovery - Remote mirroring
While answering people do NOT portray clearly what they mean & what advantages each of them have, which are cost effective & which are to be used for the client's requirements.

48. What is the difference b/w SAN and NAS?

The basic difference between SAN and NAS, SAN is Fabric based and NAS is Ethernet based.

SAN - Storage Area Network

It accesses data on block level and produces space to host in form of disk.

NAS - Network attached Storage

It accesses data on file level and produces space to host in form of shared network folder.

49. What is a typical storage area network consists of - if we consider it for implementation in a small business setup?

If we consider any small business following are essentials components of SAN

- Fabric Switch
- FC Controllers
- JBOD's

50. Can you briefly explain each of these Storage area components?

Fabric Switch: It's a device which interconnects multiple network devices .There are switches starting from 16 port to 32 ports which connect 16 or 32 machine nodes etc. vendors who manufacture these kind of switches are Brocade, McData.

FC Controllers: These are Data transfer media they will sit on PCI slots of Server; you can configure Arrays and volumes on it.

JBOD: Just Bunch of Disks is Storage Box, it consists of Enclosure where set of hard-drives are hosted in many combinations such SCSI drives, SAS, FC, SATA.

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