

# Module 6: File-based Storage System (NAS) - MCQs (Part 1)

**Instructions:** Choose the best answer for each question.

1. What is the primary focus of Module 6? A) Block-based storage systems (SAN) B) Components, architectures, protocols, and virtualization of file-based storage systems (NAS) C) Object-based storage systems D) Business continuity planning  
**Correct Answer: B Reasoning:** The module introduction explicitly states it focuses on components, architectures, file sharing protocols, file-level virtualization, and tiering related to file-based storage systems (NAS).
2. Which file sharing method involves clients directly sharing files with each other over a network, differing from a client-server model? A) File Transfer Protocol (FTP) B) Network File System (NFS) C) Peer-to-Peer (P2P) D) Common Internet File System (CIFS) **Correct Answer: C Reasoning:** The module describes P2P as enabling client machines to directly share files with each other, contrasting it with client-server models using file servers.
3. What is a Network Attached Storage (NAS) device defined as in this module? A) A general-purpose server used for various applications. B) A dedicated, high-performance file sharing and storage device accessible over an IP network. C) A type of network switch optimized for storage traffic. D) A component within a Fibre Channel SAN. **Correct Answer: B Reasoning:** NAS is defined as a "dedicated, high-performance file sharing and storage device" enabling clients to share files over an IP network.
4. What is a key advantage of using a NAS device compared to a general-purpose server for file serving? A) NAS runs a general-purpose operating system. B) NAS has a specialized OS optimized for file I/O, leading to better performance for file serving tasks. C) General-purpose servers offer better file sharing protocols. D) NAS devices cannot be clustered. **Correct Answer: B Reasoning:** The module states NAS uses a specialized OS optimized for file I/O, performing better than general-purpose servers and allowing it to serve more clients.
5. What are the two main components of a NAS system according to the module? A) CPU and Memory B) Controller(s) and Storage (Disks) C) Network Interface Card and Power Supply D) Operating System and Applications **Correct Answer: B**

**Reasoning:** The text explicitly states, "A NAS system consists of two components, controller and storage."

6. What is the role of the controller in a NAS system? A) To physically store the data bits. B) To run a specialized OS, manage file systems, handle network connectivity, and serve file I/O requests. C) To connect the storage system to the power grid. D) To cool the disk drives. **Correct Answer: B Reasoning:** The controller is described as a compute system running a specialized OS, responsible for RAID, LUNs, file systems, network export, and I/O processing.
7. What is the purpose of having active/passive controllers in some NAS systems? A) To increase storage capacity. B) To provide redundancy; the passive controller takes over if the active one fails. C) To support different disk types. D) To simplify management. **Correct Answer: B Reasoning:** The module explains active/passive configurations where some controllers handle I/O while others act as spares, taking over only upon failure of an active controller.
8. Which NAS architecture involves upgrading or adding NAS heads and storage to a single NAS system, but has a fixed capacity ceiling? A) Scale-out NAS B) Scale-up NAS C) Gateway NAS D) Clustered NAS **Correct Answer: B Reasoning:** Scale-up NAS is defined as scaling the capacity and performance of a single system by adding/upgrading components, limited by a fixed capacity ceiling.
9. What is an Integrated NAS system? A) A NAS head that uses external, independently managed storage. B) A system containing one or more NAS heads and storage within a single system package. C) A software-only NAS solution. D) A NAS system designed only for UNIX clients. **Correct Answer: B Reasoning:** Integrated NAS is described as containing both NAS heads and storage within a single system, managed together.
10. What is a Gateway NAS system? A) A system containing NAS heads and storage in one package. B) A system consisting of one or more NAS heads that use external, independently managed storage (often block-based SAN storage). C) A type of network router. D) A NAS system that only supports NFS. **Correct Answer: B Reasoning:** Gateway NAS consists of NAS heads that connect to and utilize external storage systems, requiring separate management for the gateway and the storage.
11. Which NAS architecture involves pooling multiple NAS nodes together in a cluster that performs as a single entity and scales by adding more nodes? A) Scale-up NAS B) Integrated NAS C) Scale-out NAS D) Gateway NAS **Correct Answer: C Reasoning:** Scale-out NAS is defined by pooling multiple nodes (head/storage) into a cluster, scaling resources by adding nodes, and operating as a single entity.

12. What type of file system is typically used in a Scale-out NAS cluster? A) A local file system on each node. B) A distributed clustered file system that runs across all nodes. C) NTFS only. D) EXT4 only. **Correct Answer: B Reasoning:** Scale-out NAS uses a distributed clustered file system running on all nodes, making the entire file system accessible from any node.
13. How is data typically stored across nodes in a Scale-out NAS cluster? A) Each file is stored entirely on a single node. B) Data is striped across all nodes, often with mirror or parity protection. C) Data is only stored in the controller cache. D) Data is compressed and stored on one dedicated node. **Correct Answer: B Reasoning:** The module explains that scale-out NAS stripes data across nodes with protection (mirror/parity) and retrieves blocks from multiple nodes for reads.
14. What is the benefit of adding a node to a Scale-out NAS cluster? A) It decreases overall storage capacity. B) It increases aggregate storage, memory, CPU, and network capacity, thus increasing cluster performance. C) It simplifies the internal network configuration. D) It requires shutting down the entire cluster. **Correct Answer: B Reasoning:** Adding nodes to a scale-out cluster increases the total resources (storage, compute, network) and aggregate performance, typically without downtime.
15. What type of network is typically used for intra-cluster communication in Scale-out NAS? A) Standard external Ethernet network. B) A dedicated internal network offering high throughput and low latency (e.g., InfiniBand or Gigabit Ethernet). C) Wireless network. D) Fibre Channel network. **Correct Answer: B Reasoning:** Scale-out clusters use a separate, high-speed internal network for communication between nodes.
16. Which file sharing protocol is described as a public/open variation of Server Message Block (SMB) and commonly used by Windows clients? A) Network File System (NFS) B) Hadoop Distributed File System (HDFS) C) Common Internet File System (CIFS) D) File Transfer Protocol (FTP) **Correct Answer: C Reasoning:** CIFS is explicitly defined as a client-server protocol, an open variation of SMB, enabling file requests over TCP/IP.
17. What feature does CIFS use to prevent users from overwriting each other's work on the same file or record? A) Unicode character encoding. B) Fault tolerance. C) File and record locking. D) Stateful protocol design. **Correct Answer: C Reasoning:** The module lists file and record locking as a feature CIFS uses to manage concurrent access and prevent overwrites.
18. Why is CIFS considered a stateful protocol? A) It uses UDP for transport. B) It does not maintain connection information. C) The CIFS server maintains connection

information about every connected client. D) It only supports read-only access.

**Correct Answer: C Reasoning:** CIFS is described as stateful because the server keeps track of client connections. If a failure occurs, the client is notified (though recovery depends on the application).

19. Which file sharing protocol is commonly used on UNIX systems and was originally based on UDP? A) Common Internet File System (CIFS) B) Network File System (NFS) C) Server Message Block (SMB) D) Hadoop Distributed File System (HDFS)

**Correct Answer: B Reasoning:** NFS is identified as a client-server protocol commonly used on UNIX, originally using UDP.

20. Which version of NFS introduced TCP support and a stateful protocol design? A) NFSv2 B) NFSv3 C) NFSv4 D) NFSv1 **Correct Answer: C Reasoning:** NFSv4 is described as using TCP and being based on a stateful design, differing from the stateless nature of v3 and earlier.

21. What is a key characteristic of HDFS (Hadoop Distributed File System) access? A) It can be mounted directly like a standard network drive. B) It requires programmatic access (e.g., via MapReduce framework) and cannot be mounted traditionally. C) It only works over UDP. D) It uses CIFS as its underlying protocol. **Correct Answer: B Reasoning:** The module states HDFS requires programmatic access and cannot be mounted, presenting a streaming interface for frameworks like MapReduce.

22. What is the architecture of HDFS? A) Peer-to-peer B) Client-only C) Master/slave (NameNode as master, DataNodes as slaves) D) Ring topology **Correct Answer: C Reasoning:** HDFS is described as having a master/slave architecture with a single NameNode (master) managing the namespace and DataNodes (slaves) storing the actual data blocks.

23. What is the role of the NameNode in HDFS? A) To store all the user data blocks. B) To manage the file system namespace and control access to files by tracking block locations on DataNodes. C) To run MapReduce jobs directly. D) To provide the network interface for clients. **Correct Answer: B Reasoning:** The NameNode acts as the master, managing metadata (namespace, block locations) and controlling client access.

24. What is the role of DataNodes in HDFS? A) To manage the file system namespace. B) To store and retrieve the actual data blocks as directed by the NameNode and clients. C) To handle client authentication. D) To maintain the cluster's internal network. **Correct Answer: B Reasoning:** DataNodes are the slaves responsible for storing the data blocks that make up the files in HDFS.

25. How does a client typically write data to HDFS? A) Directly to the NameNode. B) The client interacts with the NameNode to get DataNode locations, then writes data blocks directly to the specified DataNodes. C) The client broadcasts data to all DataNodes simultaneously. D) Data is written via an NFS gateway. **Correct Answer: B Reasoning:** The HDFS write process involves the client getting metadata from the NameNode and then streaming data directly to the relevant DataNodes in a pipeline.

## Module 6: File-based Storage System (NAS) - MCQs (Part 2)

**Instructions:** Choose the best answer for each question.

1. How does a client typically read data from HDFS? A) The client reads all data directly from the NameNode. B) The client contacts the NameNode to get the locations of the required blocks, then reads the blocks directly from the relevant DataNodes. C) The NameNode reads the data from DataNodes and forwards it to the client. D) The client must download the entire file system first. **Correct Answer: B Reasoning:** The HDFS read process involves the client getting block locations from the NameNode and then directly reading those blocks from the appropriate DataNodes.
2. What is the purpose of file-level virtualization in a NAS environment? A) To virtualize the underlying NAS hardware controllers. B) To abstract file system access from the physical location of files, enabling non-disruptive file mobility across NAS devices. C) To create virtual machines on the NAS device. D) To encrypt files stored on the NAS. **Correct Answer: B Reasoning:** File-level virtualization eliminates dependencies between the data accessed at the file level and the location where the files are physically stored, facilitating seamless file movement.
3. How does file-level virtualization typically achieve location transparency? A) By using a global namespace that maps logical paths to physical file locations. B) By encrypting all file paths. C) By storing all files on a single, large NAS device. D) By requiring clients to use physical path names. **Correct Answer: A Reasoning:** Virtualization uses a global namespace, presenting a unified view of files to clients, while the virtualization layer maps these logical paths to the actual physical locations, which can change without affecting clients.
4. What is a key benefit of file-level virtualization? A) Increased physical storage capacity. B) Non-disruptive file mobility for load balancing, maintenance, or tiering

without impacting client access. C) Faster network speeds. D) Simplified RAID configuration. **Correct Answer: B Reasoning:** By abstracting the physical location, files can be moved between NAS devices (for load balancing, maintenance, etc.) without changing how clients access them, thus providing non-disruptive mobility.

5. What is file-level storage tiering? A) Creating multiple copies of files on different tiers. B) Manually moving files between different storage types. C) A policy-based mechanism that automatically moves files between different tiers of storage (e.g., high-performance SSDs, capacity HDDs) within or across NAS devices based on access frequency or other criteria. D) Compressing inactive files. **Correct Answer: C Reasoning:** File-level tiering uses policies to automatically migrate files to appropriate storage tiers based on factors like access patterns, optimizing performance and cost.

6. What is the primary goal of file-level storage tiering? A) To increase the total number of files stored. B) To improve overall performance and reduce storage costs by placing frequently accessed files on faster tiers and less frequently accessed files on cheaper, higher-capacity tiers. C) To simplify file sharing protocols. D) To provide data encryption. **Correct Answer: B Reasoning:** Tiering aims to balance performance and cost by ensuring

"hot" files are on fast storage and "cold" files are on slower, cheaper storage.

1. How does file-level tiering typically identify "hot" or "cold" files? A) Based on file size only. B) Based on file creation date only. C) Based on policies that analyze file access frequency, age, or other metadata. D) Based on the file owner. **Correct Answer: C Reasoning:** Tiering decisions are policy-driven, using criteria like access frequency (how often a file is read/written), last access time, file age, etc., to classify data.

2. What is a potential challenge in implementing file-level virtualization or tiering? A) Reduced storage capacity. B) Increased network latency. C) Complexity in managing the virtualization layer or tiering policies, and ensuring compatibility. D) Inability to use different storage protocols. **Correct Answer: C Reasoning:** Introducing virtualization or tiering adds a layer of abstraction and policy management that can increase complexity compared to direct physical access.

3. Which component in a NAS system is responsible for presenting the file system to clients using protocols like NFS or CIFS? A) The physical disk drives. B) The storage pool. C) The NAS controller (or NAS head). D) The network switch. **Correct Answer: C Reasoning:** The NAS controller runs the OS and protocol stacks (NFS, CIFS) necessary to export file systems and handle client requests.

4. In a Gateway NAS configuration, where is the actual file system typically managed?  
A) On the client machines. B) On the external block-based storage system. C) On the NAS gateway controller itself. D) Within the network switches. **Correct Answer: C Reasoning:** Even though the storage blocks reside externally, the NAS gateway controller manages the file system structure and metadata built on top of those blocks.
5. What does NAS stand for? A) Network Area Storage B) Network Attached Storage C) Node Access System D) Network Attached Server **Correct Answer: B Reasoning:** NAS stands for Network Attached Storage.
6. Which protocol is primarily used by Windows clients to access NAS shares? A) NFS B) HDFS C) CIFS/SMB D) FTP **Correct Answer: C Reasoning:** CIFS (Common Internet File System) and its successor SMB (Server Message Block) are the standard protocols for Windows file sharing.
7. Which protocol is primarily used by UNIX/Linux clients to access NAS shares? A) CIFS/SMB B) NFS C) HDFS D) HTTP **Correct Answer: B Reasoning:** NFS (Network File System) is the traditional protocol for file sharing in UNIX and Linux environments.
8. Can a single NAS device typically serve both Windows (CIFS/SMB) and UNIX/Linux (NFS) clients simultaneously? A) No, a NAS device supports only one protocol. B) Yes, most modern NAS devices support multiple protocols, allowing heterogeneous client access. C) Only if it's a Gateway NAS. D) Only if it's a Scale-out NAS. **Correct Answer: B Reasoning:** The module mentions NAS enables both UNIX and Windows users to share the same data seamlessly, implying multi-protocol support.
9. What is the purpose of using clustering in NAS systems? A) To decrease storage capacity. B) To improve availability (failover), scalability, and performance by allowing multiple controllers/nodes to work together. C) To simplify network configuration. D) To enforce stricter security policies. **Correct Answer: B Reasoning:** Clustering allows multiple NAS units to function as one, providing redundancy (if one fails, others take over) and distributing the workload for better performance and scalability.
10. In a scale-out NAS, if a client connects to Node A, can it access files physically stored on Node B? A) No, the client must connect directly to Node B. B) Yes, the distributed file system allows any node to handle requests for any file in the cluster. C) Only if Node A and Node B are from the same vendor. D) Only for read operations, not write operations. **Correct Answer: B Reasoning:** The distributed clustered file system ensures all information is shared, making the entire file system accessible regardless of which node the client connects to.

11. What technology might be used for the high-speed internal network in a scale-out NAS cluster? A) Dial-up modem B) Coaxial cable C) InfiniBand or high-speed Ethernet (e.g., Gigabit Ethernet) D) USB **Correct Answer: C Reasoning:** The module mentions InfiniBand or Gigabit Ethernet as examples of high-speed technologies used for the internal cluster network due to low-latency, high-bandwidth requirements.
12. What does RDMA (Remote Direct Memory Access), often used with InfiniBand, enable? A) Direct access to the NAS controller's CPU. B) Access to files stored on remote tape drives. C) A device to access data directly from the memory of a remote device without involving the remote CPU. D) Encrypted access to the file system. **Correct Answer: C Reasoning:** RDMA allows direct memory-to-memory transfers between devices over the network, bypassing the CPU on the target system for lower latency.
13. Which NFS version is described as stateful and using TCP? A) NFSv2 B) NFSv3 C) NFSv4 D) All versions are stateful. **Correct Answer: C Reasoning:** NFSv4 is explicitly contrasted with earlier versions by being stateful and using TCP.
14. What is a primary benefit of using file-level virtualization for data migration? A) It makes migration slower but more secure. B) It allows files to be moved between NAS devices without disrupting client access, simplifying migrations. C) It automatically converts file formats during migration. D) It eliminates the need for network connectivity during migration. **Correct Answer: B Reasoning:** The location transparency provided by virtualization means the physical location can change (migration) without affecting the logical path clients use, enabling non-disruptive migrations.
15. File-level tiering moves files based on policy. What is a common policy trigger? A) The physical color of the NAS device. B) The time of day. C) File access frequency or age (last accessed time). D) The number of users accessing the NAS. **Correct Answer: C Reasoning:** Policies typically analyze how often or how recently files are accessed to determine if they are "hot" (frequent access, move to fast tier) or "cold" (infrequent access, move to capacity tier).
16. Which NAS architecture generally offers better scalability for both capacity and performance as the environment grows significantly? A) Integrated Scale-up NAS B) Gateway Scale-up NAS C) Scale-out NAS D) Standalone NAS device **Correct Answer: C Reasoning:** Scale-out NAS adds compute and network resources along with capacity with each node, allowing for more linear scaling compared to scale-up where controllers can become bottlenecks.



17. What component manages the mapping between logical file paths and physical file locations in a file-level virtualization environment? A) The client operating system. B) The network switch. C) The file-level virtualization software/appliance. D) The physical disk drives. **Correct Answer: C Reasoning:** The virtualization layer itself maintains the global namespace and the mapping to physical locations.
18. HDFS is commonly associated with which big data processing framework? A) NFS B) CIFS C) MapReduce D) FTP **Correct Answer: C Reasoning:** The module mentions HDFS presenting a streaming interface for frameworks like MapReduce.
19. What is a potential disadvantage of Gateway NAS compared to Integrated NAS? A) Lower performance. B) Inability to scale capacity. C) Increased management complexity due to separate administration for the gateway and the external storage. D) Supports fewer file sharing protocols. **Correct Answer: C Reasoning:** Gateway NAS requires managing two separate systems (the NAS head and the backend storage array) with their respective management tools, increasing complexity.

## Module 6: File-based Storage System (NAS) - MCQs (Part 3)

**Instructions:** Choose the best answer for each question.

1. Which feature allows a NAS system to serve files previously stored on tape without retrieving them from tape first (acting as a cache)? A) File-level tiering B) File-level virtualization C) NAS caching (as described for VTL integration, though not explicitly named this way in the main NAS sections) D) HDFS integration **Correct Answer: C Reasoning:** While not detailed extensively in the main NAS sections provided, the concept aligns with caching functionality often seen in NAS integration with backup systems like Virtual Tape Libraries (VTLs), where the NAS can cache recently backed-up or frequently accessed archived data.
2. What is the primary benefit of eliminating dependencies between the logical file path and the physical file location using virtualization? A) Increased raw storage speed. B) Simplified network protocols. C) Non-disruptive data mobility and easier infrastructure management. D) Automatic data encryption. **Correct Answer: C Reasoning:** Abstracting the physical location allows files to be moved for maintenance, load balancing, or upgrades without affecting how clients access them, simplifying management and avoiding disruption.

3. If a scale-up NAS system reaches its performance or capacity limits, what is typically required to scale further? A) Add more nodes to the cluster. B) Replace the entire system with a larger one (forklift upgrade) or migrate to a different system. C) Install more client software. D) Reconfigure the network switches. **Correct Answer: B Reasoning:** Scale-up systems have fixed ceilings. Once those are reached, further scaling usually involves replacing the system or migrating data, unlike scale-out where nodes can be added.
4. What type of I/O operations are NAS systems primarily optimized for? A) Block-level I/O B) File-level I/O (reads/writes of files and directories) C) Object storage I/O D) Tape drive I/O **Correct Answer: B Reasoning:** NAS systems are designed and optimized specifically for file serving, handling requests for files and directories via file sharing protocols.
5. What does the term "namespace" refer to in the context of file systems and NAS virtualization? A) The physical location of the NAS device. B) The set of network protocols supported. C) The logical structure of directories and files presented to users/applications. D) The type of RAID configuration used. **Correct Answer: C Reasoning:** A namespace is the logical view of the file system hierarchy (folders and files) that users interact with.
6. Can file-level tiering operate across different NAS devices in a cluster or virtualization environment? A) No, tiering only works within a single NAS device. B) Yes, advanced tiering solutions can move files between different NAS systems or tiers managed by the virtualization layer. C) Only if all devices use the same disk type. D) Only for read-only files. **Correct Answer: B Reasoning:** File-level virtualization enables tiering policies to operate across multiple physical devices unified under the global namespace.
7. What is a potential benefit of using HDFS support on a NAS system? A) To provide block-level access. B) To integrate the NAS into a Hadoop ecosystem for big data analytics workloads. C) To simplify CIFS authentication. D) To improve NFS performance. **Correct Answer: B Reasoning:** Supporting HDFS allows the NAS to participate as storage within a Hadoop cluster, serving data for MapReduce or other big data applications.
8. Which component is responsible for translating a file access request using a logical path (e.g., /data/report.docx) into the physical block addresses on disk? A) The client application. B) The network switch. C) The file system running on the NAS controller. D) The physical disk drive firmware. **Correct Answer: C Reasoning:** The file system maintains the metadata that maps file names and logical block offsets within a file to the physical block locations on the storage media.

9. What is the primary difference between NAS and SAN (Storage Area Network)? A) NAS uses Fibre Channel; SAN uses Ethernet. B) NAS provides file-level access over IP; SAN typically provides block-level access over FC or IP (iSCSI). C) NAS is only scale-up; SAN is only scale-out. D) NAS does not use controllers. **Correct Answer: B Reasoning:** The fundamental difference lies in the access level: NAS operates at the file level using file sharing protocols, while SAN operates at the block level, presenting raw LUNs to servers.
10. In a simple NAS I/O operation (e.g., reading a file), which protocol handles the file request (e.g., open, read)? A) TCP/IP B) Ethernet C) NFS or CIFS/SMB D) RAID **Correct Answer: C Reasoning:** NFS and CIFS/SMB are the file sharing protocols that define the commands for file operations like open, read, write, close.
11. In a simple NAS I/O operation, which protocol typically handles the transport of the file sharing protocol messages over the network? A) NFS B) CIFS C) TCP/IP D) HDFS **Correct Answer: C Reasoning:** File sharing protocols like NFS and CIFS operate at a higher layer and rely on underlying transport protocols like TCP/IP to move data across the IP network.
12. What does "file locking" prevent in a shared file environment? A) Prevents users from reading files. B) Prevents multiple users from simultaneously modifying the same file or record in conflicting ways, ensuring data integrity. C) Prevents files from being backed up. D) Prevents files from being accessed over the network. **Correct Answer: B Reasoning:** Locking mechanisms are essential in shared environments to coordinate access and prevent data corruption when multiple users attempt concurrent writes.
13. Which NAS architecture type (Scale-up or Scale-out) is generally better suited for handling large, unpredictable growth in capacity and performance requirements, such as those found in big data environments? A) Scale-up NAS B) Scale-out NAS C) Gateway NAS D) Integrated NAS **Correct Answer: B Reasoning:** Scale-out architecture's ability to add nodes for linear scaling makes it more suitable for environments with significant and potentially unpredictable growth.
14. What is the function of a "global namespace" in file-level virtualization? A) To assign unique IP addresses to each file. B) To provide a single, unified view of files distributed across multiple physical NAS devices. C) To translate file names into different languages. D) To manage RAID configurations across devices. **Correct Answer: B Reasoning:** The global namespace abstracts the underlying physical storage locations, presenting users with a single, logical file system view even if files reside on different devices.

15. Can file-level tiering policies be based on factors other than access frequency, such as file type or owner? A) No, tiering is only based on access frequency. B) Yes, policies can often be configured based on various metadata attributes like file type, owner, size, creation date, etc. C) Only if using HDFS. D) Only in scale-up NAS systems. **Correct Answer: B Reasoning:** Advanced tiering engines often allow policies based on multiple file attributes beyond just access patterns.
16. What is a key difference in how storage is presented to a compute system by NAS versus SAN? A) NAS presents storage as mounted file systems/shares; SAN presents storage as raw block devices (LUNs). B) SAN presents storage as mounted file systems; NAS presents storage as raw block devices. C) Both present storage only as raw block devices. D) Both present storage only as mounted file systems. **Correct Answer: A Reasoning:** This is a fundamental distinction: NAS provides file-level access (shares), while SAN provides block-level access (LUNs) upon which the server builds its own file system.
17. Which component in a NAS system typically manages the RAID configuration for the internal storage? A) The client compute system. B) The network switch. C) The NAS controller. D) The file sharing protocol (NFS/CIFS). **Correct Answer: C Reasoning:** The NAS controller's OS and storage management functions are responsible for configuring and managing RAID sets on the attached storage.
18. What is the benefit of NAS consolidating storage that might otherwise be attached directly to multiple file servers? A) It increases the number of servers required. B) It complicates management. C) It simplifies management, potentially improves utilization, and centralizes data access. D) It reduces network performance. **Correct Answer: C Reasoning:** Consolidating storage onto a NAS simplifies administration (managing one system instead of many), can improve storage utilization through pooling, and provides a central point for file access.
19. If a scale-out NAS cluster node fails, what typically happens? A) The entire cluster becomes inaccessible. B) Data stored on the failed node is permanently lost. C) Due to data striping with protection (mirror/parity), the cluster continues operating, and data remains accessible from other nodes; the failed node can be replaced. D) All clients must reconnect to a different node. **Correct Answer: C Reasoning:** Scale-out clusters are designed for high availability. Data protection mechanisms (striping with parity/mirroring) allow the cluster to survive node failures and continue serving data.
20. File-level virtualization and tiering are advanced features primarily aimed at improving: A) Physical network security. B) Storage efficiency, performance, and management flexibility. C) Client operating system compatibility. D) CPU

performance on the NAS controller. **Correct Answer: B Reasoning:** Both virtualization (for mobility and management) and tiering (for performance and cost optimization) contribute to more efficient and flexible storage management.