Here are **30 multiple-choice questions (MCQs)** focused on **Lustre Architecture, Installation, Configuration, Benchmarking, and Overview of BeeGFS**:

### **Lustre Architecture**

1. **What is Lustre primarily used for?**
   * A) Cloud storage
   * B) High-performance parallel file system
   * C) Virtual machine storage
   * D) Object storage
2. **Answer**: B) High-performance parallel file system  
    **Explanation**: Lustre is a distributed parallel file system designed for high-performance computing (HPC) environments.
3. **Which of the following is NOT a component of Lustre architecture?**
   * A) Metadata Server (MDS)
   * B) Object Storage Server (OSS)
   * C) Data Access Node (DAN)
   * D) Object Storage Target (OST)
4. **Answer**: C) Data Access Node (DAN)  
    **Explanation**: Lustre components include MDS (Metadata Server), OSS (Object Storage Server), and OST (Object Storage Target), but there is no component called Data Access Node.
5. **In Lustre, which component stores metadata such as file names, directories, and file attributes?**
   * A) Metadata Server (MDS)
   * B) Object Storage Server (OSS)
   * C) Object Storage Target (OST)
   * D) Client Node
6. **Answer**: A) Metadata Server (MDS)  
    **Explanation**: The Metadata Server (MDS) in Lustre manages the metadata for files, including their names, directories, and attributes.
7. **Which component in Lustre manages actual file data storage?**
   * A) Metadata Server (MDS)
   * B) Object Storage Server (OSS)
   * C) Object Storage Target (OST)
   * D) Client Node
8. **Answer**: B) Object Storage Server (OSS)  
    **Explanation**: The Object Storage Server (OSS) handles the actual file data storage and communicates with the Object Storage Targets (OSTs).
9. **What is the role of the Object Storage Target (OST) in Lustre?**
   * A) Manages file system metadata
   * B) Provides file data storage for OSS
   * C) Connects clients to the metadata server
   * D) Coordinates file access requests
10. **Answer**: B) Provides file data storage for OSS  
     **Explanation**: OSTs are storage devices used by the Object Storage Server (OSS) to store the actual data in a Lustre file system.
11. **Which of the following is responsible for managing the communication between clients and the Lustre servers?**
    * A) Metadata Server (MDS)
    * B) Object Storage Server (OSS)
    * C) Network
    * D) Lustre Client
12. **Answer**: C) Network  
     **Explanation**: The network is responsible for managing communication between clients, metadata servers, object storage servers, and storage targets.
13. **How does Lustre achieve high performance in parallel computing?**
    * A) Through data replication
    * B) By allowing multiple clients to access data simultaneously
    * C) By using block-level storage
    * D) Through compression techniques
14. **Answer**: B) By allowing multiple clients to access data simultaneously  
     **Explanation**: Lustre allows parallel access to data by multiple clients, improving performance for large-scale computational workloads.
15. **What is the main purpose of the Lustre file system?**
    * A) Cloud backup
    * B) High-performance storage for large-scale data and applications
    * C) Personal file management
    * D) Data encryption
16. **Answer**: B) High-performance storage for large-scale data and applications  
     **Explanation**: Lustre is designed to provide high-performance storage for applications in high-performance computing (HPC) environments.
17. **Which Lustre component helps ensure fault tolerance and high availability by providing redundancy?**
    * A) Metadata Server (MDS)
    * B) Object Storage Server (OSS)
    * C) Object Storage Target (OST)
    * D) All of the above
18. **Answer**: D) All of the above  
     **Explanation**: Lustre provides redundancy at different levels (metadata, object storage) to ensure fault tolerance and high availability.
19. **What does the term "scalability" in Lustre refer to?**
    * A) The ability to add more storage devices to the system
    * B) The system's ability to handle a growing number of clients and data
    * C) The speed of data transfer
    * D) The system's ability to encrypt data
20. **Answer**: B) The system's ability to handle a growing number of clients and data  
     **Explanation**: Lustre is designed to scale horizontally, allowing it to handle large amounts of data and numerous clients in high-performance computing environments.

### **Lustre Installation**

1. **Which command is used to install the Lustre file system on a Linux system?**
   * A) yum install lustre
   * B) apt-get install lustre
   * C) dnf install lustre
   * D) All of the above
2. **Answer**: D) All of the above  
    **Explanation**: Lustre can be installed using package managers such as yum (for Red Hat-based systems), apt-get (for Debian-based systems), or dnf (for Fedora-based systems).
3. **Before installing Lustre, which kernel module needs to be installed on the system?**
   * A) lustre
   * B) lustrefs
   * C) lnet
   * D) fs\_lustre
4. **Answer**: C) lnet  
    **Explanation**: The lnet kernel module is required to set up Lustre's network layer, enabling communication between the Lustre servers and clients.
5. **Which Lustre component needs to be installed on a server to provide storage services?**
   * A) Metadata Server (MDS)
   * B) Object Storage Server (OSS)
   * C) Client Node
   * D) Management Server
6. **Answer**: B) Object Storage Server (OSS)  
    **Explanation**: The Object Storage Server (OSS) is responsible for storing data and interacting with Object Storage Targets (OSTs) in Lustre.
7. **What is the first step in configuring a Lustre file system?**
   * A) Install the Lustre client on user nodes
   * B) Install the Lustre server on the metadata server
   * C) Format the Lustre storage devices
   * D) Mount the Lustre file system
8. **Answer**: B) Install the Lustre server on the metadata server  
    **Explanation**: The first step in configuring Lustre is to install the metadata server (MDS), which handles file metadata.
9. **Which directory is commonly used to mount the Lustre file system on a client node?**
   * A) /mnt/lustre
   * B) /opt/lustre
   * C) /lustre
   * D) /usr/lustre
10. **Answer**: A) /mnt/lustre  
     **Explanation**: The Lustre file system is commonly mounted in the /mnt/lustre directory on client nodes.
11. **How is data striped across multiple storage devices in Lustre?**
    * A) By using RAID-5
    * B) By using data striping with Object Storage Targets (OST)
    * C) By using file compression
    * D) By using NFS
12. **Answer**: B) By using data striping with Object Storage Targets (OST)  
     **Explanation**: Lustre uses data striping across multiple OSTs to enhance performance by allowing parallel access to file data.
13. **Which Lustre command is used to verify if the file system is operational after installation?**
    * A) lustre-status
    * B) lfs check
    * C) lnet status
    * D) lfs df
14. **Answer**: D) lfs df  
     **Explanation**: The lfs df command provides disk usage information and checks if the Lustre file system is operational.
15. **Which tool is used to format storage devices for use with Lustre?**
    * A) mkfs.lustre
    * B) lustreformat
    * C) lustre-setup
    * D) format-lustre
16. **Answer**: A) mkfs.lustre  
     **Explanation**: The mkfs.lustre command is used to format devices for use as OSTs in the Lustre file system.
17. **Which Lustre service is responsible for managing file system access and directory structures?**
    * A) Metadata Server (MDS)
    * B) Object Storage Server (OSS)
    * C) Object Storage Target (OST)
    * D) Lustre Client
18. **Answer**: A) Metadata Server (MDS)  
    **Explanation**: The MDS manages the metadata associated with the Lustre file system, including file directories and attributes.
19. **What should be configured on the client node to enable Lustre communication?**
    * A) Install the Lustre server package
    * B) Install the Lustre client package and mount the file system
    * C) Configure network cards
    * D) Set up user permissions
20. **Answer**: B) Install the Lustre client package and mount the file system  
     **Explanation**: The Lustre client package must be installed on the client node, and the Lustre file system must be mounted for proper communication.

### **Lustre Benchmarking**

1. **Which tool is commonly used to benchmark Lustre file system performance?**
   * A) IOzone
   * B) FIO
   * C) LFS Benchmarking Tool
   * D) All of the above
2. **Answer**: D) All of the above  
    **Explanation**: Tools like IOzone, FIO, and Lustre's built-in benchmarking tools are commonly used to evaluate Lustre's performance.
3. **What performance aspect does Lustre benchmarking primarily focus on?**
   * A) File access speed
   * B) Metadata access speed
   * C) Data throughput
   * D) All of the above
4. **Answer**: D) All of the above  
    **Explanation**: Lustre benchmarking focuses on various performance aspects, including file access, metadata access, and data throughput.
5. **Which Lustre command can be used to view the current file system's performance metrics?**
   * A) lustre-stats
   * B) lfs df
   * C) lfs stat
   * D) lfs benchmark
6. **Answer**: B) lfs df  
    **Explanation**: The lfs df command provides performance statistics and disk usage for the Lustre file system.

### **BeeGFS Overview**

1. **What is BeeGFS primarily designed for?**
   * A) Distributed file system for HPC environments
   * B) Cloud storage solution
   * C) Object storage
   * D) Block-level storage
2. **Answer**: A) Distributed file system for HPC environments  
    **Explanation**: BeeGFS is designed as a high-performance, distributed file system optimized for scalability and performance in high-performance computing environments.
3. **Which of the following best describes BeeGFS's architecture?**
   * A) Single-node, single-storage
   * B) Distributed, parallel file system
   * C) Centralized file system with remote backup
   * D) Virtualized file storage solution
4. **Answer**: B) Distributed, parallel file system  
    **Explanation**: BeeGFS is a distributed, parallel file system designed to support high-throughput and low-latency access to large amounts of data.
5. **What is the role of the metadata server in BeeGFS?**
   * A) Store user files
   * B) Store file metadata
   * C) Manage backup operations
   * D) Control access permissions
6. **Answer**: B) Store file metadata  
    **Explanation**: In BeeGFS, the metadata server stores the metadata associated with files, such as file names and attributes.
7. **Which protocol does BeeGFS use for communication between clients and servers?**
   * A) NFS
   * B) SMB
   * C) TCP/IP
   * D) iSCSI
8. **Answer**: C) TCP/IP  
    **Explanation**: BeeGFS uses TCP/IP for communication between clients, metadata servers, and storage servers.
9. **Which of the following is a benefit of using BeeGFS in high-performance computing (HPC) environments?**
   * A) Scalability
   * B) Fault tolerance
   * C) High throughput
   * D) All of the above
10. **Answer**: D) All of the above  
     **Explanation**: BeeGFS offers scalability, fault tolerance, and high throughput, making it ideal for use in HPC environments.
11. **What is the role of the storage server in BeeGFS?**
    * A) Store metadata
    * B) Manage client connections
    * C) Store user files and data
    * D) Provide network routing
12. **Answer**: C) Store user files and data  
     **Explanation**: The storage server in BeeGFS stores user data and facilitates access to the files across the distributed system.
13. **Which of the following is true about BeeGFS installation?**
    * A) It requires separate servers for metadata and storage
    * B) It can be installed on a single node
    * C) It only works with Linux-based systems
    * D) It is incompatible with high-performance computing
14. **Answer**: A) It requires separate servers for metadata and storage  
     **Explanation**: BeeGFS requires separate servers for metadata management and data storage for optimal performance in distributed environments.

These questions cover the **Lustre architecture, installation, configuration, benchmarking**, and **BeeGFS overview**, providing both theoretical and practical knowledge suitable for intermediate-level learners in high-performance storage environments.