

DISTRIBUTED SYSTEMS

What is a Distributed System?

A distributed system is a collection of multiple individual systems connected through a network that share resources, communicate and coordinate to achieve common goals.

A distributed system has multiple benefits over monolithic architecture, like higher scalability and solving the problem of SPOF(Single Point Of Failure).

Redundancy/Replication can help in avoiding the issue of data loss. In a distributed system environment since nodes can be geographically distributed, a node can crash due to any reason such as natural disasters, power failures or scalability issues. Since the data is replicated on multiple servers, these replicas provide the backup and can take over, avoiding the single point of failure for data.

Example: Telecommunication Networks, Real-Time Distributed Systems.

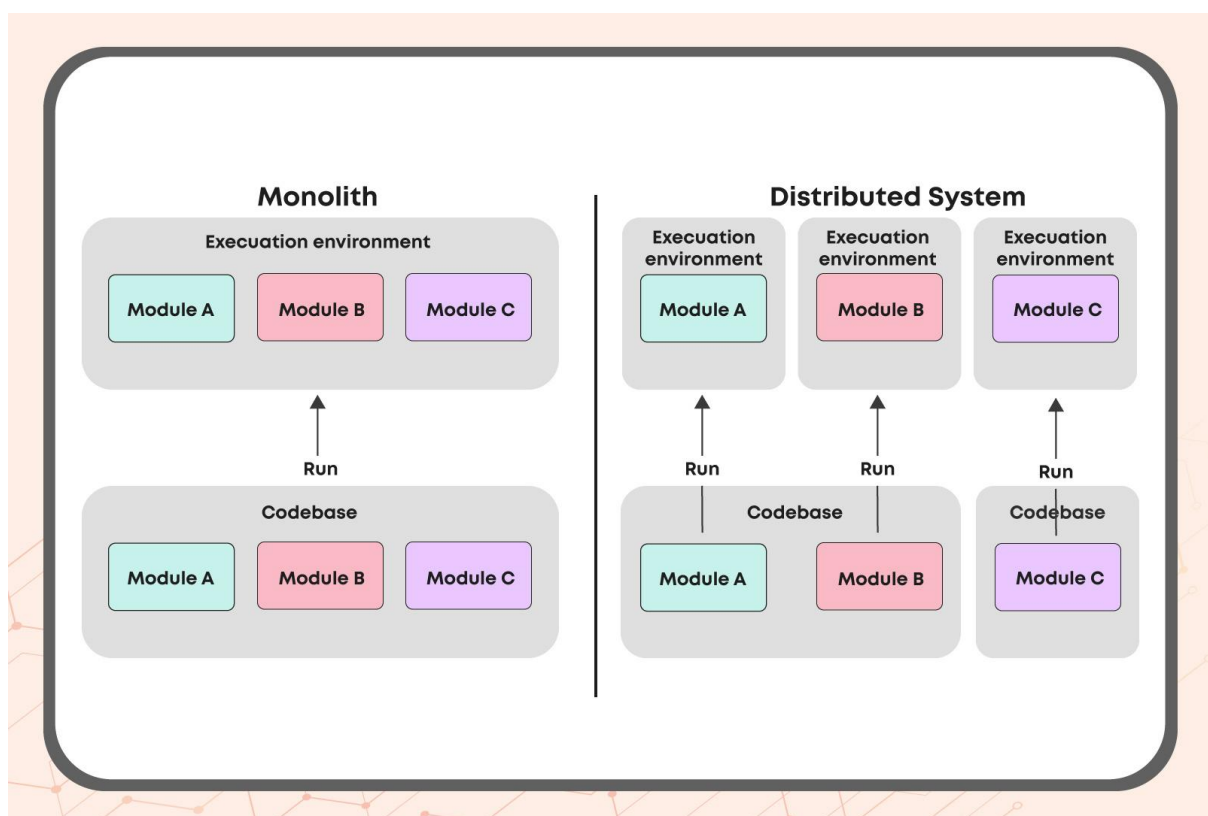


Fig: Monolithic architecture vs distributed system

Benefits of Distributed System

1. Low latency:

Distributed systems have higher speed because they can have multiple servers and the location of servers is close to the target users, thereby reducing the query time.

2. Scalability:

Distributed systems allow higher scalability. Since it is a collection of independent machines, horizontal scaling of individual servers is possible.

3. Reliability:

In contrast to monolithic architecture, distributed systems solve SPOF(Single Point Of Failure). Even if some individual units fail to work, the system would still be up and running. This increased reliability, and the system remains operational most of the time efficiently.

Disadvantages of Distributed System

1. Consistency:

The higher number of devices and network complexities may make it difficult to synchronise the application states and manage data integrity.

2. Network Failure:

Distributed systems communicate and coordinate using the network calls. During a network failure, it can lead to the transfer of conflicting information or even communication failure. This leads to poor overall system performance.

3. Complexity:

Although distributed systems are highly scalable, the increase in the number of network points and hardware leads to a rise in the complexity of the complete system. It becomes challenging to manage the entire system.

4. Management:

Additional functionality like load balancing(the process of distributing the load among various nodes of a distributed system), logging, and monitoring is required to manage the system and prevent failures.