

Distributed System

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Discussion

A Distributed System allocates coordinated processing, state, data, or services across multiple networked nodes.

The nodes communicate through messages and cooperate to provide the behavior of the system.

A Distributed System commonly uses a [Distributed Network Topology](#), but the system concept and the network topology remain distinct:

- A Distributed System describes the allocation and coordination of system behavior across nodes
- A Distributed Network Topology describes the arrangement and interconnection of the nodes

Characteristics of a Distributed System include:

- Multiple networked nodes
- Message-based communication
- Concurrent operation
- Coordinated processing
- Distributed, replicated, partitioned, or coordinated state
- Partial or independent node failure
- Continued system operation when permitted by the governing architecture

The nodes do not need to perform identical functions. Different nodes can provide different roles while participating in the same Distributed System.

A Distributed System differs from a [Centralized System](#), which concentrates primary control, processing, authoritative state, or services within a central node or central location.

Definition

system in which coordinated processing, state, data, or services are allocated across multiple networked nodes

Source

- DIDO Reference Architecture, Network Topology Taxonomy
- DIDO Reference Architecture glossary, Distributed System
- Dido Solutions, Inc. and Jackrabbit Consulting, Inc.

Note

A Distributed System does not require every node to hold the same data, perform the same processing, or possess equal authority.

The governing architecture determines:

- Node roles
- Data distribution
- State coordination
- Failure handling
- Consistency rules
- Communication mechanisms
- Authority relationships

A Distributed System can contain centralized components without becoming a Centralized System when those components do not hold exclusive authority over the complete system.

The term does not prescribe peer-to-peer communication, consensus algorithms, blockchain, distributed ledgers, cloud computing, or a particular network protocol.

Example

A deployment-management system uses multiple networked nodes to execute deployment operations, collect results, and maintain coordinated environment records.

Failure of one execution node does not prevent the remaining nodes from continuing the operations permitted by the system architecture.

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