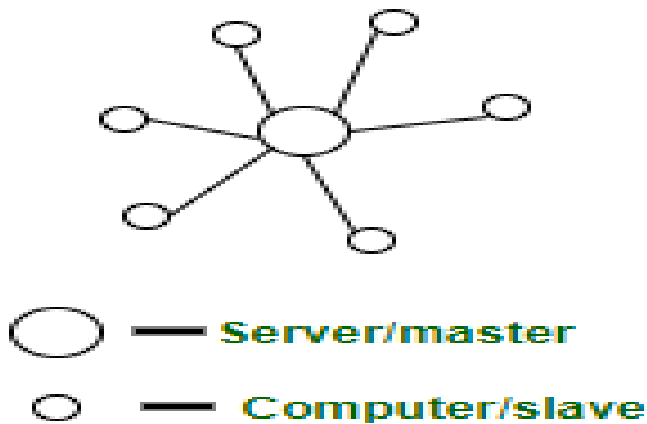


Centralized and Distributed Processing

Centralized Data Processing

This is when processing is performed on one computer or in a cluster of computers in a single location. This is the process when one server manages all other services on the network. This involves the use of what are known as “**dumb terminals**”, which sends or receives input and output only; all processing is done on the central computer.



Components of Centralized System

Components of Centralized System are,

- Node (Computer, Mobile, etc.).
- Server.
- Communication link (Cables, Wi-Fi, etc.).

Advantages of Centralized System

- Easy to physically secure. It is easy to secure and service the server and client nodes by virtue of their location

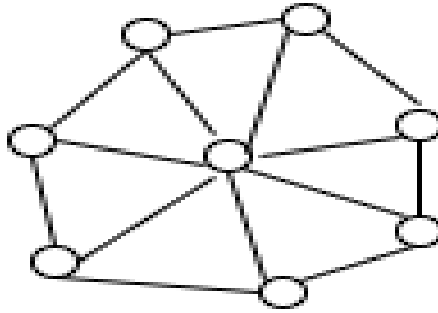
- Smooth and elegant personal experience – A client has a dedicated system which he uses (for example, a personal computer) and the company has a similar system which can be modified to suit custom needs
- Dedicated resources (memory, CPU cores, etc)
- More cost efficient for small systems upto a certain limit – As the central systems take less funds to set up, they have an edge when small systems have to be built
- Quick updates are possible – Only one machine to update.
- Easy detachment of a node from the system. Just remove the connection of the client node from the server and voila! Node detached.

Disadvantages of Centralized System

- Highly dependent on the network connectivity – System can fail if the nodes lose connectivity as there is only one central node.
- No graceful degradation of system – abrupt failure of the entire system
- Less possibility of data backup. If the server node fails and there is no backup, you lose the data straight away
- Difficult server maintenance – There is only one server node and due to availability reasons, it is inefficient and unprofessional to take the server down for maintenance. So, updates have to be done on-the-fly (hot updates) which is difficult and the system could break.

Distributed Data Processing

In this method the computing-processing ability is distributed across different locations by multiple computers. This is in contrast to a system where one server manages all other connected systems. One example is the use of **Remote Procedure Call (RPC)**, this is a procedure that will execute another address space on another computer on the network.



Node/Computer

Components of Distributed System

Components of Distributed System are,

- Node (Computer, Mobile, etc.)
- Communication link (Cables, Wi-Fi, etc.)

Limitations of Distributed System

- Difficult to design and debug algorithms for the system. These algorithms are difficult because of the absence of a common clock; so no temporal ordering of commands/logs can take place. Nodes can have different latencies which have to be kept in mind while designing such algorithms. The complexity increases with increase in number of nodes.
- No common clock causes difficulty in the temporal ordering of events/transactions
- Difficult for a node to get the global view of the system and hence take informed decisions based on the state of other nodes in the system.

Advantages of Distributed System

- Low latency than centralized system – Distributed systems have low latency because of high geographical spread, hence leading to less time to get a response.