

# DISTRIBUTED SYSTEMS

@thriverashish

[ASHISH GUPTA]

- What is Distributed Sys ?
- Characteristics of a Distributed Sys .
- Basic Concepts.
- Motivation to Use Distributed Sys
- Types of Distributed Sys .

## What is Distributed System ?

— Collection of separate and independent software/hardware components known as nodes.

↳ These nodes/components are networked and work together coherently to fulfill one end goal.

### For Example:

Youtube or Google itself are great example of distributed system.

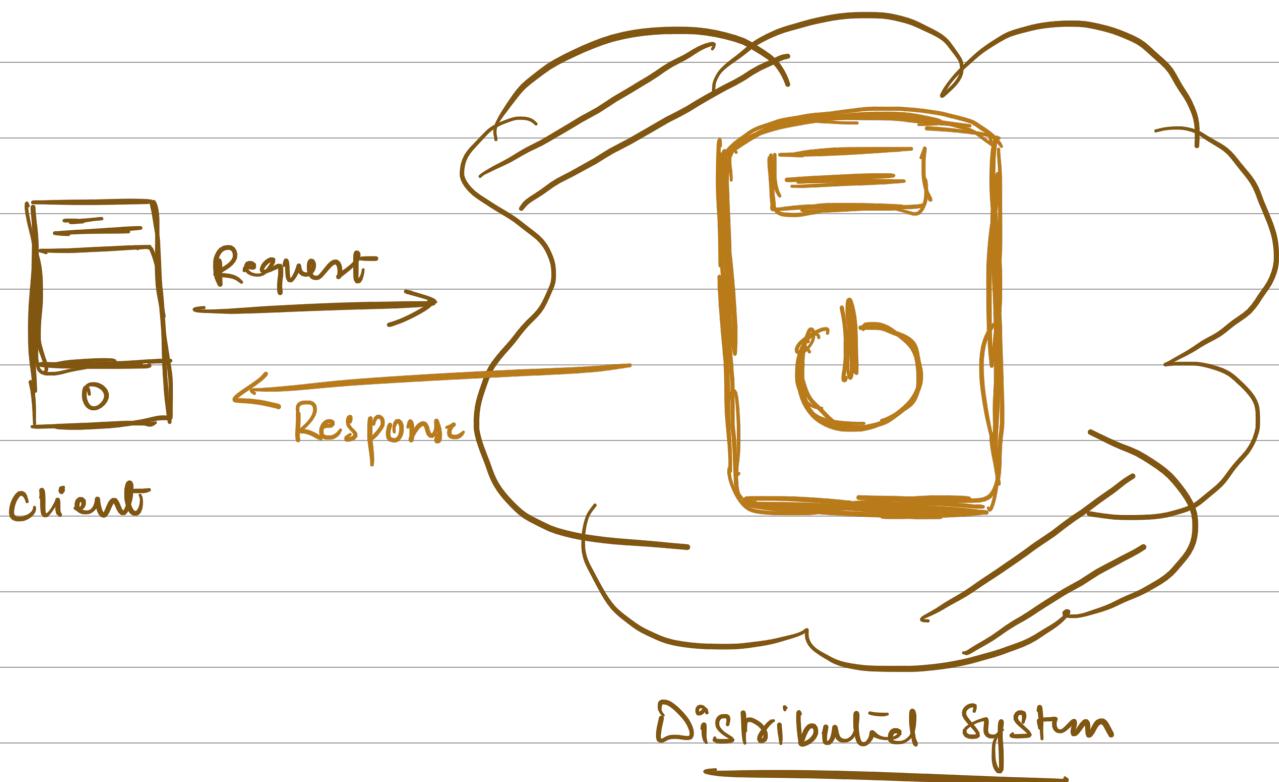
### How ?

- Servers to receive user's request either to watch or upload a video
- There will be processing queue to process the requests
- There will be Encoders to encode the videos.
- User Databases, Metadata Databases Video/Thumbnail Storage etc etc.

All these components work together and create a single system called Youtube.

\* However for the client (user or device), these internal complexities are hidden.

\* For user it appears as Single System that serves the purpose of watching videos.



## \* Characteristics of a Dist Syst :

- No Shared Clock : Logical clock is achieved by Synchronization.

Like if suppose Client and Server both running on local computer will not be considered as distributed.

No Shared Memory : State is distributed

↳ Nearly each process or component must have its independent memory.

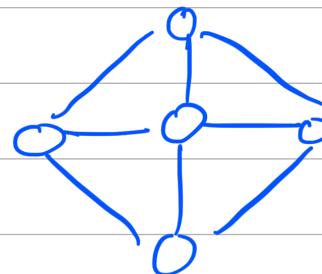
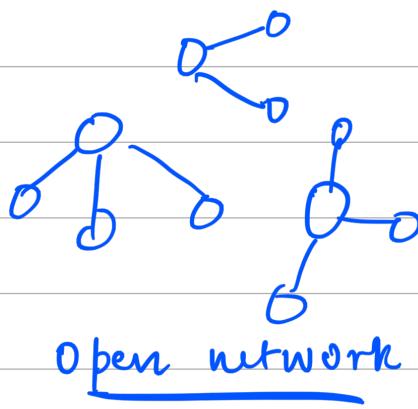
Concurrency : tasks are getting done parallelly.

Loose Coupling : Different Operating Systems and technologies

↳ not must but good to have.

## \* Basic Concepts and Terminologies

\* Node : hardware  
Software  
Open or closed groups



\* Resource : ~ Kind of Asset

File      Service      Other Network      etc.

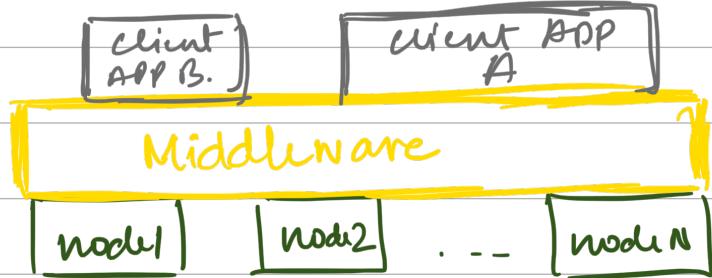
Basically Anything from which a Node get advantage.

\* Abstraction : Hide max possible from users.

Like : Distribution of resources  
Replication  
Migration operations      etc.

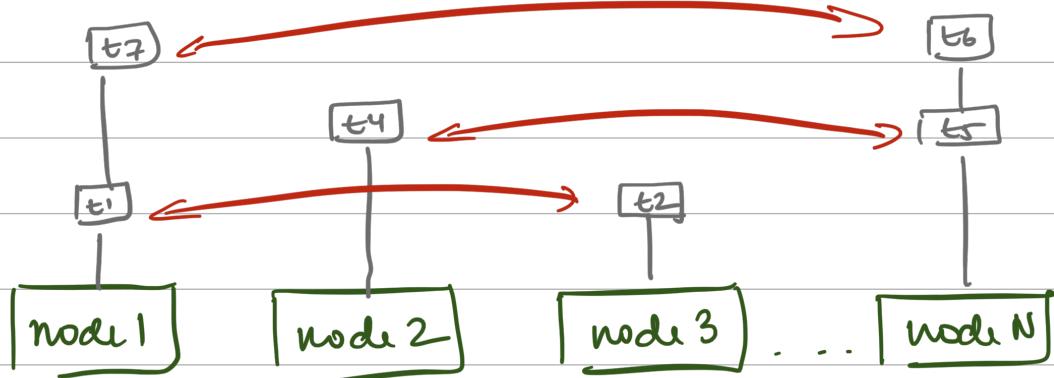
\* Middleware: logical layer on top of nodes

- Manages communication and security services.
- Handle failures and other complexities



\* Concurrency: Multiple operations parallelly.

same time.



\* Coordination and Synchronization:

coordination: Smooth collab b/w operations and Events.

Synchronization: Ordering of Events, controls access to resources.

\* Architectural Model :

- ↳ how nodes / servers are organised
- ↳ how Nodes communicate and interact

Really important for smooth and better management of complexities.

\*\* Defines the overall Structure of System.

\* Global State : combination of states of separate processes.

)  
↳ kind of Global View of entire System.

## \* Motivation to Use Distributed Sy:

{ why do we have overhead of several components and servers etc ??

### 1. Resource Sharing.



Distributed File Systems etc  
" Databases .

### 2. Scalability

### 3. Replication

### 4. Availability

### 5. Reliability .

## \* Types of Distributed Systems :

### 1. Cluster Computing :

- ) ↳ These are Centralized
- ↳ High performance
- ↳ Minimum downtime

HOMOGENOUS

### 2. Grid Computing :

Heterogeneous

Decentralized

lot of computing power is required.