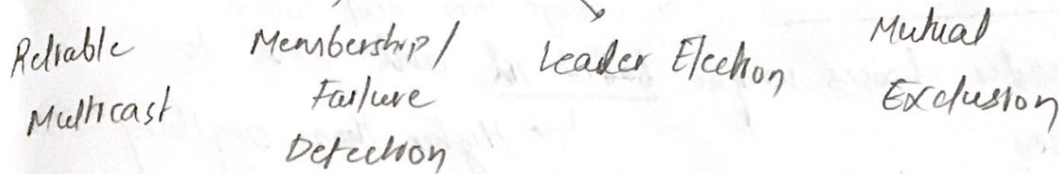


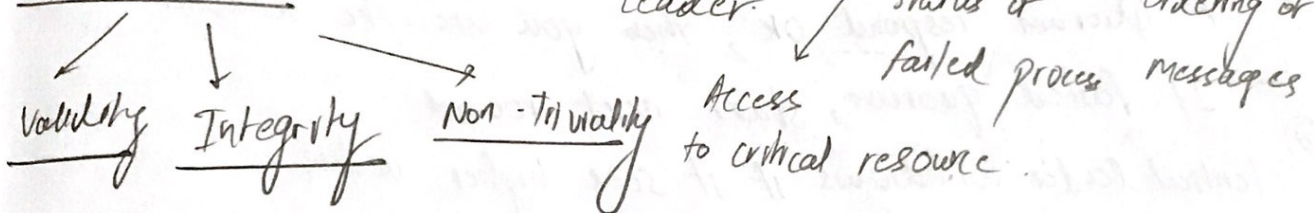
# CONSENSUS PROBLEM :-

## DISTRIBUTED SYSTEMS

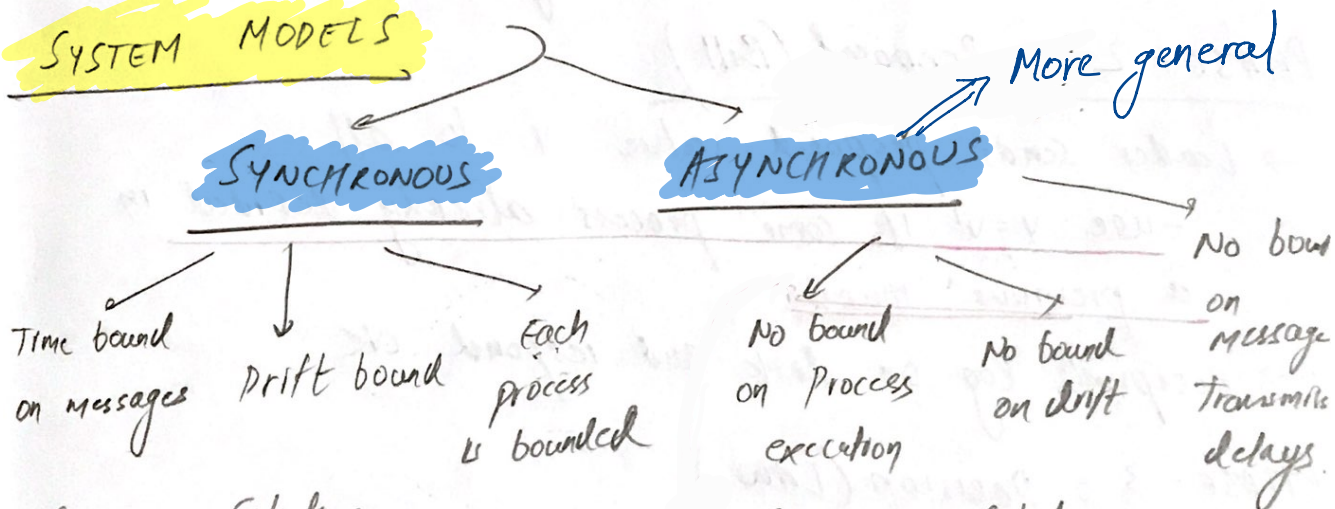


① COMMON: Coordinate and agree on a value of some parameter

## CONSENSUS :-



## SYSTEM MODELS



### Consensus Solution

Possible

\* Use time slicing or analyse different periods of rounds based on above bounds

⇒ Reverse induction on faulty nodes

### Consensus Solution

Impossible

Popular Solutions

PAXOS / SIMPLY

# PAXOS :

## SAFETY

→ No 2 processes decide different values

## EVENTUAL LIVENESS

→ Consensus reached eventually

⊛ Move to next round

## PHASE-1 : Leader Election

→ if timeout or message from next round

- ⇒ Potential leader chooses unique ballot id and send to all processes  
↳ Higher than anything seen
- ⇒ Processes wait and respond to highest ballot id
- ⇒ Process includes  $v$  in the response
- ⇒ If Quorum respond OK, then you are the leader  
↳ If failed quorum, start next round

⊛ Potential leader withdraws if it sees higher value

## PHASE-2 : Proposal (Bill)

- Leader sends proposed value  $v$  to all  
- use  $v=v'$  if some process already decided in a previous round
- Recipients log on disk and respond OK

## PHASE-3 : Decision (Law)

- If leader has majority of OK, it sends decision to all recipients

To ensure safety

Previous and new quorum intersect and hence same value used by new quorum.

## Eventual liveness

Leader fails

Messages dropped

Process fails.