10 Feb 2022
11 - 12 PM

Recap:

$$GS = \{ \bigcup_i LS_i^{x_i}, \bigcup_{j,k} SC_{jk}^{y_j, z_k} \}$$

$LS_i^{x_i}$: local states of all P_i's.

$SC_{jk}^{y_j, z_k}$: set of channels between every pair of processes j and k

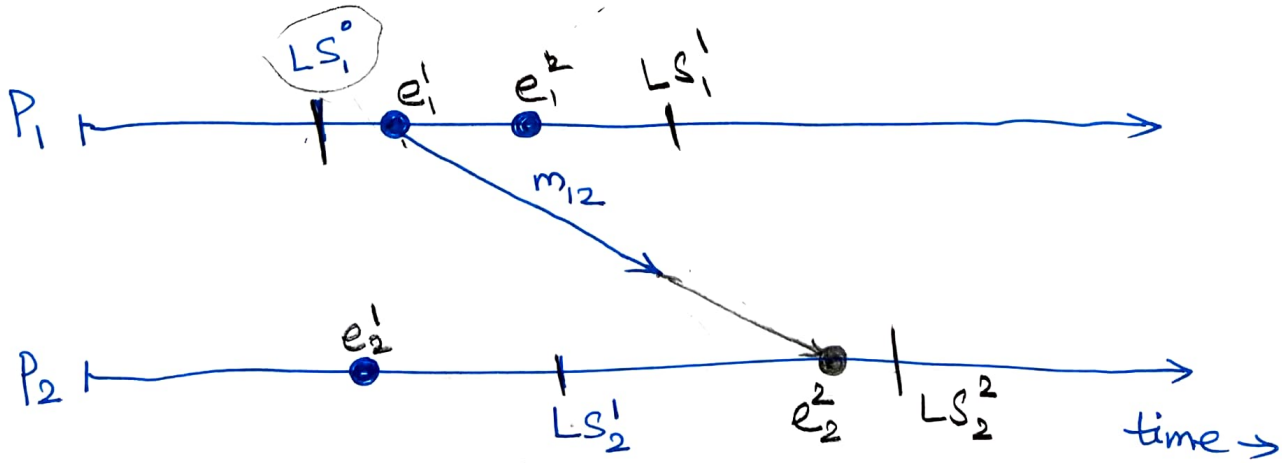
$\forall i, j, k, \quad 1 \le i, j, k \le n.$

Consistent Global State:

* Causality
* A GS is consistent GS iff

$$\forall m_{ij} : send(m_{ij}) \notin LS_i^{x_i}$$

$$\iff m_{ij} \notin SC_{ij}^{x_i, y_j} \wedge rec(m_{ij}) \notin LS_j^{y_j}$$



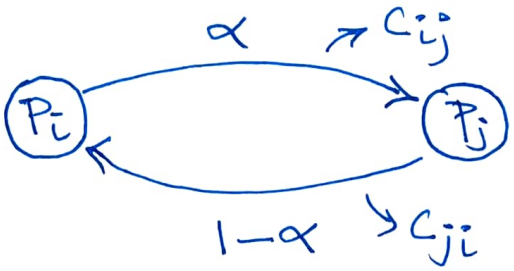
$$GS = \{ LS_1^0, LS_2^2 \}$$

Changes in GS?

→ P_i sends a message

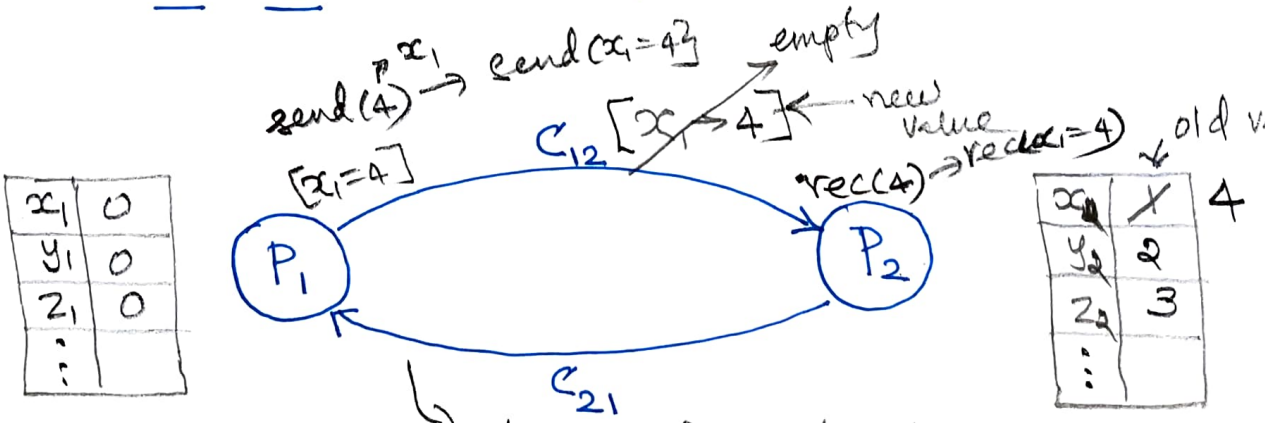
→ P_i receives a message

→ P_i performs a local event



Causality → order of messages must be preserved

Let P_1, P_2 be two processes:



channel is reliable

Fault-free (confirmed send/receive)
- no channel loss
- no alteration of messages

* Checkpointing
* Collecting GC
* Detecting deadlocks
* Tracing / debugging ... DSLN

Chandy - Lamport's Global Snapshot Recording Algo.

$$GS = \{ \underbrace{\bigcup_i LS_i^{x_i}}_{\text{local}} \quad \underbrace{\bigcup_{jk} SC_{jk}^{y_j, z_k}}_{SC} \}$$

Q: How do we record GSnapshot

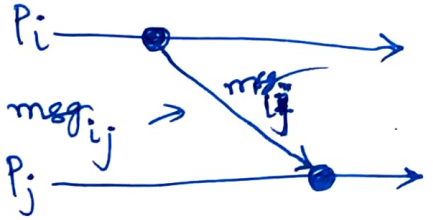
Assumptions:

* N processes
* Channel is bidirectional
  P_i, P_j: $P_i \rightarrow P_j$ and $P_j \rightarrow P_i$
* Channels are FIFO
* No failures (fault-free)
* No message is either altered or duplicated
* No central authority is available.

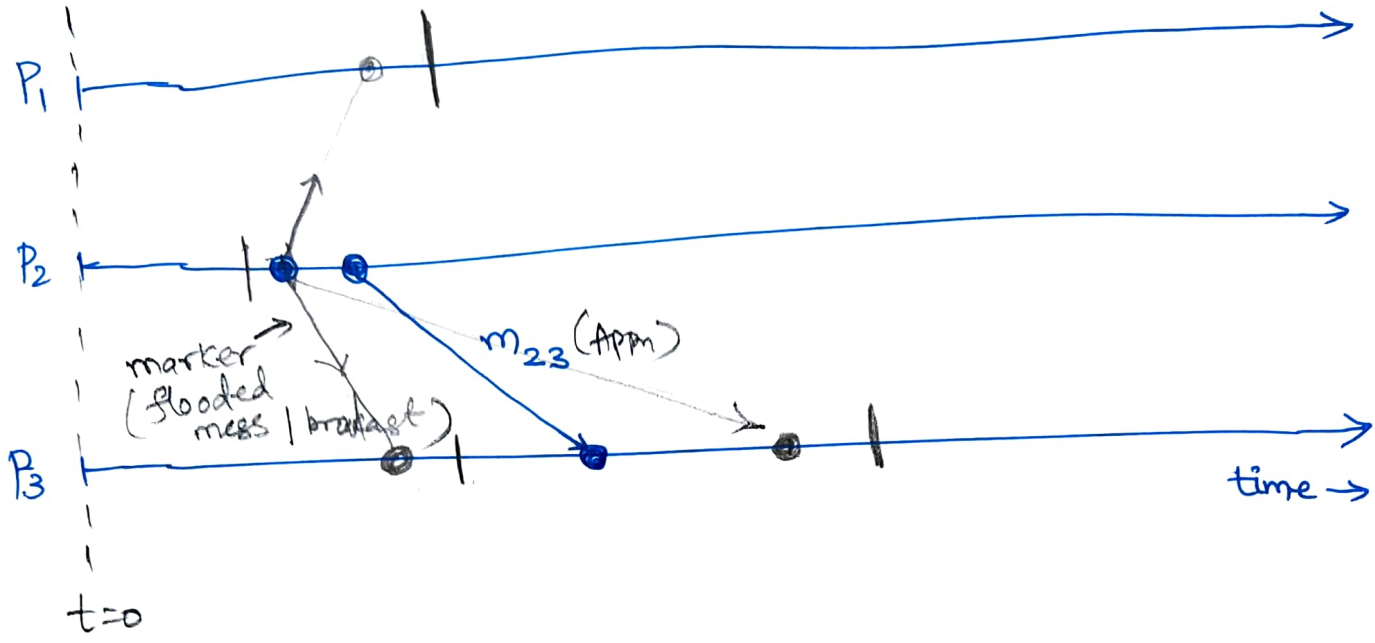
P_i: Initiator. $\forall j \neq i$ C_{ji} - incoming channels to P_i

↳ record its own snapshot

Then send a "MARKER" to all $(N-1)$ outbound channels.



→ Start recording all incomming msgs from C_{ji} for $j \neq i$.


P_1
P_2
P_3
marker
(flooded
mess | bradcast)
m_{23} (APPm)
time →
t=0