Coordinated checkpointing Alg:

- Aslo called as Koo Toueg Alg:
- It is used in distributed systems to ensure that data is consistently saved across different parts of a n/w.
- In such systems, coordinated checkpointing is crucial because it allows the entire n/w to save its state at the same time.
- This way, if something goes wrong, the system can recover from these saved points without losing important information.
- This Algorithm makes this process efficient & reliable, helping d.s. distributed system. maintain data integrity & quickly recover from failure.

Algorithm

1) Checkpoint Initiation: one node, known as the coordinator, initiates the checkpointing process by sending a checkpoint request to all other nodes in the ds.

2) Request Propagation :- After receiving the checkpoint request, each nodes propagates it to all its neighbors to ensure that every node is aware of the CP process.

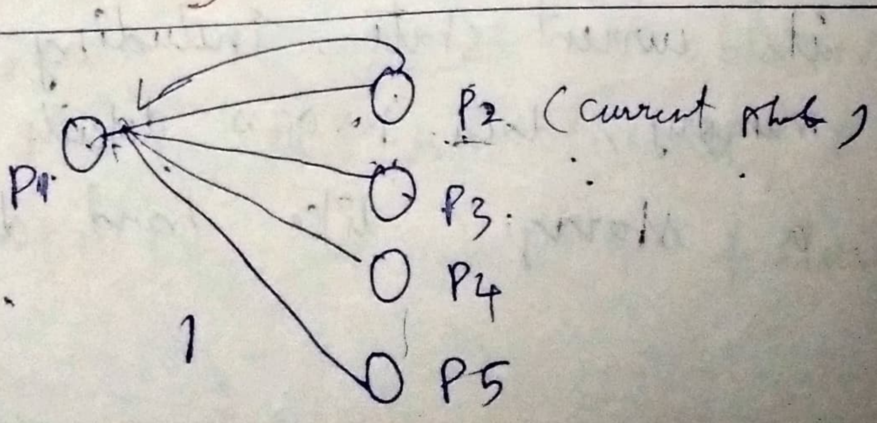
3) Pause Processes : Each node temporarily stops its current work to ensure no new messages are processed during the CP which helps maintain a consistent state.

4) Record state : Each node saves its current state, including memory, data, process details into a storage like hard drive.

5) Log Messages: While paused, the nodes also keep track of any messages that are sent or received, so that no information is lost during the checkpoint.

6) Acknowledge Completion: After saving their state, the nodes send a confirmation back to the coordinates, letting it know that their checkpoint is complete.

7) Resume operation: once all nodes have Ack that they've saved their state, the coordinates informs everyone that they can go back to their normal operation.



Time complexity:

- It depends on the no. of nodes in the system and the communication latency between them.
- It is linear:

Space complexity:

- It depends on the size of the state recorded by each node & the amount of message logging.

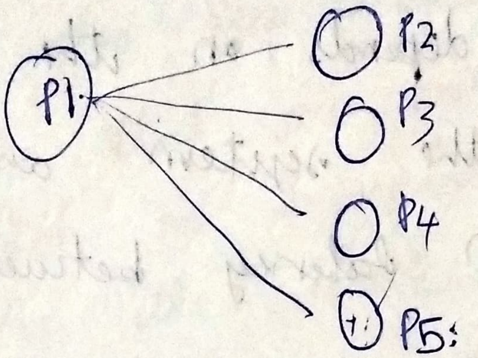
Application:

- Distributed Databases:
- Scientific computing.
- Real-time systems.
- High-performance computing.

Advantage

- consistency, Fault Tolerance, simplicity in Recovery, Minimized Rollbacks, Reliability.

Rollback | restart



failure

Yes → restart

NO → Abort.

Completed