Lab Exercise: Clock and Time Synchronization in Distributed Computing

Objective:

To understand and implement logical clocks and vector clocks in distributed systems.

To explore how clock synchronization helps maintain consistent order of events in distributed systems.

Part 1: Logical Clocks

Task 1: Implement Logical Clocks Using Lamport’s Logical Clock

Description: Implement a simple distributed system with multiple processes that use Lamport’s Logical Clock to order events. Each process will increment its logical clock and send time-stamped messages to other processes.

Part 2: Vector Clocks

Task 1: Implement Vector Clocks

Description: Implement vector clocks to handle more complex scenarios where multiple processes can be in concurrent states. Vector clocks help in determining the partial ordering of events and detecting causality.