

CS4231
Parallel and Distributed Algorithms

Solution for Homework 4

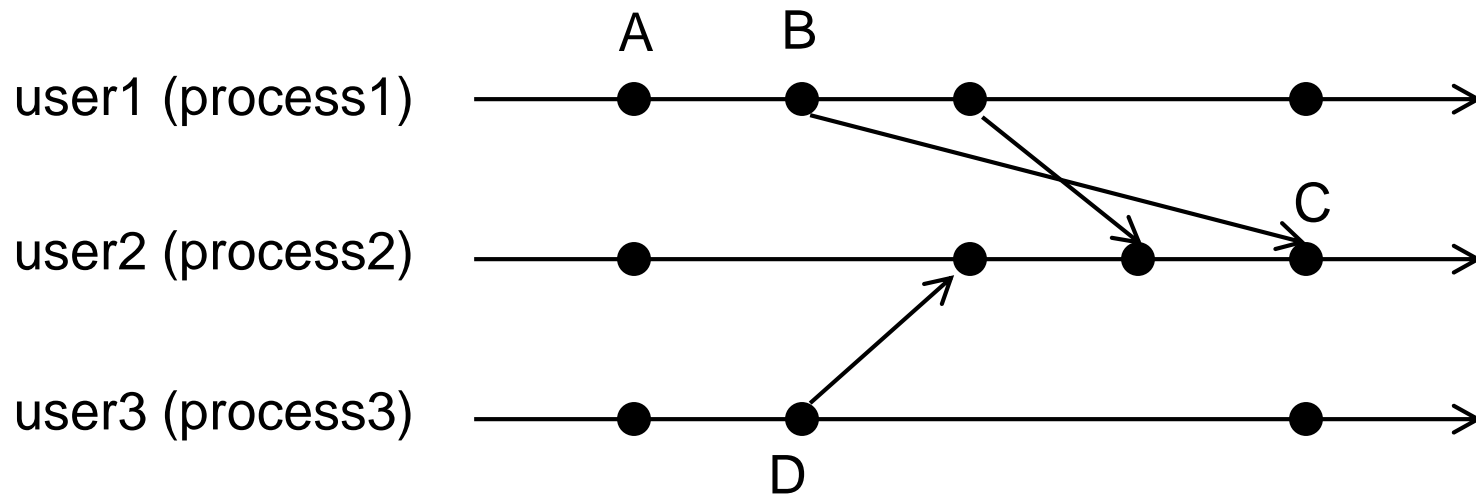
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Homework Assignment

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 - Problem 7.2 – give a counter-example
 - Problem 7.4
 - Problem 7.7 – Prove that the solution satisfies the property of logical clocks

Problem 7.2

- A and D are concurrent
- D and B are concurrent
- But A and B are not concurrent



Problem 7.4

- Many possible solutions
- General idea: Suppose we have two events with the same logical clock value t
 1. Use t to initiate a random number generator
 2. Use the random number generator to pick a uniformly random permutation of all the processes
 3. Tie-break based on the permutation

Problem 7.7

- Simply use the summation of all entries in the vector clock as the logical time
- Correctness proof:
 - Event e happened before $f \Rightarrow$
 $VC(e) < VC(f) \Rightarrow$
Each entry in $VC(e)$ is no larger than the corresponding entry in $VC(f)$, and there is one entry that is smaller \Rightarrow
Sum of all entries in $VC(e)$ smaller than $VC(f)$