CS4231
Parallel and Distributed Algorithms

Solution for Homework 4

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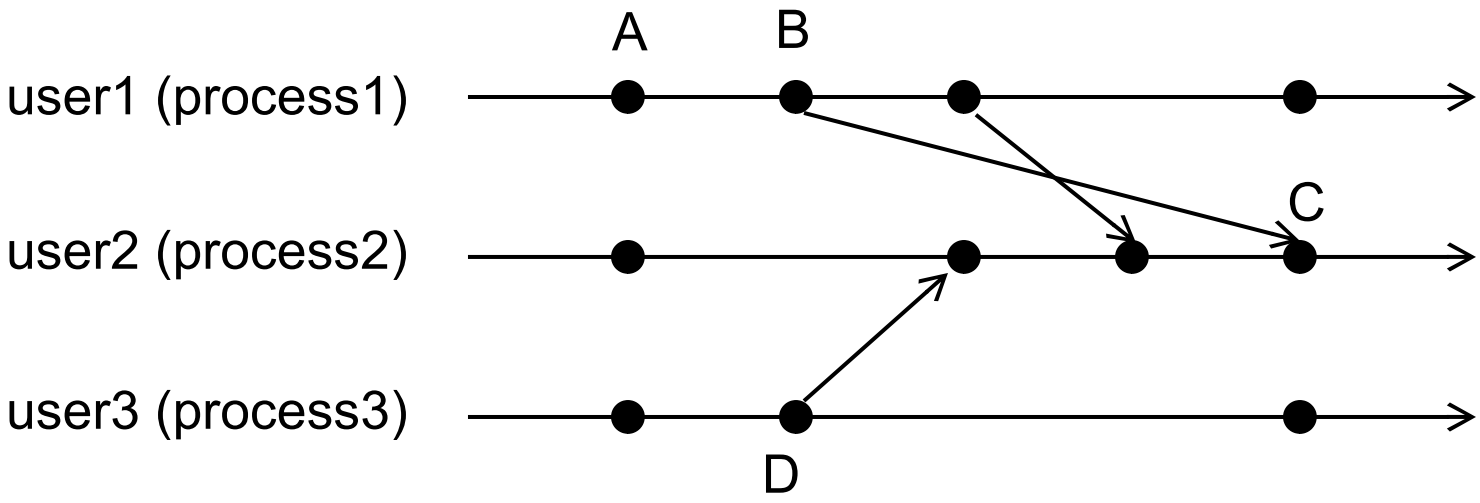
Homework Assignment

- Page 126
  - 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)