CMI/Apr-Jun 2021/Assignment 2 May 2021

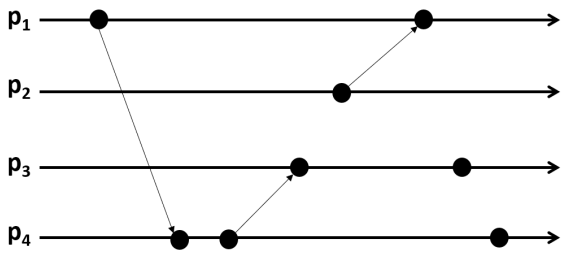
Chennai Mathematical Institute

Distributed Computing and Big Data Deadline: May 15, 2021 11:59 PM. Max Marks: 5.

Instructions:

(1) Submit your assignment solution as a single pdf file on moodle. Clearly mention your roll number and name in the solution pdf.
(2) You may write and scan your work or use tools like Word or Overleaf.
(3) You are encouraged to attempt this assignment individually. However, a group submission of up to three students is allowed.

Answer the questions given below considering the following space-time diagram of a distributed execution involving four processes.



(1) Annotate with scalar time. [0.5 Marks]

(2) Annotate with vector time. [0.5 Mark]

(3) Annotate with matrix time. [1 Marks]

(4) Give an example for a consistent cut. [0.5 Marks]

(5) Give an example for an inconsistent cut. [0.5 Marks]

(6) Give an example for happens-before relation between any two events. [0.5 Marks]

(7) For the specific example you took for the consistent cut, what is the global state represented by the cut? [**Clue**: If $e_i^{Max\_PAST_i(C)}$ denotes the latest event at process p_i that is in the PAST of a cut C, then the **global state represented by the cut** is

$$\{\bigcup_i LS_i^{Max\_PAST_i(C)}, \bigcup_{j,k} SC_{jk}^{y_j,z_k}\}$$

where $SC_{jk}^{y_j,z_k} = \{m | send(m) \in PAST(C) \wedge rec(m) \in FUTURE(C)\}$. You may make reasonable assumptions on the contents of the channel. [1.5 Marks]
