I. Chandy-Lamport Global Snapshots Algorithm

- Mark the entire global snapshot collected.
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\[
\begin{align*}
P0: S(a) \\
P1: R(a) \\
P2: \{} \\
C01: \{} \\
C02: \{} \\
C10: \{} \\
C12: \{} \\
C20: \{} \\
C21: \{}
\end{align*}
\]
II. Chandy-Lamport Global Snapshots Algorithm
- Mark the entire global snapshot collected.

Diagram:
- P0
- P1
- P2

- Solid line: Marker Message
- Dashed line: Regular Message c
II. Chandy-Lamport Global Snapshots Algorithm

- Mark the entire global snapshot collected.
III. Mark all Lamport timestamps for application messages on this figure for all events. All Lamport timestamps start from zero.

- Marker Message
- Regular Message c
III. Mark all Lamport timestamps for application messages on this figure for all events.
All Lamport timestamps start from zero.

P0: S(a)
P1: S(d)
P2: S(c)
C01: {}
C02: {}
C10: {}
C12: {d}
C20: {}
C21: {c}
IV. Mark all vector timestamps for application messages on this figure for all events.
All vector timestamps start from zeroes.

- Marker Message
- Regular Message c
IV. Mark all vector timestamps for application messages on this figure for all events.
All vector timestamps start from zeroes.

- Marker Message
- Regular Message c
V. Chandy-Lamport Global Snapshots Algorithm

• P0 initiates a snapshots run. Something is wrong with the figure. What?
V. Chandy-Lamport Global Snapshots Algorithm

- P0 initiates a snapshots run. Something is wrong with the figure. What?

**Answer:** Message d and the marker from P0 to P2 violate FIFO. As a result, the cut created by this snapshot is inconsistent (contains d’s receipt event, but not d’s send event).
VI. Chandy-Lamport Global Snapshots Algorithm

• P0 initiates a snapshots run. Something is wrong with the figure. What?
VI. Chandy-Lamport Global Snapshots Algorithm

• P0 initiates a snapshots run. Something is wrong with the figure. What?

**Answer:** When P2 receives a marker (from P0), it must send out its markers immediately. In this timeline, it processes message d first then sends out its markers. As a result, it is unclear if d’s receipt event belongs to the cut or not.
VII. Chandy-Lamport Global Snapshots Algorithm

• P0 initiates a snapshots run. Some of the markers in transit are shown. List ALL the possible snapshots that might be collected. You must assume FIFO channels.

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[Diagram showing marker messages and regular messages between processes P0, P1, and P2]
VII. Chandy-Lamport Global Snapshots Algorithm

• P0 initiates a snapshots run. Some of the markers in transit are shown. List ALL the possible snapshots that might be collected. You must assume FIFO channels.

**Answer**: Messages a, b, and d are all sent after the cut at their respective sender process, so by causality their receipt events cannot be in the cut. Message c is sent before the cut at P2, so it’s send event is a part of the cut. However, c is received at P0 after the cut, thus c is the only message that is captured in the snapshot. There is only one possible snapshot.