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5 Checkpointing (approx 5 points) – Write on this page

Two processes P1 and P2 exchange a message. The behaviour of each process is as follows:

> When a process (P1 or P2) receives the message m, it first takes a checkpoint (a snapshot of its state and then forwards the message m to the other process.

At the beginning of the execution, an external process sends the message m to P1.
Make a single drawing below for questions **1**, **3**, and **4**. Make sure it is clear and write a legend.

Question 1 Draw the timeline of the execution until each process has sent the message 3 times. Place the checkpoints. Stop the execution when the third message from P2 is on its way.

Suppose now that P1 crashes while P2 is sending the message m for the third time.

Question 2 Consider the cut made of the last two checkpoints, is it consistent? strongly consistent? Are there in transit or orphan messages?

The cut made from C.5 and C.6 is not consistant, because it has an orphan message which is m5.

Question 3 Draw the "rollback dependency graph" as we have seen in the course. Look at the other page

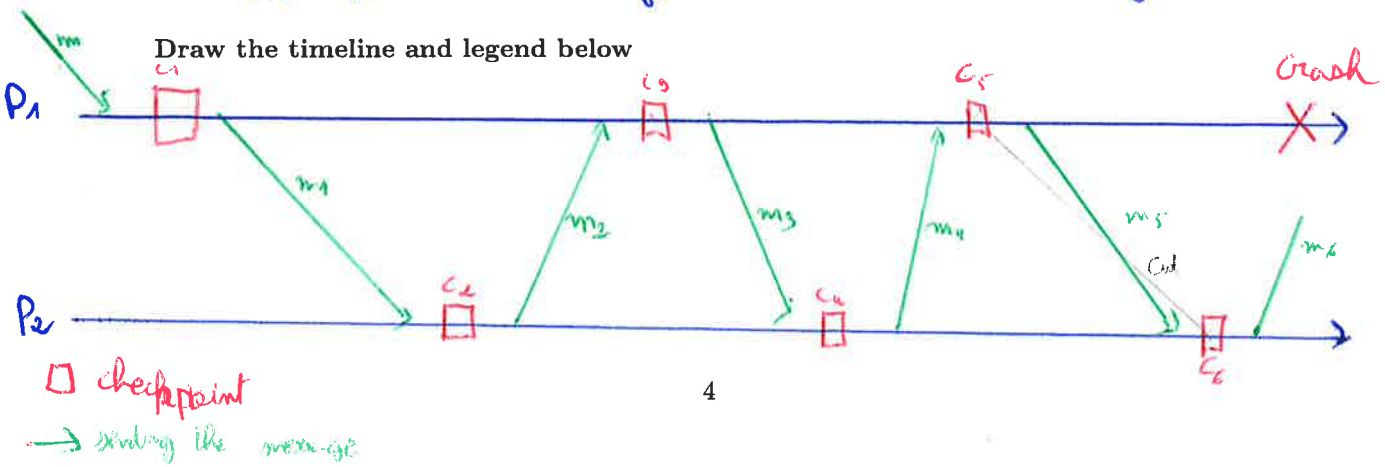
Question 4 Use the rollback dependency graph to be sure to obtain a consistent recovery line. Explain what happens in one sentence.

When we try to find the recovery line, we go back all the way to the beginning (the domino effect).

Question 5 Propose an alternative behaviour for each process to avoid the phenomenon observed in the two previous questions.

We just need to reverse the order of thing. We send the message m and then we take the snapshot with we are able to find some consistant cuts that will make for a usable recovery line.

Draw the timeline and legend below



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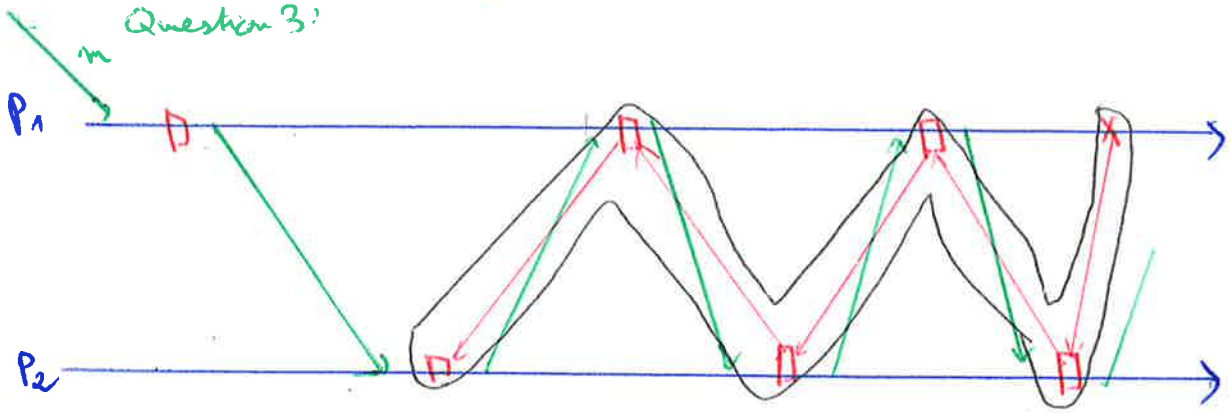
Question 3:



Question 5: