P1. Consider the synchronous components $C_1, C_2$ with their imperative description. For component $C_2$, note that input $i$ is an integer but can only take the values $\{0, 1\}$.

![State Diagrams](image)

(A) Carefully draw state diagrams for the two components above. Draw just the reachable states of each component. You may check your answer for this part carefully with your classmates or the instructor before proceeding.

(B) Output of $C_1$ is fed as input of $C_2$.

Suppose the input $i$ to the component $C_2$ were instead set to the range $\{-2, -1, 0\}$ argue whether the composition shown above is possible. Write a brief justification 2-3 sentences at most.

(C) Output of $C_2$ is fed to both inputs of $C_1$.

(D) Parallel composition.
P2 After considering the compositions in each part of problem P1 (B)-(D), write down at least two safety properties for each of the parts in P1 (B)-(D) of the composed system that are true, and at least two safety properties that are violated by the composed system.