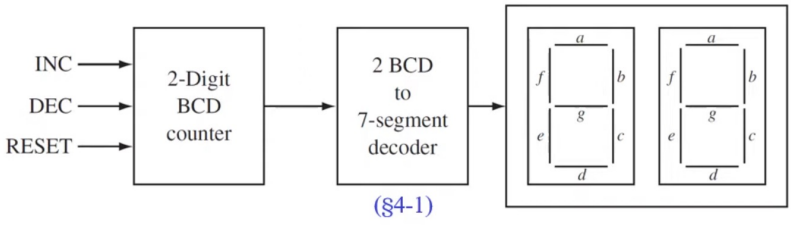
4.6 Scoreboard and Controller

Scoreboard

- Problem description:
  - design a simple scoreboard, which can display scores from 0 to 99 (decimal).
  - Inputs: a reset signal (***rst***) and control signals to increment (***inc***) or decrement (***dec***) the score
    - The 2-digit decimal count gets +1 if ***inc*** signal is true and is -1 if ***dec*** signal is true.
    - If ***inc*** and ***dec*** are true simultaneously, no action occur.
    - **The reset button (*rst*) must be pressed for 5 *consecutive* cycles in order to erase the scoreboard.**
  - The current count is displayed on 7-segment displays.

Data Path

- Block diagram of the scoreboard:



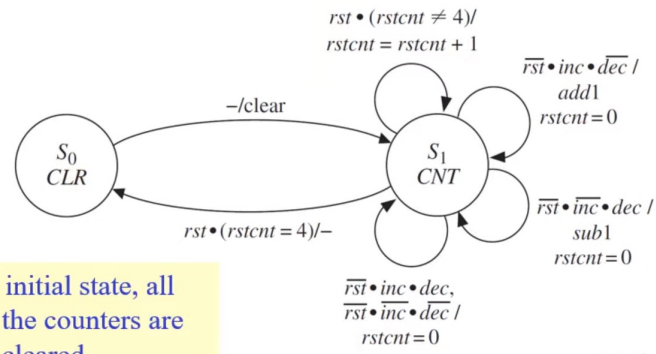
  - True reset should happen only after pressing reset for 5 clock cycles

    ⇒ Use a **3-bit reset counter** called ***rescnt***.

Controller

- State graph for scoreboard:

* The 2-digit decimal count gets +1 if ***inc*** signal is true and is -1 if ***dec*** signal is true.
* If ***inc*** and ***dec*** are true simultaneously, no action occur.
* The reset button (***rst***) must be pressed for **five *consecutive*** cycles in order to erase the scoreboard.



* S_0: initial state, all the counters are cleared

- A system rst is added to my design
- rst → erase

  rstcnt → erasecnt