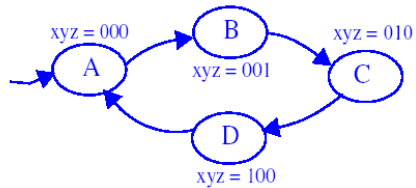


3.40 Using the five-step process for designing a controller, convert the FSM you created for Exercise 3.24 to a controller, implementing the controller using a state register and logic gates.

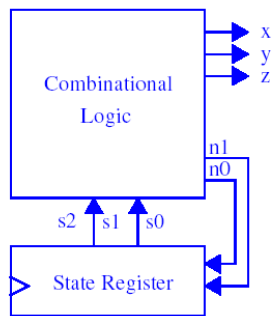
Step 1 - Capture the FSM

Inputs: None, Outputs: x,y,z



The FSM was created during Exercise 3.24.

Step 2 - Create the architecture



Step 3 - Encode the states

A straightforward encoding is A=00, B=01, C=10, D=11.

Step 4 - Create the state table

| Inputs | | Outputs | | | | |
|--------|----|---------|----|---|---|---|
| s1 | s0 | n1 | n0 | x | y | z |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 0 | 1 | 0 | 0 |

Step 5 - Implement the combinational logic

$$n1 = s1's0 + s1s0' = s1 \text{ XOR } s0$$

$$n0 = s1's0' + s1s0' = s0'$$

$$x = s1s0$$

$$y = s1s0'$$

$$z = s1's0$$