Calculator

Design Description:

- This design is a simple calculator capable of 6 different operations. (such as: +, -, <<, >>, ^2, ^3)
- The design will take one number from dataIn at a time and validate the number by a ‘validIn’ input.
- Depending on the operation, the circuit will need one or two operands, which will result in either 2 or 3 states per calculation. The operation value will be taken from dataIn.
- dataOut should output the input number or operand until the result is calculated.

Design I/O:

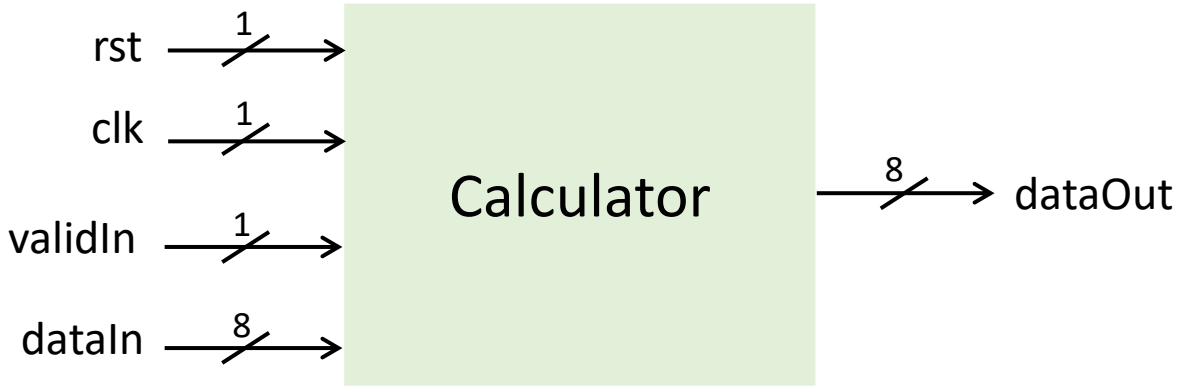
rst: 1 bit input for reset

clk: 1 bit input for clock

validIn: 1 bit input

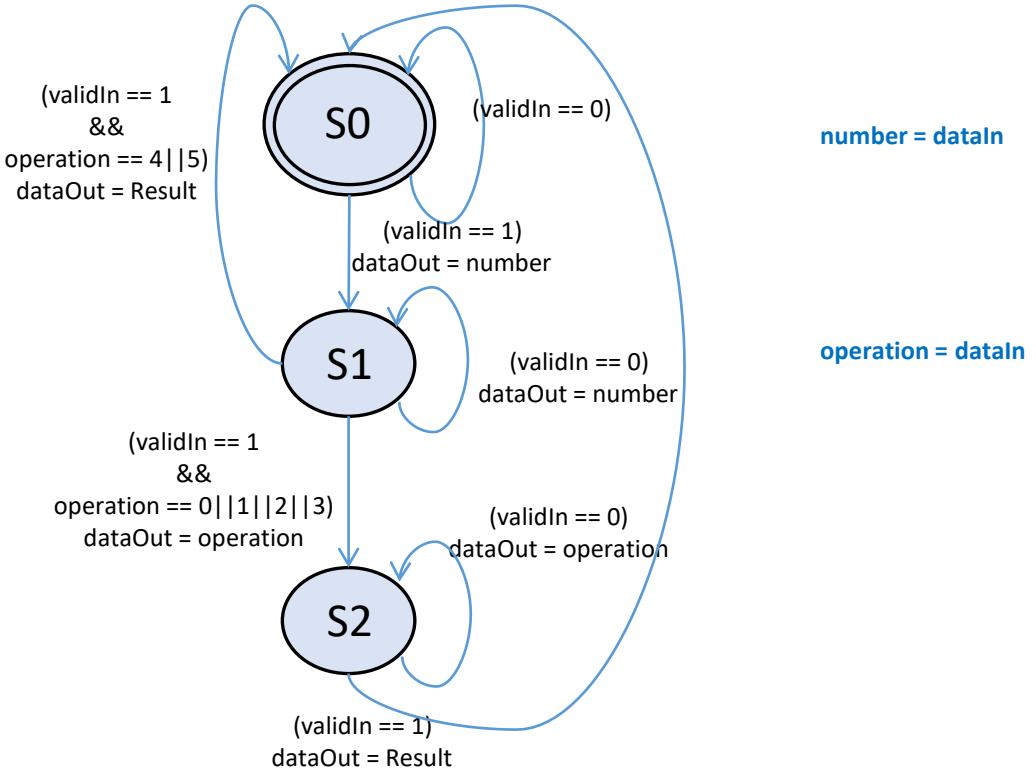
dataIn: 8 bit input

dataOut: 8 bit output



Design Behavior:

- The calculator to be implemented should use the state machine on the right.
- At every state, whenever the situations shown in its brackets are satisfied, the circuit will go to the intended state and output the equation below brackets.



Operations:

0 : Result = number + dataIn
1 : Result = number - dataIn
2 : Result = number << dataIn
3 : Result = number >> dataIn
4 : Result = number ^ 2
5 : Result = number ^ 3

Examples:

Example A: **6 + 3**

- DataIn: **6** → Switch: 00000110
- validIn: 1 → Press PushButton
- DataIn: **0** → Switch: 00000000
- validIn: 1 → Press PushButton
- DataIn: **3** → Switch: 00000011
- validIn: 1 → Press PushButton

➔ dataOut will show 00001001 (9)

Addition Command

Example B: **7 ^ 2**

- DataIn: **7** → Switch: 00000111
- validIn: 1 → Press PushButton
- DataIn: **4** → Switch: 00000100
- validIn: 1 → Press PushButton

➔ dataOut will show 00110001 (49)

Square Command