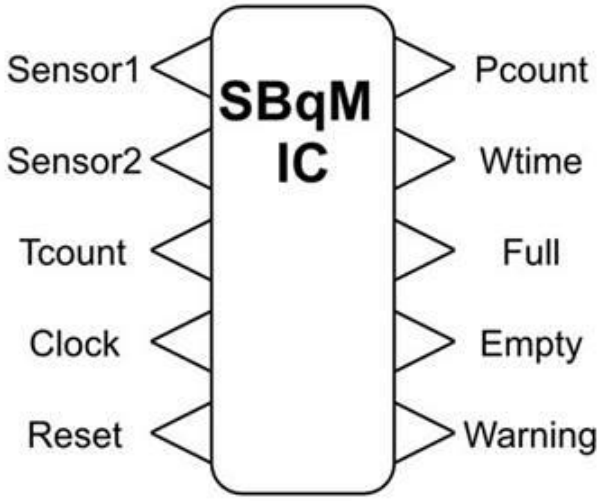
Chipions'21

SBqM Project One

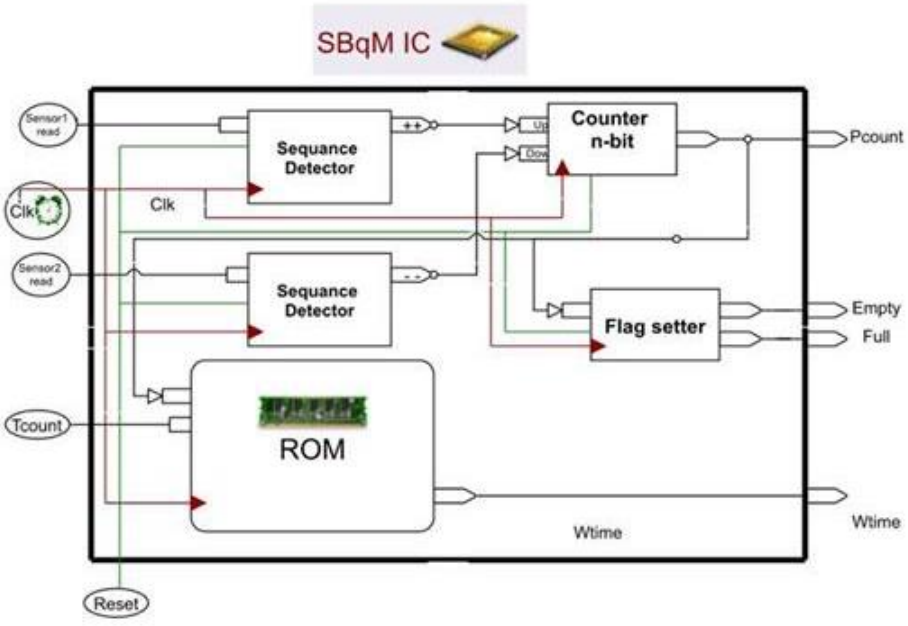
Deliverable a) I/O list:

Input &output pins	Description
1-sensor 1	An input pin receives the photo cell output of the front end of queue that always generates logic '1' signal if nobody interrupts a light beam (no one leaves the queue) and would change to logic '0' when the light beam is interrupted (someone leave the queue) .
2-sensor 2	An input pin receives the photo cell output of the back end of queue that always generates logic '1' signal if nobody interrupts a light beam (no one enters the queue) and would change to logic '0' when the light beam is interrupted (someone enter the queue) .
3-Tcount	An input pin consists of 2-bits data and receives the number of tellers currently in service . It is 2-bits because the max number of available tellers is 3 ('11') with possible values {1,2,3} .
4- Clock	An input pin receives pulses with an adjustable duty cycle to make all modules in SBqM are senchronized .above all, it can increase precision and response time of the system.
5- Reset	An input pin receives logic '1' or logic'0' which can be used to restart the SBqm's operation . Reset pin is an active low input . Thus , for normal operation it must be connected to logic '1' , if this pin is momentarily grounded ,the IC operation is inturupted,will start from again and all values of output pins will be '0 ' (e.g when we apply logic '0' to reset pin, pcount pin will be '000')
6- Pcount n-bits	output n-pins that give the number of people standing in the queue (waiting to be served by a teller) . We make it as an adjustable variable according to queue length cabability .
7- Wtime n+2 bits	Output (n+2)-pins that give the expected waiting time in the queue before being served. Wtime pins numbers is determined according to the queue length cabability 'n' .
8- Full flag	An output pin that give us the queue state when it is '1' this indicates that the queue is full and it's not allowed for another person to enter the queue and viceversa when it is '0'.
9- Empty flag	An output pin that give us the queue state when it is '1' this indicates that the queue is empty and it's allowed for people to enter the queue and viceversa when it is '0'.

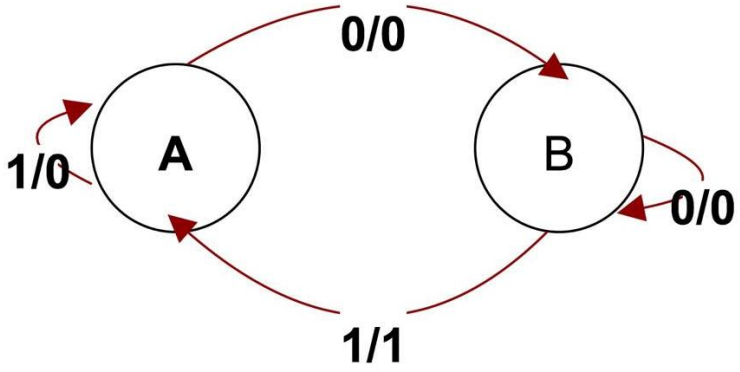
Deliverable b) icon:



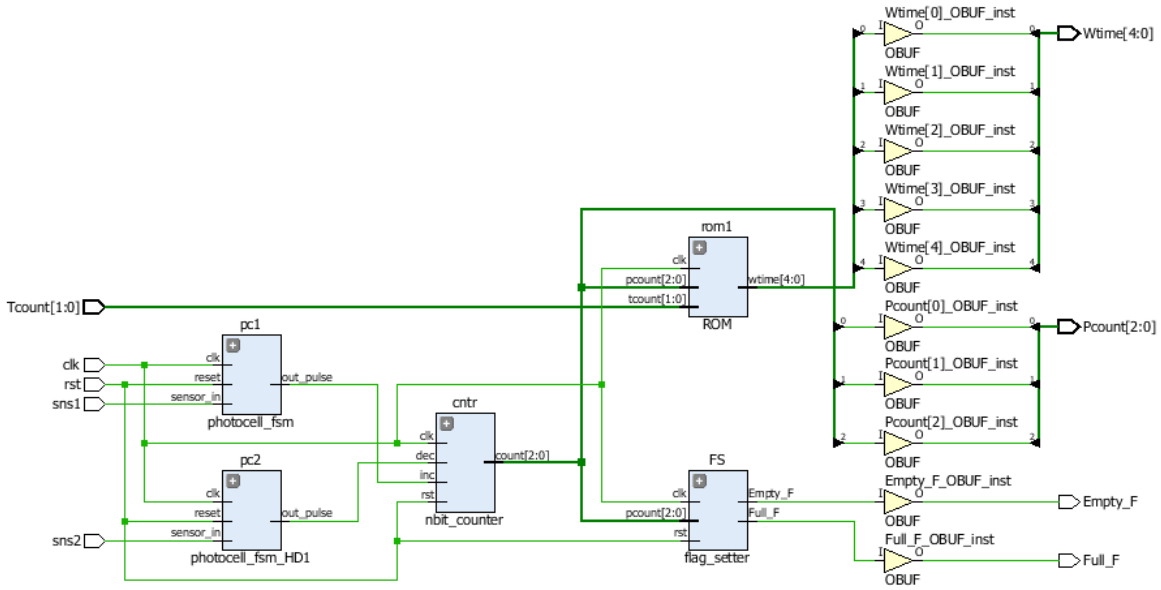
Deliverable c) Block diagram:



Deliverable d) FSM:

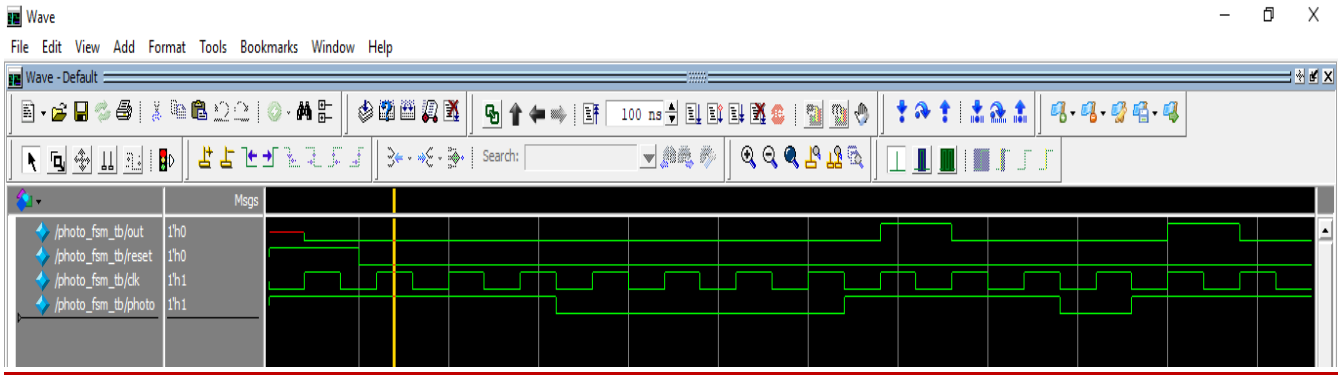


Deliverable J) Synthesized output diagram:

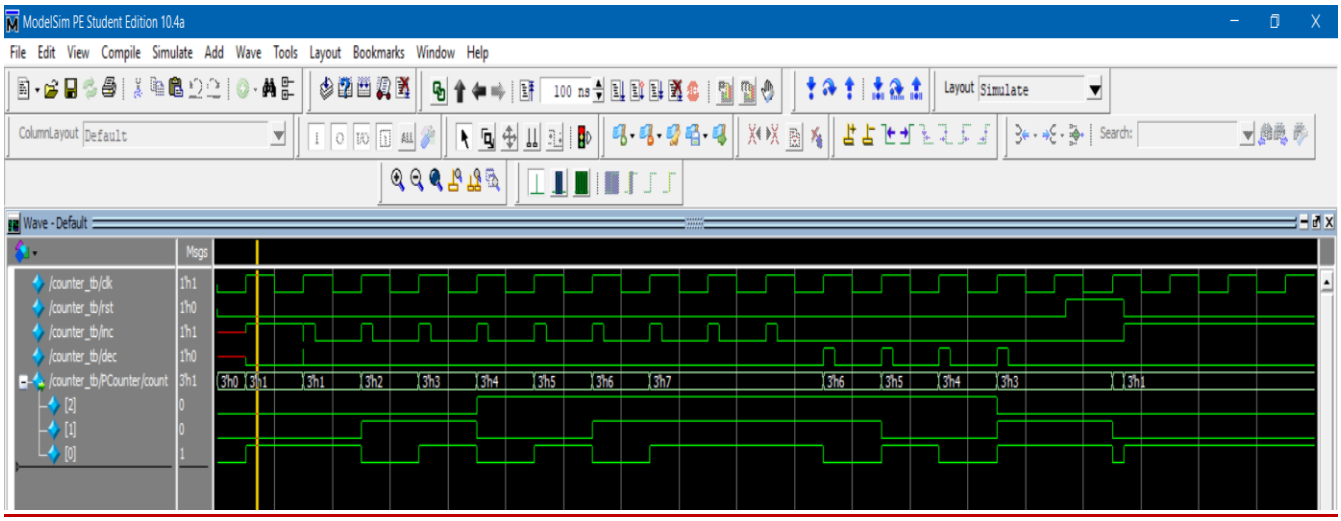


Simulation snapshots

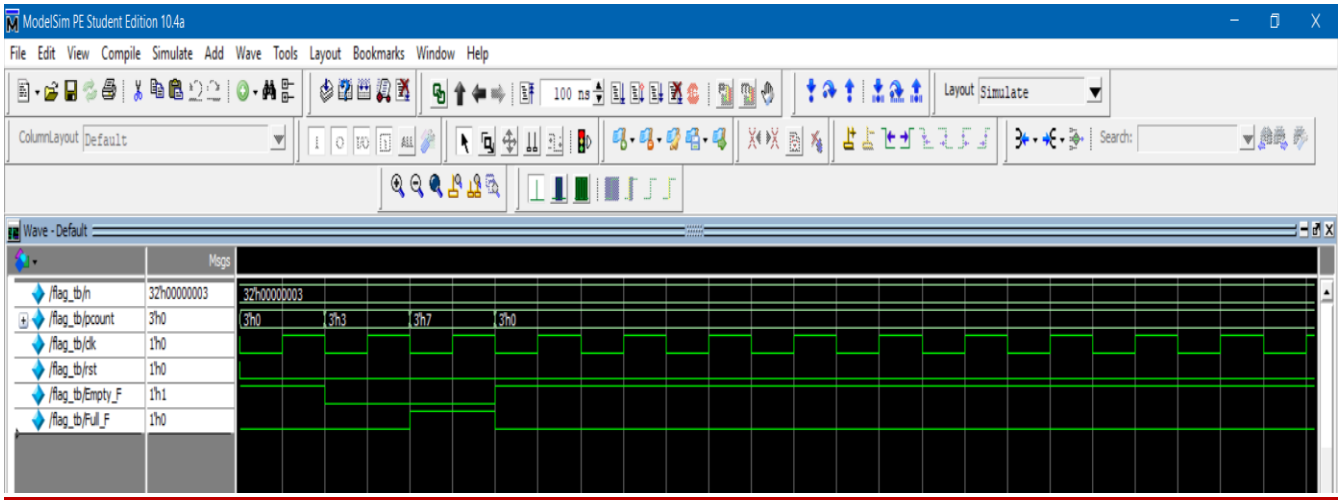
1) Photocell :



2) Counter :



3) Flag setter:



4) ROM: