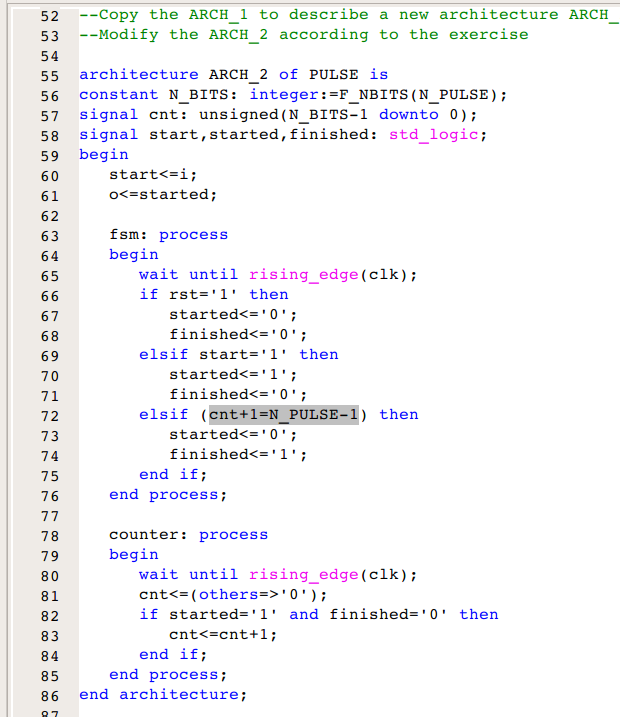
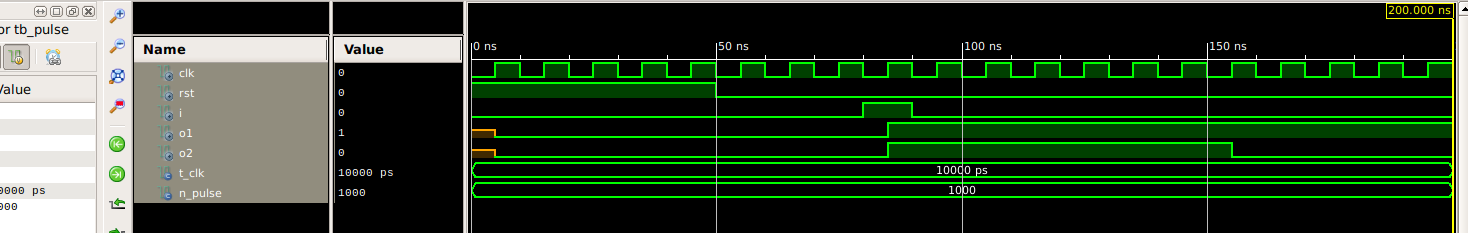
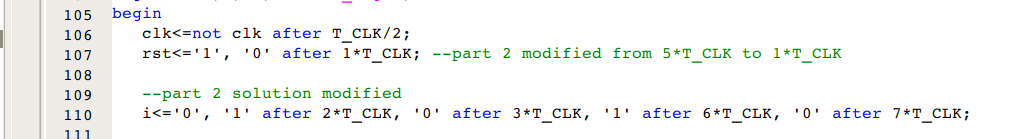
**Project Solutions**  
  
**1.** The issue is in the arch of the pulse design. Because, cnt+1 never reaches to N\_Pulse, therefore, desired result is not being achieved. This can be solved with a simple trick by replacing **cnt+1=N\_PULSE** with **cnt+1=N\_PULSE-1**  in the ARCH\_2 code line number 72.



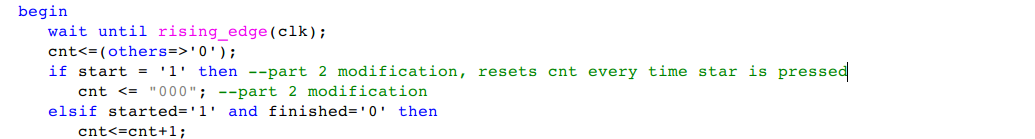


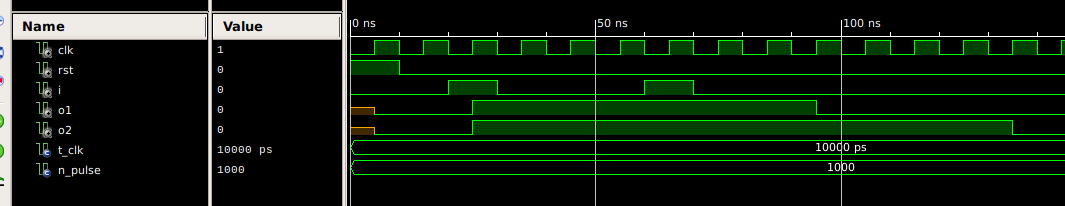
We can see in the simulation that correct ARCH\_2 output o2 is as required but arch\_1 output o1 is wrong.

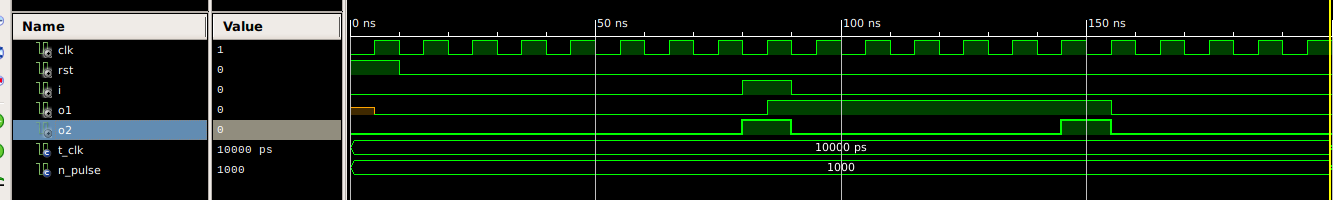
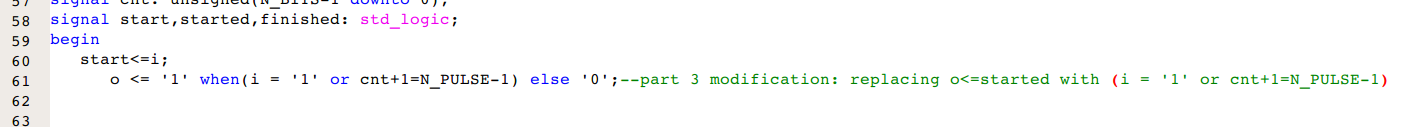
**2.** To achieve the double click, following code lines of the test bench has been modified.

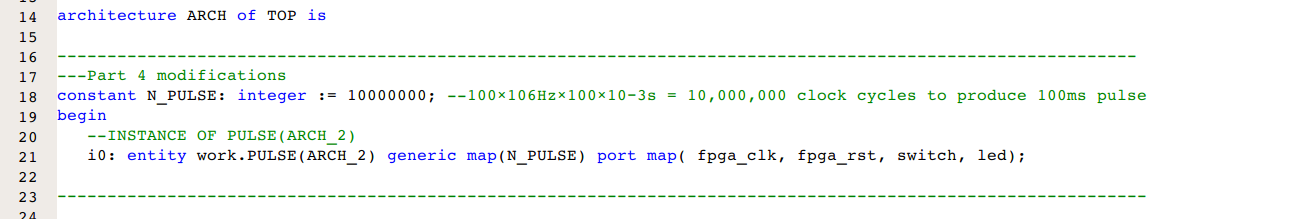


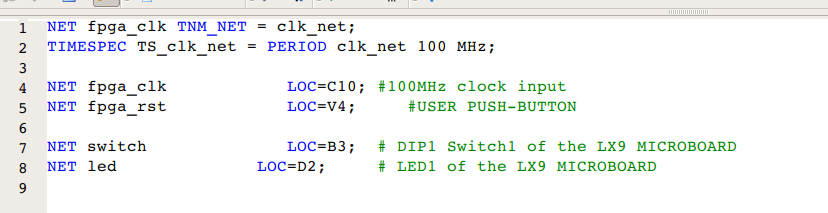
This makes sure start is pressed twice after *2\*T\_CLK* and *6\*T\_CLK.*Next, line 72 of arch\_1 is also changed to make it work.  
Now, to make sure arch\_2 output is enlarged as required, its counter (cnt) is being reset every time a start is pressed.

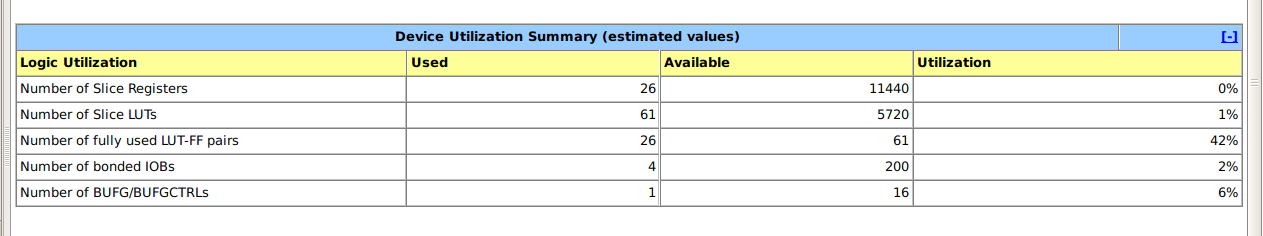


The commented line makes sure, arch\_2 is enlarged than arch\_1 output. Simulation result below shows the achieved result.  
  
  
  
  
  
**3.** In order to activate arche\_2 output o2 at the start and end of pulse, we only need to assign o2 as 1 when pulse is active or count of arche\_2 (cnt+1=N\_PULSE-1) has reached required number of pulses. This can be done by modifying 61 of the pulse as shown in the screenshot below.

As a result, desired output pulse at o2 is achieved.  


**4.**   
  
100×106Hz×100×10−3s = 10,000,000 clock cycles to produce 100ms pulse  
  
top level code modified.





|  |
| --- |
| Device utilization summary:  ---------------------------  Selected Device : 6slx9csg324-3  Slice Logic Utilization:  Number of Slice Registers: 26 out of 11440 0%  Number of Slice LUTs: 61 out of 5720 1%  Number used as Logic: 61 out of 5720 1%  Slice Logic Distribution:  Number of LUT Flip Flop pairs used: 61  Number with an unused Flip Flop: 35 out of 61 57%  Number with an unused LUT: 0 out of 61 0%  Number of fully used LUT-FF pairs: 26 out of 61 42%  Number of unique control sets: 2  IO Utilization:  Number of IOs: 4  Number of bonded IOBs: 4 out of 200 2%  Specific Feature Utilization:  Number of BUFG/BUFGCTRLs: 1 out of 16 6% |