LAB 5: Introduction to Quartus || software Design
ITI1100 B -Digital Systems
Winter 2017
University of Ottawa

LAB session 5
Group **16** :
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Experiment Date: 16/03/2017
Submission Date: 30/03/2017

Objectives:

Provide insight into the characteristics of several important latches and flip-flops.
Build latches and flip-flops from basic gates.
Explain concepts of latching and edge-Triggering.
Test latches and flip-flops to understand their operation

Equipment and Components

QUARTUS || 13.0 Service-Pick 1
Alter DE2-115 circuit board

PART 1
Circuit diagrams
Simple logic circuit

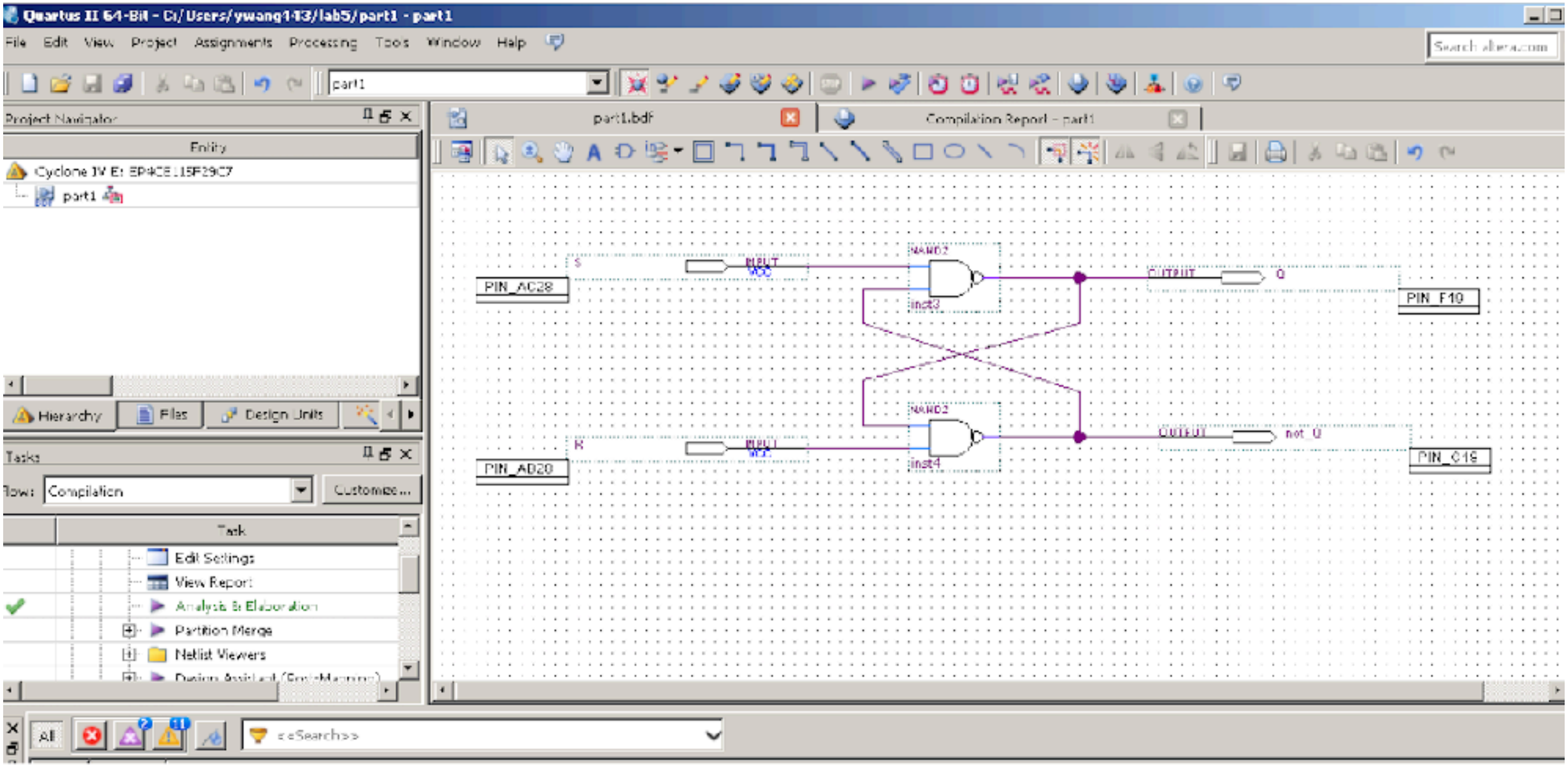


Figure 1: (Screen-shot of a simple circuit with AND,XOR, OR gates)

PART 2
Circuit diagrams
Simple logic circuit

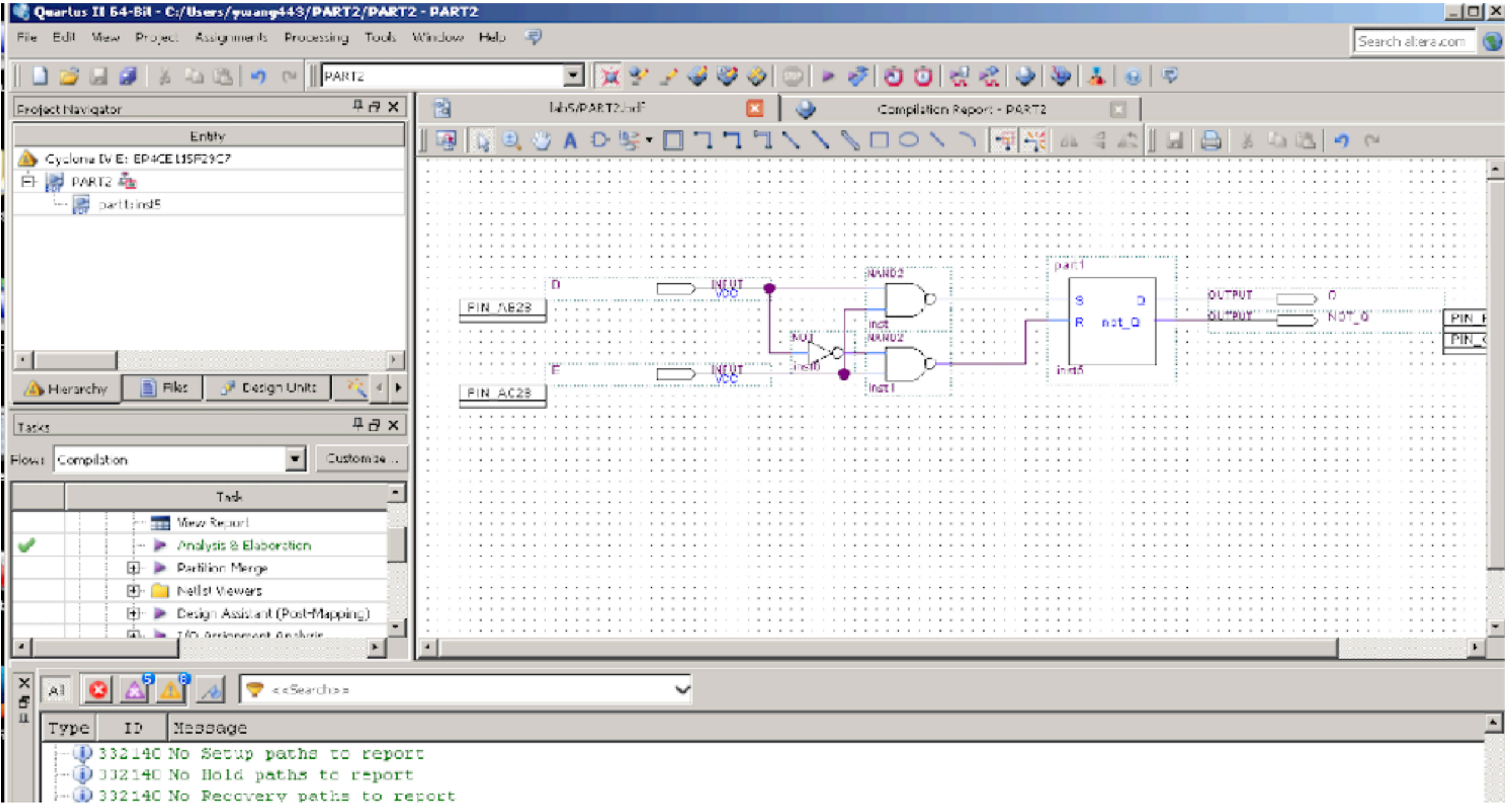
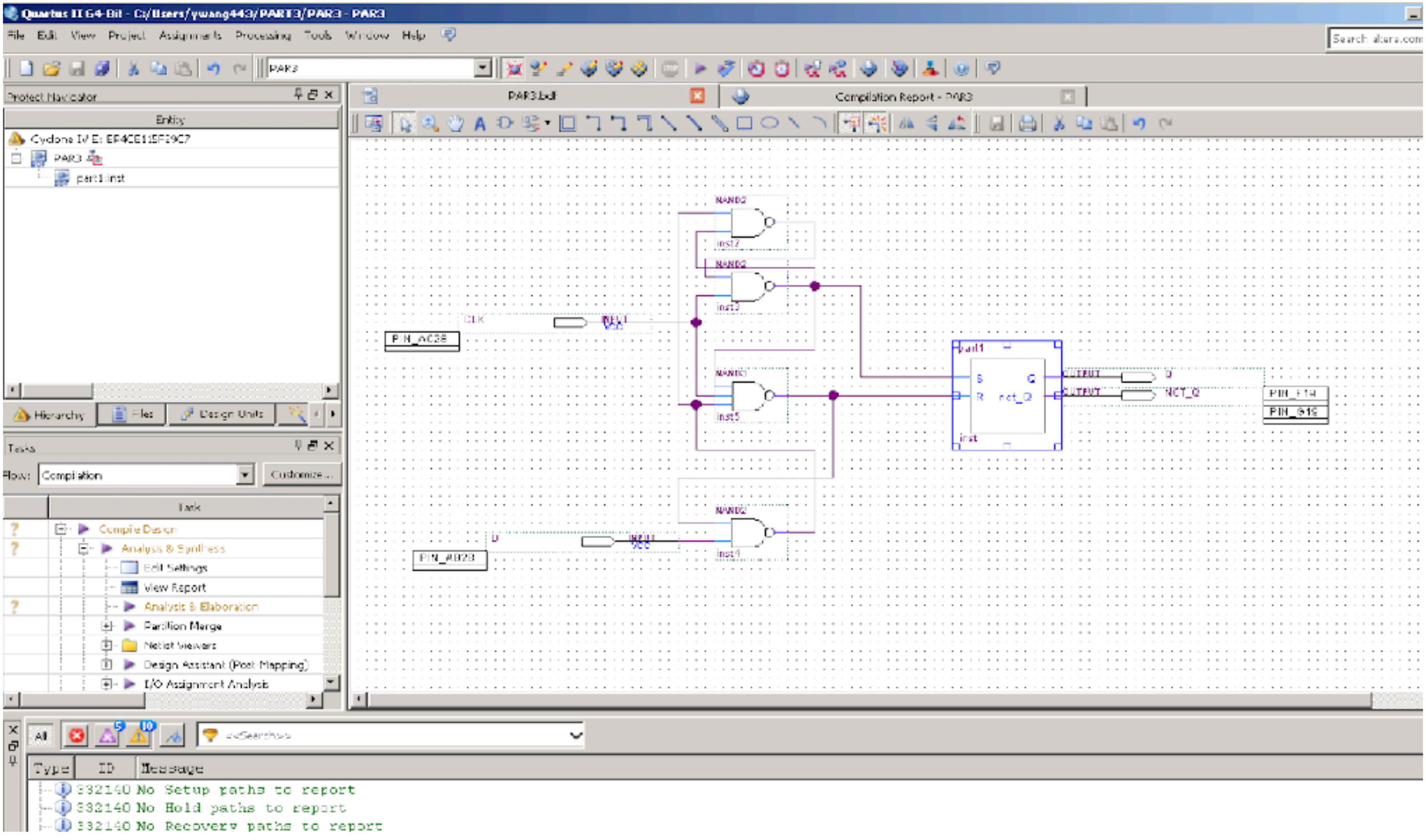
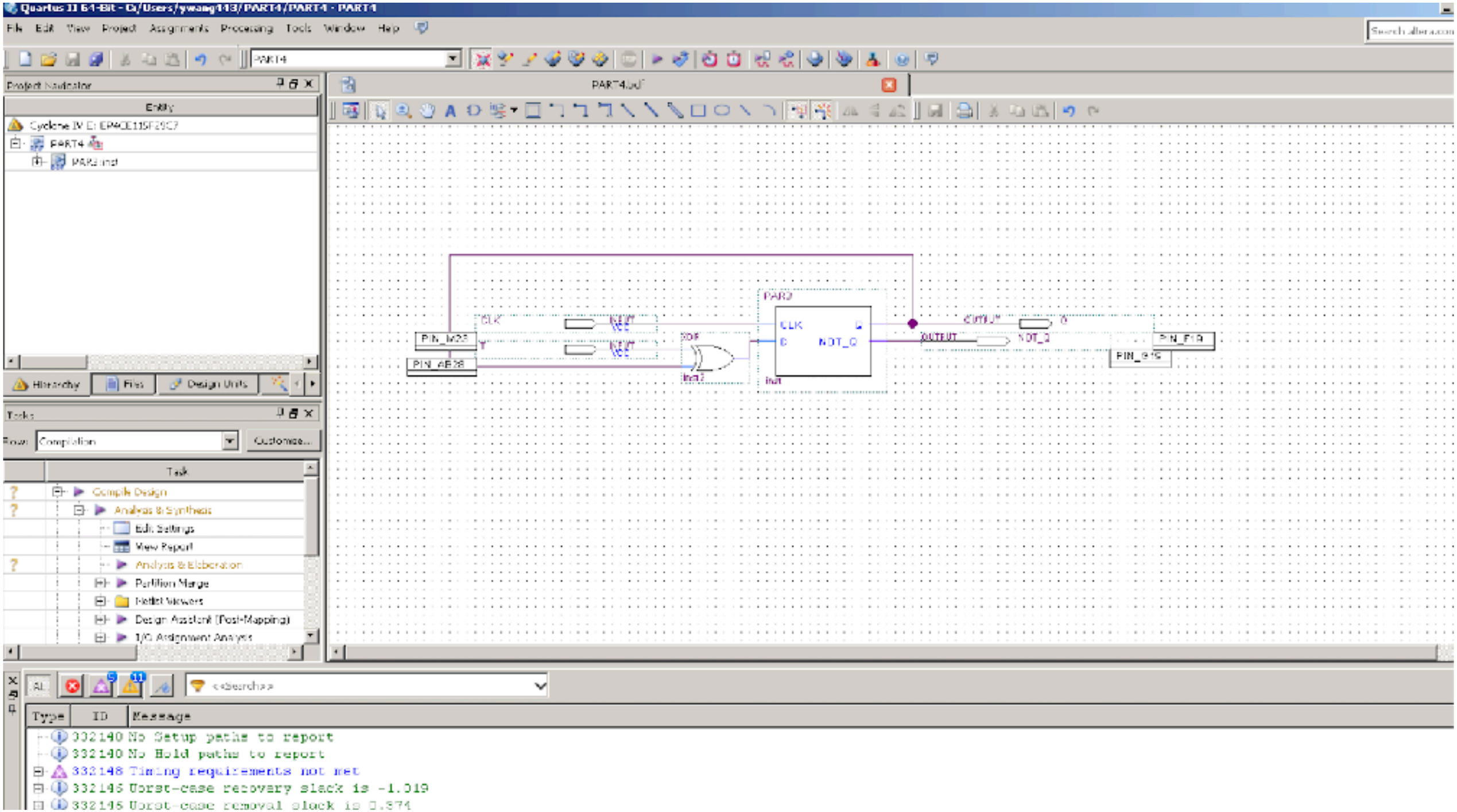


Figure 1: (Screen-shot of a simple circuit with – Parallel Adder)

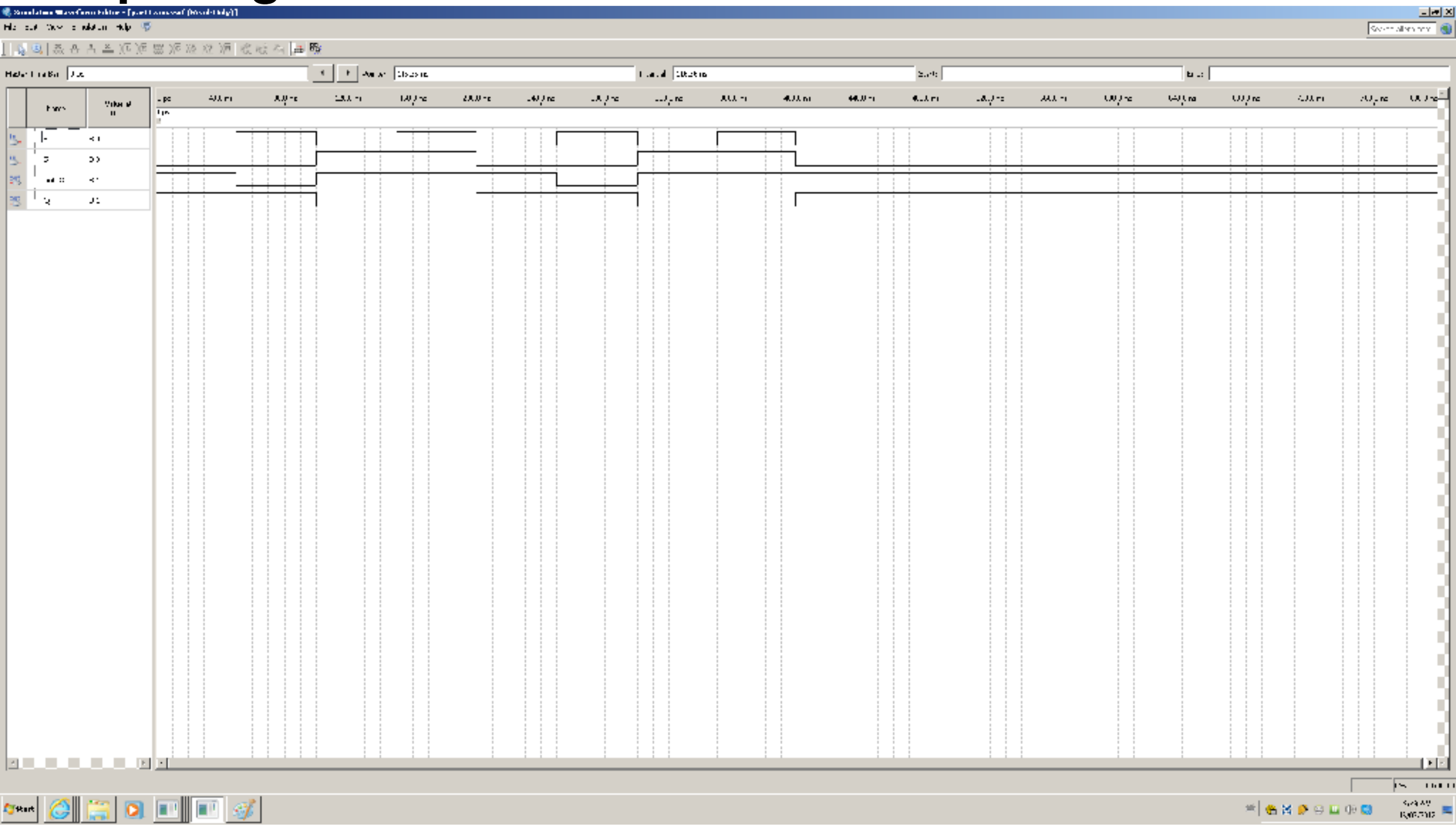
PART 3
Circuit diagrams
Simple logic circuit



PART 4
Circuit diagrams
Simple logic circuit



Experiment Data and Date Processing
Simple logic circuit



Finger 2:(Simulation Output waveform from the simple logic circuit) **part1**

Experiment Data and Date Processing
Simple logic circuit

Finger 2:(Simulation Output waveform from the simple logic circuit) **part2**

Table 1(PART1): Experimental data observed from the Altera DE2-115 board for simple circuit designed

Input given from the slide switches		Observed Output from the board	
R	S	Q	Not Q
0	0	1	1
0	1	1	0
1	0	0	1
1	1	1	0

Table 2(PART1): Comparison of Theoretical and Experimental results for the simple circuit

Input given from the slide switches		Expected Results		Actual Results	
R	S	Q	Not Q	Q	Not Q
0	0	1	1	1	1
0	1	1	0	1	0
1	0	0	1	0	1
1	1	1	0	1	0

Table 3(PART1)

Input given from the slide switches		Observed Output from the board	
R	S	Q	Not Q
0	0	1(LED didn’t glow)	1(LED didn’t glow)
0	1	1(LED didn’t glow)	0(LED did glow)
1	0	0(LED did glow)	1(LED didn’t glow)
1	1	1(LED didn’t glow)	0(LED did glow)

Discussions & Conclusion

We used Boolean logic to express complicated logic circuits into simplest form. We also used AND,XOR, OR gates to express full adder, then used full adders to express parallel adder. We also use adder function table to do the sum in both binary and hexadecimal, and showed the carry output separately.

In our experiment, we created two projects, designed their diagrams, compiled them, assigned pin names.Then, we simulated them and compared the experimental results with our theoretical results.And find the expected results and actual results and identical.