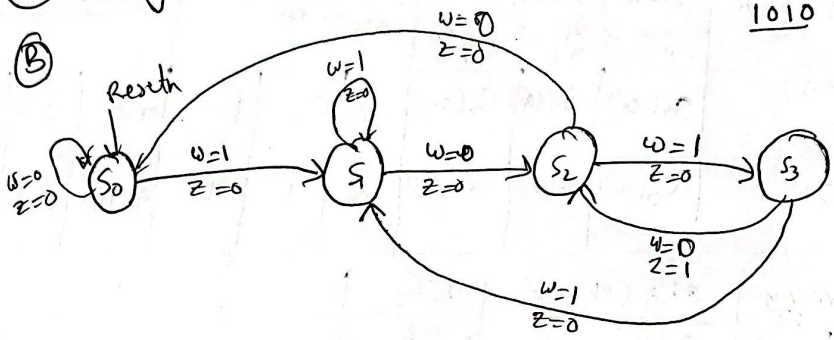
FARIHA RAHMAN
ID-19101038
Section 10
Lab Assignment-2

Problem 1:

(A) Mealy:

(B)



(C)

State table

Present State	Next State w=0	Next State w=1	Output w=0	Output w=1
S_0	S_0	S_1	0	0
S_1	S_2	S_1	0	0
S_2	S_0	S_3	0	0
S_3	S_2	S_1	1	0

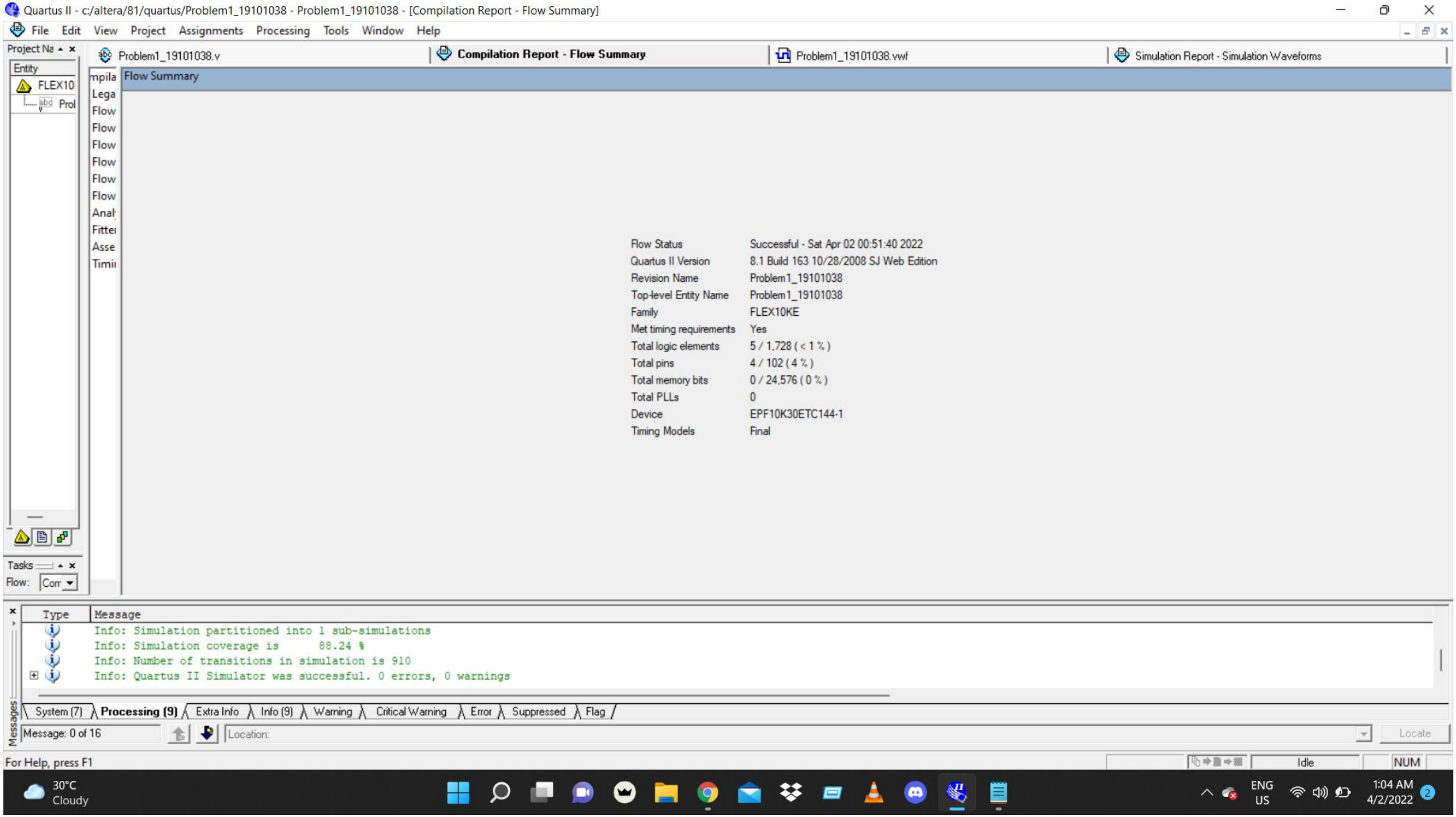
State Assigned table

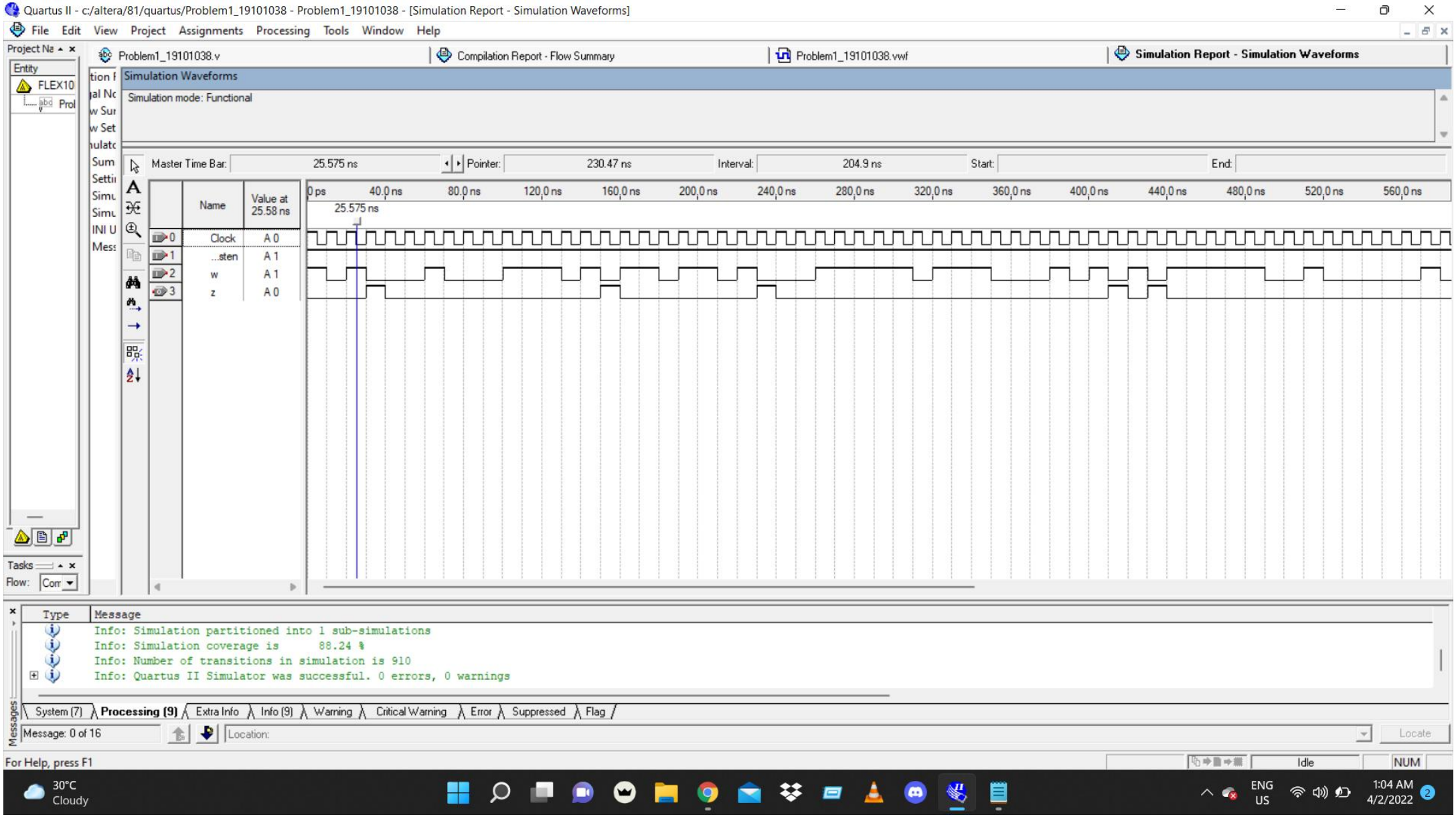
Present State	Next State w=0 Y_2 Y_1	Next State w=1 Y_2 Y_1	Output w=0	Output w=1
00	00	01	0	0
01	10	01	0	0
10	00	11	0	0
11	10	01	1	0

Scanned with CamScanner

```
module Problem1_19101038 (Clock, Resten, w, z);

input Clock, Resten, w;
output reg z;

reg [2:1]y,Y;
parameter S0=2'b00, S1=2'b01, S2=2'b10, S3=2'b11;

always @(w, y)
begin
case (y)

 S0: if(w)
   begin
    Y=S1;
    z=0;
   end

    else
   begin
    Y=S0;
    z=0;
   end

 S1: if(w)
   begin
    Y=S1;
    z=0;
   end

    else
   begin
    Y=S2;
    z=0;
   end

 S2: if(w)
   begin
    Y=S3;
    z=0;
   end

    else
   begin
    Y=S0;
    z=0;
   end

 S3: if(w)
   begin
    Y=S1;
    z=0;
   end

    else
```

```
   begin
    Y=S2;
    z=1;
   end
endcase
end
always @(negedge Resten, posedge Clock)
  if (Resten==0) y<=S0;
  else y<=Y;

endmodule
```

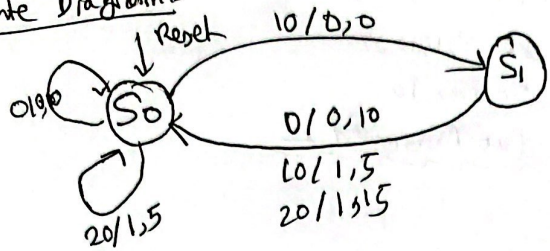

Quartus II - c:/altera/81/quartus/Problem1_19101038 - Problem1_19101038 - [Compilation Report - Flow Summary]
File Edit View Project Assignments Processing Tools Window Help
Project Na
Entity
FLEX10
Prol
Problem1_19101038.v
Compilation Report - Flow Summary
Problem1_19101038.vwf
Simulation Report - Simulation Waveforms
Flow Summary
Flow Status Successful - Sat Apr 02 00:51:40 2022
Quartus II Version 8.1 Build 163 10/28/2008 SJ Web Edition
Revision Name Problem1_19101038
Top-level Entity Name Problem1_19101038
Family FLEX10KE
Met timing requirements Yes
Total logic elements 5 / 1,728 (< 1 %)
Total pins 4 / 102 (4 %)
Total memory bits 0 / 24,576 (0 %)
Total PLLs 0
Device EPF10K30ETC144-1
Timing Models Final
Tasks
Flow:
Type Message
Info: Simulation partitioned into 1 sub-simulations
Info: Simulation coverage is 88.24 %
Info: Number of transitions in simulation is 910
Info: Quartus II Simulator was successful. 0 errors, 0 warnings
System (7) Processing (9) Extra Info Info (9) Warning Critical Warning Error Suppressed Flag
Message: 0 of 16
Location:
Locate
For Help, press F1
Idle
NUM
30°C Cloudy
ENG US
1:04 AM 4/2/2022


Quartus II - c:/altera/81/quartus/Problem1_19101038 - Problem1_19101038 - [Simulation Report - Simulation Waveforms]
File Edit View Project Assignments Processing Tools Window Help
Problem1_19101038.v
Compilation Report - Flow Summary
Problem1_19101038.vwf
Simulation Report - Simulation Waveforms
Simulation Waveforms
Simulation mode: Functional
Master Time Bar: 25.575 ns
Pointer: 230.47 ns
Interval: 204.9 ns
Start:
End:
Name
Value at 25.58 ns
0 Clock A 0
1 ...sten A 1
2 w A 1
3 z A 0
0 ps 40.0 ns 80.0 ns 120.0 ns 160.0 ns 200.0 ns 240.0 ns 280.0 ns 320.0 ns 360.0 ns 400.0 ns 440.0 ns 480.0 ns 520.0 ns 560.0 ns
25.575 ns
Type
Message
Info: Simulation partitioned into 1 sub-simulations
Info: Simulation coverage is 88.24 %
Info: Number of transitions in simulation is 910
Info: Quartus II Simulator was successful. 0 errors, 0 warnings
System (7) Processing (9) Extra Info Info (9) Warning Critical Warning Error Suppressed Flag
Message: 0 of 16
Location:
Locate
For Help, press F1
Idle
NUM
30°C Cloudy
ENG US
1:04 AM 4/2/2022

19101038

Problem-2

(A) State Diagram:



mmy	Chg
0 tk = 00	0 tk = 00
5 tk = 01	5 tk = 01
10 tk = 10	10 tk = 10
20 tk = 10	15 tk = 11

(C)

Present State	Next State			Output			Output return (chg)		
	0 tk 00	5 tk 01	10 tk 10	buy					
S0 (00)	S0 (00)	S1 (01)	S0 (00)	0	0	1	00	00	01
S1 (01)	S0 (00)	S0 (00)	S0 (00)	0	1	1	10	01	11

(B)

(coin-in) mmy	bits
0 tk	00
10 tk	01
20 tk	10

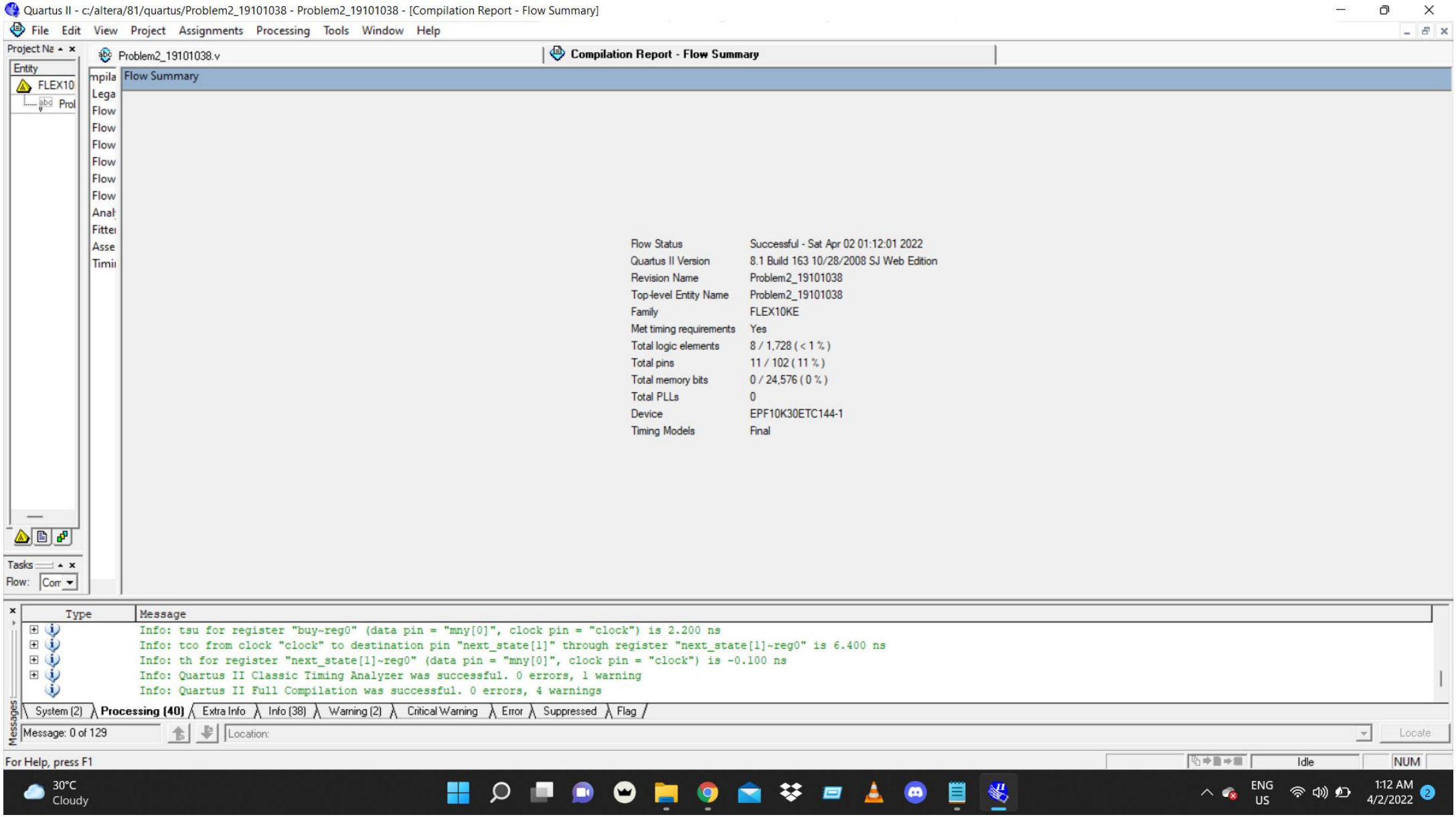
chg (change)	bits
0 tk	00
5 tk	01
10 tk	10
15 tk	11

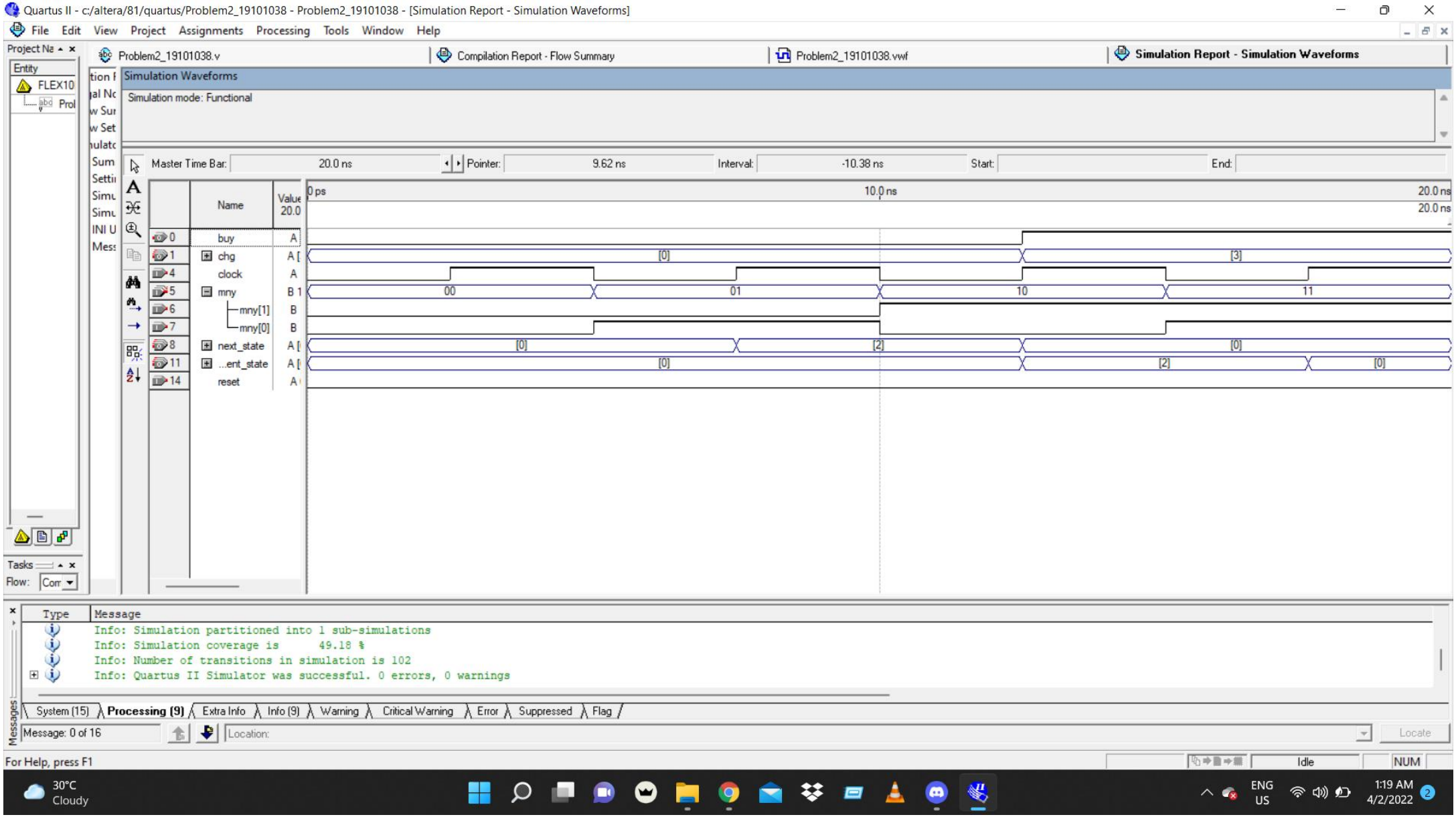
Clock	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10
mmy	0	10	0	0	10	10	0	0	20	0
buy	0	0	0	0	0	1	0	0	1	0
chg	0	0	10	0	0	5	0	0	5	0

Scanned with CamScanner

```
module Problem2_19101038(clock, reset, mny , buy, present_state, next_state, chg);
 input clock, reset;
 input [1:0] mny ;
 output reg buy; // output z = 1 or 0
 output reg [1:0] chg, present_state, next_state;
 parameter  state0tk= 2'b00, // 0tk/final state
    state10tk= 2'b10, // 10tk state
    product = 15; // what I am buying, 10/15/20 tk profuct

 always@(posedge clock)
 begin
  begin
   if(reset==1)
   begin
    present_state=0;
    next_state=0;
   end
   else
   begin
    present_state=next_state;
    case(present_state)

    state0tk: if(mny  == 2'b00) // 0 tk
       begin
        next_state = state0tk;
        buy =0;
        chg = 2'b00;
       end
      else if(mny  == 2'b01) // 10 tk
       begin
        next_state=state10tk;
        buy=0;
        chg=2'b00;
       end
      else if(mny  == 2'b10) // 20 tk
       begin
        next_state = state0tk;
        buy = 1;
        chg = 2'b01;
       end

    state10tk: if(mny  == 2'b00)
       begin
        next_state = state0tk;
        buy =0;
        chg =2'b10;
       end
      else if(mny  == 2'b01)
       begin
        next_state=state0tk;
        buy= 1;
        chg = 2'b01;
       end
      else if(mny  == 2'b10)
       begin
```

```
        next_state=state0tk;
        buy=1;
        chg=2'b11;
       end

    endcase
   end
  end
 end
endmodule
```


Quartus II - c:/altera/81/quartus/Problem2_19101038 - Problem2_19101038 - [Compilation Report - Flow Summary]
File Edit View Project Assignments Processing Tools Window Help
Project Na
Entity
FLEX10
Prol
Problem2_19101038.v
Compilation Report - Flow Summary
Flow Summary
Flow Status Successful - Sat Apr 02 01:12:01 2022
Quartus II Version 8.1 Build 163 10/28/2008 SJ Web Edition
Revision Name Problem2_19101038
Top-level Entity Name Problem2_19101038
Family FLEX10KE
Met timing requirements Yes
Total logic elements 8 / 1,728 (< 1 %)
Total pins 11 / 102 (11 %)
Total memory bits 0 / 24,576 (0 %)
Total PLLs 0
Device EPF10K30ETC144-1
Timing Models Final
Tasks
Flow:
Type
Message
Info: tsu for register "buy~reg0" (data pin = "mny[0]", clock pin = "clock") is 2.200 ns
Info: tco from clock "clock" to destination pin "next_state[1]" through register "next_state[1]~reg0" is 6.400 ns
Info: th for register "next_state[1]~reg0" (data pin = "mny[0]", clock pin = "clock") is -0.100 ns
Info: Quartus II Classic Timing Analyzer was successful. 0 errors, 1 warning
Info: Quartus II Full Compilation was successful. 0 errors, 4 warnings
System (2) Processing (40) Extra Info Info (38) Warning (2) Critical Warning Error Suppressed Flag
Message: 0 of 129
Location:
Locate
Messages
For Help, press F1
Idle
NUM
30°C Cloudy
ENG US
1:12 AM 4/2/2022


Quartus II - c:/altera/81/quartus/Problem2_19101038 - Problem2_19101038 - [Simulation Report - Simulation Waveforms]
File Edit View Project Assignments Processing Tools Window Help
Problem2_19101038.v
Compilation Report - Flow Summary
Problem2_19101038.vwf
Simulation Report - Simulation Waveforms
Simulation Waveforms
Simulation mode: Functional
Master Time Bar: 20.0 ns
Pointer: 9.62 ns
Interval: -10.38 ns
Start:
End:
Name
Value 20.0
0 ps
10.0 ns
20.0 ns
buy
chg
clock
mny
mny[1]
mny[0]
next_state
...ent_state
reset
00
01
10
11
Type
Message
Info: Simulation partitioned into 1 sub-simulations
Info: Simulation coverage is 49.18 %
Info: Number of transitions in simulation is 102
Info: Quartus II Simulator was successful. 0 errors, 0 warnings
System (15)
Processing (9)
Extra Info
Info (9)
Warning
Critical Warning
Error
Suppressed
Flag
Message: 0 of 16
Location:
Locate
For Help, press F1
Idle
NUM
30°C
Cloudy
ENG
US
1:19 AM
4/2/2022