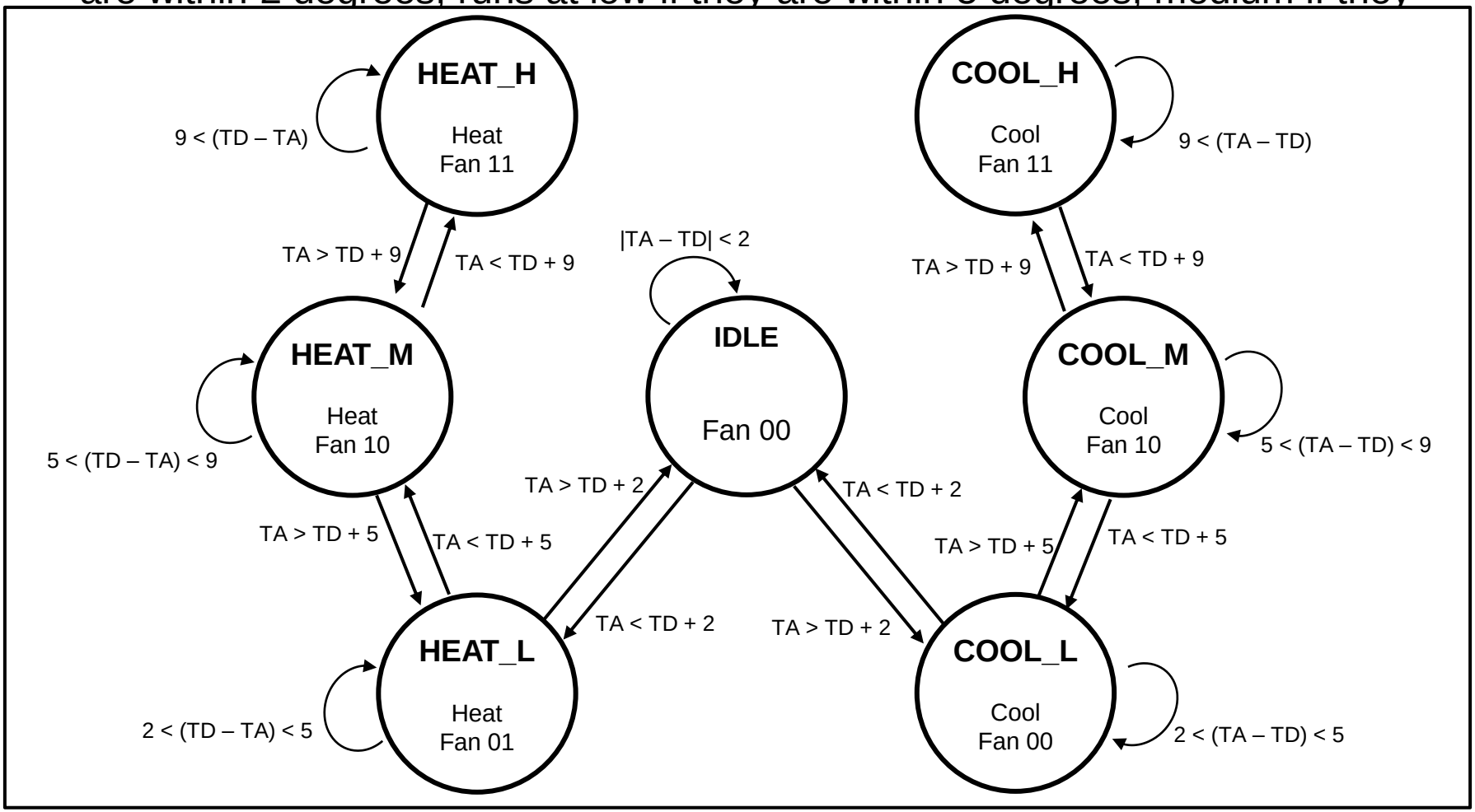
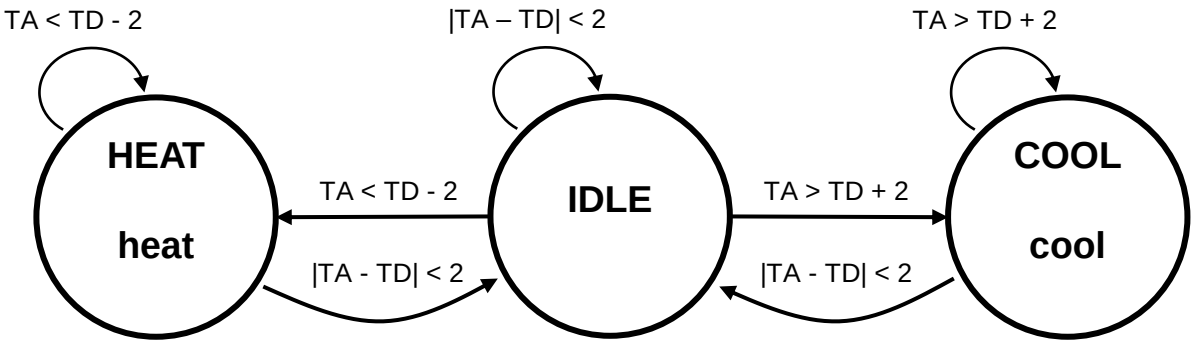
ELE 3510 HW8 Name_____

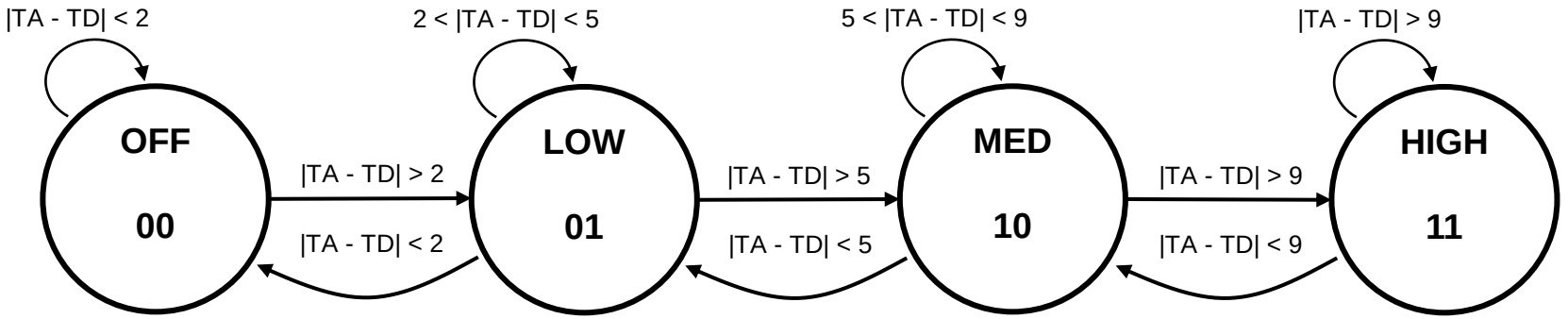
1) Create a state transition diagram for a 3 speed heating/cooling (HVAC) system. Assume the desired temperature and actual temperatures are inputs, both heating and cooling is provided, the system is off if the two temperatures are within 2 degrees, runs at low if they are within 5 degrees, medium if they



ELE 3510 HW8 Name_____

1) Create a state transition diagram for a 3 speed heating/cooling (HVAC) system. Assume the desired temperature and actual temperatures are inputs, both heating and cooling is provided, the system is off if the two temperatures are within 2 d Leads to VERY simple code s, medium if they are within 9 degrees and high if they are greater than 9 degrees apart. The outputs are fan speed (in binary) (Off, Low, Med, High), heat and cool. 30 pts



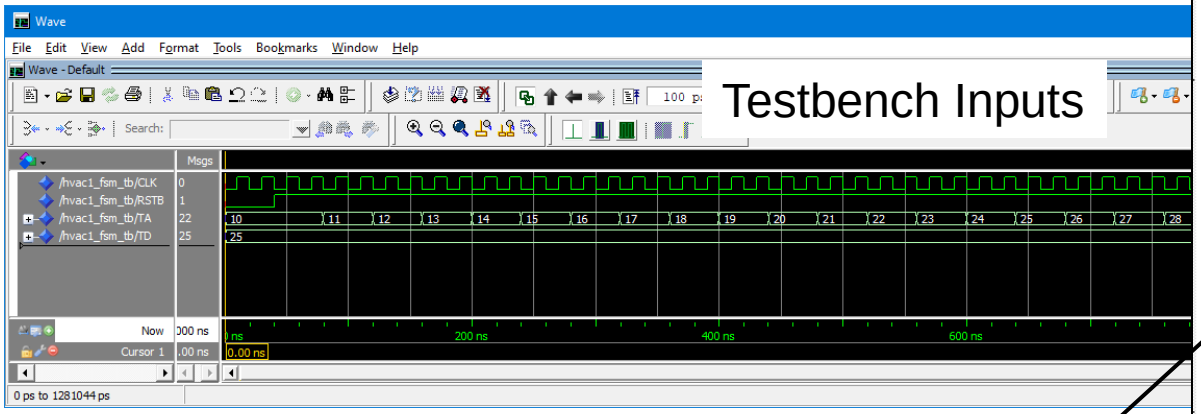



ELE 3510 HW8 Name_____

2) Code and simulate your HVAC system. Use a fixed Desired temperature of 25°C. Ramp the Actual temperature from 10°C to 40°C. 70 pts

code(x2), RTL, state diagram, simulation

Include your states in the simulation




```
architecture behavioral of hvac_fsm is

   --
   -- internal signals
   --

   -- States
   type STATETYPE_run is (IDLE, COOL, HEAT);
   signal thermal_state:      STATETYPE_run;
   signal thermal_state_next: STATETYPE_run;

   type STATETYPE_fan is (OFF, LOWF, MEDF, HIGHF);
   signal fan_state:       STATETYPE_fan;
   signal fan_state_next:  STATETYPE_fan;

   -- Type changes
   signal Tactual:   signed(7 downto 0);
   signal Tdesired:  signed(7 downto 0);
   signal fan:       unsigned(1 downto 0);

   -- Calculated value
   signal Tdelta_abs:   signed(7 downto 0);

begin
   -- Name changes
   Tactual <= signed(i_TA);
   Tdesired <= signed(i_TD);

   -- Calculated value
   Tdelta_abs <= abs(Tactual - Tdesired);
```

Type changes done 1 time instead of all over

Create a signal for the frequently used calculation: abs(Ta-Td)

ELE 3510 HW8 Name_____

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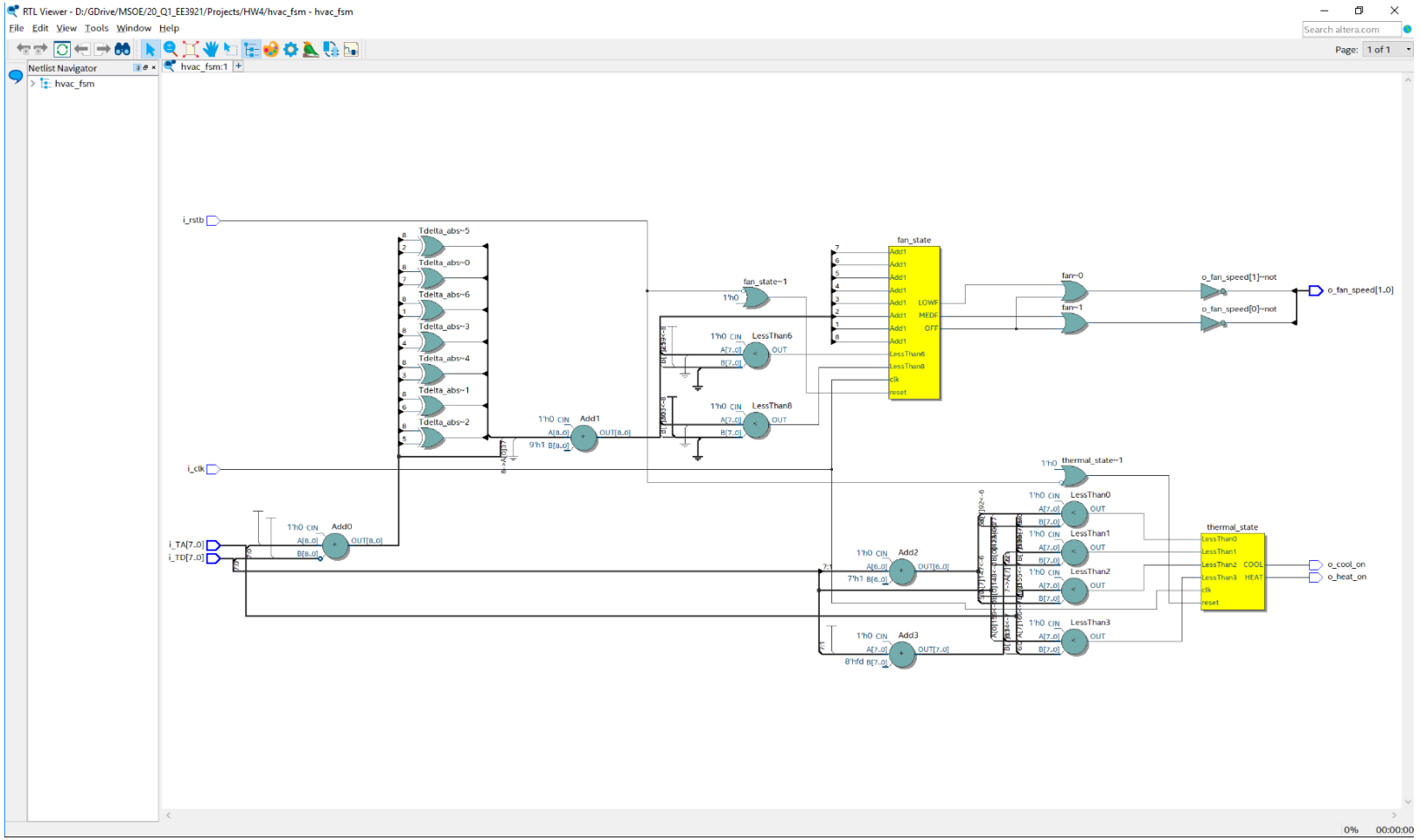
code(x2), RTL, state diagram, simulation

Include your states in the simulation



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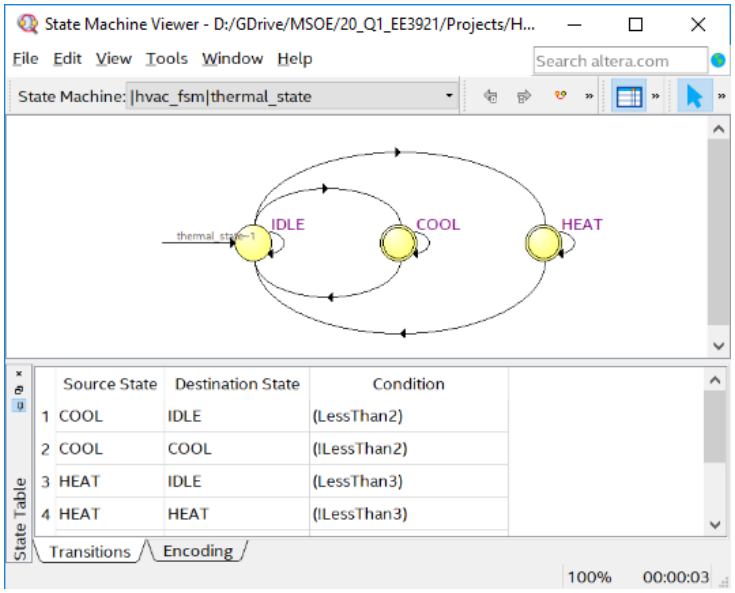


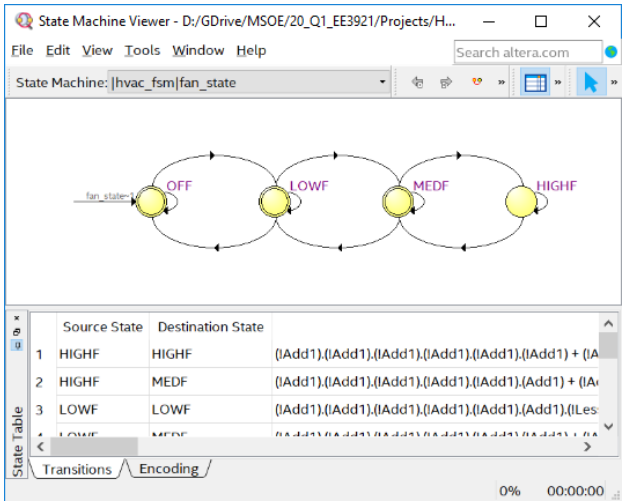

ELE 3510

States added
| Tdelta | added

2) ate your H

25°C. Ramp the Actual te

code(x2), RTL, state

Include your states in the simulation