Lab 3 – CONFORMAL

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I. Perform LEC with Conformal

Step 1: Change directory to “lec_env” folder. In this Lab 4, we will work at this place:

Step 2: Link the RTL, Netlist and Library file from “synthesis_env” into this place:

Step 3: Confirm there has no broken link (link files successfully)

Step 4: Prepare the setup script for Conformal as below:

Step 5: Prepare the execution script as below:

Step 6: Execute

Step 7: It will automatically open the GUI and execute processes that we described in file “lec.tcl”

Result

```
0
// Command: compare
================================================================================
Compared points      PO     DFF    DLAT      Total
--------------------------------------------------------------------------------
Equivalent           16     19     4         39
================================================================================
0
// Command: exit
```

II. Debug Non-equivalent point

Step 1: Copy Netlist into this place:

Step 2: Confirm Netlist already copied (not link):

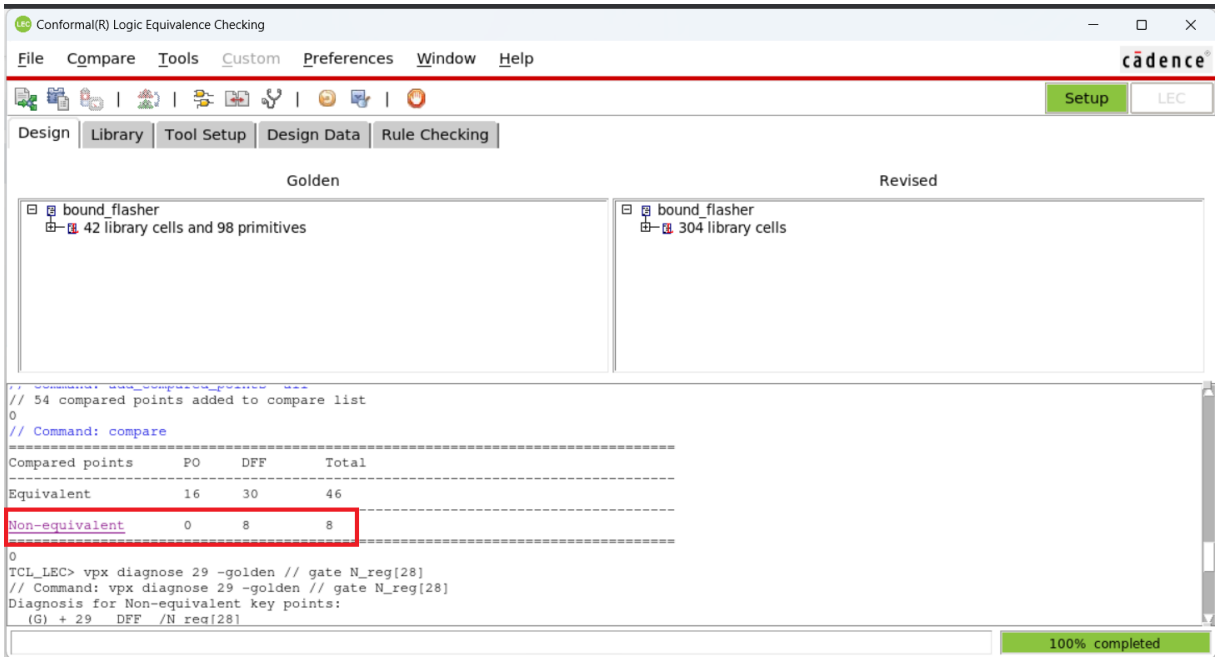
Step 3: Modify Netlist to make a “bug” intentionally:

bound_flasher_m.v

```
NOR3BX1 g5623__1881(.AN (N[2]), .B (N[1]), .C (N[3]), .Y (n_29));
NOR3BX1 g5624__5115(.AN (N[1]), .B (N[4]), .C (n_144), .Y (n_28));
NOR2X1 g5625__7482(.A (n_141), .B (n_145), .Y (n_27));
OR2X1 g5626__4733(.A (state[2]), .B (state[5]), .Y (n_26));
OR2X1 g5627__6161(.A (state[1]), .B (state[0]), .Y (n_25));
OR2X1 g5628__9315(.A (state[3]), .B (state[4]), .Y (n_24));
BUFX2 drc_bufs5661(.A (n_19), .Y (n_0));
INVX1 g5673(.A (state[4]), .Y (n_8));
INVX1 g5675(.A (state[0]), .Y (n_12));
//INVX2 drc_bufs5677(.A (n_4), .Y (n_6));
INVX2 drc_bufs5679(.A (n_4), .Y (n_7));
INVX2 drc_bufs5681(.A (n_4), .Y (n_5));
INVX1 drc_bufs5683(.A (n_22), .Y (n_1));
INVX2 drc_bufs5685(.A (n_56), .Y (n_4));
NAND3BXL g5689__9945(.AN (n_34), .B (n_18), .C (n_55), .Y (n_23));
NAND3BXL g5691__2883(.AN (n_143), .B (n_29), .C (n_27), .Y (n_14));
NAND3BXL g5693__2346(.AN (n_36), .B (N[31]), .C (flick), .Y (n_15));
NOR2X1 g5695__1666(.A (n_31), .B (n_49), .Y (n_16));
INVX1 g5697(.A (n_54), .Y (n_18));
INVX1 g5699(.A (n_16), .Y (n_17));
XNOR2X1 sub_94_11_g1096__7410(.A (N[27]), .B (sub_94_11_n_564), .Y
     (n_173));
XNOR2X1 sub_94_11_g1097__6417(.A (N[23]), .B (sub_94_11_n_572), .Y
     (n_169));
XNOR2X1 sub_94_11_g1098__5477(.A (N[19]), .B (sub_94_11_n_579), .Y
     (n_165));
OAI2BB1X1 sub_94_11_g1099__2398(.A0N (N[26]), .A1N (sub_94_11_n_586),
     .B0 (sub_94_11_n_564), .Y (n_172));
XNOR2X1 sub_94_11_g1100__5107(.A (N[15]), .B (sub_94_11_n_589), .Y
     (n_161));
OR2X1 sub_94_11_g1101__6260(.A (N[26]), .B (sub_94_11_n_586), .Y
     (sub_94_11_n_564));
```

Step 4: Re-execute

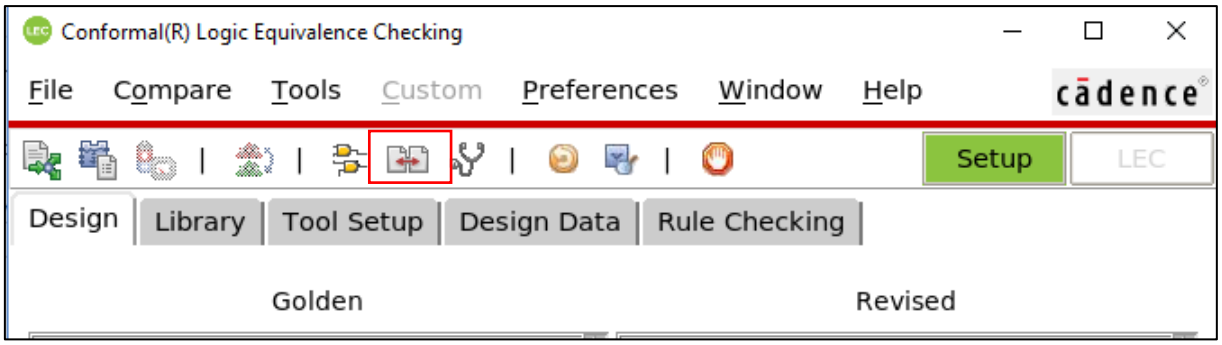
Step 5: When execution is done, “Non-equivalent” points will appear:



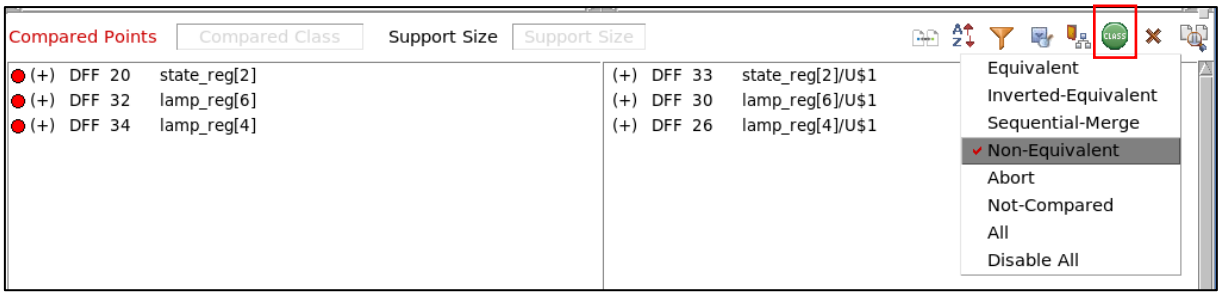
As you can see, i have total 8 Non-equivalent points

Step 6: There are many ways for debugging nonequivalent points. The following part is the debugging example using “Diagnosis Manager” and “Schematics Viewer” in GUI:

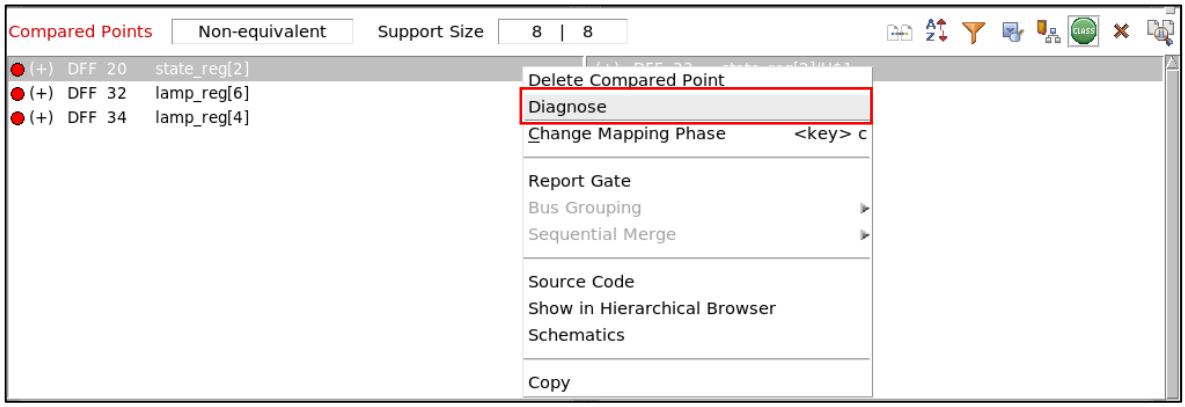
Click to open “Mapping Manager”



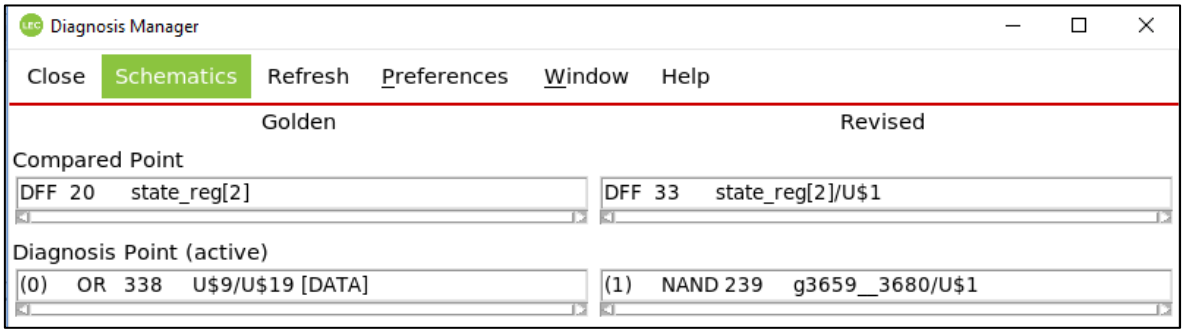
In “Mapping Manager” window, click “Class”, choose “Disable All” then choose “Non-Equivalent” to display only nonequivalent points



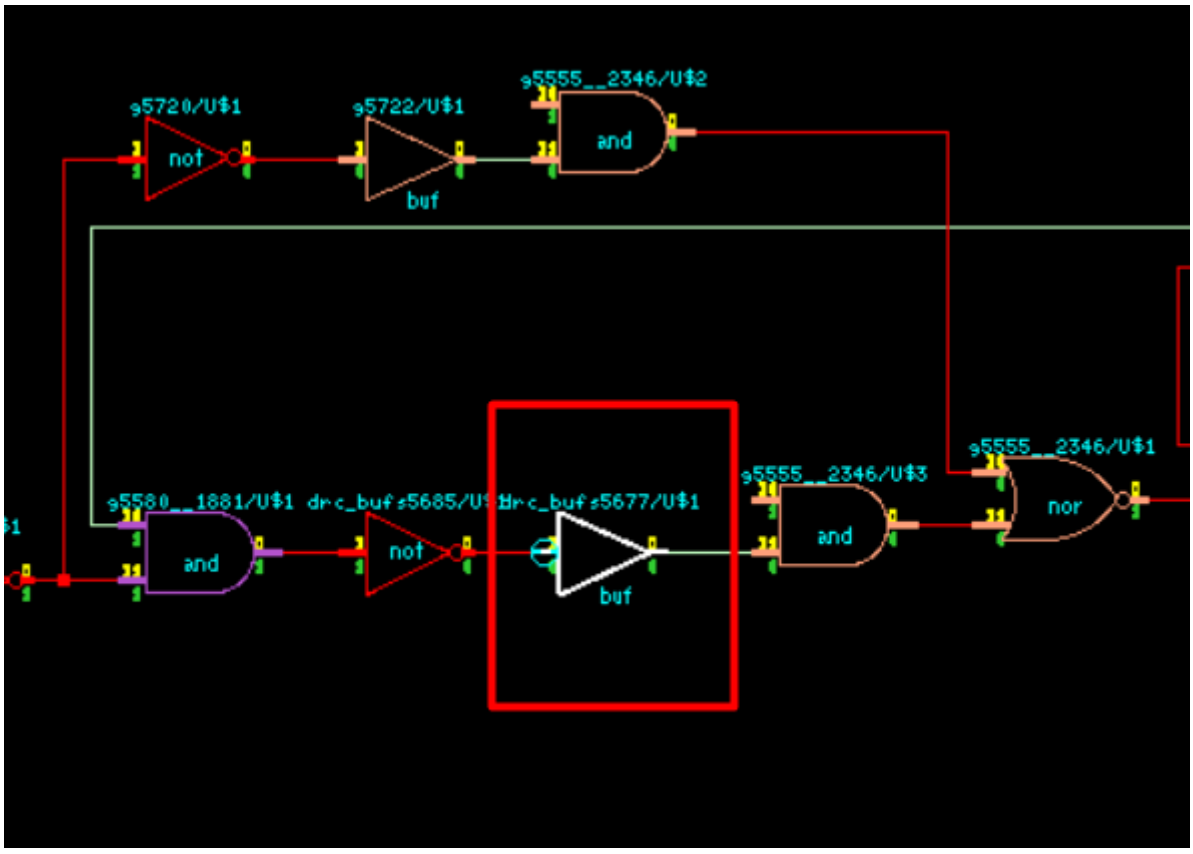
Right-click to first nonequivalent key point and choose “Diagnose” to open “Diagnosis Manager”



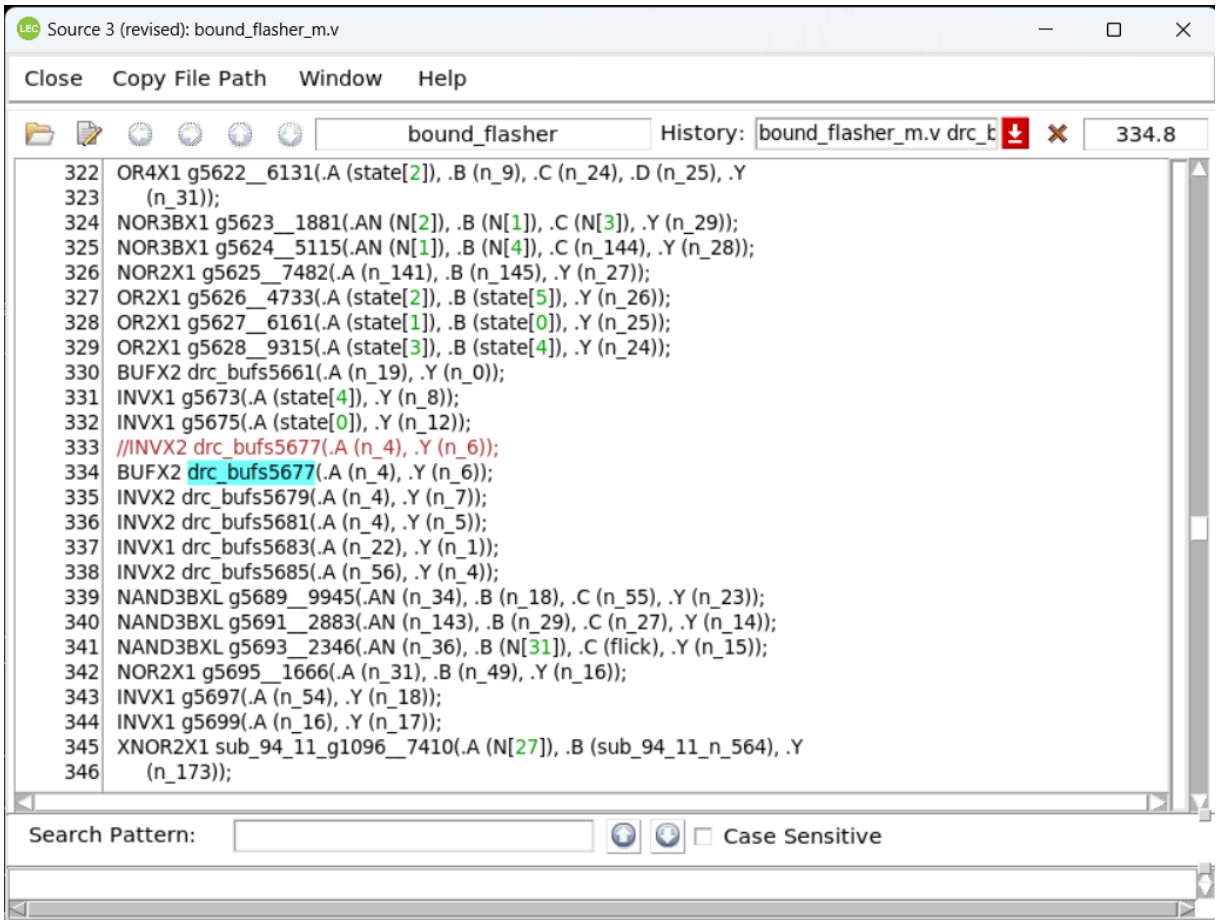
In “Diagnosis Manager” window, choose “Schematics” to open “Schematics Viewer”



After finding bug, the bug is:



As you can see at the input of the Not gate is 0 but the output is 0 too. It mus be 1 to be right



After debug, the final result

```
// Mapping key points ...
================================================================================
Mapped points: SYSTEM class
--------------------------------------------------------------------------------
Mapped points     PI     PO     DFF    DLAT      Total
--------------------------------------------------------------------------------
Golden            3      16     19     4         42
--------------------------------------------------------------------------------
Revised           3      16     19     4         42
================================================================================
0
// Command: map_key_points
// Mapping key points ...
================================================================================
Mapped points: SYSTEM class
--------------------------------------------------------------------------------
Mapped points     PI     PO     DFF    DLAT      Total
--------------------------------------------------------------------------------
Golden            3      16     19     4         42
--------------------------------------------------------------------------------
Revised           3      16     19     4         42
================================================================================
0
// Command: add_compared_points -all
// 39 compared points added to compare list
0
// Command: compare
================================================================================
Compared points      PO     DFF    DLAT      Total
--------------------------------------------------------------------------------
Equivalent           16     19     4         39
================================================================================
0
// Command: exit
```