Experiment 6

TVDC (3EC605ME24)

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AIM : To analyze code coverage

Pre Lab Quiz :

1-What is code coverage ?

Ans - Code coverage is a metric used in software testing to assess the proportion of source code executed during testing. It indicates the extent to which the code has been tested and highlights any untested sections. This metric aids in identifying untested code segments, enhances software reliability and quality, and ensures that critical execution paths undergo testing.

2-List down the types of code coverage .

Ans – Following are the types of code coverage :

- **Statement Coverage** – Measures the percentage of executed statements.
- **Branch Coverage** – Ensures all decision branches (if-else, loops) are tested.
- **Function Coverage** – Checks if all functions in the program are called.
- **Condition Coverage** – Ensures all boolean expressions are evaluated as true and false.
- **Path Coverage** – Verifies all possible execution paths are tested.

TASKS :

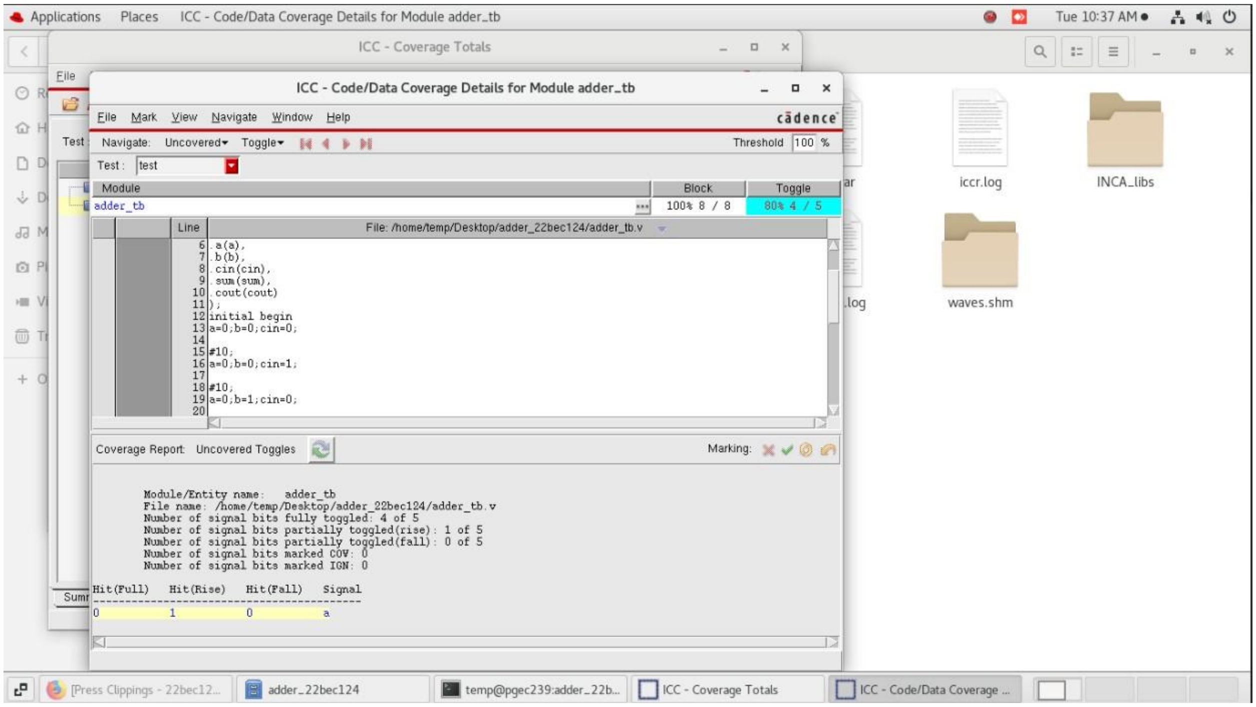
FULL ADDER VERILOG CODE :

```
module full_adder ( input
A, // Input A input B, //
Input B input Cin, //
Carry-in output Sum, //
Sum output output Cout //
Carry-out
);
assign Sum = A ^ B ^ Cin; // XOR for sum assign Cout = (A
& B) | (B & Cin) | (A & Cin); // Carry logic
endmodule
```

TESTBENCH :

```
module tb_full_adder; reg
A, B, Cin; // Inputs wire
Sum, Cout; // Outputs
full_adder uut (  .A(A),
.B(B),
.Cin(Cin),
.Sum(Sum), .Cout(Cout)
);
initial begin
A = 0; B = 0; Cin = 0; #10;
A = 0; B = 0; Cin = 1; #10;
A = 0; B = 1; Cin = 0; #10; A
= 0; B = 1; Cin = 1; #10;
A = 1; B = 0; Cin = 0; #10;
A = 1; B = 0; Cin = 1; #10;
A = 1; B = 1; Cin = 0; #10;
A = 1; B = 1; Cin = 1; #10;
$finish; // End simulation end endmodule
```

SIMULATION :


Applications
Places
ICC - Code/Data Coverage Details for Module adder_tb
Tue 10:37 AM
ICC - Coverage Totals
ICC - Code/Data Coverage Details for Module adder_tb
File
Mark
View
Navigate
Window
Help
cādence
Navigate:
Uncovered
Toggle
Threshold 100 %
iccr.log
INCA_libs
waves.shm
Coverage Report: Uncovered Toggles
Marking:
[Press Clippings - 22bec12...
adder_22bec124
temp@pgec239:adder_22b...
ICC - Coverage Totals
ICC - Code/Data Coverage ...

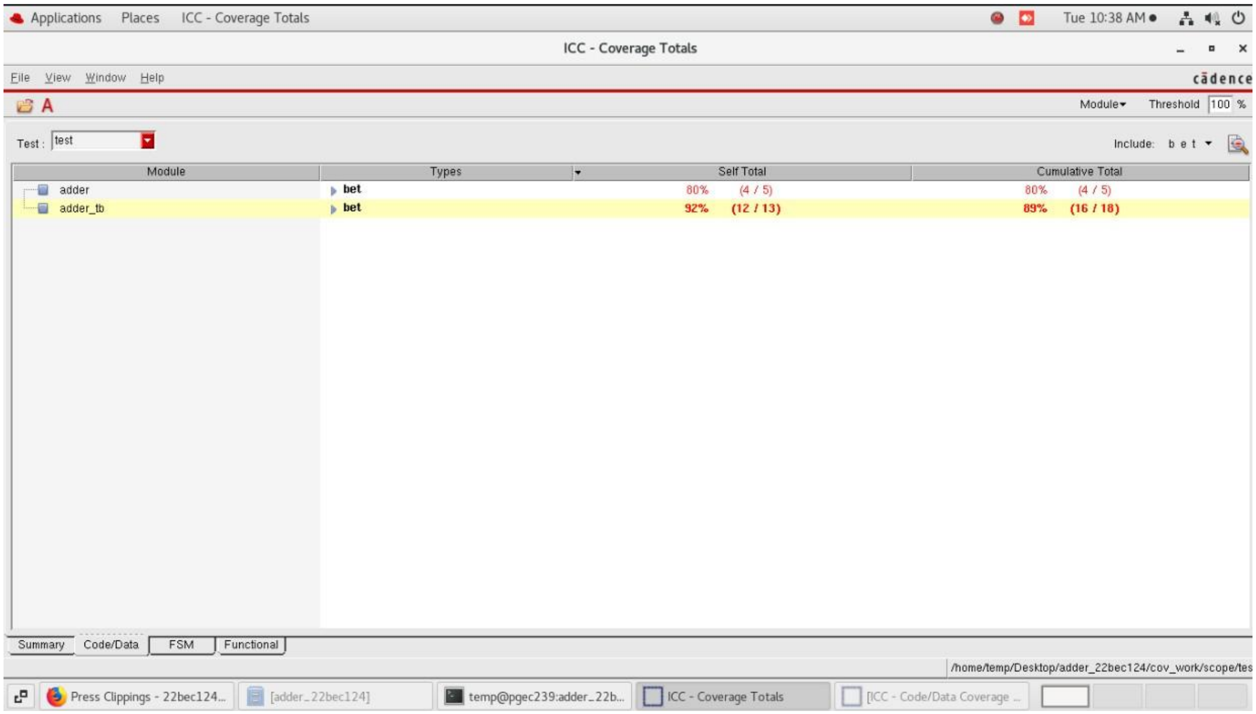
Test : test

Module	Block	Toggle
adder_tb	100% 8 / 8	80% 4 / 5

File: /home/temp/Desktop/adder_22bec124/adder_tb.v

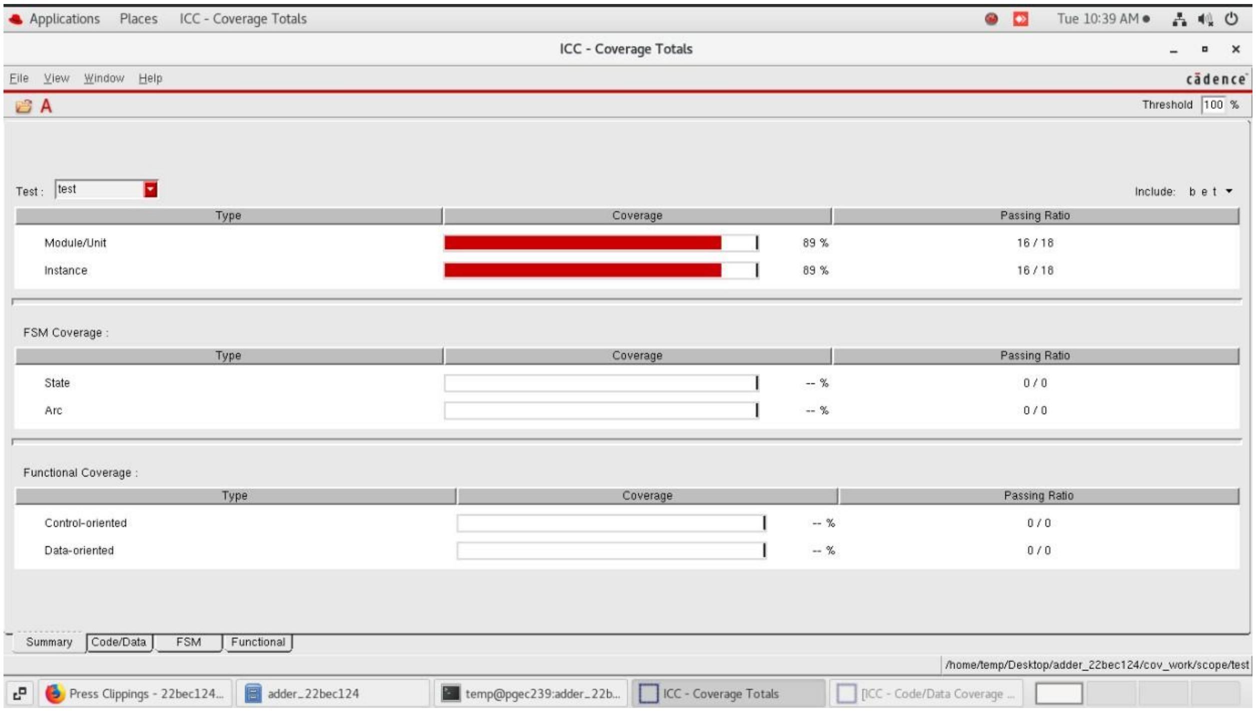
```
.a(a),
.b(b),
.cin(cin),
.sum(sum),
.cout(cout)
);
initial begin
a=0;b=0;cin=0;

#10;
a=0;b=0;cin=1;

#10;
a=0;b=1;cin=0;

```

```
        Module/Entity name:   adder_tb
        File name: /home/temp/Desktop/adder_22bec124/adder_tb.v
        Number of signal bits fully toggled: 4 of 5
        Number of signal bits partially toggled(rise): 1 of 5
        Number of signal bits partially toggled(fall): 0 of 5
        Number of signal bits marked COV: 0
        Number of signal bits marked IGN: 0
Hit(Full)   Hit(Rise)   Hit(Fall)   Signal
------------------------------------------
0           1           0           a
```



Test : test

Module	Types	Self Total		Cumulative Total	
adder	bet	80%	(4 / 5)	80%	(4 / 5)
adder_tb	bet	92%	(12 / 13)	89%	(16 / 18)


Applications Places ICC - Coverage Totals
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ICC - Coverage Totals
File View Window Help
cādence
Threshold 100 %
Include: b e t
Summary
Code/Data
FSM
Functional
/home/temp/Desktop/adder_22bec124/cov_work/scope/test
Press Clippings - 22bec124...
adder_22bec124
temp@pgec239:adder_22b...
ICC - Coverage Totals
[ICC - Code/Data Coverage ...

Test : test

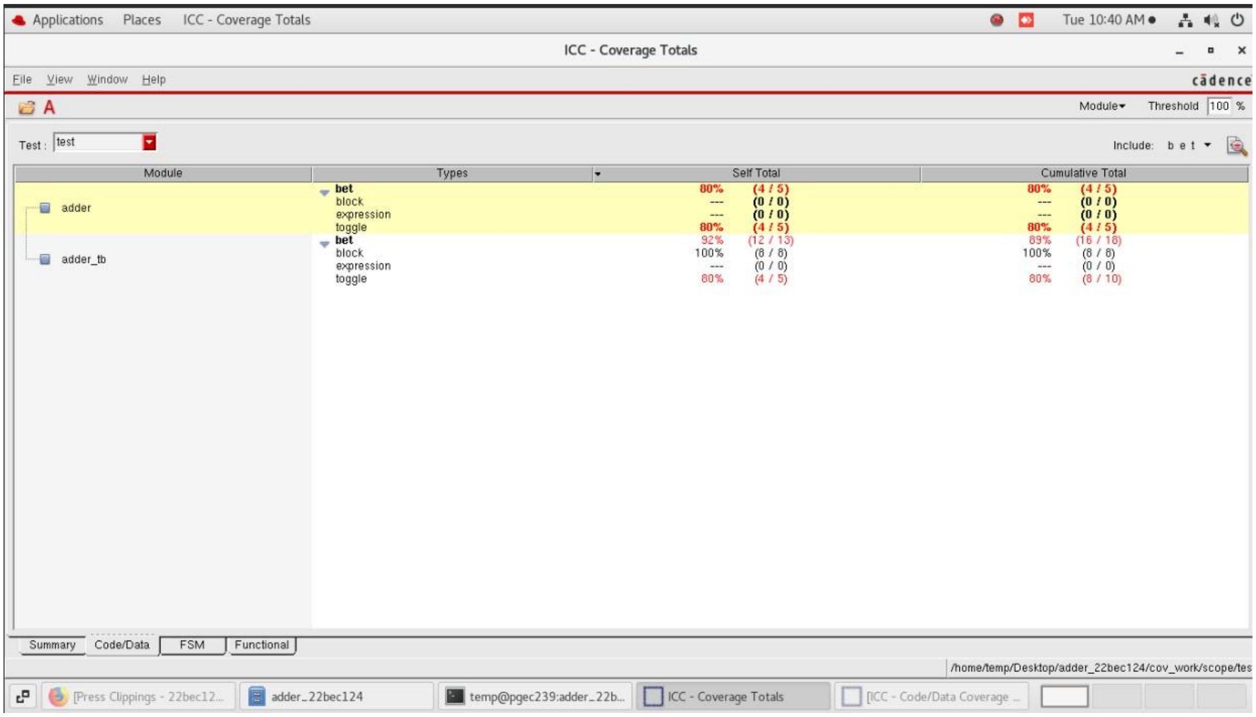
Type	Coverage	Passing Ratio
Module/Unit	89 %	16 / 18
Instance	89 %	16 / 18

FSM Coverage :

Type	Coverage	Passing Ratio
State	-- %	0 / 0
Arc	-- %	0 / 0

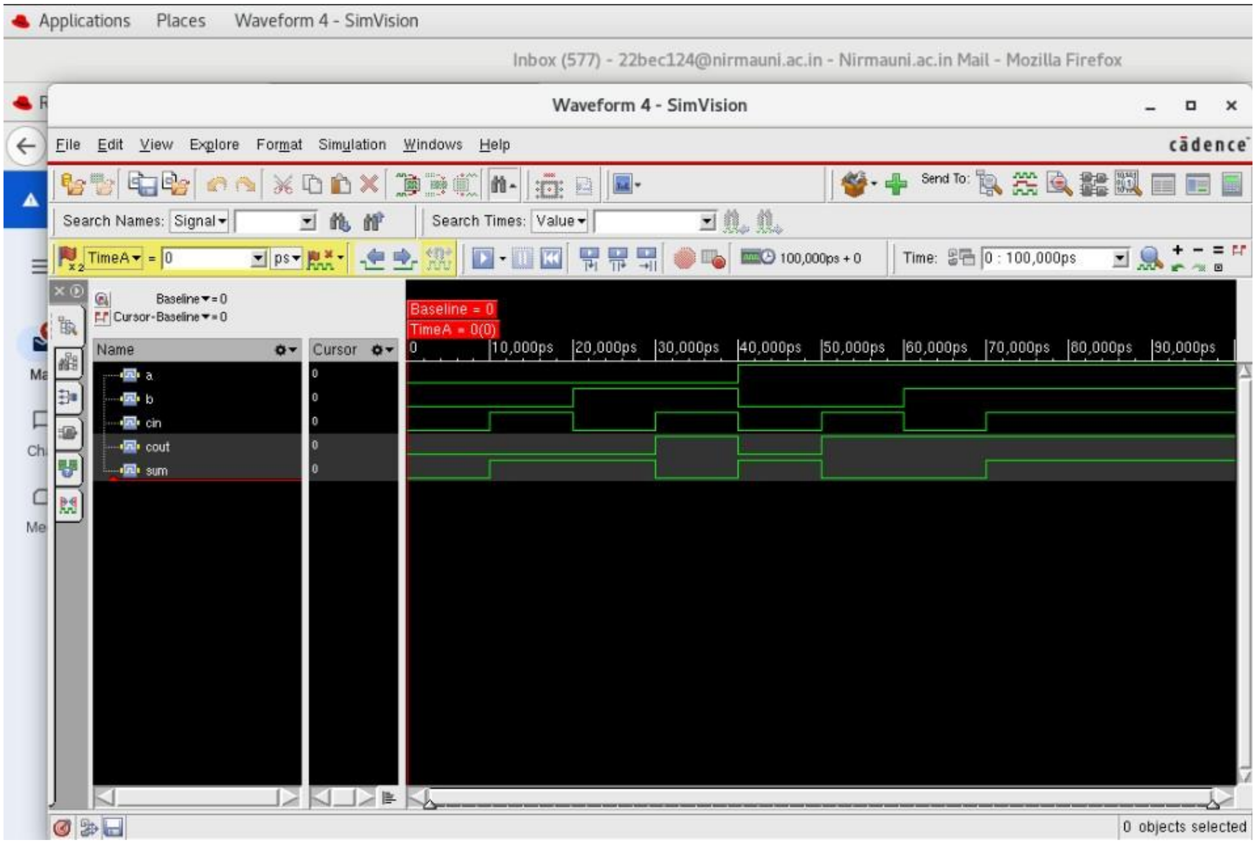
Functional Coverage :

Type	Coverage	Passing Ratio
Control-oriented	-- %	0 / 0
Data-oriented	-- %	0 / 0


Applications Places ICC - Coverage Totals
Tue 10:40 AM
ICC - Coverage Totals
File View Window Help
cādence
Module
Threshold 100 %
Include: b e t
Summary
Code/Data
FSM
Functional
/home/temp/Desktop/adder_22bec124/cov_work/scope/tes
[Press Clippings - 22bec12...
adder_22bec124
temp@pgec239:adder_22b...
ICC - Coverage Totals
[ICC - Code/Data Coverage ...

Test : test

Module	Types	Self Total		Cumulative Total	
adder	bet	80%	(4 / 5)	80%	(4 / 5)
	block	---	(0 / 0)	---	(0 / 0)
	expression	---	(0 / 0)	---	(0 / 0)
	toggle	80%	(4 / 5)	80%	(4 / 5)
adder_tb	bet	92%	(12 / 13)	89%	(16 / 18)
	block	100%	(8 / 8)	100%	(8 / 8)
	expression	---	(0 / 0)	---	(0 / 0)
	toggle	80%	(4 / 5)	80%	(8 / 10)


Applications
Places
Waveform 4 - SimVision
Inbox (577) - 22bec124@nirmauni.ac.in - Nirmauni.ac.in Mail - Mozilla Firefox
Waveform 4 - SimVision
File
Edit
View
Explore
Format
Simulation
Windows
Help
cādence
Send To:
Search Names: Signal
Search Times: Value
TimeA = 0 ps
100,000ps + 0
Time: 0 : 100,000ps
Baseline = 0
Cursor-Baseline = 0
Name
Cursor
Baseline = 0
TimeA = 0(0)
0
10,000ps
20,000ps
30,000ps
40,000ps
50,000ps
60,000ps
70,000ps
80,000ps
90,000ps
a 0
b 0
cin 0
cout 0
sum 0
0 objects selected