



**University of
Batangas**
LIPA CITY

COLLEGE OF ENGINEERING
& ARCHITECTURE

**UNIVERSITY OF BATANGAS – LIPA CAMPUS
COLLEGE OF ENGINEERING AND ARCHITECTURE
COMPUTER ENGINEERING**

Arithmetic Circuits – Adders / Subtractors

Experiment #5

Hardware Description Language

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PROFESSOR



Output Screenshot:

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Command Prompt
Microsoft Windows [Version 10.0.19045.2364]
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C:\Users\pamvm>cd..

C:\Users>cd..

C:\>dir
Volume in drive C has no label.
Volume Serial Number is D865-B202

Directory of C:\

01/07/2022  03:45 pm  <DIR>          $WINDOWS~BT
25/09/2022  12:26 pm                30 AVScanner.ini
20/01/2022  01:08 pm  <DIR>          Brother
03/07/2022  06:13 pm  <DIR>          ESD
19/01/2022  11:27 pm  <DIR>          Intel
18/12/2022  06:27 pm  <DIR>          iverilog
07/12/2019  05:14 pm  <DIR>          PerfLogs
07/11/2022  03:29 pm  <DIR>          Program Files
18/12/2022  11:13 am  <DIR>          Program Files (x86)
16/05/2022  11:05 am  <DIR>          Users
15/12/2022  12:50 pm  <DIR>          Windows
               1 File(s)              30 bytes
            10 Dir(s) 134,254,485,504 bytes free

C:\>cd iverilog

C:\iverilog>dir
Volume in drive C has no label.
Volume Serial Number is D865-B202

Directory of C:\iverilog

18/12/2022  06:27 pm  <DIR>          .
18/12/2022  06:27 pm  <DIR>          ..
19/09/2022  08:02 am  <DIR>          bin
18/12/2022  06:07 pm  <DIR>          exercises
09/10/2022  09:43 pm  <DIR>          exp
18/12/2022  11:41 pm  <DIR>          Experiments
19/09/2022  08:02 am  <DIR>          gtkwave
19/09/2022  08:02 am                52 Icarus Verilog.url
25/04/2004  04:52 pm            18,902 icarus.ico
19/09/2022  08:02 am  <DIR>          include
19/09/2022  08:02 am  <DIR>          lib
09/10/2022  08:51 pm  <DIR>          samples
19/09/2022  08:02 am  <DIR>          share
19/09/2022  08:02 am            184,689 unins000.dat
19/09/2022  08:01 am        3,153,063 unins000.exe
               4 File(s)          3,356,706 bytes
            11 Dir(s) 134,253,977,600 bytes free

C:\iverilog>cd Experiments
```



```
Command Prompt
11 Dir(s) 134,253,977,600 bytes free

C:\iverilog>cd Experiments

C:\iverilog\Experiments>dir
Volume in drive C has no label.
Volume Serial Number is D865-B202

Directory of C:\iverilog\Experiments

18/12/2022 11:41 pm <DIR>      .
18/12/2022 11:41 pm <DIR>      ..
18/12/2022 06:28 pm          948 Experiment1.v
18/12/2022 08:37 pm        3,233 Experiment2.v
18/12/2022 09:25 pm        3,996 Experiment3.v
18/12/2022 11:08 pm        1,872 Experiment4.v
19/12/2022 12:08 am        2,580 Experiment5.v
19/12/2022 12:03 am        2,206 Lab5CPE314.vcd
18/12/2022 07:04 pm          848 LabExp1.vcd
18/12/2022 08:37 pm        1,812 LabExp2.vcd
18/12/2022 09:25 pm        4,510 LabExp3.vcd
18/12/2022 11:21 pm        1,217 LabExp4.vcd
19/12/2022 12:03 am       12,479 test
               11 File(s)      35,701 bytes
               2 Dir(s) 134,253,977,600 bytes free

C:\iverilog\Experiments>iverilog -o test Experiment5.v

C:\iverilog\Experiments>vvp test
VCD info: dumpfile Lab5CPE314.vcd opened for output.

Command Prompt

Simulating Half Adder
A=0, B=0, Sum=0, Carry=0
A=0, B=1, Sum=1, Carry=0
A=1, B=0, Sum=1, Carry=0
A=1, B=1, Sum=0, Carry=1

Simulating Full Adder
A=0, B=0, cIn=0, Sum=0, Carry=0
A=0, B=0, cIn=1, Sum=1, Carry=0
A=0, B=1, cIn=0, Sum=1, Carry=0
A=0, B=1, cIn=1, Sum=0, Carry=1
A=1, B=0, cIn=0, Sum=1, Carry=0
A=1, B=0, cIn=1, Sum=0, Carry=1
A=1, B=1, cIn=0, Sum=0, Carry=1
A=1, B=1, cIn=1, Sum=1, Carry=1

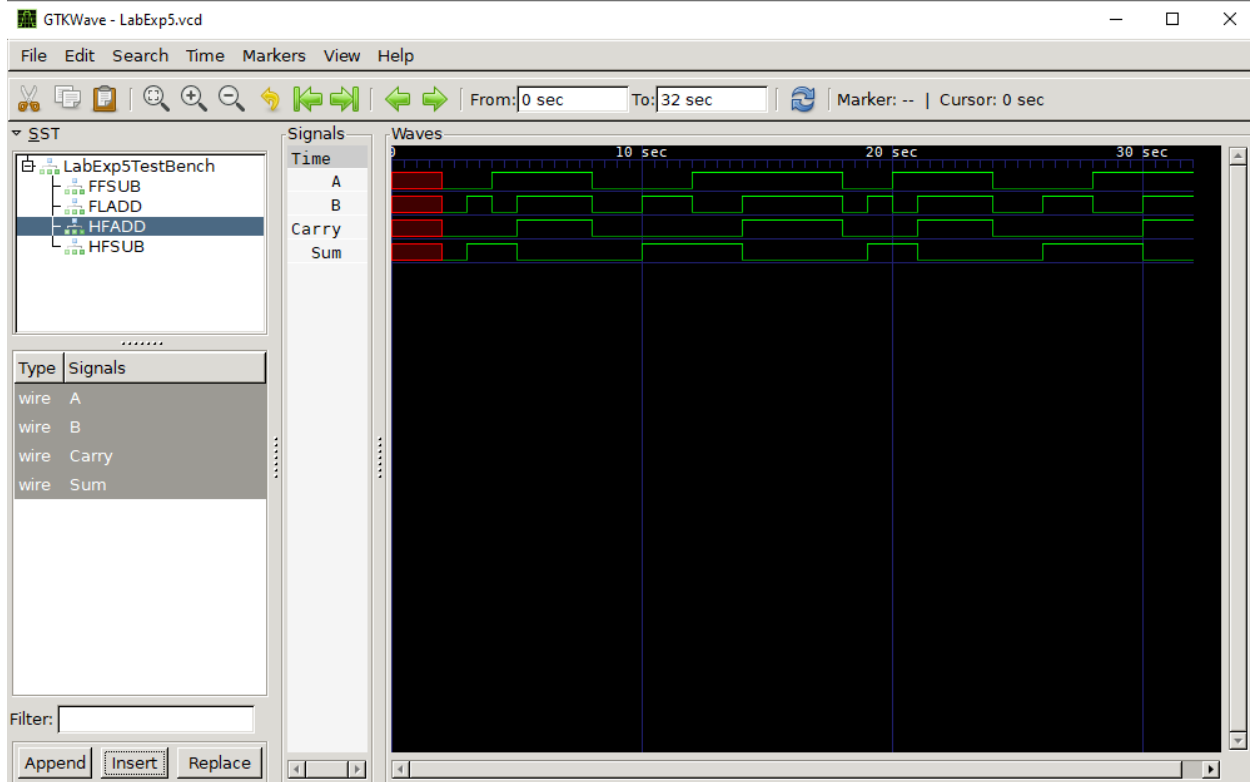
Simulating Half Subtractor
A=0, B=0, Diff=0, Borrow=0
A=0, B=1, Diff=1, Borrow=1
A=1, B=0, Diff=1, Borrow=0
A=1, B=1, Diff=0, Borrow=0

Simulating Full Subtractor
A=0, B=0, bIn=0, Diff=0, Borrow=0
A=0, B=0, bIn=1, Diff=1, Borrow=1
A=0, B=1, bIn=0, Diff=1, Borrow=1
A=0, B=1, bIn=1, Diff=0, Borrow=1
A=1, B=0, bIn=0, Diff=1, Borrow=0
A=1, B=0, bIn=1, Diff=0, Borrow=0
A=1, B=1, bIn=0, Diff=0, Borrow=0
A=1, B=1, bIn=1, Diff=1, Borrow=1
Experiment5.v:117: $finish called at 32 (1s)

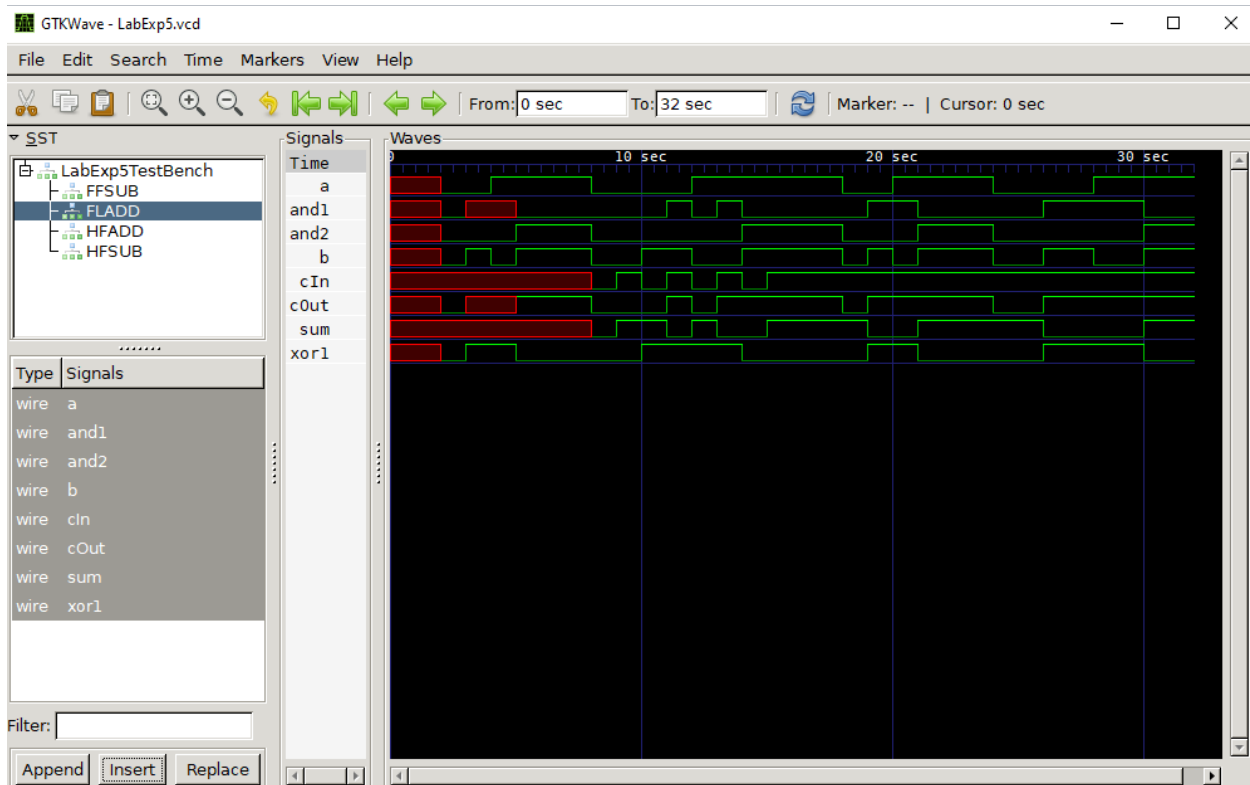
C:\iverilog\Experiments>
```



GTKwave: Half Adder:

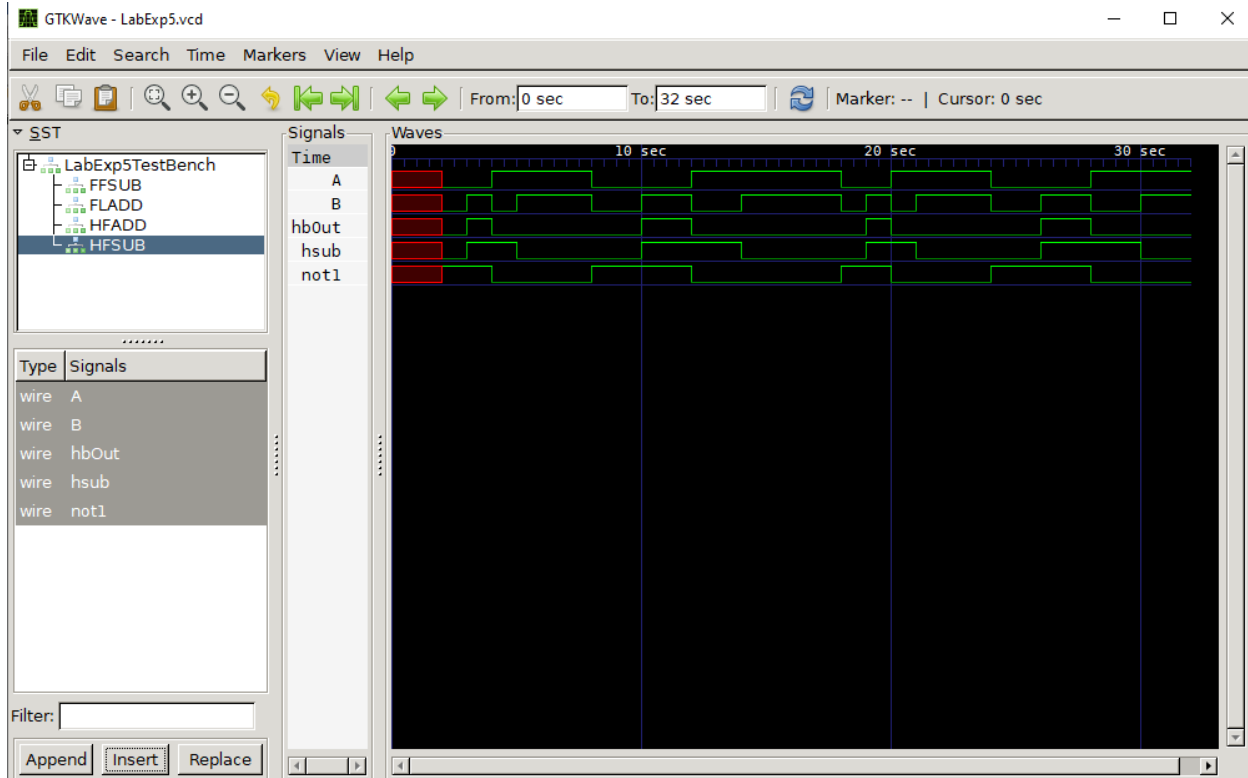


Full Adder





Half Subtractor



Full Subtractor

