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Course:- Digital design using HDL 4AL16EC046

6 B

21 June 2020

The team FPGA stands for field programming array:-

- And it is one of semiconductor logic chip which can be programmed to become almost any kind of system.
- PLDs are limited to hundreds of gates.
- But FPGAs support 1000 of gates.

Field Programmable gate Arrays

- FPGAs can provide a noll of advantages over a fixed fun ASIC technology such as standard cells.
- Normally, ASICs takes months to manufature & cost of them will be thousands of dollars to obtain the device.

FPGA architecture:-

- The basic FPGA architecture consists of thousands of fundamental elements called configurable logic blocks surrounded by a system of programable interconnects, called a fabre, I/o blocks & external device.

- Applications:-

Scanned with CamScanner

Verilog HDL Basics:-

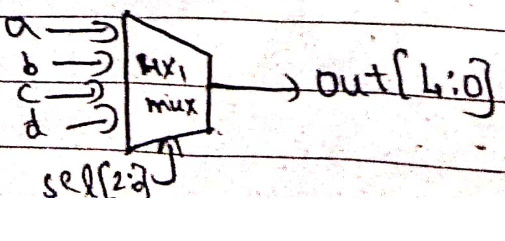
- Modeling structure

```
module  module_name (port_list);
        post declarations,
        data type declarations
        circuit functionality
        liming specification's
endmodule
```

Verify Design under test

```
module testbench:
  reg a, b, C: wire sum, cout;
  full_adder FA (sum, cout, a, b, C);
  initial
  begin
     $monitor ($time, "a=%b, b=%b, C=%b, sum=%b,
                                  Cout=%b");
     #5 a=0; b=0; C=1
     #5 b=1;
     #5 a=1;
     #5 a=0; b=0, C=0;
     #5 $finish
     end
  endmodule
```

Task for Day2:



```
module   tb_4to1_mux;
       reg [3:0] a;
       reg [3:0] b;
       reg [3:0] c;
       reg [3:0] d;
       wire [3:0]  out;
      reg [1:0] sel;
      integer;
mux_4to1_case   mux0 (.a(a), b(b), c(c), d(d),
                          .sel (sel), .out (out)),
initial begin
     $monitor ("[%0t] sel = 0x%0h   a = 0x%0h b=0x%
                 c=0x%0h  .d=0x%0h,  out=0x%0h",
            $time, sel ,a, b, c, d ,out);
   sel <=0;
   a <= $randon;
    b <= $random;
     c <= $random;
    d <= $random;

for (i=1; i<4; i=i+1) begin
    #5  sel <=i;
end
   #5 $finish
 end
endmodule
```

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Python proggraming.

Instructive data visualizeation with Bokesh

Bokesh is the library

We can grab data from the value using Bokd

Installing Bokesh-

```
pip install bokesh
or pip3 install bokesh.
```

Snipped producing the triangle based plot:

```
from bokesh. plotting import figure
from bokesh, io import output_file, show

x = [3, 7, 5, 10]
y = [3, 6, 9]
output_file ("line. html")
 f = figure ()
f. triangle (x, y)        [for circle based. f circle(x,y)]
shows(f)
```

Plotting educational data

```
from bokeh . plotting import figure
from bokeh . io. import output_file. show
import pandas
df = pandas._read_csv ("http://pythonhow.com/data/bachelors
                                                       csv")
x = df ["year"]
y = df ['Engineering "]
output_file ("line from bachelors. html")
f = figure ()
```

```
f.line (x, y)
show(f)
```

- loading Excel files-
  pip install xlrd or pip3 install xlrd

Webscraping with python beautiful soup:

- Request headers

```
r=requests. get ("http://www.pythonhow.com/example.html")
```

```
• import requests
from bs4 import Beautifulsoup

r= requests.get ("http://pythonhow.com/example.html")
c=r.content
c
soup = Beautiful soup (c, "html.parser")
all = soup.find_all ("div", {"class": "cities"})
all
all [0].find_all (h2) [0].text
for item in all:
  print (item.find_all ("h2") [0].text)
```