

Date:	02-06-2020	Name:	Yamunashree N
Course:	HDL	USN:	4AL17EC097
Topic:	FPGA Basics: Architecture, Applications and Uses, Verilog HDL Basics by Intel, Verilog Testbench code to verify the design under test (DUT)	Semester and section	6 th sem 'B' section
Github repository:	yamunashree-course		

What is FPGA? FPGA Ba

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FPGA Architecture

A basic FPGA architecture (Figure 1) consists of thousands of fundamental elements called configurable logic blocks (CLBs) surrounded by a system of programmable interconnects, called a fabric, that routes signals between CLBs. Input/output (I/O) blocks interface between the FPGA and external devices.

Depending on the manufacturer, the CLB may also be referred to as a logic block (LB), a logic element (LE) or a logic cell (LC).

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Verilog HDL Basics

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Module and Port Declaration

- Module Declaration:**
 - Begins with keyword **module**
 - Provides module name
 - Includes port list, if any
- Port Types:**
 - input** => input port
 - output** => output port
 - inout** => bidirectional port
- Port Declarations:**

```
<port_type> <port_name>;
```

```
module mult_acc (out,
    ina, inb,
    clk, aclr);
    input [7:0] ina, inb;
    input clk, aclr;
    output [15:0] out;
    ...
endmodule
```

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ALTERA MEGAWEB ADVANTAGE

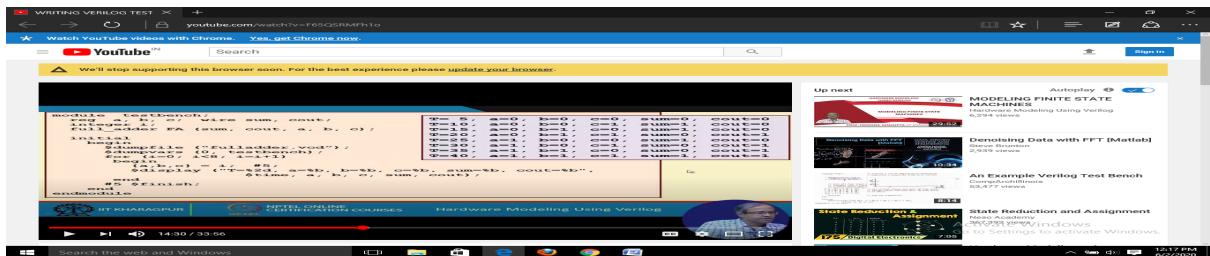
FPGA Design Intel FPGA + 4/185 videos

- Verilog HDL Basics Intel FPGA
- VHDL Basics Intel FPGA
- ModelSim®-Intel FPGA Edition Simulation with intel Quartus Prime Pro Edition Intel FPGA
- Generating PHYLITE example design simulation in ModelSim in 16.1 with Arria10 Intel FPGA
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HDL

FPGA basics: Architecture applications and uses

The field-programmable gate array (FPGA) is an integrated circuit that consists of internal hardware blocks with user programmable interconnects to customize operation for a specific application.

What is FPGA:

Field-programmable gate array

FPGA architecture

FPGA design

library ieee;

use ieee.std_logic_1164.all;

use ieee.numeric_std.all;

entity signed_adder is

port

(

aclr: in std_logic;

clk: in std_logic;

a: in std_logic_vector;

b: in std_logic_vector;

q: out std_logic_vector);



end signed-adder;

architecture signed-adder-arch of
signed-adder is
signal q, s: signed(a'high & down to 0);

begin

assert (a'length ≤ b'length)

report "Port A must be the longer
vector if different size!"

severity FAILURE;

q <= std-logic-vector(q,s);

adding-proc:

process (aclr, clk)

begin

if (aclr = '1') then

q,s <= (others => '0');

elsif rising-edge (clk) then

q,s <= ('0' & signed(a)) + ('0' & signed
(b));

end if; -- clk'd

end process;

end signed-adder-arch;

* FPGA Use: An Attractive choice
for certain applications

* FPGA Applications



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VHDL HDL Basic by Intel

VHDL

- * IEEE Industry Standard Hardware Description Language (HDL) - used to describe a digital system
- * use in both hardware simulation and synthesis

Behavior modeling

- * only the functionality of the circuit, no structure
- * Synthesis tool creates cost logic

```

→      if (shift & left)
Inputs  begin out[0]
        <= #5'0;
        for (i = 1; i <
                j & j + 1)
                out[i] <= #5
                out[i] <= out[i - 1];
end
→      output
    
```

VHDL

Test bench code to verify the design under the (DUT)

Full adder

```

module full-adder (S, CO, a, b, c);
    input a, b, c;
    output S, CO;
    assign S = a ^ b ^ c;
    
```



```
assign CO = (a&b).i(b&c) | (c&a);  
endmodule
```

4 bit shift register :

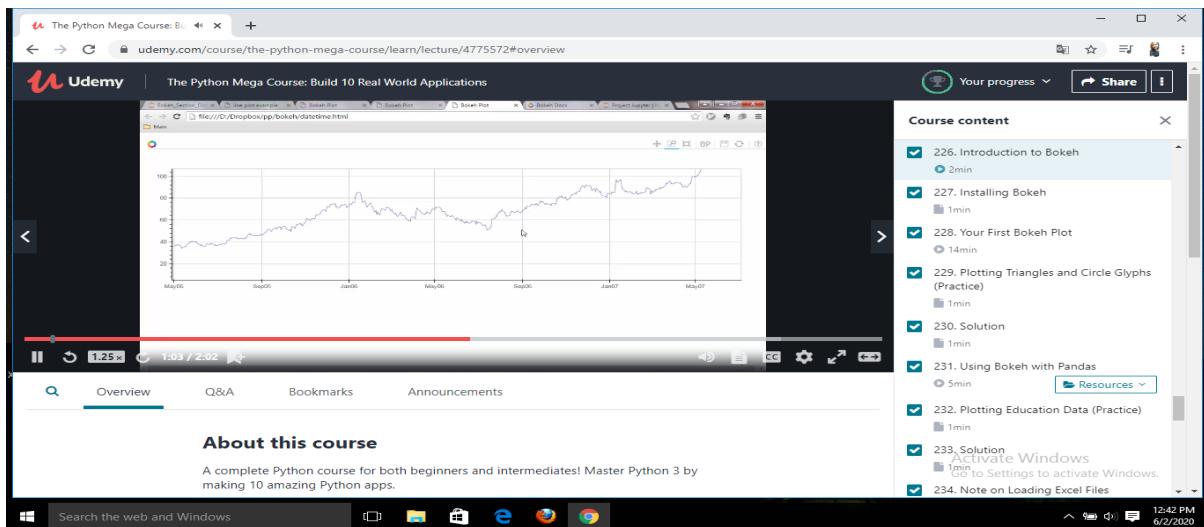
```
module shiftreg_4bit (clock, clear, A, E);  
    input clock, clear, A;  
    output reg G;  
    reg B, C, D;  
    always @ (posedge clock or negedge  
    clear)  
    begin  
        if (!clear) begin B <= 0; C <= 0;  
        D <= 0; E <= 0; end  
        else begin  
            E <= D;  
            D <= C;  
            C <= B;  
            B <= A;  
        end  
    end  
endmodule
```

Automatic verification of output

```
module fulladder (a, b, c, S, cout);  
    input a, b, c;  
    output S, cout;  
    assign S = a' b' c;  
    assign cout = (a&b) | (b&c) | (c&a);  
endmodule.
```



Date:	02-06-2020	Name:	Yamunashree N
Course:	Python programming	USN:	4AL17EC097
Topic:	Interactive data visualization with bokeh and Webscraping with python beautiful soup	Semester and section:	6 th sem and B sec



Solution

```

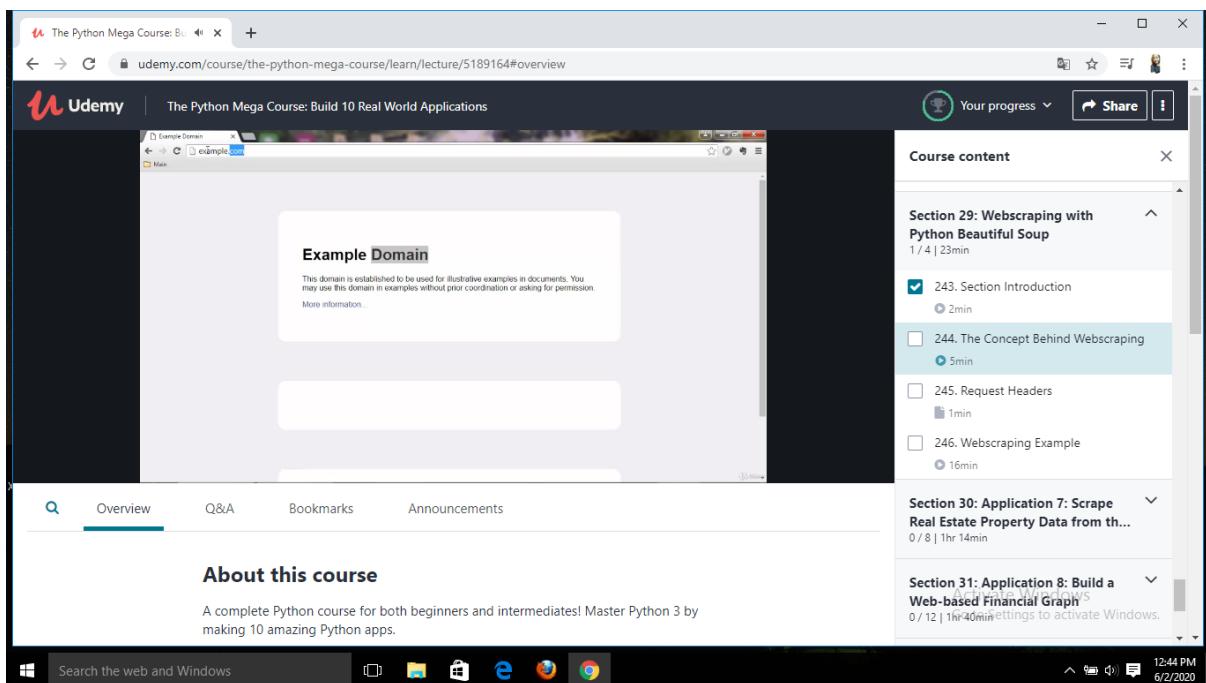
1 import pandas
2
3 from bokeh.plotting import figure, output_file, show
4
5 df=pandas.read_excel("http://pythonhow.com/data/verlegenhuken.xlsx",
6 df["Temperature"]*df["Temperature"]/10
7 df["Pressure"]*df["Pressure"]/10
8
9 p=figure(plot_width=500,plot_height=400,tools='pan')
10
11 p.title.text="Temperature and Air Pressure"
12 p.title.text_color="Gray"
13 p.title.text_font="arial"
14 p.title.text_font_style="bold"
15 p.xaxis.minor_tick_line_color=None
16 p.yaxis.minor_tick_line_color=None
17 p.xaxis.axis_label="Temperature (°C)"
18 p.yaxis.axis_label="Pressure (hPa)"
19
20 p.circle(df["Temperature"],df["Pressure"],size=0.5)
21 output_file("Weather.html")
22 show(p)

```

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Request Headers

Note

When I use this code in the next video:

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

please use this instead:

```
r = requests.get("http://www.pyclass.com/example.html",
headers={'User-agent': 'Mozilla/5.0 (X11; Ubuntu; Linux
x86_64; rv:61.0) Gecko/20100101 Firefox/61.0'})
```

The rest of the code stays the same.

So, we're just changing the domain name from `pythonhow` to `pyclass` and we're adding a `header` argument. Some webpages don't like scripts sometimes, so adding a header allows the script to impersonate a web browser.

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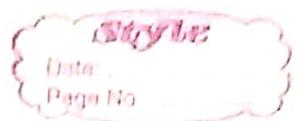
Interactive Data visualization
with Bokeh
and

web scraping with Python
Beautiful Soup

Interactive Data visualization with
Bokeh

- * Introduction to Bokeh
- * Installing Bokeh
- * your first Bokeh plot
- * plotting triangles and circle glyphs
- * Solution
- * using Bokeh with pandas
- * plotting Education Data (practice)
- * Solution
- * Note on Loading excel files
- * plot properties
- * plot properties
- * plotting Weather Data
- * Solution
- * visual attributes
- * Time-series plots
- * more visualization examples with bokeh
- * plotting time intervals of the Motion Detector
- * Hover tool implementation





web scraping with python beautiful soup :

- ★ Section Introduction
- ★ The concept Behind web scraping
- ★ Request Headers
- ★ web scraping example

