**DAY 16 ASSIGNMENT**

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| **Date:** | **04-06-2020** | **Name:** | **Ashish Shanbhag** |
| **Course:** | **DIGITAL DESIGN USING HDL** | **USN:** | **4AL16EC008** |
| **Topic:** | 1. **Hardware modelling using verilog** 2. **FPGA and ASIC Interview questions** | **Semester & Section:** | **8th A** |
| **Github Repository:** | **Ashish Shanbhag** |  |  |

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| **FORENOON SESSION DETAILS**      **Hardware modelling using verilog**  Hardware description languages are special purpose programming languages. They are primarily used to specify the behavior of digital systems and are rapidly replacing traditional digital system design techniques. This is because they allow the designer to concentrate on how the system should operate rather than on implementation details. Hardware description languages allow a digital system to be described with a wide range of abstraction, and they support top down design techniques. A key feature of any hardware description language environment is its ability to simulate the modeled system. The two most important hardware description languages are Verilog and VHDL. Verilog has been the dominant language for the design of application specific integrated circuits (ASIC's). However, VHDL is rapidly gaining in popularity.  Verilog HDL Hardware Modeling   * Hardware Encapsulation Verilog Module * Module Ports * Module Implementation * Hardware Modeling Verilog Primitives * Descriptive Styles * Explicit Structural Description * Implicit Structural Description Continuous Assignments * Structural Connections * Behavioral Descriptions in Verilog * Hierarchical Descriptions of Hardware * Structural (Top-Down) Design Methodology * Arrays of Instances * Using Verilog for Synthesis   **ASIC** An ASIC (application-specific integrated circuit) is a microchip designed for a special application, such as a particular kind of transmission protocol or a hand-held computer. You might contrast it with general integrated circuits, such as the microprocessor and the random access memory chips in your PC. ASICs are used in a wide-range of applications, including auto emission control, environmental monitoring, and personal digital assistants ([PDA](https://searchmobilecomputing.techtarget.com/definition/personal-digital-assistant)s). An ASIC can be pre-manufactured for a special application or it can be custom manufactured (typically using components from a "building block" library of components) for a particular customer application.  The development and manufacture of an ASIC design including the ASIC layout is a very expensive process. In order to reduce the costs, there are different levels of customisation that can be used. These can enable costs to be reduced for designs where large levels of customisation of the ASIC are not required. Essentially there are three levels of ASIC that can be used:   * Gate Array * Standard cell * Full custom design   The area of applications of ASICs is very wide as they are basically used everywhere where there is a need for performance, customization and size. Some of the common categories of application are mentioned below.   * Sensors and Transducers * Automotive and Avionic Components * Satellite, Radar and related Communication processors * Microprocessors, Memories, Microcontrollers     **Implement a simple T Flipflop and test the module using a compiler.**  **Design**  module tff ( input clk,input rstn,input t,output reg q);  always @ (posedge clk)  begin  if (!rstn)  q <= 0;  else  if (t)  q <= ~q;  else  q <= q;  end  endmodule    **Testbench**  module tb;  reg clk;  reg rstn;  reg t;  tff u0 ( .clk(clk),  .rstn(rstn),  .t(t),  .q(q));  always #5 clk = ~clk;  initial begin  {rstn, clk, t} <= 0;  $monitor ("T=%0t rstn=%0b t=%0d q=%0d", $time, rstn, t, q);  repeat(2) @(posedge clk);  rstn <= 1;  for (integer i = 0; i < 20; i = i+1) begin  reg [4:0] dly = $random;  #(dly) t <= $random;  end  #20 $finish;  end  endmodule    **Simulation Log**  T=0 rstn=0 t=0 q=x  T=5 rstn=0 t=0 q=0  T=15 rstn=1 t=0 q=0  T=19 rstn=1 t=1 q=0  T=25 rstn=1 t=1 q=1  T=35 rstn=1 t=1 q=0  T=43 rstn=1 t=0 q=0  T=47 rstn=1 t=1 q=0  T=55 rstn=1 t=0 q=1  T=59 rstn=1 t=1 q=1  T=65 rstn=1 t=1 q=0  T=67 rstn=1 t=0 q=0  T=71 rstn=1 t=1 q=0  T=75 rstn=1 t=0 q=1  T=79 rstn=1 t=1 q=1  T=83 rstn=1 t=0 q=1  T=87 rstn=1 t=1 q=1  T=95 rstn=1 t=0 q=0 |

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| **Date:** | **04-06-2020** | **Name:** | **Ashish Shanbhag** |
| **Course:** | **PYTHON** | **USN:** | **4AL16EC008** |
| **Topic:** | **Build a Web-based Financial Graph** | **Semester & Section:** | **8th A** |
| **Github Repository:** | **Ashish Shanbhag** |  |  |

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| **FORENOON SESSION DETAILS**      **Build a Web-based Financial Graph**  The Stock market process is precarious and is affected by many factors. Hence the Stock market prediction is a strain on business and finance. For the naive investors, it will provide an idea – What's trending in the market and what can be the appropriate time to get into or get out of the market? Considering the risk involved in stock market trading resulting from the volatility which is influenced by several factors across the globe, analyzing the behavior and short term or long-term potential of a company's stocks has been one area of interest of several Data Analysts from a long time now.  A web-based application is any program accessed over a network that runs in a web browser and the browser supporting the programming language such as the combination of JavaScript, Hypertext Markup Language (HTML) and Cascading Style Sheets (CSS) are used for the creation of web-based applications. HTML is the communication standard used by the World Wide Web and a protocol that enables a web browser to retrieve text, graphics, sound and other information from a web server.CSS is a style sheet language used for describing the presentation(look) and formatting of a documents or web pages, including colors, layout, and fonts written in a markup language. Python programming language is used for web scraping. Web scraping is described as extracting and processing large amounts of data from the websites using programs or algorithms while using Python is a skill which can be used to extract the data into a useful form that can be imported and the main reason for preferring Python is Scrapy and Beautiful Soup, the most widely used and preferred frameworks; Python library is designed for fast and highly efficient data extraction.  The basic function of the developed application includes representation of stock market data into graphical format. Creating a graph is a simple approach for giving a brief idea of the current trends in the market. Constructing and analysing Stock Charts provide an easy-to-read graphical representation of a stock's price alteration over a definite interval of time. They sometimes called stock market graphs and are a component of Technical Analysis and are an essential component in stock trading.  Firstly, web scraping is performed to scrape the required data. We are using real-time stock market data for scraping and then store it into a CSV file format using Python libraries. Data is extracted from the web using Python's Beautiful Soup module. Beautiful Soup is an inbuilt package in Python that is used for parsing HTML and XML documents (including having distorted or abnormal mark- up, i.e. non-closed tags, so named after tag soup). It develops a parse tree for already parsed documents that can further be used to extract data from HTML file or document, which is useful in case of web scraping.  Secondly, the graph is a plot on our designed website from the CSV files containing the scraped data from the web. This task is done by using c3.js and Papa Parse libraries and their respective dependencies. C3 provides an easy way to construct D3-based charts by encapsulating the code that is required to generate the entire chart/graph. C3 library of JavaScript provides a wide range of APIs and Callbacks (Callback is a function in JavaScript that is executed after another program has finished its execution) to access the status of the chart at a particular time. By using this C3 library, we can update the chart/graph even after it is accomplished.  Another library that we have used in graph making is Papa Parse which is the fastest in-browser CSV (or delimited text) parser for JavaScript. Papa Parse is the world's first multi- threaded CSV parser used for the browser. It is reliable and easy to use. Papa-parse is an effective and convenient CSV parser that can handle files having size in gigabytes without crashing. It is capable of manipulating your CSV files in many ways. First off, the input. This component can read your data from anywhere, via a URL, from a raw string or even from your local storage. The output will be an array of rows, where each row is an array of table data, and it will be returned if the header flag is not set. Otherwise, an array of objects will be the product, where each object is a map comprising of the column name and its corresponding value or the row (e.g., {col1: value1, col2: value2}). The recent format is in the vicinity of a JSON file. |