Analysis Tool for Digital Circuit Design Requirements

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Background

Manufacturing of everyday electronic products such as cell phones and laptops depends on the design of digital circuits. The design tasks require analysis of large amount of design data to obtain the fastest speeds, performance and maximum time interval between recharging of batteries of these devices. Electronic Design Automation companies such as Cadence, Synopsys and Mentor Graphics have extensive list of software tools to simulate digital circuits and then to analyze the simulation data. Even though these tools in most cases provide graphical user interfaces (GUI) to analyze the design data, there is a vast amount of data that is in text format for which there is always the need for representing them in graphical formats.

Python is a widely used and increasingly popular programming language for data analysis. A Standard Graphical User Interface (GUI) package or library name for Python is Tkinter.

Need Statement

Software tools such as Microsoft Excel can be used to easily convert text files from a UNIX environment to tabular or graphical format if the text files are in tabular or regular format to begin with. However, the design data from different EDA tools, or even from the same EDA tool, has mostly irregular and different text formats such as different line width or different repetitive structures. Digital designers spend a significant amount of effort in reading the text files to understand the contents and also to analyze the data which eventually impacts the design completion time. A Graphical User Interface (GUI) tool that automatically reads the text would be very beneficial to speeding up the time for which it takes to analyze the data and complete the project.

Objective Statement

The objective of this project is to use Python and the Tkinter library to graphically represent text based digital design data in plots and tables with the ability to sort and filter that data based on user inputs. The GUIs will enable faster time to market and also overall higher performance and lower power consuming products.

Requirements

Functionality

1. Offer a GUI tool that shows reports from the Design Compiler to analyze the reports.
2. Provide different ways to analyze a report. E.g, graphs, histograms, tables, and text conclusions.

Specifications

Must

- Based on Python 3.5 (or above) and Tkinter 8.5.X (or above)
- Works on LINUX platform
- Offer detailed analysis for the reports
    - Table to represent data
    - Sort and filter data
    - Draw conclusions about the circuits' behaviour

Should

- Show different kind of diagrams. E.g, histogram chart
- Capability to generate a second report based on data from current report

Bonus

- If there are any errors, recommend potential fixes on the circuit.
- Show the error that was found from the report on the circuit schematic.

Economic

Nothing at the moment. To be determined.

Usability

Tool should be simple and concise. Users should spend little time to learn how to use the software. Following the instructions on the GUI windows should make it easy to analyze the reports from the Design Compiler, which will help save time to read complicated data. The user can read analytic results intuitively and graphically.

Tentative Schedule Milestones

Events	Milestone
Team and project assignment made	Mon. 11/23/2017
First Meeting with advisor	Wed. 11/29/2017
First Meeting with Sponsor	Fri. 06/22/2018
Project Proposal Document Approved	Fri. 02/02/2018
First Prototype	Mon. 03/26/2018
Second Prototype	Fri. 05/04/2018
Final Testing and Debugging	Mon. 05/14/2018
Create Poster	Mon. 05/21/ 2018
Final Project Presentation	June 2018
Poster Session	June 2018

Project Deliverables

The completed project will result in a set of Python scripts that will generate GUIs that can be used to analyze design data. The GUIs would enable the designer:

1. To represent text based data in plots and tables
2. To filter, sort and search data based on user given options
3. To upload the data in various formats on web servers.