SOFTWARE REQUIREMENTS SPECIFICATION

for

SRS for AC CIRCUIT SOLVER

Prepared by:

Abhishek Gupta(2016CSJ0012)

Akshit Kansra(2016CSJ0001)

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1 Introduction

1.1 Purpose

In this Assignment We have to make AC Circuit Solver .The assignment is divided into two parts (for ease of debugging). In the first part, we will draw the AC circuit and in the second, we will do an AC circuit analysis.

1.2 Document Conventions

The following PDF has been generated using latex.

1.3 Intended Audience and Reading Suggestions

This project aim at providing help to most of the students as they can find the voltage and curent at any part of the circiut . Hence it would be a great learning tool for all . Moreover one can use his/her creativity in designing very complex circuits.

1.4 Project Scope

In this assignment we will be a given an input file (top.cir) .We will parse it and will create a SVG Image .Moreover all the value of current and Voltages will be displayed on clicking a particular part of a circuit. Errors will be diplayed for invalid circiut.

1.5 References

1. MIT AC Circuit analysis notes. http://web.mit.edu/8.02t/www/802TEAL3D/visualizations/coursenotes/modules/guide12.pdf
2. Refer SVG Primer https://www.w3.org/Graphics/SVG/IG/resources/svgprimer.html for basic SVG help.
3. A nice Lex and Yacc Tutorial http://epaperpress.com/lexandyacc/index.html
4. Online AC Circuit simulator. https://www.partsim.com
5. Yacc with C++ How-To http://tldp.org/HOWTO/Lex-YACC-HOWTO-5.html
6.Solving multi-frequency circuits. https://www.allaboutcircuits.com/textbook/alternating-current/chpt-7/circuit-effects/

2 Overall Description

2.1 Product Functions

We will be able to tell the values of current and voltages at every point the user wishes. Moreover a zoomable image will also be displayed if the user wishes. Also, we can tell the current and voltage values across any component, and the phase of voltages and current across that particular component.

2.2 Operating Environment

Our application will work good in all the linux environment

2.3 Design and Implementation Constraints

For extremely large number of nodes the SVG Image may don't look good.

2.4 User Documentation

Input Netlist Format:
Let us use an example to explain the net listing format.
Netlist:
R1 Net3 0 10K
C1 Net2 Net3 100NF
L1 Net1 Net2 10NH
V1 Net1 0 SINE (0.0 1.0 10Khz 0.0S 0.0)
Note: 1) Ground net is always numbered 0. 2) N - nano, K - Kilo 3) Resistance does not require ohm. Whereas, inductance is NH- Nanohenry.
For the resistor R, inductor L, capacitor C the netlisting format is: <Name> < Net Connected to terminal> < Net Connected to other terminal> < Value>
For the voltage source V, current source I: <Name>, <Net Connected to terminal>, <Net Connected to other termainal> SINE(< Offset>, <Amplitude>, <Frequency>, <Delay>, <Damping Factor>)

3 IMP Points for our AC CIRCIUT Solver

3.1 Tools used

Int this project, we are making use of tools such as Flex, Bison and SVG. Flex and Bison work together in order to parse the netlist format code and generate `SVG` code. Flex is a Scanner, Bison is a parser and SVG is our Image Rendering Library. The image can easily be seen in any Browser.

3.2 Scalable Image

Circuit is scalable in terms of nodes. That is, the number of nodes can go as high as 1000 or more. Note: This is where the zooming functionality is primarily required.The created circuit should be compact. For example, if a voltage source is connected to three other components, identify this and draw one voltage source with the three components connected to it, instead of drawing three copies of the voltage source (which is actually a wrong circuit)

3.3 Displaying SVG Image

In order to display the SVGs you generate, we will either use a browser or create your own SVG viewer using opengl/opencv/tkinter