Software Requirements Specification:
Logic Simulator

1. Introduction

1.1 Background

Dr. Newberry is an instructor at Michigan Technological University. He wrote the original LogicSim for use in CS3421: Introduction To Computer Architecture. LogicSim is a text based logic simulator for testing logic circuits. Students utilize this tool to better understand many of the elements in CPU design, such as instruction encoding, combination logic, and arithmetic circuits.

LogicSim has proved a useful teaching tool, however it has its drawbacks. The biggest problem is that students have a difficult time using the LogicSim interface and Dr. Newberry noticed that many were spending too much time trying to implement correct circuits. Another drawback of this program is that LogicSim is unable to represent certain types of logic circuits.

In the fall of 2002 Rolly Jones worked with Dr. Newberry to create LSGUI. This program provided a graphical user interface that could draw circuits. The correct LogicSim code was then exported to a file.

1.2 Purpose

The purpose of this document is to provide a blueprint for the further development of a Java based Logic Simulator with a Graphical User Interface (LSGUI). This new simulator will replace the use of LogicSim in Michigan Tech's classrooms

1.3 Scope

This document describes the requirements for the final implementation of the Java based LSGUI. This includes improvements in functionality and the graphical interface of the original LSGUI. Specifics concerning the implementation of these improvements will not be discussed.

This project will consist of three objectives. First, the development team will remove the LogicSim text export functionality included in the original version of the LSGUI. The team will then implement a java based logic simulator. Finally, minor improvements to the original GUI will be made.

1.4 Definitions, Acronyms, and Abbreviations

LSGUI - Logic Simulator Graphical User Interface
LogicSim - C-based Logic Simulator created by Dr. Newberry

1.5 References

Dr. Newberry - LogicSim

Rolly Jones

1.6 Overview

The second section of this document indicates the motivation behind the software and its requirements. This section is followed by an explanation of specific requirements of the LSGUI software.

2. Overall Description

2.1 Product Perspective

LSGUI is an interactive tool for designing logic circuits and will be used by students and faculty at Michigan Technological University. This project will add simulation capabilities to LSGUI.

2.2 Product Functions

Users create, save/open, and simulate logic circuits using the LSGUI.
The user can also view several propagation statistics after a simulation.

2.3 User Characteristics

Although all users are expected to have a working knowledge of computers, users will range from students with little to no experience with logic circuits to skilled professionals.

2.4 Constraints
LSGUI must...
Be user-friendly and easy-to-use for all user types.
Simulation of logic circuits must be available in a reasonable amount of time.

2.5 Assumptions and dependencies

2.6 Apportioning of requirements

3. Specific Requirements

LSGUI must...
- Correctly simulate logic circuits
- Simulate logic circuits in a reasonable amount of time.
- Be user-friendly and easy-to-use for all user types.

Output gate information to stdout.

Users must...

Be able to select multiple gates
Be able to flag specific gates for a watch window.
Be able to view gate information for grading and debugging purposes
Be able to go through the circuit at variable increments.

Create Java based Logic Simulator

Loops are allowed
No state machine
Toggle between step by step and end result views

Fix current bugs

Multiple inputs
Point errors
Properties window

Allow users to create macro gates

Add/Save/Open gates/circuits
-How to get the gates to scale on number of inputs/outputs?

Read memory file / editor
Watch window(s)

Provide calculated propagation delay (statistics)

From point A to B
To point A
Total time
Etc.

GUI changes

Displaying # of bits for an element
Mass selecting (with mouse or shift or control)
Mouse over for element info summary
Change grid size
Cancel from creating gate

4. Requirements traceability

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