Leo De Silva

A Level Computer Science

DESIGNING & MAKING THE SOFTWARE SUITE

for a proprietary machine code specification.

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Contents

1 Analysis

1.1 Problem Defenition

The goal of this project is to design the hardware specification for a custom 16-bit single cycle CPU, and develop the suite of tools required to simulate such a processor, including an Emulator (1.2.2), Assembler (1.2.3), and Compiler (1.2.4). The project will detail the abstract design of the computer's Instruction Set Architecture (ISA) (1.2.1) and its implementation in hardware, considering the internal registers, system clock, main memory, and fetch execute cycle.

1.1.1 Background to the Problem Area

This project will explore lower level systems software and look in detail at the fundemental architecture of modern computing systems.

1.2 Definitions

1.2.1 Instruction Set Architecture

The ISA acts as an interface between the hardware and software of a computing system, and contains crucial information regarding the capabilities of a processor, including: a functional defenition of storage locations (e.g. registers and memories) as well as a description of all instructions and operations supported.

1.2.2 Emulator

An emulator is a software program that allows one computer to imitate another - and by simulating the hardware of the other – execute machine code programs written for a processor other than itself.

1.2.3 Assembler

An assembler is a program that translates assembly language (a low level programming language that uses mneumonics to directly represent machine code instructions) into object code that can be executed by the processor.

1.2.4 Compiler

A compiler is a program that translates high level program source code into a set of machine language instructions. Some compilers translate source code into an intermediate assembly language before using an assembler to produce the machine code instructions, whereas others compile into machine code directly.