CHAPTER 1

INTRODUCTION

1.1 Overview

Digital system design has become a crucial technology that moves the modern world. It has been contributing its hands in variety of field of activities. From industrial to daily life, mankind cannot deny that digital system has been an important need in this modern world now and future.

So, this development of technology of digital system is going forward for the sake of modern technology in trying to reduce the cost production and maximized the output of production as example for industrial field. In people daily life, they expected in to do various kind of task that would ease our job despite being portable and has limited resources. For example a handset, which in nowadays users not only can use it as communication tools but also as entertainment tools. This is thanks to digital system technology that has been developed and still developing as it offers many possibilities in improving it.

In developing digital system design, a common techniques use is to used VHDL language in order to programmed it in software where simulation can be perform to do analysis of designed system. This approached has its advantages as its does not make any cost as the programmed system can be programmed and erased without the effort to alter the hardware.
VHDL stands for (very high speed integrated circuit hardware description language) is languages that enable the programmer describe the circuits of digital design in textual form. So, it is preferred than other programming language such as C++, Visual Basic and MATLAB which is usually a sequential languages.

Usually the hardware used would be a development board such as FPGAs that being offers by many manufacturer, for example is Spartan-3 from Xilinx. This development board has a chip that can be used to implement the designed digital system for analysis afterward.

1.2 Objective

This project has 3 objectives;

1. To use a description language to creates digital system design.
2. To choose and understand a suitable algorithm to be implemented.
3. To operates a Fixed-point square root function with a digital system design by simulation.

1.3 Scope of project

1. Output of the system would be in Fixed-point only, which means no floating point will be expected to be in the output.
2. The language used would be VHDL that stands for (very high speed integrated circuit description language).
3. The input would have maximum range of 16 bit which means the range would be 0 to +65535 of unsigned number.
4. The design would be running trough simulation only, no implementation into hardware involved.
1.4 Problem Statement

The square root function is a basic operation in computer graphic and scientific calculation application. Due to its algorithm complexity, the square root operation is hard to be designed in digital system. Digital system is the system that can realize the operation of square root operation in hardware. As known, digital system has been used in daily life or industrial purpose that may have been in need of square root operation to fully its functions.

So, this project is being done to help create a prototype of digital system design that can operate as square root operation that would be implemented in hardware devices. Furthermore, the design created is reduced in cost and high in performance by choosing the appropriate algorithm.

1.5 Project Contribution

A prototype of functioning digital system that operates the fixed-point square-root function with accurate output within the required limitation of Spartan-3 Xilinx FPGA board.

A systematic approach of designing a digital design using VHDL language with ISE 10.1 as the platform software used.

1.6 Thesis Organization

This thesis is organized into five chapters. The first chapter introduced the introduction of this project, project objective, scope of work, and contribution of this project.