Simulator 1.0 For DSP Raptor Core

Ву

Raja Omar Riaz M.Sc. Computer Sciences



Submitted in partial fulfillment of the requirements for the Degree of Master of Computer Sciences.

Bahria Institute of Management and Computer Sciences (BIMCS)

Islamabad (Pakistan)

Septmeber, 2000

Certificate

This is to certify that we approve this Project Report submitted by <u>Raja Omar</u>
<u>Riaz</u> for the partial fulfillment of the M.Sc. Degree in Computer Sciences:

1.	Dr. Muhammad Yousuf Khan (Project Supervisor):
	Jan Mich

2. Mr. Rashid Karim Siddiqui (Internal Examiner):

3. Dr. Mahmood Anwar Khan (External Examiner):

Department of Computer Sciences

Bahria Institute of Management and Computer Sciences (BIMCS)

Islamabad

September 2000

IN THE NAME OF

"ALLAH"

THE MOST BENEFICIENT & MERCIFUL

DEDICATED

TO

My affectionate **Parents & Teachers**, whose encouragement, endless love and prayers have been a source of inspiration and guidance for me.

Table of Contents

Acknowledgment				7	
Abstract				8	
		is the effections			
Chapter 1:	Introd	luction		9	
1.1	Introd	duction		10	
1.2	Projec	ctSignificance		11	
Chapter 2:	Over	view of Technolog	ау	13	
2.1	Over	view		14	
2.2	What	14			
2.3 Constituents Components of DSP				16	
2.4	Advo	antages of Digital S	ignal Processing	17	
2.5	2.5 Usage of Digital Signal Processing				
2.6	2.6 Simulation				
2.7	2.7 DSP Simulators				
Chapter 3:	Syste	m Design		24	
3.1	Introd	25			
3.2	3.2 Raptor Core Architecture				
	3.2.1	Basic Features of	Raptor Core	26	
	3.2.1.1 Program Sequencer			27	
		3.2.1.1.1	Fetch Stages	28	
		3.2.1.1.2	Dispatch Stage	29	
		3.2.1.1.3	Decode Stage	31	
		3.2.1.1.4	Execute Stage	31	
		33			
		40			
		3.2.1.4 Address C	alculation Units	43	

	3.2.1.5 ESPC & Signal Processing Core (SPC)	46		
	3.2.1.6 Bus Architecture	50		
	3.2.1.7 Raptor Core Scalable Architecture	52		
		52		
3.3	3.3 System Objective			
3.4	3.4 Requirements Specification			
3.5	Design Specifications	56		
	3.5.1 Classes & Hierarchies	56		
	3.5.2 Use Case Diagram	59		
	3.5.3 Class Diagram	60		
	3.5.4 Deployment Diagram	64		
Chapter 4:	Evaluation & Future Design	65		
4.1	Web Simulators	66		
4.2	Future Efforts	67		
4.3	Final Words	71		
References	Compatter Sciences Department for their value	72		
	nce stronger of my learning period here in Salaria	Institute o		
Appendix A	A: Product Snap shot	76		
Appendix I	B: Project Metrics	90		
Appendix (C: Technical Documentation	95		

Acknowledgement

With lots of thanks to Almighty Allah from the depth of my heart for his blessings and providing me with the ability and potential to successfully get through my period of studies. Though it seems absurd to thank all the people involved in making this project happen in only a few paragraphs. However as this is arguably simpler than making the Simulator, so I am certainly willing to attempt it.

First of all, I offer my sincerest appreciation to my supervisor, <u>Mr. Dr. Muhammad Yousuf Khan</u>, for his skilled guidance, dynamic supervision and keen interest in solution of problem faced during the accomplishment of this dissertation. I am also grateful to my honorable teachers like <u>Mr. Dr. Saeed A. Bhatti & Mr. Zafar I. Malik</u> for their kind cooperation and real encouragement. And many thanks owed to all the teachers of Computer Sciences Department for their valuable advices and guidance throughout my learning period here in Bahria Institute of Management & Computer Sciences (BIMCS).

I also applaud the nice company of all my friends. I will always cherish my association and affinities with all of them and treasure the good days and pleasure moments spent with them.

Additionally, I had a supporting cast of family that made the amount of time and effort needed to make this project possible, and even enjoyable.

Raja Omar Riaz BIMCS, Islamabad September 2000.

Abstract

The purpose of this documentation is to describe the design and implementation of a 16-bit Fixed-Point DSP (Digital Signal Processor) Simulator. It describes the importance and effects of digital technology on our world along with a brief introduction of my project and its significance with respect to Pakistan Software Exports. Then this documentation provides a comprehensive overview of DSP technology as well as the fundamentals of DSP Simulation along with the system architecture.

At the end I encompass the future aspects of DSP Simulation and goals achieved by this system.