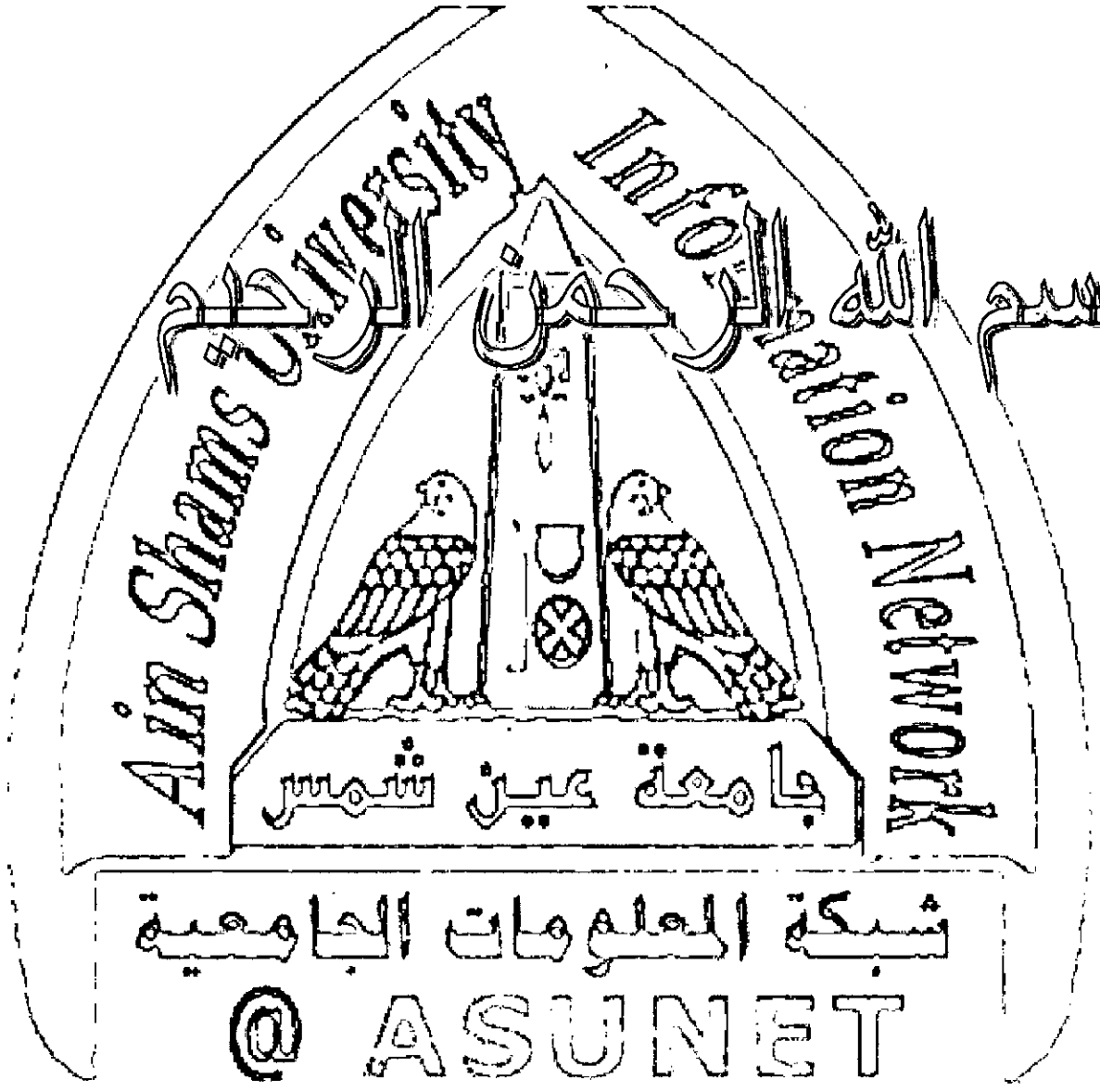

شبكة المعلومات الجامعية




# شبكة المعلومات الجامعية

# التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

# جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغيرات

## يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ منوية ورطوبة نسبية من ٢٠-٤٠%

**To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%**


بالرسالة صفحات لم ترد بالأصل

# بعض الوثائق الأصلية تالفة

Ain Shams University Information Network
جامعة عين شمس
شبكة المعلومات الجامعية
@ ASUNET

# SPEEDING UP SYSTEMC SIMULATIONS USING PROCESS SPLITTING

By

**Youssef Nagy Naguib**

B.Sc. in Electronics and Communications Engineering – Cairo University

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the

Requirements for the Degree of

**Master of Science**

In

Electronics and Electrical Communications Engineering

Faculty of Engineering, Cairo University

Giza, Egypt

2007

# SPEEDING UP SYSTEMC SIMULATIONS USING PROCESS SPLITTING

By

**Youssef Nagy Naguib**

B.Sc. in Electronics and Communications Engineering – Cairo University

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the

Requirements for the Degree of

**Master of Science**

In

Electronics and Electrical Communications Engineering

Supervised by

**Dr. Serag El Din Habib**

Professor, Faculty of Engineering, Cairo University

**Dr. Rafik Safwat Guindi**

Associate Professor, Faculty of Engineering, Cairo University

Faculty of Engineering, Cairo University

Giza, Egypt

2007

# SPEEDING UP SYSTEMC SIMULATIONS USING PROCESS SPLITTING

By

**Youssef Nagy Naguib**

B.Sc. in Electronics and Communications Engineering – Cairo University

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the

Requirements for the Degree of

**Master of Science**

In

Electronics and Electrical Communications Engineering

Approved by the examining committee

| | |
|---|---|
| **Dr. Ashraf Mohamed El Farghaly** | **Ain Shams University, member.** |
| **Dr. Abd El Halim Mahmoud Shousha** | **Cairo University, member.** |
| **Dr. Serag El Din Habib** | **Cairo University, thesis advisor** |

Faculty of Engineering, Cairo University

Giza, Egypt

2007

# Abstract

This theses presents a new approach that can be used to speed up SystemC simulations by automatically optimizing the model for simulation. The work addresses the inefficiency of the standard SystemC scheduler that may lead, in some situations, to unnecessary wake-up calls, as well as unnecessary code execution.

Previous solutions presented for this issue recommend remedies by applying changes to the SystemC simulation engine and provide extra non-standard SystemC descriptions to the model. The main drawback of this approach is that the simulation model cannot be simulated on any SystemC engine, and changes to the SystemC standard simulation engine is not a preferred solution. Moreover the previously presented solution does not solve the problem of unnecessary code execution.

The method presented in this work analyzes the SystemC model to automatically extract signal dependencies based on a set of rules. The rules are based on the concepts of software slicing. This information is then used to split large processes into smaller ones. The code of the original process is divided among the new smaller processes. By applying process splitting on a SystemC model, only the code that is necessary to evaluate the output signal is put in the new small processes, and is executed only when evaluating output signals is necessary.

Process splitting is performed by a tool – SplitPro – which generates an optimized code that can be run on any standard SystemC engine. The SplitPro tool analyzes the SystemC modules in the simulation model and generates the dependency tree of each output port. The dependency tree of each output port determines the input-output relationships and the necessary code for evaluating each output. It then checks if it is possible to split the code inside one process among a number of smaller processes without changing the behavior of the system. This way, whenever a process is called, it will only execute the necessary code to evaluate the required output.

The SplitPro tool was used to analyze the simulation models of an Alpha super scalar processor and a 4-port switch. The results of these simulations are analyzed and presented in the theses.

# Acknowledgements

*I have the pleasure and honor to express great gratitude to my supervisors Dr. Serag El Din Habib and Dr. Rafik Safwat Guindi for encouragement and unfailing guidance which enabled achieving the research goals.*

*Grateful thanks are also due to Eng. Ahmed Sabry for his help and advice.*

*The role of Eng. Mina Aziz and Eng. John Selim is also gratefully acknowledged.*

*Last, but not least, a special expression of gratitude and appreciation goes to my family for their patience and generous support.*

# Table of Contents

# List of Figures

# List of Tables