TECHNICAL UNIVERSITY OF CRETE

DIPLOMA THESIS

Interactive User Environment Application on Kubernetes

Author:
Kyriakos CHALVATZIS

Thesis Committee:
Prof.Vasilis SAMOLADAS
Prof. Name GIATRAKOS
Prof. Name PETRAKIS

A thesis submitted in fulfillment of the requirements for the diploma of Electrical and Computer Engineer

in the

School of Electrical and Computer Engineering

June 3, 2025

TECHNICAL UNIVERSITY OF CRETE

Abstract

School of Electrical and Computer Engineering

Electrical and Computer Engineer

Interactive User Environment Application on Kubernetes

by Kyriakos CHALVATZIS

The Thesis Abstract is written here (and usually kept to just this page). The page is kept centered vertically so can expand into the blank space above the title too...

TECHNICAL UNIVERSITY OF CRETE

Abstract

School of Electrical and Computer Engineering

Electrical and Computer Engineer

Interactive User Environment Application on Kubernetes

by Kyriakos CHALVATZIS

Η περίληψη της διπλωματικής γράφεται εδώ (και συνήθως αποτελεί αυτή την μία μόνο σελίδα). Η σελίδα αυτή κρατάται στοιχισμένη στην μέση οριζόντια και κάθετα, ώστε να μπορεί να επεκτίνεται στον κενό χώρο και πάνω από τον τίτλο...

Acknowledgements

The acknowledgments and the people to thank go here, don't forget to include your project advisor...

Contents

List of Figures

List of Tables

List of Algorithms

List of Abbreviations

ALU	**A**rithmetic **L**ogic **U**nit
ASIC	**A**pplication **S**pecific **I**ntegrated **C**ircuit
BRAM	**B**lock **R**andom **A**ccess **M**emory
CPU	**C**entral **P**rocessor **U**nit
CS	**C**omputer **S**cience
DDR4	**D**ouble **D**ata **R**ate type **4** memory
DRAM	**D**ynamic **R**andom **A**ccess **M**emory
DSP	**D**igital **S**ignal **P**rocessor
FF	**F**lip **F**lops
FPGA	**F**ield **P**rogrammable **G**ate **A**rray
GDDR6	**G**raphics **D**ouble **D**ata **R**ate type **6** memory
GPU	**G**raphic **P**rocessor **U**nit
HBM	**H**igh **B**andwidth **M**emory
HDL	**H**ardware **D**escription **L**anguage
HLS	**H**igh **L**evel **S**ynthesis
HPC	**H**ight **P**erformance **C**omputing
LUT	**L**ook **U**p **T**able
MPSoC	**M**ulti **P**rocessor **S**ystem **o**n **C**hip
PL	**P**rogrammable **L**ogic
PS	**P**rocessing **S**ystem
RAM	**R**andom **A**ccess **M**emory
SDK	**S**oftware **D**evelopment **K**it
SIMD	**S**ingle **I**nstruction **M**ultiple **D**ata
SSE	**S**treaming **S**IMD **E**xtensions
SSD	**S**olid **S**tate **D**rive
TDP	**T**hermal **D**esign **P**ower
URAM	**U**ltra **R**andom **A**ccess **M**emory
USD	**U**nited **S**tates **D**ollar

Dedicated to my family and friends…

Chapter 1

Introduction

1.1 Motivation

1.2 Scientific Contributions

1.3 Thesis Outline

- **Chapter 2 - Theoretical Background:** Chapter 2 description
- **Chapter 3 - Related Work:** Chapter 3 description
- **Chapter 4 - Robustness Analysis:** Chapter 4 description
- **Chapter 5 - FPGA Implementation:** Chapter 5 description
- **Chapter 6 - Results:** Chapter 6 description
- **Chapter 7 - Conclusions and Related Work:** Chapter 7 description

Chapter 2

Theoretical Background

2.1 Subject A

2.2 Subject B

2.3 Theoretical knowledge sources

Chapter 3

Related Work

3.1 Related work A

3.2 Related work B

3.3 The FPGA Perspective

3.4 Thesis Approach

Chapter 4

Robustness Analysis

4.1 Experiment A

4.2 Experiment B

Chapter 5

Results

5.1 Specification of Compared Platforms

5.2 Power Consumption

5.3 Energy Consumption

5.4 Throughput and Latency Speedup

5.5 Final Performance

Chapter 6

Conclusions and Future Work

6.1 Conclusions

6.2 Future Work

Appendix A

Frequently Asked Questions

A.1 How do I change the colors of links?

The color of links can be changed to your liking using:

`\hypersetup{urlcolor=red}`, or

`\hypersetup{citecolor=green}`, or

`\hypersetup{allcolor=blue}`.

If you want to completely hide the links, you can use:

`\hypersetup{allcolors=.}`, or even better:

`\hypersetup{hidelinks}`.

If you want to have obvious links in the PDF but not the printed text, use:

`\hypersetup{colorlinks=false}`.