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Simulation of a MIPS machine

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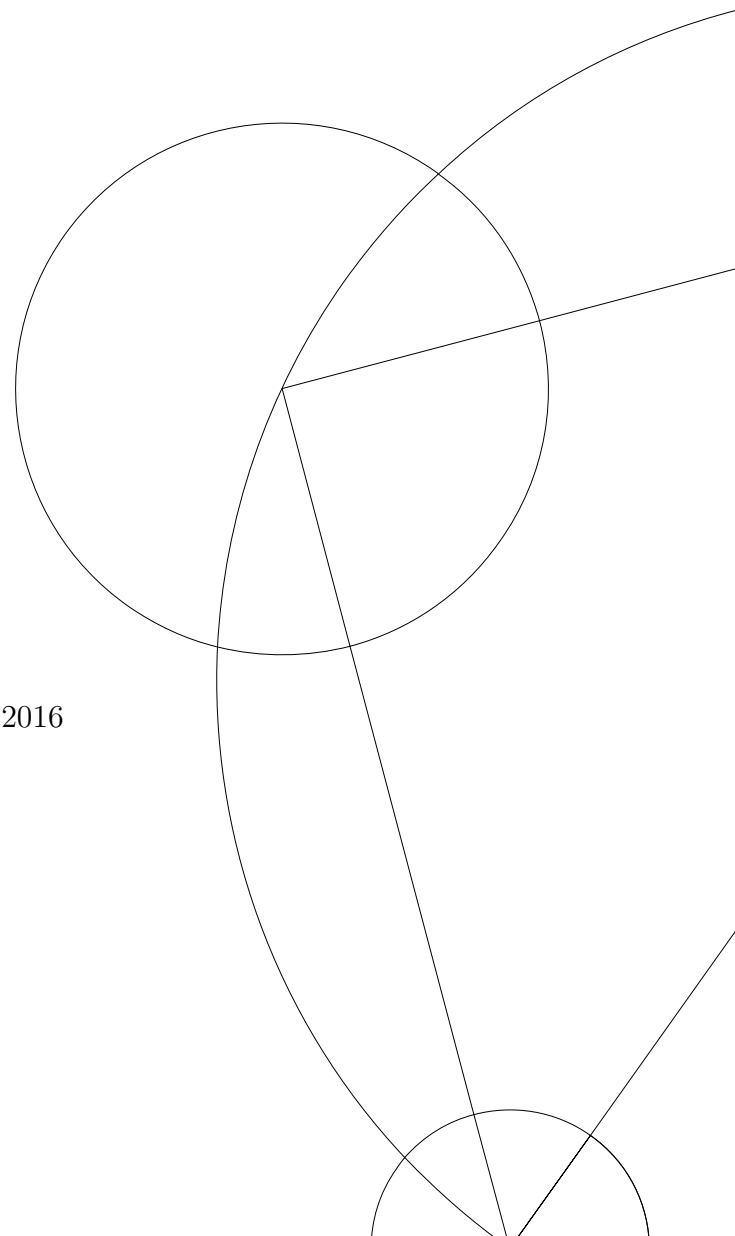

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Abstract

TODO

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1 Introduction

This report describes the development of a MIPS simulator, intended to support the operating system KUDOS. The simulator will be written in C, and will support the most important processor features such as the translation lookaside buffer (TLB), memory management unit (MMU), user and kernel CPU modes, multiple cores (SMP), and I/O device emulation.

1.1 Motivation

KUDOS is a small operating system skeleton intended to be used by students attending operating system project courses at university of Copenhagen. It is used to explore operating system concepts by extending and improving on existing system. Initially, KUDOS targetsthe MIPS architecture, which leverages on the advantages of a reduced instruction set computing - RISC. To ease the development and debugging of KUDOS, it is desireable to run the OS in a simulated machine. This enables the students and other developers to better inspect the state of the machine while executing, as well as making up for the difference in the hardware of the host machine.

1.2 A simulator

Simulation is the act of imitating the operation of an existing system. In our case, we will be imitating, or rather, simulating a MIPS machine running KUDOS.
Unlike emulating a system, the simulator will execute every instruction exactly as a hardware machine might do. This allows the developer to not only see how a program behaves, but also the internal state of the machine, its memory, registers and so on.

2 MIPS Architecture

3 TLB

4 MMU

5 User and Kernel mode

6 SMP

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8 Performance

9 Conclusion

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