ASCS ADAPTIVE & SECURE COMPUTING SYSTEMS LABORATORY

Summary

In this work, as a step towards designing Self-Aware Polymorphic Architecture (SAPA) systems, we investigate self-organizing memory structures and adaptive memory hierarchies, particularly in the caching subsystem.

The concept introduced and explored in this work, Application-Aware Memory Organization Models (AMOM), provides a generalized framework for designing smart and reconfigurable memory subsystems.

The proposed design uses hardware counters and other specialized hardware modules to learn the application's memory access pattern and estimate an optimal memory configuration, both at runtime.

Problem Statement

With the advent of technologies like mobile and cloud computing, context-aware computing, internet-of-things, autonomous car, computing systems must be redesigned to meet the performance requirements of these emerging applications.

Furthermore, the current multicore or manycore computer systems present application programmers with a great deal of challenges due to their ever-increasing complexity and heterogeneity. To make optimal use of the system components, programmers must first learn about system parameters and how to best leverage them for a given application.

A promising approach to address these computing challenges is via adaptive-approximate computer architectures with decision making capabilities for autonomous optimization and resource allocation based on the application under execution.

Introduction



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L2 Cache size	2 MB
Associativity	2-way

