Trace Based Switching For A Tightly Coupled Heterogeneous Core
Shruti Padmanabha, Andrew Lukefahr, Reetuparna Das, Scott Mahlke
University of Michigan
Electrical Engineering and Computer Science

Fine-grained Heterogeneity

Traditional big LITTLE Architecture

Composite Cores Architecture

Transfer Overhead: ~20K cycles

Transfer Overhead: ~35 cycles

Fine-granularity “Reacts” Poorly

• Traditionally, controllers assume future quanta (intervals) have behaviors similar to recent past
• React to performance changes!
• At fine-granularity, performance varies rapidly between quanta
• Traditional controllers cannot react promptly enough to capture variation

Don’t React – Predict!

Trace-Based Controller Overview

Traditional Switching Controllers

Super-trace Construction

Accuracy - gcc

Big Quanta = Red, Little Quanta = Blue

Energy Conservation

On average, we conserve 43% more energy than a reactive controller