CSE 249A Project Ideas

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Overview of Projects

- Android Stack and BBench
- Thermal Time Shifting
- Trace Former Engine
- Super Traces!!! (SMT in Software)
- A Lightweight Introspection Engine
- Connect Gem5 to McPat
- Adaptive Thread to Core Mapping Engine
- Bubble-Up in the Network
- The Bubble Recorder (D-Bar)
- Smashbench (Dylan)
- Mini GWP (MoZo)

Android Stack and BBench

- Problem Theme: Building a better hardware/software stack for emerging mobile workloads
- Tasks:
  - Bring up Gem5+Android+bbench (and other benchmarks).
  - Run on top of Harp!
  - Evaluate Gem5 design space for best match for bbench
    - objective: energy efficiency
  - Create hooks into Gem5 to be manipulated by OS and JVM
- LETS BRAINSTORM!

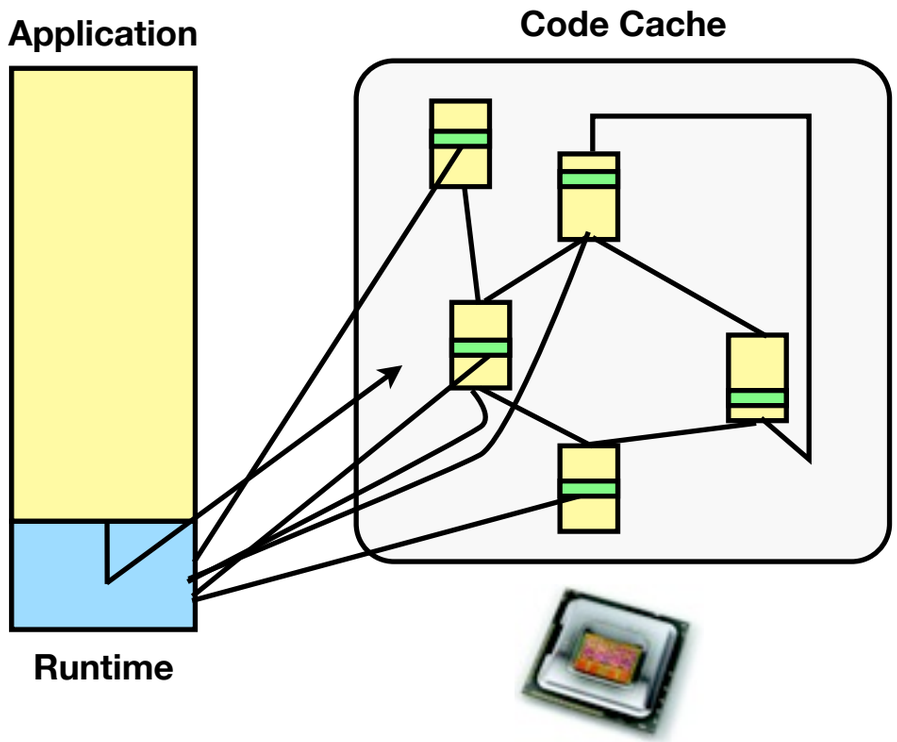
Thermal Time Shifting

- Problem Theme: Make datacenters consume less power by keeping them cool
- Tasks:
  - Link up with Manish Arora

  - Leverage Datacenter Thermal Models
  - Add Phase Change material models
  - PAPER!

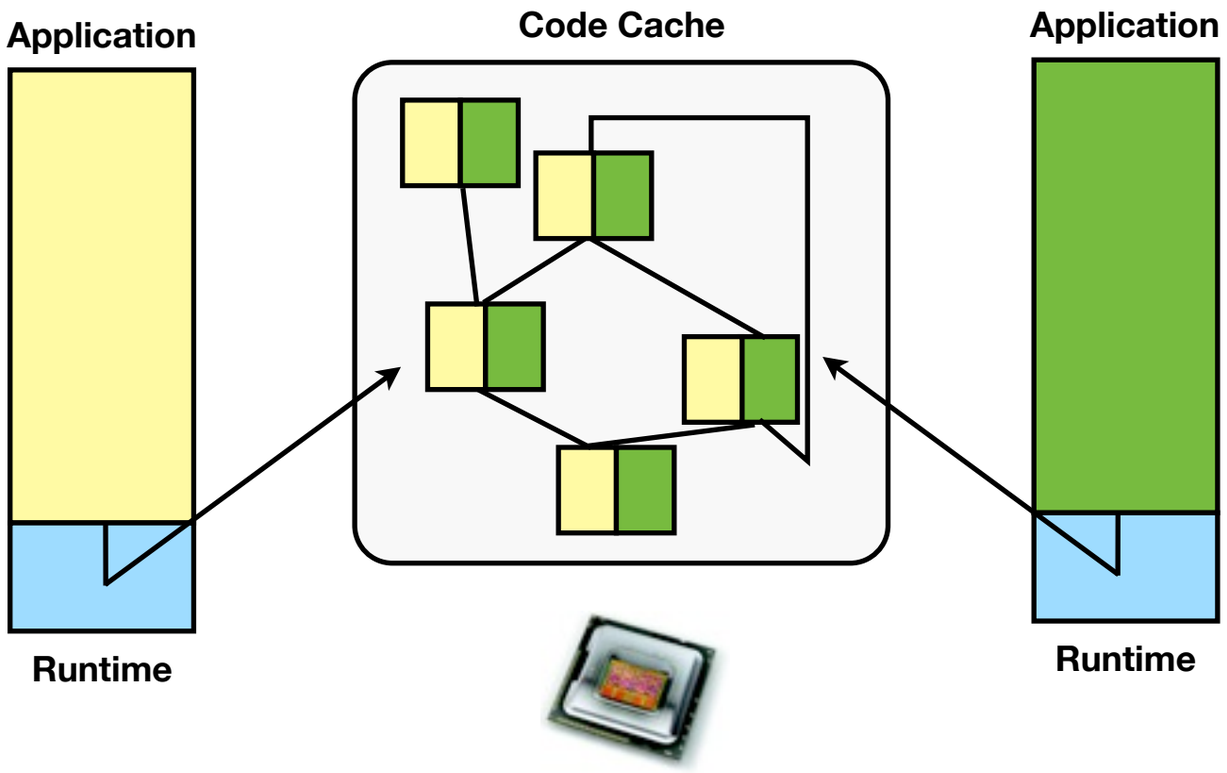
Trace Former Engine

- Problem Theme: Trace formation critical for Hybrid Architectures



- Tasks:
  - Check out Hazelwood paper
  - Clean infrastructure - input is a stream of dynamic instructions
  - Implement NET and LEI, and compare

Super Traces!!! (SMT in Software)



- NOVELTY HIGH!
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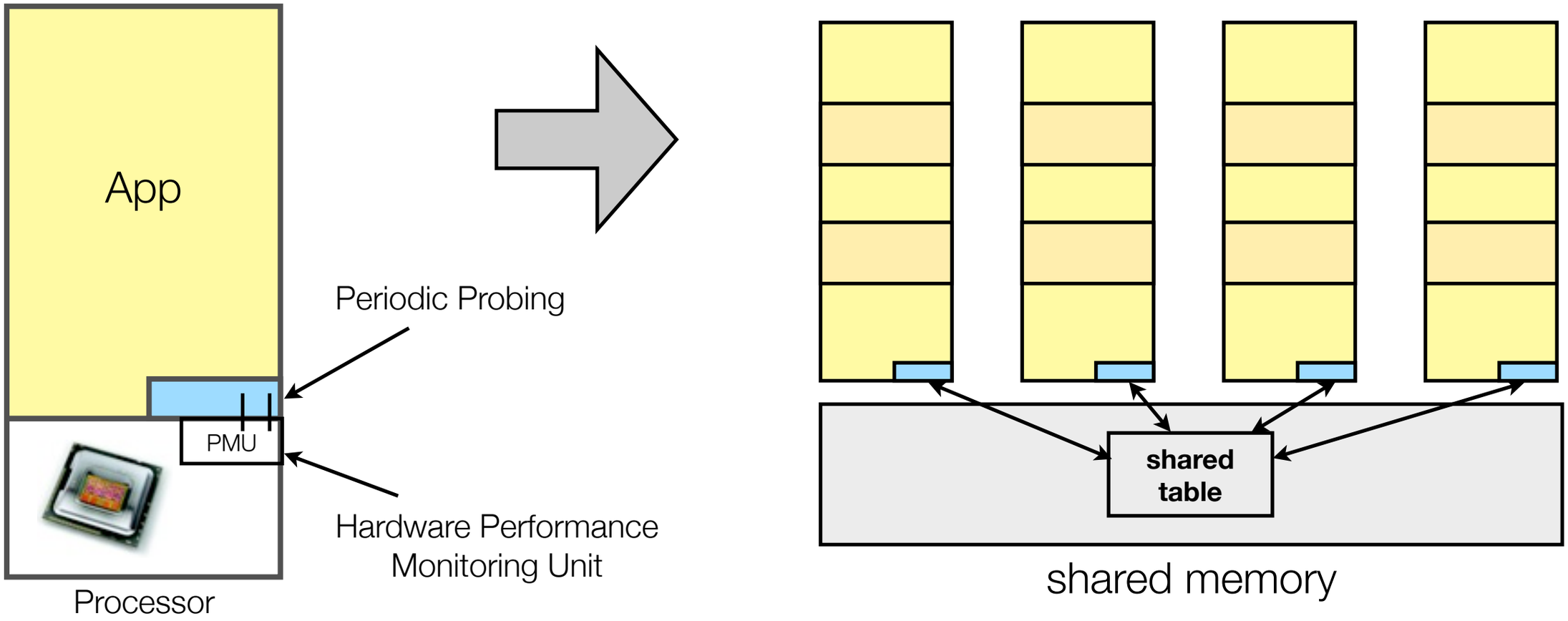
A Lightweight Introspection Engine

- Problem Theme: Lightweight runtime to enable adaptive solutions



Connecting Gem5 to McPat

- Problem Theme: Our community NEEDS this! We will open source this project

- Tasks:
  - Learn and understand Gem5 stats
  - Learn and understand McPat XML input
  - Write extensible super script (Python) to from stat -> xml

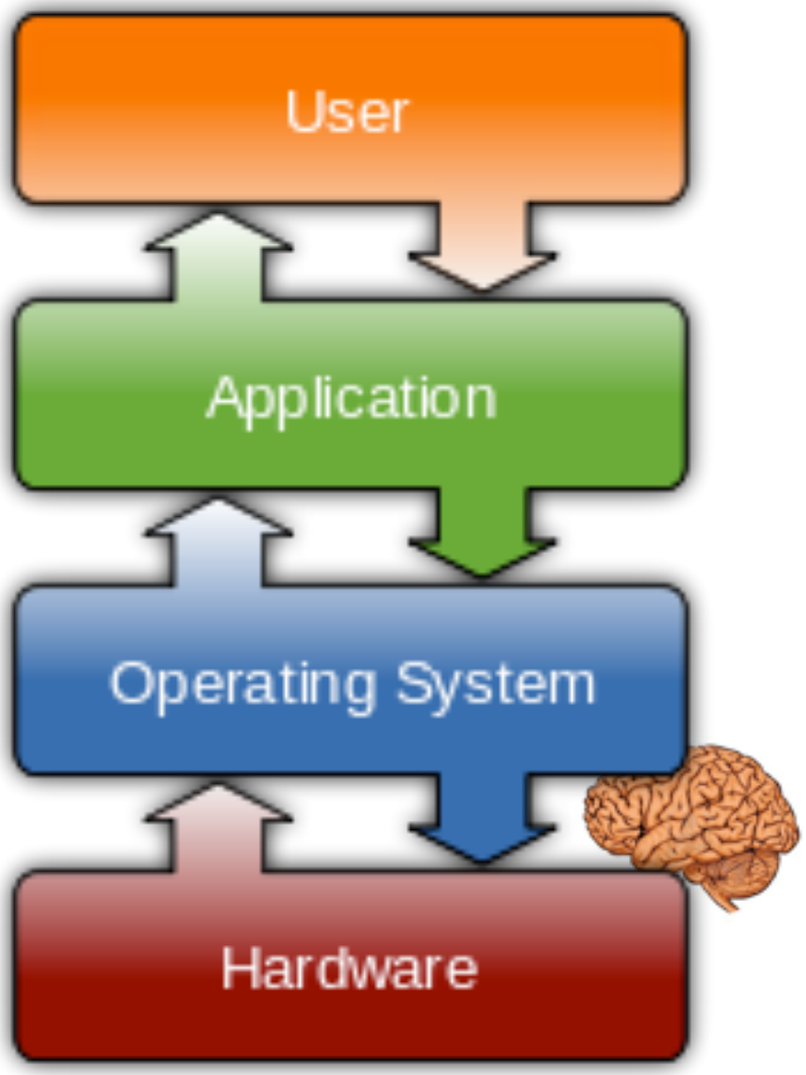
Adaptive Thread to Core Mapping Engine

- Problem Theme: OS and runtimes need mechanism to know how to employ the right policies to converge on optimal perf. dynamically

- Tasks:

  - Identify the right machine learning algo (probably reinforcement learning)

  - Build runtime that will dynamically remap threads based on reinforcement learning



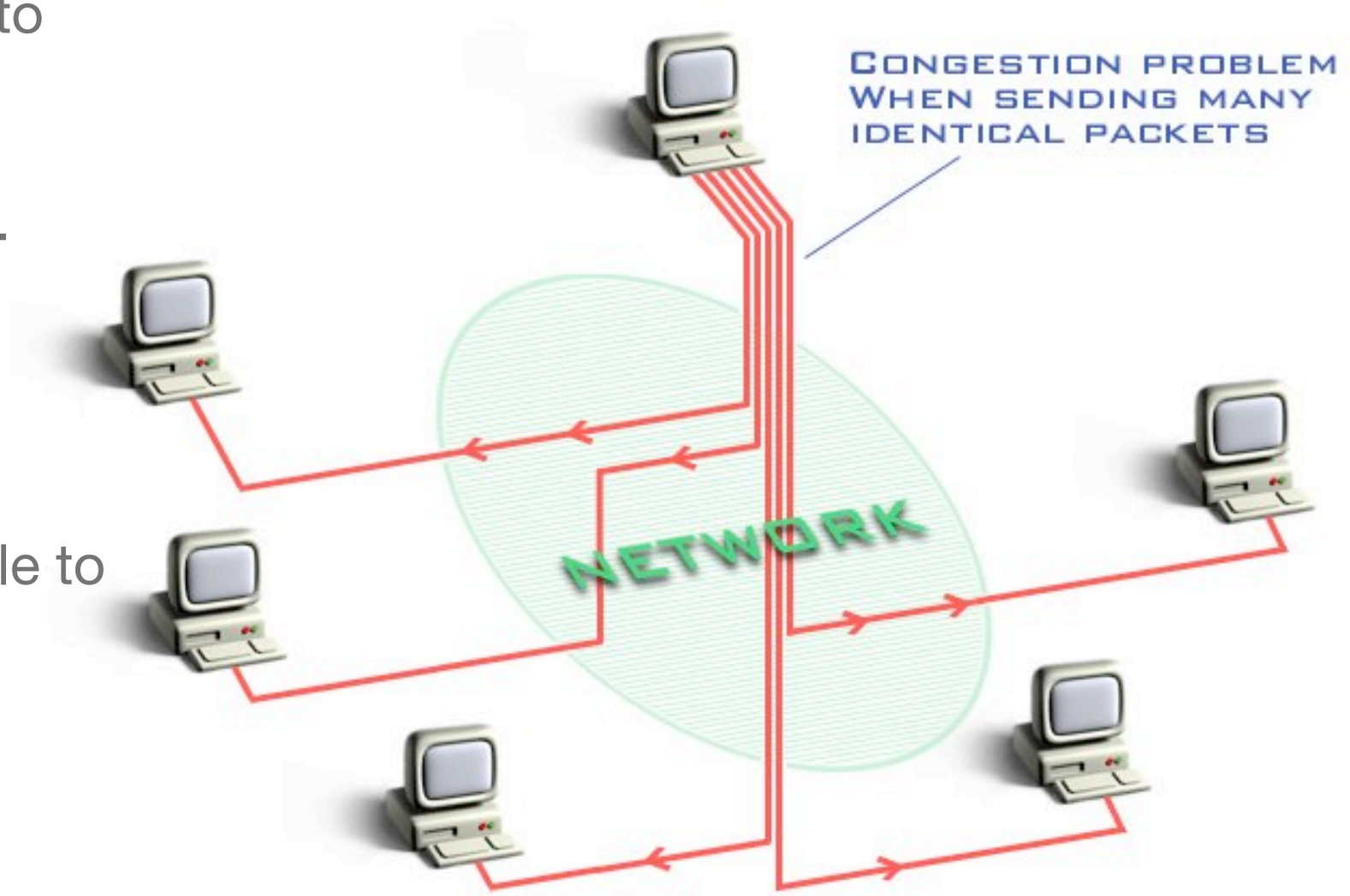
Bubble-Up in the Network

- Problem Theme: Need to extend the precise quantification of interference to network.

- Tasks:

  - Build a packet bubble to gradually constrain network.

  - Test on HPC applications



The Bubble Recorder (D-Bar)

Smashbench (Dylan)

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You Decide!

- Thursday is Pitch DAY!