MLP-Aware Dynamic Instruction Window Resizing for Adaptively Exploiting Both ILP and MLP

Yuya Kora
Kyohei Yamaguchi
Hideki Ando

Nagoya University
Problem to Solve

• Difficult to improve single-thread performance in memory-intensive programs
  – Memory wall
• Very large instruction window can overcome this problem by exploiting MLP
  – This degrades the clock cycle time
  – While pipelining can solve this, it instead prevents ILP exploitation, degrading IPC in compute-intensive programs
Dynamic Instruction Window Resizing

- Adapt window size to available parallelism
  - ILP or MLP
  - Based on prediction

![Graphs showing relative IPC for GM memory-intensive and compute-intensive workloads with fixed and dynamic resizing.](image-url)
Dynamic Instruction Window Resizing

- Adapt window size to available parallelism
  - ILP or MLP
  - Based on prediction

21% speedup on average