Introduction

Motivation for Proposing a new Microarchitecture
Background and Literature Study

Resource-Flow execution model

Speculative data-flow execution of code
Using a couple of examples we introduce the concept of Time Tags, snooping and forwarding as the fundamental way of enforcing data and control dependencies.

Time Tags

A Simple example that shows the basic idea behind using time tags

Nullifying and memory operations

Another example to demonstrate handling of memory operations using time tags, backwarding buses and nullifies.

Branches and Dynamic Predication

Dynamic Predication is explained through an example. Expaline how backward branches are converted into forward branches.

Execution Window of a Resource Flow Microarchitecture

A high level description of Levo is presented.

Sharing Groups

The internal structure of a SG is explained.   AS as an issue slot, AS logic, PE and incoming and outgoing buses.

Segmented Buses

Register and Memory Filter Units are introduced in conjunction with segmented buses.

Commitment, flushes and window shifting

The logical rotating window is explained as well as issues related to commitment and flushing

Multipath Execution

Disjoint execution

Instruction Fetch and Issue

Unrolling, inlining, Dynamic Fetch and Trace Cache

Memory System

L0, PCB, Horizontal buses, …

Simulation Results

Baseline, IPC v.s. Geometry, Sensitivity data (Forwarding Units, Bus Span, Memory and L1), Effect of DEE,