TLC: A Tag-Less Cache for Reducing Dynamic First Level Cache Energy

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14:00 Session 1B - Energy Optimizations [Alpha Gamm Rho Room]
Problem: L1D consumes energy due to tags and ways.

Solution: Extend the TLB to eliminate tags and find the way.

Read Energy

Read 8 Tags & 8 Lines

Use 1 Line
Problem: L1D consumes energy due to tags and ways

Solution: extend the TLB to eliminate tags and find the way
Results

Reduce total L1D dynamic energy by 78%

1. Eliminate extra data-array reads
   - by determining the correct correct way from the TLB

2. Eliminate the tag-array
   - by avoiding tag comparisons

3. Filter out cache misses
   - by checking in the eTLB

4. Amortize the TLB lookup energy
   - by integrating it with way information
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More cool stuff in the presentation:
   ▪ μPages, synonyms, coherency, replacements, …