**Introduction**

- Developed locality transformations for nested recursive iteration spaces
- Introduced recursion twisting, a recursion-friendly analog of loop titling
- Handling recursive iteration spaces with irregular bounds
- Achieved $\sim 4x$ geo-mean performance enhancement using our transformations

**Contributions**

- **Locality Transformations for Nested Recursive Iteration Spaces**
  - Kirshanthan Sundararajah, Laith Sakka and Milind Kulkarni
  - School of Electrical and Computer Engineering, Purdue University

**Evaluation Platform**

- Dual 12-core Intel Xeon 2.7 GHz
- L1 - Cache 32K
- L2 - Cache 256K
- L3 - Cache 20 MB

**Irregular Iteration Spaces**

- Use Cases of Nested Recursion
  - Tree-Join Applications
  - Dual-Tree N-Body Applications

**Recursion Interchange and Twisting**

- Reuse Distance for the Inner Tree Nodes are Bigger.
- Bad Locality!!

- Reuse Distance for Most of the Tree Nodes are Smaller.
- Good Locality!!

**Results**

**Locality**

- Speedup
- Scalability

- Instruction Overhead
- Instruction Overhead (X)

**Discussion**

- Unimodular and Polyhedral Frameworks

- Point Blocking and Traversal Splicing
  - Walder1990, Rajbhandari2016

- Use Cases of Nested Recursion
  - Tree-Join Applications
  - Dual-Tree N-Body Applications

- Loop Fusion and Loop Interchange and Tiling
  - [Walder1990, Ahmed2000]

- Unimodular and Polyhedral Frameworks

- Point Blocking and Traversal Splicing
  - Walder1990, Rajbhandari2016