1. Cache Behavior Over Time

Why do we care?
- Performance profiling: optimize code
- Code optimization: optimize data
- Scheduling: optimize sharing

Average cache behavior is misleading:
- Different phases need different optimizations.


- StatCache: Statistical cache model based on sparsely sampled memory accesses.
- ScarPhase: Uses Intel PEBS to sample branches to identify phases (2% overhead).

3. Modeling Cache Behavior Over Time

Option 1: StatCache on all execution

Option 2: Periodic Profiling

Option 3: Phase Guided Profiling

Lower overhead, but lower resolution

Overhead proportional to number of phases

4. Accuracy and Overhead

Accuracy:
- Strictly better accuracy for phase guided profiling.
- Much better for some applications because of smarter profiling.

39% better accuracy!

Overhead:
- No redundant samples from the same phase.
- 21% overhead on average.

6× faster!

- Both faster and more accurate!

5. Phase Behavior

Similar sensitivity at 2MB cache, but very different at 1KB.

Solution: Spread out the memory samples over the whole phase.