1. How can phases help you to profile your application?

Baseline CPI: bzip2/chicken

Average CPI

Periodic CPI profiling

Phase guided profiling

- Fast
- Inaccurate

2. Why are phases important?

- Most metrics are a function of what code is executed
- Divide the execution into non-overlapping fixed size intervals
- Sample what code is executed
  - BBV - (Dense) Basic Block Vector (Calder et al.)
  - EIPV - Extended Instruction Pointer Vector (Davies et al.)
  - MBBV - Mapped Basic Block Vector (Calder et al.)
  - BRV - Branch Vector
  - CBRV - Conditional Branch Vector
- Intel PEBS to sample basic blocks
  - Sample what code is executed
  - Divide the execution into non-overlapping fixed size intervals
  - Most metrics are a function of what code is executed

3. How to detect phases?

Interval: 4 5 6 7 8
Now
Time
Branch Vectors

Clustering
Phase A
Phase B
Phase C

Phase guided profiling

- Only profile a small part of each phase
- < 1% of the execution is profiled
- The profiled phases covers 90% of the execution
- Predict the phase in the next interval:
  - Profile the next interval if the phase has not been profiled
  - Otherwise, turn off the profiler
- Each interval is assigned the profile of the phase it belongs to

5. Use Case: Phase Guided Profiling

- 3x better accuracy compared to average profile
- 2x better accuracy compared to periodic profiling
- 1.7% overhead with ScarPhase