INTRODUCTION
- Runtime optimization to maximize power-normalized performance
- Trading off inter-application concurrency with performance/power
- Workload classification allows the minimization of models to reduce overhead and complexity
- RTMx runtime facility for runtime algorithm plug-ins
- Performance counters as monitors
- Decision space reduced from NP (exponential) to linear
- Negligible time overheads
- Robustness enhancements
- Runtime, per time-interval classification detects different phases of each app
- Odroid XU3 experimental validation with up to 120% performance/power improvements

METRICS
- cmr: (InstRet-Mem)/InstRet
- uur: Cycles/ClockRef

CLASSIFICATION
- uur of all cores [0, 0.11] 0: Low activity
- cmr per-core [0.3, 1): 1: CPU-intensive
- cmr per-core [0.25, 0.3] 2: CPU+memory
- cmr per-core [0, 0.25] 3: memory-intensive
- out of range 4: unclassified
- special class 5: low-parallelizability

DECISIONS
- 0: F = min A7 = 1 A15 = 0
- 1: F = max A7 = 0 A15 = max
- 2: F = min A7 = max A15 = 0
- 3: F = max A7 = 1 A15 = 0
- 4: F = min A7 = 1 A15 = 0
- 5: F = max A7 = 0 A15 = 1

TRACE STATE SPACE
- Model-free RTM with workload classification
- A. Aalsaud, A. Rafiev, F. Xia, R. Shafik, A. Yakovlev

IMPROVEMENT

<table>
<thead>
<tr>
<th>STATE SPACE</th>
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<tbody>
<tr>
<td>apps</td>
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<tr>
<td>fluidanimate</td>
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<td>3 diff class apps</td>
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<td>2 class 3 apps</td>
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<tr>
<td>3 class 3 apps</td>
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<tr>
<td>2 class 1 apps</td>
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</tbody>
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WL CLASSES
- 0: Low activity; 1: CPU-intensive;
- 2: CPU- & memory-intensive;
- 3: Memory-intensive.