System Measurement: Workload phase

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What do we mean by “workload phase?”
A Classic Linpack Profile: Colosse

Nearly flat, except...

Job launch

Job cleanup
The Core Phase

• The time period under test

• Possible core phases:
  • Job scheduling -> Job completion
  • Application start -> application end
  • Benchmark start -> benchmark end

• Any is valid, so long as it matches your other metrics
The Core Phase: Linpack Example

Core phase cuts off most of the cruft
What do we require now?
Workload Timing by Measurement Level

Level 1: 20%

Level 2: evenly spaced average measurements

Level 3: Continuously integrated energy

Segment

Power (kW)

Time from start (seconds)
Power Variability

Segment: Core, Startup, Tear-down

Time from start (seconds) vs. Power (kW)

First 20%: 398.1
Last 20%: 398.2
Core phase average: 398.7
Why Change the Requirement?
Newer system designs have a different pattern.
Sequoia25 Linpack Profile

![Graph showing the power consumption profile of Sequoia25 Linpack with segments for core, startup, and tear-down. The graph indicates that the tail-off phase is longer.](image-url)

**Tail-off is longer**
Core Phase Averaged in 20% Increments

- **First 20%:**
  - Core phase average: 11503.3 kW
  - First 20%: 11628.7 kW

- **Last 20%:**
  - Core phase average: 11503.3 kW
  - Last 20%: 11244.2 kW

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**Core phase average:**

- Total Power: 11503.3 kW
Core Phase Averaged in 20% Increments

3.4% Lower average power in the last 20%
Piz Daint (GPU accelerated) Linpack Profile

Tail-off is much longer
Core Phase Averaged for Piz Daint

First 20%: 873.8
Last 20%: 698.4
Core phase average: 833.4
Core Phase Averaged for Piz Daint

Segment

Core
Startup
Tear–down

Power (kW)

25%
Lower average power in the last 20%!

Time from start (seconds)
What do we propose?
Workload Timing by Measurement Level

Level 1: 100%

Level 2: evenly spaced average measurements

Level 3: Continuously integrated energy
Conclusions

- Our current requirements for measurement timing are insufficient
- New system types require a longer measurement phase to get a true average
- We propose raising the requirement on Level 1 measurements to an average over the full core phase, or to use a higher level’s measurement style