

Speed vs Rate matrix for Embnech - 0.1-draft-2020420

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Revision History

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Reference Documents

Item #	Document	Revision Used	Comment
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Abbreviations

Abbreviation	Description
SW	Software
HW	Hardware
MCU	Micro Controller Unit

1. Overview

1.1. Motivation

On the embedded space, sometimes throughput is more important than latency. Those days we can start seeing emerging IoT cores/MCUs that have a multithreaded design. On Those designs score for **rate/throughput** will be more critical than a score for **speed**. It is straightforward to estimate the **rate** score of multi-core without shared resources, but with HW multi-threading, resource sharing is built-in. Even for multi-core without HW threading, sharing for resources is inevitable. E.g. Crossbar matrix is shared among the multi-cores, and it will impact the score result.

2. Speed Metric (Embench native Matric)

- Measure latency: how fast the CPU completes a single workload.
- Benchmark Score Formula:

$$\text{Reference-Time}_{(\text{one-workload})} / \text{Platform-under-Test-Time}_{(\text{one-workload})}$$

- Final Score: Geomean

3. Rate metric

- Measure throughput: for a given frame time, how many copies of the same workload the CPU can do.
- Benchmark score formula:

$$N = \text{Number of workload copies under test}$$

$$N * \text{Reference-Time}_{(\text{one-workload-copy})} / \text{Platform-under-Test-Time}_{(\text{all-workload-copies})}$$

- Final Score: Geomean

NOTE

We need to use the same reference time for both, speed and rate