




Slot-Level Time-Triggered Scheduling on COTS Multicore Platform with Resource Contentions^Δ

Ankit Agrawal^{*}, Gerhard Fohler^{*}, Jan Nowotsch[§],
Sascha Uhrig[§], and Michael Paulitsch[‡]

^{*} TU Kaiserslautern , [§] Airbus Group Innovations ,
and [‡] Thales Austria GmbH 

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- Time-triggered (TT) systems
 - Used in many safety-critical domains like avionics
 - Benefits: system-wide determinism, ease of certification, reduced costs etc.

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- Time-triggered (TT) systems

**Combine benefits
&
Use in next-generation Integrated
Modular Avionics (IMA)**

Problem & Challenges

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Problem: Enable TT scheduling on COTS multicores

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 - No mention of task deadline and ET computation
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COTS Multicore Challenges

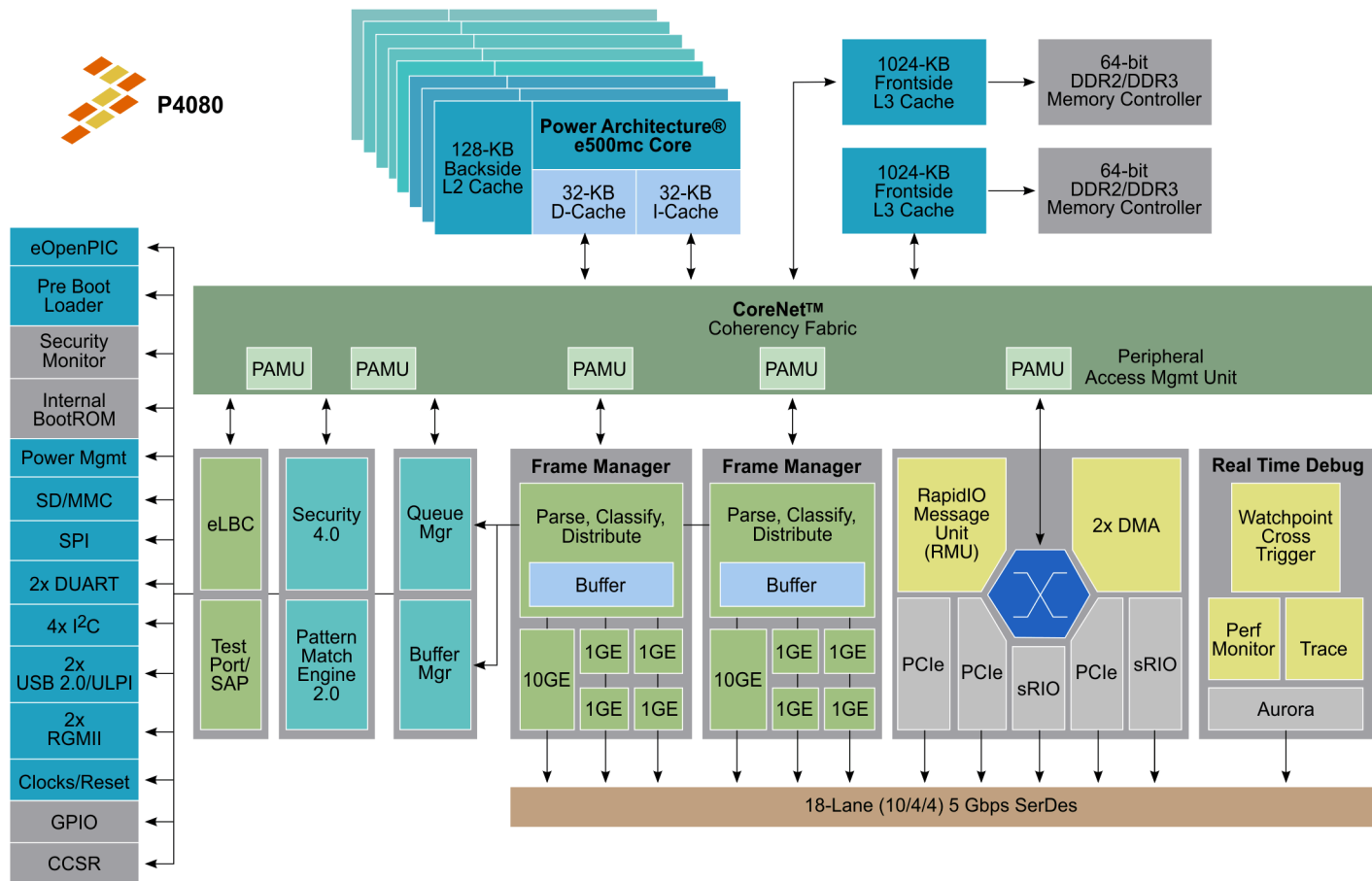
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TT Challenges

- For each task, **guarantee offline**:
 - Maximum **number** of runtime inter-core interferences
 - **latency of runtime inter core interferences**
- Runtime mechanism that upholds offline guarantees
- **Find valid offline schedule**

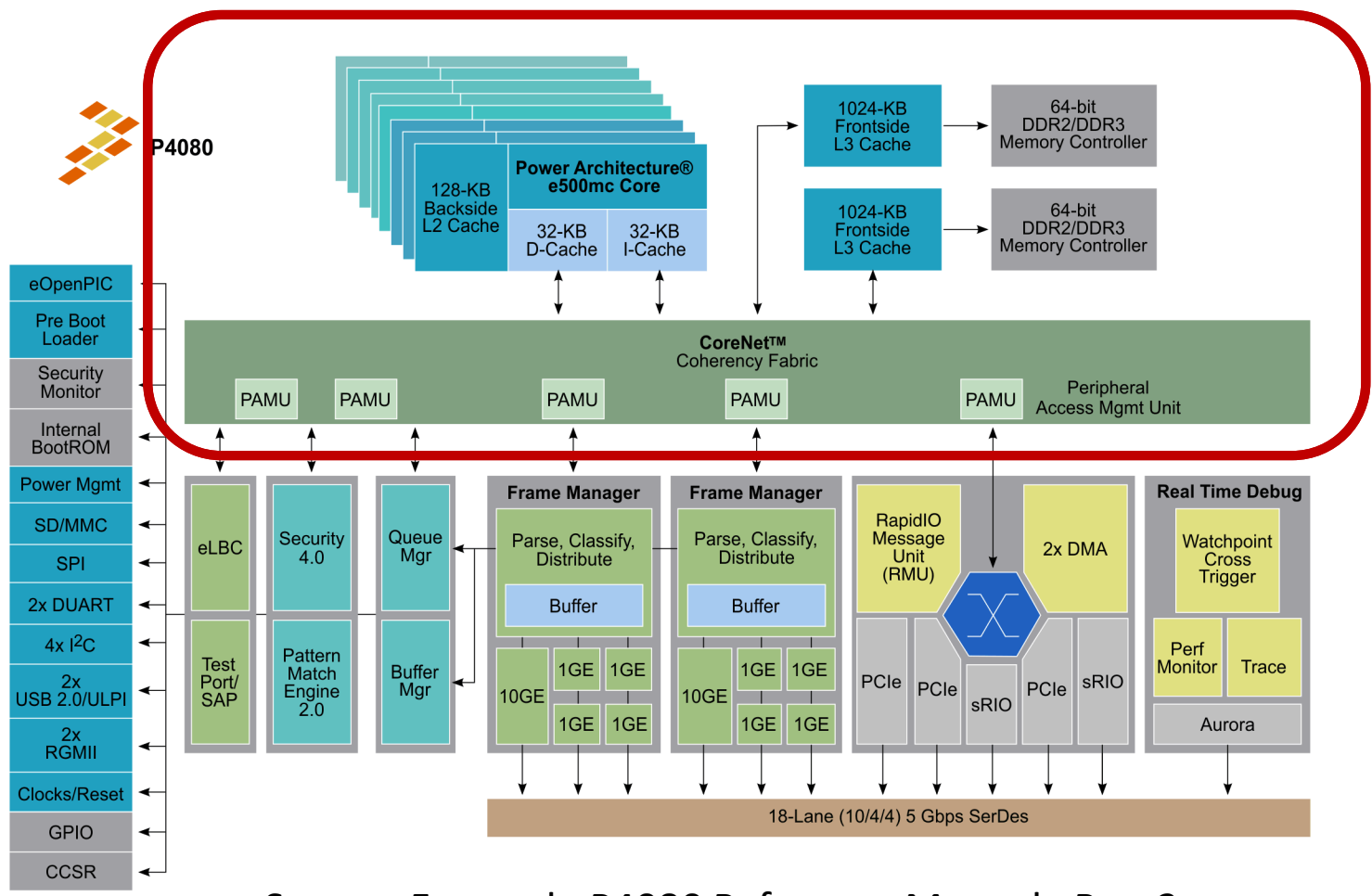
System Model: Freescale QorIQ P4080

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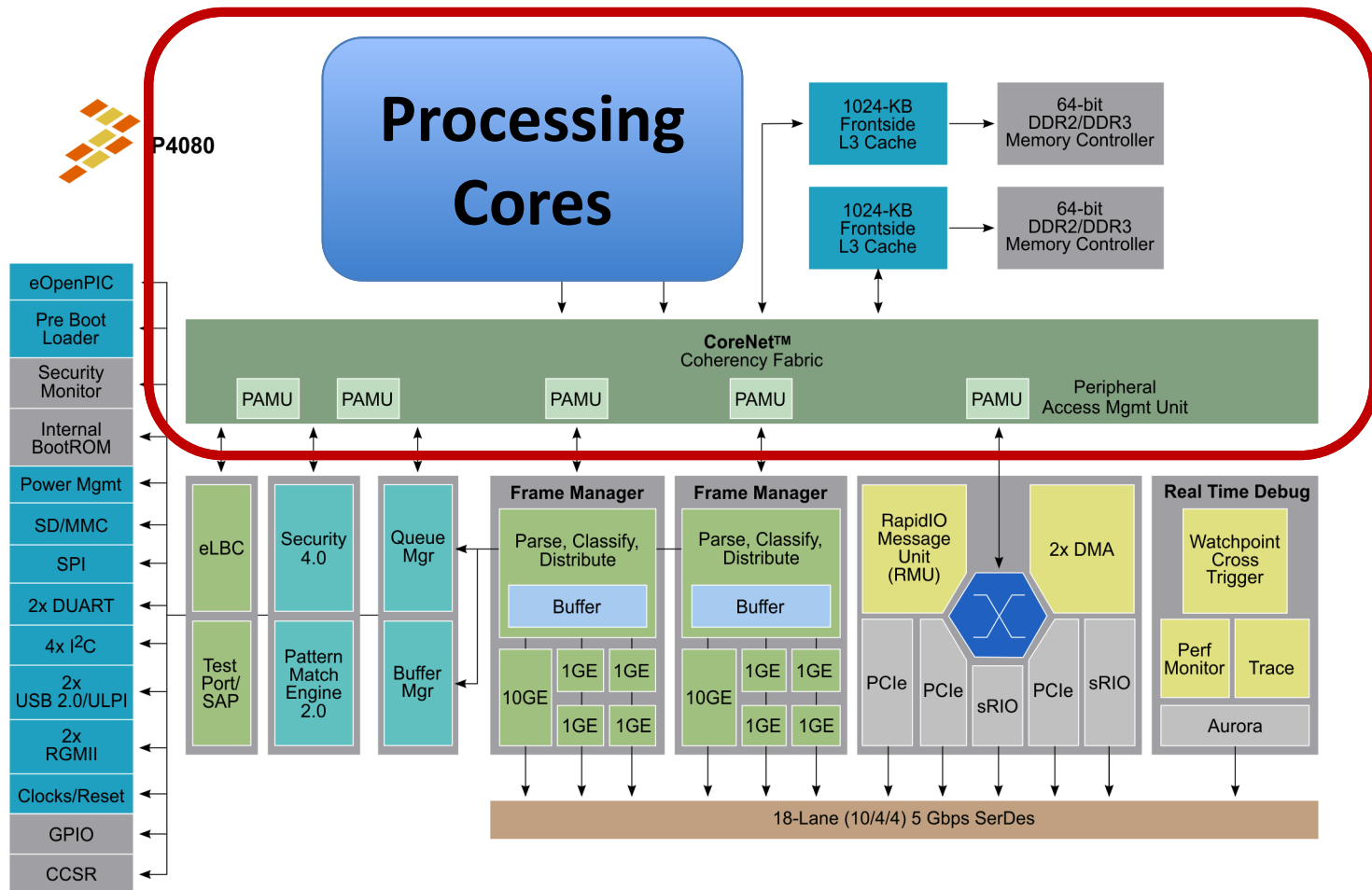
Source: Freescale P4080 Reference Manual, Rev. 3.

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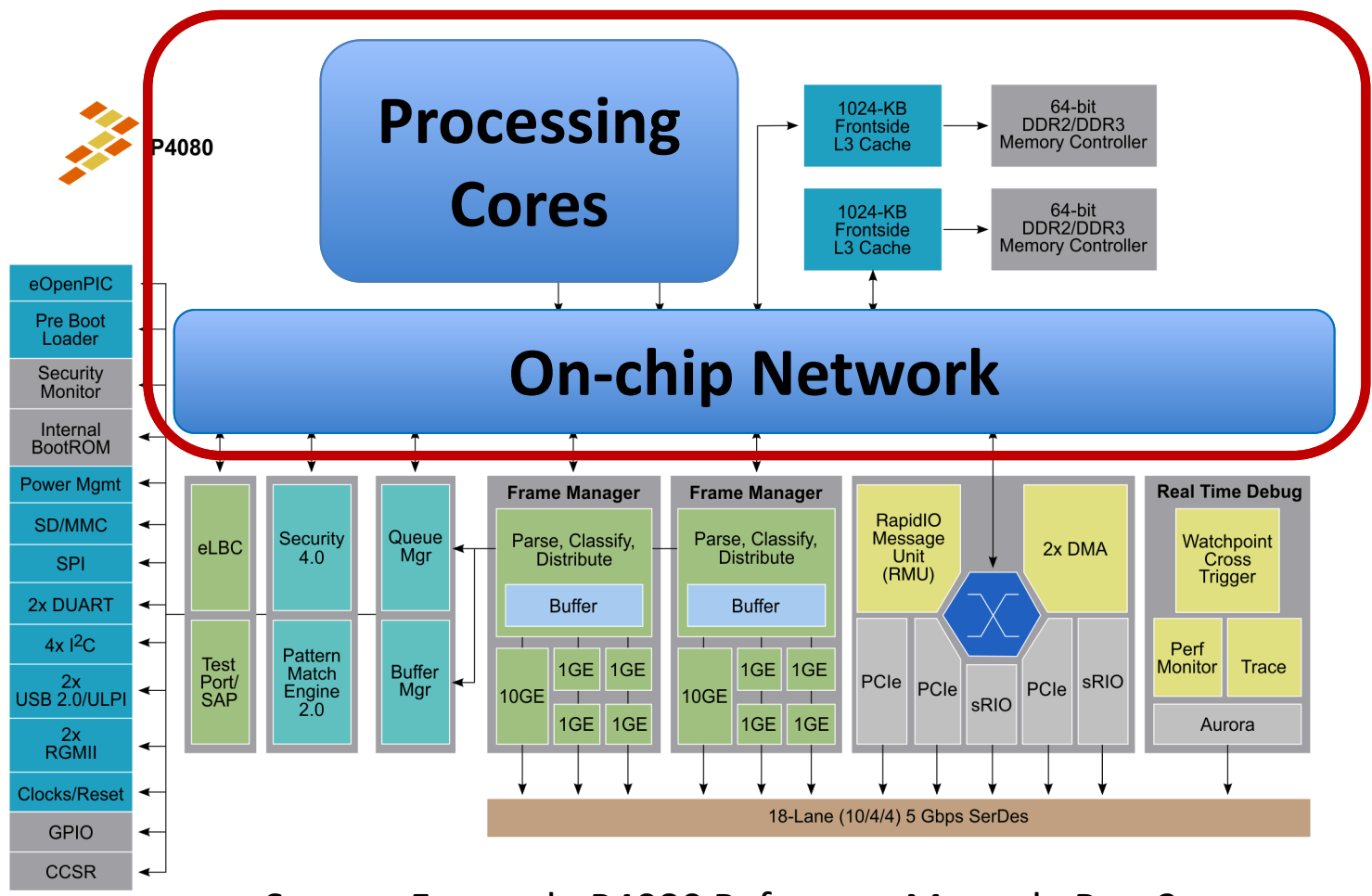
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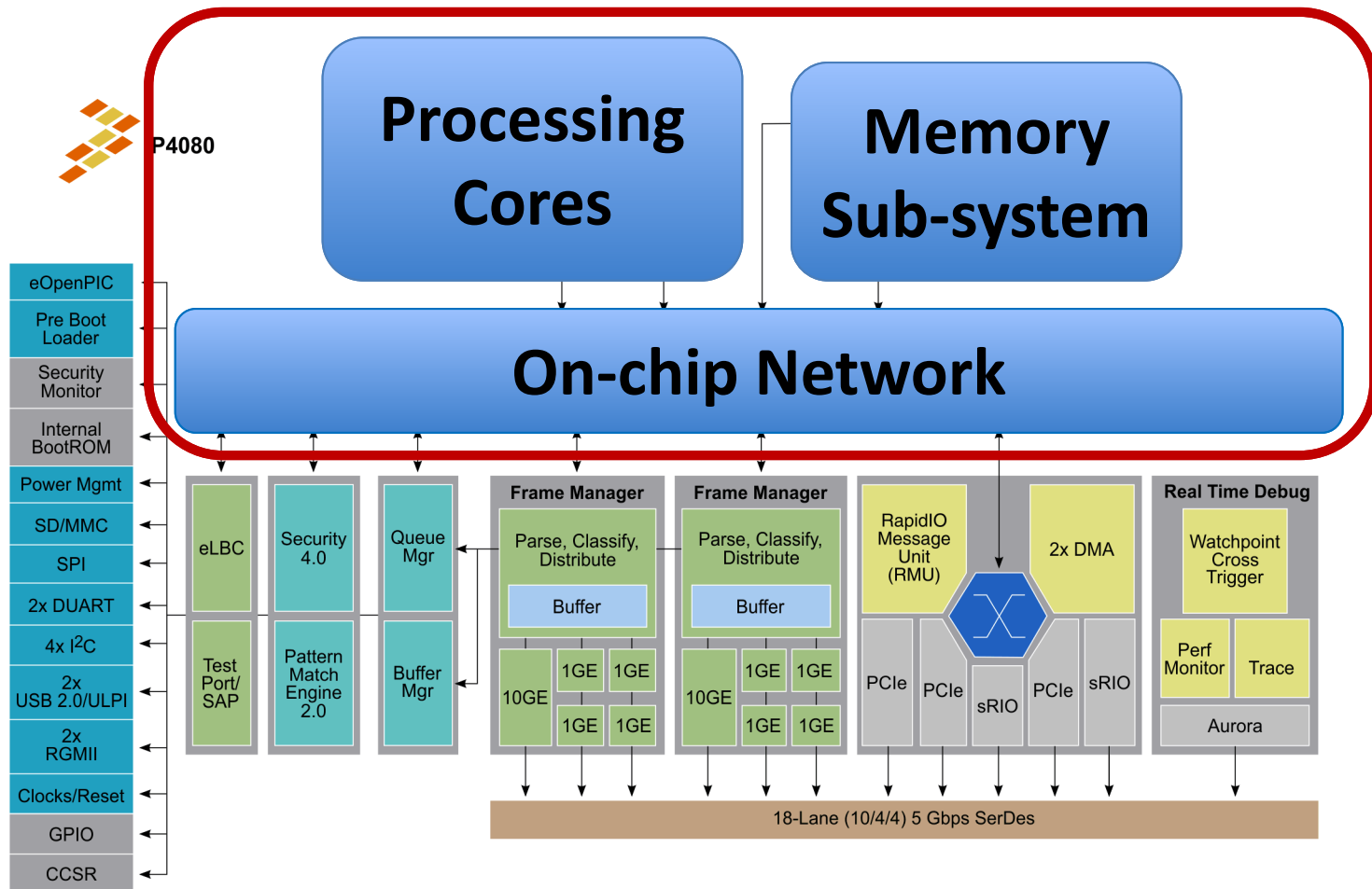
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Proposed Method

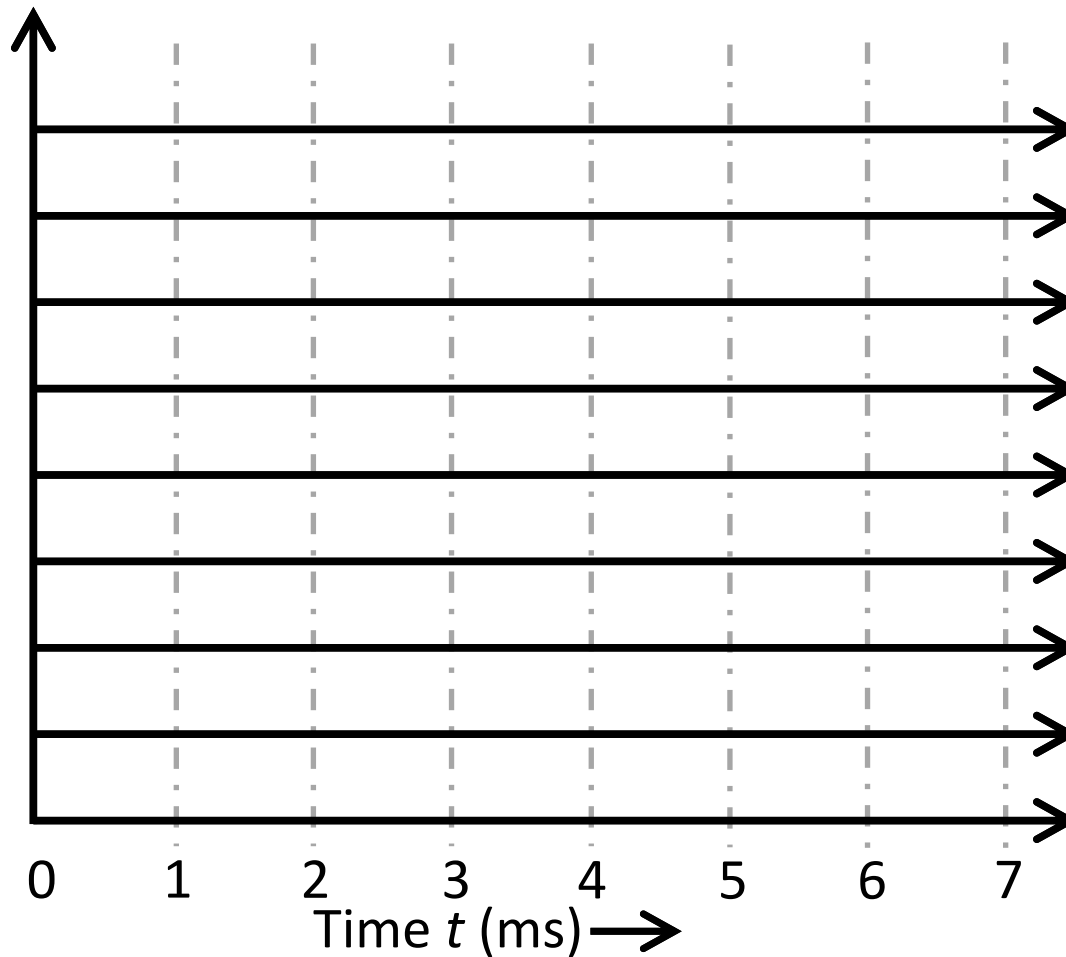
Proposed Method

- Phase 1

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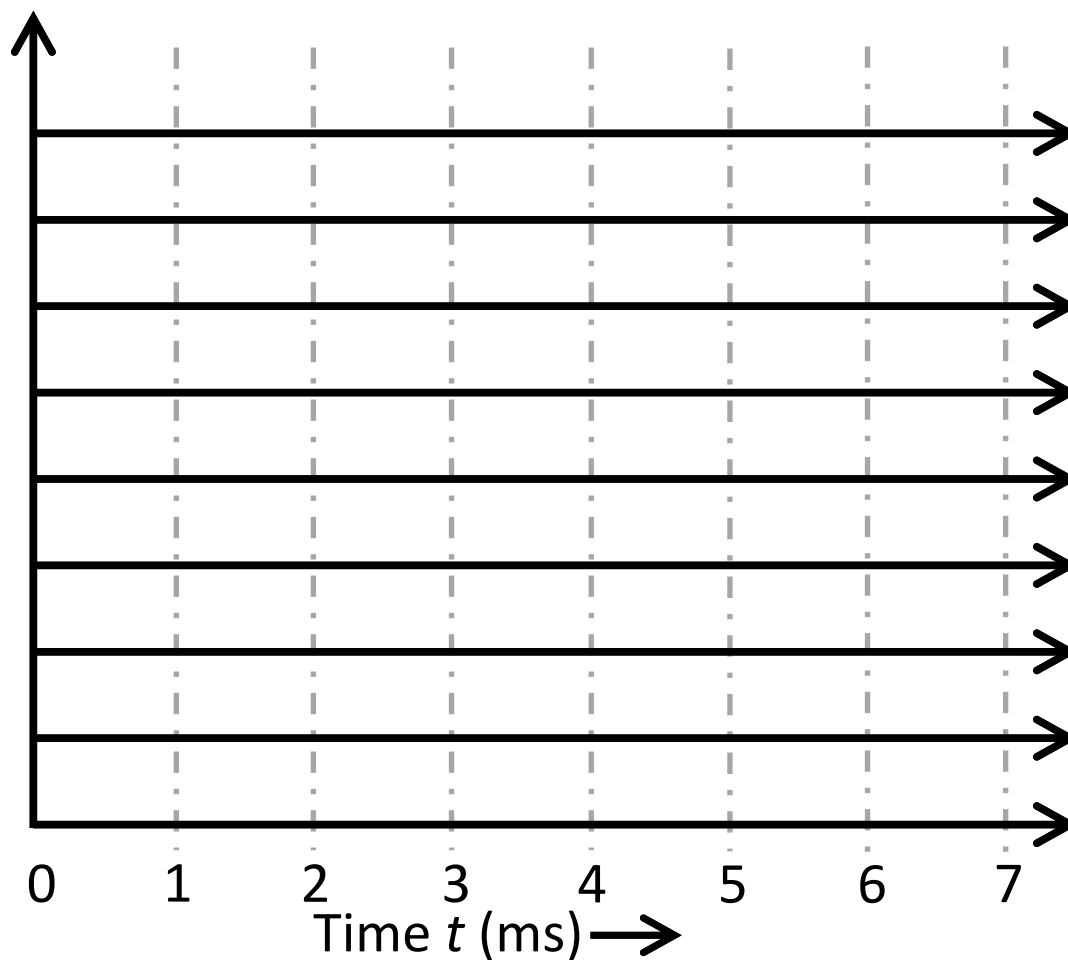
- Phase 1
 - Runtime

Proposed Method



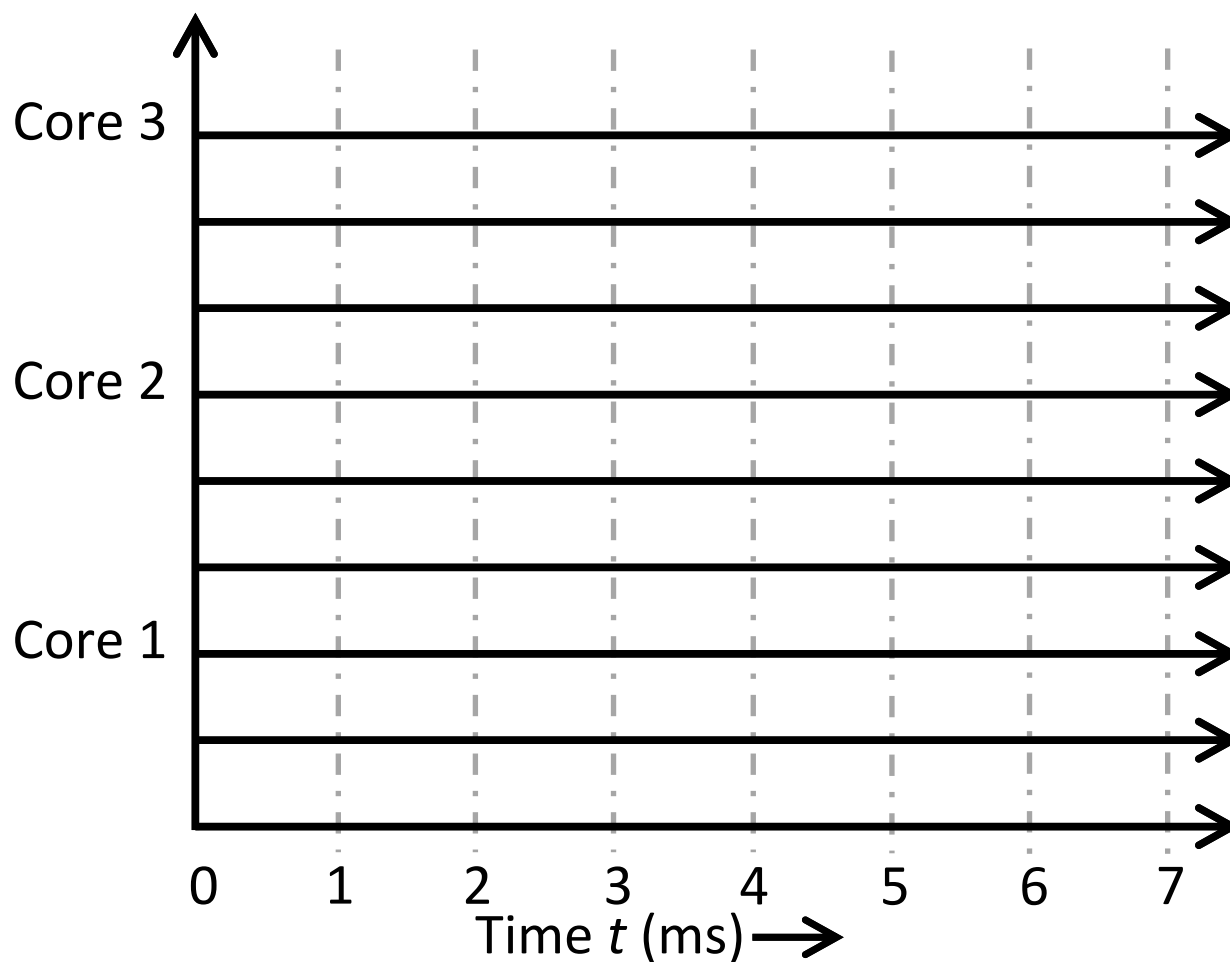
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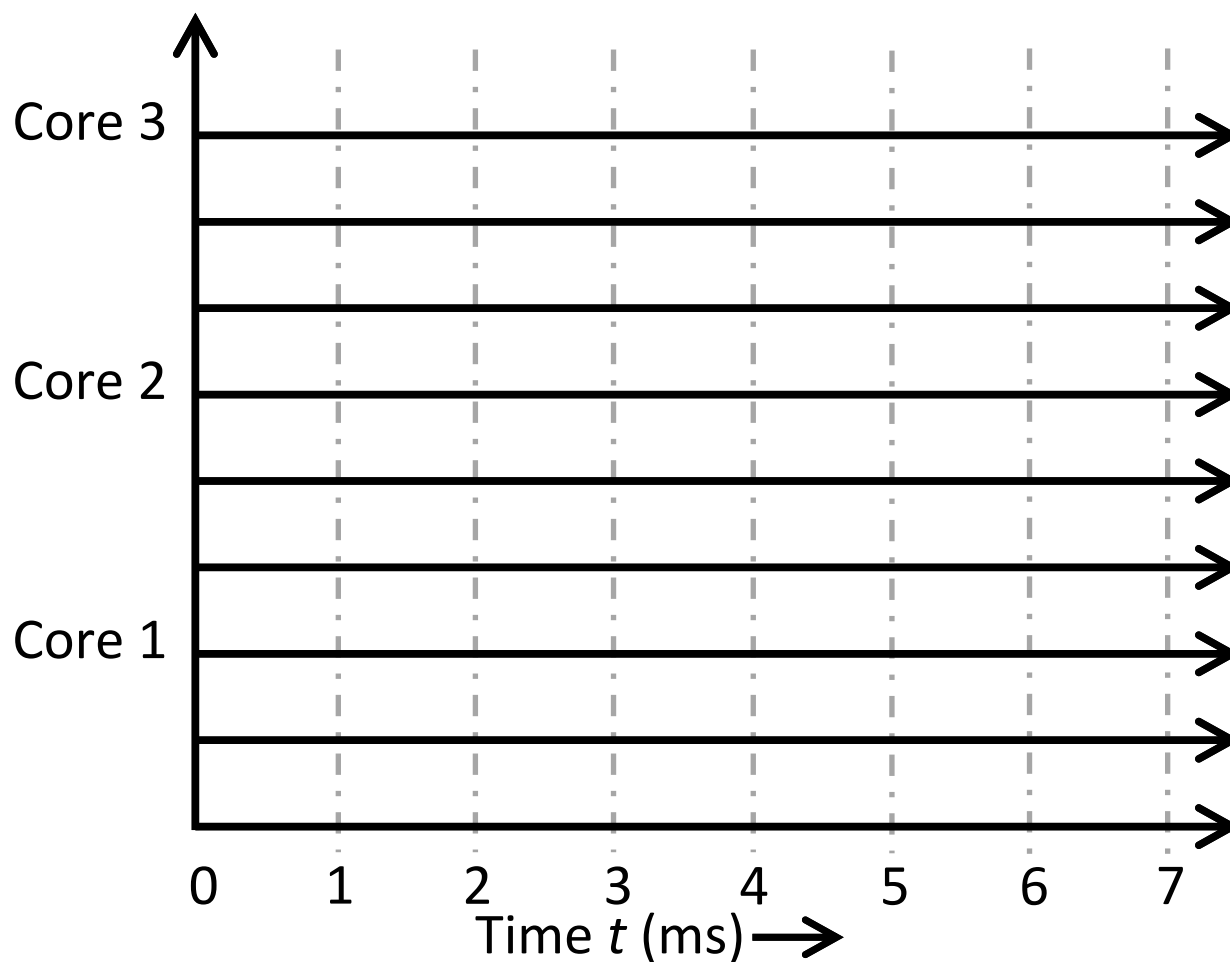
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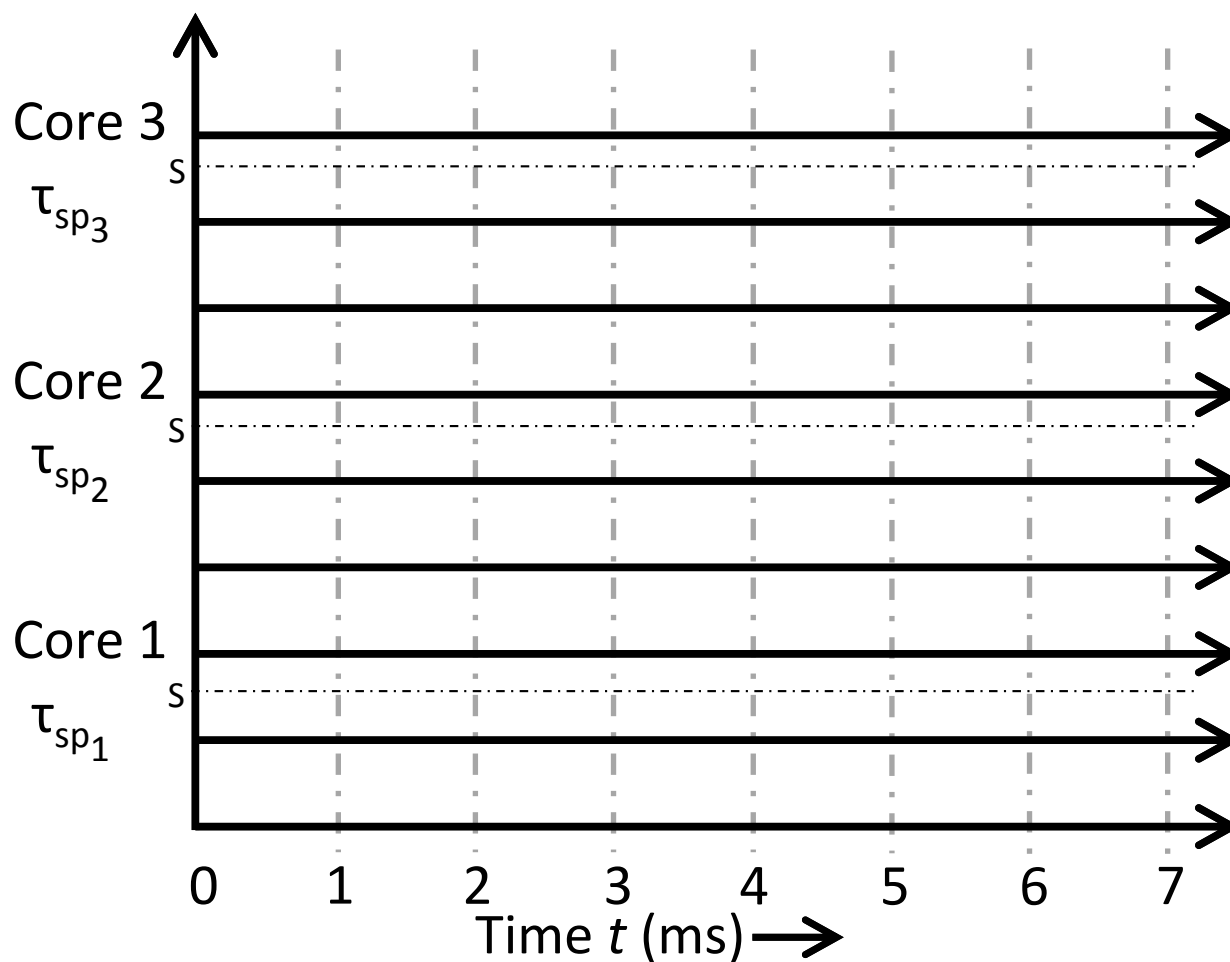
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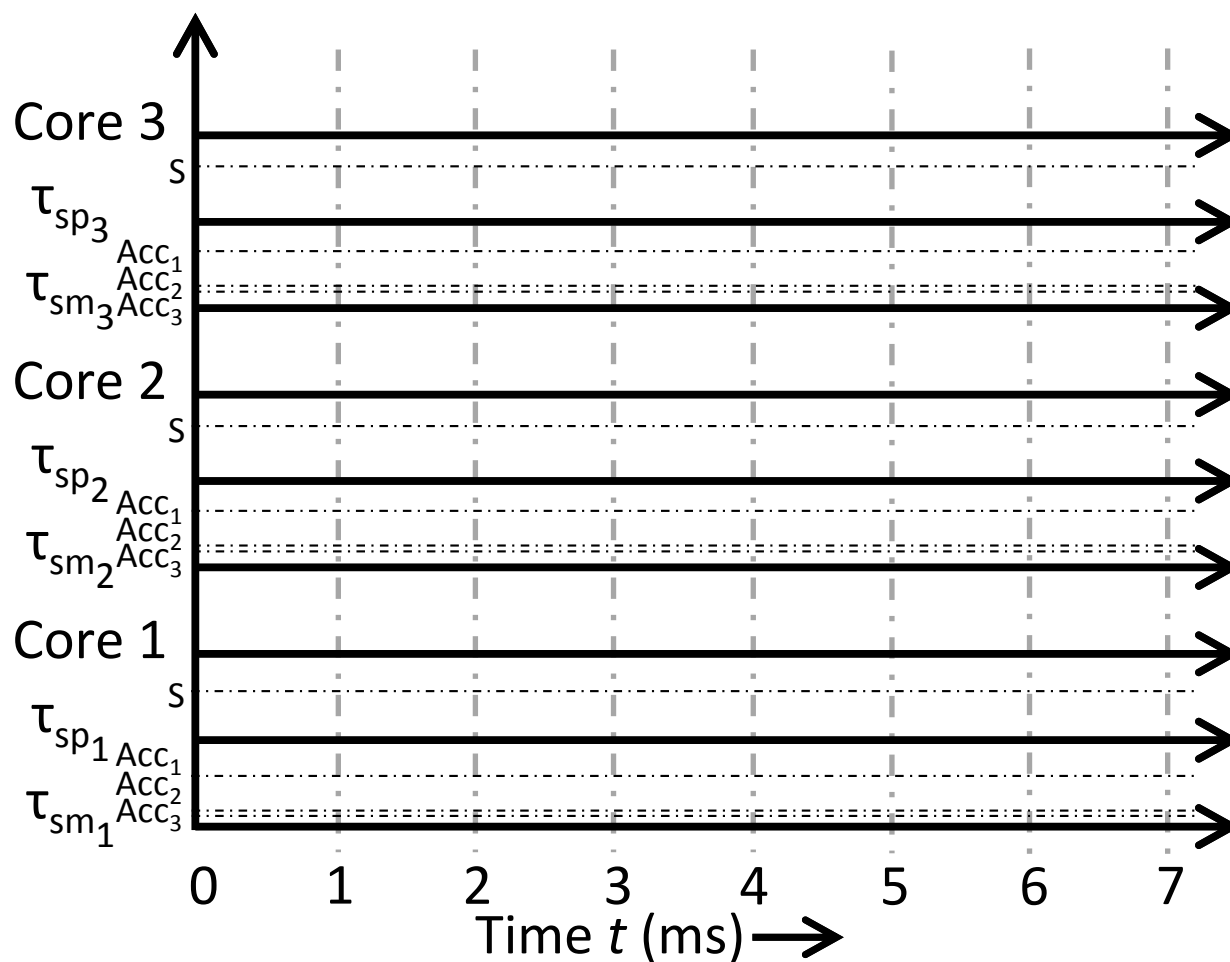
- Phase 1
 - Runtime
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 - 2 servers per core

Proposed Method



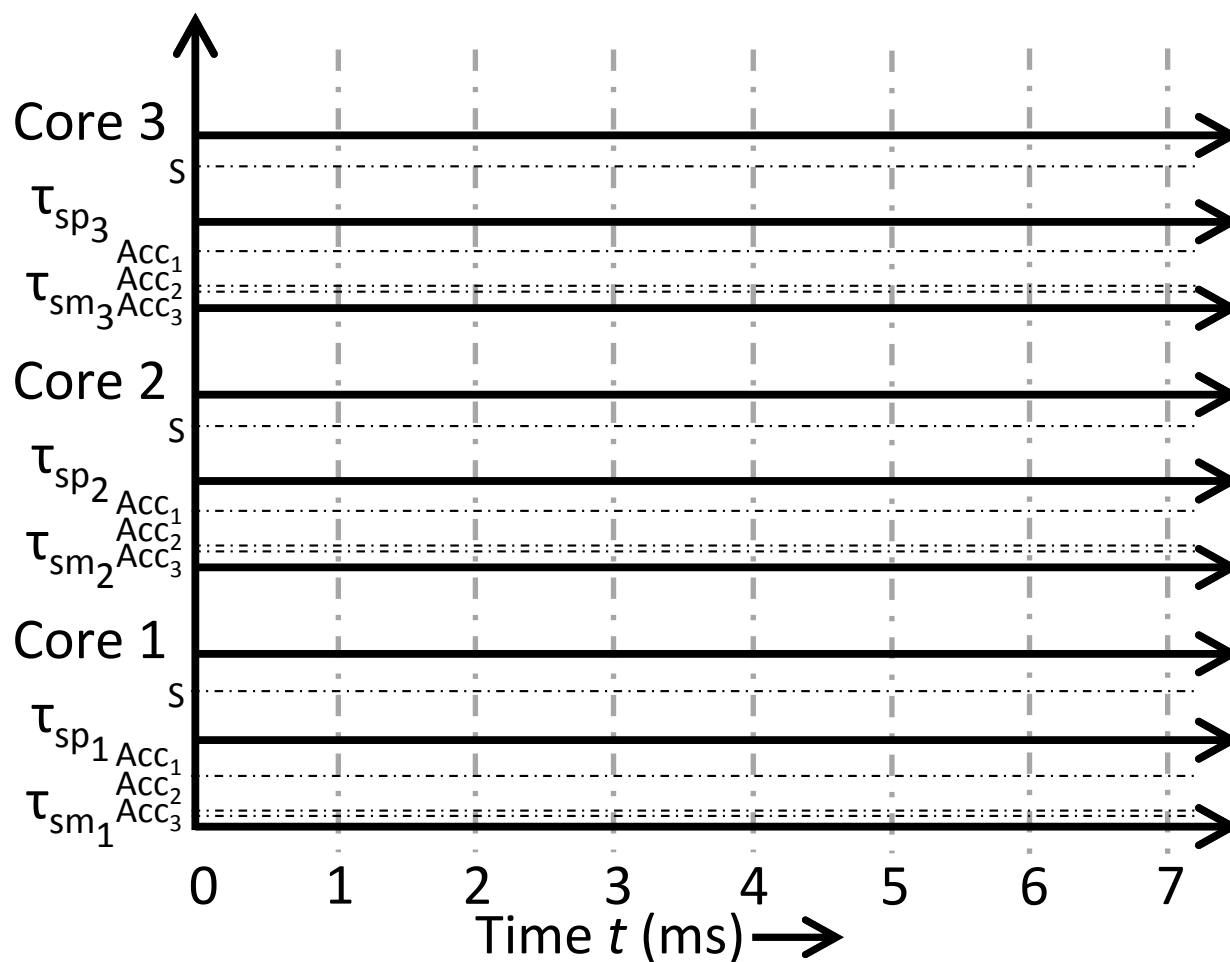
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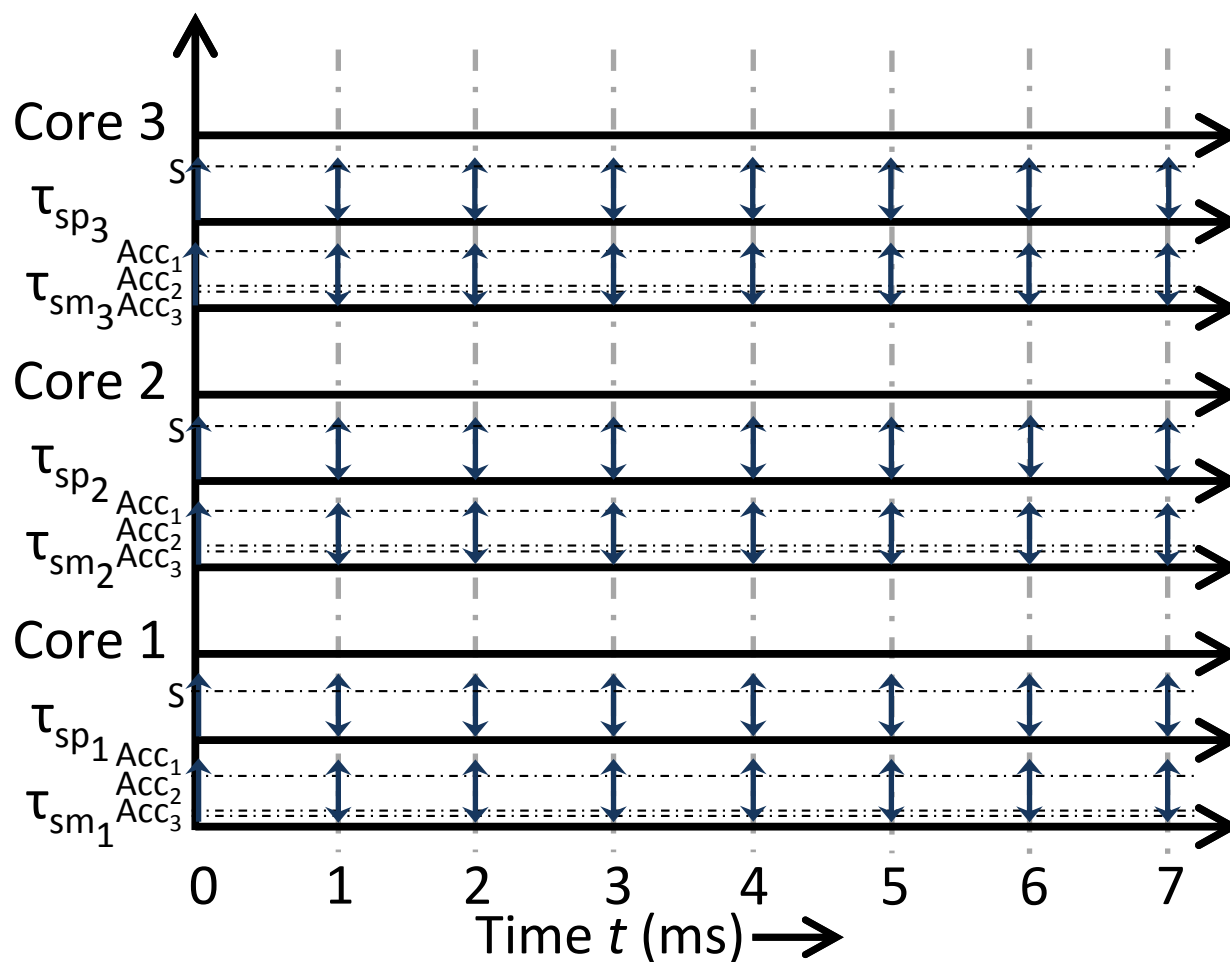
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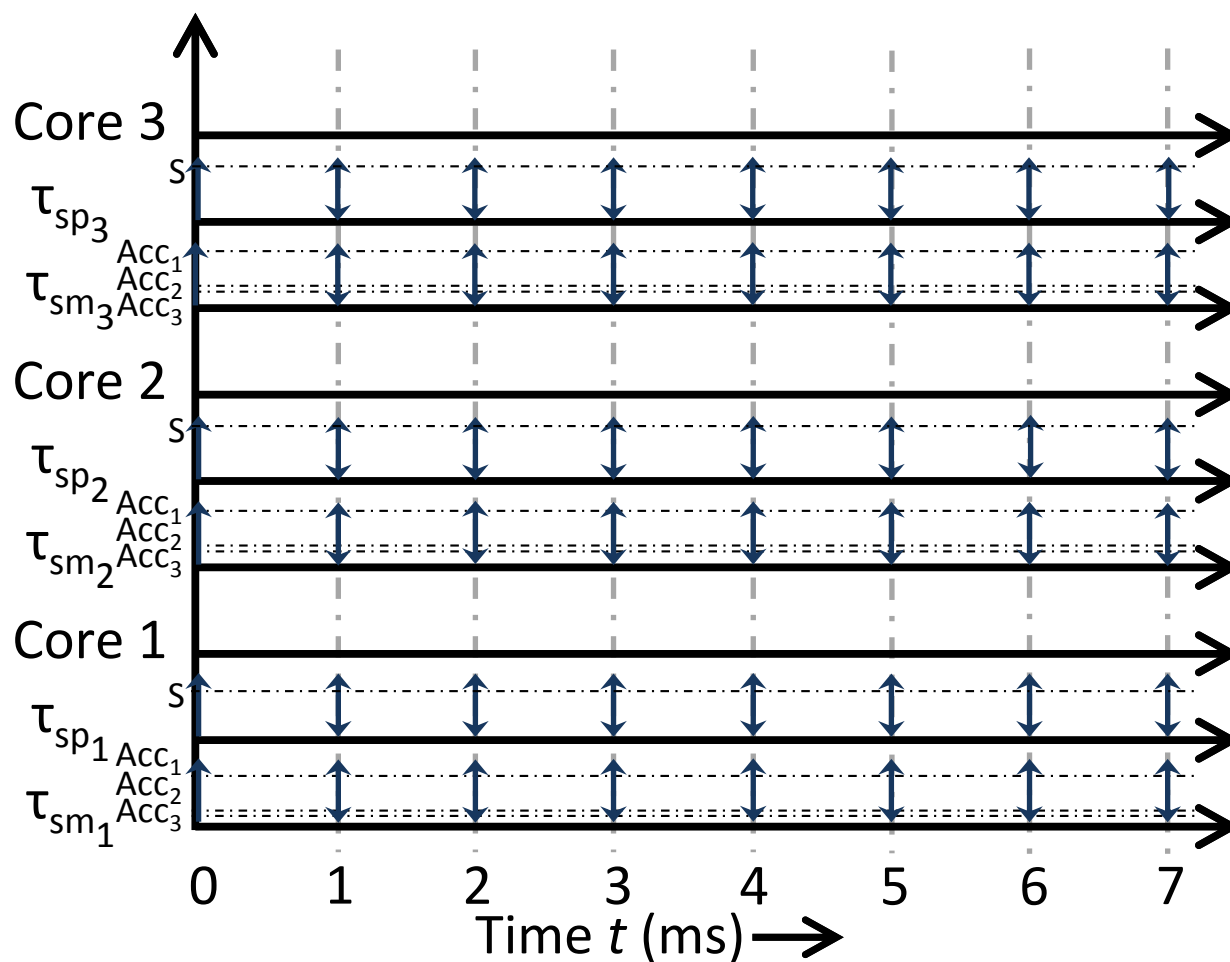
- Phase 1
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 - 2 servers per core
 - Synchronous release of servers

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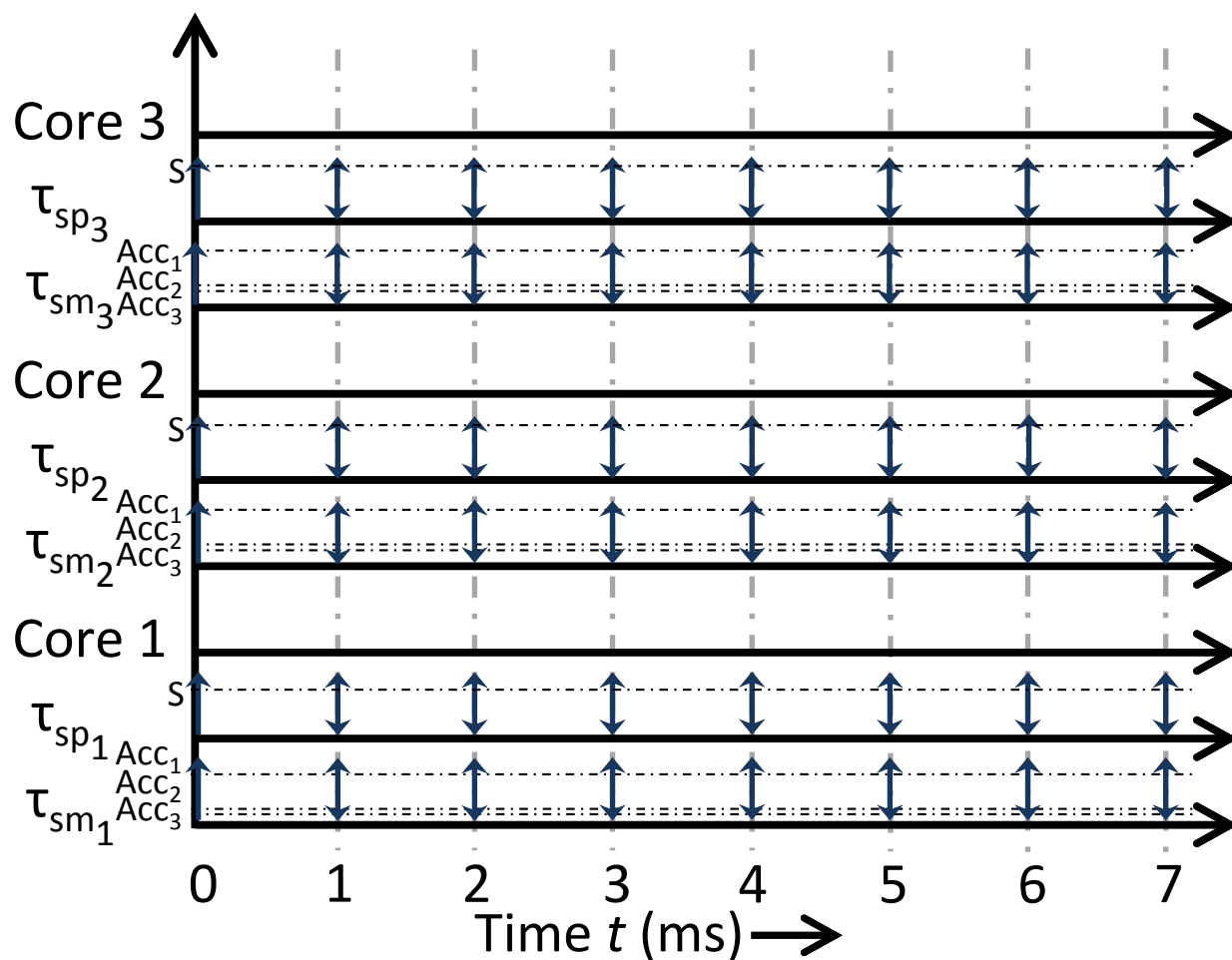
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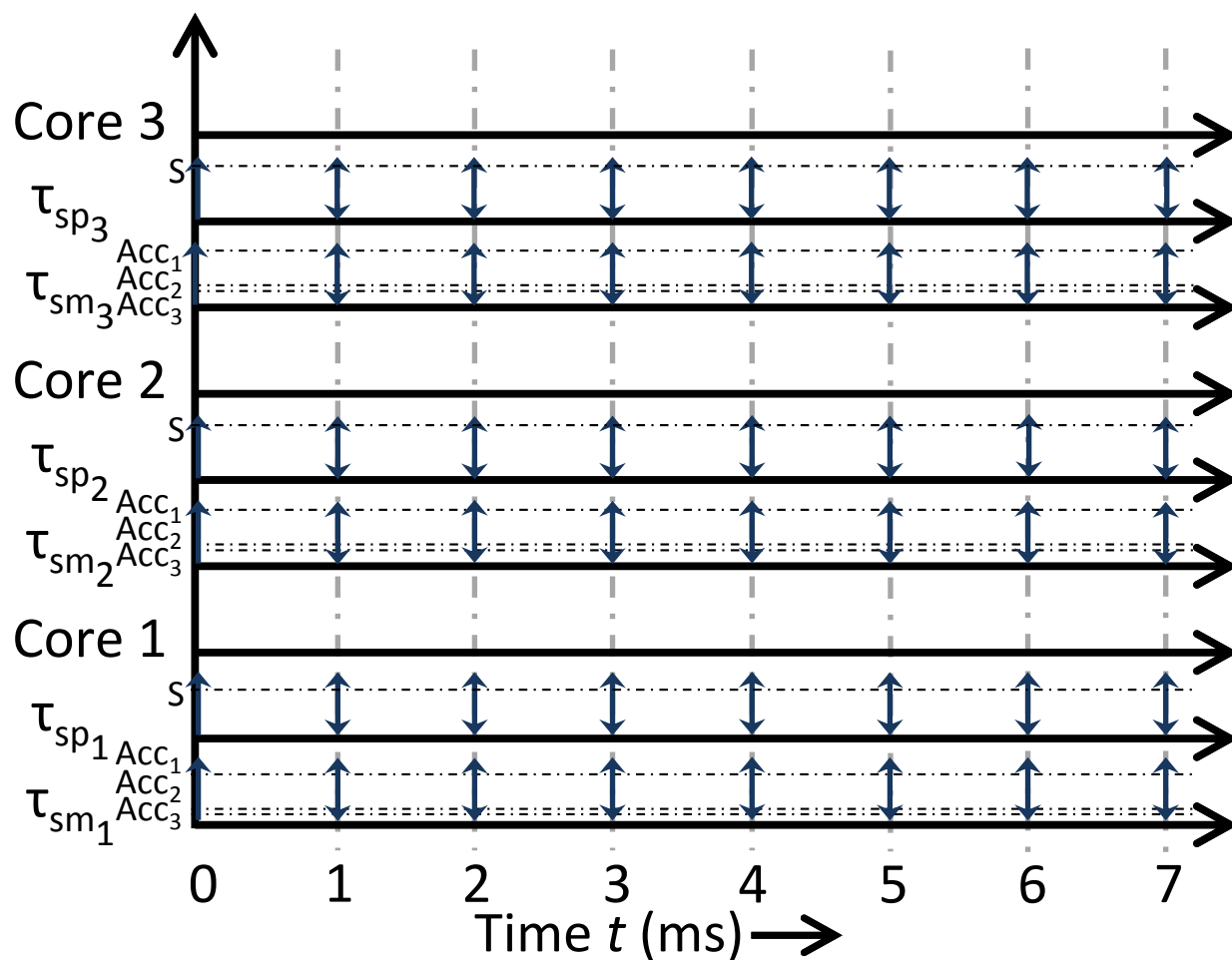
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 - Synchronous release of servers
 - Regulates contention & latency

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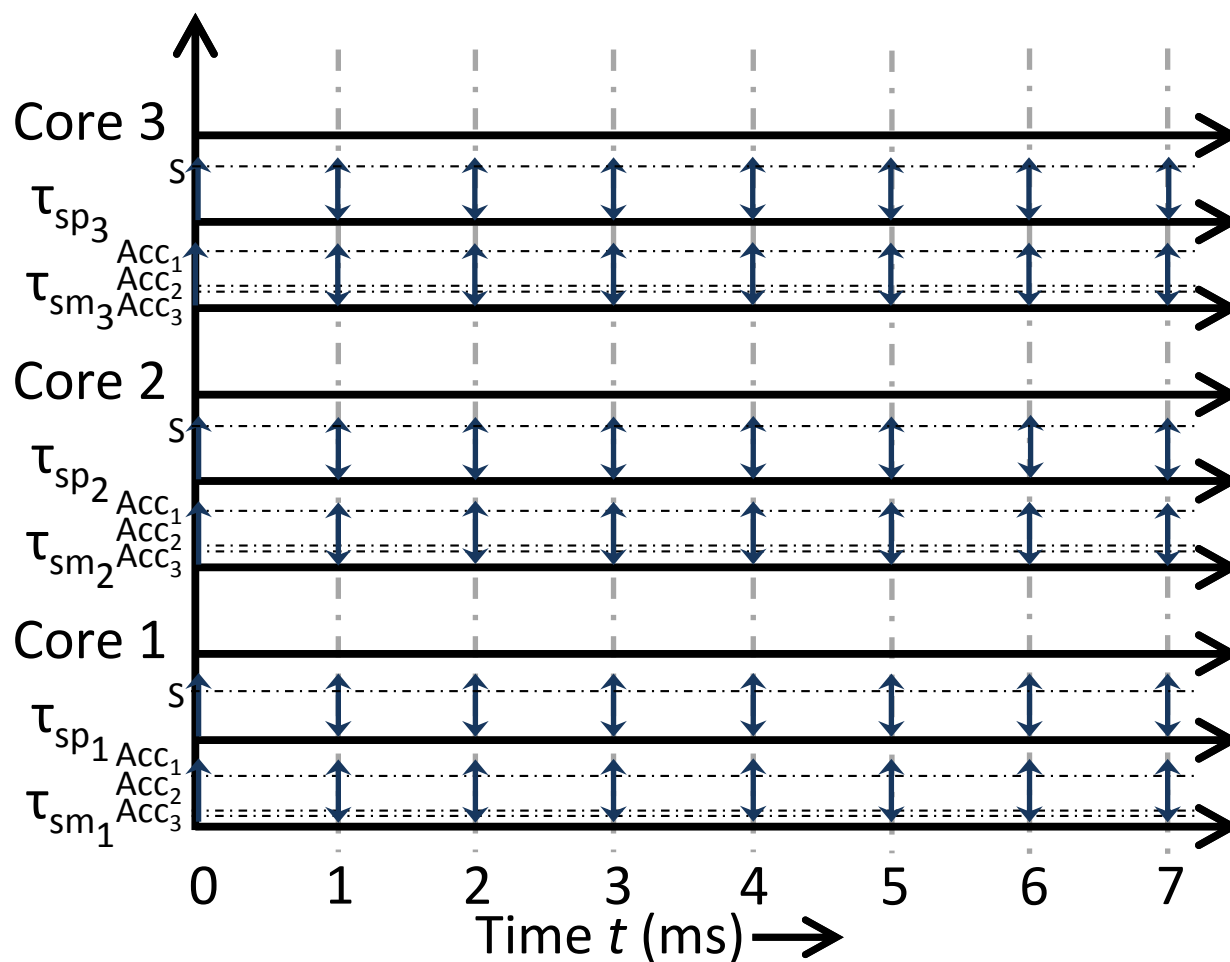
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- Phase 2

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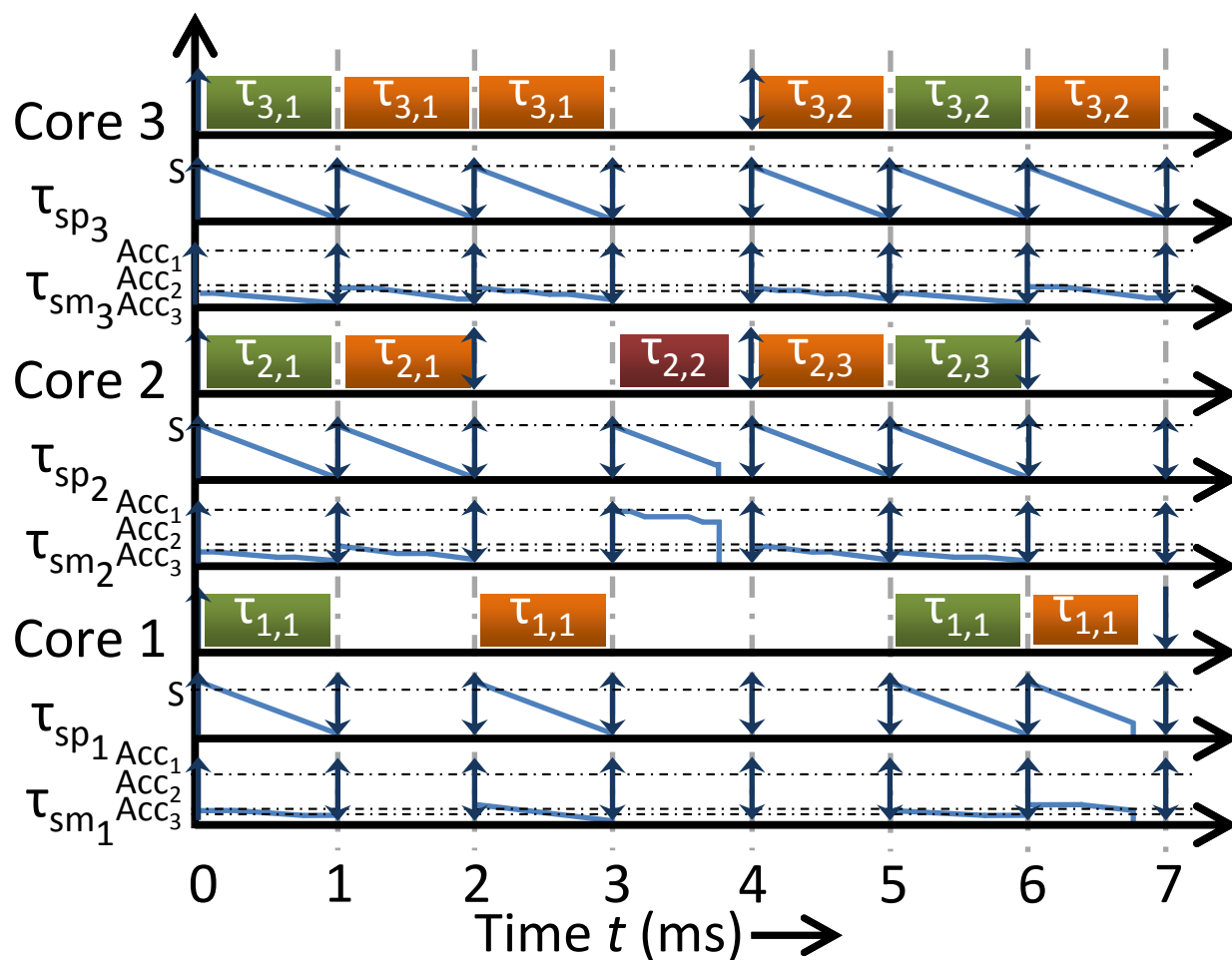
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- Phase 2
 - Offline

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 - TT Schedule

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- Generic: can be used by other schedulers as well

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Initial step towards enabling TT scheduling on COTS multicores

- Generic: can be used by other schedulers as well

Questions?

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Thank You!