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UPM

Evaluating MSRP and MrsP with the multiprocessor Ravenscar profile

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Have you ever read/written a paper including…

“ for the ease of presentation we omit […]
this would be easily […]”

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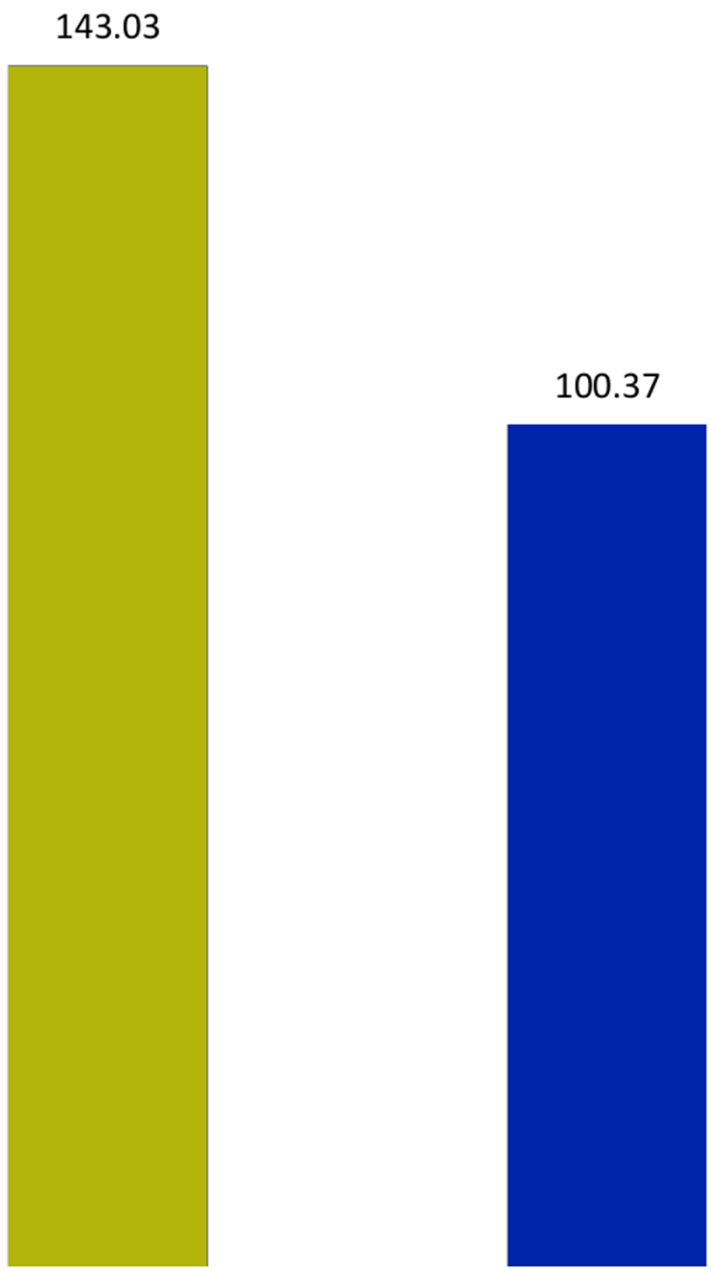
… and never read/written about that omitted thing?


143.03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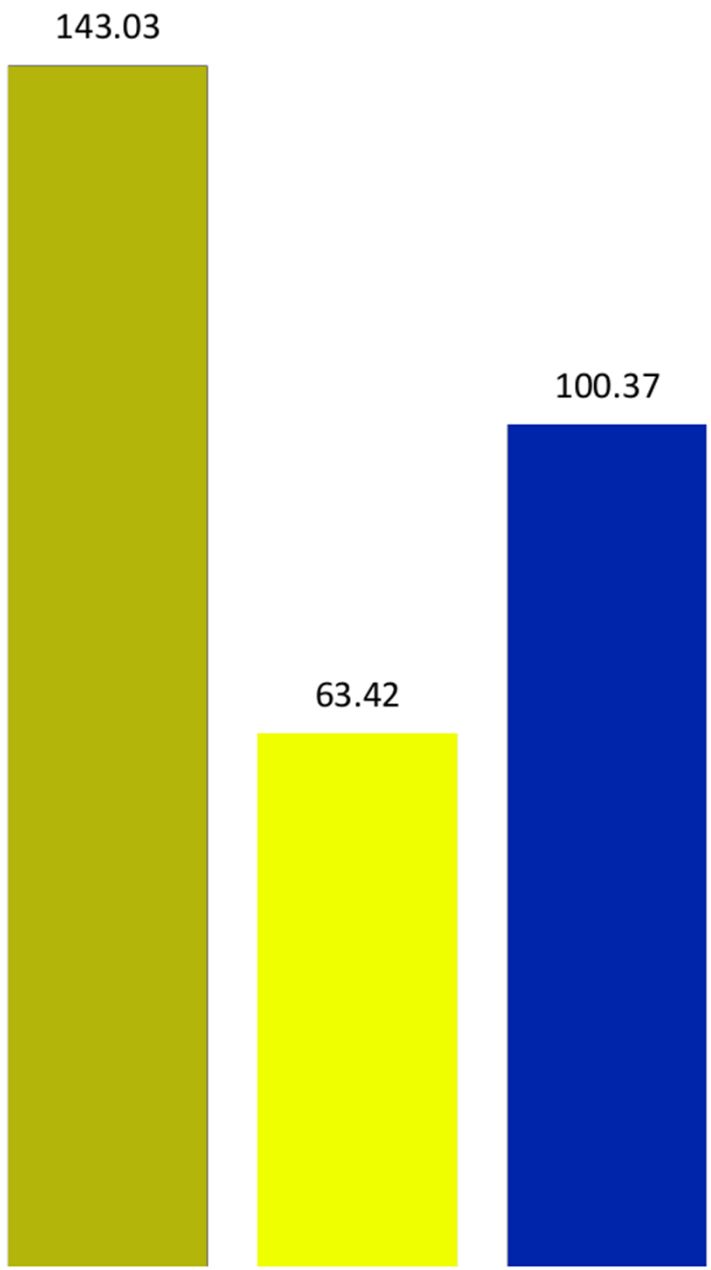
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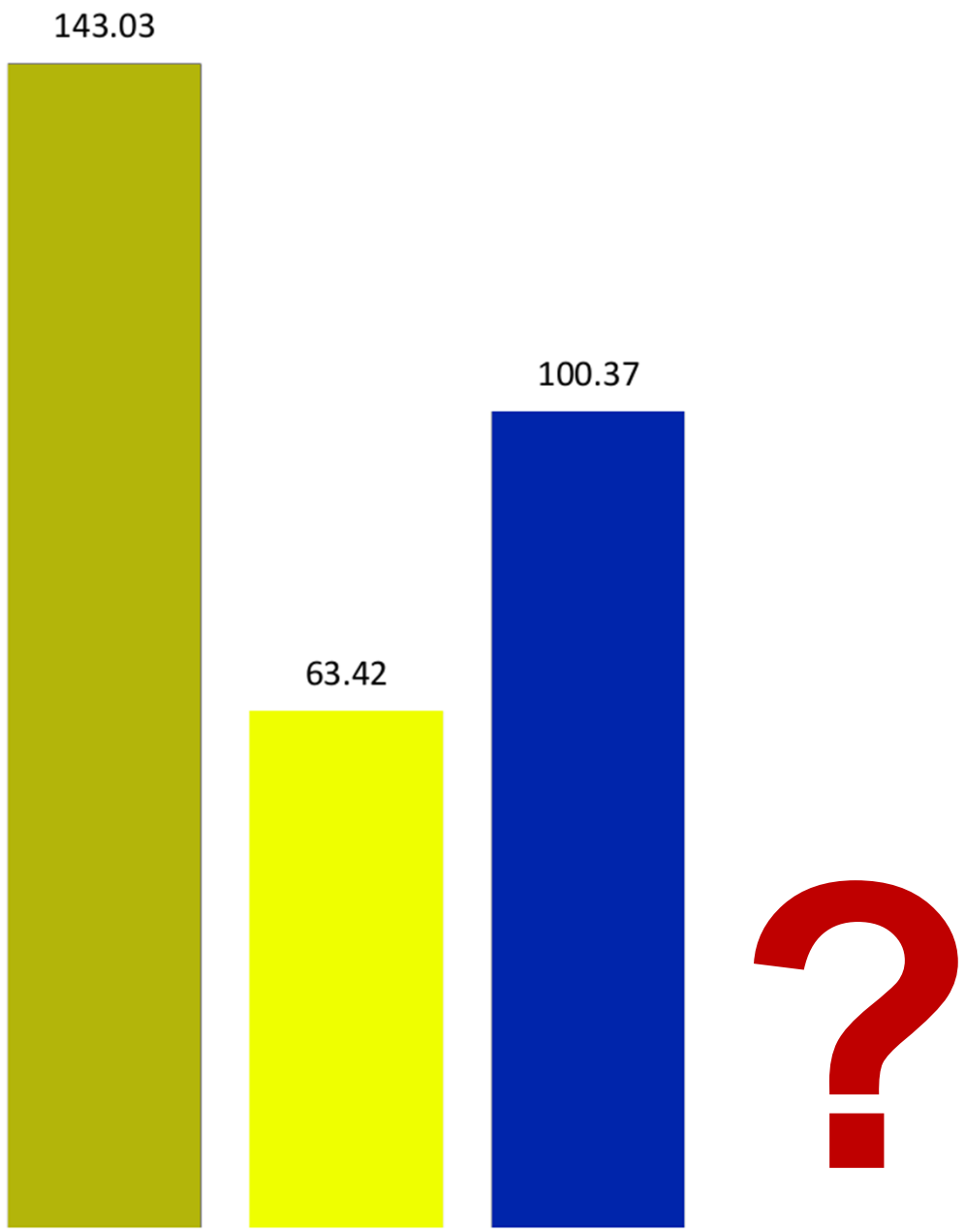
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?

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non-volatile memory

communication devices

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… and realized the different access times they have depending on the requested operation?

Motivation

Study the impact of considering heterogeneous access costs for multiprocessor resource sharing protocols

Introduction – MSRP & MrsP

- MSRP – Multiprocessor Stack Resource Prolicy

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  - ✓ Spin-wait
    - × MSRP : non-preemtable
    - × MrsP : local ceiling priority

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    - Spin-waiting tasks can undertake preempted accesses

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      × Not allowed under Ravenscar profile

MSRP & MrsP timing analysis

$$R_i = C_i + \max(\hat{e}, \hat{b}) + \sum_{\tau_j \in \mathbf{hpl}(i)} \left\lceil \frac{R_i}{T_j} \right\rceil C_j$$

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  - MrsP : highest e^j value of any resource accessed by a lower priority task and an equal or higher priority task.

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  - Each analyzed with MSRP and MrsP
    - homogeneous
    - heterogeneous

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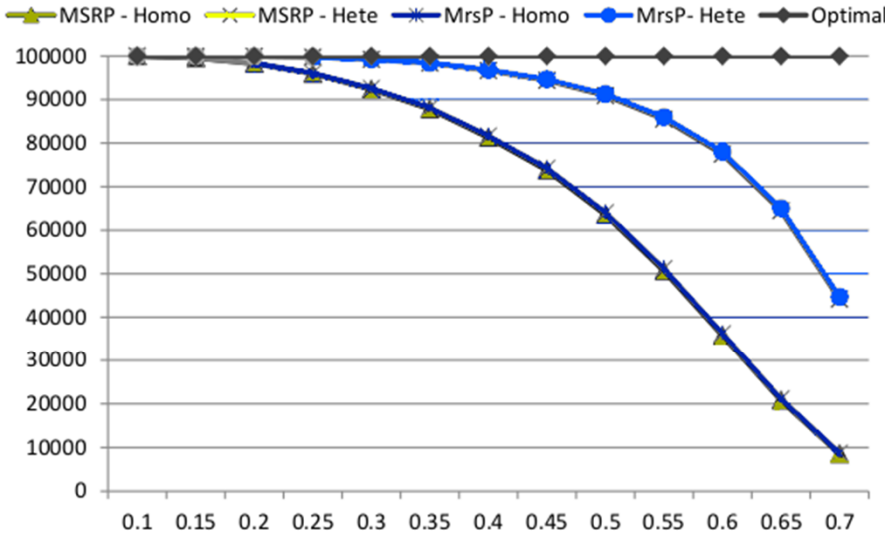
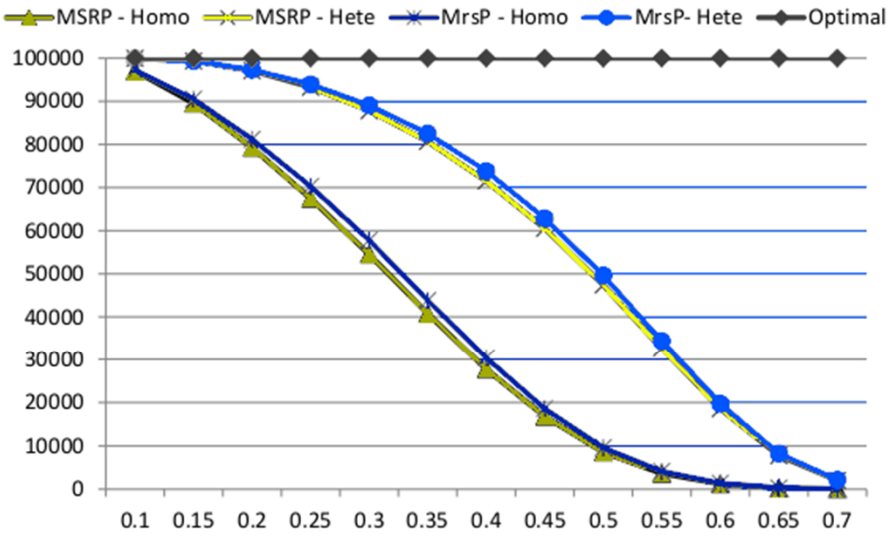
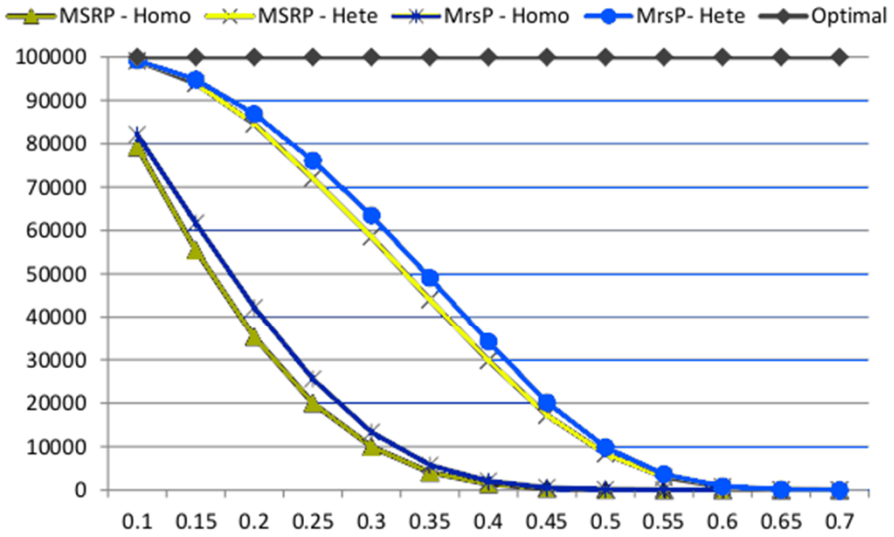
- If the resource is used, the probability of accessing the resource *n* time per release is $P(n) = 1/n^2$



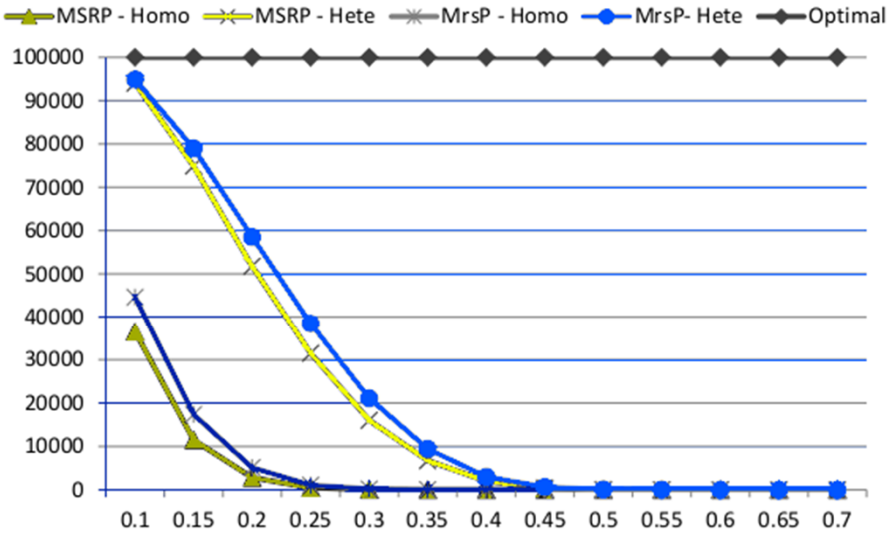
(a) $N = 2$.



(b) $N = 4$.



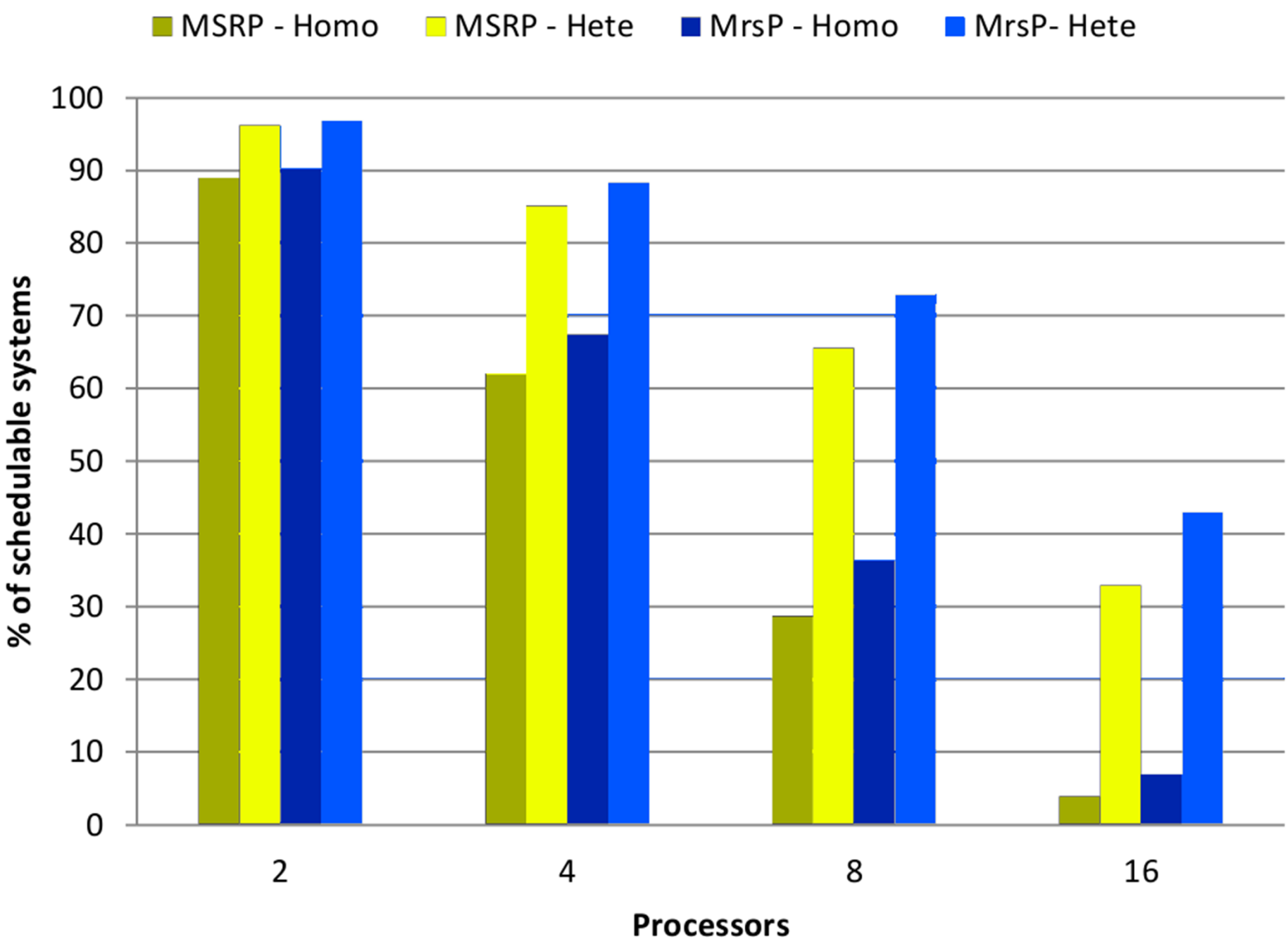
(c) $N = 8$.



(d) $N = 16$.

Schedulable systems per system utilization

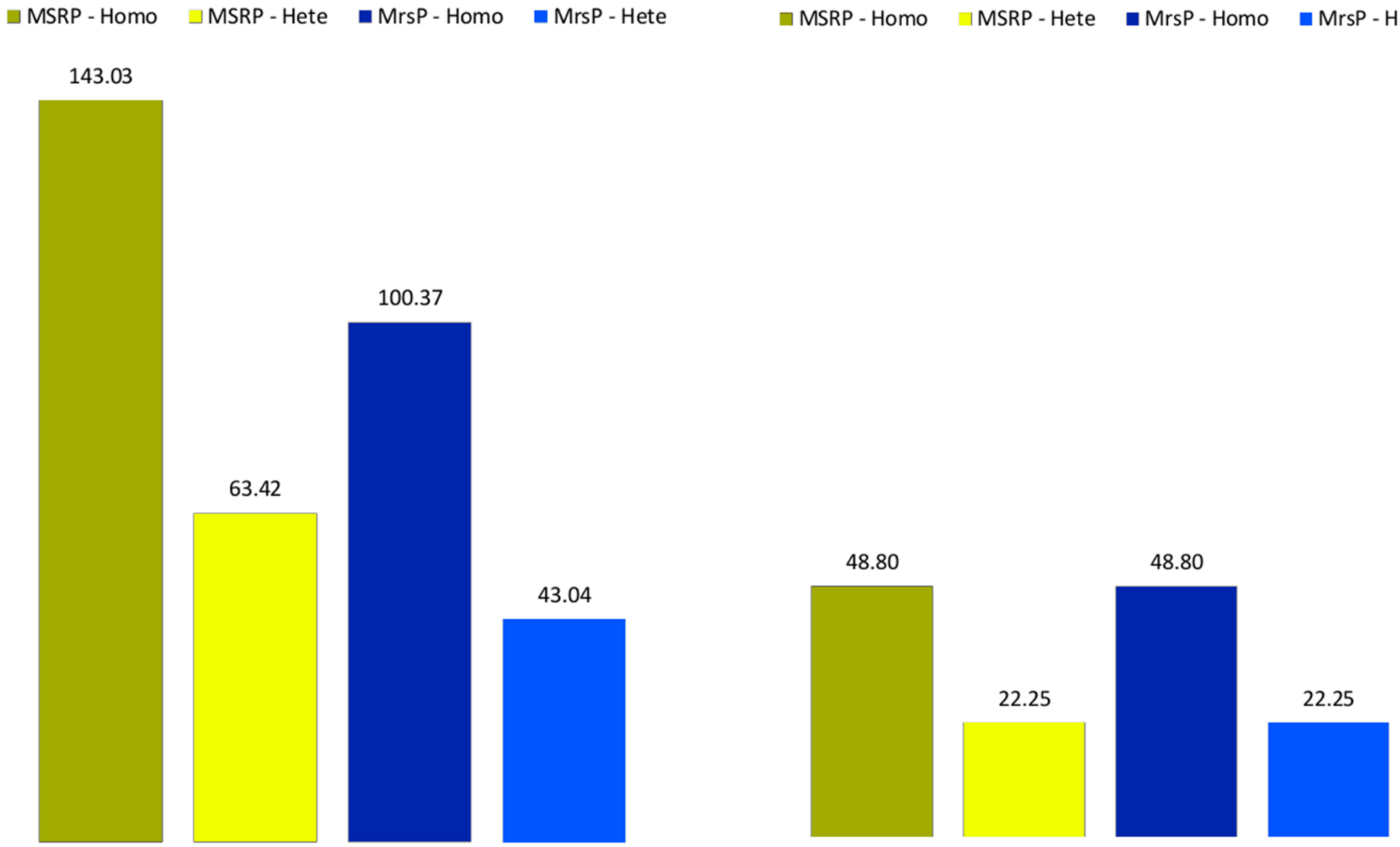
Tasks utilization [0.1,0.2]



Schedulable systems per number of processors

Processor utilization 0.35 Tasks utilization [0.1,0.9]

Response time overhead (%) over optimal resource scheduling



Highest priority tasks

Lowest priority tasks

Processor utilization 0.1 Tasks utilization [0.1,0.9] 8 processors

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- Raw data, more results & charts available upon request

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- Task allocation strategies required

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