Preemption Point Selection in Limited Preemptive Scheduling using Probabilistic Preemption Costs

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Limited Preemptive Scheduling

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- An attractive scheduling paradigm instead of **fully-preemptive** and **non-preemptive** scheduling.

- Enables **control of preemption related overheads**, thus reducing their impact on schedulability.

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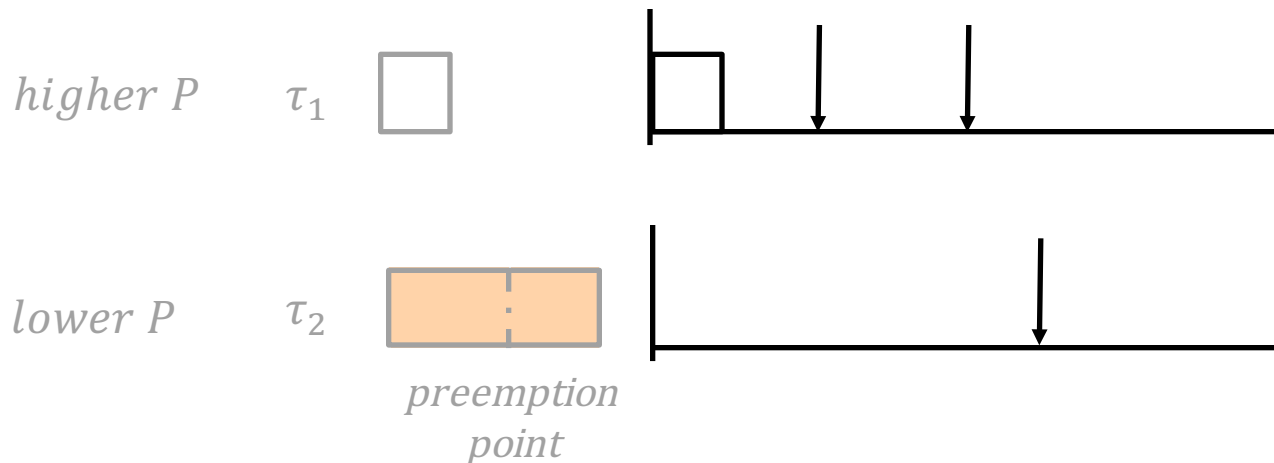 - Preemption is allowed only at predefined **selected** locations inside the code, called preemption points.

higher P τ_1 ☐

lower P τ_2

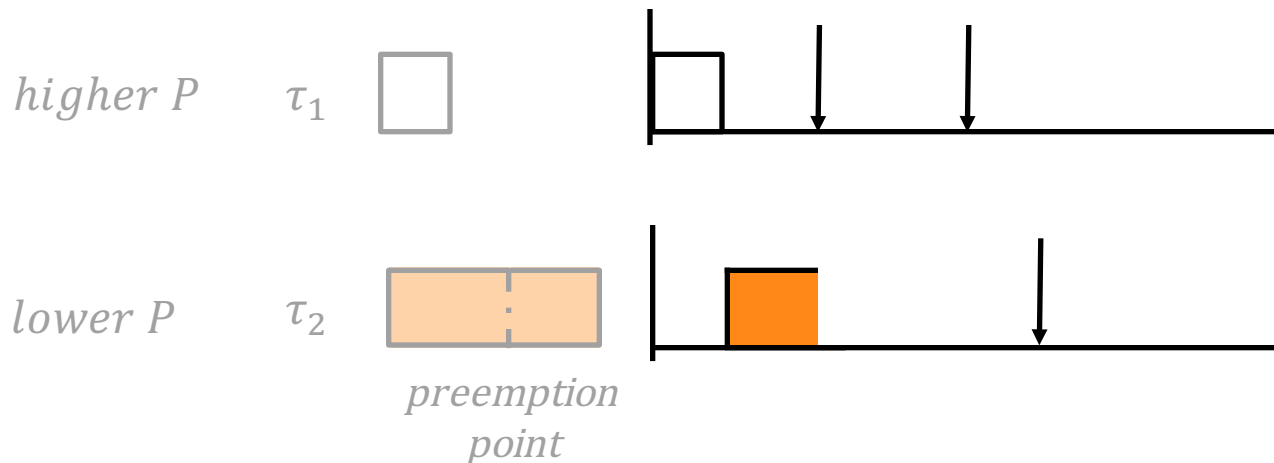*preemption
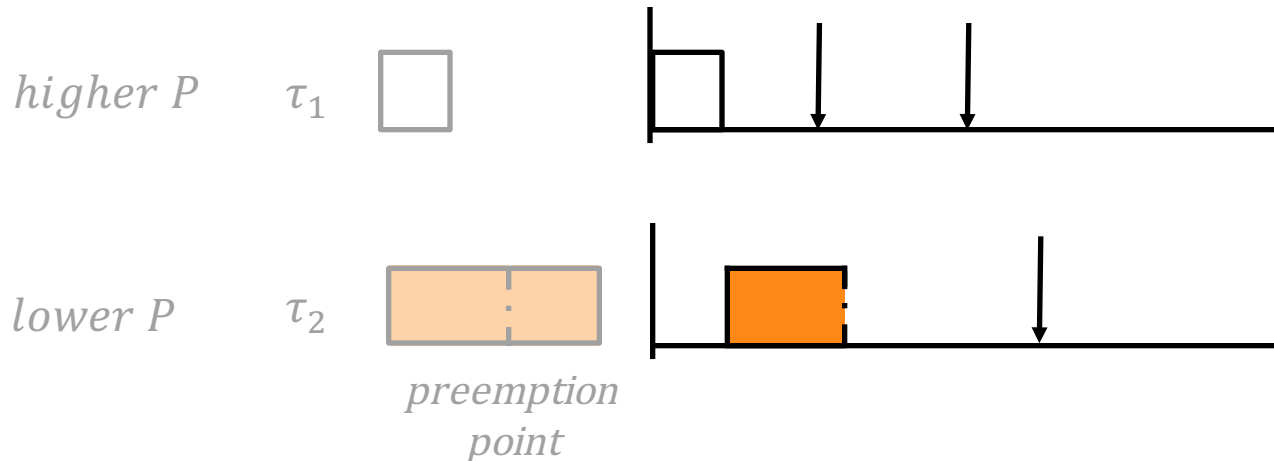point*

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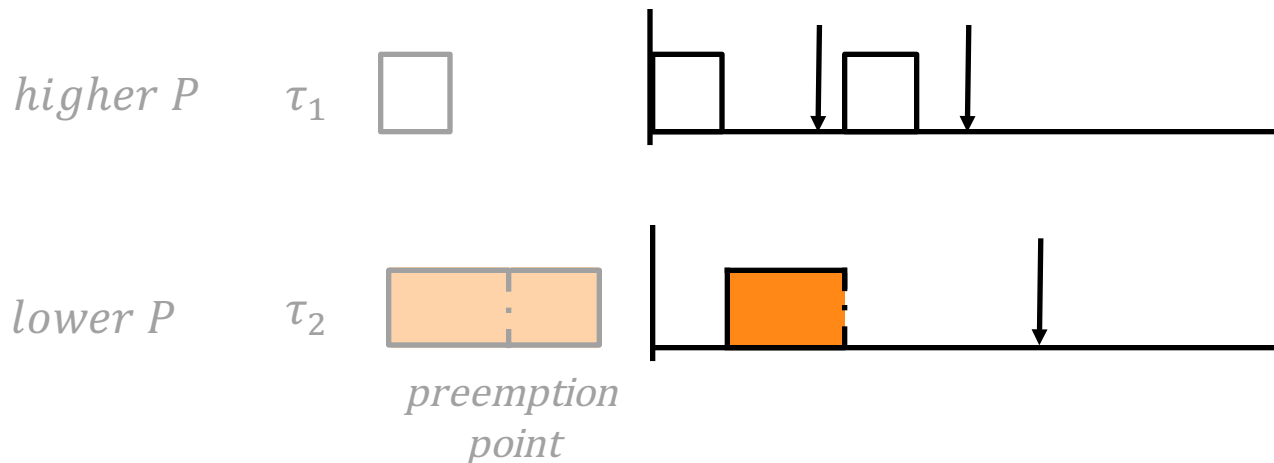
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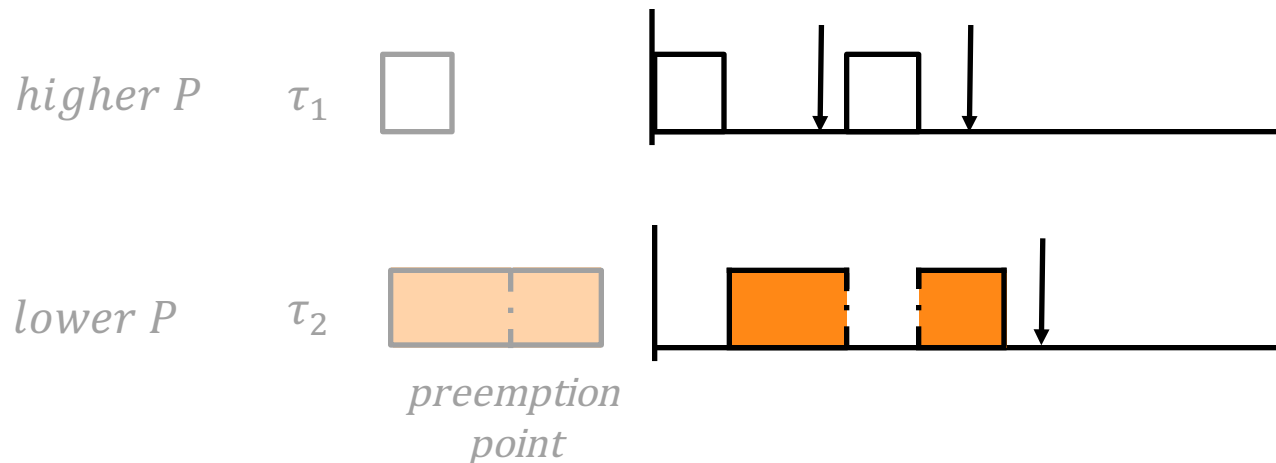
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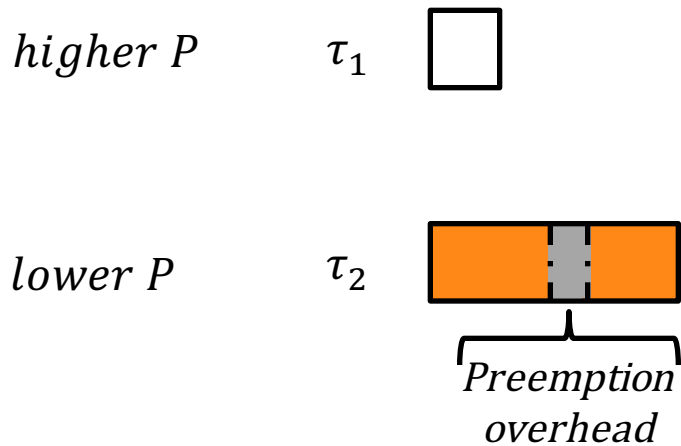 - Preemption is allowed only at predefined **selected** locations inside the code, called preemption points.

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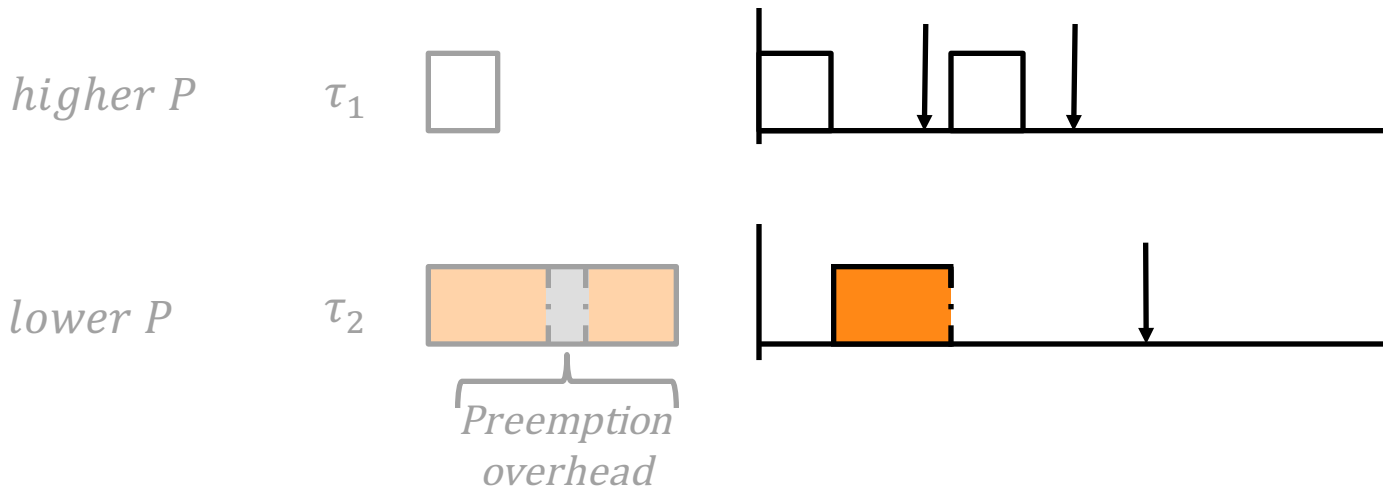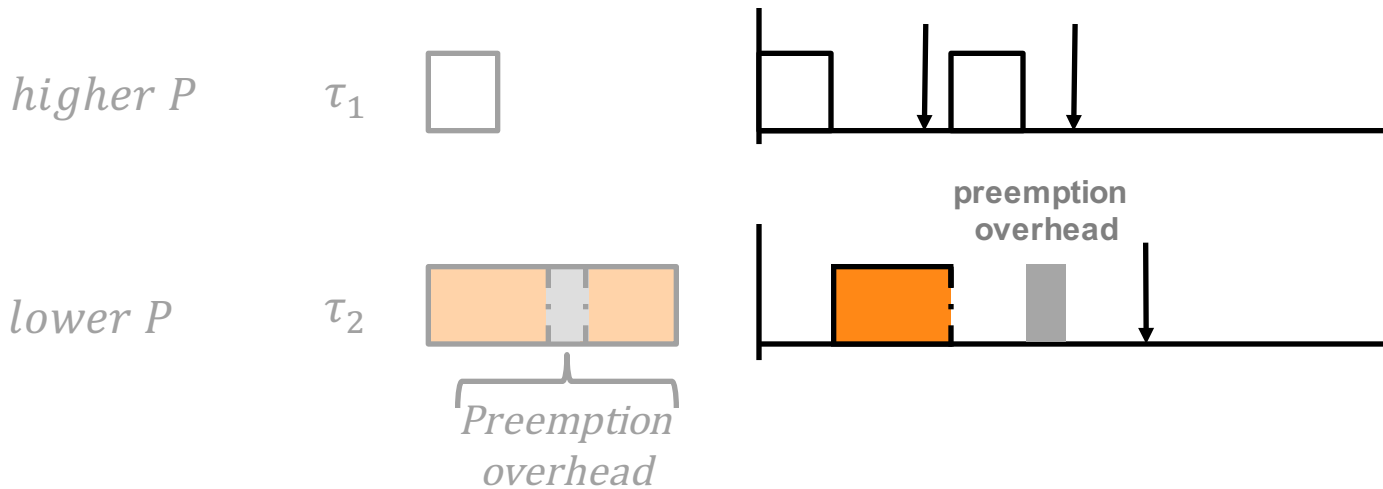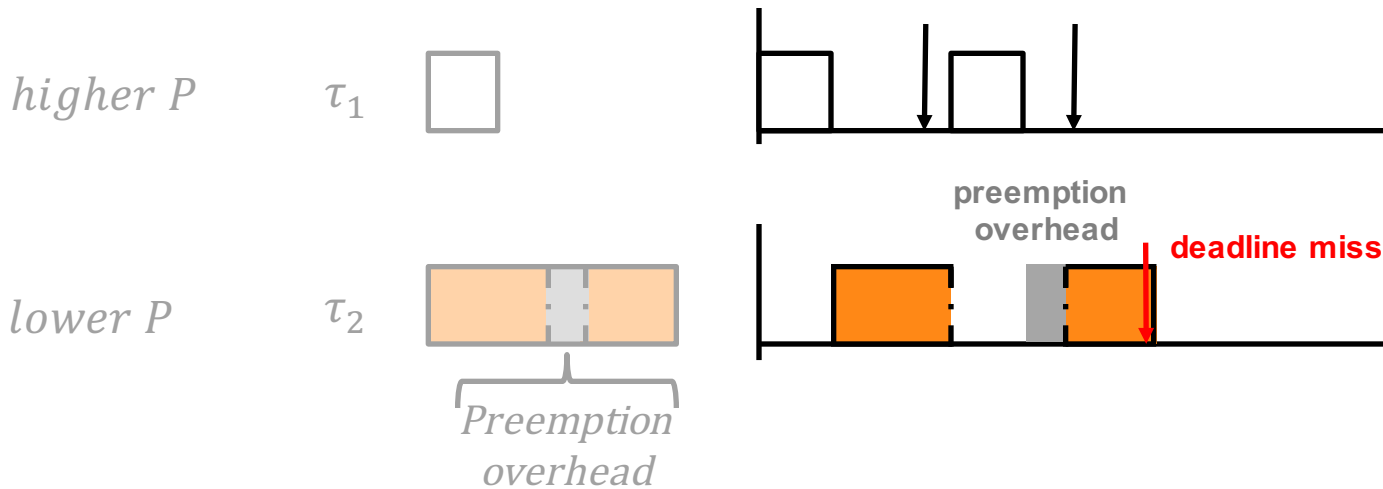
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- The existing **selection methods** account for **upper bounded preemption overheads**, thus introducing a potentially high level of **pessimism** in the results.
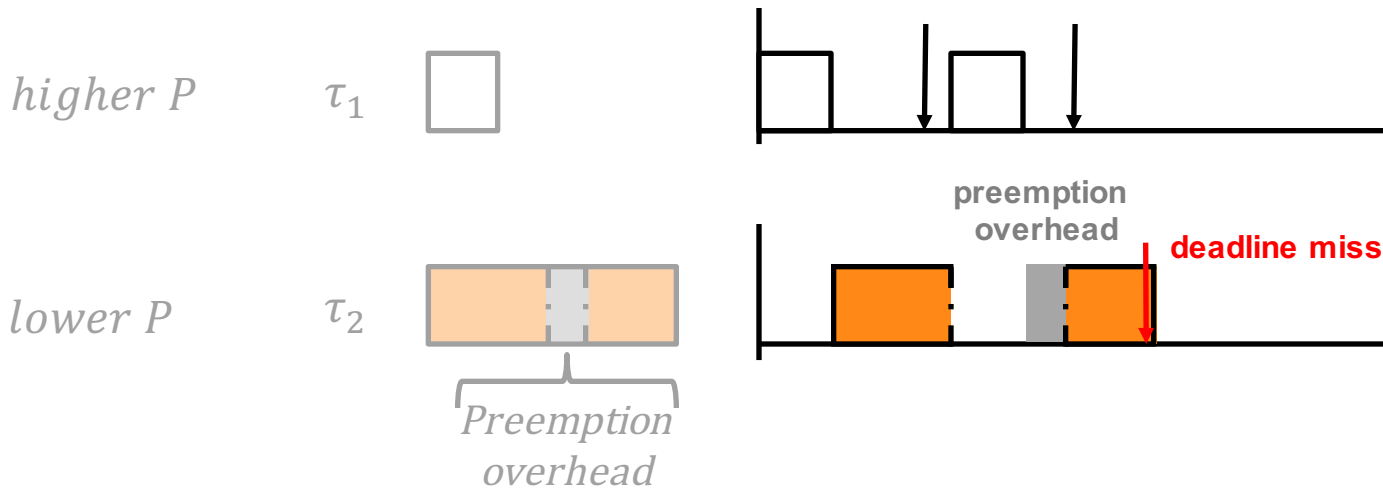
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Preemption overhead

preemption overhead

deadline miss

- Can we **reduce the pessimism** by considering probabilistic information about overheads?
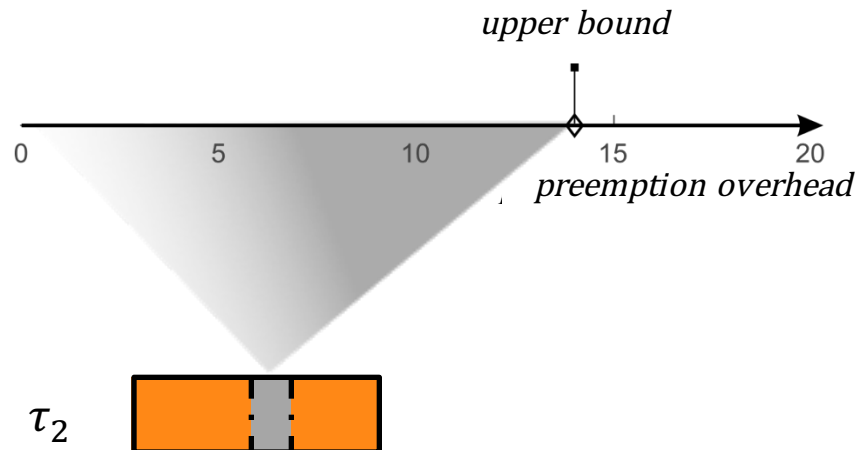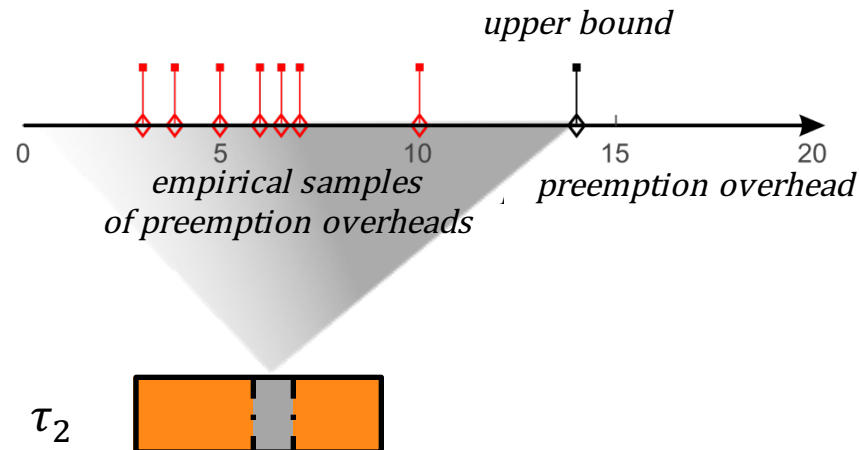
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- We propose a **probabilistic distribution model** of overheads and **preemption point selection method** which provides **controllable probabilistic relaxations**.
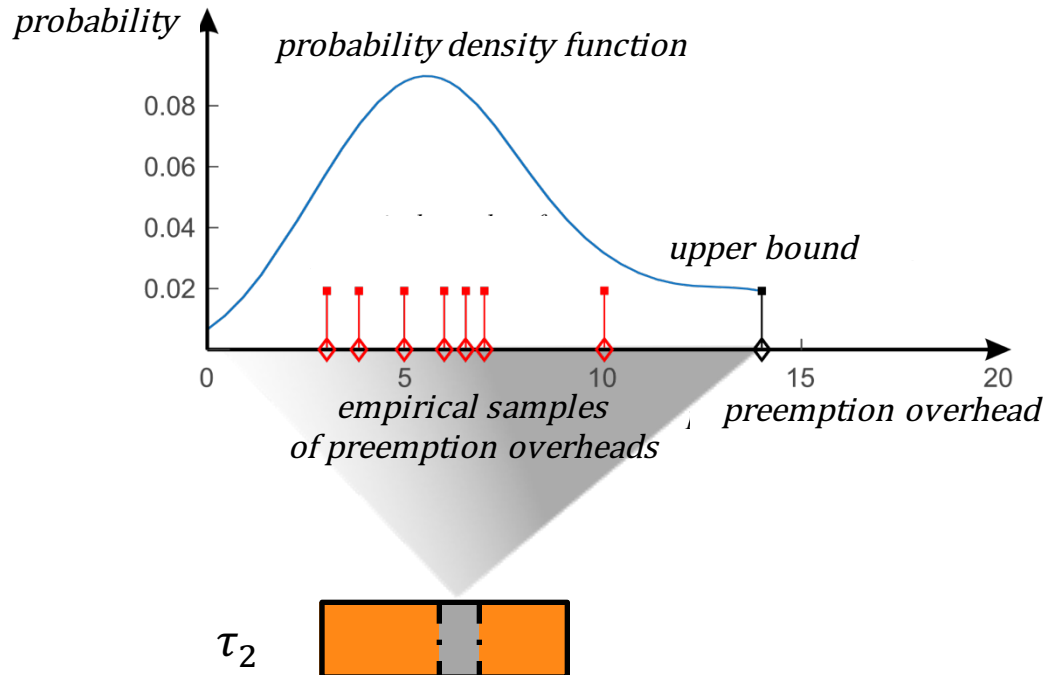
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upper bound

preemption overhead

τ_2

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- **Algorithm**
  - Gradually **decreases** probabilistic factor for preemption overheads in order to find preemption point selection

Preemption Point Selection Algorithm

iteration   focused overhead   implies selection   probability of a deadline miss
                                              of different points   (*part of the future work*)

1

0   1

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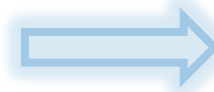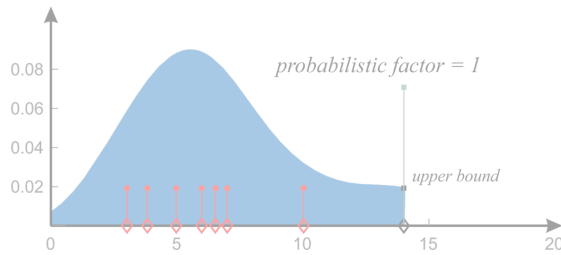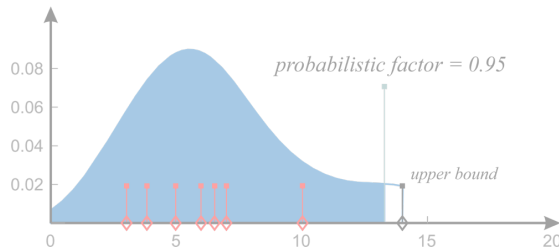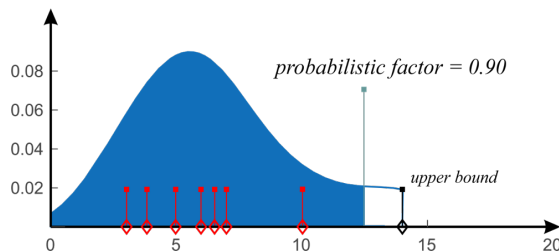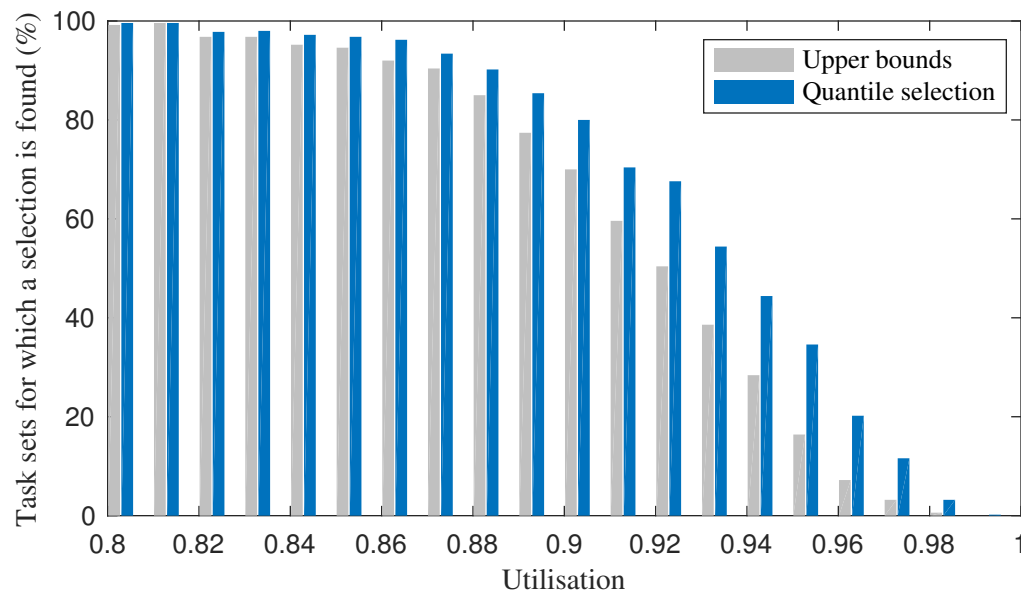
Preliminary results

- **Goal of the experiment**: To investigate to what extent the relaxation of the considered overheads facilitates finding solutions to the preemption point selection problem.

Summary and Future work

- **Contributions**
  - Probabilistic overhead model
  - Preemption point selection based on probabilistic overhead distributions

- **Future work**
  - Probabilistic schedulability analysis techniques for tasks with fixed preemption points and associated probabilistic overheads
  - Novel preemption point selection strategies to maximize schedulability