Fault-Tolerant Multiprocessor Scheduling
Making Use of Backup Copy Technique

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Aim: Development of a run-time, self-adaptive and fault-tolerant scheduling algorithm for Multiprocessor System-on-Chip

Keywords: Fault-tolerant design, Mapping and scheduling, Multiprocessor platform

Applications

Constraints
- Small area
- High performance
- Low power consumption
- Hard real-time
- ...

Multiprocessor System

Baseline Technique

- Primary copy scheduled ASAP
- Backup copy scheduled ALAP

Backup Deallocation

Backup Overloading

Simulation & Task Parameters

<table>
<thead>
<tr>
<th>Simulation parameter</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of processors: P</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Targeted processor load: TPL</td>
<td>0.5</td>
<td>1.0</td>
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Task attribute

- Arrival time a (AU): Poisson
- Computation time c (AU): Uniform 1 20
- Deadline d (AU): Uniform a + 2c  a + 5c

Interarrival time
- Poisson parameter to generate task arrival times
  \[ \lambda = \frac{\text{average computation time}}{\text{TPL} \cdot P} \]

Results: Rejection Rate and Processor Load as a Function of the Number of Processors
