Work-in-Progress:

*RWS* – A Roulette Wheel Scheduler for Preventing Execution Pattern Leakage

Ying Zhang, Lingxiang Wang, Wei Jiang, Zhishan Guo
Department of Computer Science, Missouri S&T

Presenter: Zheng Dong*

* Department of Computer Science, The University of Texas at Dallas
Motivation

• Real-time system is to support various critical computations and control systems.

[Image of a Tesla Model X driving on the highway with a car following behind, and a SpaceX Falcon 9 rocket taking off.]
Motivation

- Cyber attacks aim at damaging the reliability of the real-time system.

![Diagram showing task misses its deadline and breaks logical correctness]
Motivation

• Scheduling information leakage\(^1\)

The critical job can be detected in a few possible execution patterns.

\(^1\)Chen, Chien-Ying, et al. Schedule-based side-channel attack in fixed-priority real-time systems. 2015.
Roulette Wheel Scheduler (RWS)

- RWS is a randomized scheduling algorithm based on the roulette wheel selection.
- It schedules the jobs according to the predefined possibilities.

Randomize the jobs’ execution patterns.
Roulette Wheel Scheduler (RWS)

- Divide the timeline into mini-slots of length $\Delta$
Roulette Wheel Scheduler (RWS)

- Divide the timeline into mini-slots of length $\Delta$
- Assign sufficient time slices to every job.

**TABLE I: Parameters of a task set.**

<table>
<thead>
<tr>
<th>Task</th>
<th>WCET ($e_i$)</th>
<th>Period ($P_i$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\tau_1$</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>$\tau_2$</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
Roulette Wheel Scheduler (RWS)

- Divide the timeline into mini-slots of length $\Delta$
- Assign sufficient time slices to every job.

**TABLE I: Parameters of a task set.**

<table>
<thead>
<tr>
<th>Task</th>
<th>WCET ($e_i$)</th>
<th>Period ($P_i$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\tau_1$</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>$\tau_2$</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
Thanks!