SEMPEROS: A Distributed Capability System

Matthias Hille†  Nils Asmussen† *  Pramod Bhatotia‡  Hermann Härtig† *

†Technische Universität Dresden  ‡The University of Edinburgh  * Barkhausen Institut

Dresden, 2019/06/21
Hardware Environment

General-purpose cores

Accelerators

Memory
Rights Management – Capability Systems
Rights Management – Capability Systems

Capability Tree

C1

C1
Rights Management – Capability Systems

Capability Tree
Rights Management – Capability Systems

Capability Tree

SEMPEROS: A Distributed Capability System
M. Hille, N. Asmussen, P. Bhatotia, H. Härtig
Dresden, 2019/06/21
Rights Management – Capability Systems

Capability Tree

C_1

C_2

C_1

C_2
Rights Management – Capability Systems

Capability Tree

SEMPEROS: A Distributed Capability System
M. Hille, N. Asmussen, P. Bhatotia, H. Härtig
Dresden, 2019/06/21
Rights Management – Capability Systems
Rights Management – Capability Systems

Capability Tree

- C1
- C2
- C3

C3

C1

C2
Rights Management – Capability Systems

Capability Tree

C₁

C₂

C₃

C₁

C₂

C₃

C₃
Rights Management – Capability Systems

Capability Tree

C₁

C₂

C₁ → C₂

SEMPEROS: A Distributed Capability System
M. Hille, N. Asmussen, P. Bhatotia, H. Härtig
Dresden, 2019/06/21
Rights Management – Capability Systems
Do Capability Systems Scale?
Base Capability System – $M^3$
SEMPEROS: A Distributed Capability System
M. Hille, N. Asmussen, P. Bhatotia, H. Härtig
Dresden, 2019/06/21
The Distributed Capability System

Kernel $\alpha$

Process A

Capability I

ID: 000 001 100 000...
Child: 011 010 101 010...

Kernel $\beta$

Process B

Capability II

Parent: 000 001 100 000...
ID: 011 010 101 010...
Scalability

Parallel Efficiency (%) vs. # of Benchmark Instances

- tar
- untar
- find
- SQLite
- LevelDB
- PostMark
SEMPEROS: A Distributed Capability System

Come and visit our talk!

Thursday, July 11, 2019 at 5:35 pm

Track 1: Exotic Kernel Features #2