Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Seminar: Resource Management on Power

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The Seminar

- Sibling to “IBM Power Block Course”
- Extend: 2 SWS, 3 graded CP
- Dates: Wednesday 11.00 – 12.30
- Room: HS 3
- Enroll: 28.10
- Updates and more information on:

  www.dcl.hpi.uni-potsdam.de/teaching/remapsem

Your Task

- Choose Topic
- Study Literature and Technical Background
- Plan Experiment
- Do Experiment
- Present your Results (45 Minutes)
- Hand in written Report (8-10 Pages)

1. Simultaneous Multithreading

- 8 HW Threads per Core
  - Not all SMT Modes are equally strong
  - Modes: ST, SMT2, SMT4, SMT8
  - 2 HW Thread-sets
- Auto Balancing Features
- Best and Worst Case for different Workloads

2. Transactional Memory

- Group of load/store operations as “single atomic operation“
- ”Hello World”
- TM vs. Critical Sections
- Integrate TM in Application

3. Monitoring/Profiling Tools for IBM Power

- Access Performance Counter Facilities
  - AIX
  - Linux
- Marked Events
- Event Based Branching

4. Virtualization Techniques in IBM Power

- Micropartitioning
- HMC Rest Client Experiment
  - LPAR assigns additional Resources to itself

5. PowerVM/PowerKVM API and Performance Comparison

- OpenPower
  - Ubuntu 14.04 Bare Metal
  - PowerKVM Guests
- E880
  - AIX LPAR
  - Linux LPAR

6. PowerVP: Monitoring on System Level

- E880: Monitor whole System
- Identify misplaced Virtual Processors and Memory Pages
- Rebalance System
- Best and Worse-Cases

7. RAS Features of IBM Power Systems

- Instruction Authority Mask Register (IAMR)
  - Kernel Hotpatching
- Build AIX Cluster

8. Cache Structure, Coherency Protocol and Data Prefetchers

- Benchmark Cache Structures
- Experiment with Prefetching Facilities
- Experiment with Cache Invalidation
- Effects of Cache Coherency Protocol
- OpenPower and E880

9. Coherent Accelerator Processor Interface

- OpenPower
- Extension Cards integrated into the Cache Coherency Protocol
- Programmable FPGAs

10. Accelerator Facilities in IBM Power/OpenPower

- OpenPower/E880
- Processor Accelerators (Crypto, Compression, ...)
- Nvidia K80

Please choose 3 Topics

- Go to https://www.dcl.hpi.uni-potsdam.de/powersubmit/
- Add Submission with 3 Lines as Description containing the Topic Ids
- Thanks!