CAPPLab Research Group Presentations – Summer 2011

Friday, June/17 – Dr. Zaman Presents
Friday, June/24 – Vidya Presents
Friday, July/1 – Sri Ramya Presents
Friday, July/8 – Divya Presents
Friday, July/15 – Jahnavi Presents
Friday, July/22 – Sandeep EE/ Sandeep CN Presents
Friday, July/29 – Anshuman Presents
Friday, August/5 – Abilash/Dr. Zaman Presents

CAPPLab Research Group Meeting – Fall 2011
Fridays at 10 AM, starting on Friday, Sep/9/2011.
Ph.D. Dissertation Defense

“CACHE OPTIMIZATION FOR REAL-TIME EMBEDDED SYSTEMS”

Abu Asaduzzaman

Florida Atlantic University
Department of Computer and Electrical Engineering and Computer Science
December 2009

NOTE: References and abbreviations used in this presentation are as they appear in the original dissertation manuscript.
Credit Scheduling and Prefetching in Hypervisors using HMM

Vidya Suryanarayana
Advisor: Dr. Ravi Pendse
Torus Based multi-core network topology to minimize number of switches and thereby reducing the heat dissipation and power consumption

Sri Ramya Chaturvedula
Advisor: Dr. Abu Asaduzzaman
Directory Based Mechanism
To minimize communication latency
In Multi-core Architecture

Advisor - Dr. Abu Asaduzzaman
By:- Divya Vardha
Data Marshaling
by
Jahnavi Burugupalli
StimulusCache:
Boosting Performance of Chip Multiprocessors with Excess Cache

Sandeep Vempati
Multicore Simulation Platform
by
Sandeep CN (Phanendra S.N. Gavara)
MIGRATION ISSUES IN CLOUD COMPUTING

Presented by:

Anshuman Jain
Masters in Computer Networking and telecom
Cloud Migration
by
Abilash Rao Joseph
Level-1 Cache Locking in Multicore
by
Dr. Zaman
August 5th, 2011
CL1 Cache Locking in Multicore

A system with 4 cores

CL1 – I1 + D1 – level-1 cache
I1 – level-1 instruction cache
D1 – level-1 data cache
CL2 – level-2 cache
BAMI – block address and miss information
Level-2 cache locking in multicore is proposed. Easy to implement. Level-1 cache locking should be more effective.

Proposed Level-1 Cache Locking:
- Random Strategy
- Static Strategy
- Dynamic Strategy
- Hybrid Strategy
CL1 Cache Locking in Multicore

Random Strategy

Start

Select (N or less) jobs; pre-load CL1/CL2 with randomly selected blocks; assign jobs among cores.

Locking?

Yes

Randomly Lock I1/job

Core.1

Assign task.

Process

Done?

Yes

Delay = SUM(MAX(delay for each N jobs))

Power = SUM(power for all N jobs)

No

Randomly Lock I1/job

Core.2

Assign task.

Process

Done?

Yes

Randomly Lock I1/job

Core.3

Assign task.

Process

Done?

Yes

Randomly Lock I1/job

Core.4

Assign task.

Process

Done?

Yes

... Core. N

Assign task.

Process

Done?

Yes

All jobs done?

No

Mean Delay per Task = Total delay / Number of tasks

Total Power = Total power for all tasks

End
CL1 Cache Locking in Multicore

Static Strategy

Start

Pre-load CL1/CL2 with selected blocks using BAMI

No

Locking?

Yes

Lock I1.1 using BAMI

Lock I1.2 using BAMI

Lock I1.3 using BAMI

Lock I1.N using BAMI

Select (N or less) jobs; assign jobs among cores.

Core.1

Core.2

Core.3

Core.

N

Assign task.

Assign task.

Assign task.

Assign task.

Process

Process

Process

Process

Done?

Done?

Done?

Done?

Delay = SUM (MAX (delay for each N jobs))
Power = SUM (power for all N jobs)

All jobs done?

No

Mean Delay per Task = Total delay / Number of tasks
Total Power = Total power for all tasks

End
CL1 Cache Locking in Multicore

Dynamic Strategy

Start

Select (N or less) jobs; pre-load CL1/CL2 with selected blocks using BAMI; assign jobs among cores.

Locking?

Yes

Lock I1/job using BAMI

Core.

Assign task.

Process

Done?

Yes

End

No

Core.

Assign task.

Process

Done?

Yes

Delay = SUM^N(MAX (delay for each N jobs))

Power = SUM (power for all N jobs)

All jobs done?

No

Yes

Mean Delay per Task = Total delay / Number of tasks

Total Power = Total power for all tasks

Dr. Zaman; 8/5/11
Hybrid Strategy

- Some cores dedicated for small applications → no locking
- Some cores dedicated for large applications → static locking
- Some cores dedicated for new/unknown applications → random locking
- The rest of the cores dedicated for other applications → dynamic locking
CL1 Cache Locking in Multicore

Q/A

E-mail:
Abu.Asaduzzaman@wichita.edu
abuasaduzzaman@ieee.org

Telephone:
+1-316-978-5261 (Office)
+1-316-978-3927 (CAPPLab)

Dr. Zaman; 8/5/11
See you all on Friday, Sep/9/2011.