Topic V1E

Transactional Memory

Textbook was written before this improvement

Transactional Memory

Transactional Memory: Architectural Support for Lock-Free Data Structures

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Proceedings of the 20th annual international symposium on computer architecture

Chairman: Alan Jay Smith

Publication of:
· Conference
ISCA'93 20th International Symposium on Computer Architecture
San Diego, CA, USA — May 16 - 19, 1993
ACM New York, NY, USA ©1993

1993 Proceeding

Bibliometrics
· Downloads (6 Weeks): 192
· Downloads (12 Months): 1,446
· Citation Count: 1,450

Multiple Reservations and the Oklahoma Update

Janice M. Stone, Harold S. Stone, Philip Heidelberger, and John Turek
IBM T.J. Watson Research Center

IEEE Parallel and Distributed Technology, November 1993

This concept has also been developed concurrently and independently by Herlihy and Moss in their work on transac-

[redacted]hanges

tional memory,[3] although many implementation details differ. Our

IBM's new transactional memory: make-or-break time for multithreaded revolution

At Hot Chips last week, IBM talked about BlueGene/Q, the processor powering …

by **Peter Bright** - Aug 31 2011, 6:15pm BRT

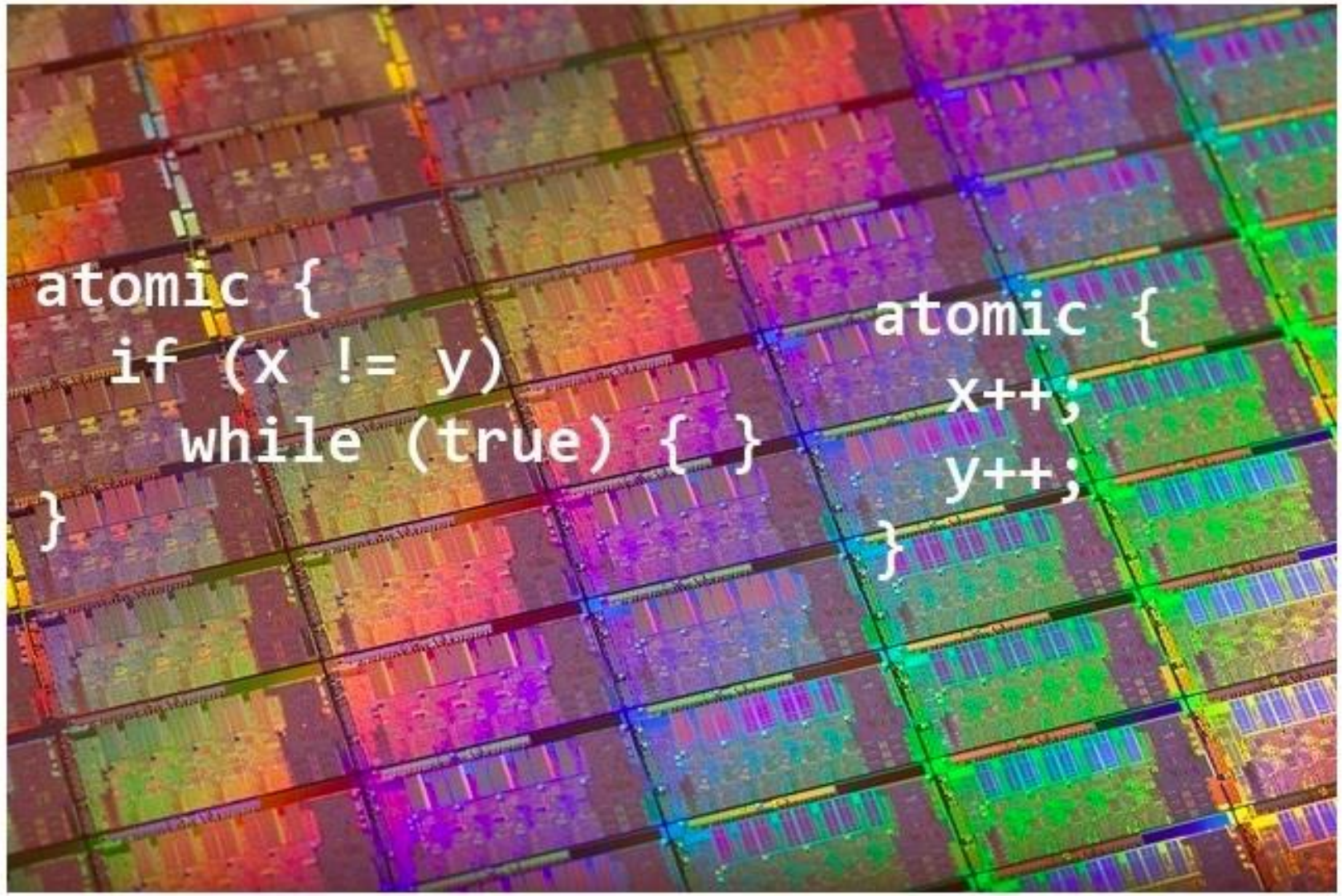
109

Transactional memory going mainstream with Intel Haswell

Transactional memory is a promising technique for making the development of …

by **Peter Bright** - Feb 9 2012, 12:10am BRST

70



IBM Unveils zEnterprise EC12, a Highly Secure System for Cloud Computing and Enterprise Data

Technology Breakthroughs Extend the Mainframe's Leadership as the Enterprise System for Critical Data

ARMONK, NY - 28 Aug 2012:

Evaluation of Blue Gene/Q Hardware Support for Transactional Memories

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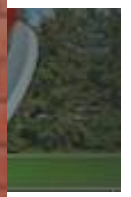


Transactional Event Profiling In a Best-Effort HTM System
Matthew Gaudet mgaudet@ualberta.ca Supervisor: José Nelson Amaral jamaral@ualberta.ca
Collaborators: Peng Wu (IBM Research, Yorktown, NY, USA), Amy Wang (IBM Software Laboratory, Markham, ON, Canada)
Doing better:
We can do better than a simple global summary —
— in understanding transactional applications.
Rates:
Often it's the rate of transactional events we care about
We draw different conclusions based on rates!
Change over Time:
Rates change over time:
Plotting can reveal trends
Micro data: Also useful!
See restart convoy, maladaptation
Measure transaction durations, distributions
Capturing Detailed Information about Transactional Execution
Program
Runtime
Hardware
Log File
Analyzers
Event Rates
Transaction Occurences
Transaction Lengths
Transaction Lengths
Case Study: Adaptation
BlueGene/Q: Can force a transaction to completion: Serialization
When?
Correct decisions requires dynamic information
Solution?
Adaptation: Decide on dynamic information.
Problem: Understanding what adaptation does at runtime?
Log Dynamic Parameters, alongside events!
Allows:
Visualization of parameter values

inneapolis Institute of Art

Serialization Management Driven Performance in Best-Effort Hardware Transactional Memory Systems

M. Sc. thesis by

Matthew Gaudet

December 2014

Matthew Gaudet

Transactional Synchronization Explained:

http://software.intel.com/en-us/blogs/2012/02/07/coarse-grained-locks-and-transactional-synchronization-explained/

Transactional Synchronization in Haswell:

http://software.intel.com/en-us/blogs/2012/02/07/transactional-synchronization-in-haswell/

Support for Transactional Memory in BlueGeneQ:

http://arstechnica.com/hardware/news/2011/08/ibms-new-transactional-memory-make-or-break-time-for-multithreaded-revolution.ars

Transactions x lr.w/sc.w

"Transactional memory is a kind of LL/SC on steroids: each thread in a transaction can, in effect, perform an LL on many different memory locations, and the commit operation performs a kind of SC that takes effect on those multiple locations simultaneously, with either every store succeeding or failing together."

IBM's new transactional memory: make-or-break time for multithreaded revolution
By Peter Bright

rstechnica.com/hardware/news/2011/08/ibms-new-transactional-memory-make-or-break-time-for-multithreaded-revolution.ars

https://www.dagstuhl.de/15021

January 4 – 9 , 2015, Dagstuhl Seminar 15021

Concurrent Computing in the Many-core Era

Organizers

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Pascal Felber

Sandhya Dwarkadas

Transactional Memories Support Speculative Execution

They lead to vulnerabilities

Vulnerabilities require mitigations

Meltdown and Spectre

Vulnerabilities in modern computers leak passwords and sensitive data.

Meltdown and Spectre exploit critical vulnerabilities in modern processors. These hardware vulnerabilities allow programs to steal data which is currently processed on the computer. While programs are typically not permitted to read data from other programs, a malicious program can exploit Meltdown and Spectre to get hold of secrets stored in the memory of other running programs. This might include your passwords stored in a password manager or browser, your personal photos, emails, instant messages and even business-critical documents.

Meltdown and Spectre work on personal computers, mobile devices, and in the cloud. Depending on the cloud provider's infrastructure, it might be possible to steal data from other customers.

https://meltdownattack.com/

Hardware vulnerability bypasses Spectre and Meltdown patches

It impacts all Windows systems using Intel and AMD processors since 2012.

https://www.cnet.com/news/hardware-vulnerability-bypasses-spectre-and-meltdown-patches/

BY CORINNE REICHERT | AUGUST 6, 2019 8:02 PM PDT

7 new Spectre, Meltdown attacks uncovered by security researchers

The widespread Spectre and Meltdown vulnerabilities were first revealed in January.

https://www.cnet.com/news/7-new-spectre-meltdown-attacks-uncovered-by-security-researchers/

BY CARRIE MIHALCIK | NOVEMBER 14, 2018 11:14 PM PST

LILY HAY NEWMAN SECURITY 01.03.2019 12:33 PM

The Elite Intel Team Still Fighting Meltdown and Spectre

https://www.wired.com/story/intel-meltdown-spectre-storm/

One year after a pair of devastating processor vulnerabilities were first disclosed, Intel's still dealing with the fallout.