Scaling Talks

Linux Kernel Summit, Edinburgh, UK
Overview

- A few short talks:
  - Memory barriers the easy way (this one)
  - Josh Triplett: Creating correct RCU data structures
  - Andi Kleen: Lock elision
  - Lai Jiangshan: Overview of SRCU

- These will not be complete descriptions
  - More detailed discussions in this afternoon's hacking session

- Lots of other experts in the room!
Memory Barriers the Easy Way: Example

CPU 0

X=1

Memory Barrier

Y = 1

CPU 1

r1 = Y

Memory Barrier

r2 = X

... memory barriers guarantee r2 == 1.

Given r1 == 1 ...

(Or some later value in both cases.)
Memory Barriers the Easy Way: General Rule

CPU 0
- Memory Reference X0
  - Memory Barrier
  - Memory Reference Y0

CPU 1
- Given Y0 before Y1...
- Memory Reference Y1
  - Memory Barrier
  - Memory Reference X1

.... memory barriers guarantee X0 before X1.
But Memory Barriers Are Expensive...

Can't we use something cheaper?
But Memory Barriers Are Expensive...

Can't we use something cheaper? We can shift the costs...
Memory Barriers the Fast and Easy Way Using RCU
RCU As Barrier: Rule

- If any part of an RCU read-side critical section happens before the beginning of an RCU grace period...
  - ... all of that RCU read-side critical section happens before the end of that RCU grace period

- If any part of an RCU read-side critical section happens after the end of an RCU grace period...
  - ... all of that RCU read-side critical section happens after the beginning of that RCU grace period
But Grace Periods Are *Really* Expensive...
But Grace Periods Are *Really* Expensive...

... and Josh will show us when we really need them and when we don't!

Or:

“Constructing correct RCU data structures”
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