Efficient GPU Synchronization without Scopes: Saying No to Complex Consistency Models

Matthew D. Sinclair, Johnathan Alsop, Sarita V. Adve University of Illinois @ Urbana-Champaign hetero@cs.illinois.edu

This is your brain



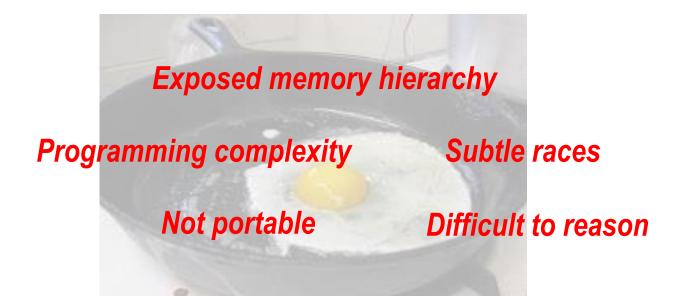
This is your brain on drugs complex consistency models





Just Say No to Complex Consistency Models

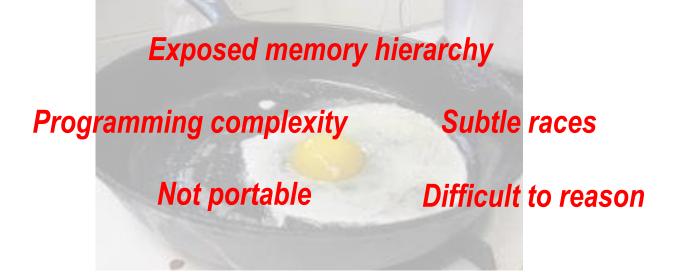
• 1970s-1990s: Addiction to complex CPU consistency models



 1990s-2000s: War on Complex CPU Consistency Models Won (mostly) by data-race-free (DRF) model But still burdened by poorly designed legacy systems

Just Say No to Complex Consistency Models

- 2015: Déjà vu: Complex Models for Heterogeneous Systems
 - E.g., Heterogeneous-Race-Free (HRF) adopted by HSA [ASPLOS '14]



- This work
 - HRF's complexity arises due to poor coherence design
 - DeNovo coherence enables data-race-free \Rightarrow Simplicity + Efficiency

