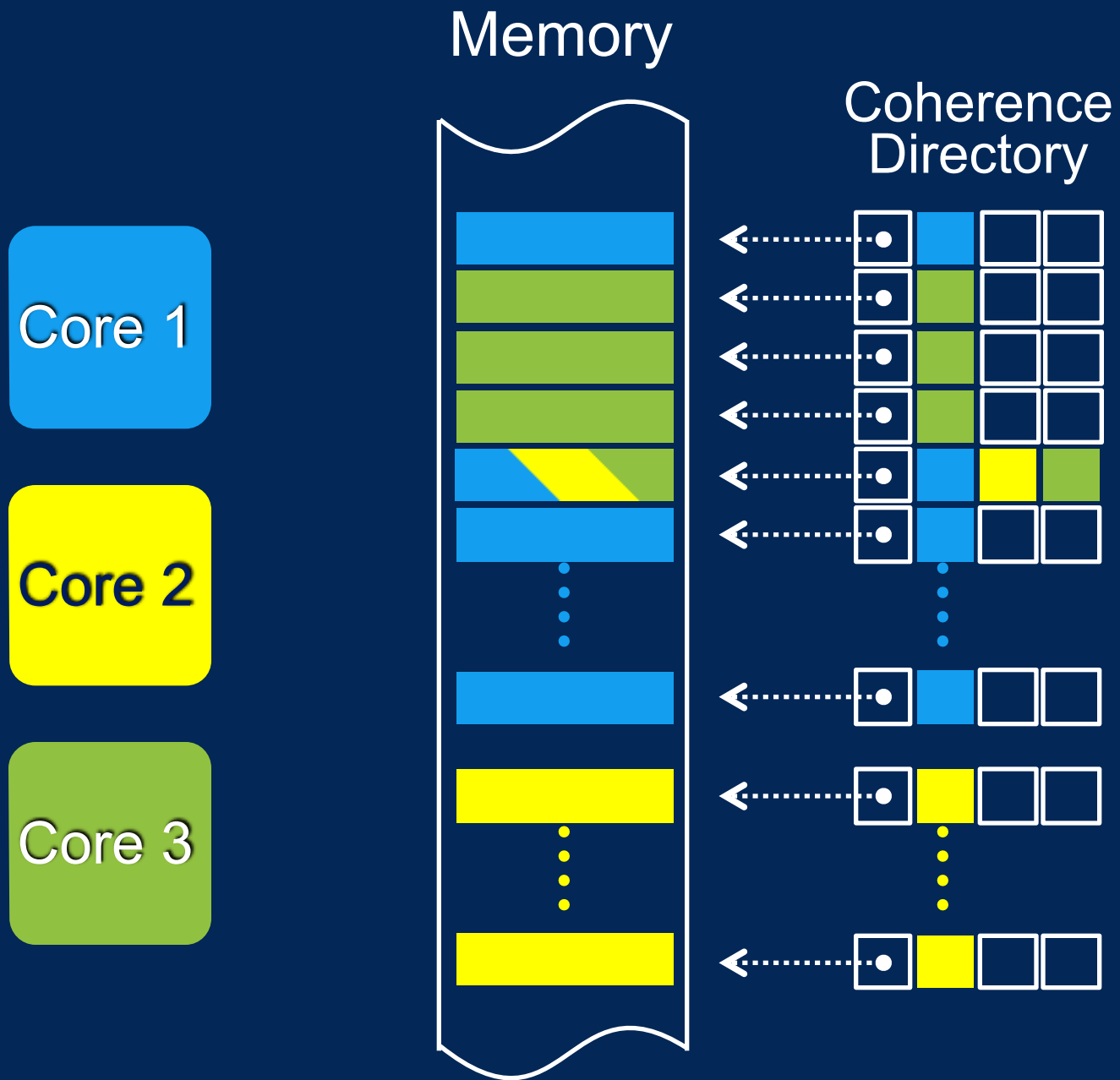# Multi-Grain Coherence Directories

Dr. Jason Zebchuk
Principal Engineer, Cavium Inc.

Prof. Andreas Moshovos, *University of Toronto*
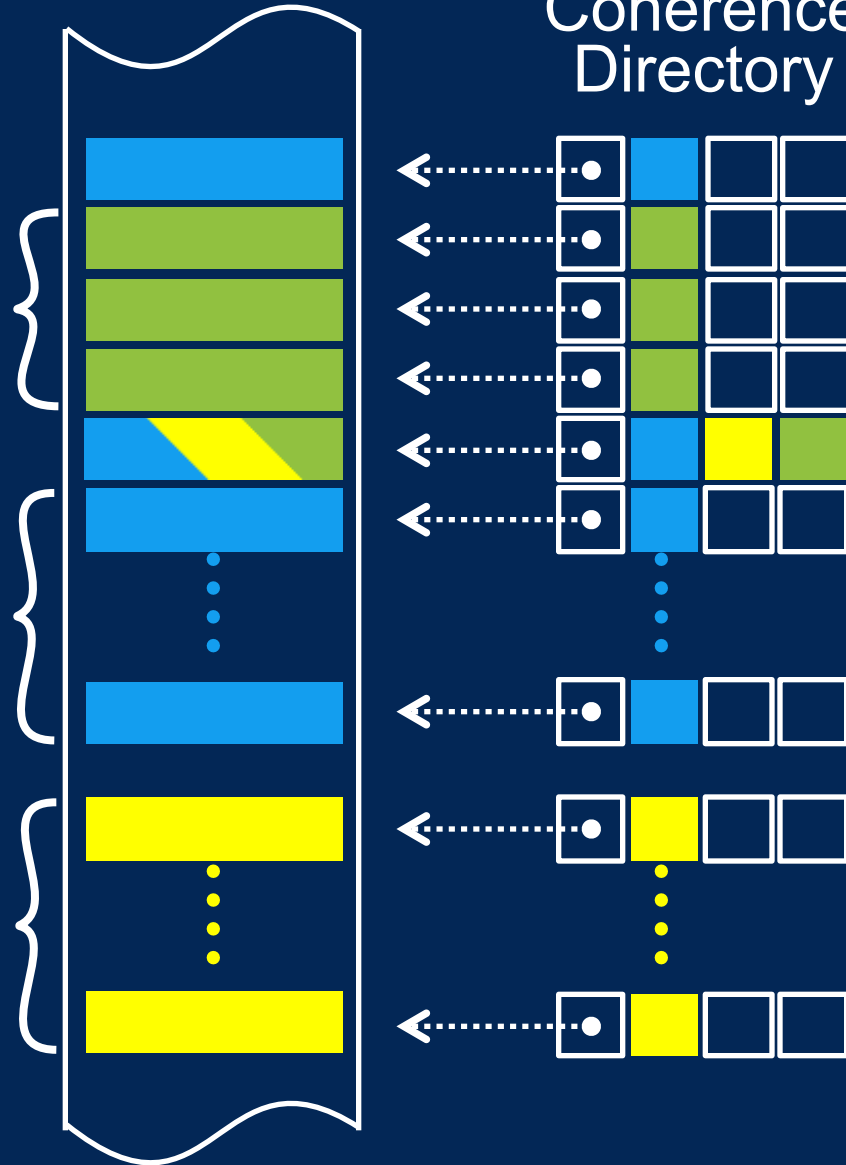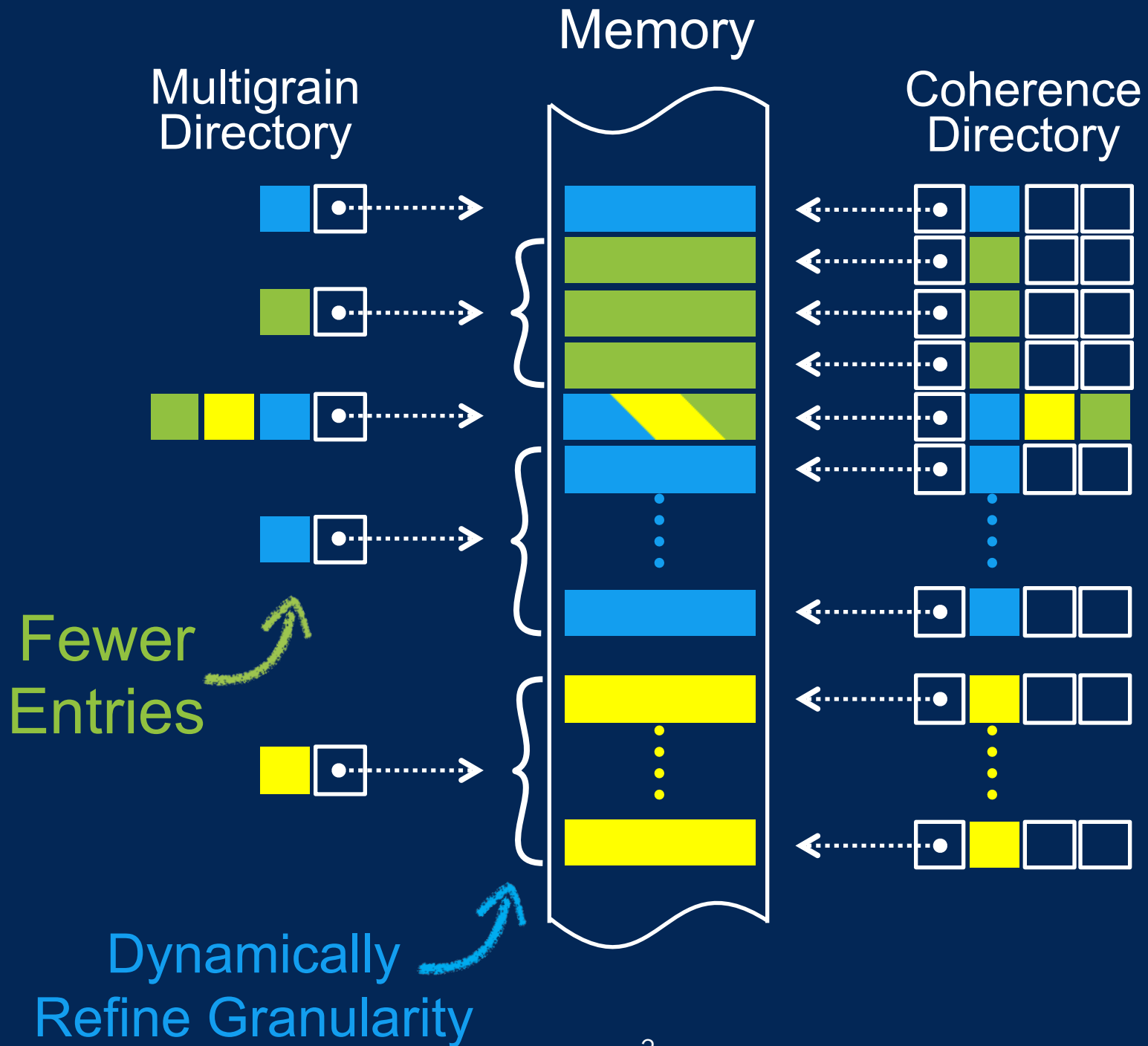Prof. Babak Falsafi, *EcoCloud, EPFL*

Memory

Coherence
Directory

Core 1

Core 2

Core 3

2

Memory

Coherence Directory

Naturally "Private" Memory Regions

Multigrain Directory

Memory

Coherence Directory

Fewer Entries

Dynamically Refine Granularity

Multi-Grain Coherence Directory (MGD)

Conceptual MGD Directory:

- ✓ Dynamically refine granularity of entries
- ✓ 78% fewer directory entries (on average)

Practical MGD Directory:

- ✓ Limited number of fixed granularities
- ✓ 41% less area
- ✓ Robust performance
- ✓ No coherence protocol changes