



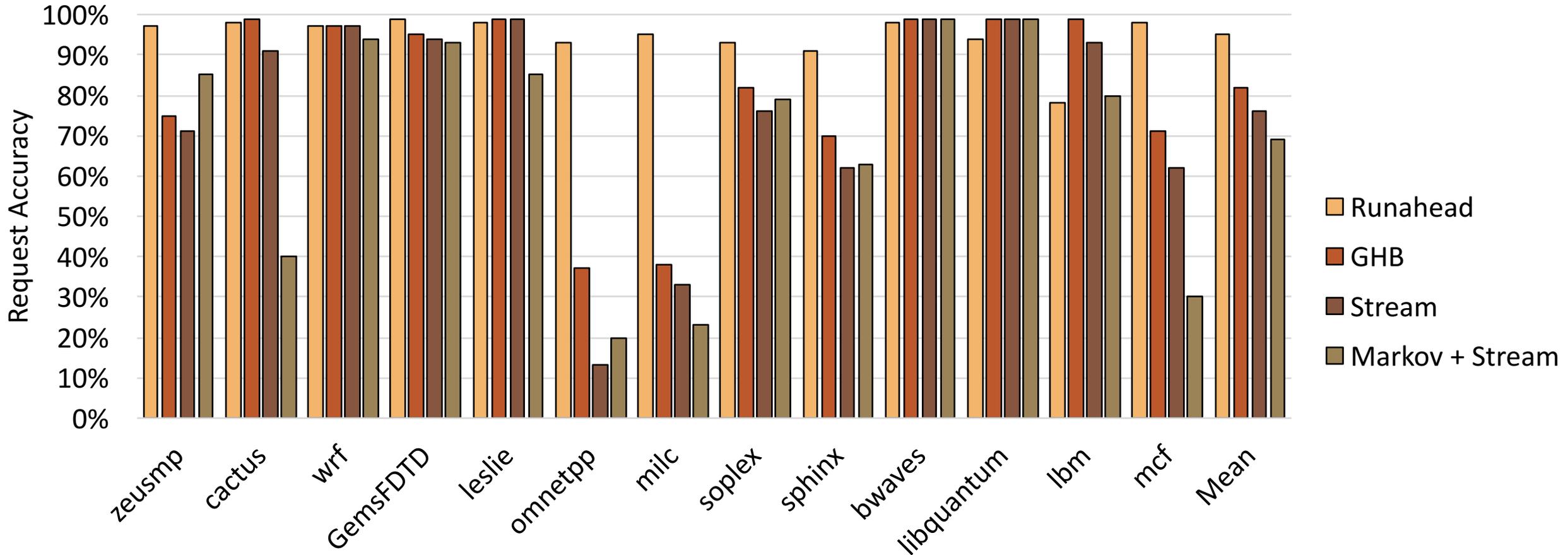
Continuous Runahead: Transparent Hardware Acceleration for Memory Intensive Workloads

Milad Hashemi, Onur Mutlu, Yale N. Patt

Wednesday October 19th: Session 7, 11:50AM

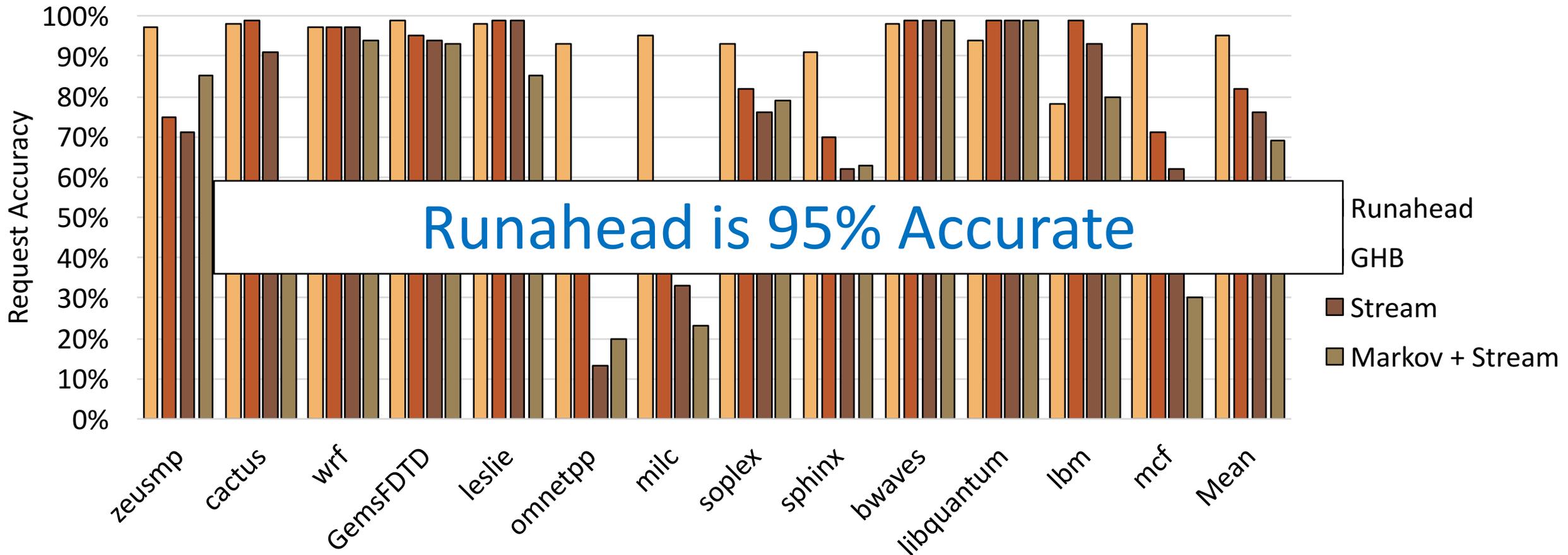


Traditional Runahead Prefetch Accuracy



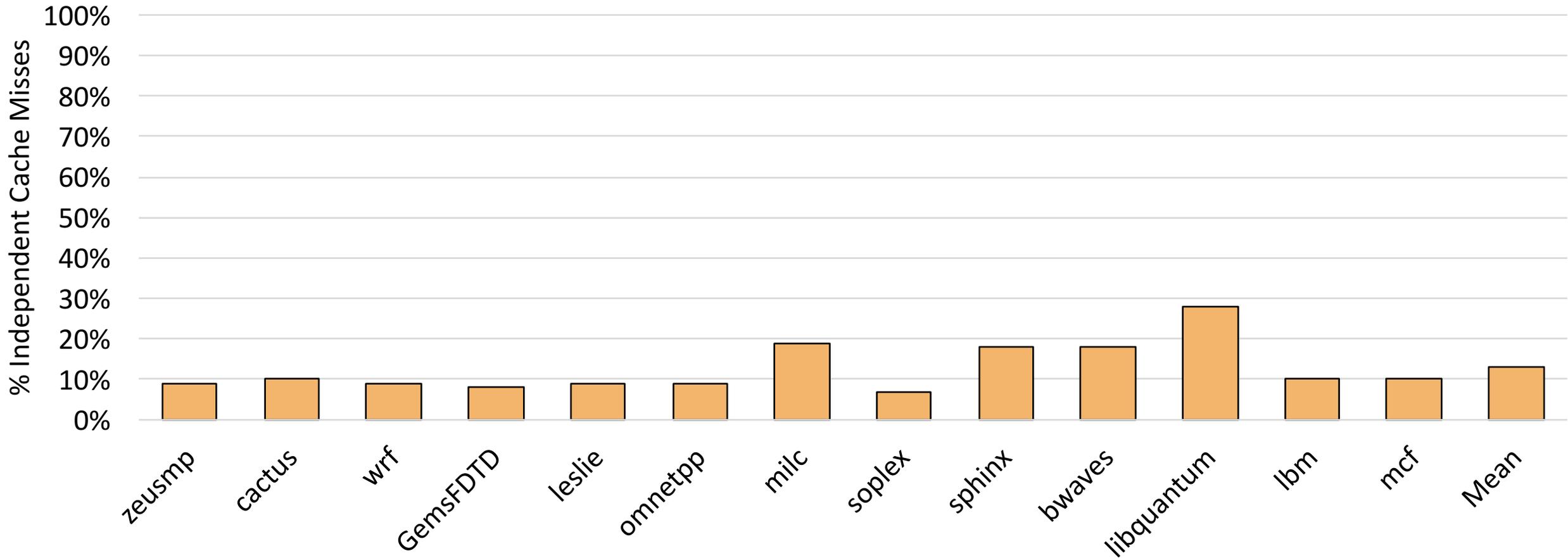


Traditional Runahead Prefetch Accuracy



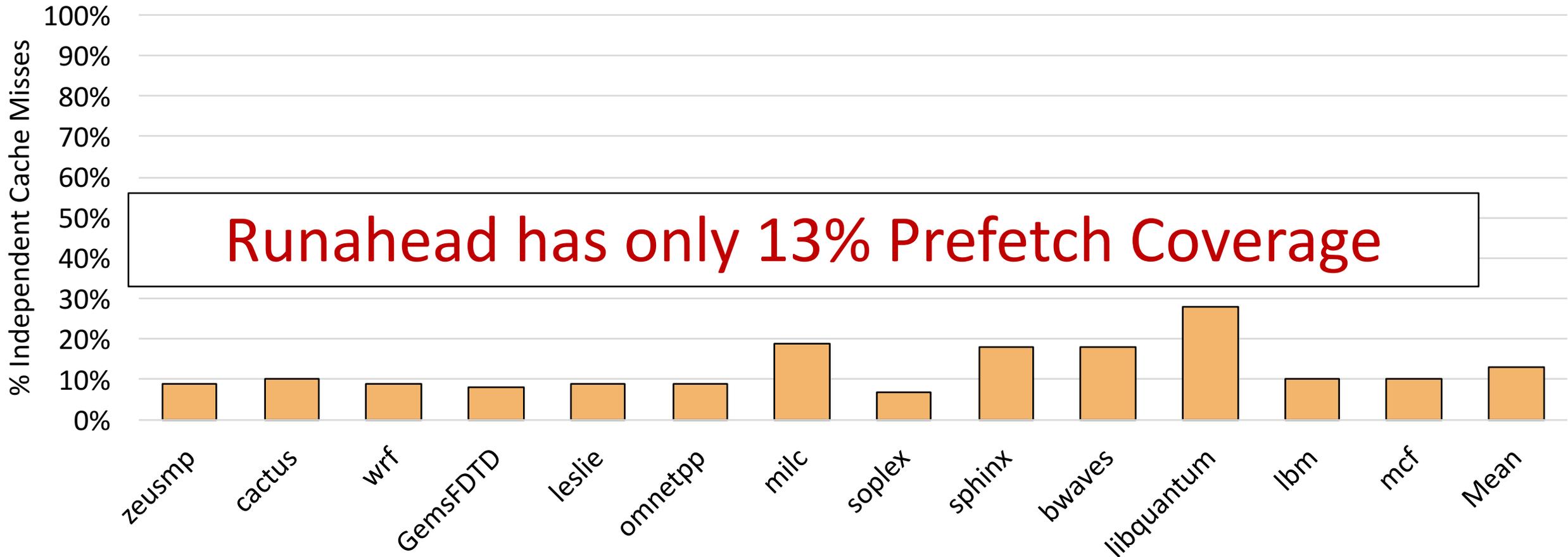


Traditional Runahead Prefetch Coverage



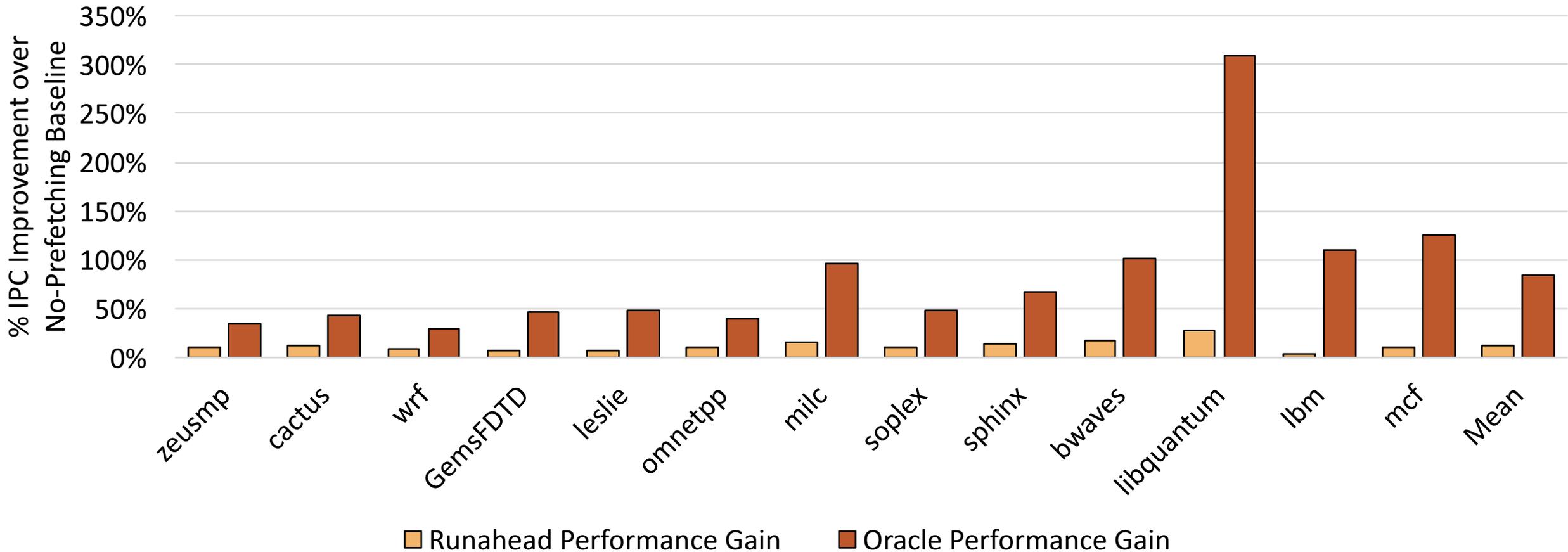


Traditional Runahead Prefetch Coverage



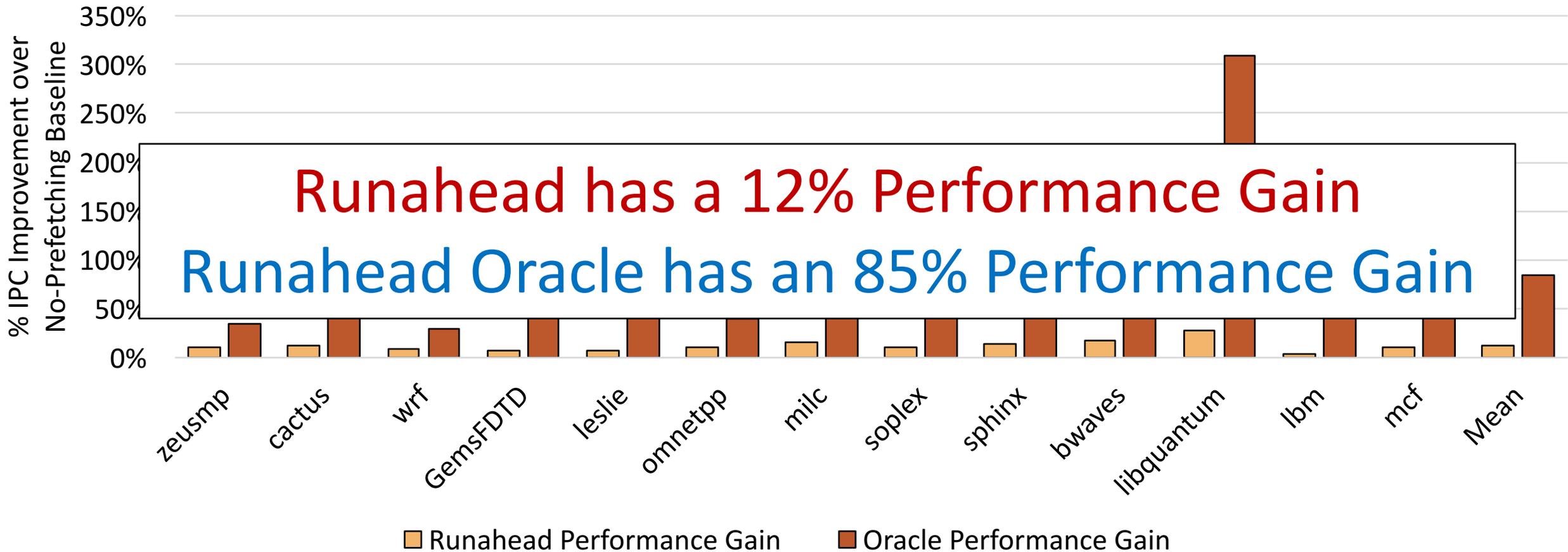


Traditional Runahead vs. Oracle Performance



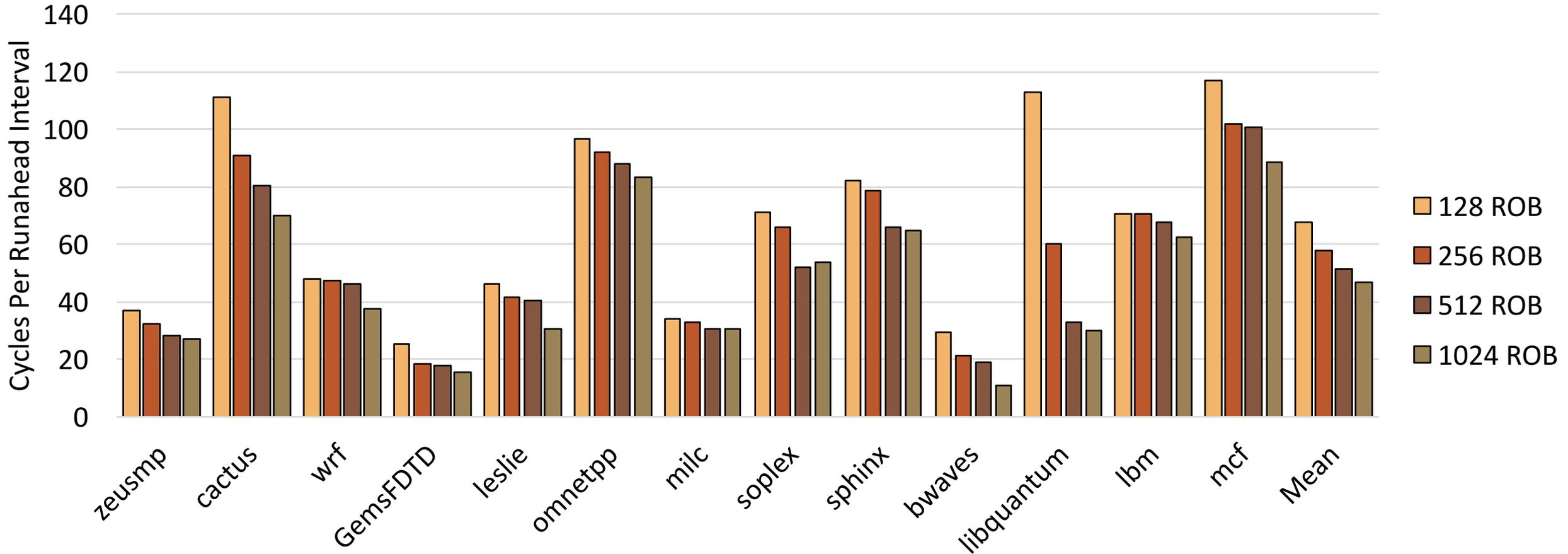


Traditional Runahead vs. Oracle Performance



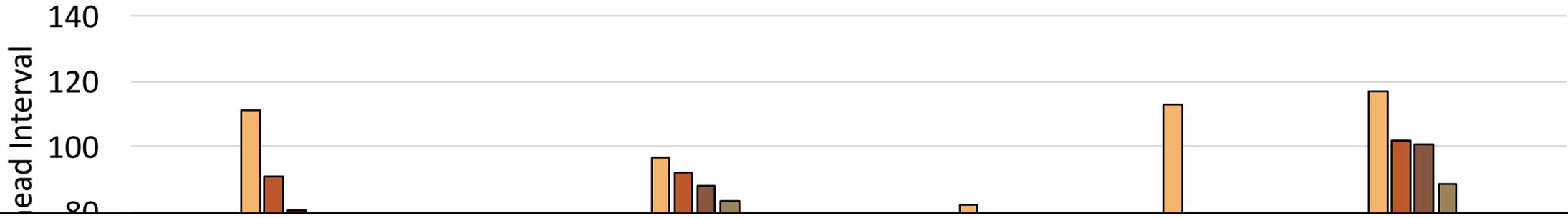


Traditional Runahead Interval Length

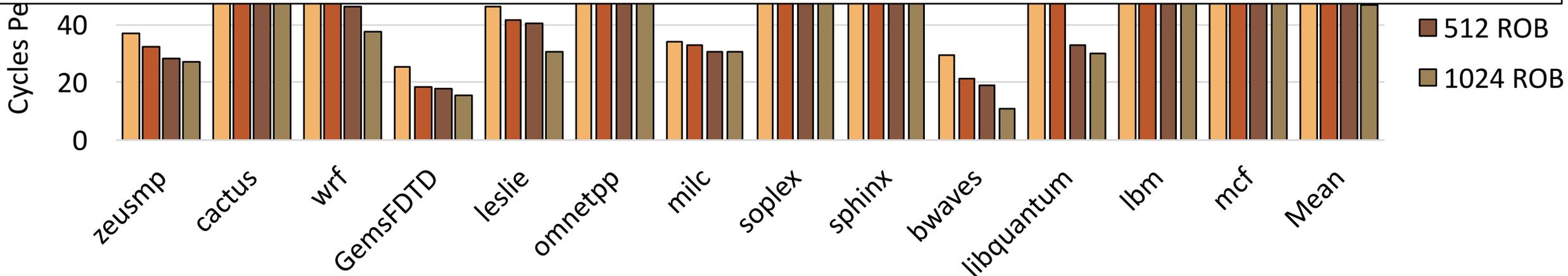




Traditional Runahead Interval Length



Runahead Intervals are Short → Low Performance Gain





Continuous Runahead

- Run ahead for longer intervals



Continuous Runahead

- Run ahead for longer intervals
- Dynamically identify the chains of operations that cause the most critical cache misses

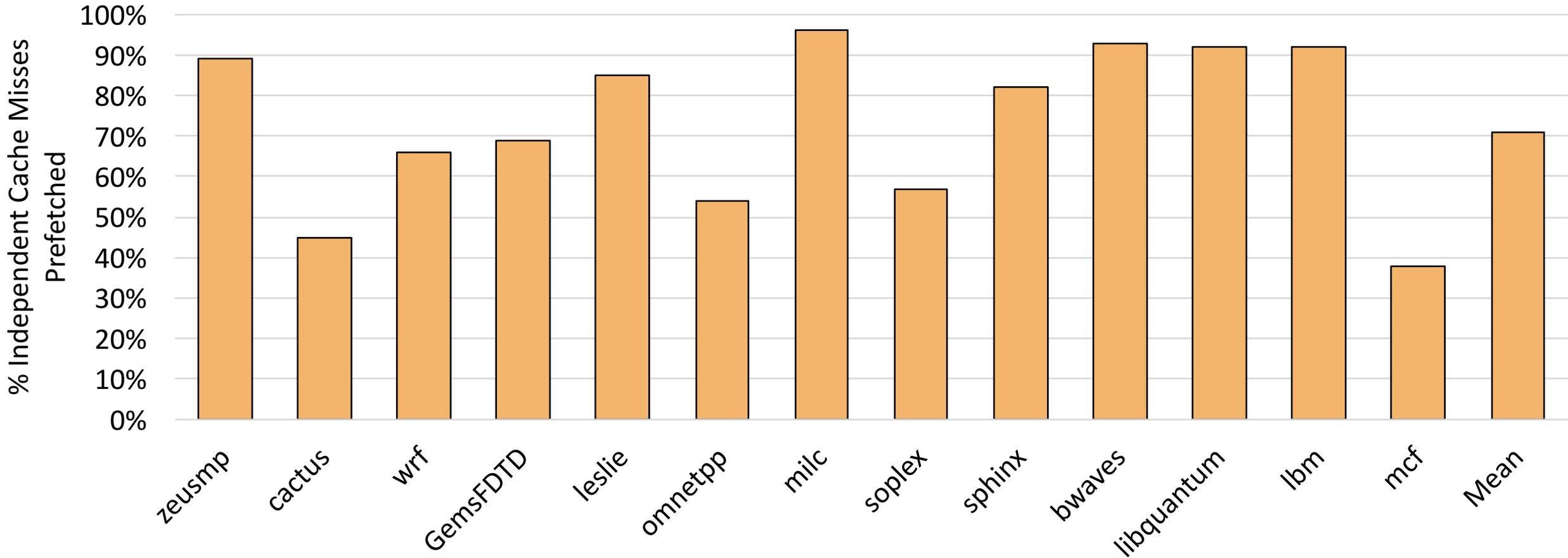


Continuous Runahead

- Run ahead for longer intervals
- Dynamically identify the chains of operations that cause the most critical cache misses
- Pre-execute these chains for extended intervals using specialized hardware in the memory controller

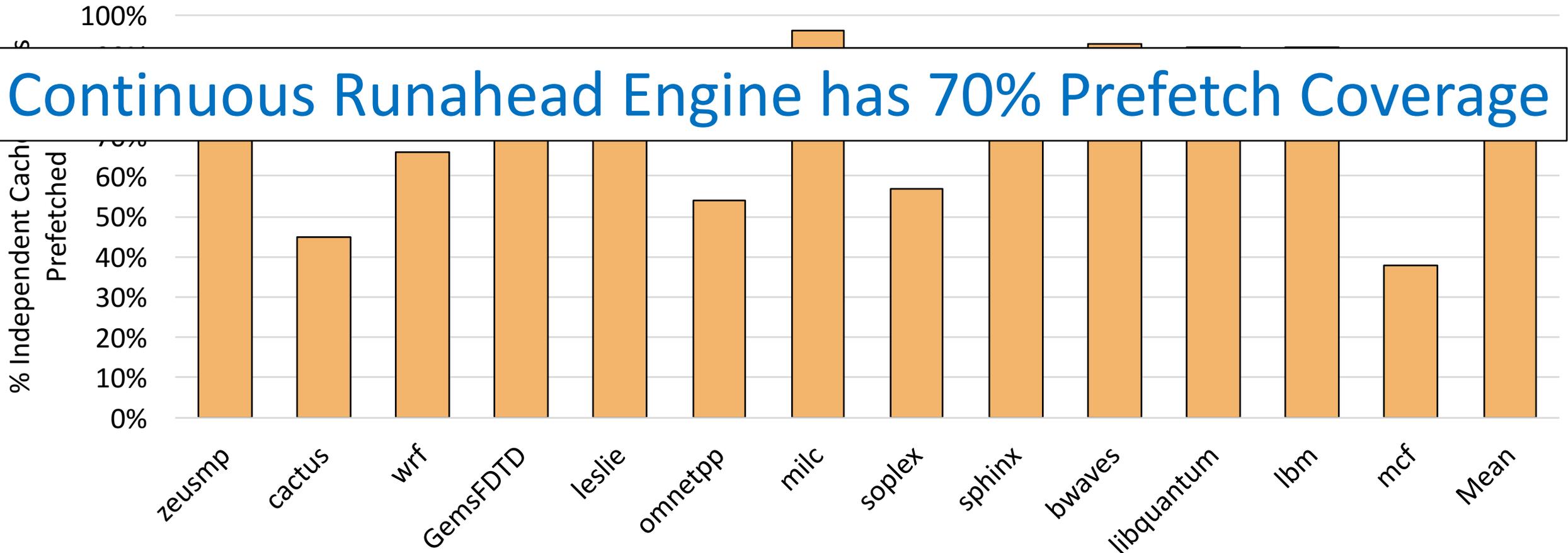


Continuous Runahead Prefetch Coverage



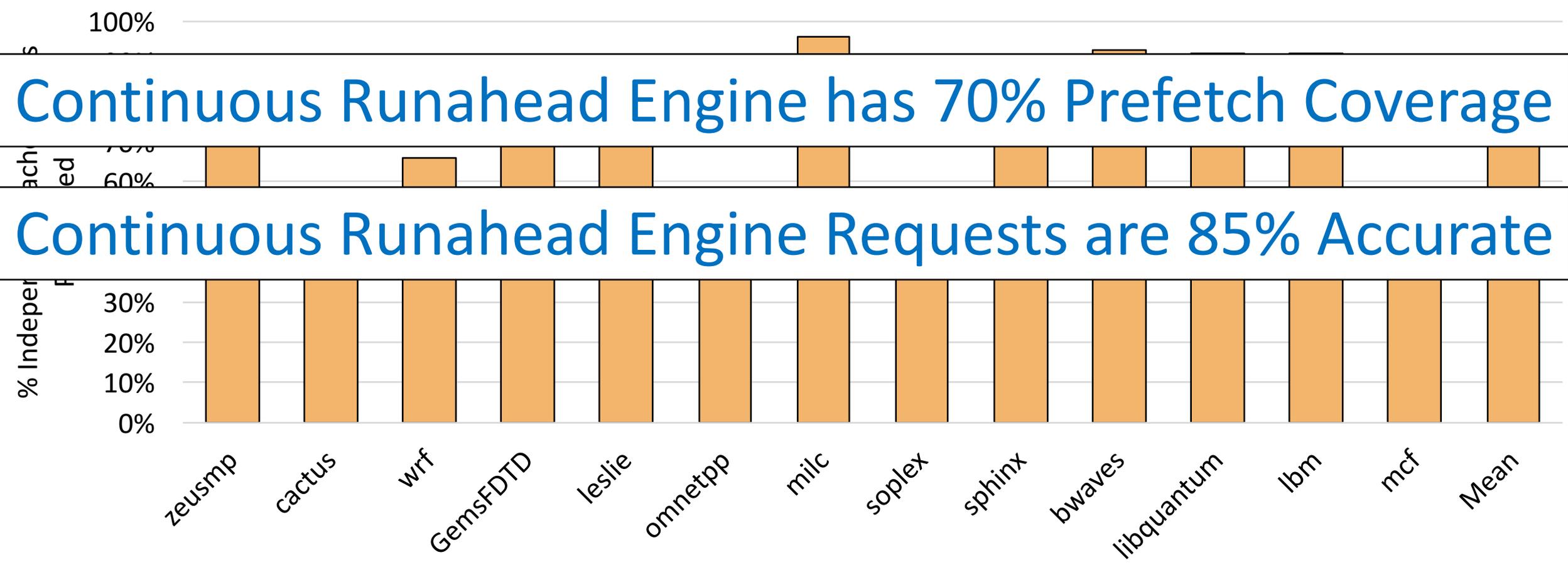


Continuous Runahead Prefetch Coverage



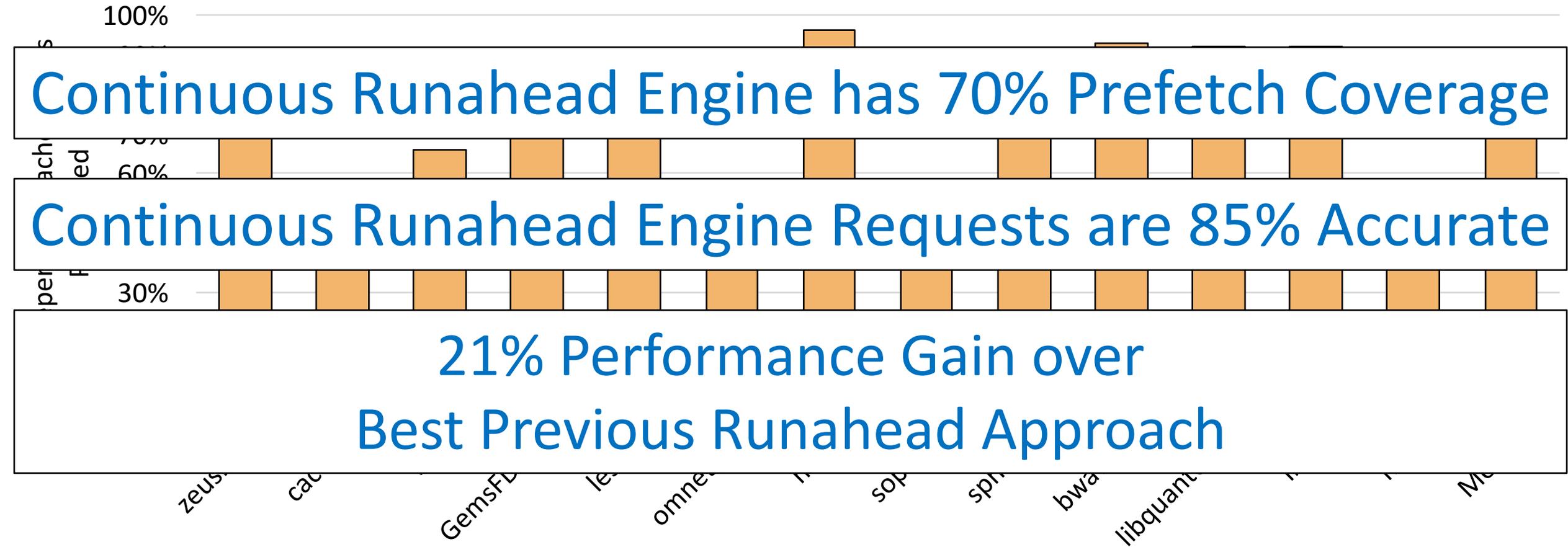


Continuous Runahead Prefetch Coverage





Continuous Runahead Prefetch Coverage





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