The many faces of TM

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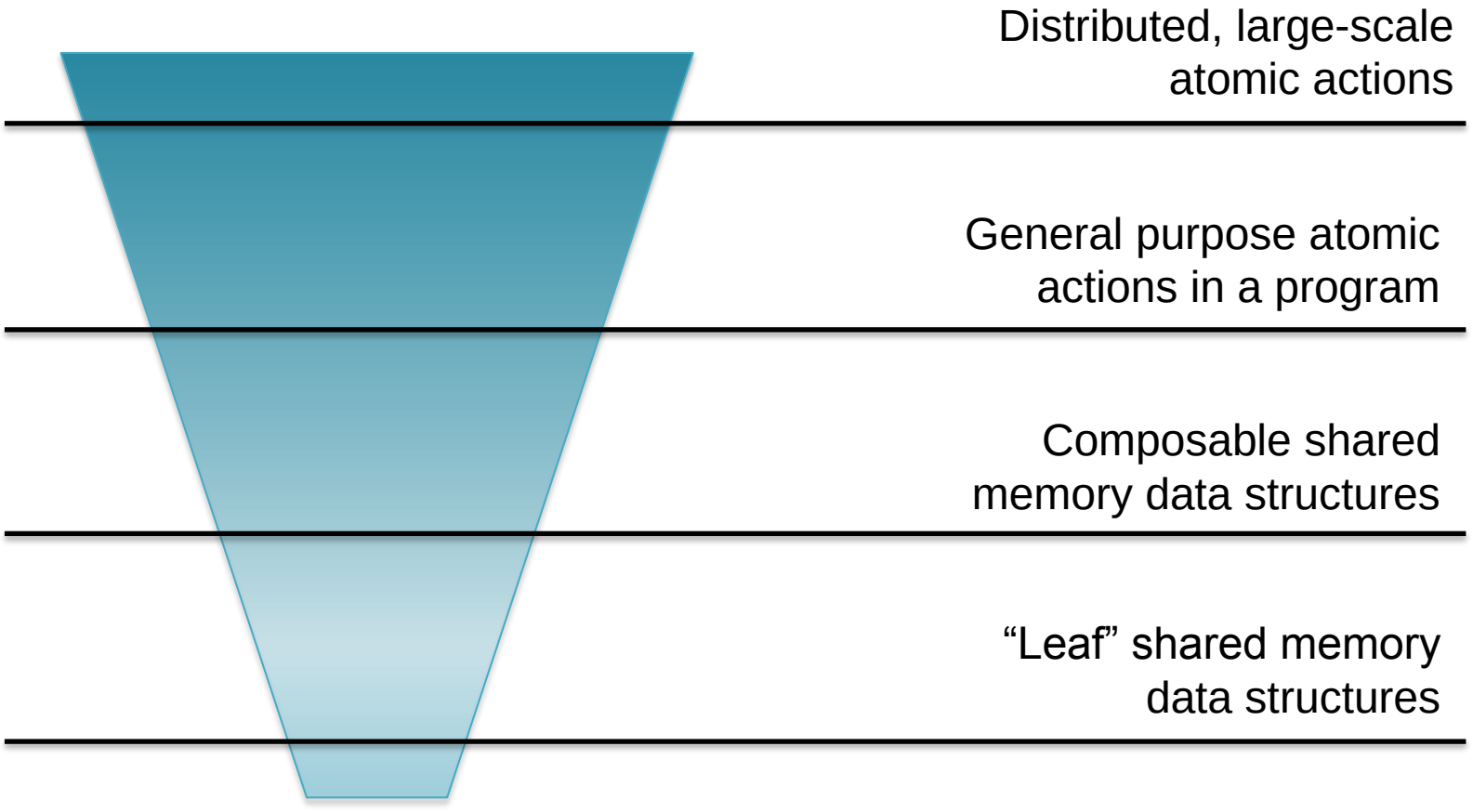
Granularity



Programming abstraction

Lock elision

The program's semantics is defined using locks. TM is used as an implementation mechanism.

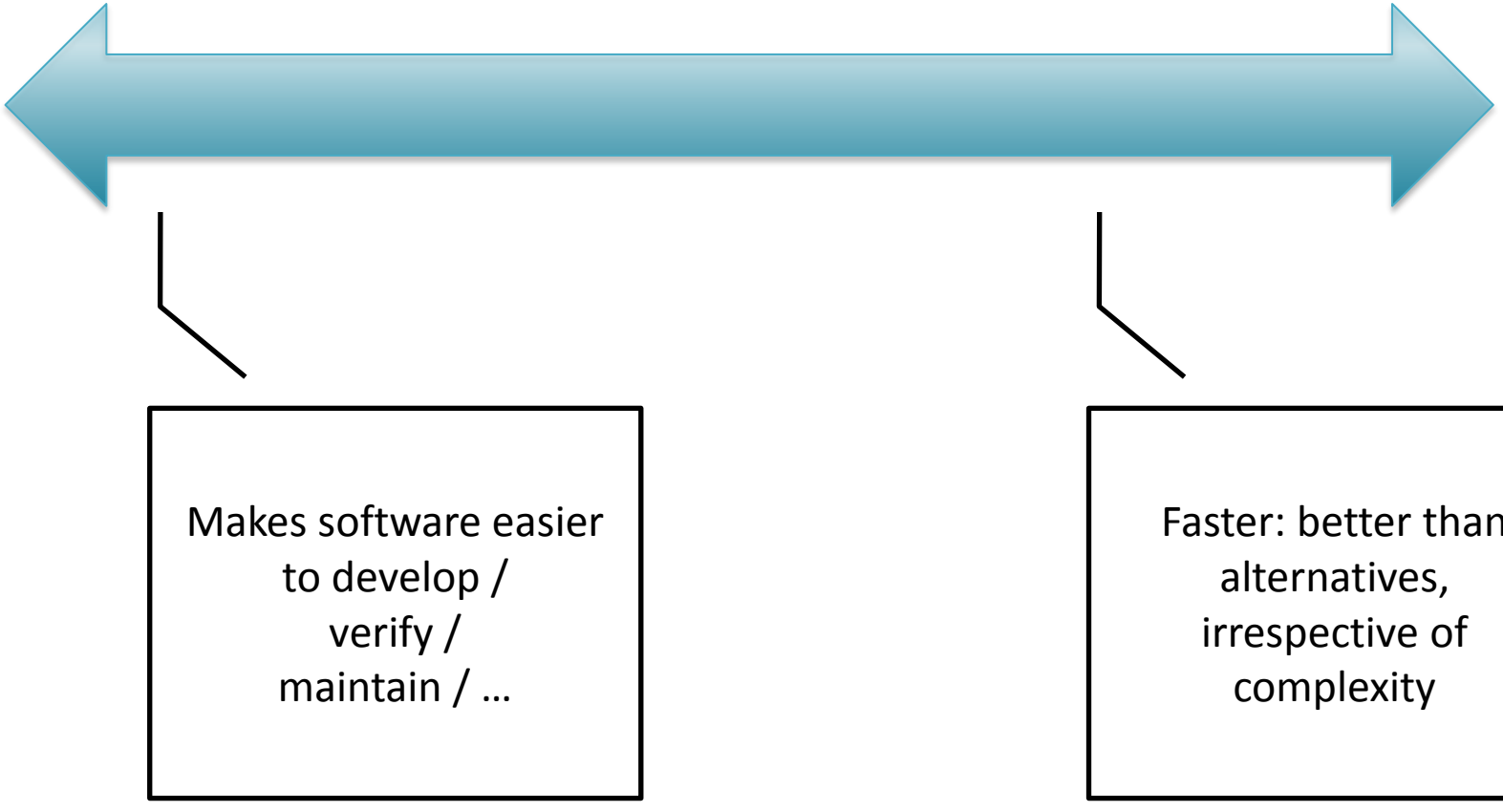
Speculation

Semantics defined by speculative execution, commit, etc. (either implicitly, or explicitly)

Atomic

Semantics defined by atomic execution (e.g. "atomic { X }"). Speculation, if used, is abstracted by the implementation.

Purpose


Makes software easier to develop / verify / maintain / …
Faster: better than alternatives, irrespective of complexity

Design points that I like

DCAS / 3-CAS / …
Granularity: leaf data structures
Abstraction: atomic multi-word CAS
Purpose: faster

HTM with limited guarantees (~ASF)
Granularity: leaf data structures
Abstraction: short transactions
Purpose: faster

Static separation (e.g., STM-Haskell)
Granularity: composable data structures
Abstraction: atomic actions
Purpose: easier, decent perf

Design points I am sceptical about

Speculative lock elision on general-purpose s/w

“atomic” blocks over normal data in a high-level language (C#/Java)

(prove me wrong, I would like either of these to work!)

Summary

- Papers on TM could often be more explicit about their goals
  - The reason for using parallel h/w is usually performance… comparing against optimized sequential code is important
- Some of the clearest uses for TM are specialized data structures written by expert programmers
  - When I've tried to build more general systems, they have either lost the perf needed, or have become infeasibly complicated

Microsoft Research PhD Scholarship on Concurrent Software Verification

- **Project:** A Proof System for Relaxed Memory Models

- **Advisors:**
  - Serdar Tasiran (Koc University, Istanbul, Turkey)
  - Shaz Qadeer (Microsoft Research, Redmond)

- **Benefits:**
  - 1250 Euros/mo net stipend
  - Housing, health insurance
  - Annual summer school at Microsoft Research, Cambridge
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  - Laptop and software

- Contact **Serdar.Tasiran@acm.org**

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