PARTISAN SCALING THE DISTRIBUTED ACTOR RUNTIME

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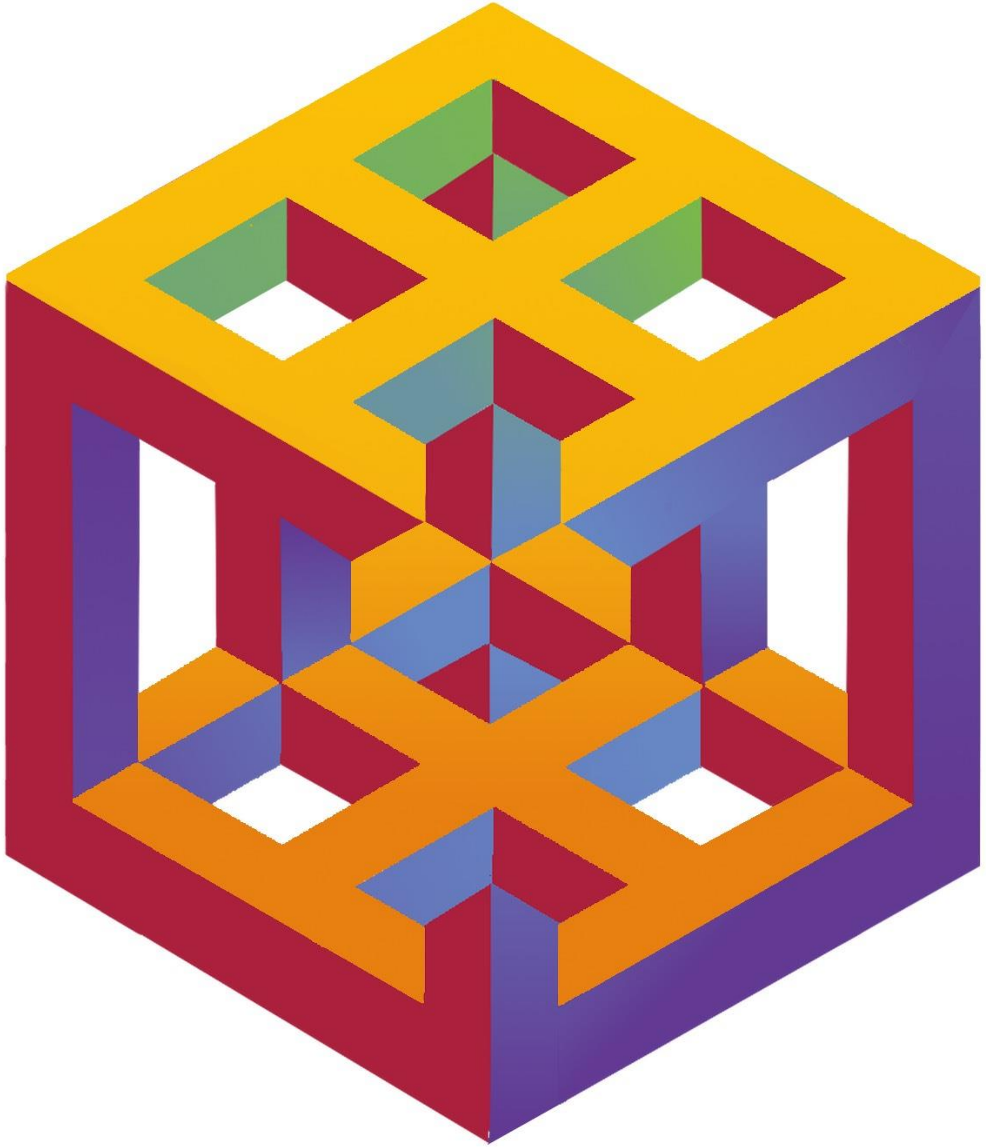


MOTIVATION

Distributed systems programming is still very hard:

- How to manage state?
- How do we manage concurrency?
- How do we leverage parallelism?

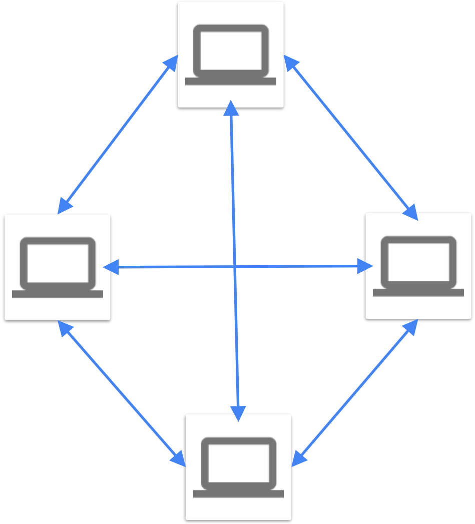
Distributed actors are good! (and, a good match to distributed systems, too!)

- Encapsulation for state
- Pervasive concurrency – thousands of actors working together
- Asynchronous messaging – no shared memory between actors
- Transparent messaging and serialization – easy programming model!

Demonstrated success:

- Erlang: Call of Duty, League of Legends, WhatsApp
- Orleans: Halo, Gears of War

DISTRIBUTED ACTORS: TODAY'S DRAWBACKS



Scalability

- All-to-all communication is expensive and prohibitive
- Nodes need to know about all other nodes

Latency

- Multiplexed TCP connection is a bottleneck
- Many actors reduced to a single connection's speed
- Congestion:
  - network latency, queueing delay
- Contention:
  - competing for shared resources, slow-sender vs. fast-sender

PARTISAN

Design of an alternative runtime system for distributed actor systems

- Design and prototype implementation in Erlang

Runtime selection of communications overlay network

- Specialize overlay selection to communications pattern of application
- No modification to application code

Provides reduced latency and increased scalability

- Enable parallelism on the network
- Schedule messages efficiently on the network

Results:

- Order of magnitude increase in cluster size
- Up to 13.5x reduction in latency and 38.07x increase in throughput

Come to our talk!
11:20 AM, Track 2: Runtimes
July 10th