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
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