

Building Concurrent Systems with Akka.NET

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About Me

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C#, WPF, MVC, Web API

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Concurrency is hard,
but increasingly relevant

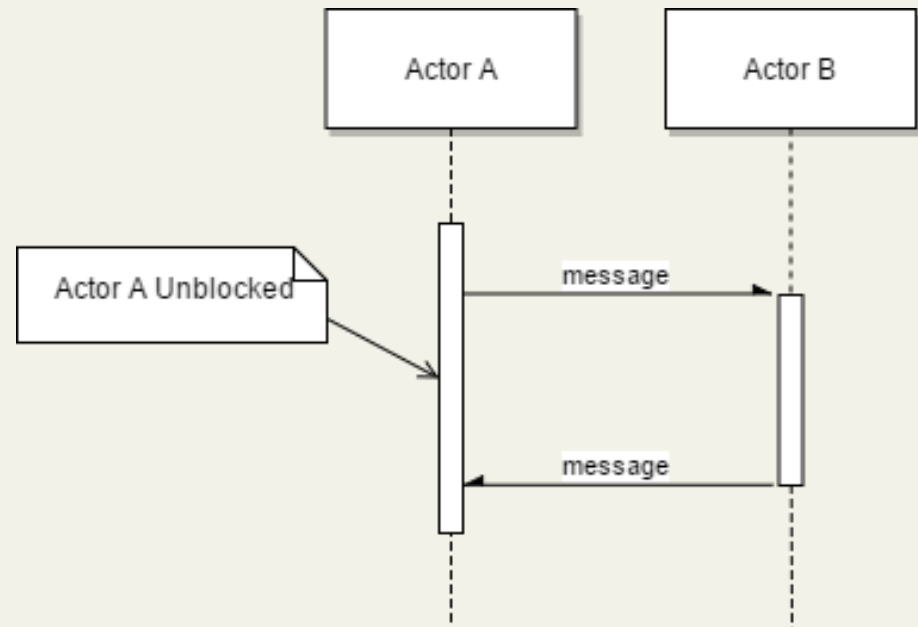
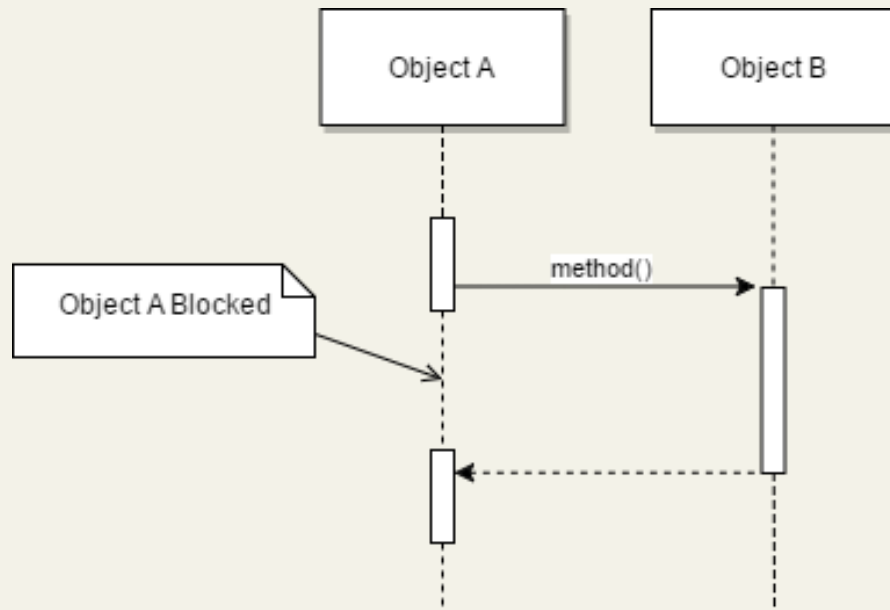
The Actor Model

- Actors
 - Send and receive messages
 - Create other actors
 - Change state based on a message
 - State machine

Context

- History
 - Conceptualized at Ericcson (1973)
 - Erlang (1986)
 - Akka on Scala/JVM (2009)
 - Akka.NET (2014)
- Use Cases
 - Concurrency, Parallelism
 - IoT

Concurrency



Concurrency – Part 2



Actor

Thread

Demo

State Machines

- Become
- Stash
- FSM class

Scalability

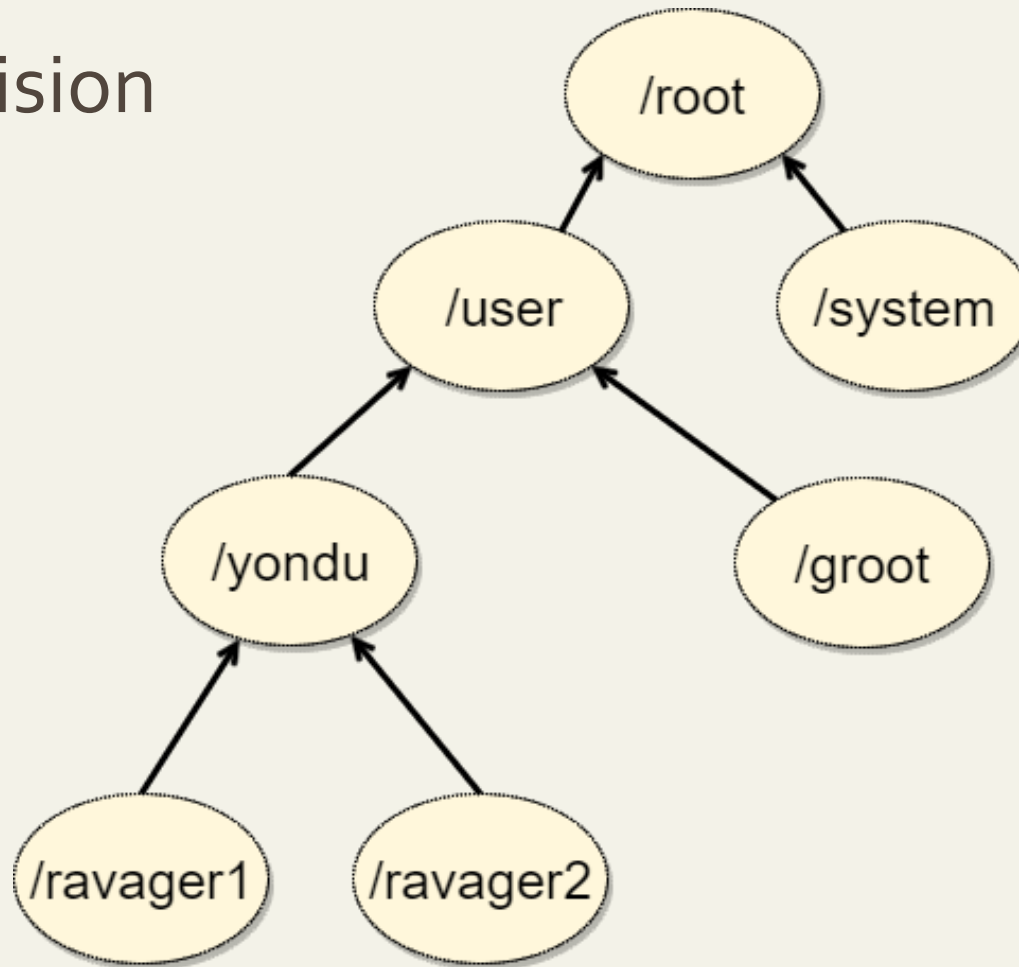
- Routers
 - Pools
 - Groups
- Strategies
 - RoundRobin
 - Broadcast
 - ConsistentHashing
 - TailChopping
- Dynamically Resizable Pools

Distribution

- Location transparency
- Addressing
 - Local
akka://system/user/service-a/worker1
 - Remote
akka.tcp://system@example.com:5678/user/service-b

Fault Tolerance

Supervision



Persistence

- Event Sourcing
- Snapshots
- Supports many stores
 - MS SQL, MySql, Redis, Cassandra , Mongo, CouchBase, PostgreSQL, ServiceFabric

Message Delivery

- Default delivery rules
 - At most once delivery
 - Message ordering guaranteed per sender-receiver
- Local delivery rules better
 - No message loss
 - Ordering mostly guaranteed
- At least once delivery part of persistence

Clustering

- Peer-to-peer networks of Akka.NET applications
- Built on remoting to provide high availability, scalability, and fault tolerance
- Clustered routers

Lessons Learned

- Looking at Akka is sometimes helpful
- Design thinking
 - Single Responsibility
 - State machines
 - Communicate with actors only via messages
- Problems occur at the boundary
- Ask is evil
- Extension methods
- Serializer

Other Topics

- Dependency Injection
 - Autofac, Castle Windsor, Ninject, SimpleInjector, StructureMap, Unity
- Logging support
 - Common Logging, Log4Net, NLog, Slf4net, Serilog
- Unit Testing
 - TestKit
- Scheduler
- Event Bus
 - Publish/Subscribe
- HOCON

Resources

- Akka.NET
<http://getakka.net/>
- Bootcamp
<https://petabridge.com/bootcamp/>
- GitHub
<https://github.com/akkadotnet/akka.net>

More Resources

- Pluralsight – Jason Roberts
 - Building Concurrent Applications with the Actor Model in Akka.NET
 - Improving Message Throughput in Akka.NET
- Reactive Applications with Akka.NET
Anthony Brown, Manning
- Gitter
<https://gitter.im/akkadotnet/akka.net>

Alternatives

- Orleans (Microsoft)
- Service Fabric Reliable Actors (Microsoft)
- Proto.Actor

Contact Me

Presentation and source on GitHub:

<http://bit.ly/AkkaNetPresentation>

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<http://WirtleyConsulting.com>

O'Reilly Generics Screencast:

<http://bit.ly/GenericsScreencast>