

Deploying ActiveMQ with High Availability

Scott Cranton
Solution Consultant Manager

FuseSource
integration everywhere

Agenda

- Who's FuseSource?
- High Availability Concerns for ActiveMQ
- Demo
 - Walk through install
 - High availability: failover and back
 - Master/Slave
 - Network of Broker

FuseSource - the Leading Open Source Integration and Messaging Vendor

■ Company built on success

- Founded in 2005
- Double digit year-over-year growth
- Offices in 9 time zones

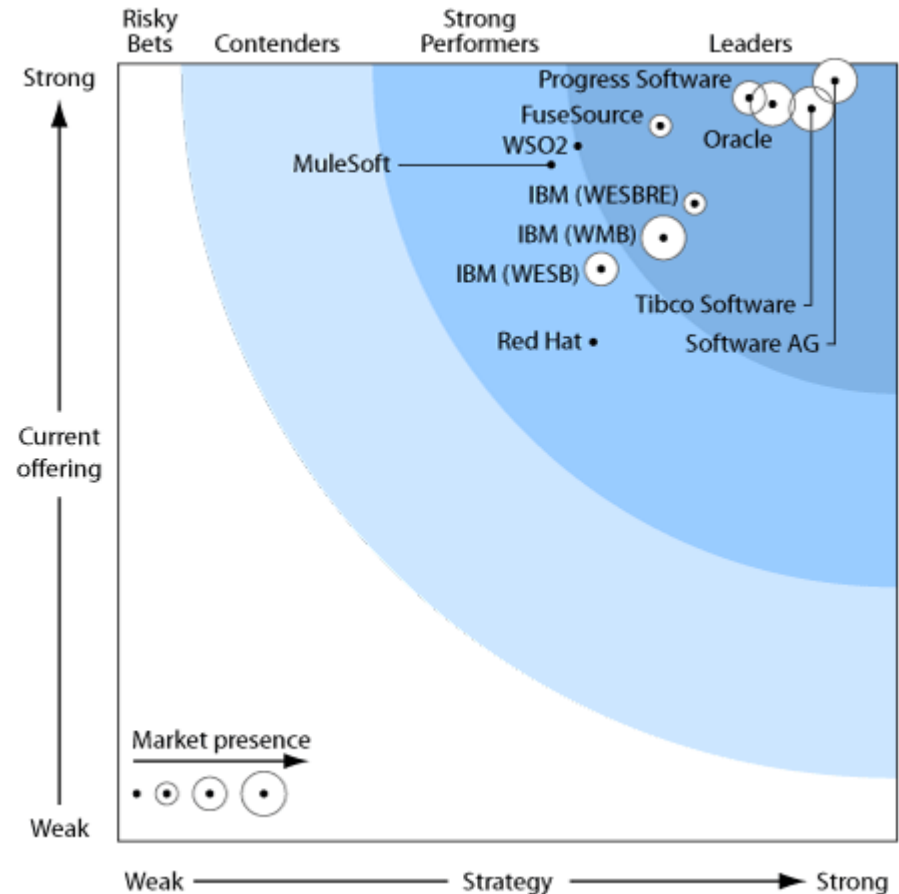
■ Enterprise products that integrate everything

- Community-backed, open source products
- Proven track record in mission-critical apps
- Leader status in Forrester ESB Wave



Forrester Wave Report Q2 2011: Fuse ESB is a “Leader”

- FuseSource placed in “Leader” category in company with large, established vendors
- One of few open source solutions considered for this report
- Highest ranked open source solution



The Forrester Wave is copyrighted by Forrester Research, Inc. Forrester and Forrester Wave are trademarks of Forrester Research, Inc. The Forrester Wave is a graphical representation of Forrester's call on a market and is plotted using a detailed spreadsheet with exposed scores, weightings, and comments. Forrester does not endorse any vendor, product, or service depicted in the Forrester Wave. Information is based on best available resources. Opinions reflect judgment at the time and are subject to change.

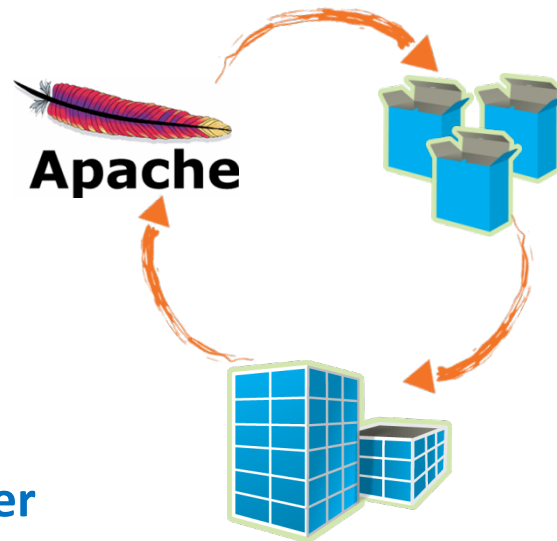
Bringing Open Source Integration & Messaging to Enterprise IT

Apache Software Foundation

- ActiveMQ (reliable messaging)
- Camel (Ent. Integration Patterns)
- ServiceMix / Karaf (containers)

Enterprise OSS Products:

- Integrated solutions
- Tested and certified
- Documented



Subscriptions

**Collaborative relationship
with your software provider**

- Enterprise tooling
- Services level agreement
- WW support organization

Training & Consulting

- Expert training on site or via the Web
- Packaged services for all phases of the lifecycle

FuseSource: the Leaders in Open Source Integration

- Open source community expertise
 - Co-founders and PMC members of ServiceMix, Karaf, ActiveMQ, Camel, and others
 - Over 25 active committers on 11 Apache projects
- Enterprise training and consulting designed for success
 - Training: getting started -> production readiness -> management
 - Consulting: PoC Workshop -> Architectural Assessments -> Tuning & HA configuration -> Go-Live Assessment
- Proven enterprise IT success
 - 200+ customers
 - 3 of top 5 retailers in the world

FuseSource Subscription: Collaborative relationship with your software provider

Support

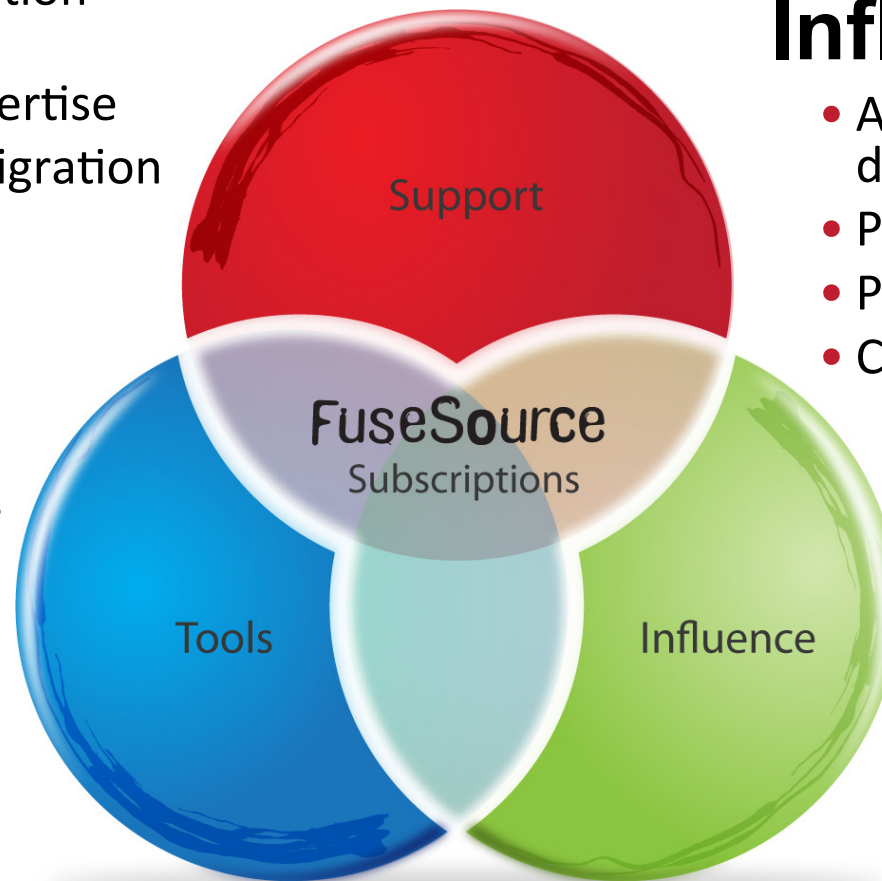
- Enterprise-class 24x7 coverage
- Global organization
- Mission-critical integration expertise
- Updates and migration assistance

Tools

- Certified distributions
- Dev, ops, and management tools
- Performance tuning
- Documentation

Influence

- Access to the development team
- Product roadmaps
- Planning processes
- Conduit to Apache

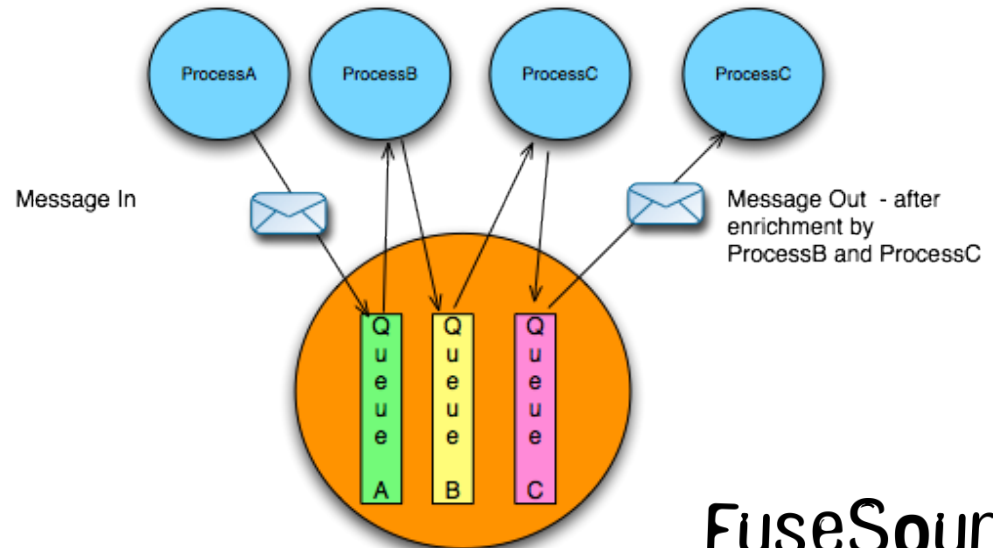


What is Apache ActiveMQ?

- Top level Apache Software Foundation project
- Wildly popular, high performance, reliable message broker
 - Supports JMS 1.1; adding support for AMQP 1.0 and JMS 2.0
 - Supports publish/subscribe, point to point, message groups, out of band messaging and streaming, distributed transactions, ...
 - Fault Tolerance and High Availability
- Myriad of connectivity options
 - Native Java, C/C++, and .NET
 - STOMP protocol enables Ruby, JS, Perl, Python, PHP, ActionScript, ...
- Embedded and standalone deployment options
 - Pre-integrated with open source integration and application frameworks
 - Deep integration with Spring Framework and Java EE

Why Use Messaging?

- Reliable remote communication between applications
- Asynchronous communication
 - De-couple producer and consumer (loose coupling)
- Platform and language integration
- Fault tolerant - processing can survive Processor outage
- Scalable - multiple consumers of each queue
 - Distributes processing



What is “High Availability”?

- Always Ready – Infrastructure **appears** to always be ready
- Change Transparency – Infrastructure changes are **transparent** to application
- Fault Tolerance – maintain quality of service **despite** system failures
- Scalable – ability to grow (and shrink) infrastructure to meet needs

High Availability Concerns

- Application (messaging client)
 - (Re)Connect to messaging infrastructure automatically
 - Ignorant (mostly) of messaging infrastructure configuration
 - Balancing messaging quality of service tradeoffs
- Infrastructure (messaging broker)
 - Fault Tolerance – balance cost of outage prevention
 - Ability to scale out (and in) horizontally as needed

Application Recommendations for High Availability

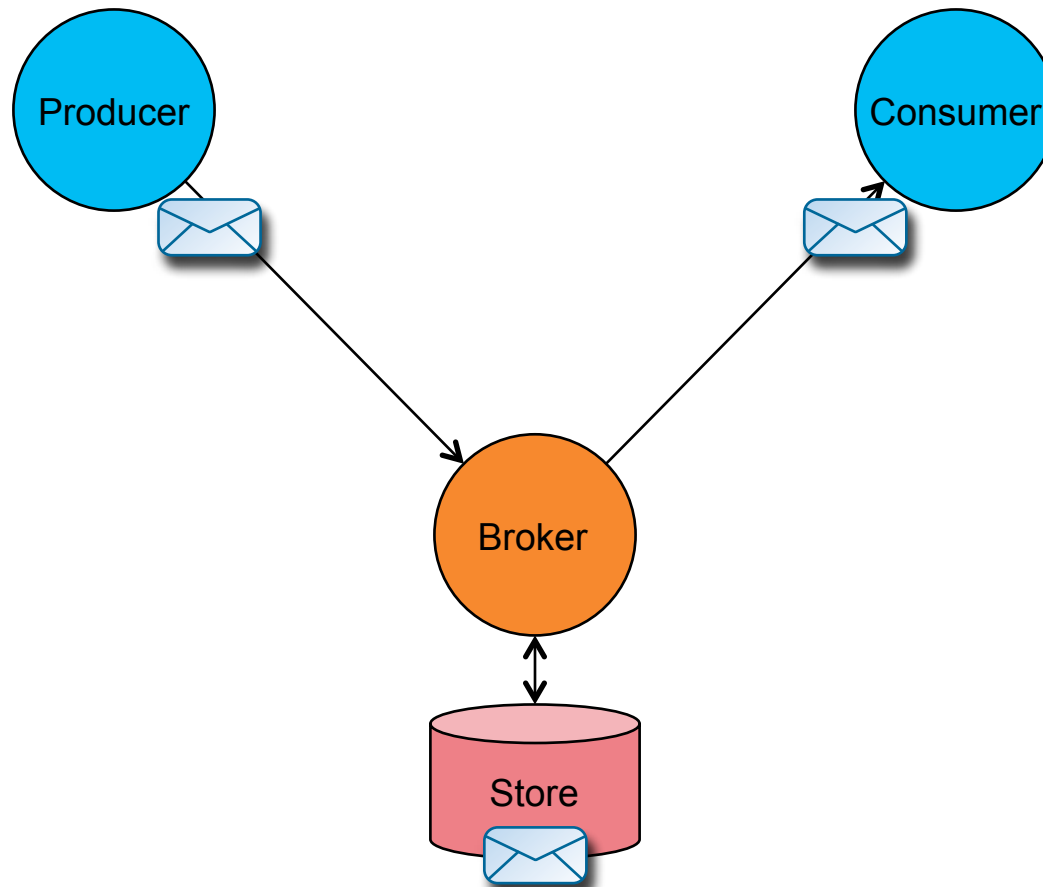
- Always use Connection Pooling
 - Single biggest issue with large deployments
 - Most applications work fine with a **pool** of 1 connection
- Always use Failover transport
 - Transparently re-connect on connection failure
 - Works with discovery
 - Can rebalance connections across group of brokers
- Example connection URI
 - `failover:(tcp://master:61616,tcp://slave:61616)?random=false`
 - `failover:(tcp://broker:61616)`

Application Recommendations for High Availability

Balancing messaging quality of service

- Persistent versus non-persistent – Fault Tolerance
 - Persistent messages saved to store (most reliable, but slower)
 - Non-persistent are not (fastest, but lost on broker failure)
- Synchronous versus Asynchronous send - Throughput
 - Synchronous (default) means client thread waits for broker to acknowledge message receipt
 - Asynchronous (JMS non-standard) means client thread does not block
- Transactions – not a silver bullet
 - XA / 2 phase transactions are most reliable (in theory), but can be difficult to get working, and are slow
 - Using JMS (local) transactions for message batch sending can increase throughput

Single Broker



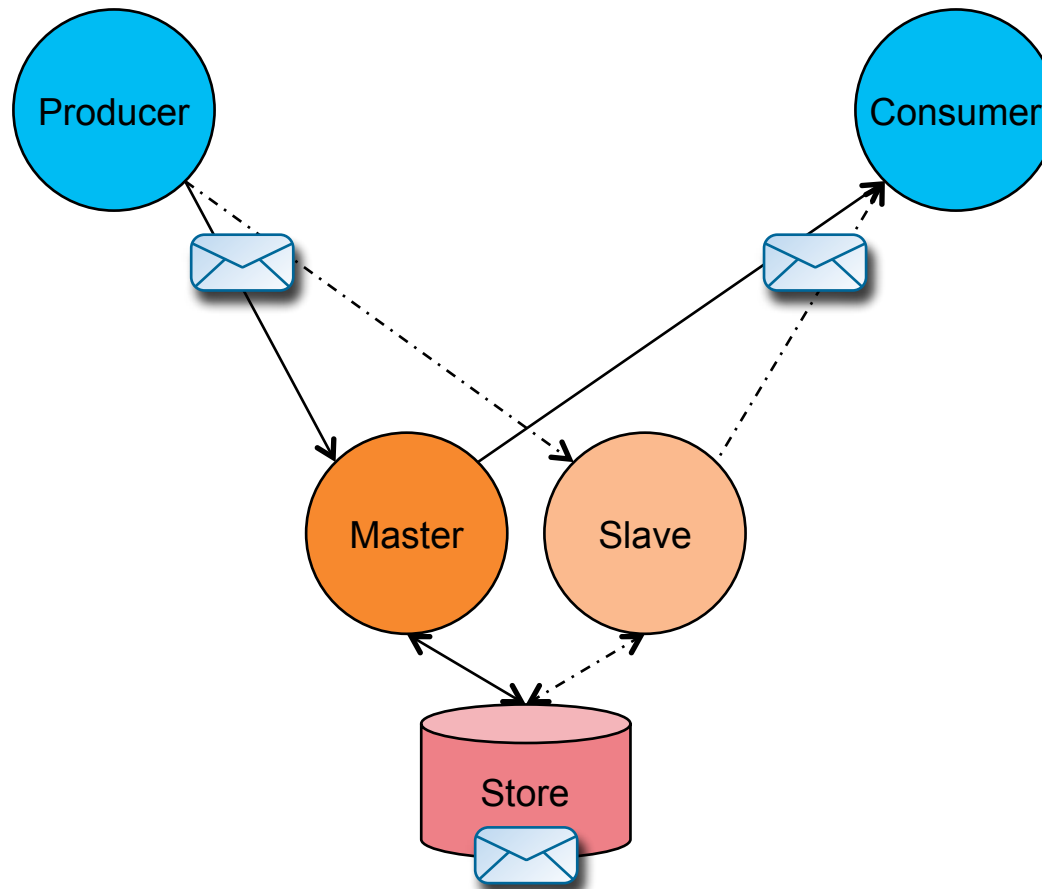
failover:(tcp://broker:61616)

Infrastructure Recommendations for High Availability

Understand difference between Master/Slave and Network for Brokers

- Master/Slave
 - Multiple broker instances (generally 2) on same persistence store
 - Helps ensure **timeliness** of message delivery
- Network of Brokers (Broker Federation)
 - Connect group of brokers together
 - Messages forward through network of brokers
 - Enables horizontal scaling and multi-location reliable messaging
- Combination
 - Network of Master/Slave pairs
- Note: Persistent messages depend on integrity of persistence store technology (disk or database)

Master / Slave Brokers

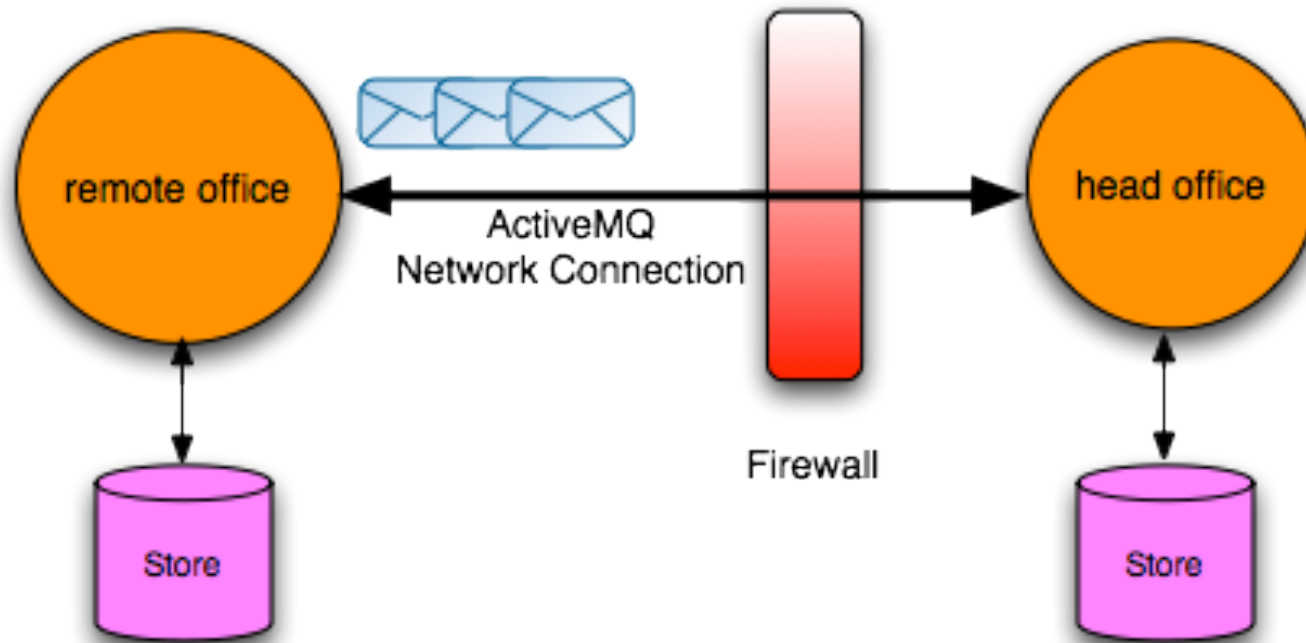


`failover:(tcp://master:61616,tcp://slave:61616)?random=false`

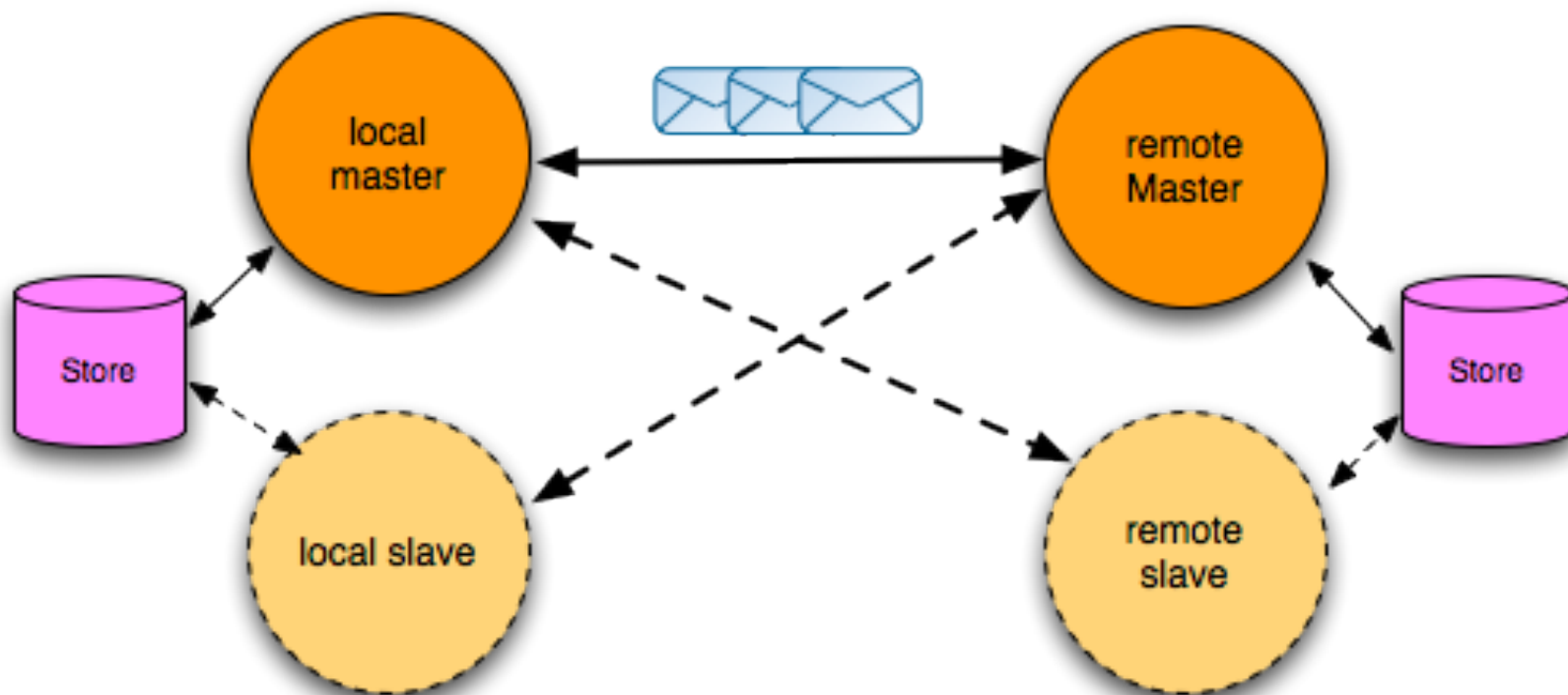
Network of Brokers : Geographically Dispersed



Network of Brokers : Geographically Dispersed



Network of Brokers : Network with Master/Slave



Network of Broker Notes of Caution

- Network Connector does two (2) things
 - Manages a network (socket) connection
 - Bridges message destinations
- Dynamic versus static bridging
 - Dynamic bridging uses Advisory Topics
 - Advisory messages sent when MessageConsumers connect and disconnect on any destination by default
 - Static bridging requires manual configuration of destinations
 - Can use destination wildcards
 - Does not need Advisory Topics
 - Can be difficult to configure and manage – though getting easier with newer version of ActiveMQ

Network of Broker Notes of Caution

Network of Master / Slave pairs

- Fixed as of ActiveMQ 5.5.1 (AMQ-3542)
 - `static:(failover:(tcp://master,tcp://slave)?maxReconnectAttempts=0)`
- Failover transport usage means only connect to one and only one of listed brokers
- `maxReconnectAttempts=0` means failover transport should NOT transparently reconnect on failure; allow static discovery transport to reconnect
 - Bridge code needs to know when connection failures happen
- As of ActiveMQ 5.6
 - `masterslave:(tcp://master,tcp://slave)`



Code Time

FuseSource
integration everywhere

Sample Code

https://github.com/FuseByExample/getting_started_with_activemq

Great stuff on FuseSource.com



CamelOne

- 2011 videos and presentations available
- 2012 Coming Soon!



Virtual Training:

- *Developer Training for ActiveMQ*
EUR: Jan 26-27
USA: March 20-21
- *Developer Training for ServiceMix 4.x with Camel*
EUR: Feb 23-24
USA: Jan 24-25

Questions

