JBoss Messaging

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Agenda

- Why do we replace JBossMQ?
- Project Goals
- JBoss Messaging 1.0 – Current Situation
  - ✓ Features
  - ✓ Architecture
  - ✓ Installation and configuration
- Roadmap

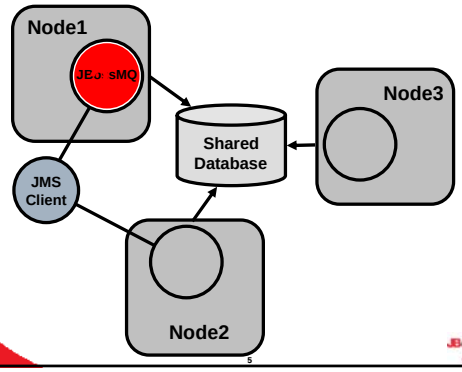
Reasons to replace JBossMQ

- JEMS (JBoss Enterprise Middleware System) already contains a production-quality JMS provider, JBossMQ
- JBossMQ
  - ✓ Evolved from SpyderMQ
  - ✓ Mature implementation
  - ✓ Used in production in numerous environments
  - ✓ However, it has several fundamental limitations ...

JBossMQ limitations

- Performance problems in certain high-load configurations
  - ✓ we will see later performance comparison charts
- Originally designed without HA support
- HA features added later in the form of a HA Singleton
  - ✓ single JMS provider instance in a cluster
  - ✓ recoverability for PERSISTENT messages
  - ✓ in-flight NON-PERSISTENT messages are lost in case of failure.
  - ✓ non-transparent client fail-over

JBossMQ High Availability



JBoss Messaging Project Goals

- Fully compliant JMS 1.1 implementation
  - ✓ Compatibility tested with Sun's TCK
  - ✓ Implementation available standalone as well as AS-integrated
- Goal achieved in 1.0

JBoss Messaging Project Goals (2)

- Improved performance over JBossMQ
  - ✓ Completely new architecture based on Channels (more about this later)
  - ✓ New threading model
  - ✓ Optimized persistence
  - ✓ Better transaction handling
  - ✓ Less serialization
  - ✓ Support for large queues or subscriptions
- Goal achieved in 1.0

JBoss Messaging Project Goals (3)

- A completely new clustering model
- Greatly improved HA and load balancing features
  - ✓ Not a simple HA Singleton anymore
  - ✓ Distributed and replicated destinations available
  - ✓ Transparent client fail-over
- Goal planned to be fully achieved in 1.2

JBoss Messaging Project Goals (4)

- Backbone of JBoss ESB
  - ✓ Messaging Core planned to be used as asynchronous messaging foundation for JBoss ESB
  - ✓ Integration with JBoss ESB sometime in Q3 2006
- In progress

JBoss Messaging Project Goals (5)

- JMS interface to JGroups
- In progress

Features

- JBoss Messaging 1.0 is a fully compliant JMS 1.1 provider
- JMS 1.1 compliance is tested with Sun's J2EE CTS (Compatibility Test Suite)
- Current pass rate is 100%
- No clustering for 1.0
  - ✓ JMS clustering will be available in the 1.2 release

Architecture

- A Messaging sever instance consists of two major (and independent) layers
  - ✓ The Messaging Core
  - ✓ The JMS Façade

The Messaging Core

- Messaging Core is a generic, reliable and distributed messaging transport system
- Does just two things and does them well
  - ✓ Guarantees the *reliability* of a message submission, for those messages that have been configured to be reliable
  - ✓ It is *distributed* by nature, so it can reliably send messages between different address spaces
- Supports generic messages (not necessarily JMS)
- Has a proprietary API

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The JMS Facade

- Gives JMS "personality" to the Messaging Core
- Implements the JMS API
- Its inner workings are built in top of JBoss AOP
- Stack of aspects plus a set of services

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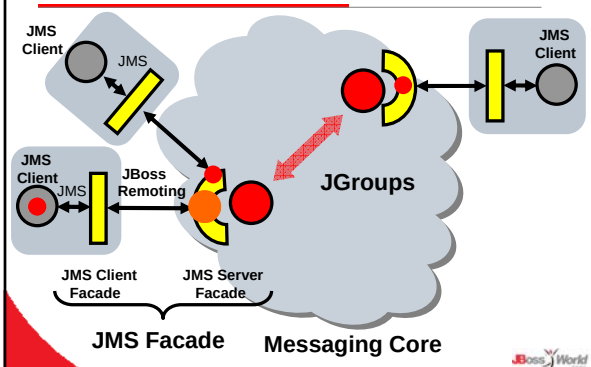
The JMS Facade



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Messaging Core Internals

- The Messaging Core is an aggregation of
  - ✓ Receivers
  - ✓ Channels
  - ✓ Routers

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Receiver

- A Receiver is a the basic message handling component, that

  1) Receives messages for consumption or forwarding
  2) Returns a Delivery object instance for each message it receives

- The receiver then uses the Delivery instance to acknowledge the message, immediately or later
- The sender (implementing DeliveryObserver) hangs on Delivery, and implicitly on message until acknowledgment arrives

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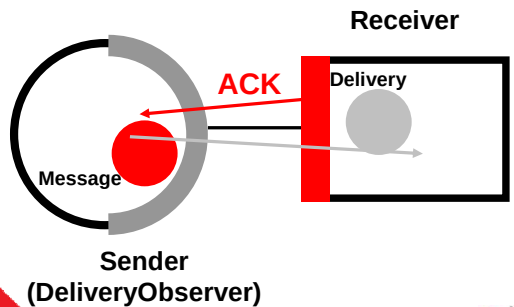
Receiver



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Channels and reliability

- In Core, messages flow from senders to receivers and acknowledgments flow back
- As long as a Delivery's corresponding message is reliably stored, the message IS NOT LOST even if both the sender and the receiver crash
- NOT losing messages is the Channel's job

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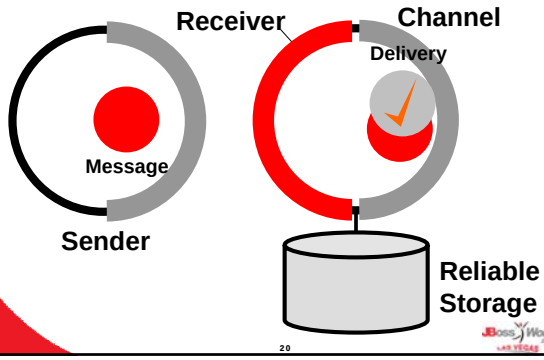
A Reliable Channel, part one



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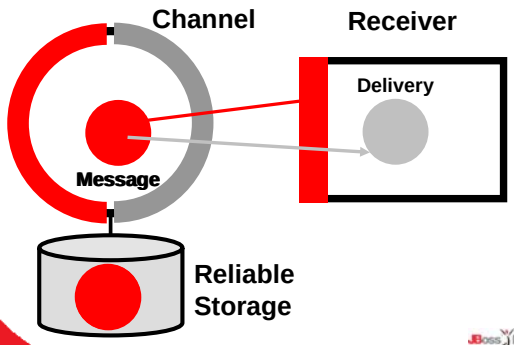
A Reliable Channel, part two



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All together now ...

- Receivers, Channels and Routers are just the basic building blocks
- They are used to assemble more complex structures, as queues and topics ...

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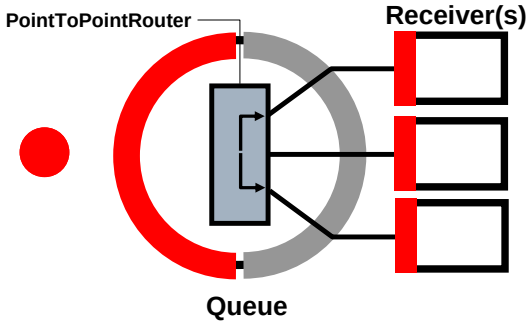
A core Queue



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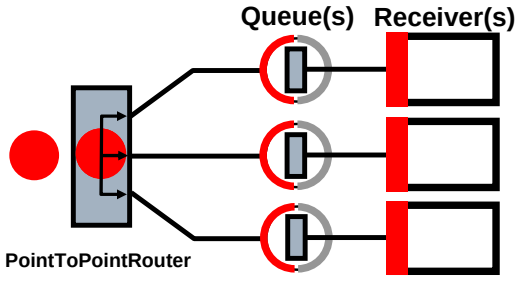
A core Topic



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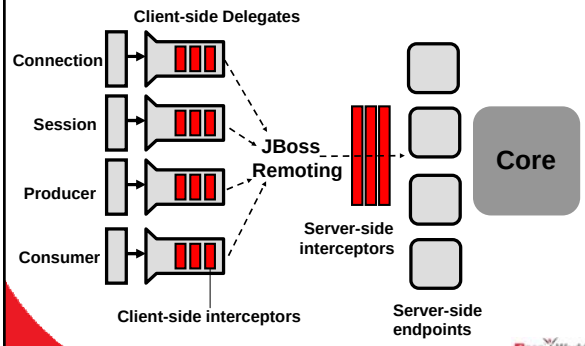
The JMS Facade

- The JMS façade gives the JMS "personality" to the Messaging server
- Other different façades could be implemented
- The current implementation is built in top of the JBossAOP framework
- A client-side and server-side AOP aspect stack plus a set of services (MBeans)

The JMS Façade continued



JBoss Messaging internals

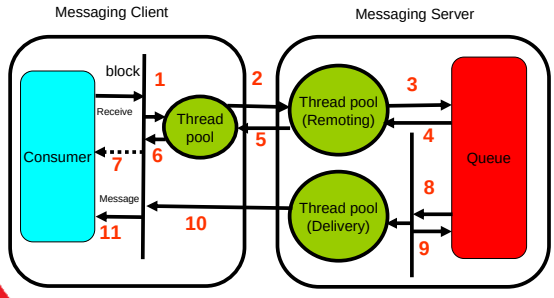
Focus on a few areas of current and soon to be available features

- Threading model
- Transactions
- Persistence
- Serialization and copying
- Large numbers of messages and large messages
- Distributed destinations

Threading

- Threads are a precious commodity
- Minimise threads blocking on server for messages.
- Minimise number of threads used for delivery.

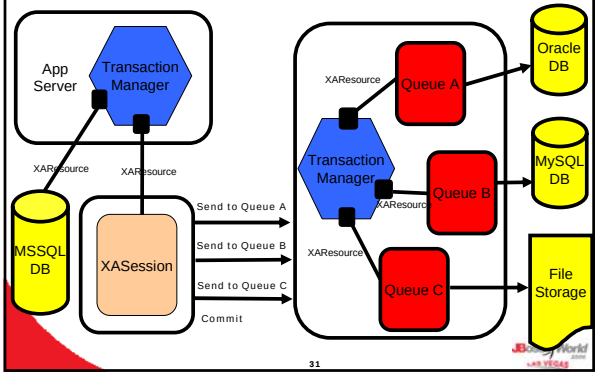
Threading – Message receive



Transactions

- Efficient use of JDBC transactions – batch updates
- JBoss Messaging provides XAResource instances
- Coming soon - Destinations can be enlisted as separate XAResource instances –allowing different stores, allows system to scale.
- Coming soon - with JBoss Transactions will give full XA recoverability
- Coming soon - Separate file based transaction log

Transactions



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Optimized Persistence

- Many persistence optimizations over and above JBoss MQ
- Currently ships with JDBC Persistence support for MSSQL, MySQL, Oracle, Sybase, PostgreSQL, HSQL
- Local file based persistence support on the way – likely to leverage functionality in JBoss Transactions.

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Minimise Serialization and copying

- Serialization is expensive – both in *time* and *space*– keep it to a minimum.
- Don't serialize the whole message in the db.
- Don't serialize across the wire if it can be avoided.
- Minimise copying of messages – in some INVM cases no copying is necessary – passing by reference enables high performance
- Pluggable serialization library

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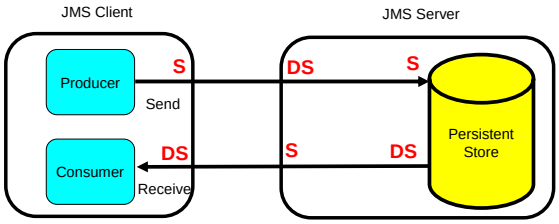
Serialization – the naïve way



S = Serialize, DS = De-serialize

3 x Serialization + 3 x De-serialization

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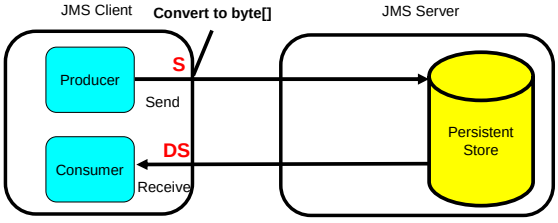
Serialization – a better way



S = Serialize, DS = De-serialize

1 x Serialization + 1 x De-serialization

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Very large queues / subscriptions

- Queues/subs may need to hold many millions of messages.
- Cannot store in memory at once
- Page messages to and from storage as necessary
- JBoss Messaging can handle very large queues
- Coming soon - Support for very large messages – streams, chunks, compression.

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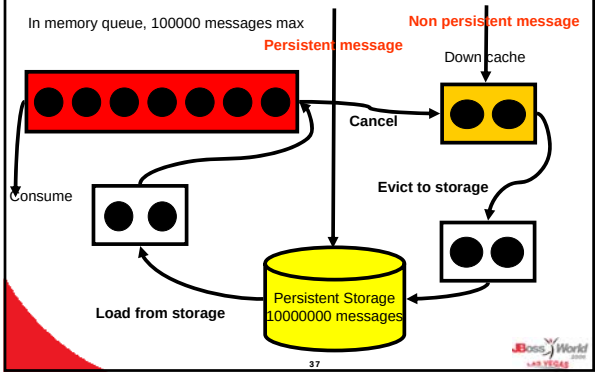
Page-able Queues/subscriptions



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Distributed destinations

- State of the art distributed destinations (unlike some competing products)
- Multiple consumers for the same queue distributed across the cluster
- Multiple consumers for the same durable subscription distributed across the cluster
- Combine with multiple persistent stores then we have a highly scaleable distributed messaging system
- Fully recoverable ACID transactions guaranteed across the cluster

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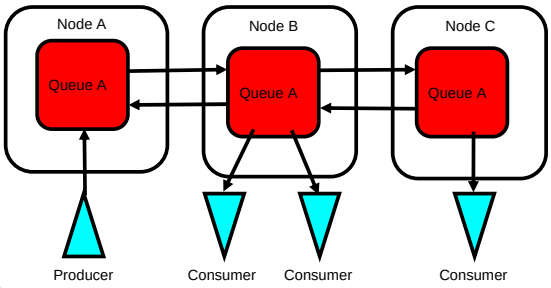
Distributed Queue



Producers and Consumers can connect to any node
Only one consumer will receive the message sent by the producer

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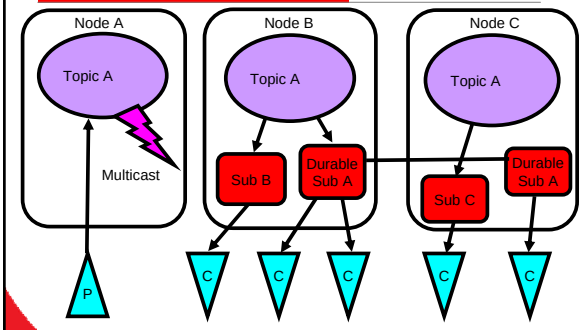
Distributed Topic



Subscriptions on the topic can be spread across the cluster
There can be multiple consumers of the durable subscription on different nodes

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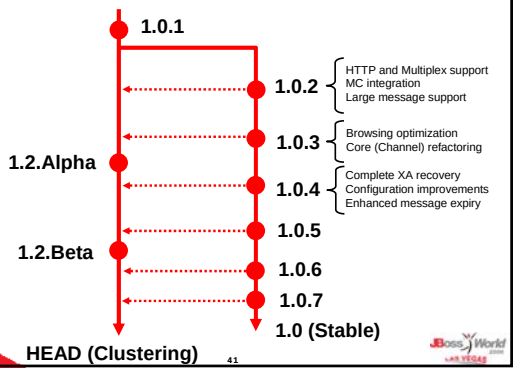
Roadmap



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Q&A

Slide 38

T1 Mention
Tim, 6/9/2006