eGee

Enabling Grids for E-science in Europe

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Messaging and queuing
Common components

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EGEE JRA1 Data Management Cluster

Definition of messaging and queuing

- **JMS functionality is based on IBM MQSeries (now WebSpohereMQ) which has existed for many years ('70) and used by Banks, FI, Military**

- **JMS compliant products enable programs to talk to each other across a network of unlike components - processors, operating systems, subsystems, and communication protocols - using a simple and consistent application programming interface.**
 - **The only open standard for MOM**

Standard features, concepts

- **Asynchronous message-driven processing**

- **Built around queue managers, queues and messages**
- **Application communication never requires name of a target program**
- **Destinations can be local or remote**
- **Can be redefined and relocated**
- **Can be part of (JTS/OTS) transactions with XA compliant databases or other resources**

Standard and special features

- **Assured delivery with persistent messages**
- **Ordered delivery**
- **Grouping of messages**
- **Messages' metadata for special treatment**
- **Messages expiry**
- **Extras:**
  - **Transparent distribution – remote queues**
    - **Queue manager channels**
  - **QMgr Clusters**
  - **Special queues**
  - **Event messages**

Distributed communication
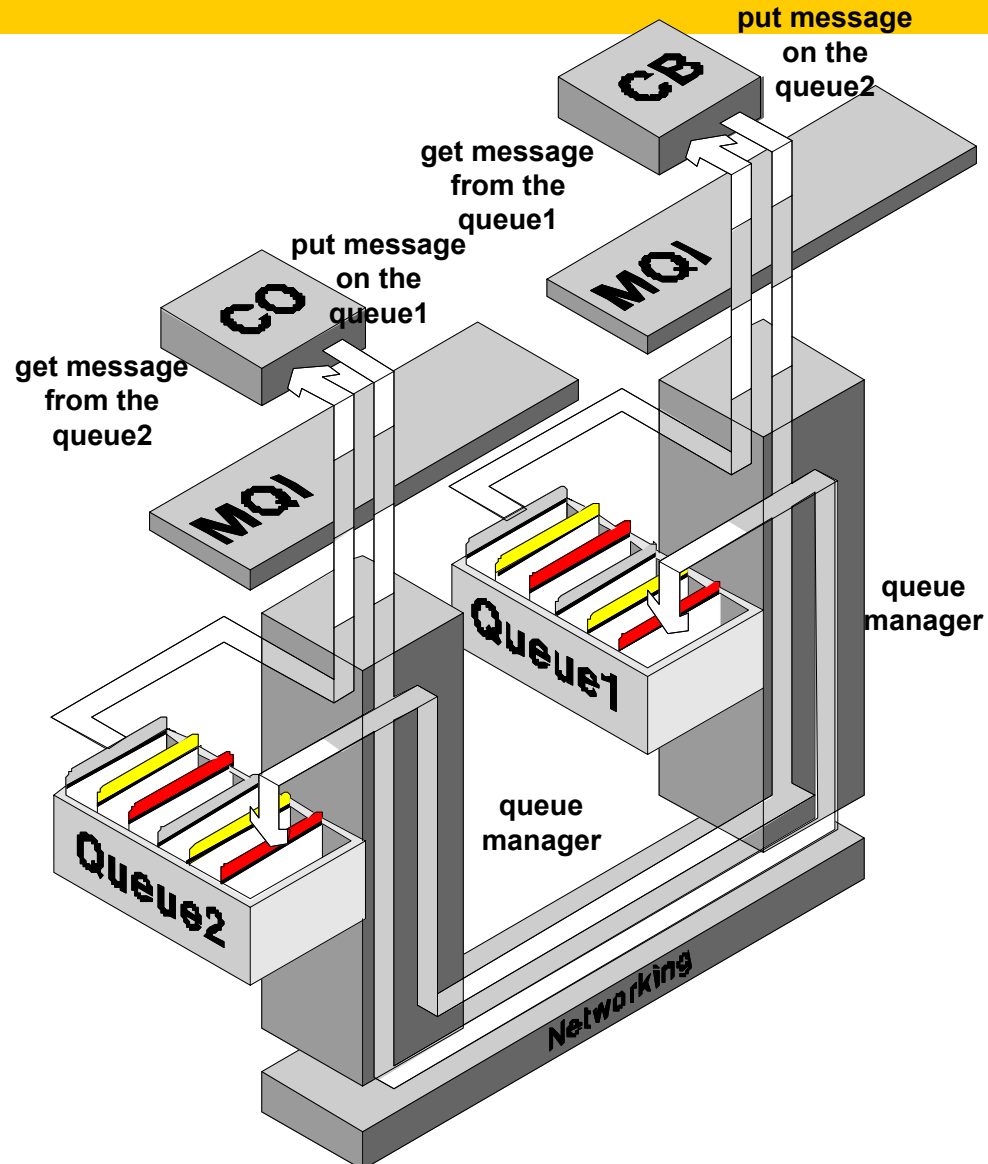
Pic of IBM Corp.

Publish-Subscribe paradigm

- **Topics**
  - **hierarchies**

- **Publish/Subscribe**
  - **Publishers**
  - **Subscribers**
  - **Brokers**
    - **Message transformation**

Topics example

- Subscriptions:
  - Science/*

  - Science/Physics/HEP/*/*/Results
  - Science/Physics/HEP/ Cern*/CMS/Analysis/XGroup

Publish Subscribe examples

- **Users could make contents specific subscriptions, like**
  - `+/Alice/+/ESD_TAGS/filter:E<90 AND runNumber> 1000 AND runNumber<5000 -get all Alice ESDs events (files) with Energy < 90 of runs(1000,5000)`

- **Data Management module could be interested in fetching all the newly created files or tags for a given period for replication of a subset of files created in any of the sites.**

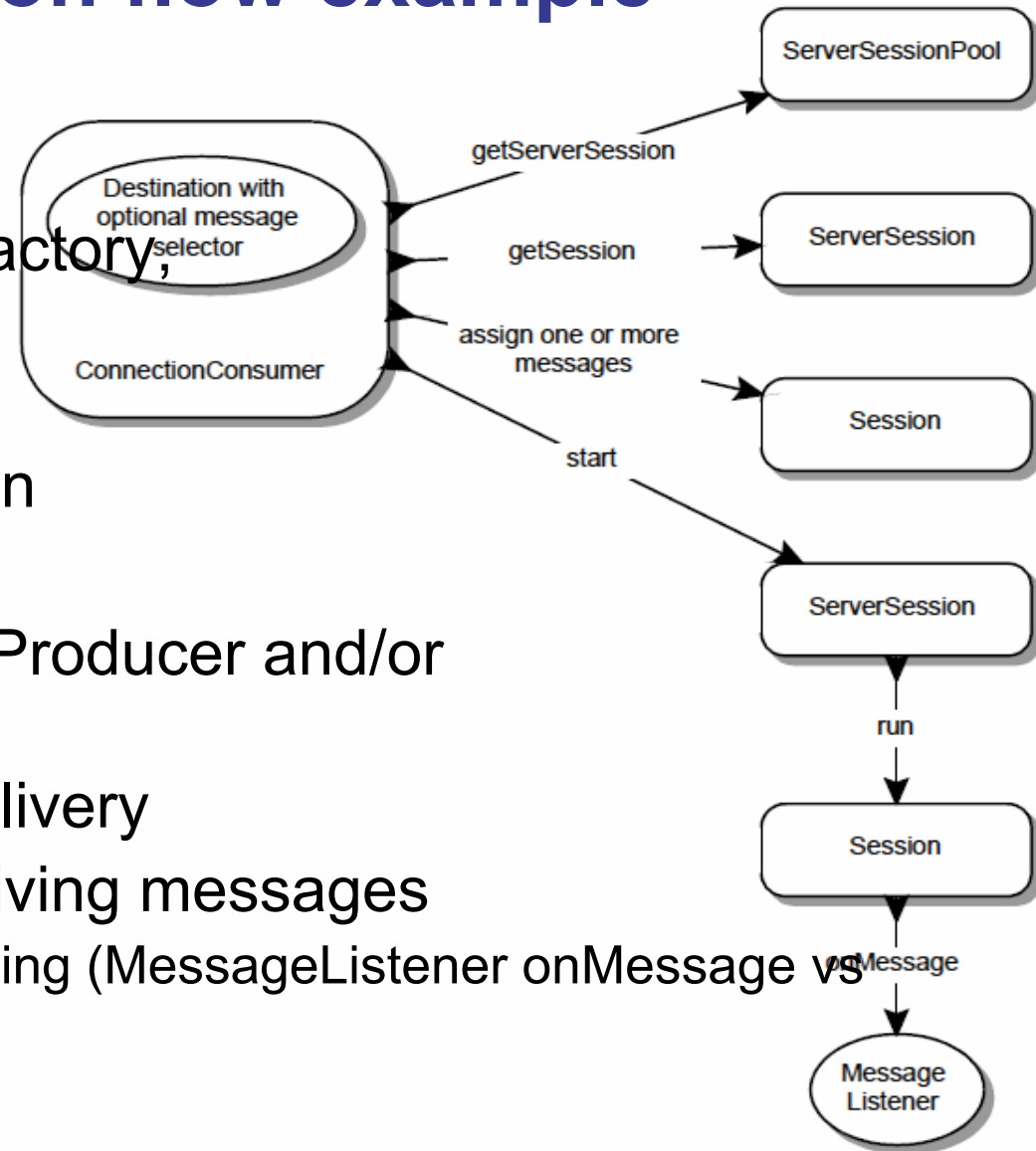 - `+/CMS/+/Files/+/filter:CreationDate in (2003,2009)`

JMS Application flow example

- Typical flow:
  - Getting connection factory, usually using JNDI
  - Getting a destination
  - Creating a connection
  - Creating a session
  - Creating a MessageProducer and/or MessageConsumer
  - Starting message delivery
  - Sending and/or receiving messages
    - async vs. sync receiving (MessageListener onMessage vs receive()

The following diagram illustrates the process a *ConnectionConsumer* uses to deliver a message to a *MessageListener*.

ServerSessionPool

getServerSession

Destination with optional message selector

getSession

ServerSession

ConnectionConsumer

assign one or more messages

Session

start

ServerSession

run

Session

onMessage

Message Listener

What JMS lacks

- **Standard way of dealing with:**
  - **Administration**
  - **Load balancing**
  - **Fault Tolerance**
  - **Standardised system errors/hints/warning notifications**
  - **Security**
  - **Wire protocol**
  - **Storage**

Implementations

- Free:
  - NaradaBrokering
  - OpenJMS
  - Joram

- Commercial
  - WebSphereMQ
  - SonicMQ
  - MSMQ
  - OracleAQ
  - …

MOM in EGEE?

- Deployment issues
- Language issues
- Integration with WS issues
    - SOAP-over-mq
    - WS-ReliableMessaging