The J2EE™ Platform Connector Architecture 1.0

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Agenda

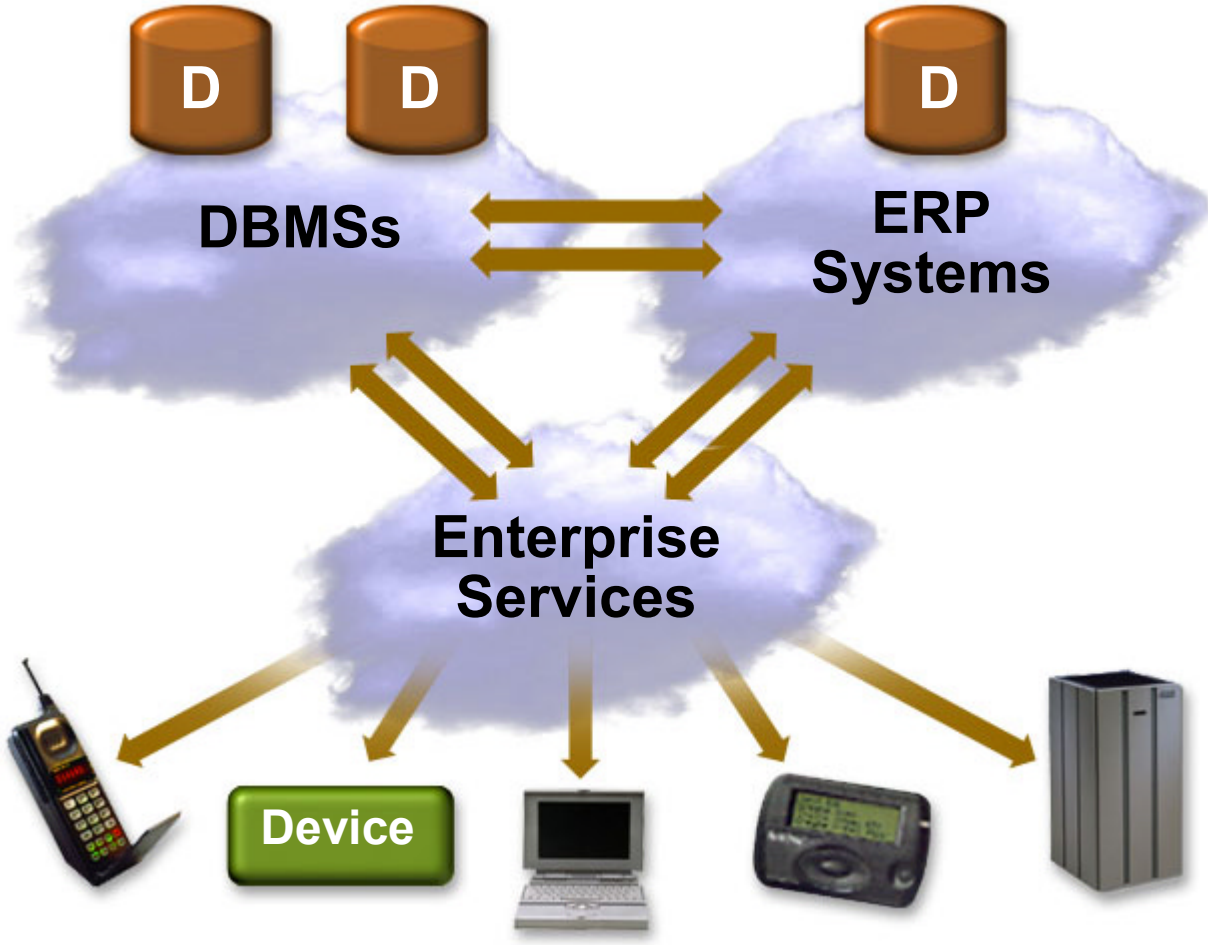
- Overview
- Technical details of Connector Architecture
- Status and roadmap
- Q&A

Enterprise Applications

EIS Tier

Middle Tiers

Clients



EIS Integration

- Key issues in EIS integration
  - Heterogeneous and complex EISs
  - Ease of integration and application development
  - Tools
  - Transactions and security
  - Scalability
- Connector Architecture addresses this under the scope of the J2EE 1.3 platform

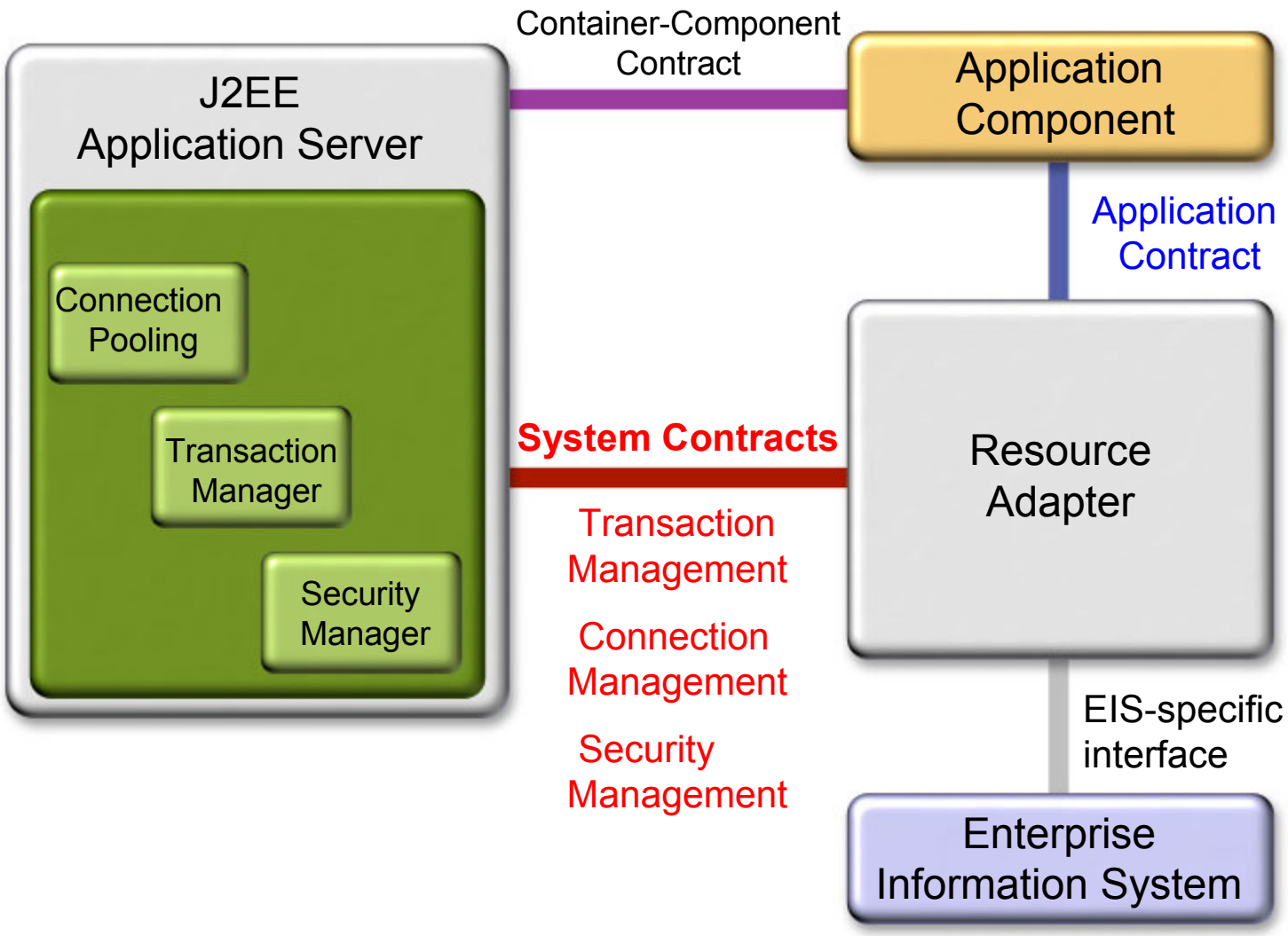
J2EE™ Platform

- The J2EE platform provides:
  - Faster solution delivery time to market
  - Re-usable components
  - Write Once, Run Anywhere™
  - Huge Industry Support
- Connector architecture adds:
  - Easy EIS connectivity
  - Enterprise Application Integration

Connector Architecture

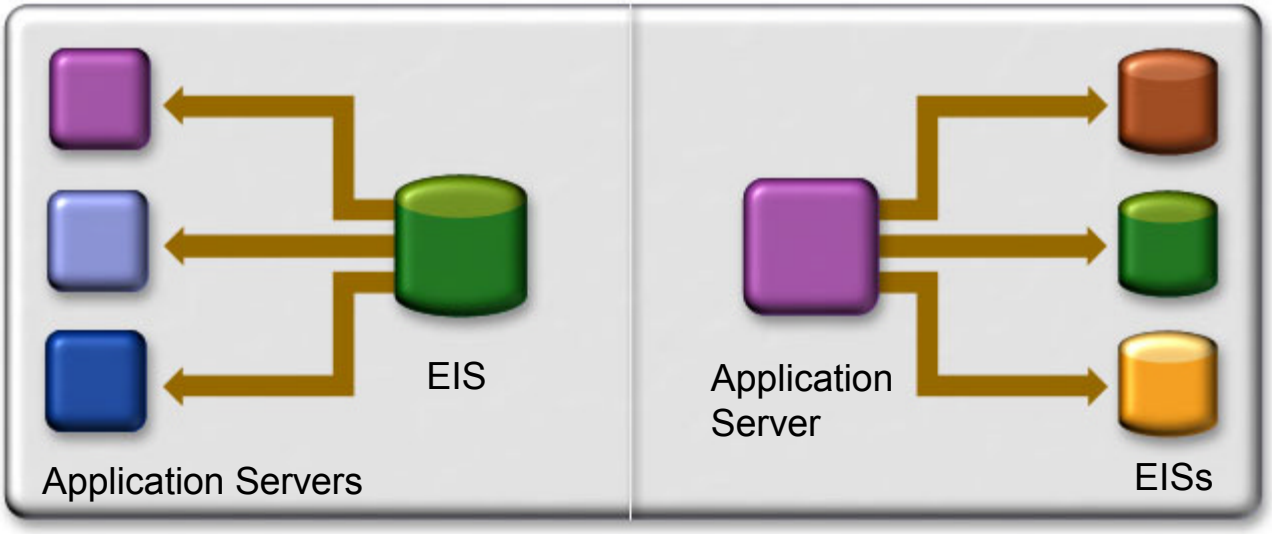
- Standard architecture for EIS integration
- Targeted EISs under 1.0:
  - ERP systems
  - Mainframe transaction processing systems
  - Non-Java legacy applications
  - Database systems
- Defined through the Java Community Process℠ initiative

High Level Architecture



Value Proposition

- Reduces scope from *m* x *n* to *m* + *n*



- Simplifies application development
- Provides scalable, secure and transactional integration

System Contracts

- System Contracts specified in 1.0:
  - Connection management
  - Transaction management
  - Security management
- Proposed enhancements in later versions:
  - Thread management
  - JMS pluggability

Connection Management Contract

- Supports connection management
  - Connection pooling
  - Configuration of connection factory
  - Creation of connection
  - Matching of pooled connections
- Enables application server to provide Quality of Services (QoS)

Transaction Management

- Local Transaction
  - Managed internally by an EIS resource manager
- XA Transaction
  - Spans across multiple EIS resource managers
  - Requires transaction coordination by an external Transaction Manager
    - Two-phase commit (2PC)
    - One-phase commit (1PC) optimization

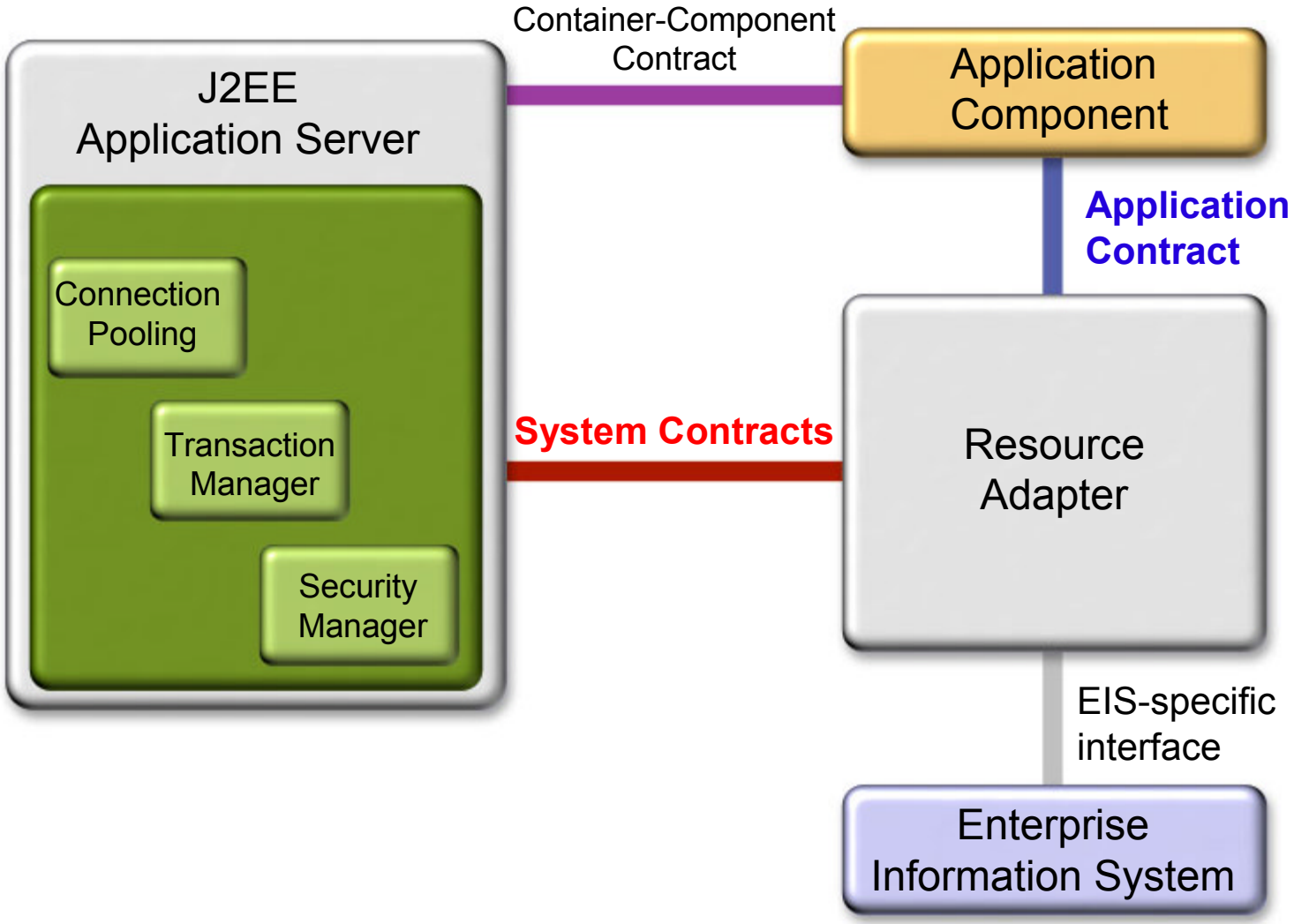
Transaction Management Contract

- Resource Manager (RM) can be:
  - Non-transactional
  - Local transaction only
  - Local and XA transaction
- Resource Adapter implements:
  - LocalTransaction interface
  - JTA XAResource interface
- Application server required to support all three transaction levels

Security Management

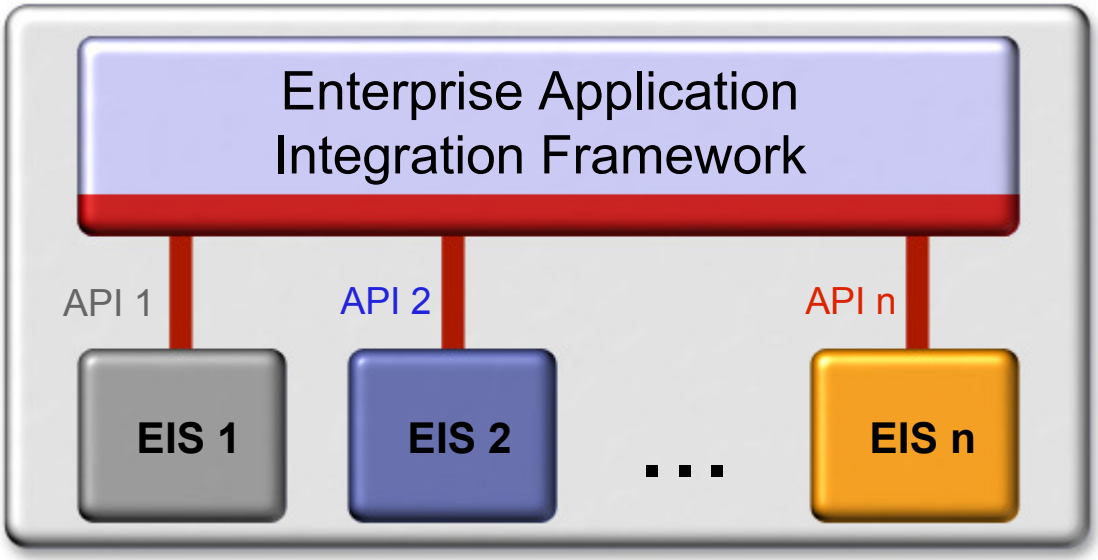
- Extends the J2EE platform security model for secure EIS connectivity
- Security mechanism and technology independent:
  - Basic user-password mechanism
  - Kerberos v5
  - EIS specific security mechanism

Common Client Interface



Rationale for CCI

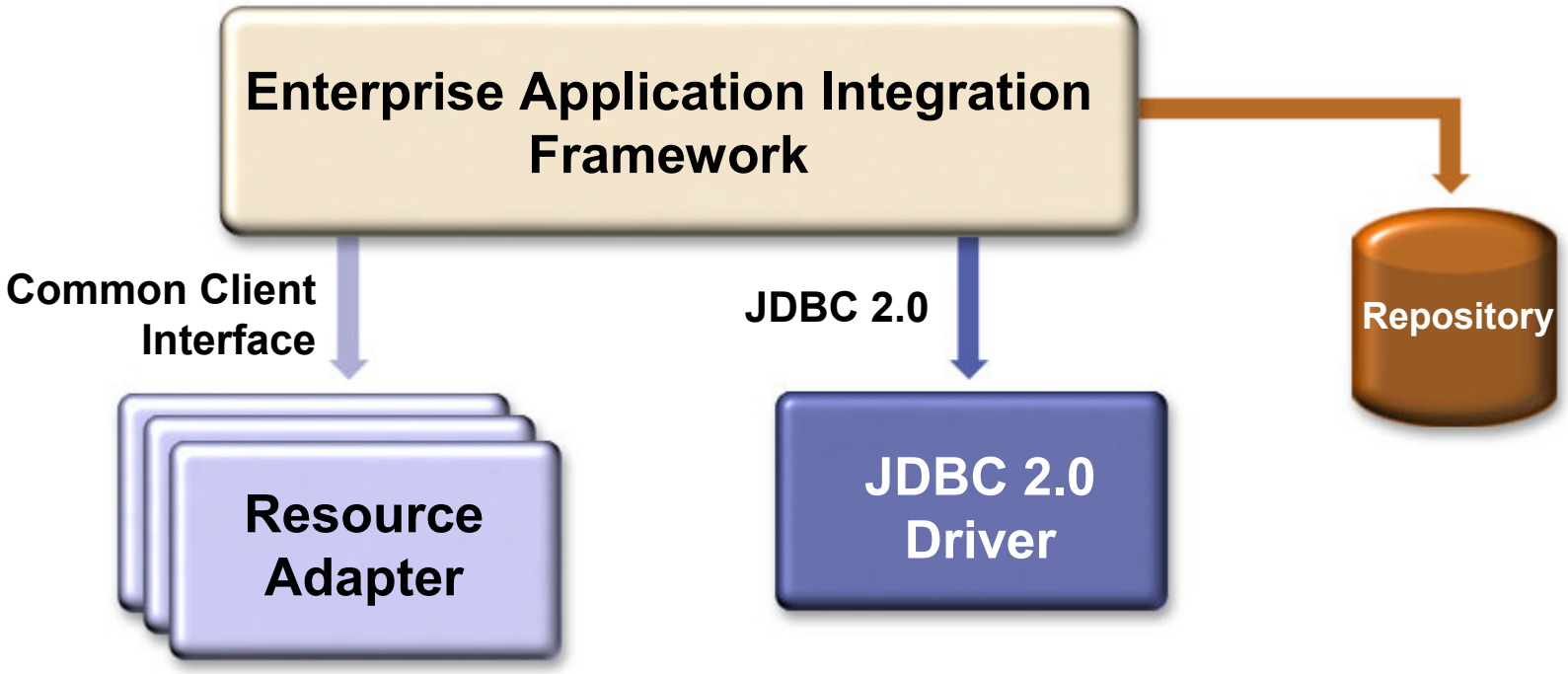
- Problem for development tools and EAI frameworks:
  - EISs support different client APIs
  - Need for adapting client APIs
- CCI solves this problem



Overview of CCI

- Provides simple remote-function call API
- Focuses on toolability
- Leverages JavaBeans™ architecture-based components and Collections
- Targets EAI and application development tools
- Recommended for resource adapters in version 1.0

Scenario: EAI Framework



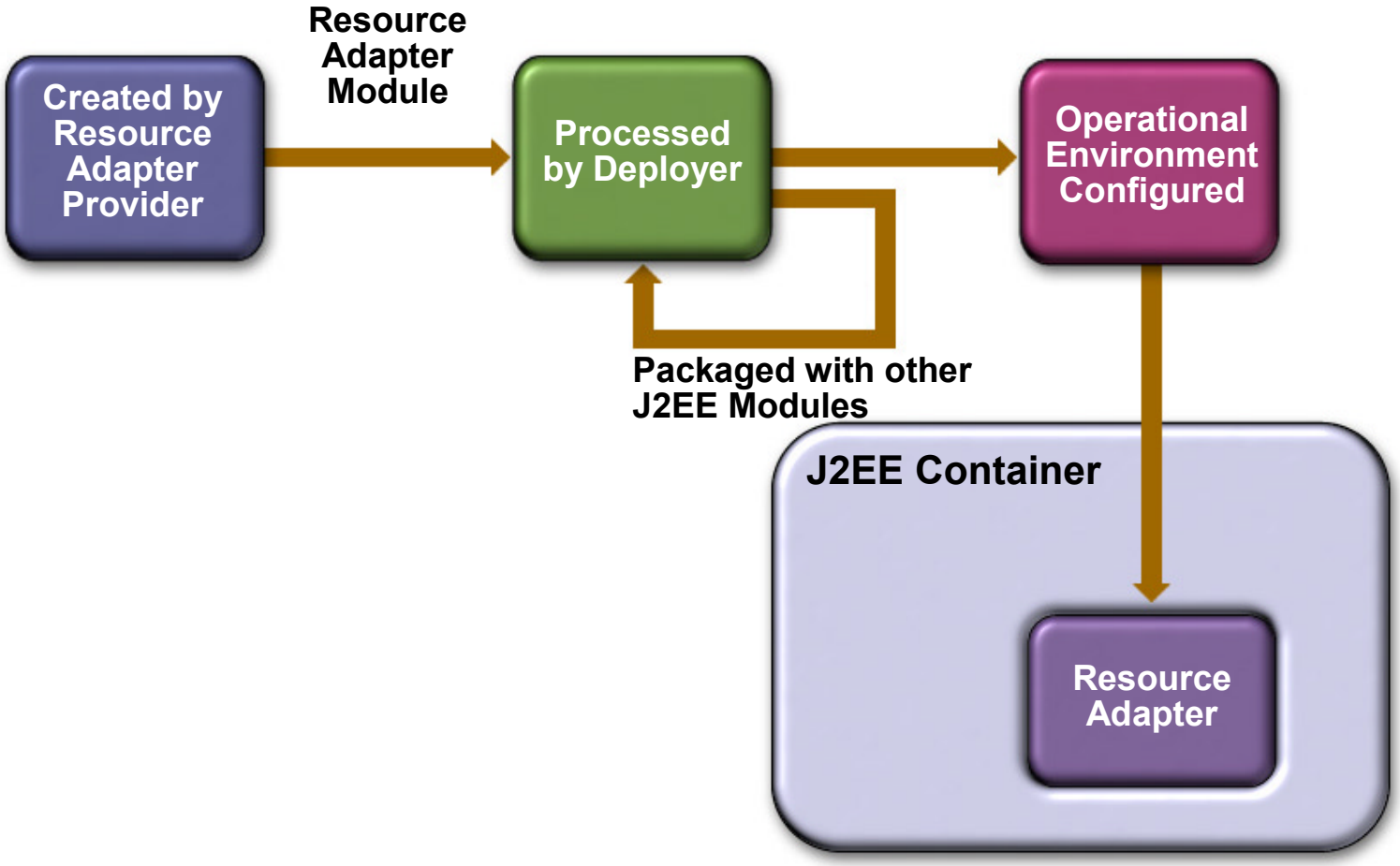
Scenario: CCI Usage

```
// Get a Connection
javax.naming.Context nc = new InitialContext();
ConnectionFactory cf =
   (ConnectionFactory)nc.lookup("...");
Connection cx = cf.getConnection();

// Create an Interaction
Interaction ix = cx.createInteraction();

// Create input and output Record
RecordFactory rf = //.. get a RecordFactory
MappedRecord input = rf.createMappedRecord("...");
IndexedRecord output =  rf.createIndexedRecord("...");

// Create/get an InteractionSpec
InteractionSpec ixSpec = // ...
ixSpec.setFunctionName("<NAME-OF-EIS-FUNCTION>");

// Execute the Interaction
boolean ret = ix.execute(ixSpec, input, output);
```

Packaging of Resource Adapter

- Standard packaging format for resource adapter
  - Packaged as JAR
  - Equivalent to "J2EE module"
- XML based deployment descriptor
  - General information
  - Configurable properties
  - Transaction support level
  - Security related configuration

Deployment of Resource Adapter



Status and Roadmap

- Defined through Java Community Process initiative
- Release Schedule:
  - Public draft 1: Released 06/2000
  - Proposed Final Draft 1: Released 10/2000
  - Final release: Q2 CY-2001
- Connector.next process initiation
  - Targeted for 02/2001

Reference Implementation and CTS

- J2EE™ RI with Connector support:
  - Early access released in 10/2000
  - Beta release J2EE 1.3 RI: Q1-2001
  - Subsequent RI and CTS releases tied with the J2EE 1.3 platform
- Connector related J2EE RI features:
  - System contracts on container side
  - Packaging and deployment
  - CCI-based sample resource adapter

Connectors 2.0

- Proposed features:
  - Asynchronous resource adapters
  - JMS Pluggability
  - XML support in application contract
  - Metadata support
- Schedule for 2.0:
  - JSR targeted for 02/2001
  - Call for experts

Industry Support

- Part of the J2EE 1.3 platform
- Expert group for Connectors 1.0:
  - BEA, Fujitsu, IBM, Inline, Inprise, iPlanet, Motorola, Oracle, SAP, Sun, Sybase, Tibco, Unisys
- Huge Java™ technology community interest:
  - Successful early access release
  - Strong support for resource adapter providers

Advantages of Architecture

- Application developers
- Application server providers
- Enterprise Information system vendors
- Application development tools provider
- Enterprise application integration (EAI) vendors
- Third-party ISVs

Pointers and References

- Web resources:
  - http://java.sun.com/j2ee/
  - http://java.sun.com/j2ee/connector/
- Spec lead: rahuls@eng.sun.com

Java Message Service (JMS) 1.0

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Agenda

- Overview of the Java™ Message Service API (JMS)
- JMS Reference Implementation
- Preview of J2EE™ platform-based component messaging
- Future considerations

What Is the JMS API?

- A common Java™ platform API for creating, sending, receiving and reading messages
- Enables communication that is
  - Loosely coupled
  - Reliable
  - Asynchronous
- Designed by Sun and partners
- Released 11/1999

JMS API Objectives

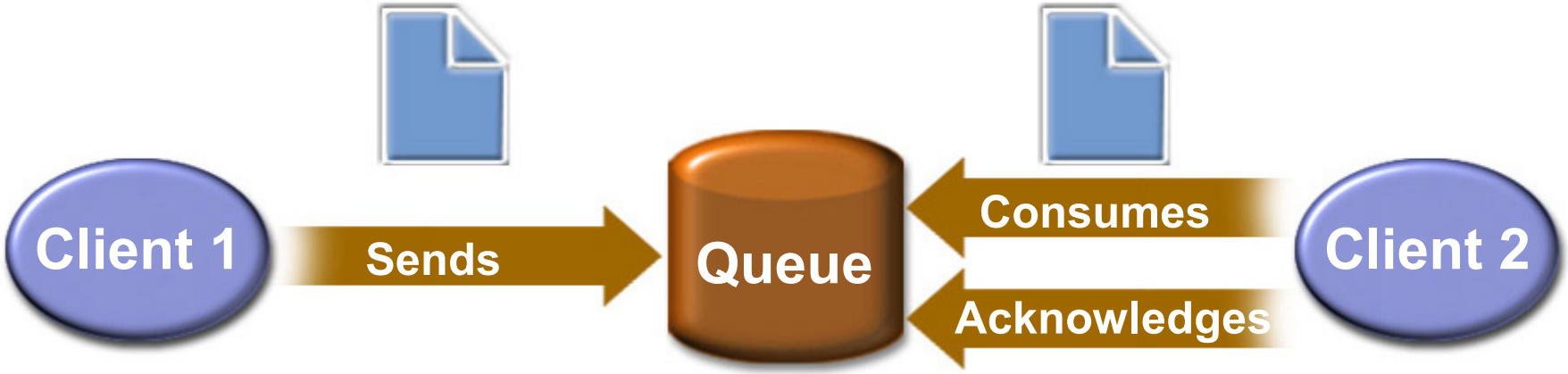
- Capable of mapping to existing Message Oriented Middleware (MOM) systems
- Enough functionality to support sophisticated messaging applications
- Enable the development of efficient JMS Providers
- Allow portability of a new JMS application across JMS products in same message domain

JMS Functionality

- Two messaging domains
  - Point-to-Point (Reliable Queue)
  - Publish/Subscribe
- Message delivery
  - Synchronous or asynchronous
  - Reliability provided by acknowledgements
- Message selectors
- Transactions
- Choice of five Message types

Point-to-Point Messaging

- Only one consumer of queue message
- No timing dependencies between sender and receiver



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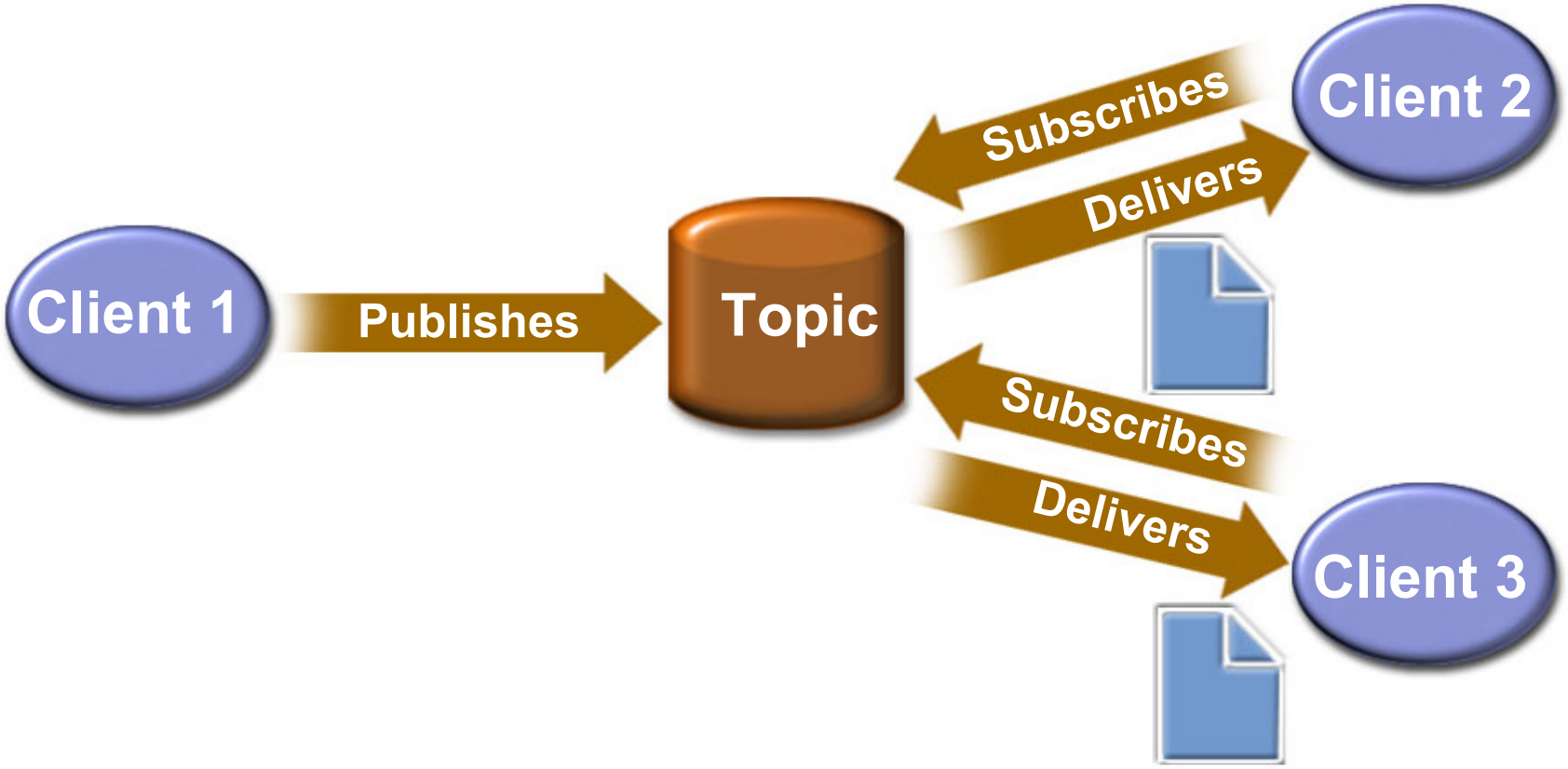
Publish/Subscribe Messaging

- Broadcast message to all subscribers



Vendor Implementations

- See website: http://java.sun.com/products/jms/vendors.html
- 13 implementations of JMS API:

(Note: Listing by vendor request, not all-inclusive)

BEA Systems, Inc.	Fiorano Software, Inc.
IBM	objectCube, Inc.
Oracle Corporation	Orion
Progress Software	Saga Software, Inc.
Softwired, Inc	SpiritSoft, Inc.
Sun Java Message Queue	
Valto Systems	Venue Software

JMS Within the J2EE™ Platform

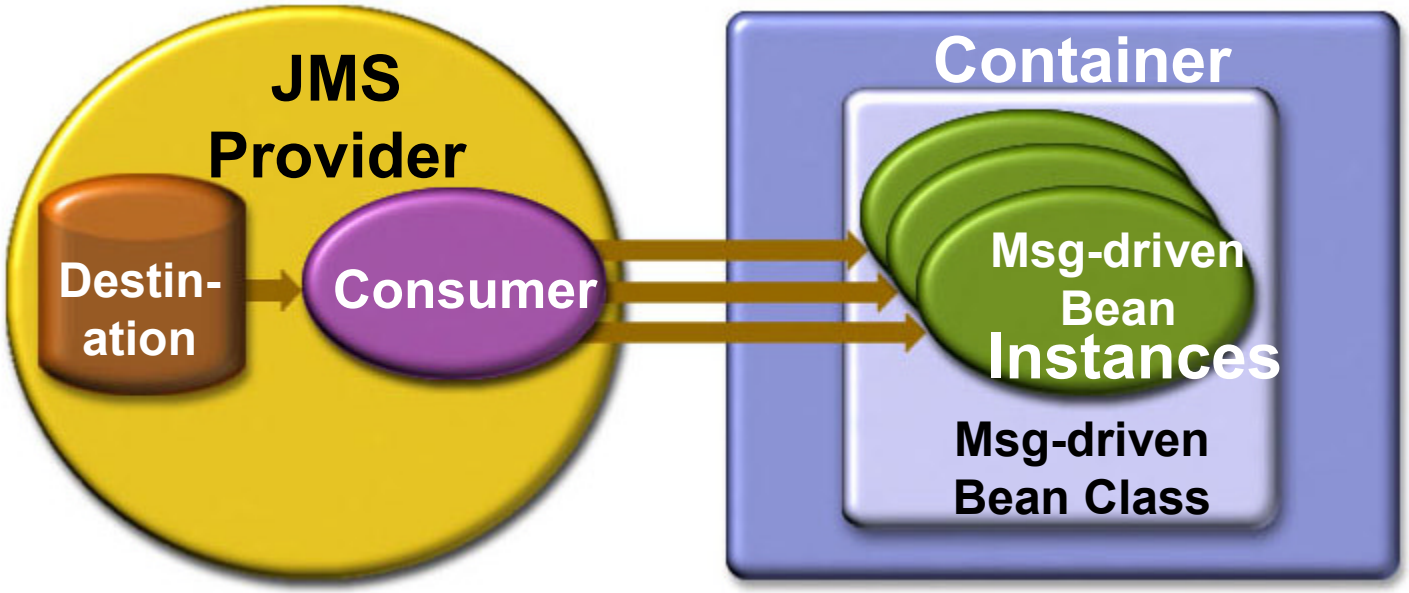
- Enables J2EE components to
  - Interact via first class distributed computing paradigm of message passing
  - Interact with message-enabled legacy systems
- Uses an open standard API
  - Will allow freedom of choice among JMS Providers

Accessing JMS From an EJB™ Architecture-Based Component ("EJB Component")

- Any EJB component type can send or synchronously receive a message
- Message-driven Bean enables asynchronous invocation mechanism
- Msg send and receive can participate in JTA transaction
- Described in the EJB 2.0 specification

Goals of Message-Driven Bean

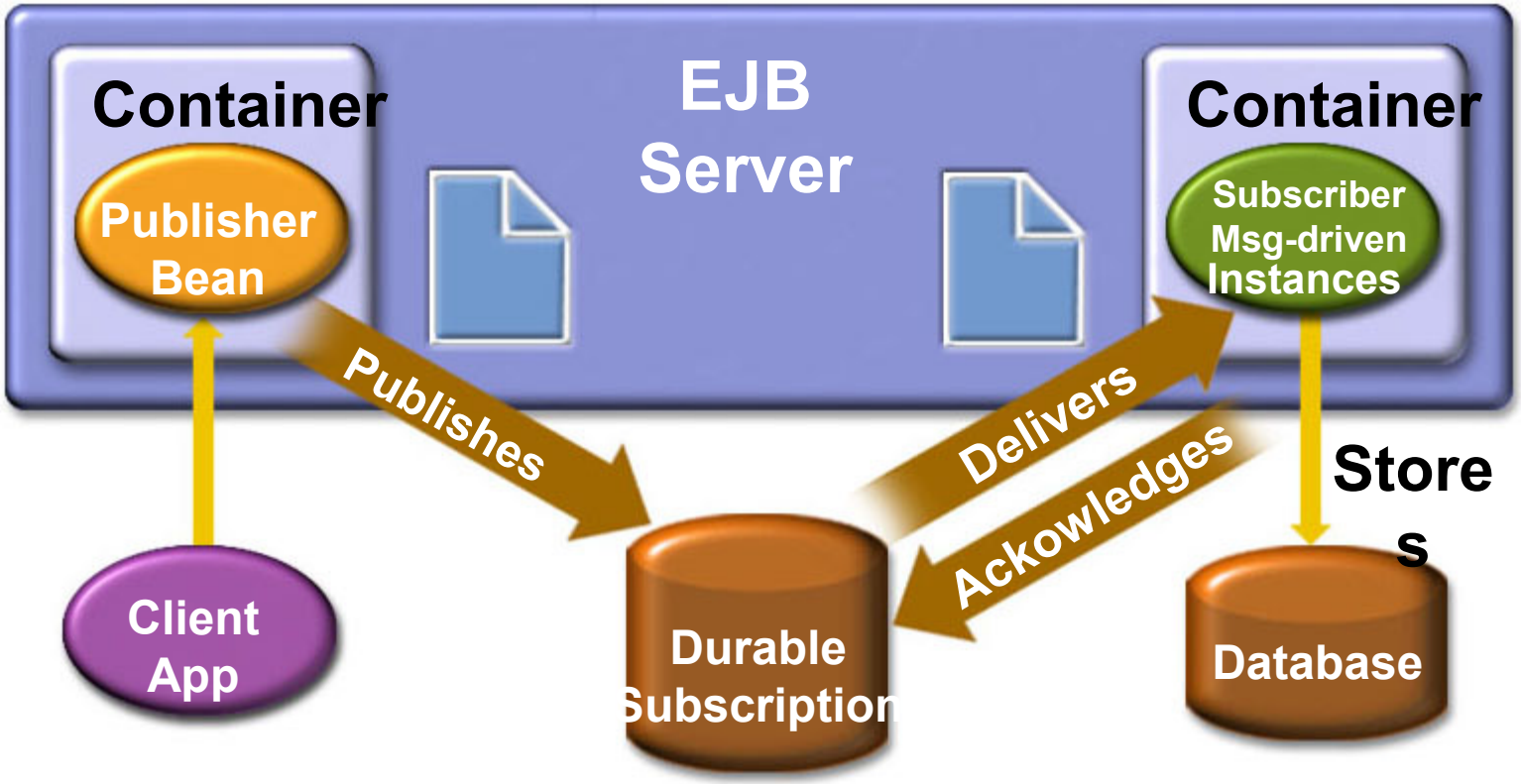
- As simple to write as any other JMS MessageListener
- Allow for asynchronous concurrent message consumption



Message-Driven Bean Instance

- Executes on receipt of a JMS message
- Shares the following characteristics of stateless session bean
  - Can be transaction-aware
  - May update shared data in an underlying database
  - Is stateless and relatively short-lived
  - Notable difference:
    No home or remote interface

Overview of EJB Architecture Messaging Source Code Example



Code for Publisher Bean

```
import javax.ejb.*;
import javax.naming.*;
import javax.jms.*;

public class PublisherEJB implements SessionBean {
 TopicConnection tconn = null;
 Topic topic = null;

 // Cache lookup of JMS Connection and Destination
 public void ejbCreate() throws RemoteException {
  Context ctx = new InitialContext("java:comp/env");
  topic = (Topic)ctx.lookup("jms/MyTopic");
  TopicConnectionFactorry tcfac = (TopicConnectionFactory)
           ctx.lookup("jms/MyTopicConnectionFactory");
   tconn = tcfac.createTopicConnection();
 }

 // Release JMS connection
 public void ejbRemove() throws RemoteException {
  if (tconn != null) tconn.close();
 }
```

Code for Publisher Bean (Cont.)

```
/**
 * Publishes a message to a topic.
 */
public void publishNews() throws EJBException {

  // Create JMS context to publish message to topic
     TopicSession  tsess = tconn.createTopicSession(true, 0);
     TopicPublisher  tpub  = tsess.createPublisher(topic);

  // Create and send message
     TextMessage message = tsess.createTextMessage("News
 item");
     tpub.publish(message);

  // Release JMS resources
  tsess.close();
   }
 }
```

Code for Message—Driven Bean

```
public class SubscriberMsgBean implements MessageDrivenBean {

  < define ejbCreate(), ejbRemove() and
    setMessageDrivenContext(MessageDrivenContext mdc) >

  /* Message acknowledge and database update participate
   * in distributed txn.
   */
  public void onMessage(Message inMessage) {
    TextMessage msg = (TextMessage) inMessage;

    try {
      < look up JDBC database >
      < store info from message in database >
    } catch(Exception e) {
      e.printStackTrace();
    }
  }
}
```

Benefits of JMS Within an EJB Component

- Simplify enterprise development with
  - Loosely coupled, reliable, asynchronous interactions between EJBs and other components
  - Ease of extensibility of business events
    - Add a new message-driven bean to introduce new business logic for existing business events
- JMS functionality enhanced by EJB container architecture
  - Distributed transaction support
  - Concurrent consumption of messages

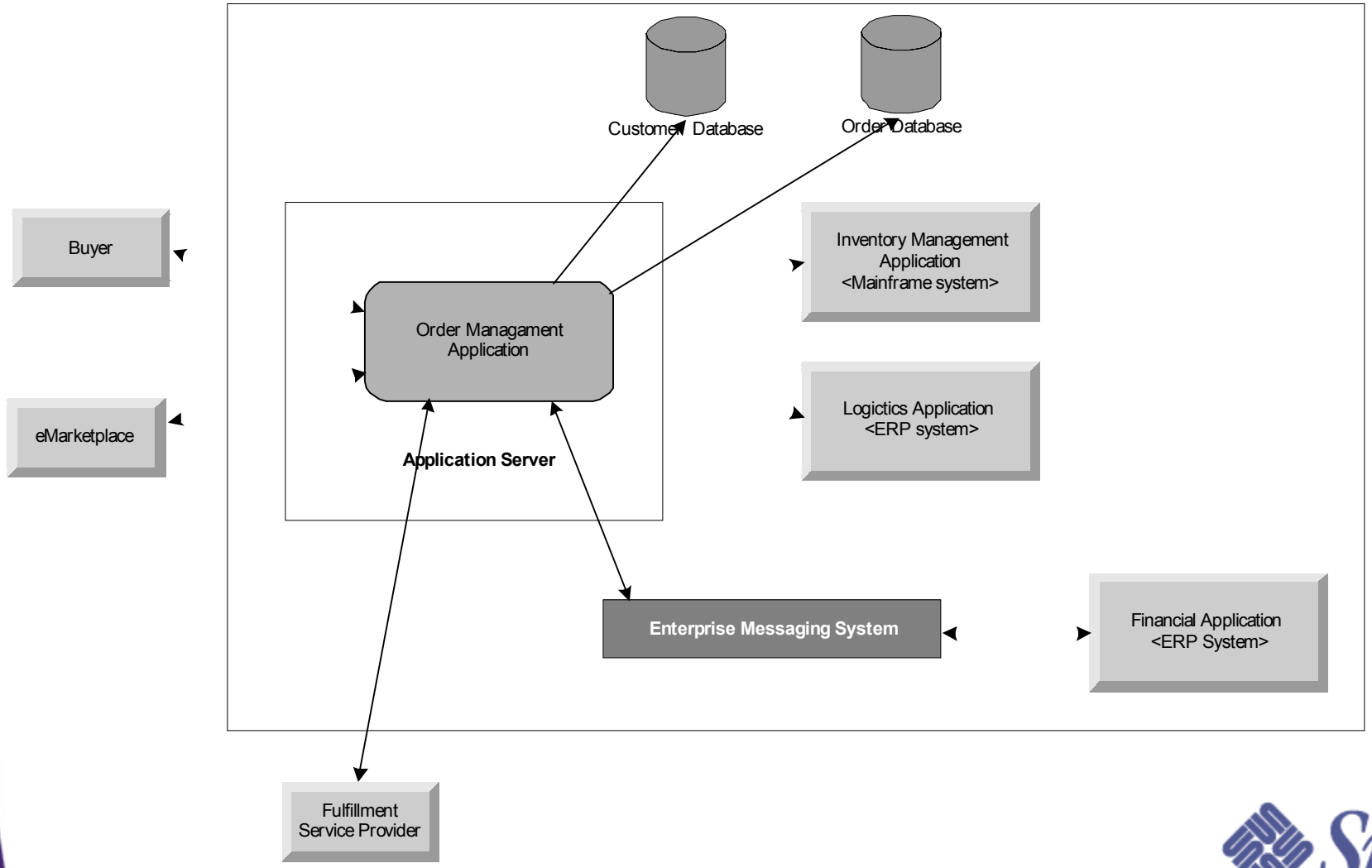
Conclusions

- The J2EE™ platform is ideal for enterprise development
- The Java™ Message Service API (JMS) enables asynchronous, loosely coupled, reliable communication among clients
- JMS adds messaging paradigm to J2EE platform
- J2EE container architecture enhances JMS functionality

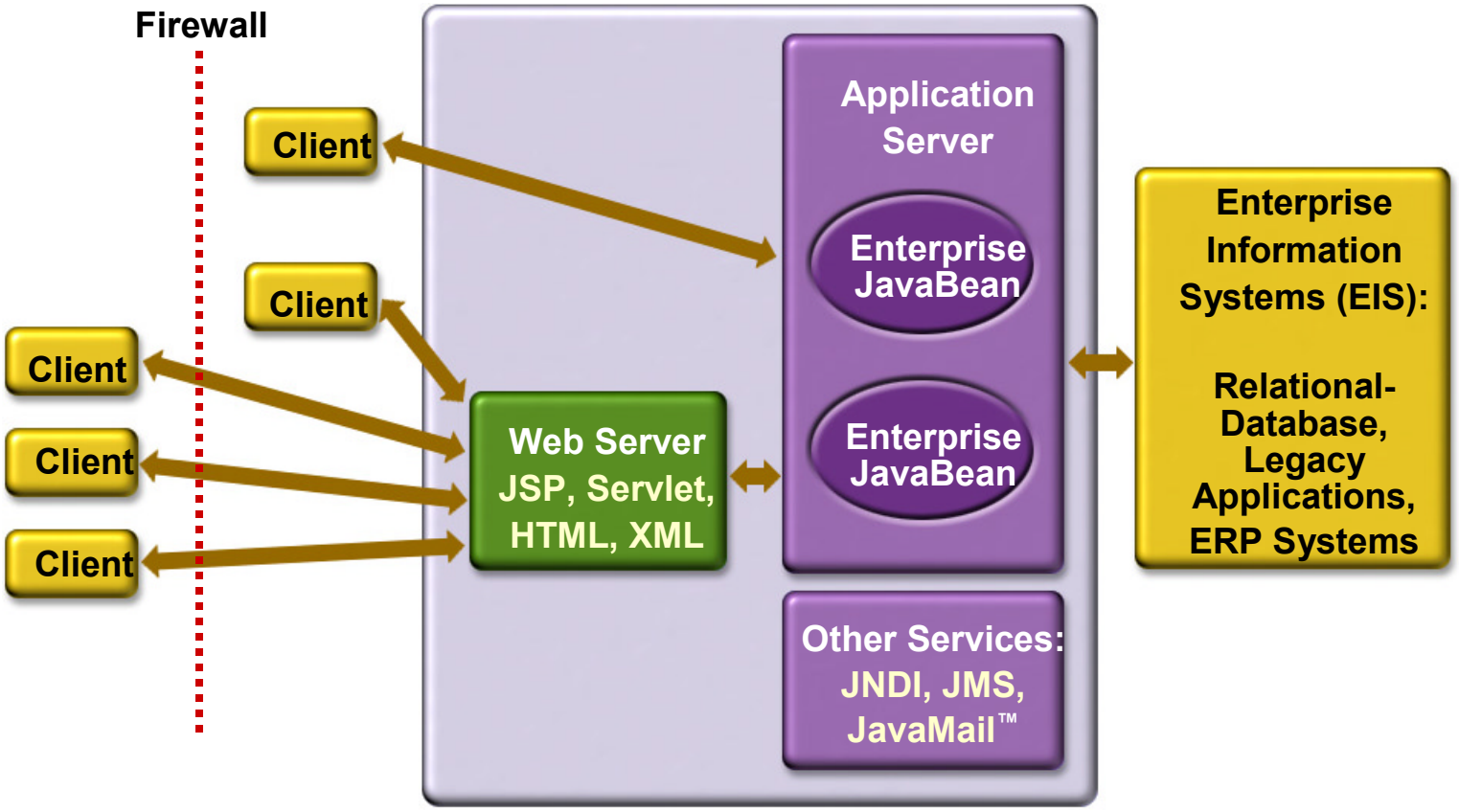
More Information

- Web sites
  - JMS: http://java.sun.com/products/jms
  - J2EE: http://java.sun.com/products/j2ee
- Mailing list
  - jms-interest@java.sun.com
    - Join at http://archives.java.sun.com

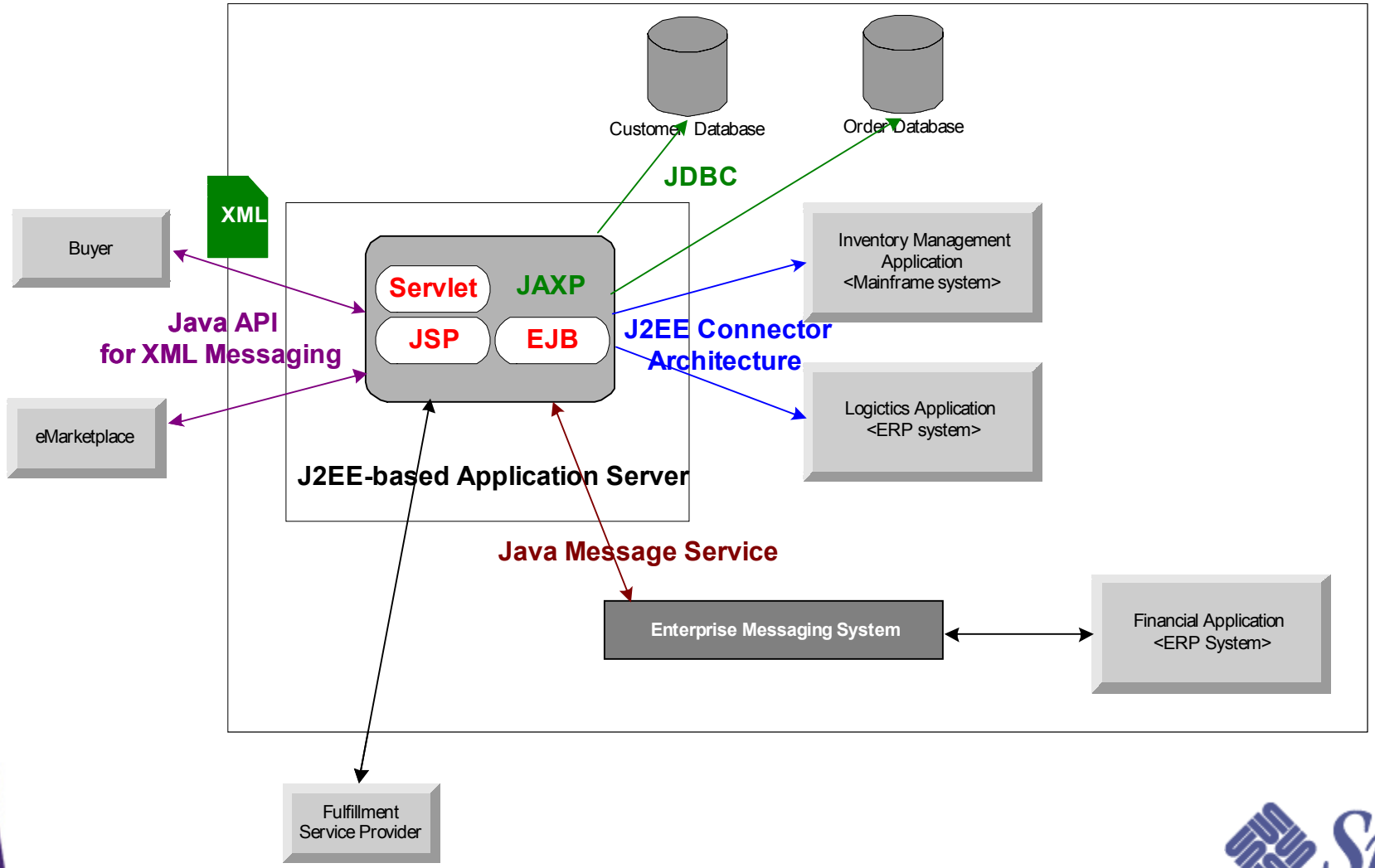
EAI Scenario



The J2EE™ Platform



Using J2EE


Customer Database
Order Database
JDBC
XML
Buyer
Servlet
JAXP
JSP
EJB
Java API
for XML Messaging
J2EE Connector
Architecture
Inventory Management
Application
<Mainframe system>
Logictics Application
<ERP system>
eMarketplace
J2EE-based Application Server
Java Message Service
Enterprise Messaging System
Financial Application
<ERP System>
Fulfillment
Service Provider