Open Source Enterprise Service Bus Platforms

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Agenda

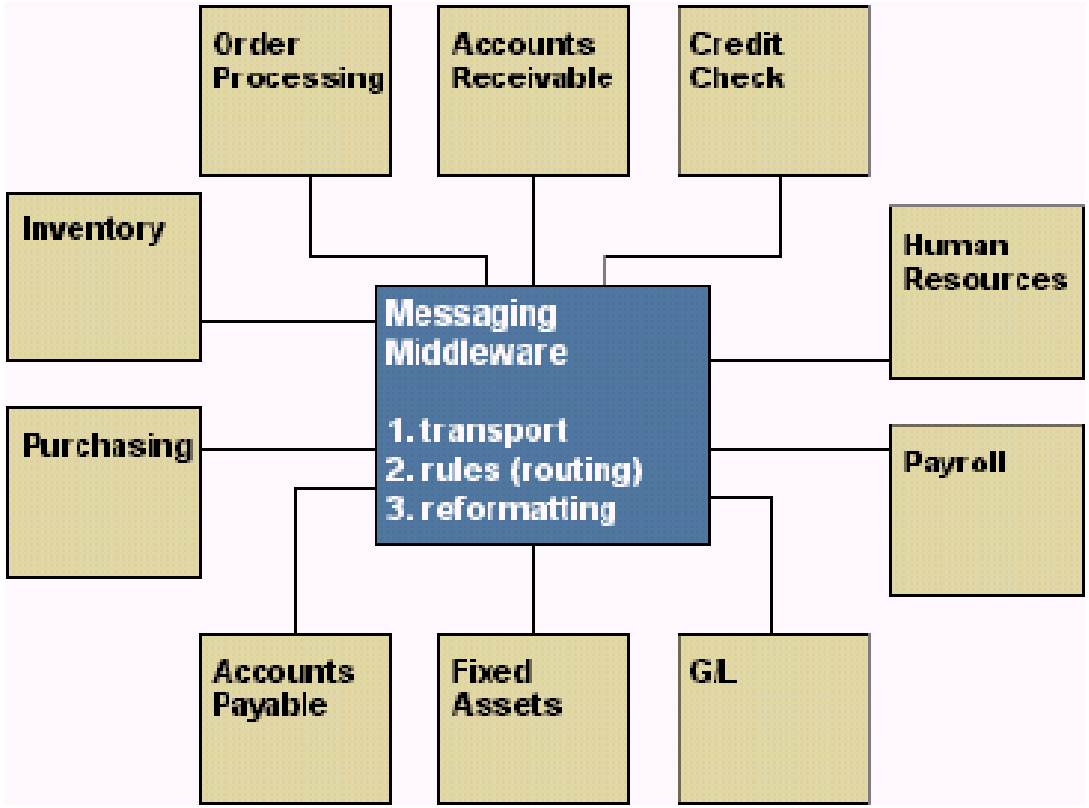
- Introduction to EAI & SOA
- What is an ESB?
- Java Business Integration (JBI)
- Open Source ESB Solutions
- Conclusion

Background & Domain

- Typical scenario in large enterprises:
  - Hundreds or thousands of applications:
    - Custom built
    - Third party
    - Legacy Systems
- Applications should be able to communicate with each other
- Traditional Solution: Messaging Middleware

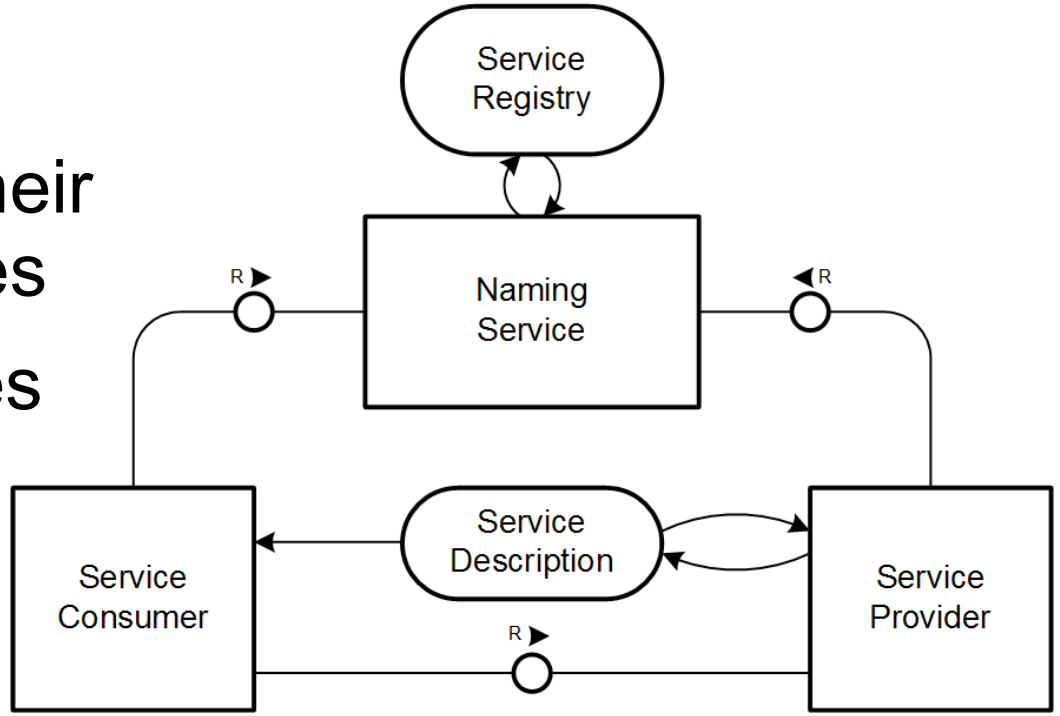
Message-Oriented Middleware (MOM)

- Message Queuing Systems
- Applications connected to a central Message-Broker
- Messages stored in a queue
- Routes messages to the appropriate destinations
- Reformats data if necessary



Service-Oriented Architecture (SOA)

- Architecture concept:
  - Applications provide their functionality as services
  - Standardized interfaces
  - Services used by other applications

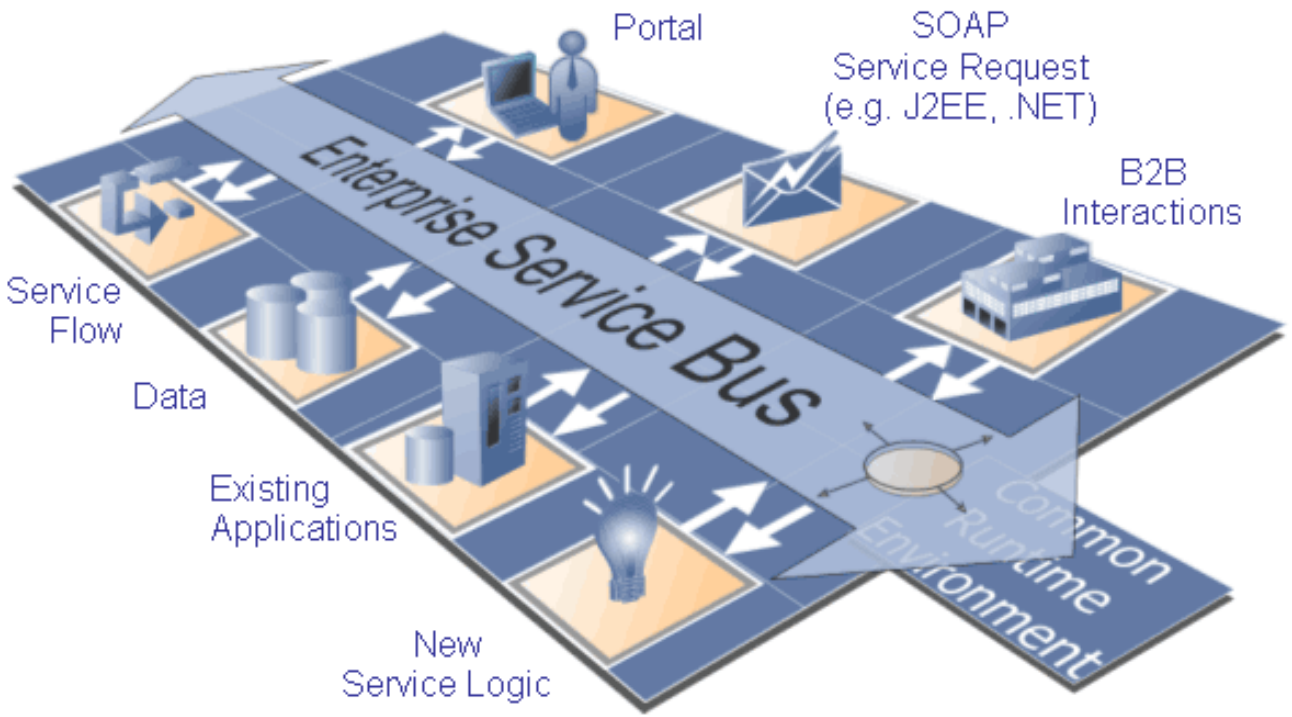


- Complex business processes implemented through combination of services (Orchestration)

What is an ESB?

An infrastructure backbone to...

- implement Service-Oriented Architecture
- realize application integration scenarios

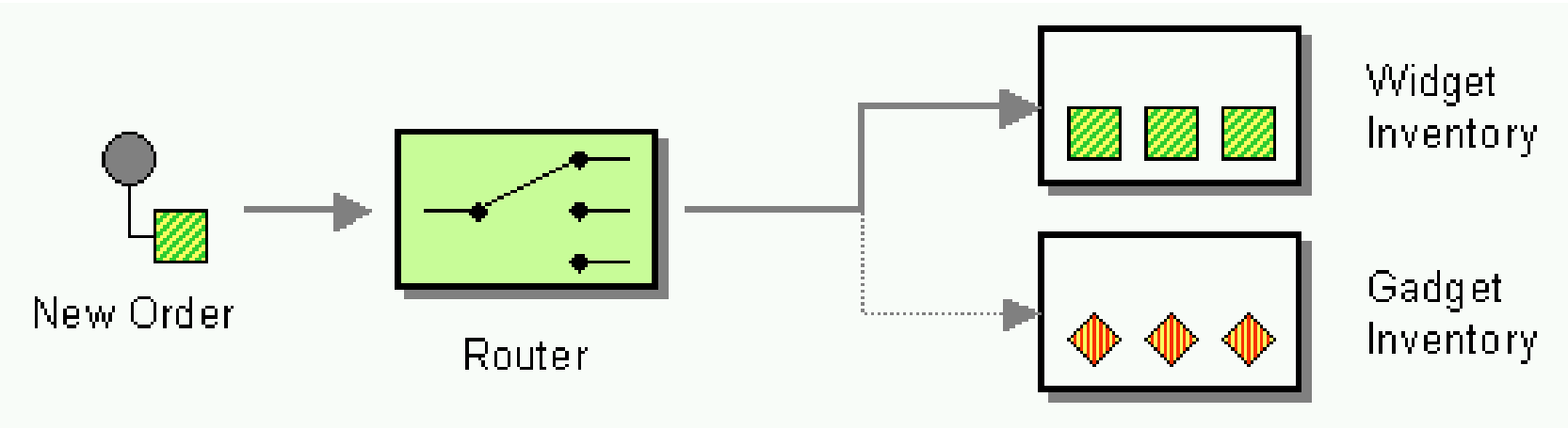


Features of an ESB

- Based on open standards
  - ESB Services & integration mechanisms
  - Canonical message format: XML
- Highly distributed system
  - ESB Containers
- Provides routing, invocation, and mediation services
- Guaranteed message delivery
- Optional: Scripting, BPM, Rules-Engine

Content-Based Routing

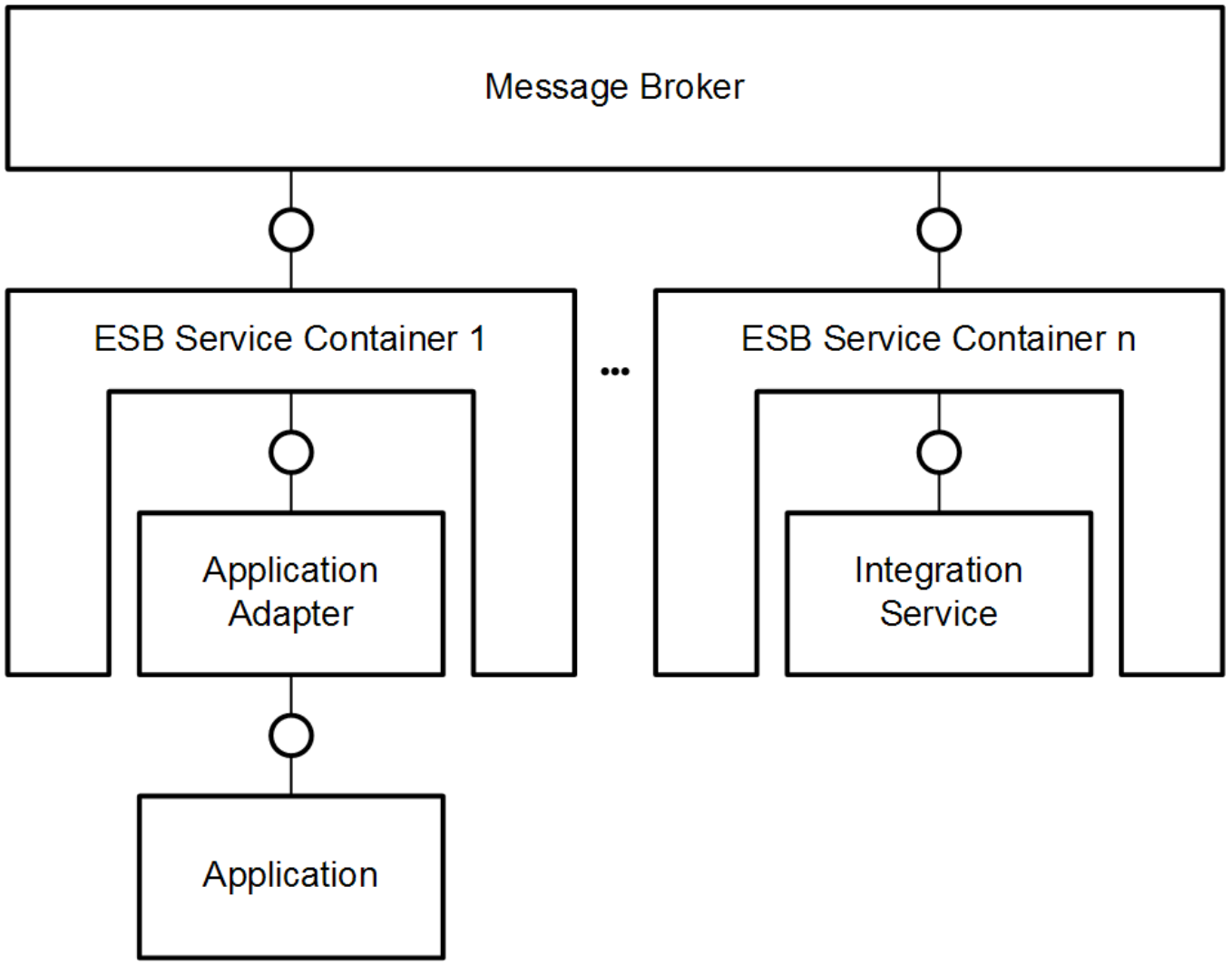
- Routing of messages based on their content
- Allows messages without destination address
- Usually implemented using XPath and a rules engine



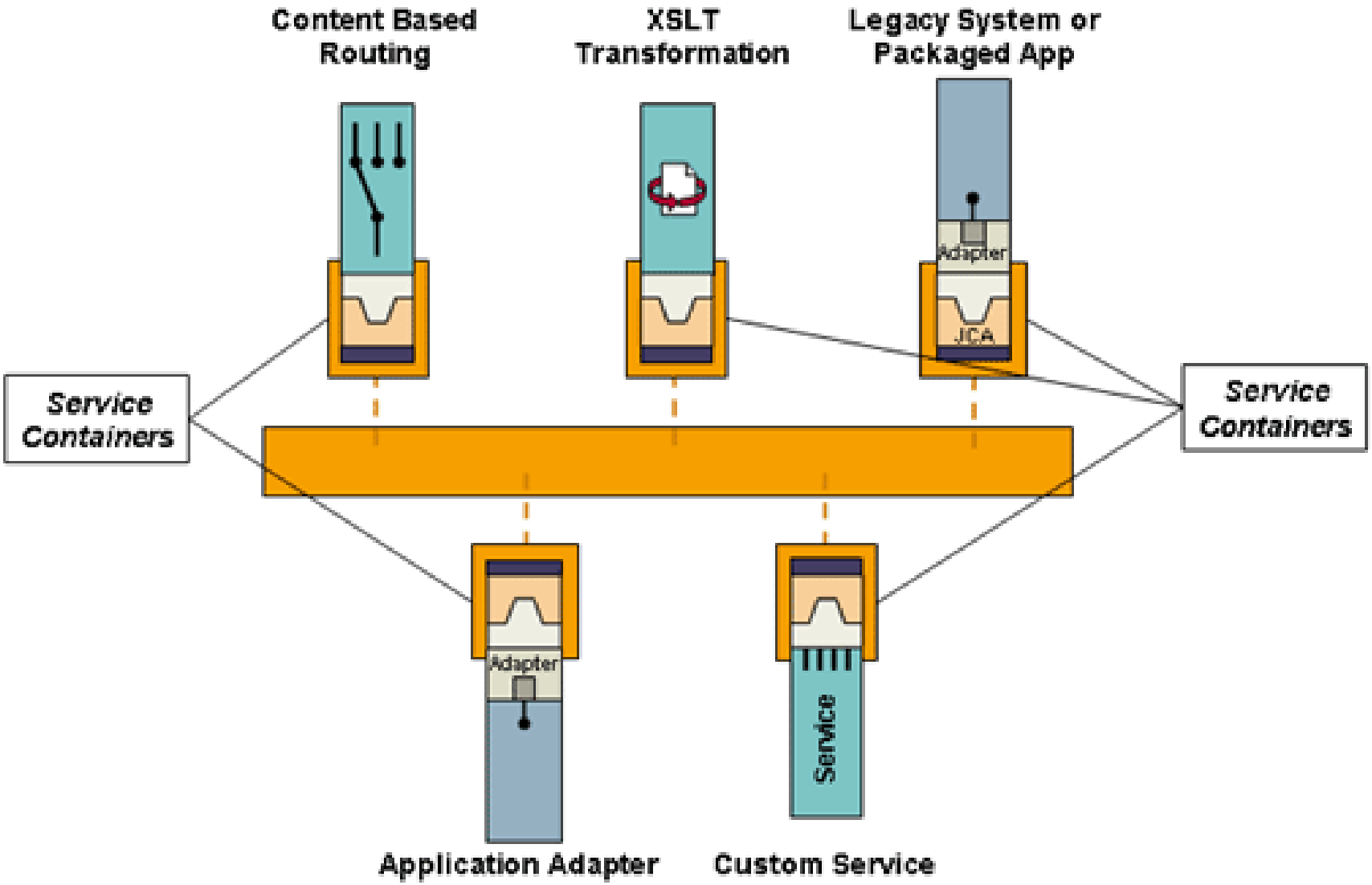
Mediation

- Translation & transformation of messages
- Typical services:
  - Normalizer
  - Content Enricher
  - Content Filter
  - Splitter, Aggregator
- Usually implemented using XSLT & XPath
- Invocation of connected resources

ESB Service Containers



ESB Service Containers



Java Business Integration (JBI) [JSR 208]

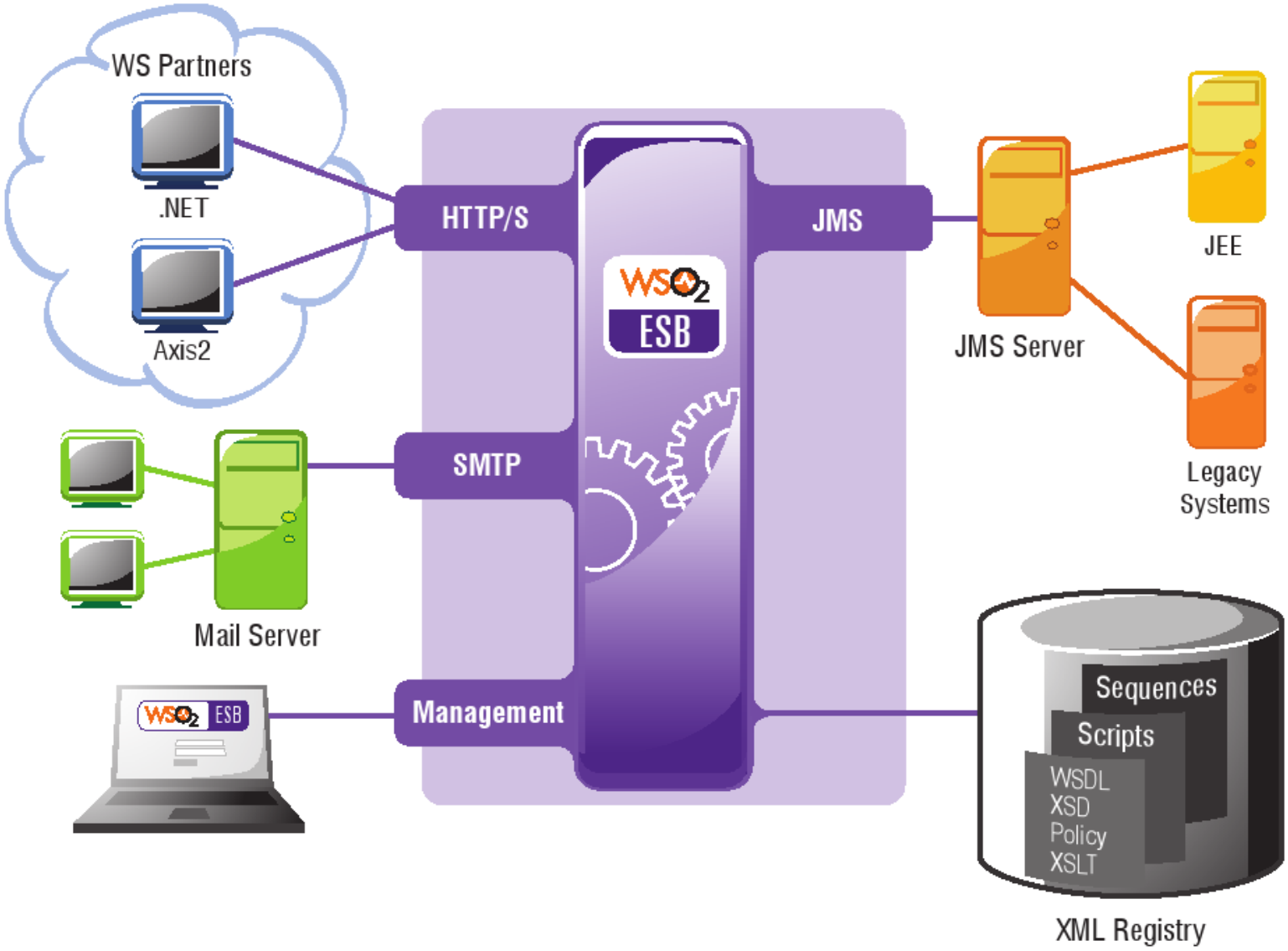
- Standardized container architecture
  - Normalized Message Router (NMR)
  - WSDL 2.0 Message Exchange Patterns
- Standardized component packaging
  - Binding Components (BC)
  - Service Engines (SE)
  - Service Units (SU) & Service Assemblies (SA)
- Installation, deployment, monitoring and lifecycle handled via JMX

Open Source ESBs

- WSO2 ESB
- JBoss ESB
- OpenESB
- Mule
- Apache ServiceMix

=> All based on Java

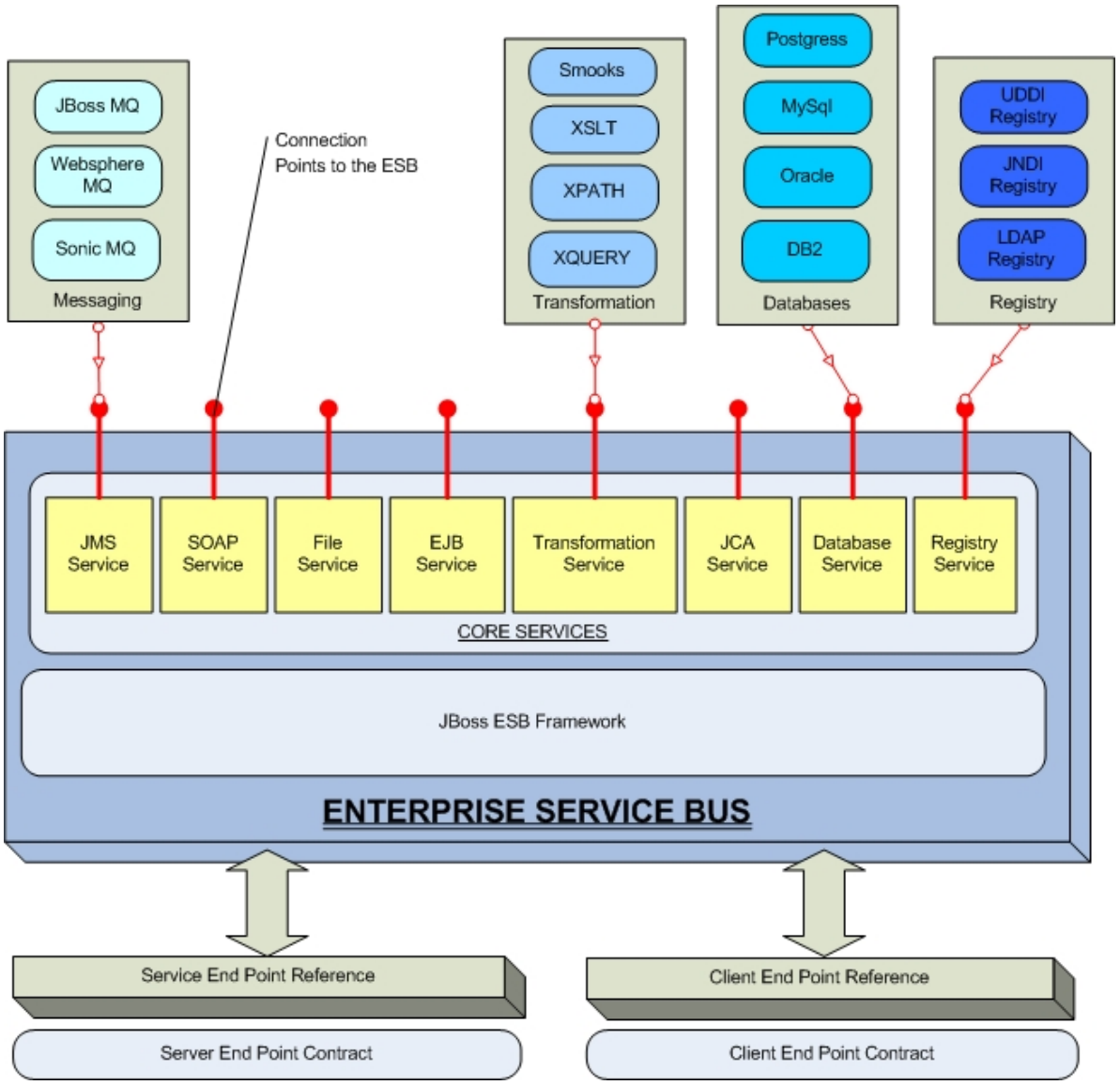
WSO2 Enterprise Service Bus



WSO2 Enterprise Service Bus

- Lightweight ESB
- XML and Web Service centric
- Based on Apache Synapse and Axis2
- Basic features like routing & mediation
- Only JMS, HTTP & SMTP transports
- Built-in registry for XML configuration data
- Integrated graphical tooling
- No JBI support

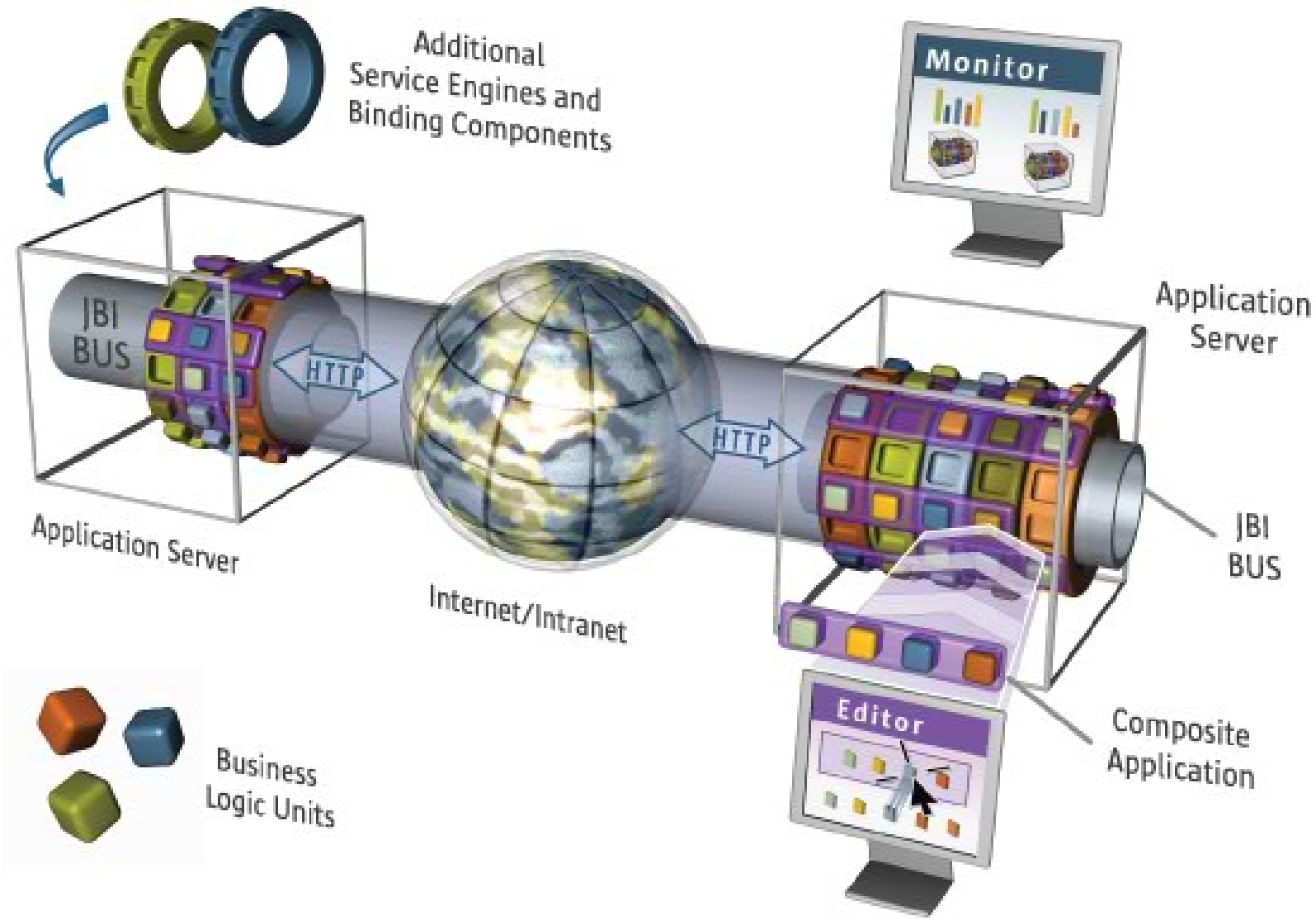
JBoss ESB


JBoss MQ
Websphere MQ
Sonic MQ
Messaging
Connection Points to the ESB
Smooks
XSLT
XPATH
XQUERY
Transformation
Postgress
MySql
Oracle
DB2
Databases
UDDI Registry
JNDI Registry
LDAP Registry
Registry
JMS Service
SOAP Service
File Service
EJB Service
Transformation Service
JCA Service
Database Service
Registry Service
CORE SERVICES
JBoss ESB Framework
ENTERPRISE SERVICE BUS
Service End Point Reference
Server End Point Contract
Client End Point Reference
Client End Point Contract

JBoss ESB

- Based on JBoss Enterprise Middleware Suite (JEMS)
- Technology acquisition: Rosetta-ESB
- POJO plug-in interface for services subsystems
- No support for JBI (JBI 2.0 planned)
- Good tool support through JBoss IDE
- Still in development, but good progress and growing community

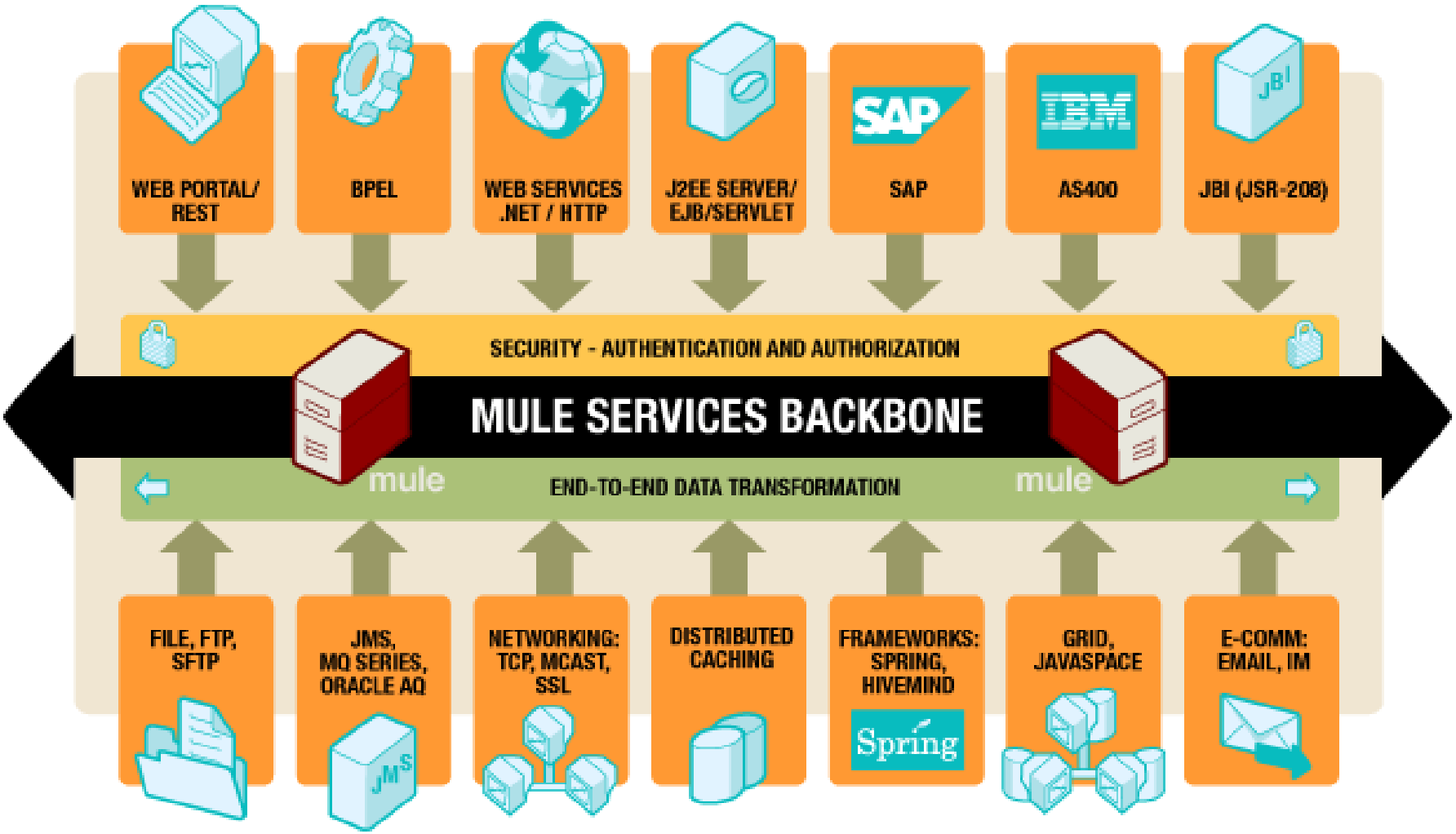
Open ESB


Additional
Service Engines and
Binding Components
Monitor
JBI
BUS
HTTP
HTTP
Application
Server
Application Server
Internet/Intranet
JBI
BUS
Editor
Composite
Application
Business
Logic Units

Open ESB

- Initiated by Sun Microsystems
- Part of Java Application Platform SDK
- Implements Java Business Integration 1.0
- Lots of integration components through Open JBI Components Project (may be used in other JBI ESBs as well)
- Integration with GlassFish application server and NetBeans IDE

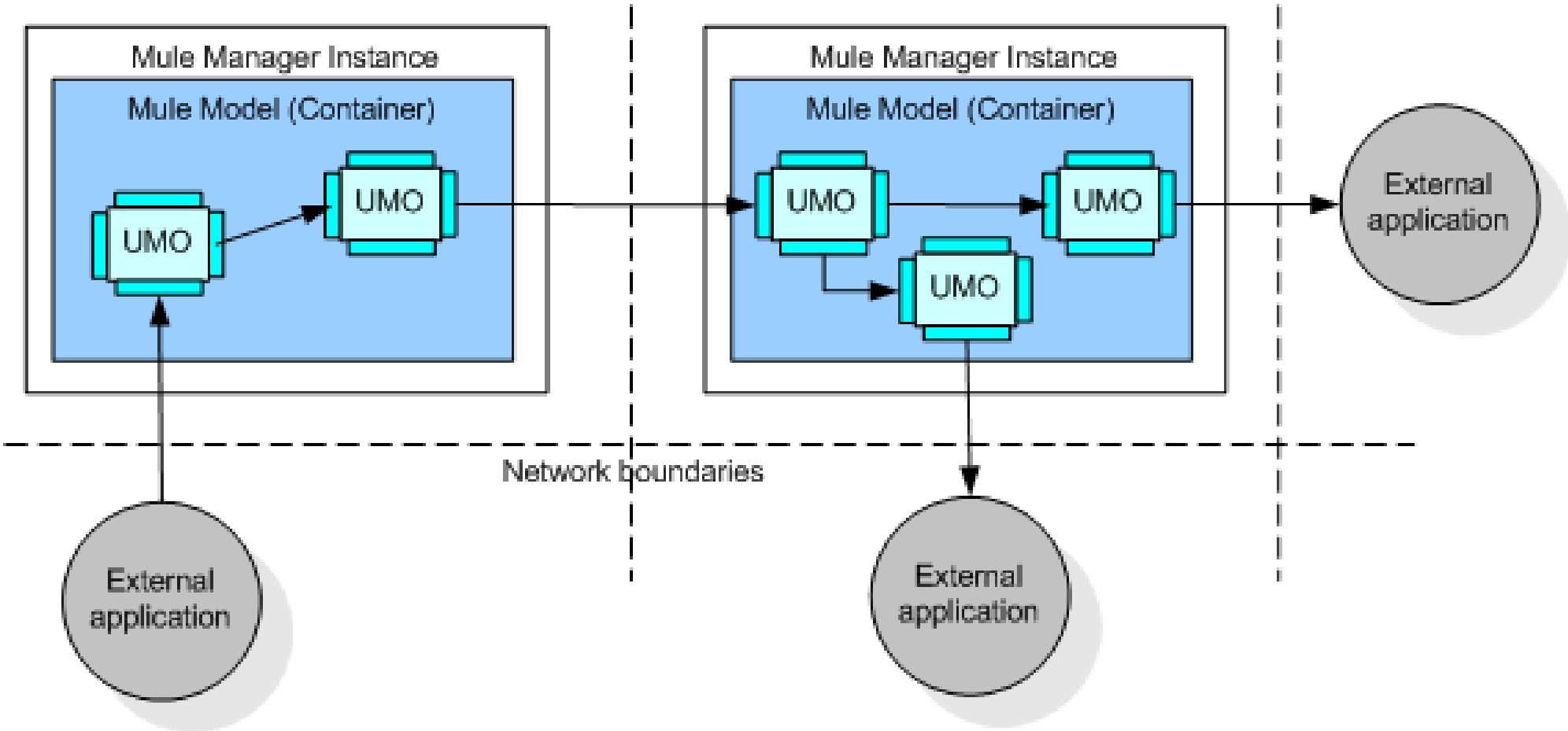
Mule


WEB PORTAL/ REST
BPEL
WEB SERVICES .NET / HTTP
J2EE SERVER/ EJB/SERVLET
SAP
AS400
JBI (JSR-208)
SECURITY - AUTHENTICATION AND AUTHORIZATION
MULE SERVICES BACKBONE
mule
END-TO-END DATA TRANSFORMATION
mule
FILE, FTP, SFTP
JMS, MQ SERIES, ORACLE AQ
NETWORKING: TCP, MCAST, SSL
DISTRIBUTED CACHING
FRAMEWORKS: SPRING, HIVEMIND
GRID, JAVASPACE
E-COMM: EMAIL, IM

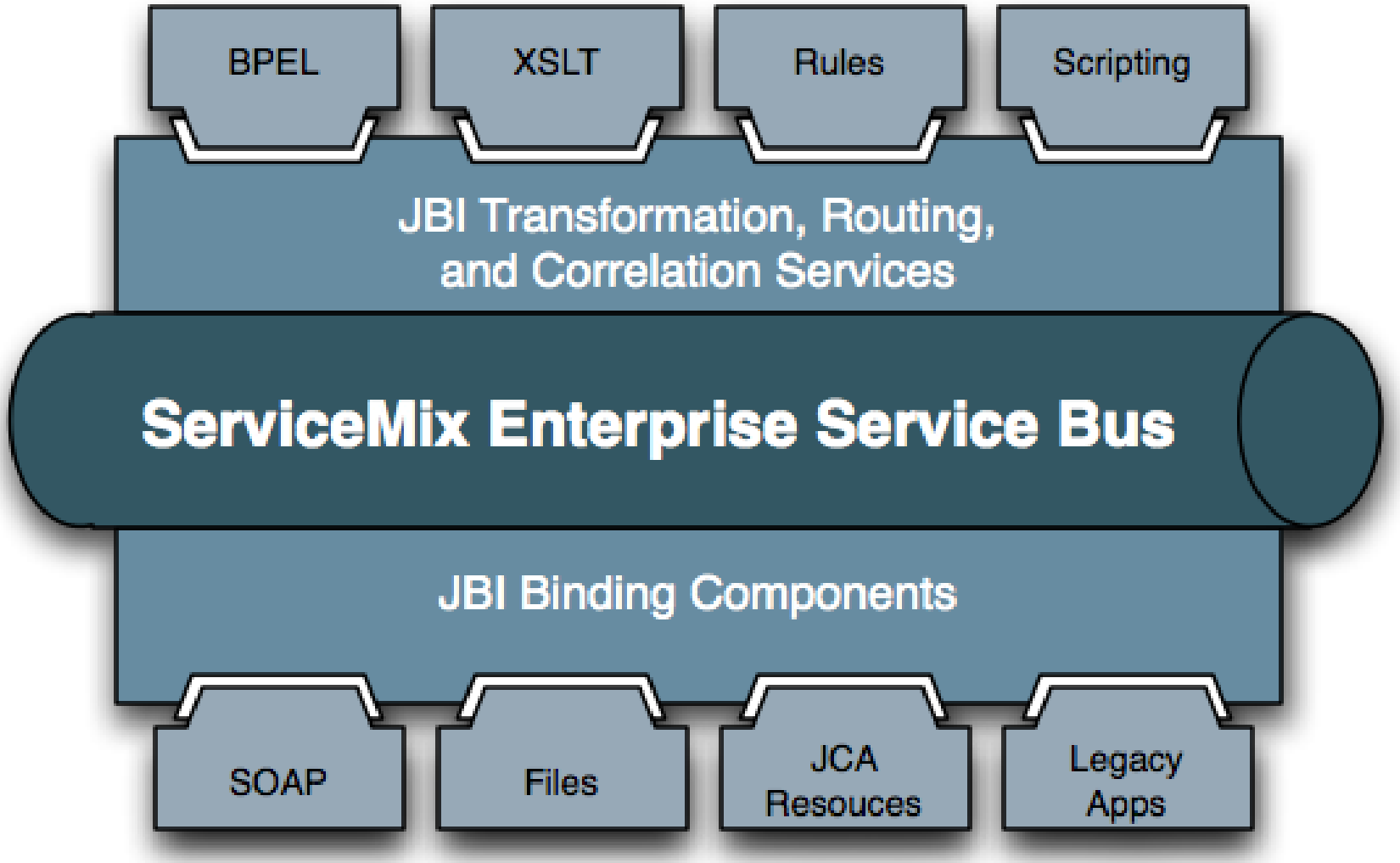
Mule

- Lightweight open source messaging framework developed at Codehaus
- Supports ESB architecture
- Highly distributable object broker
- Manages all interactions among applications transparently
- Central concept: Universal Message Objects
- JBI messaging support, but no runtime

Mule: Universal Message Objects



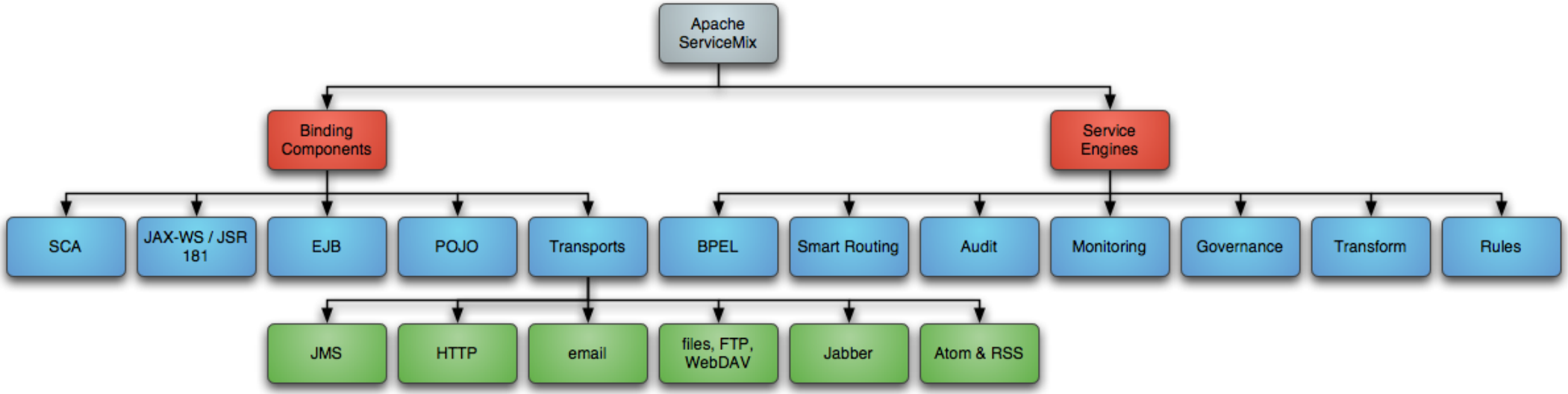
Apache ServiceMix



Apache ServiceMix

- currently in Apache Incubator,
  formerly developed at Codehaus like Mule
- Company behind ServiceMix:
  Logic Blaze => recently acquired by IONA
- JBI-certified as part of Apache Geronimo
- Uses Apache ActiveMQ to provide remoting,
  clustering, reliability and distributed failover
- Standalone or embedded in a client or server
- Lots of JBI components provided

Apache ServiceMix: JBI Components



Conclusion

- An ESB is an infrastructure for Enterprise Application Integration and Service-Oriented Architectures
- Recommendations for ESB adoption:
  - Concentration on the concrete infrastructure problem
  - Standard-based solution
  - Sustainable vendor

Conclusion

- Criteria for selecting an ESB platform:
  - Origin
  - Maturity
  - Level of commitment to standards
  - Flexible deployment options
  - Platform support
  - Community viability and momentum
  - Commercial Support
  - Tooling and Documentation

Suggested Reading

- *"Enterprise Integration Patterns"*
  by Gregor Hohpe and Bobby Woolf
  http://www.enterpriseintegrationpatterns.com
- *"Enterprise SOA: Service-Oriented Architecture Best Practices"* by Dirk Krafzig
- http://mule.codehaus.org
- http://servicemix.org
- *"Enterprise Service Bus"*
  by David A. Chappell