



Using WebSphere Enterprise Service Bus for z/OS

Name



Trademarks

The following are trademarks of the International Business Machines Corporation in the United States, other countries, or both. For a complete list of IBM trademarks please visit www.ibm.com/legal/copytrade.shtml

CICS	IBM Logo	S/390
DB2	IMS	Tivoli
E-business logo	iSeries	VM/ESA
ESCON	MVS	VSE/ESA
eServer	OS/390	WebSphere
FICON	pSeries	z/OS
IBM	Rational	zSeries
	RS/6000	System z

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

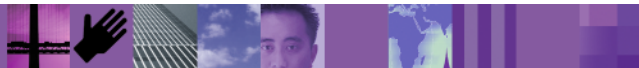
Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.
Microsoft trademark guidelines

Intel is a registered trademark of Intel Corporation in the United States and other countries.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.



Agenda

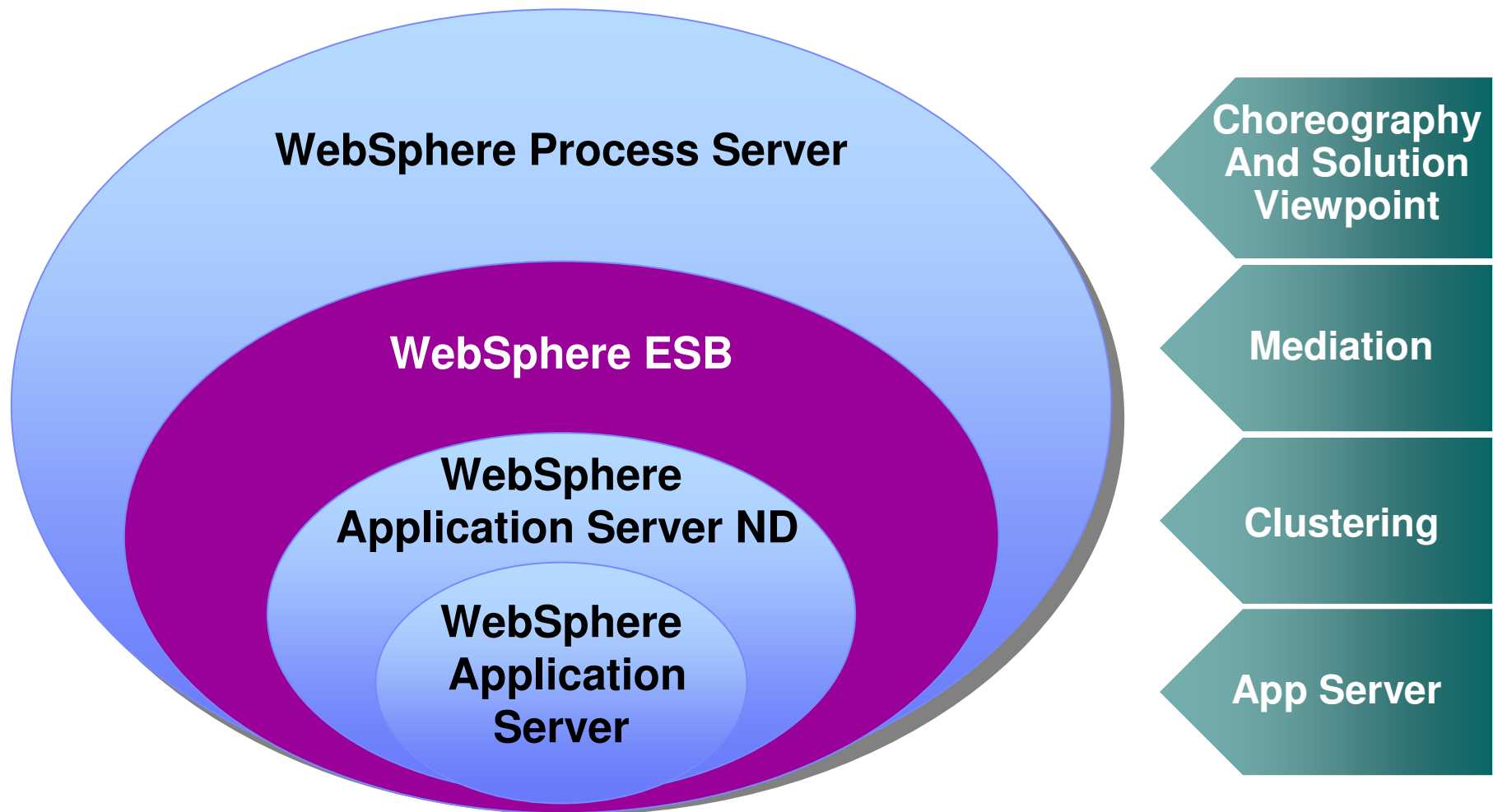
- What is WebSphere Enterprise Service Bus
- What's new with V6.1
- A System z customer scenario



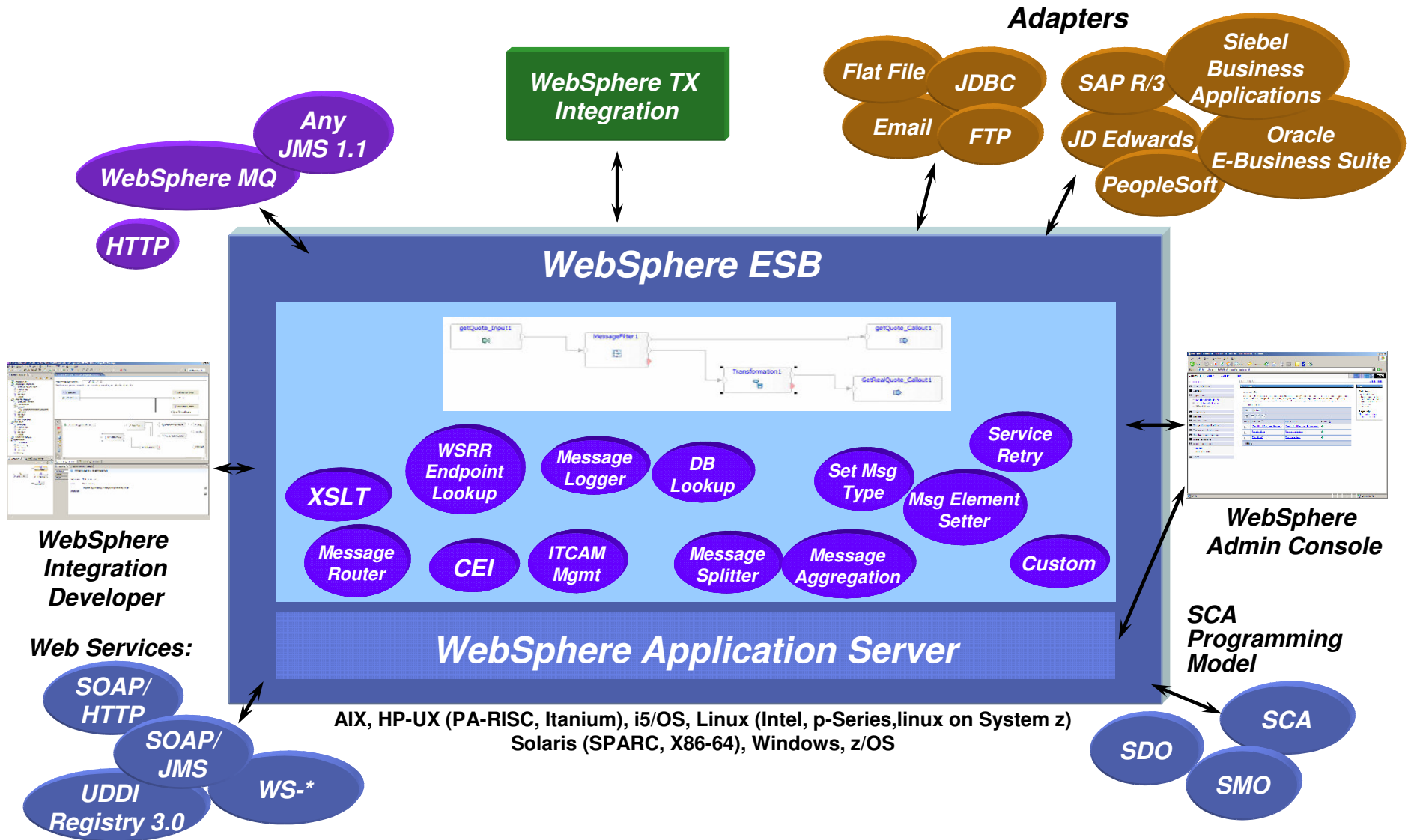
SOA: Unlock business value.
→ New software and services.



WebSphere Application Server, ESB, and Process Server



WebSphere ESB



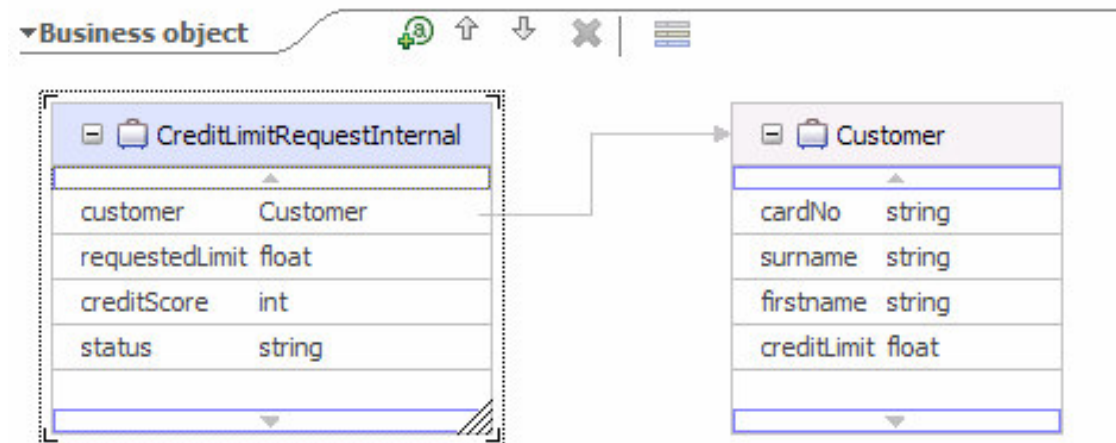
Service Component Architecture (SCA)

- Component-based programming model for constructing distributed applications
 - ▶ Components run in SCA container
 - ▶ Component interfaces described by WSDL
- Component invocations via API or by wiring in SCA assembly
- Application data represented by business objects (SDO)
- Many possible component implementation types
 - ▶ ESB focus is on Mediation Flow Component



Common Data Model: Business Objects

**Business object
definition
(SDO/XML schema)**

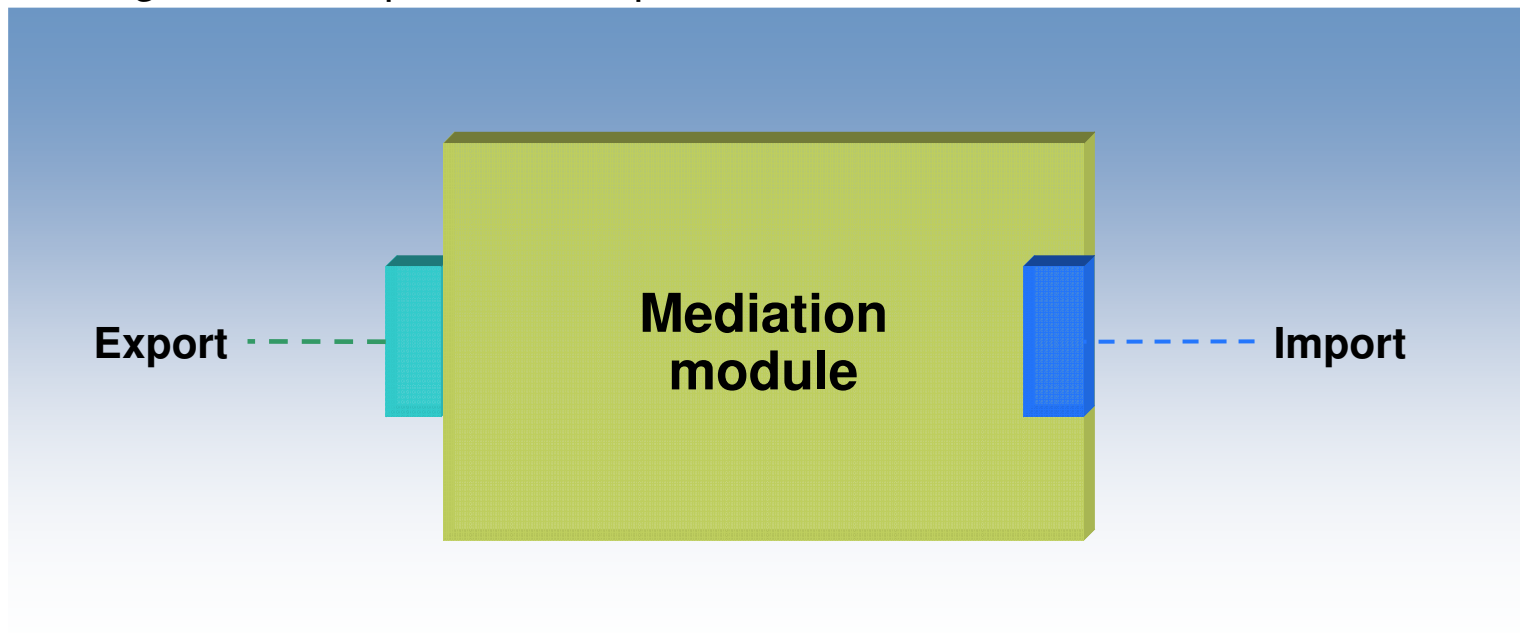


- Business Objects represent structured application data
- Consistent logical representation, independent of data source or wire format
- Based upon SDO standard
- Multiple data bindings can be supported

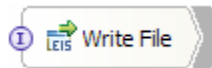


Concepts: Mediation Module

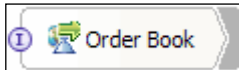
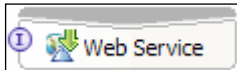
- **Interactions with external service requesters and providers defined by imports and exports**
 - ▶ Interfaces are defined using the Web Services Description Language (WSDL)
 - Which may contain several service *operations*
 - ▶ Different kinds of requester and provider are made available via different *bindings* for the imports and exports



Export/Import Bindings



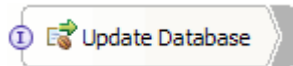
WebSphere Adapters (e.g. CICS, IMS, SAP...)



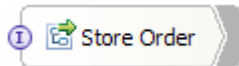
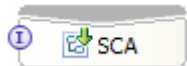
Web services (SOAP/HTTP, SOAP/JMS)



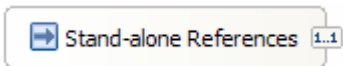
JMS / WebSphere MQ JMS / WebSphere MQ



EJB



Native (SCA)



Java invocation



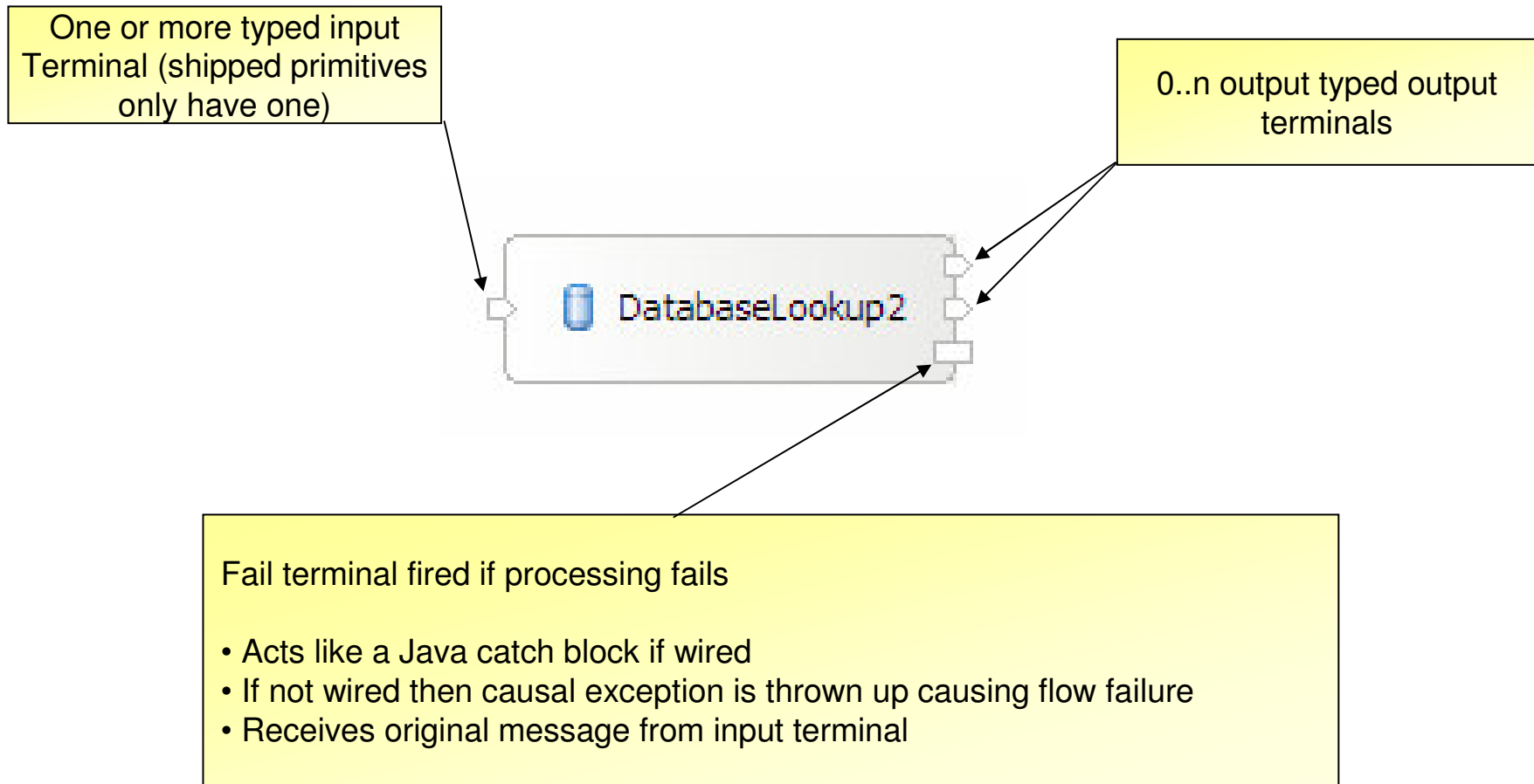
Concepts: Integrating request-response interactions using WebSphere ESB Mediation Flow Components

- **Processing is performed by one or more mediation *flows*, comprising instances of mediation *primitives***
- **Processing of requests is separated from processing of responses**
- **WebSphere ESB Mediation Flow Components can act as ‘service intermediaries’**
 - ▶ Allowing the mediation flow component to
 - pass a (potentially modified) request from a service requester to a service provider
 - pass a (potentially modified) response from a service provider to a service requester
- **Request processing within a mediation flow component can send a response back to the requester without necessarily needing to contact a service provider**





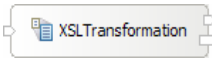
Anatomy of a Mediation Primitive



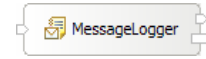
WebSphere ESB v6.0 Mediation Primitives



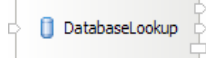
MessageFilter – routes within a flow



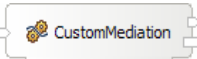
XSLTransformation – transforms content



MessageLogger – logs to database



DatabaseLookup – adds content from database



CustomMediation – executes custom logic (Java)



Fail – terminates flow with an exception



Stop – terminates flow normally



EventEmitter - emits a common base event at a point significant in the mediation flow



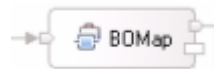
Message Element Setter - sets, copies, or deletes the content of message headers or bodies



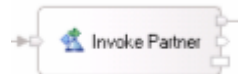
Endpoint Lookup - queries the WebSphere® Service Registry and Repository and retrieves service endpoints, which it places in the message context. The retrieved endpoints can then be used to dynamically invoke a service



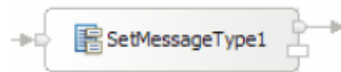
WebSphere ESB 6.1 Additional Primitives



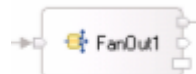
Business Object Mapper Primitive: performs structure-structure mapping, provides access to relationships function.



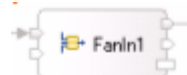
Service Invoke: allows a service to be invoked from within a request or response flow (not just at the end, as in 6.0.2)



Set Message Type: allows a weakly typed element (xs:any, xs:anyType, ...) to have a type asserted for it at runtime



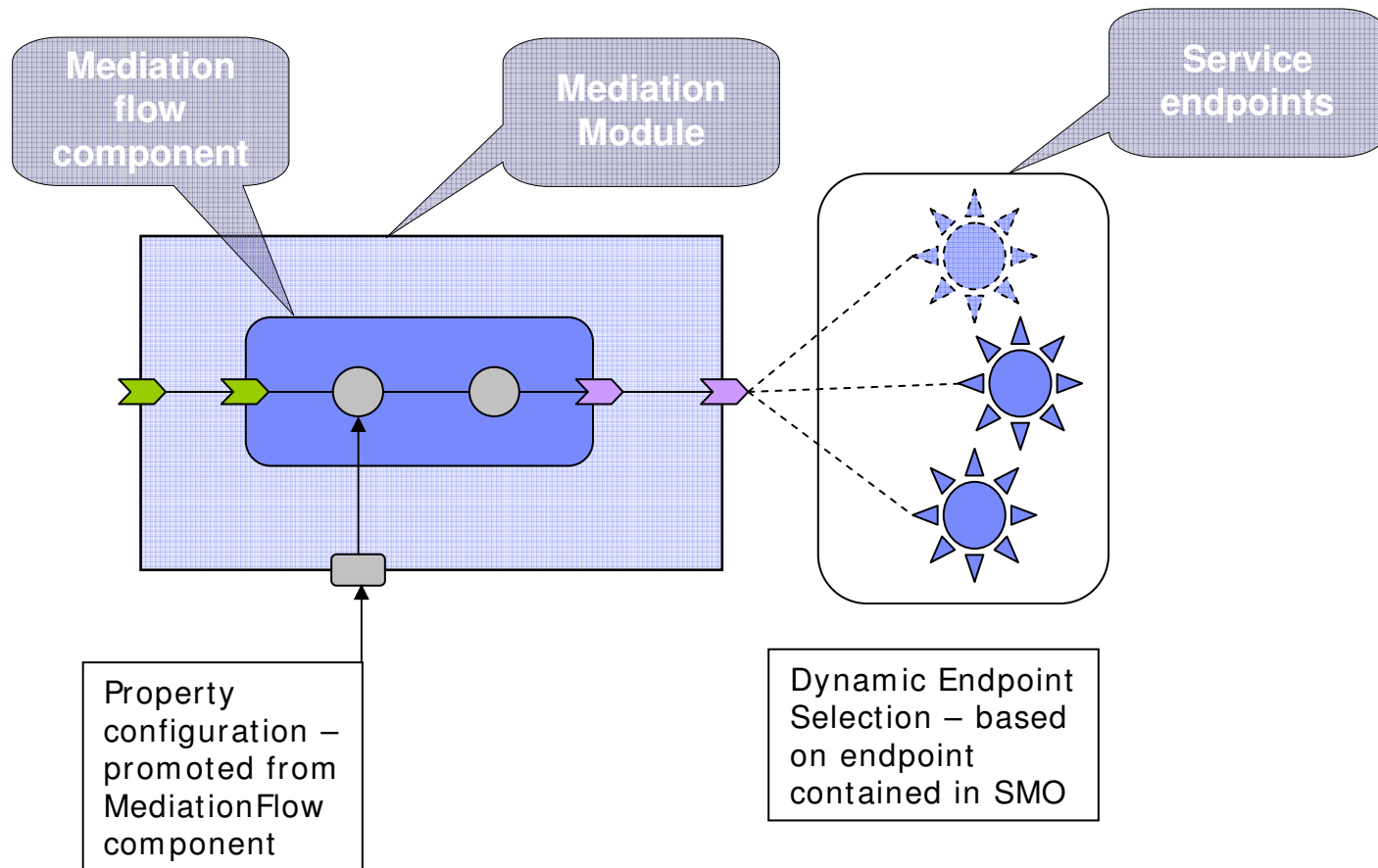
Fanout: allows a flow to be split - and to operate on repeating elements of the message, and may be paired with **Fanin**



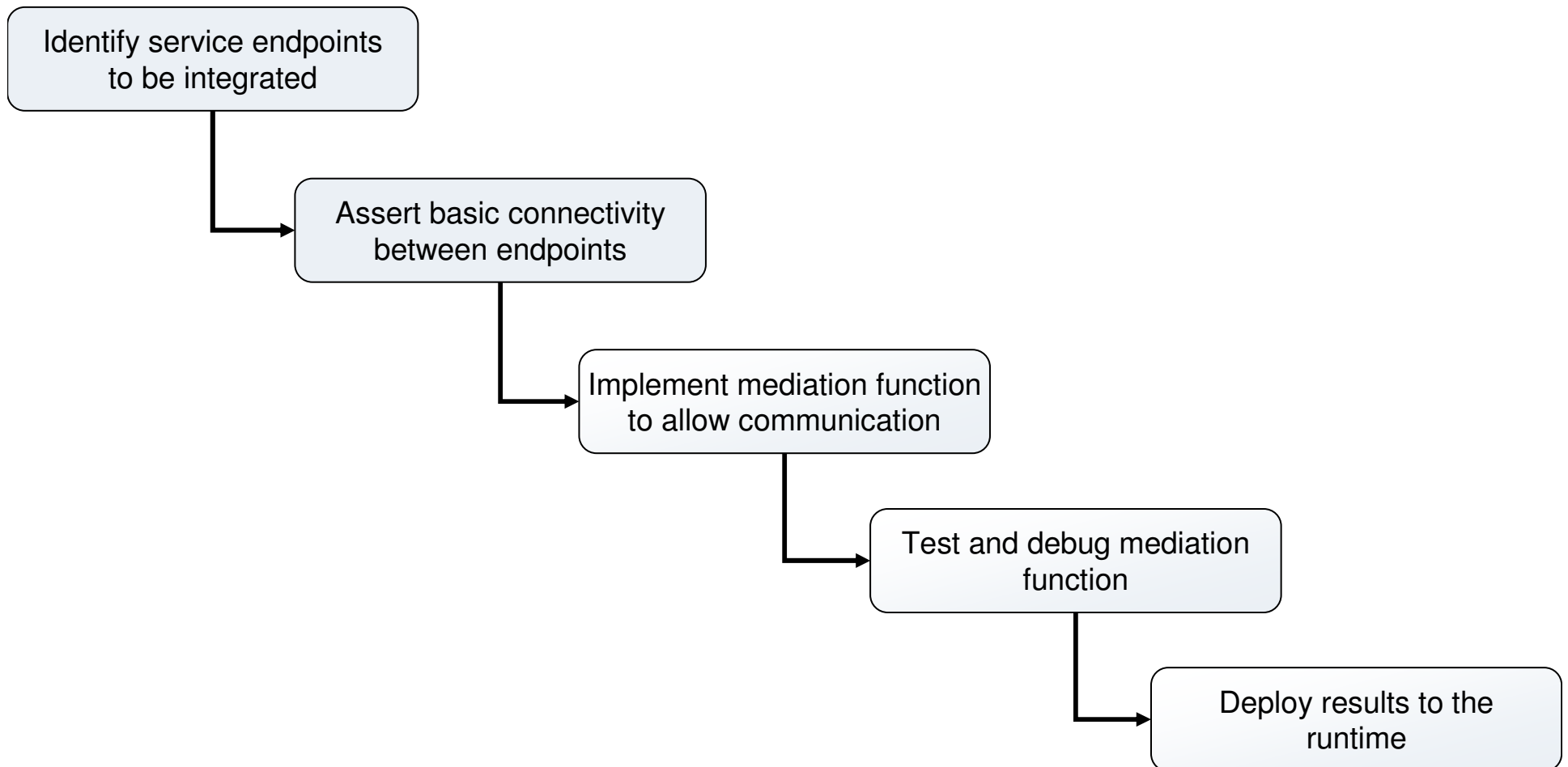
Fanin: allows a flow that has been split using Fanout to be joined - can be used to perform *aggregation*



Dynamic Service Invocation



Typical Integration Developer Task Flow

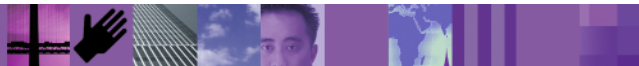
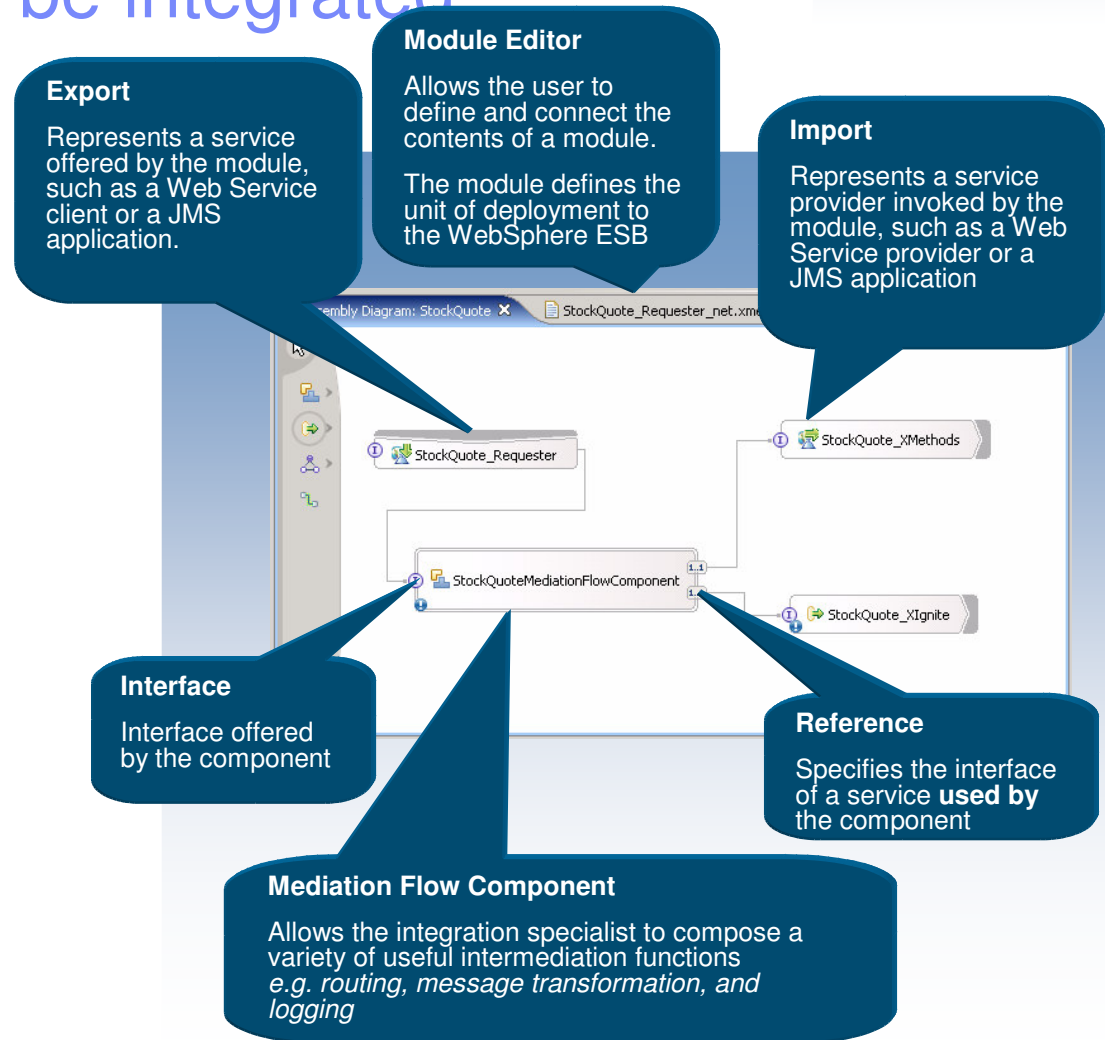




Integration Developer

1. Integration developer specifies the service endpoints that need to be integrated

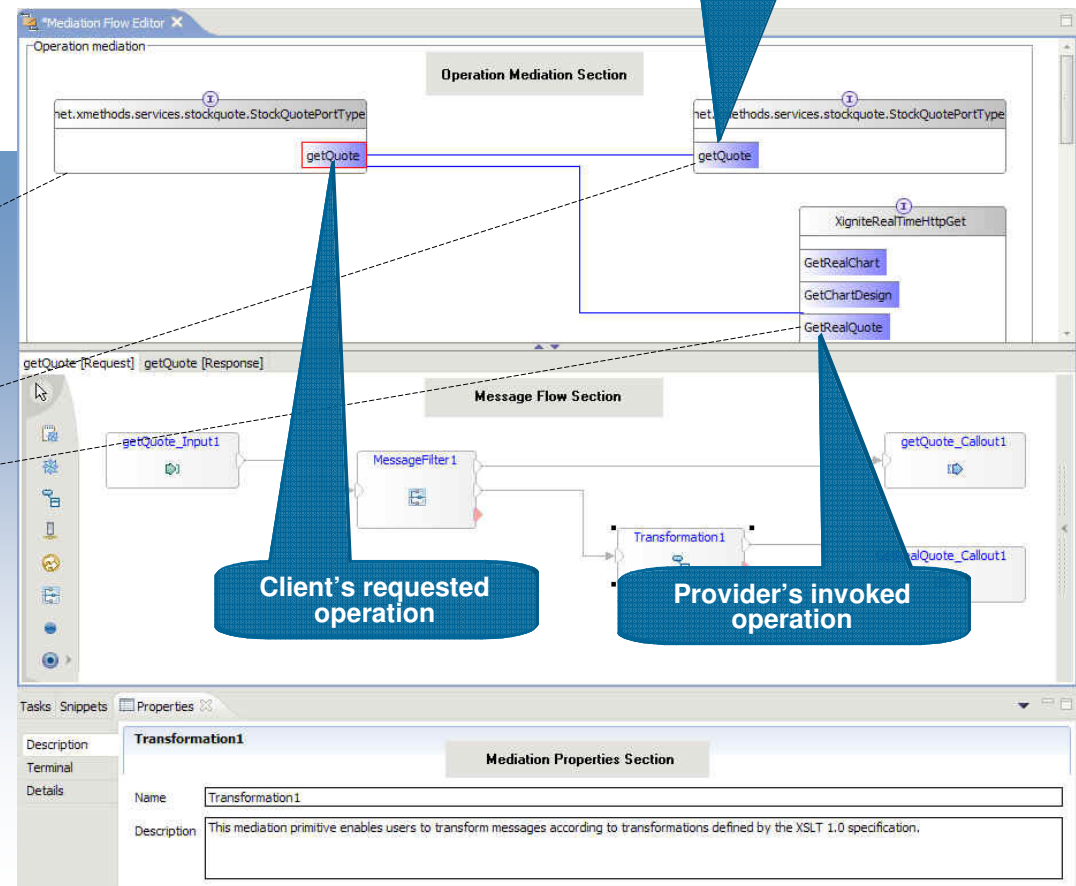
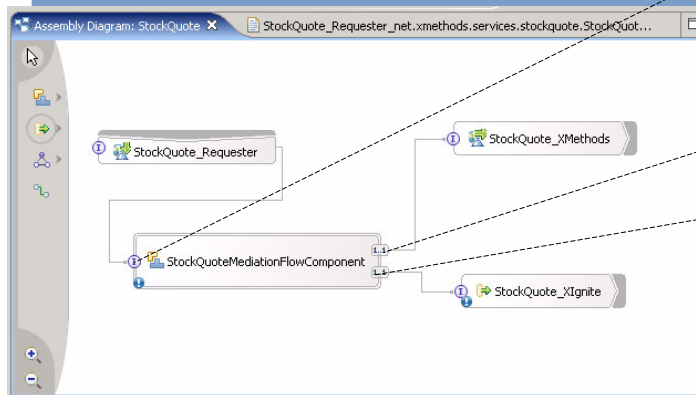
- **Uses the 'module editor' to construct a mediation module**
 - ▶ specifies how a subset of WebSphere ESB's service requesters and service providers interact
- **Within the module**
 - ▶ Service requesters are represented as 'exports'
 - ▶ Service providers are represented as 'imports'
 - ▶ The integration (mediation) function is represented as a 'mediation flow component'
 - ▶ Imports and exports are connected to the mediation flow component





2. Integration Developer asserts the basic connectivity between these endpoints

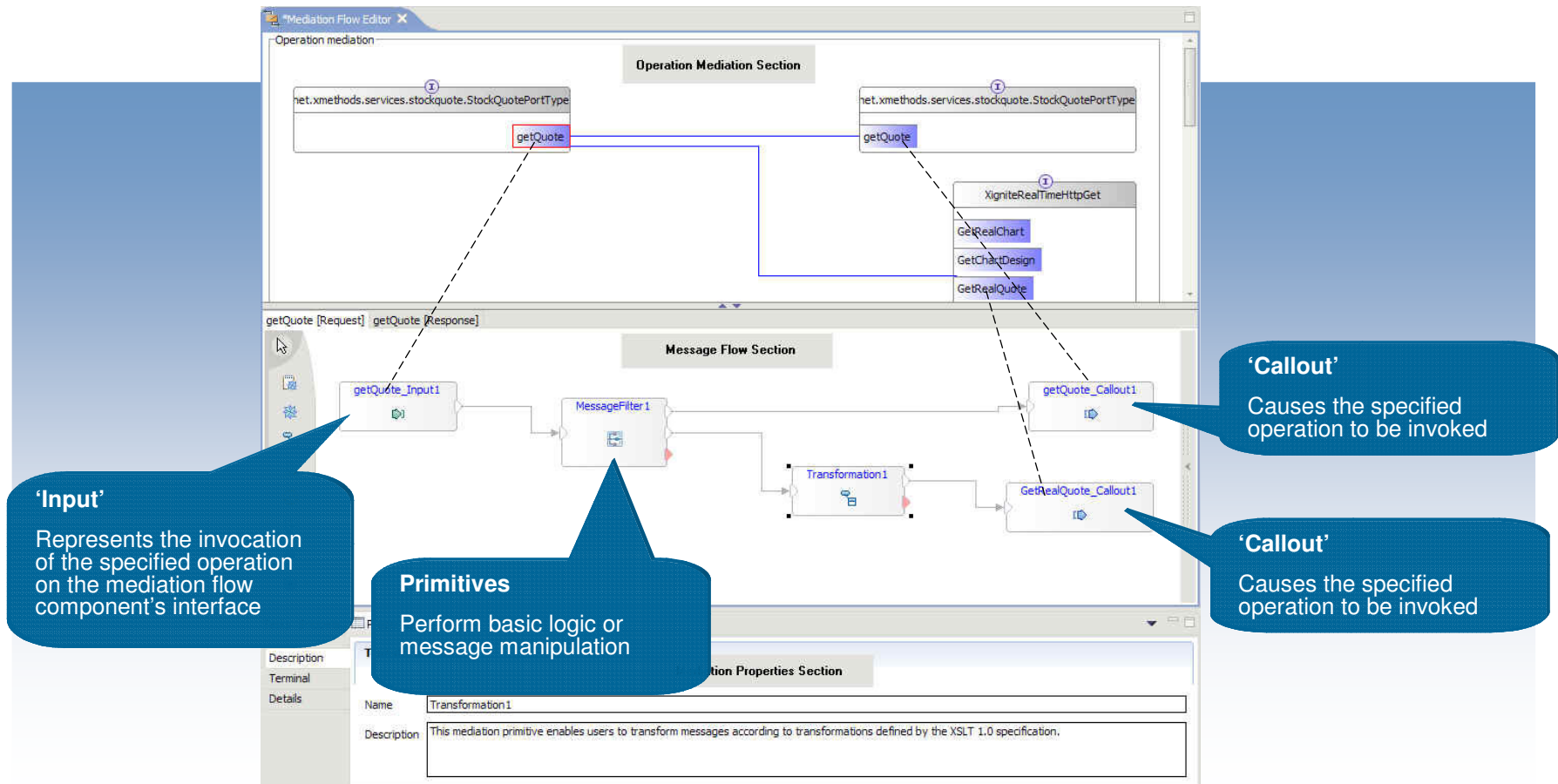
- The integration developer uses the *mediation tooling* to specify the essential connectivity between a requester and one or more service providers





3. Decides on the mediation function required to allow endpoints to communicate effectively

- The integration developer constructs a *mediation flow* for the service request by selecting and connecting *mediation primitives* from supplied function





4. Integration developer customizes the elements of the mediation flow

- e.g. Customizes the XSLT transform mediation primitive by using mapping tool to construct an XSLT transform

The structure of the message is represented graphically

A properties view is provided where the details of the mapping can be specified

Define functions that apply to the mapping

Target	Source	Applied Function/Grouping
StockQuoteXignite_GetRealQuote...	StockQuoteXMethod_getQuoteRequest1	
tns:GetRealQuote		
Exchange		string
Symbol [0..1]	symbol	
IncludeBidAsk		boolean

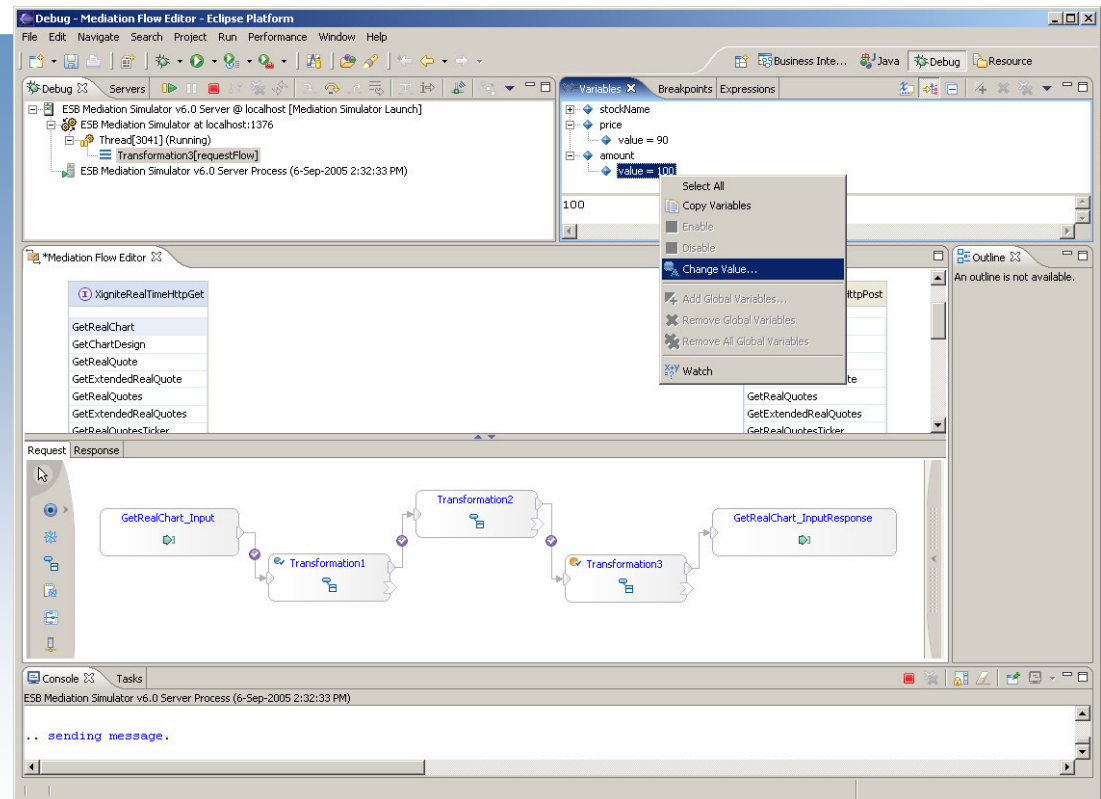




5. Debugs the composed/configured mediation function: WID Mediation Visual Debug

Use the visual debugging tools to debug a solution

- Debug mediation flows using an in-place visual debugger
- Breakpoints can be added, step into, through, or over areas of interest while inspecting the values of the messages



Test and Debug – Integration Test Client

Launch Integration Test Client

Select Module, Operation

Configuration: Default Module Test

Module: Main_Module

Component: TranslateProcess

Interface: TranslateProcess

Operation: startProcess

Initial request parameters

Name	Type	Value
input1	Translate_IN	
name	string	Paul Pacholski
message	string	hello
language	string	german

Continue

Examine, Event Trace & Output

Enter Input Data & Launch Operation

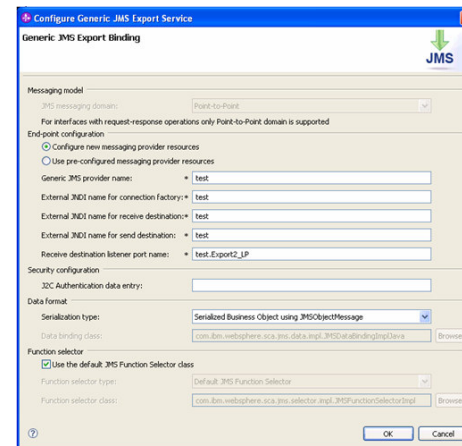
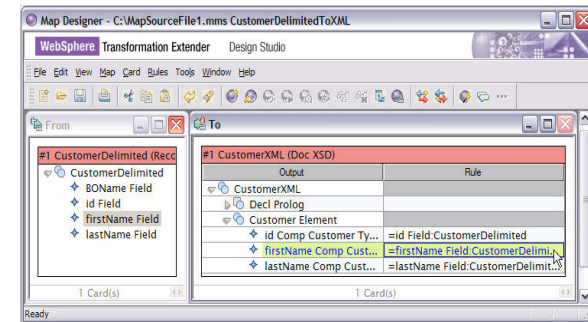
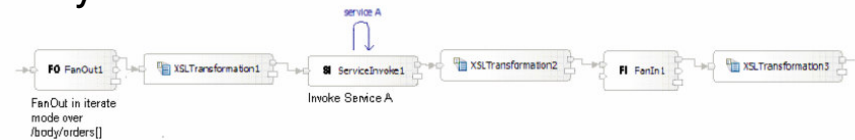
What's New in WebSphere Enterprise Service Bus v6.1

- Supports a broader set of mediation patterns quickly and with reduced development effort
 - New message splitting and aggregation patterns
 - New service retry capability
 - Updated Business Object Mapper and relationship support

- Integrates a broader range of services with expanded connectivity
 - New WebSphere TX integration
 - New WS-Notification support
 - New generic HTTP support
 - Enhanced 3rd party JMS support

- Enables streamlined operational infrastructure with platform currency
 - Updated WAS 6.1 based runtime
 - New and expanded OS platforms, including 64-bit exploitation and i5/OS support

- Improves consumability and usability across the solution lifecycle
 - Easier server installation and configuration
 - Expanded XML and WSDL support



WebSphere ESB 6.1.2 Available 1 Aug 2008

- **Enhanced support for Web Services Description Language (WSDL) XML Schema Definition (XSD), enabling the use of many industry-standard XML schemas.**
- **Improved error messages, logging, and First Failure Data Capture (FFDC) usage. FFDC can reduce defect resolution times and the number of times IBM Support asks a client to recreate a problem with different trace settings turned on.**
- **Adds support for manipulating MQCIH message headers for WebSphere MQ, which are exploited by the CICS bridge to enable interaction with CICS applications.**
- **Adds new format support for the following additional message formats:**
 - Delimited and full support for Comma Separated Values (CSV) Fixed-width format, and JavaScript Object Notation (JSON)
 - Enhances support for COBOL Copybook, C Struct, and PLI



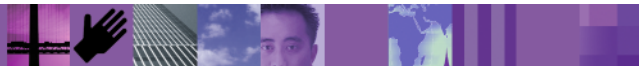
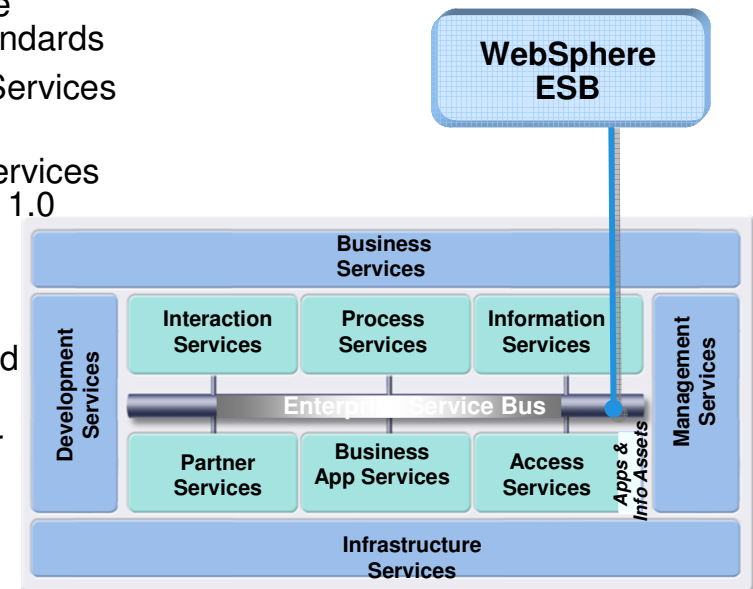
WebSphere ESB for z/OS – Extends the value of WebSphere Application Server for z/OS

- Clustering support for fault tolerance, scalability
- Java platform with zAAP offload
- Native application integration
 - WebSphere MQ for z/OS (including CICS)
 - WebSphere TX integration
 - CICS Transaction Gateway (JCA)
 - IMS Connect (JCA)
 - DB2 – DB2 Universal JDBC Provider, IBM Application Connectivity to DB2 for z/OS Feature
 - PDS files
 - WebSphere Classic Federation Server for z/OS integration
- IBM z/OS Security Server support



WebSphere Enterprise Service Bus v6.2 – What is coming!

- Delivers new policy-driven connectivity
 - Increased flexibility to administratively configure service mediations through policies
 - Full set of mediation capabilities manageable via policies
 - Integration with WebSphere Service Registry and Repository for policy management and governance
- Enhances web services standards support
 - Improved interoperability with support for WS-I Reliable Secure Profile, SOAP 1.2, WS-Reliable Messaging and supporting standards
 - Simplified administration of Qualities of Service through Web Services policy sets
 - Simplified development through the provision of a new Web Services binding based on JAX-WS 2.0, JAXB 2.0, SAAJ 1.3, and StAX 1.0
- Enhances service mediation capabilities
 - Enhanced flexibility in service gateway scenarios
 - Enhanced performance with parallel processing for splitting and aggregation patterns
 - Streamlined integration to support WebSphere Process Server solutions
- New! IBM Media Extender for WebSphere ESB
 - Delivers “media-aware” service mediation facilities
 - Key element of IBM’s Media Hub Solution Framework to link business and content systems together for effective media management



Industry: Education
URL: <http://cms.bsu.edu/>

“SOA has been such a gift to us. It enables us to embrace a new technology that provides services at a level that we couldn’t even imagine before.”

–Dr. O’Neal Smitherman



BALL STATE
UNIVERSITY



Ball State University

Ball State University bridges disparate systems and solves key administrative issue with IBM SOA solution.

CHALLENGE

- Coordinate 40 name and address systems to streamline administrative processes and ensure information integrity for users

SOLUTION

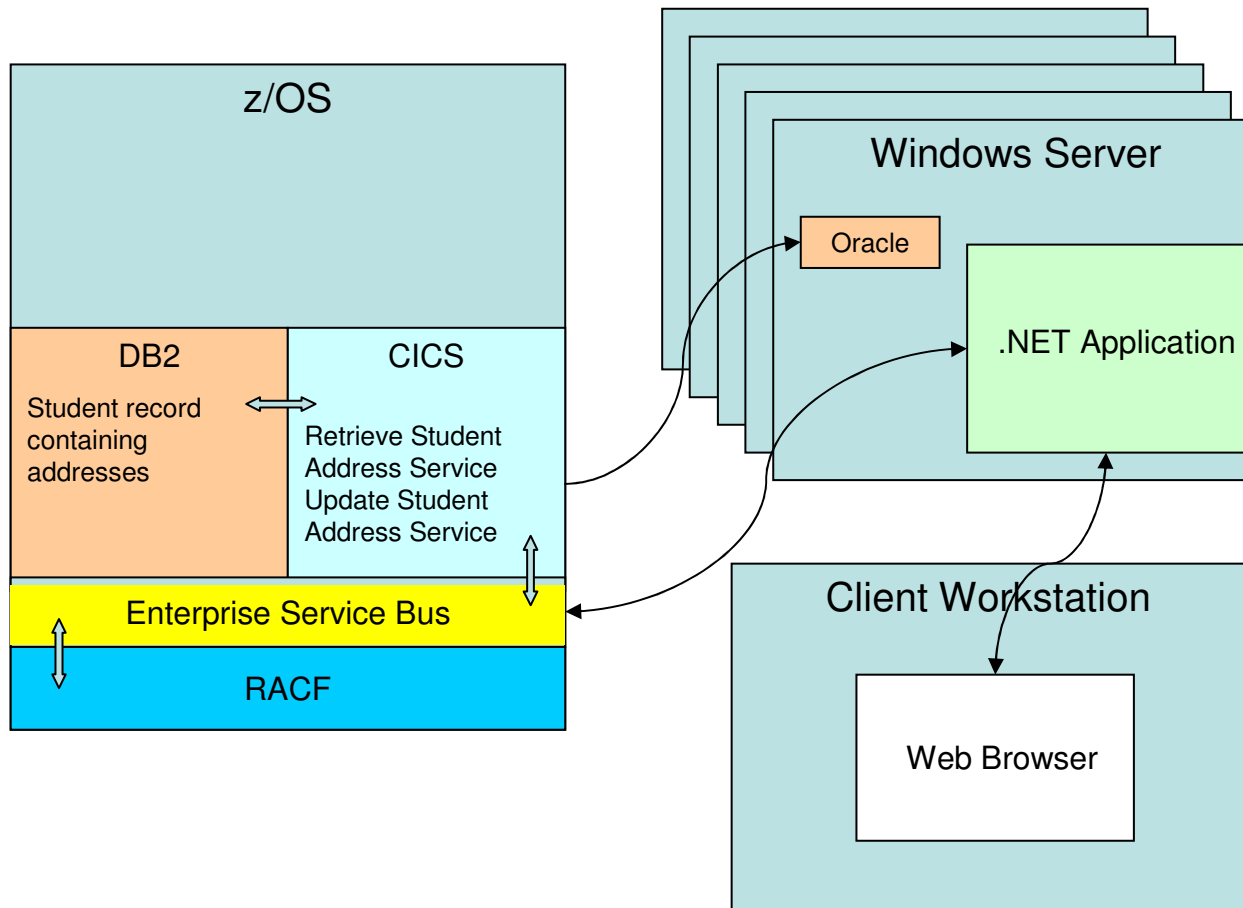
- SOA with Enterprise Service Bus to connect siloed applications without hand-coding individual API calls (WESB, CICS TS, System z)

BENEFITS

- Ability to develop and implement services in an SOA environment for resolving name and address discrepancies in 10 months, as opposed to several years for hand-coding individual application connections
- Confidence that IBM solution can lead to wider use of SOA to further streamline administrative business processes
- Services created here can be reused in later SOA efforts



BSU Application Architecture



Reference Information

- New! Redpaper - IBM Connectivity Reviewer's Guide
<http://www.redbooks.ibm.com/redpapers/pdfs/redp4434.pdf>
- ESB Portfolio Trifold
ftp://ftp.software.ibm.com/software/websphere/integration/wbimessagebroker/esb_trifold_0103A.pdf
- IBM WebSphere Business Process Management V6.1 Performance Tuning Redpaper <http://www.redbooks.ibm.com/abstracts/redp4431.html>
- Announcement Letter 208-325 IBM WebSphere Process Server for z/OS, WebSphere Integration Developer, and WebSphere Enterprise Service Bus for z/OS V6.2 enable dynamic processes and flexible connectivity for agile business solutions <http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=an&subtype=ca&htmlfid=897/ENUS208-325>
- Teleconference: Which ESB on System z? Selection Guidelines for WebSphere Message Broker, WESB and DataPower XI50
<http://www.ibm.com/software/os/systemz/telecon/30jul/>



Thank
YOU

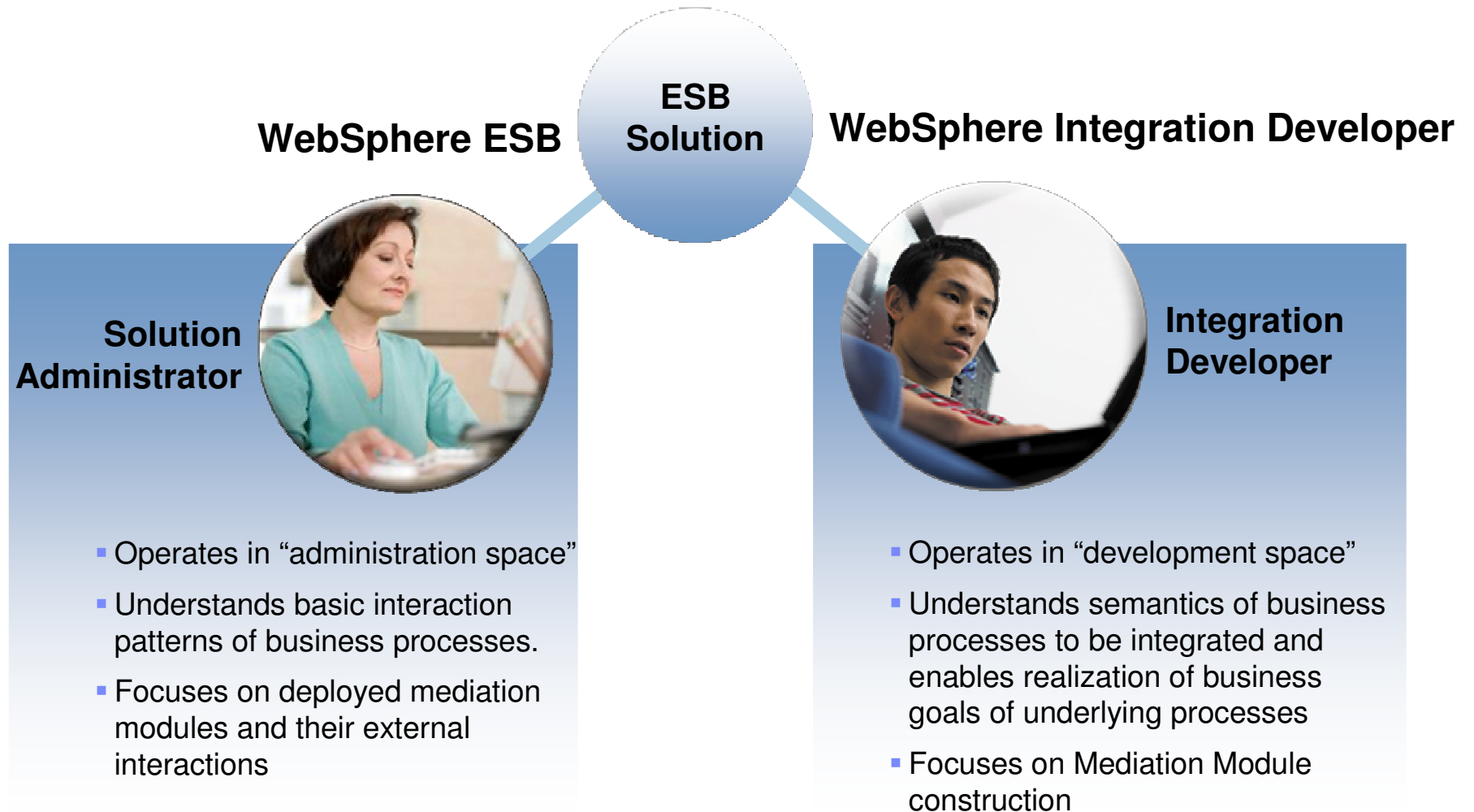




Additional Information on WESB V6.1



User Roles and Tasks





WebSphere ESB Core

Fundamental Services and Connectivity

WebSphere software



HTTP Export / Import [New]

- HTTP 1.0 and 1.1
- SSL over HTTP
- Request/Response invocation
- Static header setting in WID and Admin
- Dynamic header setting via SMO in mediation modules
- Binary, XML and SOAP payloads
 - Plus custom data bindings
- Custom HTTP methods in Import
- Specifiable Content and Transfer encodings
- Endpoint based routing in Export

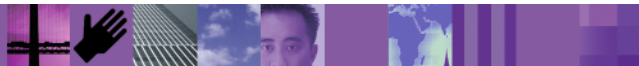
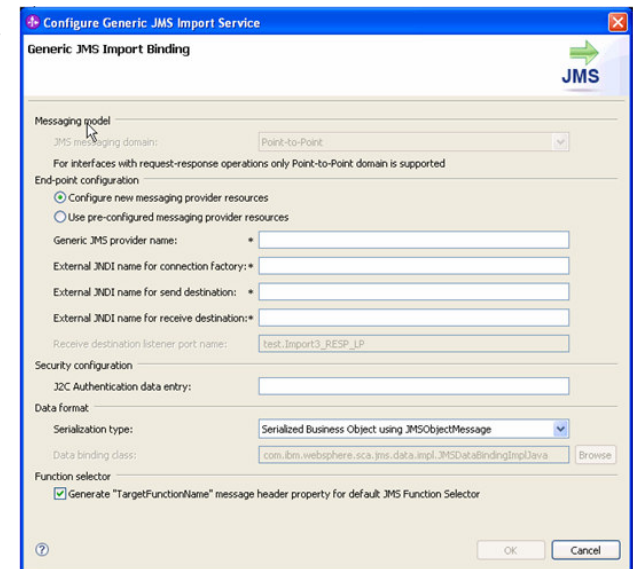
The screenshot illustrates the process of configuring an HTTP binding for a component. The top part shows a context menu for 'CustomerOrderImport' with 'Generate Binding...' selected, which has opened a sub-menu where 'HTTP Binding' is chosen. The bottom part shows the configuration dialog for 'Import: CustomerOrderImport (HTTP Binding)' with the following settings:

Property	Value
Endpoint URL:	http://temp.url
Data Binding:	com.ibm.ws.sca.databinding.impl.DataBindingImplXML
HTTP Version:	1.1
HTTP Method:	GET
Binding description:	



Generic JMS Export / Import Bindings [New]

- Simplify definition of JMS Export/Import binding
 - For 3rd-party JMS 1.1 ASF-compliant providers
 - Oracle AQ, TIBCO, SonicMQ, WebMethods, BEA WebLogic, etc.
 - Avoids Deployment Descriptor editing
 - Automatic setup of WAS Generic JMS resources
 - Manual setup of provider's JMS resources
- Admin visibility and modification of binding properties
 - Now available across all JMS and MQ bindings
- Dynamic JMS header updates via SMO
- Works with existing JMS Data Bindings



WTX Data Bindings [New]

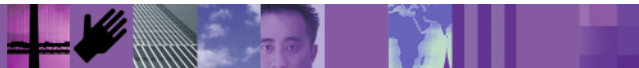
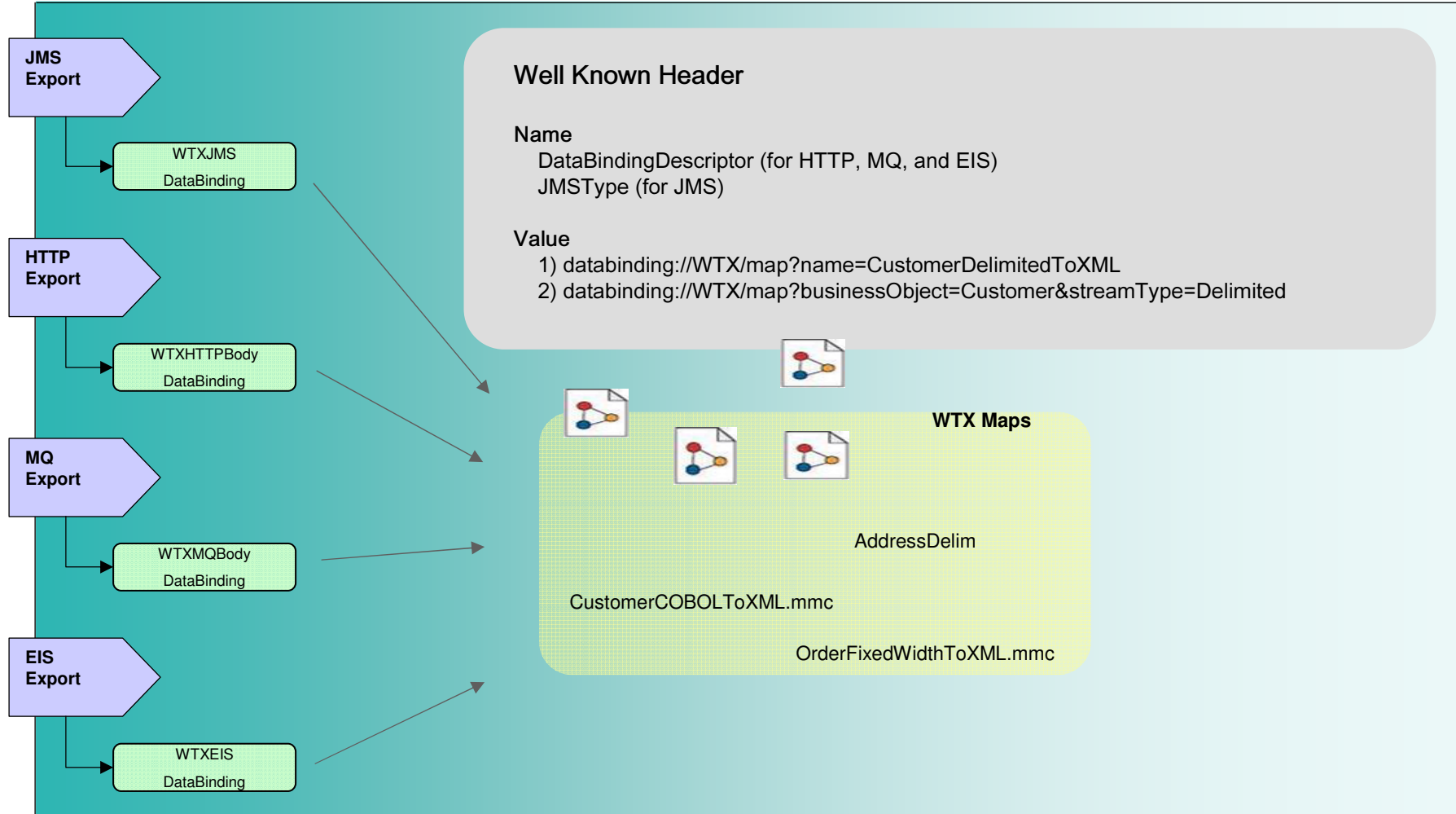
- WebSphere Transformation Extender Integration
 - Toolled Data Bindings
 - Semi-structured to Business Object Transformations
- WPS/WESB & WTX
 - WPS/WESB will provide the data bindings
 - WTX 8.2 must be installed in order to use the data binding
- Exports & Imports
 - JMS, MQ, HTTP, EIS
 - Flexible bindings (any data any format)



WTX Data Bindings

Any Business Object, Any Format

SCA Module





Mediation Updates

New and changed mediation primitives
Service Message Object Updates

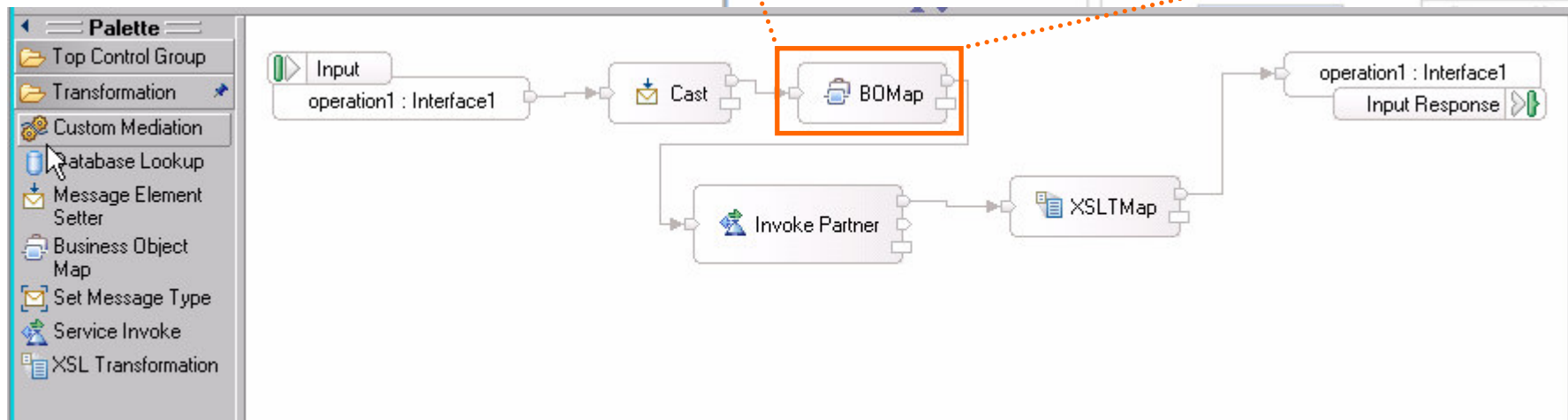
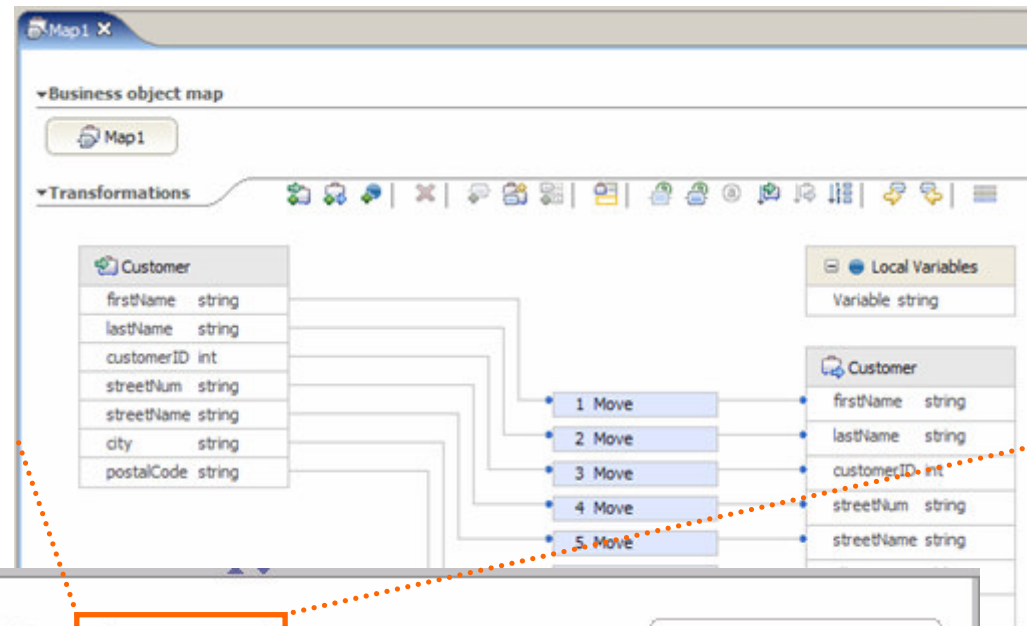
WebSphere software



WESB Enhancements

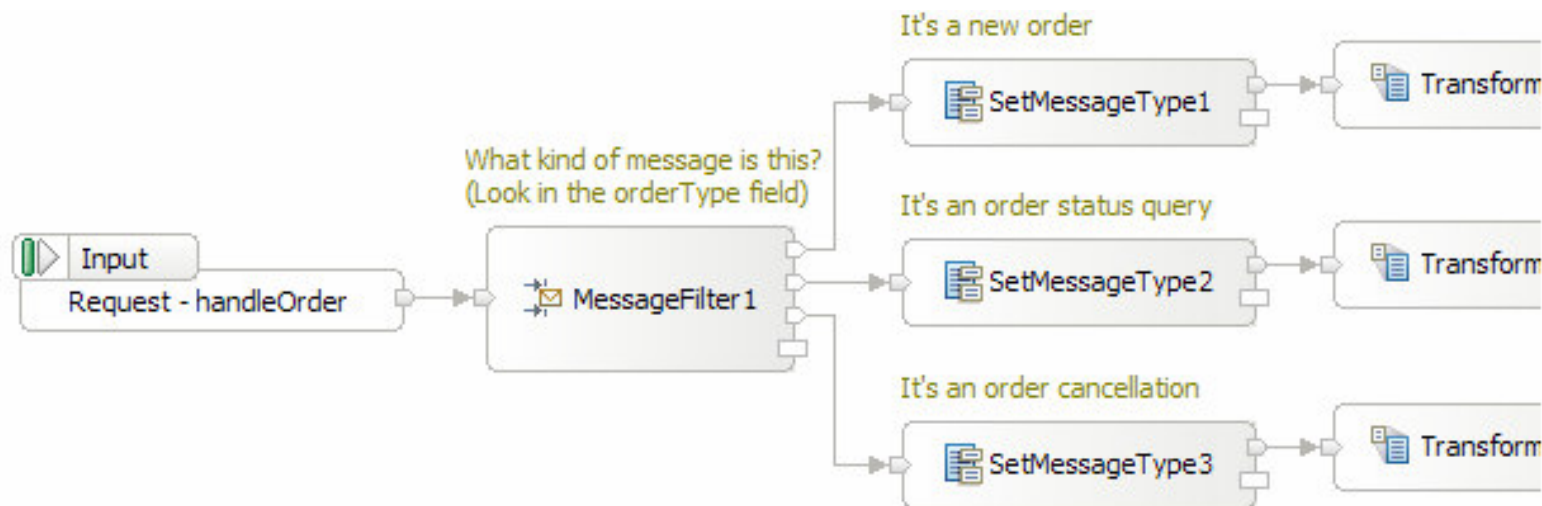
BO Map Primitive

- Enable use of Business Object Maps in Mediation modules
 - An alternative to XSLT transforms
 - Supports relationship based mapping



Mediation Flow Component Type Refinement [New]

- Ability to assert concrete types for message elements described by 'weak types' such as anyType, anySimpleType or any
- New SetMessageType mediation primitive
 - Conceptually performs a 'cast' operation on any part of the message
 - Works with other primitives and XPath support to provide full access to weakly typed message content in mediation flows
 - Weakly typed content can be visualized, mapped and manipulated as if its structure were fully defined in the original BO definition



WESB Enhancements

Service Invocation and Retry Primitive

- Invokes a target service from within a request or response flow
- Includes built-in retry capability; retries x times in event of failure
- Can try/retry a list of target endpoints in turn until success
 - Can exploit multiple endpoints returned from the Endpoint Lookup primitive for this purpose
- Also acts as a building block for aggregating content from more than one service
- Capability similar to existing Callout, but flow continues inline (no switch to response flow)
- New context area in the SMO contains invocation request/response body content
- Service A invocation can be asynchronous

Service Invoke : Invoke Partner

Reference Name:

Operation Name:

Retry On:

Retry Count:

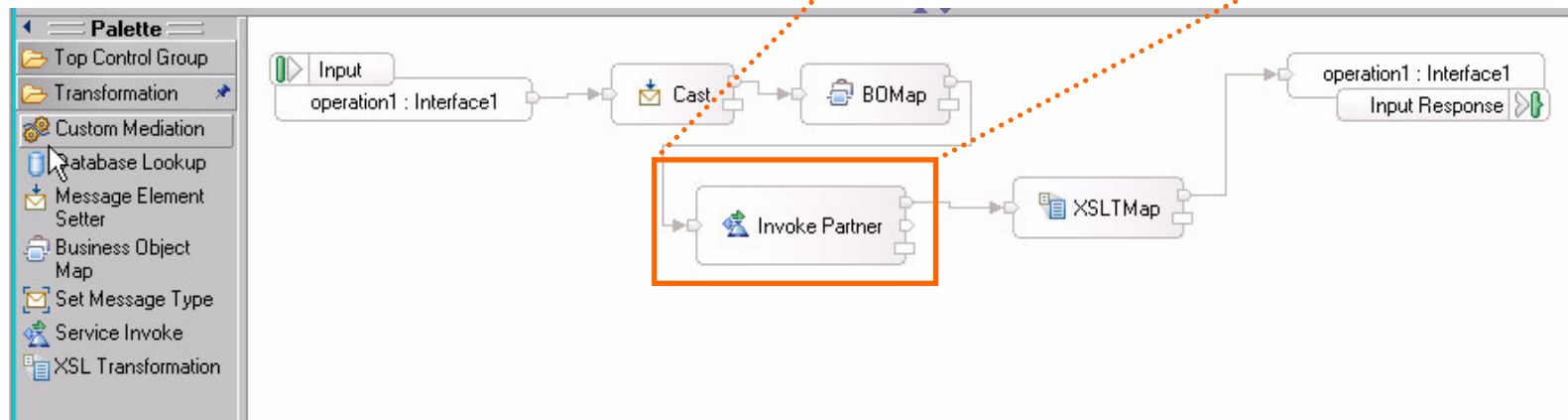
Retry Delay:

Use Dynamic Endpoint

Try Alternate Endpoints

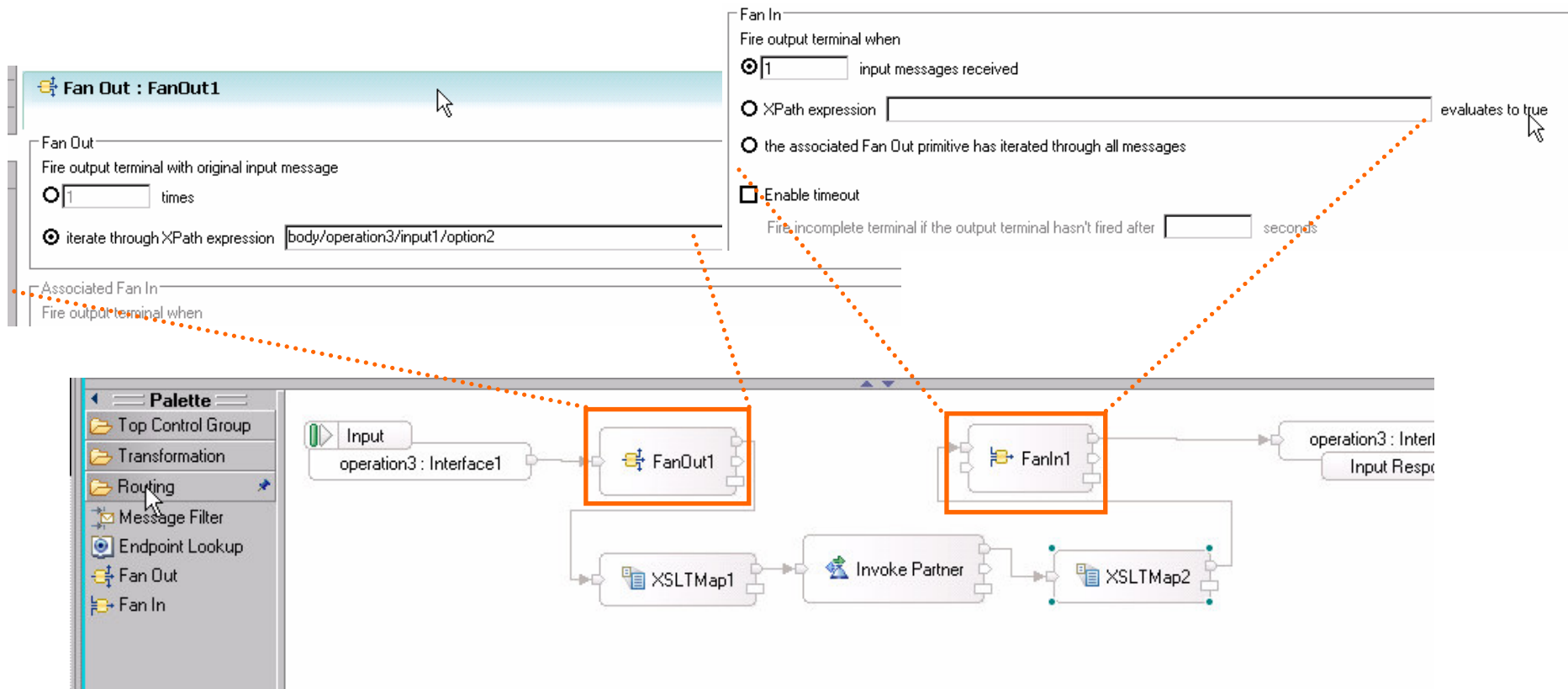
Async Timeout:

Force Sync



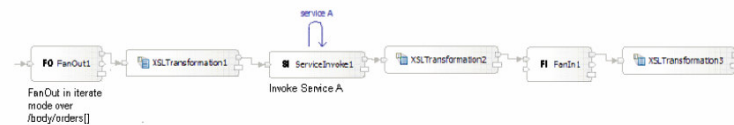
New: FanOut and FanIn Mediation Primitive

- Messages can be split for further processing
- Results can be aggregated

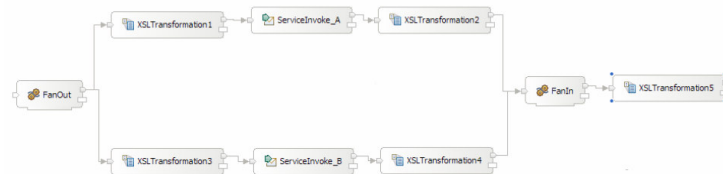


Splitting and Aggregating - details

- New FanOut and FanIn primitives
 - FanOut splits an incoming message based upon a repeating element



- ...or sets up branching paths that are later joined by FanIn



- Allows composite messages to be split up for individual processing of the parts; and assembly of composite messages
- Aggregation supported using ServiceInvoke primitive
 - Invoke multiple services and combine the results



WESB Enhancements

Custom Mediation Primitive

- Multiple input and output terminals
- User-defined properties
- Easy access to ESB mediation primitive programming model

Custom Mediation : CustomMediation1

CustomPropertyGroup CustomUserProperties CustomJavaImports

User Properties:

Name	Type	Value	Required
frequency	Integer	5	<input checked="" type="checkbox"/>

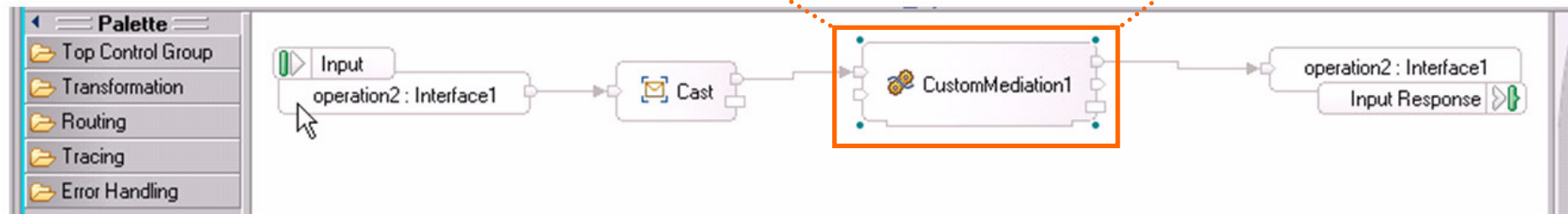
Custom Mediation : CustomMediation1

Implementation: Visual Java

```

/**
 * Variables: for output terminals - out1, out2 (com.ibm.wsspi.sib)
 *            for user properties - frequency (int)
 * Inputs:    inputTerminal (com.ibm.wsspi.sibx.mediation.InputTerr
 * Exceptions: com.ibm.wsspi.sibx.mediation.MediationConfigurationE)
 */
// Fire the output terminal(s)
out1.fire(smo);
out2.fire(smo);

```





ND Topology Configuration

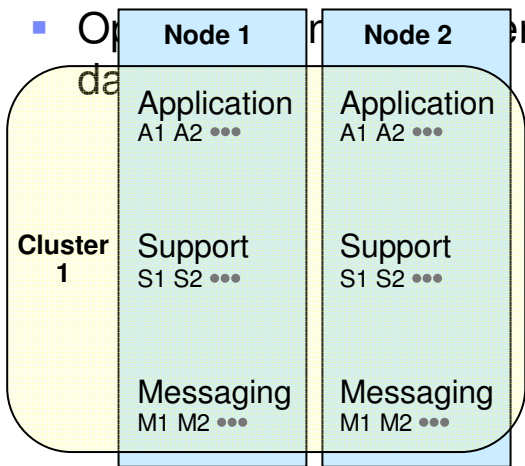
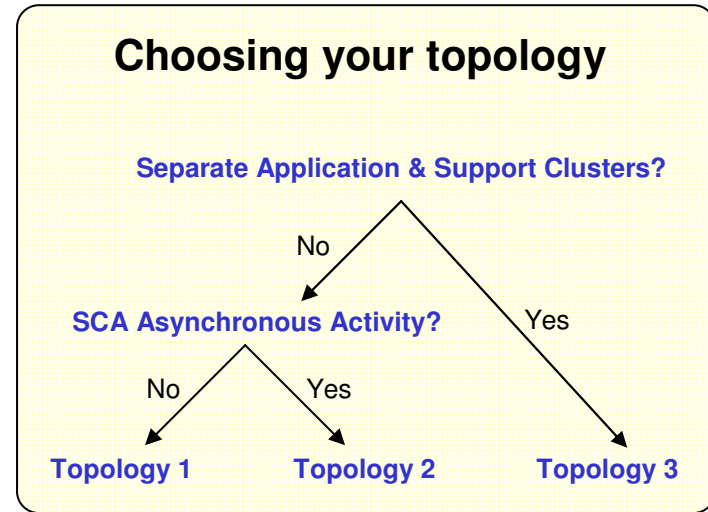
Ease of Use Updates

WebSphere software

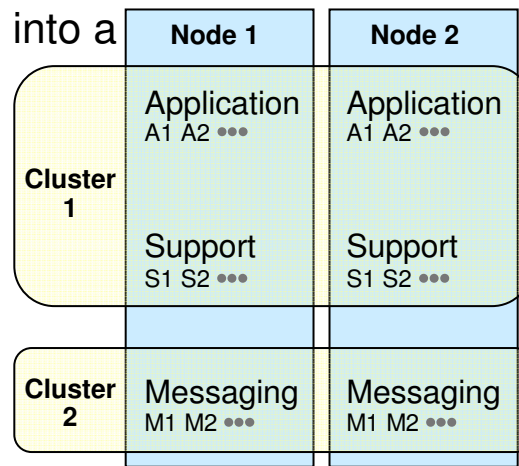


Template-driven ND topology

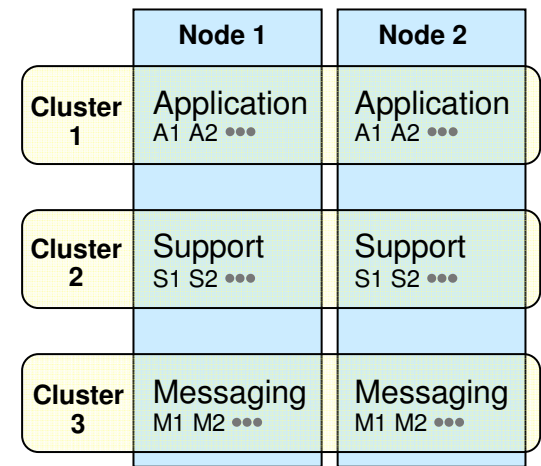
- Wizard driven approach to configuring your ND topology
 - Install support
 - Administration support
- Three primary roles nodes can play
 - Customer applications
 - WPS/WESB Support applications
 - Messaging (Destinations)



Topology 1: Single Cluster



Topology 2: Remote Messaging



Topology 3: Remote Messaging and Support



Summary and Conclusion

WebSphere software



Conclusion

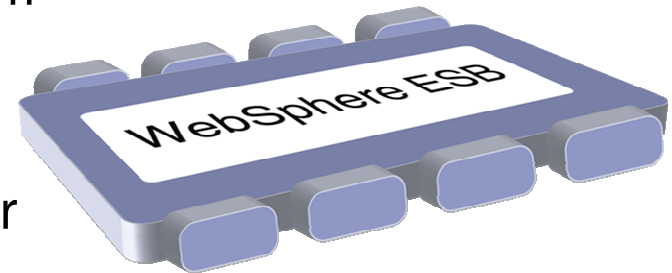
- Key evolution in 6.1, centering on
 - Consumability
 - both administration and development interfaces
 - Completeness of capability
 - Additional connectivity
 - Additional mediation function
- Continued maturation and evolution



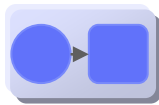
WebSphere ESB for z/OS

Built on WebSphere Application Server for an integrated SOA platform

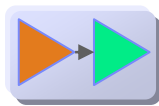
- Integrates seamlessly with WebSphere platform
- Delivers business-critical qualities of service
- Easily extended to WebSphere Process Server
- Integrated solution for service mediation and hosting



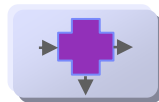
Delivers leadership in SOA standards for service composition, and leverages the embedded messaging and web services engines from WebSphere



Integrates everything with WebSphere Adapters for enterprise applications, the breadth of the WebSphere ecosystem, and support for standard protocols



Optimized for standard XML and web services formats, with basic support for other common formats



Provides business visibility with embedded event engine for Business Activity Monitoring solutions

