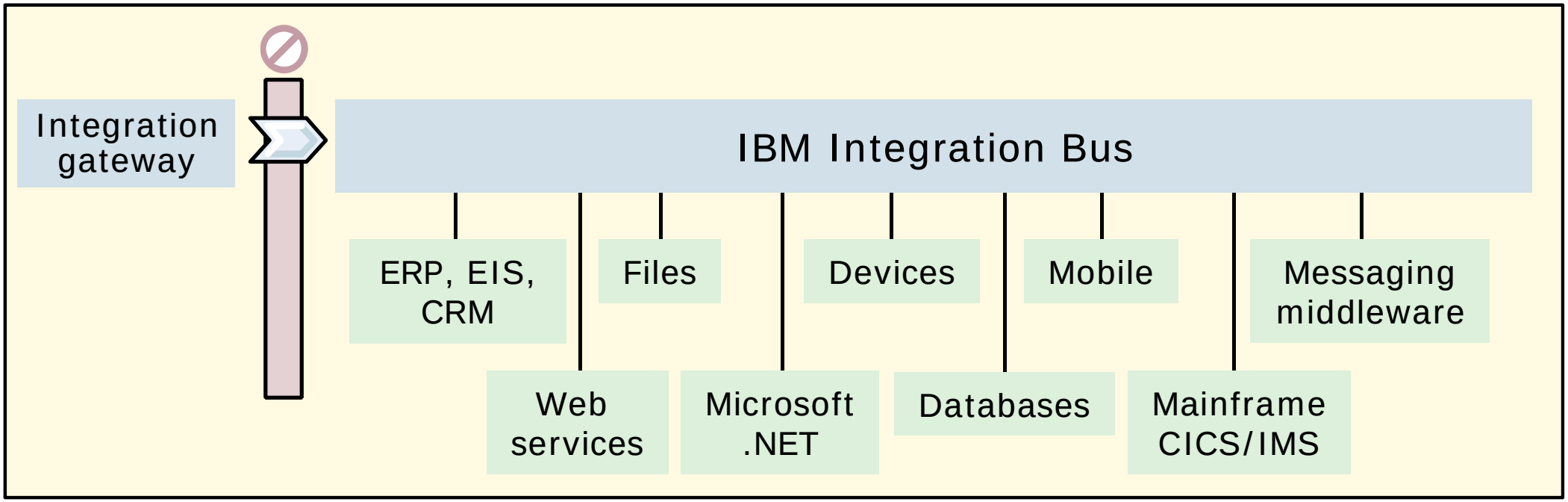
Introduction to IBM Integration Bus

Unit objectives

After completing this unit, you should be able to:

- Describe the features and functions of IBM Integration Bus
- Describe the business value of IBM Integration Bus
- Describe the IBM Integration Bus architecture and components
- Identify the IBM Integration Bus editions

IBM Integration Bus



- IBM Integration Bus provides connectivity across enterprise systems, applications, and data
  - Avoids rewrites in response to new integration requirements
  - Simplifies maintenance by reducing expensive coupling
  - Provides flexibility, which adds anonymity between data producers and consumers
  - Adds insight into applications and the business value that they bring

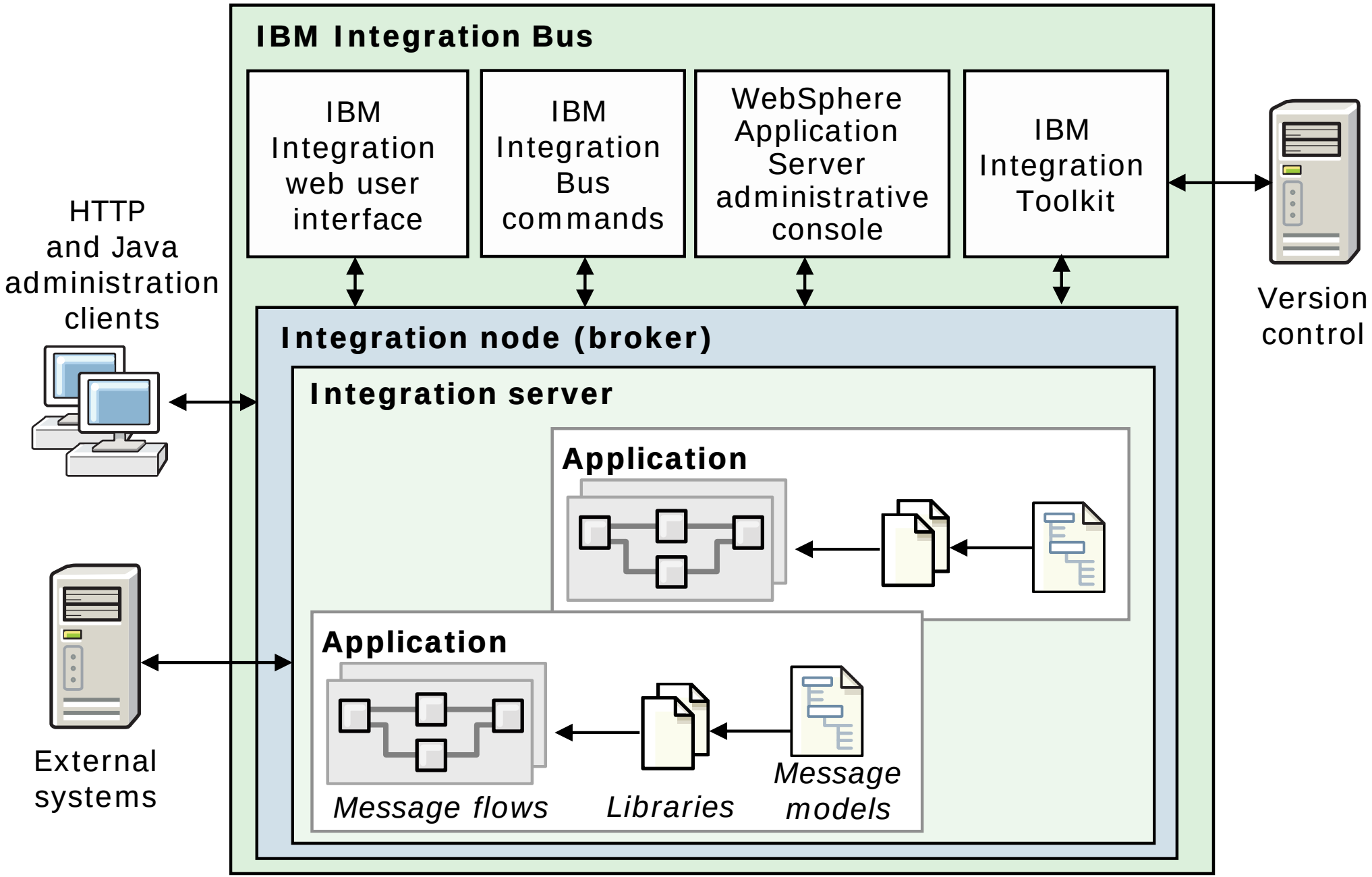
IBM Integration Bus themes

- Simple and productive
  - Quickly develop, deploy, manage, and migrate integration solutions
- Universal and independent
  - Connects to a range of different systems
  - Universal connectivity includes standards, *de facto* standards, industry, and custom systems
- Industry specific and relevant
  - Provides industry relevant connectivity packs to solve domain-specific problems
  - Industry-specific processing nodes, solution-oriented patterns, and user-oriented tooling
- Dynamic and intelligent
  - Allows the creation of dynamic solutions that provide business insight
  - Flexible configuration tools, analysis of data and intelligence
- High performing and scalable
  - Provides hardware, software, and technology neutral connectivity options
  - Works on the widest possible range of hardware, software, and virtualized environments

IBM Integration Bus features

- Transform and route data from anywhere, to anywhere
  - Supports a wide range of protocols and data formats
  - Includes comprehensive operations to route, filter, transform, enrich, monitor, distribute, decompose, sequence, correlate, and detect
  - Converts transport protocols between a requester and a service
  - Handles business events from disparate sources
  - Implements transformation by using graphical mapping, Java, ESQL, and XSL
  - Publish/subscribe with IBM MQ or MQTT
- Patterns provide reusable solutions that encapsulate a tested approach to solving a common architecture, design, or deployment task
- Operational management and performance
  - Provides administration and systems management options for developed solutions
  - Offers performance of traditional transaction processing environments
  - Web tools for real-time performance statistics
  - Integration with software products from IBM and other vendors that provide related management and connectivity services

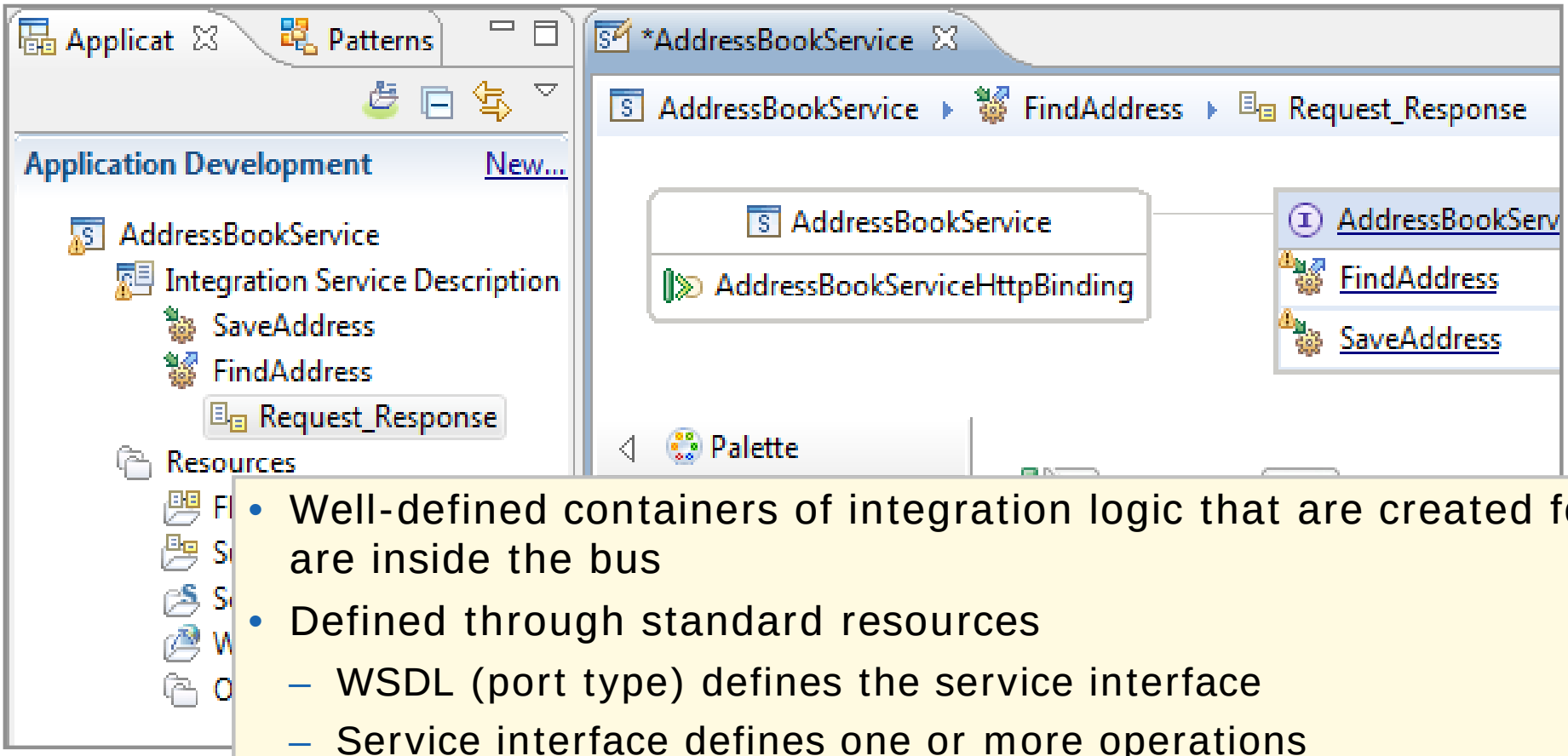
IBM Integration Bus main components



IBM Integration Bus runtime components

- Integration node
  - Routes, transforms, and enriches in-flight messages as determined by message flows and message models
  - Can be many integration nodes, each running on separate systems to provide protection against failure or separate the work
- Integration server
  - Named grouping of message flows that are assigned to an integration node
  - Each integration server is a separate operating system process, which provides isolated runtime environments for a set of deployed message flow applications
- Message flow applications
  - Describe the application connectivity logic, which defines the exact path that the data takes in the integration node, and the processing that is applied to it by the message processing nodes in that flow
  - Reference message models that describe the data

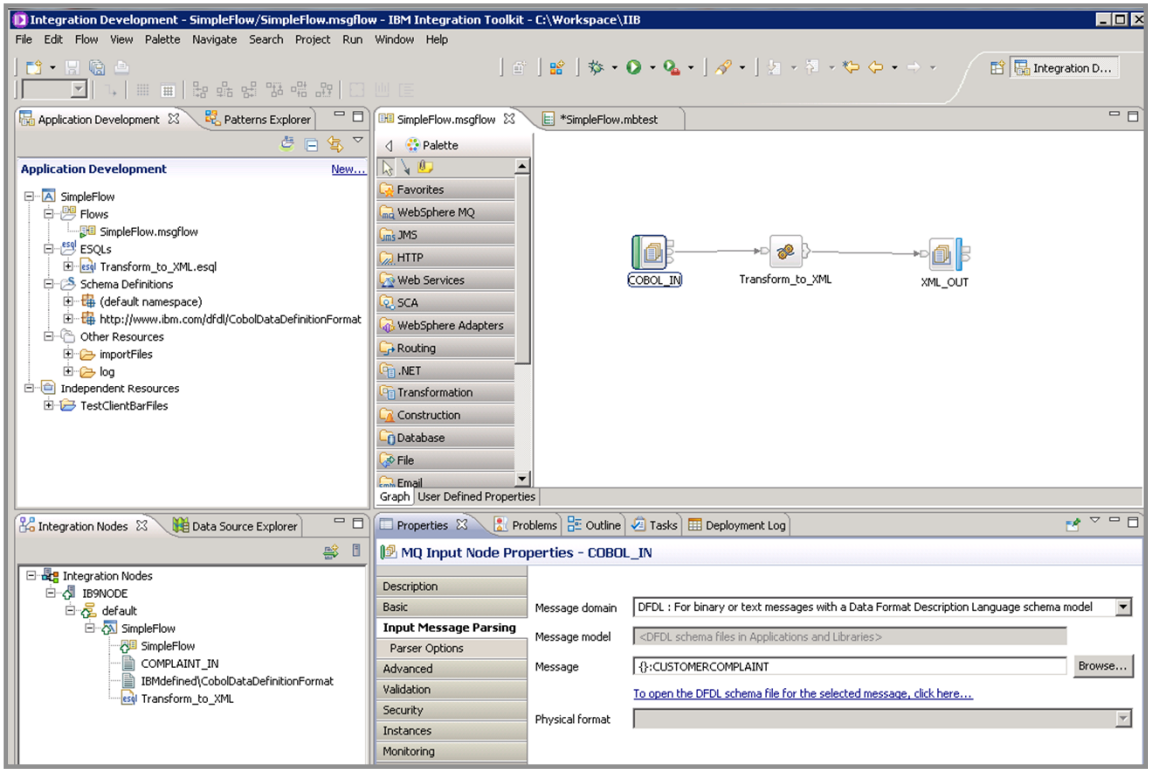
IBM Integration Bus integration services



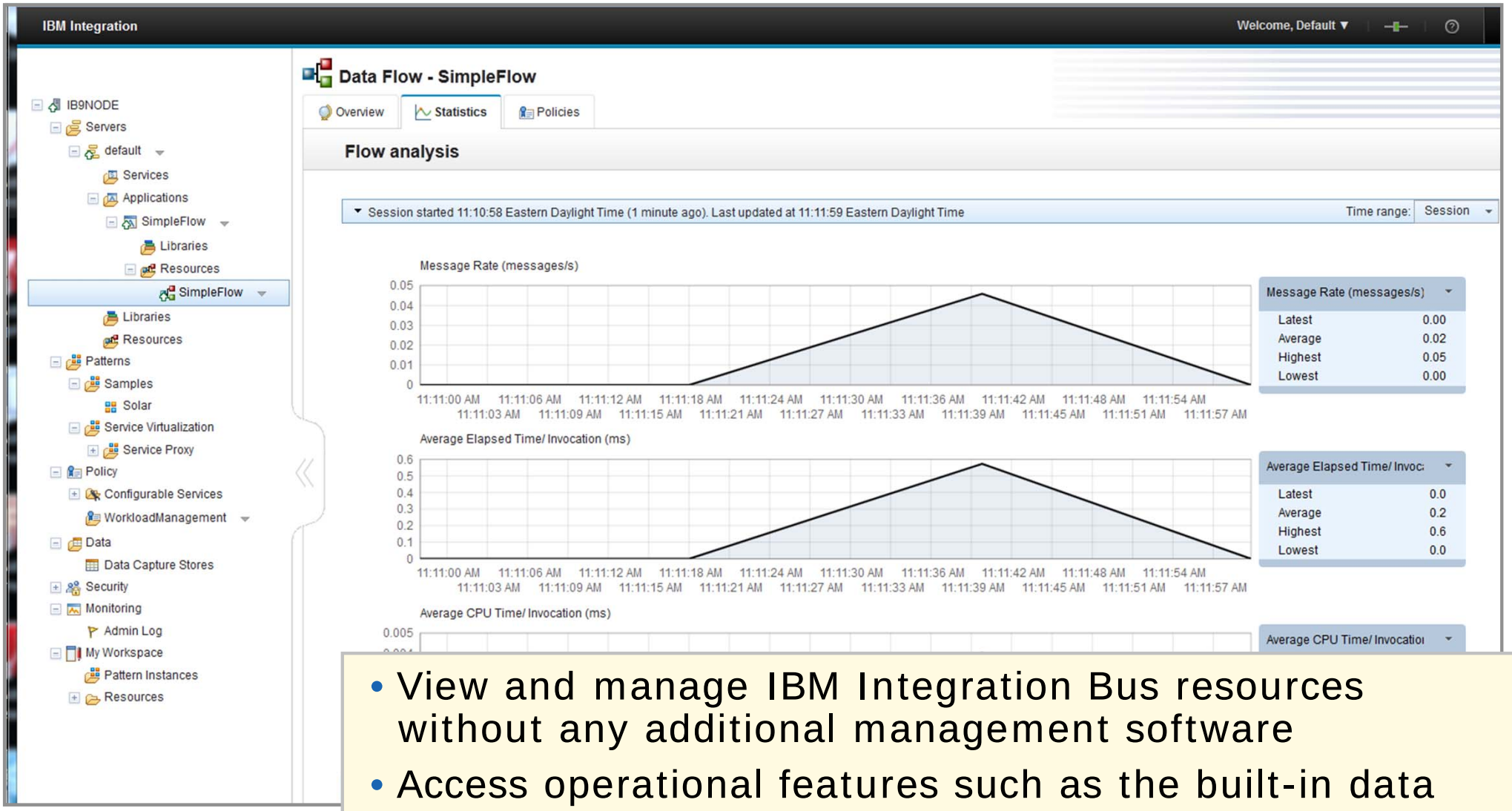
- Well-defined containers of integration logic that are created for and are inside the bus
- Defined through standard resources
  - WSDL (port type) defines the service interface
  - Service interface defines one or more operations
  - Service descriptor (XML) ties the service interface with the implementation
- Simple lifecycle for services creation and management
  - Simple creation of new integration services
  - Deployment is the same as standard integration applications

IBM Integration Toolkit

- An integrated development environment and graphical user interface that is based on Eclipse
- A single perspective for compiling, testing, deploying, and fixing message flows
- Connects to one or more integration nodes to which the message flow applications are deployed
- Connects to patterns galleries for getting started quickly
- Runs on Microsoft Windows and Linux on x86



IBM Integration web user interface



- View and manage IBM Integration Bus resources without any additional management software
- Access operational features such as the built-in data record and replay tool
- Configure policy-based workload management
- Deploy IBM Integration Bus applications

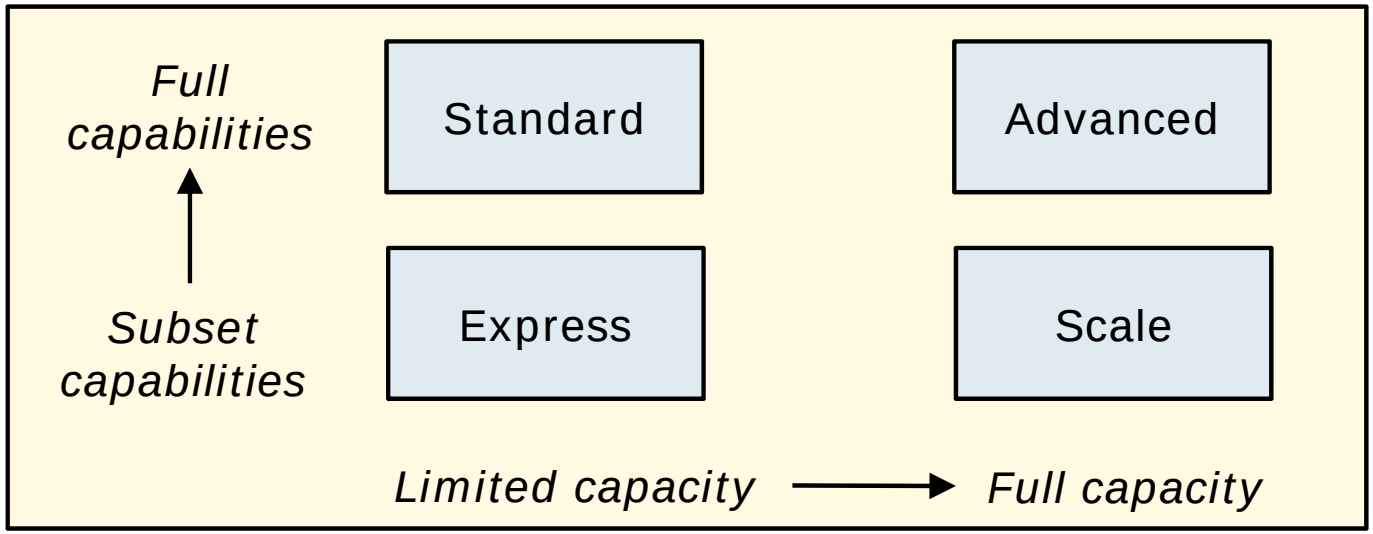
IBM Integration Bus command utilities

- IBM Integration Toolkit and run time commands
- Available on operating systems that IBM Integration Bus supports
  - z/OS requires a product such as SDSF to allow mixed case on the command line
  - On Windows, components are services and can be started automatically
- Some commands require extra security configuration

IBM Integration API

- Java administration API for IBM Integration Bus
- Applications can use the API to control integration nodes and their resources through a remote interface
  - Deploy files
  - Change the integration node configuration properties
  - Create, modify, and delete integration servers
  - Inquire and set the status of the integration node and its associated resources
  - Get information about the status of integration servers, deployed message flows, and deployed files that are used by the message flows
  - View the integration node Administration log
  - View the integration node Activity log
  - Create and modify message flow applications

IBM Integration Bus operation modes



Mode	Features	Integration servers	Deployed message flows
Express	Limited set of message flow nodes	One	Unlimited
Scale	Limited set of message flow nodes	Unlimited	Unlimited
Standard	All features enabled	One	Unlimited
Advanced	All features enabled	Unlimited	Unlimited

Supported hardware and environments

- Operating systems and hardware
  - AIX, Windows, z/OS, HP-UX, Linux on System x, pSeries, zSeries, Solaris (x86-64 and SPARC), Ubuntu
  - Optimized 64-bit support on all platforms
- Virtual images for efficient utilization and simple provisioning
  - Extensive support for virtualized environments such as VMWare and AIX Hypervisor
  - Pre-built images (Hypervisor editions) available on Linux on System x and AIX
  - Support for public and private clouds such as SoftLayer and Pure
  - Chef scripts for automated building of flexible IBM Integration Bus images on GitHub

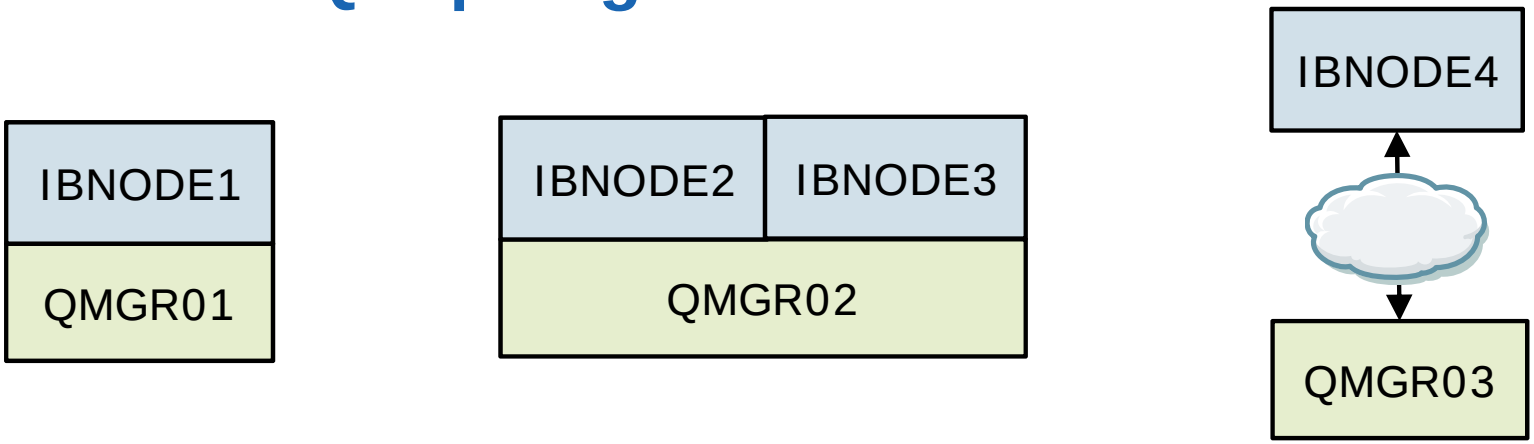
Supported software

- Supports access to industry standard databases
  - DB2, Oracle, Sybase, SQL Server, Informix, solid DB
  - Open Driver Manager support enables new ODBC databases to be accessed
  - JDBC Type 4 for popular databases
- Supports access to message-oriented middleware
  - IBM MQ 7.0.1, 7.1, 7.5, and 8.0
  - JMS 1.2 and 2.0
- Includes access to ERP systems such as SAP, Siebel, PeopleSoft, and JD Edwards

Technology components and prerequisites

- IBM MQ
  - Optional on distributed systems for most applications
  - Required on z/OS and for the use of some IBM Integration Bus features
- Java 7.1 on all platforms
- Other prerequisites are determined by operating system and hardware
  - Detailed system requirements are on `www.ibm.com/integration-bus`

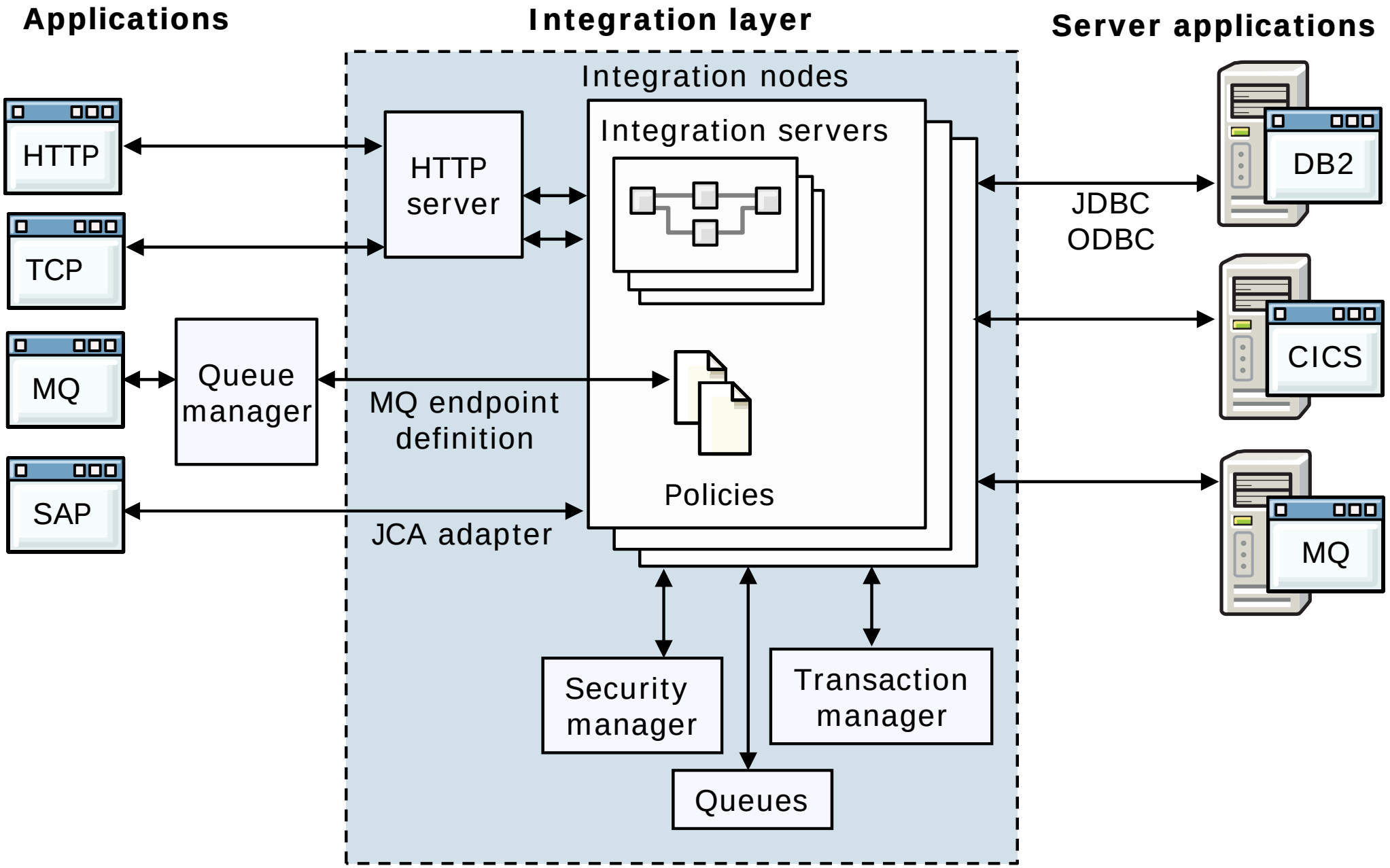
Flexible IBM MQ topologies



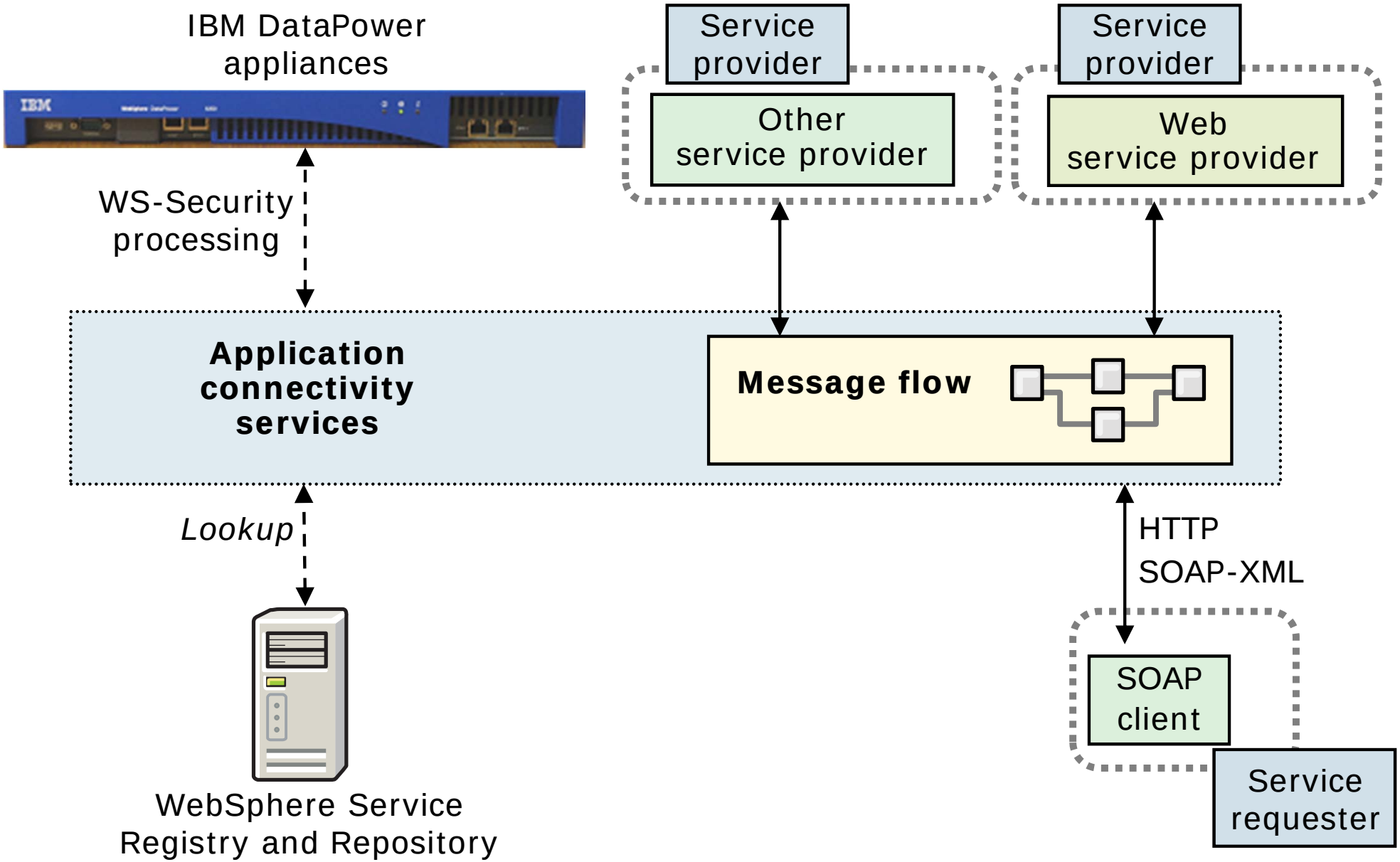
- On distributed systems, IBM MQ is not a prerequisite in most implementations
- On z/OS, IBM MQ is required for installation
- Flexible topology options for IBM MQ access for simplicity, scalability, availability, and migration
- If IBM MQ is installed, IBM Integration Bus detects IBM MQ and configures it
- IBM MQ policies identify run time resources

***Note**: On z/OS, only local connections to queue managers are supported

Connectivity to external systems



IBM Integration Bus web services

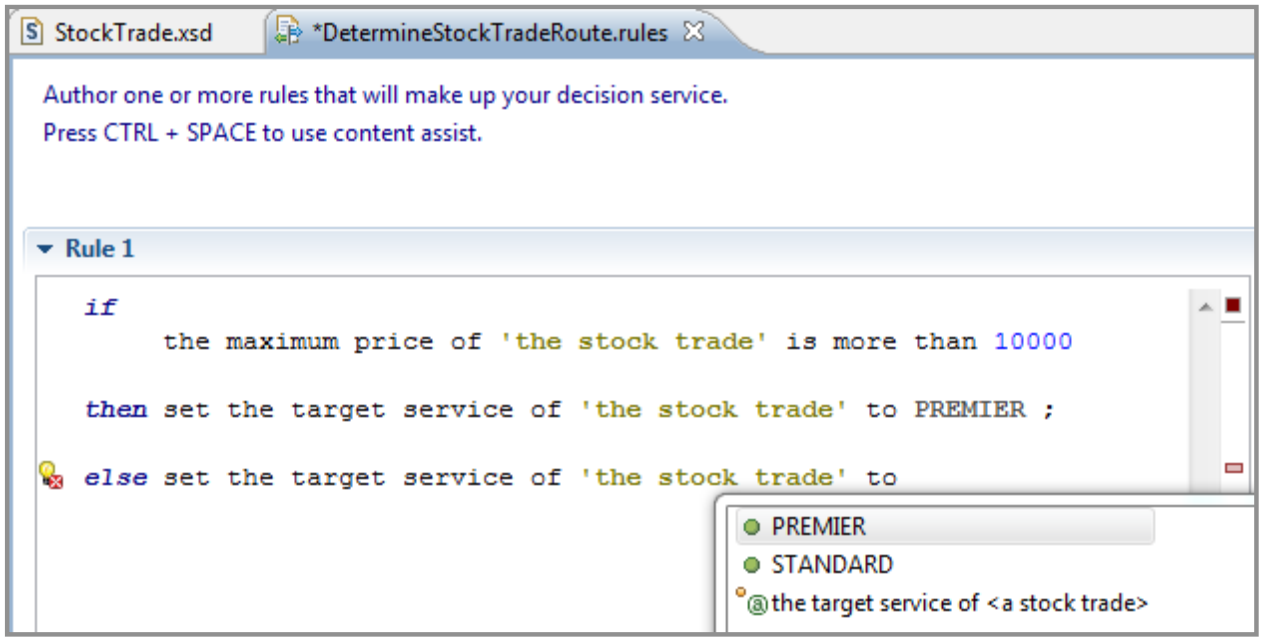


IBM Integration Bus and publish/subscribe support

- IBM Integration Bus uses publish/subscribe to notify applications of significant events that occur in integration nodes
- IBM Integration Bus supports IBM MQ and MQTT for publish/subscribe
  - Choose the publish/subscribe broker based on processing requirements and your existing architecture
- A built-in MQTT broker is provided with IBM Integration Bus
  - MQTT publication is enabled by default for all events that are generated by the integration node except for business events
- If IBM MQ is installed, you can use the IBM MQ publish/subscribe broker
  - IBM Integration Bus connectivity can be published as an IBM MQ publication
  - IBM MQ queue manager delivers the publication to all subscribing applications that match the topic, and other options that are specified on their subscriptions

Decision management in IBM Integration Bus

- Provides business insight during integration data flows
- DecisionService node
  - Identifies inputs to business rules from in-flight data
  - Starts built-in rule engine to run business logic
  - Captures rules output for downstream processing



- User can create rules in IBM Integration Toolkit or optionally refer to business rules on external IBM Operational Decision Manager decision server
- Embedded rules engine acts on business rules in the flow
  - Rule runs in the same operating system process as integration data flow
  - Rule update notification ensures consistent rule execution

IBM Integration Bus runtime security

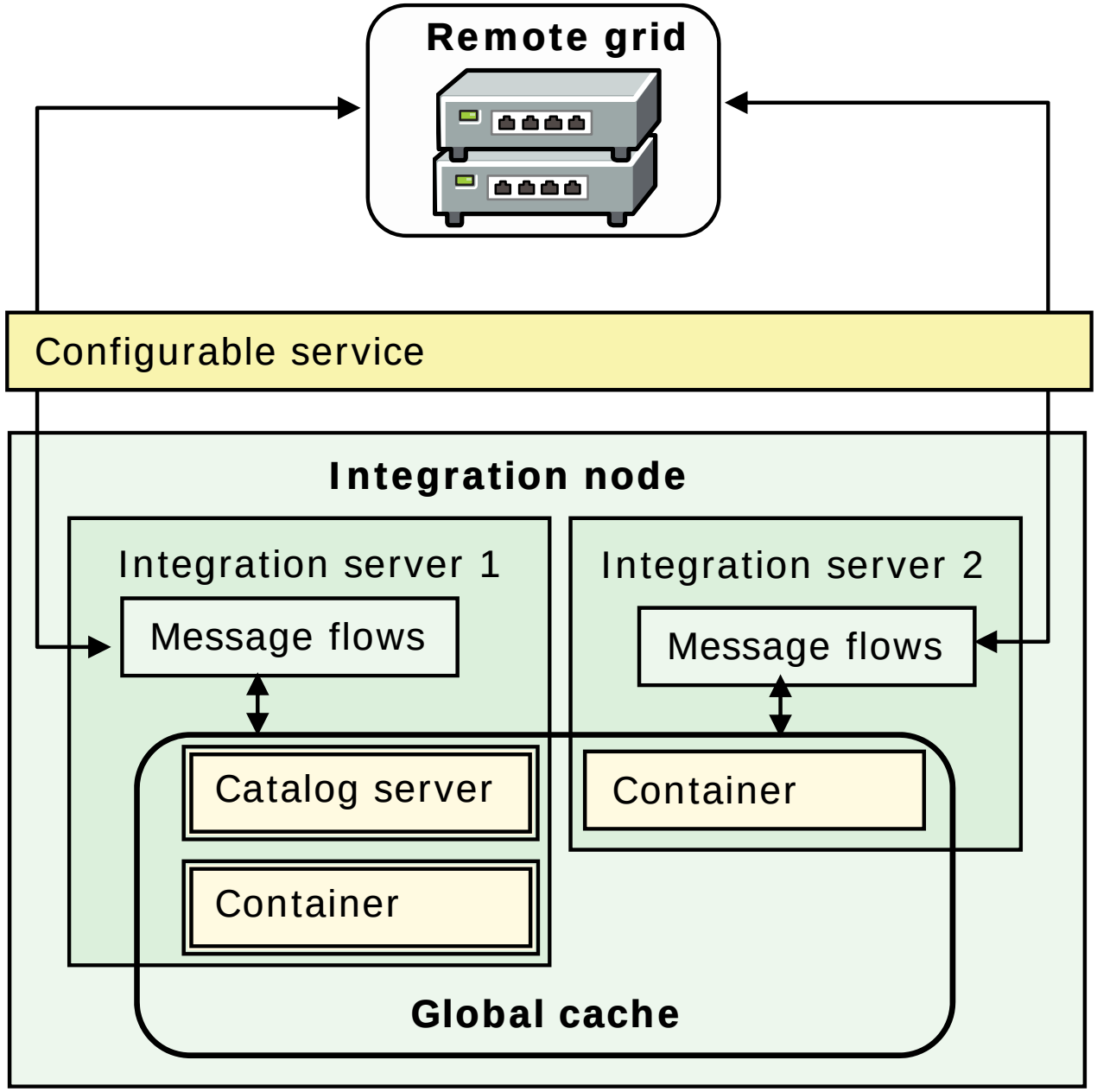
- Identifies who is authorized to submit a message to a message flow
- IBM Integration Bus Runtime Security Manager controls
  - Allows end-to-end processing on behalf of the identity in the message
  - Specifies identity authentication, mapping, authorization, and propagation
  - Administrator configures by using security profiles
- Uses centralized security provider
  - LDAP for authentication and authorization
  - IBM Tivoli Federated Identity Manager for authentication, authorization, and mapping
- Choose between file-based authorization or IBM MQ queue-based authorization
- Can be offloaded to an IBM DataPower appliance
- Specifies resources that are accessible to that message flow

Operational management and performance

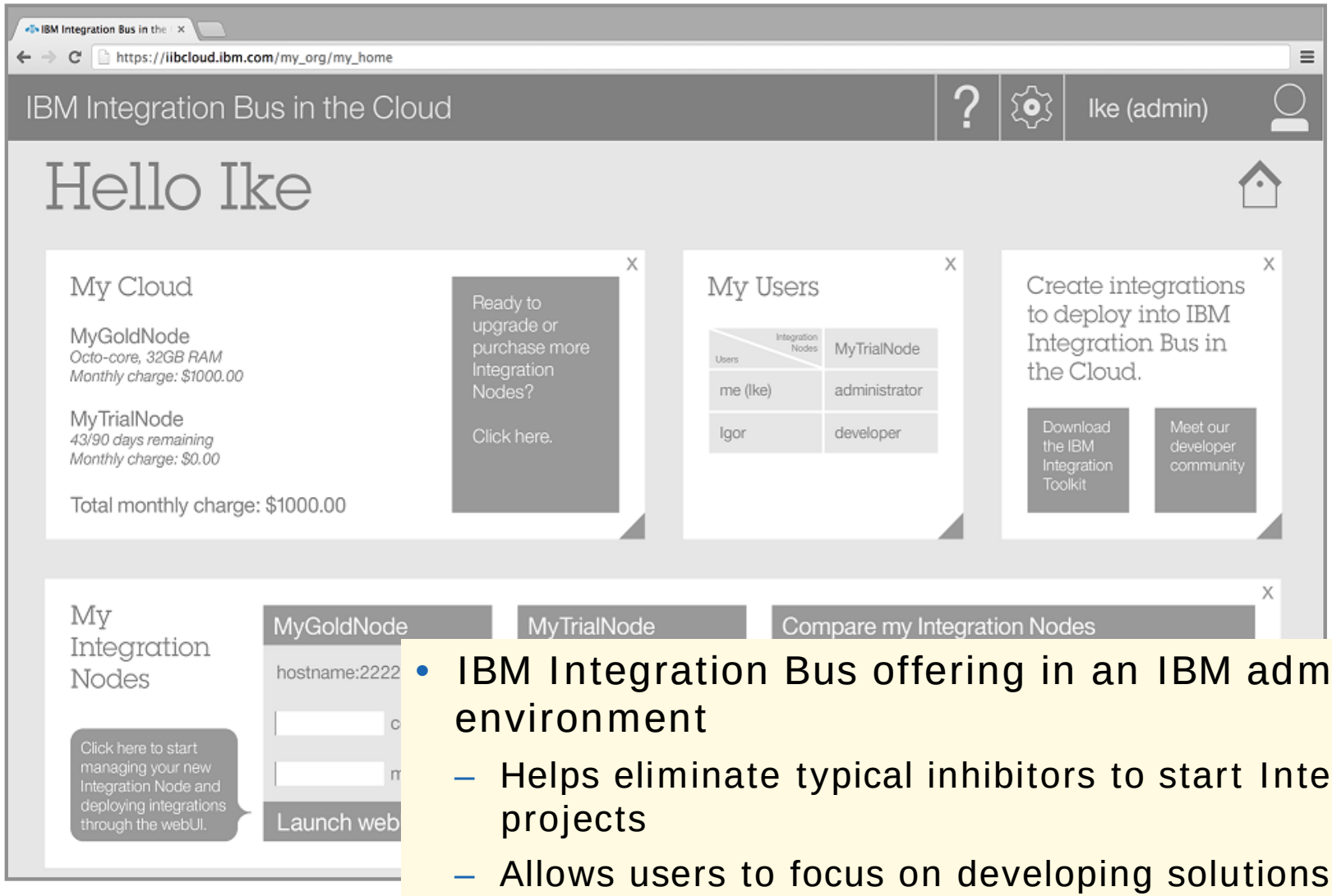
- Record and replay
  - Record messages to a database when they pass through a message flow
  - Use for problem determination, auditing, or collection data from a production system for replay on a development system
- Global caching
  - Store data that you want to reuse by using the embedded global cache or an external WebSphere eXtreme Scale grid
- High availability
  - Multi-instance integration nodes with IBM MQ or an existing high-availability manager

Connectivity to WebSphere eXtreme Scale grids

- Can connect to external WebSphere eXtreme Scale grid
- Connect to multiple external grids, and the embedded global cache at the same time
- Interactions with external grids are logged in Activity Log and Resource Statistics in the same way as for the embedded global cache



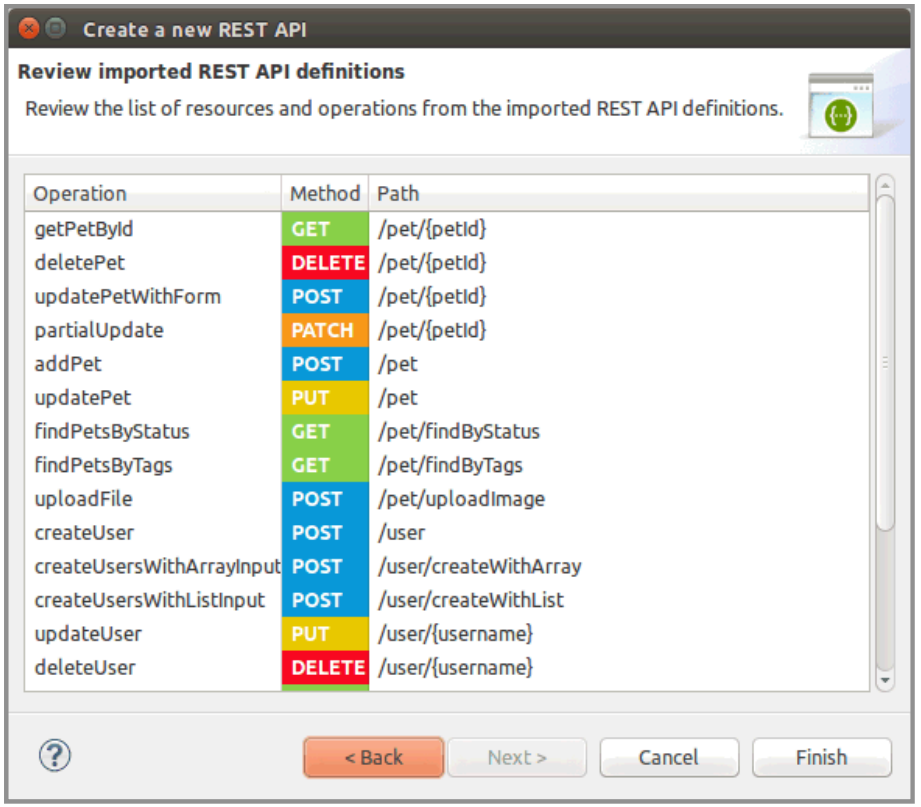
IBM Integration Bus in the Cloud



- IBM Integration Bus offering in an IBM administered cloud environment
  - Helps eliminate typical inhibitors to start Integration Bus projects
  - Allows users to focus on developing solutions
  - Within the constraints of a cloud environment, developers can use the same development tools for both cloud and on-premise software and assets that are generated can be deployed to either environment

Using IBM Integration Bus to provide a REST API

- Provides a way to receive JSON over HTTP/HTTPS and expose a REST API
  - Create a REST API in the IBM Integration Toolkit
  - Administer REST APIs as an IBM Integration Bus construct in the IBM Integration web user interface
- IBM Integration Toolkit REST API project
  - Import Swagger V2.0 JSON file to create the REST API project in the IBM Integration Toolkit
  - Defines a metadata format that is based on JSON schema to describe the REST APIs, their parameters, and the messages that are exchanged
  - Original JSON files are included in the project
  - Can use Swagger user interface to test and generate client code bindings

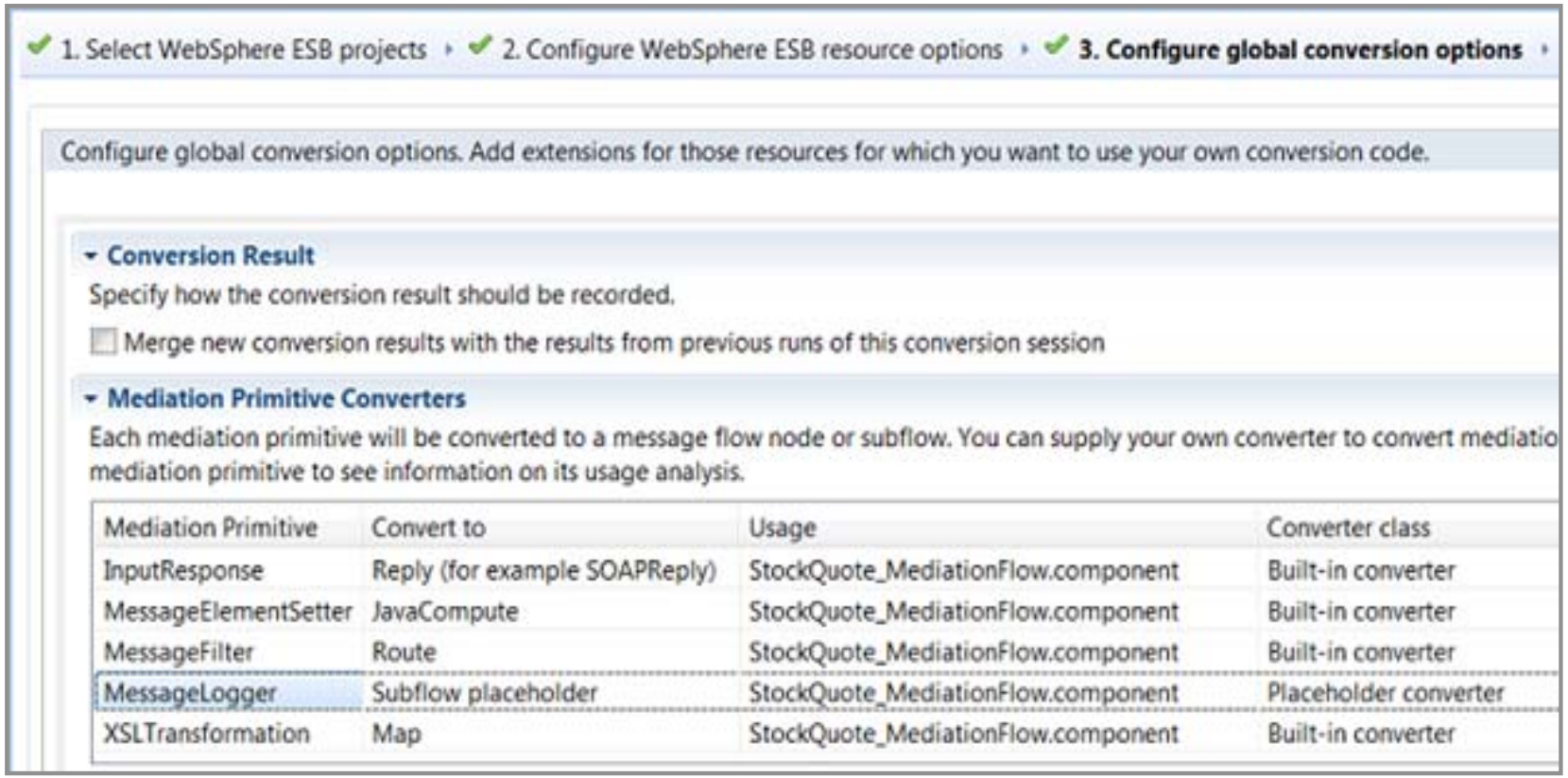


IBM Integration Bus Industry Packs

- **IBM Integration Bus Healthcare Pack** provides prebuilt patterns and connections that enable rapid clinical application and device integration for more connected healthcare systems
- **IBM Integration Bus Manufacturing Pack** helps to integrate heterogeneous IT and operational manufacturing systems and make information flow more quickly and reliably
- **IBM Integration Bus Retail Pack** accelerates the development and deployment of integration between retail applications and systems, and enables the transformation and enrichment of data

Conversion from WebSphere Enterprise Service Bus

- Built-in conversion tools for WebSphere Enterprise Service Bus source
  - Preserves structural wiring between primitives of a mediation flow
  - No minimum version requirement of WebSphere Enterprise Service Bus source
  - Remaining manual tasks are provided in a task list
- WebSphere Enterprise Service Bus customers can obtain a transfer license to migrate to IBM Integration Bus, and to create and run integration servers in Scale mode



Supported migration paths

- You can migrate to IBM Integration Bus Version 10.0 from:
  - WebSphere Message Broker Version 7.0.0.5 or later
  - WebSphere Message Broker Version 8.0
  - IBM Integration Bus Version 9.0

- You can migrate only to a full edition of IBM Integration Bus Version 10.0, Remote Adapter Deployment, Express Edition, or Standard Edition

Note: IBM Integration Bus Version 10.0 does not include IBM Integration Explorer. There is no migration process for IBM Integration Explorer or WebSphere Message Broker Explorer

Unit summary

Having completed this unit, you should be able to:

- Describe the features and functions of IBM Integration Bus
- Describe the business value of IBM Integration Bus
- Describe the IBM Integration Bus architecture and components
- Identify the IBM Integration Bus editions

Checkpoint questions

1. Choose all the tasks that you can do with IBM Integration Bus:
   a. Send a message to one or multiple destinations that depend data content
   b. Use a database to select or store message information
   c. Transform messages so that diverse applications can understand and process them
   d. Create a workflow with long-running or manual processes
   e. Monitor message flows
   f. Customize processing by using supplied, customer-programmed, or third-party plug-in nodes
   g. Publish a message to other applications based on a topic or the content
   h. Get data directly from various applications, triggered by events

Checkpoint answers

1. Choose all the tasks that you can do with IBM Integration Bus:
   a. Send a message to one or multiple destinations that depend on the data content
   b. Use a database to select or store message information
   c. Transform messages so that diverse applications can understand and process them
   d. Create workflow with long-running or manual processes
   e. Monitor message flows
   f. Customize processing by using supplied, customer-programmed, or third-party plug-in nodes
   g. Publish a message to other applications based on topic or content
   h. Get data directly from various applications, triggered by events

The correct answers are a, **b**, **c**, **e**, **f**, and **g**.

Choice “d” is incorrect; use WebSphere Business Process Manager instead.
Choice “h” is incorrect; use WebSphere Adapters instead.