Introduction to IBM App Connect Enterprise

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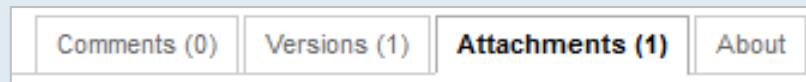
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Unit objectives

- Describe the features and functions of IBM App Connect Enterprise
- Describe the business value of IBM App Connect Enterprise
- Describe the IBM App Connect architecture and components
- Identify the IBM App Connect editions

Key concepts in this unit (1 of 2)

- ACE   App Connect Enterprise
- API   Application Programming Interface
- BAR   Broker Archive
- CICS   Customer Information Control System
- COBOL   Common Business Oriented Language
- CRM   Customer Relationship Management
- EDI   Electronic Data Interchange
- EIS   Enterprise Information System
- ERP   Enterprise Resource Program
- ESB   Enterprise Service Bus
- ESQL   Extended Structured Query Language
- FTP   File Transfer Protocol
- HTTP   HyperText Transfer Protocol
- IIB   IBM Integration Bus

Key concepts in this unit (2 of 2)

- JCA   J2EE Connector Architecture
- JDBC   Java Database Connectivity
- JMS   Java Message Service
- JSON   JavaScript Object Notation
- MQ   Message Queue
- MQTT   Message Queueing Telemetry Transport
- ODBC   Open Database Connectivity
- REST   Representational State Transfer
- SOAP   Simple Object Access Protocol
- SWIFT   Society for Worldwide Interbank Financial Telecommunications
- TCP/IP   Transfer Control Protocol / Internet Protocol
- XML   Extensible Markup Language
- XSL   XML Stylesheet

Topics

- Overview and background
- Features and functions
- Architecture
- Developer tools
- Supported hardware and software
- Connectivity to external systems
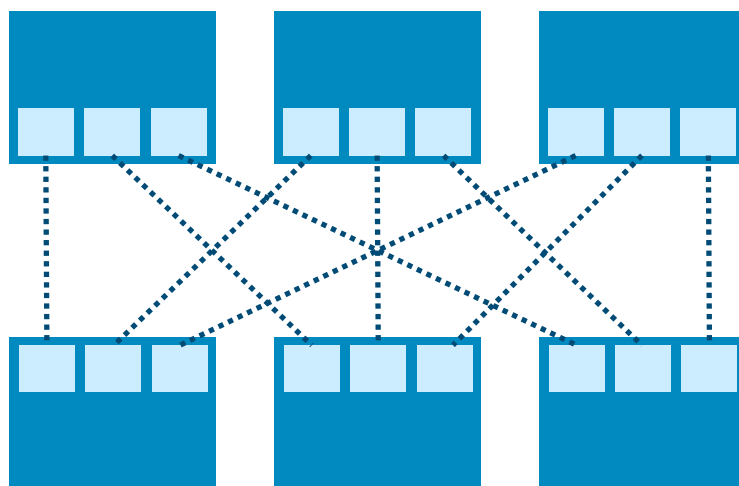- Operational management

Overview and background

Background

- App Connect Enterprise can be used to support the hub-and-spoke architectural pattern.
- This pattern is used with an enterprise service bus (ESB) to expose services within an enterprise.
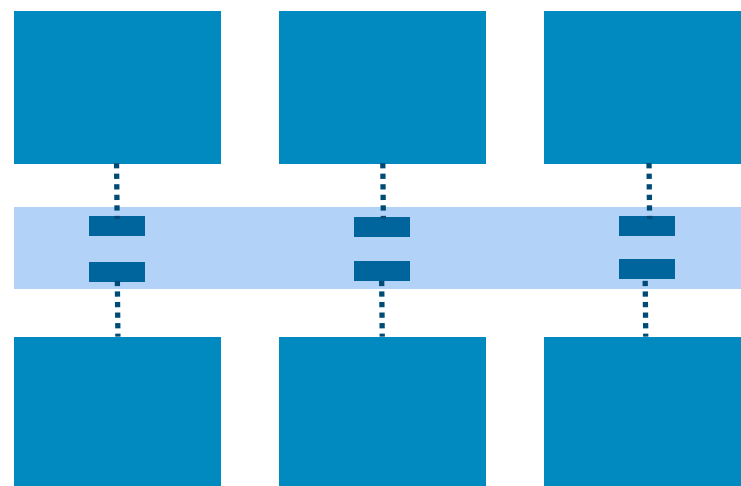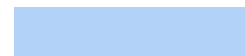
Point to point

Hub and spoke

Application

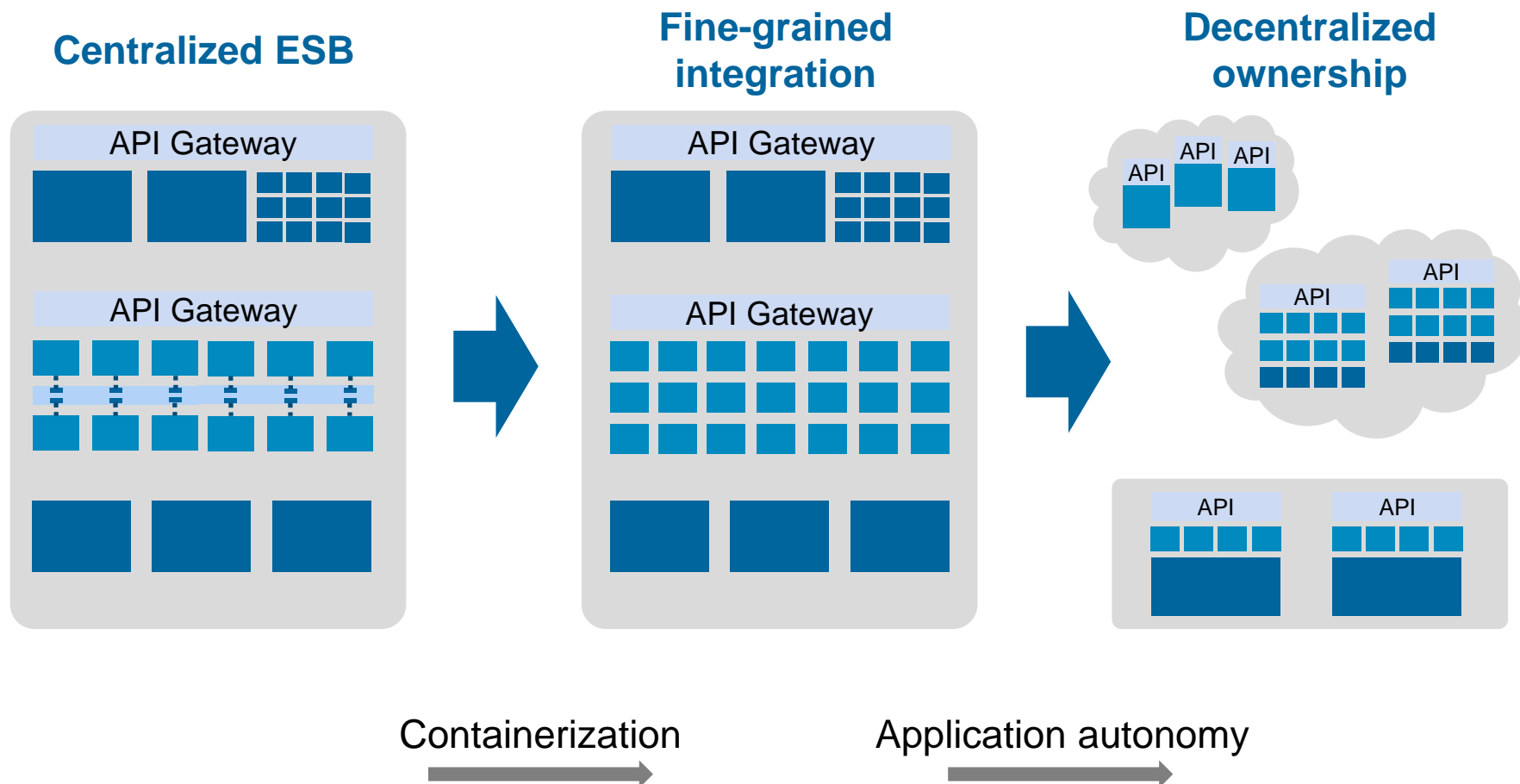Integration code

Reusable connector

Integration hub
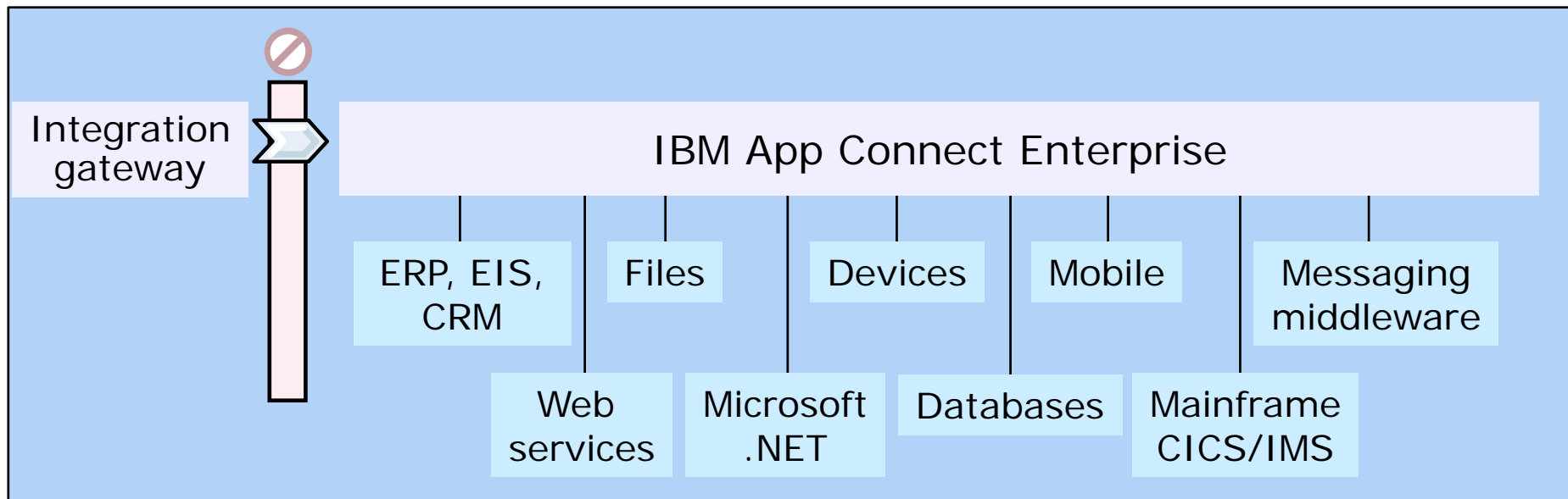
Integration modernization

- IBM App Connect Enterprise supports all integration topologies.
- Applications can be implemented in an ESB or as a cloud-native app.

Features and functions

IBM App Connect Enterprise

- IBM App Connect Enterprise 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 App Connect Enterprise 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 App Connect Enterprise 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
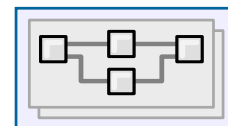
Architecture

# IBM App Connect Enterprise runtime components

- **Integration node**
  - Routes, transforms, and enriches in-flight messages as determined by message flows and message models
  - There 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
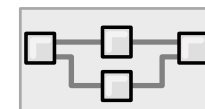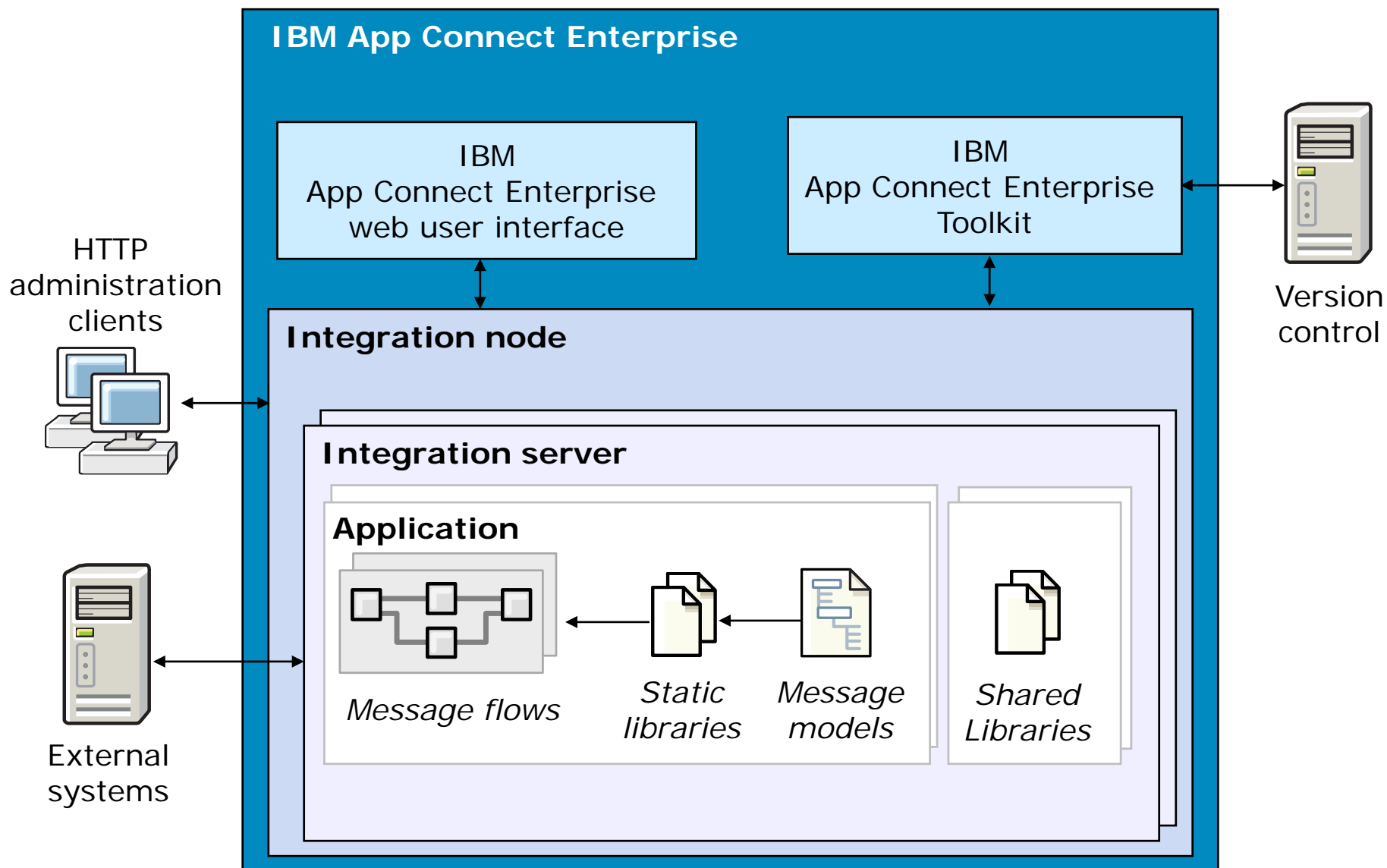
- **Message flow applications**
  - Describe the application connectivity logic, which defines the exact path that the data takes in the integration node, and the processing that is applied to it by the message processing nodes in that flow
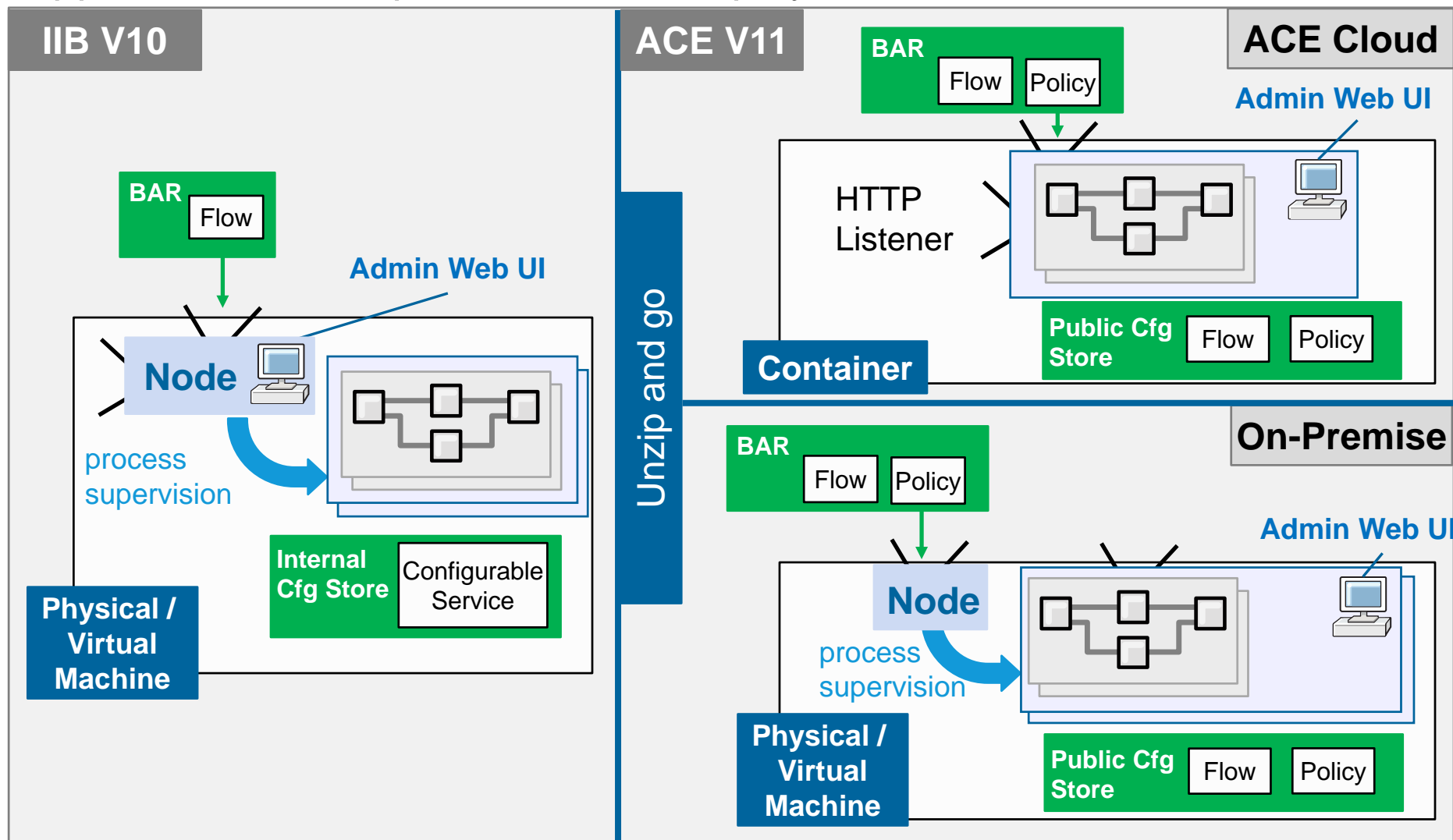 - Reference message models that describe the data

Node

IBM App Connect Enterprise main components

IBM App Connect Enterprise

IBM App Connect Enterprise web user interface

IBM App Connect Enterprise Toolkit

HTTP administration clients

Version control

Integration node

Integration server

Application

Message flows

Static libraries

Message models

Shared Libraries

External systems

IBM App Connect Enterprise architecture update

App Connect Enterprise is built to deploy to the cloud

Developer tools

IBM App Connect Enterprise 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 or servers to which message flows are deployed
- Connects to patterns galleries for getting started quickly
- Runs on Microsoft Windows and Linux on x86
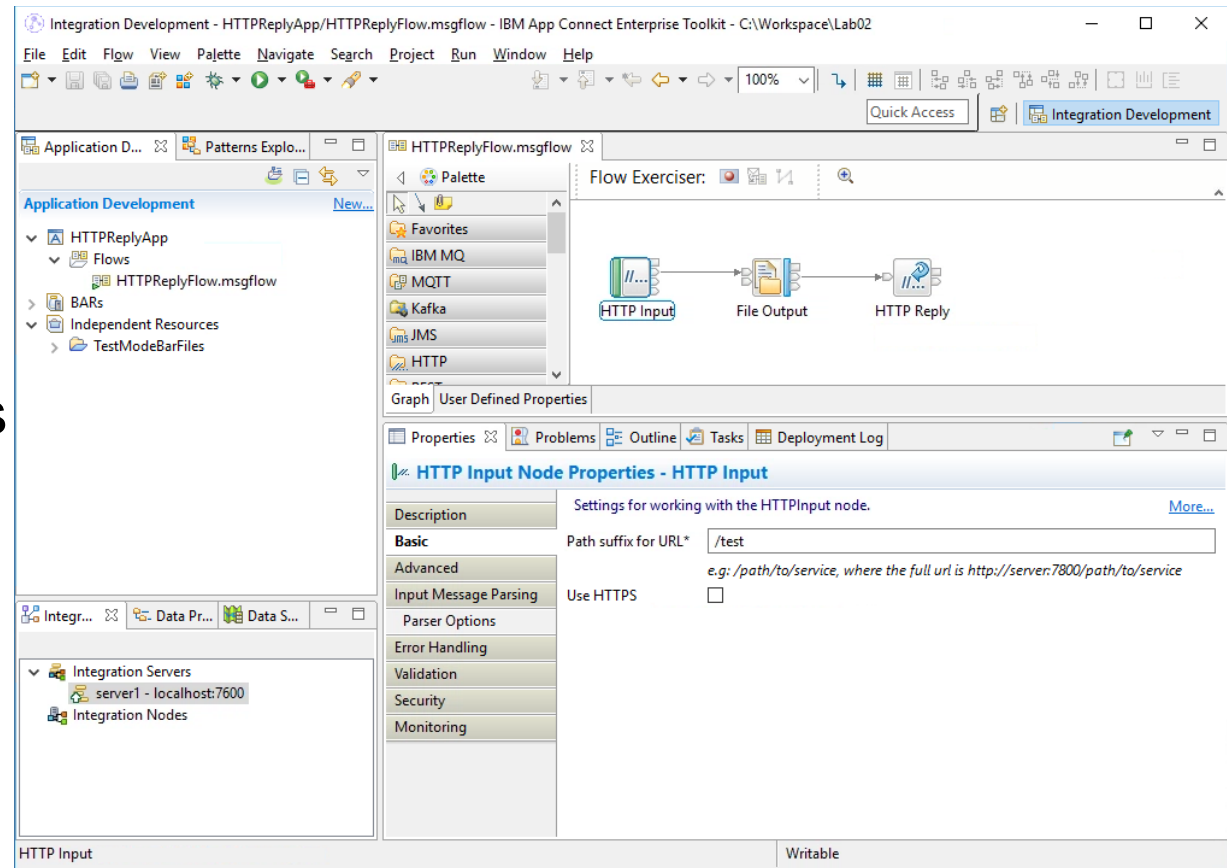
IBM Integration web user interface

IBM App Connect

Node: NODEIPL102 / Server: N101ISAA

N101ISAA

○ Started

| **Contents** | **Properties** | **Policies** | **Statistics** | **Resource statistics** |

🔍 Search

Deploy ⊕

LeadXML

API

on server: N101

LeadXML2ACoIC

TemperatureConverter

S

○ Started

- View and manage IBM App Connect Enterprise 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 App Connect Enterprise applications

IBM App Connect Enterprise command utilities

- Available on operating systems that IBM App Connect Enterprise supports

- Users of the web user interface and the IBM App Connect Enterprise Toolkit who do not have read, write, and execute permissions for the integration node or integration servers, have only restricted access to those resources.

- Some commands require extra security configuration

- Some commands can be run only on the computer on which the integration node is running, and other commands can be run remotely.

IBM Integration API

- Java administration API for IBM App Connect Enterprise
- Applications can use the API to control integration nodes and their resources through a remote interface
  - Deploy BAR files
  - Change the integration node configuration properties
  - Create, modify, and delete integration servers
  - Inquire about the status of an integration node and its associated resources, and be informed if the status of any of the following items changes:
    - Integration servers
    - Deployed message flows
    - Deployed files that are used by the message flows (for example, JAR files)
  - Create and modify message flow applications
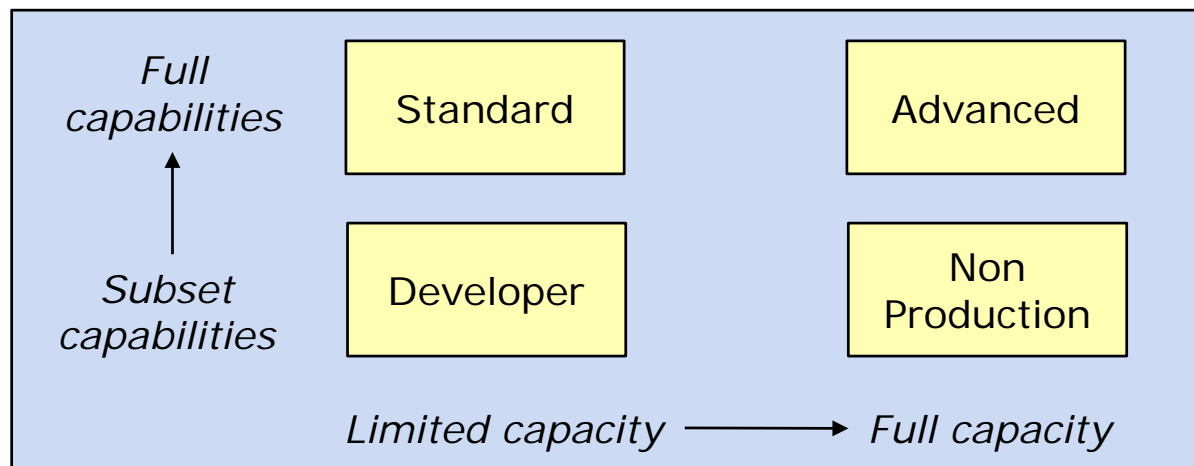
IBM App Connect Enterprise in the Cloud

IBM App Connect Enterprise offering in an IBM administered cloud environment

- Helps eliminate typical inhibitors to start App Connect Enterprise 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.
- Assets that are generated can be deployed to either environment.

Supported hardware and software

IBM App Connect Enterprise operation modes

Full capabilities

Subset capabilities

| Standard | Advanced |
| Developer | Non Production |

Limited capacity ——→ Full capacity

Mode	Features	Integration servers	Message execution rate
Developer	All features enabled but only for test purposes	One	Limited
Non-Production	All features enabled but only for eval purposes	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 AWS, ICP, Microsoft Azure and OpenShift
  - Chef scripts for automated building of flexible IBM App Connect Enterprise images on GitHub

Supported software

- Supports access to industry standard databases
  - DB2, Oracle, Sybase, SQL Server, Informix
  - 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 9.0, 9.1
  - WebSphere MQ 8.0
  - JMS 1.1 and 2.0

- Includes access to ERP systems such as SAP, Siebel, PeopleSoft, and JD Edwards

Technology components and prerequisites

- System resources
  - Minimum 2.3GB disk space
  - Minimum 4GB memory

- IBM MQ
  - Optional on distributed systems for most applications
  - Required on z/OS and for the use of some IBM App Connect Enterprise features

- Java 7.1 on all platforms

- Other prerequisites are determined by operating system and hardware
  - Detailed system requirements are in the Knowledge Center.

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
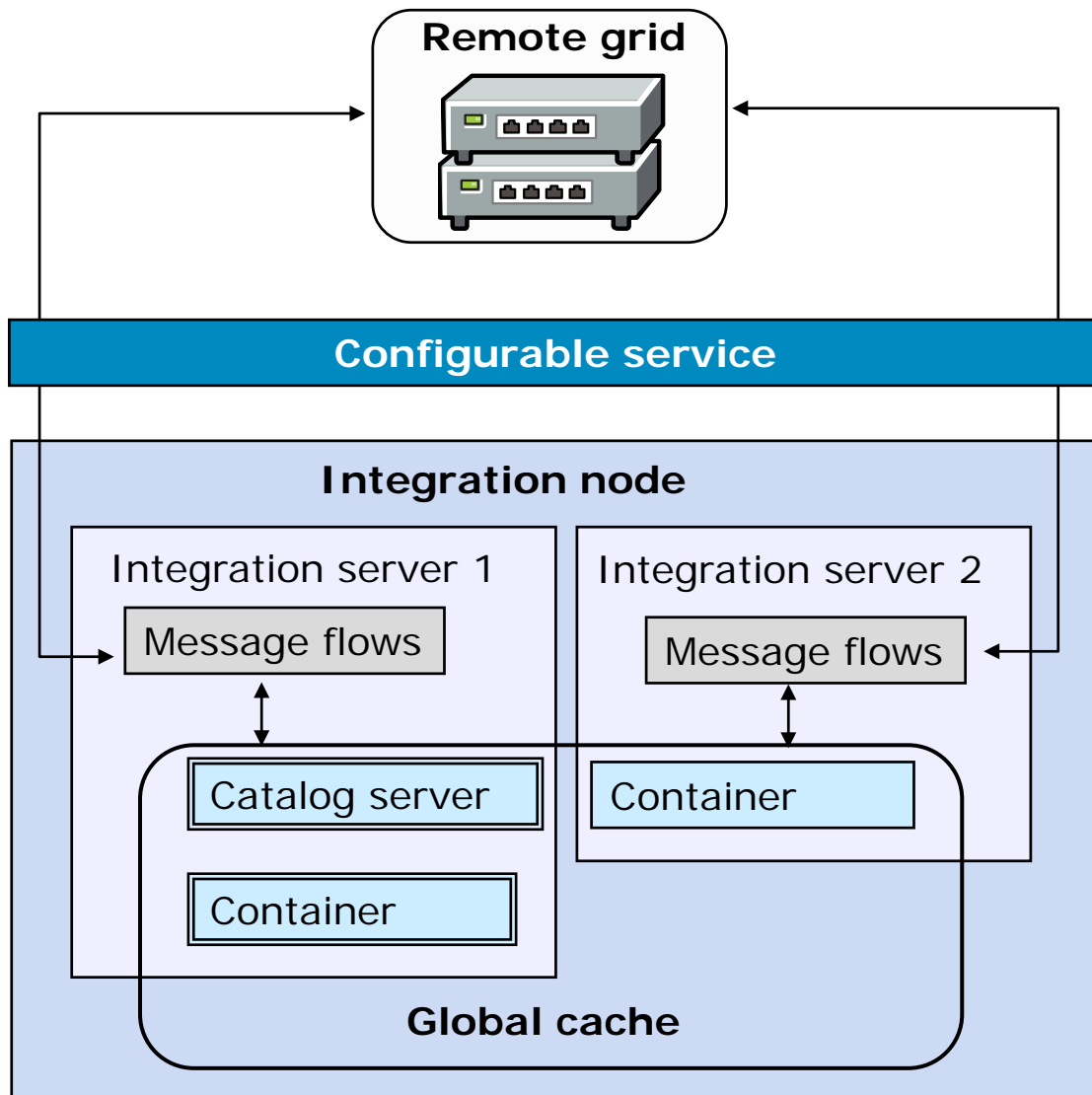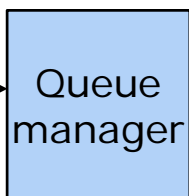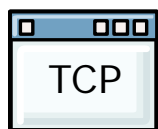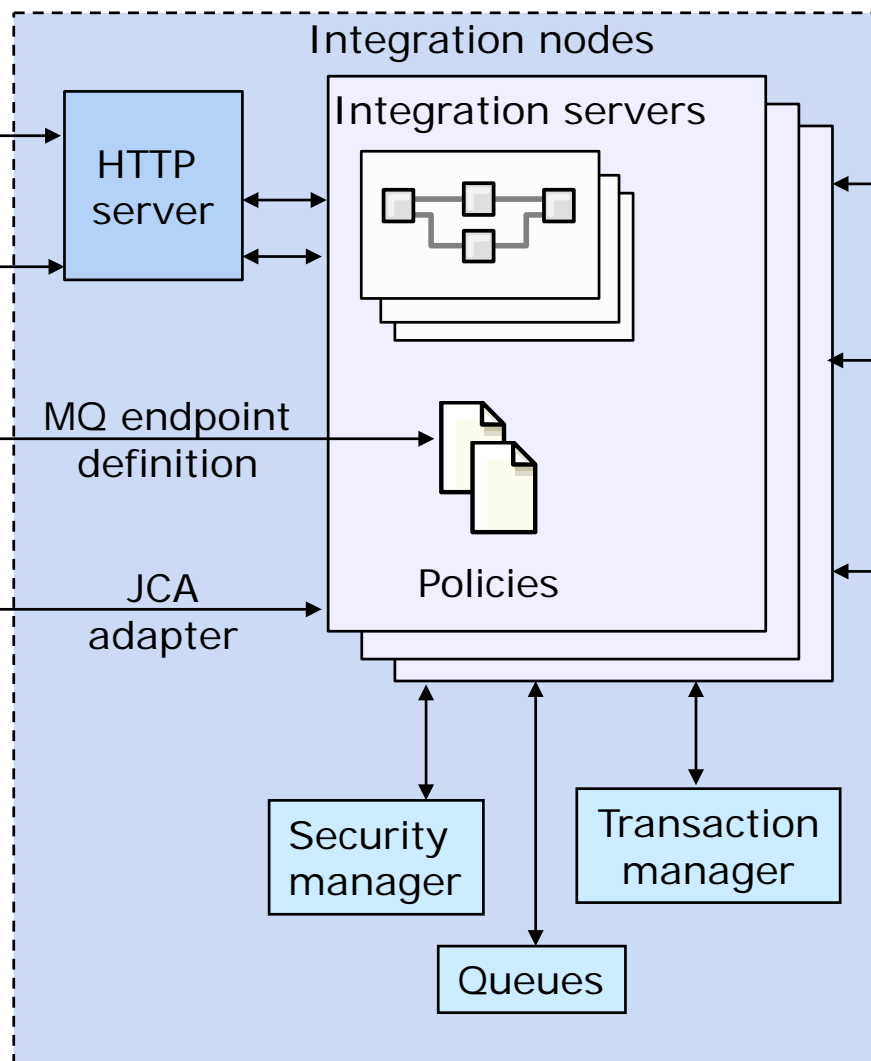
Connectivity to external systems

Connectivity to external systems

Applications　　　　**Integration layer**　　　　**Server applications**
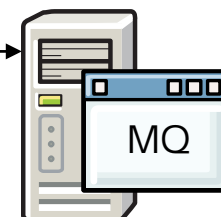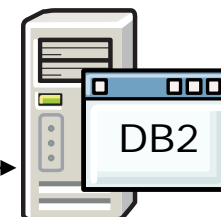
IBM App Connect Enterprise web services

IBM DataPower
appliances

WS-Security
processing

**Application
connectivity
services**

Service
provider

Other
service provider

Service
provider

Web
service provider

Message flow

HTTP
SOAP-XML

SOAP
client

Service
requester

IBM App Connect Enterprise can be
used for connectivity to web
services and web service
appliances such as IBM DataPower.
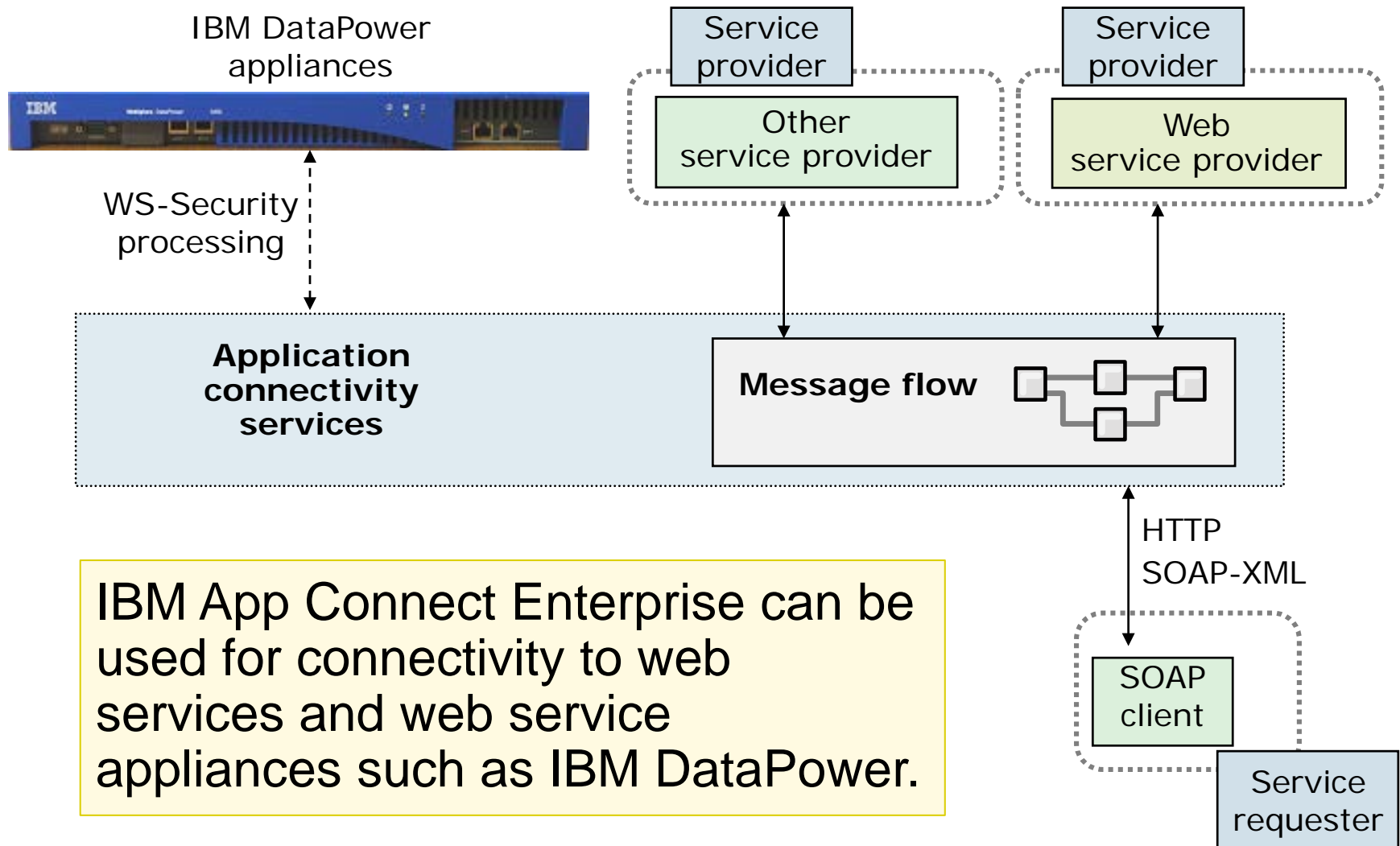
Using IBM App Connect Enterprise to provide a REST API

- Provides a way to receive JSON over HTTP/HTTPS and expose a REST API
  - Create a REST API in the IBM App Connect Enterprise Toolkit
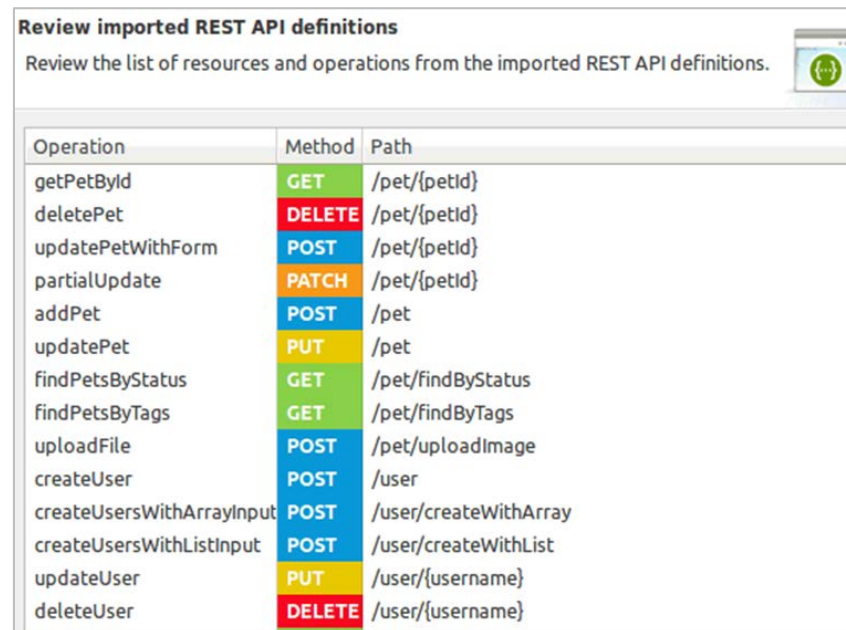 - Administer REST APIs as an IBM App Connect Enterprise construct in the IBM App Connect Enterprise web user interface

- IBM App Connect Enterprise Toolkit REST API project
  - Import Swagger V2.0 JSON file to create the REST API project in the IBM App Connect Enterprise 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

Review imported REST API definitions

Review the list of resources and operations from the imported REST API definitions.

Operation	Method	Path
getPetById	GET	/pet/{petId}
deletePet	DELETE	/pet/{petId}
updatePetWithForm	POST	/pet/{petId}
partialUpdate	PATCH	/pet/{petId}
addPet	POST	/pet
updatePet	PUT	/pet
findPetsByStatus	GET	/pet/findByStatus
findPetsByTags	GET	/pet/findByTags
uploadFile	POST	/pet/uploadImage
createUser	POST	/user
createUsersWithArrayInput	POST	/user/createWithArray
createUsersWithListInput	POST	/user/createWithList
updateUser	PUT	/user/{username}
deleteUser	DELETE	/user/{username}

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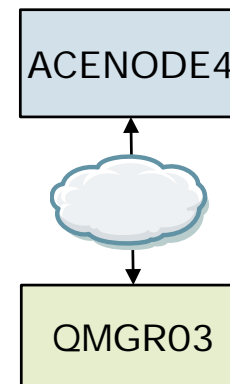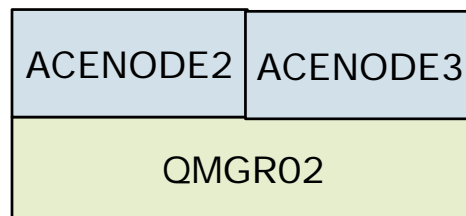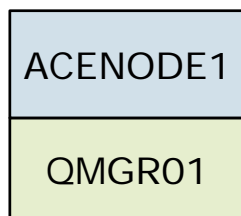
- On distributed systems, IBM MQ is not a prerequisite in most implementations
- On z/OS, IBM MQ is required for installation
- Flexible topology options for IBM MQ access for simplicity, scalability, availability, and migration
- If IBM MQ is installed, IBM App Connect Enterprise detects IBM MQ and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

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

IBM App Connect Enterprise and publish/subscribe support

- IBM App Connect Enterprise uses publish/subscribe to notify applications of significant events that occur in integration nodes

- IBM App Connect Enterprise 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 App Connect Enterprise
  - 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 App Connect Enterprise 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

Operational management

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

IBM App Connect Enterprise runtime security

- Identifies who is authorized to submit a message to a message flow

- IBM App Connect Enterprise 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

, 2019
IBM Training

IBM App Connect Enterprise Industry Packs

- **IBM App Connect Enterprise Healthcare Pack** provides prebuilt patterns and connections that enable rapid clinical application and device integration for more connected healthcare systems

- **IBM App Connect Enterprise Manufacturing Pack** helps to integrate heterogeneous IT and operational manufacturing systems and make information flow more quickly and reliably

- **IBM App Connect Enterprise Retail Pack** accelerates the development and deployment of integration between retail applications and systems, and enables the transformation and enrichment of data

Introduction to IBM App Connect Enterprise

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Supported migration paths

- You can migrate to IBM App Connect Enterprise Version 11.0 from:
  - IBM App Connect Enterprise Version 10.0
  - IBM App Connect Enterprise Version 9.0

- You can migrate from IBM App Connect Enterprise Version 10.0 or Version 9.0 only to either a full edition or Standard edition of IBM App Connect Enterprise Version 11.0. Do not migrate integration nodes from an earlier version to the Developer Edition.

> You can either perform parallel migration to migrate integration nodes, or extract migration to migrate integration servers to IBM App Connect Enterprise Version 11.0.

Unit summary

- Describe the features and functions of IBM App Connect Enterprise
- Describe the business value of IBM App Connect Enterprise
- Describe the IBM App Connect architecture and components
- Identify the IBM App Connect editions

Review questions

1. True or False:
   IBM App Connect Enterprise can deploy integration servers independently of integration nodes.

2. True or False:
   IBM MQ must be installed before installing IBM App Connect Enterprise on Windows or Linux.

3. Choose all the tasks that you can do with IBM App Connect Enterprise:
   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

Review answers

1. True.
2. False: If IBM MQ is installed, IBM App Connect Enterprise detects IBM MQ and configures it.
3. A, B, C