



SAP® PartnerEdge®

# Partner Certification Academies for SAP BTP

## Developing with SAP Integration Suite (C\_CPI\_15)

Milton Chandras, SAP  
June 11, 2023

INTERNAL – SAP and Partner use only

# Agenda

## Day 1

Intro

Unit 1 Introducing the  
Integration Suite

Unit 2 Introducing iPaaS

Unit 3 Managing APIs

## Day 2

Unit 4 Managing Cloud  
Integration

Unit 5 Modeling processes

Outro

# Background

SAP Learning Journeys

SAP Learning Journeys provide free, easy-to-navigate learning content which helps you gain the skills you need and to prepare for an SAP Certification. Find the right journey for your specific learning needs and reach your learning goals quickly.



Build the skills you need at your own pace

Choose one of the guided SAP Learning Journeys

**SAP LEARNING JOURNEY**  
Utilize Low-Code/No-Code Applications and Automations for Citizen Developers  
8 Units • 18 hrs • SAP Certification

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Discover SAP Business Technology Platform  
9 Units • 6 hrs 15 mins • Record of Achievement

**SAP LEARNING JOURNEY**  
Getting Started with UX  
3 Units • 8 hrs

**SAP LEARNING JOURNEY**  
Introducing SAP Analytics Cloud  
8 Units • 20 hrs • SAP Certification

SAP Certification

SAP Certifications for developers are proof of programming knowledge and product expertise. Each certification is based on an SAP Learning Journey, which ends with a certification exam. Get certified and benefit from the value of SAP Certification.

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Validate your SAP expertise

SAP Certifications are an important asset in your career. Not only do they validate your skills and competencies around SAP software, SAP Certifications offer other tangible benefits, like improved earnings potential and greater job satisfaction. SAP Certifications are highly valued credentials that set you apart in a crowded market. Pass the certification exam and you'll receive a digital badge that you can use to verify your knowledge.

Choose an SAP Certification and follow the related free learning journey to prepare for your certification exam.

**C\_CPE\_13**  
SAP Certified Development Associate - SAP Extension Suite  
80 Questions • 3 hrs

**C\_SAC\_2202**  
SAP Certified Application Associate - SAP Analytics Cloud  
80 Questions • 3 hrs

# Partner Certification Academies for SAP BTP

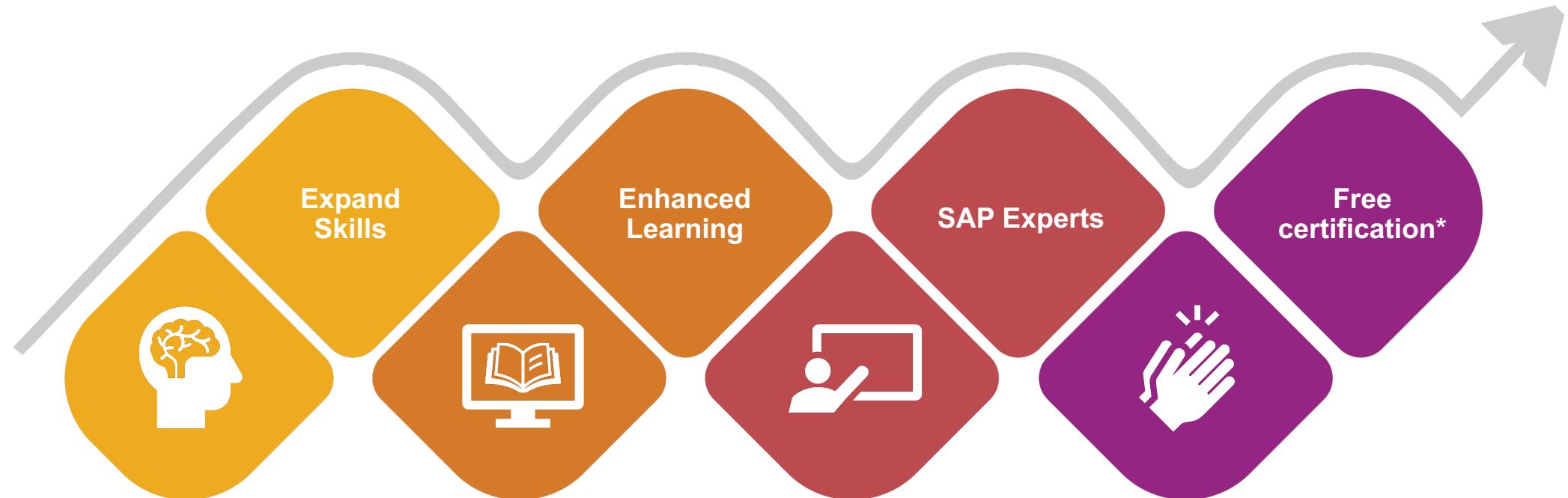
## Developing with SAP Integration Suite

Pre-requisite	June 12	June 14	June 21
	Duration: 2 hours	Duration: 2 hours	Duration: 1 hour
<ul style="list-style-type: none"><li>• Basic knowledge of JavaScript or other programming languages used for web development</li><li>• Basic knowledge of cloud development concepts</li></ul>	<ul style="list-style-type: none"><li>• Introducing the Integration Suite</li><li>• Introducing iPaaS</li><li>• Managing APIs</li></ul>	<ul style="list-style-type: none"><li>• Managing Cloud Integration</li><li>• Modeling processes</li></ul>	<ul style="list-style-type: none"><li>• Ask the Expert</li></ul>

This Academy is based on the [Developing with SAP Integration Suite learning journey](#) content which is part of the preparation for the associated certification exam [SAP Certified Development Associate - SAP Integration Suite \(C\\_CPI\\_15\)](#), coming soon).

Please note that learning journey content and certification exam questions change occasionally and it is your own responsibility to ensure you are up to date with the latest learning content.

# Value of Partner Certification Academies



## Expand Skills

Gain expertise with SAP BTP to build on a unified platform & help customers accelerate innovation

## Enhanced Learning

Get a clear understanding of the courses and certification expectations at an accelerated pace

## SAP Experts

Engage with SAP experts to help navigate the content & get your questions answered live

## Free certification\*

Eligible partners can get the cost of certification attempt(s) reimbursed\*

# Certification Incentive

- ✓ Reimbursement of certification attempt costs\*
- ✓ Partner needs to certify at least 5 consultants\*
- ✓ Available to eligible PE Sell partners\*

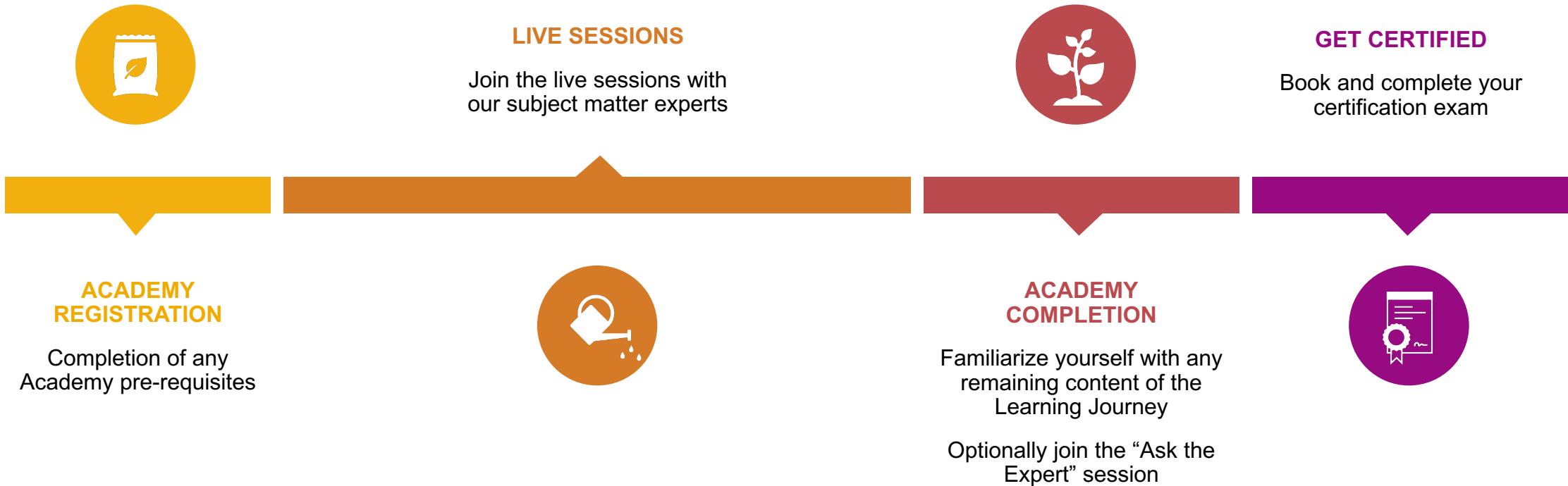
\* Please check all eligibility criteria and details of the incentive here:

- [APJ region](#)
- [Other regions](#)

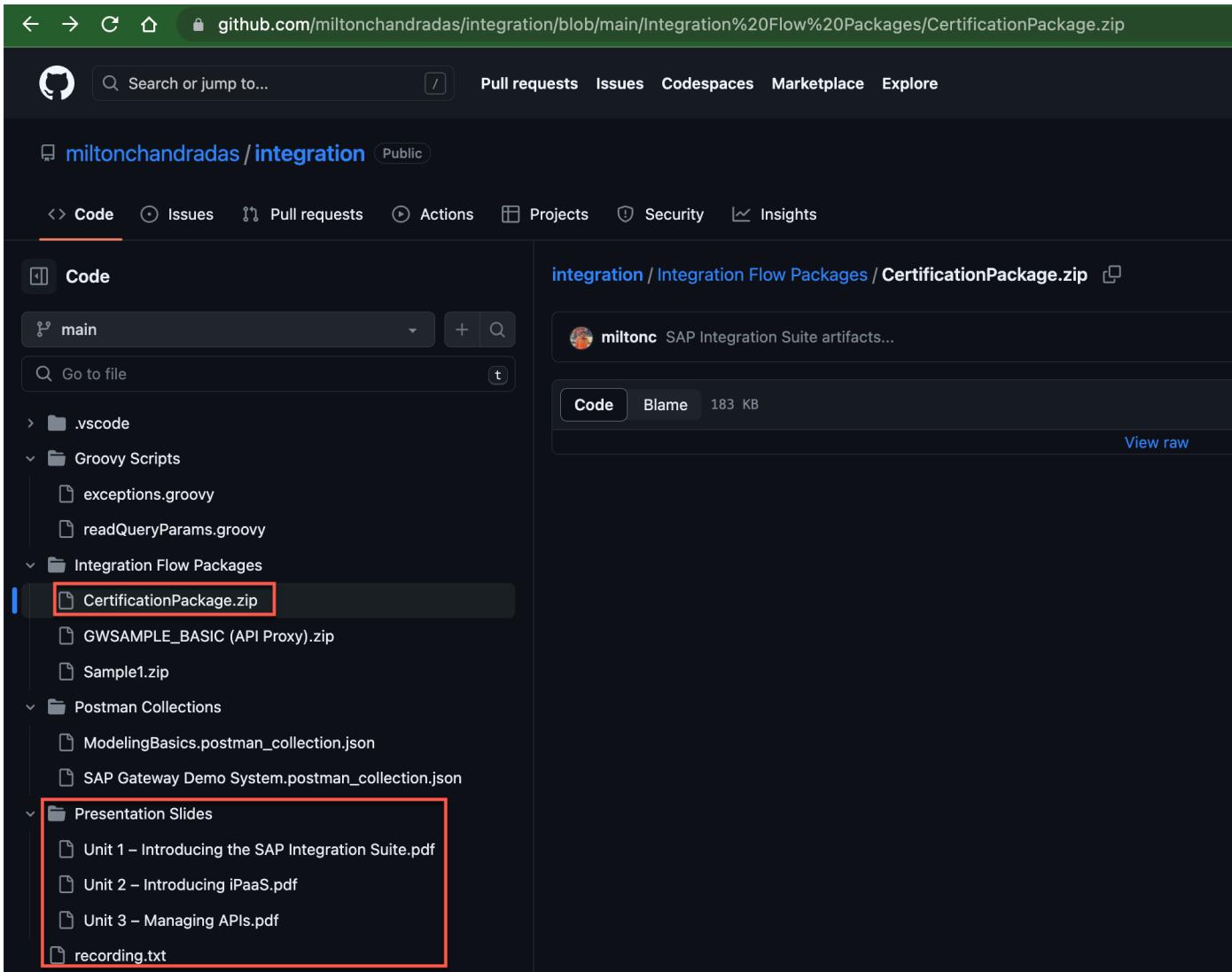
(only accessible to employees of PE Sell partners of Silver or Gold level)

The image displays two screenshots of SAP PBC website pages. The top screenshot shows the 'Partner Cloud Certification Initiative' page, which includes a title, a star rating of 0, a brief description about a limited-time offer for reimbursement, and a 'Contact Us' button. The bottom screenshot shows the 'APJ Partner Cloud Capacity Program' page, which includes a title, a star rating of 0, a detailed description about the program's purpose and benefits, and a 'Contact Us' button. Both pages have a dark background featuring a person working on a laptop.

# How does it work?



# Slides and recordings availability



<https://github.com/miltonchandradas/integration>

# Unit 1 – Introducing the SAP Integration Suite

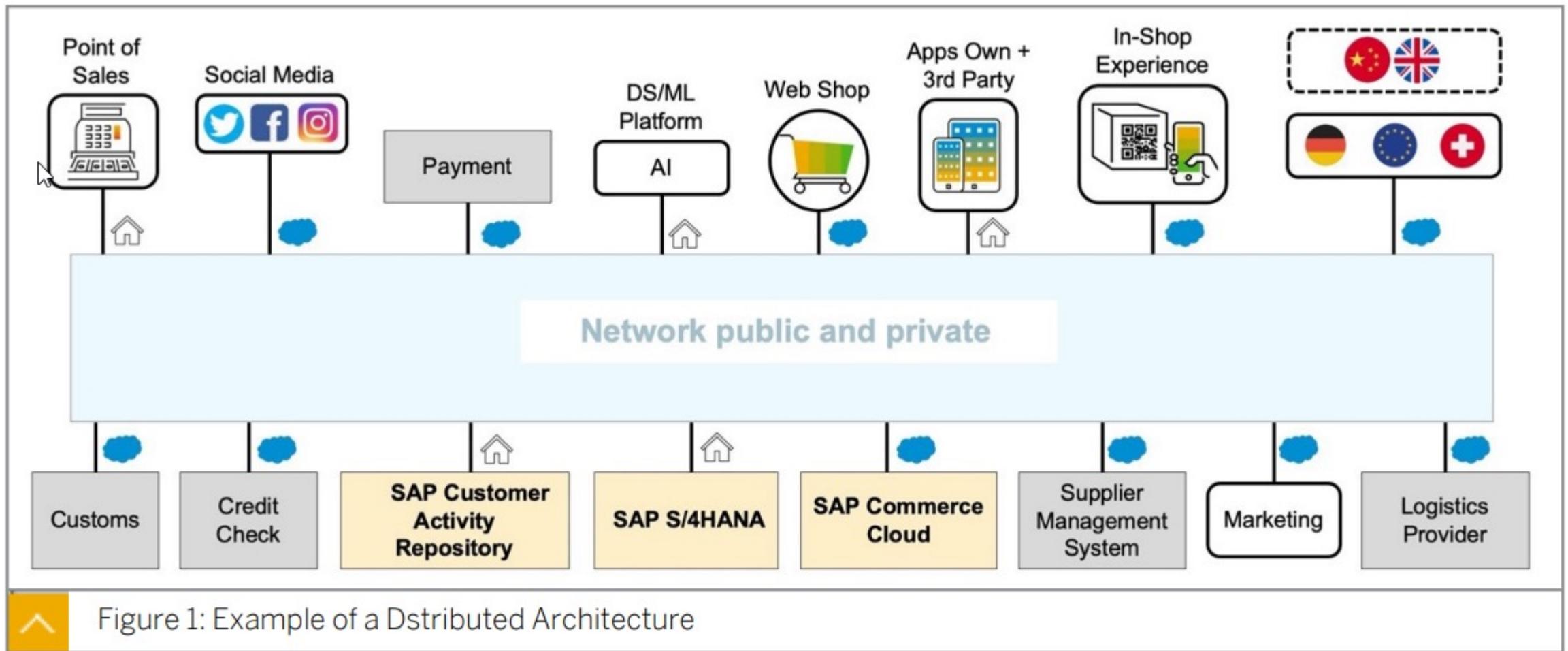
Developing with SAP Integration Suite

**C\_CPI\_15**

# Unit 1 Contents

- Distributed architecture
- API first approach
- Exercise scenario
- Operating modes of API architecture
- REST, OData
- SAP Gateway Demo System
- SAP Graph
- Key summary points

# Distributed Architecture



# Challenges of Distributed Architecture

- Different transport and message protocols
- Release management
- Monitoring, Observability
- Security
- Latency, Quality of service
- Documentation

Heterogenous systems: Expensive, complex solutions are needed

# API first approach

- Focus on the API to create applications that can be easily connected to each other
- **API Provider** – Provides the interface
- **API Consumer** – Consumes the interface

## Types of APIs

- Databased APIs
- Object Oriented APIs
- **Remote APIs**
- **Messaging APIs**

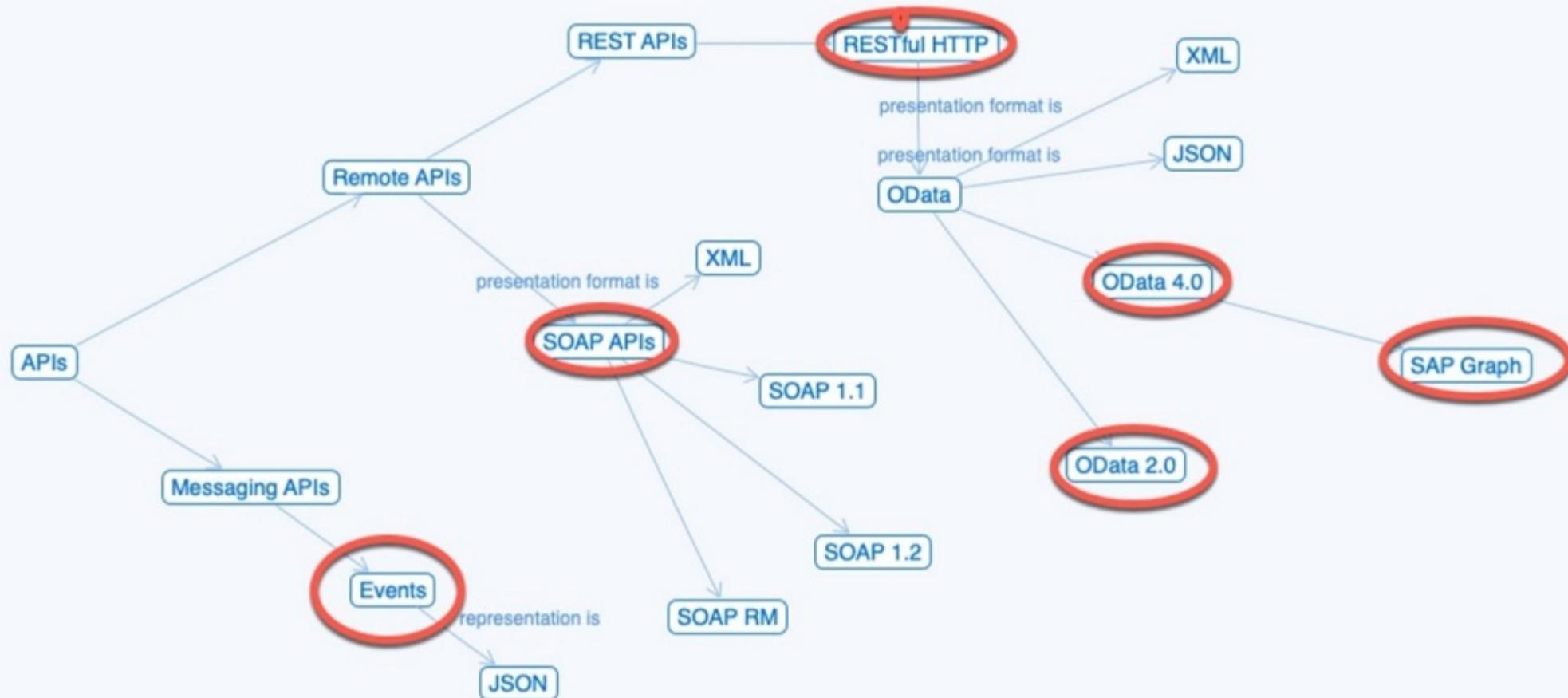


Figure 5: Relationship between APIs

# SOAP, REST

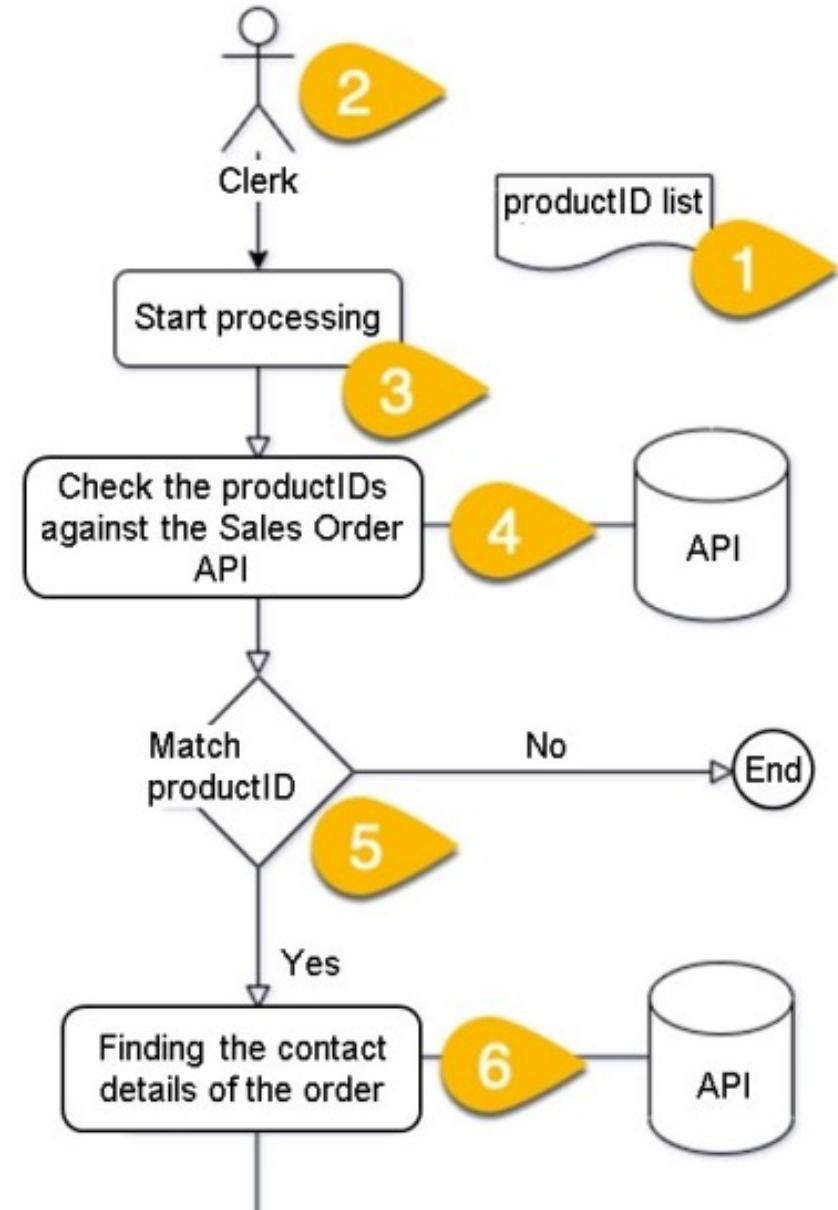
Type of API	Description language
SOAP	Web Services Description Language (WSDL)
REST	<p>Open API</p> <ul style="list-style-type: none"><li>Used in API management</li><li>Interface definition language for describing, producing, consuming and visualizing RESTful web services</li></ul> <p>RAML</p>

## Contract between API Provider and API consumer

- Implementation first approach
  - Implementation created first by API Provider
  - Contract generated automatically which is used by API Consumer
- Contract first approach
  - Contract created first
  - Both API Provider and API Consumer can simultaneously start working against the contract

# Business Scenario

- Company A sells goods to customers
- Some products cannot be delivered on time
- Inform customers who ordered these products about delay



# Task flow



# Demo of the exercise

- SOAP Adapter \$top=2
- SOAP Adapter everything

# Parts of the Exercise

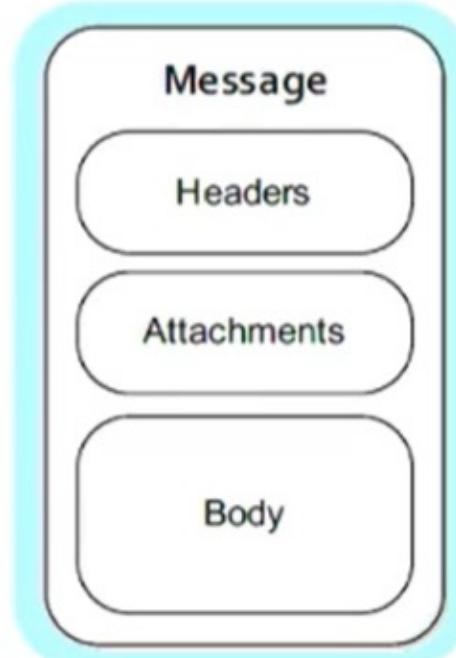
- Part 1
  - Create APIs on API Business Hub Enterprise Portal (API Management)
- Part 2
  - Consume the APIs and process data (Cloud Integration)
- Part 3 (independent)
  - Investigate sample integration flows (Cloud Integration)

# Basic concepts of Cloud Integration flow...

## Message

Fundamental entity **containing the data** being carried and routed in Camel

- Messages have a body (a payload), headers, and optional attachments
- Messages are uniquely identified with an identifier of type `java.lang.String`
- *Headers*
  - Headers are values associated with the message
    - ⇒ Sender identifier, hints about content encoding, authentication information,...
  - Headers are name-value-pairs
    - ⇒ Name is a unique, case-insensitive string
    - ⇒ Value is of type `java.lang.Object`
- *Attachments*
  - Optional – typically used for Web service and e-mail components
- *Body*
  - Type: `java.lang.Object` → any kind of content is allowed

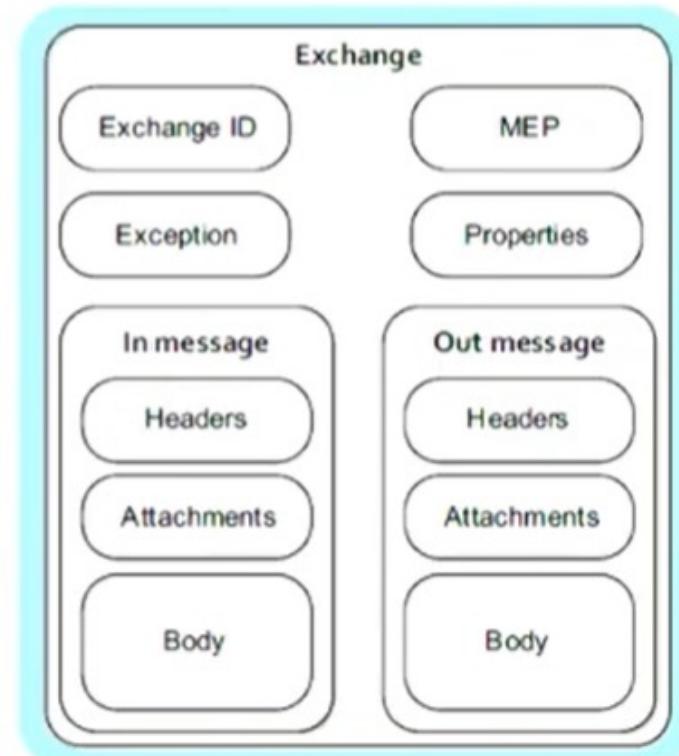


# Basic concepts of Cloud Integration flow...

## Exchange

The **message's container** during routing

- Provides support for various interaction types between systems, known as Message Exchange Patterns (MEP)
  - InOnly: a one-way message (e.g. JMS messaging)
  - InOut: a request-response message (e.g. HTTP-based transports)
- *Exchange ID*: a unique ID that identifies the exchange
- *MEP*
  - InOnly: exchange contains an “in message” **only**
  - InOut: exchange contains an “in message” **and** an “out message” containing the reply message for the caller
- *Exception*: If an error occurs during runtime, the Exception field will be filled
- *Properties*: Similar to message headers, but they last for the duration of the entire exchange; they contain global-level information; you can store and retrieve properties at any point during the lifetime of an exchange



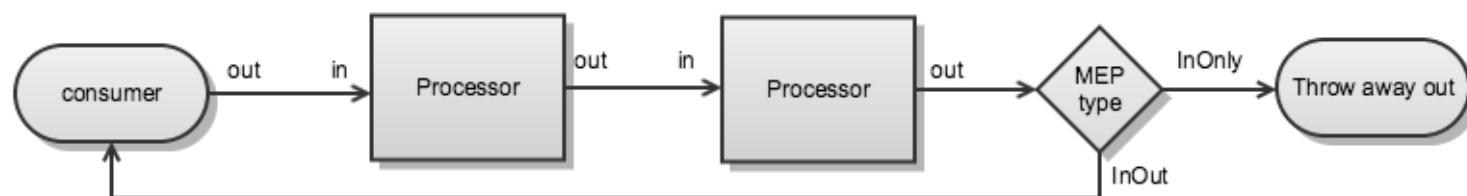
# MESSAGE EXCHANGE PATTERNS AND THE EXCHANGE OBJECT

The Camel API is influenced by APIs such as JBI specification, CXF which defines a concept called Message Exchange Patterns (MEP for short).

The MEP defines the messaging style used such as one-way (`InOnly`) or request-reply (`InOut`), which means you have IN and optionally OUT messages. This closely maps to other APIs such as WS, WSDL, REST, JBI and the likes.

The `Exchange` API provides two methods to get a message, either `getIn` or `getOut`. Obviously the `getIn` gets the IN message, and the `getOut` gets the OUT message.

## FLOW OF AN EXCHANGE THROUGH A ROUTE



- The out message from each step is used as the in message for the next step
- if there is no out message then the in message is used instead
- For the InOut MEP the out from the last step in the route is returned to the producer. In case of InOnly the last out is thrown away

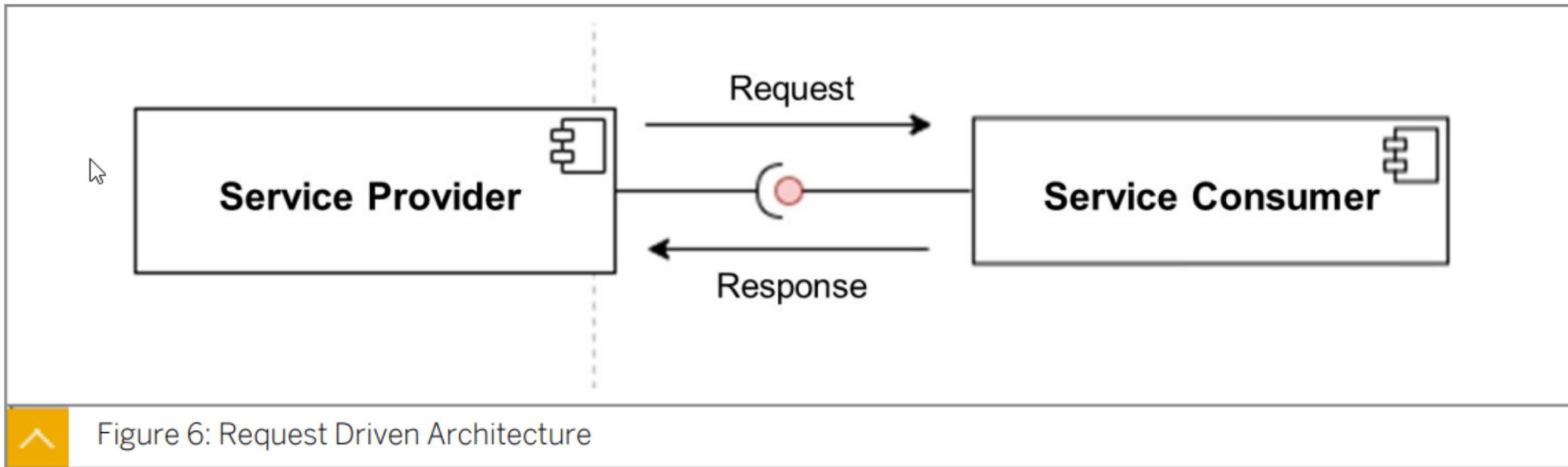
### TIP

#### Beware of `getOut` to check if there is an out message

`exchange.getOut` creates an out message if there is none. So if you want to check if there is an out message then you should use `exchange.hasOut` instead.

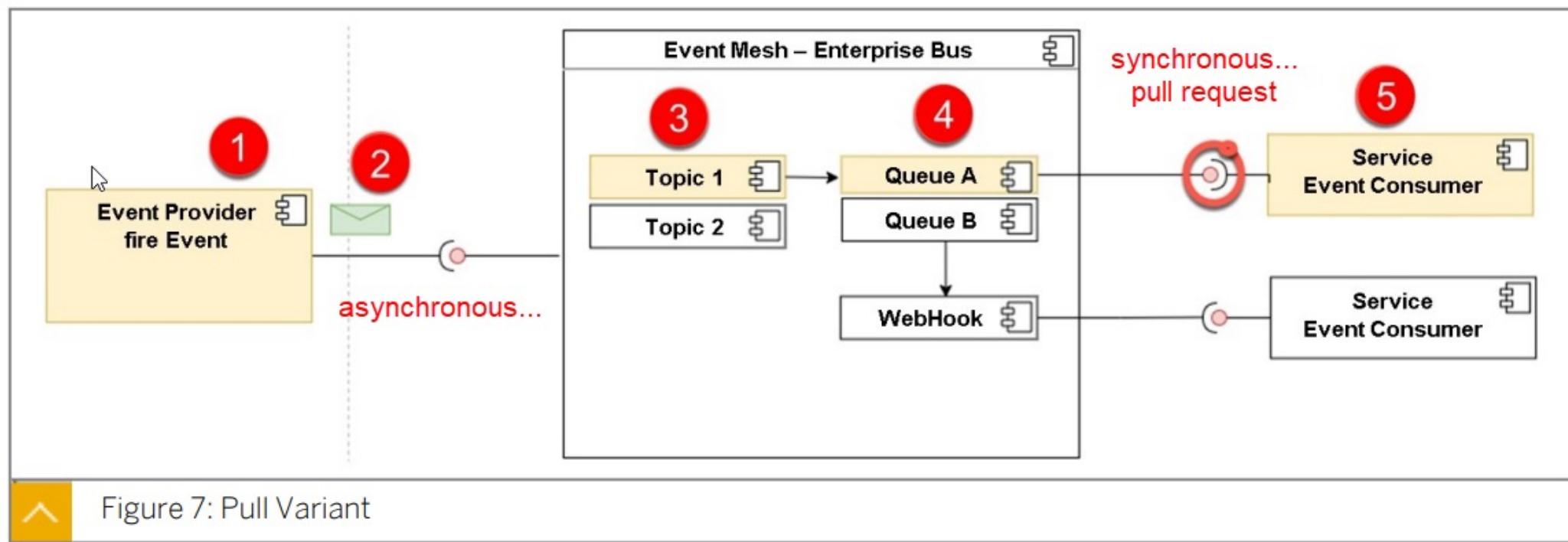
# Operating Modes of API Architectures

- Request driven architecture
- Event driven architecture
- Combination



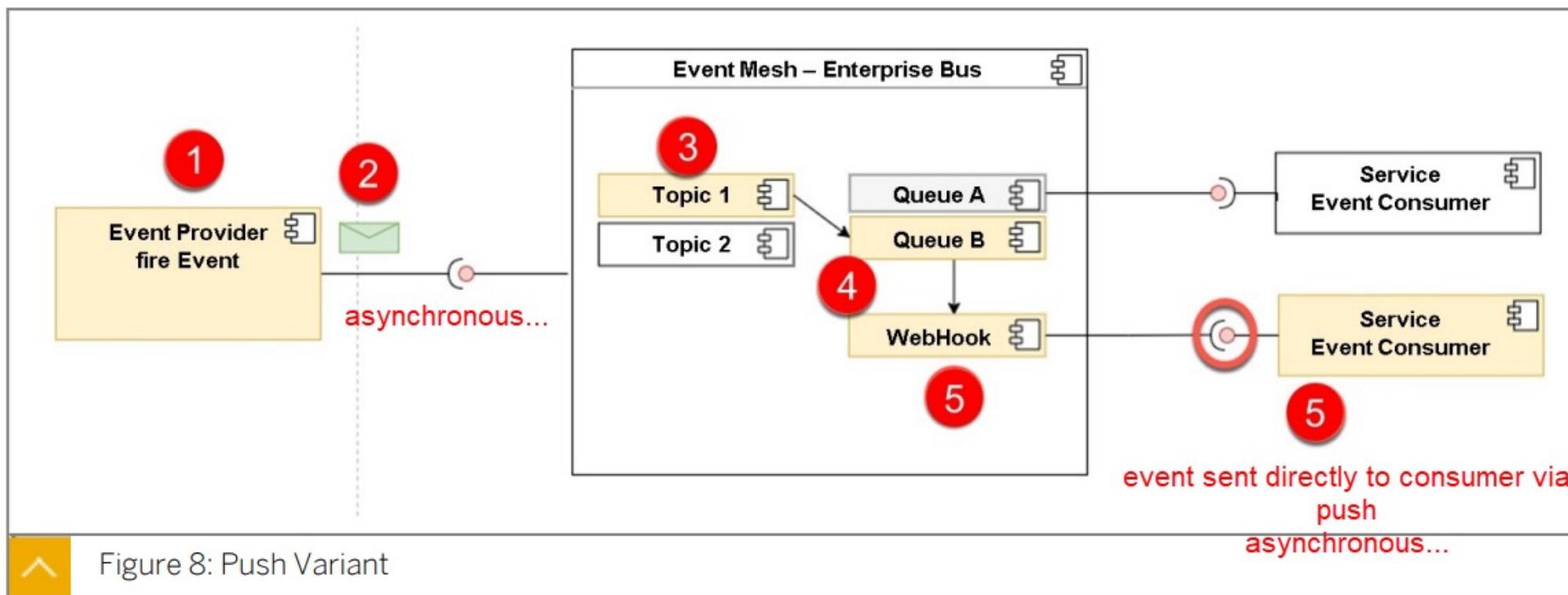
# Request driven architecture

## Pull Variant

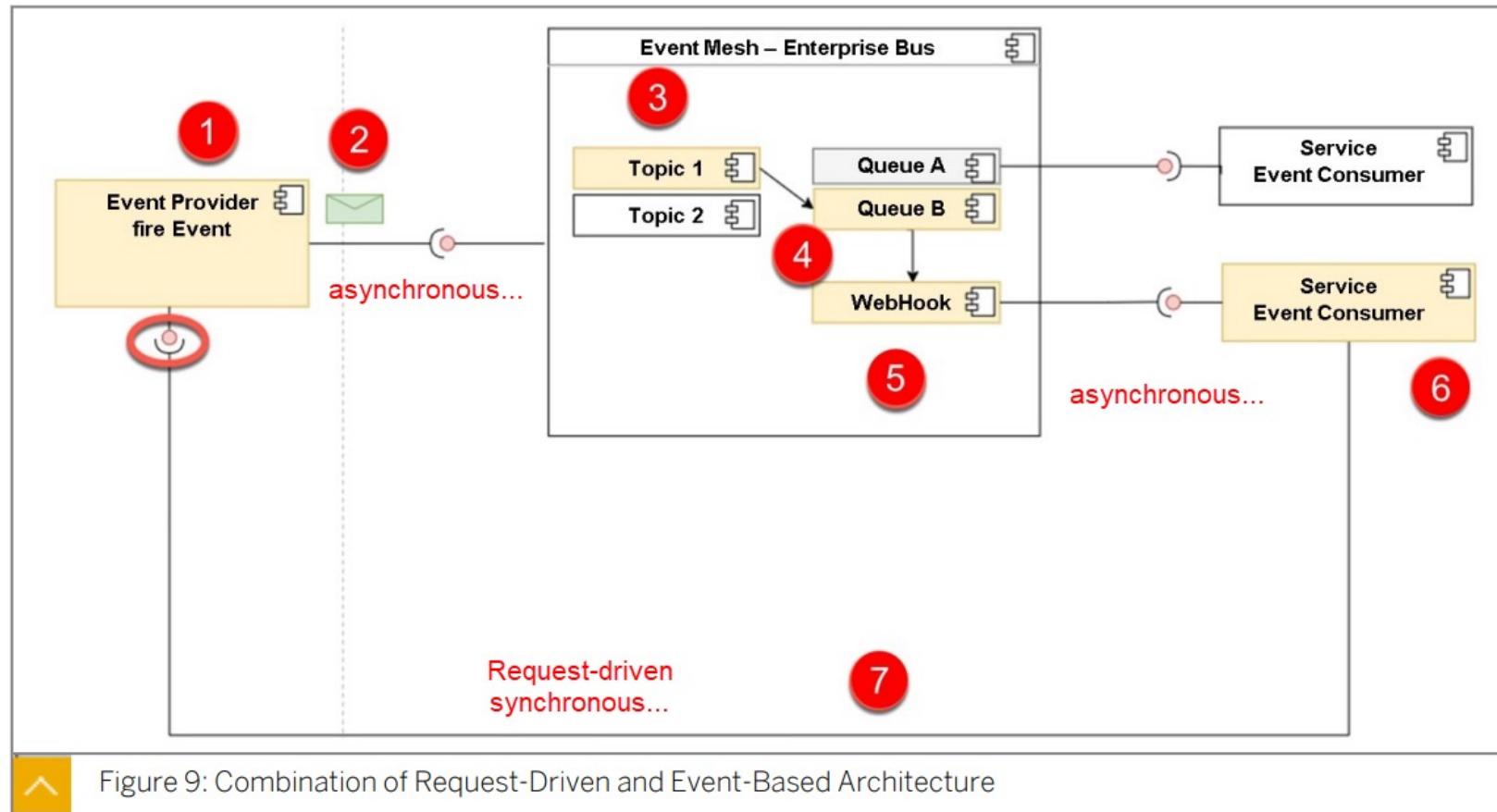


# Event driven architecture

## Push Variant



# Combination: Request-Driven & Event-Based



# REST

- Architectural properties
  - Simplicity of uniform interface
  - Scalability, modifiability, reliability etc.
- Architectural constraints (6)
  - Client server architecture
  - Stateless
  - Cache ability
  - Layered system
  - Code on demand (optional)
  - Uniform interface
- Uses standard HTTP methods and supports many media types

# OData

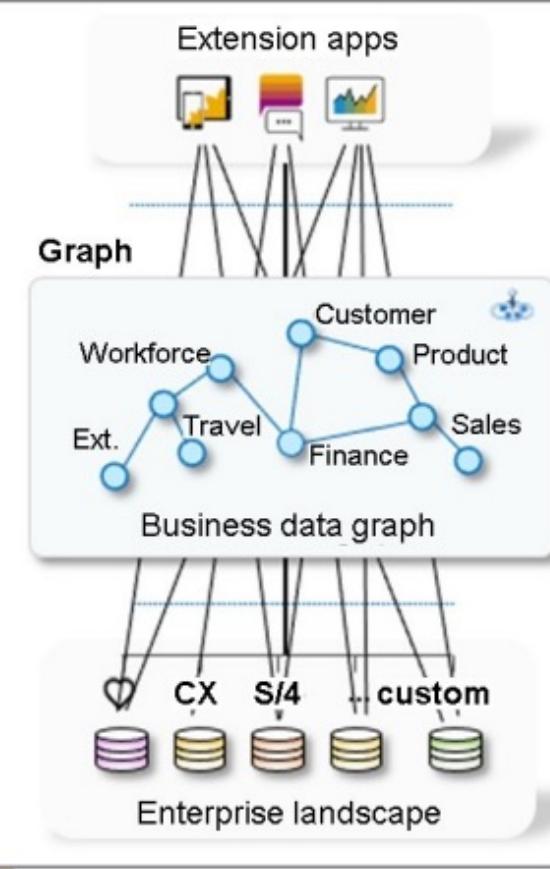
- Architectural constraints
  - Resource identification
  - Fixed documents
    - Service document
    - Metadata document
  - Dynamic resources
  - Resource operation
  - Querying
  - Resource representation

# SAP Gateway Demo System

- Check if product is available: HT-1000
- Get all sales order for product: HT-1000
- Get customer details for each sales order for product: HT-1000

# SAP Graph

- API based on OData v 4.0
- Connects entities from different sources in one API
  - For example, SAP S/4HANA Cloud, Sales Cloud and others
- Existing SAP Graph APIs for various entities
- Can be programmed with Node.js, SAP API Management (low code)



# Unit 2 – Introducing iPaaS

Developing with SAP Integration Suite

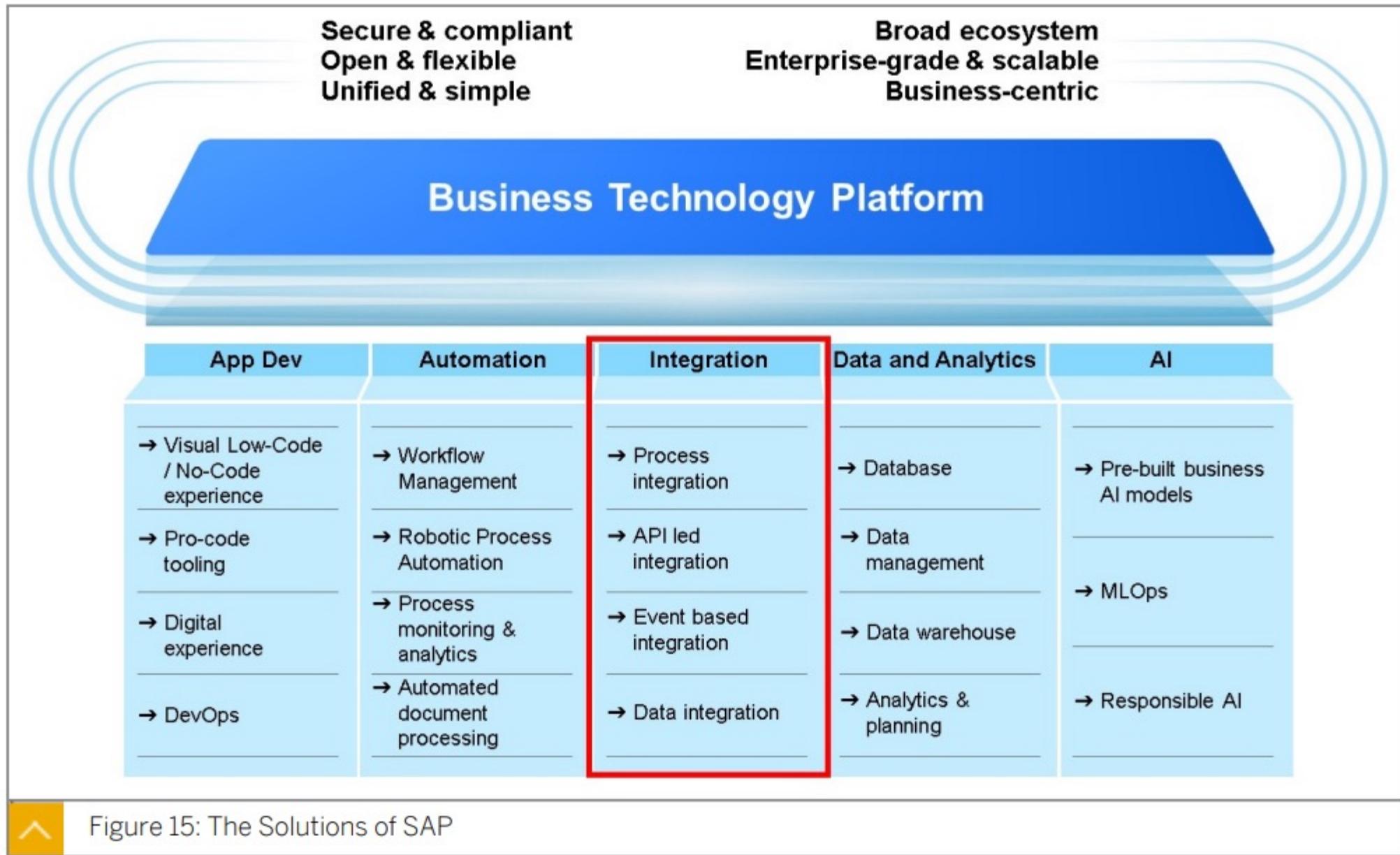
C\_CPI\_15

# Unit 2 Content

- Integration strategy of SAP
- SAP Integration Solution Advisory Methodology (ISA – M)
- Positioning Integration Suite
- Introduction to API Management
- Key summary points

# Integration Strategy (4 principles)

- Predefined integration
  - Prebuilt integrations in SAP Business Accelerator Hub
- Open integration
  - Integration to SAP software, partner software and 3<sup>rd</sup> party software
  - Open Connectors
- Holistic integration
  - Covers most flavors of cloud and hybrid integration
- AI driven integration
  - AI techniques for integration scenarios
  - Integration Advisor



# Integration Solution Advisory Methodology (ISA-M)

- Template in PowerPoint based on all the integration knowledge at SAP
- Aimed at Integration Architects
- Existing integration solutions can be documented
- New integration requirements can be determined and mapped to specific services

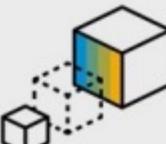
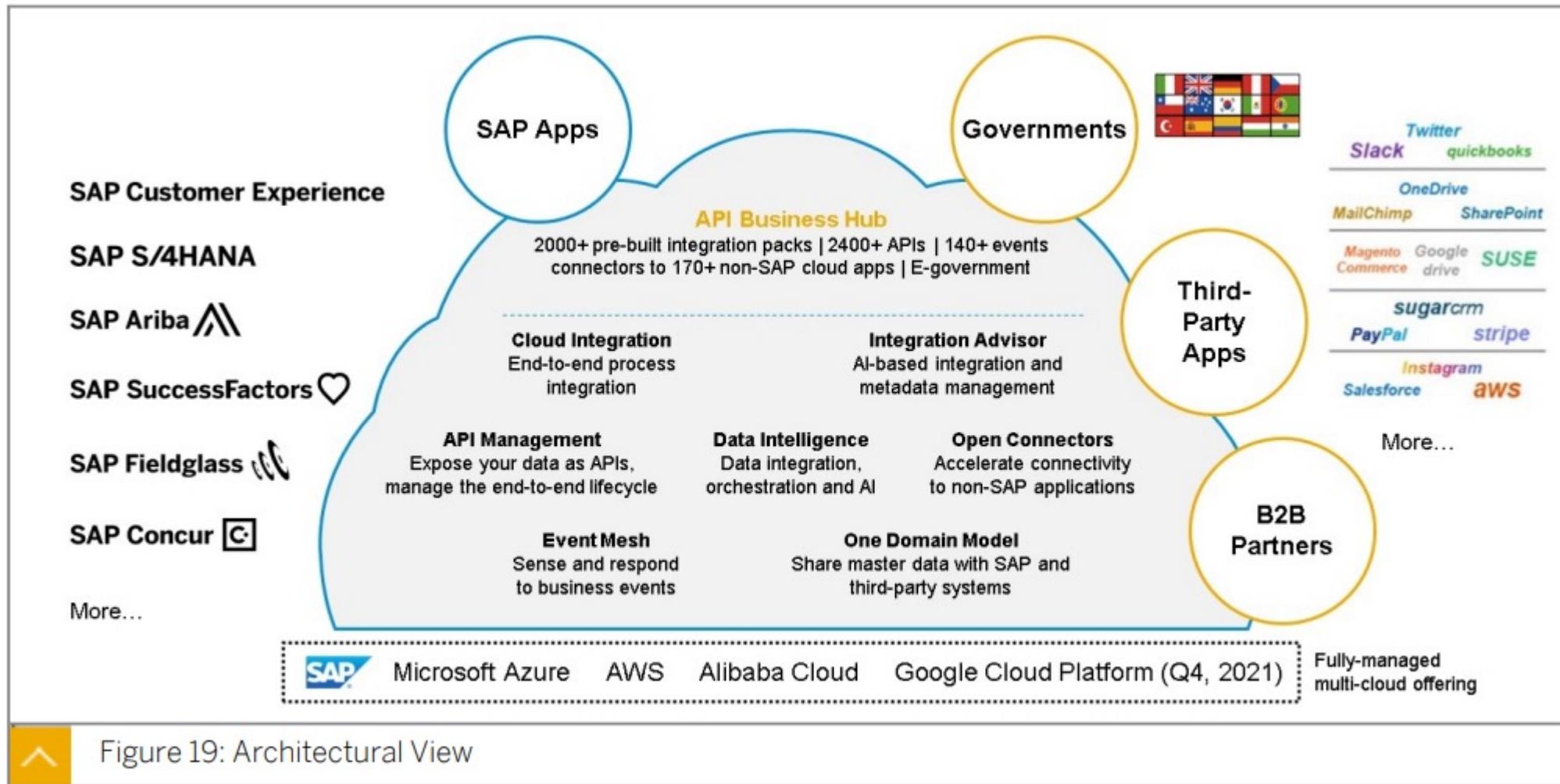
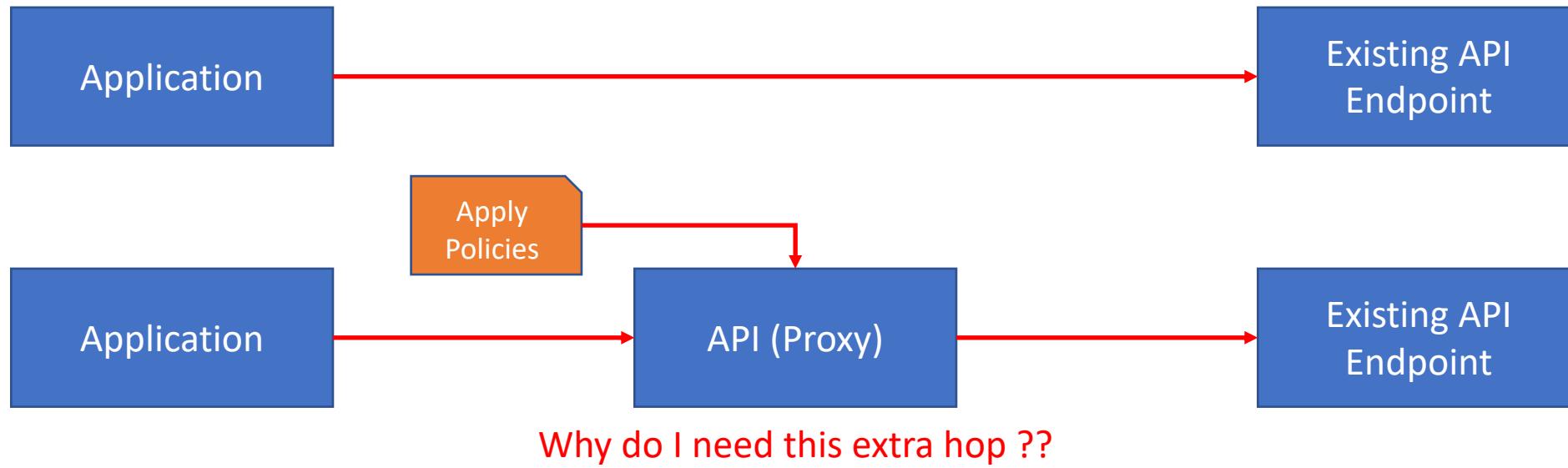
Simplify Integration by a Systematic Integration Approach			
1 <b>Assess your integration Strategy</b>	2 <b>Design your Hybrid Integration Platform</b>	3 <b>Define Integration Best Practices</b>	4 <b>Enable a Practice of Empowerment</b>
			
Document/review your integration architecture	Map use case patterns to integration technologies	Define solution architecture blueprints	Democratize integration delivery
Scoping of focus area e.g. future building blocks	Derive integration guidelines for your organization	Add decision criteria and key characteristics	Define areas for self service integration
Use-case driven approach (technology-agnostic)	Reflect customer context	Establish integration as recognized discipline	Establish a shared developer community

 Figure 17: ISA-M: Four Use Cases for Enterprise Architects

# Positioning Integration Suite



# API Management (Key concept)



## Advantages:

- Consistent management rules and policies
- Token verification
- Rate limiting
- Caching
- Analytics and reporting etc.

# API Management - Terminologies

- API Provider
  - Concept in API Management that defines connection details for existing services
- API (Proxy)
  - Managed facades for existing services (sits in front of the existing service)
  - Applications connect to API (proxy)
- Policies
  - Provides capabilities to define behavior of an API (proxy)
- Product
  - Bundle and publish API (proxies) as a Product for consumption
- Application
  - Consumes the Product (bundle of API proxies) using api key and secret

# Unit 3 – Managing APIs

Developing with SAP Integration Suite

C\_CPI\_15

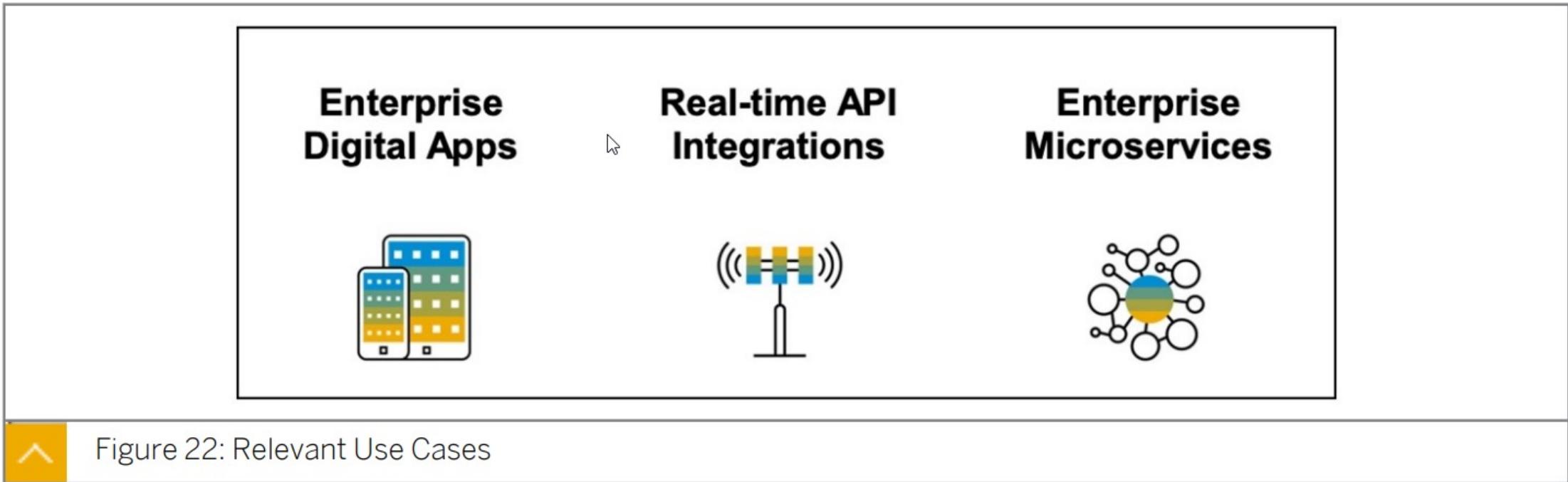
# Unit 3 Content

- SAP API Management
- Components of SAP API Management
- Creating an API Provider
- Creating an API (proxy)
- Using Policies
- Creating a Product
- Logging and Monitoring
- Key Summary Points

# SAP API Management

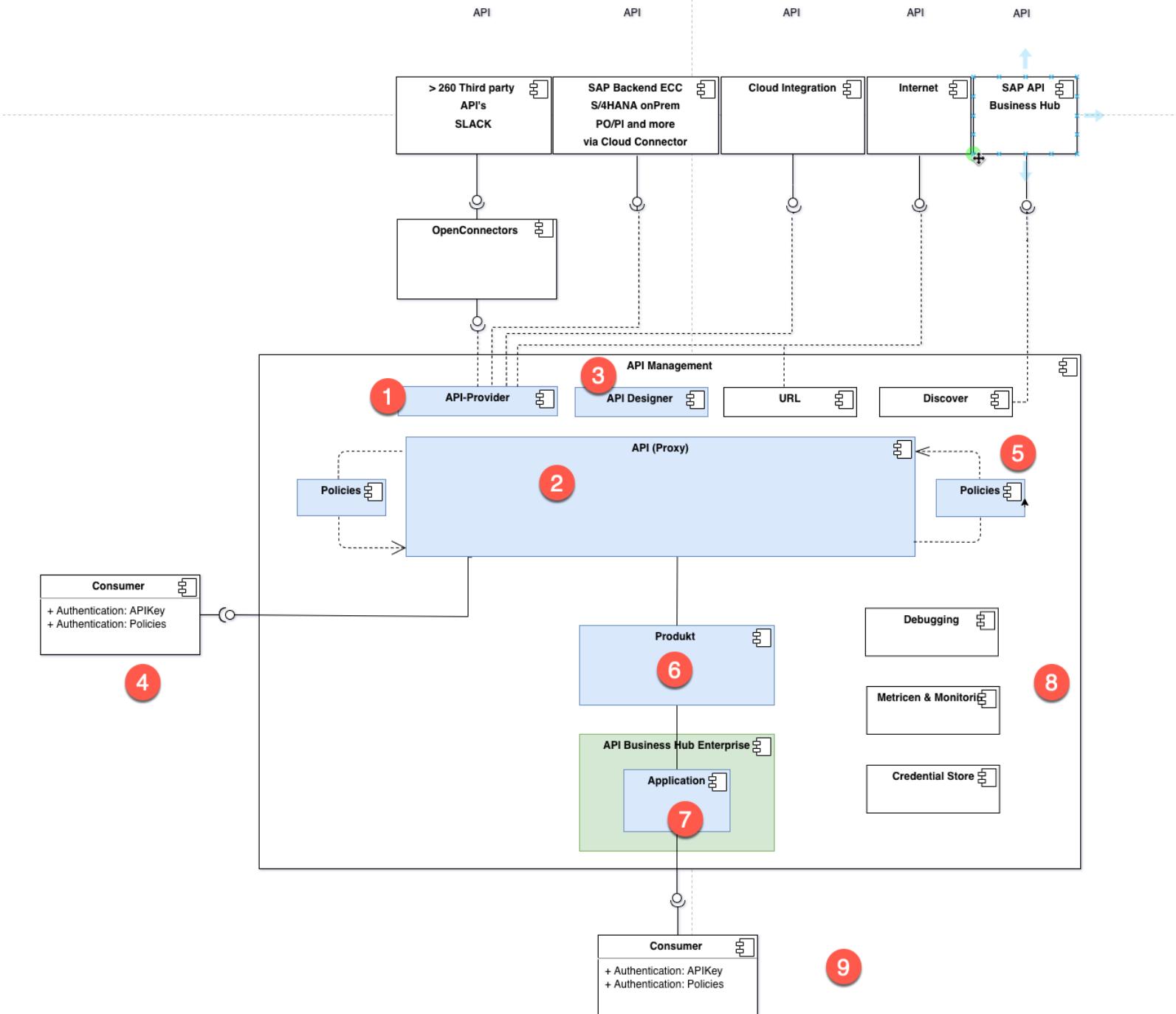
- Building APIs (proxies)
- Publishing APIs (Bundle APIs as Product)
- Analyzing APIs
- Consuming APIs
- Monetizing APIs
- Discover API Packages
- API (proxy) Designer

# Relevant Use Cases



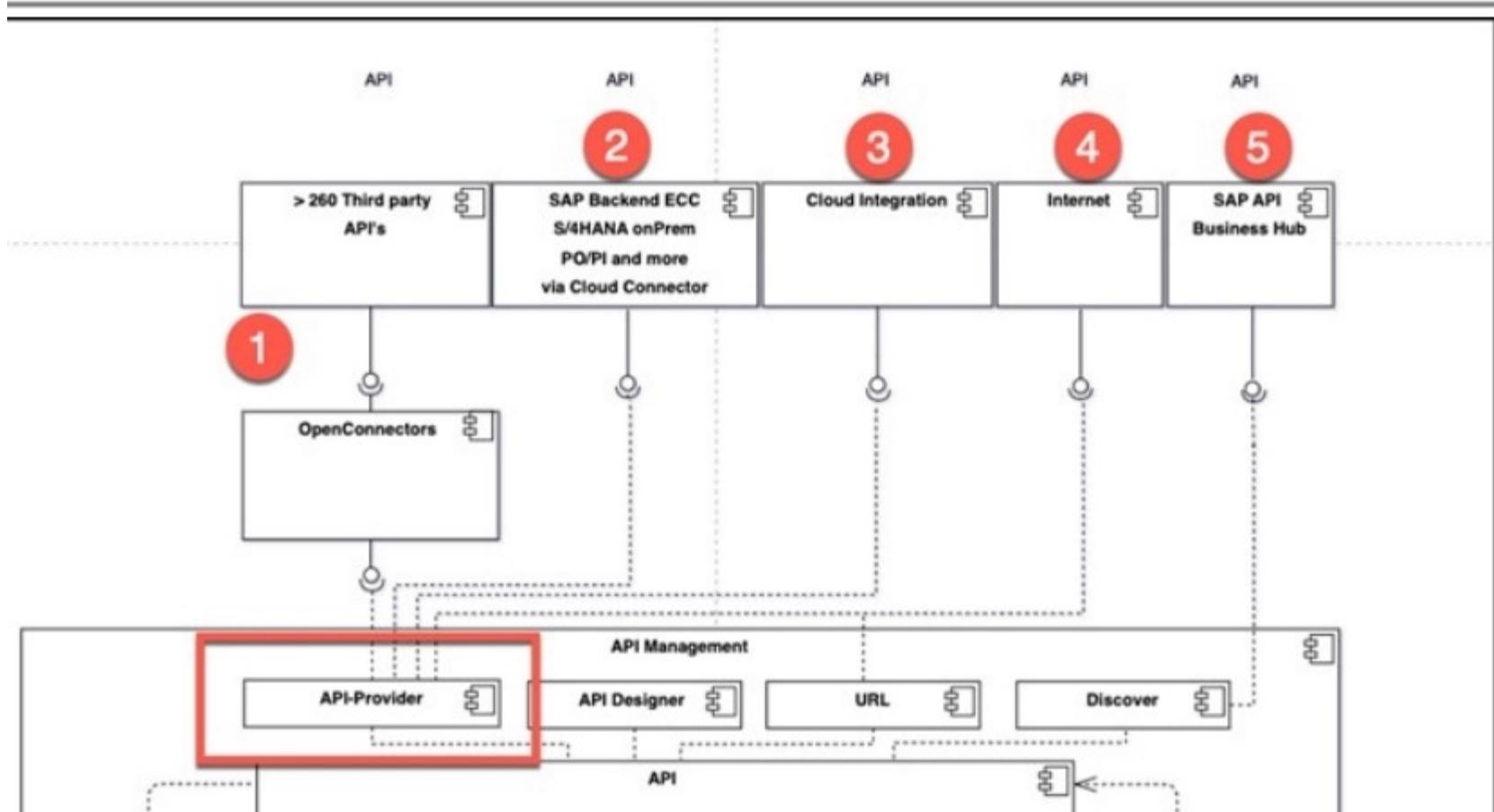
# Components of SAP API Management

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# Creating an API Provider

- Concept in SAP API Management
- Defines the connection details for services
  - Details of the host
  - Additional details to establish connection – for example, proxy settings



# Demo: API Provider (5 different sources)

- Open Connectors
- Through Cloud Connector to SAP On-Premise backends
- Cloud Integration
- APIs from internet
- SAP Business Accelerator Hub (API Business Hub)

Overview    Connection    Catalog Service Settings

Type: \*①

Internet

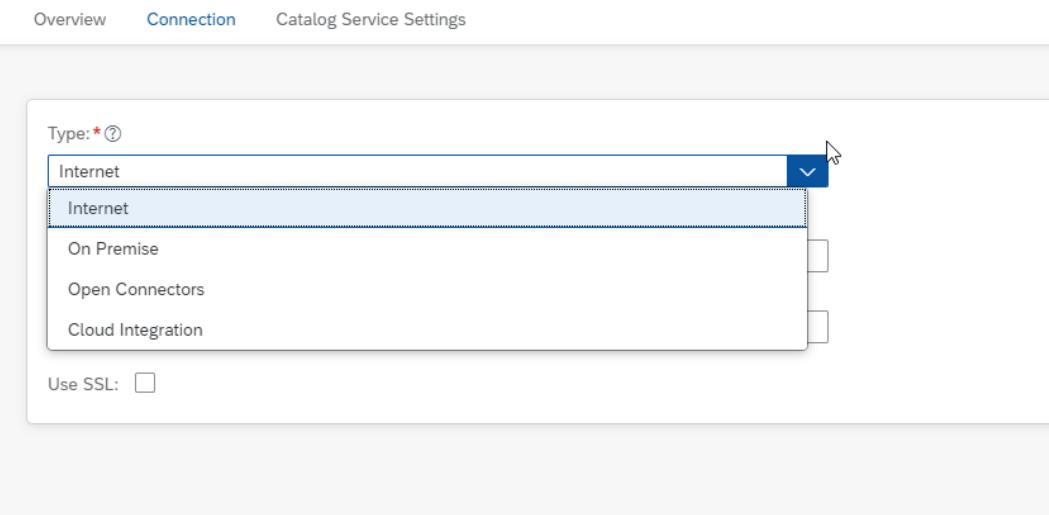
Internet

On Premise

Open Connectors

Cloud Integration

Use SSL:



The screenshot shows the 'Connection' tab of the SAP API Business Hub interface. The 'Type' field is highlighted with a red box, showing a dropdown menu with five options: 'Internet', 'On Premise', 'Open Connectors', and 'Cloud Integration'. The 'Internet' option is selected. Below the dropdown, there is a checkbox labeled 'Use SSL:'.

# Demo: API Provider

Field Name	Input
Type	Internet
Host	sapes5.sapdevcenter.com
Port	443
Use SSL	Checked
Path Prefix	/sap/opu/odata
Service Collection URL	/IWFND/CATALOGSERVICE/ServiceCollection
Authentication Type	Basic
Username	
Password	

# Catalog Service

The catalog service provides a list of all available services for your area. Exploration of OData services is crucial for several tools to identify a suitable service for the realization of a business use case. Therefore certain search capabilities are required.

Metadata exploration is available using standard OData mechanisms. It is built on top of OData Channel to have full OData feature support when accessing the local database. Exposure of metadata uses search capabilities (scanning the English version of a description of a service), for example, search for all service documents where SalesOrder is used in the description.

## Note

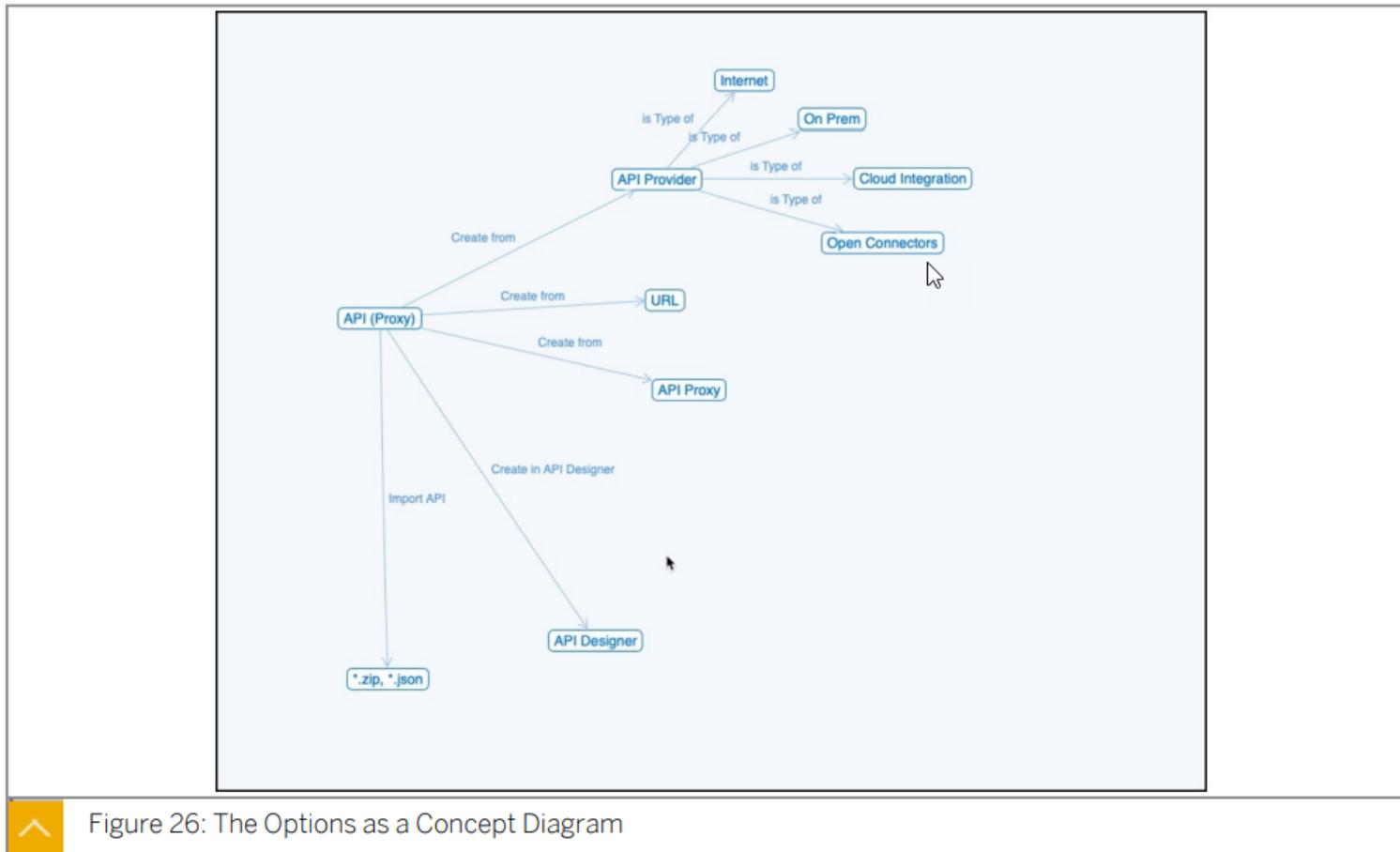
Exploration of the remote OData Channel's services and the registration of its services on SAP Gateway is also provided.

The **catalog service** retrieves a list of all available services on SAP Gateway. It is based on a catalog service pattern proposed by Microsoft™ and consists of an implementation approach of the catalog service pattern in the context of SAP Gateway.

## Note

There are two versions of the catalog service available in SAP Gateway, Version 1 and Version 2. Version 2 has EntitySet collection, Tag collection, Vocabulary collection and Annotations. The open search functionality is also enhanced in Version 2. You can choose the version based on your requirement.

# Creating an API (proxy)



# Demo: API Proxy

- Create Button
  - API Provider
  - API Proxy (copy an existing proxy)
  - URL
- Import API
- Create in API Designer

SAP Integration Suite

Develop

Create APIs, Products, import Policy Templates and view Applications here.

APIs (3) Products (0) Applications (0) Policy Templates (0)

Custom Type System Design and develop API artifacts

1

2 3 4

Create Import API Create in API Designer Filter

Name	Title	Status	Type	Changed By	Last Updated
GWSAMPLE_BASIC	GWSAMPLE_BASIC	Deployed	ODATA	milton.chandra...	5/27/2023, 4:51:14 PM
kubectl-c-81b58c5	Kubernetes (api.c-81b58c5.kyma.shoot.live.k8s...)	Deployed	REST	piotr.tesny@sa...	5/3/2023, 8:42:25 AM
HelloWorldAPI	HelloWorldAPI	Deployed	REST		5/3/2023, 7:25:11 AM

Home Discover Design Integrations APIs (1) MIGs MAGs Test Configure Monitor Monetize Settings

# Using Policies

- Policy is a program that executes a specific function at runtime
- Adds common functionality to API (proxy)
- Provides features to secure APIs, control API traffic etc.
- Also customize the behavior of API by adding scripts

# Prebuilt policies

- Access Control
- Basic Authentication
- Extract Variables
- JavaScript
- Oauth v2.0
- Quota
- Verify API Key
- And so on...

are

← → ⌂ ⌂ 🔒 api.sap.com/content-type/API/apis/policytemplate

DRPA Wakefern Learning Journey SAP Utils Pending Innovator Challenge Healthcare Cloud Providers SAPUI5 - PWA Past Projects SCN SF Java Extension SWGas DDD Lockheed Blogs

SAP Business Accelerator Hub Explore Resources Discover Integrations Partner with Us

APIs 1 Find APIs to integrate and extend.

Packages All SOAP ODATA V2 ODATA V4 GraphQL REST Policy Template 2

Sort by: A-Z

3

4

Performance\_Traceability

This policy template assists in API Proxy Execution Performance assessment

cacheMetadata

Improve performance of Odata API Proxies by caching metadata across invocations

Version 1 Version 1

/ SAP API Management Debugging and Traceability

## Performance\_Traceability 1

This policy template assists in API Proxy Execution Performance assessment

Download4

### Overview

This policy template assists in API Proxy Execution Performance assessment

Version: 1

Last Modified: 07 Apr 2022

Type: Policy Template

Policies		
proxy_request_receiving_latency.js	ProxyEndPoint	PreFlow
proxy_processing_time.js	ProxyEndPoint	PostFlow
targetreceivinglatency.js	TargetEndPoint	PreFlow
target_processing_time.js	TargetEndPoint	PreFlow

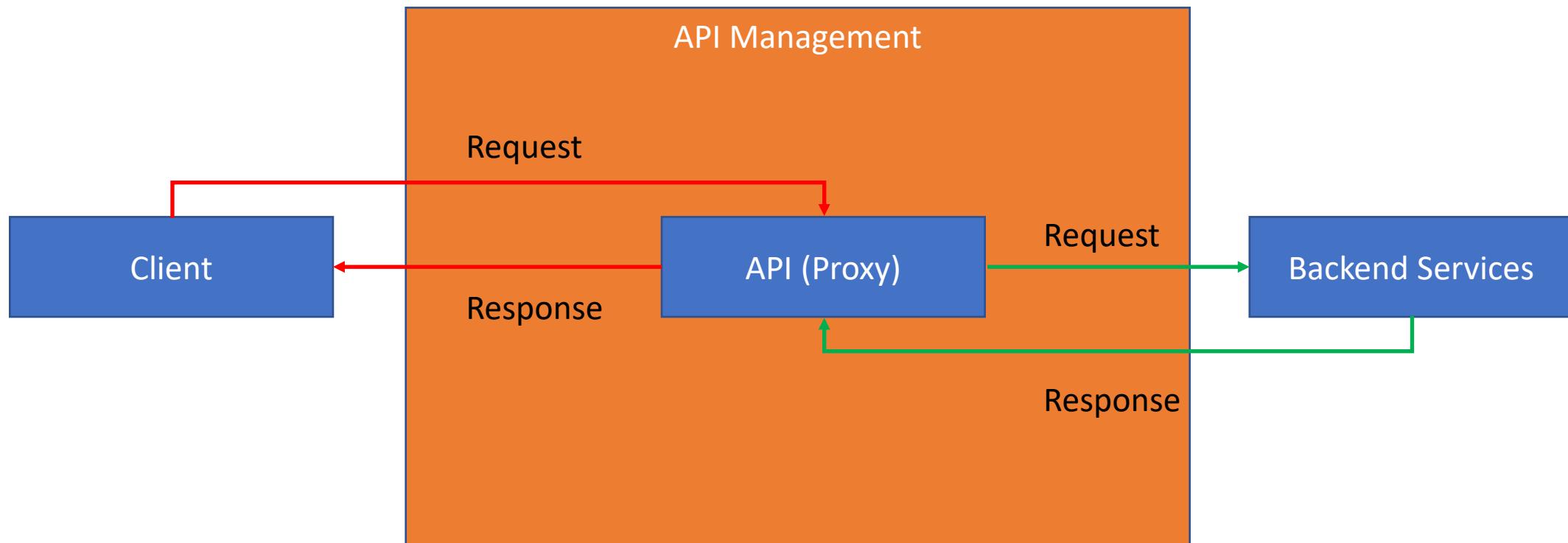
Flow Type:



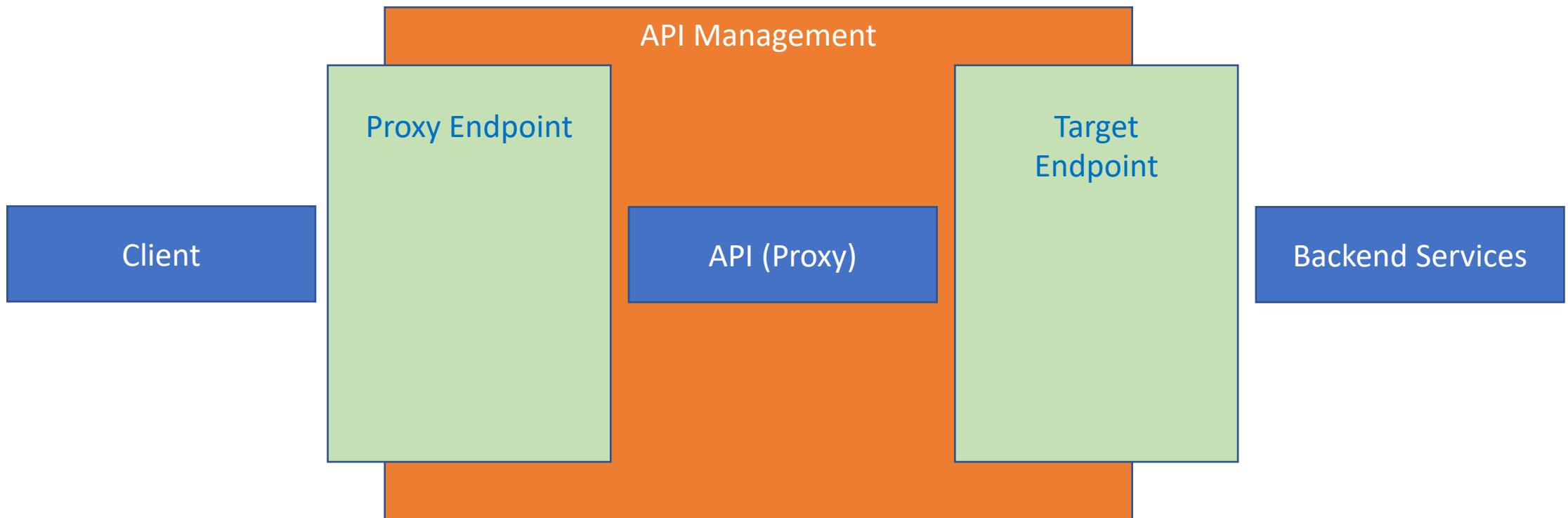
Scripts		
proxy_processing_time.js		
proxy_request_receiving_latency.js		
target_processing_time.js		
targetreceivinglatency.js		

FEEDBACK

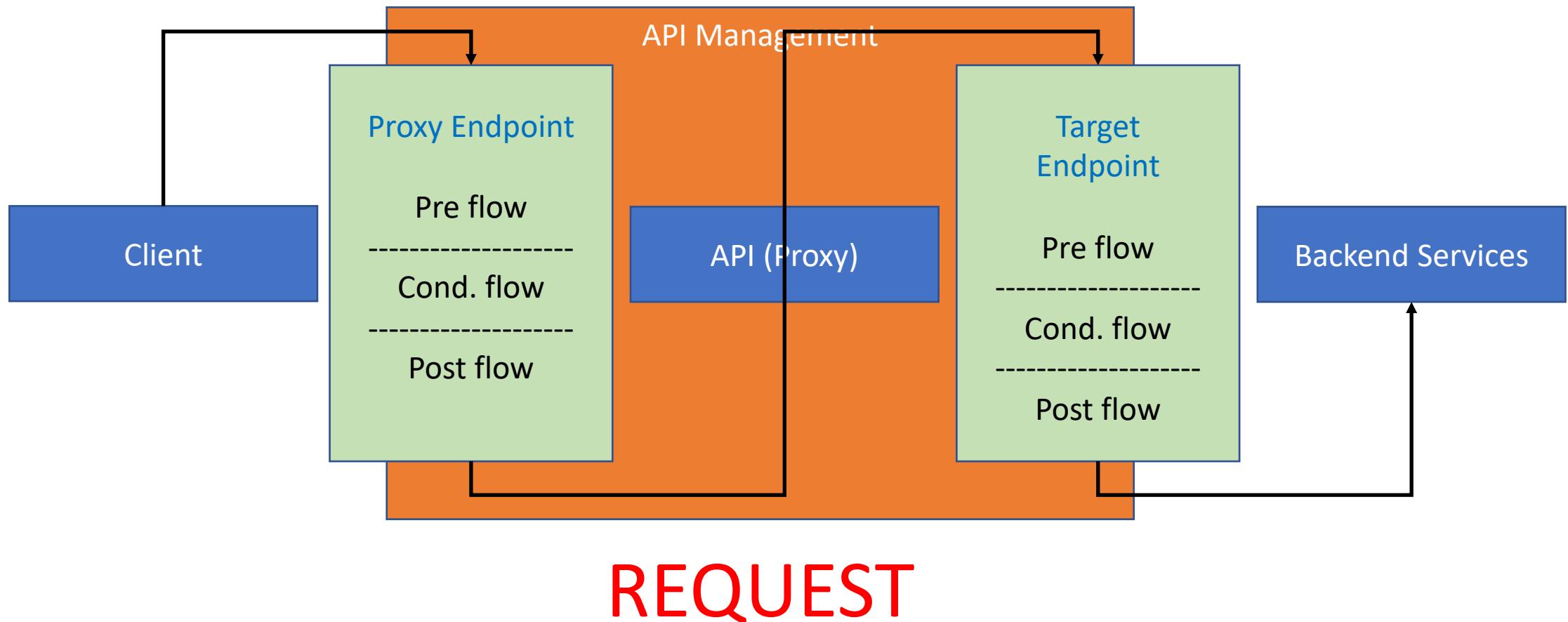
# Flows – Where should I apply my policies ?



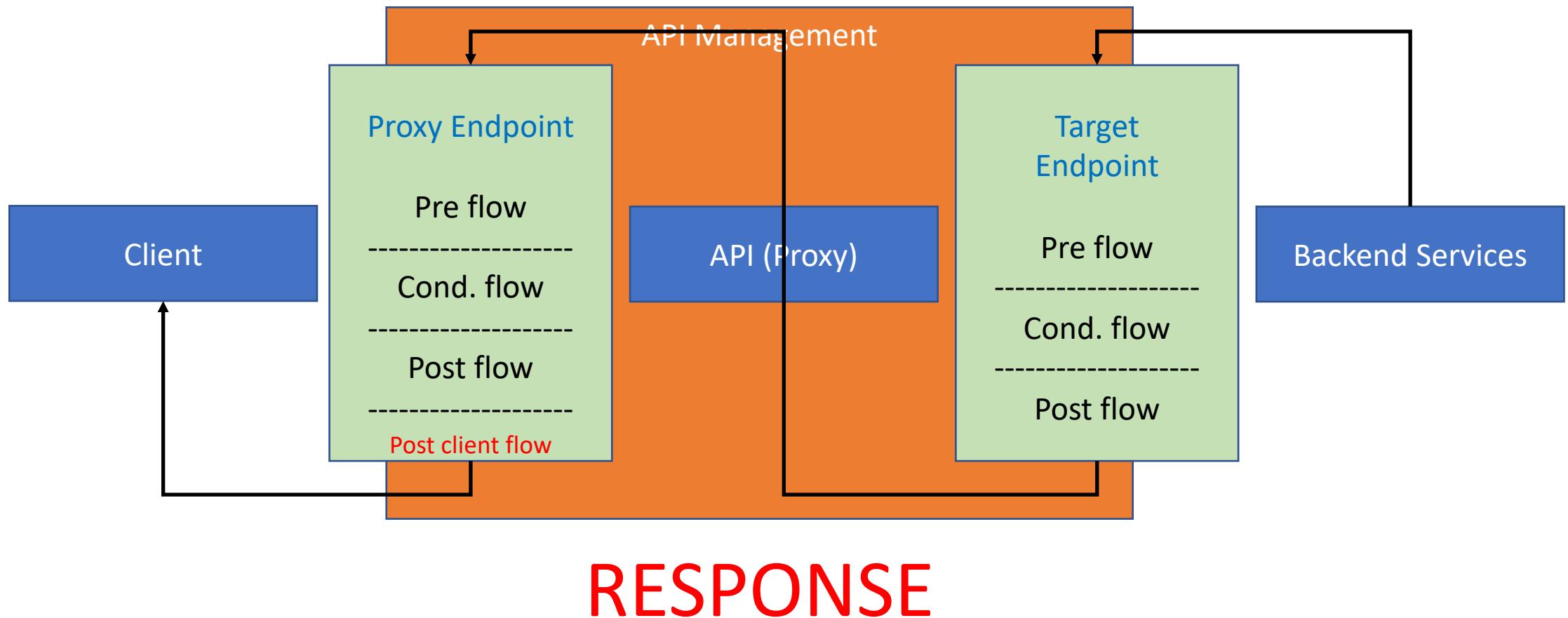
# Flows – Where should I apply my policies ?



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# Flows – Where should I apply my policies ?



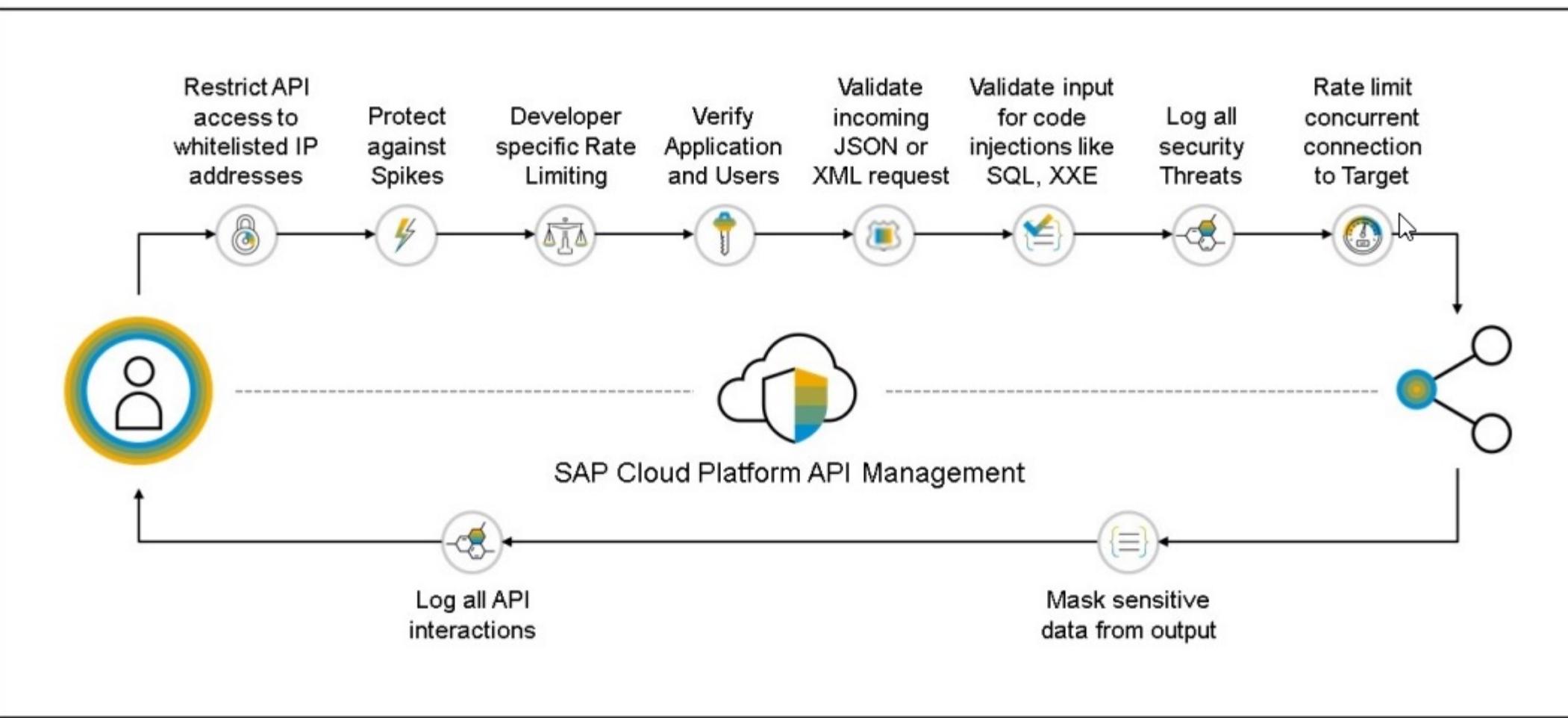


Figure 44: SAP Cloud Platform API Management

# Demo: Policies for basic authentication

SAP Integration Suite API Portal

API Artifacts for GWSAMPLE\_BASIC\_v1

Policy Editor

Flows

- > ProxyEndpoint
- <
- > TargetEndpoint
- <
- PreFlow 0
- PostFlow 2

Created Policies

Scripts

setCredentials...

setBasicAuth...

Update Policy Template Cancel

Policies

Security Policies

- Basic Authentication
- DecodeJWT
- GenerateJWT
- JSON Threat Protection
- OAuth v2.0
- OAuth v2.0 GET
- OAuth v2.0 SET
- Regular Expression Protection
- SAML Assertion Generation
- SAML Assertion Validation
- Verify API Key
- VerifyJWT
- XML Threat Protection

Traffic Management Policies

- Access Control
- Concurrent Rate Limit
- Invalidate Cache
- Lookup Cache
- Populate Cache

```
1 <BasicAuthentication async="true" continueOnError="false" enabled="true" xmlns="http://www.sap.com/opimgmt">
2   <!-- Operation can be Encode or Decode -->
3   <Operation>Encode</Operation>
4   <IgnoreUnresolvedVariables>true</IgnoreUnresolvedVariables>
5   <!-- for Encode, User element can be used to dynamically populate the user value -->
6   <User ref="request.header.username"></User>
7   <!-- For Encode, Password element can be used to dynamically populate the password value -->
8   <Password ref="request.header.password"></Password>
9   <!-- Source is used to retrieve the encoded value of username and password. This should not be used if the operation is
      Encode-->
10  <Source>request.header.Authorization</Source>
11  <!-- AssignTo is used to assign the encoded value of username and password to a variable. This should not be used if the
      operation is Decode -->
12  <AssignTo createNew="false">request.header.Authorization</AssignTo>
13 </BasicAuthentication>
```

# Demo: Policies for basic authentication

Field Name	Value
Policy Type	Assign Message
Policy Name	setCredentials
Endpoint Type	TargetEndpoint
Flow Type	Postflow
Stream	Incoming Request
Policy Type	Basic Authentication
Policy Name	setBasicAuthentication
Endpoint Type	TargetEndpoint
Flow Type	Postflow
Stream	Incoming Request

# Editing APIs

The screenshot shows the SAP API Management interface for editing APIs. The top navigation bar includes 'View API' (with a back arrow), 'Transport', 'Policies', 'Copy', 'Edit', and a 'More' option. The main title is 'GWSAMPLE\_BASIC' with a gear icon. Below it, the status is 'Deployed' and the API Proxy URL is [https://quovadis.test.apimanagement.eu10.hana.ondemand.com:443/GWSAMPLE\\_BASIC](https://quovadis.test.apimanagement.eu10.hana.ondemand.com:443/GWSAMPLE_BASIC). The navigation tabs at the top are 'Overview' (highlighted with a red circle), 'Proxy EndPoint', 'Target EndPoint', and 'Resources'. The 'Overview' section displays the following details:

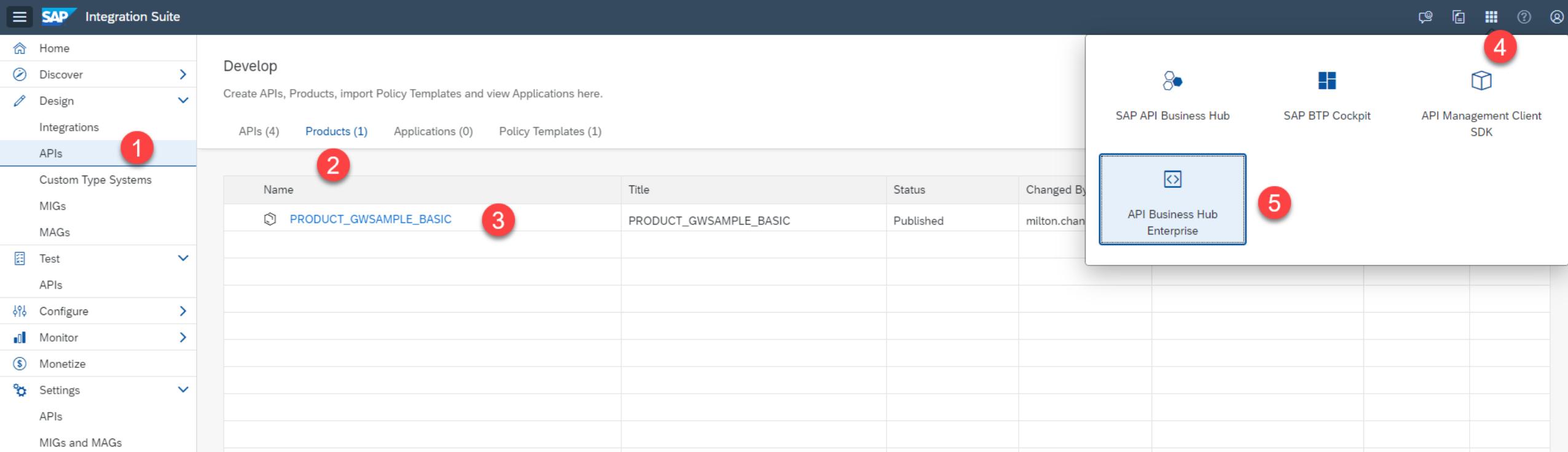
- Title: GWSAMPLE\_BASIC
- Host Alias: quovadis.test.apimanagement.eu10.hana.ondemand.com
- API Base Path: /GWSAMPLE\_BASIC
- API State: Active
- Description: (empty)

On the right side, there are two summary boxes:

- Calls(05/01/2023 - 05/29/2023)**: 3.5k
- API Health**: A green bar chart showing 3487 calls, with a red line at 0.

# Creating a Product

- Products are artifacts that appear in the SAP API Business Hub Enterprise Portal
- Role Collections
  - AuthGroup.API.Admin
  - AuthGroup.API.ApplicationDeveloper





# API Business Hub Enterprise

Centralized API catalog to discover, consume and monitor APIs

Type here to search



## PRODUCT\_GWSAMPLE\_BASIC

API Based on the SAP Gateway  
Demo System (ES5). The  
authorization against the source  
interface is realized via policies. No...

Published on May 29 2023

1 API

# Logging and Monitoring

SAP Integration Suite

Home Discover Design Integrations APIs Custom Type Systems MIGs MAGs Test APIs Configure Monitor APIs Monetize Settings APIs MIGs and MAGs

Analyze

Here you can view the KPIs for the highlights and information related to various APIs

Overview Health Usage + Add (UTC+0:0) UTC

May 23, 2023 - May 29, 2023

Total API Calls: 3496 △ Difference from last week

API Response Time: 93.2 ms △ Difference from last week

Request Processing Latency: 4445 ms △ Difference from last week

Total API Errors: 0 Difference from last week

Target System Errors: 0 Difference from last week

Target Response Time: 91.5 ms △ Difference from last week

API Calls Number of calls per day

All APIs Select APIs from the list

Cumulative Failure Success

3.44K

The screenshot shows the SAP Integration Suite Analyze dashboard. The left sidebar has a red circle labeled '1' over the 'APIs' menu item. The main area has three red circles labeled '2', '3', and '4' over the 'Overview', 'Health', and 'Usage' tabs respectively. The dashboard displays various KPIs for the week of May 23-29, 2023. It includes cards for Total API Calls (3496), API Response Time (93.2 ms), Request Processing Latency (4445 ms), Total API Errors (0), Target System Errors (0), and Target Response Time (91.5 ms). Below these are sections for API Calls (number of calls per day) and a line chart showing cumulative, failure, and success API calls over time, with a peak of 3.44K.

# Unit 4 – Managing Cloud Integration

Developing with SAP Integration Suite

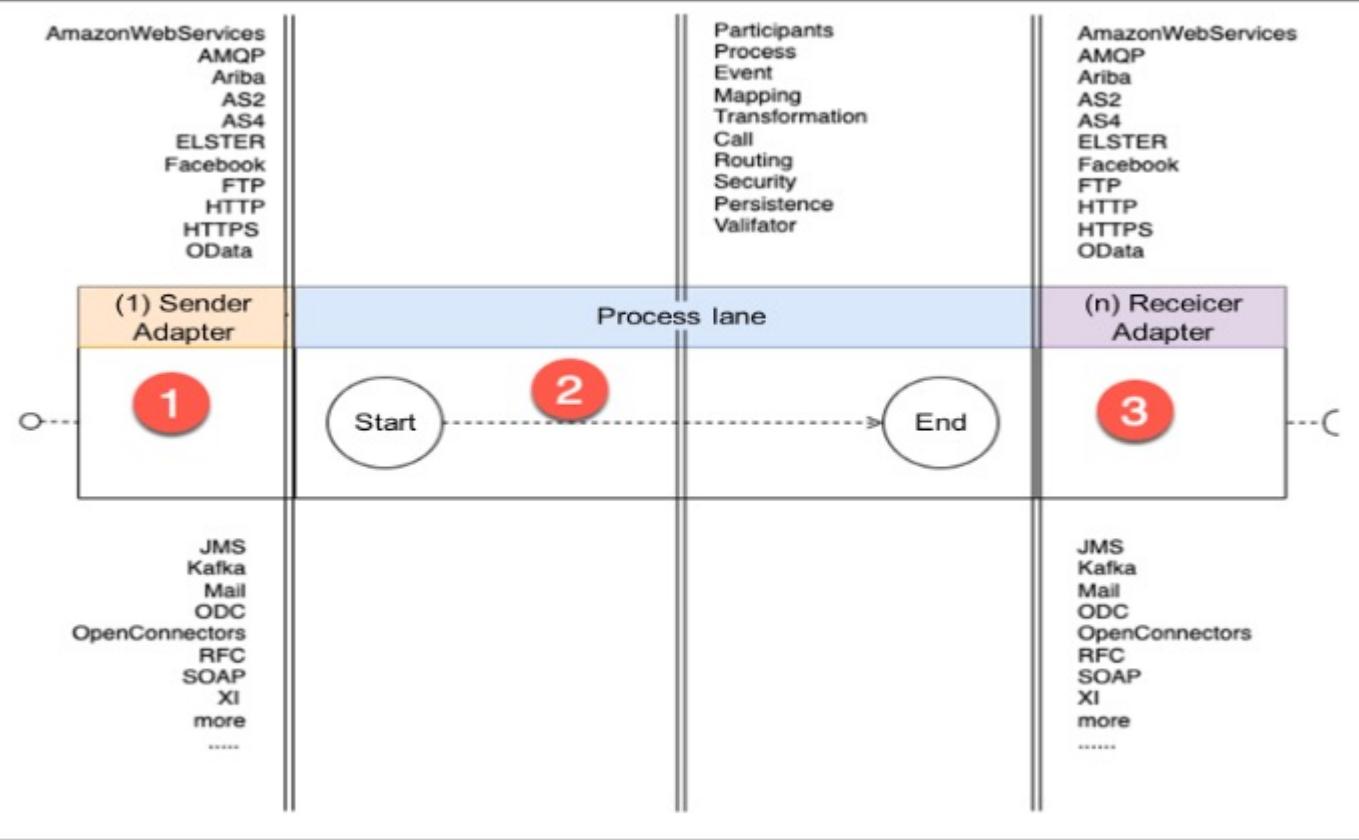
C\_CPI\_15

# Unit 4 Content

- Introducing Cloud Integration
- Business Scenario
- Explaining Development Cycle
- Message Monitoring and Logging
- Camel Data Model and Simple Expression Language

# Introducing Cloud Integration

- Supports end-to-end process integration through exchange of messages
- Based on open source framework Camel from Apache Software Foundation
- Core capabilities of SAP BTP Integration Suite
- Low Code / No Code approach



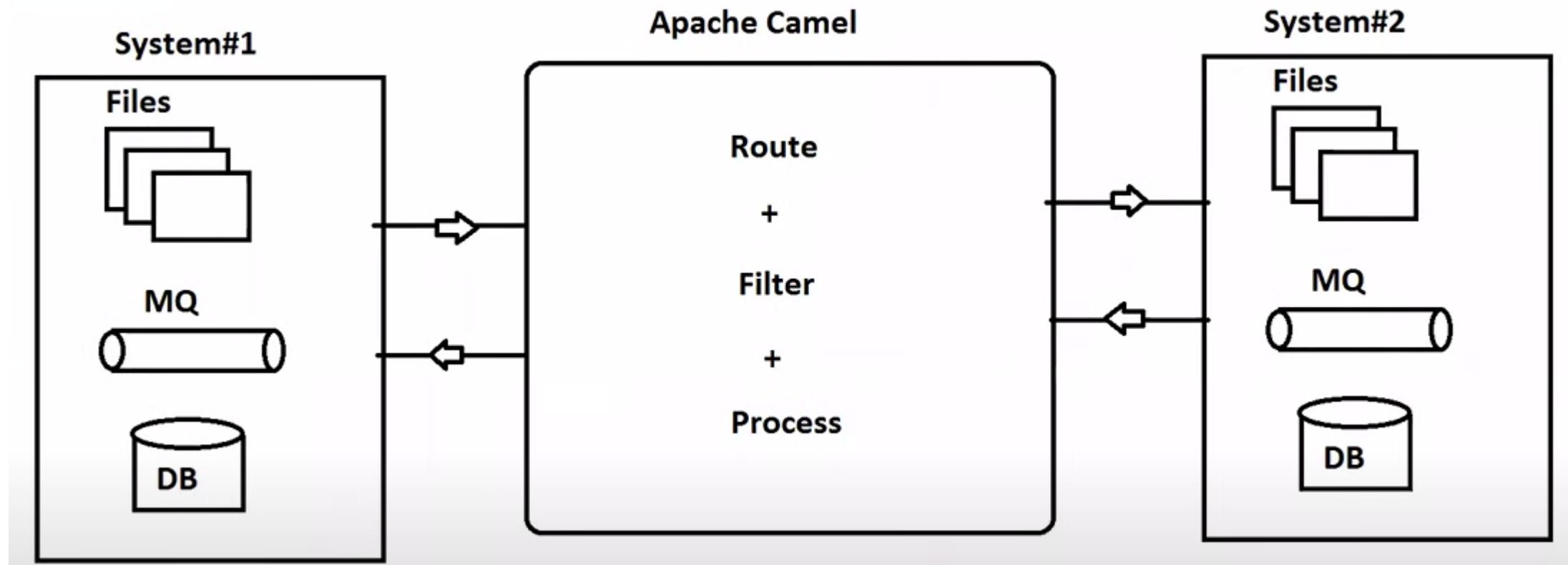
- Integration flow has 0-1 sender adapter
- Message is delivered via an endpoint
  - If an adapter is configured
- Process is started via **Start** event
- Different ways messages can be processed
- Receiver adapters can be configured
- Message processing can be synchronous or asynchronous

Key Features of Cloud Integration

# Apache Camel - Challenge

- Companies have data in various systems
- Need to move data between various systems
- Writing a program entails understanding...
  - Protocols of the various systems
  - Data formats of the various systems
  - And so much more

# Apache Camel



# Apache Camel

- Java library that helps you write integrations and run them
- Define your integration flows
  - Where you want to pull data from
  - What you can or cannot do with the data
  - Where the data needs to go
  - And a lot more...
- Comes with built-in set of patterns you can use in integration flows
  - Splitter pattern – split the message based on how you want
  - Content based routing pattern – route messages based on content
  - And a lot more...

*The Addison-Wesley Signature Series*

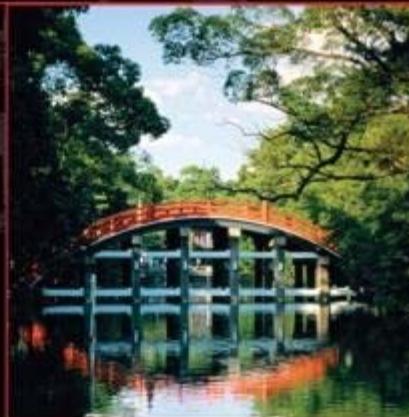
# ENTERPRISE INTEGRATION PATTERNS

DESIGNING, BUILDING, AND  
DEPLOYING MESSAGING SOLUTIONS

GREGOR HOHPE  
BOBBY WOOLF

WITH CONTRIBUTIONS BY

KYLE BROWN  
CONRAD F. D'CRUZ  
MARTIN FOWLER  
SEAN NEVILLE  
MICHAEL J. RETTIG  
JONATHAN SIMON



*Forewords by John Crupi and Martin Fowler*



A MARTIN FOWLER SIGNATURE BOOK

# SAP Cloud Integration

- Adds enterprise features to Apache Camel
- Engineered for cloud
  - Multitenancy
  - Rolling software updates
  - Horizontal scalability
- Strong focus on security including data isolation
- Used by SAP SaaS solutions
  - SAP S/4HANA
  - SAP SuccessFactors and so on...

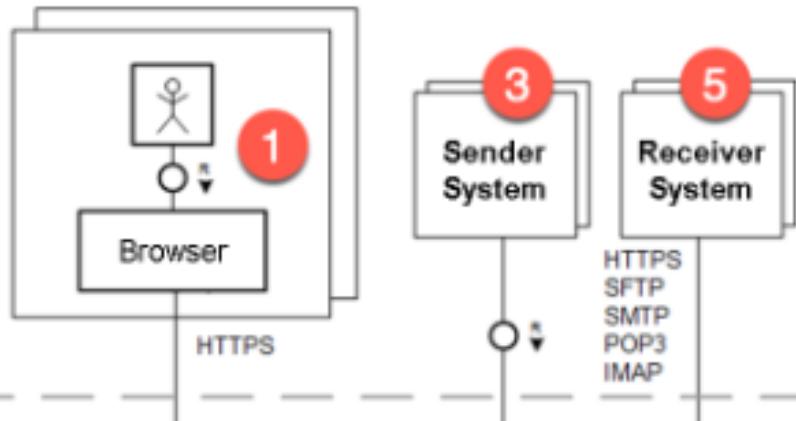
### Administrator, Integration Developer

#### Administrator:

Manages user permissions for account and application

#### Integration Developer:

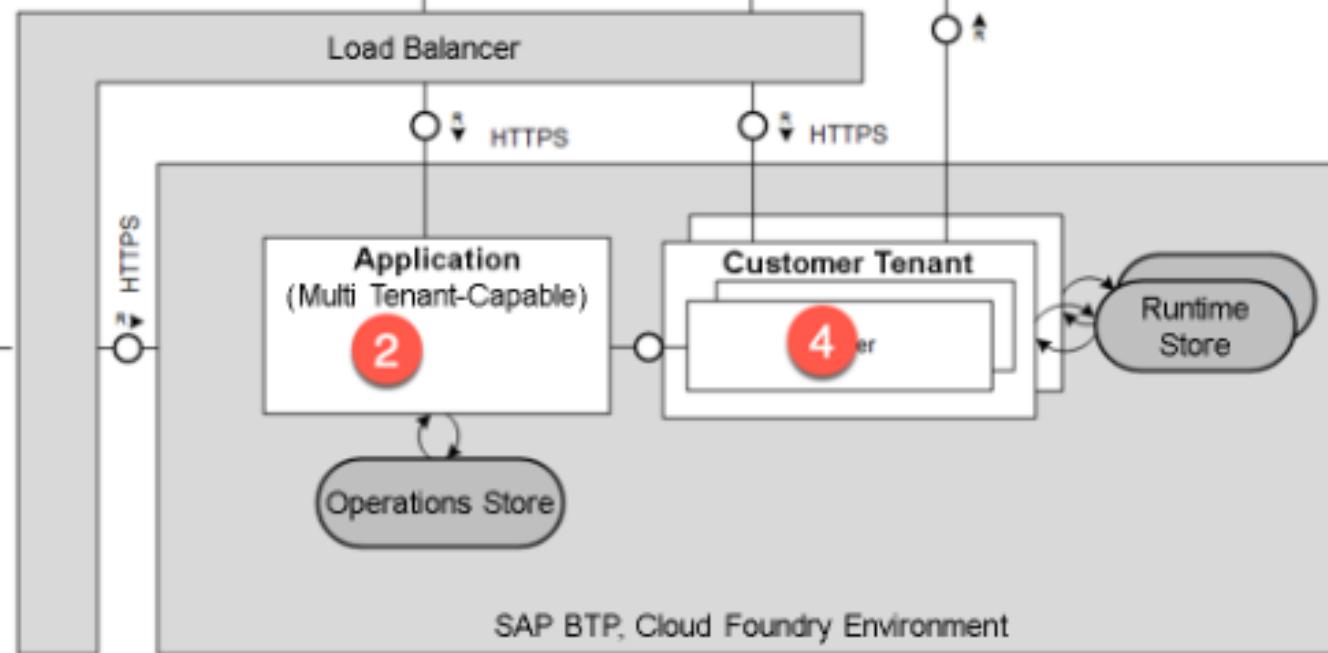
Design and operates integration content



### Infrastructure Provider



Provides infrastructure for customer



The Entire Implementation

# Demo: Building sample integration

- Building integration from scratch
- Predefined integration content

# Business Scenario

- Company A sells goods to customers
- Some products cannot be delivered on time
- Inform customers who ordered these products about delay

# Task flow



# Demo of working solution...

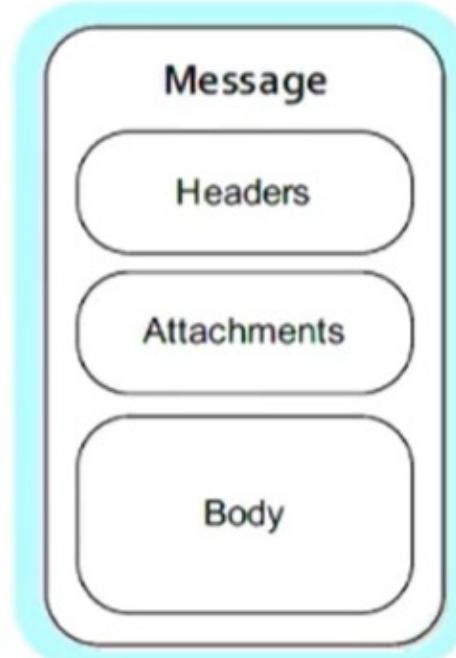
- Demo of the working solution
- Explore Cloud Integration
  - Discover area
  - Design area
  - Monitor area
  - Settings area

# Basic concepts of Cloud Integration flow...

## Message

Fundamental entity **containing the data** being carried and routed in Camel

- Messages have a body (a payload), headers, and optional attachments
- Messages are uniquely identified with an identifier of type `java.lang.String`
- *Headers*
  - Headers are values associated with the message
    - ⇒ Sender identifier, hints about content encoding, authentication information,...
  - Headers are name-value-pairs
    - ⇒ Name is a unique, case-insensitive string
    - ⇒ Value is of type `java.lang.Object`
- *Attachments*
  - Optional – typically used for Web service and e-mail components
- *Body*
  - Type: `java.lang.Object` → any kind of content is allowed

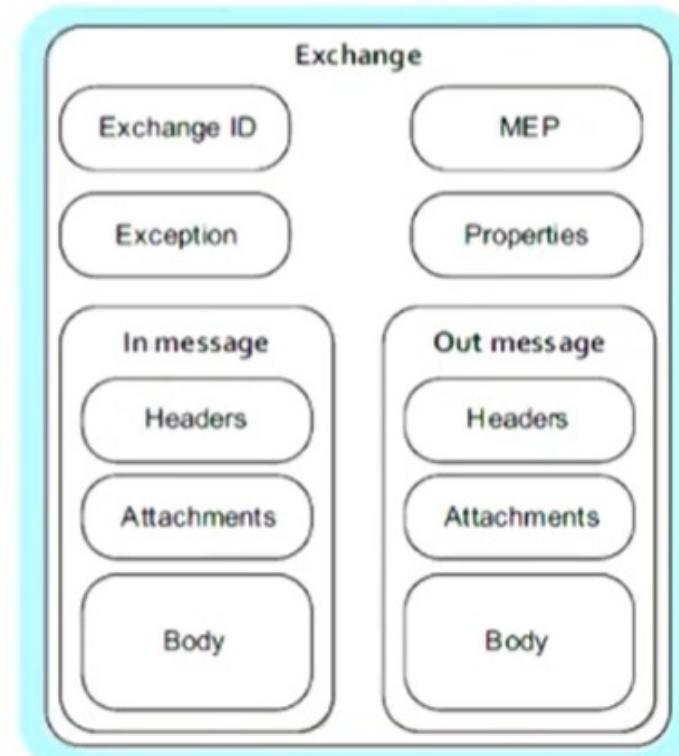


# Basic concepts of Cloud Integration flow...

## Exchange

The **message's container** during routing

- Provides support for various interaction types between systems, known as Message Exchange Patterns (MEP)
  - InOnly: a one-way message (e.g. JMS messaging)
  - InOut: a request-response message (e.g. HTTP-based transports)
- *Exchange ID*: a unique ID that identifies the exchange
- *MEP*
  - InOnly: exchange contains an “in message” **only**
  - InOut: exchange contains an “in message” **and** an “out message” containing the reply message for the caller
- *Exception*: If an error occurs during runtime, the Exception field will be filled
- *Properties*: Similar to message headers, but they last for the duration of the entire exchange; they contain global-level information; you can store and retrieve properties at any point during the lifetime of an exchange



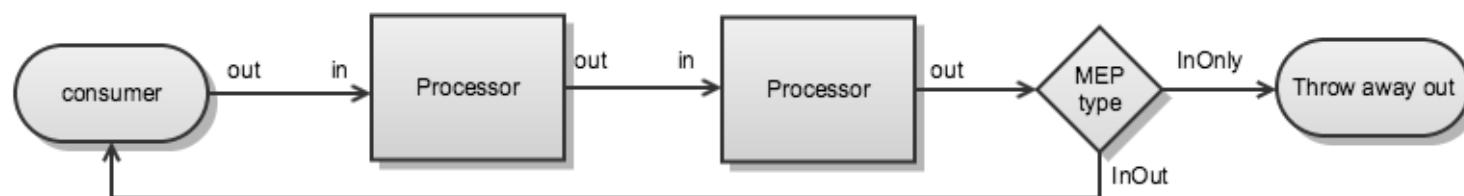
# MESSAGE EXCHANGE PATTERNS AND THE EXCHANGE OBJECT

The Camel API is influenced by APIs such as JBI specification, CXF which defines a concept called Message Exchange Patterns (MEP for short).

The MEP defines the messaging style used such as one-way (`InOnly`) or request-reply (`InOut`), which means you have IN and optionally OUT messages. This closely maps to other APIs such as WS, WSDL, REST, JBI and the likes.

The `Exchange` API provides two methods to get a message, either `getIn` or `getOut`. Obviously the `getIn` gets the IN message, and the `getOut` gets the OUT message.

## FLOW OF AN EXCHANGE THROUGH A ROUTE



- The out message from each step is used as the in message for the next step
- if there is no out message then the in message is used instead
- For the InOut MEP the out from the last step in the route is returned to the producer. In case of InOnly the last out is thrown away

### TIP

#### Beware of `getOut` to check if there is an out message

`exchange.getOut` creates an out message if there is none. So if you want to check if there is an out message then you should use `exchange.hasOut` instead.

# Manipulating Exchange Parameters

- Exchange params (including payload): set by incoming messages
- But these params can also be manually manipulated
  - Content Modifier component
  - Groovy SDK
  - JavaScript SDK
  - PDF in Message Mapping
  - XSLT Mapping
  - And more...

# Simple Expression Language

- Used to parameterize Exchange Parameters
- General scheme is  `${}` placeholder containing built-in variable or Exchange parameter
- For example
  - `${in.body}`
  - `${property.someproperty}`
  - `${header.someheader}`

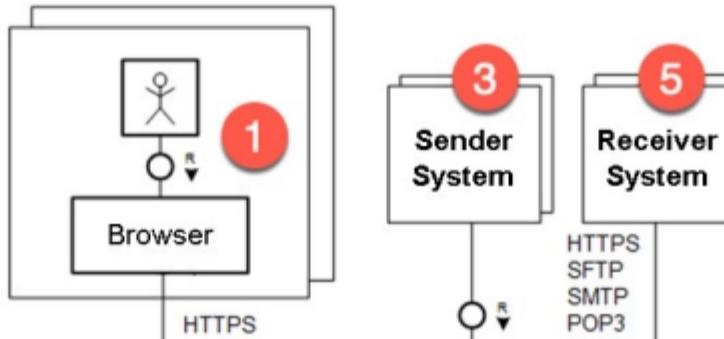
### Administrator, Integration Developer

#### Administrator:

Manages user permissions for account and application

#### Integration Developer:

Design and operates integration content



### Infrastructure Provider



Provides infrastructure for customer

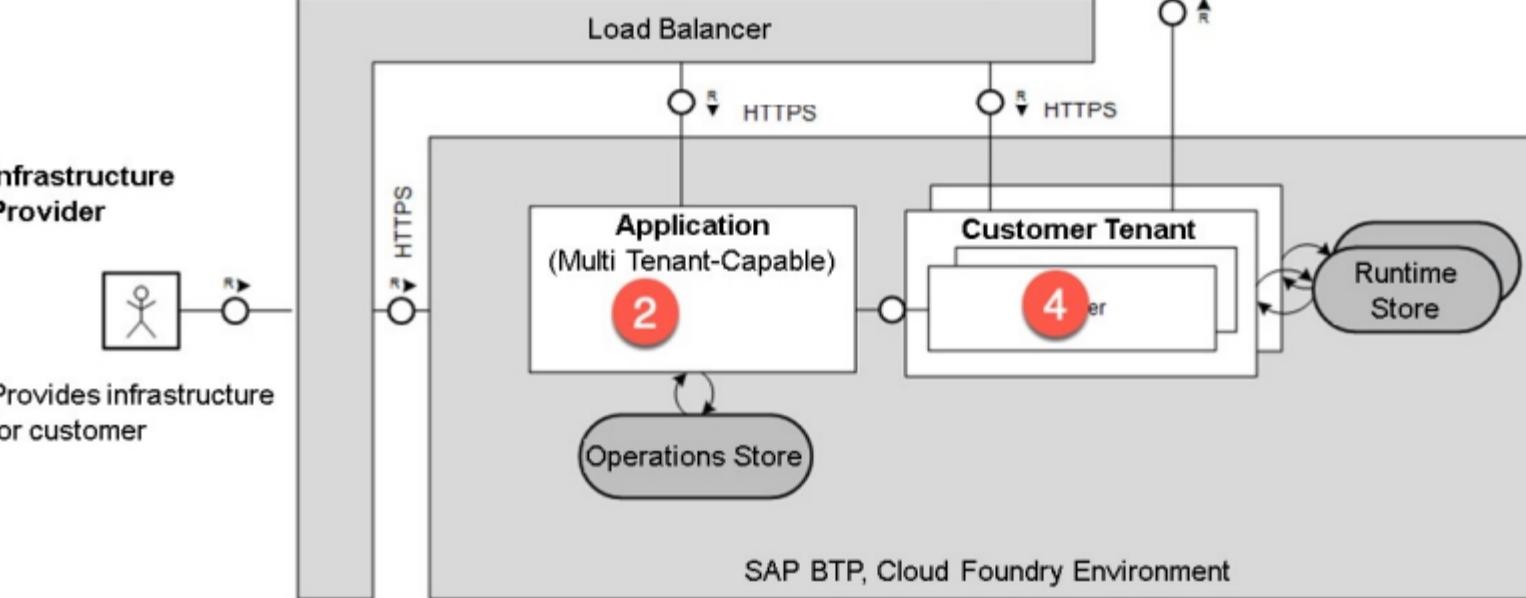


Figure 78: The Entire Implementation

# Business Scenario - Task flow



# Business Scenario – Steps involved

1. Create Integration Package and Integration Flow with **Timer**
2. Add **Content Modifier** (mock data – Product list)
3. Add **General Splitter** (split Products for iteration)
4. Add **Content Modifier** (add Product ID to Exchange Property)
5. Add **Request Reply** (is Product ID in database)
6. Add **Router** (If Product ID exists - CONTINUE, else END)

# Unit 5 – Modeling Processes

Developing with SAP Integration Suite

C\_CPI\_15

# Agenda

- Modeling Integration Flows
- Learning the Basics
- Using Adapters
- Using Mappings
- Using Adapter Outbound Security
- Performing Exception Handling
- Using Scripting
- Using Adapter Inbound Security
- Using Integration Patterns

# Business Scenario - Task flow



# Business Scenario – Steps involved

1. Create Integration Package and Integration Flow with **Timer**
2. Add **Content Modifier** (mock data – Product list)
3. Add **General Splitter** (split Products for iteration)
4. Add **Content Modifier** (add Product ID to Exchange Property)
5. Add **Request Reply** (is Product ID in database)
6. Add **Router** (If Product ID exists - CONTINUE, else END)

# Using Adapters

- Wide variety of pre-built adapters available
- Support various application, transport protocols, message protocols
- Differentiation made between input and output adapters
- Broadly categorized into 2 groups
  - TCP based
  - Non TCP based

# Features of OData Adapter

- Query wizard
  - Navigate the interface to be accessed with metadata document
- Page Processing mode
  - Read entries in multiple pages which are processed sequentially
- Automatically removing namespaces
  - Remove namespaces and prefixes automatically

# XPath Expressions

The screenshot shows the 'XPath Notebook' interface within a code editor. It displays three examples of XPath queries against a 'Products.xml' source file.

**Example 1:**

```
[44] ✓ 0.2s
Source: 'Products.xml' Items: 1 XPath
... "/ProductSet[1]"
```

**Example 2:**

```
[45] ✓ 0.2s
Source: 'Products.xml' Items: 1 XPath
... 1
```

**Example 3:**

```
[46] ✓ 0.2s
Source: 'Products.xml' Items: 1 XPath
... true
```

The right side of the interface shows the XML structure of the 'Products.xml' file, which includes a ProductSet element containing a single Product element with attributes Category, ProductID, and Name.

```
1 <ProductSet>
2   <Product>
3     <Category>Flat Screen Monitors</Category>
4     <ProductID>HT-1035</ProductID>
5     <Name>Flat Basic</Name>
6   </Product>
7 </ProductSet>
```

# XPath Expressions

The screenshot shows an IDE interface with two tabs: 'NoProducts.xbook' and 'SalesOrders.xml'. The main area displays three XPath queries:

- [47] `/ProductSet` ✓ 0.2s Source: 'NoProducts.xml' Items: 1 XPath  
... `"-/ProductSet[1]"`
- [48] `/ProductSet/count(Product)` ✓ 0.2s Source: 'NoProducts.xml' Items: 1 XPath  
... `0`
- [49] `/ProductSet/count(Product) > 0` ✓ 0.2s Source: 'NoProducts.xml' Items: 1 XPath  
... `false`

The third query has a blue arrow icon to its left, indicating it is the current active item.

# Business Scenario - Task flow



# Business Scenario – Steps involved

7. Add **Request Reply** (get all Sales Orders for each Product)
8. Add **XSLT Mapping** (remove namespaces)
9. Add **General Splitter** (split Sales Order for iteration)
10. Add **Content Modifier** (add Sales Order ID, Item to Exchange Property)

# Business Scenario - Task flow



# Business Scenario – Steps involved

11. Add **Request Reply** (get Sales Header for each Sales Order)
12. Add **XSLT Mapping** (remove namespaces)
13. Add **Content Modifier** (add Customer ID to Exchange Property)

# HTTP Adapter

The screenshot shows the SAP Business Application Studio interface with two main panes. The left pane displays an XML feed from the SAP OData service, and the right pane shows the resulting data and an XPath notebook.

**Left Pane (XML Feed):**

```
<feed xmlns="http://www.w3.org/2005/Atom"
      xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata"
      xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservices" xml:lang="en">
  <id>https://sapdevcenter.sapes5.com/sap/opu/odata/iwbep/GWSAMPLE_BASIC</id>
  <title type="text">SalesOrderLineItemSet</title>
  <updated>2023-06-04T07:44:49Z</updated>
  <author>
    <name/>
  </author>
  <link href="ProductSet('HT-1035')/ToSalesOrderLineItems" rel="self" type="application/atom+xml">
  <entry>
    <id>https://sapdevcenter.sapes5.com/sap/opu/odata/iwbep/GWSAMPLE_BASIC(SalesOrderID='0500000001')</id>
    <title type="text">SalesOrderLineItemSet(SalesOrderID='0500000001')</title>
    <updated>2023-06-04T07:44:49Z</updated>
    <category term="GWSAMPLE_BASIC.SalesOrderLineItem" scheme="http://schemas.microsoft.com/ado/2007/08/dataservices/scheme">
    <link href="SalesOrderLineItemSet(SalesOrderID='0500000001', ItemPosition=40)" rel="self" type="application/atom+xml">
      <content type="application/xml">
        <m:properties xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata"
                      xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservices" xml:lang="en">
          <d:SalesOrderID>0500000001</d:SalesOrderID>
          <d:ItemPosition>000000040</d:ItemPosition>
          <d:DeliveryDate>2018-01-07T23:00:00.0000000</d:DeliveryDate>
        </m:properties>
      </content>
    </entry>
    <entry>
      <id>https://sapdevcenter.sapes5.com/sap/opu/odata/iwbep/GWSAMPLE_BASIC(SalesOrderID='0500000001', ItemPosition=41)</id>
      <title type="text">SalesOrderLineItemSet(SalesOrderID='0500000001', ItemPosition=41)</title>
      <updated>2023-06-04T07:44:49Z</updated>
    </entry>
  </feed>
```

**Right Pane (XPath Notebook):**

Two XPath queries are shown:

- Query [53]: `//content/m:properties/d:SalesOrderID`  
Result: [✓] 0.2s  
Source: 'SalesOrdersNamespaces.xml' Items: 2 XPath  
Paths:  
"-/feed[1]/entry[1]/content[1]/m:properties[1]/d:SalesOrderID[1]",  
"-/feed[1]/entry[2]/content[1]/m:properties[1]/d:SalesOrderID[1]"
- Query [54]: `//content/m:properties/d:ItemPosition`  
Result: [✓] 0.2s  
Source: 'SalesOrdersNamespaces.xml' Items: 2 XPath  
Paths:  
"-/feed[1]/entry[1]/content[1]/m:properties[1]/d:ItemPosition[1]",  
"-/feed[1]/entry[2]/content[1]/m:properties[1]/d:ItemPosition[1]"

**Note:** Namespaces are not automatically removed in HTTP adapter... So your XPath needs to take that into account

# Mappings

- Message Mapping
  - Mapping editor provides tools to map XML or JSON messages
- XSLT Mapping
  - Language designed for transforming XML docs to other formats
  - Stylesheet is processed by an XSLT processor (Xalon or Saxon)
- Mapping with scripting
- Operation Mapping from Enterprise Service Repository (On-Premise)

# Mappings

- Process of converting source format into different target formats
- **Message Mapping** offers context handling, UDF, testing functions
- **XSLT Mapping** requires XML as input
  - Can create more target formats
  - Useful for creating attachments
- **Mapping via scripting** offers most flexibility

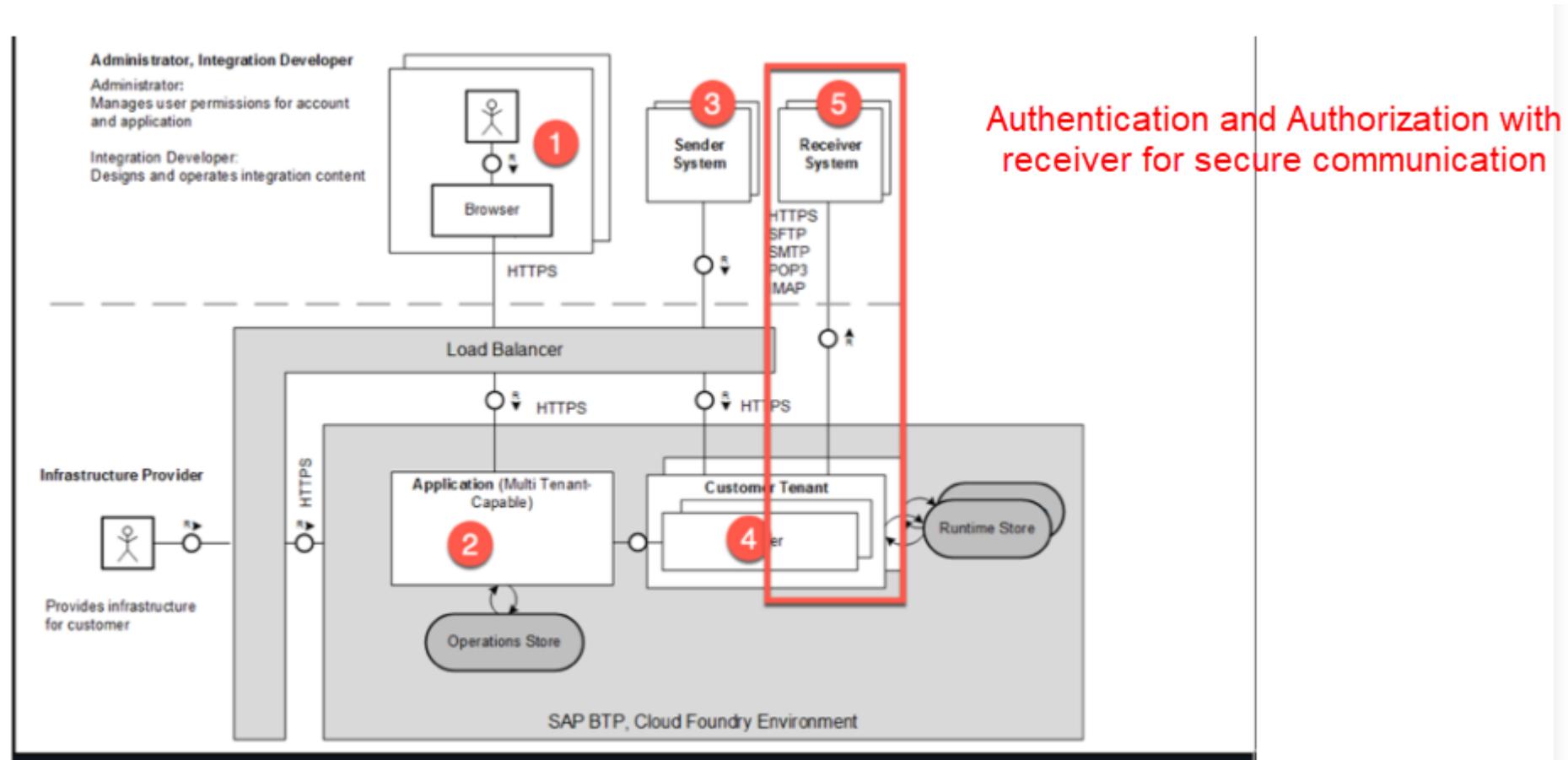
# Business Scenario - Task flow



# Business Scenario – Steps involved

14. Add **Data Store** (write Customer ID to Data Store)

# Using Adapter Outbound Security



# Options for Authentication / Authorization

- Basic
- Client Certificate
- None
- OAuth2 Client Credentials
- OAuth2 SAML Bearer Assertion

# Business Scenario - Task flow



# Business Scenario – Steps involved

15. Add **Exception Subprocess** (barebone)
16. Add **Groovy Script** (read exception messages to payload)

# Business Scenario - Task flow

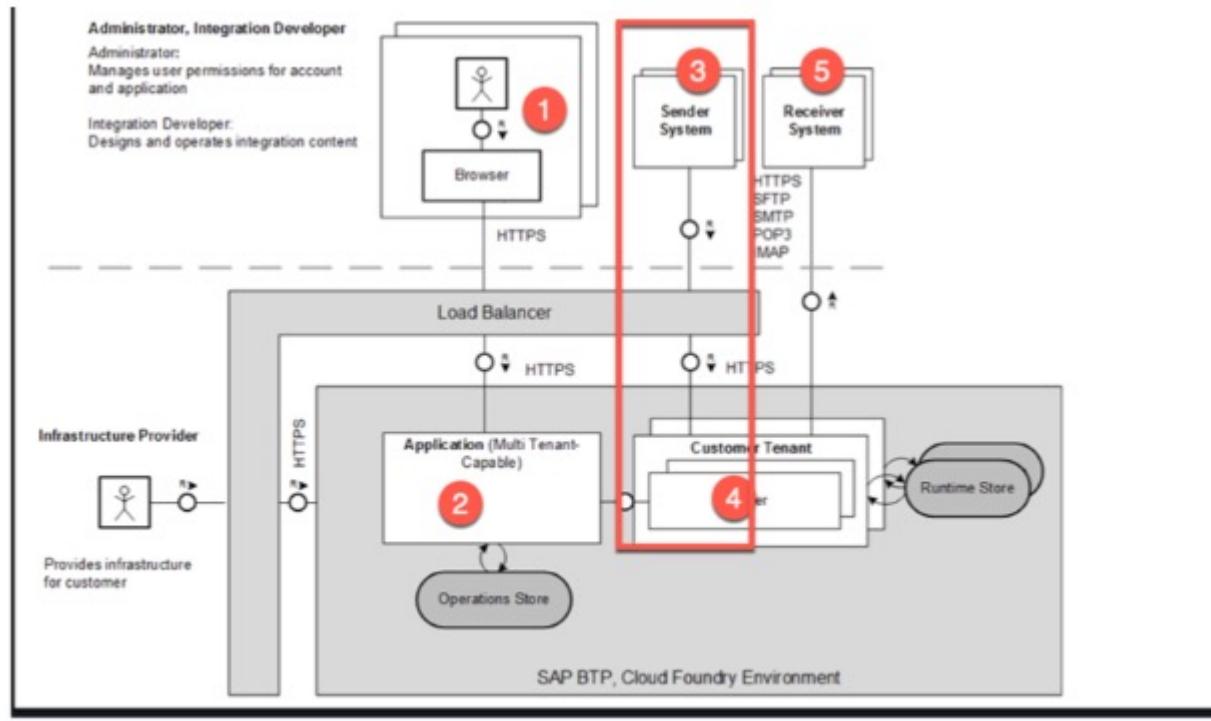


# Business Scenario – Steps involved

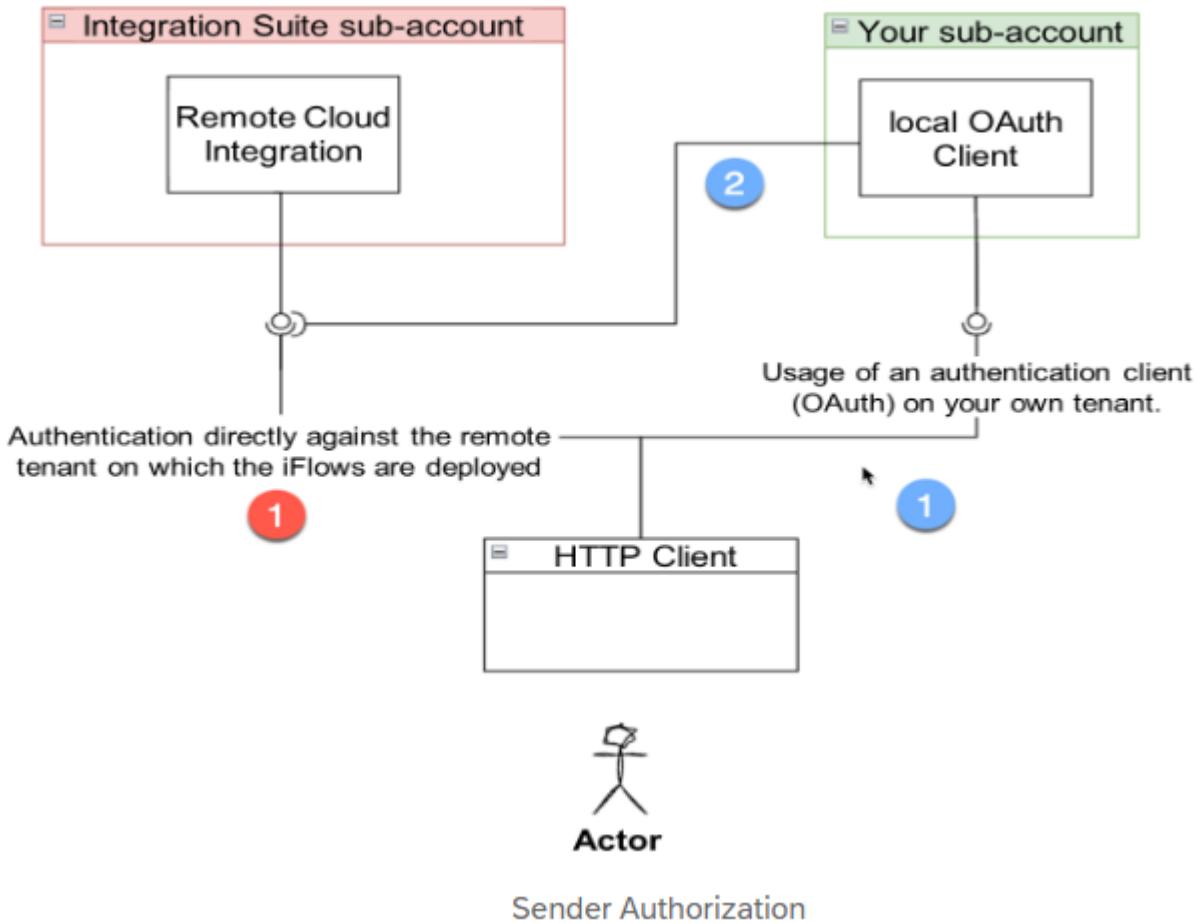
17. Add **Message Start** (remove Timer)
18. Add **SOAP adapter** (asynchronous call)
19. Remove \$top clause (power of asynchronous call)

# Using Adapter Inbound Security

- Certificates between sender and load balancer for HTTPS connection
- Sender's authorization validated against Integration flow endpoint



# Authorization of sender



Authentication against remote endpoint

- Assign user role [ESBMessaging.send](#)
- Not recommended for production use

Authentication (Oauth) client on your own Tenant

- Set up Process Integration Runtime instance
- Supports
  - Authorization code
  - Client credentials
  - Password
  - Refresh Token
  - SAML2 Bearer
  - JWT Bearer

# Sample Integration Flows

The screenshot shows the SAP Integration Suite interface. The left sidebar has a red circle labeled '1' over the 'Discover' button in the 'Integrations' section. The main area shows a breadcrumb 'Discover (Integrations) / Discover (542)' and a dropdown menu with 'Examples' selected, indicated by a red circle labeled '2'. Below it, a message says '9 package(s) found'. Four packages are listed, each with a red circle labeled '3' over the first one:

- Integration Flow Design Guidelines - Scripting Guidelines**  
This integration package contains integration flows to illustrate the design guidelines for ...
- Integration Flow Design Guidelines - Learn the Basics**  
This integration package contains integration flows to illustrate the design guidelines for ...
- Integration Flow Design Guidelines - Enterprise Integration Patterns**  
This integration package contains integration flows to illustrate the design of the ...
- Integration Flow Design Guidelines - Handle Errors Gracefully**  
This integration package contains integration flows to illustrate the design guidelines for ...

Start Process Integration to Cloud Integration Migration

SAP Integration Suite

Integrations / Integration Flow Design Guidelines - Learn the Basics / Integration Flow Design Guidelines - Learn the Basics

This integration package contains integration flows to illustrate the design guidelines for modeling integration flows.

Vendor: SAP Mode: Editable  
Version: 1.10.0

Overview Artifacts (35) Documents (3) Tags Comments

Actions generic

Copy Actions

View metadata

Download

Configure

Deploy

Deploy

Name	Type	Version
Generic Receiver	Integration Flow	1.0.0
Integration flow mocking a receiver system for test purposes Unmodified		

1 2 3 4 5 6 7

The screenshot shows the SAP Integration Suite interface. The left sidebar has a 'Design' section with 'Integrations' selected, indicated by a red circle with the number 1. The main content area shows an integration package titled 'Integration Flow Design Guidelines - Learn the Basics'. The 'Artifacts (35)' tab is selected, indicated by a red circle with the number 3. A table lists artifacts, with one entry for 'Generic Receiver' highlighted by a red circle with the number 5. To the right, a context menu is open under the 'Actions' heading, with 'generic' selected, indicated by a red circle with the number 4. The 'Deploy' option in the menu is highlighted with a blue box and a mouse cursor, indicated by a red circle with the number 7. Other options in the menu include 'Copy', 'View metadata', 'Download', and 'Configure'. The top right of the screen has standard SAP navigation icons for 'Edit', 'Export', and 'Delete'.

SAP Integration Suite

Integrations / Integration Flow Design Guidelines - Learn the Basics / Integration Flow Design Guidelines - Learn the Basics

This integration package contains integration flows to illustrate the design guidelines for modeling integration flows.

Vendor: SAP Mode: Editable  
Version: 1.10.0

Overview Artifacts (35) Documents (3) Tags Comments

Design (1)

Integrations (2)

APIs

Custom Type Systems

MIGs

MAGs

Test >

Configure >

Monitor >

Monetize

Settings >

APIs

MIGs and MAGs

Actions JMS (4)

Copy

View metadata

Download (6)

Configure

Deploy (7)

Deploy

Name	Type	Version
Modeling Basics - Decouple Flows Using JMS	Integration Flow	1.0.0
Basic integration flow to show how to decouple two integration flows using JMS queues as persistency		

Modified (5)

1 2 3 4 5 6 7

The screenshot shows the Postman application interface. On the left, there is a sidebar with a tree view of collections and environments. A red circle with the number 1 is on the ModelingBasics collection. A red circle with the number 2 is on the DecoupleProcessing folder under ModelingBasics. A red circle with the number 3 is on the DecoupleFlowsUsingJMS POST request. On the right, the main window displays a POST request for the URL `https://{{host}}/http/ModelingBasics/DecoupleFlowsUsingJMS`. The Headers tab is selected, showing a table with one row where the key is `productId` and the value is `HT-2025`. The Body tab shows an XML response with the following content:

```
1 <response>
2   <info>product ID HT-2025 has been passed to the JMS queue and will be picked up soon for processing</info>
3   <pattern>InOut</pattern>
4 </response>
```

A red circle with the number 4 is on the Cookies tab. A red circle with the number 5 is on the XML tab of the Body panel.

# Outro

# Certification preparation

## General rules about questions

- Questions
  - are simple and objective.
  - can be single choice or multiple choice, which will be clearly indicated.
- Multiple-choice questions
  - number of correct answers is given as part of the question.
  - question is considered correct only if all correct alternatives are selected.
    - i.e. multiple-choice questions **cannot** be partially correct. They are either correct or wrong.

# Certification preparation

## Important Exam Process and Security Guidelines

- An on-site exam:
  - is proctored in person by an exam supervisor
  - requires 2 forms of valid identification (not expired)
    - at least one government-issued photo ID
  - personal items (cell phones, bags, notepads, organizers, etc.) not allowed
- An online exam:
  - requires stable internet
  - is proctored remotely via Zoom (both webcam and entire desktop)
  - requires government-issued photo ID (not expired) via webcam
  - is only released by the exam supervisor after checking the exam environment
    - requires you to be in a quiet and secure room alone throughout the exam
    - you will be asked to rotate your webcam around the room
    - only one screen may be active.
    - cellphones/tablets and recording devices are forbidden
  - requires you use the Questionmark Secure browser to access the exam

More details [here](#)

# Take SAP Certification Exams in your own language

With a new translation tool, SAP can now provide real-time machine translation from English to eight other languages: Chinese, French, German, Japanese, Korean, Portuguese, Russian, and Spanish

Please read [this blog](#) for additional details.

The screenshot shows a SAP Consultant Certification exam interface. At the top, it says "SAP Consultant Certification" and "May 18 2021 Logged in as: SAPdemo@questionmark.com". The main content area displays a question about SAP BPC options. On the right side, there is a "Translation" panel with a red border around its header and body. The panel has a title "Translation" and a dropdown menu "Language" set to "English". It lists eight languages: Chinese (简体中文), English, French (Français), German (Deutsch), Japanese (日本語), Korean (한국어), Portuguese (Português), and Russian (Русский). The "French (Français)" option is highlighted with a cursor. At the bottom of the screen, there are navigation buttons: "Next Question > Assessment Navigator" and "Submit".

# What are the next steps?

Here we are today



## ACADEMY REGISTRATION

Completion of any  
Academy pre-requisites

## LIVE SESSIONS

Join the live sessions with  
our subject matter experts



## ACADEMY COMPLETION

Familiarize yourself with any  
remaining content of the  
Learning Journey

Optionally join the “Ask the  
Expert” sessions

## GET CERTIFIED

Book and complete your  
certification exam



# Purchasing certification exam attempts

The image displays two side-by-side screenshots of the SAP TRAINING website. Both screenshots show a product page for SAP Certification exams.

**SAP Certification Exam, One Attempt (Left Screenshot):**

- Title:** SAP Certification Exam, One Attempt
- Delivery Methods:** SAP Certification
- Level:** Certification
- Languages:** English
- Solution Release:** 010
- Price:** 200.00 € (EUR) **Price excludes tax.**
- Add to basket** button

**SAP Certification Exam, Six Attempts (Right Screenshot):**

- Title:** SAP Certification Exam, Six Attempts
- Delivery Methods:** SAP Certification
- Level:** Certification
- Languages:** English
- Solution Release:** 010
- Price:** 500.00 € (EUR) **Price excludes tax.**
- Add to basket** button

**Common Elements:**

- Header:** SAP TRAINING, navigation links (Explore catalog, SAP Learning Hub, SAP Certification, More), user profile, language (German), shopping cart (0).
- Search Bar:** Enter keyword to search for courses, certifications or training paths.
- Course Announcements:** SAP Certification validates the expertise of anyone in the SAP ecosystem with innovative certifications delivered directly by SAP. All exams are proctored and delivered online, for maximum flexibility and convenience.
- Course Information:** A subscription to SAP Certification exam, one attempt provides you a 12-months access to Certification Hub, where you can schedule one exam attempt over your subscription period.
- Content:** A subscription to SAP Certification exam, six attempts provides you a 12-months access to Certification Hub, where you can schedule up to a maximum of six exam bookings over your subscription period.
- Chat Now** button on the right side of each screenshot.

# Ask your “off-line” questions in the SAP BTP Learning community

SAP | Community Groups Partner Groups SAP Events Help

## SAP BTP Learning

Search all content

SAP Community Groups > Groups > SAP Learning > SAP BTP Learning Options :

**Welcome learners! Join in this new and exciting collaboration experience.**

6226 views, 14 comments, 32 likes on 11-10-2021

**How to get certified as an SAP BTP expert - in 3 simple steps**

7901 views, 12 comments, 24 likes on 11-16-2021

**SAP Learning Tips & Tricks: How to Bookmark a Lesson**

946 views, 0 comments, 1 like on 12-03-2021

**Group Activity**

Most Recent ▾

**Join Group** (button circled in red)

**Group Information**

Corrections to text of Learning Journey: Developing with SAP Extension Suite

Dear Learning Hub team, first of all, I'd like to say how impressed I am with the flow and text of the Learning Journey - Development with SAP Extension Suite. Well done! Whilst going through the learning journey, I have noticed a few errors in parts of the text. Although the errors are not major, I would like to be able to feed them back to the Learning Jou ... [View more](#)

By AB • Member • SAP BTP Learning Q&A • Friday

51 Views 1 comment 1 like

SAP | Community Groups Partner Groups SAP Events Help

## SAP BTP Learning

Search all content

SAP Community Groups > Groups > SAP Learning > SAP BTP Learning Options :

**Success! You are now a member and will receive notifications of group activity.**

**Welcome learners! Join in this new and exciting collaboration experience.**

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# Complement your certification related learning with SAP HANA Academy

Check out the [blog post](#) for current and coming topics

Denys van Kempen 

May 10, 2022 | 8 minute read

## Get Certified – SAP Integration Suite | SAP BTP Certification Video Tutorials

5 comments 10 likes 5,830 views

Interested to get SAP BTP certified? Here is a video tutorial series from the SAP HANA Academy to help you reach your goal.

- Get Certified – SAP Integration Suite << this article
- Get Certified – SAP Extension Suite
- Get Certified – SAP HANA Cloud

For earlier articles about SAP BTP certifications, see

- Get Certified: C\_CPI\_14 | SAP Certified Development Associate – SAP Integration Suite
- Get Certified: C\_CPE\_13 | SAP Certified Development Associate – SAP Extension Suite
- Get Certified: C\_SAC | SAP Certified Application Associate – SAP Analytics Cloud
- Get Certified: C\_HCADM | SAP Certified Technology Associate – SAP HANA Cloud
- Get Certified: C\_HCMOD\_01 | SAP Certified Technology Associate – SAP HANA Cloud
- Get Certified: C\_HCDEV\_01 | SAP Certified Development Associate – SAP HANA Cloud

Questions? Please post as comment.

Useful? Give us a like and share on social media.

Thanks!

Dive directly into the [video playlist](#) of the first topic covered – SAP Integration Suite



### SAP BTP Certifications: SAP Integration Suite

16 videos • 644 views • Updated yesterday



Video tutorials to prepare for the SAP Certification SAP Certified Development Associate - SAP Integration Suite (C\_CPI\_14):  
<https://learning.sap.com/learning-jou...>

For the article (blog post), see  
<https://blogs.sap.com/2022/05/10/get...>

Exclusive for SAP Partners, make sure also to check out the schedule for the live sessions  
<https://bit.ly/partneredge-certificat...>



SAP HANA Academy

SUBSCRIBE

- 1 SAP Integration Suite Certification | SAP Discovery Center  
SAP HANA Academy 5:39
- 2 SAP Integration Suite Certification | Entitlements  
SAP HANA Academy 4:24
- 3 SAP Integration Suite Certification | Provisioning  
SAP HANA Academy 5:05
- 4 SAP Integration Suite Certification | Troubleshooting Open Connectors  
SAP HANA Academy 4:12
- 5 SAP Integration Suite Certification | Open Connectors  
SAP HANA Academy 3:49
- 6 SAP Integration Suite Certification | API Management  
SAP HANA Academy 6:48
- 7 SAP Integration Suite Certification | API Management Concepts  
SAP HANA Academy 6:40

# Live Q&A sessions with SAP Learning for select Learning Journeys

SAP Learning

On this page: Learning Content **Live sessions** SAP Learning Group SAP Learning Class SAP Certification Practice Systems

## Live Sessions

Expand your learning experience and deepen your knowledge in SAP solutions by registering for one or more scheduled expert-led live sessions from our limited free series.

**Live Sessions**

**Q&A live sessions - Side-by-Side Extensions on SAP BTP**  
Join a Q&A live session with an SAP Learning expert to get answers to your questions about the self-study content, and successfully complete the SAP Learning...

**Expert deep dive live sessions - Deploy a CAP application to SAP BTP, Kyma Runtime**  
Register for any of the deep dive live sessions delivered by SAP Learning experts, who will guide you through specific topics with detailed explanations and demos.

**SAP Learning Group for SAP BTP**  
Join our SAP expert-moderated learning group. Get answers to questions about your learning journey and certification preparation.

**Join here**



SAP

### Q&A Live Session - Developing Side-by-Side Extensions with SAP BTP

**Q&A Live Session - Developing Side-by-Side Extensions with SAP BTP**

**Description:**  
This expert-guided live session provides an opportunity to have questions about the learning journey "Build side-by-side extensions on SAP BTP" answered by an expert. Bring your open questions about difficult topics, and get answers live from your speaker, as well as hearing explanations to questions raised by your fellow learners.

**Speakers:**  
SAP Instructors

**Date:**  
May 16, 2023

**Time** Berlin CEST 10:00 - 11:00 (UTC+01:00)  
Time New Delhi IST 13:30 - 14:30 (UTC+05:30)  
Time Singapore SGT 16:00 - 17:00 (UTC+08:00)

**Q&A Live Session - Developing Side-by-Side Extensions with SAP BTP**

**Description:**  
See details above

**Speakers:**  
SAP Instructors

**Date:**  
May 16, 2023

**Time** Berlin CEST 15:00 - 16:00 (UTC+01:00)  
Time San Francisco PDT 06:00 - 07:00 (UTC-08:00)  
Time New York EDT 09:00 - 10:00 (UTC-05:00)

**Q&A Live Session - Developing Side-by-Side Extensions with SAP BTP**

**Description:**  
See details above

**Speakers:**  
SAP Instructors

**Date:**  
June 30, 2023

# Schedule for all Partner Certification Academies for SAP BTP

As of 24<sup>th</sup> of May 2023

Learning Journey	Associated Certification	Schedule & Registration		
		NA/LAC	EMEA	APJ/ANZ
<a href="#">Explore SAP Analytics Cloud</a>	<a href="#">SAP Certified Application Associate - SAP Analytics Cloud</a>	<a href="#">Mar 14,16,28</a>	<a href="#">Mar 14,16,28</a>	<a href="#">Mar 14,16,28</a>
<a href="#">Build side-by-side extensions on SAP BTP</a>	<a href="#">SAP Certified Development Associate - SAP BTP Extension Developer</a>	<a href="#">Jun 13,15,27</a>	<a href="#">Jun 8,9,20</a>	<a href="#">Jun 13,15,27</a>
<a href="#">Developing with SAP Integration Suite</a>	<a href="#">SAP Certified Development Associate - SAP Integration Suite</a>	<a href="#">Jun 8,9,20</a>	<a href="#">Jun 13,15,27</a>	<a href="#">Jun 12,14,21</a>
<a href="#">Develop Data Models with SAP HANA Cloud</a>	<a href="#">SAP Certified Technology Associate - SAP HANA Cloud Modeling</a>	<a href="#">May 8,10,12,22</a>	<a href="#">May 15,17,19,29</a>	<a href="#">May 8,10,12,22</a>
<a href="#">Develop Applications Running on SAP BTP Using SAP HANA Cloud</a>	<a href="#">SAP Certified Development Associate - SAP HANA Cloud 1.0</a>	<a href="#">May 15,17,19,29</a>	<a href="#">May 22,24,26 / Jun 6</a>	<a href="#">May 15,17,19,29</a>
<a href="#">Explore Provisioning and Administration with SAP HANA Cloud</a>	<a href="#">SAP Certified Technology Associate - SAP HANA Cloud Provisioning and Administration</a>	<a href="#">Q4 2022 replay</a>	<a href="#">Q4 2022 replay</a>	<a href="#">Q4 2022 replay</a>
<a href="#">Utilize SAP Build for Low-Code/No-Code Applications and Automations for Citizen Developers</a>	<a href="#">SAP Certified Citizen Developer Associate - SAP Build Low-code/No-code Applications and Automations</a>	<a href="#">Jun 20,22,29</a>	<a href="#">Jun 13,15,27</a>	<a href="#">Jun 20,22,29</a>
<a href="#">Implement and Administer SAP Build Work Zone</a>	<a href="#">SAP Certified Application Associate - SAP Build Work Zone - Implementation and Administration</a>	<a href="#">Apr 17,18,25</a>	<a href="#">Mar 21,23,29</a>	<a href="#">Mar 28,30 / Apr 11</a>

Last date is the optional Ask-the-Expert session

Latest schedule and information can always be found [here](#).

# Please help amplify on Social Media

SAP PartnerEdge  
47,262 followers  
6d • 

STARTING SOON! Join this **#SAPPartner** Certification Academy to learn about and get certified for **#SAPBTP** side-by-side extension development. Gain an overview of key features and tools to use in future extension projects on SAP BTP. Regional sessions available - register <https://sap.to/6046O9g3s>



SAP PartnerEdge  
47,262 followers  
1w • 

Mark Your Calendar! The **#SAPPartner** Certification Academy just added sessions to get certified for SAP Integration Suite. Register to gain an overview of key features and tools of the SAP Integration Suite to use in future extension projects on **#SAPBTP**.  
Regional sessions are offered:

- ✓ NA/LAC <https://sap.to/6048OgBU>
- ✓ APJ/ANZ <https://sap.to/6049OgBU>
- ✓ EMEA <https://sap.to/6040OgBU>



SAP PartnerEdge  
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Why wait? Join the **#SAPPartner** Certification Academy to get certified for Low-Code/No-Code Applications and Automations. Gain an overview of the SAP Build portfolio's key features and tools for future **#SAPBTP** projects. Select your region to register <https://sap.to/6049OYlhV>



**Build side-by-side extensions on SAP BTP:**  
<https://twitter.com/SAPPartnerEdge/status/1658791227322519557>  
<https://www.linkedin.com/feed/update/urn:li:activity:7064753228743077889>

**SAP Integration Suite:**  
<https://www.linkedin.com/feed/update/urn:li:activity:7063786860992458752/>  
<https://twitter.com/SAPPartnerEdge/status/1658277840691789825>

**Utilize SAP Build for Low-Code/No-Code Applications and Automations for Citizen Developers:**  
<https://twitter.com/SAPPartnerEdge/status/1660527666158501888>  
<https://www.linkedin.com/feed/update/urn:li:activity:7066489653939331072>

# Thank you.

Contact information:

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[peter.von.linstow@sap.com](mailto:peter.von.linstow@sap.com)