

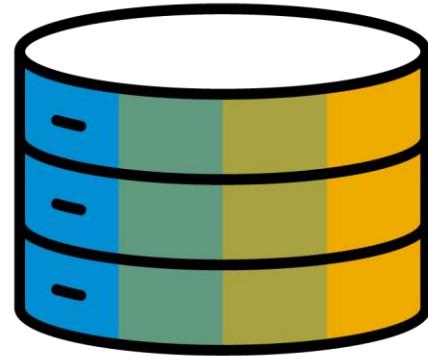


Week 2: Expand Your Skills

Unit 1: Persisting and Securing Messages

Reasons for persistency

- Persistency is helpful in many integration situations
 - Store and pickup
 - Neither sender nor receiver want to open their firewall
 - State keeping between flow executions
 - e.g., when was the last record received?
 - State keeping between executions of *different* integration flows
 - e.g., token handling
- Cloud Integration offers multiple flow steps for persistency
 - Datastore
 - Variables
 - Persist step



Persisting and securing messages

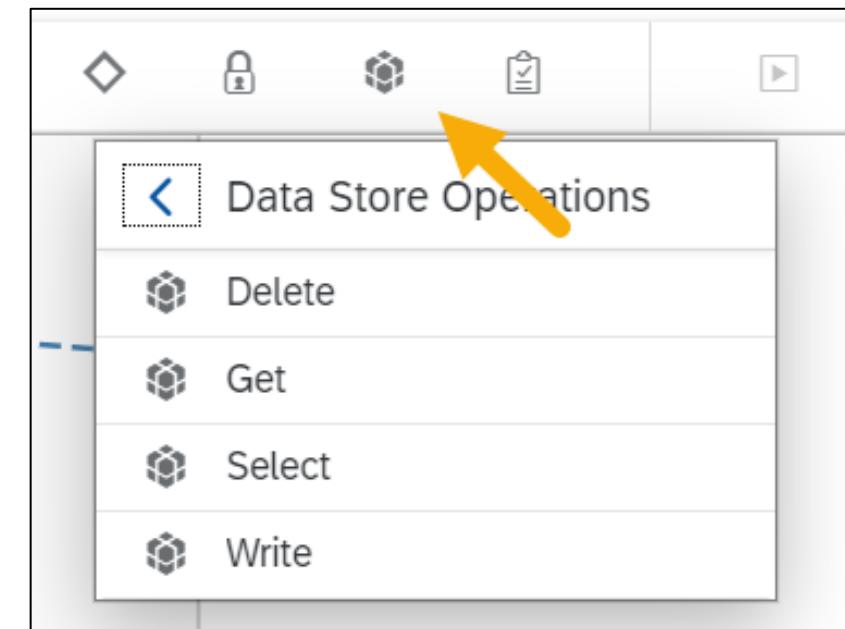
Data store

- Store the whole message body
- Read will replace the original message body
- Headers can be persisted in addition
- Visibility
 - Integration flow: only this integration flow can access it
 - Global: every integration flow on this tenant can access it
- Retention time up to 180 days, default 90 days
- Content stored in the tenant's database



Data store operations

- GET
 - Retrieve a single entry
- WRITE
 - Add a single entry
 - Entry ID can be specified or gets generated
 - The generated entry ID is available afterwards via header *SapDataStoreId*
- SELECT
 - Retrieve a bulk message with n entries
 - Entries must be XML messages
- DELETE
 - Remove a specific entry

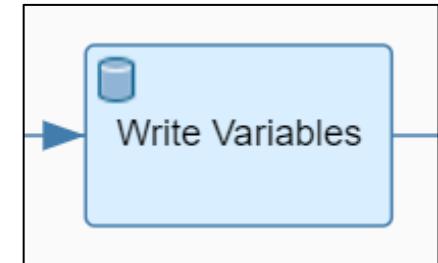


Persisting and securing messages

Variables

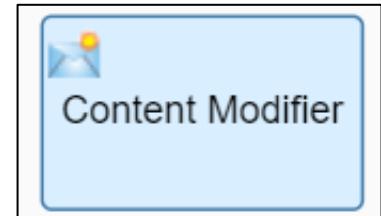
- Storage of small values
- Persistency directly out of headers / properties / ...

Variables:					
<input type="checkbox"/> Name	Type	Data Type	Value	Global Scope	
<input type="checkbox"/> myVariableName	Header		mySourceHeader	<input type="checkbox"/>	<button>Select</button>



- Scope
 - Local: only this flow can access it
 - Global: every flow can access it
- Retention time 400 days
- Restored via content modifier step directly into headers or properties

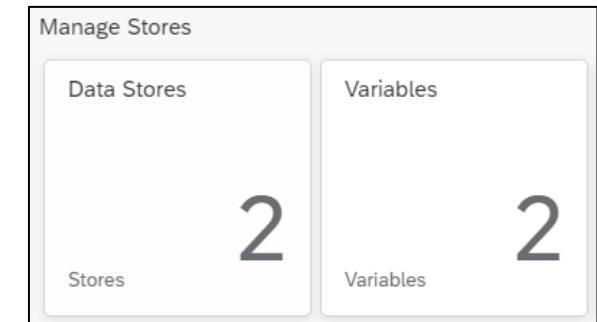
Headers:						Add	Delete
<input type="checkbox"/> Action	Name	Type	Data Type	Value	Default		
<input type="checkbox"/> Create	myHeader	Local Variable		myVariableName	myDefaultValue		



Persisting and securing messages

Monitoring

- Data stores and variables are accessible via monitors in the Overview section
- Download entries
- Delete entries



Overview / Manage Data Stores						
Data Stores (2)	Filter by Name	Search icon	Refresh icon	Settings icon		
myDataStore Global						Delete
myDataStore	3					
Global						
myOtherDataStore	1					
FlowWithDataStore						
Entries (3)						
ID	Message ID	Status	Due At	Created At	Retain Until	
f5cc75df-047d-42a8-a712-94ef06ef4991	AF5dIgTojN_3UG4M9ViSgr6rRd7a	Waiting	Mar 04, 2020, 16:11:00	Mar 02, 2020, 16:11:00	May 31, 2020, 17:11:00	
3cadca95-4a08-42ef-9277-adf7fc525707	AF5dIfpRn5qXex624hPDIvgdAzLB	Waiting	Mar 04, 2020, 16:10:50	Mar 02, 2020, 16:10:50	May 31, 2020, 17:10:50	
4a434561-e7c6-40d2-b465-b38b80d58007	AF5dlb4OdxofoNOEjt09-OOWDW-a	Waiting	Mar 04, 2020, 16:09:50	Mar 02, 2020, 16:09:50	May 31, 2020, 17:09:50	

Overview / Manage Variables					
Variables (2)					Filter by Variable Name or Integration Flow
Name	Visibility	Integration Flow	Updated At	Retain Until	Actions
myGlobalVariable1	Global		Mar 02, 2020, 16:15:15	Apr 06, 2021, 17:15:15	
myVariable1	Integration Flow	FlowWithVariables	Mar 02, 2020, 16:15:15	Apr 06, 2021, 17:15:15	

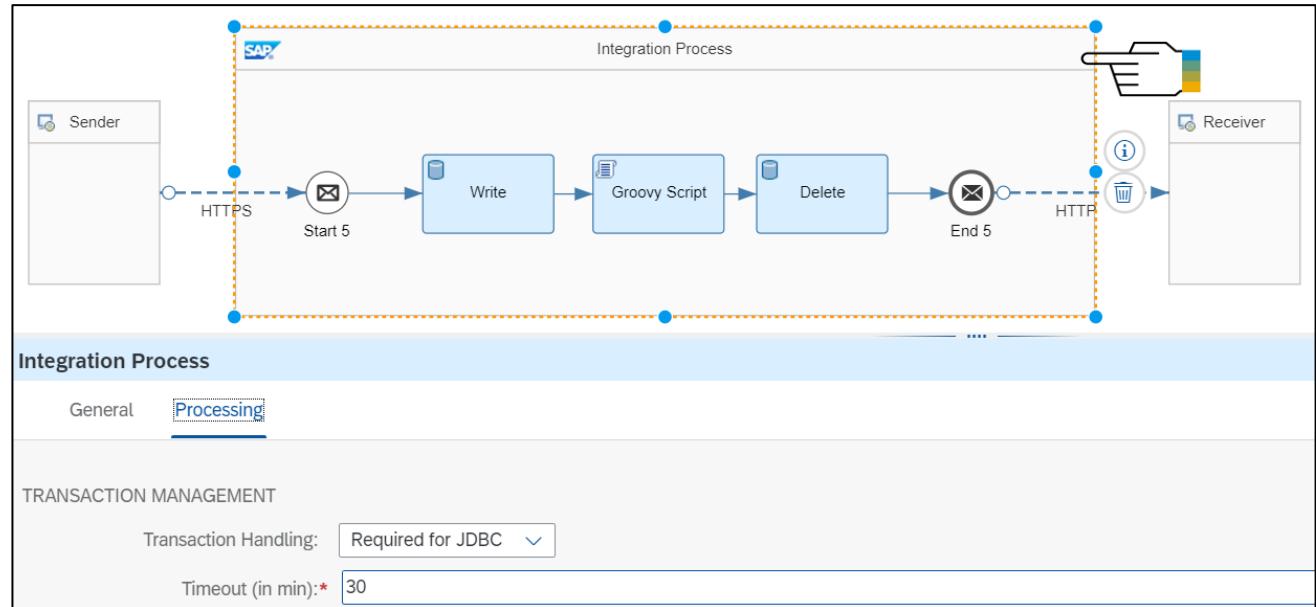
Transaction handling

Why?

- Correct information relies on data consistency
- What to do with modified persistency data in case of errors during the integration scenario?

How?

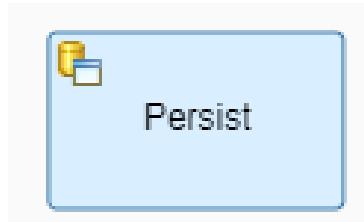
- Control transaction management
- “Required for JDBC” (default)
 - DB commit is bound to flow success
 - In case of errors, everything gets rolled back
 - Flow execution time must be smaller than timeout
 - Cannot be spawned across multiple threads (for example, in parallel multicast)
 - DB connection is blocked for the whole processing time
- “Not Required”
 - Each DB operation will be committed immediately



Note: If no database operation is used, the JDBC transaction settings are irrelevant.

Persist step

- Storage of messages for auditing purposes
- Only successful messages are stored
- Only body is stored
- No storage in case of errors (except worker crash like OOM)
- Independent of JDBC transaction
- Retention time is bound to the message processing log, per default 30 days
- No monitor available
- Accessible via OData API



Persist Message

General Processing

*Step ID: Persist1

Encrypt Stored Message

A screenshot of a software interface titled "Persist Message". It shows two tabs at the top: "General" and "Processing", with "Processing" being the active tab. Below the tabs, there is a field labeled "*Step ID:" containing the value "Persist1". At the bottom of the screen, there is a checkbox labeled "Encrypt Stored Message" which has a blue checkmark indicating it is selected.

Persistency best practices

- Persistency should not be used for intra-flow buffer (performance!)
Use properties or headers instead
- Cloud Integration database storage is limited; each tenant has a DB size of 32 GB
- Persistency is meant to be used for temporary storage only
- If you need to store data permanently, we recommend using external storage



Security

Why?

- Sensitive data must be protected from unwanted spectators
- Data is secure inside Cloud Integration
 - Encrypted storage, robust architecture, audit logging
- But even if the business systems are highly secure, what about the infrastructure between Cloud Integration and them?
 - SFTP servers
 - Message brokers
 - External network infrastructure
- So you have to secure the message by making it unreadable for malicious purposes



How?

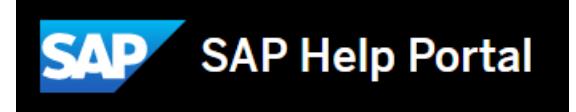
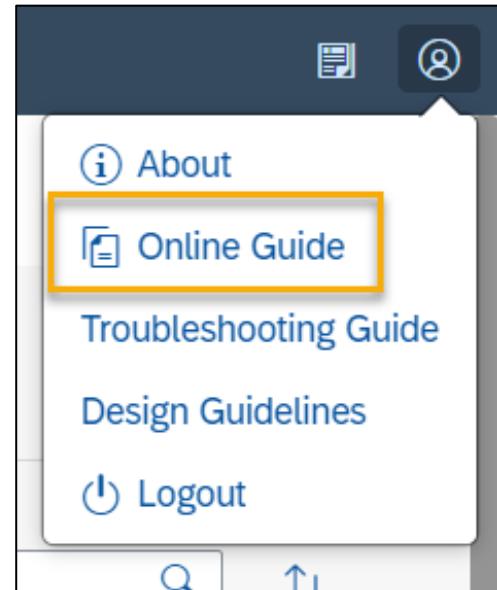
- Transport level security
- Message level security

Transport level security

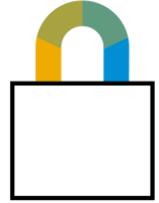
Broad topic

- How can I set up a secure inbound/outbound HTTP communication?
- How do I do HTTP authentication using an X.509 client certificate?
- How can I secure my SFTP connection?
- How can I securely connect to my mail server?
- How can I use OAuth?
- ...

Our online documentation contains all the answers!



Message level security: encryption



Encryption



- Cloud Integration encrypts messages with the public key/certificate of the receiver (stored in the Cloud Integration keystore)
- Standalone encryption/decryption
 - PKCS#7
 - PGP
- Adapter-based encryption/decryption
 - S/MIME: Mail adapter
 - WebService Security: SOAP, AS4

Decryption



- Cloud Integration decrypts messages with the own private/secret key (stored in the Cloud Integration keystore)
- In case of a key change inside Cloud Integration, all communication partners using encryption must be updated with the new public key



Message level security: signing



Signature

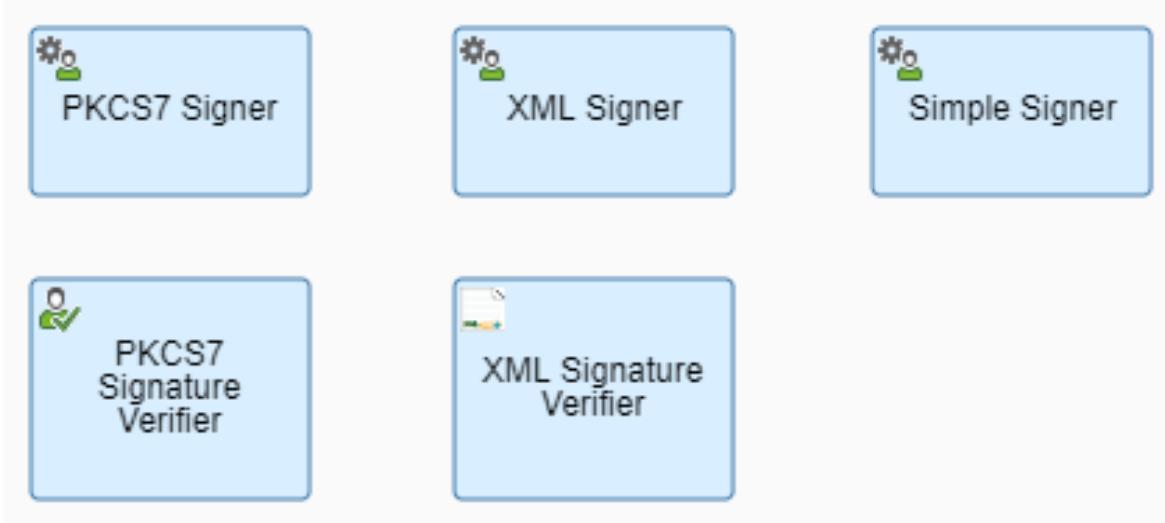


- Senders sign messages in order to prove that a message was sent by them
- Signing on Cloud Integration is done with the private/secret key (stored in the Cloud Integration keystore)
- Each tenant is provisioned with a key pair; more key pairs can be generated
- Standalone signature
 - PKCS#7
 - XML signature
 - Simple signature
- Adapter-based signature
 - S/MIME: Mail adapter
 - WS-Security: SOAP, AS4

Verification



- Receiver verifies signatures to check if payload can be trusted
- Signatures are verified by Cloud Integration with the public key/certificate of the signer (stored in the Cloud Integration keystore)

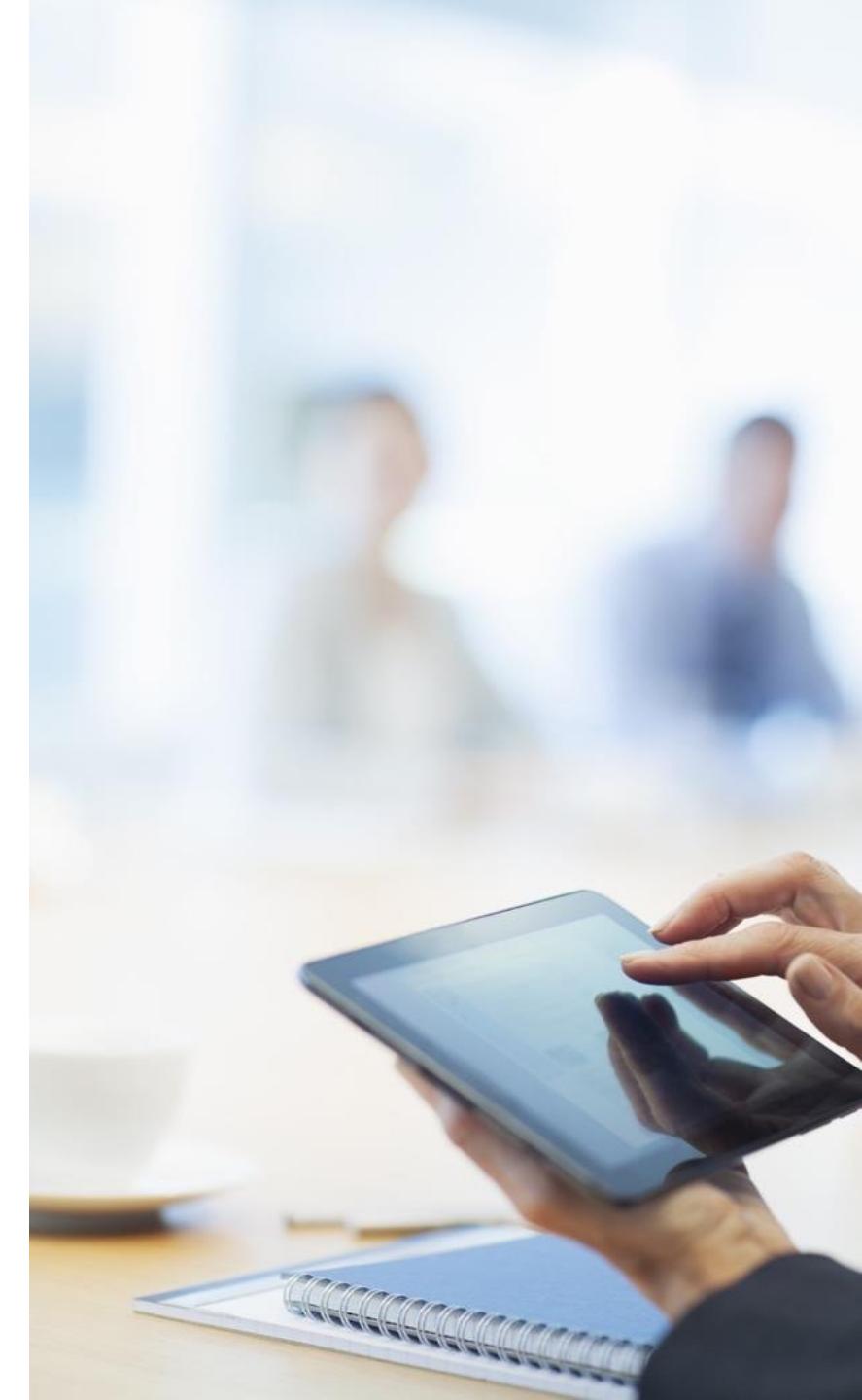


A photograph showing a close-up of a person's hands typing on a laptop keyboard. The scene is bathed in warm, golden sunlight streaming through a window, creating a strong lens flare effect. The laptop screen is visible in the background, and the overall atmosphere is bright and focused.

Demo

Summary

- Persistency can be done in multiple ways, depending on the use case.
- Via monitors, you can see the content of the datastore and variables.
- With flow steps for message level security, you can protect your messages against unauthorized access by others.
- Check out our online documentation for details about transport level security.



Thank you.

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Week 2: Expand Your Skills

Unit 2: Testing an Integration Flow

Testing an integration flow

Simulation

The simulation feature enables integration developers and business experts to easily test the integration flow, or parts of it, during development without the need to deploy and trace explicitly.

Advantages:

- Helps integration developer to **debug** the configurations
- Available in both **read-only and edit mode** of integration flow
- Option to provide simulation input or **test data**
- Allows the developer to simulate dependencies by providing **mock simulation response**
- **Errors** identified during the simulation are recorded, along with recommendations to fix it
- Improves integration **developer productivity** and saves time in development of an integration flow

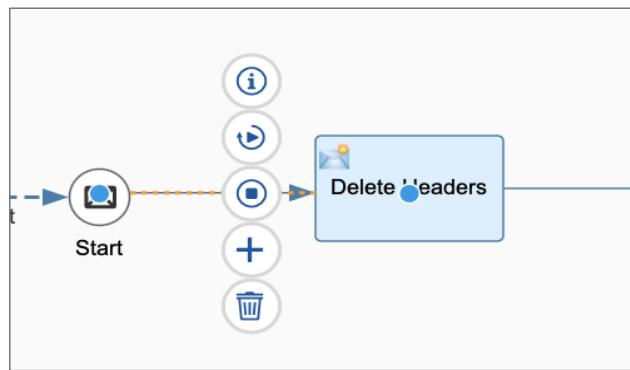


Testing an integration flow

Simulation steps: start point, end point, run and clear

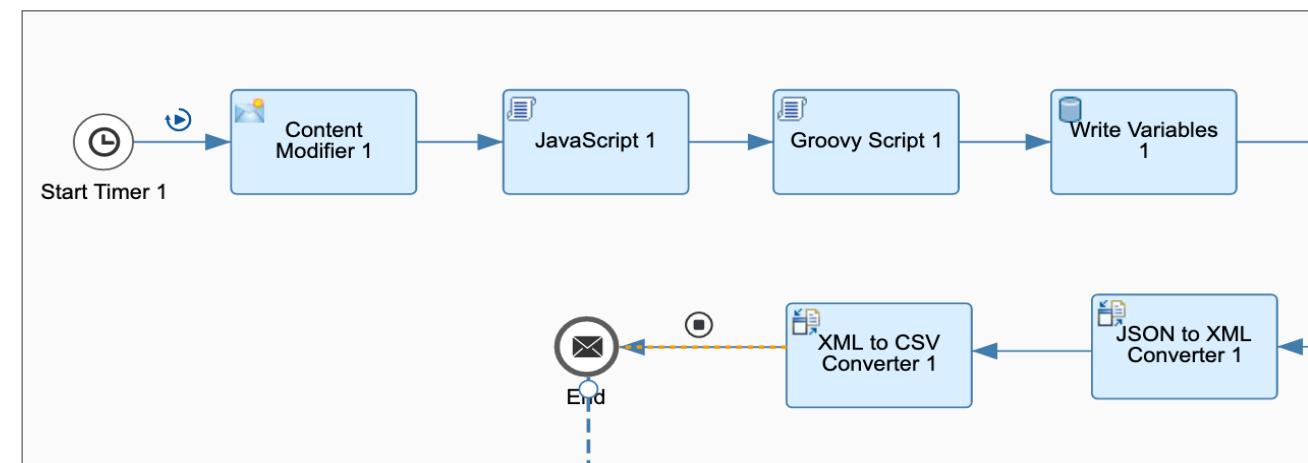


- The Simulation section on the palette has *Run*, *Clear*, and *Help* buttons.



- Select the sequence flow to invoke quick buttons.
- Drop the *start point* where you want the simulation to begin.

- Then drop the *end point* where you want the simulation to end.



Testing an integration flow

Run simulation

Add Simulation Input

Header

Name:	Value
No data	

Add Delete

Properties

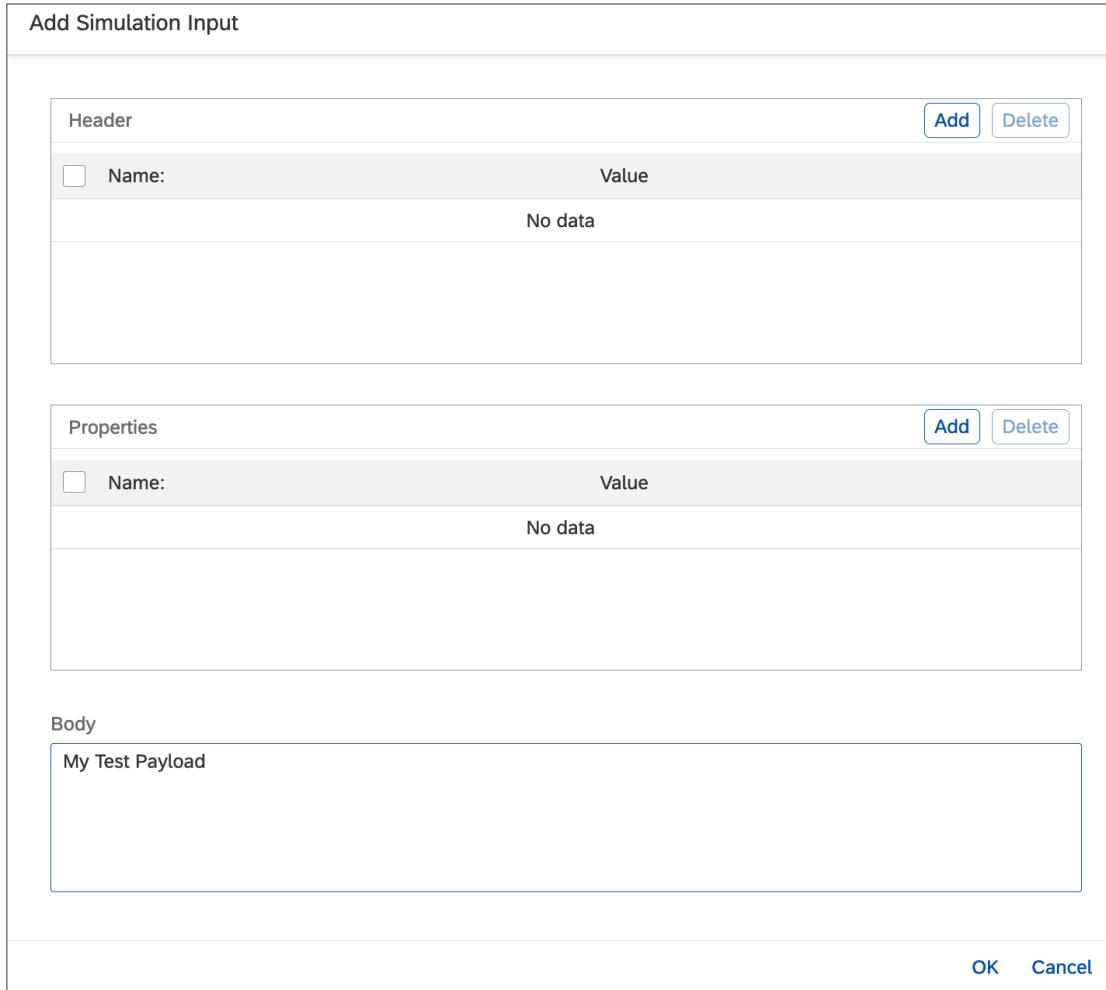
Name:	Value
No data	

Add Delete

Body

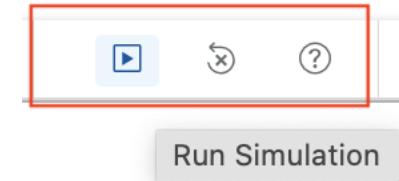
My Test Payload

OK Cancel



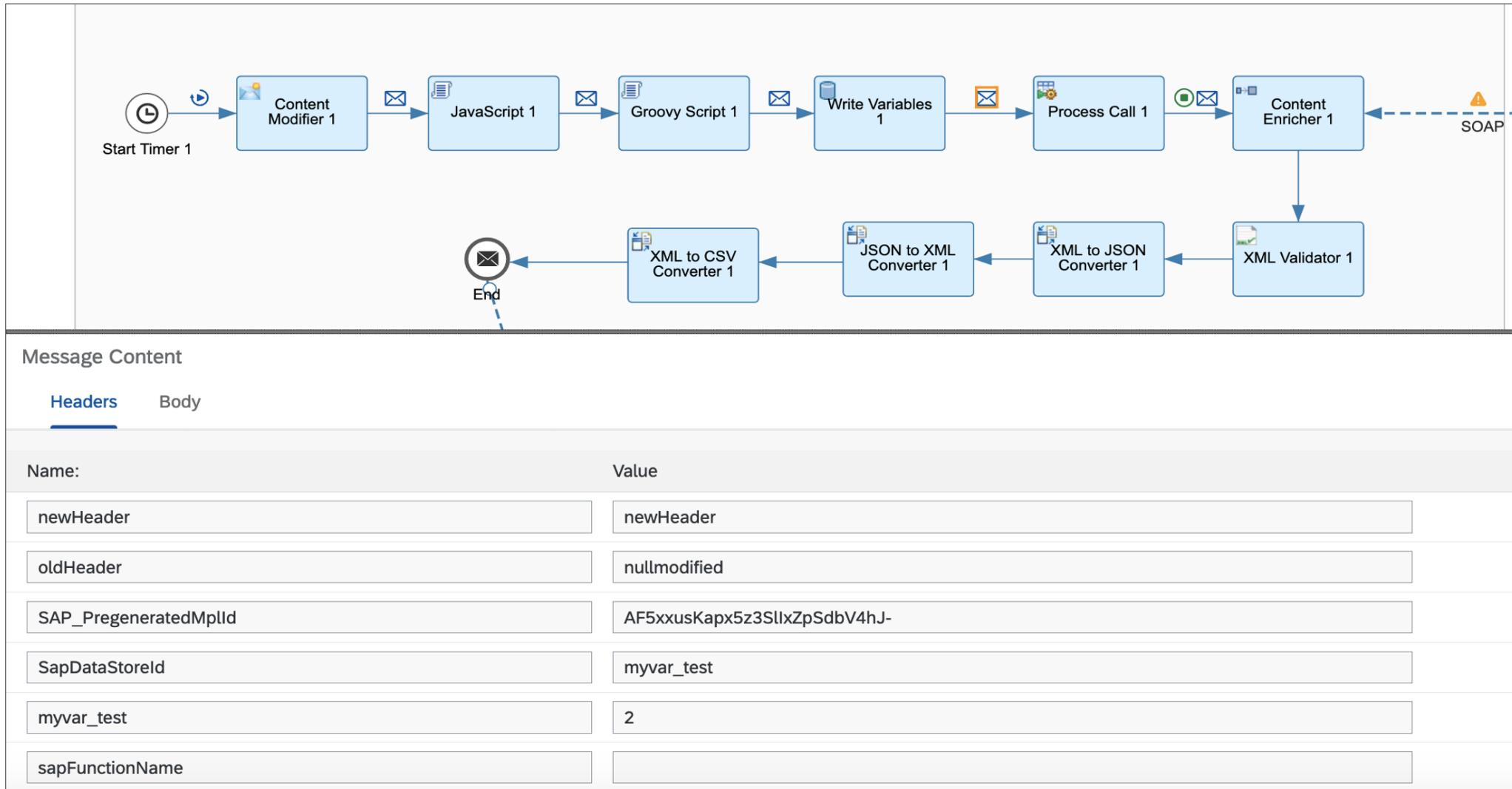
- To run the simulation:

- Select the start point to provide the simulation input or test data
- Click *Run* from the simulation section of the palette



Testing an integration flow

View simulation results

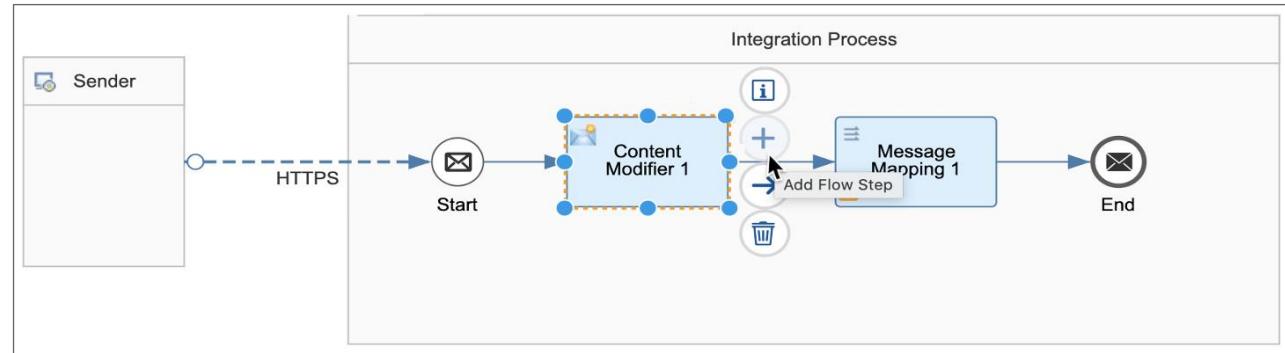


Testing an integration flow

Flow step recommendations

Flow step recommendation enables integration developers to easily add subsequent flow steps while modeling an integration flow.

It recommends the appropriate steps based on machine learning from a rich set of pre-packaged standard integration content.



Content Modifier

General Message Header Exchange Property Message Body

Name: Content Modifier 1

Add Flow Step

Recommended Steps

- Groovy Script
- End Message
- Request Reply

All Steps

Search Step

Transformation

- Content Modifier
- Converter
- CSV to XML

Externalize

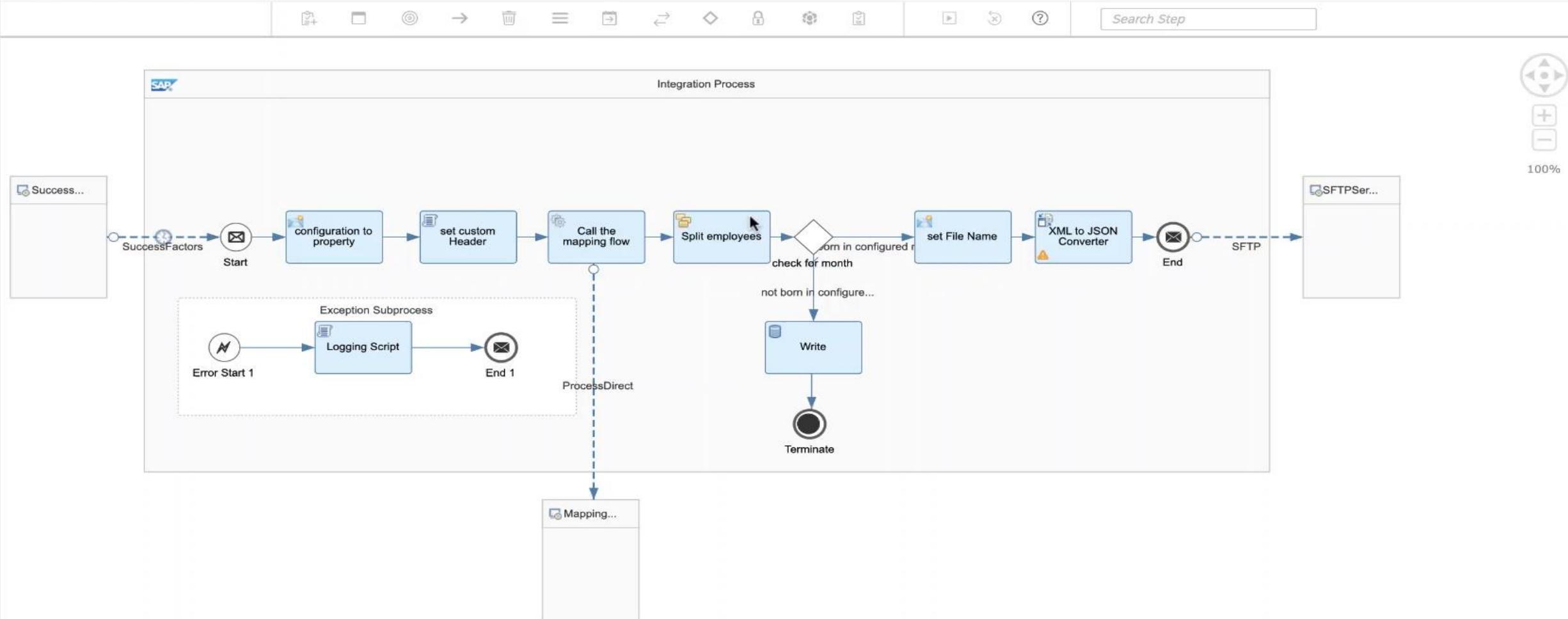
A photograph showing a close-up of a person's hands typing on a laptop keyboard. The scene is bathed in warm, golden sunlight streaming through a window, creating a strong lens flare effect. The laptop screen is visible in the background, and the overall atmosphere is bright and focused.

Demo

SAP Integration Suite Cloud Integration

 Send Birthday Greetings to Employees /
Send Birthday Greetings to Employees

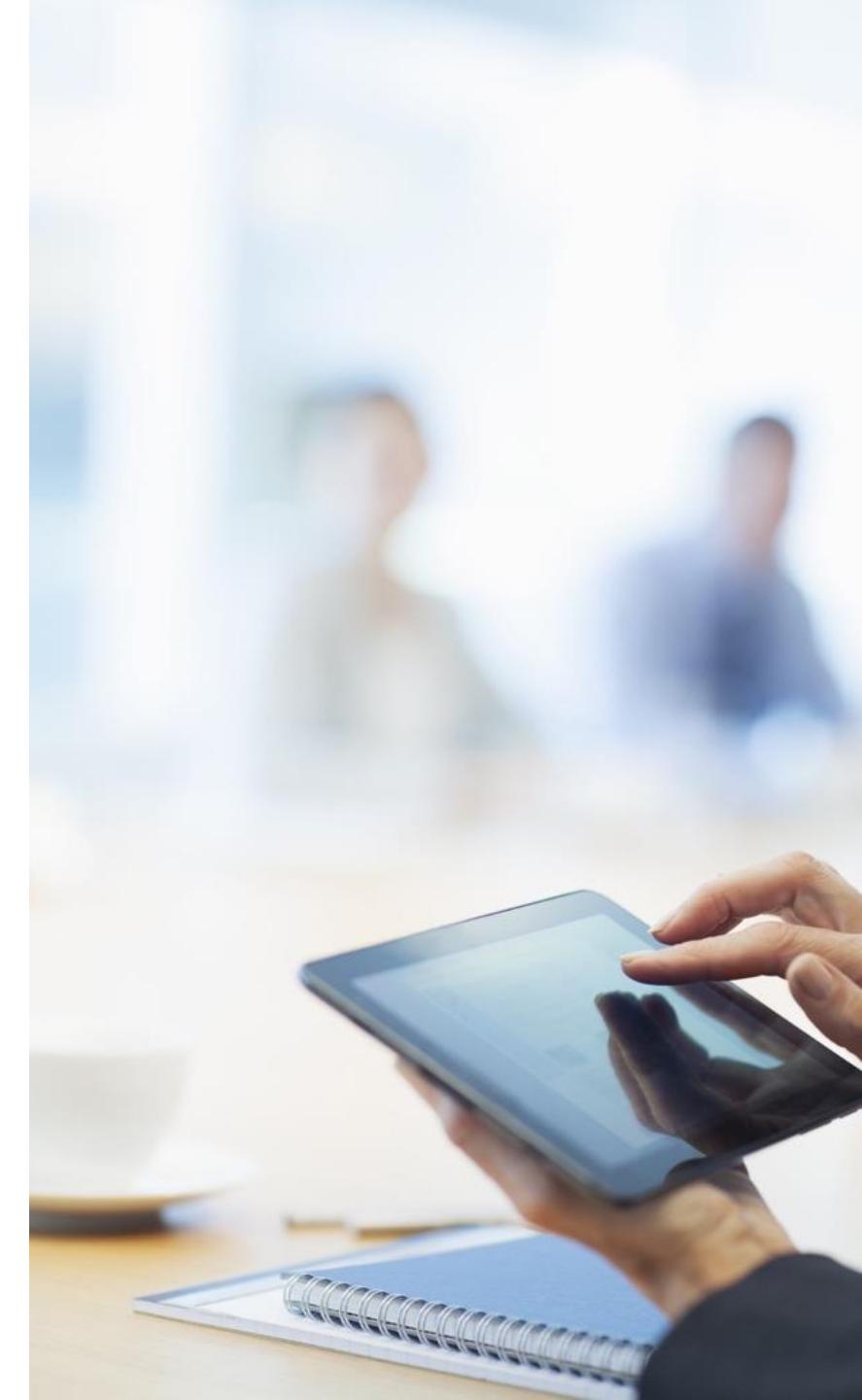
Edit Configure Deploy Delete



Summary

The **simulation** feature allows integration developers and business experts to easily test the integration flow, or parts of it, during development without the need to specifically deploy and trace.

Flow step recommendation enables integration developers to easily add subsequent flow steps while modeling an integration flow.



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Week 2: Expand Your Skills

Unit 3: Externalizing Integration Flow Configurations

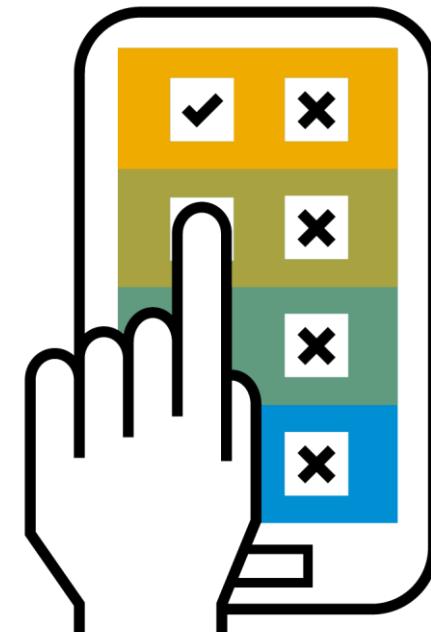
What is externalization?

Externalization enables isolation of the business logic from the integration flow complexity, thus empowering even the business users to easily configure the flow.

Using externalization, you can declare a **parameter** and **reuse** it across multiple components in the same integration flow.

You can define **multiple parameters** for each field, but you can only assign a single value for each parameter. If a value contains common strings that can be reused, you can split the value and assign the strings to different parameters.

Externalization is very useful when you have to **move your integration flows across tenants**, because it enables you to modify the externalized parameters with **tenant-specific details** without editing the integration flow.



Externalizing integration flow configurations

Externalization editor

You can externalize the configurations of the adapter, flow step, process, or integration flow via

- Externalization editor or
- Property sheet

If externalization is supported for a component, you will find a new *Externalize* button in the right corner.

When you click the *Externalize* button, the externalization editor is launched, which has all the configurations of the selected component that can be externalized.

This view is divided into 3 columns: field name, parameter, and value.

The screenshot shows the SAP Studio interface for configuring an integration flow. The title bar says "Integration Flow". Below it is a navigation bar with tabs: General (which is selected), Runtime Configuration, Error Configuration, Resources, Externalized Parameters, and Problems. In the top right corner of the main area, there is a blue button labeled "Externalize". The "General" tab displays three fields: "Name" with the value "Externalize Integration Flow", "ID" with the value "Externalize_Integration_Flow", and "Description" which is empty.

The screenshot shows the "Externalization" dialog box. At the top, it says "Integration Flow" and "Externalization". Below that, it has tabs: Runtime Configuration (which is selected) and Error Configuration. The "Runtime Configuration" tab contains two sections: "Allowed Header(s)" and "HTTP Session Reuse". Under "Allowed Header(s)", there is a parameter field with the placeholder "<Define Parameter>". Under "HTTP Session Reuse", there is another parameter field with the placeholder "<Define Parameter>" and a dropdown menu set to "None". At the bottom right of the dialog box are "OK" and "Cancel" buttons.

Externalizing integration flow configurations

Create parameter, provide values, and reuse existing parameters

Externalization

Integration Flow

Runtime Configuration Error Configuration

Allowed Header(s): <Define Parameter>

HTTP Session Reuse: {{httpSessionHandling}} None

Update Value of 'httpSessionHandling'

Changing a parameter's default value replaces the current value at all locations. Configured values precede the default value at all times. Choose Configure option if the configured value requires any changes.

Default Value: None

Configured Value: <No Value Configured>

OK Cancel

Externalization

Integration Process

TRANSACTION MANAGEMENT

Transaction Handling: {{}}

*Timeout (in min): 30

- Create a new parameter using the format {{<parameter_name>}}
- When you move out of the field, a token is created in the value column of the new parameter.
- Click on token in the value column, which opens an “Update Value” dialog to provide a value for the parameter.
- To reuse, start typing two curly brackets “{{” in the parameter column. You will get a list of all existing parameters and the associated values via auto-suggest.

Externalizing integration flow configurations

Using multiple parameters and removing externalization

SOAP

Connection WS-Security

CONNECTION DETAILS

*Address:	<code>{{host}}{{port}}</code>	<code>http:// <Define Value> : <Define Value> /soapEndpoint</code>
Proxy Type:	<code><Define Parameter></code>	Internet <input type="button" value="▼"/>
URL to WSDL:	<code><Define Parameter></code>	<input type="button" value="Select"/>

- Combine multiple parameters to form a single value within a field.
- You can also add text before and after the token, which will not be externalized, but will be concatenated along with the values of the parameter during runtime.

SOAP

Connection WS-Security

CONNECTION DETAILS

*Address:	<code>{{host}}</code>	<code>http:// myHost:myPort/soapEndpoint</code>
Proxy Type:	<code><Define Parameter></code>	Internet <input type="button" value="▼"/>
URL to WSDL:	<code><Define Parameter></code>	<input type="button" value="Select"/>

- To remove externalization of a field, delete the parameter from the parameter column.
- Note: Removing externalization of a field doesn't delete the parameter altogether.*

Managing externalized parameters

The Externalized Parameters view enables management of all parameters from a central place.

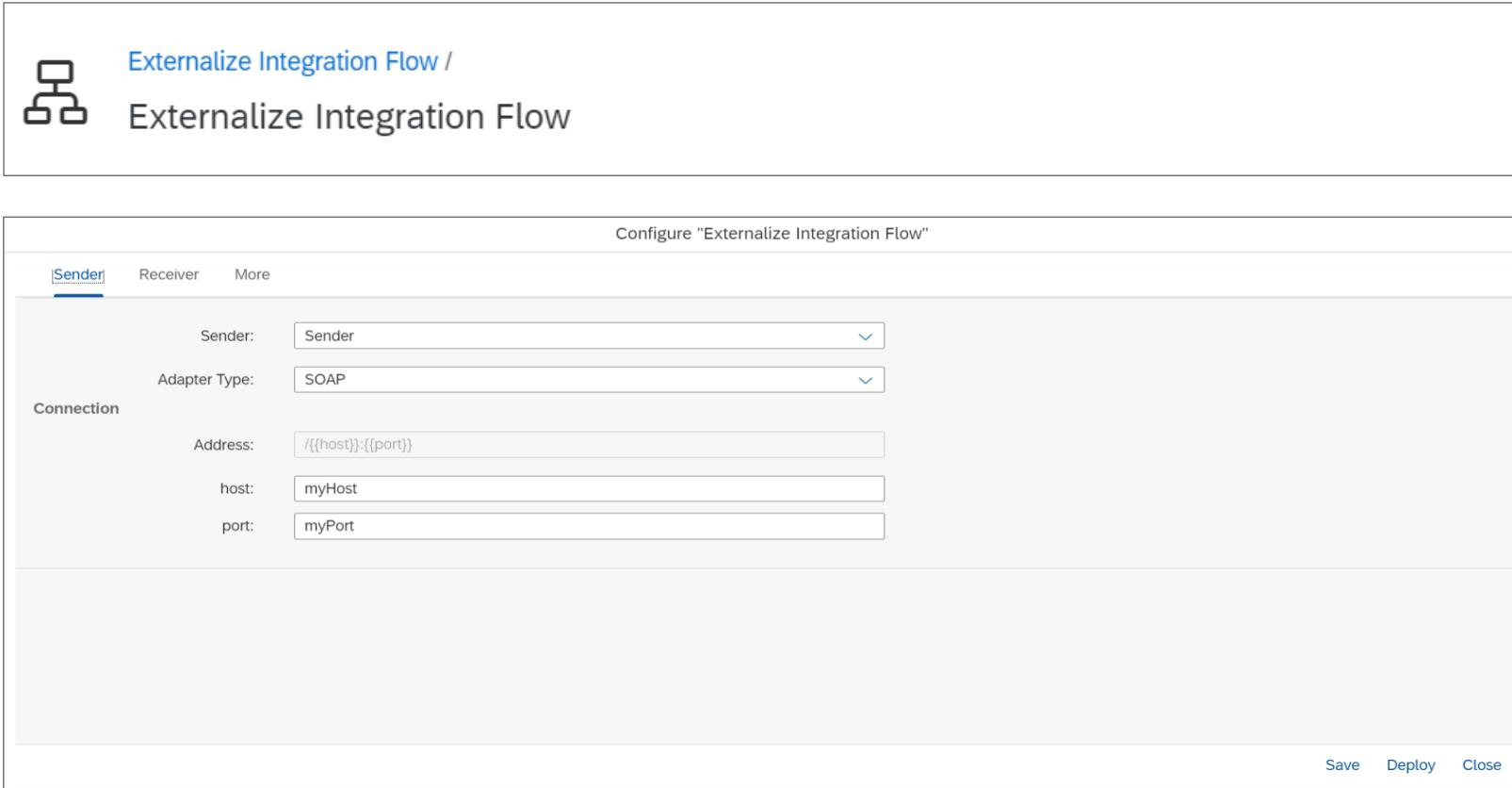
- It provides a list of all parameters used in the integration flow.
- You can provide values or update existing values of parameters.
- Remove unused parameters using the *Remove Unused* button.

Integration Flow			Externalize	?	Export	Import
General	Runtime Configuration	Error Configuration	Resources	Externalized Parameters	Problems	
<p>Changing a parameter's default value replaces the current value at all locations. Configured values precede the default value at all times. Choose Configure option if the configured value requires any changes.</p>					<input type="text"/> Filter by Name/Value	
Name	Default Value			Configured Value		
allowedHeaders	<input type="text"/> myHeader			<input type="text"/> <No Value Configured>		
host	<input type="text"/> myHost			<input type="text"/> <No Value Configured>		
httpSessionHandling	<input type="text"/> None			<input type="text"/> <No Value Configured>		
myProxy	<input type="text"/> default			<input type="text"/> <No Value Configured>		
port	<input type="text"/> myPort			<input type="text"/> <No Value Configured>		
returnException	<input type="checkbox"/>			<input type="text"/> <No Value Configured>		

Externalizing integration flow configurations

Configuring externalized parameters

You can configure the externalized parameters without editing the integration flow, using the *Configure* option from the integration flow editor or the package explorer, before deploying the integration flow.



The screenshot shows the 'Configure "Externalize Integration Flow"' dialog. At the top, there are tabs for 'Sender', 'Receiver', and 'More'. The 'Sender' tab is selected. Below it, under the 'Connection' section, there are fields for 'Sender' (set to 'Sender'), 'Adapter Type' (set to 'SOAP'), 'Address' (set to '/{{host}}:{{port}}'), 'host' (set to 'myHost'), and 'port' (set to 'myPort'). At the bottom right of the dialog are buttons for 'Save', 'Deploy', and 'Close'.

Externalize Integration Flow /
Externalize Integration Flow

Edit **Configure** Deploy Delete

Configure "Externalize Integration Flow"

Sender Receiver More

Connection

Sender: Sender
Adapter Type: SOAP
Address: /{{host}}:{{port}}
host: myHost
port: myPort

Save Deploy Close

The Configure view lists all the externalized parameters with default values. You can configure or change the values of these parameters with tenant/landscape-specific values.

Externalizing integration flow configurations

Configuring multiple integration flows

You can configure multiple integration flows by selecting them from the package explorer and choosing “Configure”.

Configure parameters of each integration flow one by one and then “Save All” or “Deploy All”.

Overview Artifacts (20) Documents (4) Tags

Name Type Version

Create Business Partner Relationships Integration Flow 1.2.0

Create Customer Contact Relationships from SAP S/4HANA to SAP Field Service Management
Unmodified

Replicate Business Partner Address Integration Flow 1.2.0

Replicate Business Partner Address from SAP S/4HANA to SAP Field Service Management
Unmodified

Actions ▾ Partner Download Configure

Configure Selected Artifacts

Artifact	Sender	Receiver	More
Create Business Partner Relationships	S4hana		
Replicate Business Partner Address	SOAP		

Connection

Sender: S4hana

Adapter Type: SOAP

Address: /S4/FSM/Business_Partner_Relationships

Authorization: User Role

User Role: ESBMessaging.send

Select

Externalizing integration flow configurations

Downloading externalized parameters

The externalized parameters can be downloaded along with the download of integration flows using one of the following options:

- Default Values Only
- Merged Configured and Default Values

The screenshot shows the SAP ALE Platform interface. In the top-left, there's a navigation bar with tabs: Overview, Artifacts (1), Documents, and Tags. The 'Artifacts (1)' tab is selected. Below it, a table lists an artifact named 'Externalize Integration Flow'. The table columns include 'Name' (checkbox), 'Type' (Integration Flow), and 'Version' (Draft). To the right of the table is a context menu with options: Copy, View metadata, Download (highlighted in blue), Configure, and Deploy. A small icon with a circular arrow is also present. At the bottom of the screen, a modal dialog titled 'Download Integration Flow' is open. It contains a dropdown menu labeled 'Download Externalized Parameters with:' with three options: 'Merged Configured and Default Values' (selected and highlighted in blue), 'Default Values Only', and 'Merged Configured and Default Values' (duplicated entry). At the bottom right of the dialog are 'Download' and 'Cancel' buttons.

Recommendations

1. **Externalize** all the fields of the integration flow that you envisioned and provide the appropriate default values.
2. Be sure not to provide the tenant/landscape-specific value as a **default** parameter value.
3. Validate the default value of parameters through **validation** checks. Saving the integration flow will run validation checks.
4. Always provide the **tenant/landscape-specific** value in the Configure view.
5. Before downloading the integration flow or exporting the content package, always leverage the benefit of the **Externalized Parameters view** to compare the default and configured value of parameters for quality assurance. Update the default parameter value from the Externalized Parameters view or externalization editor for any correction.
6. Download the integration flow with **Default Values Only** if you do not want to reuse the configurations of the source system while importing into the target system.*
7. Download the integration flow from source system with **Merged Configured and Default Values** if you want to reuse the configurations of the source system while importing into the target system.*

* The configurations available in the target system will not be overwritten in any case.

A photograph showing a close-up of a person's hands typing on a laptop keyboard. The scene is bathed in warm, golden sunlight streaming through a window, creating a strong lens flare effect. The laptop screen is visible in the background, and the overall atmosphere is bright and focused.

Demo

SAP Integration Suite Cloud Integration

Design / openSAP CP10 / Send Birthday Greetings to Employees / Send Birthday Greetings to Employees

Edit Configure Deploy Delete

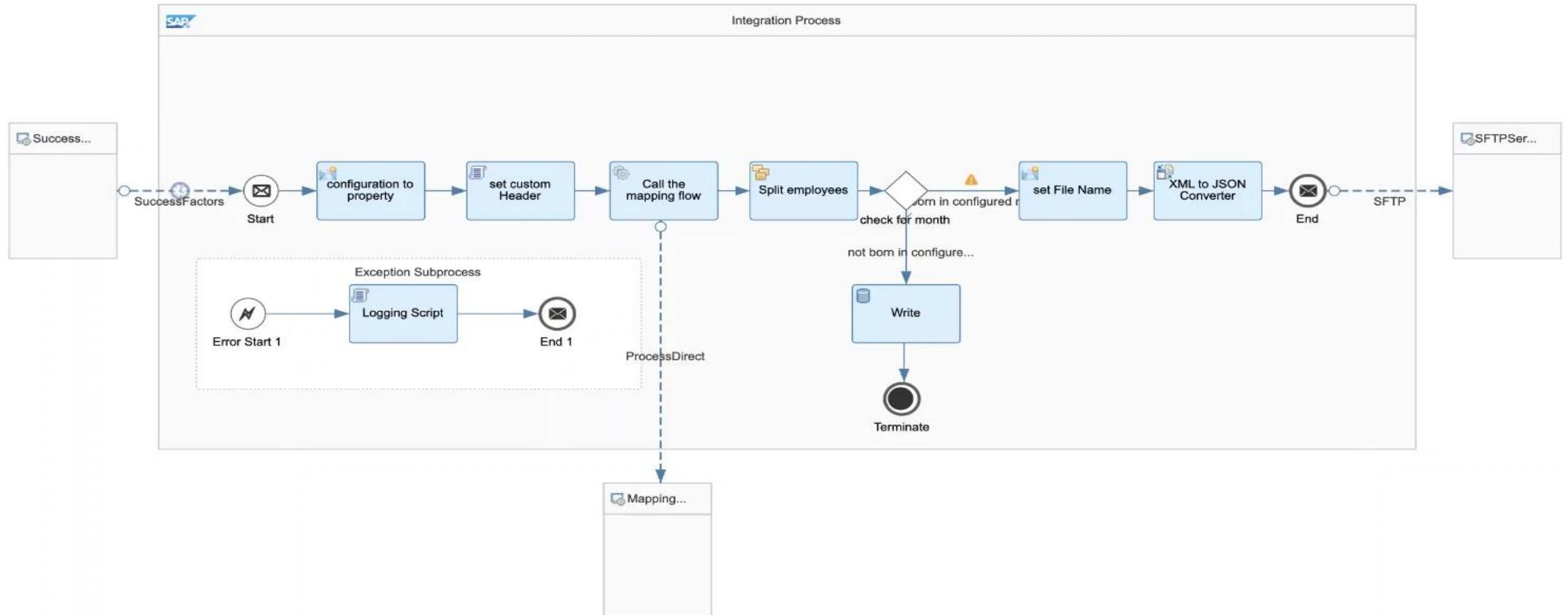
Success... SFTPSer...

Start configuration to property set custom Header Call the mapping flow Split employees set File Name XML to JSON Converter End

Error Start 1 Logging Script End 1 ProcessDirect Write Terminate

Mapping...

Search Step



Summary

The **externalization** feature enables an integration developer to define parameters for certain configurations of adapters or flow steps of an integration flow, whose values can be provided at a later point in time, without editing the integration flow.



Thank you.

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open@sap.com

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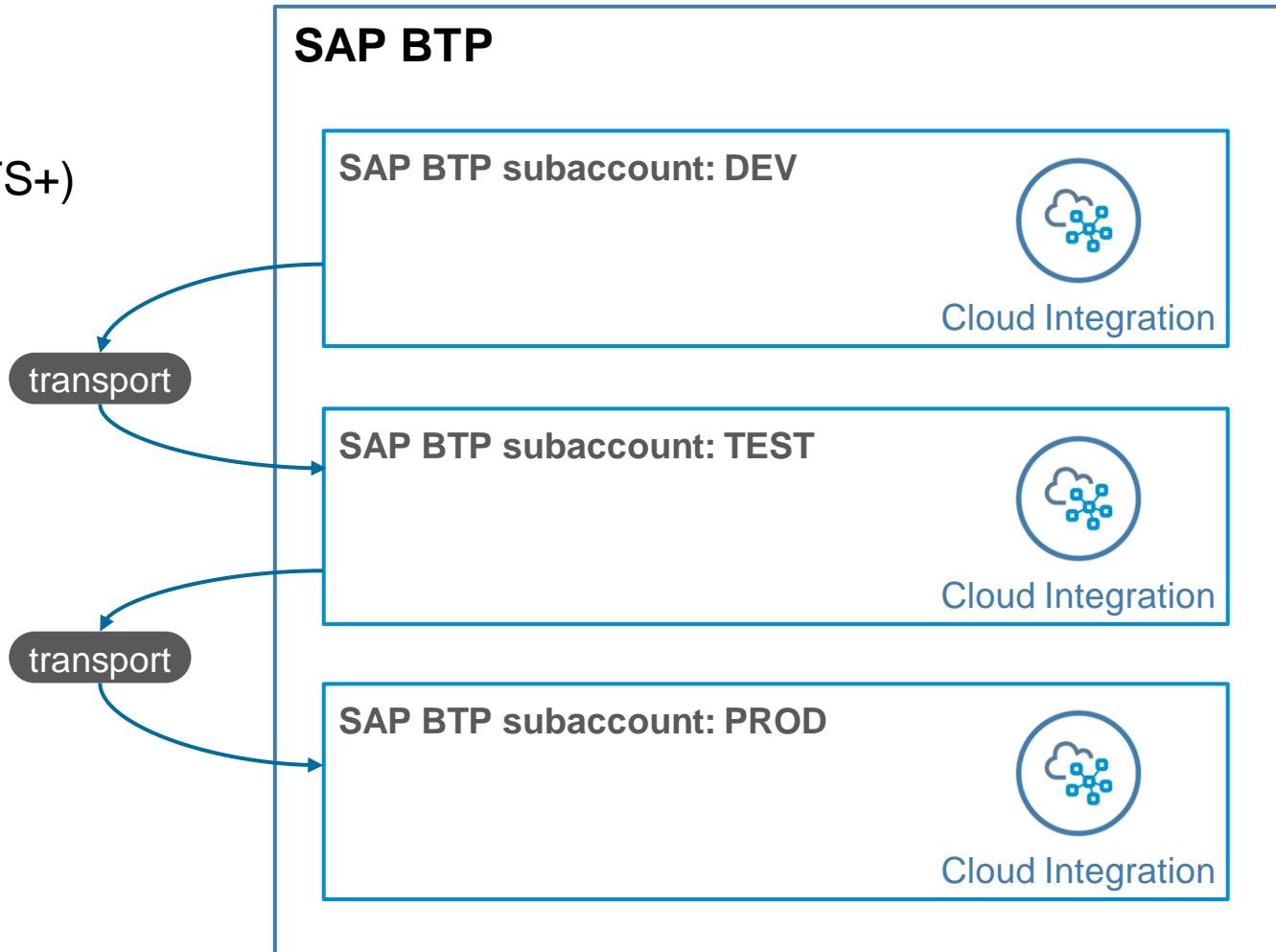
Week 2: Expand Your Skills

Unit 4: Transporting Integration Scenarios Across Tenants

Transporting integration scenarios across tenants

Ways to transport

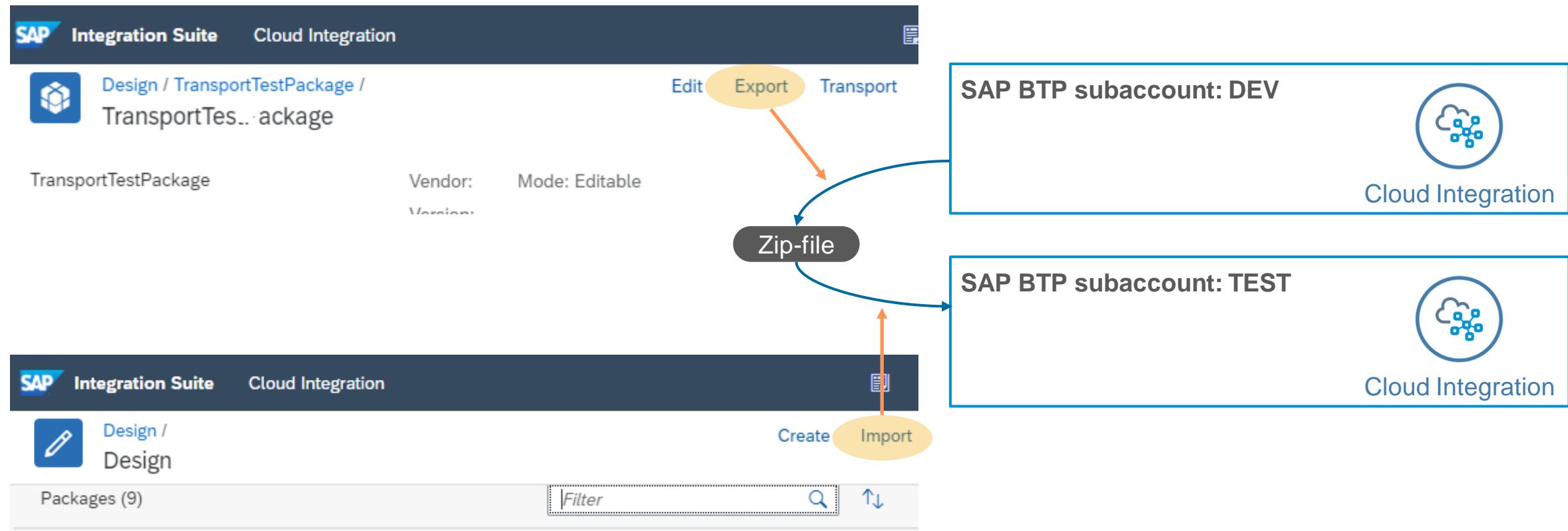
- Manual export and import
- Download multi-target application file (MTAR)
- Enhanced Change and Transport System (CTS+)
- SAP Cloud Transport Management Service



Transporting integration scenarios across tenants

Manual export and import

The manual export and import has to be triggered in the UI. It can be done for packages, but also for single integration flows.

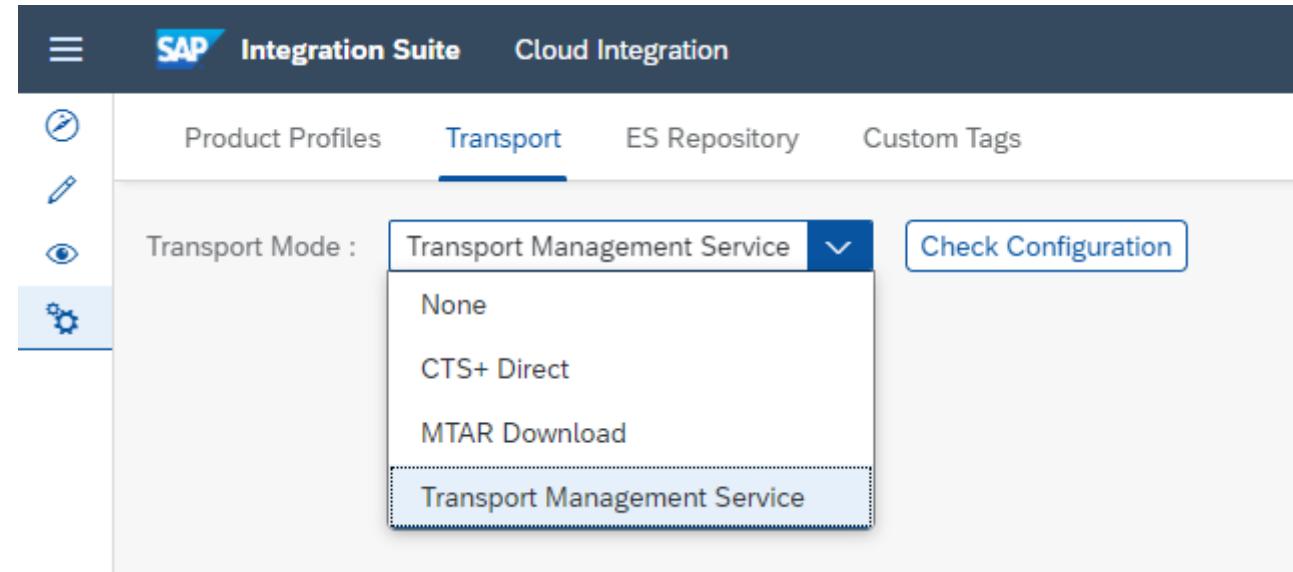


Transporting integration scenarios across tenants

Setting up transport mode

1. The transport mode has to be set by the tenant admin in the tenant settings of the Cloud Integration tenant.
2. Transport system (either CTS+ or Transport Management Service) has to be configured.
3. Integration developers who should be allowed to transport content need the additional role

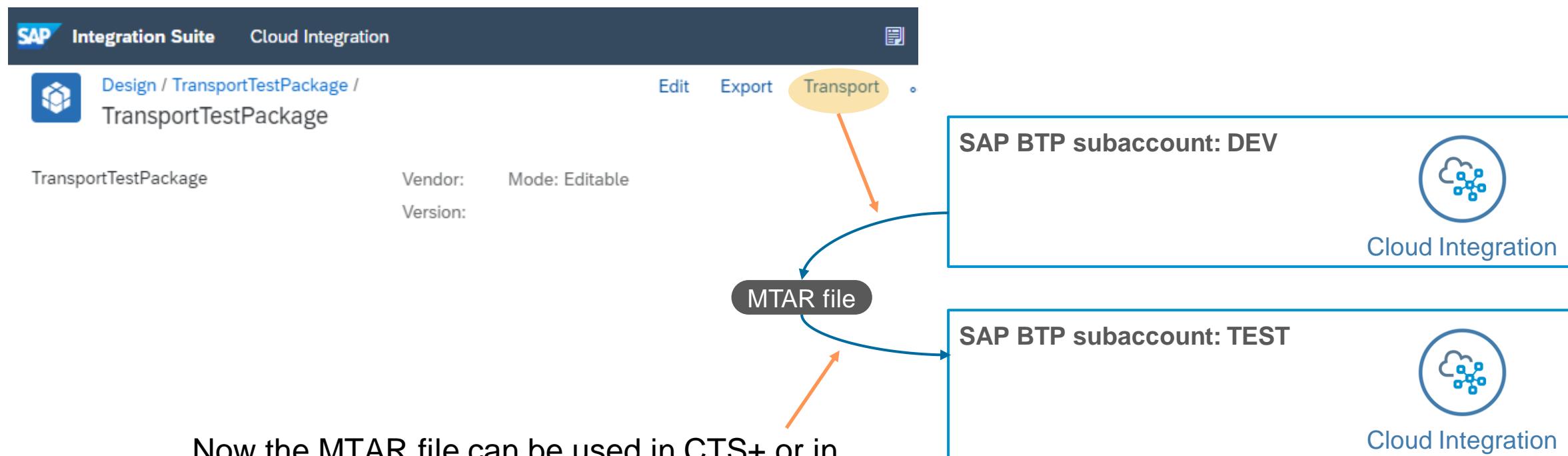
Workspace Packages Transport



Transporting integration scenarios across tenants

Transport using MTAR download

The transport can also be executed semi-automatically by downloading the MTAR file to use it either in CTS+ or in Transport Management.

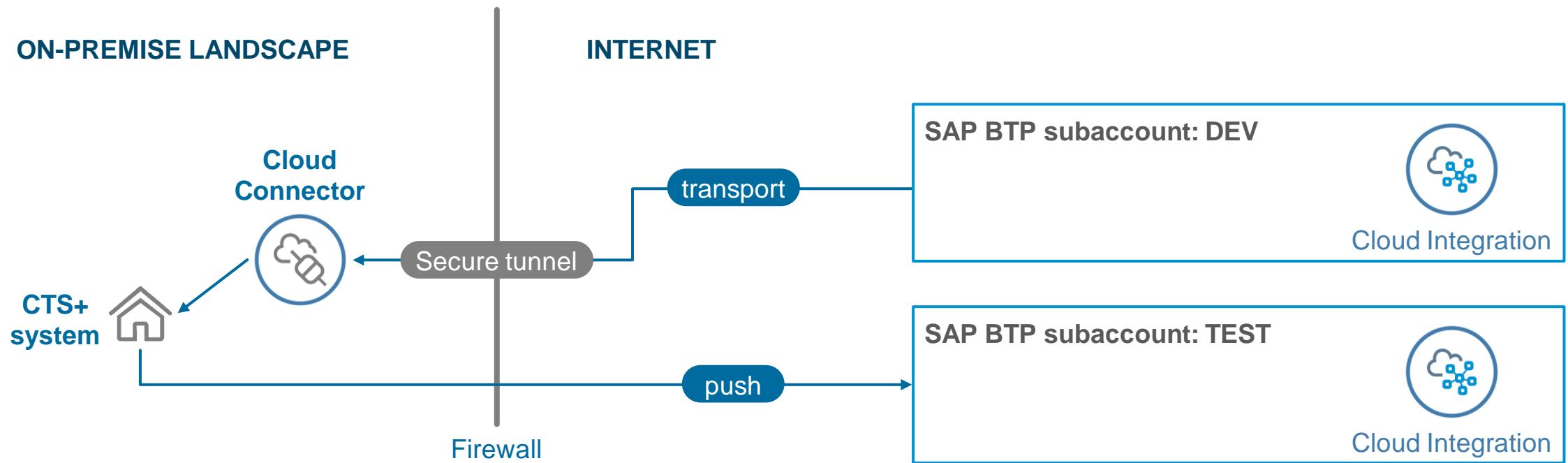


Now the MTAR file can be used in CTS+ or in the Transport Management Service to be pushed into the destination tenant.

Transporting integration scenarios across tenants

Transport via Enhanced Change and Transport System (CTS+)

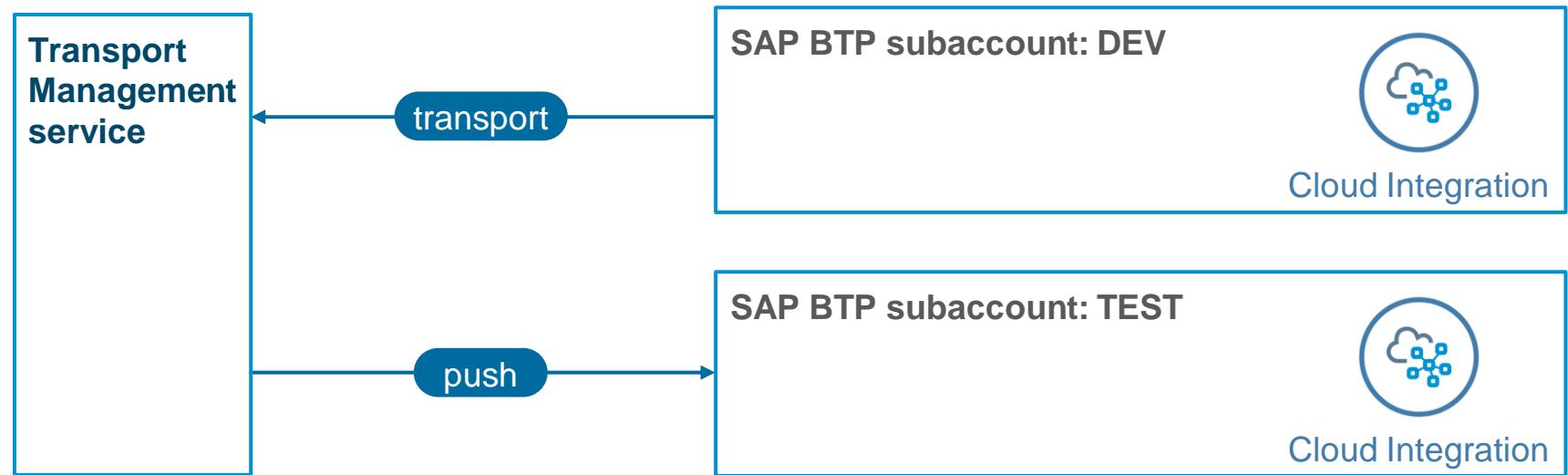
Transporting integration content using CTS+ is triggered by the transport button in the UI and then handled by the on-premise CTS+ system, which pushes the package to the destination system.



Transporting integration scenarios across tenants

Transport via SAP Cloud Transport Management Service

Transporting integration content using the SAP Cloud Transport Management Service is triggered by the transport button in the UI and handled by the Transport Management Service in the cloud, which pushes the package to the destination system.



A photograph showing a close-up of a person's hands typing on a laptop keyboard. The scene is bathed in warm, golden sunlight streaming through a window, creating a strong lens flare effect. The laptop screen is visible in the background, and the overall atmosphere is bright and focused.

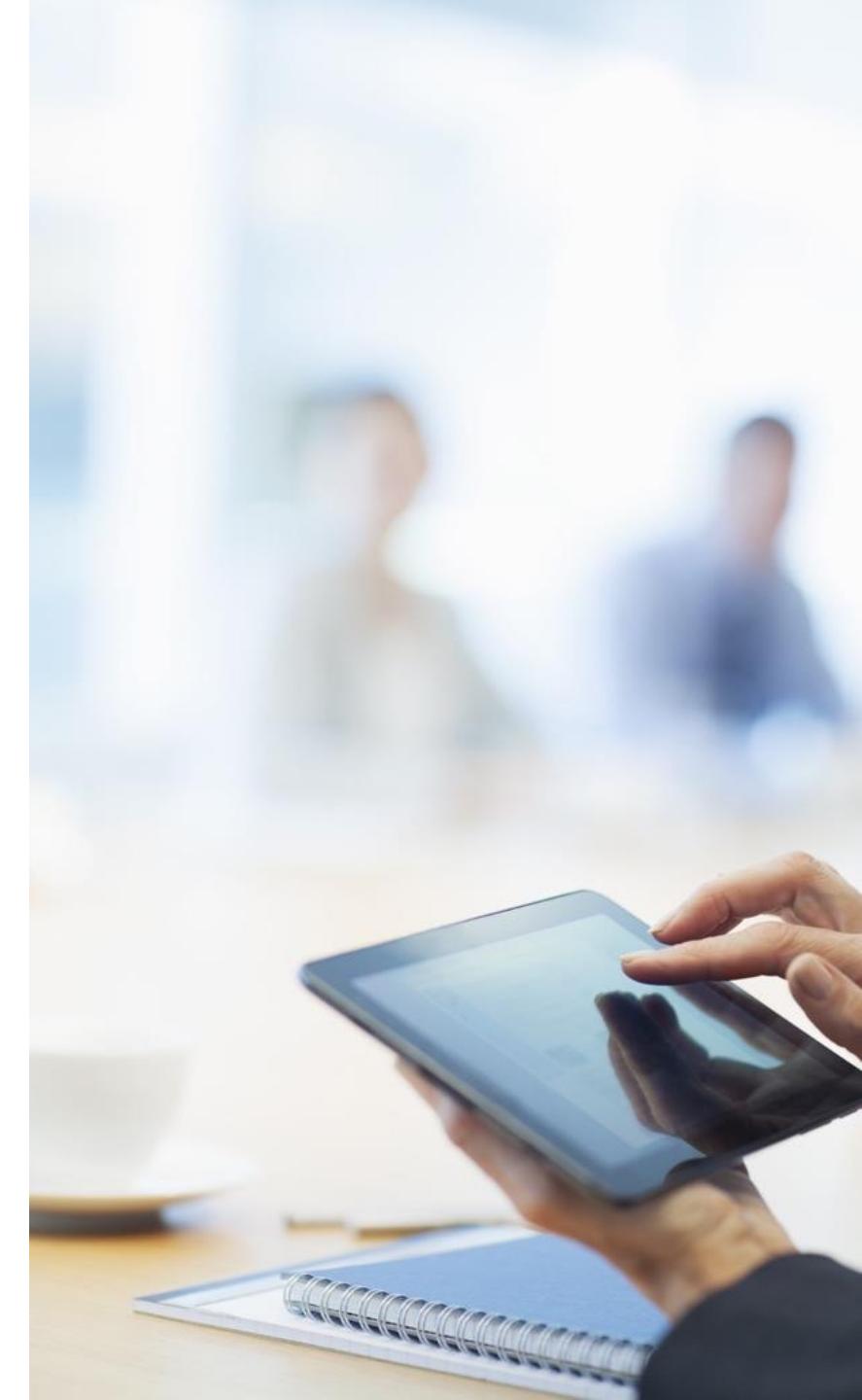
Demo

Transporting integration scenarios across tenants

Summary

Transporting integration content can be done in several ways:

- Manual export/import of packages and integration flows
- OData API
- MTAR download
- With the on-premise Enhanced Change and Transport System (CTS+)
- In the cloud with the SAP Cloud Transport Management system



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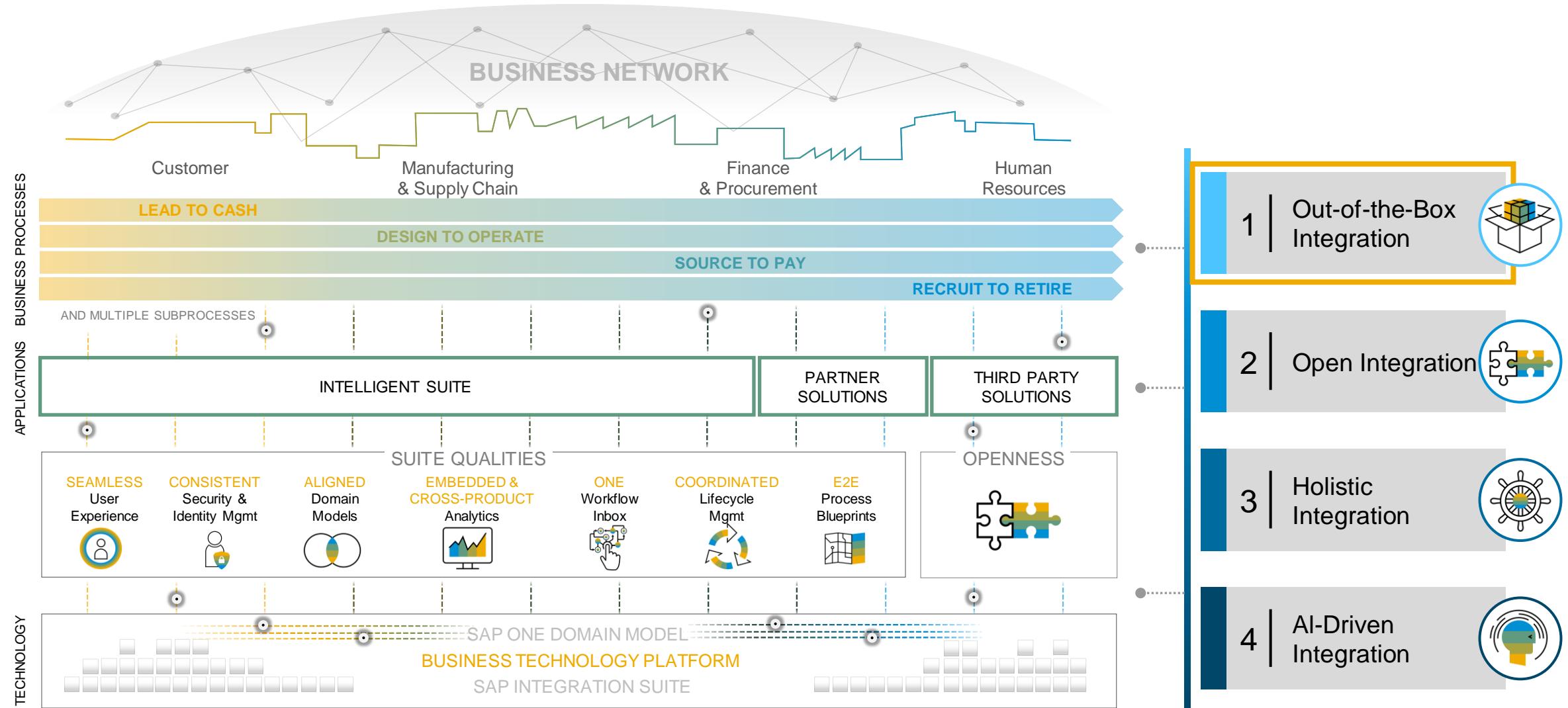


Week 2: Expand Your Skills

Unit 5: Configuring and Consuming Prepackaged Integration Content

Configuring and consuming prepackaged integration content

Key integration principles for the Intelligent Enterprise



Configuring and consuming prepackaged integration content

Prepackaged out-of-the-box integrations

Fully Maintained by SAP

2000+

Prebuilt
Integrations

170+

Open
Connectors

165

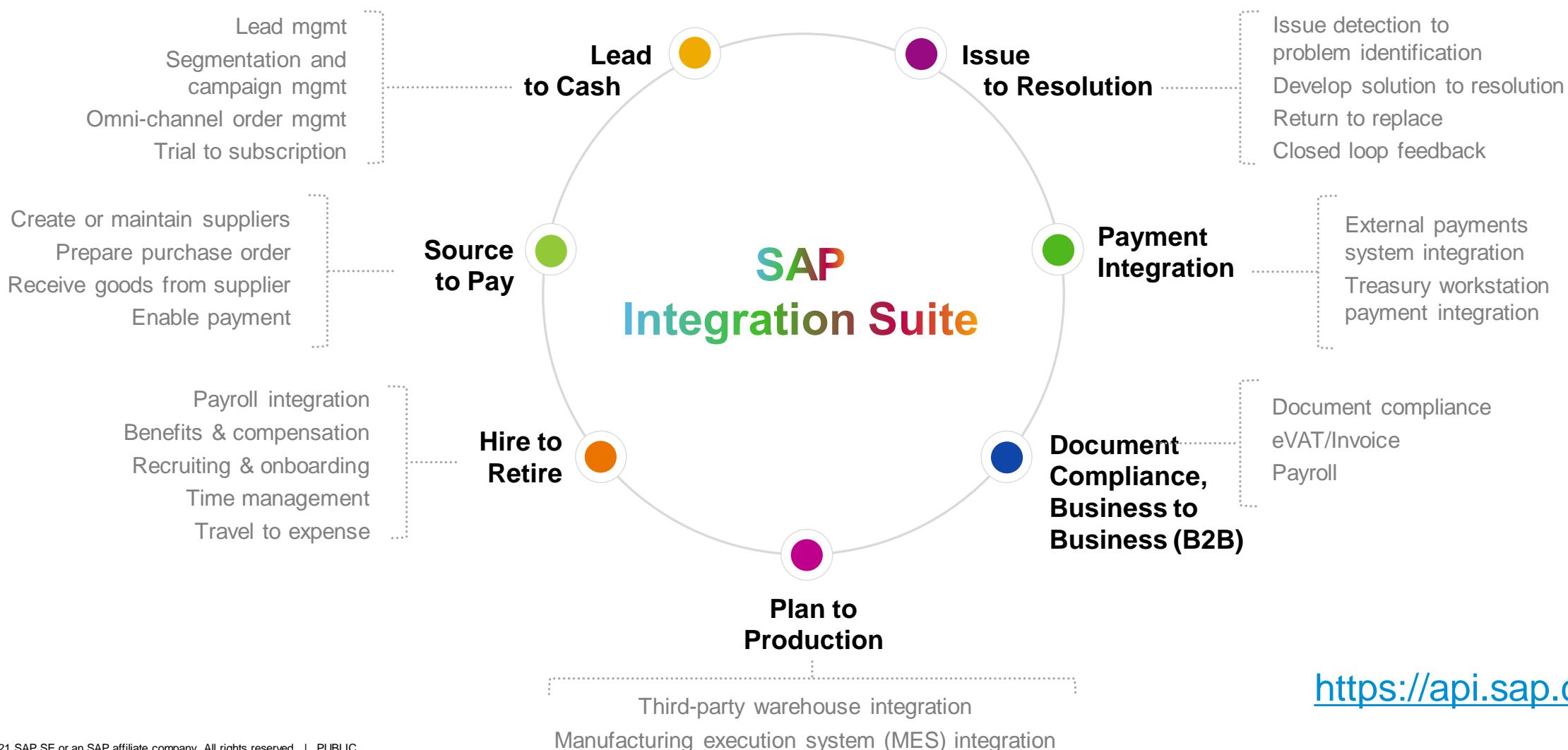
Prebuilt
Events

10x

Savings

5x

Faster
Execution



Configuring and consuming prepackaged integration content

SAP API Business Hub – api.sap.com

The public catalog of SAP's integration reference content as well as partners' content

- Business processes
- APIs
- Events
- Integration packages
- ...

Customers can discover, try out, and consume integration content to increase speed of implementation of integration and extensions

The screenshot shows the SAP API Business Hub homepage. At the top, there are three main navigation links: 'Discover', 'Explore', and 'Consume'. Below these, a search bar is followed by a navigation menu with tabs: 'Products', 'Business Processes', 'Content Categories', 'Partner Content', and 'Featured Content'. A large section titled 'Choose a Product to Explore' displays eight cards, each representing a different product or service:

- S/4HANA® Cloud**: Next generation digital core designed to help you run simple in a digital economy. It provides the industry-specific capabilities and cloud benefits that your business needs.
- S/4HANA®**: A future-ready ERP system with built-in intelligent technologies, including AI, machine learning, and advanced analytics which transforms business processes with intelligent automation.
- Customer Experience**: Bring together customer data, machine learning technology, and microservices to power real-time customer engagements across sales, service, marketing, and commerce.
- Cloud Platform**: An integration and extension platform that enables you to connect your landscape and create application extensions that focus on your business needs.
- SuccessFactors**: A global, cloud-based human resource management software system, evolving to help people and businesses thrive in the
- Ariba**: A cloud-based innovative solution that allows suppliers and buyers to connect and do business on a single platform. It provides
- Concur**: Provides an integrated online and mobile business travel and expense management software solution that automates your travel
- Fieldglass**: A cloud-based, open Vendor Management System that helps organizations find, engage, manage, pay, and unlock more

Below this section, there is a 'Partner Content' area featuring logos for Vertex, Avalara, Celum, Keytree, ADP, NGA Human Resources, ROJO Consultancy, and QforIT.

Configuring and consuming prepackaged integration content

Integration packs for non-SAP integrations

E-Government | 30+ countries

Austria	Australia	Belgium
Brazil	Chile	China
Columbia	Czech Rep.	Denmark
Germany	Greece	Hungary
India	Ireland	Italy
Mexico	Netherlands	New Zealand
Norway	Peru	Poland
Portugal	Singapore	South Korea
Spain	Sweden	Thailand
Turkey	United Kingdom	United States

End-to-end business processes | 150+ integrations

- SAP SuccessFactors
 - ADP
 - Alight Benefits
 - Benefitfocus
 - IBM Kenexa
 - Kronos
 - Microsoft
- SAP Ariba
 - Paradata
 - NGA HR
 - People Answers
 - SHL
 - Thomsons Darwin
 - Workforce
- SAP Customer Experience
 - Celum
 - Facebook
 - Google
 - MindTouch
 - Mobile Applications
 - ON/24
 - Twitter
- SAP S/4HANA
 - Jira
 - Salesforce
 - Tax Validation Services (EU, USA)

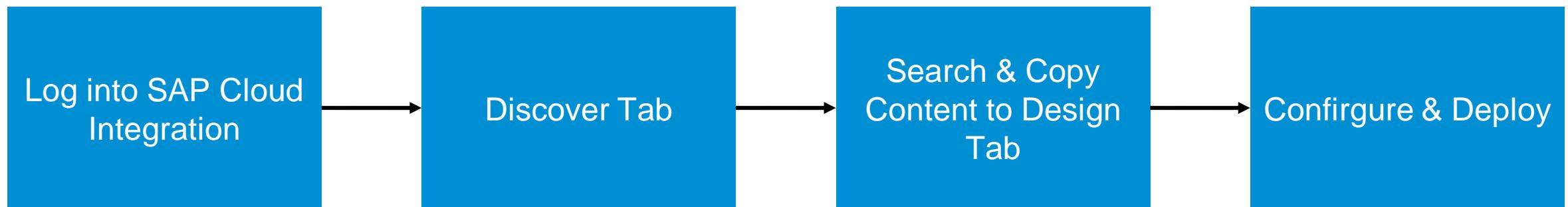
Partners | 80+ integration solutions

- ADP
- Alight
- Avalara
- Celum
- Commando
- Data Mill
- Delaware
- Here
- KaTe
- Keytree
- Medepia
- NGA
- Q for IT
- Rojo Consultancy
- Vertex
- Whitepaper Interface Design
- Zoop.One
- ...

Configuring and consuming prepackaged integration content

Leverage prepackaged integration content

- Working with Integration Packs



- Copy integration pack from Discover tab to Design tab

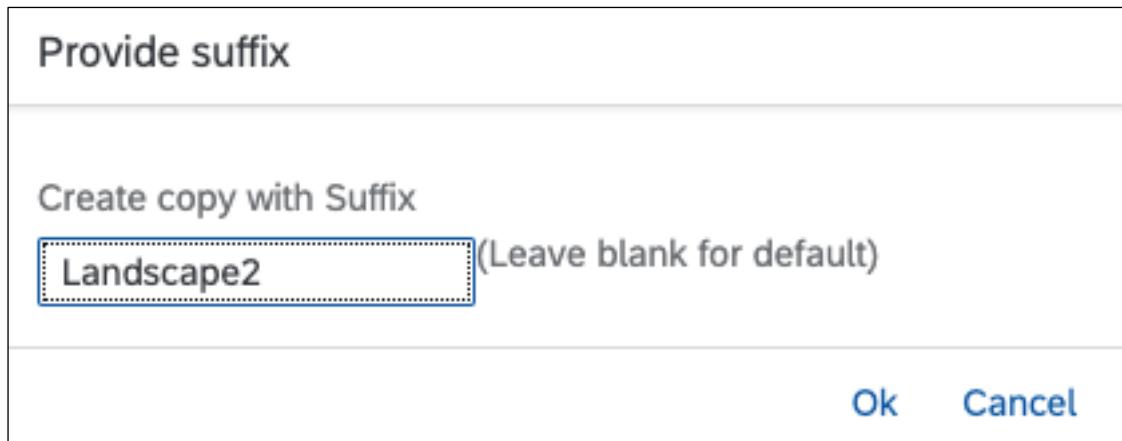
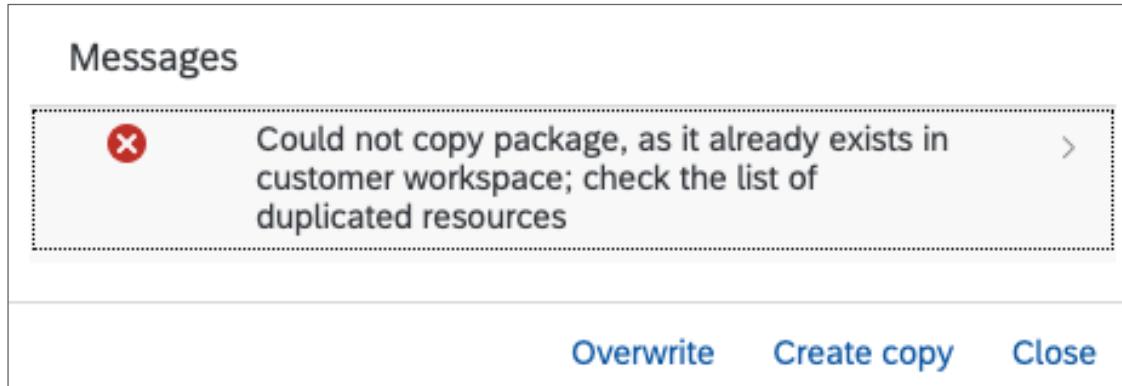
Copy

Package copied

Configuring and consuming prepackaged integration content

Leverage prepackaged integration content

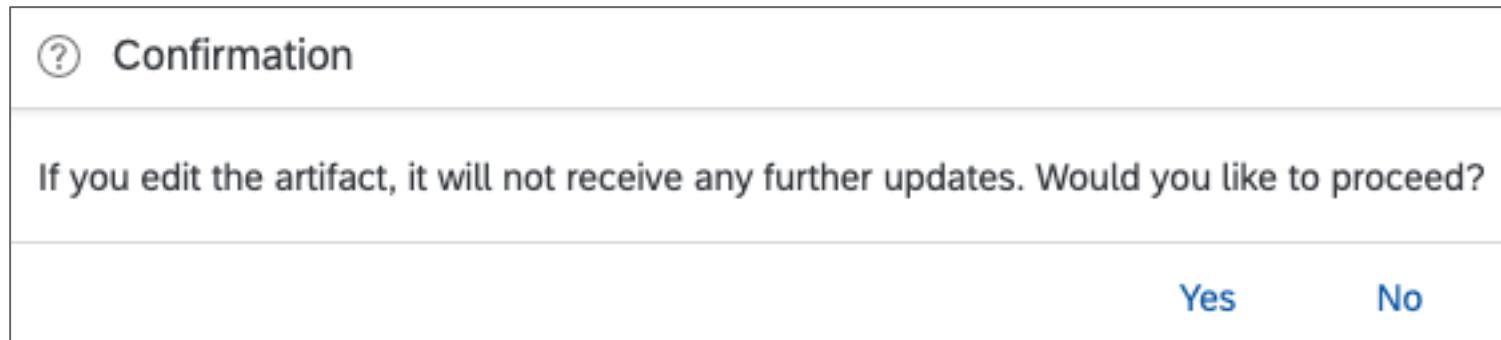
- Multiple copies of integration pack from Discover tab to Design tab



Leverage prepackaged integration content

- [Use integration packs delivered by SAP](#)

- Updates to standard integration content cannot be applied to modified content in your design workspace



- Options to extend integration packs delivered by SAP and still receive updates:

- [Use externalized parameters of an integration flow](#)
 - [Keep modifications separate from prepackaged integration content](#)

Configuring and consuming prepackaged integration content

Leverage prepackaged integration content

▪ Automatic update of integration packs

Name	Mode	Version	Created By
 SuccessFactors HCM Suite Competency with SA P HCM Qualification <div style="border: 2px solid orange; padding: 2px;">Will be updated within 12 hrs</div>	Editable	1.0	[REDACTED]

Name	Mode	Version	Created By
 SuccessFactors HCM Suite Competency with SA P HCM Qualification <div style="border: 2px solid orange; padding: 2px;">Will be updated on 21/09/2019</div>	Editable	1.0	[REDACTED]

Leverage prepackaged integration content

▪ Manual update of integration packs

Edit

Export

Update package

Delete Package

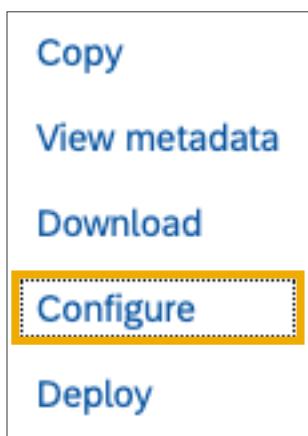
 SuccessFactors HCM Suite Competency with SAP HCM Qualification	Editable	1.0	
<input type="checkbox"/> Employee Qualification Rating One time upload of Employee Skills (PA or PD) from SAP HCM to SFSF HCM Suite - Modified the properties Modified Update Available			Integration Flow
<input type="checkbox"/> User Competency Rating Recurring transfer of Changed and New Competency Rating from SuccessFactors to SAP HCM (PA or PD) Unmodified Update Available			Integration Flow

Configuring and consuming prepackaged integration content

Leverage prepackaged integration content

- Use externalized parameters of an integration flow

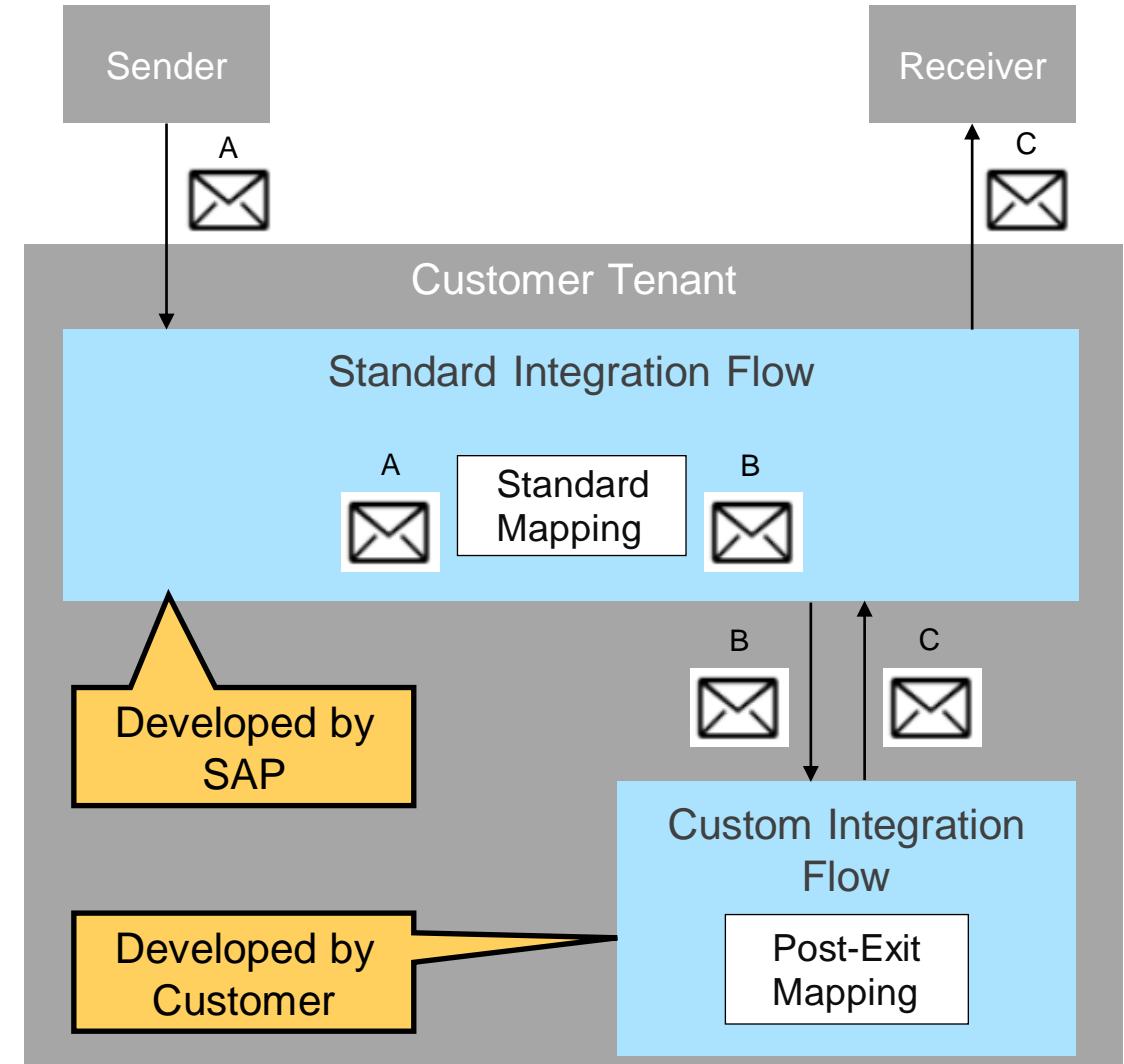
Integration Flow		
General	Runtime Configuration	Error Configuration
Resources	Externalized Parameters	Problems
① Changing a parameter's default value replaces the current value at all locations. Configured values precede the default value at all times. Choose Configure option if the configured value requires any changes.		
Name	Default Value	Configured Value
Address	/S4HANACloud/Salesforce/SalesOr...	No Value Configured
CredentialName	S4H_S4HANA_Cloud	No Value Configured
ExceptionLogging	NO	No Value Configured
HostName	myxxxxx-api.s4hana.ondemand.com	No Value Configured



Sender	Receiver	More
	Receiver: S4HANA_Cloud	▼
	Adapter Type: HCIOData	▼
Connection		
	Address: https://{{HostName}}:{{Port}}/sap/opu/odata/sap/API SALES ORDER_SRV	
	HostName: myxxxxx-api.s4hana.ondemand.com	
	Port: 443	
	Credential Name: S4H_S4HANA_Cloud	

Leverage prepackaged integration content

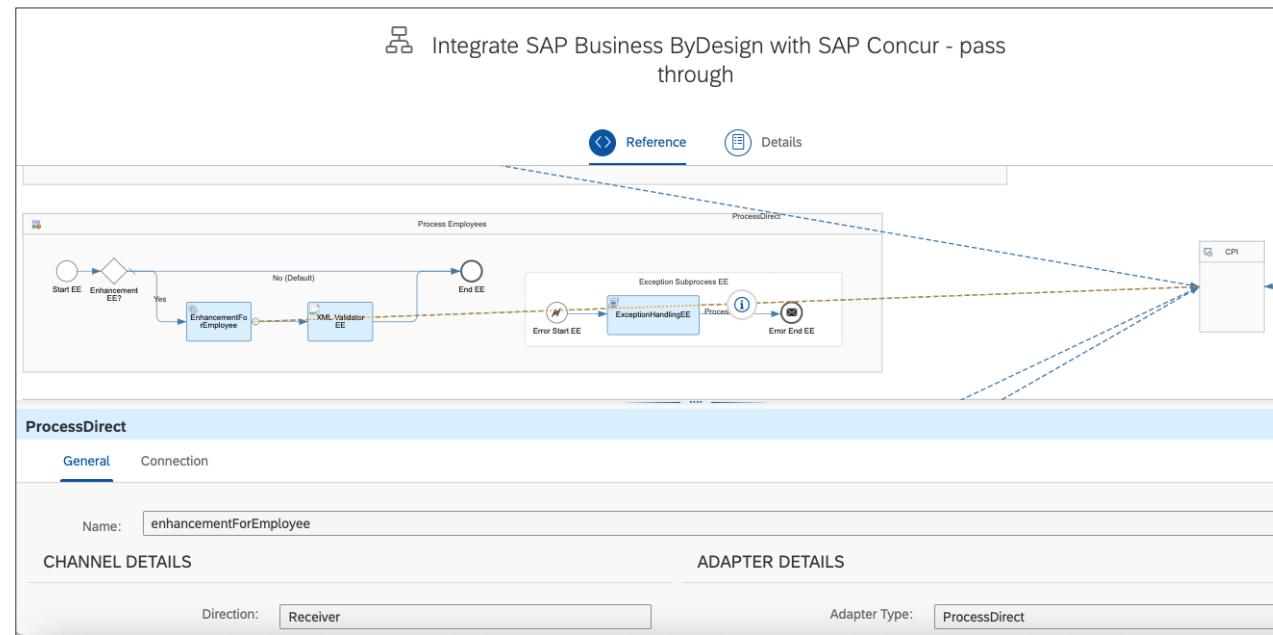
- Keep modifications separate from prepackaged integration content
 - **Decoupling of standard & customer-specific integration flows**
 - SAP predefines user exits in standard integration flow
 - Customers can develop own content as **extensions** in customer-specific integration flows, which are called from standard integration flow via **ProcessDirect adapter**
 - Updates of SAP standard content without the need by customers to also change their content
- Typical example: **mapping extension***



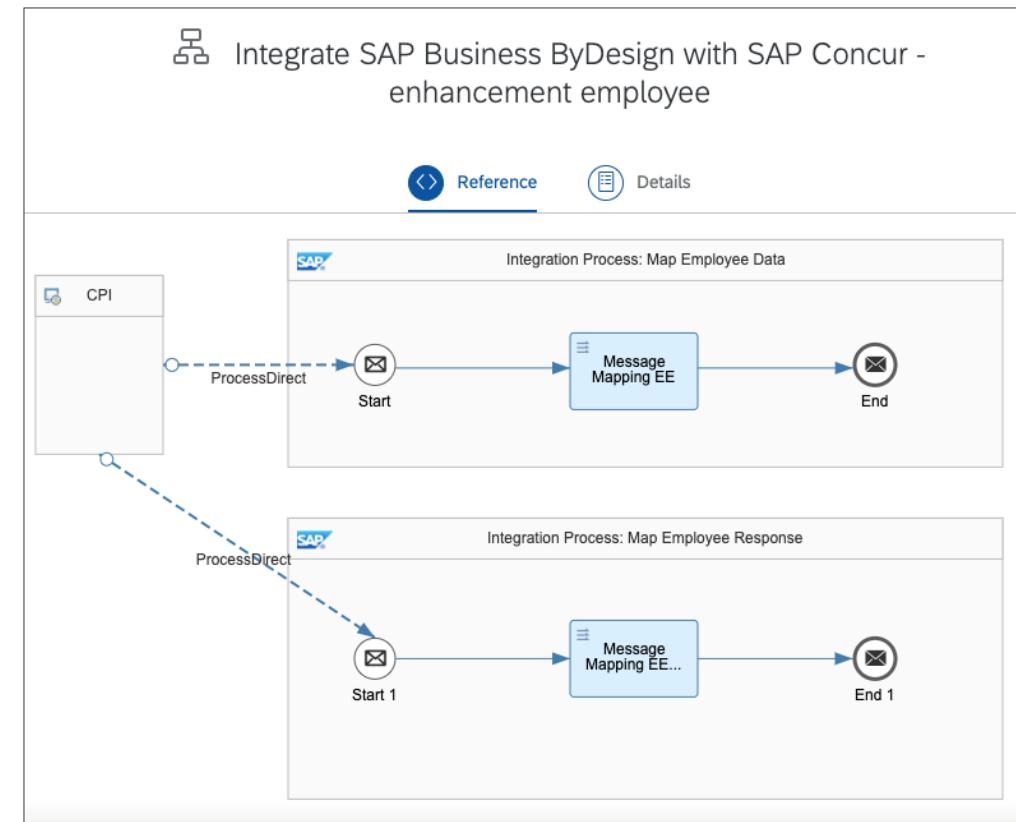
Configuring and consuming prepackaged integration content

Leverage prepackaged integration content

[SAP Business ByDesign to SAP Concur Integration](#)



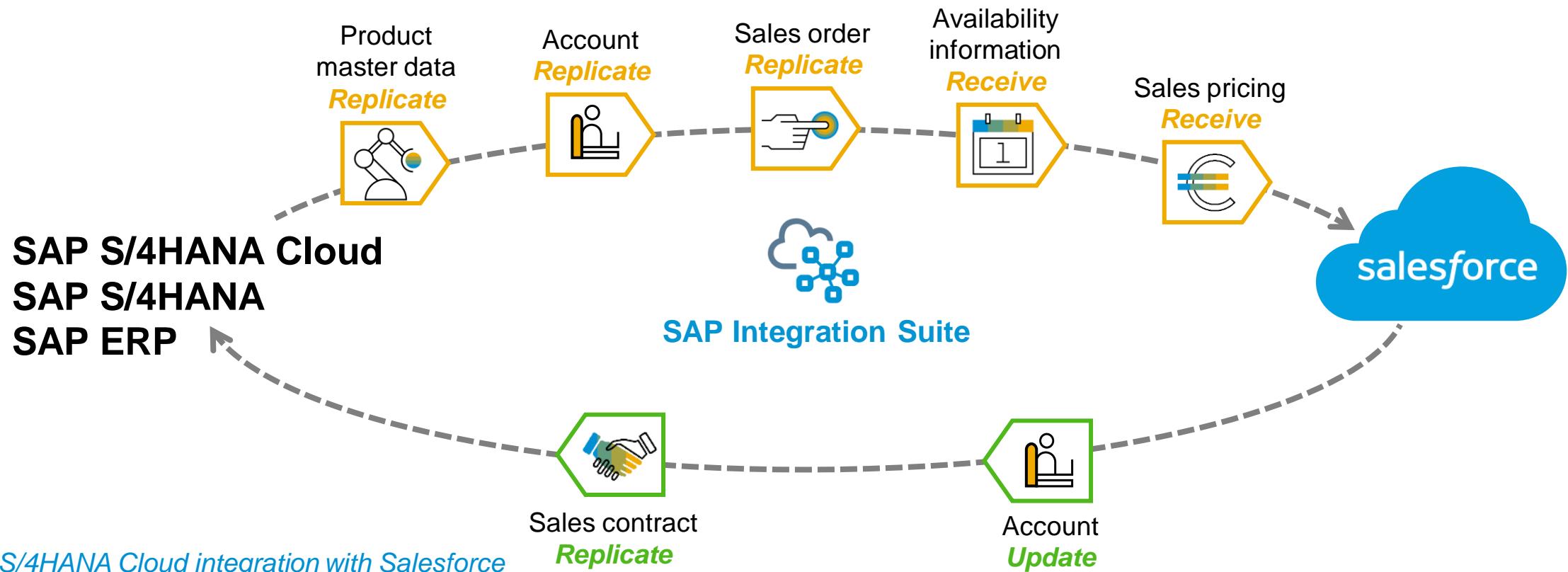
[SAP Business ByDesign to SAP Concur Integration Enhancements](#)



Configuring and consuming prepackaged integration content

SAP S/4HANA Cloud and SAP S/4HANA or SAP ERP – Integration with Salesforce

No additional costs for SAP S/4HANA Cloud and Cloud Integration customers



[SAP S/4HANA Cloud integration with Salesforce](#)

[SAP S/4HANA integration with Salesforce](#)

[SAP ERP integration with Salesforce](#)

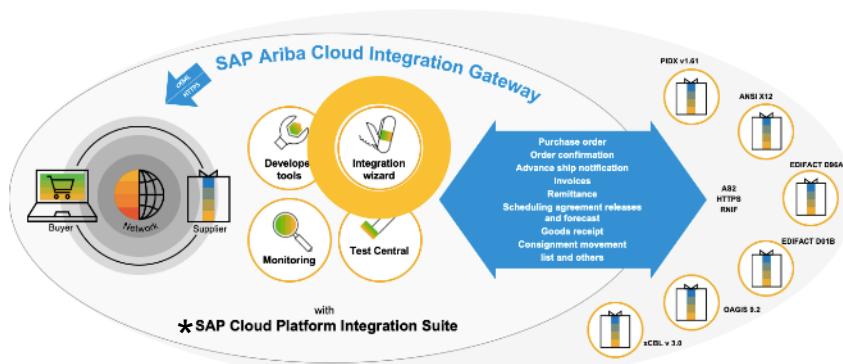
A photograph showing a close-up of a person's hands typing on a laptop keyboard. The scene is backlit by bright sunlight streaming through a window, creating a warm, glowing effect on the hands and the laptop screen. The laptop is open, and the screen is visible in the background.

Demo

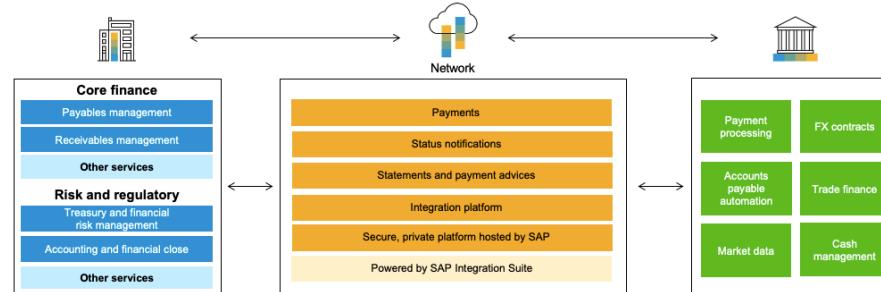
Configuring and consuming prepackaged integration content

LoB and industry integration clouds

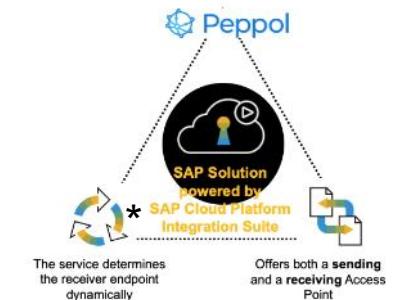
SAP Ariba Cloud Integration Gateway



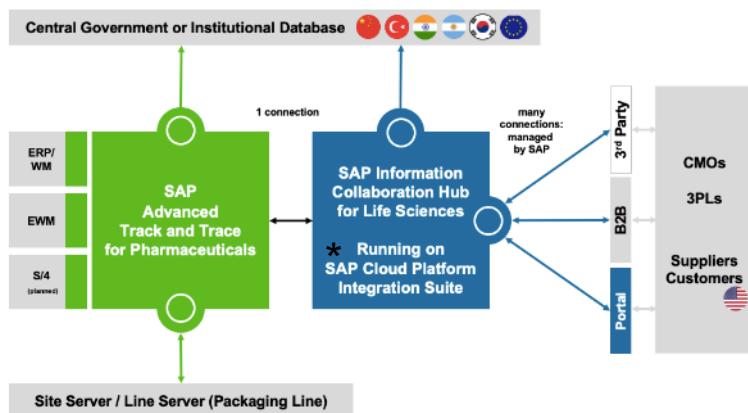
SAP Multi-Bank Connectivity



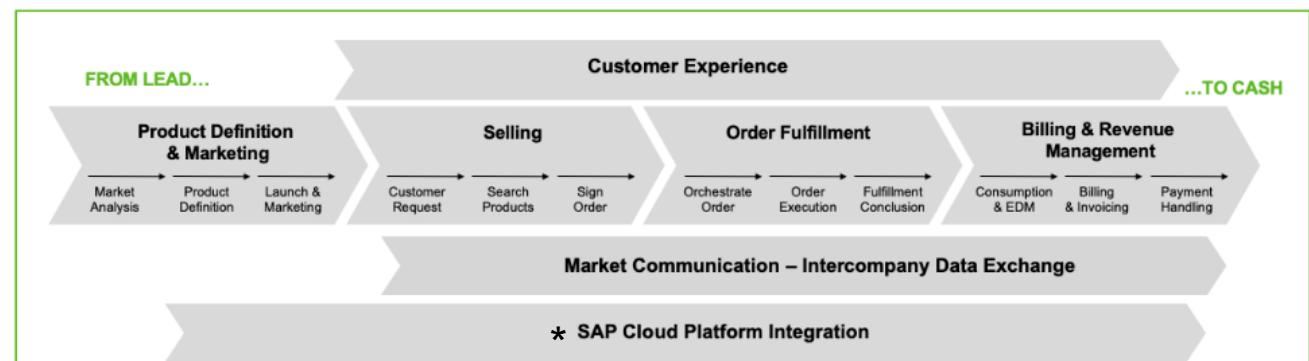
SAP Document Compliance, Peppol Exchange Service



SAP Information Collaboration Hub for Life Sciences



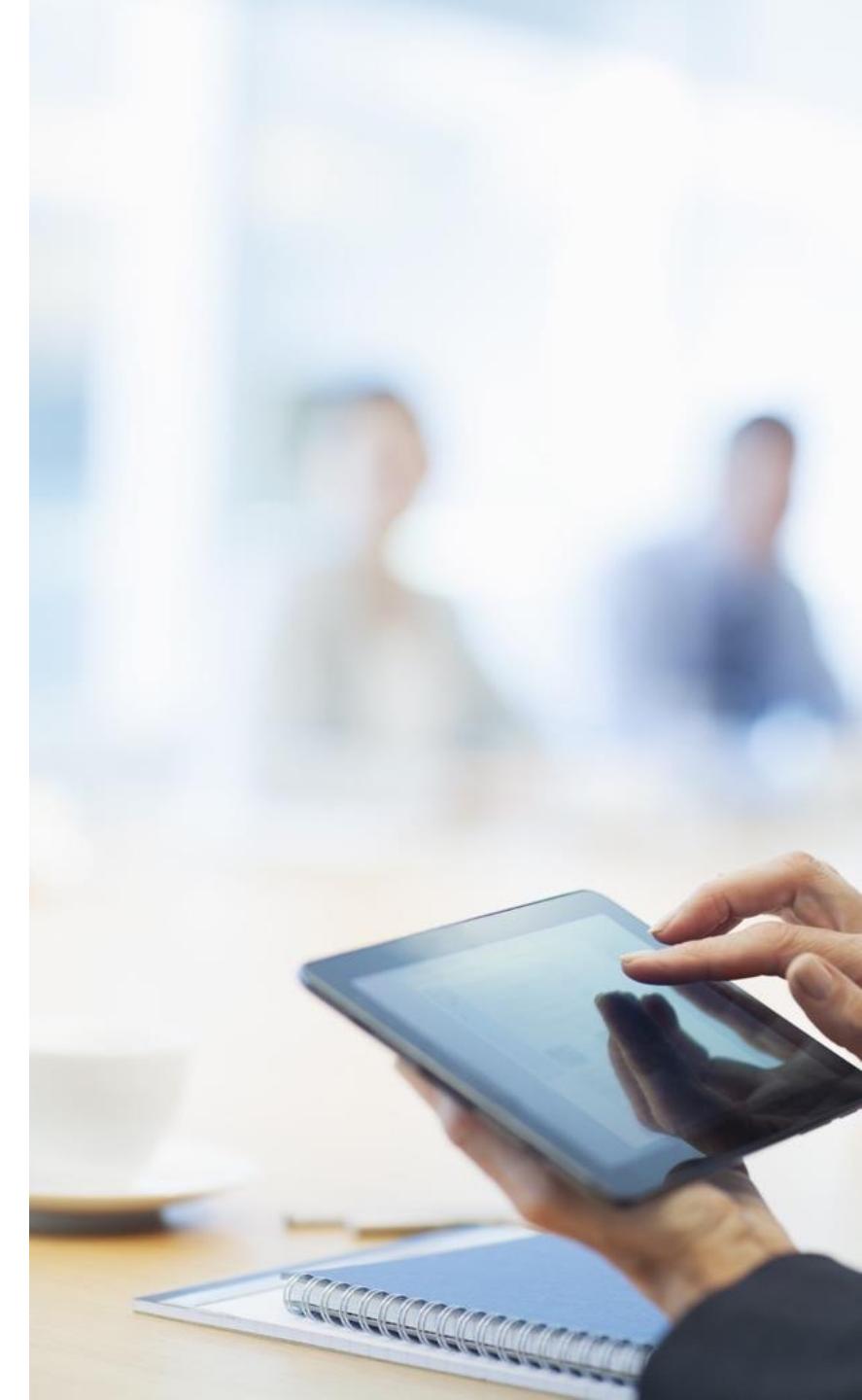
SAP Cloud for Utilities



Configuring and consuming prepackaged integration content

SAP Integration Suite – What you've learned in this unit

- SAP Integration Suite offers out-of-the-box integration packs and APIs to jump-start your integration projects
- The SAP Integration Suite integration packs are offered by SAP and selected partners
- The SAP Integration Suite integration packs cover SAP and non-SAP scenarios including non-SAP-to-non-SAP integrations
- Additionally, SAP offers fully managed industry-specific cloud solutions powered by SAP Integration Suite, such as SAP Ariba Cloud Integration Gateway, SAP Information Collaboration Hub for Life Sciences, SAP Document Compliance, SAP Multi-Bank Connectivity



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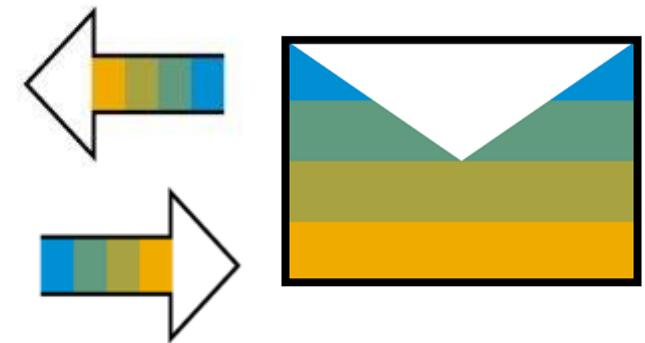
Week 2: Expand Your Skills

Unit 6: Configuring Asynchronous Messaging

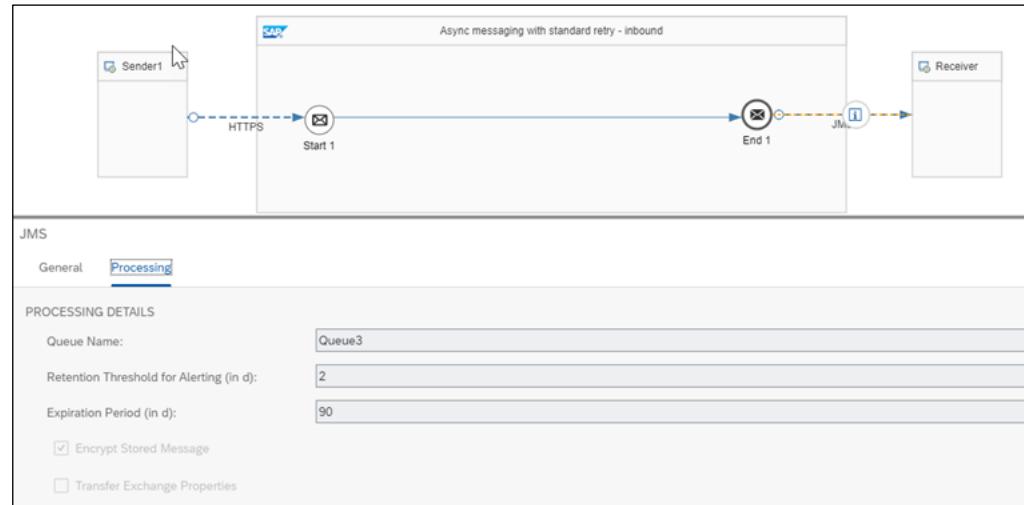
Introduction to JMS adapter

A JMS adapter can be used to enable asynchronous messaging using message queues. The advantages of JMS messaging for asynchronous messaging scenarios are:

1. Connected systems are decoupled so that messages are processed asynchronously
2. Configurable automatic retries from JMS queue
3. Leverages SAP Event Mesh for high-performance queueing
4. Explicit modeling of integration flow transaction handling for stateful processing



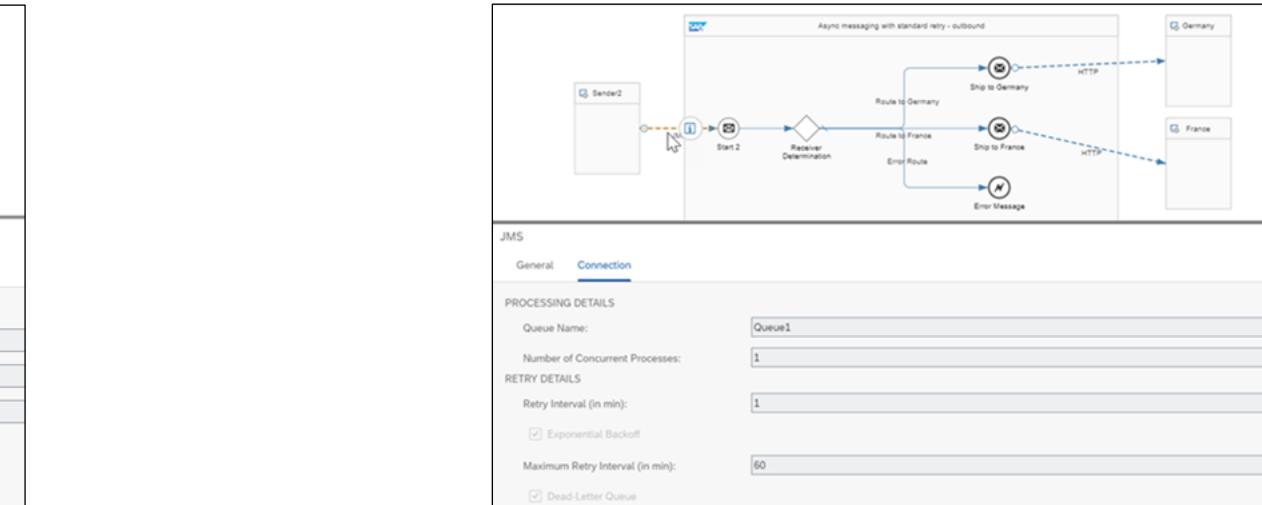
Configuring asynchronous messaging JMS receiver and sender channel



Properties not persisted by default

Transaction handling

The **JMS receiver adapter** can be used as the outbound adapter to store the messages in the queue



Flow-to-flow communication

Limited resources



Retry can be configured

The **JMS sender adapter** can be used as the inbound adapter to consume the messages from the queue

Configuring asynchronous messaging

Monitor message processing

To check the processing in detail, you can use monitoring in Cloud Integration.

The screenshot shows the 'Manage Integration Content' interface with the 'Integration Content' tab selected. It displays a single integration flow named 'Flow with JMS Sender Channel' which is 'Started'. The 'Endpoints' tab is active, showing that there are no endpoints configured. The 'Status Details' tab indicates that the integration flow is deployed successfully. The 'Polling Information' section shows an adapter URI of 'jms:myQueue' and a consumption status of 'Successful'.

The screenshot shows the 'Monitor Message Processing' interface for the 'receiver' artifact. It lists three messages: one completed (sender) and two failed (com.prism.HTTP.Receiver.WO.Sen.d.Body). The 'Logs' section shows five runs, all of which are completed with a status of 'Retry'. The 'Properties' tab shows the artifact name is 'receiver', artifact ID is 'receiver', and artifact type is 'Integration Flow'. The 'Runs (5)' table provides detailed information about each run, including start time, duration, log level, process ID, and status.

#	Started At	Duration	Log Level	Process ID	Status
5	Mar 09, 2020, 09:36:06	6 ms	Info	3daaf30	Completed
4	Mar 09, 2020, 09:34:08	13 ms	Info	3daaf30	Retry
3	Mar 09, 2020, 09:34:06	57 ms	Info	3daaf30	Retry
2	Mar 09, 2020, 09:33:27	17 ms	Info	3daaf30	Retry
1	Mar 09, 2020, 09:33:25	2 sec 126 ms	Info	3daaf30	Retry

Manage Integration Content

- Deployed integration flows and their status
- Polling information

Monitor Message Processing

- Message processing logs
- Messages are correlated via a correlation ID
- Outbound message status retry

Configuring asynchronous messaging

Monitor and manage queues

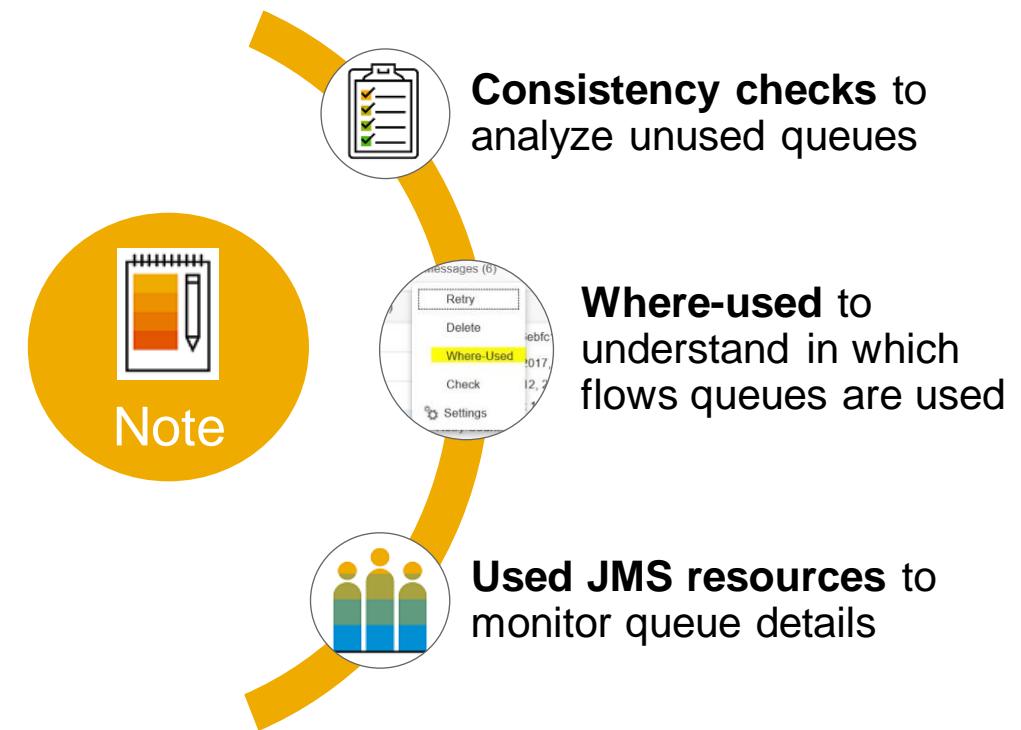
- Queues can be checked for messages
- Check number of retries and next retry
- Trigger an immediate retry of the message
- Queues can be deleted manually

Overview / Manage Message Queues										Check
JMS Resources: OK. Details										
Queues (6)			Filter by Name		Messages (5)					
Name	Entries	Status	JMS Message ID	Message ID	Status	Due At	Created At	Retain Until	Retry Count	
AS2_AS2_Async_Decoupling_Scenario_AS2_b32bcd09_2	5		ID:10.214.29.8a9ee1706228cfda0:654	AF5d5dCn5fYqPLSqiXPZS0NvjlyJ	Overdue	Mar 05, 2020, 10:36:24	Mar 03, 2020, 10:36:24	Jun 01, 2020, 10:36:24	3	
b9e			ID:10.214.29.8a9ee1706228cfda0:653	AF5d5Z-mLHTdgstgh2mKwcXmR_I	Overdue	Mar 05, 2020, 10:35:35	Mar 03, 2020, 10:35:35	Jun 01, 2020, 10:35:35	3	

Configuring asynchronous messaging

Checks

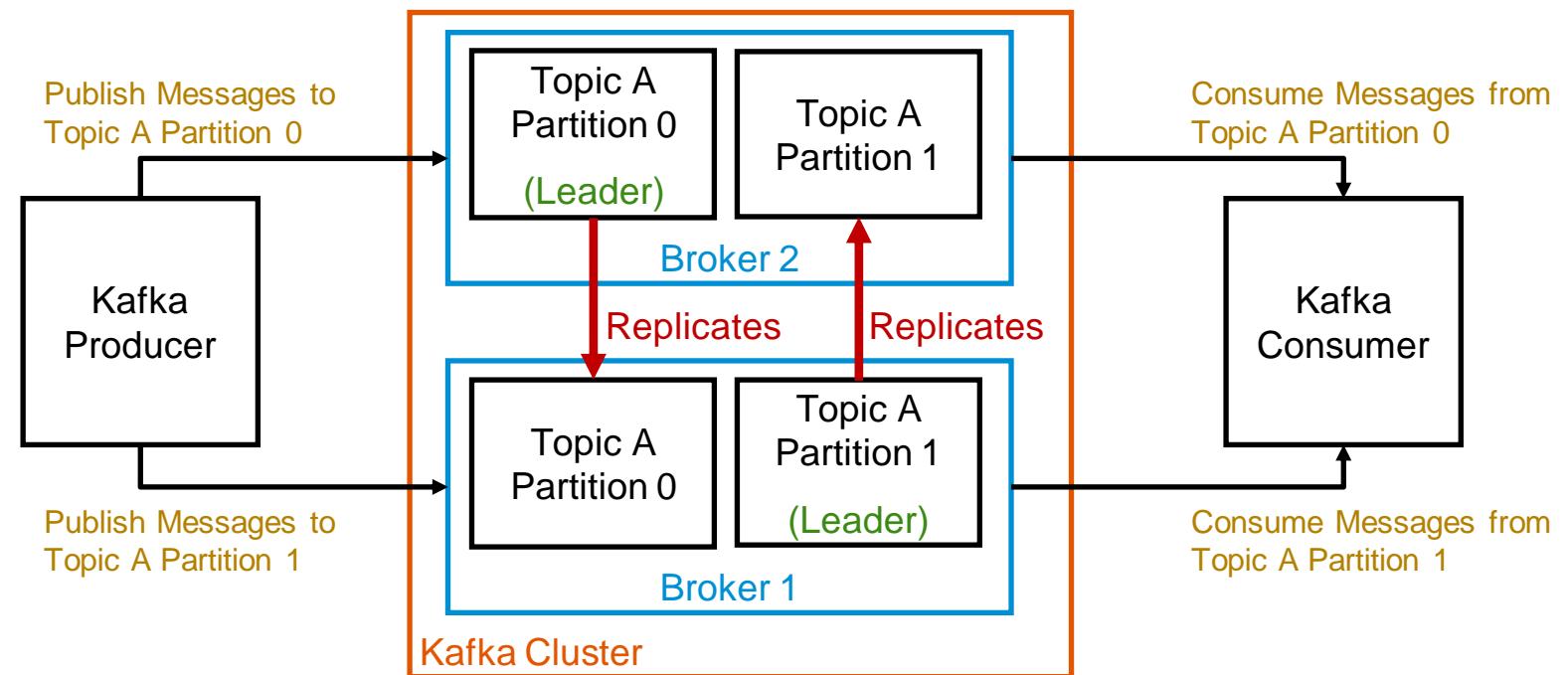
- Unused queues that do not contain messages and are not referred by an integration flow on runtime will be deleted automatically.
- If a specific queue is no longer needed, you can delete the queue manually.
- If the limit on the number of queues is reached, you can check for unused queues by clicking the **Check** option and deleting the unused queues.



Introduction to Kafka adapter

Kafka adapter provides a low-latency, fault-tolerant publish and subscribe pipeline capable of processing streams of events. The key benefits are:

1. Supports multiple producers and consumers
2. Disk-based retention
3. Scalable
4. High-performance streaming



Note: JMS adapter is a Cloud Integration internal connector whereas the Kafka adapter connects to an external broker.

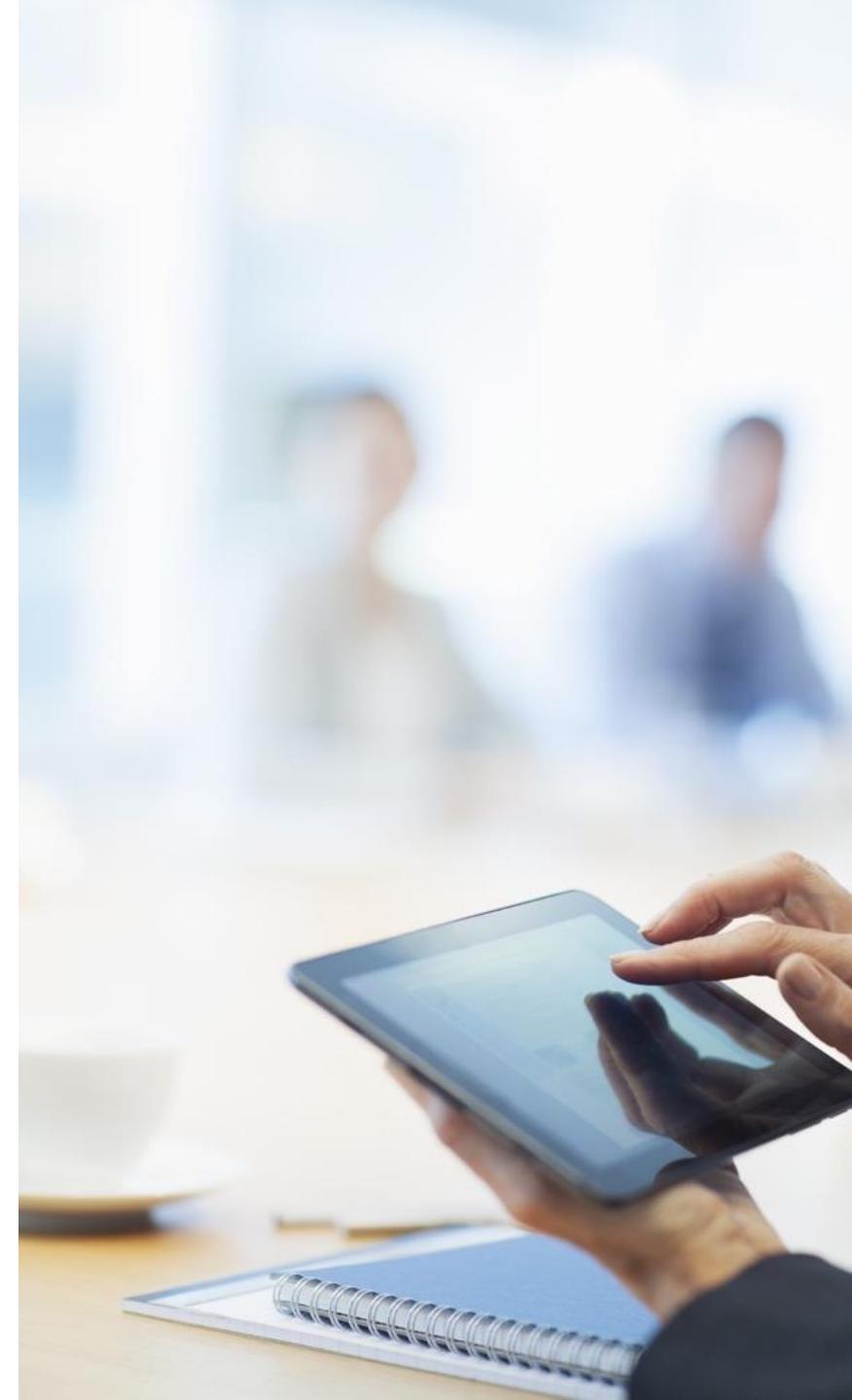
A photograph showing a close-up of a person's hands typing on a laptop keyboard. The scene is bathed in warm, golden sunlight streaming through a window, creating a strong lens flare effect. The laptop screen is visible in the background, and the overall atmosphere is bright and focused.

Demo

Configuring asynchronous messaging

Summary

- **JMS** and **Kafka** adapters can be configured to enable asynchronous messaging
- Queues need to be provisioned for the JMS adapter while using SAP Integration Suite
- Queues and messages can be monitored in the Cloud Integration tenant



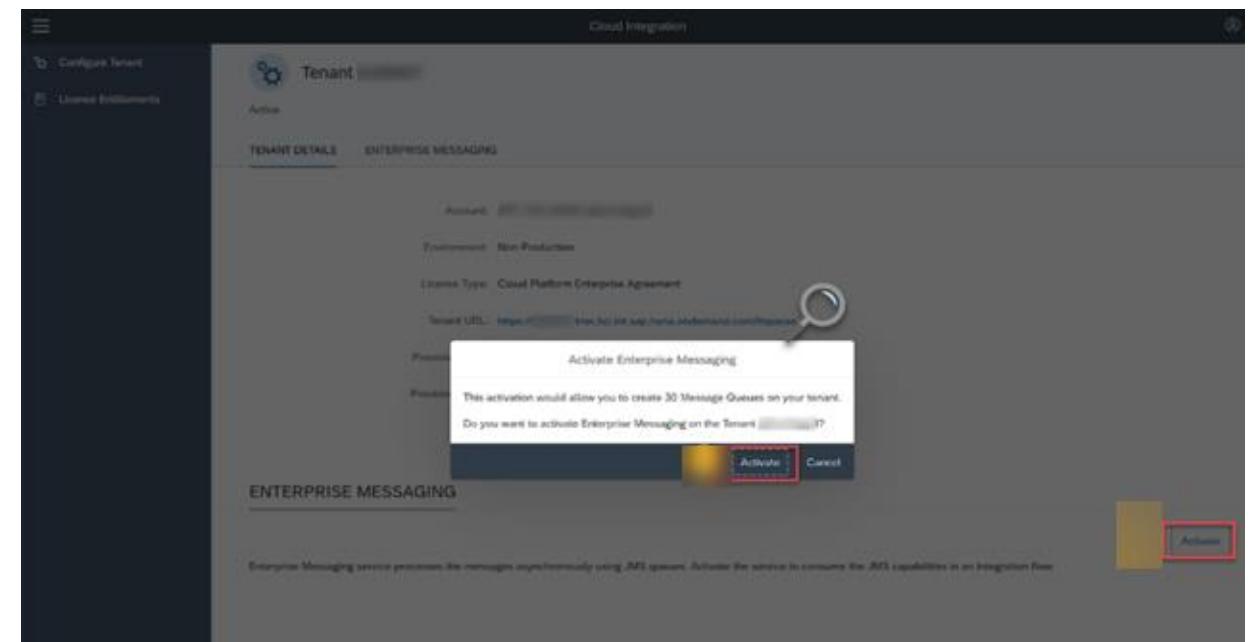
Configuring asynchronous messaging

Activating a broker to use JMS queues for Enterprise Edition

To be able to use JMS queues to store messages, you first need to activate the message broker for your Cloud Integration tenant. There are two possible scenarios, depending on the Cloud Integration license being used.

Scenario 1: Tenants with Cloud Integration Enterprise Edition

1. Provision the tenant via *Provisioning* application
2. Activate *Enterprise Messaging*



1. Tenants with Cloud Integration Enterprise Edition and Cloud Platform Enterprise Agreement (CPEA) get activated with default quota of 30 message queues.
2. CPEA licensed customer will be charged based on their JMS throughput (incoming and outgoing).

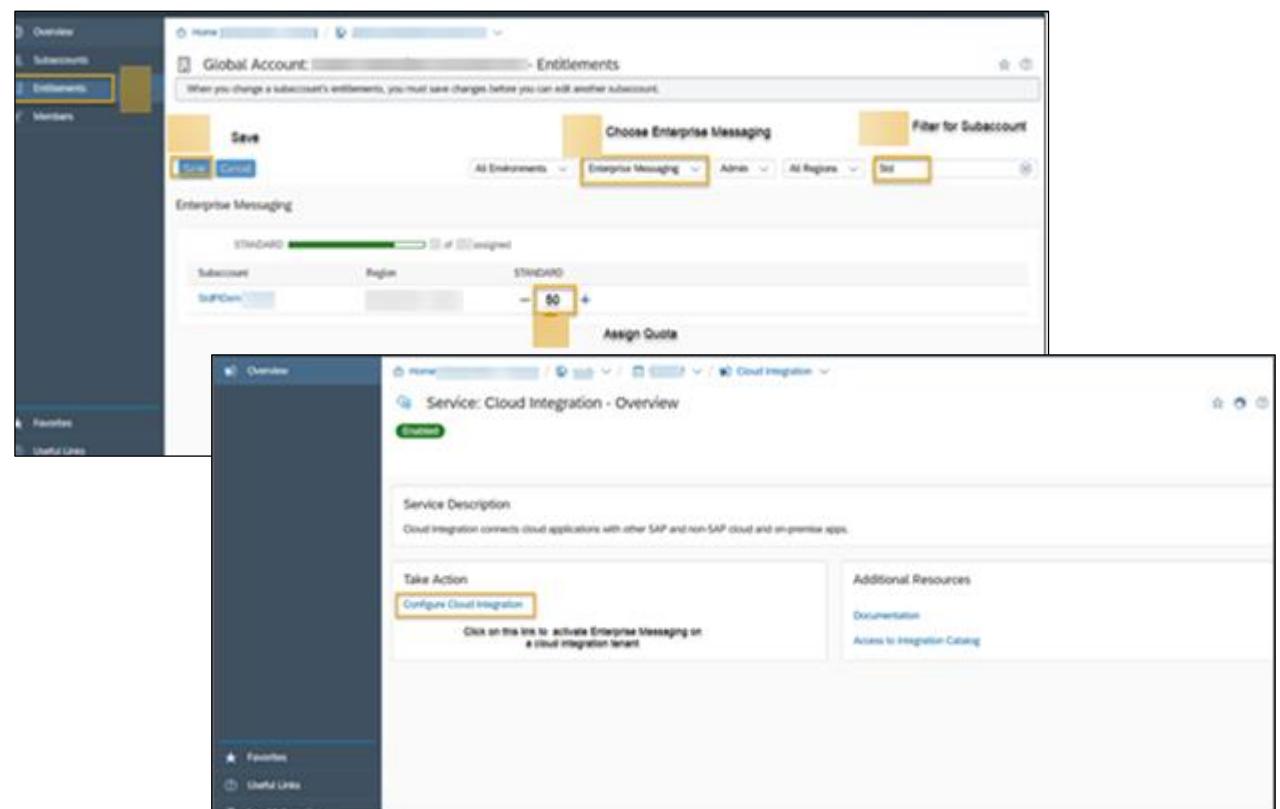
Configuring asynchronous messaging

Activating a broker to use JMS queues for non-Enterprise Edition tenants

You can use JMS queues to store messages on non-Enterprise Edition tenants. The steps to activate the message broker are as follows:

Scenario 2: Tenants without Cloud Integration Enterprise Edition

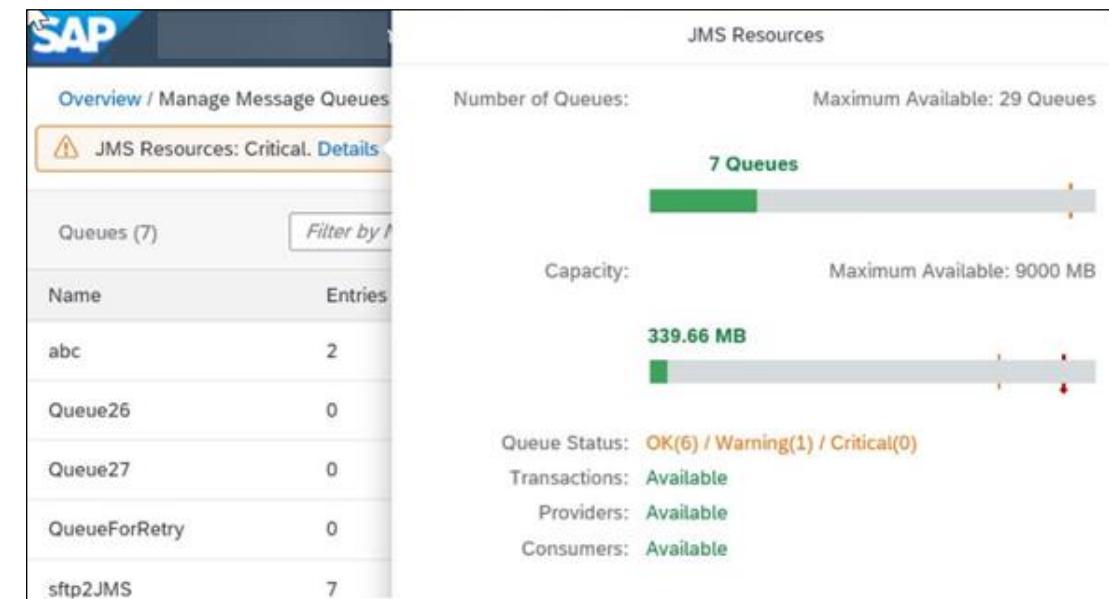
1. Order for SAP Enterprise Messaging (material ID: 8005999).
2. Access the *Provisioning* application via the *Configure Cloud Integration* option.
3. Activate *Enterprise Messaging*.



Resources limit for Cloud Integration Enterprise Edition

Cloud Integration Enterprise Edition sets a limit on the queues, storage, and connections that you can use in the messaging instance:

- Maximum number of queues: 30
- Total queue capacity: 9.3 GB
- Maximum capacity for one queue: 95% of the total
- 150 transactions
- 150 consumers
- 150 providers
- 150 GB of data per month can be processed by JMS messaging
- 256 messages can be processed in one transaction



Read more on size limits for JMS resources [here](#)

Thank you.

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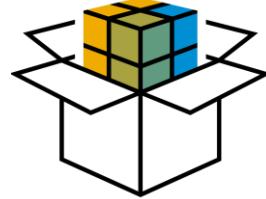
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Week 2: Expand Your Skills

Unit 7: Implementing Event-Driven Integration

Introduction to Advanced Message Queuing Protocol (AMQP)



Open source published
standard for
asynchronous messaging



Enables encryption and
interoperable messaging



Features guaranteed delivery
with acknowledgement of
received messages



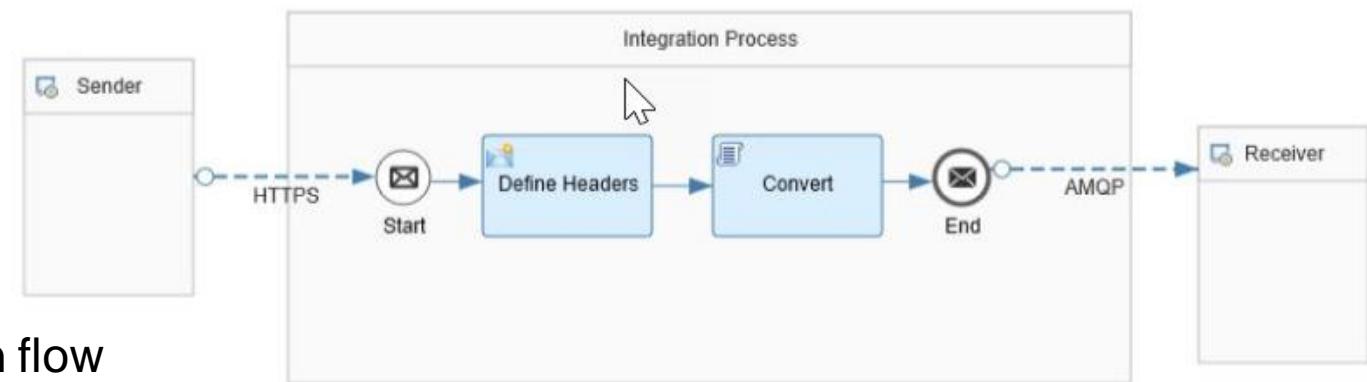
Supports multi-client
environments and handles
requests faster

Accelerate connectivity to messaging systems using the AMQP adapter

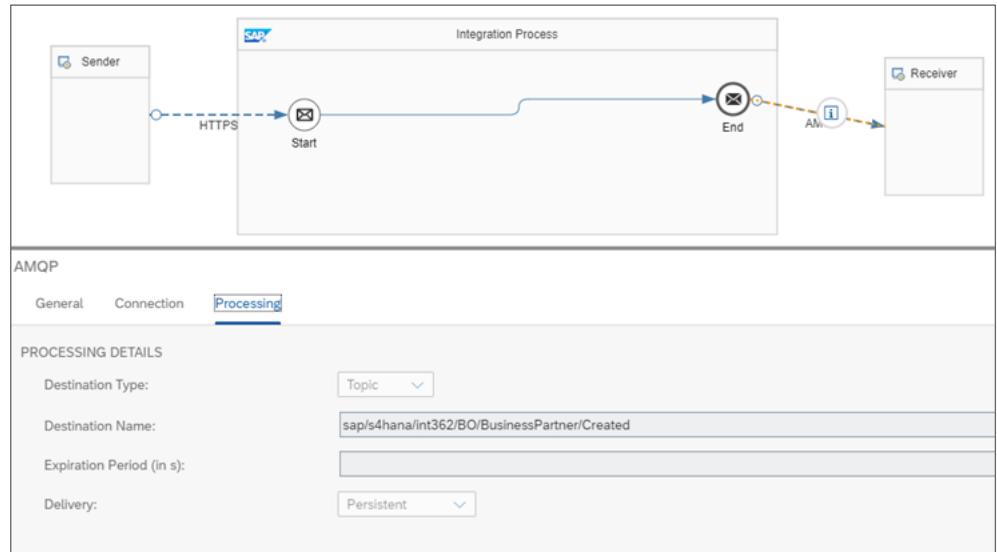
In many integration scenarios, messages or events have to be exchanged between applications or systems via messaging systems. With the Advanced Message Queuing Protocol (AMQP) adapter, Cloud Integration can be used as a provider or a consumer of such messages or events.

Benefits

- Connect to external messaging systems using AMQP protocol
- Consume messages or events using the AMQP sender adapter
- Endpoints are accessible for both integration flow and OData service
- Store messages or events in the message broker using the AMQP receiver adapter
- Supports connectivity to on-premise messaging systems using SAP Connectivity service
- Exclusive (in-order) processing using AMQP broker



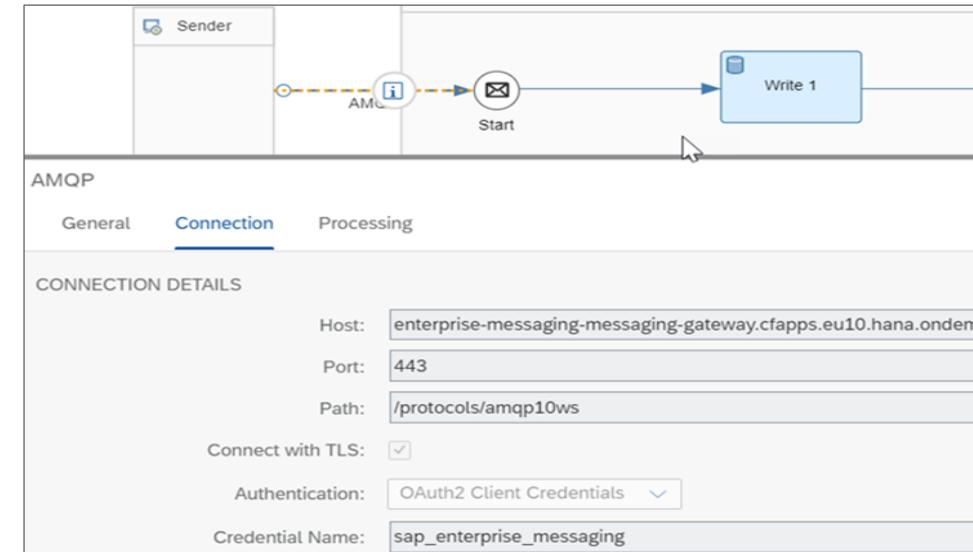
Implementing event-driven integration AMQP receiver and sender channel



Only payload gets exchanged
Transaction handling not supported

The **AMQP receiver adapter** can be used to send messages from Cloud Integration to queues or topics

Flow to external communication
Resources based on the external broker



Retry can be configured

The **AMQP sender adapter** can be used to consume messages in Cloud Integration from queues

Support for external messaging systems

The AMQP adapter supports connecting to all messaging systems that support AMQP 1.0. These are the most-used messaging systems which were tested by Cloud Integration:

SAP Event Mesh

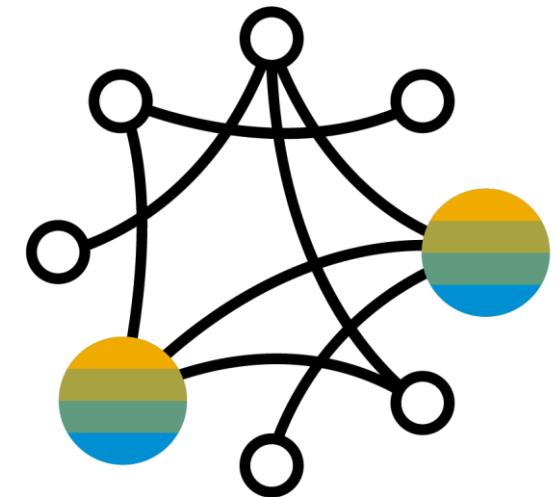
Solace PubSub+

Microsoft Azure
Service Bus

Apache Qpid
Broker-J

Apache ActiveMQ
Artemis

Apache ActiveMQ 5



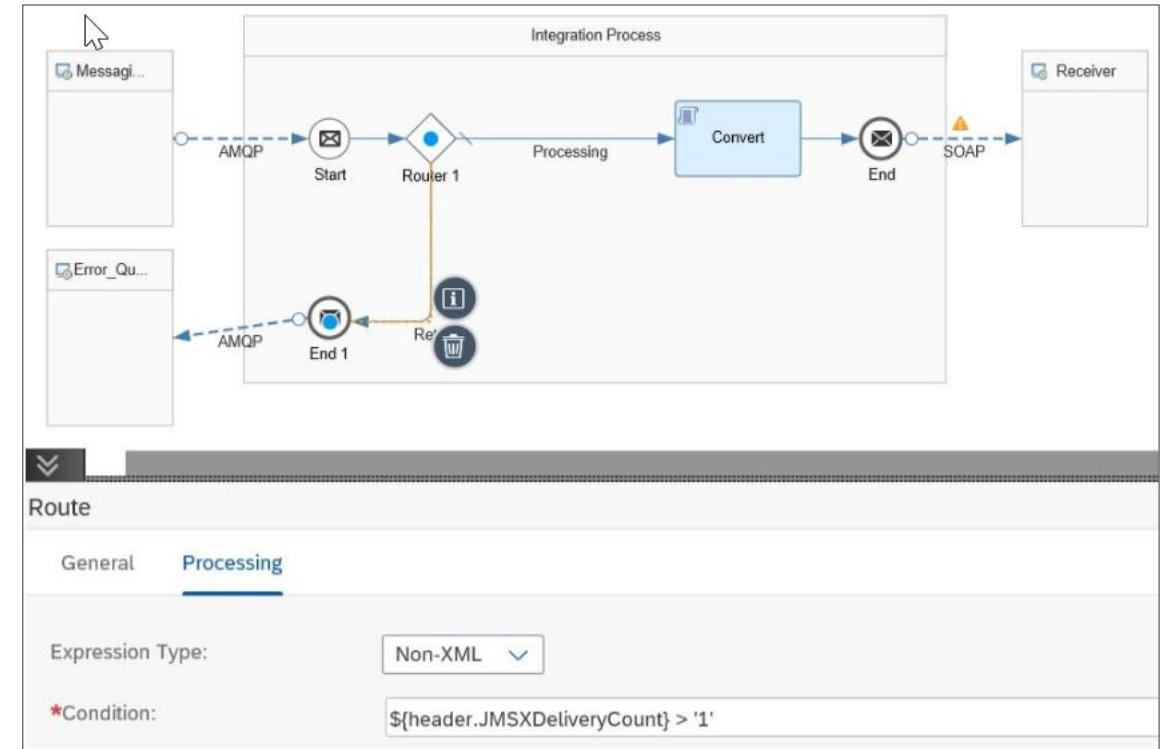
Implementing event-driven integration

Retry configuration in Cloud Integration

Errors during processing of the consumed message can be handled by retry configurations at integration flow level.

Some important points for error messages and retry configuration:

1. The error message is not removed from the messaging system, but is retried again immediately.
2. Configuring a delay in retry processing is not supported by the AMQP adapter.
3. Retry handling can be configured in the integration flow using dead letter queues.
4. Retry can be stopped by introducing a logic using Groovy script in the process that writes the message back to the processing queue.



Securely connect to on-premise messaging systems

Currently, Cloud Integration supports on-premise connectivity configuration via the “On-Premise” connection proxy type in several adapters, including the AMQP adapter.

Steps to configure on-premise messaging system with AMQP adapter:

1. Configure a cloud-to-on-premise system mapping in SAP Connectivity service.
2. Consume your newly established TCP connection in the AMQP sender or receiver adapter.
 - I. Maintain the virtual AMQP server name and port in Host and Port
 - II. For Proxy Type, select On-Premise.
 - III. Enter location ID of the cloud connector.
 - IV. Define the authentication configuration as required by your on-premise AMQP server.
3. Save and deploy the integration flow.

The screenshot shows the SAP Cloud Integration interface for configuring an AMQP connection. The 'Connection' tab is active. The 'Connection Details' section contains the following fields:

- I. Host: messaging.host.com
- *Port: 5671
- II. Proxy Type: On-Premise
- III. Location ID: cc2
- Connect with TLS
- IV. Authentication: SASL
- *Credential Name: Usercredentials



Read more about how to securely connect to on-premise messaging systems [here](#).

Implementing event-driven integration Monitoring

There are various options to monitor the integration flows and the messages processed.

The screenshot shows the SAP Integration Content Monitor interface. On the left, a sidebar lists 'Integration Content (11)' with a search bar and filter. The main area displays the details for an integration flow named 'openSAP_AMQP'. It shows deployment information: 'Deployed On: Mar 06, 2020, 12:51:05' and 'ID: openSAP_AMQP'. Below this, there are tabs for 'Endpoints', 'Status Details', 'Artifact Details', and 'Log Configuration'. Under 'Endpoints', a URL is listed: 'https://...-iflmap.hcisbt.eu2.hana.ondemand.com/http/openSAP/https/AMQP'. A status message at the bottom says 'The Integration Flow is deployed successfully.'

Integration Content Monitor

The screenshot shows the SAP Message Processing Monitor interface. It displays a table of messages with one entry for 'openSAP_AMQP'. The message details show it was deployed on 'Mar 06, 2020, 12:58:33' and has a 'Failed' status with a processing time of '910 ms'. An error message is displayed below: 'Message processing failed. com.sap.it.rt.adapter.http.api.exception.HttpResponseException: An internal error occurred while processing the message. Found null value for required parameter. The MPL ID for the failed message is : AF5h-60ry12kWZvCw3Rz32HT0tVP. For more details please check tail log.'

Message Processing Monitor

Overview	Rules	Queues	Webhooks	Events	Service Descriptor	Test
sap/cpi/int362/BP362BLR32_HubSpot	0	0	0	0	0	
sap/cpi/int362/BP362BLR32_Slack	0	0	0	0	0	
sap/cpi/int362/BP362BLR34_HubSpot	1	0	0	449	0	
sap/cpi/int362/BP362BLR34_Slack	0	0	0	0	0	
sap/cpi/int362/BP362BLR35_HubSpot	0	0	0	0	0	
sap/cpi/int362/BP362BLR35_Slack	0	0	0	0	0	
sap/cpi/int362/EMS_AMQP	1	0	0	1600	0	

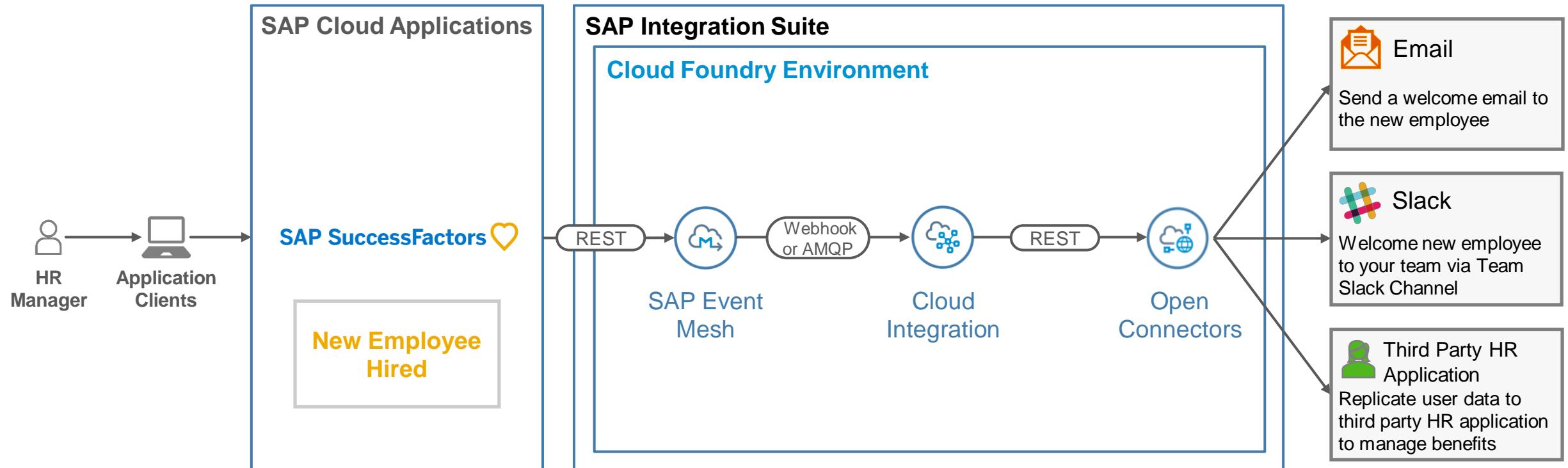
Messaging System Monitor

A photograph showing a close-up of a person's hands typing on a laptop keyboard. The scene is bathed in warm, golden sunlight streaming through a window, creating a strong lens flare effect. The laptop screen is visible in the background, and the overall atmosphere is bright and focused.

Demo

Implementing event-driven integration

Demo scenario



Summary

- You can configure asynchronous message processing using the AMQP adapter, which can connect to different messaging systems using the Advanced Message Queuing Protocol (AMQP)
- Supports multiple providers of external messaging systems
- Support for on-premise connectivity



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