

Customer Success Day
SAP Business Technology Platform



Cloud Integration Best Practices – How to Design Enterprise-Grade Integration Flows

- Daniil Bolobonov – BTP Solution Advisor

Comprehensive set of guidelines for Cloud Integration

- **Guidelines to design enterprise-grade integration flows**
 - Covering different areas such as applying highest security standards, handling errors, scripting, etc.
 - Application specific guidelines (SuccessFactors, API Management)
 - Reference integration flows [@ Business Accelerator Hub](#) or directly in Cloud Integration to be deployed with minimum effort
 - See [guidelines in documentation](#)
- **Guidelines to implement specific integration patterns**
 - Most common enterprise integration patterns such as content-based routing, aggregator, splitter, etc.
 - Exactly-once scenarios
 - See [blog series](#)
- **Enterprise integration pattern community**
 - 60+ enterprise integration patterns implemented with Cloud Integration
 - [Overview blog](#)



[Huge and active community](#)

The screenshot displays the SAP Help Portal interface for 'Integration Flow Design Guidelines'. The top navigation bar includes 'SAP Help Portal' and 'SAP Cloud Integration'. The main content area features a search bar with the text 'Discover (364)' and a list of 11 packages found. The packages are categorized by integration flow design guidelines, such as 'Learn the Basics', 'Enterprise Integration Patterns', 'Scripting Guidelines', 'Cloud Integration - Exemplars', 'SAP S/4HANA Integration with External Tax Calculation Engines', 'Apply Highest Security Standards', 'Handle Errors Gracefully', 'Relax Dependencies to External Components', 'Run an Integration Flow Under Well-Defined Boundary Conditions', and 'Use the Partner Directory Appropriately'.

How to find Design Guidelines?

SAP Integration Suite Cloud Integration

Design / Design

Packages (44) Filter

Name	Mode	Version	Created By	Created Date	Description

- About
- Online Guide
- Troubleshooting Guide
- Design Guidelines**
- Logout

Help Portal → SAP Cloud Integration → Development → Integration Flow Design Guidelines

<https://help.sap.com/docs/cloud-integration/sap-cloud-integration/integration-flow-design-guidelines>

Guidelines for Using Prepackaged Integration Content



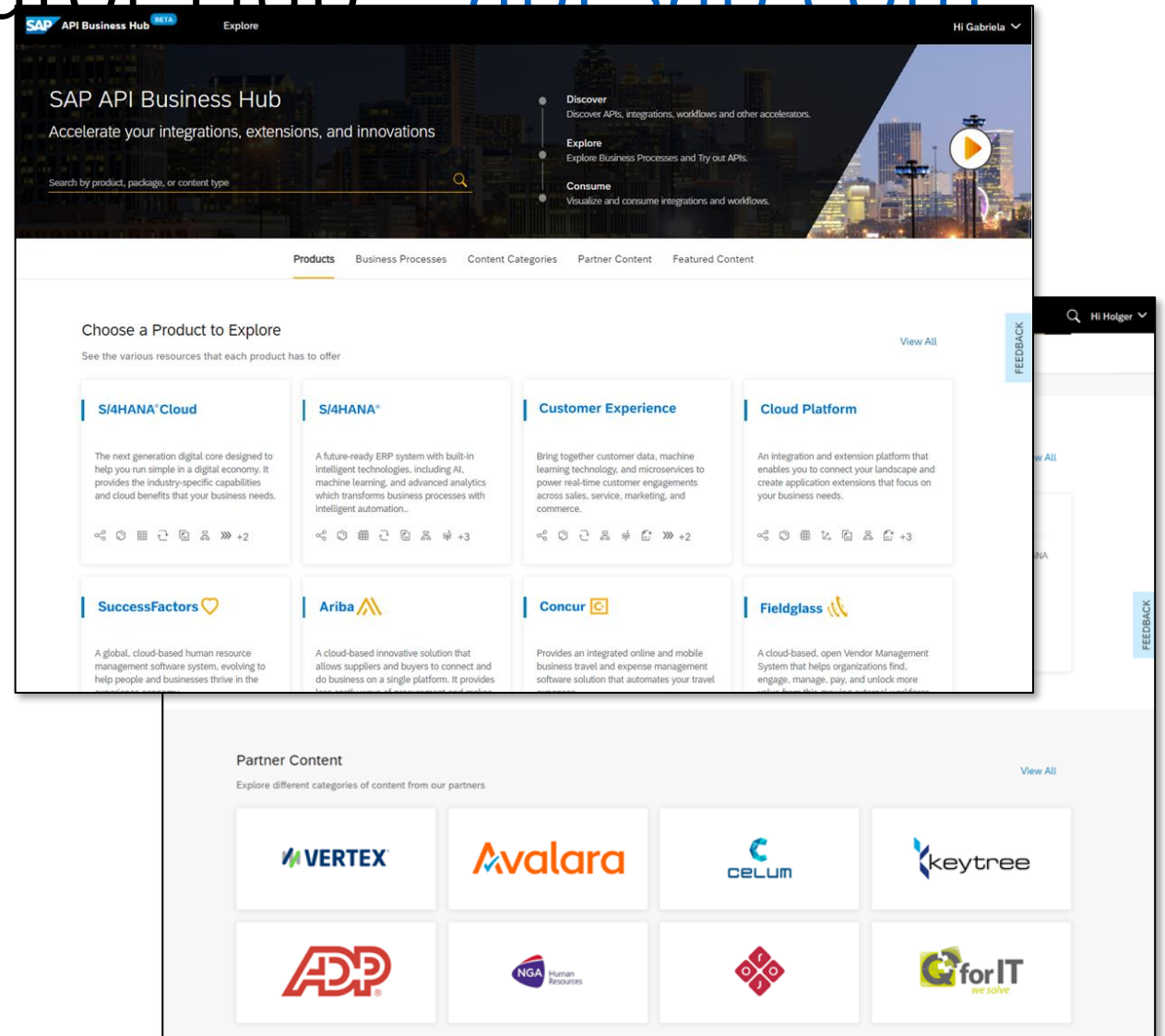
SAP Business Accelerator Hub – api.sap.com

The public catalog of **SAP's integration reference content of SAP** 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

[What is SAP Business Accelerator Hub? | SAP Help Portal](https://api.sap.com)



Popular integrations for Intelligent Enterprise business scenarios

SAP S/4HANA integrations with SAP and third-party applications

Fully maintained and updated by SAP

3,200+

Prebuilt integrations

350+

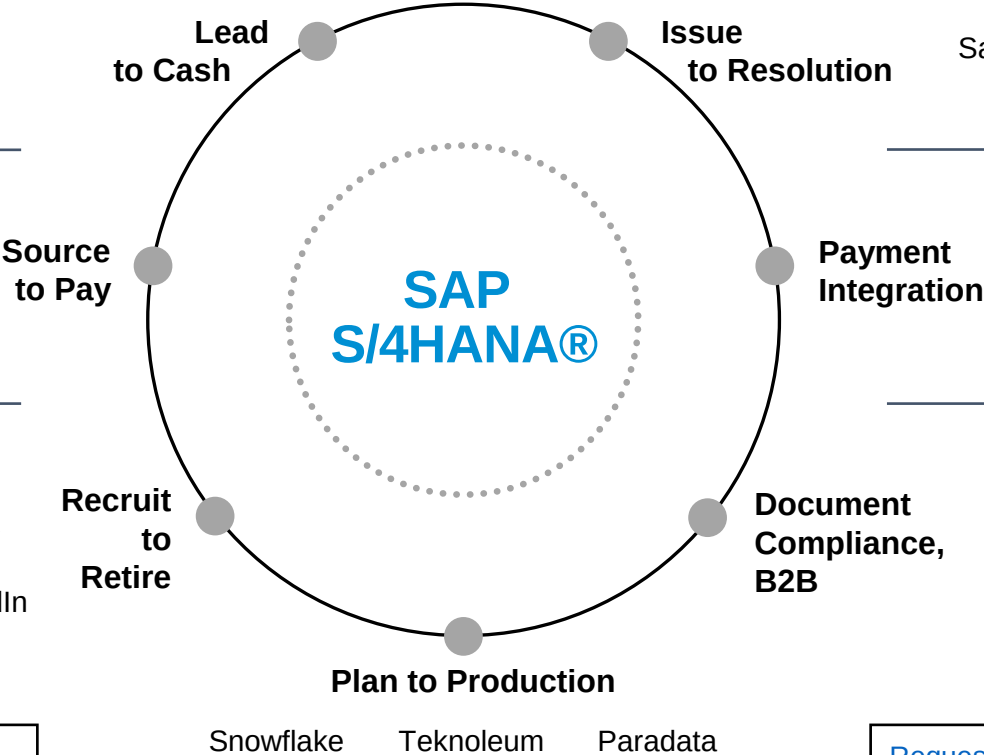
Business event

SAP Customer Experience Magento Shopify
Amazon Services HubSpot Zoho Marketo
Salesforce Sales Cloud Zendesk NetSuite

SAP Ariba GEP Coupa
Mercateo

SAP SuccessFactors SAP Concur SAP Fieldglass
Kronos Automatic Data Processing (ADP) Workday
Alight Oracle Human Capital Management LinkedIn

[Pre-built integrations on SAP Business Accelerator Hub](#)



SAP Customer Experience Jira ServiceNow
Salesforce Service Cloud Freshdesk ServiceMax

QuickBooks FreshBooks Vertex
Tipalti Microsoft Dynamics Sage

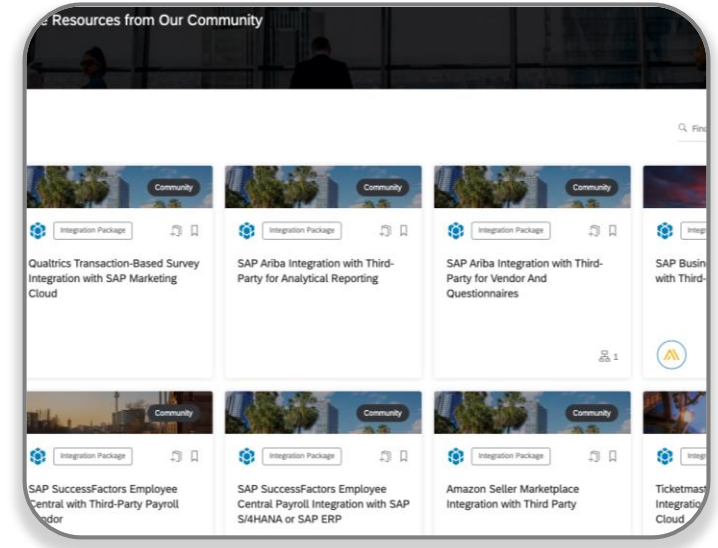
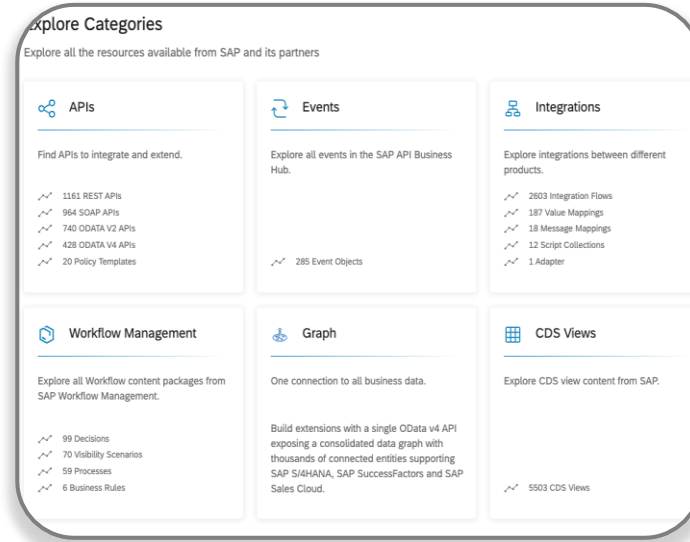
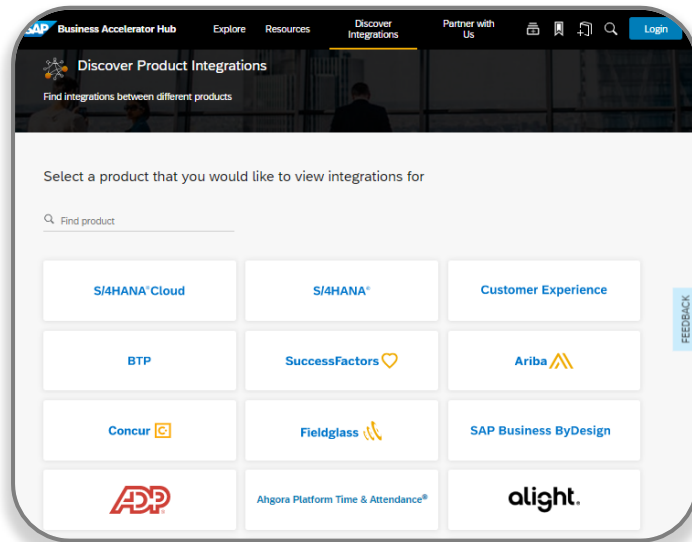
DocuSign Adobe Sign
UN/EDIFACT
UNECE ASCX12

Snowflake Teknoleum Paradata

[Request further integrations via SAP Customer Influence](#)

Profit from quick time-to-value through proven prebuilt integrations

Central catalog: SAP Business Accelerator Hub @ api.sap.com



Value = 5x acceleration, 10x savings

Public catalog

to discover, try out, and consume prebuilt integrations and connectors easily to increase speed of implementation of integration and extensions

Content categories

3.200+ Prebuilt integrations
3.700+ APIs
350+ Business event
250+ Connectors to SAP & non-SAP

Content providers

- SAP LoB solutions, industries
- Partners: 460+ integration flows
- Community: 60+ integration flows

* For partners participating in the "partner engagement for digital content" program, read also the [blog](#)

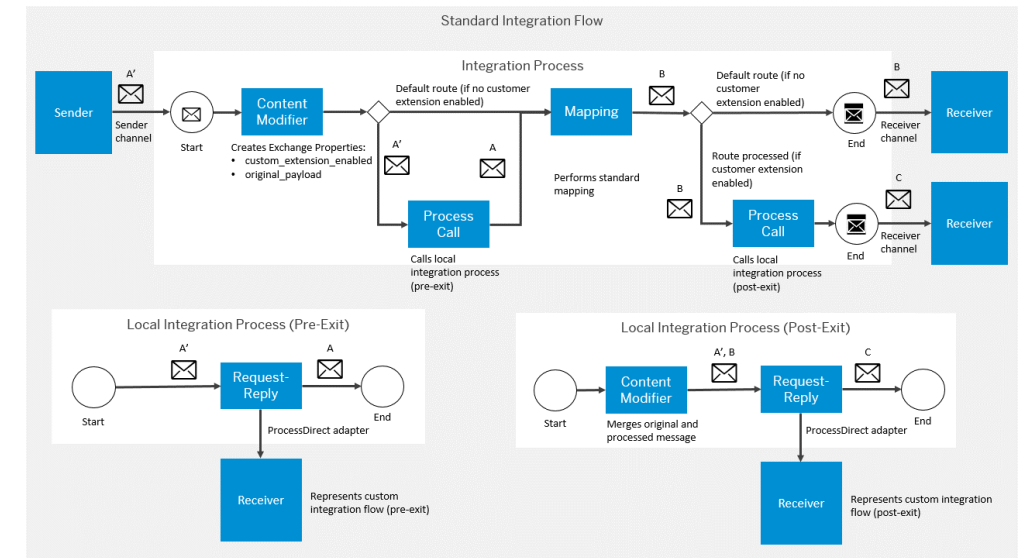
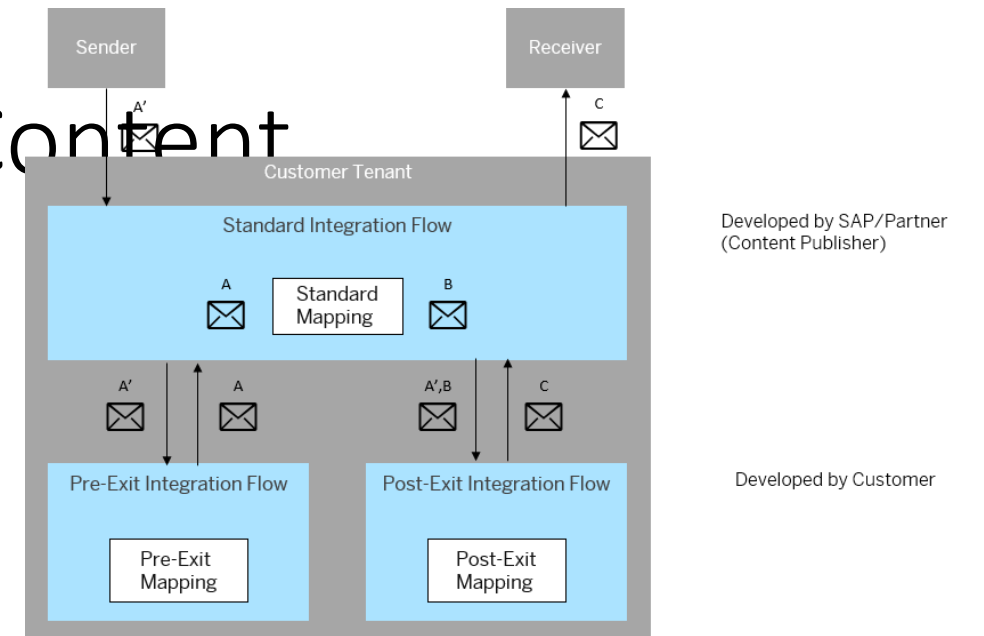
Keep Modifications Separate from Prepackaged Integration Content

To adapt the content to custom business requirements, you can edit and modify the related integration flows contained in the standard integration package.

However, further updates to the standard integration content in the SAP Business Accelerator Hub can't be applied to the modified content in your design workspace.

To avoid overwriting changes, keep the modifications required for the business process separate from the prepackaged integration content by using **Customer Exits** and

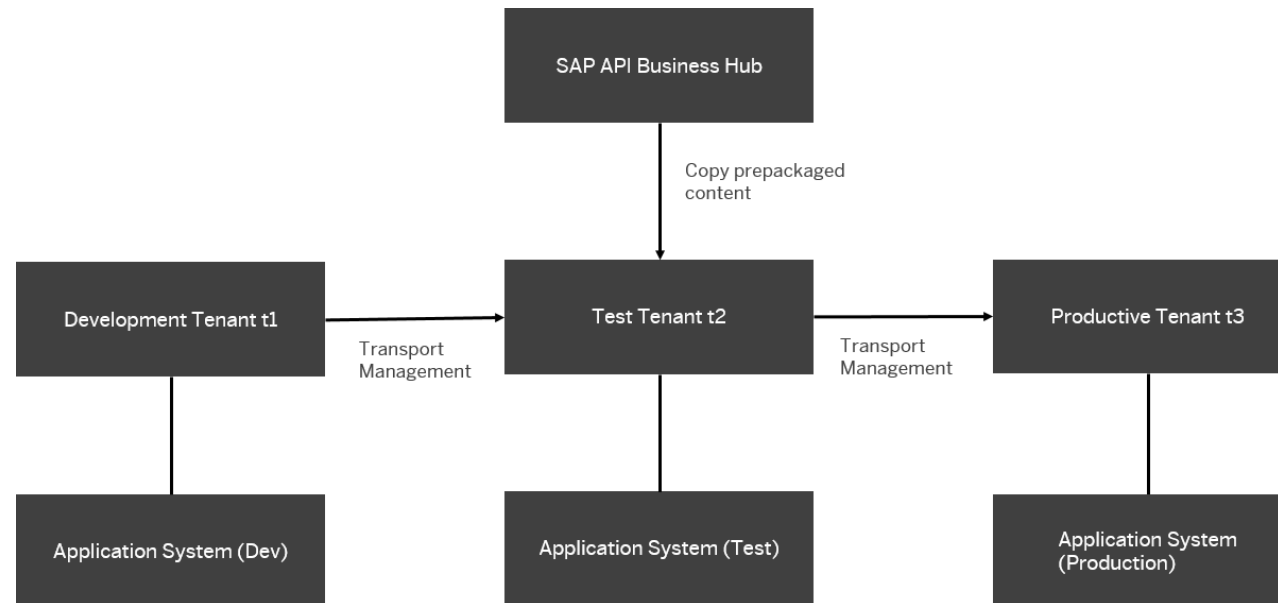
ProcessDirect adapter: [Keep Modifications Separate from Prepackaged Integration Content | SAP Help Portal](#)



Subscribe Only a Single Tenant to SAP Business Accelerator Hub

To control the impact of integration content updates, subscribe only a single tenant (typically the one used for testing) to SAP Business Accelerator Hub. That way, the other tenants in the system landscape are updated with the latest version of the content only after it has been tested in the tenant that is connected to SAP Business Accelerator Hub.

[Subscribe Only a Single Tenant to SAP Business Accelerator Hub | SAP Help Portal](#)



Managing Available Resources and Design Guidelines



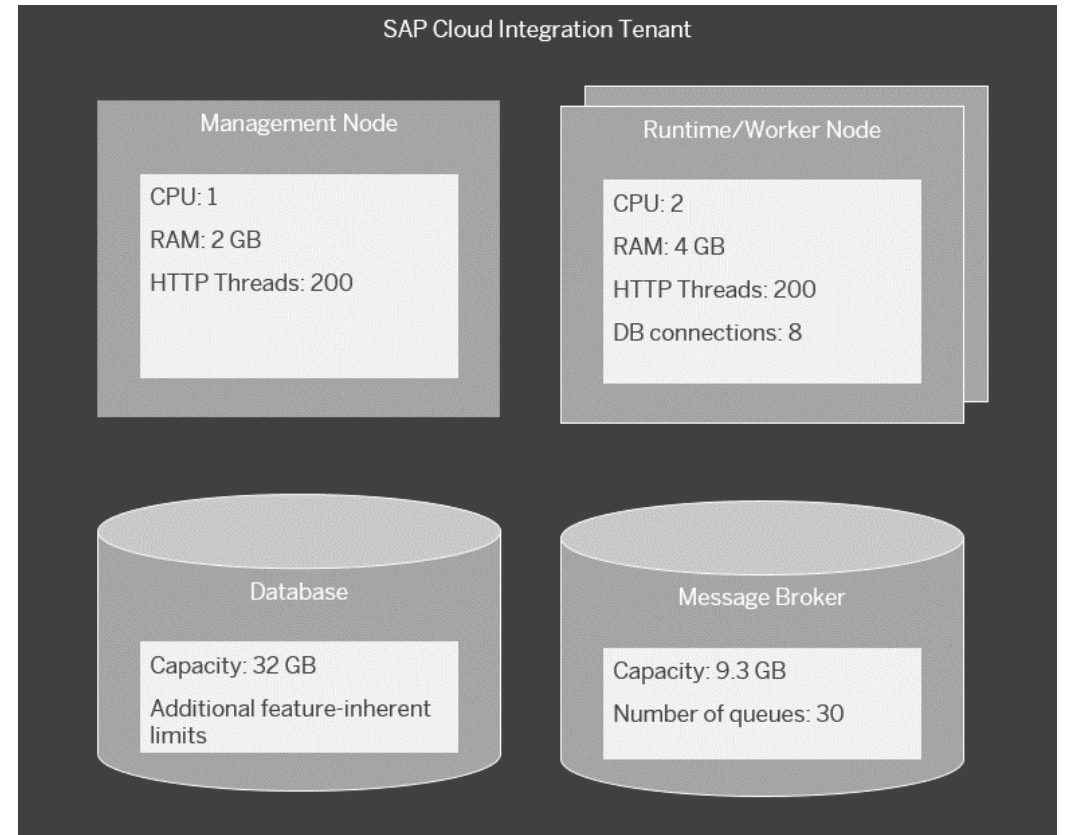
Available Resources of Cloud Integration Tenant

Developing enterprise grade integration flows mandates the diligent management of the resources available on the customer tenant.

Resources of the tenant available by default:

Management Node	• CPU: 1 • RAM: 2 GB • HTTP threads: 200
Runtime/Worker Node	• CPU: 2 • RAM: 4 GB • HTTP threads: 200 • Database connections: 8
Database	• Capacity: 32 GB • Additional feature-inherent limits
Message Broker	• Capacity: 9.3 GB • Number of queues: 30

[Run an Integration Flow Under Well-Defined Boundary Conditions | SAP Help Portal](#)



Available Resources of Cloud Integration Tenant

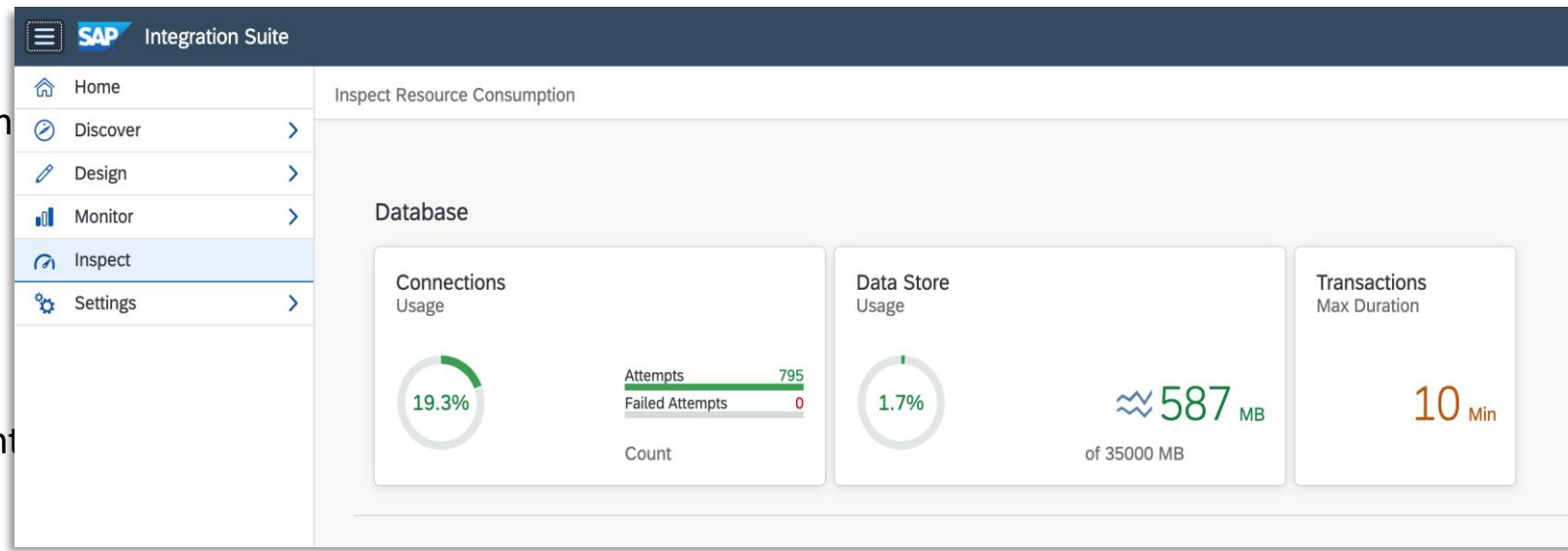
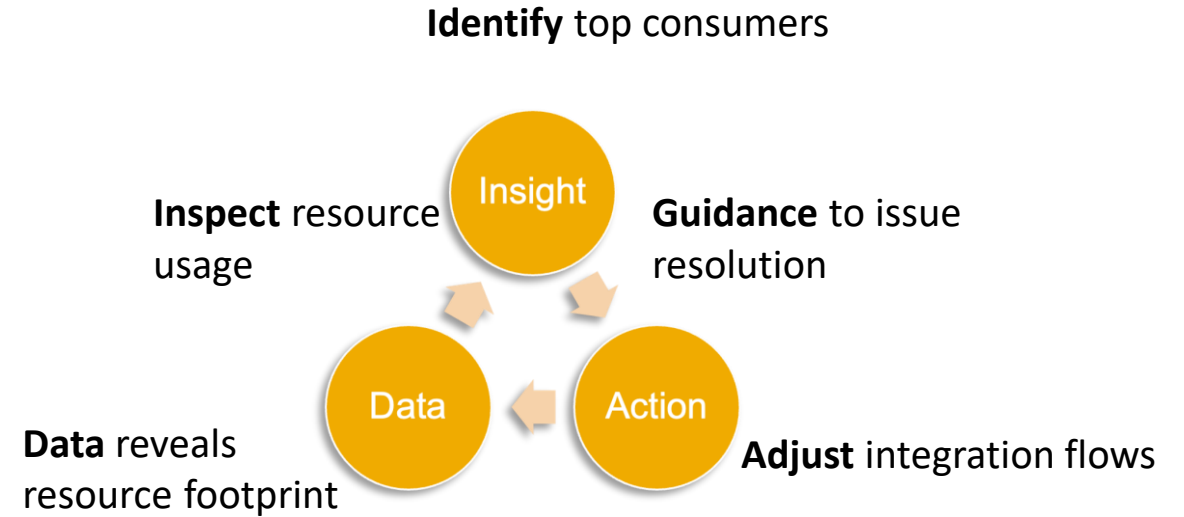
System scope for Cloud Integration tenants that are deployed in the Cloud Foundry environment:

Resource	Scope
Integration content	<u>500 MB</u> Refer to the blog on Content Size Limits learn how to reduce your integration content size.
JMS queues	<u>9 GB, 150 transactions</u> (default configuration with 30 queues) Can be scaled up to <u>30 GB, 500 transactions</u> (with 100 queues) See the blog on Cloud Integration – JMS Resource and Size Limits for further guidance on how to set the queue size to restrict the limit and on how to delete unused queues.
Message processing log persistence	<u>35 GB</u> See: Cloud Integration – Setting the Log Level for Message Processing
Data store message persistence	<u>35 GB</u> See: Optimize Performance
Disk space	<u>4 GB</u> Refer to SAP Note 2648415 to learn how to optimize the integration flow development to prevent the integration flow from running into the “No More Space left on Disk” error.

[System Scope in the Cloud Foundry Environment | SAP Help Portal](#)

Inspect Resource Usage

- **Empower customers** to control resource utilization by their integration flows
- **Common use cases**
 - Resource overview at a glance,
 - Troubleshooting bottlenecks
 - Identify trends in integration flows
- **Current scope**
 - Database (database connection storage, transactions)
 - More to follow
- **Available in**
 - SAP Integration Suite
 - SAP Cloud Integration in the Cloud Foundry environment



External Logging and Archiving of Message Processing Logs

External Logging and Archiving is available in the Cloud Foundry Environment as a **feature**, meaning no custom development is required, only configuration / activation.

The **External Logging** feature provides the ability to push message processing logs of Cloud Integration to external customer-owned persistence solutions such as **Splunk**:

- [External Logging Cloud Foundry Environment | SAP Help Portal](#)
- [SAP Integration Suite – External logging to Splunk | SAP Blogs](#)

The **Archiving** feature enables storing of the message processing logs in a CMIS-compliant archiving system such as [BTP Document Management service](#) beyond default period of 30 days:

- [Archiving Data, Cloud Foundry Environment | SAP Help Portal](#)
- [SAP Cloud Integration data archiving to BTP SDM | SAP Blogs](#)

Endpoints Status Details Artifact Details **Log Configuration**

Log Configuration

Log Level: Info

Archive Data Save Cancel

Sender Channel Messages x	Receiver Channel Messages x	Persisted Messages x	Log Attachments x
☒ Sender Channel Messages	Message received from Sender and responses returned to Sender		
☒ Receiver Channel Messages	Messages sent to Receiver and responses returned by Receiver		
☒ Persisted Messages	Messages as stored via Persist flow step		
☒ Log Attachments	Attachments of Message Processing Logs		

[Monitor Message Processing](#)
[View deployed Artifact](#)
[Navigate to Artifact Editor](#)

Log Configuration

Log Level: Info External Log Level: Info

Guidelines for Achieving Optimal Performance of Integration Flows

- [Optimize Performance](#)
- [Manage Large Batch Sizes](#)
- [Limit Size of Incoming Messages](#)
- [Anticipate Message Throughput When Choosing a Storage Option](#)
- [Control the Number of Simultaneously Opened Database Connections](#)
- [Specify Proper Session Handling](#)
- [Define Proper Transaction Handling](#)
- [Optimize Memory Footprint](#)
- [Optimize Integration Flow Design for Streaming](#)
- [Reduce the Memory Consumption for Splitter Scenarios](#)

Processing Step	CPU	RAM
Mapping components including message mapping, operation mapping, and XSLT mapping	X	X
Security components, including decryptor, encryptor, signer, and verifier	X	-
Components with XPath operations like content modifier, splitter, and filter	-	X
Validating components including XML validator and adapters like SOAP adapter performing a validation of the message syntax	X	-
Transforming components like content converter, encoder, decoder, filter and message digest	X	-

Specify Proper Session Handling

Many integration scenarios use one or several HTTP based outbound calls from Cloud Integration. For some scenarios **re-using sessions across several calls** can be useful to improve performance or to connect to a server keeping a state (stateful service).

Adapters Applicable for Session Handling:

- SOAP Receiver Adapter with both protocols, SOAP1.x and SAPRM
- IDOC Receiver Adapter
- HTTP Receiver Adapter
- SuccessFactors Receiver Adapter with protocols OData V2 and SOAP
- SuccessFactors Sender Adapter with protocol SOAP
- ODC Receiver Adapter
- OData Receiver Adapter
- AS2 Receiver Adapter (with 10-December 2017 Release)
- XI Adapter

[Specify Proper Session Handling | SAP Help Portal](#)

[Cloud Integration – How to configure Session Handling in Integration Flow](#)

The screenshot shows the 'Integration Flow' configuration window with the 'Runtime Configuration' tab selected. The 'HTTP Session Reuse' dropdown menu is open, displaying three options: 'None', 'On Exchange', and 'On Integration Flow'. The 'Runtime Profile' is set to 'Cloud Integration'. The 'Namespace Mapping' and 'Allowed Header(s)' fields are empty.

- **None:** no sessions re-use.
- **On Exchange:** session is re-used for one message exchange.
- **On Integration Flow:** session is re-used across several calls of the integration flow.

Define Proper Transaction Handling

Many integration scenarios in Cloud Integration use transacted resources, like data stores or message queues, that have to be **executed in a single end-to-end transaction** to ensure data consistency.

JMS Transacted Resources

- JMS Sender and Receiver Adapter
- AS2 Sender Adapter
- XI Sender and Receiver Adapter using EO with JMS as temporary storage

JDBC Transacted Resources

- Data Store Operations (Write, Delete)
- Write Variables (Local and Global)
- XI Sender and Receiver Adapter using EO with Data Store as temporary storage
- Aggregator

The screenshot shows the 'Integration Process' configuration window with the 'Processing' tab selected. Under the 'TRANSACTION MANAGEMENT' section, the 'Transaction Handling' dropdown menu is open, displaying three options: 'Not Required' (selected), 'Required for JDBC', and 'Required for JMS'.

Integration Process	
General	Processing
TRANSACTION MANAGEMENT	
Transaction Handling:	Not Required ▼ Not Required Required for JDBC Required for JMS

Define Proper Transaction Handling - Scenarios

Scenario	Transaction required in main process	Transaction required in subprocess	Transaction type
Control database connections: subprocess with two write operations	No	Yes	Required for JDBC
Splitter with Multiple Receivers (JMS Adapter Type)	Yes	n/a	Required for JMS
JMS Send Step in Local Integration Process	Yes	Yes	Required for JMS
Master Data Update with XI Send Steps	No	Yes	Required for JDBC
Master Data Update with JMS Send Steps	No	Yes	Required for JMS

[Define Proper Transaction Handling | SAP Help Portal](#)

[Cloud Integration – How to configure Transaction Handling in Integration Flow](#)

[Transaction Handling Characteristics and Restrictions | SAP Help Portal](#)

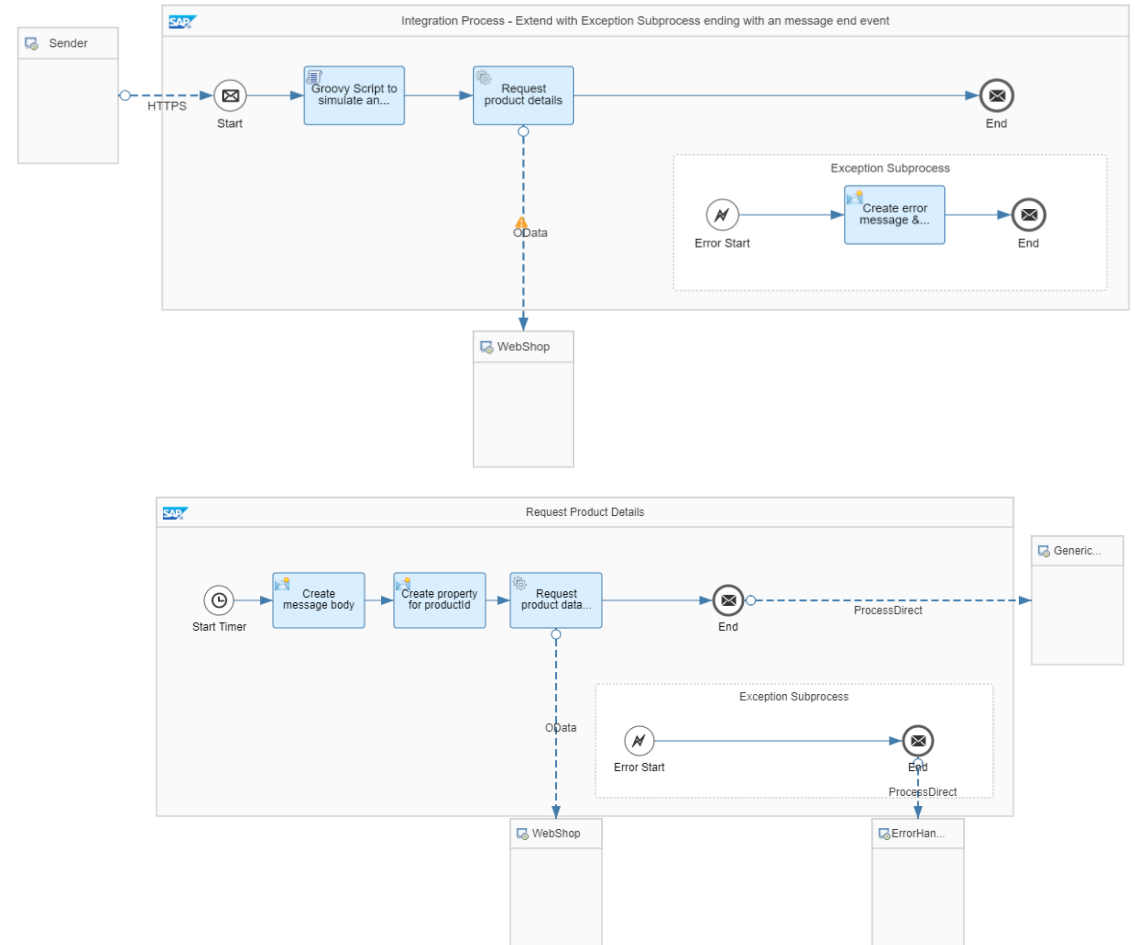
[Transaction Handling Guidelines | SAP Help Portal](#)

Error Handling Guidelines

Even well-designed integration flows sporadically break based on load, resource usage, and other factors. To prepare for such situations, extend the integration flow with the appropriate error handling.

Basic Exception Handling Rules:

- [Handle Exceptions | SAP Help Portal](#)
- [Handle Errors in Successful Responses | SAP Help Portal](#)
- [Outsource Exception Handling into a Separate Integration Flow | SAP Help Portal](#)



Best Practices for Keeping Readability and Maintainability in Mind

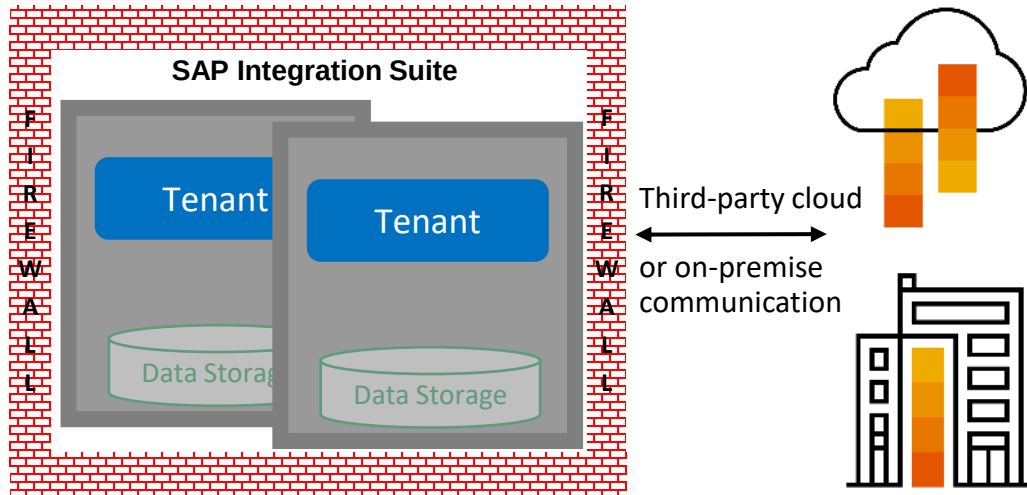
- Troubleshooting an integration flow requires that you understand its integration logic. Make use of [Local Integration Processes](#) and [ProcessDirect adapter](#) to encapsulate related integration logic in separate integration flows or processes and improve readability.
- Define and enforce the usage of [Naming Conventions](#).
- Consider basic layout principles when modelling an integration flow. The flow direction must be from left to right and top to bottom. Message flow must be in straight horizontal or vertical lines. Make use of [Auto layout to beautify Integration Flow in the Cloud Integration capability of SAP Integration Suite](#).
- Use the **Externalize** feature to declare a parameter as a variable and reuse it across multiple components in the same integration flow. More info: [Externalize Parameters of an Integration Flow | SAP Help Portal](#).

Security



Security

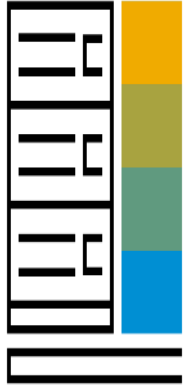
Cloud Integration capability of SAP Integration Suite



Secure Certified **Data Centers**

- Compliance standards: **ISO 22301, ISO 27001, SOC 1, SOC 2, C5, CSA STAR, TISAX**
- Hundreds of surveillance cameras with digital recording
- Fully monitored doors
- Tens of thousands of environmental sensors
- Security and facility support team onsite 24x7
- Biometric access to secured areas
- Multiple redundant internet connections from multiple carriers
- Redundant data storage in two data center locations

→ [How Secure is the SAP Data Center?](#)



Secure **Provisioning and Infrastructure**

- Multi-tenancy
- Data isolation
- Audit logs
- Tracing
- Roles based access
- Data privacy and protection
- Data storage and backup
- Malware scanning of uploaded resources



Secure **Communication**

- Transport level: HTTPS, SFTP, FTPS, TLS, SMTP, POP3, IMAP
- Payload level: Encryption, decryption, signing, signature verification:
 - PGP, WS security, XML digital signature, PKCS#7
- Authentication:
 - OAuth 2.0, X.509 certificates, PGP keys, SAML, JWT, known host file, basic authentication
- Secure storage of key stores in data base
- Encrypted data persistency



Strong focus on security

Cloud Integration ensures cloud security at multiple levels

- Tenant isolation to separate data
- Data flow security on transport level
 - HTTP over TLS
 - HTTP authentication using an X.509 client certificate
 - SSH File Transfer Protocol (SFTP)
 - SMTP, POP3, and IMAP
 - Authentications such as JWT, SAML, X509, Basic
- Data flow security on message level against unauthorized access
 - Digital encryption and signatures



- Data storage security
- Audit logging and tracing (stored for a defined retention time)
- Physical data storage
- User management and authorization
 - Role based authorization concept
- Access management
 - Client certificate authentication
 - Single sign-on
- Malware scanning of uploaded resources

Guidelines for Security and Access Management Aspects

- Integration developer has to make sure that the integration flows are designed in a way that ensures that the highest security standards are applied. Refer to [Concepts of Secure Communication](#) and [Apply the Highest Security Standards](#) guidelines.
- Define roles and permissions for each Persona and for each environment. You can make use of the [predefined authorization groups](#) or tailor the permissions to your own requirements by applying roles that are defined for individual tasks: [Tasks and Permissions](#).
- It is not **not** recommend to use basic authentication for inbound or outbound communication over HTTPS in productive scenarios. Instead, make use of client certificate or OAuth authentication. More info: [HTTPS-Based Communication](#).
- Make use of [Auditing and Logging Information](#) if you suspect a security violation.
- Use API Management to apply additional security policies (URL masking, IP access control, validation/threat protection policies, etc.) and expose Cloud Integration endpoints to API Business Hub Enterprise where they can be securely consumed by internal/external developers. More info: [Streamline Exposing and Managing Connections to Your Cloud Integration Flows with API Management](#).
- Define Access Policies when you need to restrict the access to integration artifacts and their associated data to specific user group. More info: [Cloud Integration – Access Policies: Defining Roles on Artifact Level](#).

Persisting and securing messages

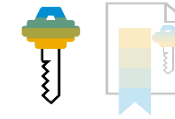
Message level security: [encryption](#)

Encryption

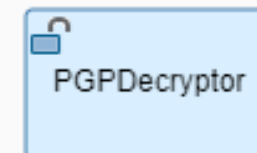
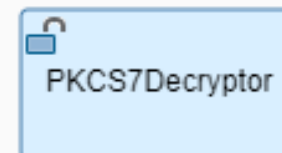
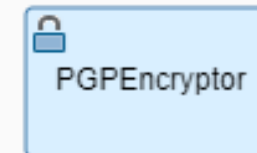
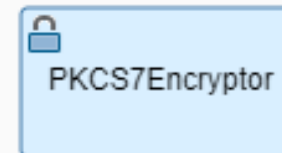


- Cloud Integration encrypts messages with the public key/certificate of the receiver (stored in the Cloud Integration keystore)
- Standalone encryption/decryption
 - PKCS#7
 - PGP
- Adapter-based encryption/decryption
 - S/MIME: Mail adapter
 - WebService Security: SOAP, AS4

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



Persisting and securing messages

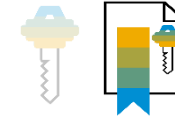
Message level security: [signing](#)

Signature

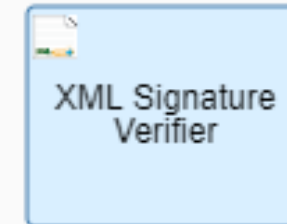
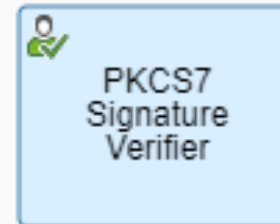
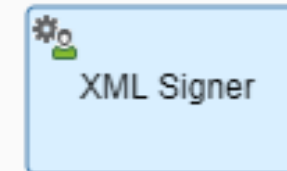
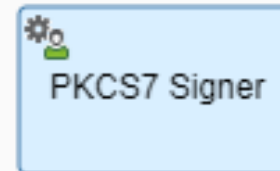


- Senders sign messages in order to prove that a message was sent by them
- Signing on Cloud Integration is done with the private/secret key (stored in the Cloud Integration keystore)
- Each tenant is provisioned with a key pair; more key pairs can be generated
- Standalone signature
 - PKCS#7
 - XML 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)



Monitoring



Monitoring Dashboard

Monitoring Tab

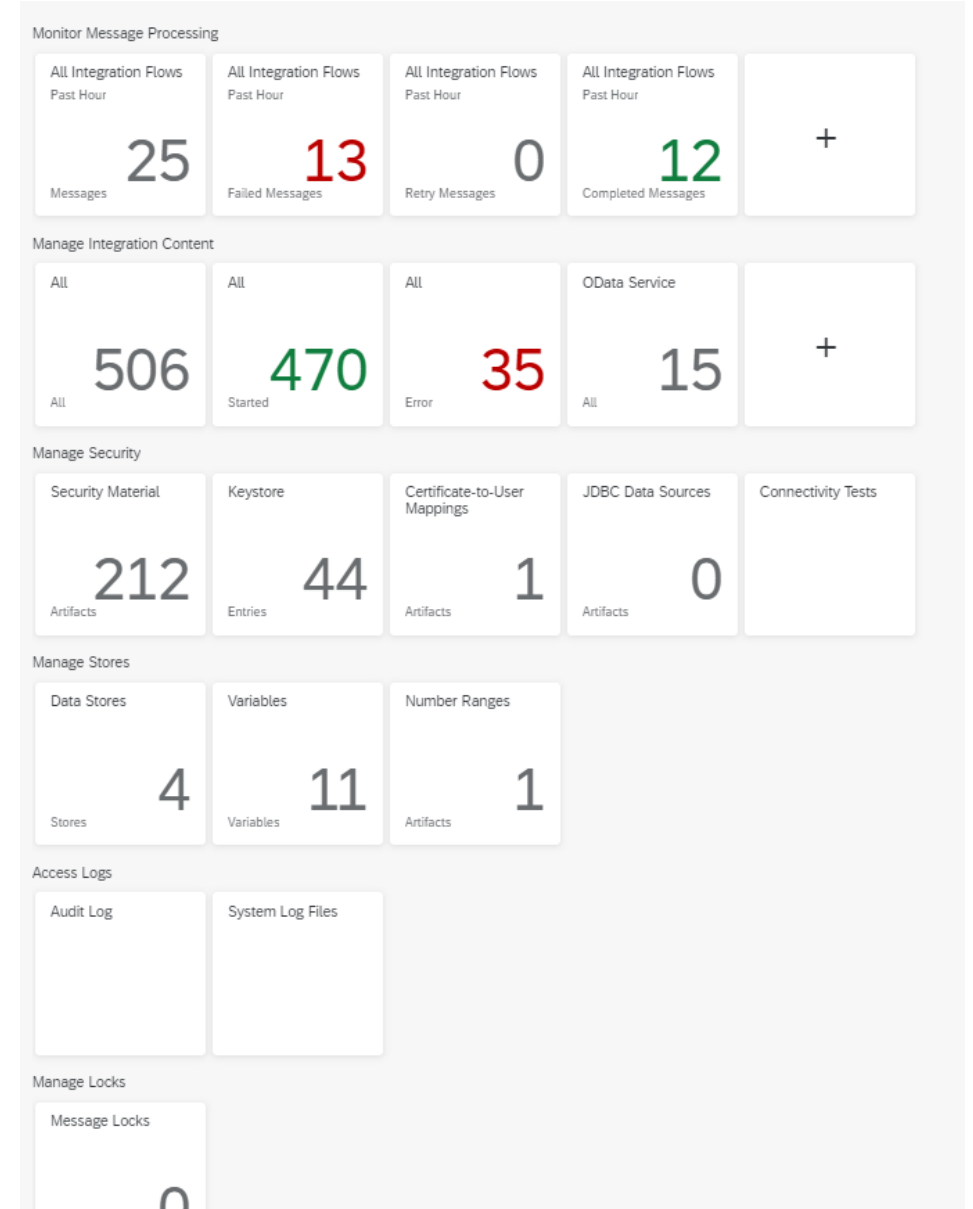
- Access different monitors available
- Monitors for Integration Content and Message Monitoring
- Six main tile groupings

Monitoring Tile Groupings

- Monitor Message Processing
 - Details of all message processings
- Manage Integration Content
 - Displays statuses of different integration artifacts deployed on tenant
- Manage Security
 - Manages security objects (certificates, user credentials etc)
- Manage Stores
 - Monitors to handle temporary data (Data Stores and JMS Queues)
- Access Logs
 - Access to different logs created (Audit Logs and System Log Files)
- Manage Locks
 - Locks are written by some components
 - Ex: In-Progress repository to avoid same message being processed multiple times in parallel
 - Ensure efficient and consistent message processing in runtime

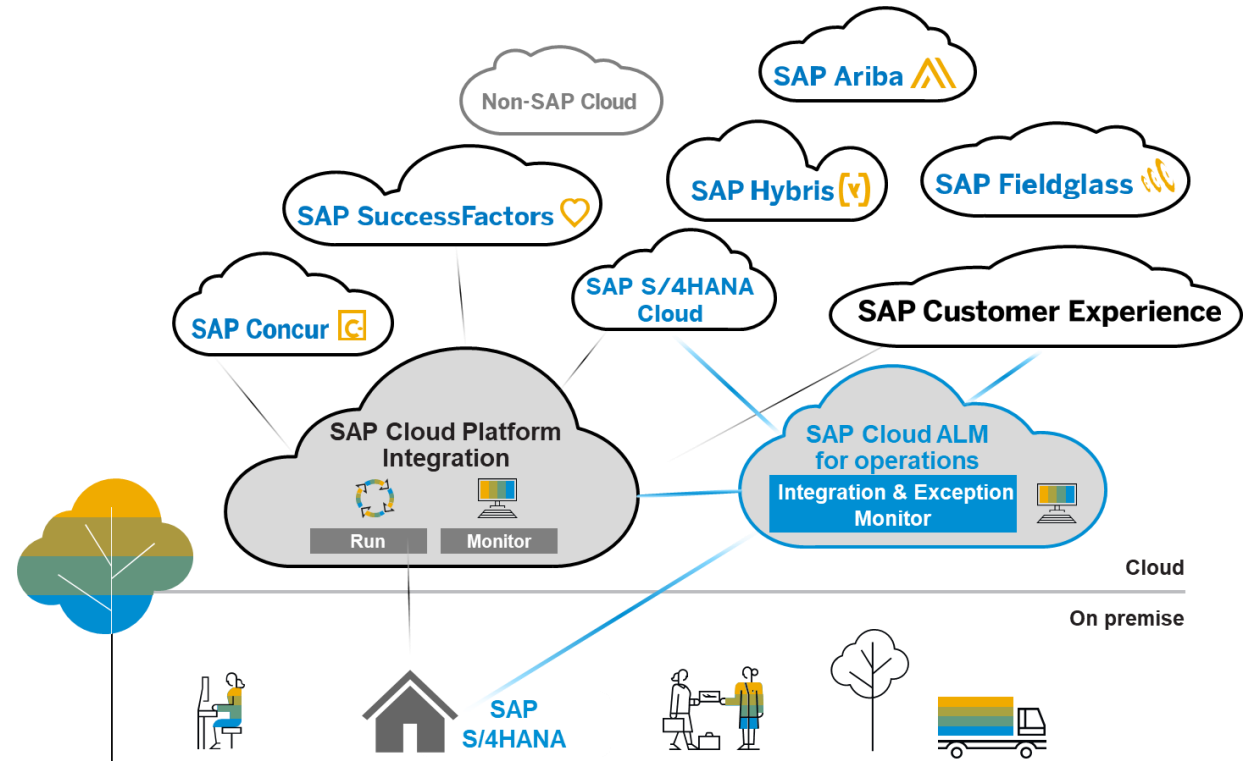
[SAP Cloud Integration – Monitor | SAP Help Portal](#)

[Guidelines and Best Practices for Message Monitoring | SAP Help Portal](#)



Centralized monitoring and alerting using SAP Cloud ALM

- **Central end-to-end business and IT monitoring** for hybrid SAP-centric landscapes that brings the technical flow closer to the business context
- **Integration & exception monitoring** with correlation of messages to provide end-to-end visibility
- **Tracking** of messages based on business context attributes
- Automated **alerting** for proactive monitoring
- Context-sensitive jump-ins to local monitoring tools such as Cloud Integration monitoring
- Technical **health monitoring** of cloud services

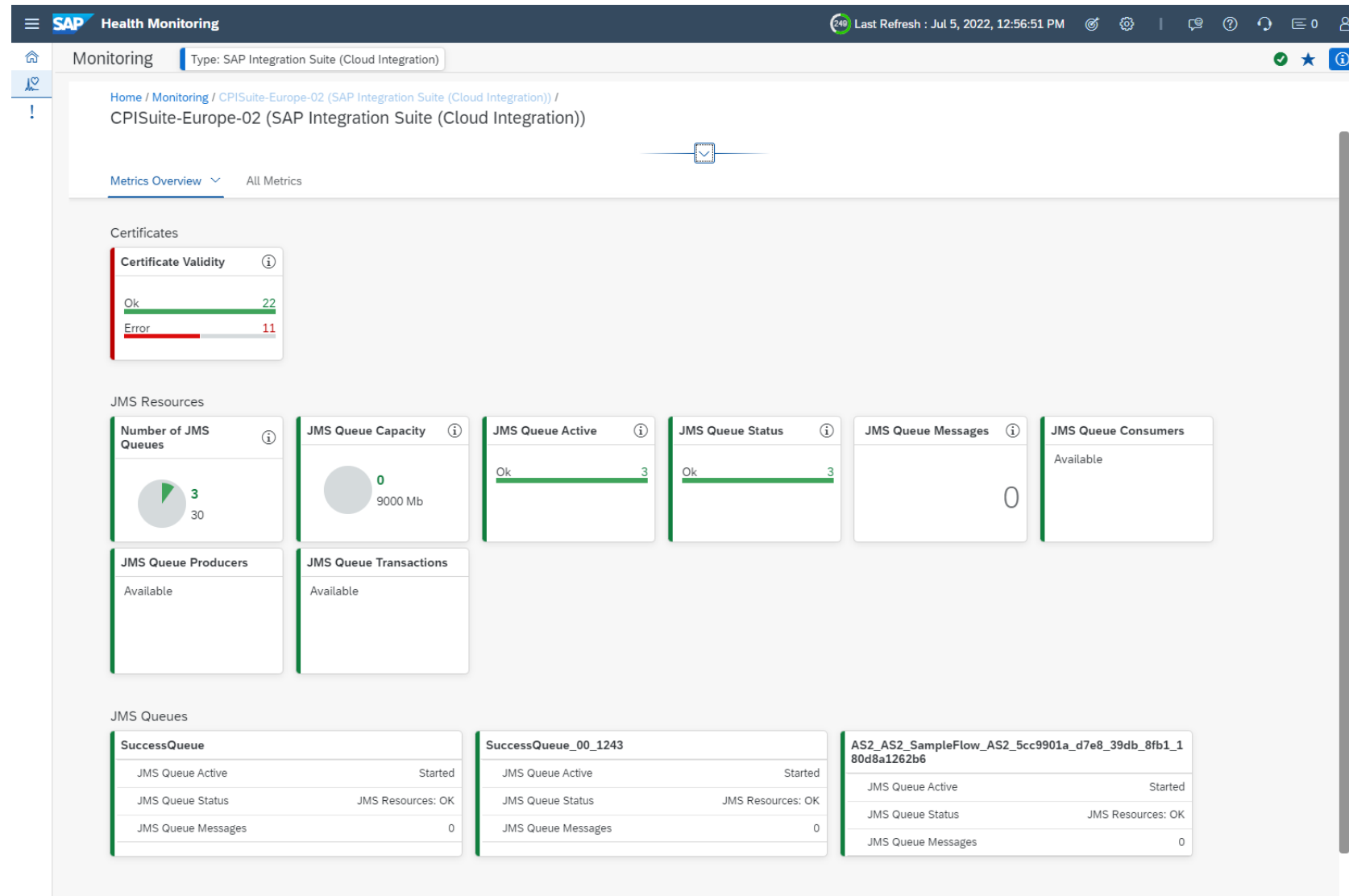


Current indicators for Cloud Integration tenants

Health Monitoring

Indicators

- **Availability** of the tenant
- Utilizations of **JMS resources** as #queues, capacity consumers, producers, transactions
- For each JMS queues: activation status, #messages in queue, status of queue
 - Label queue name
- **Expired certificates** & key pairs
 - Labels alias, type
- CALM is pulling data regularly, every 5 min and persist for 30 days



Start today with SAP Cloud ALM for integration scenarios

- [Expert Portal SAP Cloud ALM](#)
- [How-to videos](#)
- Blog posts
 - [Central monitoring of integration scenarios using SAP Cloud ALM](#)
 - [Centralized health monitoring of SAP Cloud Integration using SAP Cloud ALM](#)
 - [Monitoring tools for Cloud Integration capability of SAP Integration Suite](#)
- [Roadmap](#)

The image displays two screenshots from SAP. The top screenshot shows the 'SAP Cloud ALM for Operations - Expert Portal' interface. It features a navigation bar with links like 'My Support', 'Products', 'Tools', 'Maintenance', 'Offerings & Programs', and 'Application Lifecycle Management'. Below this, a breadcrumb trail reads 'SAP Support Portal Home / Application Lifecycle Management / SAP Cloud ALM / SAP Cloud ALM for Operations'. The main content area is titled 'SAP Cloud ALM for Operations - Expert Portal' and includes a central logo for 'SAP Cloud ALM'. To the left, there's a 'Business Process Monitoring' section with a sub-link for 'Business Process Monitoring'. To the right, there's an 'Integration & Exception Monitoring' section with sub-links for 'Overview', 'Content', 'Details', and 'How-To Videos'. Below these, there's a 'Job & Automation Monitoring' section with sub-links for 'Overview' and 'Details'. At the bottom, there's a 'Landscape Management' section with a sub-link for 'Setup Managed Services'.

The bottom screenshot shows a blog post from the SAP Community. The post is titled 'Central monitoring of integration scenarios using SAP Cloud ALM' by Gabriela Gahse, dated December 21, 2021, with a 13-minute read time. The post content discusses the importance of central monitoring of the entire IT landscape covering cloud-based applications and legacy on-premise solutions. It mentions that within the blog, the author will explain how SAP Cloud ALM and especially the Integration & Exception Monitoring application of this platform helps business and integration experts in their daily work. The post provides a deeper insight into the integration and exception monitoring of the Cloud Integration capability of SAP Integration Suite. The post includes a list of topics to be covered: some background about SAP Cloud ALM and Integration & Exception Monitoring; how to monitor end-to-end integration scenarios and drill-down from high-level integration scenario to single message details for an analysis and navigate forward to the local monitoring tools for issue resolution; how to monitor deployment exceptions and see the detailed error pattern; how to track messages based on business or technical attributes; how to use the embedded alert inbox to collaborate with colleagues during troubleshooting; and how to configure alerts for failed messages and deployment exceptions. The post also features a 'Follow' button, a 'Like' button, and an 'RSS Feed' button. On the right side, there's a section for 'Assigned Tags' including 'SAP Integration Suite', 'Cloud Integration', and 'SAP Cloud ALM'. Below that, there's a 'Similar Blog Posts' section with two posts: 'Monitoring tools for Cloud Integration Capability of SAP Integration Suite' by Francisco Miguel Mangas (Oct 28, 2021) and 'Centralized health monitoring of SAP Cloud Integration using SAP Cloud ALM' by Gabriela Gahse (Feb 07, 2022). At the bottom, there's a link to 'SAP S/4HANA Cloud Integration | SAP SuccessFactors Employee Central' by Hoang Vu (May 02, 2018).

Cloud Integration Reporting Dashboard using SAP Analytics Cloud

- Reporting dashboard provides **at-a-glance view of relevant key performance indicators of a Cloud Integration tenant**.
- Customers get the insights of the Cloud Integration tenant using the intuitive and interactive widgets.
- Using the dashboard, customer can:
 - Monitor the integration flows which has the highest processed messages.
 - Analyze the status of processed messages.
 - Get the count of the deployed artifacts.
 - Find the distribution of service endpoints across API protocols.
- Customer also extend the functionalities of the dashboard using other available Cloud Integration OData APIs.
- Better User Experience: The widgets in the dashboard displays data in a simple metric that helps you to visualize the context information with slicing and dicing capabilities.



DevOps

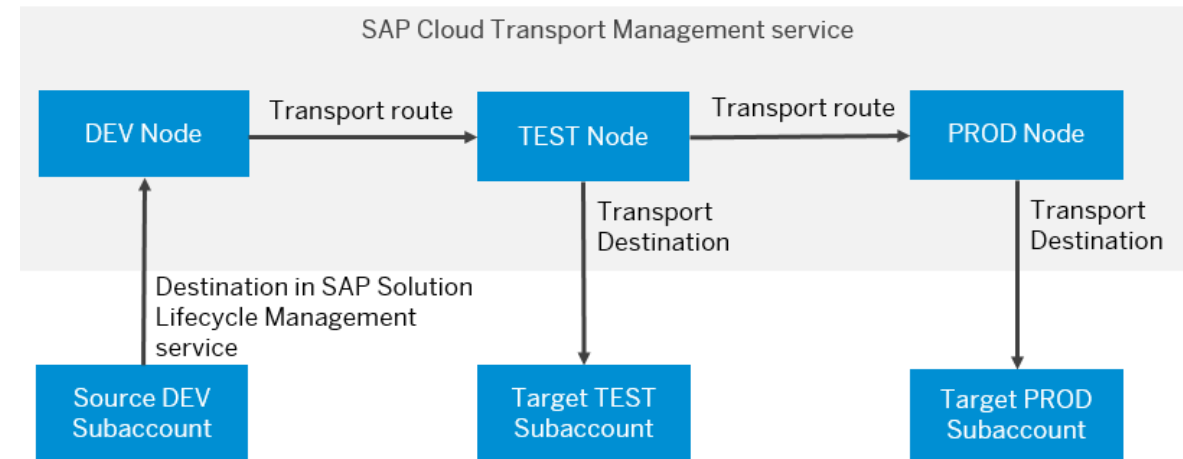
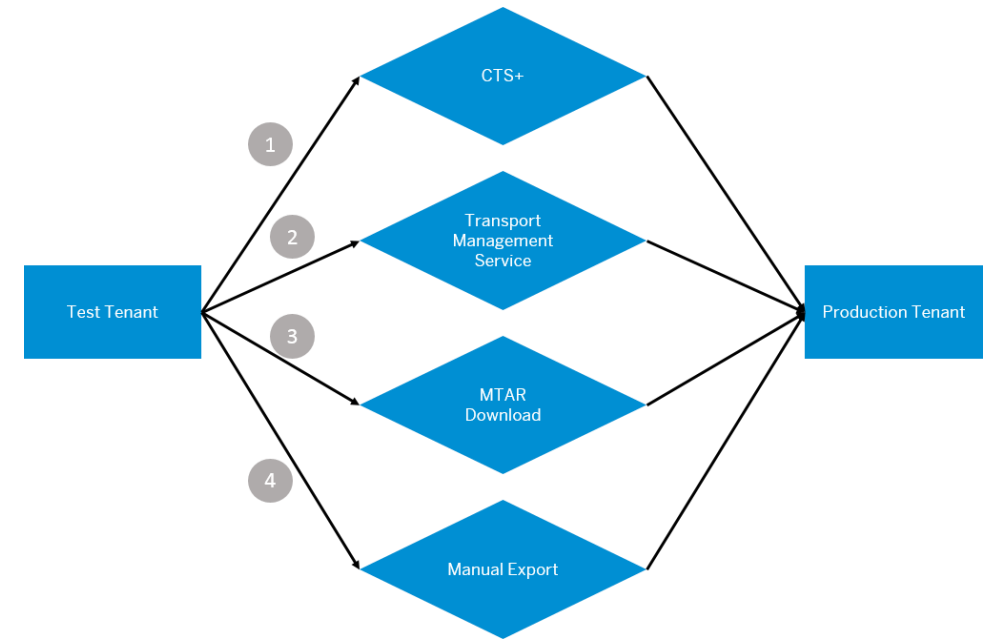


Content Transport

Cloud Integration offers different options to transport integration content. There is a certain criteria that help you to decide which option to choose for your integration project:

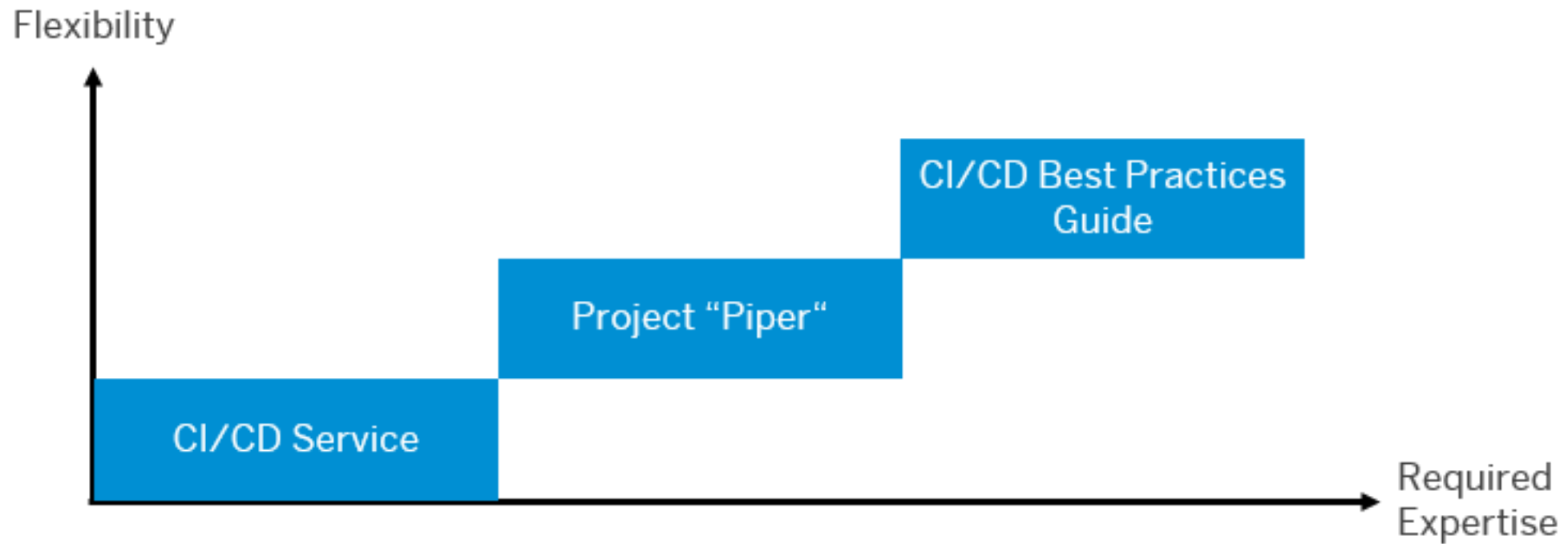
[SAP Cloud Integration - Content Transport | SAP Help Portal](#) | [Guidelines and Best Practices for Content Transport | SAP Help Portal](#)

[Step-by-step guide](#) to configure transport flow with BTP Cloud Transport Management service.



Solutions for CI/CD

- [SAP Solutions for Continuous Integration and Delivery | SAP Help Portal](#)



Applying DevOps

- Automation of integration operations is possible using the [OData APIs](#) for Cloud Integration as given on [SAP API Business Hub](#)
- Ready-to-use pipelines for Jenkins-Git infrastructure ([SAP API Business Hub integration recipes GitHub community](#))
- Project [Piper](#) contains multiple library steps for integration operations which can be used in CI/CD pipelines
- [SAP Continuous Integration and Delivery](#), a BTP solution for CI/CD, also offers pre-defined pipelines for Cloud Integration artifacts
- [SAP CPI: CI/CD from from zero to hero](#)

The collage consists of four overlapping screenshots:

- Top Screenshot:** SAP API Business Hub interface showing the 'OData V2 API' section with tabs for Overview, Documents, and Log Files. It includes sections for Integration Content, Log Files, Message Processing Logs, and Message Stores.
- Middle-left Screenshot:** A GitHub repository page for 'CICD - Update Integration Resources on Git Con'. It shows a commit by Sunny Kapoor and a README file.
- Middle-right Screenshot:** Project 'Piper' User Documentation, titled 'Continuous Delivery for the SAP Ecosystem'. It describes continuous delivery methods and lists artifacts like 'handlePipelineStepErrors' and 'kanikoExecute'.
- Bottom-right Screenshot:** A blog post by Irina Kirilova titled 'SAP Continuous Integration and Delivery for SAP Integration Suite Artifacts'. It discusses the latest release of SAP Continuous Integration and Delivery and provides prerequisites for using it.