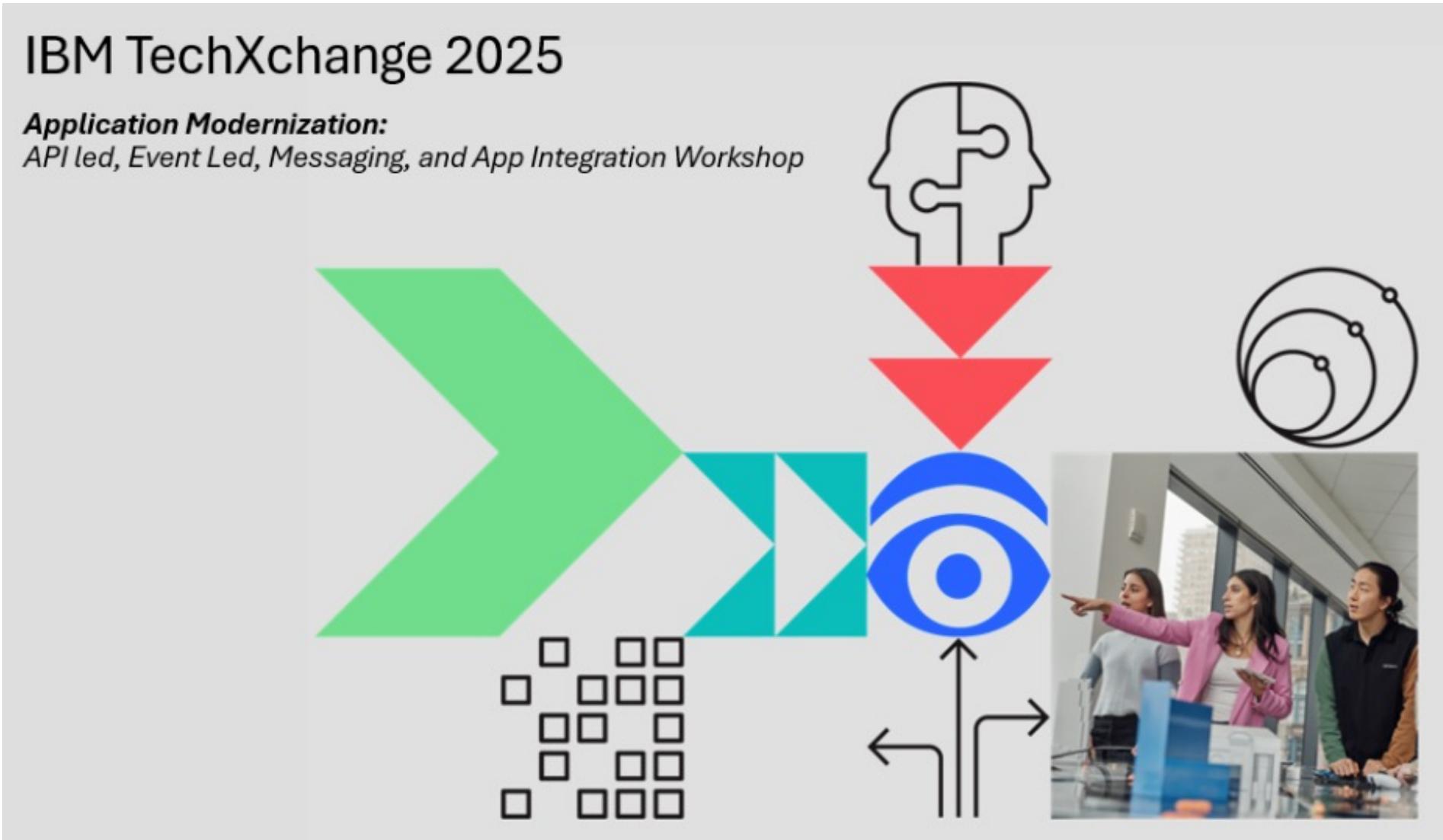


IBM TechXchange 2025

Application Modernization:
API led, Event Led, Messaging, and App Integration Workshop



Speakers

Sudhakar Bodapati

Application Integration Technical Specialist

Sudhakar.Bodapati@ibm.com

LinkedIn: <https://www.linkedin.com/in/sudhakar-bodapati-64106810b>



Joel Gomez

WW Executive Cloud Integration Architect, Cloud Pak for Integration
Technical Lead

joel.gomez@us.ibm.com

LinkedIn: <https://www.linkedin.com/in/jgomezr/>



Joseph Jodl

Automation Technical Specialist, IBM Technology, Financial Services Markets

joel.gomez@us.ibm.com

LinkedIn: <https://www.linkedin.com/in/joe-jodl-74388611/>



Agenda

1. API Led Integration

- APIs through the API Lifecycle

2. Application Integration (Any to Any integration solution)

- Integration of Apps and Data Using Existing APIs
- API-led approach delivers multi-dimensional value in enterprise connectivity

3. MQ Enterprise Messaging

- MQ HA/DR and security
- MQ Plus Kafka

4. IBM Event Led Integration: What are its capabilities?

- How does Event Processing work?
- How does Event Endpoint Management work?
- How does Event Streams work?

Agenda Day 1

Day 1	Type	Start	Duration
Check-in, Welcome & Intros		9:00	15 minutes
Introduction to IBM Multi-style Integration Approach	Presentation	9:15	30 minutes
API Management Introduction	Presentation	9:45	30 minutes
Manage APIs: - Create and Secure APIs - Socialize and Consume APIs - Implement Oauth and Manage Lifecycle - GraphQL Proxy API	<u>Lab 1-4</u>	10:15	2 hours total
LUNCH		12:15	60 minutes
Instana overview and Demo	Presentation	13:15	30 minutes
App Connect Enterprise Intro	Presentation	13:45	30 minutes
Application Connectivity for CRMs with APIs and Event Driven flows (SalesForce or ServiceNow) - Toolkit experience - Salesforce experience - ServiceNow experience	<u>Lab 1-3</u>	14:15	90 minutes (30 mins each)
End of Day		16:30 – 17h	

Agenda Day 2

Day 2	Type	Start
Check-in, Welcome & Intros		8:30
MQ & Event Streams	Presentation	9:00
Kafka scenarios with Event Streams, MQ and App Connect - Kafka experience	<u>Labs 1-2</u>	9:30
LUNCH	LUNCH	12:00
Event Endpoint Mgmt Experience Event Processing Experience	Labs 1-2	12:30
MQ messaging labs - Uniform Clusters - Native HA in Cloud Pak - Streaming Queues for MQ	Labs 1-3	14:00
All labs	<u>Lab</u>	15:30
End of Day	-	16:30

IBM Integration: Usage patterns

Integrate by building,
managing and sharing APIs

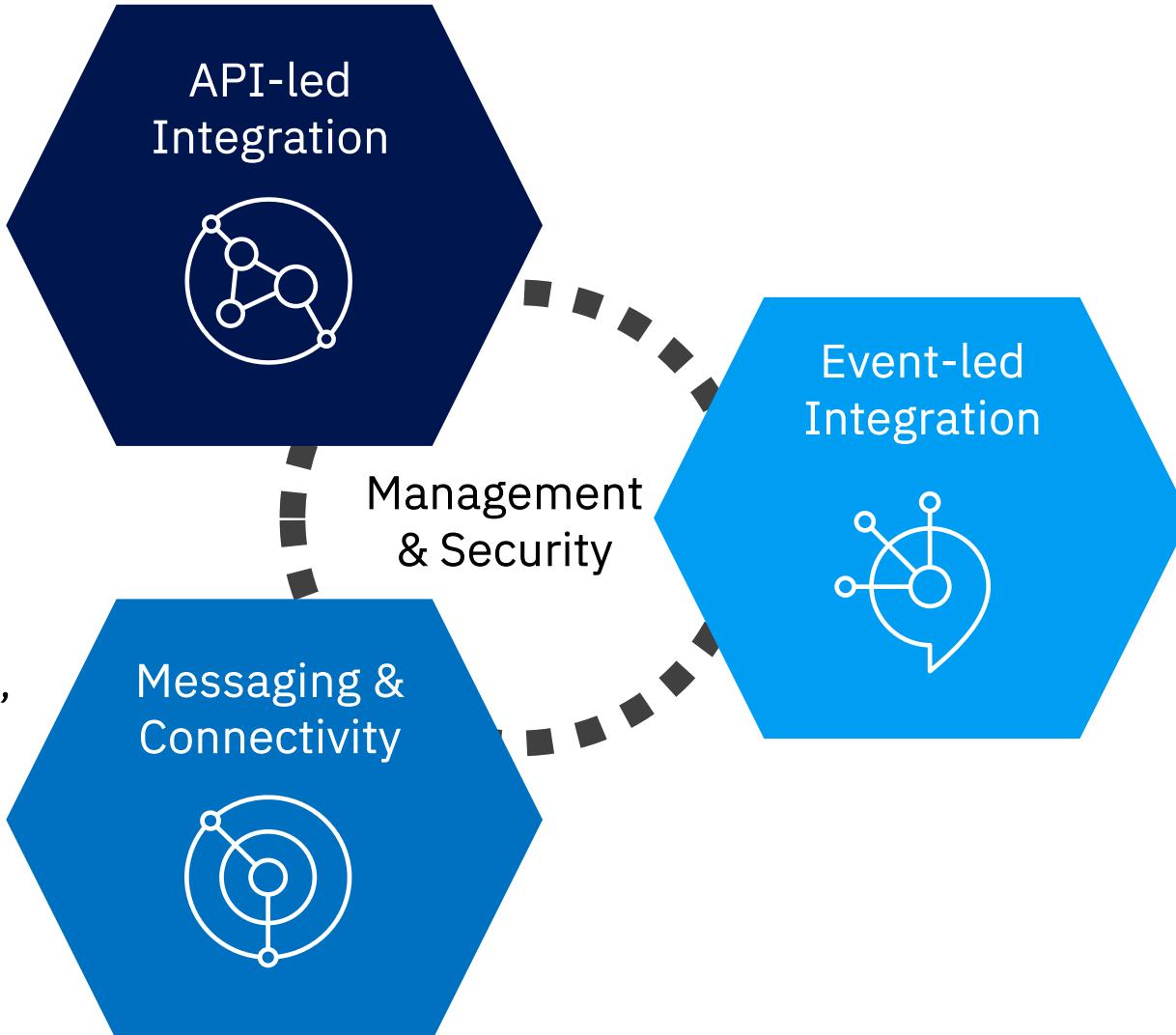
Primary products:

- API Connect
- App Connect
- DataPower (API Gateway)

Connect to anything quickly,
securely and at scale

Primary products:

- MQ
- App Connect
- Aspera
- DataPower



Unleash real-time insights
to drive data-driven actions

Primary products:

- Event Streams
- Event Endpoint Management
 - Event Gateway
- Event Processing

Messaging & Connectivity

Messaging & Connectivity provides the most **reliable and secure** messaging capabilities for your most **business-critical data** securely moving it at **high speed** regardless of size, distance or network conditions.



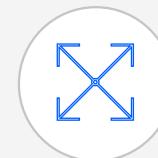
Secure message delivery

Once and only once delivery of messages with end-to-end message-level encryption



High performance

Message transport to deliver business-critical, high-value data with improved speed and reliability



Deploy where needed

On-prem, cloud, software, appliance

API-led Integration

APIs link together individual systems that contain data about clients, partners, products, business performance, and more. They help organizations scale operations by providing a convenient and standardized means of sharing data and services.

Get the most from your APIs with API-led Integration enabling businesses to deliver new services faster with improved productivity and automation in a single, unified experience.



Enable digital business

Using new channels partners and monetizing data



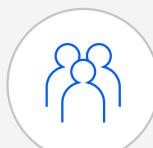
Speed application development

Ongoing app evolution via reusable APIs



Securely expose data

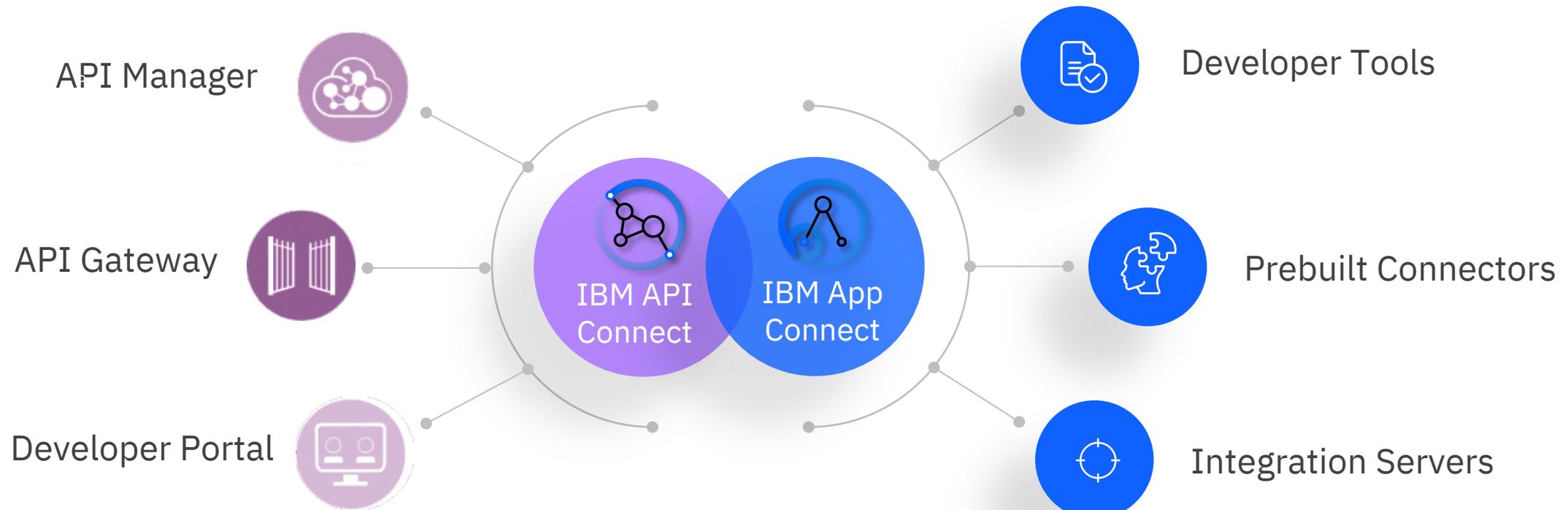
And business applications on-premise and across clouds



Expand brand reach

By publishing APIs to tap into a broad developer community

IBM API-led Integration Technology

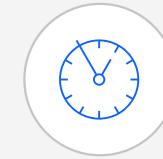


Event-led Integration

Become an event-driven enterprise with [Event-led Integration](#) helping you work with events in [real-time](#) and uncover [new insights](#) about your business to deliver more relevant and [engaging customer experiences](#).



Driving new, responsive digital experiences and channels



Real-time visibility of business operations



Workflow automation



Real-time analytics



Automating decisions

Solving business problems requires multiple styles of integration



API
management

Secure and socialize app
and data integration services



Application integration



Event streaming

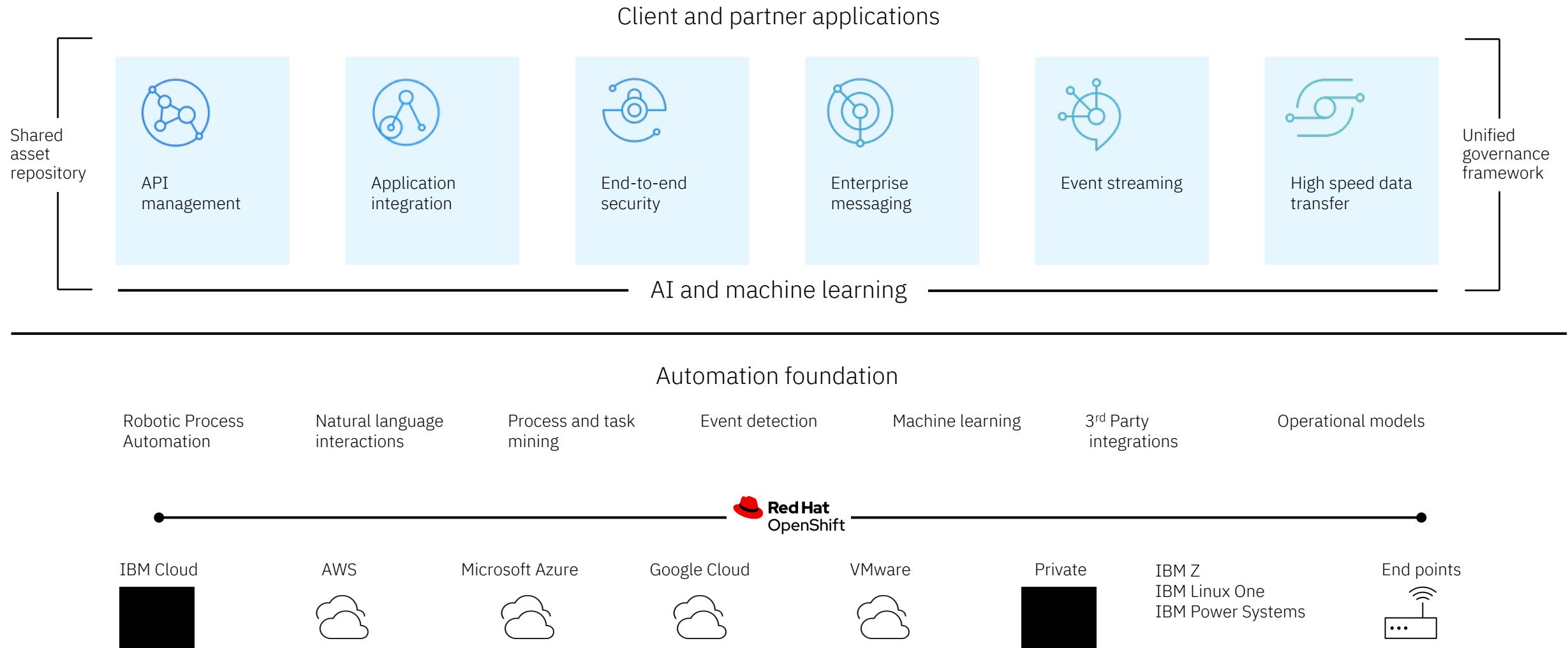


End-to-end security

Secure consistently using DataPower
Gateways for all your integration needs

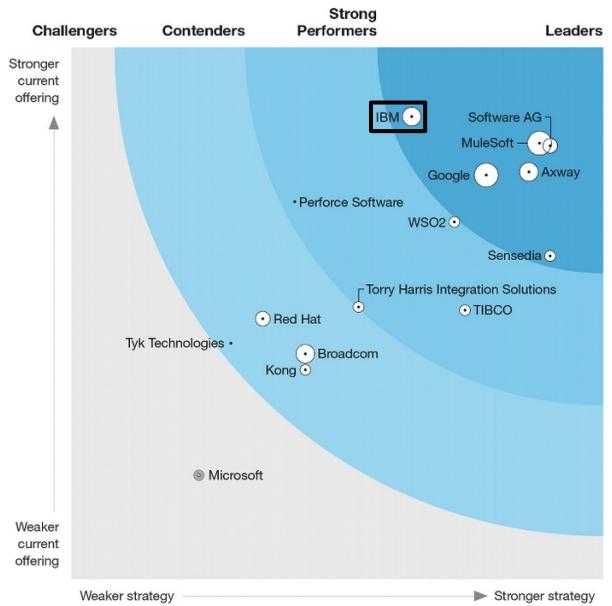
Deliver results faster when integration capabilities are built to work together in one platform

One platform to automate integration: IBM Cloud Pak for Integration



IBM Integration is a recognized market leader

IBM Ranking: Leader



Source: [The Forrester Wave: API Management Solutions, Q3 2022](#)

IBM Ranking: Leader, 7 consecutive years.



Source: [Gartner Magic Quadrant: Full Lifecycle API Management, 2022](#)

IBM was named #1 in four out of the six Use Cases in the 2023 Gartner Critical Capabilities for Integration Platform as a Service, Worldwide:

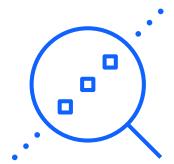
- Multistep Process (External)
- Composite Service (Internal and External)
- Data Consistency (Data)

Source: [Gartner Critical Capabilities: Enterprise Integration Platform as a Service, Worldwide, 2023](#)

API Management

- APIs through the API Lifecycle

Without a Strong API Management Solution...



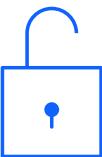
Limited Visibility of the API Estate

Without a unified view of all existing APIs, clients could risk duplicating efforts, underutilizing their APIs to their fullest potential and missing opportunities to innovate quickly.



Ad-hoc and Inconsistent Lifecycle Experience

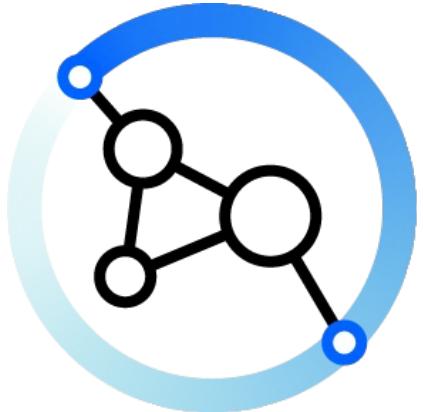
To deliver a best-in-class experience for consumers and providers, the fully managed lifecycle of individual and groups of APIs must be realized. Proper lifecycle management of APIs includes creation through retirement and everything in between.



Security Vulnerabilities

Every API endpoint is a potential doorway to the IT estate. Without a robust management system that sees into all APIs and helps consistently secure and manage them; this increases the risk of cyber attacks.

IBM API Connect



IBM API Connect empowers clients to unlock new digital innovation by seamlessly and securely connecting data and applications with APIs – wherever they reside.



Create

Automatically create APIs to expose data, microservices, enterprise applications, and SaaS services using open standards



Manage

Rapidly organize, publish and analyze any API through the full lifecycle, from design to retire



Secure

Easily apply built-in and extensible policies to secure, control, and mediate the delivery of APIs protecting data and business assets



Socialize

Empower application developers to explore and consume your APIs using branded self-service portals



Analyze

Understand API traffic patterns, latency, consumption, and more to make data driven insights into their API initiatives



Monetize

In addition to offering free Plans for your customers to use your Products, you can also define Plans that automatically bill your customers who are using your Products in IBM® API Connect.

Key Differentiators

Hybrid and Open



Support for multi-cloud deployment

Flexible hybrid cloud support to deploy different components on any cloud/on-premise

Support native Kubernetes based deployment
(IKS,AWS,EKS,AKS,ROKS,ROSA,ARO)

Support for Open Virtual Appliance

Gateway choice and flexibility to support all use-cases – internal, secure external networks and traditional applications

Enterprise Grade Security



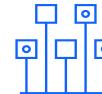
Trusted, security hardened gateway with a wide range of policies to protect APIs and support for enterprise standards and security protocols (WS*, SAML, Kerberos etc.)

Integrated API Governance enforcing organizational standards for consistency and quality

Discover shadow and un-managed APIs running in API estate with API Discovery

Advanced Security with Akamai enables real time detection and prevention of malicious attacks

Multi form API Management



First class support for diverse API formats such as REST, AsyncAPIs, GraphQL, SOAP, WebSocket etc.

Declarative GraphQL creation from federated data sources using IBM API Connect for GraphQL

Share diverse API types on the same developer portal for easy discovery and consumption

Manage AsyncAPIs and REST APIs together through integration with Event Endpoint Management

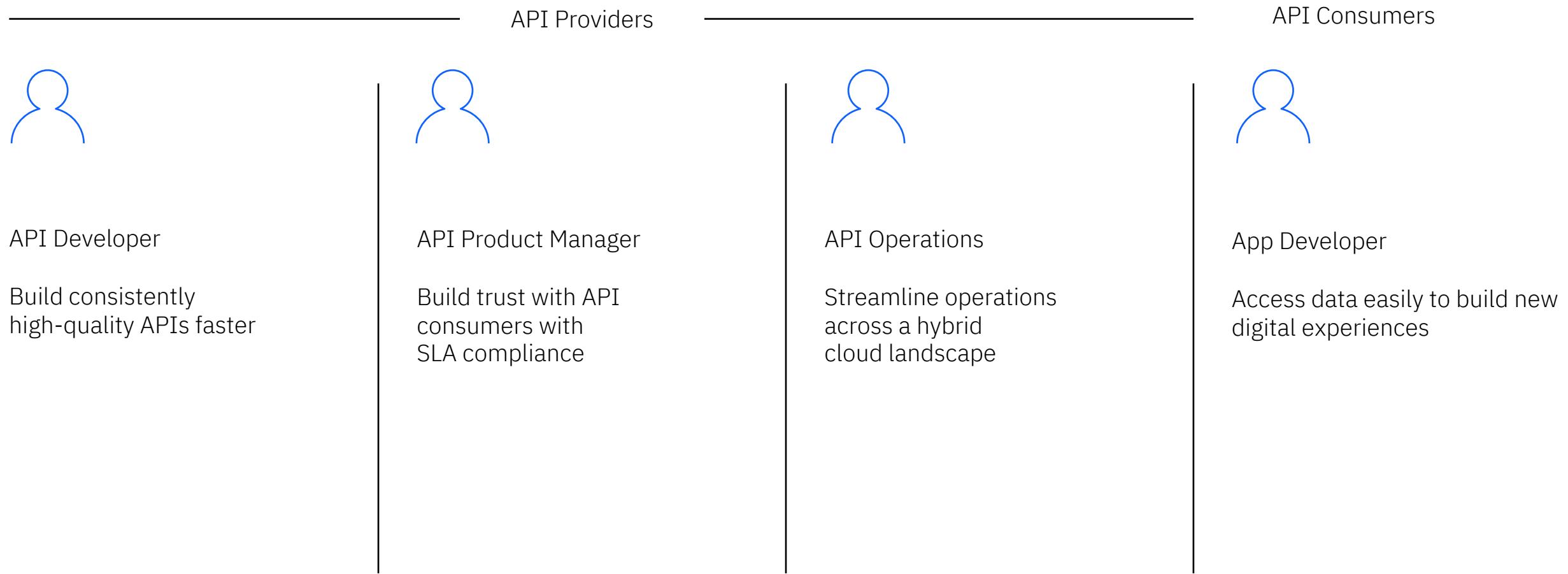
AI and APIs



Purpose built AI Gateway provides policies such as token-based cost mgmt., response caching, insights into org's use of AI services, enables business leaders to make faster choices on AI services.

Accelerate productivity across API teams with Gen AI powered API Assistant. Enhance code quality, improve API documentation and upskill developers for faster time to market

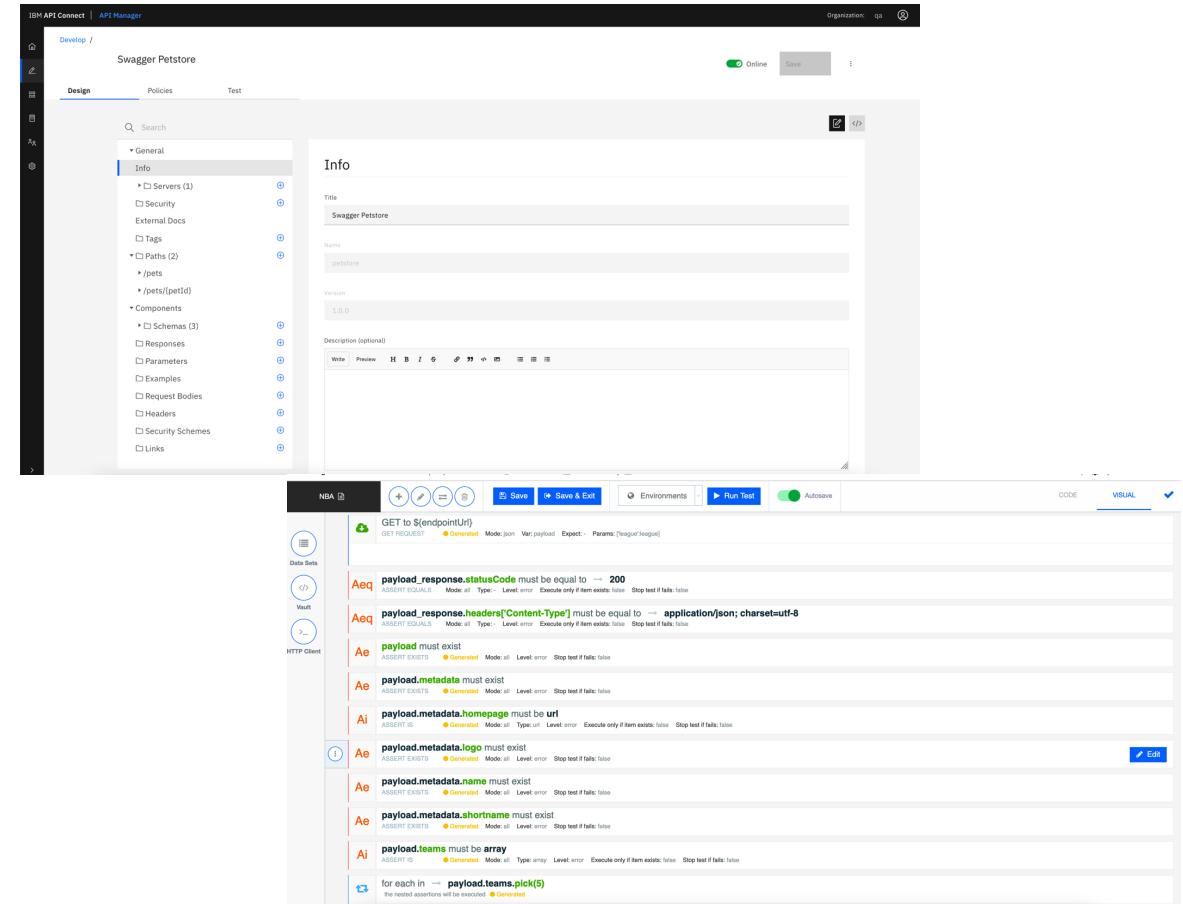
Delivering productivity benefits across organizations



Create APIs

Improve quality with automated test generation, No code visual composer, rich dashboards, interactive test and debug, and DevOps integrations

- Rapidly develop APIs with open standards
 - REST (OAI 2.0 & 3.0)
 - SOAP
 - GraphQL
 - Async API
- Accelerate development through inline code validation, quickly create in form or source view using an intuitive API editor experience
- Improve developer productivity to work independently using API Designer and a local test environment to develop APIs
- Automate API creation and testing using DevOps choices



Create



Manage



Secure



Socialize

API Assistant

Augment API documentation & automatically fix API specification validation errors within seconds for easy and quick API consumption & development by both humans and AI

- Generates suggested descriptions and examples for each endpoint, parameter, and response type
- Identifies gaps in schema documentation
- Validates examples against schema enforcement rules
- Automatically debugs common validation errors such as missing parameters, incorrect data types, and inconsistent naming conventions in real time
- Enables less context switching with more focus on building instead of troubleshooting

The screenshot displays two panels of the IBM API Connect interface. The left panel shows the 'Swagger Petstore' API specification in OpenAPI 3.0 format. The right panel shows AI-generated recommendations and validation errors.

AI Recommendations:

- Add description for "General: Info"
- Add examples for "Schema: Customer"

Specification validation errors:

- Remove line 14
- Remove additional properties
- Array items are not unique (indexes 0 and 1) at #/produces
- Additional properties not allowed: security at #/security
- Additional properties not allowed: security at #/security
- Additional properties not allowed: security at #/security

Code Snippets:

```
openapi: 3.0.2
servers:
  - url: /v3
info:
  description: This is a sample Pet Store Server based on the OpenAPI 3.0 specification. You can find out more about Swagger at http://swagger.io. In the third iteration of the pet store, we've switched to the design first approach, so we're changing the way APIs are defined. Instead of making changes to the definition itself or to the code. That way, with time, we can improve the API in general, and expose some of the new features in OAS3.
version: 3.0.11
title: Swagger Petstore - OpenAPI 3.0
x-ibm-gateway: https://swagger.io/ibm/
contact:
  name: apiteam@swagger.io
  email: apiteam@swagger.io
  url: http://www.apache.org/licenses/LICENSE-2.0.html
  x-ibm-gateway: https://swagger-petstore-openapi-3.0
tags:
  - name: pet
    description: Everything about your pets
  - name: store
    description: Stores for selling pet supplies
  - name: user
    description: Operations for managing users
paths:
  /pet:
    post:
      tags:
        - pet
      summary: Add a new pet to store
      description: Adds a new pet to existing collection
      operationId: addPet
      consumes:
        - application/json
      produces:
        - application/json
      securityDefinitions:
        - key: apiKey
          type: apiKey
          in: header
          name: X-IBM-Client-ID
          security: []
          clientID: []
          type: wsd1-to-test
          testable: true
          selfLink: https://ibm.com/gateway/datapower-api-gateway
          cors:
            enabled: true
            wsd1Definition:
              wsdl: Calculator.WSDL
              wsdlLocation: http://wsdl/calculator
              port: CalculatorSoap
              soapVersion: "1.1"
              produces:
                - application/json
              x-ibm-gateway-optimize-schema-definition:
                value: "true"
                description: Optimize map schema loading
                encoded: false
              assembly:
                execute:
                  switch:
                    title: switch
                    case: "POST"
                    condition: ($$HttpVerb = "POST" and $operationPath)
                    = "/Add")
                    execute:
                      - parse:
                        - validate:
                          - validate:
                            - validate:
                              - validate:
                                - validate:
                                  - validate:
                                    - validate:
                                      - validate:
                                        - validate:
                                          - validate:
                                            - validate:
                                              - validate:
                                                - validate:
                                                  - validate:
                                                    - validate:
                                                      - validate:
                                                        - validate:
                                                          - validate:
                                                            - validate:
                                                              - validate:
                                                                - validate:
                                                                  - validate:
                                                                    - validate:
                                                                      - validate:
                                                                        - validate:
                                                                          - validate:
                                                                            - validate:
                                                                              - validate:
                                                                                - validate:
                                                                                  - validate:
                                                                                    - validate:
                                                                                      - validate:
                                                                                        - validate:
              wsdl:
                wsdl: Calculator.WSDL
                wsdlLocation: http://wsdl/calculator
                port: CalculatorSoap
                soapVersion: "1.1"
                produces:
                  - application/json
                x-ibm-gateway-optimize-schema-definition:
                  value: "true"
                  description: Optimize map schema loading
                  encoded: false
                assembly:
                  execute:
                    switch:
                      title: switch
                      case: "POST"
                      condition: ($$HttpVerb = "POST" and $operationPath)
                      = "/Add")
                      execute:
                        - parse:
                          - validate:
                            - validate:
                              - validate:
                                - validate:
                                  - validate:
                                    - validate:
                                      - validate:
                                        - validate:
                                          - validate:
                                            - validate:
                                              - validate:
                                                - validate:
                                                  - validate:
                                                    - validate:
                                                      - validate:
                                                        - validate:
                                                          - validate:
                                                            - validate:
                                                              - validate:
                                                                - validate:
                                                                  - validate:
                                                                    - validate:
                                                                      - validate:
                                                                        - validate:
              wsdl:
                wsdl: Calculator.WSDL
                wsdlLocation: http://wsdl/calculator
                port: CalculatorSoap
                soapVersion: "1.1"
                produces:
                  - application/json
                x-ibm-gateway-optimize-schema-definition:
                  value: "true"
                  description: Optimize map schema loading
                  encoded: false
                assembly:
                  execute:
                    switch:
                      title: switch
                      case: "POST"
                      condition: ($$HttpVerb = "POST" and $operationPath)
                      = "/Add")
                      execute:
                        - parse:
                          - validate:
                            - validate:
                              - validate:
                                - validate:
                                  - validate:
                                    - validate:
                                      - validate:
                                        - validate:
                                          - validate:
                                            - validate:
                                              - validate:
                                                - validate:
                                                  - validate:
                                                    - validate:
                                                      - validate:
                                                        - validate:
                                                          - validate:
                                                            - validate:
                                                              - validate:
                                                                - validate:
                                                                  - validate:
                                                                    - validate:
                                                                      - validate:
                                                                        - validate:
              wsdl:
                wsdl: Calculator.WSDL
                wsdlLocation: http://wsdl/calculator
                port: CalculatorSoap
                soapVersion: "1.1"
                produces:
                  - application/json
                x-ibm-gateway-optimize-schema-definition:
                  value: "true"
                  description: Optimize map schema loading
                  encoded: false
                assembly:
                  execute:
                    switch:
                      title: switch
                      case: "POST"
                      condition: ($$HttpVerb = "POST" and $operationPath)
                      = "/Add")
                      execute:
                        - parse:
                          - validate:
                            - validate:
                              - validate:
                                - validate:
                                  - validate:
                                    - validate:
                                      - validate:
                                        - validate:
                                          - validate:
                                            - validate:
                                              - validate:
                                                - validate:
                                                  - validate:
                                                    - validate:
                                                      - validate:
                                                        - validate:
                                                          - validate:
                                                            - validate:
                                                              - validate:
                                                                - validate:
                                                                  - validate:
                                                                    - validate:
                                                                      - validate:
                                                                        - validate:
              wsdl:
                wsdl: Calculator.WSDL
                wsdlLocation: http://wsdl/calculator
                port: CalculatorSoap
                soapVersion: "1.1"
                produces:
                  - application/json
                x-ibm-gateway-optimize-schema-definition:
                  value: "true"
                  description: Optimize map schema loading
                  encoded: false
                assembly:
                  execute:
                    switch:
                      title: switch
                      case: "POST"
                      condition: ($$HttpVerb = "POST" and $operationPath)
                      = "/Add")
                      execute:
                        - parse:
                          - validate:
                            - validate:
                              - validate:
                                - validate:
                                  - validate:
                                    - validate:
                                      - validate:
                                        - validate:
                                          - validate:
                                            - validate:
                                              - validate:
                                                - validate:
                                                  - validate:
                                                    - validate:
                                                      - validate:
                                                        - validate:
                                                          - validate:
                                                            - validate:
                                                              - validate:
                                                                - validate:
                                                                  - validate:
                                                                    - validate:
                                                                      - validate:
                                                                        - validate:
              wsdl:
                wsdl: Calculator.WSDL
                wsdlLocation: http://wsdl/calculator
                port: CalculatorSoap
                soapVersion: "1.1"
                produces:
                  - application/json
                x-ibm-gateway-optimize-schema-definition:
                  value: "true"
                  description: Optimize map schema loading
                  encoded: false
                assembly:
                  execute:
                    switch:
                      title: switch
                      case: "POST"
                      condition: ($$HttpVerb = "POST" and $operationPath)
                      = "/Add")
                      execute:
                        - parse:
                          - validate:
                            - validate:
                              - validate:
                                - validate:
                                  - validate:
                                    - validate:
                                      - validate:
                                        - validate:
                                          - validate:
                                            - validate:
                                              - validate:
                                                - validate:
                                                  - validate:
                                                    - validate:
                                                      - validate:
                                                        - validate:
                                                          - validate:
                                                            - validate:
                                                              - validate:
                                                                - validate:
                                                                  - validate:
                                                                    - validate:
                                                                      - validate:
                                                                        - validate:
              wsdl:
                wsdl: Calculator.WSDL
                wsdlLocation: http://wsdl/calculator
                port: CalculatorSoap
                soapVersion: "1.1"
                produces:
                  - application/json
                x-ibm-gateway-optimize-schema-definition:
                  value: "true"
                  description: Optimize map schema loading
                  encoded: false
                assembly:
                  execute:
                    switch:
                      title: switch
                      case: "POST"
                      condition: ($$HttpVerb = "POST" and $operationPath)
                      = "/Add")
                      execute:
                        - parse:
                          - validate:
                            - validate:
                              - validate:
                                - validate:
                                  - validate:
                                    - validate:
                                      - validate:
                                        - validate:
                                          - validate:
                                            - validate:
                                              - validate:
                                                - validate:
                                                  - validate:
                                                    - validate:
                                                      - validate:
                                                        - validate:
                                                          - validate:
                                                            - validate:
                                                              - validate:
                                                                - validate:
                                                                  - validate:
                                                                    - validate:
                                                                      - validate:
                                                                        - validate:
              wsdl:
                wsdl: Calculator.WSDL
                wsdlLocation: http://wsdl/calculator
                port: CalculatorSoap
                soapVersion: "1.1"
                produces:
                  - application/json
                x-ibm-gateway-optimize-schema-definition:
                  value: "true"
                  description: Optimize map schema loading
                  encoded: false
                assembly:
                  execute:
                    switch:
                      title: switch
                      case: "POST"
                      condition: ($$HttpVerb = "POST" and $operationPath)
                      = "/Add")
                      execute:
                        - parse:
                          - validate:
                            - validate:
                              - validate:
                                - validate:
                                  - validate:
                                    - validate:
                                      - validate:
                                        - validate:
                                          - validate:
                                            - validate:
                                              - validate:
                                                - validate:
                                                  - validate:
                                                    - validate:
                                                      - validate:
                                                        - validate:
                                                          - validate:
                                                            - validate:
                                                              - validate:
                                                                - validate:
                                                                  - validate:
                                                                    - validate:
                                                                      - validate:
                                                                        - validate:
              wsdl:
                wsdl: Calculator.WSDL
                wsdlLocation: http://wsdl/calculator
                port: CalculatorSoap
                soapVersion: "1.1"
                produces:
                  - application/json
                x-ibm-gateway-optimize-schema-definition:
                  value: "true"
                  description: Optimize map schema loading
                  encoded: false
                assembly:
                  execute:
                    switch:
                      title: switch
                      case: "POST"
                      condition: ($$HttpVerb = "POST" and $operationPath)
                      = "/Add")
                      execute:
                        - parse:
                          - validate:
                            - validate:
                              - validate:
                                - validate:
                                  - validate:
                                    - validate:
                                      - validate:
                                        - validate:
                                          - validate:
                                            - validate:
                                              - validate:
                                                - validate:
                                                  - validate:
                                                    - validate:
                                                      - validate:
                                                        - validate:
                                                          - validate:
                                                            - validate:
                                                              - validate:
                                                                - validate:
                                                                  - validate:
                                                                    - validate:
                                                                      - validate:
                                                                        - validate:
              wsdl:
                wsdl: Calculator.WSDL
                wsdlLocation: http://wsdl/calculator
                port: CalculatorSoap
                soapVersion: "1.1"
                produces:
                  - application/json
                x-ibm-gateway-optimize-schema-definition:
                  value: "true"
                  description: Optimize map schema loading
                  encoded: false
                assembly:
                  execute:
                    switch:
                      title: switch
                      case: "POST"
                      ...
```



Create



Manage

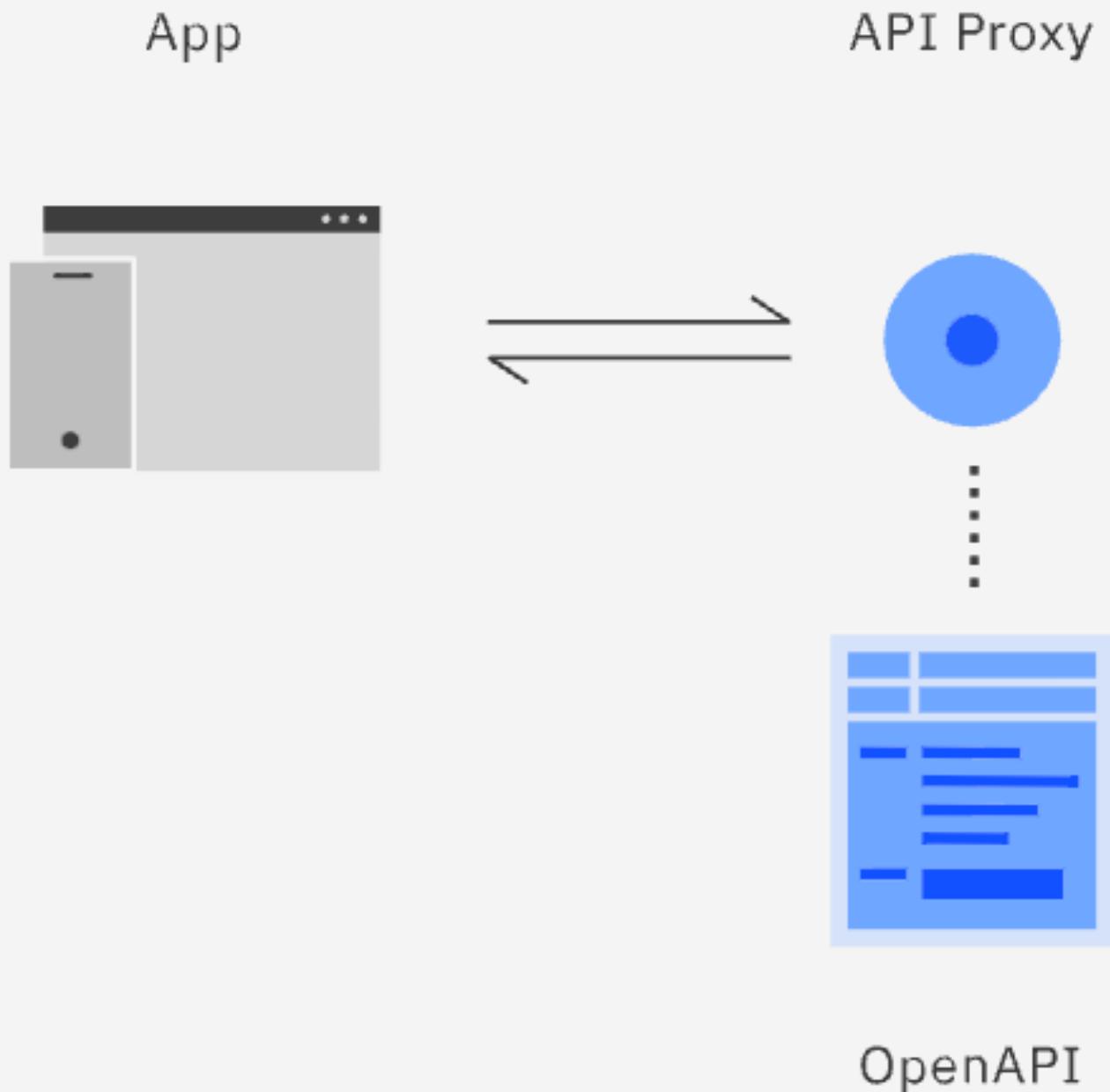


Secure

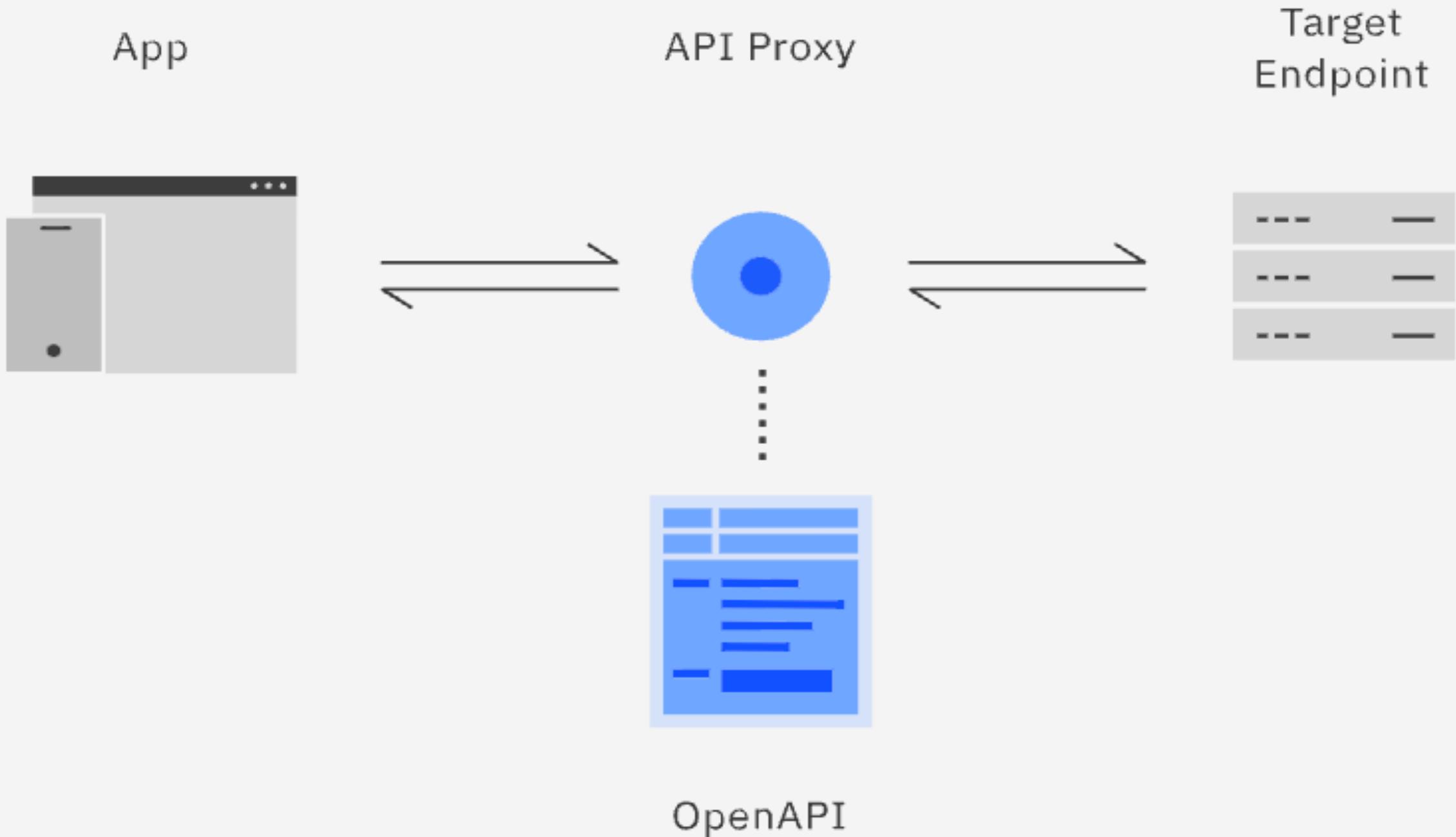


Socialize

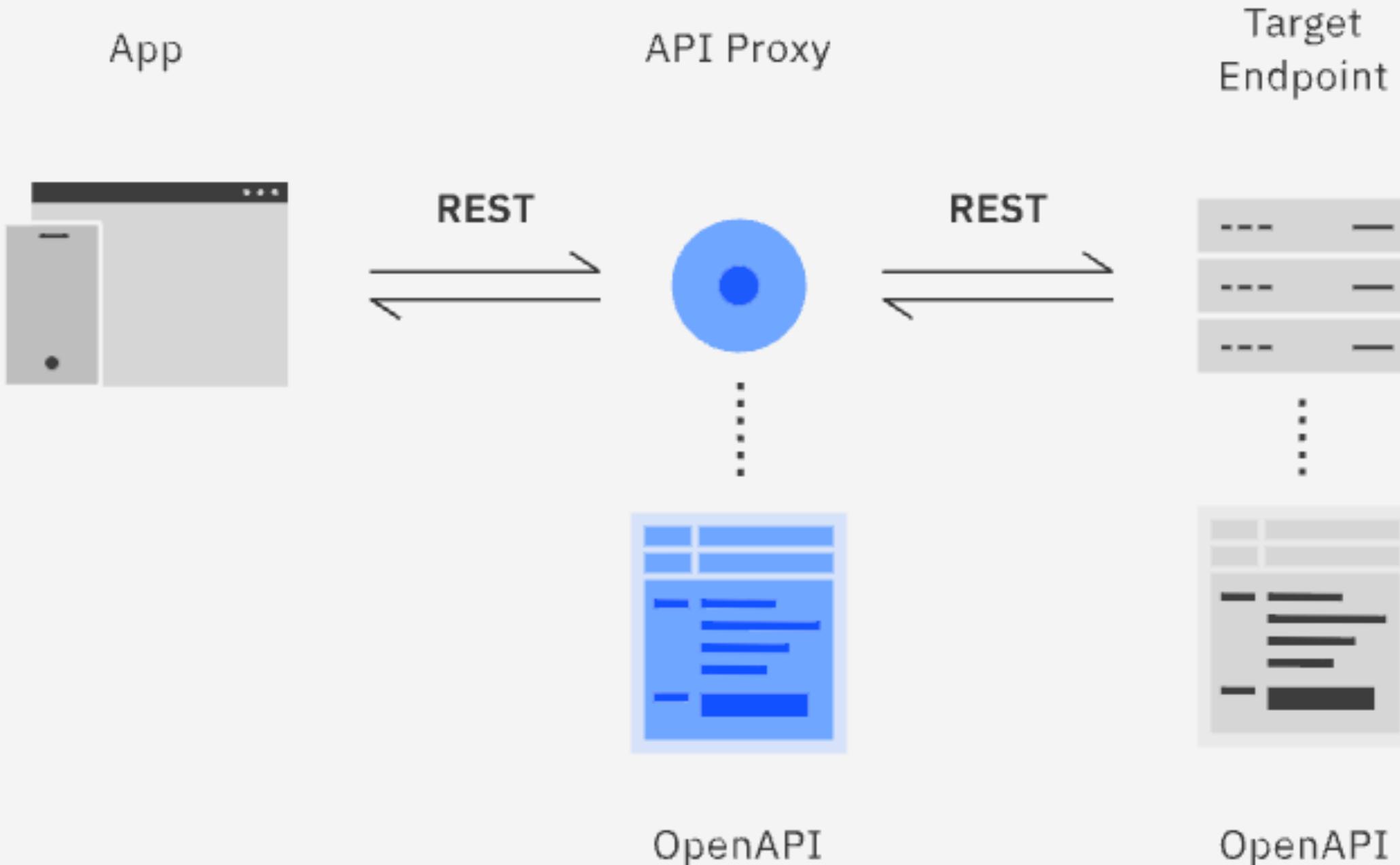
API Authoring: Create API from scratch



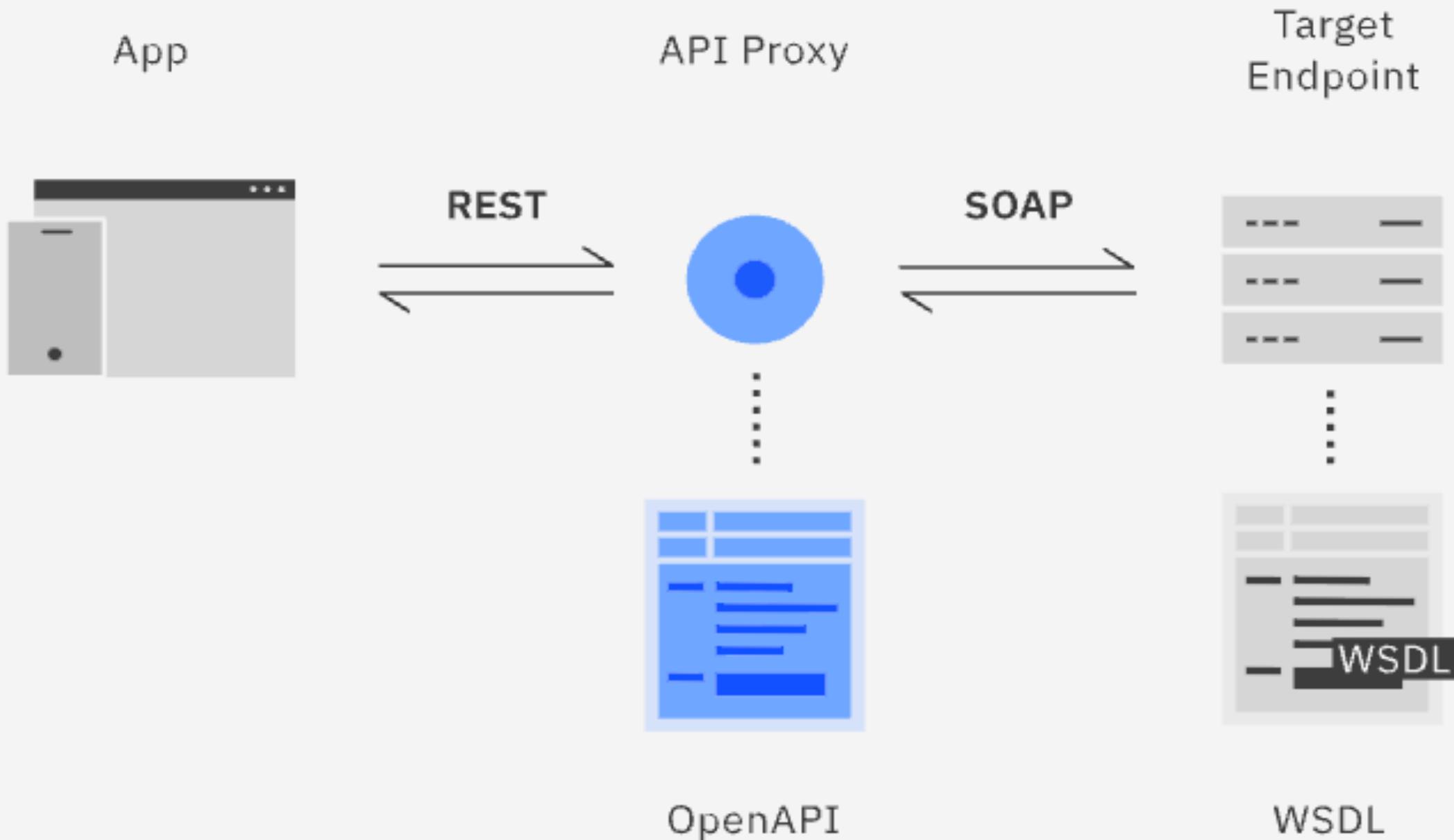
API Authoring: Create API from Target Endpoint



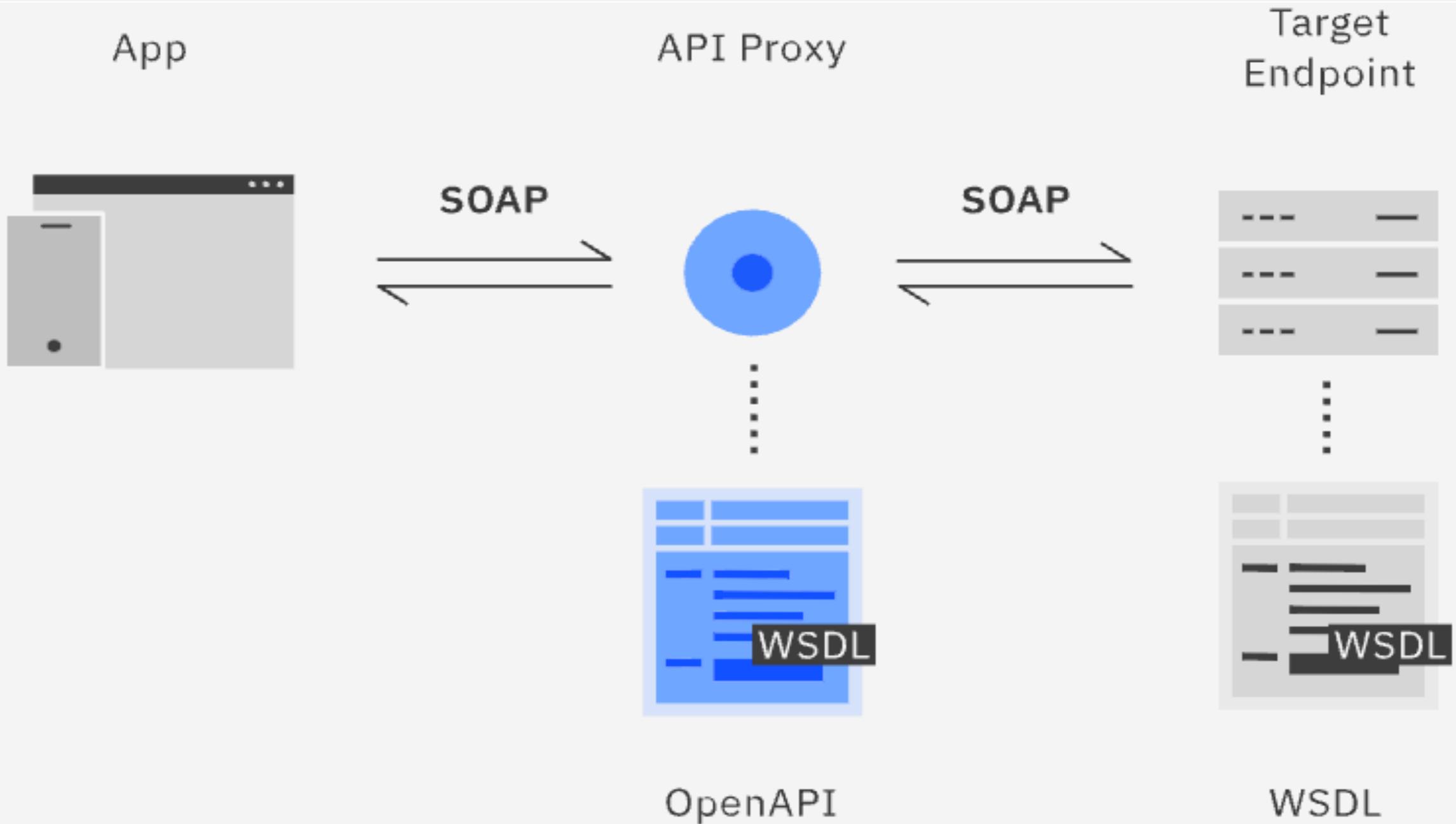
API Authoring: Create API from existing OpenAPI service



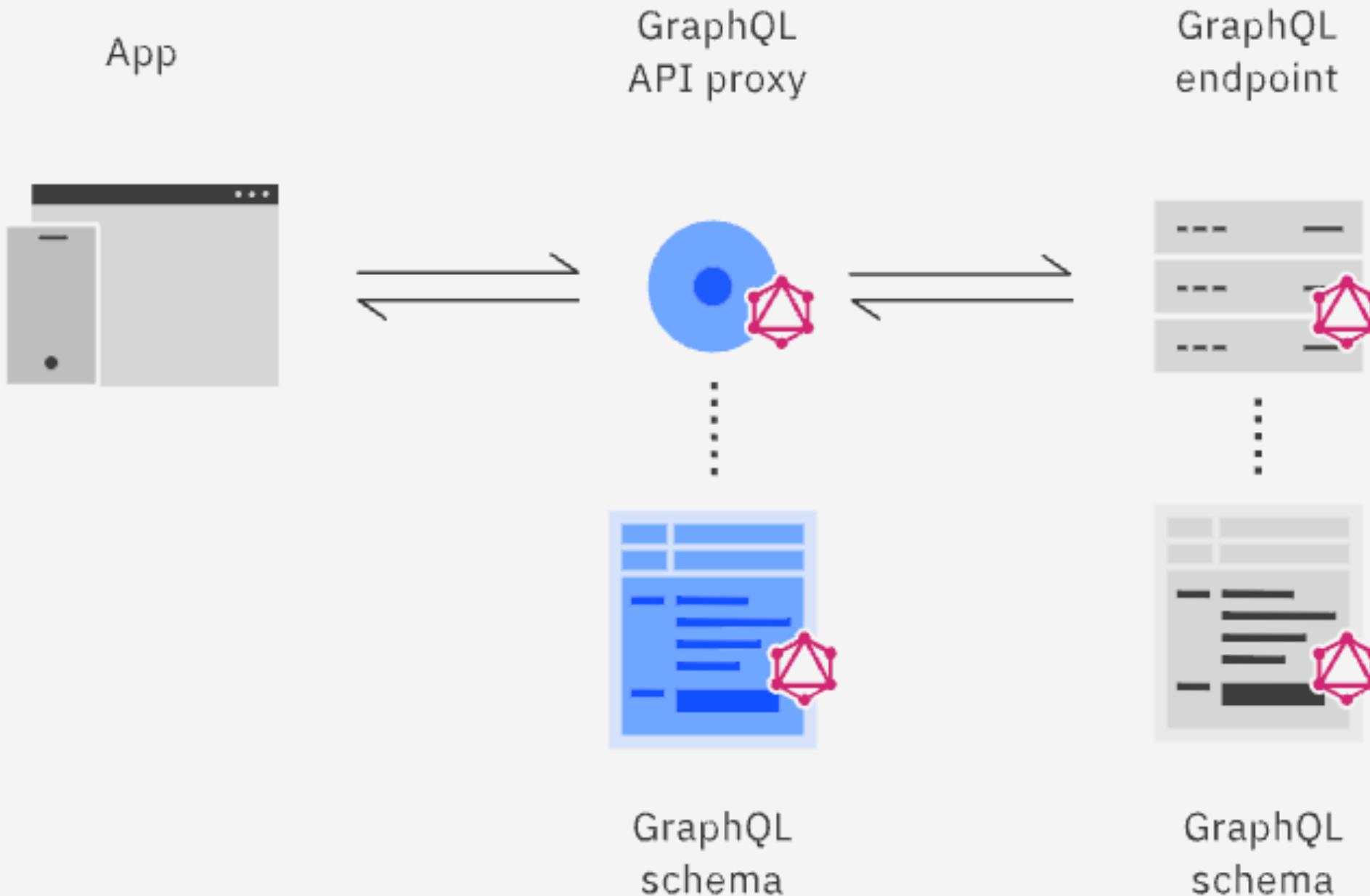
API Authoring: Create API from existing WSDL – REST to SOAP



API Authoring: Create API from existing WSDL – SOAP to SOAP



API Authoring: Create GraphQL API from existing GraphQL Service



API Authoring: Create AsyncAPI from Event Endpoint Management

Event Endpoint Management

App



⋮



What is GraphQL
anyway?

Ask for bits you want, get the bits you want

The screenshot shows the StepZen API Builder interface. At the top, the URL is https://anant.stepzen.net/ and the endpoint is api/basicdemo. Below the URL, there are navigation buttons for Docs, History, Builder, Connect, and Refresh.

The main area displays a GraphQL query on the left and its corresponding JSON response on the right. The query is:

```
1▼ {  
2▼   customerByEmail(email:"john.doe@example.com") {  
3    name  
4    city  
5    countryRegion  
6▼     orders {  
7      createdOn  
8      carrier  
9      trackingId  
10    }  
11  }  
12 }
```

The JSON response is:

```
▼ {  
  "data": {  
    "customerByEmail": {  
      "name": "John Doe",  
      "city": "Miami",  
      "countryRegion": "US",  
      "orders": [  
        {  
          "createdOn": "2022-05-06",  
          "carrier": "dhl",  
          "trackingId": "6035077344"  
        }  
      ]  
    }  
  }  
}
```

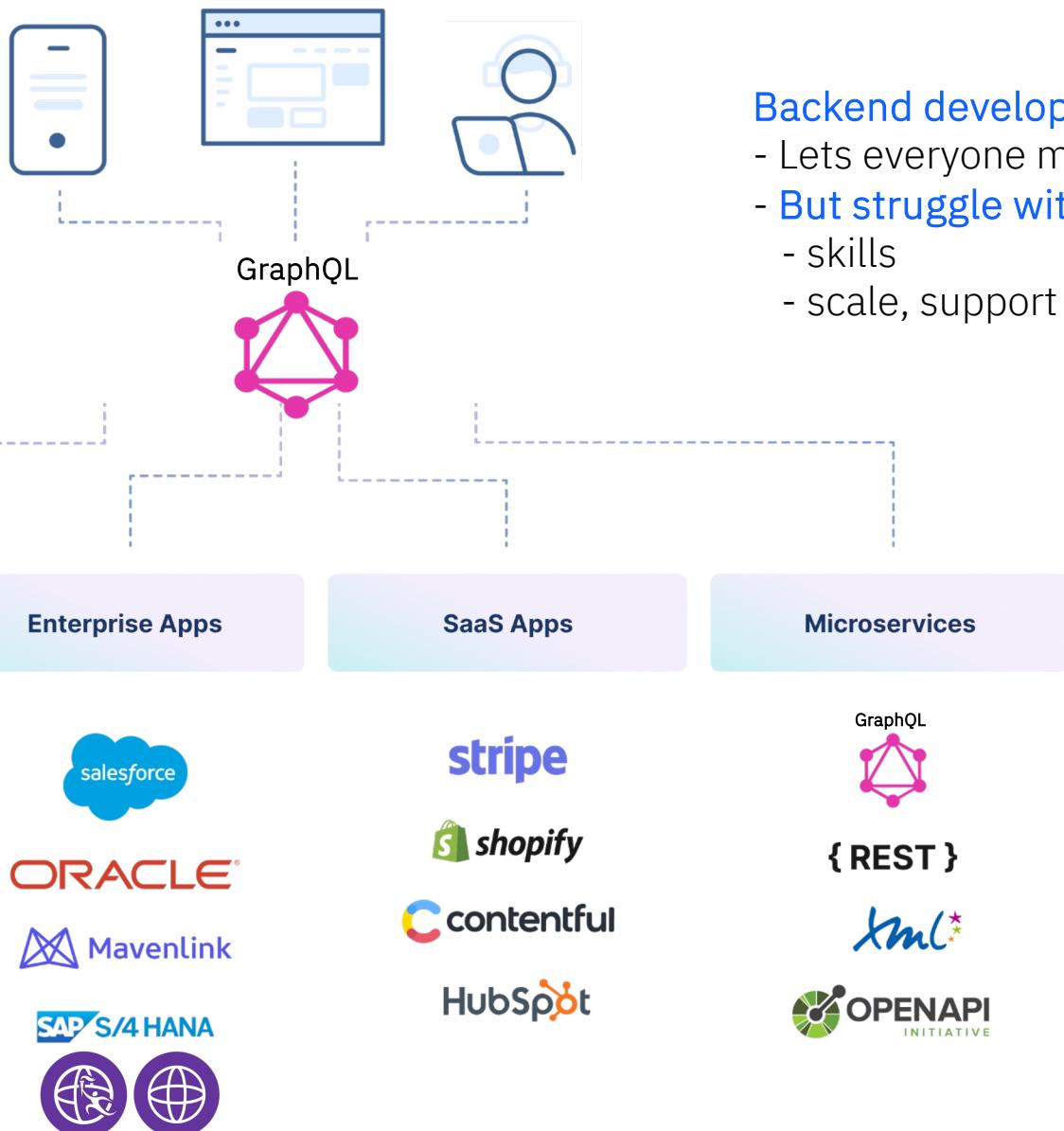
At the bottom, there are tabs for Variables and Headers, and a section for setting Authorization headers:

```
1▼ {  
2  "Authorization": "apikey anant::stepzen.io+1000::8b24d7ec  
3 }
```

GraphQL APIs enable access to diverse sources

Frontend developers love GraphQL:

- Very easy to consume
- All backends get abstracted away

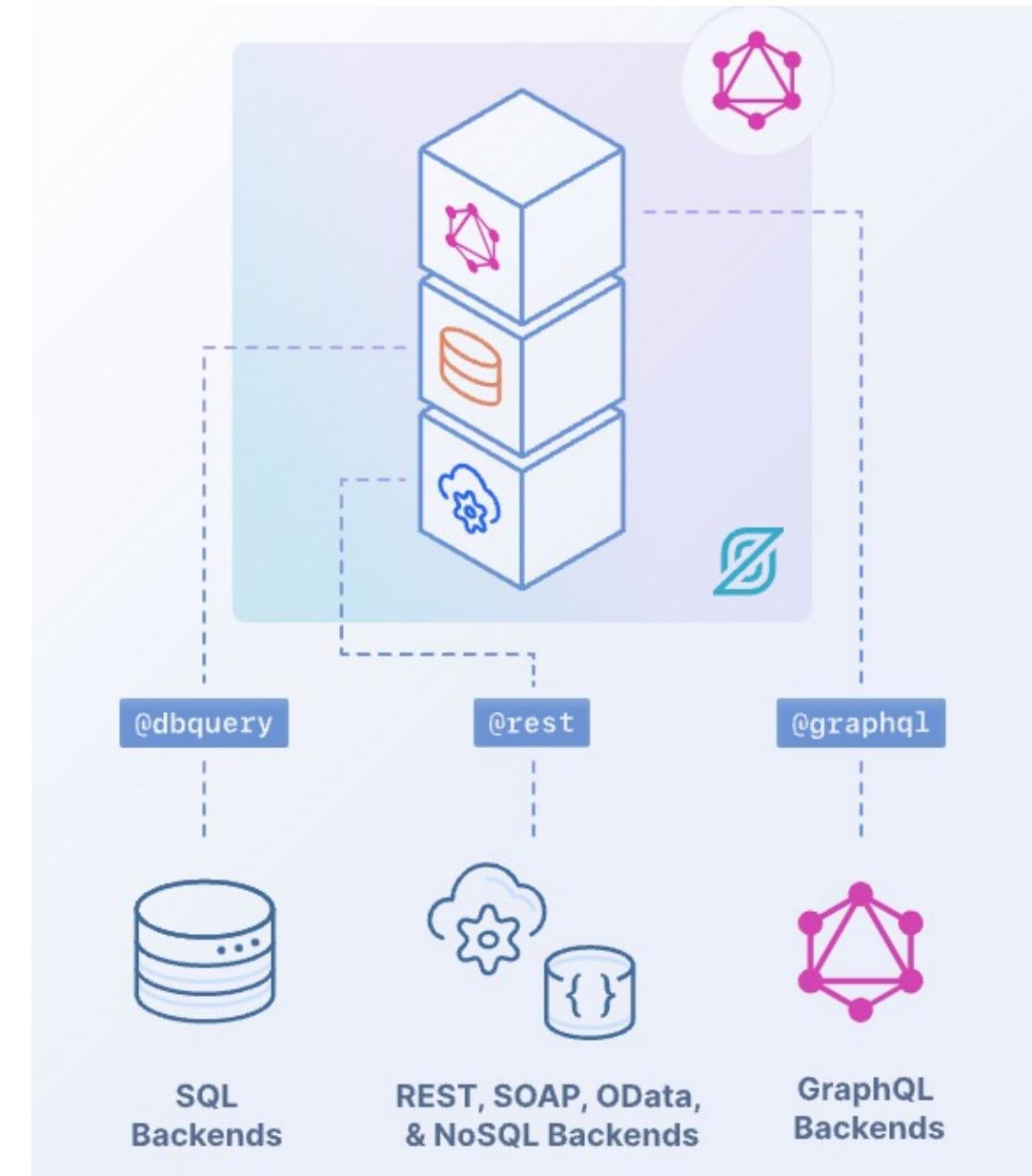


Backend developers like GraphQL:

- Lets everyone move faster
- **But struggle with success:**
 - skills
 - scale, support and maintenance

IBM API Connect for GraphQL

- Is a GraphQL Engine to Build and run API's
- Federate data from multiple sources
 - REST APIs
 - SOAP / WebServices
 - SQL Databases
 - NoSQL Databases
 - GraphQL APIs
- Declaratively build GraphQL APIs from back-end services by auto-generating schemas.
- Bring together different services (sub-graphs) into one.
 - Unified federated GraphQL API
 - Super-graph using annotation, not coding.
- Available as both SaaS and on-premises
- You can use with IBM API Management & IBM API Gateways, and any API Management & Gateways.



API Connect Essentials (StepZen) solves hard problems,
so you can focus on value

StepZen is a GraphQL engine

- Build GraphQL APIs declaratively (no code)
- Introspect diverse backends to easily surface data and services new apps need
- GraphQL server runtime
- Optimizes the hard problems for you



1 Developer GraphQL-izes backends, *easily*

2 Developer “stitches” the GraphQL-ized backends, *easily*

3 StepZen does the hard things, *transparently*



Optimization
Protection
Scale & Low
Latency
Deployment
Caching
Geo Distribution

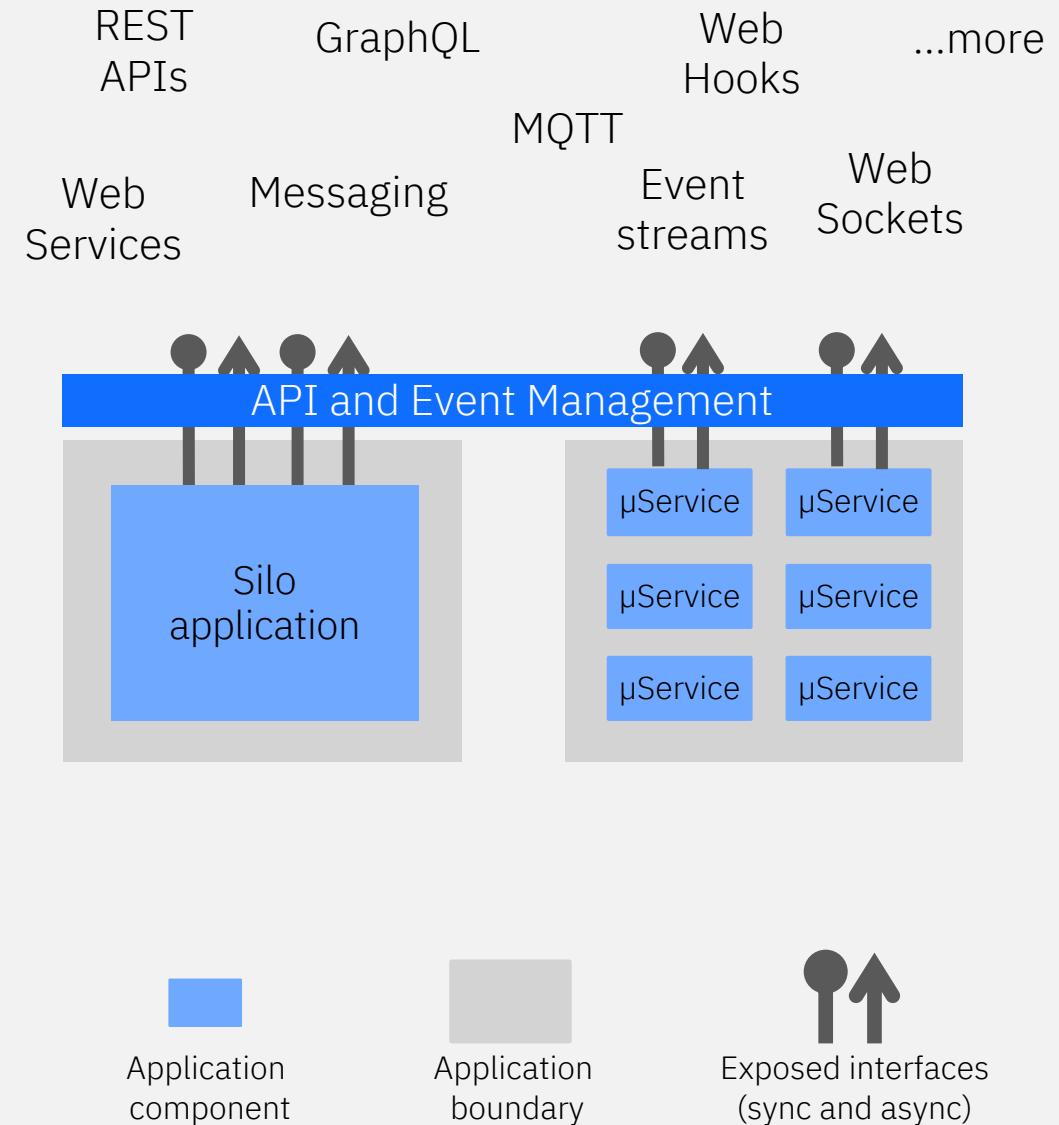
“Beyond REST” – the introduction of Event Endpoint Management ASyncAPIs

REST APIs have increasingly become the dominant form of interface exposure over the last decade

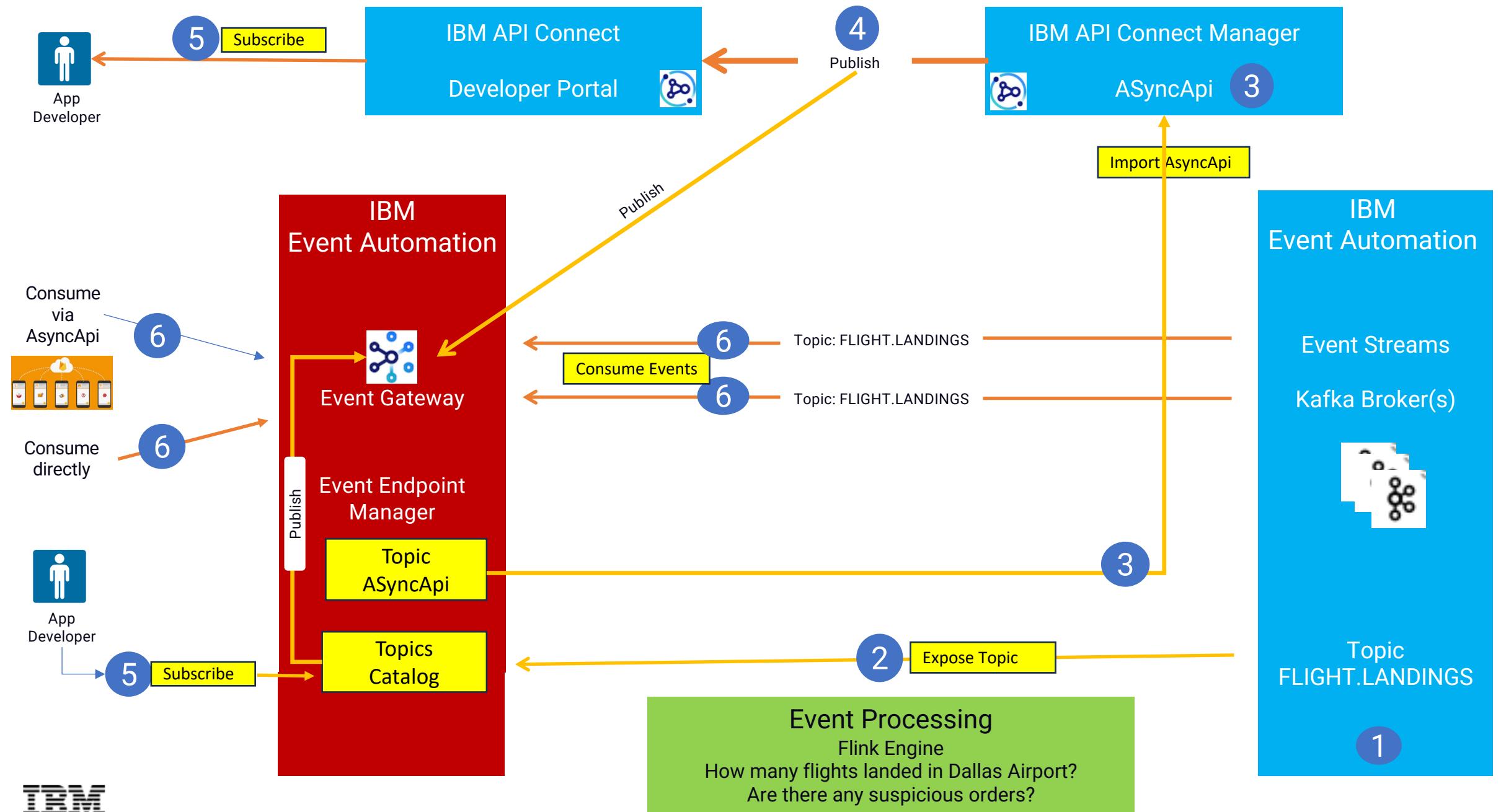
There are new synchronous protocols contenders such as GraphQL.

There is an increasing interest in exposing asynchronous protocols such as that used by Apache Kafka.

IBM API Connect now enables “Event Endpoint Management” to allow Kafka “topics” to be discovered and managed in the same way synchronous APIs are today.



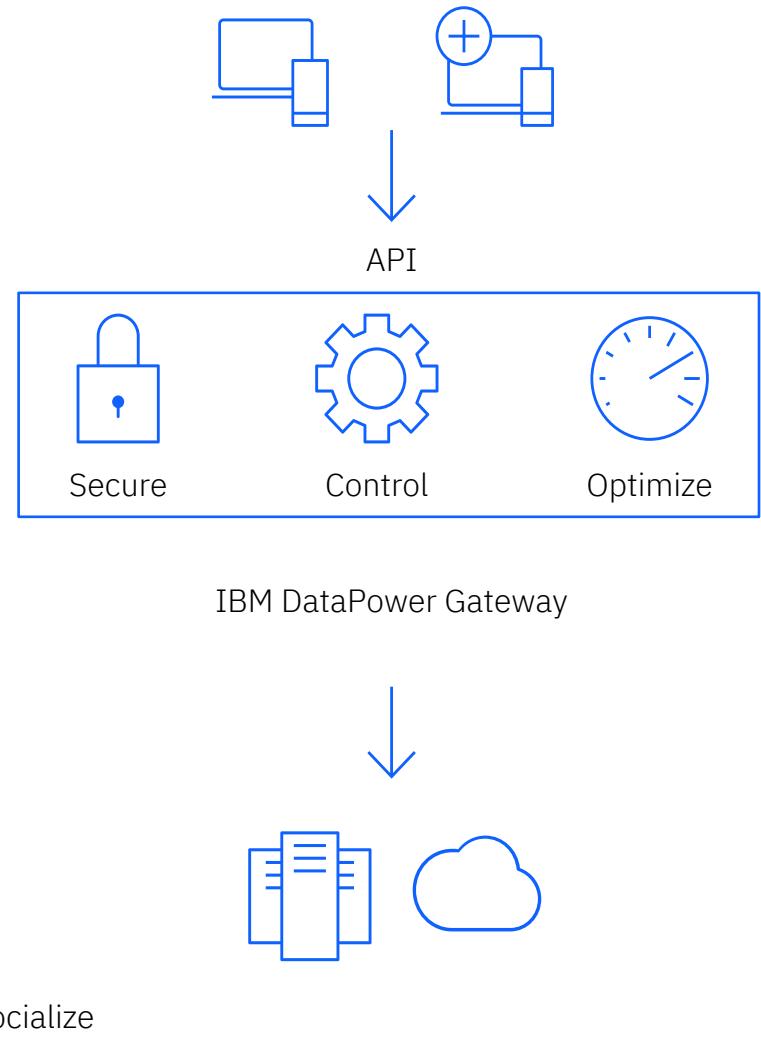
IBM Event Automation – Event Endpoint Management – AsyncAPIs – Flight landings Demo



Secure APIs

Accelerate time to value with easy to apply, pre-built policies to secure, authenticate, manage traffic, and provide mediation.

- Extend base capabilities to meet unique requirements using custom policies
- Provide protected access to backend data and systems at runtime without increasing risk
- Deploy almost anywhere, from the DMZ to microservice co-located, maximizing security and performance
- Meet SLAs using a performant and scalable enterprise-grade gateway
- Secure to the core with a signed, encrypted gateway image that contains no external dependencies, thus minimizing risk



Advanced API Security Enhanced with Noname Advanced API Security for IBM



Noname Advanced Security for IBM augments API Connect & DataPower with traffic monitoring, active testing & more, to protect APIs from growing security risks.

Learn more: <https://www.ibm.com/products/noname-advanced-api-security>



API Discovery

Discover the unmanaged APIs across the landscape



API Posture Management

Quickly identify and resolve misconfigurations that could lead to a breach or compliance violations



API Runtime Protection

Detect and prevent threats in real time by analyzing the API traffic



API Security Active Testing

Test APIs for vulnerabilities early on using prebuilt 160 tests



Create



Manage



Secure



Socialize

Manage APIs

API Discovery

Provide visibility to quickly uncover shadow APIs (not managed by API management) that exist within the enterprise estate and manage them, impacting cost savings, enabling reuse, and reducing security risk.

- Streamlined approach to finding shadow APIs running in your API estate
- Unified view to understand what the discovered APIs are doing and presented to be reviewed and copied to drafts
- Discovery service generates Open API specification from logs via IBM proprietary statistical model
- Log traffic is acquired by placing collectors onto different sources
- IBM provided Collectors for:
 - OpenTelemetry on Istio
 - DataPower API Gateway
 - Nginx
 - GitHub

The screenshot shows the 'Discover' tab in the IBM API Connect interface. On the left is a dark sidebar with navigation links: Home, Discover (which is selected), Develop, Manage, Resources, Analytics, Members, Settings, and Search. The main area has a title 'Discover' with a sub-instruction: 'Discover the APIs in your organization, and copy them to drafts to enable API lifecycle management. To get started, go to sources tab to configure a source for your API discovery. Learn more'. Below this is a table titled 'APIs' with a 'Sources' tab selected. The table has columns: Title, State, Description, Source, and Last updated. It lists four APIs: 'users-jsonplaceholder.typicode.com' (Discovered, user-proxy:1.0.0, 2/2/2024, 4:05:02 PM), 'Uber API' (Copied to draft, Move your app forward with the Uber API send to discovery service, github.com/integrationsuperhero/apic-discovery-test, 1/31/2024), 'Swagger Petstore' (Discovered, A sample API that uses a petstore as an example to demonstrate features in the swagger-2.0 specification, github.com/integrationsuperhero/apic-discovery-test, 1/31/2024), and 'Order' (Discovered, View and track your orders and deliveries, github.com/integrationsuperhero/acme-coffee-discovery, 1/31/2024). To the right of the table is a vertical toolbar with options: Download, View metadata, Copy to draft, Hide API, and Remove API. A blue box highlights the 'Download' button.

The screenshot shows the 'Discover' tab in the IBM API Connect interface. The sidebar and overall layout are identical to the previous screenshot. The main area has a title 'Discover' with the same sub-instruction. Below this is a table titled 'Sources' with a 'Sources' tab selected. The table has columns: Title, Description, Type, Source, Status, and Last run. It lists three collectors: 'user-proxy:1.0.0' (Info not specified, ibm-gateway-proxy, Info not specified, Enabled, 2/2/2024, 4:05:02 PM), 'github.com/integrationsuperhero/apic-discovery-test' (Info not specified, github, Info not specified, Enabled, 1/31/2024), and 'github.com/integrationsuperhero/acme-coffee-discovery' (Info not specified, github, Info not specified, Enabled, 1/31/2024). To the right is a vertical toolbar with options: Add Collector, Pause collector, and Delete collector. A blue box highlights the 'Add Collector' button.



Create



Manage



Secure



Socialize

API Governance

Enables speed to market while acting as guardrails to help develop high quality APIs consistently by adhering to governance standards to bring value to the business.

- Validation of APIs during Development against standards with a focus on consistency of API quality
- Automatic catalog scanning to access conformance of APIs in catalogs and spaces
- Reduce development review cycles by conforming to Industry, Best Practices and Enterprise standards
- Provide a quantifiable quality measure in the form of a scorecard
- CLI commands to configure API governance for automated DevOps pipeline
- OSS spectral based Rulesets
- 10 Rulesets totaling 150+ rules for OWASP, OAS, AsyncAPI, Security Validation, and more
- Rulesets matching based on metadata tags

The screenshot displays the IBM API Connect interface across three windows:

- Top Window:** Shows the "Info" tab for an API named "Order". It includes tabs for "Design", "Gateway", "Test", "Endpoint", and "Explorer". Buttons for "Validate", "Save", and "With specifications" are visible.
- Middle Window:** Titled "Validate API with rulesets". It shows a list of selected rulesets:
 - spectral-async (Async Ruleset, 1.5.0, Private, 7/6/2023, 3:34:16 AM)
 - spectral-oas (OpenAPI Specification, 1.5.0, Private, 7/6/2023, 3:34:17 AM)
 - spectral-owasp (OWASP API Security, 1.4.3, Private, 7/6/2023, 3:34:19 AM)
 - ibm-boundaries (Boundary validation, 1.0.0, Private, 7/6/2023, 3:34:12 AM)
- Bottom Window:** Titled "Scorecard - 1/31/2024, 10:18:17 AM". It features two donut charts:
 - "Notification type": Total 64, 93.8% Info, 6.3% Warn, 0% Other, 0% Error.
 - "Notification by Ruleset": Total 64, 79.7% acme-style-guide, 10.9% spectral-owasp, 7.8% spectral-oas, 1.6% ibm-boundaries.A table below lists audit findings:

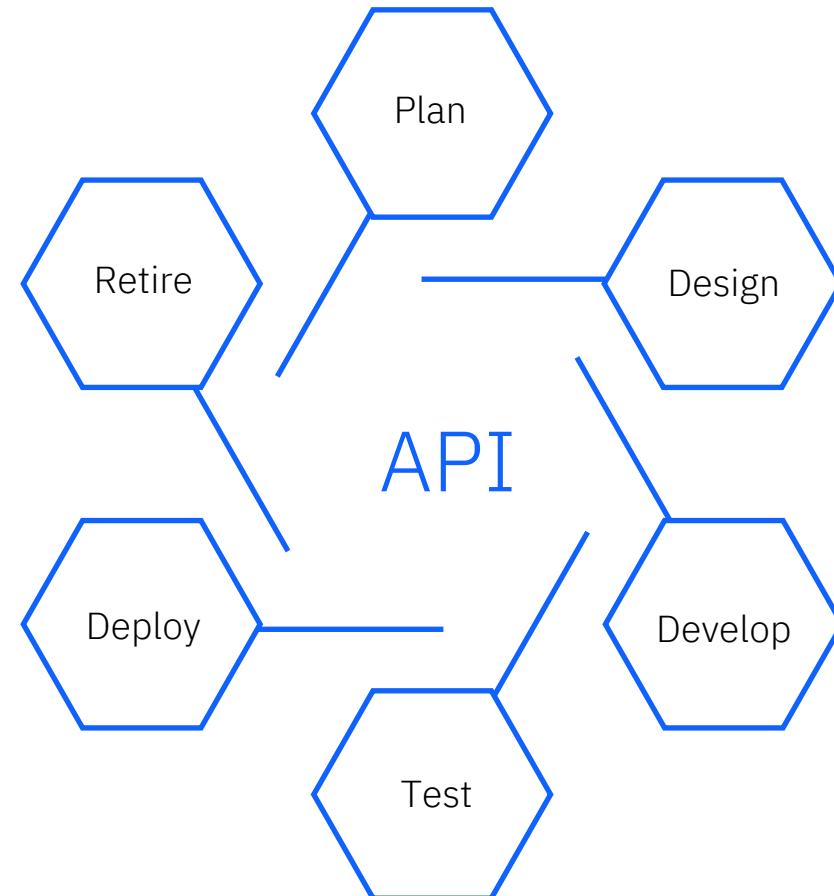
Severity	Message	Rule	Ruleset	API	Location
Info	ACME APIs should have a health path ('/health') defined	health-check-exists	acme-style-guide	Order:2.0.0	paths
Warn	Operation is missing a default response.	default-response	ibm-response	Order:2.0.0	paths://(orderNumber)/get/responses



Manage APIs through the API Lifecycle

Multiform API Management to manage different API formats such as REST, SOAP and GraphQL APIs consistently

- Provide governance and version control across the API Lifecycle from design and develop to retire
- Provide governance and autonomy to each provider organization to manage APIs, products, plans, and multiple gateway endpoints independently within their space
- Package APIs into Products and tailor them to target specific consumer markets
- Publish and Promote across different environments to align with DevOps practices
- Grow go-to-market channels using subscriptions, monetization and community management



Create



Manage



Secure



Socialize

AI Gateway

AI Gateway provides a single point of control that secures and manages interactions between enterprise applications and AI APIs.

Applies traditional API management techniques to AI APIs, acting as a broker that instruments and records AI API traffic and as a Policy Enforcement Point (PEP) with protocol mediation and access management.

Use Cases

- Agility and Speed: Self-service registration for internal teams to use AI APIs, getting developers up and running faster.
- Cost Management: Policies for token-based rate limiting and response caching to prevent runaway consumption.
- Visibility: Dashboards showing which teams and which apps are using tokens, how many, when, and from which models and providers.



Create



Manage



Secure



Socialize

Socialize APIs

Developer Portals: Engage with API Consumers to Drive Adoption

Empower application developers to discover, explore and consume APIs quickly

- Socialize APIs using a self-service, branded Developer Portal across multiple API provider lines of businesses within an organization
- Completely customizable and extensible Drupal based portal to address user specific requirements
- Engage with API consumers via community building features: blogs, forums, ratings, etc.
- Automate portal customizations and operations via CLI commands
- Accelerate consumer onboarding with federated identity management with support for social identity providers such as Google, GitHub, Facebook, etc.
- Consumer Catalog – Lightweight portal without added install or complicated setup associated with Drupal portals
 - Federated login support via OIDC User Registry
 - Insights on API usage at the application level

The collage consists of three main screenshots of developer portals:

- Royal Mail API Portal:** A colorful landing page featuring a cartoon illustration of a postwoman, a man with a smartphone, and a delivery van. It includes links for Home, Documentation, API Products, and Blogs, along with a "Discover our API" button.
- PSA Group for Developers:** A screenshot showing a blog entry titled "Last blog entry" with a link to "14/09 MEETUP PARIS: PG4D + IBM BLUEMIX + IoT WATSON". Below the blog is a snippet of API call history.
- IBM API Connect Developer Portal:** A detailed dashboard showing API usage statistics. It includes sections for Total calls (7), Total errors (0), Average response time (109 milliseconds), Number of API calls (over 1000), Response time (line graph), Number of throttled API calls (empty), and API call history (table).



Create



Manage



Secure



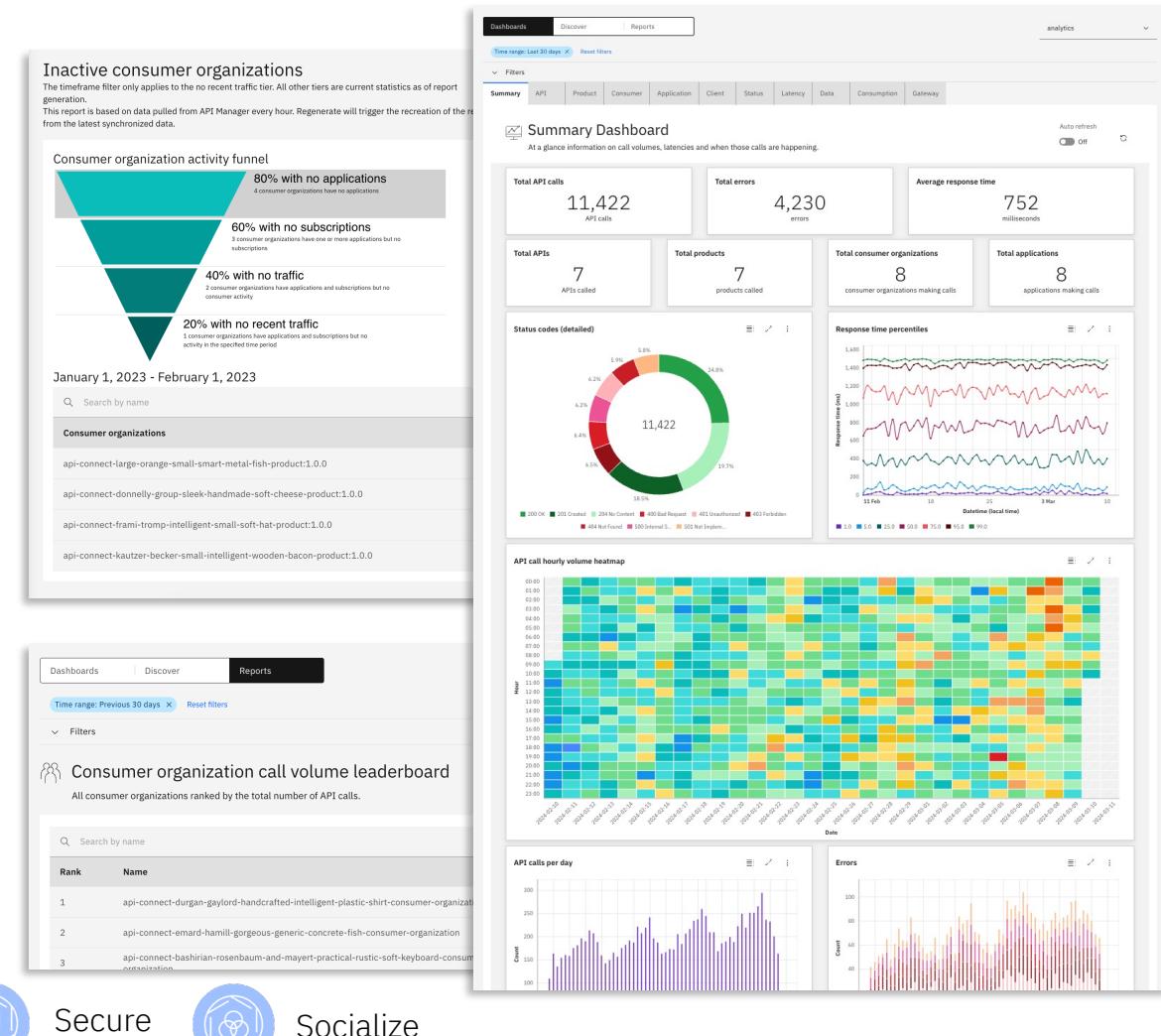
Socialize

Analyze APIs

Analytics to Insights

Get deeper insights to assess the business value of APIs to enterprises by introducing trends on consumer, inactive products, inactive consumer orgs, and details on API call volume leaderboards.

- Insights to get visibility and understand trends in API consumption
 - which APIs are used and those that are not used
 - **Call volume** trends to understand the API usage over a period
 - **Consumer trends** for evaluating how successful API platform has been
 - **Inactive products** for identifying least used products and investigate
 - **Inactive consumer organizations** to understand and drive engagement
 - **Leaderboards** for quick understanding of popular APIs, products, plans and consumer orgs
- New and updated dashboards as well as Discover view to analyze API Calls and determine any problems that occurred
- Offload usage data to external systems: Splunk, Elastic, Syslog, Kafka, DataPower Ops Dashboard, etc



Create



Manage



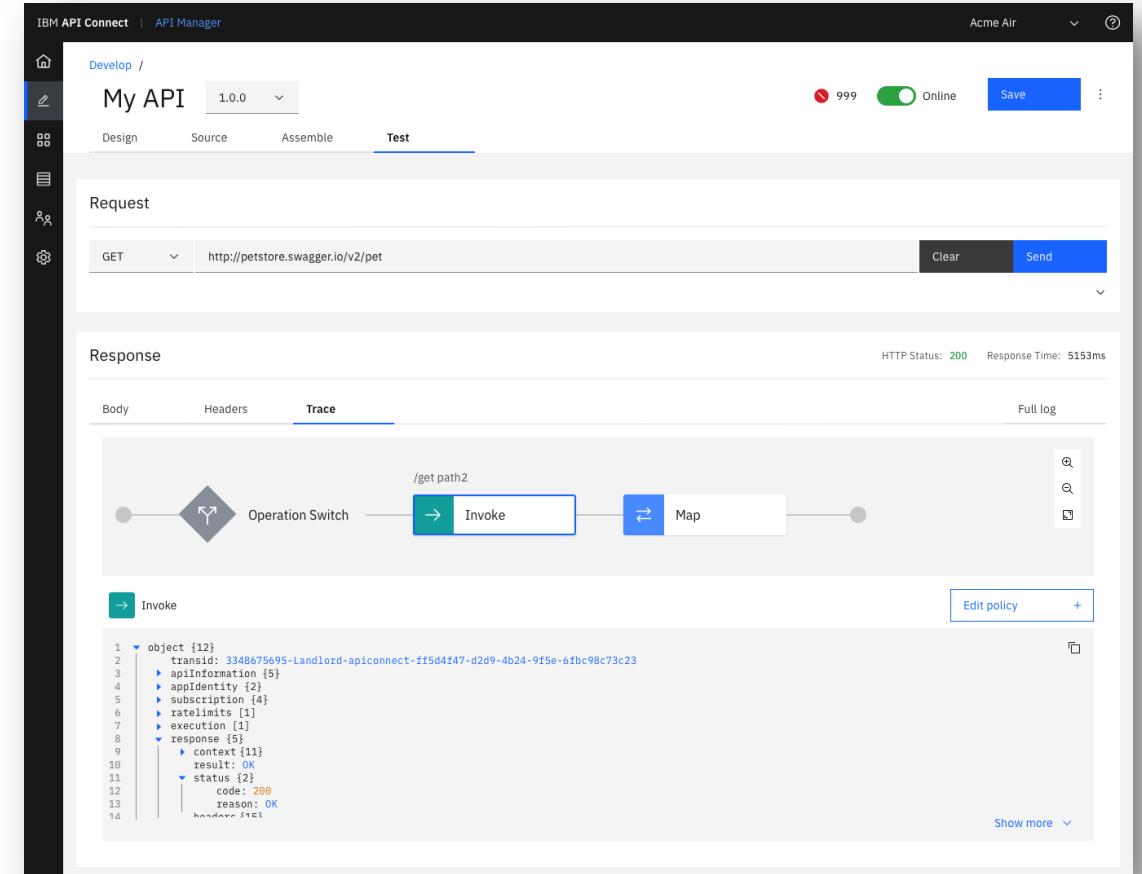
Secure



Socialize

Accelerate Development with Test and Debug of API Execution

- **Simple Test UX** to test APIs
- **Accelerate development** through visual representation of the API execution flow for simple tracing
- **Debug each assembly activity** by viewing input and output
- **Optimize policy execution** through performance driven insights
- **Iteratively develop, test and debug** with intuitive user experience



Auto Test Assist (Fuzz Testing)

Automatically test APIs to identify errors / issues in API Specification within minutes instead of hours

- Improve developer productivity through automatic generation, schedule and test APIs during creation without writing test cases
- Use “Biased Random” request generation, strongly biased towards correct requests unlike plain random requests
- Send thousands of requests to auto-test APIs during creation with no test data needed
- Validate and test APIs with just the OpenAPI document (API endpoint)
- Create comprehensive reports on coverage and easy drill down into the results

The screenshot shows the 'AutoTest profiles' section of a web-based API management tool. At the top, there's a navigation bar with tabs like 'Tests', 'Dashboard', 'API Quality', and 'Vault'. Below the navigation is a search bar and a user dropdown. The main area has a title 'Bookshop Testing' and tabs for 'Design' (which is selected) and 'Report'. On the left, there's a sidebar with 'Configuration', 'Info', and 'Security' sections. The 'Design' tab displays a code editor with a configuration file:

```
1 ##### Default profile for the API Exerciser
2 #####
3 #####
4 #####
5 #####
6 #####
7 #####
8 #####
9 #####
10 #####
11 # The endpoint to test (must be set)
12 ServerURL: 'http://bookshop-gateway-ata.apps.ferni-gyges.cp.fyre.ibm.com'
13 #####
14 #####
15 # Stopping Criteria:
16 # the tester will stop when the first of these limits is reached
17 #####
18 # The maximum length of time to run, in minutes
19 TimeToRun: 2
20 #####
21 # The maximum number of requests to send (@ = unlimited)
22 MaxRequests: @
23 #####
24 # The maximum number of errors to accept (@ = unlimited)
25 MaxErrors: 3
26 #####
27 # Execution Control
28 #####
29 #####
30 #####
31 # whether to submit requests in parallel
32 # this can be helpful in exposing concurrency issues in the API
33 ParallelRequests: true
34 #####
35 # whether to submit known, badly-formed requests
```

To the right of the code editor is a large dark panel containing a detailed report table. The table has columns for Path, Verb, 2xx successes, 4xx successes, 2xx errors, 4xx errors, 5xx errors, and Total. It lists various API endpoints and their performance metrics. At the bottom of the report table, there are pagination controls.



Create



Manage



Secure



Socialize

Smart Generation

Auto generate test cases in seconds for multi-step calls using NLP to understand dependencies between operations.

- Uses Natural Language Processing to understand dependencies between operations to create test cases
- Intelligence to generate assertions for headers and payload for validating API behavior
- Feature rich visual test editor
- Seamlessly integrate with DevOps pipeline through admin REST API
- Insights into test runs and API quality

The screenshot displays the API Management Test API interface, specifically the 'Bookshop Testing' profile under 'AutoTest profiles'. The interface is divided into several sections:

- Design Tab:** Shows a code editor with configuration settings for the API test profile. Key configurations include:
 - # Default profile for the API Exerciser
 - # The API
 - # The endpoint to test (must be set)
 - ServerURL: http://bookshop-gateway-atm.apps.fisma-qygen.svc.fyre.io:8080
 - # Stopping Criteria:
 - # that tester will stop when the first of those limits is reached
 - ####
 - # The maximum length of time to run, in minutes
 - TimeValue: 2
 - # The maximum number of requests to send (0 = unlimited)
 - MaxRequests: 0
 - # The maximum number of errors to accept (0 = unlimited)
 - MaxErrors: 3
 - # Execution Control:
 - ##
 - # whether to submit requests in parallel
 - # this can be helpful in exposing concurrency issues in the API
 - ParallelRequests: true
 - # whether to submit known, badly-formed requests
- Report Tab:** Displays a table of test results for various API endpoints. The table includes columns for Path, Verb, 2xx successes, 4xx successes, 2xx errors, 4xx errors, 5xx errors, and Total. Examples of rows include:

Path	Verb	2xx successes	4xx successes	2xx errors	4xx errors	5xx errors	Total
/books	POST	0	0	0	274	0	274
/customers	POST	135	0	0	131	1	267
/customers/{customer_id}	DELETE	135	0	0	51	1	187
/customers/{customer_id}	GET	143	0	0	41	5	189
/customers/{customer_id}	PUT	0	0	0	194	0	194
/customers/{customer_id}/orders	POST	0	0	0	291	2	293
- Visual Test Editor:** Shows a detailed view of a specific test step for a GET request to \$({endpointUrl}). The step includes assertions for payload response status code (assert equals), content type (assert equals), and address fields (assert exists). The interface also shows tabs for Data Sets, Vault, and HTTP Client.



Create



Manage



Secure

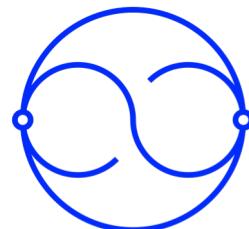


Socialize

Automate End-to-End with DevOps-ready Features

A comprehensive set of public APIs to API Connect for CI/CD integration and automation.

- Command Line Interfaces (CLIs) for each API operation, including API Governance, facilitating end-to-end automation
- Versioning of APIs and API products supports your CI/CD processes
- Use DevOps tools and pipeline choices to:
 - Automate running API tests
 - Manage or publish API products
 - Automate developer portal customizations



```
swethasridharan@mac APIs % apic --help
APIConnect toolkit 669ecc35a7824d6abe7ef2323b5d49d67776a292 (Built 2024-06-18T20:01:23Z)

Usage:
  apic [flags]
  apic [command]

Available Flags:
  --accept-license      Accept the license for API Connect
  --debug               Enable debug output
  --debug-output string Write debug output to file
  -h, --help              Help for apic
  --lang string          Toolkit operation language
  --live-help            Enable or disable tracking of limited usage information
  -m, --mode string      Toolkit operation mode (default "apim")

Examples:
To accept the license and disable live-help, you can run the following command:
$ apic --accept-license --live-help=false

To accept the license and enable live-help, you can run the following command:
$ apic --accept-license --live-help=true

Available Commands:
  Creating applications and artifacts
    client-credentials
    config
    create
    Manage the client configuration parameters. Client ID and Client Secret.
    Create an API or product definition

  Publishing to the cloud
    activations
    analytics
    analytics-services
    api-keys
    api
    apps
    associates
    availability-zones
    billings
    catalog-settings
    catalog
    cloud-emails
    cloud-settings
    configured-api-user-registries
    configured-billings
    configured-catalog-user-registries
    configured-gateway-services
    configured-auth-providers
    configured-apis-client-profiles
    consumer-orgs-settings
    consumer-orgs
    credentials
    draft-apis
    draft-products
    drafts
    entries
    extensions
    gateway-extensions
    gateway-services
    global-policies
    Manage configuration variables
    Anis operations
    Apps operations
    Associates operations
    Availability Zones operations
    Billings operations
    Catalog Settings operations
    Catalog operations
    Cloud Email operations
    Cloud Settings operations
    Configured Api User Registries operations
    Configured Billings operations
    Configured Catalog User Registries operations
    Configured Gateway Services operations
    Configured OAuth Providers operations
    Configured Oauth Client Profiles operations
    Consumer Org Settings operations
    Consumer Orgs operations
    Credentials operations
    Draft Apis operations
    Draft Products operations
    Drafts operations
    Entries operations
    Extensions operations
    Gateway Extensions operations
    Gateway Services operations
    Global Policies operations
```



Create



Manage



Secure



Socialize

API Management with choice and flexibility



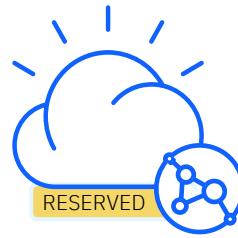
IBM Cloud Pak for Integration

Consume API Management integration capabilities in a unified integration platform, on OpenShift anywhere



IBM API Connect Software

Deploy on-prem or any cloud, bring your own OpenShift, other K8s platforms, or VMware



IBM API Connect Reserved Instance

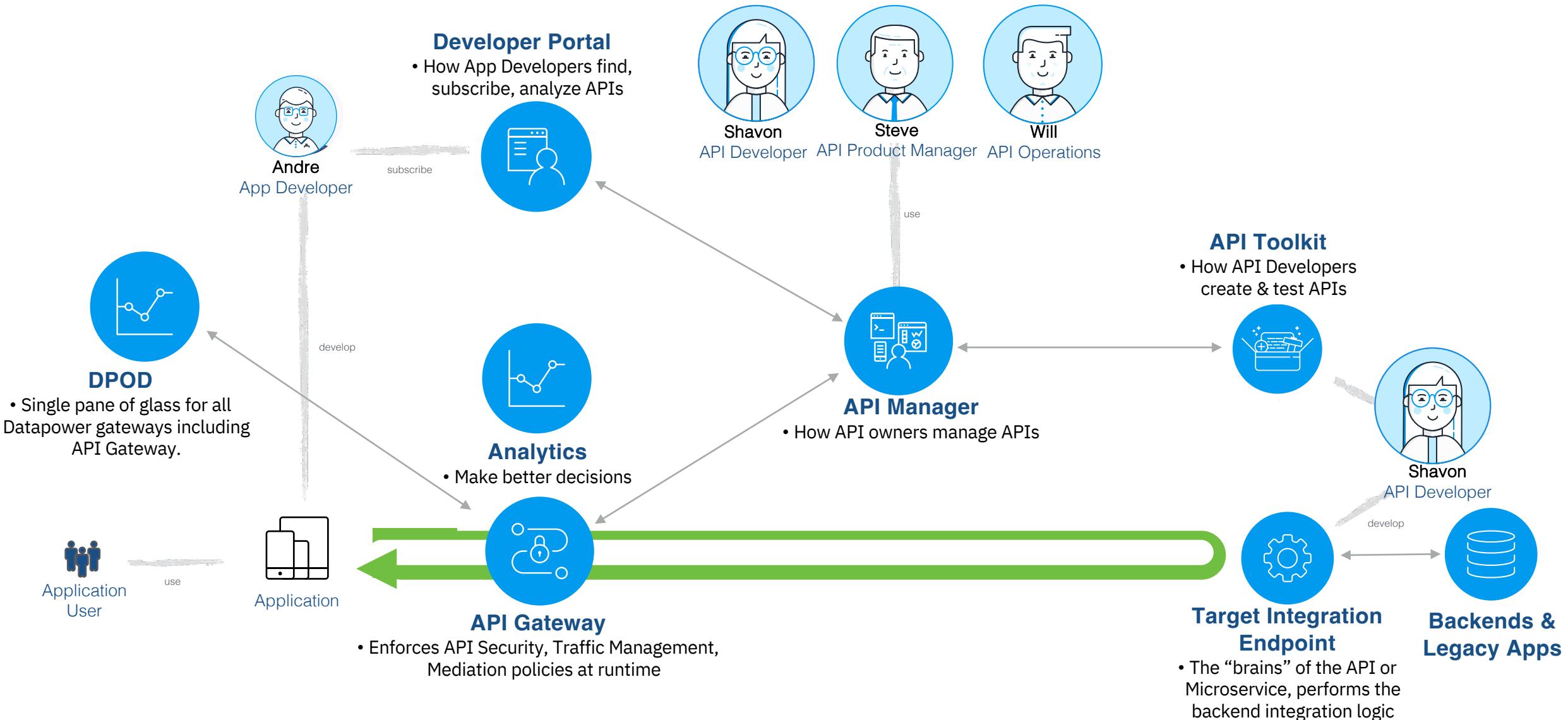
Single tenant service on IBM Cloud



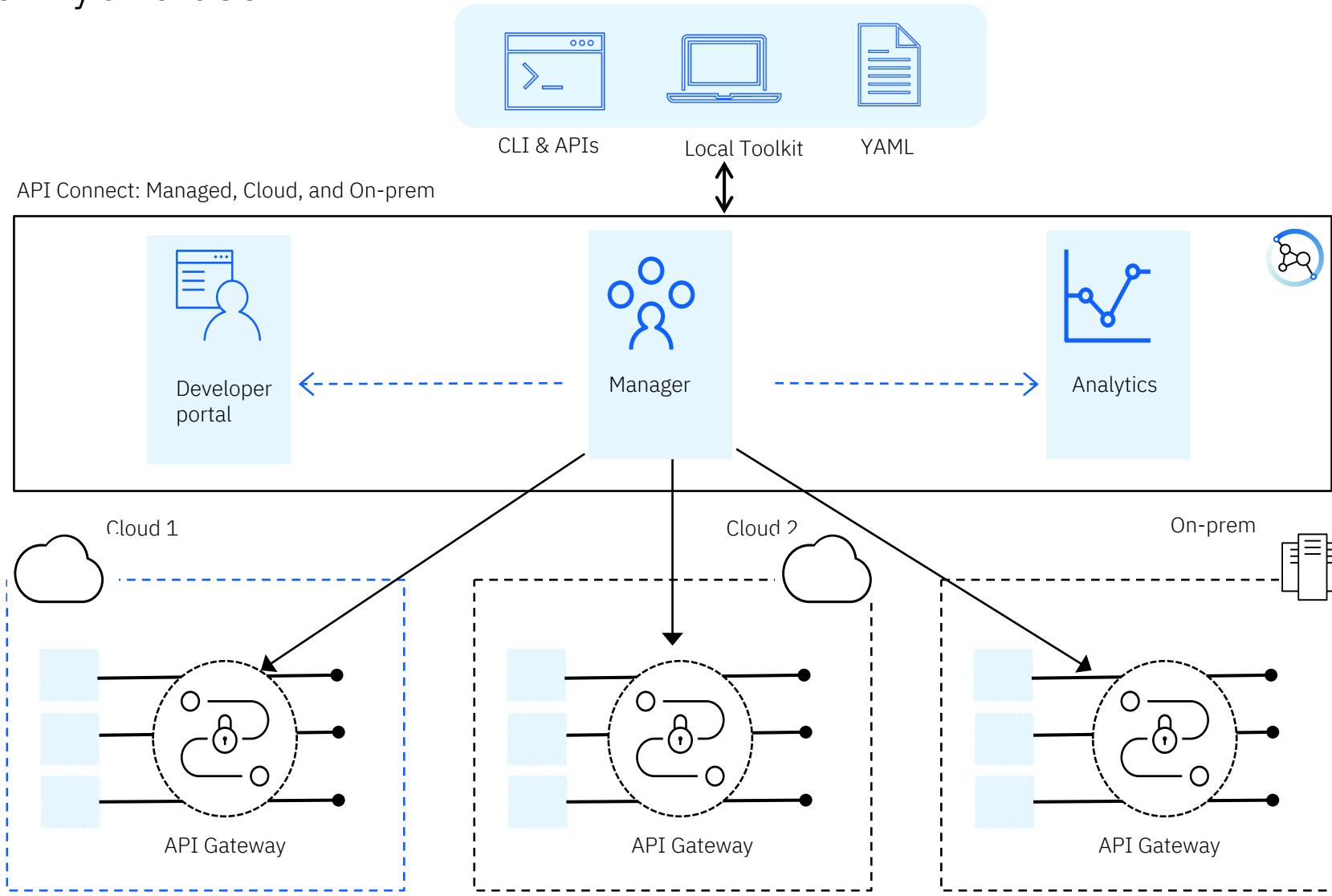
IBM API Connect Enterprise as a Service

Multi tenant service available in the AWS Marketplace

API Connect: Components & Personas



Modern and cloud-native: Scalable and built for multi-cloud or hybrid use



Optimized developer experience for rapid local API creation, testing, deployment, and DevOps integration

Centralized control plane for creating, managing, socializing and analyzing the API program

Data plane can be deployed anywhere data and apps live

IBM API Connect is consistently recognized as a market leader

IBM Ranking: 2023 Leader
8th time in a row.

Figure 1: Magic Quadrant for API Management



Source: [Gartner Magic Quadrant: API Management, 2023](#)

IBM is ranked #1 vendor in 4 of 5
Gartner critical capabilities:

- Multiexperience Architecture
- Integration using APIs
- Internal API management
- Productizing APIs
- Distributed API management

IBM Ranking: Leader



Source: [Gartner Magic Quadrant: API Management, 2023](#)

Source: [The Forrester Wave: API Management Solutions, Q3 2022](#)



Resources: Learn More About API Connect and API Management



Provides a set of security principles to drive the highest possible level of API protection.

[Principles for API security →](#)



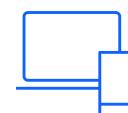
Trust APIs from development to production?

[Can you trust your APIs? →](#)



How to organize both IT and business roles in order to have a successful API agenda.

[Recommendations for an API economy Center of Excellence →](#)



Iteratively develop, test, and promote APIs across environments.

[Agile API development powered by API Connect →](#)

Try it Yourself

Free trial on AWS instantly deployed →

[Sign up for a free 30-day trial](#)

Free trial with Cloud Pak for Integration →

[Free trial](#)

Available API-C Labs

Proof of Technology Labs

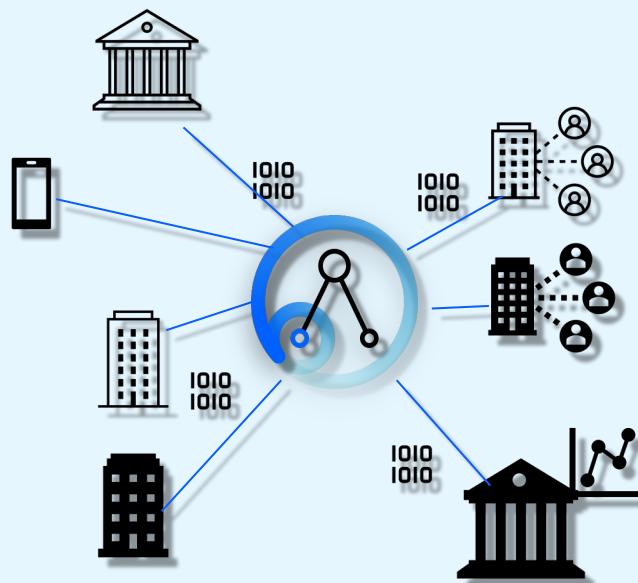
Explore key APIC capabilities
such as

- Create and Secure an API to Proxy an Existing REST Web Service
- The Developer Portal Experience
- Add OAuth Security to your API and use Lifecycle Controls to Version Your API.
- Creating a StepZen GraphQL API.
- Test APIs using SmartGenerator

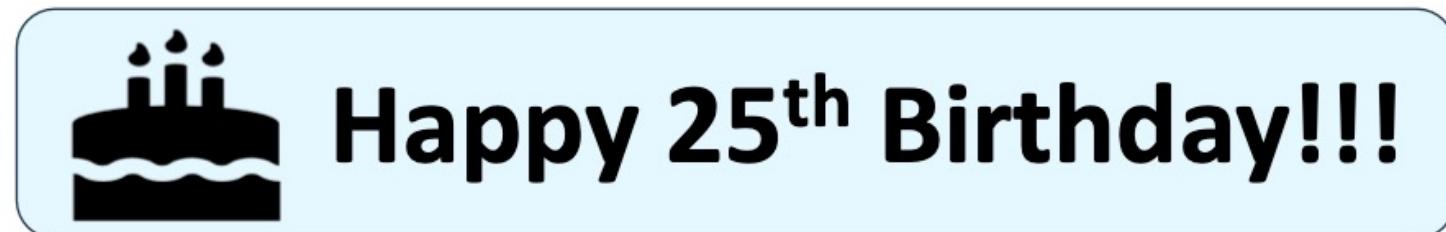
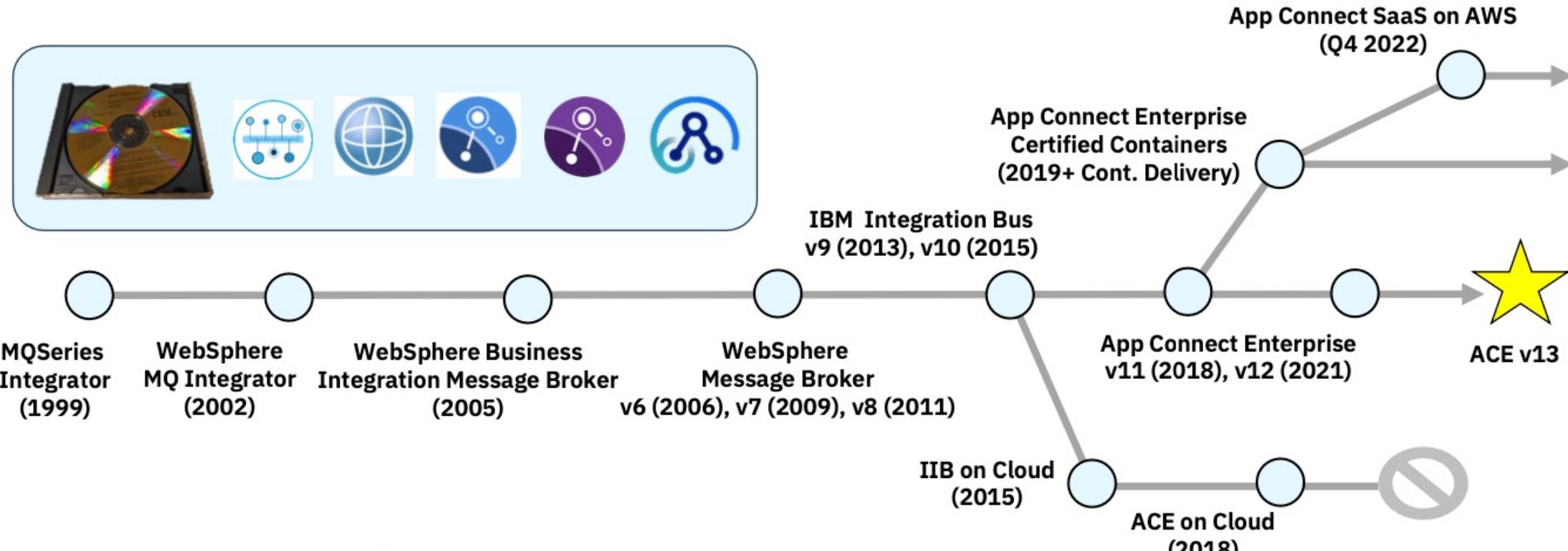


Application Integration (Any to Any integration solution)

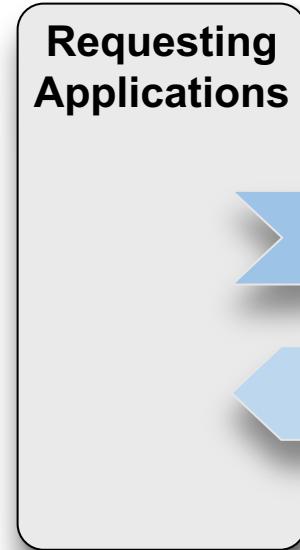
- Integration of Apps and Data Using Existing APIs
- API-led approach delivers multi-dimensional value in enterprise connectivity



ACE: Past, Present and Future!



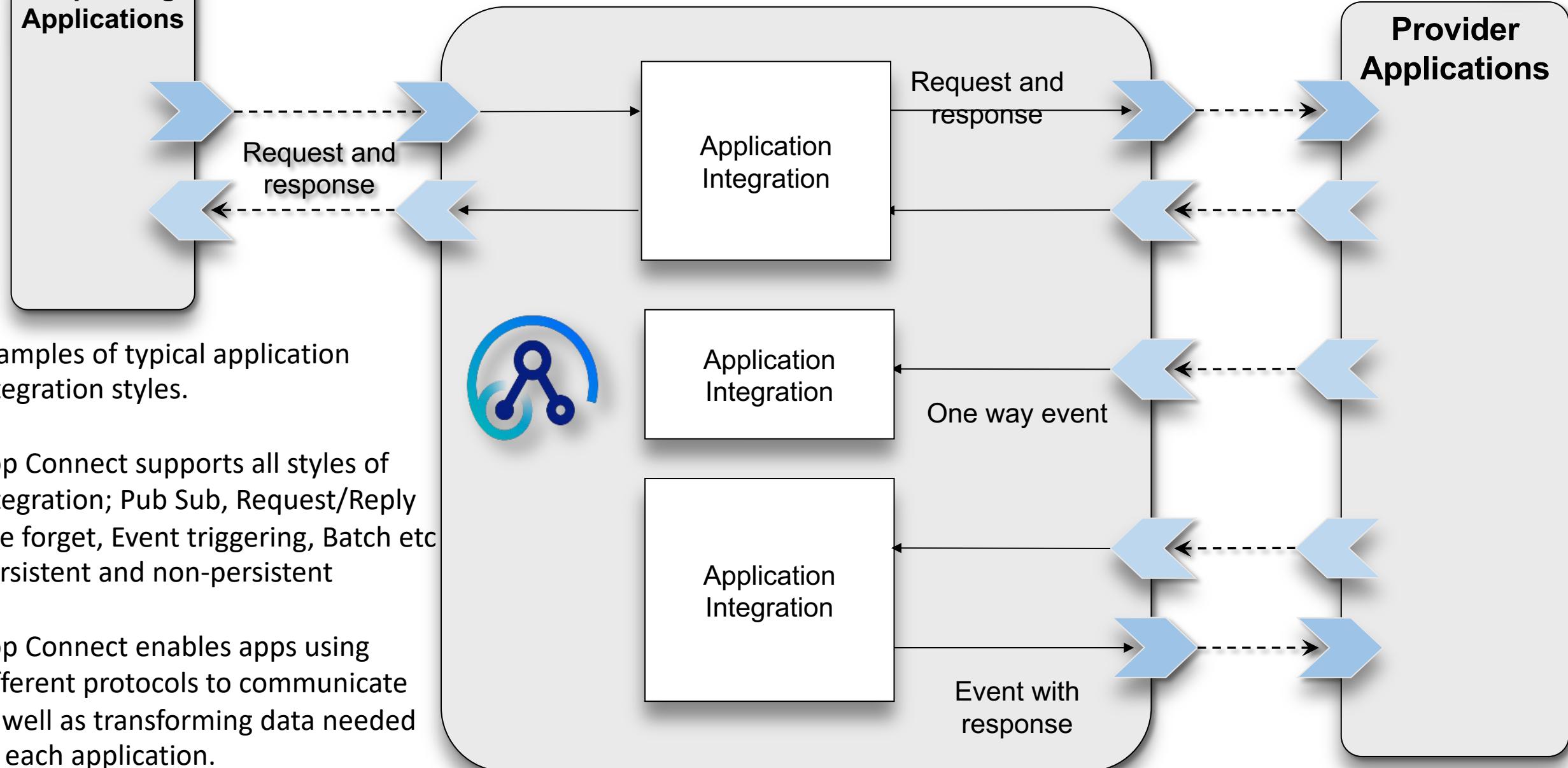
What is application integration?



Examples of typical application integration styles.

App Connect supports all styles of integration; Pub Sub, Request/Reply, Fire forget, Event triggering, Batch etc persistent and non-persistent

App Connect enables apps using different protocols to communicate as well as transforming data needed by each application.



Application integration use cases



SaaS integration

Enable effortless, rapid cloud integration to streamline connectivity for [improved operability](#) across all apps and environments



360° client view

Become [insight-driven](#) by unlocking the full potential of client data across all their interaction points



Real-time data needs

[Quickly reconcile data](#) across disparate sources for mission critical and real-time decision-making needs



Back-office integrations

Build robust accounting, inventory, and resource planning processes that scale on demand to [reduce risk to the business](#)



Modernization

Run integrations close to where data lives with [total deployment flexibility](#)



Omni channel

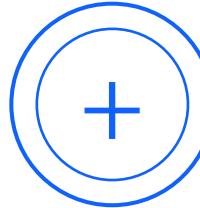
[Create engaging client experiences](#) when users blend APIs and events for a seamless and personalized approach

IBM App Connect



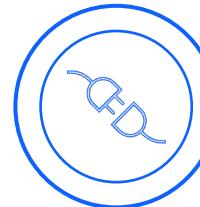
Unlock the value of systems and data by connecting business applications, integrating data, building APIs, and acting on events

64



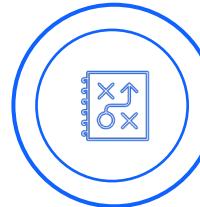
Build

Quickly build and test integration flows with authoring tools for both integration experts and business technologists



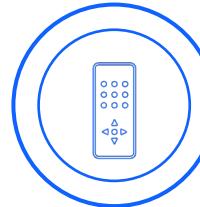
Connect

Securely connect with hundreds of applications on cloud and on-premises with pre-built connectors and templates



Transform

The fastest performing engine that virtually supports any-to-any data format. Offers AI-powered, smart tooling for non-specialists

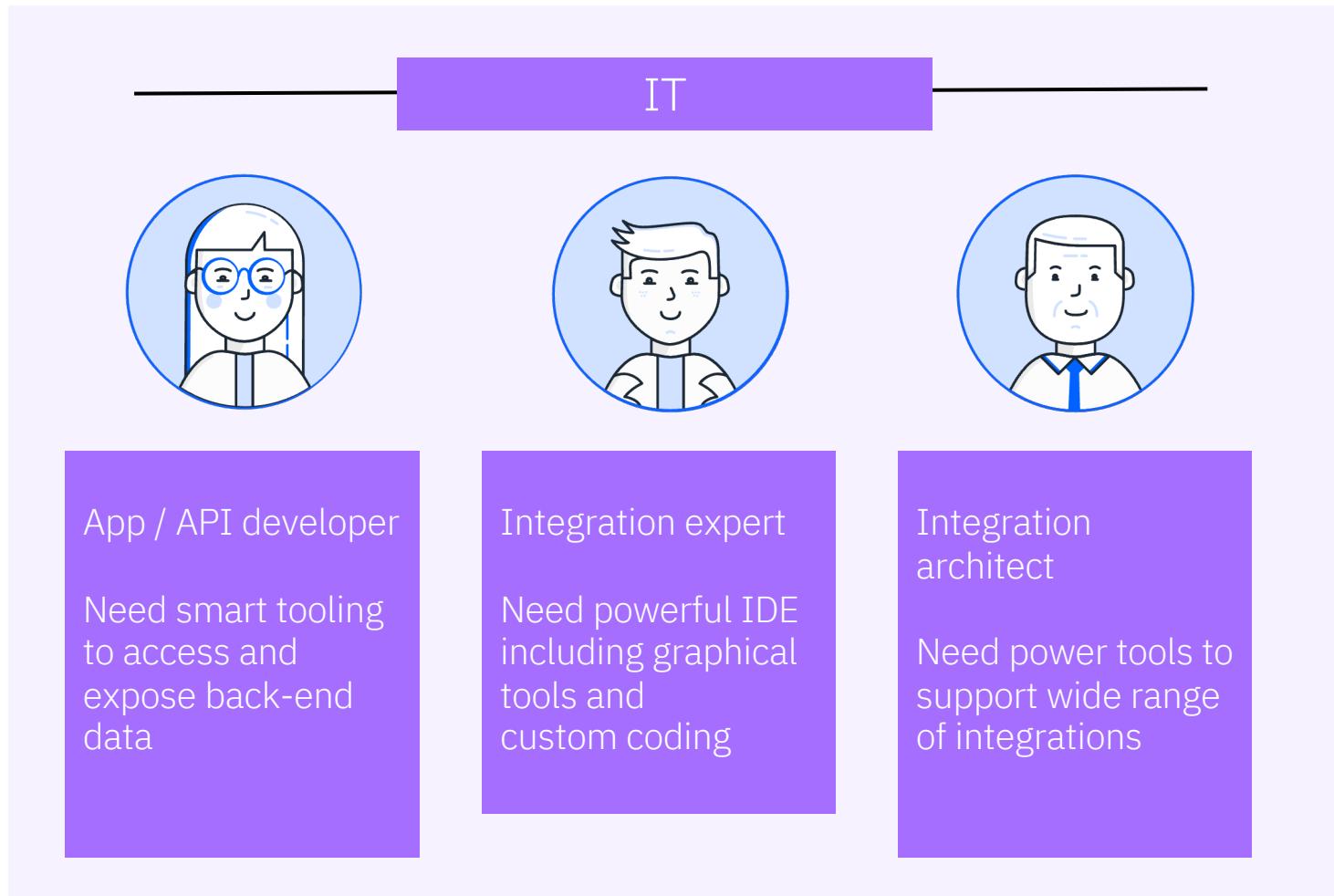
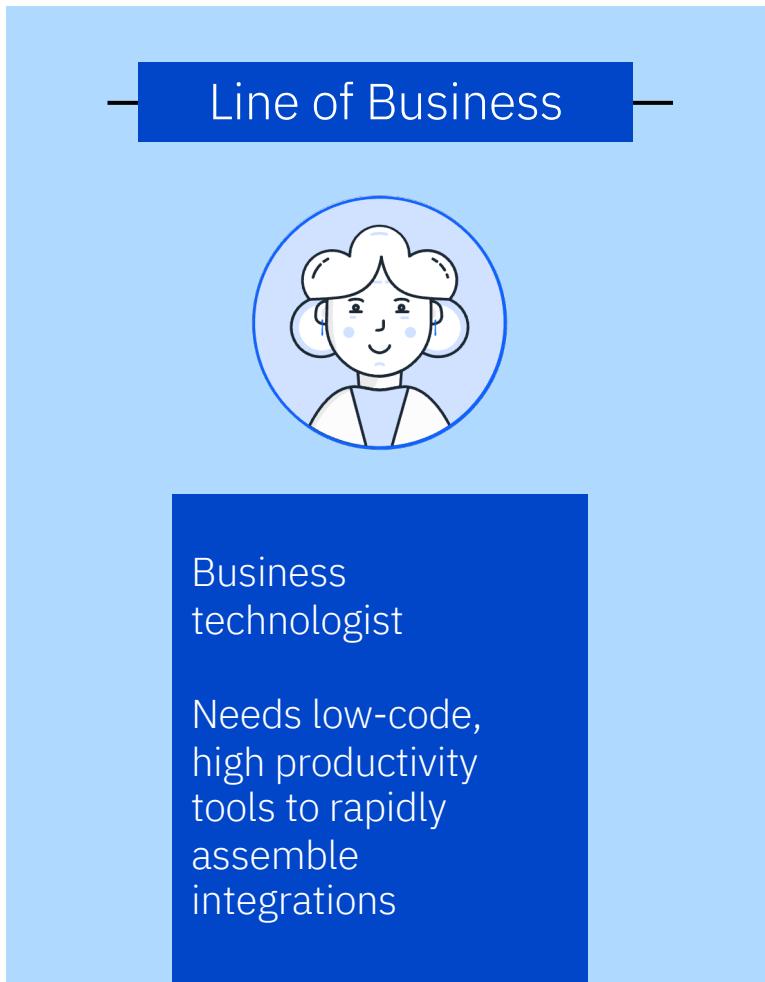


Manage

Easily deploy integrations using ESB or microservices with visibility into flow health and performance across hybrid environments

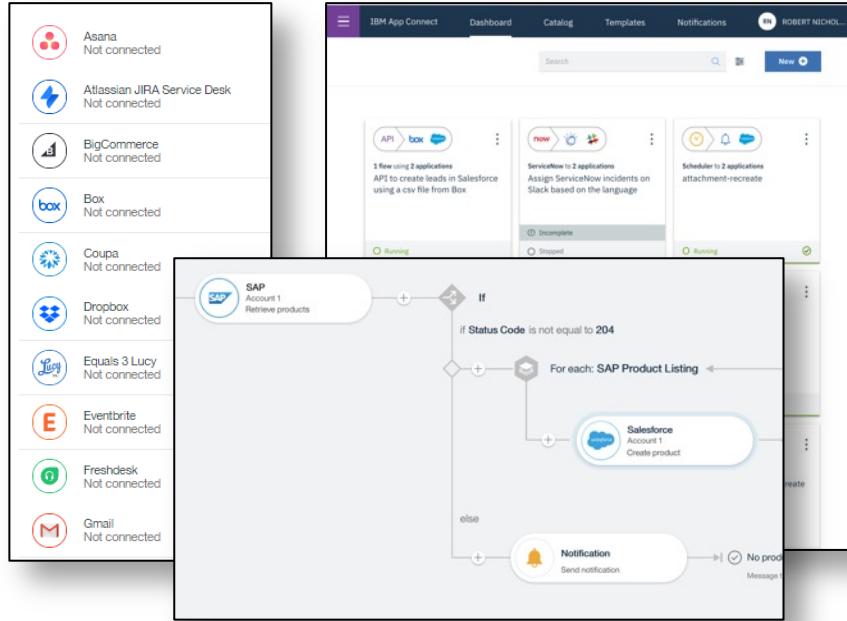
Integration for the whole team

Helping a diverse set of users easily achieve all their connectivity needs



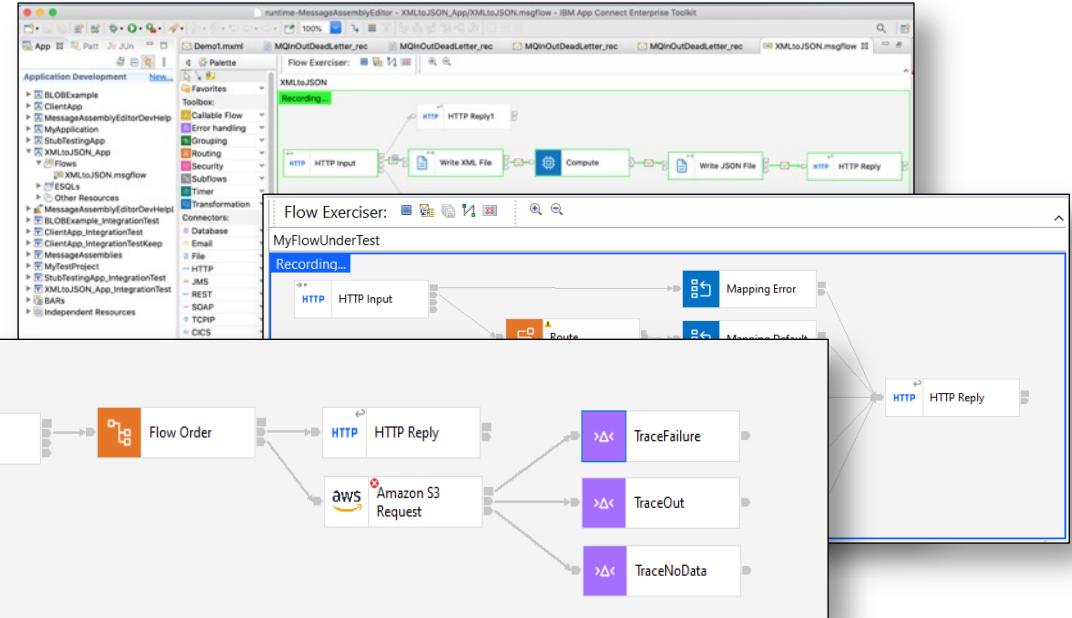
Complimentary authoring experiences support a wide range of users

Designer for business technologists



Designer provides an award-winning user interface with **no-code** development and **AI-powered** tooling for **business users**

Toolkit for integration experts



Toolkit provides **feature rich message modelling** with **built-in nodes** encapsulating transports, technologies, and applications for **integration experts**

Common runtime for both authoring experiences, deploy on-prem in an ESB style or in containers for micro-services and/or to clouds

Designer - Zero Code development

No code, streamlined, guided experience to create integrations faster and easier

- Create APIs, act on events, and integrate data
- Design flows with Connectors, pre-discovered events, and APIs
- Use native business logic blocks to build intelligent workflows
- Start with 100s of templates and examples with zero learning curve



AI-powered
tooling



Democratize
integration dev



increase
productivity, ROI

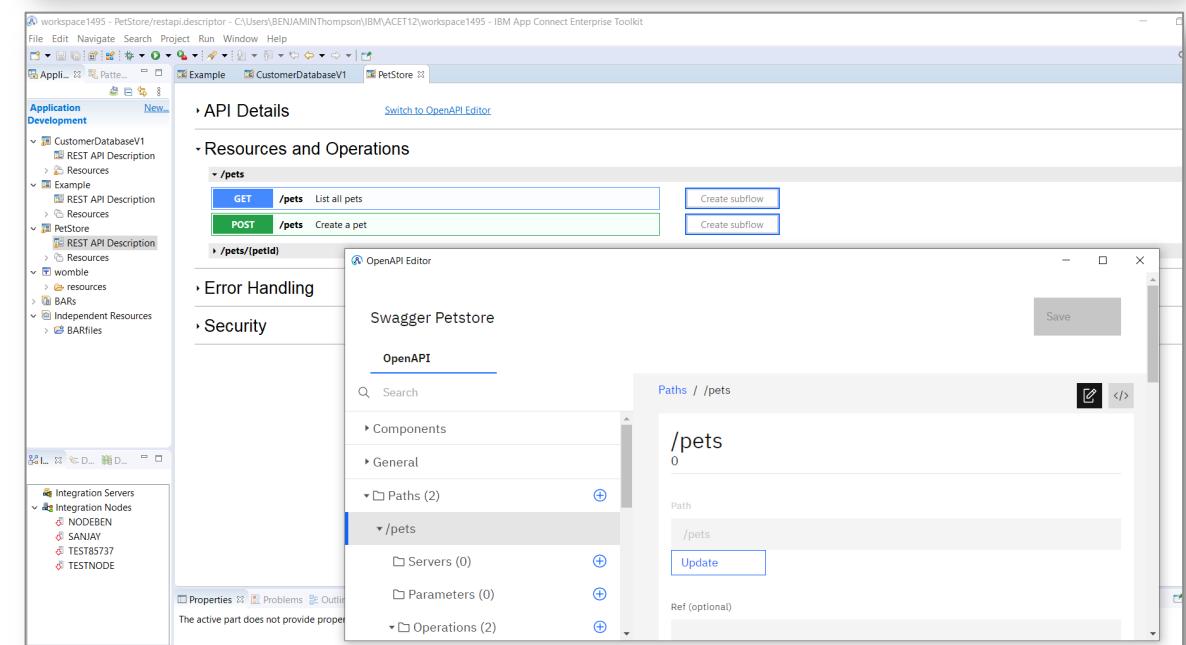
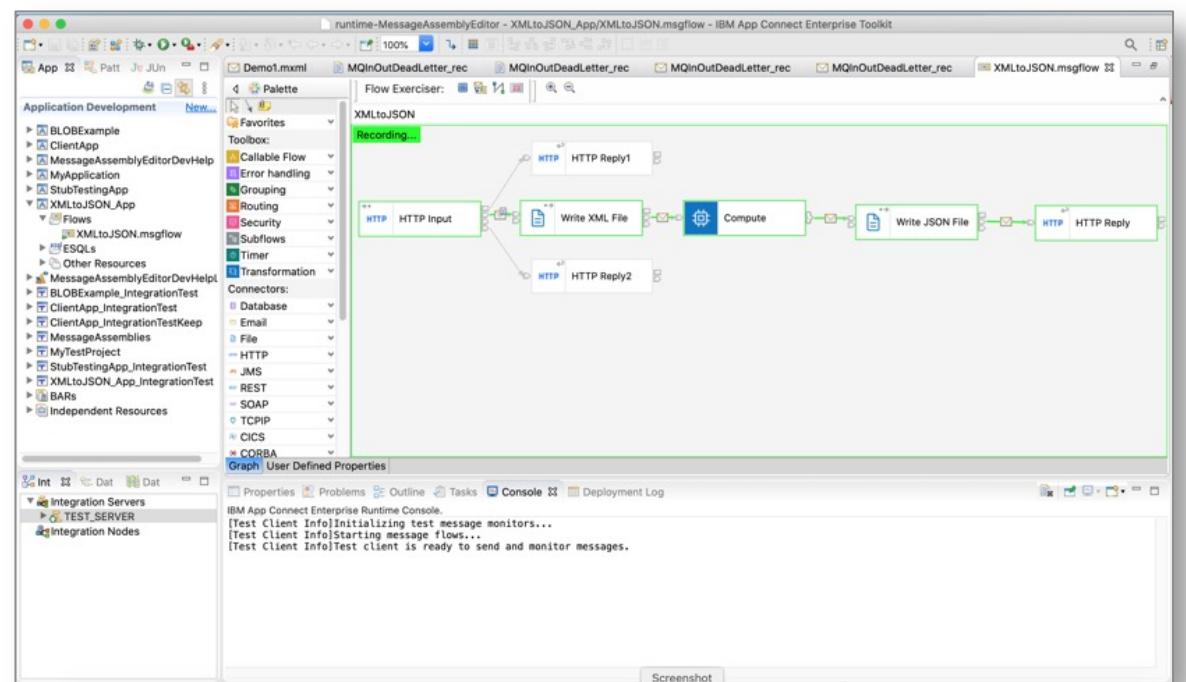
The screenshot shows the IBM App Connect Designer interface. At the top, there's a header with the title "IBM App Connect" and a "Dashboard / sample data demo" section. Below the header, there are two main components: "Eventbrite Account 1 Retrieve contacts" and "Gmail Account 1 Create email". A central panel titled "Context and sample data" displays a list of contacts from Eventbrite, including fields like User ID, Contact list, First name, Last name, Email, Created, and Name. To the right, there's a "Gmail" configuration panel where a new email is being composed, with fields for "To", "Subject", and "Body".

The screenshot shows the IBM App Connect Designer interface with a "Templates" sidebar. One template is selected: "Salesforce to 4 applications Classification and sentiment analysis on new Salesforce case". The template details are shown in a modal window, including instructions to use Watson Tone Analysis, Watson Natural Language Classifier, and Watson Classification. The "Create flow" button is highlighted at the bottom of the modal.

Toolkit for IT technologists – High Control

Most advanced enterprise platform for designing and developing integrations

- Create REST APIs, services, pub/sub, event, sync/async, transactional
- Total connectivity with multi-protocol, full database, ERP, and EIS support
- Drag and drop with pre-built blocks or code in a variety of languages
- Quickly start with 100s of tutorials with templates and working examples or with Patterns that can be configured for faster time to market of services
- Deploy to a highly optimized and high-performance runtime that is available on-prem in an ESB configuration, as micro-services in containers and to clouds including managedaaS clouds.

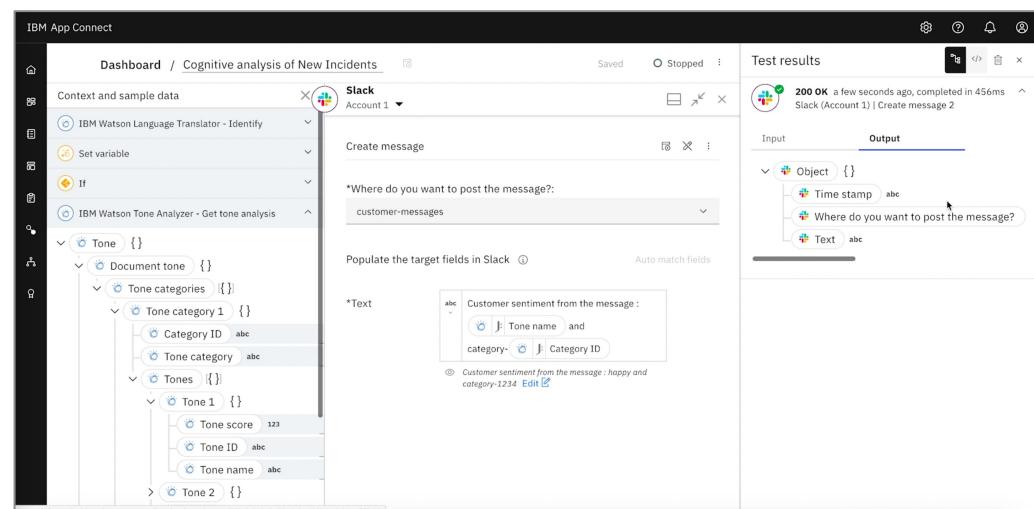
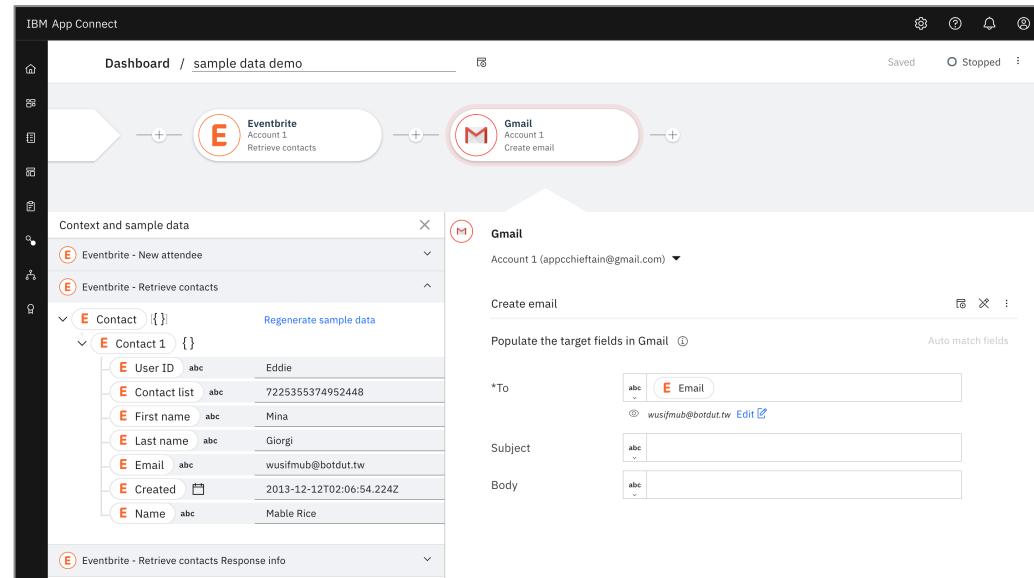


Data-driven development and test for business technologists

Run quick tests from within Designer without going through deploy cycles

- Auto-generate sample and mock data for a wide range of scenarios
- Perform inline visual validations with smart previews
- Individually test each node, or the entire flow, against real endpoints
- Iterate quickly with smart insights, test history, and troubleshooting tips

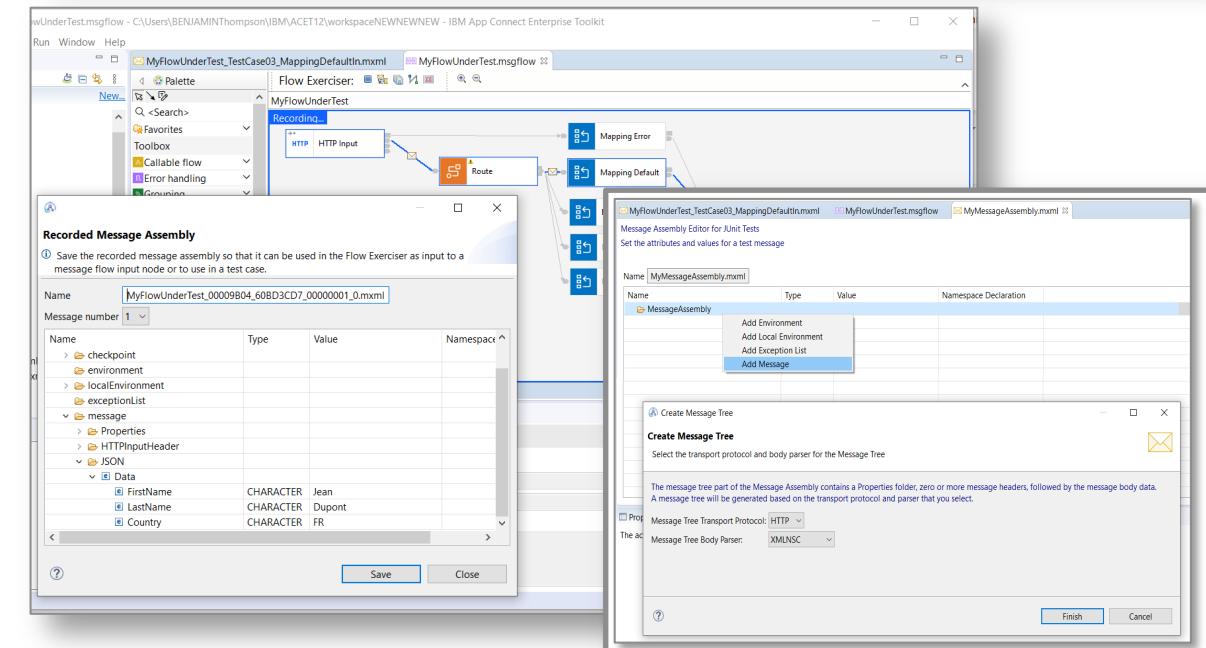
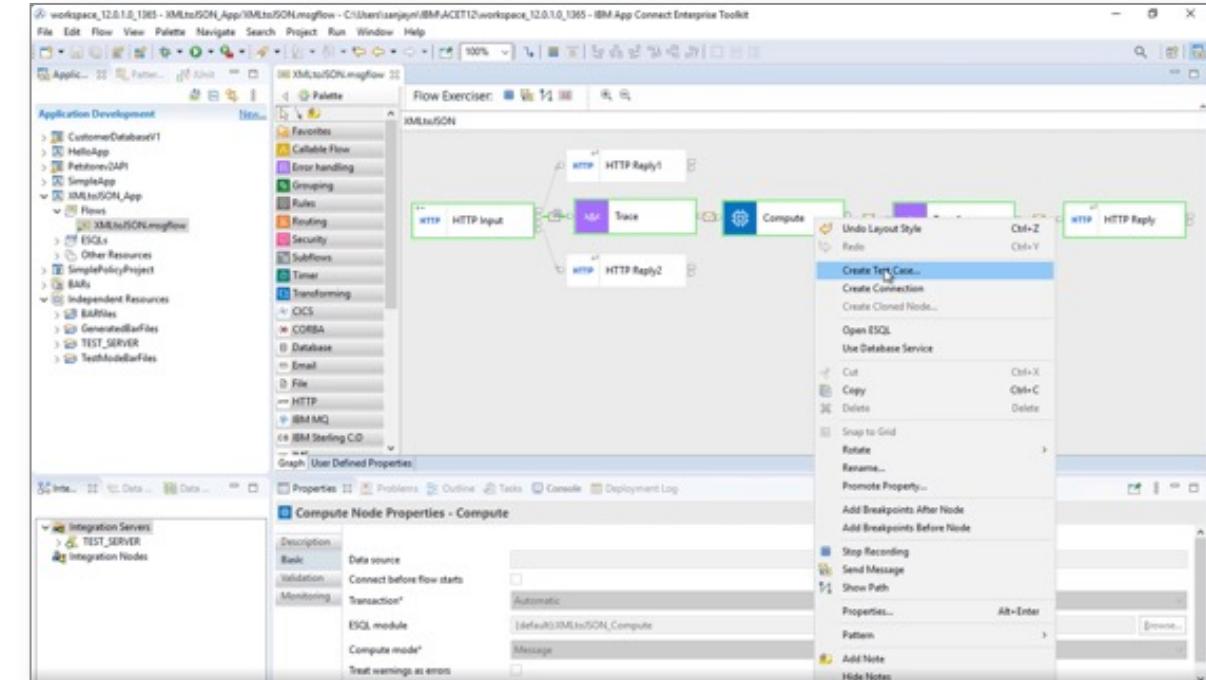
Designer



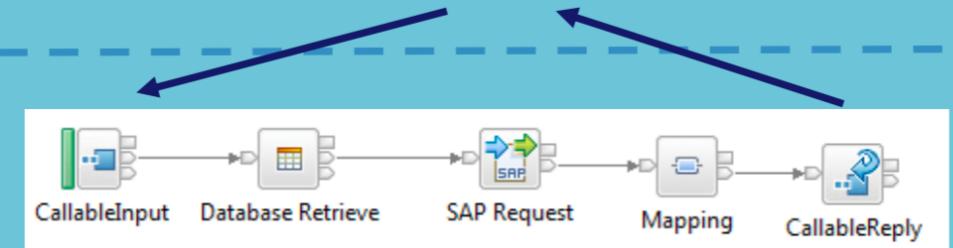
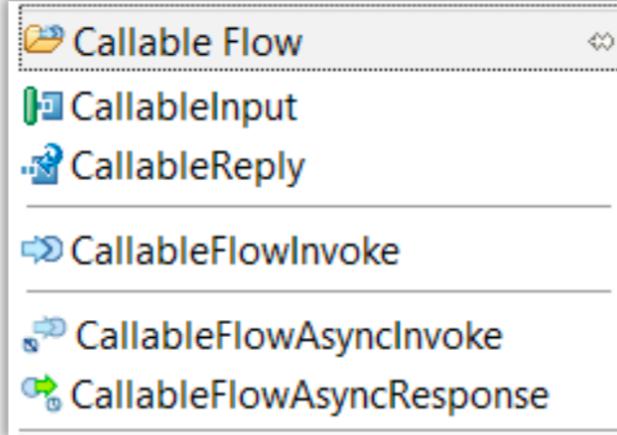
Test-driven development for integration experts

A native test framework that offers agility to integration experts to accelerate and improve business outcomes

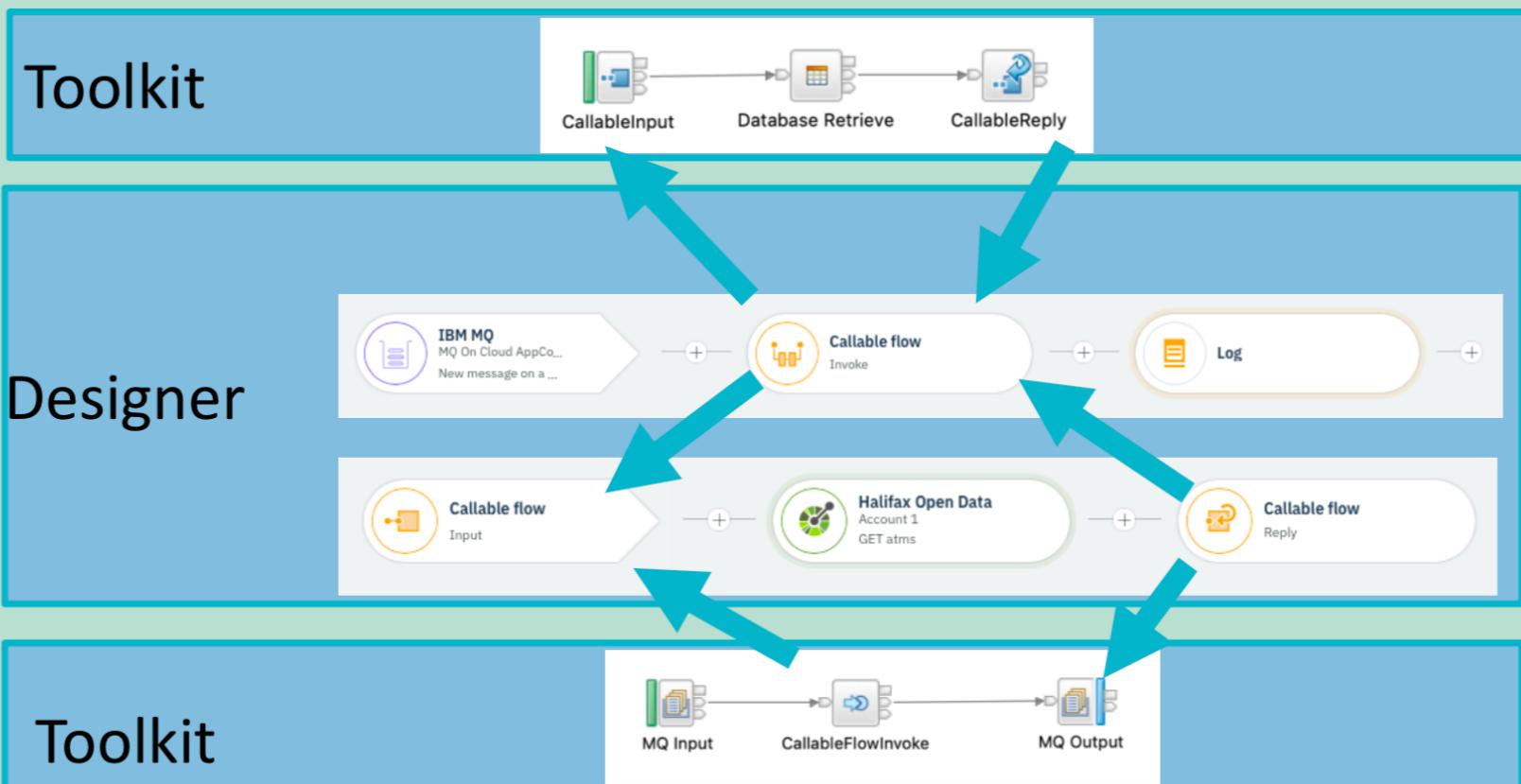
- Seamlessly record data within and across integrations
- Auto-generate tests across a comprehensive set of dimensions
- Intelligently simulate backends with spies, mocks, and stubs
- Complete test harness with JUnit assertions, 3rd party, and product specific matchers
- Comprehensive interactive step by step debugging



Callable Flows



- SaaS Connectors Can be used to call and be called by App Connect Toolkit flows.
- This gives easy Cloud to Cloud and Cloud to On-Prem integration
- IIB and ACE can invoke each other.
- Secured via provided “switch server”



Connectors play a key role in integrating applications, building APIs and acting on events

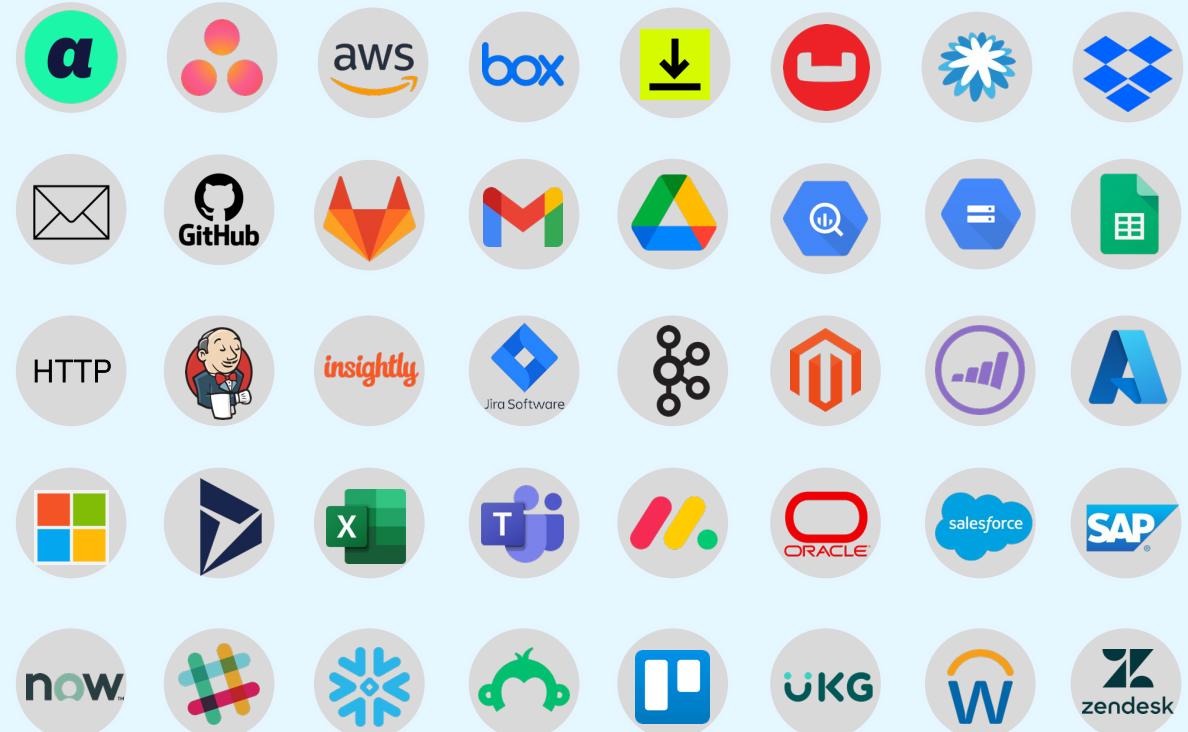
All connectors meet high standards and offer consistent user experience, behaviour, security, performance and QoS

All connectors offers native support for:

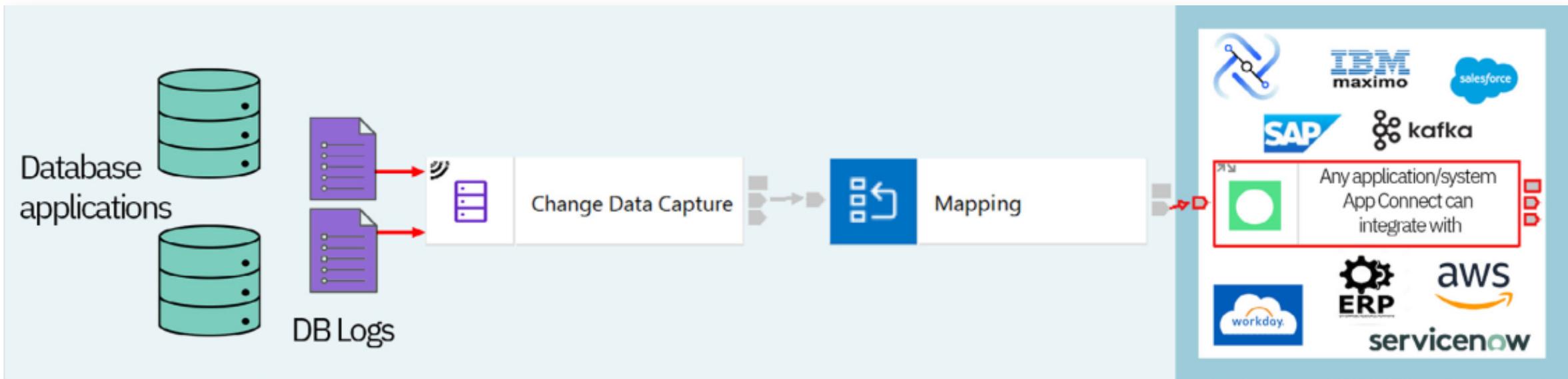
- Performs metadata discovery
- Manages security
- Manages session
- Consistent behaviour and user experience with REST-like representation
- Enhanced actions
- Events support
- Built-in error handling
- Native support for batch & bulk interactions
- Manages scaling and deployment

Without connectors, users lose the versatility to quickly connect diverse types of systems, the standardization to ensure reliable consistency, the ability to scale integrations on demand, and the time spent on increased maintenance and governance.

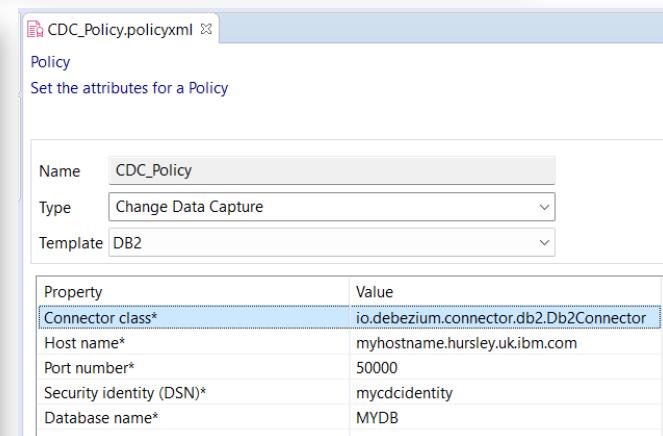
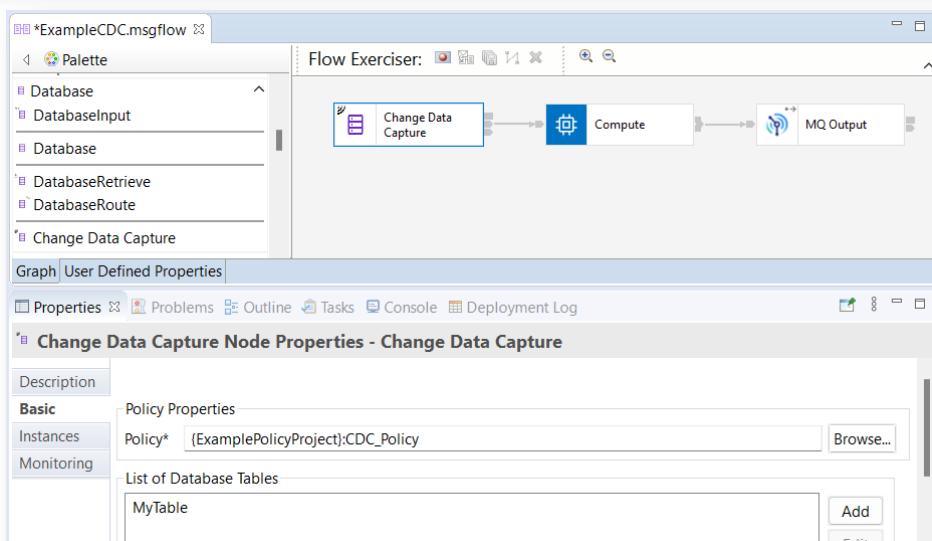
Leverage 200+ Connectors & Templates to jumpstart integration



Dynamically capture database changes with CDC



App Connect Enterprise provides a Change Data Capture message flow node without a Kafka pre-req which automatically captures changes to data sources and integrates them into an App Connect integration service which allows the data to be dynamically integrated into other Applications, databases or other data sources.



The CDC node references a CDC policy that describes how to communicate with the database

Scheduler Node

Scheduler Node Properties - Scheduler

Description	Schedule Identifier
Basic	Schedule Control <input checked="" type="radio"/> Repeat Interval <input type="radio"/> Calendar
Output Message	Interval 1
Retry	Interval Unit* Minutes
Instances	Days <input checked="" type="checkbox"/> Monday <input checked="" type="checkbox"/> Tuesday <input checked="" type="checkbox"/> Wednesday <input checked="" type="checkbox"/> Thursday <input checked="" type="checkbox"/> Friday <input checked="" type="checkbox"/> Saturday <input checked="" type="checkbox"/> Sunday
Monitoring	Time zone* UTC
	Run when flow is first switched on <input type="checkbox"/>

Scheduler Node Properties - Scheduler

Description	Schedule Identifier
Basic	Schedule Control <input type="radio"/> Repeat Interval <input checked="" type="radio"/> Calendar
Output Message	Run every Hour at 00 past the hour
Retry	Time zone* UTC
Instances	Run when flow is first switched on <input type="checkbox"/>
Monitoring	

Scheduler Node Properties - Scheduler

Description	
Basic	
Output Message	Message Output Control <input checked="" type="radio"/> Scheduler format <input type="radio"/> Timeout notification node format <input type="radio"/> Message Assembly File
Retry	Message Assembly file <input type="text"/> Browse... Open...
Instances	
Monitoring	

- The Scheduler node, you can configure a message flow to run at specified intervals of time, or at specified times on specified days.
- Timeout notification node format: The message tree which is output from the node is in the same style as that of a Timeout notification node. The main message tree simply carries a Property folder (and no message domain body) and the LocalEnvironment tree carries both a Scheduler section and a Timeout section

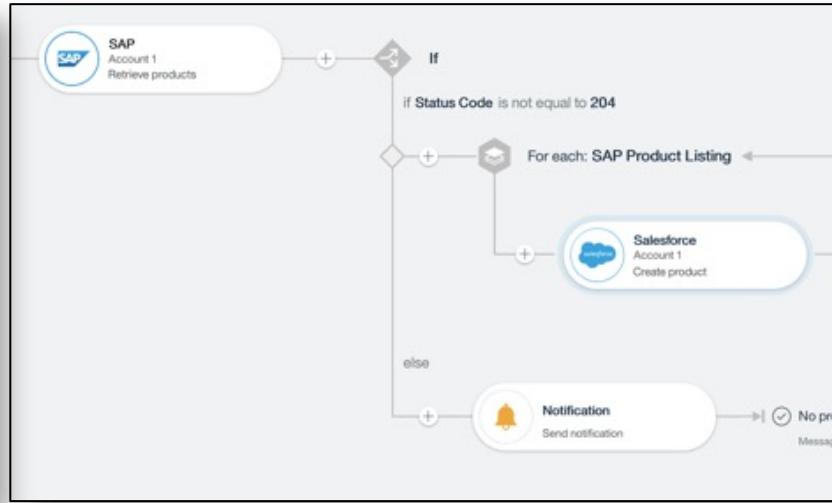
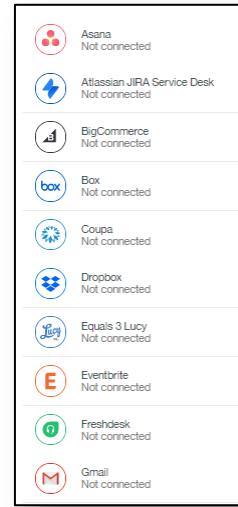
```
===== LocalEnvironment =====
( [ 'MQROOT' : 0x1cc0107a4d0]
  (0x01000000:Name):Scheduler      = (
    (0x03000000:NameValue):lastEventTime  = '1970-01-01 00:00:00' (CHARACTER)
    (0x03000000:NameValue):currentEventTime = '2023-07-07 20:00:00' (CHARACTER)
  )
  (0x01000000:Name):TimeoutRequest = (
    (0x03000000:NameValue):Action        = 'SET' (CHARACTER)
    (0x03000000:NameValue):StartDate     = '2023-07-07' (CHARACTER)
    (0x03000000:NameValue):StartTime     = '20:00:00' (CHARACTER)
    (0x03000000:NameValue):Count         = 1 (INTEGER)
    (0x03000000:NameValue):Interval       = 0 (INTEGER)
    (0x03000000:NameValue):IgnoreMissed   = TRUE (BOOLEAN)
    (0x03000000:NameValue):AllowOverwrite = TRUE (BOOLEAN)
  )
)
```

- Message assembly file: This option lets you browse and select a Message assembly file. This file describes the format of the logical tree which should be propagated downstream each time the node is fired.

Discover, consume, and build connectors

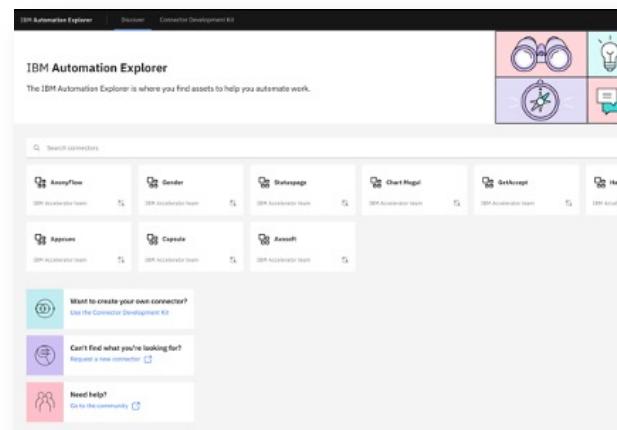
- Discover and learn about more connectors and templates in IBM Automation Explorer
- Use out-of-the-box connectors providing ready connectivity to enterprise-apps
- Build and customize connectors using a low-code [Connector Development Kit](#)

Use a broad set of connectors

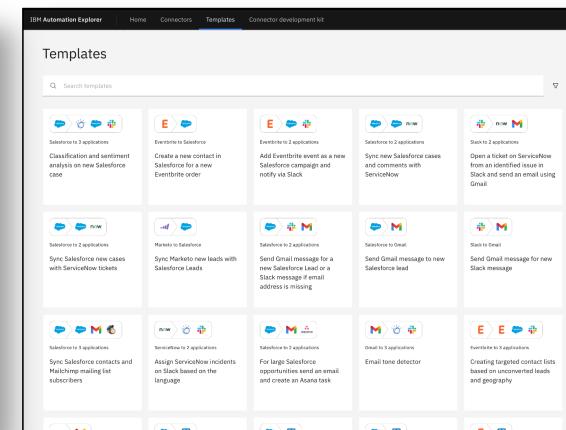


A screenshot of the 'Connectors' page in the IBM Automation Explorer. It shows a grid of available connectors categorized by icon. Some visible categories include Acoustic Campaign, AWS services (Amazon S3, Amazon SNS, Callable flow), Apache Hive, Asana, BigCommerce, Box, Cisco Webex Teams, CMIS, Confluence, Coupa, Domino, Dropbox, Eventbrite, FlexEngage, Freshdesk, Gmail, Google Analytics, Google Drive, Google Sheets, HTTP, IBM Cloud Object Storage S3, IBM Cloudant, IBM DB2, IBM Doc, IBM Engineering Workflow Management, IBM Event Streams, FileNet, IBM FileNet Content Manager, IBM Food Trust, IBM Maximo, IBM MQ, IBM Sterling Inventory Control Tower Master Data, IBM Studio, IBM Studio Portfolios, IBM Supply Chain, and IBM Watson Assistant.

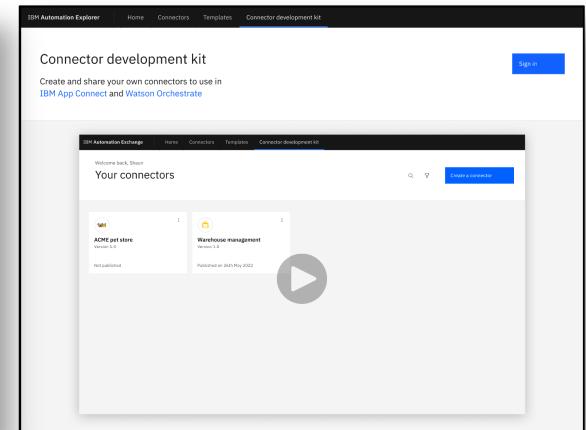
Discover more connectors



Learn and explore



Build your own



IBM Connector Development Kit

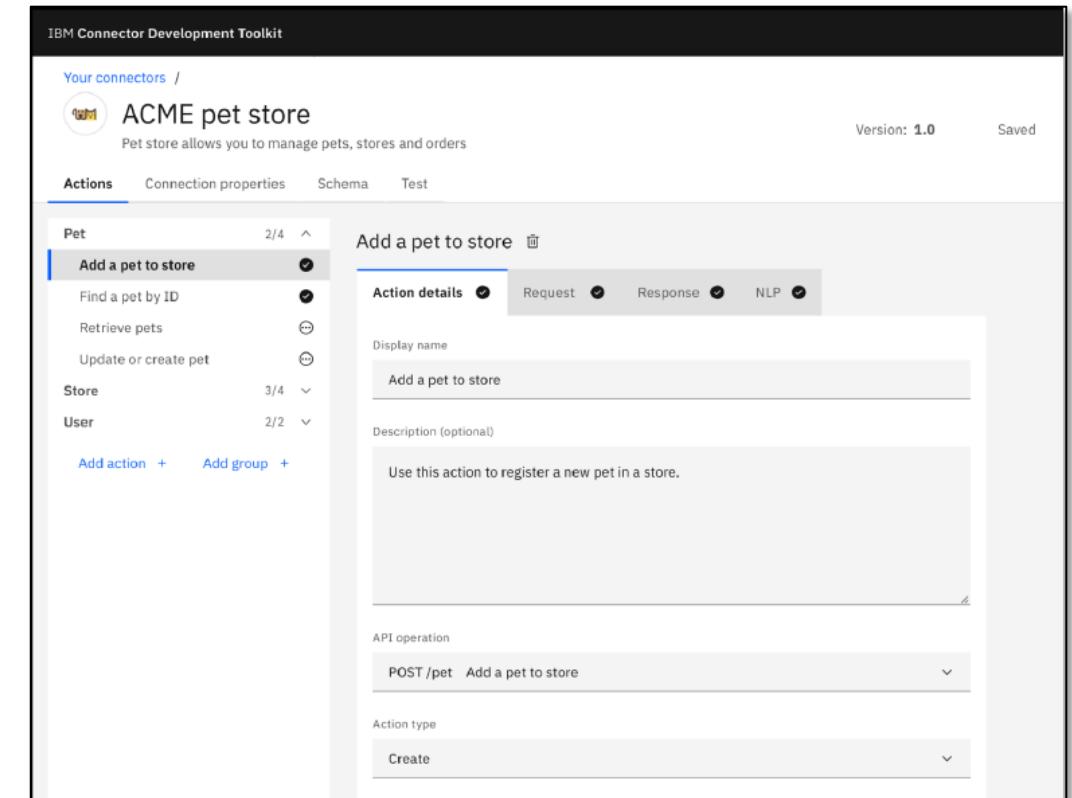
Designer

A simple to use, low-code developer experience that enables clients to build their own connectors in less than a day

[Build](#) connectors from an Open API document or from scratch

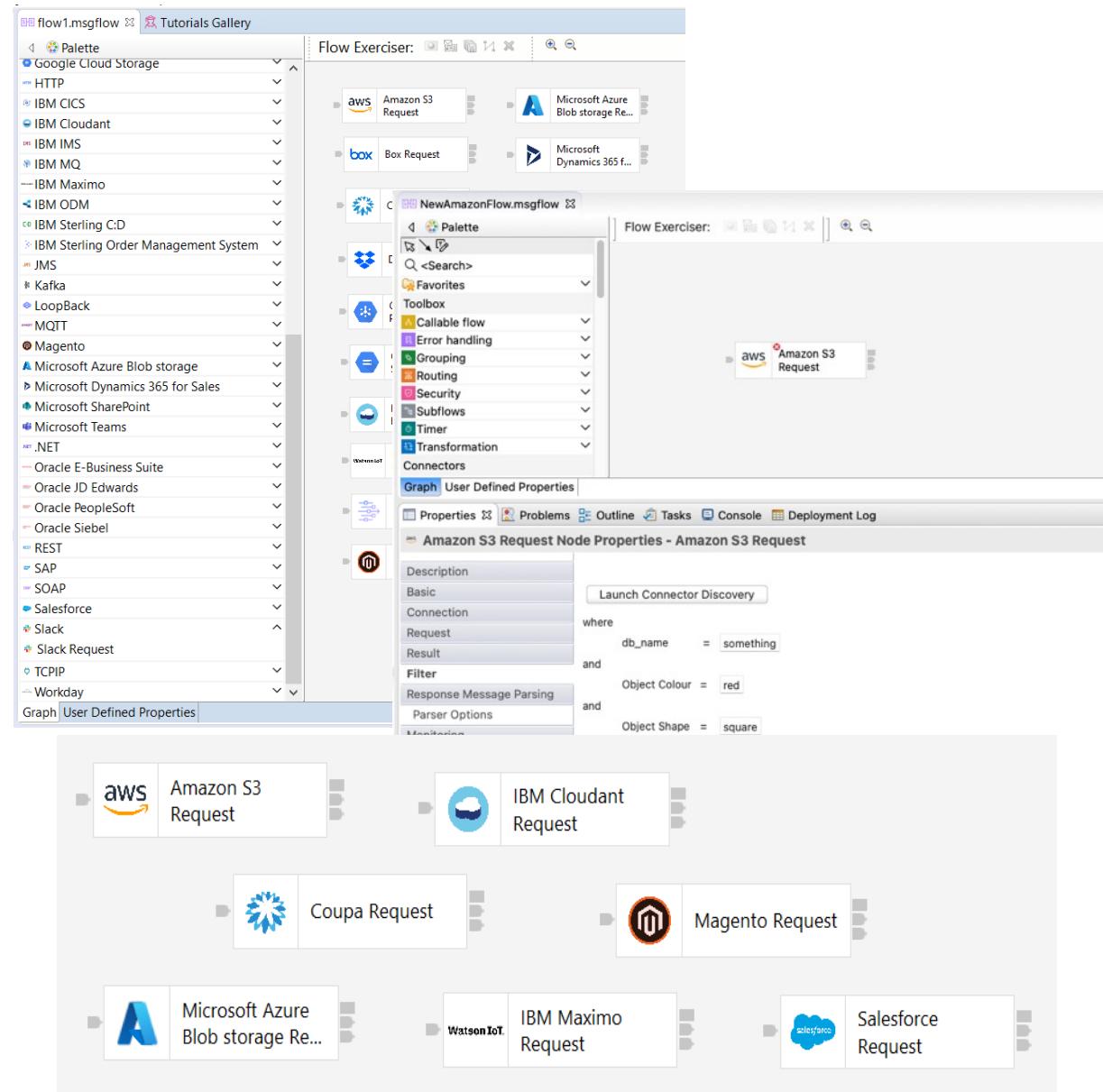
[Consume](#) connectors in App Connect, and extend the capabilities provided out-of-the-box with unique requirements a business may have

[Contribute](#) to the connector ecosystem benefiting the global community



Smart Connectors in Toolkit for integration experts

- Pre-built connectors natively supported directly within Toolkit
- Integrate with pre-packaged cloud and on-premise apps with smart connectors without coding
- Use these connectors natively with other Toolkit features and capabilities
- No dependency on Designer
- Deploy these connectors and integration flows in ESB architecture on VMs or as microservices on containers/K8s platforms
- Connectors and flows are supported on all platforms supported by App Connect Enterprise

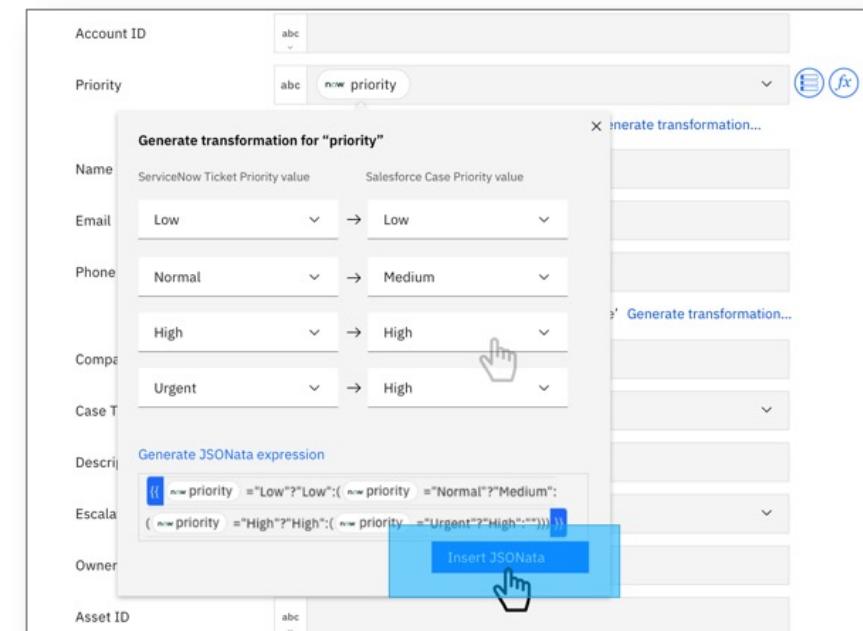
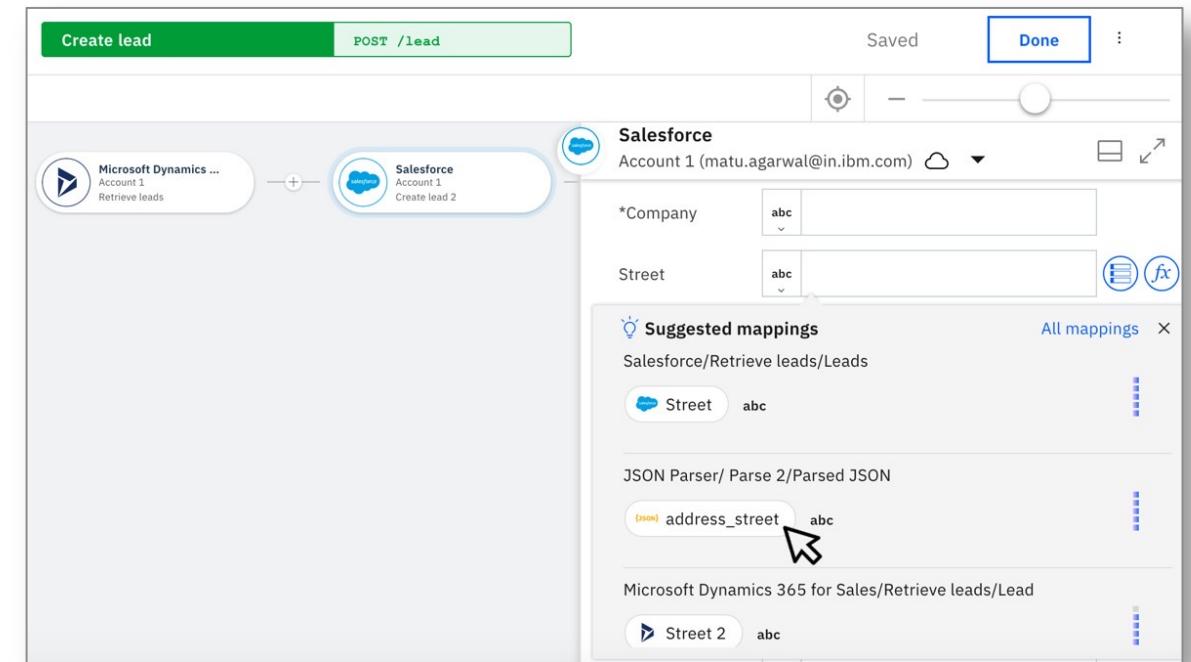


Smart Mapper

Designer

AI-powered mapper greatly simplifies the most complex task of creating integrations

- Spreadsheet like UI with hundreds of pre-built functions based on JSON data
- Easily transform data to and from JSON, XML, and flat files
- AI/ML powered mapping suggestions and transformation logic
- Offers inline guidance and recommendations for solving complex use cases

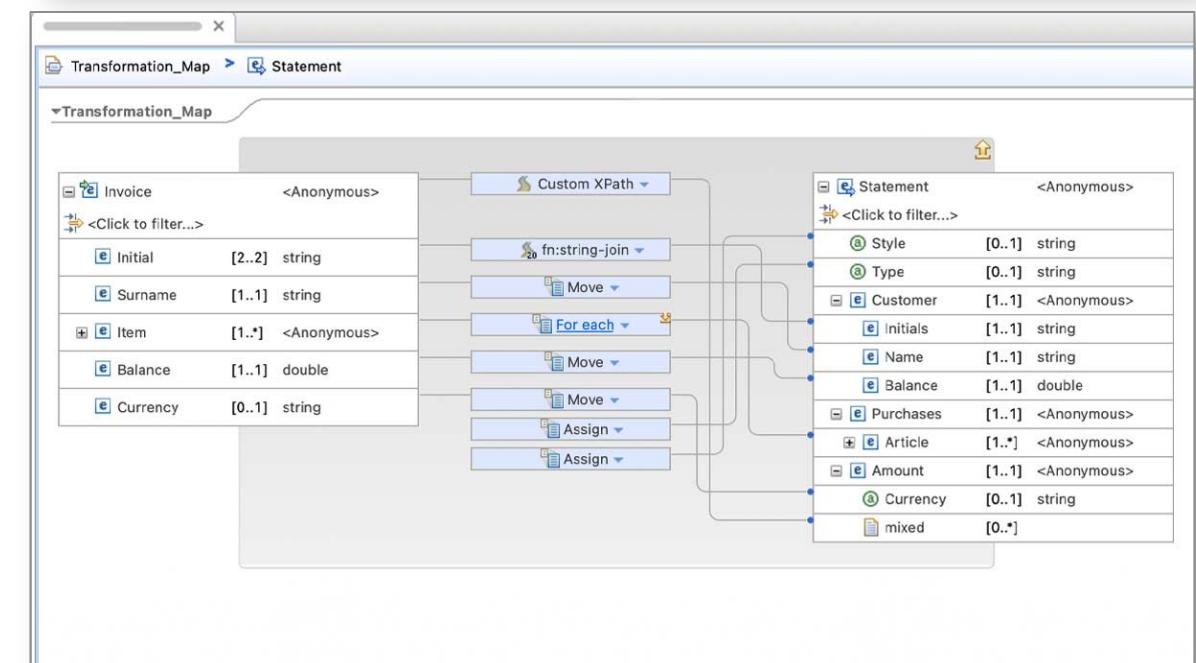
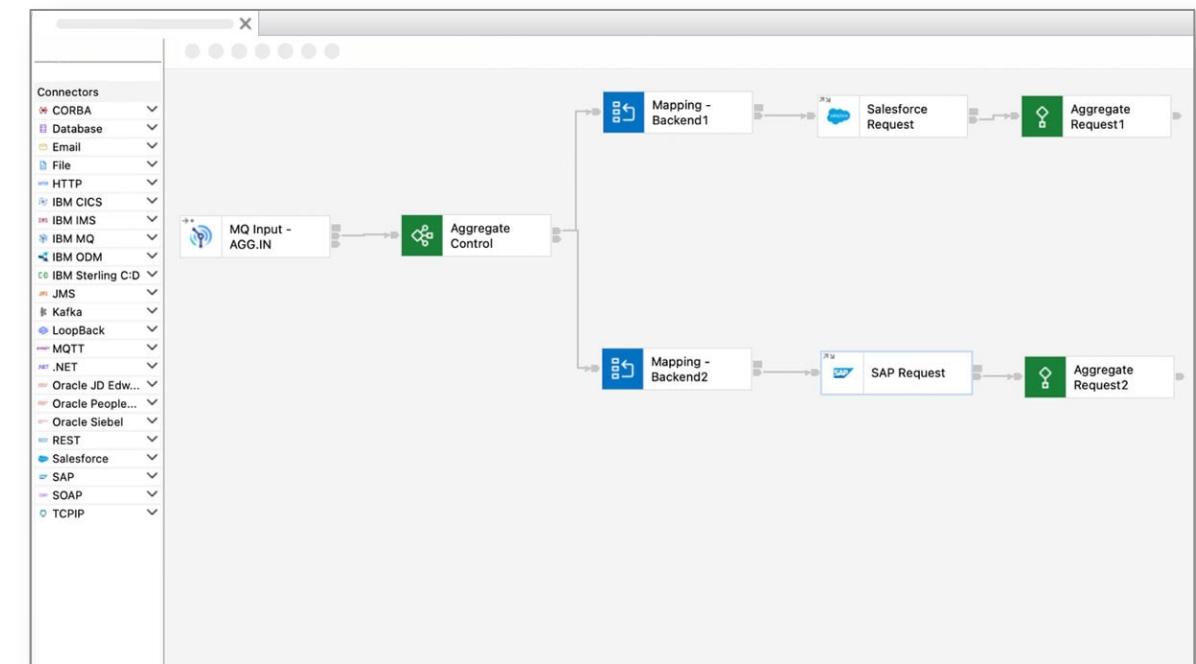


Transform and mediate

Toolkit

Powerful tooling that offers complete developer flexibility to meet the most complex integration scenarios

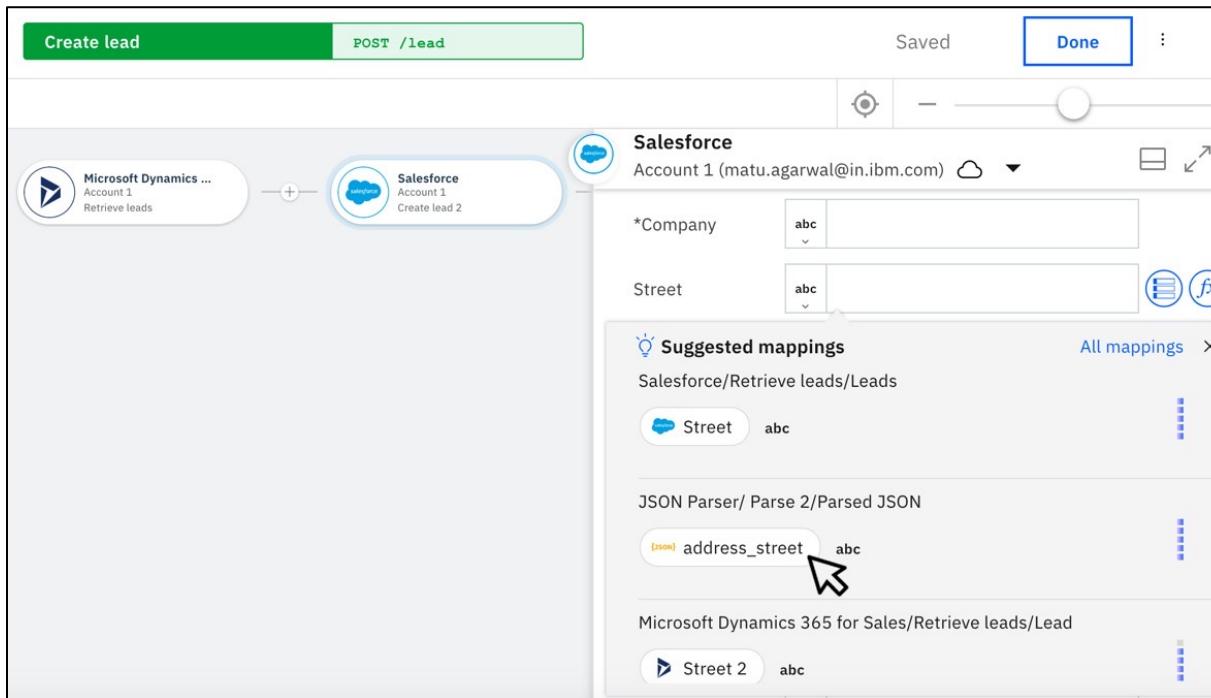
- Use graphical data mapper or write code in variety of languages
- Transform virtually any data format including XML, JSON, binary, industry(Swift, EDI, IDOC,ISOnnn etc), or custom
- Build complex business and mediation logic such as route, orchestrate, enrich, filter, collect, distribute, correlate, aggregate, trigger and detect
- High performance parsers in C++ for performance and resource optimisation



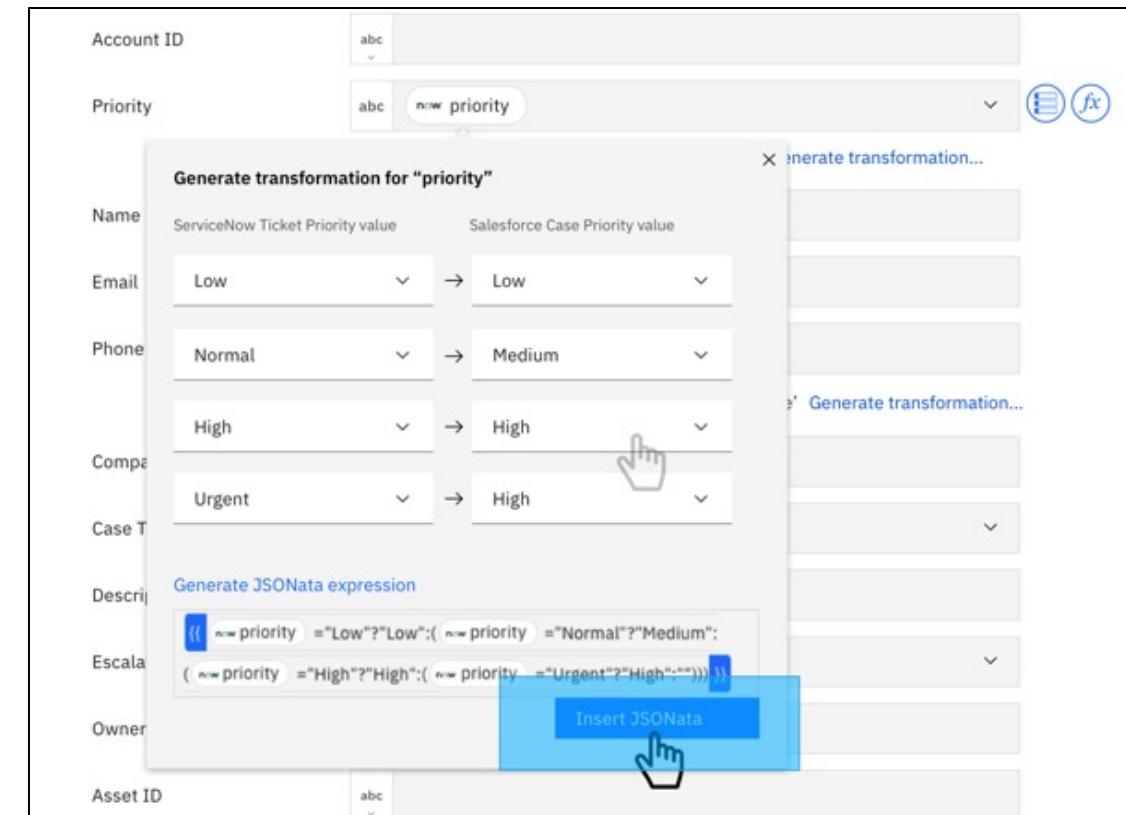
Accelerate the integration experience for all users with AI assistance

Designer

Receive suggested mappings
with **Mapping Assist**



Quickly transform data
with **Data Assist**

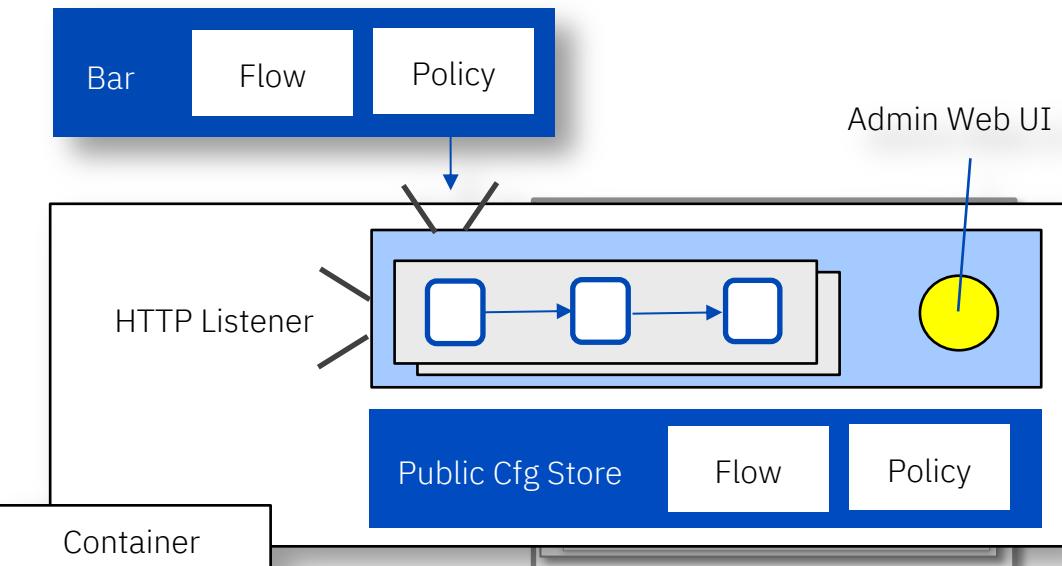
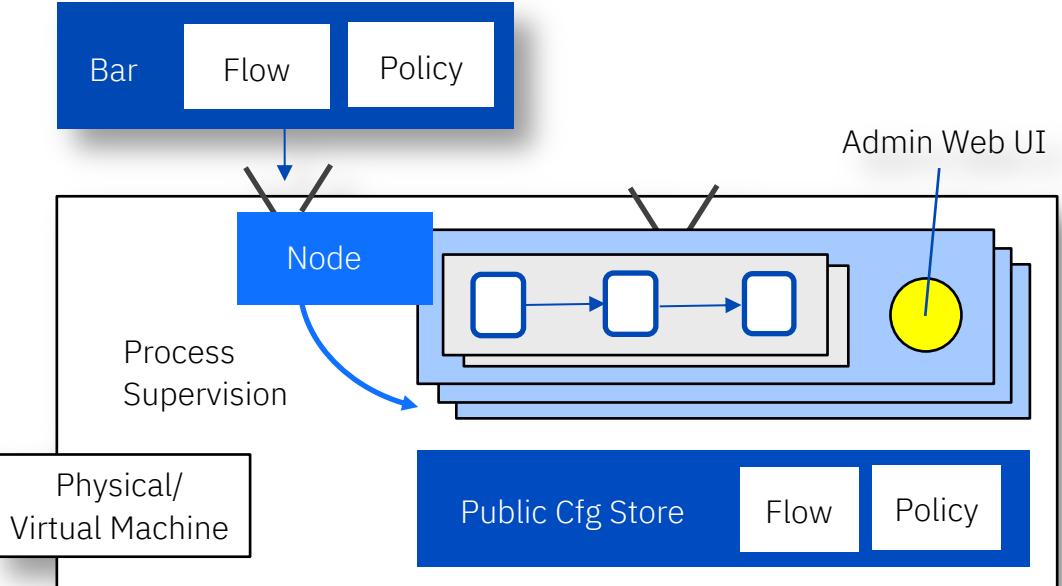


- Simplify field mapping between applications
- Easily transform data to and from JSON, XML, and flat files
- Inline guidance and recommendations

One unified runtime

One runtime for APIs, events and integration use cases

- Run anywhere from on-premises, cloud, or on the edge
- Light-weight, fastest performing engine, with horizontal and vertical scaling support to meet most demanding industry needs
- Built-in workload management
- Flexibly adapt any architecture from ESB to micro-services

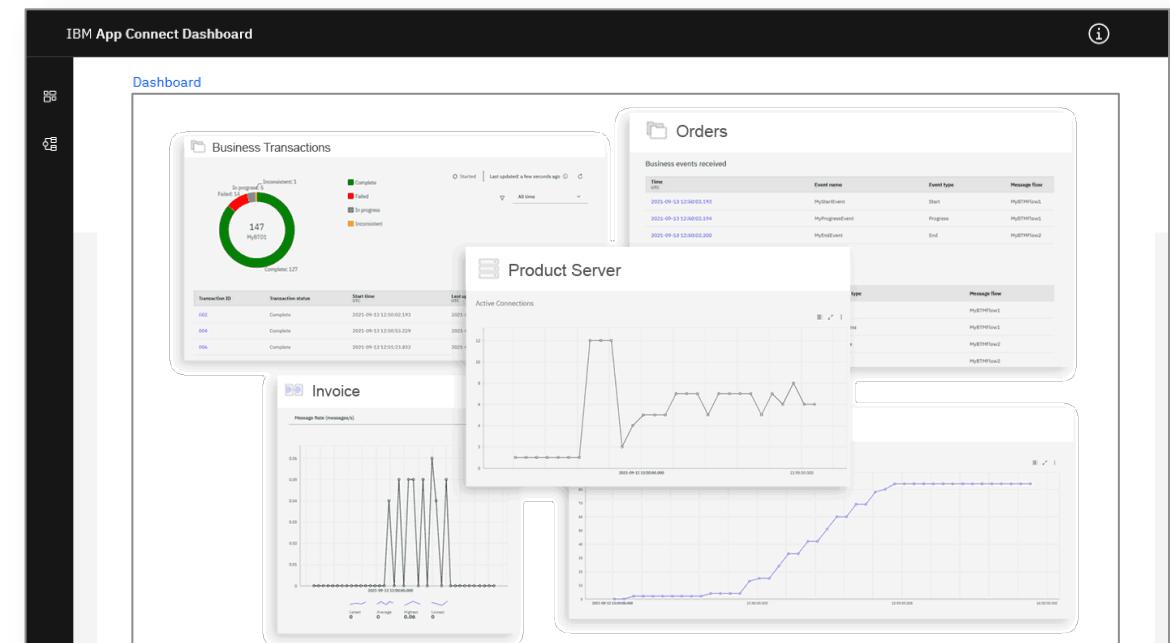


A unified management experience for monitoring integration flows

View and monitor integration health across the enterprise landscape

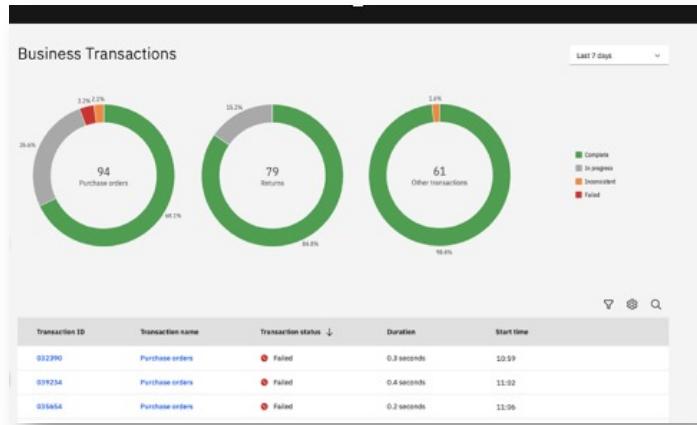
- Lightweight dashboard that can securely communicate with multiple deployment locations
- View deployments on-premises, public, private, multi, hybrid clouds in a single control plane
- Perform instant health checks, problem determination, and troubleshooting across deployments
- Data easily integrated with Instana and other monitoring tools

The screenshot shows the 'Integrations' section of the IBM App Connect Dashboard. It displays three items: 'CountryAPI API' (Started), 'MyApplicationUnderTest Application' (Started), and 'MyApplicationUnderTest Application on server: default' (Started). Each item has a small icon, a name, a type, and a status indicator.



Enterprise observability across the cloud and on-premise integration technologies

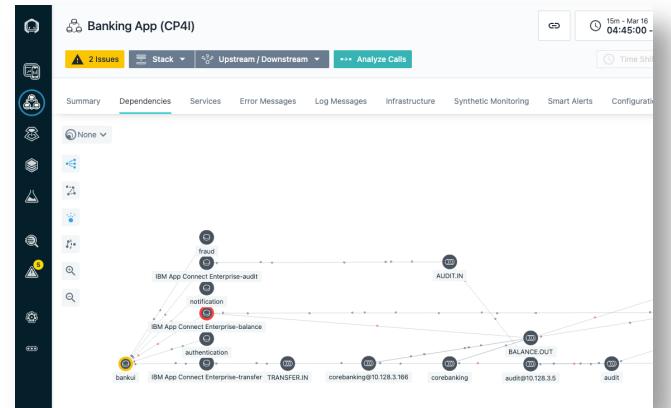
Business transaction monitoring



AppConnect Enterprise

- Trace business level transactions across multiple flows in App Connect
 - Define transaction events
 - Status of transactions
 - Transactions listed for drill down

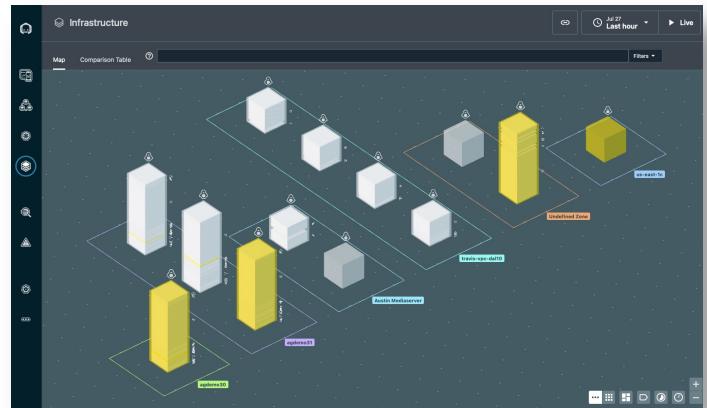
End-to-end transaction tracing



INSTANA
an IBM Company

- From the initial user app interaction through all integration components and backend
 - Drill down into App Connect message flows and flow nodes

Integration runtime monitoring



INSTANA
an IBM Company

- See the health of all instances
 - Track changes and automatically correlate with incidents

End-to-end DevOps automation

Build automated deployment pipelines and achieve unprecedented acceleration of project timelines

- Comprehensive set of mature APIs and CLIs to control each aspects of integration lifecycle
- New “ibmint” command family to help build source to server pipeline
- Integrate and run tests from unit test framework as part of any pipeline
- Fully compatible with client DevOps tools of choice



Deploy where data resides



[IBM Cloud Pak for Integration](#)

Consume application integration capabilities in a unified integration platform, on OpenShift anywhere



[IBM App Connect](#)

Deploy on-prem or any cloud, bring your own OpenShift, other K8s platforms, Docker, or VM



[IBM App Connect as a service](#)

Access a highly available, multi-tenant service fully managed, maintained and operated by the IBM team

IBM App Connect Enterprise SaaS

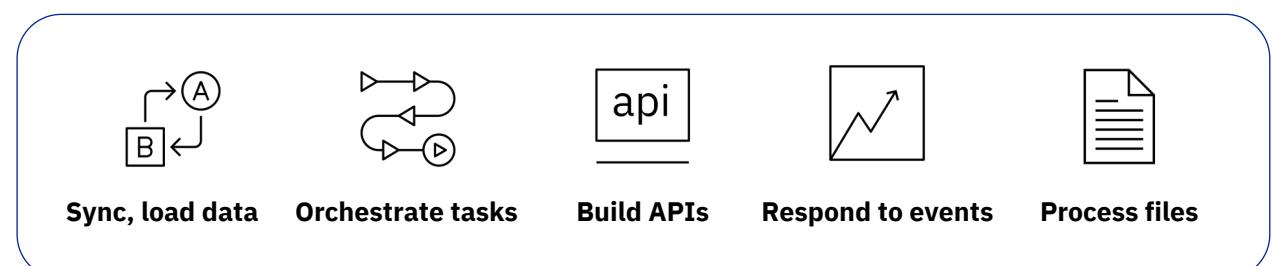
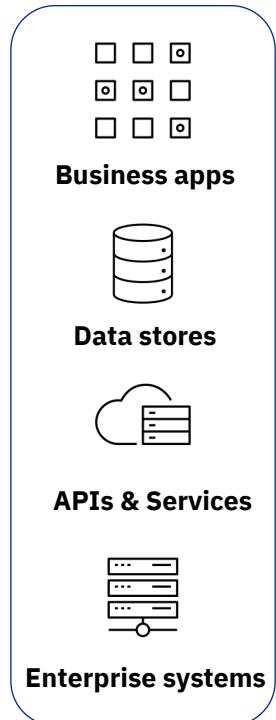
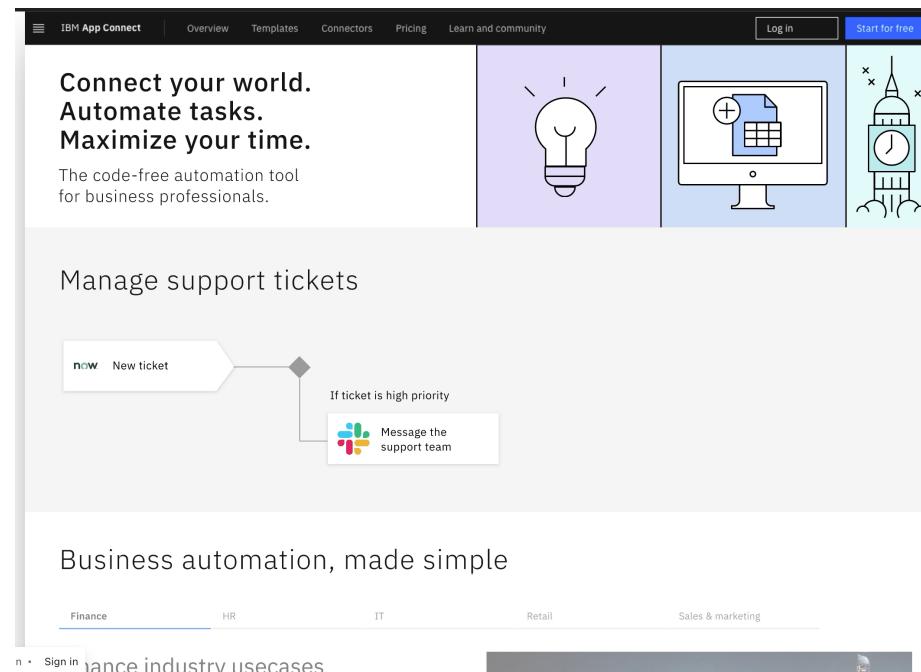
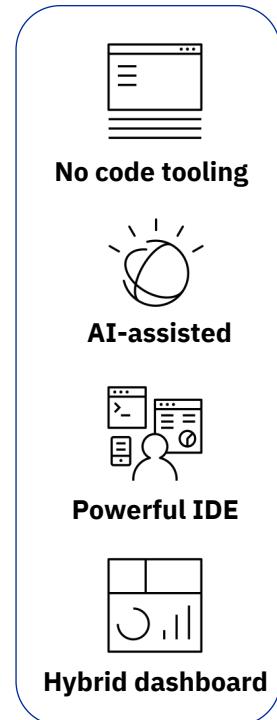
A powerful IBM iPaaS with hundreds of pre-built connectors and templates

Simple, no-code interface equipped with **AI-based** features

Versatile development environment to build and deploy flows for multiple integration patterns

Built-in management and dashboard tools, to easily administer and govern integrations

Highly scalable and available, multi-tenant integration platform supporting billions of transactions per day



Welcome to IBM App Connect Enterprise Toolkit
Integrate your business. Connect your world.

Tutorials

Get started quickly using our tutorials

What's new?

See what's new in IBM App Connect Enterprise 1.2

Language pack

Install a toolkit language pack

App Connect Enterprise Tutorial Gallery

Get Productive faster, with well over 100 Product Tutorials!

Tutorials

What are you looking for today?

Getting started - Creating a very simple message flow



5 minutes

Getting started - Creating an Integration Server



5 minutes

Getting started - Creating a Simple Unit Test



10 minutes

Tutorials

Tag: OpenAPI X Tag: Getting started X Tag: test X

Getting started - Creating a very simple message flow

Learn how to quickly create a very simple message flow

Getting started REST

Start →

Getting started - Creating an Integration Server

Learn some basics about integration servers and how to use them

Getting started REST

Start →

Getting started - Creating a Simple Unit Test

Learn how IBM App Connect Enterprise unit tests help you with rapid Test Driven Development by creating and executing a simple Java Unit Test.

10 minutes.

48

Tutorial topics

- Java Unit Testing
- Test Projects

Learning outcomes

- Use IBM App Connect Enterprise to create a test case for a Mapping node in a message flow.

Overview

This tutorial uses a simple message flow in an application that receives an XML input message over HTTP and converts the data into JSON using a Mapping node. The output JSON data is returned to the requesting client using an HTTPReply node. An example input message is provided.

The tutorial provides the user with the message flow already constructed and describes the step-by-step instructions for writing and executing a unit test for the flow. The new test is created in a

Learn how to use discovery connectors for many SaaS applications with tutorial lead examples

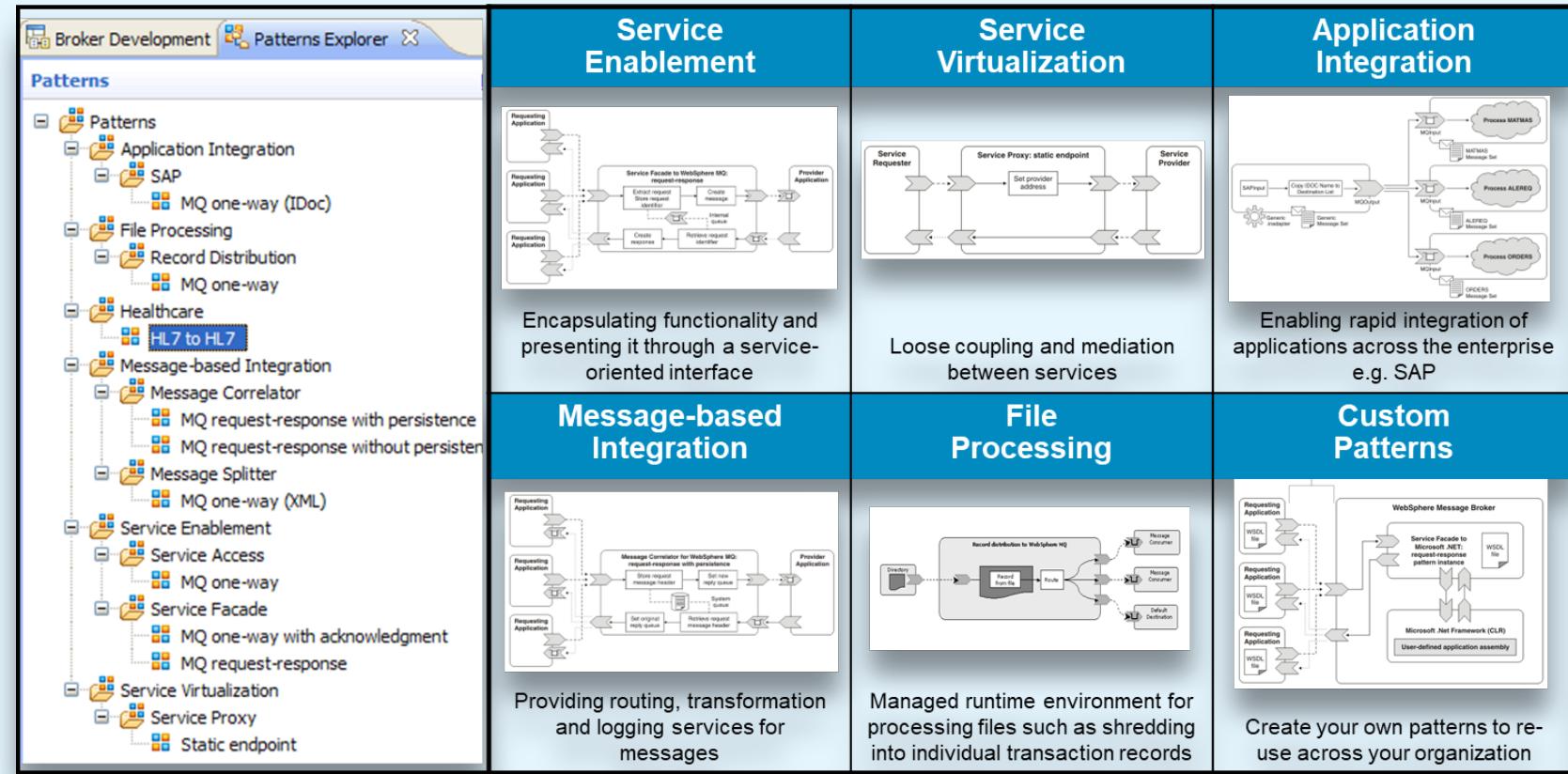
Learn App Connect by using the built-in tutorials, follow best practices, e.g *how do I integrate a Database, how do I read records from a file or a whole file, how do I transform*. There are many tutorials covering a wide range of integration scenarios.

New ACE Toolkit Patterns

A pattern is a reusable solution that encapsulates a tested approach to solving a common architecture, design, or deployment task in a particular context

ACE Patterns are used to:

- Generate customized solutions to a recurring integration problem in an efficient way
- Encourage adoption of preferred techniques in message flow design
- Help guide developers who are new to the product
- Provide consistency in the generated resources



Format Transformation Patterns

- ↳ BLOB to Delimited [Not installed]
- ↳ BLOB to Fixed Length [Not installed]
- ↳ BLOB to JSON [Not installed]
- ↳ BLOB to XML [Not installed]
- ↳ Delimited to BLOB [Not installed]
- ↳ Delimited to Fixed Length [Not installed]
- ↳ Delimited to JSON [Not installed]
- ↳ Delimited to XML [Not installed]
- ↳ Fixed Length to BLOB [Not installed]
- ↳ Fixed Length to Delimited [Not installed]
- ↳ Fixed Length to JSON [Not installed]
- ↳ Fixed Length to XML [Not installed]
- ↳ JSON to BLOB [Not installed]
- ↳ JSON to Delimited [Not installed]
- ↳ JSON to Fixed Length [Not installed]
- ↳ JSON to XML [Not installed]
- ↳ XML to BLOB [Not installed]
- ↳ XML to Delimited [Not installed]
- ↳ XML to Fixed Length [Not installed]
- ↳ XML to JSON [Not installed]

Protocol Transformation Patterns

- ↳ Database to Email [Not installed]
- ↳ Database to File [Not installed]
- ↳ Database to HTTP [Not installed]
- ↳ Database to IBMMQ [Not installed]
- ↳ Database to JMS [Not installed]
- ↳ Database to Kafka [Not installed]
- ↳ Database to MQTT [Not installed]
- ↳ Database to TCPIP [Not installed]

Enterprise Integration Patterns

- ↳ Canonical Data Model [Not installed]
- ↳ Circuit Breaker [Not installed]
- ↳ Claim Check [Not installed]
- ↳ Dynamic Routing [Not installed]
- ↳ Filtering [Not installed]
- ↳ Record and Replay [Not installed]
- ↳ Saga [Not installed]
- ↳ Scheduling [Not installed]
- ↳ Sequence-Resequence [Not installed]

Messaging Patterns

- ↳ Coordinated Request-Reply [Not installed]
- ↳ Messaging Fire-and-Forget [Not installed]
- ↳ Messaging Publication [Not installed]
- ↳ Messaging Request-Reply [Not installed]

Scatter-Gather Patterns

- ↳ Collector [Not installed]
- ↳ Non-Persistent Aggregation [Not installed]
- ↳ Persistent Aggregation [Not installed]
- ↳ Splitter [Not installed]

- ↳ Email to Database [Not installed]
- ↳ Email to File [Not installed]
- ↳ Email to HTTP [Not installed]
- ↳ Email to IBMMQ [Not installed]
- ↳ Email to JMS [Not installed]
- ↳ Email to Kafka [Not installed]
- ↳ Email to MQTT [Not installed]
- ↳ Email to TCPIP [Not installed]
- ↳ File to Database [Not installed]
- ↳ File to Email [Not installed]
- ↳ File to HTTP [Not installed]
- ↳ File to IBMMQ [Not installed]
- ↳ File to JMS [Not installed]
- ↳ File to Kafka [Not installed]
- ↳ File to MQTT [Not installed]
- ↳ File to TCPIP [Not installed]

- ↳ HTTP to Database [Not installed]
- ↳ HTTP to Email [Not installed]
- ↳ HTTP to File [Not installed]
- ↳ HTTP to IBMMQ [Not installed]
- ↳ HTTP to JMS [Not installed]
- ↳ HTTP to Kafka [Not installed]
- ↳ HTTP to MQTT [Not installed]
- ↳ HTTP to TCPIP [Not installed]
- ↳ IBM MQ to Database [Not installed]
- ↳ IBM MQ to Email [Not installed]
- ↳ IBM MQ to File [Not installed]
- ↳ IBM MQ to HTTP [Not installed]
- ↳ IBM MQ to JMS [Not installed]
- ↳ IBM MQ to Kafka [Not installed]
- ↳ IBM MQ to MQTT [Not installed]
- ↳ IBM MQ to TCPIP [Not installed]

- ↳ JMS to Database [Not installed]
- ↳ JMS to Email [Not installed]
- ↳ JMS to File [Not installed]
- ↳ JMS to HTTP [Not installed]
- ↳ JMS to IBM MQ [Not installed]
- ↳ JMS to Kafka [Not installed]
- ↳ JMS to MQTT [Not installed]
- ↳ JMS to TCPIP [Not installed]
- ↳ Kafka to Database [Not installed]
- ↳ Kafka to Email [Not installed]
- ↳ Kafka to File [Not installed]
- ↳ Kafka to HTTP [Not installed]
- ↳ Kafka to IBM MQ [Not installed]
- ↳ Kafka to JMS [Not installed]
- ↳ Kafka to MQTT [Not installed]
- ↳ Kafka to TCPIP [Not installed]

- ↳ MQTT to Database [Not installed]
- ↳ MQTT to Email [Not installed]
- ↳ MQTT to File [Not installed]
- ↳ MQTT to HTTP [Not installed]
- ↳ MQTT to IBM MQ [Not installed]
- ↳ MQTT to JMS [Not installed]
- ↳ MQTT to Kafka [Not installed]
- ↳ MQTT to TCPIP [Not installed]
- ↳ TCPIP to Database [Not installed]
- ↳ TCPIP to Email [Not installed]
- ↳ TCPIP to File [Not installed]
- ↳ TCPIP to HTTP [Not installed]
- ↳ TCPIP to IBM MQ [Not installed]
- ↳ TCPIP to JMS [Not installed]
- ↳ TCPIP to Kafka [Not installed]
- ↳ TCPIP to MQTT [Not installed]

Even more new patterns coming soon!

Deploy where data resides



[IBM Cloud Pak for Integration](#)

Consume application integration capabilities in a unified integration platform, on OpenShift anywhere.



[IBM App Connect](#)

Deploy on-prem or any cloud, bring your own OpenShift, other Kubernetes platforms, Docker, bare metal or VMs



[IBM App Connect as a service](#)

Access a highly available, cloud service fully managed, maintained and operated by the IBM team

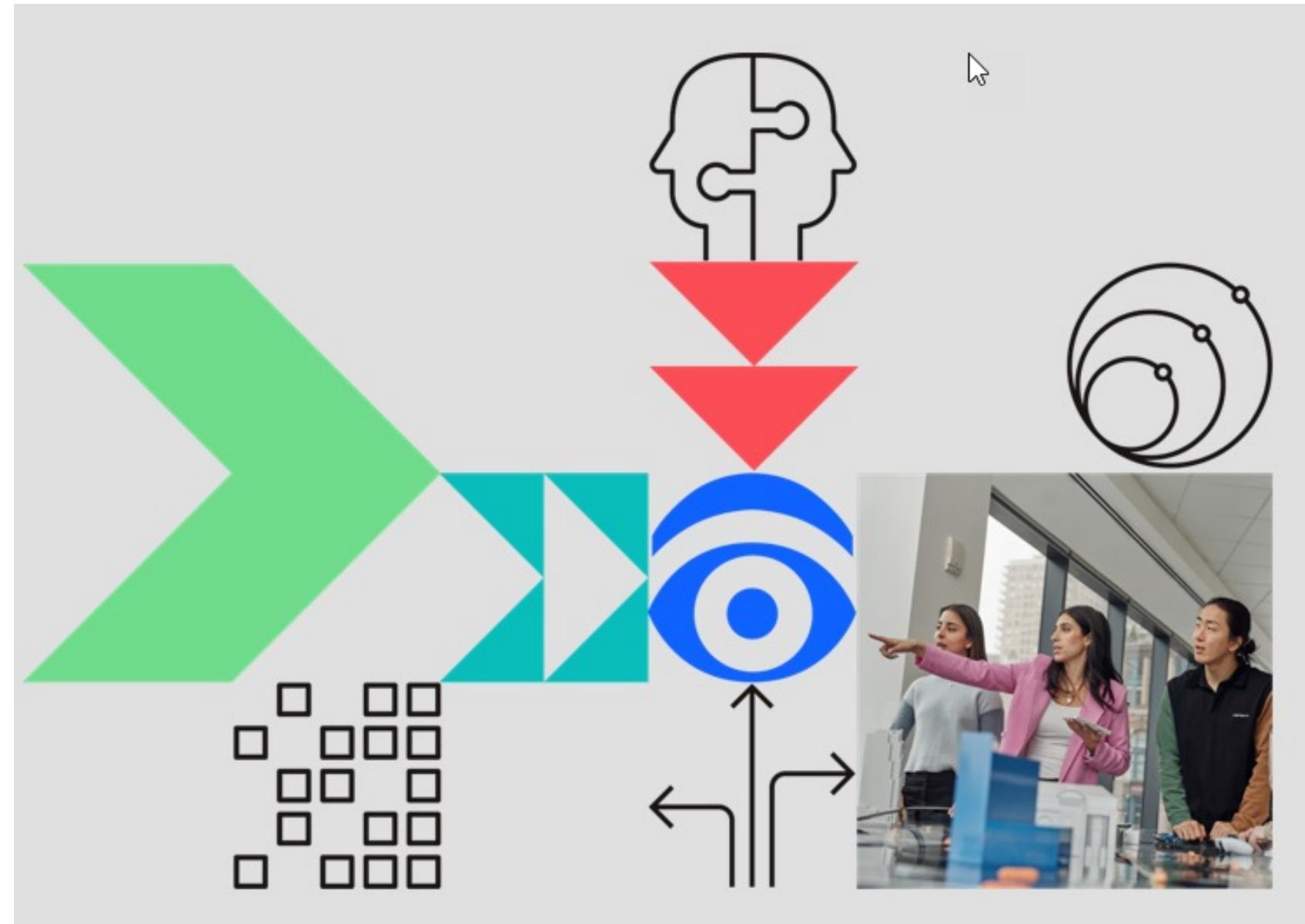
Available APP Connect Labs

Integration Labs

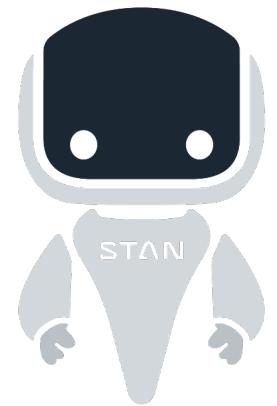
Leverage ACE Toolkit and ACE Designer to build integrations. When creating APIs with Designer you will also import them into API-C. We will also cover Event Driven Architecture and Kafka on Day2.

Subjects include:

1. Toolkit experience
2. Salesforce experience
3. ServiceNow experience



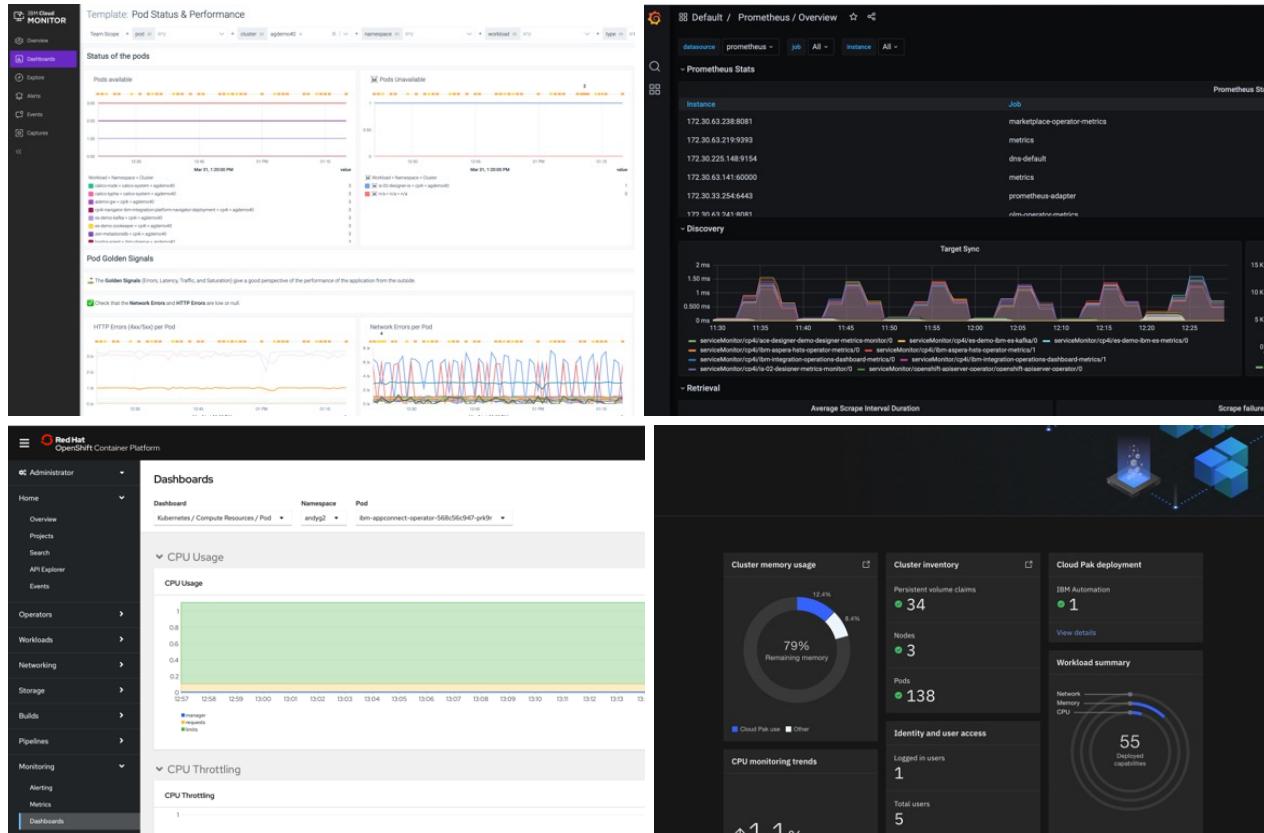
Observability with IBM Instana overview and Demo



Administrators need a way to **trace integration issues** back to their origin and know where to apply fixes.

Today, they are required to use several tools which are disjointed and have siloed functionality

They will benefit from **enhanced** and **holistic monitoring** and **tracing**.



Instana with Cloud Pak for Integration

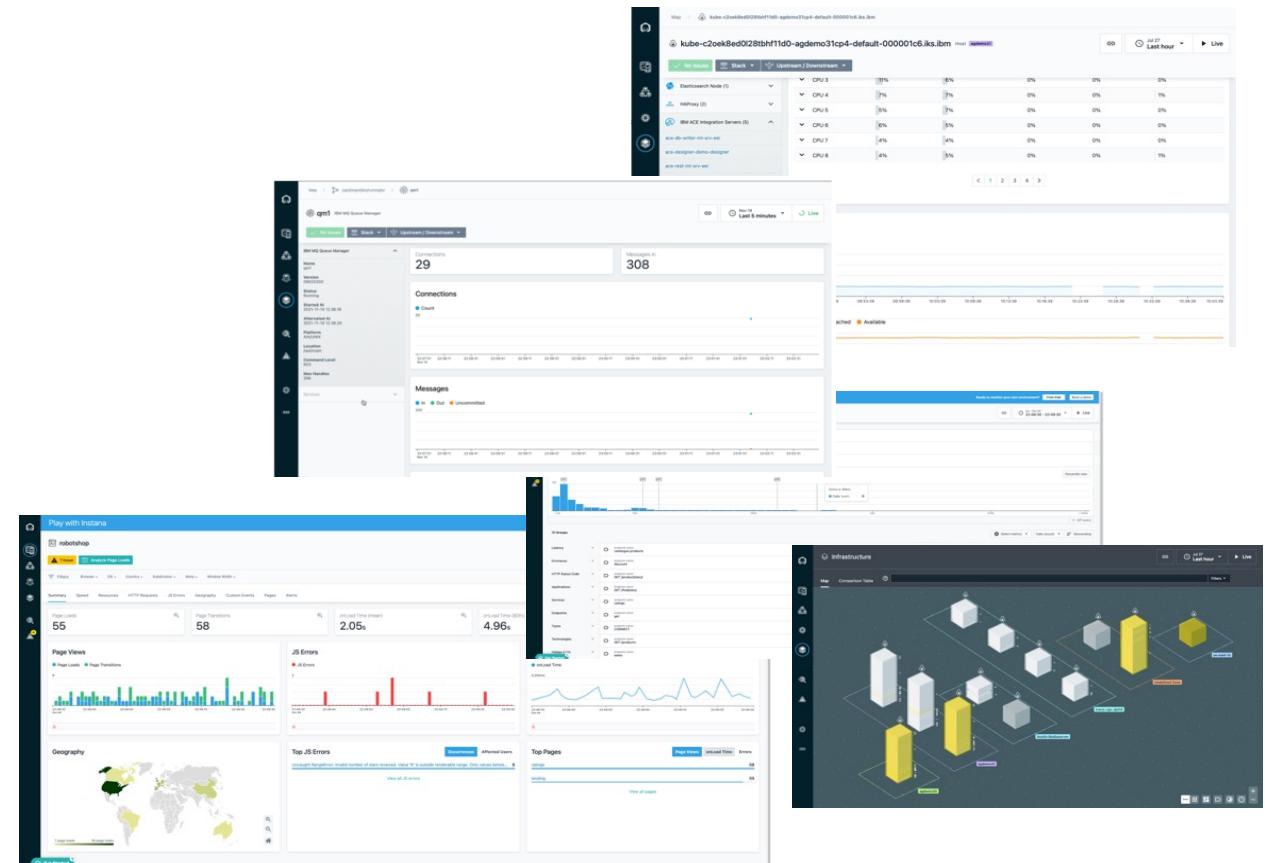
Provide a consistent and holistic monitoring and tracing solution for a customer's entire Cloud Pak for Integration estate regardless of where Pak components are deployed

Free 6-month entitlement to Instana APM

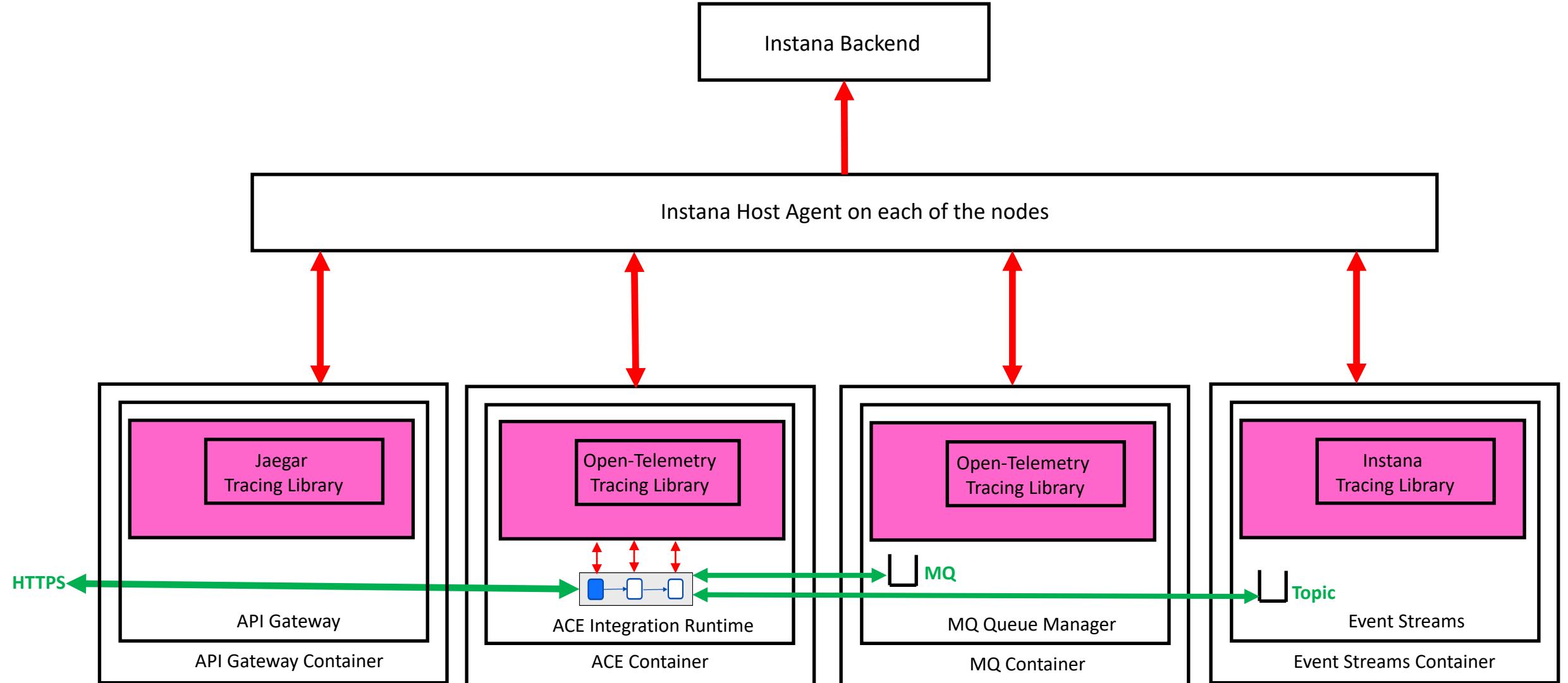
- Restricted to new License sales only
- New customers + expansion of existing clients, one 6-month entitlement only per customer
- Limited to Instana Agent Sensors for integration components e.g., MQ, ACE, APIC etc.
- Observe any product under CP4I entitlement
 - Products do not need to be deployed on OpenShift but can be deployed in traditional environments

Benefits

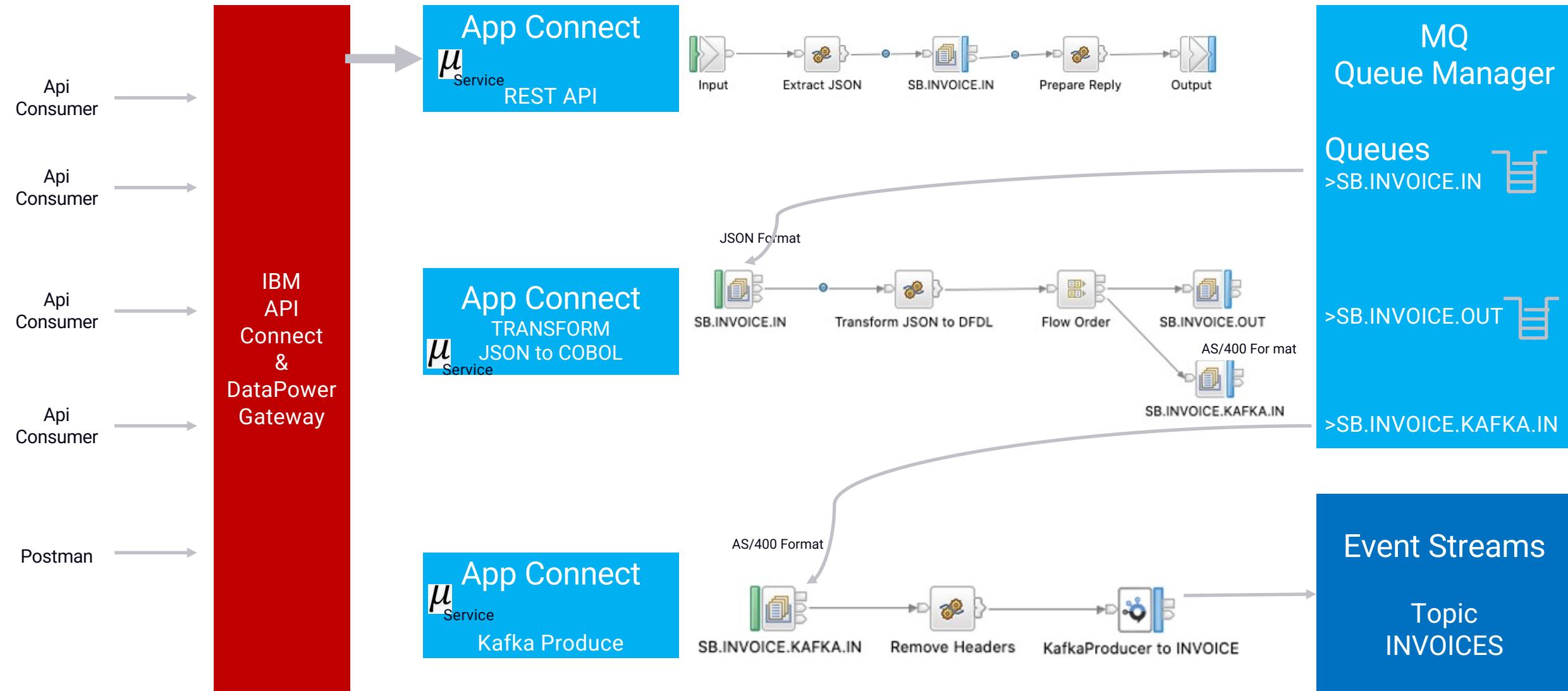
- Monitor CP4I components consistently in same tool
- Trace transactions through CP4I
- Integrated into CP4I user experience
- Tracing agents pre-configured to work with CP4I containers



Cloud Pak for Integration (CP4I) and Instana Deployment Architecture



Multi-Style Integration – Invoice Posting API - Transformation & Routing to MQ, and Kafka



IBM Cloud Pak for Integration on OpenShift



sbodapati-cp4i-ace-invoice-posting-api

No Issues | Stack | Upstream / Downstream | Analyze Calls | (1)

- Summary
- Dependencies
- Services
- Error Messages
- Log Messages
- Infrastructure
- Synthetic Monitoring
- Smart Alerts
- Configuration

Calls

HTTP status codes Call count

Releases

Alerts

Potential Problems

Erroneous Call Rate

Erroneous Call Rate

Releases

Alerts

Potential Problems

Latency

50th 90th 95th 99th Mean

Releases

Alerts

Potential Problems

Infrastructure Issues & Changes

Infra Issues Offline Online Changes

1

Top Services

Service	Latency	Calls	Erroneous Call Rate
IBM App Connect Enterprise-ace-tk-invoice-api	54ms		
mqdv03	4ms		
mqdv03@10.129.2.11	< 1ms		

Processing Time

Self Http Messaging

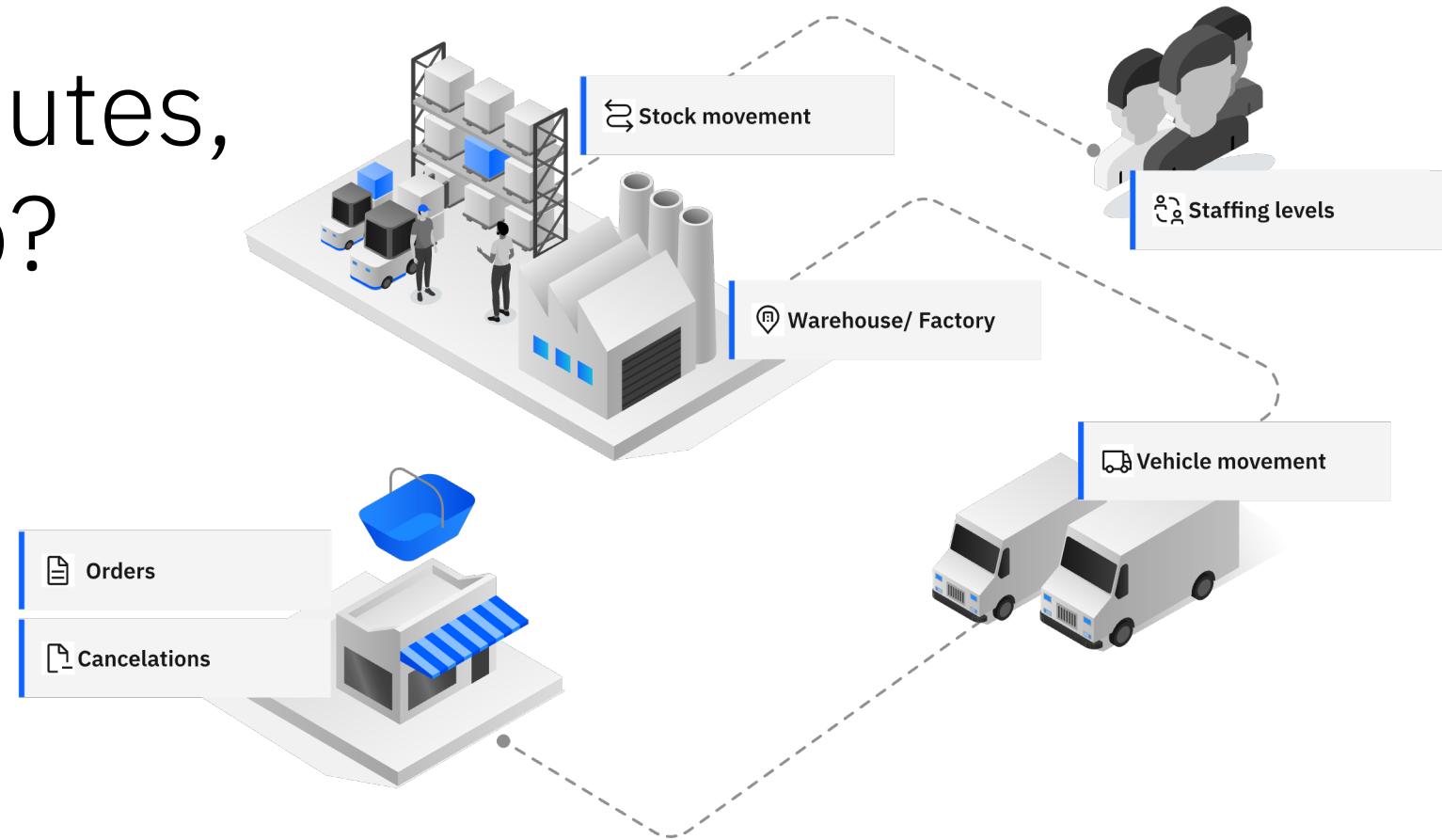
200ms

DAY 2

IBM Event Led Integration: What are its capabilities?

- How does Event Streams work?
- How does Event Endpoint Management work?
- How does Event Processing work?

If you knew what was going to happen in your business in the next 30 minutes, what could you do?

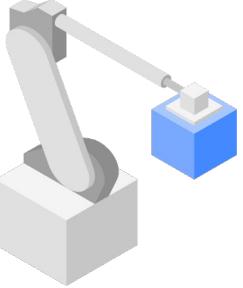


Event-driven fuels the real-time enterprise



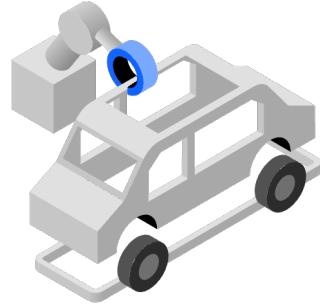
Provides continuous awareness

Build a better picture of your current business



Enables adaptability

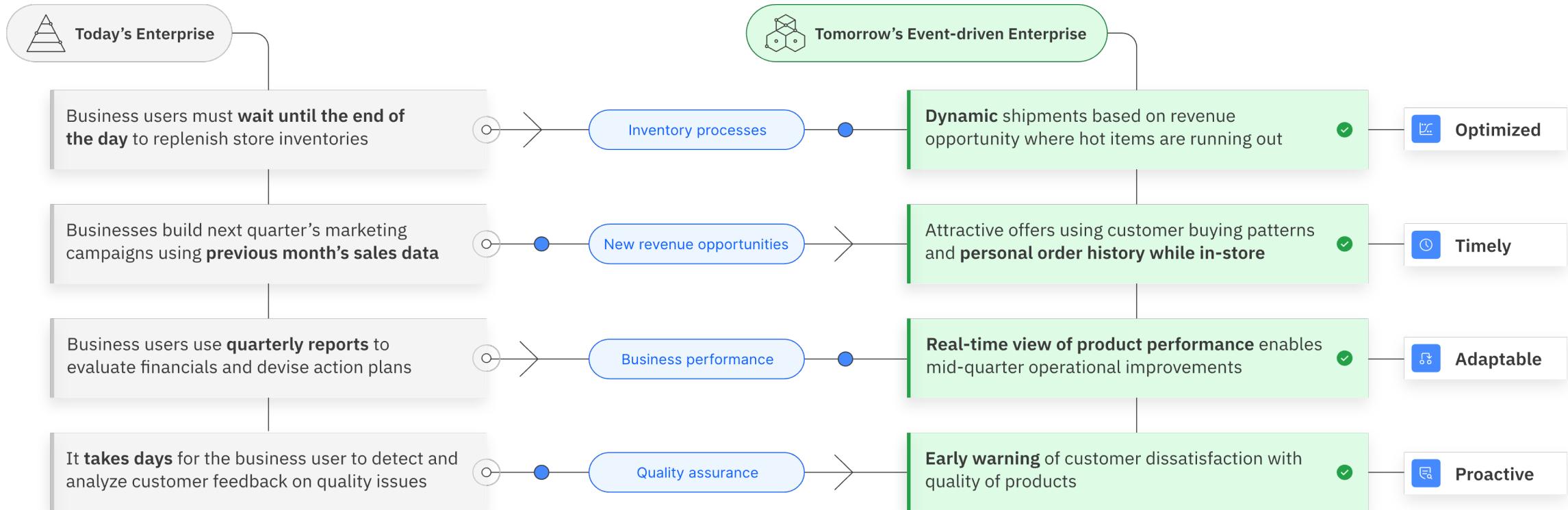
Adapt the way your business operates based on situations you detect



Drives automation

Enable automation in response to events to any given situation

Imagine if your business could take advantage of business events and use them to act in the moment

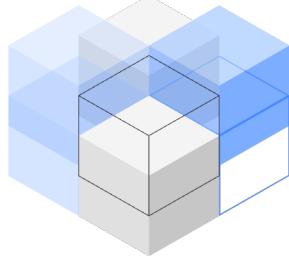


However,
enterprises face
challenges
in becoming
event-driven



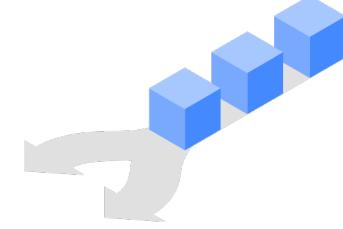
Discovering and locating events for reuse

Events exist across all many disparate data sources, applications and systems



Uncovering insights

Continuous, large volumes of new events make it difficult to narrow the insights and detect the patterns



Accelerating the re-use of events

Shortage of deep, technical skills slow down putting events to use

IBM Event Automation
is a fully composable
event-driven solution
designed to put business
events to work by enabling
users to detect situations,
act in real-time, automate
decisions, and maximize
revenue potential



IBM Event Automation capabilities

Puts business events to work by enabling users to detect situations, act in real time, automate decisions, and maximize revenue potential.

Event Streams

The screenshot shows the IBM Event Automation interface for Event Streams. It displays the 'ORDERS.NEW' topic with a list of messages. Each message entry includes the Partition, Offset, Date, Time, Headers (with a key and value), and Payload (with 'Formatted Payload' and 'Raw Payload' options). The payload content is shown as JSON, such as {"id": "20540274-e2b1-4ce0-80c4-8f3b1bd8e284", "customer": "Marvin Schaefer", "order": "DVM", "product": "Denim Jogger Jeans", "size": "XL", "description": "XL Denim Jogger Jeans", "price": 38.32, "quantity": 1}. The interface also shows consumer groups and a 'System is healthy' status.

Event Endpoint Management

The screenshot shows the IBM Event Automation interface for Event Endpoint Management. It features a welcome message: 'Welcome to Event Endpoint Management.' Below it are three cards: 'Subscribing to topics' (with a magnifying glass icon), 'Consuming from a topic' (with a laptop icon), and 'Resources' (with a gear icon). At the bottom, there's a 'Catalog' section with a link to 'Browse topics that represent event sources.'

Event Processing

The screenshot shows the IBM Event Automation interface for Event Processing. It displays a visual canvas for defining business logic. The canvas includes nodes for 'Orders', 'Small Orders', 'Large Orders', 'Cancellations', and 'Suspicious Orders'. Edges connect these nodes, representing data flow and processing steps. On the left, there's a sidebar with sections for Events (Event source, Event destination), Processors (Filter, Transform, Aggregate), and Joins (Interval join).

Distribution

Collect streams of real-time business events with enterprise-grade Apache Kafka.

Discovery

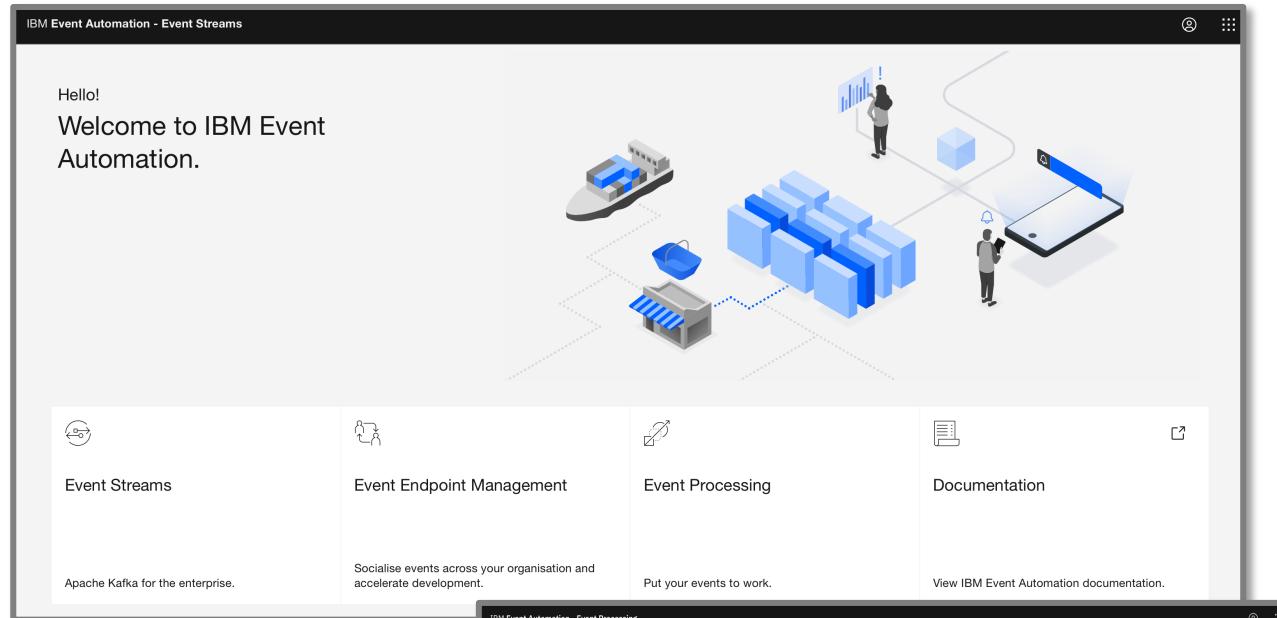
Build a self-service catalog of event sources for users to securely browse and utilize.

Processing

Define business situations in a visual authoring canvas in order to act in real-time and automate decisions.

IBM Event Automation

Composable set of capabilities

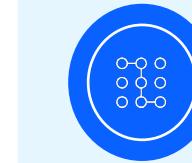
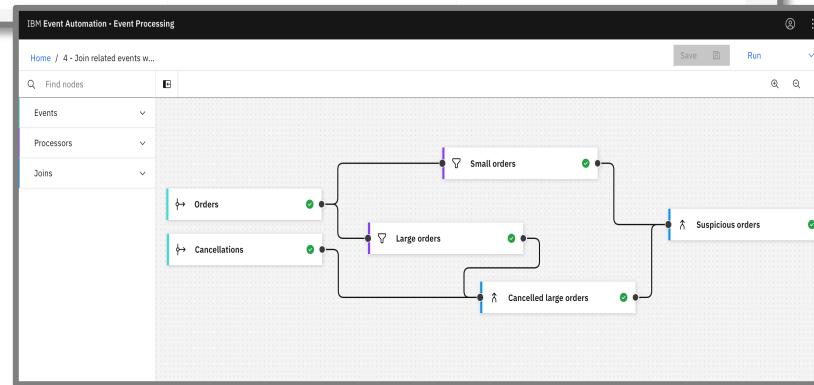


The screenshot shows the IBM Event Automation - Event Streams interface. At the top, it says "Hello! Welcome to IBM Event Automation." Below this is a 3D isometric illustration of various business entities like a ship, a factory, a person at a desk, and a smartphone, all connected by dashed lines to a central cluster of blue rectangular blocks representing data storage or processing nodes. Below the illustration are four main navigation links:

- Event Streams**: Represented by a circular icon with three nodes connected by lines.
- Event Endpoint Management**: Represented by a circular icon with two people icons.
- Event Processing**: Represented by a circular icon with a pencil and a document.
- Documentation**: Represented by a circular icon with a book.

Underneath these links, there are two descriptive sections:

- Apache Kafka for the enterprise.**: Includes a small icon of a speech bubble with a checkmark and the text "Socialise events across your organisation and accelerate development."
- Put your events to work.**: Includes a small icon of a smartphone with a bell and the text "View IBM Event Automation documentation."



Event Streams

Collect streams of real-time business events with enterprise-grade Apache Kafka



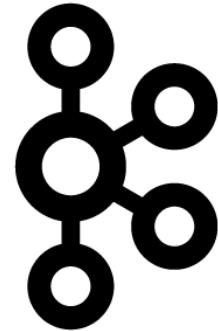
Event Endpoint Management

Build a self-service catalog of event sources for users to securely browse and utilize



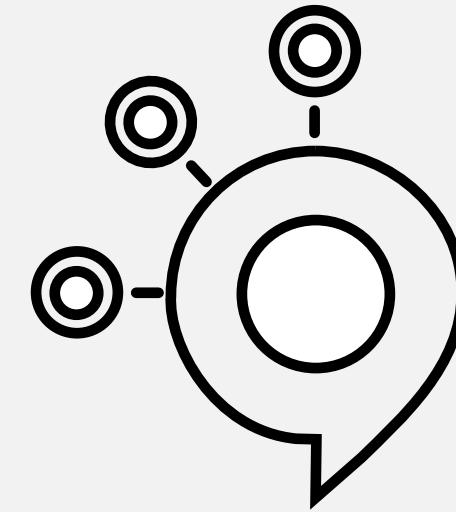
Event Processing

Define business situations in an intuitive, easy-to-use authoring canvas in order to act in real-time and automate decisions



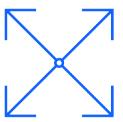
kafka

Apache Kafka® is the de-facto standard for event-driven applications.



IBM Event Streams is fully supported by Apache Kafka® with value-add capabilities.

Event Streams



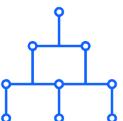
Deploy

Apache Kafka across
the enterprise



Access

Event sources via Kafka
Connect and REST API



Manage

Browse messages, monitor
key metrics and manage
your Kafka deployments

Event Streams is the core of an event-driven enterprise that efficiently makes business events available in the locations they are needed.

Building on open-source technologies like Apache Kafka makes it easy to tap into an entire ecosystem for connectors, analytics, processing and more.

Making it manageable across an entire enterprise

by incorporating:

Operators to deploy Apache Kafka

Supporting event data schemas

Workload balancing

Connectors to access external systems

Management UI for hybrid deployments

IBM Event Streams provides a “Connector Catalog”

Event Streams Connector Catalog (58 connectors) contains a list of top connectors that are supported either by IBM or the community:

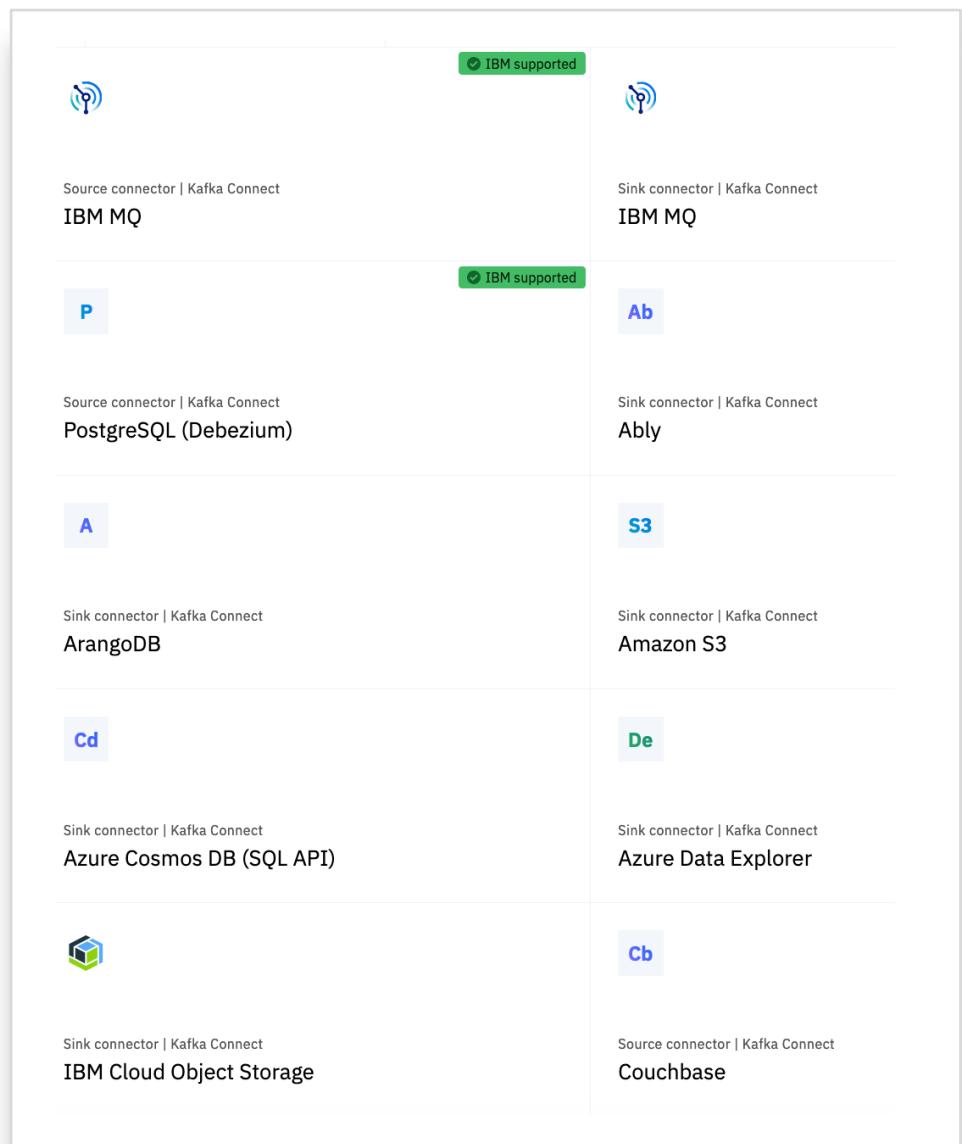
IBM supported connector: Support is provided by IBM for customers with a support entitlement for IBM Cloud Pak for Integration or IBM Event Automation

Community supported connector: Each community connector is subject to its own set of license terms, and you can seek support from the community (not supported by IBM)

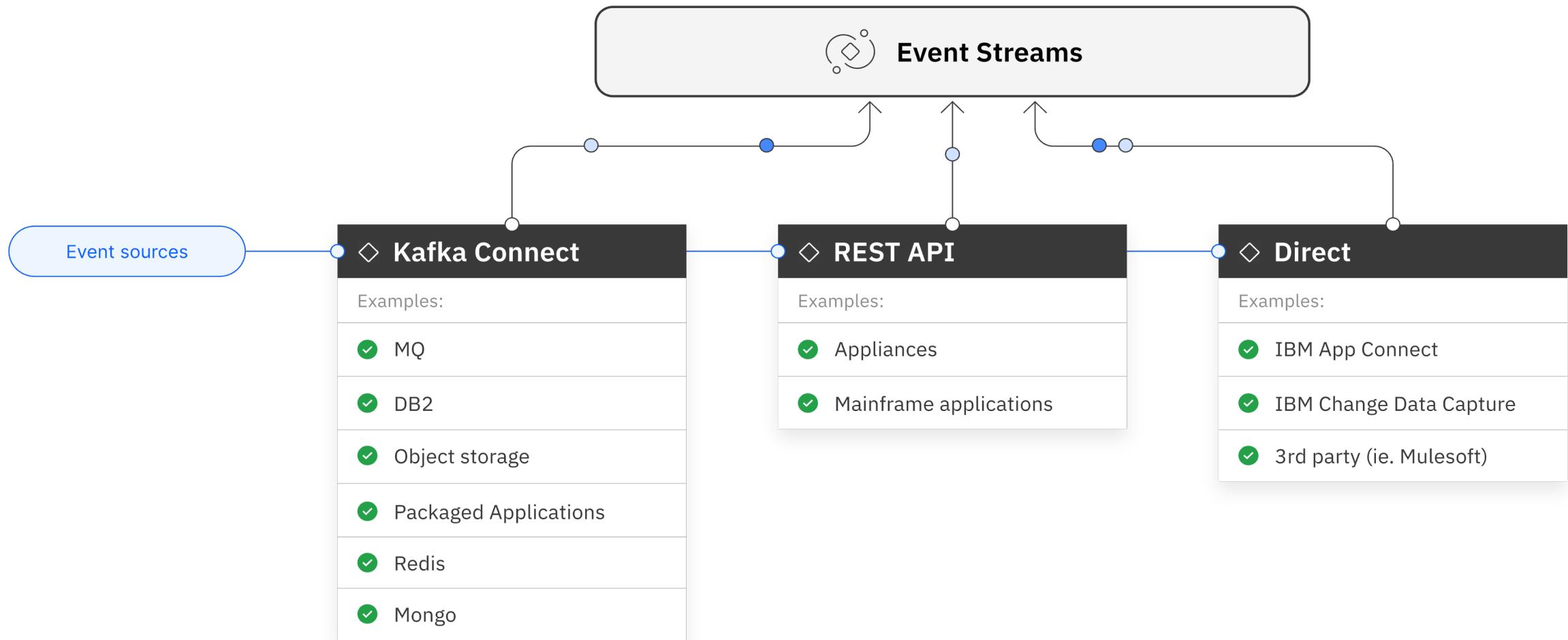
IBM Event Streams is compatible with **all** Kafka Connect based connectors (not limited to the ones in catalog)

IBM regularly evaluate what further connectors to bring into the catalogue based on customer demand.

<https://ibm.github.io/event-streams/connectors/>



Access events from multiple sources to unlock real-time in the enterprise



Event Endpoint Management



Describe

Your events in
a standardized way



Socialize

Publish your events for reuse
across the organization



Secure

Self-service access to
events, while retaining
proper controls and
good governance

Enable existing events to be [discovered and consumed by any user and manage](#) event sources like APIs to securely reuse them across the enterprise.

Event Endpoint Management accelerates the implementation of event-driven and situational applications by making the events that drive them accessible to everyone.

Providing a common management facility where streams of events can be:

- Described in a standardized way using AsyncAPI
- Published in a searchable catalog
- Advertised for others to gain self-service access based on applied policies and gateway enforcement

Event Endpoint Management

Describe Socialize Secure

1 Event Endpoint Management uses AsyncAPI as the standardized way of describing events so users can quickly understand what they are and how to consume them

2 Publish events to the catalog so they can be discovered and consumed by any users in one place

3 Define how people can access events and apply policies to ensure compliance. Remove bottlenecks with self-service access based on policies and enforcement via event gateways

The screenshot shows the IBM Event Automation interface. On the left, the 'Catalog' section displays a list of event topics:

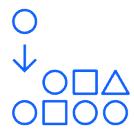
Topic name	Description	Tags
CANCELLATIONS	Events for order cancellations recorded by th...	retail
CUSTOMERS.NEW	New customer registrations from the custom...	retail
DOOR.BADGEIN	Records an employee using their id badge to ...	operations
ORDERS.NEW	Events from the order management system	orders
SENSOR.READINGS		
STOCK.MOVEMENT		

Below the table, there are buttons for 'Rows per page:' (set to 10) and 'Showing 1 - 6 of 6 items'. On the right, the 'ORDERS.NEW' topic is selected in the 'Catalog' sidebar. The 'Topic Information' panel describes the 'ORDERS.NEW' topic, mentioning it represents new orders from the order management system. It notes that multiple products can be purchased as separate events, with dynamic pricing and product descriptions. The 'Event information' panel shows the 'Schema' tab, which displays the AsyncAPI schema for the 'ORDERS.NEW' topic:

```
[{"namespace": "com.loosehanger:jeans", "type": "xsd:card", "name": "Order", "fields": [{"name": "id", "type": "string", "logicalType": "uuid", "doc": "order id"}, {"name": "customer", "type": "string", "doc": "Name of the customer who made the order"}]}
```

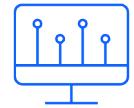
The 'Sample message' tab is also visible. A modal window titled 'Access credentials' is open, prompting the user to save their password as it cannot be retrieved later. It lists security protocols (SASL, PLAIN), and asks for a username and password. A note states: 'This is your unique password and it cannot be retrieved later. If you lose this password, you will need your administrator to revoke these credentials.' At the bottom of the modal are 'Close' and 'Download as JSON' buttons.

Event Processing



Define

Your business situations without need for deep technical skills



Configure

Operations to process events



Apply

Publish to event consumers to act and automate in real-time

Empower users to [work with relevant business events](#) to identify and act on situations in the moment.

Event Processing takes raw events and makes them relevant to a business context.

Users can:

- Filter and transform event properties
- Combine events to identify patterns over continuous time windows
- Aggregate events to analyze trends and detect anomalies

Results can be immediately visualized as well as modified and adjusted to adapt to changing conditions. Outputs can easily be consumed by automation.

Event Processing

Define situations without writing code

- 1 An intuitive and visual way for users to combine and aggregate events to identify important business situations
- 2 Drag and drop event sources and wire together processing operations, with assistance and validation at each step
- 3 Press run and immediately see output directly in the editor
- 4 Export snapshots of results or send them as a continuous stream to a Kafka topic
- 5 Export SQL processing jobs for a developer to extend

The screenshot shows the IBM Event Automation - Event Processing interface. On the left, there's a sidebar with tabs for 'Events', 'Processors', and 'Joins'. Below these are two event sources: 'Orders' and 'Cancellations', each with a green circular icon. From each source, a line leads to a processing node: 'Small orders' for Orders and 'Large orders' for Cancellations. Both of these nodes have a green circular icon. From 'Small orders', a line goes to a 'Suspicious orders' node, which has a blue circular icon. From 'Large orders', a line goes to a 'Cancelled large orders' node, which also has a blue circular icon. The 'Suspicious orders' and 'Cancelled large orders' nodes are connected by a line, leading to a final 'Suspicious orders' node with a blue circular icon.

The screenshot shows a table titled 'Events' with the following data:

order_id	order_timestamp	productdescription	productid	customer
dfaefc3e-76a2-479d-bcfb-68154bfe77a3	2023-05-02T08:11:19	XXL White Ripped Jeans	e5ae7fab-b546-4bcc-a900-be9a1f906bae	bf2835bf-680b-4bc0-ae7b-2ed9e535cd19
b60504f8-2971-46be-b549-0b90a66ff566	2023-05-02T09:21:47	XXL White Ripped Jeans	e5ae7fab-b546-4bcc-a900-be9a1f906bae	bf2835bf-680b-4bc0-ae7b-2ed9e535cd19

At the bottom of the table, it says 'Items per page: 5' and '1-2 of 2 items'.

Event Processing

Simple and easy to configure processing

A guided experience with help and assistants to configure processing operations, increasing productivity

- 1 Visual representations of events occurring over time windows
- 2 Expression builder with context-sensitive help and auto-complete
- 3 Embedded help with examples to help you learn

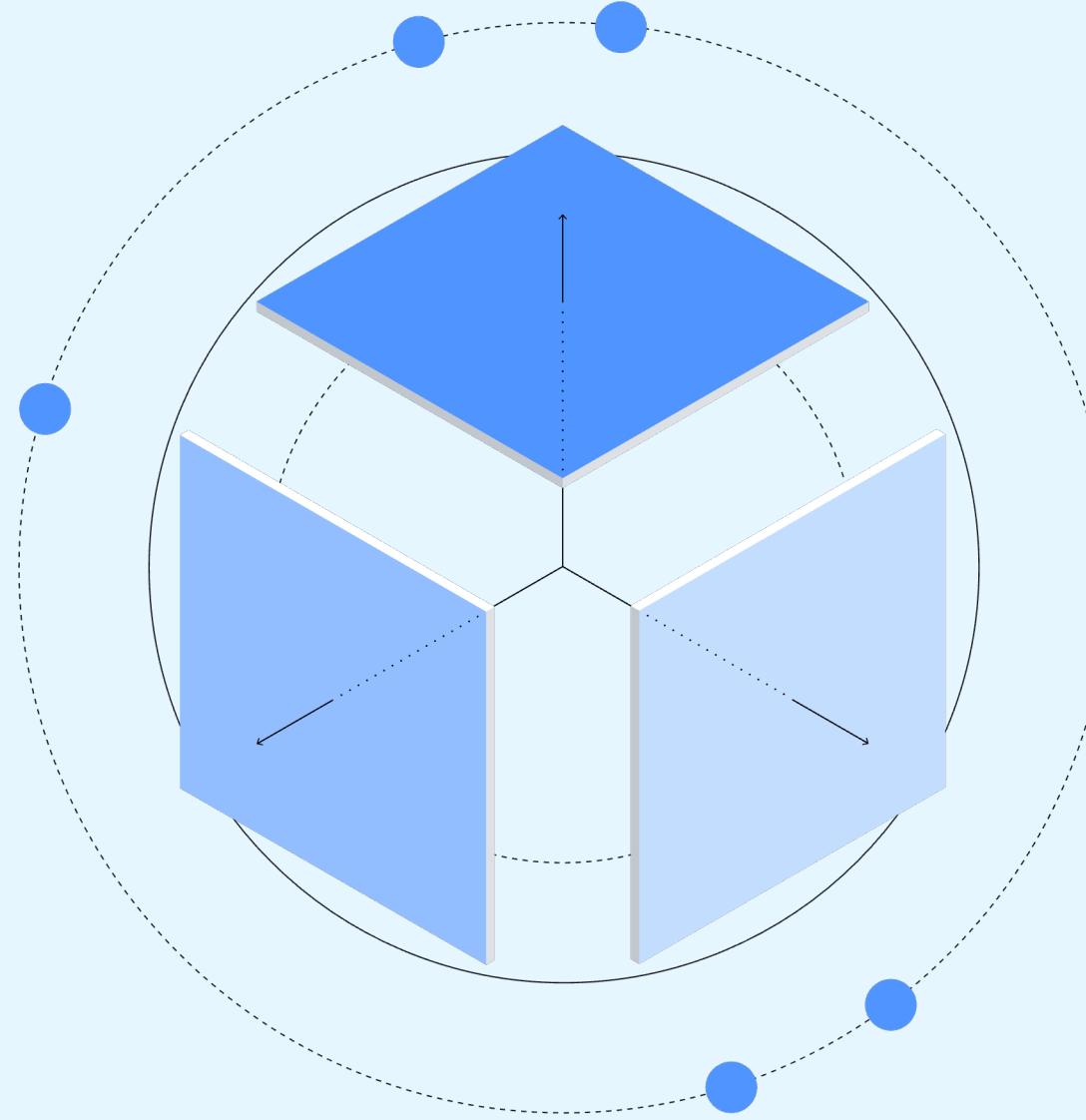
The screenshot displays the SAP Event Processing configuration interface with three main panels:

- Configure interval join**: A panel for merging event sources based on time windows. It shows a timeline from 0 to 30 minutes. A blue vertical bar is at 0, and a grey horizontal bar spans from approximately 15 to 25 minutes, labeled "Cancellations.event_time". Below the timeline, there are input fields for "Event to detect" (set to "Cancellations(event_time)") and "Event to set the time window" (set to "Large orders(event_time)").
- Define filter**: A panel providing help on filter expressions. It includes a section titled "How does a filter work?" with an example: "A filter expression such as shape LIKE 'triangle' will keep only events where the property shape is triangle." Below this are several icons representing different shapes: triangle, circle, square, and diamond.
- Configure transform**: A panel for transforming events. It shows a table for creating properties:

Property name	Expression
fullName	CONCAT(first_name, ' ', last_name)

A dropdown menu under "Select function" shows "CONCAT" selected, with a tooltip explaining it concatenates strings. Other functions like "CONCAT_WS" are also listed.

IBM Event Automation enables your event-driven enterprise



Empower broad range of users

Less technical users can work with real-time events to detect and automate business situations using their existing skill set

Facilitate sharing and reuse of events

IT teams can provide self-service access to events while retaining proper controls and good governance

Extend existing infrastructure

Enterprise architects can extend existing event-driven investments with composable capabilities

Go from months to minutes in putting your business events to work!

“It looks so easy to understand, can see how the assistants help educate the business analyst user.”

[Large EU Auto Manufacturer](#)

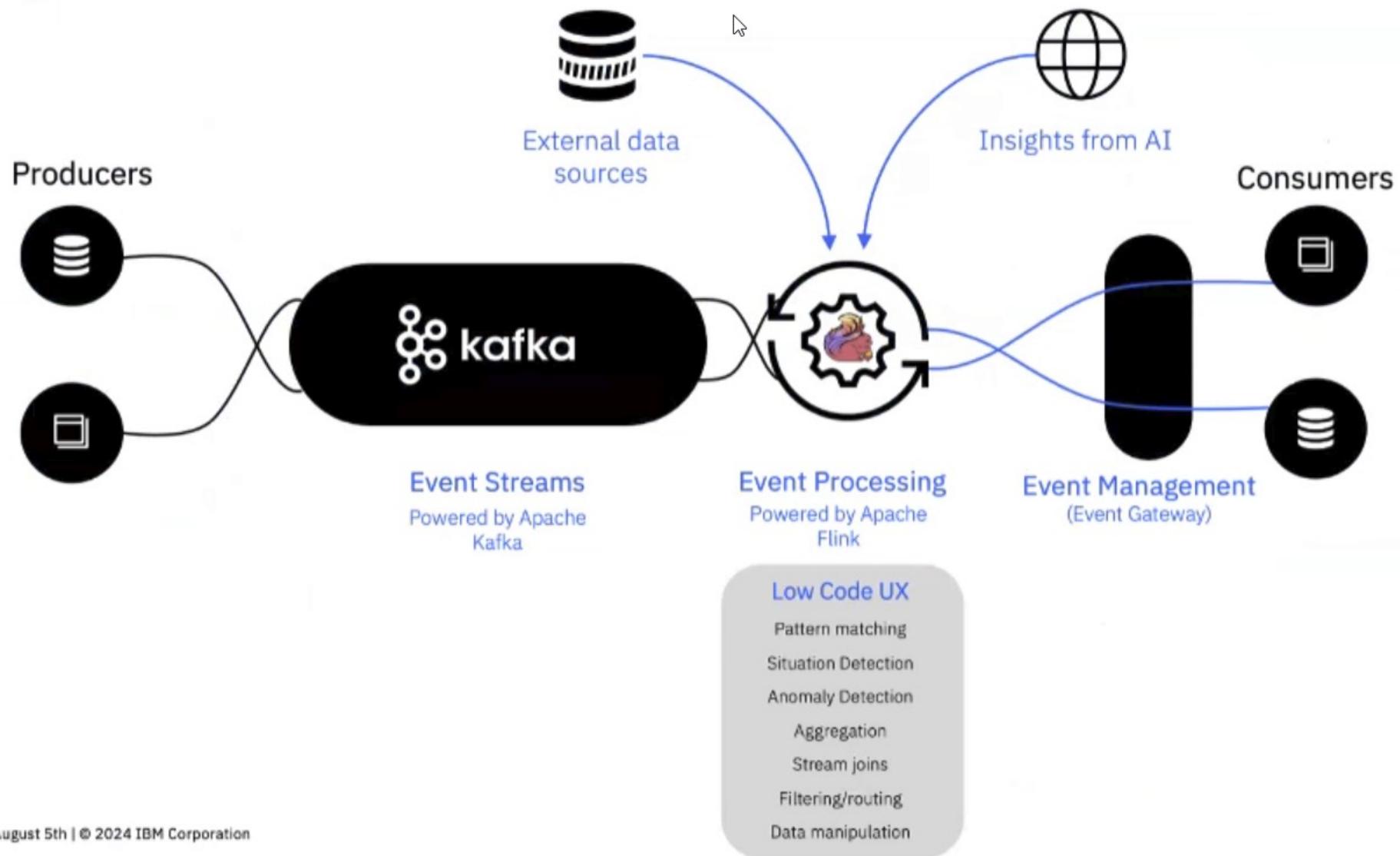
“ Like the productivity of low code event processing, this will be very positive as an accelerator.”

[Large North American Bank](#)

“The benefits of event-driven increase exponentially with each use case. This is helping solve for technical complexity that often stops people dead in their tracks with EDA.”

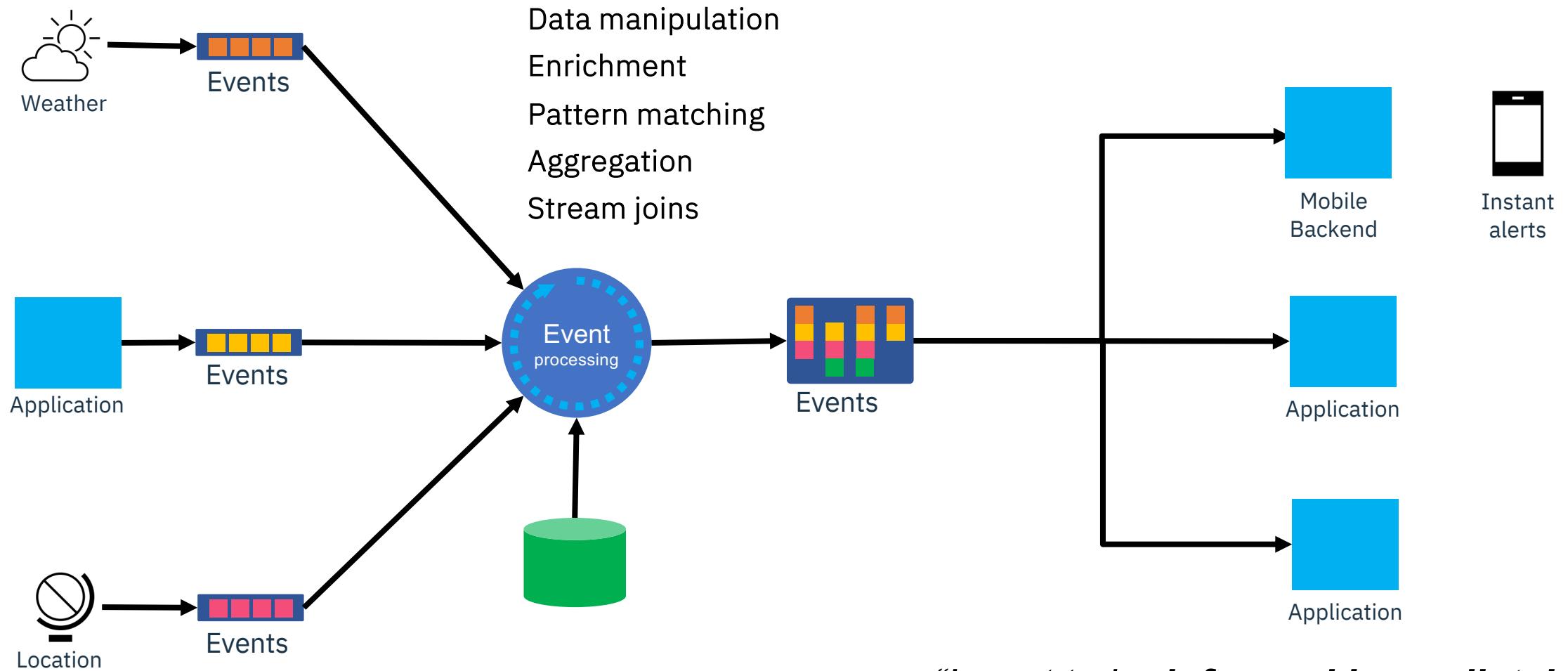
[Global Market Intelligence Analyst](#)

IBM offers a complete and composable architecture for event-driven



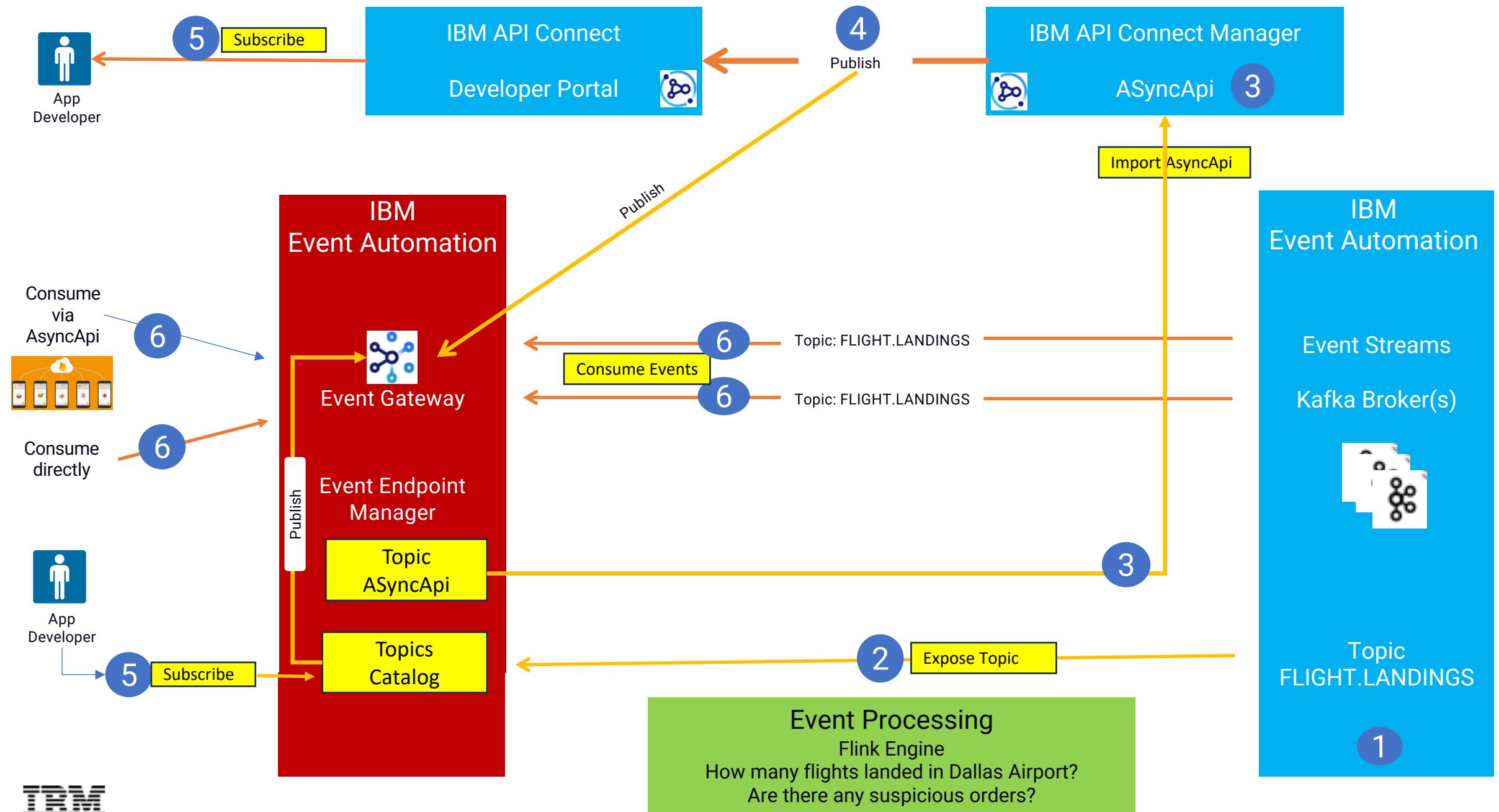
Event processing

Filter, transform, enrich, aggregate, analyze and correlate streams of events



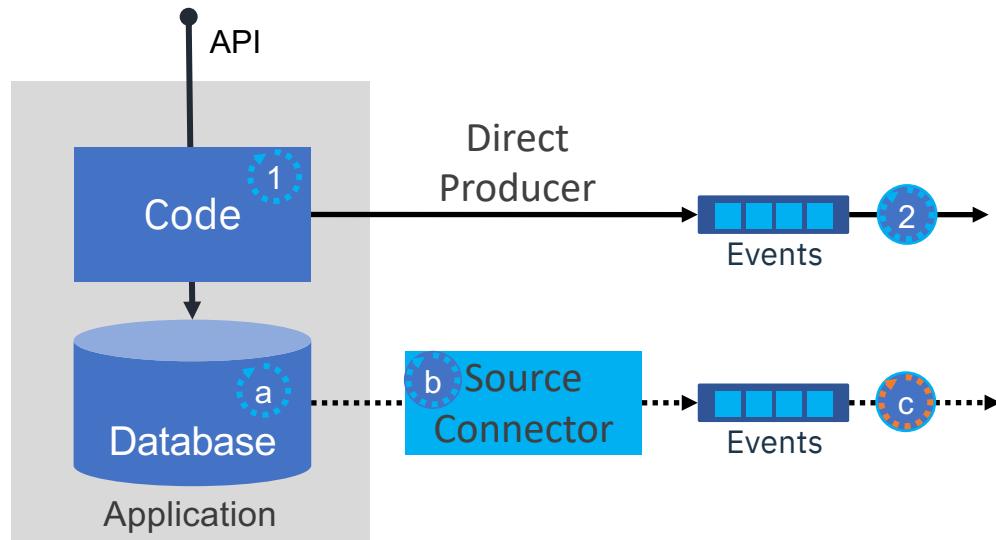
“I want to be informed immediately when something happens”

IBM Event Automation – Event Endpoint Management – AsyncAPIs – Flight landings Demo



Producer patterns – where to do **event processing**?

Often the data emitted by the source is too raw for general use



Direct Producer

1. The code producing the event can perform data transformation and contextual filtering before publishing.
2. Further stream-based processing may be required to make the events more broadly relevant/useful

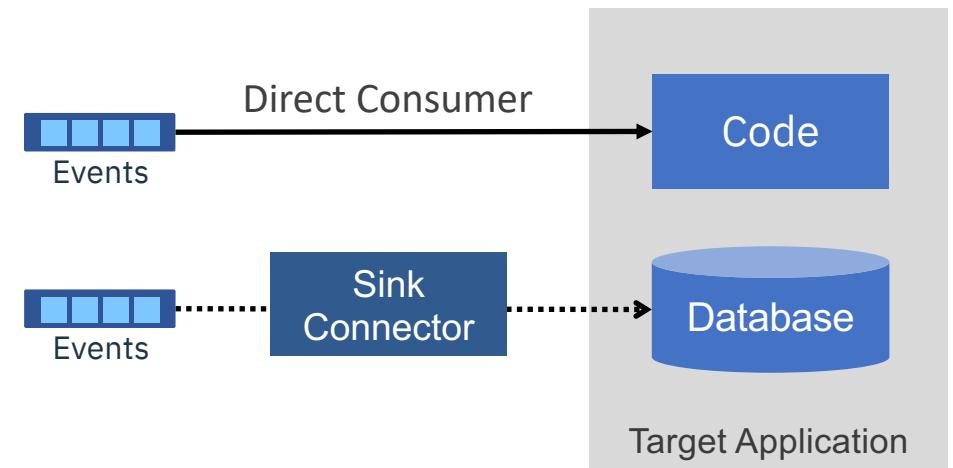
Source Connector

- a. The data base might be able to perform some transformation for example in triggers for an outbox pattern.
- b. Connector frameworks provide a mechanism for simple transformation and data mapping
- c. Further stream-based processing may be required to make the events more broadly relevant/useful

Consumer types

Direct Consumer (“pull”)

- The target application contains code that directly “pulls” events from Kafka for events
- Application implements event consumption logic*



Sink Connector (“pull” then “push”)

- Intermediary (connector) “pulls” events from Kafka
- Intermediary then “pushes” those events to the target application
- The connector implements event consumption logic*

*consumption logic includes: retries, offset management, idempotence, error handling etc.

Available Event Automation Labs

Event Automation Labs

- Integration to Kafka is a real time event streaming platform that enables you to publish/subscribe, store, and process events as they happen. App Connect provides a Kafka smart connector that enables you to connect to a number of supported Kafka implementations.
- Show how to create an Async API in IBM API Connect Manager, Produce events to IBM Event Streams using IBM App Connect Toolkit Flow, and finally run varies Consumers to read the events
- Define business scenarios in an intuitive, easy-to-use authoring canvas. Detect whenever they arise and start acting in real-time when it matters the most.

Labs included:

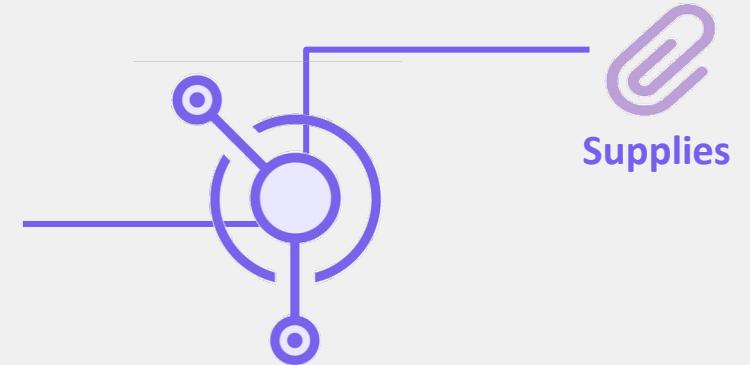
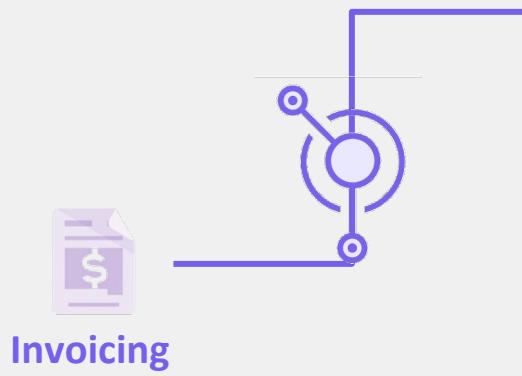
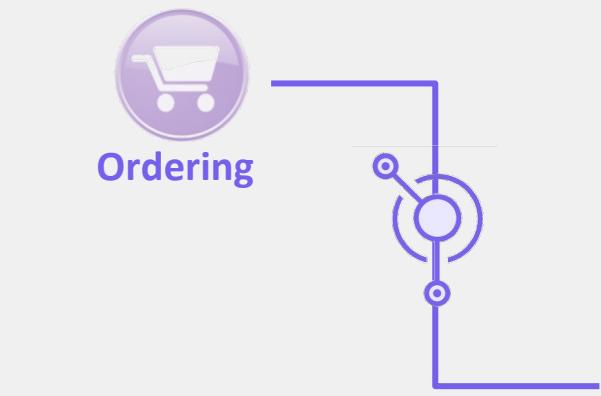
1. Event Endpoint Experience
2. Event Automation Authoring Experience
3. Kafka App Connect Experience



MQ Enterprise Messaging

- MQ HA/DR and security
- MQ Plus Kafka

What *is* MQ?



MQ is the **wiring** between the different parts of a business

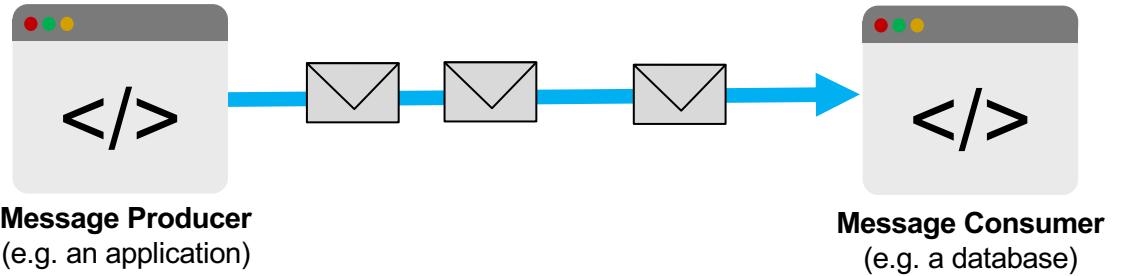
...securely taking data and file contents **where they need to go**

Business critical communication: Flexible, reliable, secure assured delivery

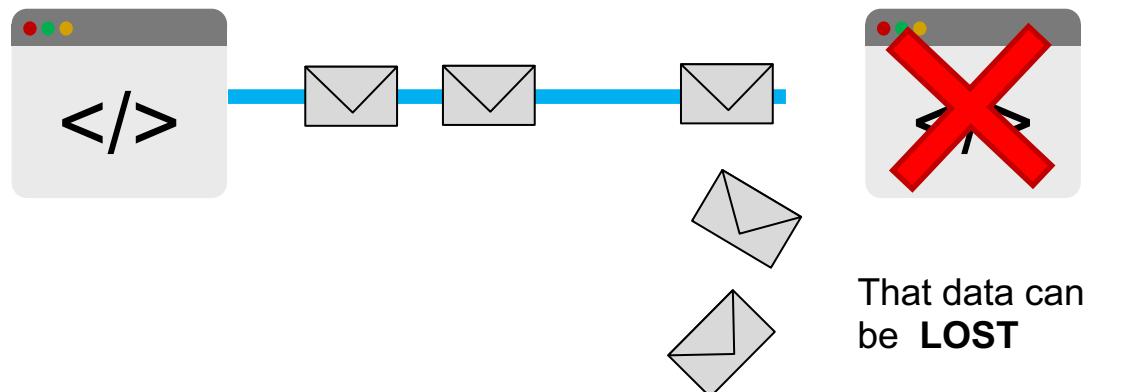
Proven technology for communicating business critical data to support applications and microservices.

- Once and once only
- Targeted delivery
- Platform agnostic

Applications, services, systems etc send data to each other.



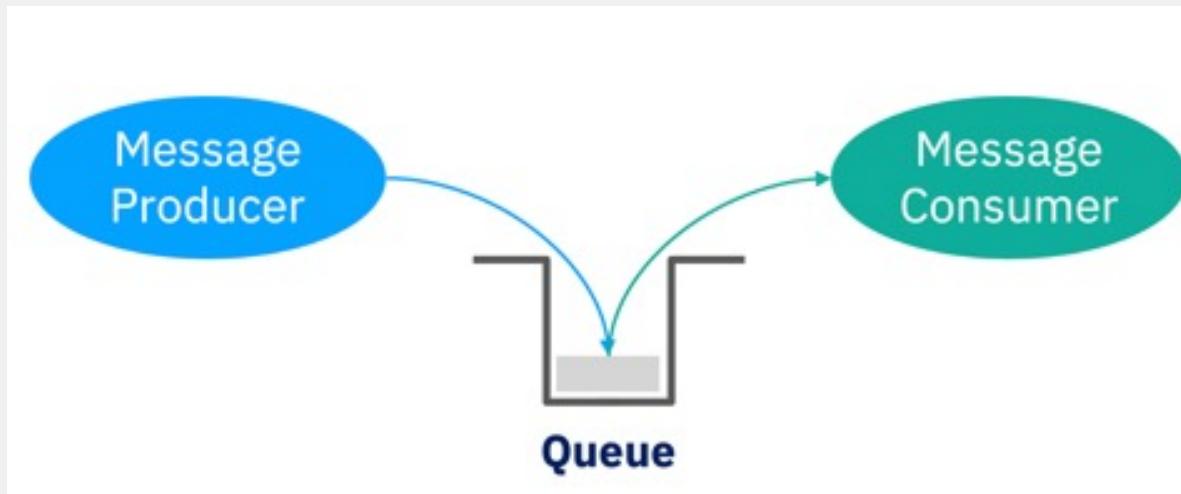
But if there is a problem with infrastructure or the receiving application...



How does MQ work?

IBM MQ is placed between two or more applications, so they are not communicating directly. Messages from applications are put on a queue. The sender application does not need the receiving application to be available at the same time, as the queue provides availability. **This model is known as asynchronous messaging.**

Think of sending an SMS text message – you don't need the receiving persons' phone to be available in order to send your message, and you can carry on with your other tasks once your message is sent.



Asynchronous messaging is sometimes referred to as “fire and forget”, this is particularly true for IBM MQ as
[IBM MQ delivers messages exactly-once](#)

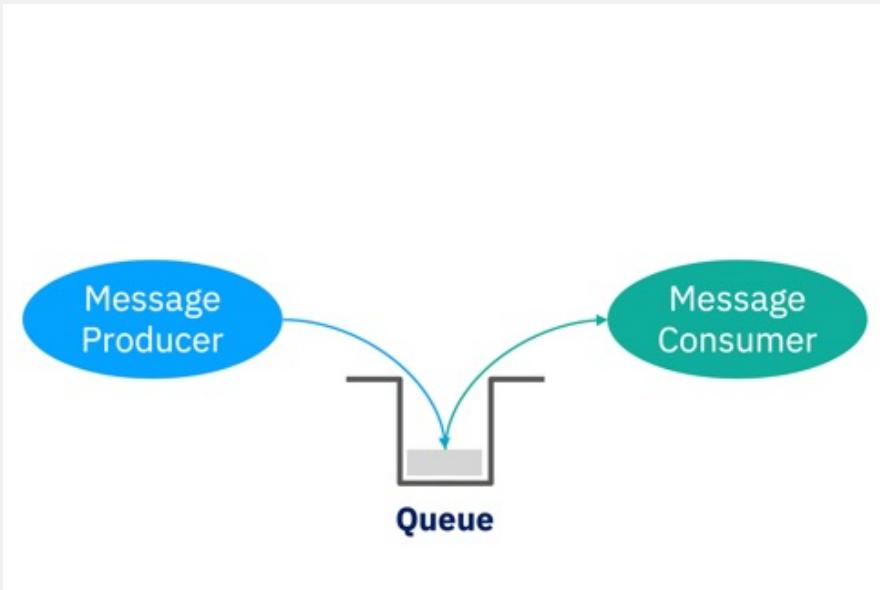
unlike some competitive solutions which provide at-least-once messaging (meaning there may be duplicates) or at-most-once messaging (which means the message may not be delivered at all).

How does MQ work?

Messaging patterns available in IBM MQ

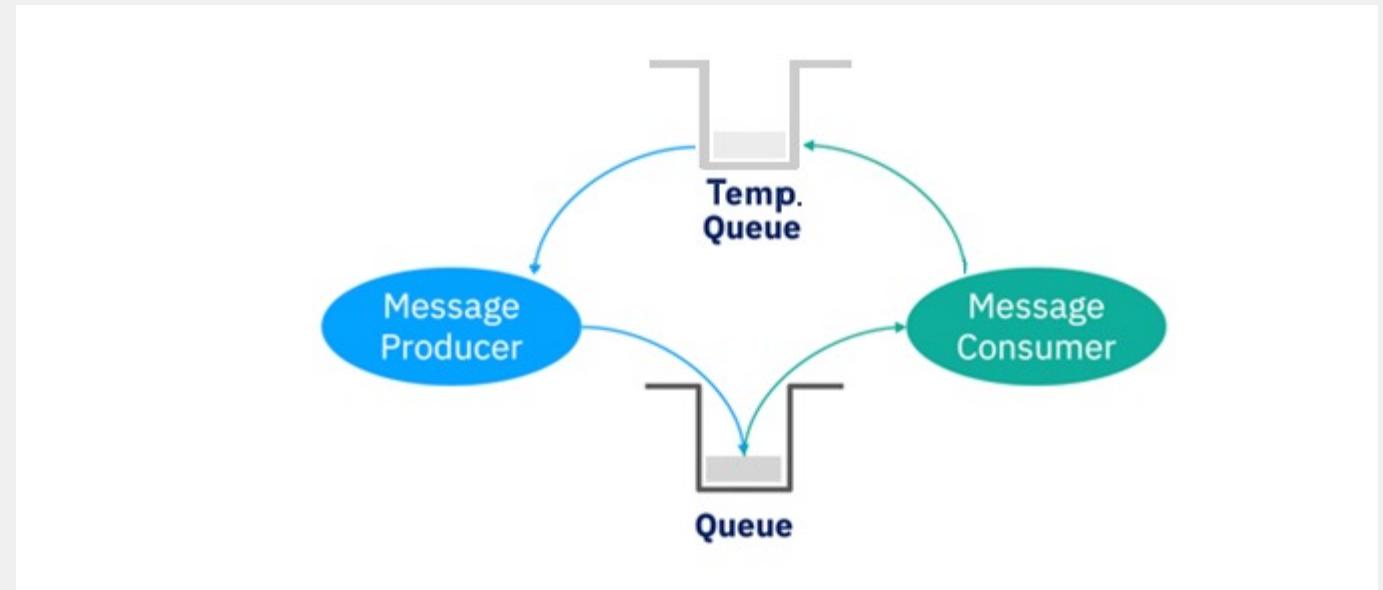
Point-to-point messaging

Senders produce messages to a queue, and receivers asynchronously consume messages from that queue. MQ provides a ‘safe place’ for messages between applications. So, applications or servers being down means that message aren’t lost.



Request/Response messaging

Request/response messaging, or ‘conversational messaging’ is very similar to point-to-point, but in this case we need/want a response to our message. To make things run more smoothly, many customers create special temporary queues for response messages – so the sending application can send the message, get on with other tasks and monitor the temporary queue for a response.



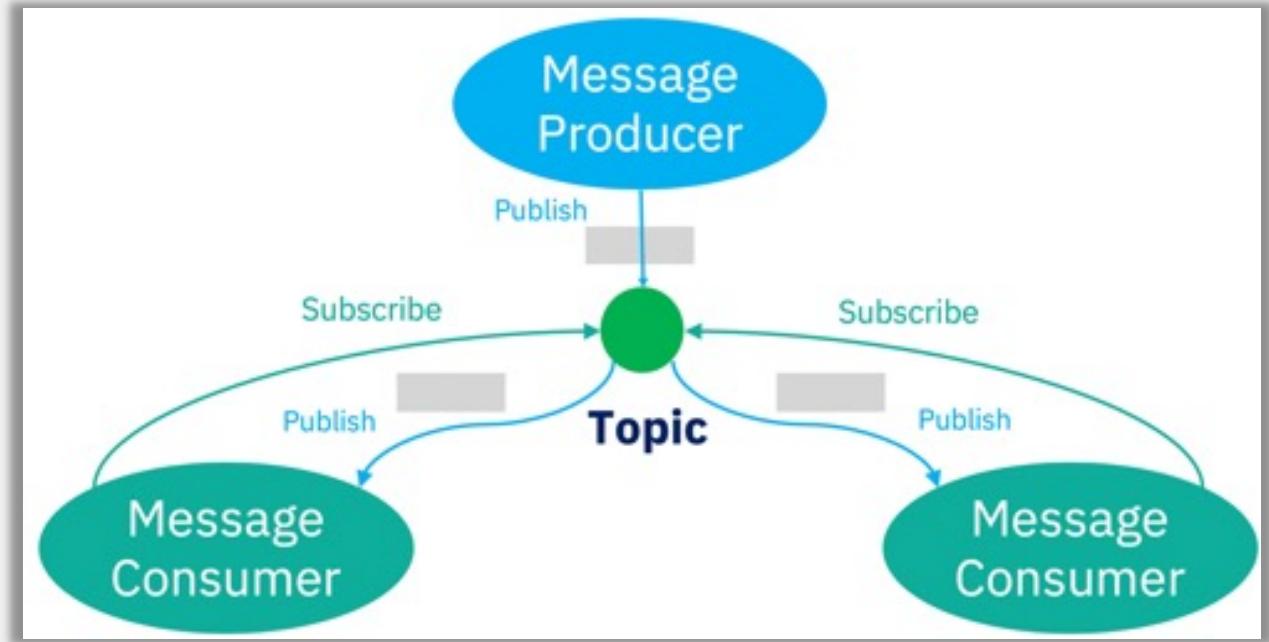
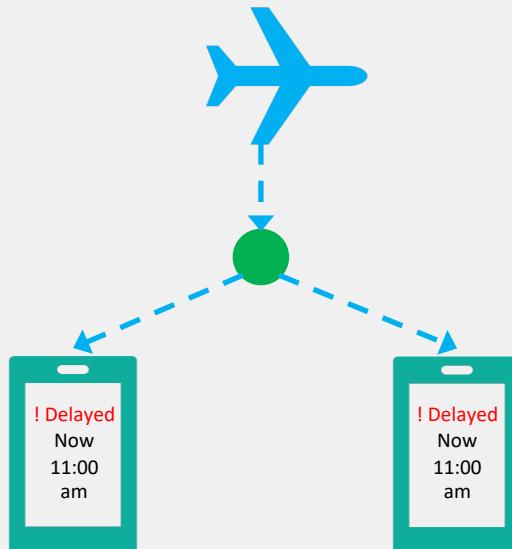
How does MQ work?

Messaging patterns available in IBM MQ

Publish / Subscribe (Event driven messaging)

In this style of messaging, an application (message producer) publishes a message to a topic. Interested applications, called consumers, subscribe to the topic. When a new message is published to a topic, each subscriber will receive a copy.

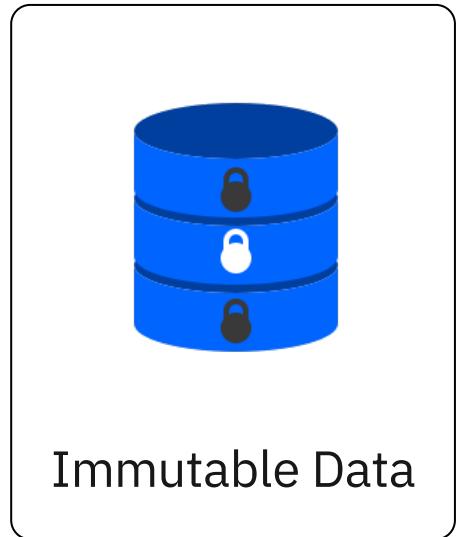
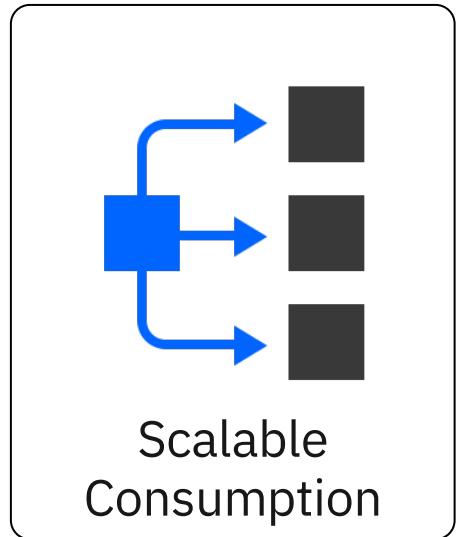
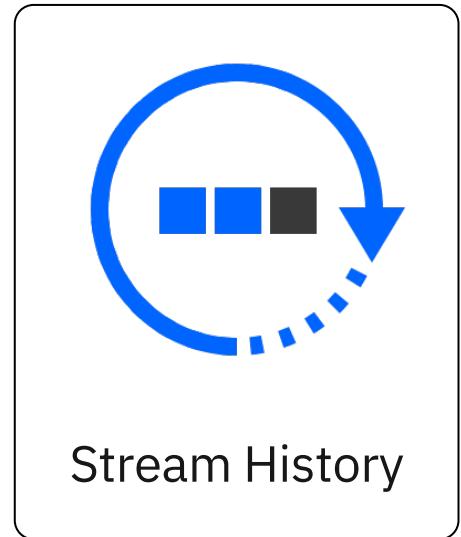
There could be many publishes and many subscribers to a topic.



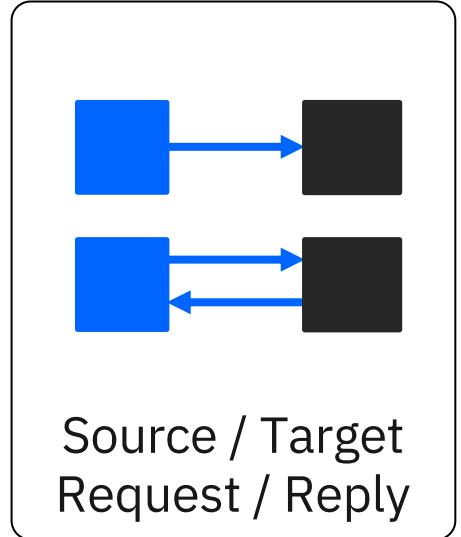
An example of Publish/subscribe messaging is flight delay notification.

- **Message producer:** an airline application that tracks flight status. When the application determines that a flight will be delayed, a message containing an updated 'estimated time of departure' is published to a 'flight update' topic.
- **Message consumers:** the airline's mobile app for passengers to manage their itinerary. These are the subscribers to the flight updates topic. When the message arrives on the topic, it is sent to each subscriber, in this case each passenger who is booked onto the affected flight, via their mobile app.

Events (notifications)



Messaging (commands)



IBM MQ Advanced

The market-leading capabilities of MQ with added Connectivity, Reliability and Security options.



Advanced **Connectivity**

- Send files over your MQ network with **Managed File Transfer**
- IBM **Aspera fasp.io Gateway** for rapid message transfer - increasing existing network capacity
- **MQ Telemetry** for connectivity via MQTT to remote sensors, actuators, and telemetry devices.



Advanced **Security**

- Full **end-to-end-encryption** for unrivaled security of company and customer data
- Compliance with regulations and confidence for audits



Advanced **Reliability**

- Replicated Data Queue Managers to implement effective failover with reduced network storage costs
- Pre-packaged MQ Advanced **certified container** to effortlessly deploy a production-ready IBM MQ image.

IBM MQ | Console

Updated in IBM MQ v9.3.4 CD

IBM MQ | 30 Years of Innovation

The IBM MQ Console enables administrators to perform common tasks via a graphical user interface.

The MQ Console now makes it easier to see what's happening on a queue manager:

- Which connections are active, over which channel, and what they've been doing.
- how a queue manager is interacting with other queue managers in its network.
- Increased insight into the MQ network with new application-centric views to show relationships between applications, queue managers, queues and channels.
- Easily understand and observe the relationships between MQ resources

The image displays three screenshots of the IBM MQ Console interface:

- Top Screenshot:** Shows the "Connected queue managers" section for Queue Manager QM2. It lists two connected queue managers: QM1 (Running) and QM3 (Running), along with their data transferred, message flow, and last message details. A table shows the following data:

Name	Status	Data transferred	Message flow	Last message	Clusters
QM1	Running	29.04 KB	Receiving from QM1	Today at 12:40:13 PM	1
QM3	Running	290.41 KB	Receiving from QM3	Today at 12:40:12 PM	1
- Middle Screenshot:** Shows the "Connections" section for Queue Manager QM2. It lists various application producers and consumers along with their message flows and open MQ objects. A table shows the following data:

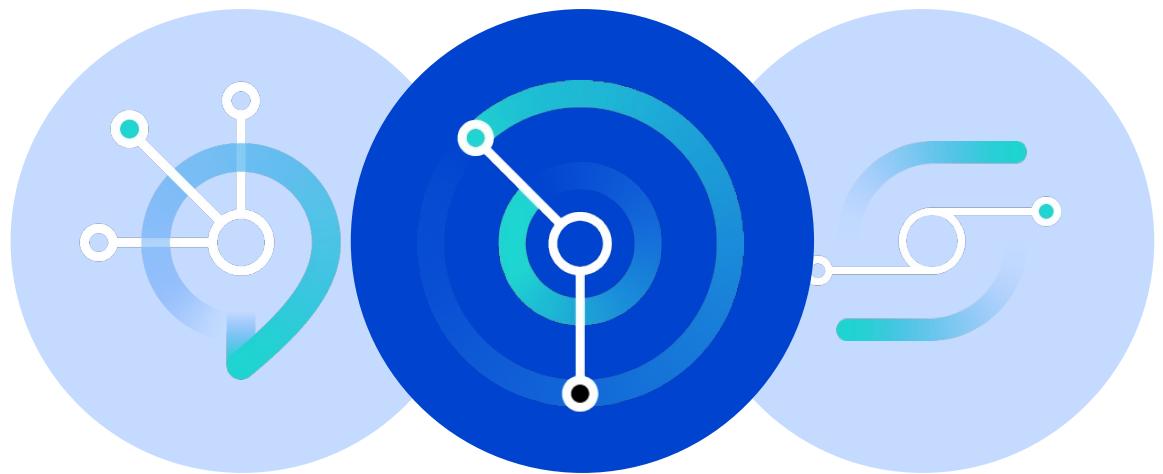
App name	App message flow	Open MQ objects
ucProducer	→ Sending	DEV.QUEUE.1
ucProducer	→ Sending	DEV.QUEUE.1
ucProducer	→ Sending	DEV.QUEUE.1
ucConsumer	← Receiving	DEV.QUEUE.1
ucConsumer	← Receiving	DEV.QUEUE.1
ucConsumer	← Receiving	DEV.QUEUE.1
numproducer	→ Sending and receiving	15
numrooth	-	-

A detailed "Connection details" panel on the right provides specific connection information like Thread, Channel name, App name, and Options.
- Bottom Screenshot:** Shows the "Queues" section for Queue Manager QM1. It displays queue depths (3 full, 2 warning, 4 critical), associated objects (Streaming queue SYSTEM.DEFAULT.LOCAL.QUEUE, Initiation queue SYSTEM.REST.REPLY.QUEUE, Backout queue queue SYSTEM.DEFAULT.LOCAL.QUEUE), and cluster channel names (TEST*). A table shows the following data:

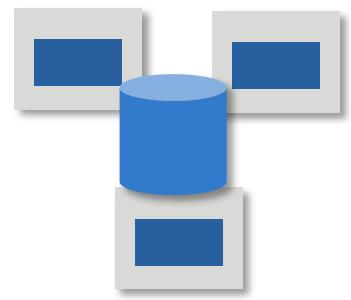
Name	Type	Depth %	Maximum depth	Current connections
Test1234	Local	120%	6000/5000	Input 0, Output 1
Test123	Local	100%	5000/5000	Input 0, Output 1
Test12	Local	60%	3000/5000	Input 0, Output 3

MQ message availability

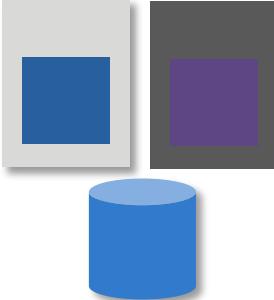
Protecting your critical data



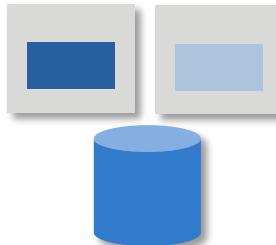
Constantly evolving to meet your availability needs



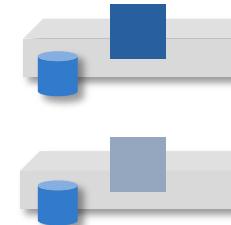
z/OS Queue
Sharing Groups



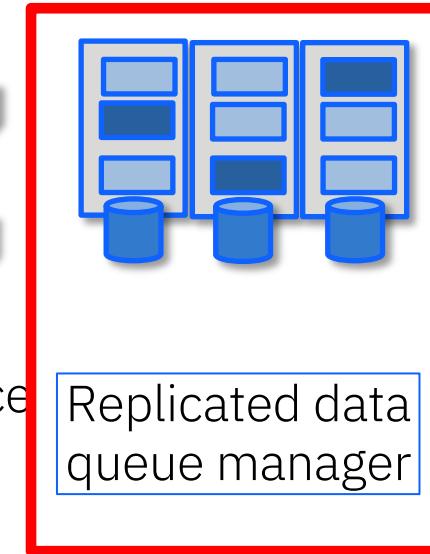
System
managed HA



Multi-instance
queue
managers



MQ Appliance



Replicated data
queue manager

consistency

availability

Dependencies

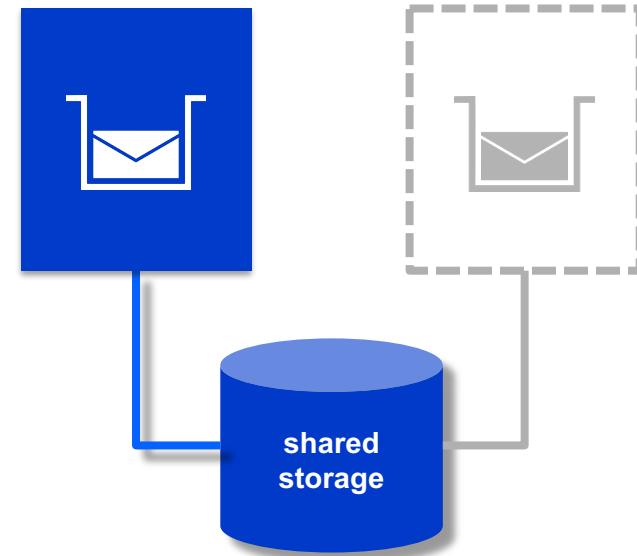
Multi-instance queue managers

Provides basic failover support without HA coordinator (HA cluster)

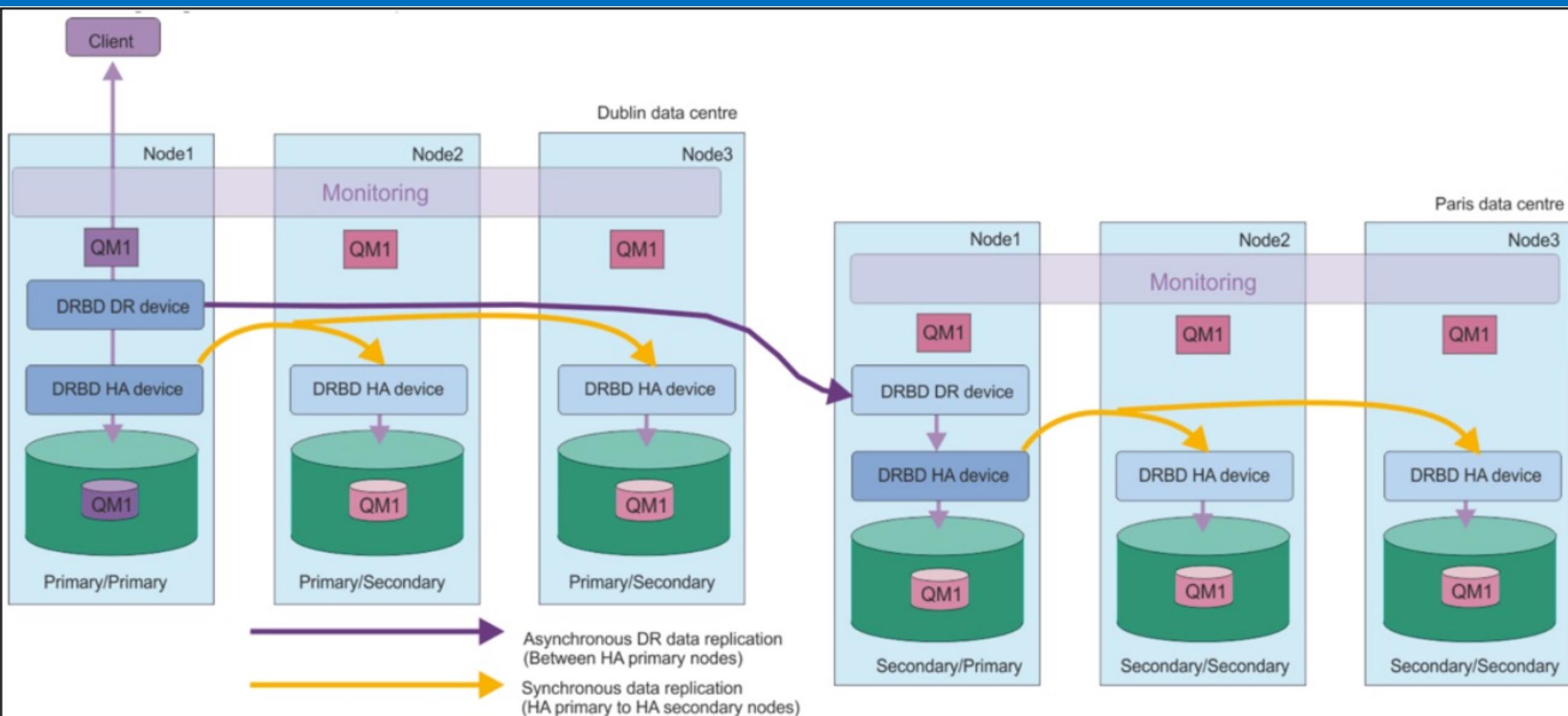
- ✓ Faster takeover - fewer moving parts
- ✓ Cheaper - no specialised software or administration skills needed
- ✓ Windows, Unix, Linux platforms
- ✗ No IP address takeover

Queue manager data held in networked storage
- e.g. NFS, GPFS, etc.

If the active instance fails, standby instance performs queue manager restart and becomes active



RDQM-RDQM DR (6 nodes)

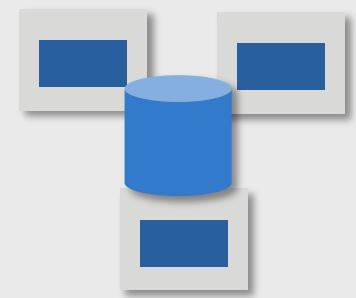


Cloud native availability

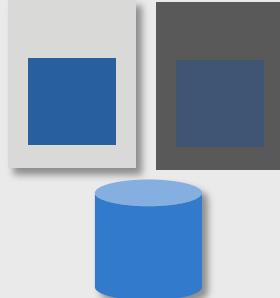
Replication and consensus



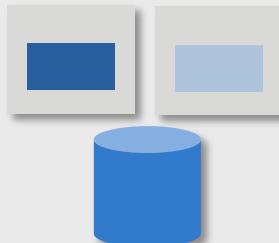
Constantly evolving to meet your availability needs



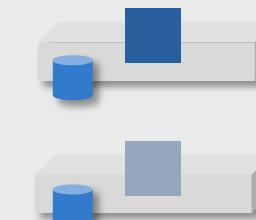
z/OS Queue
Sharing Groups



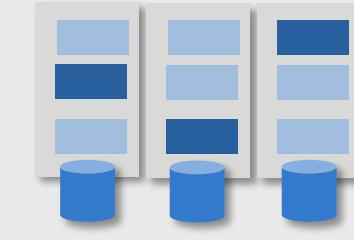
System
managed HA



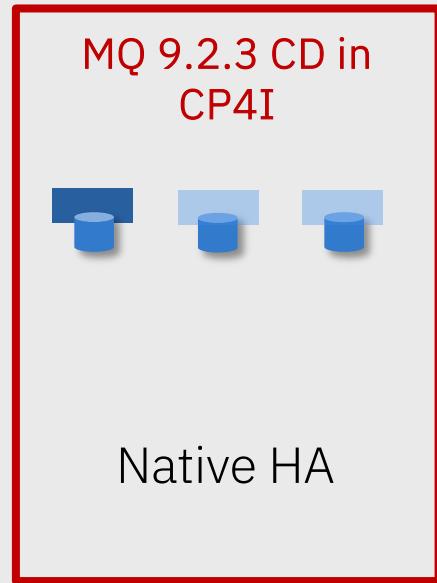
Multi-instance
queue
managers



MQ Appliance



Replicated data
queue manager



Native HA

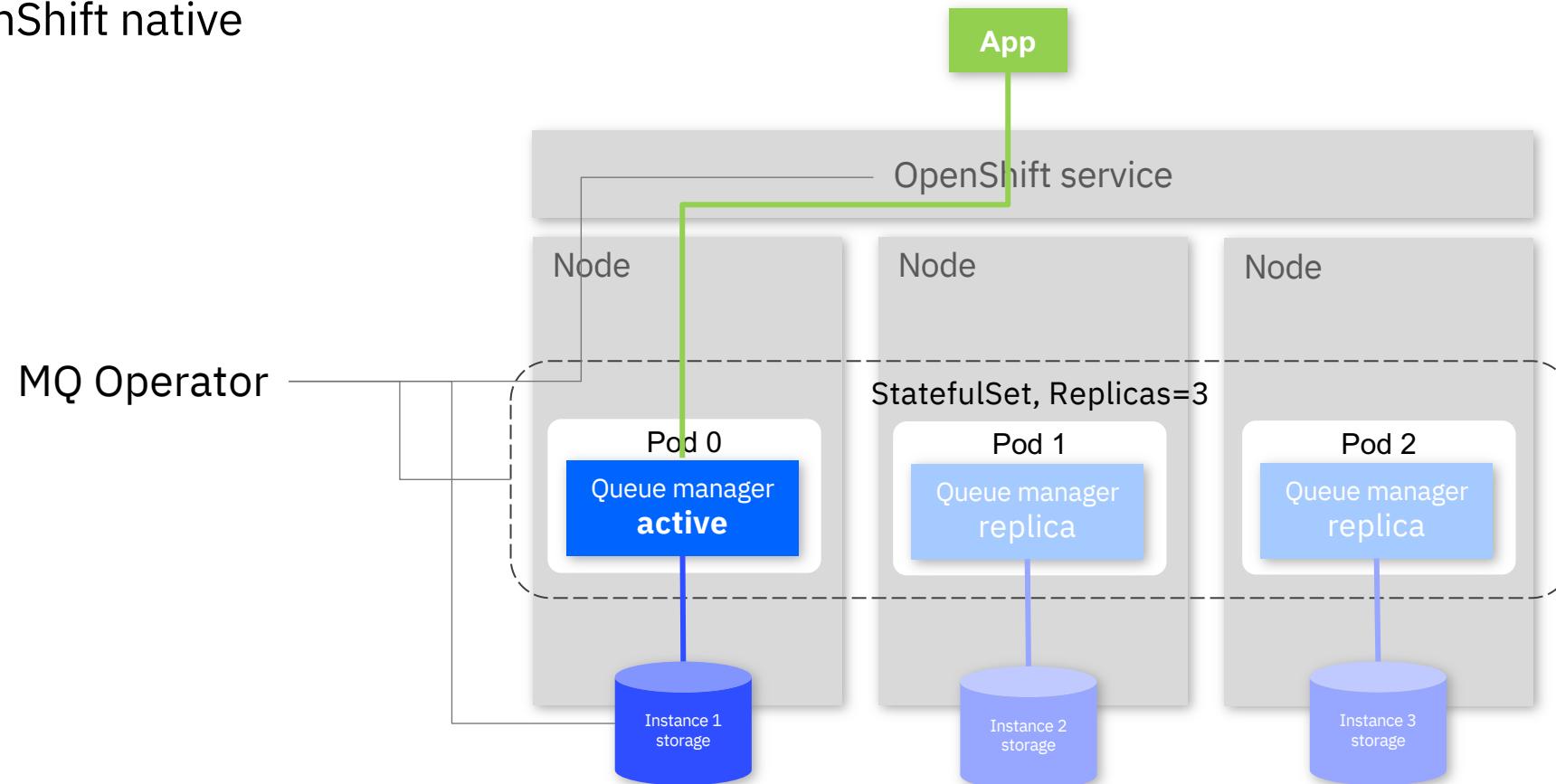
consistency

availability

Dependencies

MQ Native HA

OpenShift native



Availability:

cross AZ RPO=0, RTO “a few seconds”

Compatibility:

simple RWO block storage requirement

Cost:

Included in CP4I license (MQ Advanced ratio)

Complexity:

No external services to manage

Performance:

Network + block storage

MQ Always-on

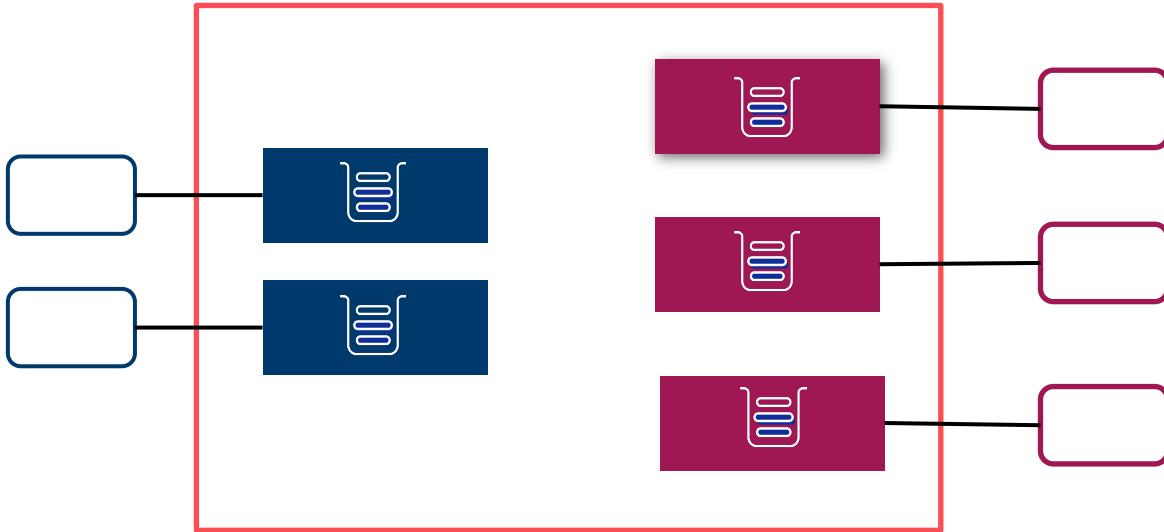
Building scalable, active-active, solutions



MQ Clusters

Traditional cluster

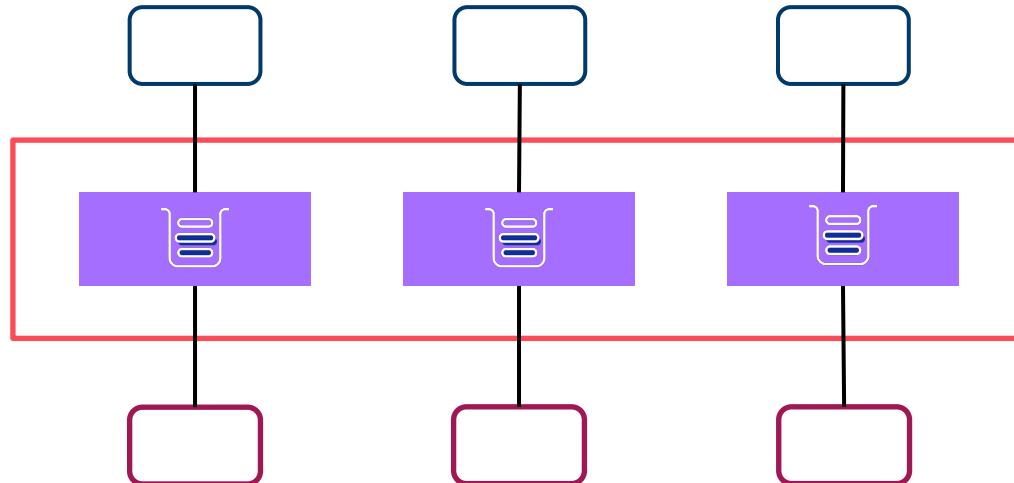
- Workload balancing
- 24x7 service availability
- Intelligent routing
- Automatic configuration



Uniform cluster

Traditional plus:

- Automatic rebalancing of client connections
- Enhanced to ensure uniformity across queue managers

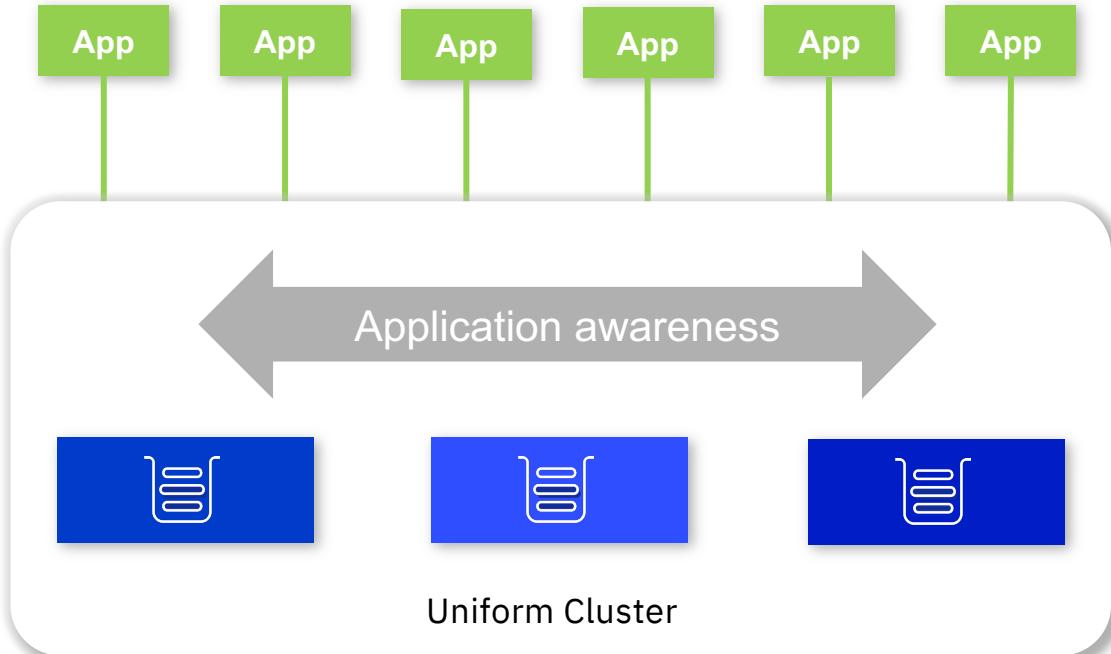


Always-on MQ

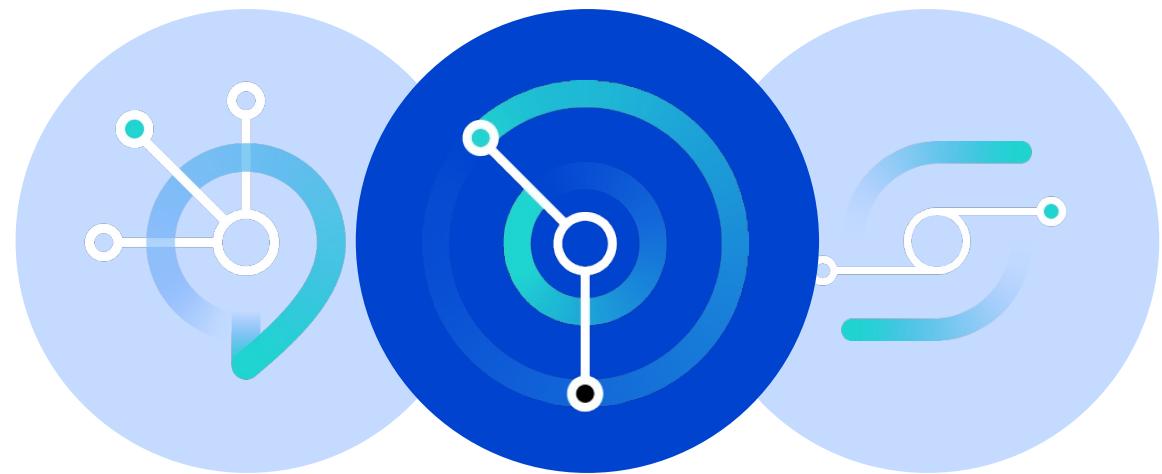
To provide an active/active, solution you need to consider multiple active queue managers acting as a *single messaging service*

Applications should treat the queue managers as interchangeable and want to connect to the group in the most efficient and available distribution

With IBM MQ 9.2 LTS, queue managers can form a **uniform cluster**, each queue manager provides the same messaging capabilities



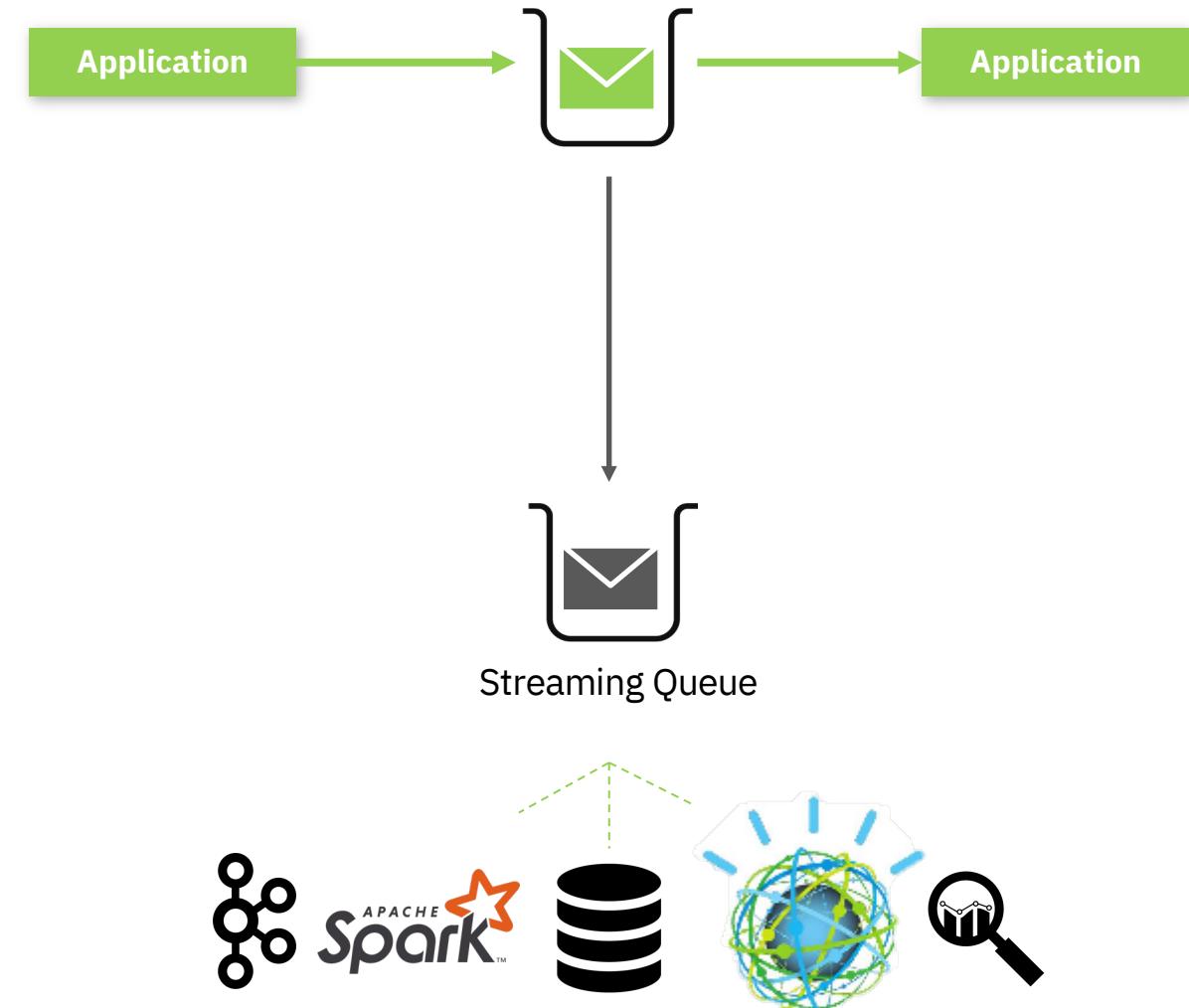
MQ Streaming Queues



MQ Streaming Queues

Tap into the value of existing data flowing over MQ by making message data available to Kafka, AI, and analytics applications with **zero impact to the existing applications or their messages**, and without a need for re-architecting your message flows.

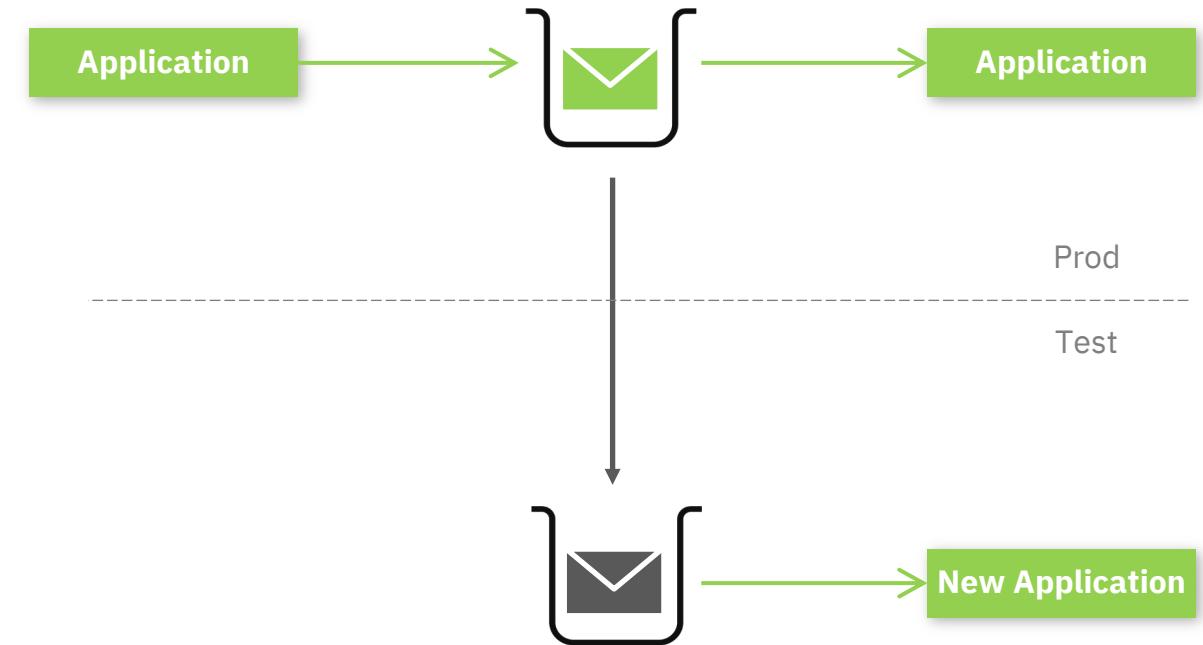
- 1. Streaming Processing** to accelerate time to insight from existing data.
- 2. Real world data** to accurately simulate production workloads to test the impact of architectural changes on applications.
- 3. Auditing and Replay** of data in the event of disasters. Auditing and replay use cases require exact duplicates of message content as well as message attributes including Message IDs, coral IDs etc.



MQ Streaming Queues

Can Streaming Queues help with production rollouts?

Yes, generate a stream of production messages to test your new environment and application versions



MQ Streaming Queues

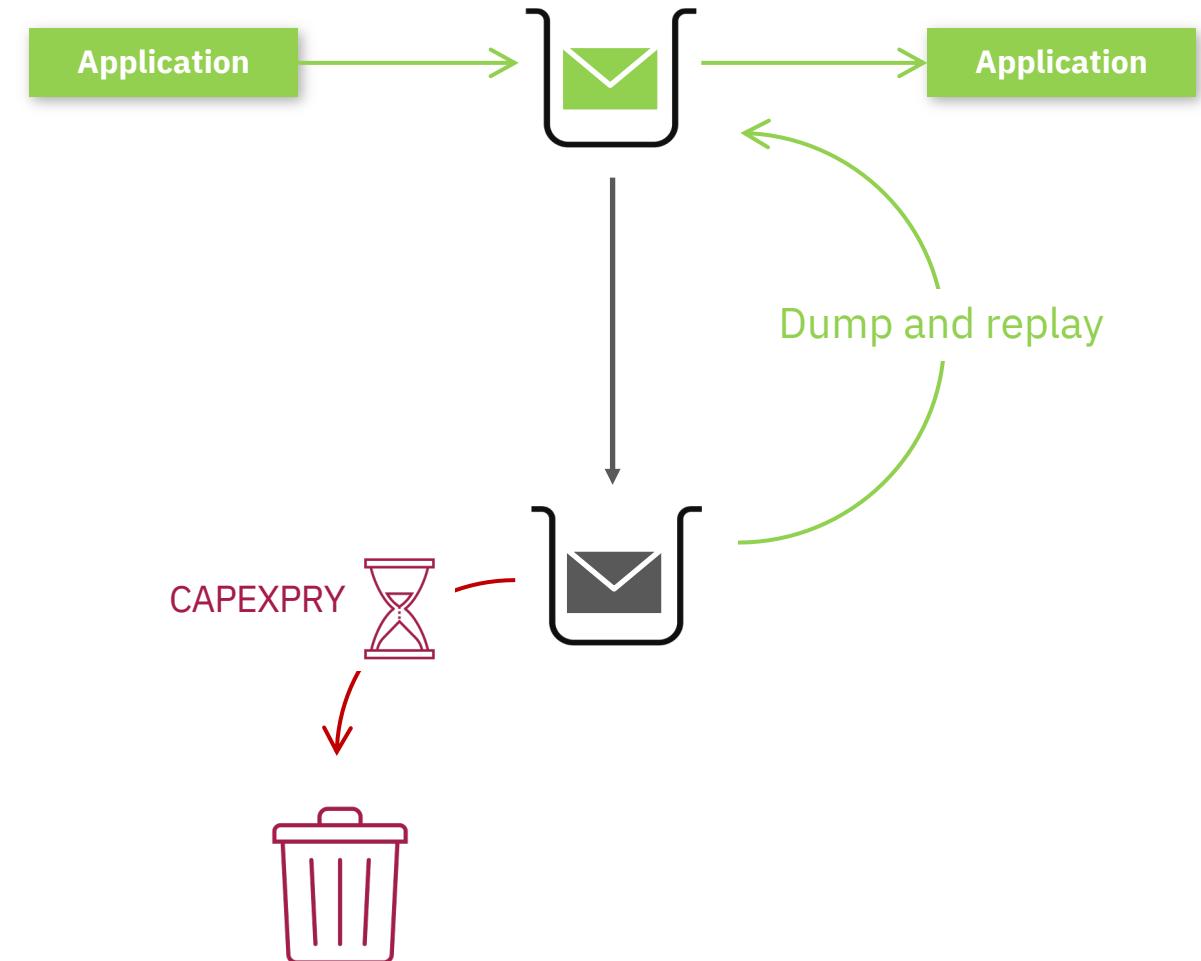
*So, can I use MQ for **event streaming**?*

Not exactly, but if you're asking...

*Can I keep a **message history** for replay?*

Yes!

<https://community.ibm.com/community/user/integration/blogs/matthew-whitehead1/2022/04/30/stream-queues-with-capexpry>



IBM MQ | Apache Kafka Connectors

Available in IBM MQ Advanced v9.3.3 and above

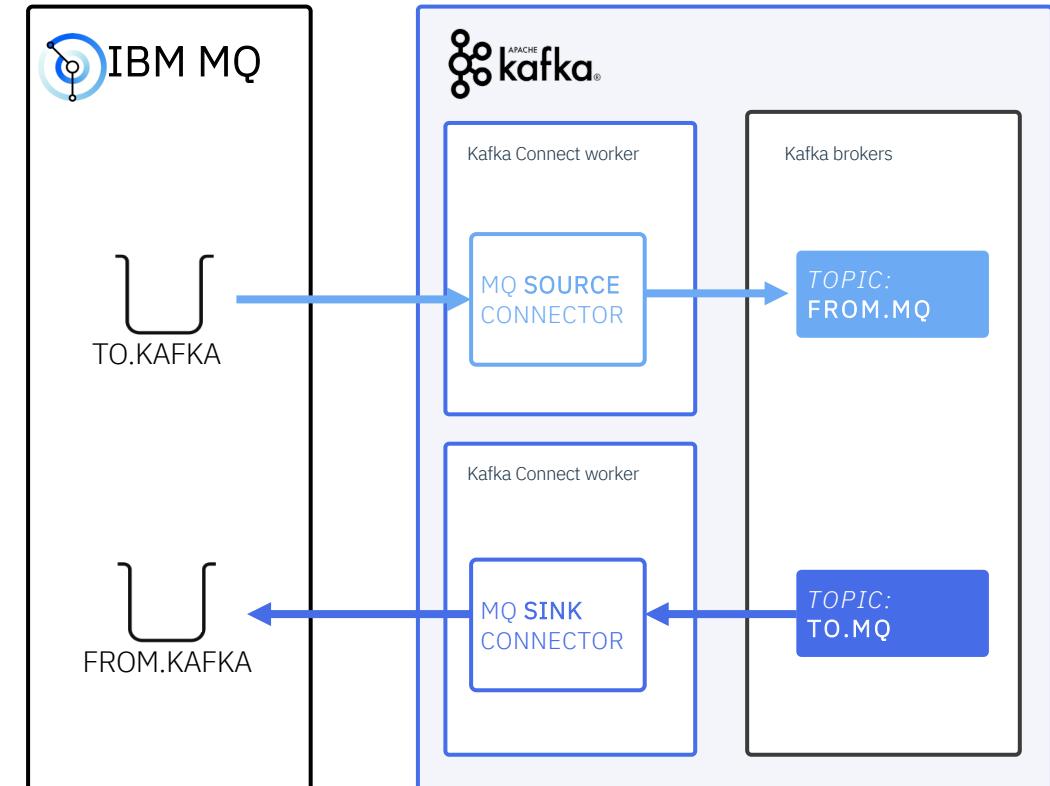
Several sink and source connectors exist for connecting MQ queues to Apache Kafka topics.

The source connector is the most commonly used, enabling MQ to be used as a source for events into Apache Kafka.

Functionally identical connectors are available from IBM:

- **Unsupported open source** available for:
 - IBM MQ (base) and the free Developer Edition
- **Supported by IBM** available for:
 - IBM MQ Advanced
 - Cloud Pak for Integration

IBM MQ | 30 Years of Innovation



<https://github.com/ibm-messaging/kafka-connect-mq-source>

<https://github.com/ibm-messaging/kafka-connect-mq-sink>

MQ Aspera fasp.io Gateway



IBM Aspera delivers performance at any distance

- Global hybrid multi-cloud transfer platform
- Transfer up to 100s of times faster using built-in **FASP® protocol**
- Predictable and reliable for any size or volume of data
- Adaptive bandwidth control for multi-Gbps speeds
- Enterprise-grade security to protect at rest and in motion, trusted and proven in heavily regulated industries

High-speed data transfer across hybrid cloud



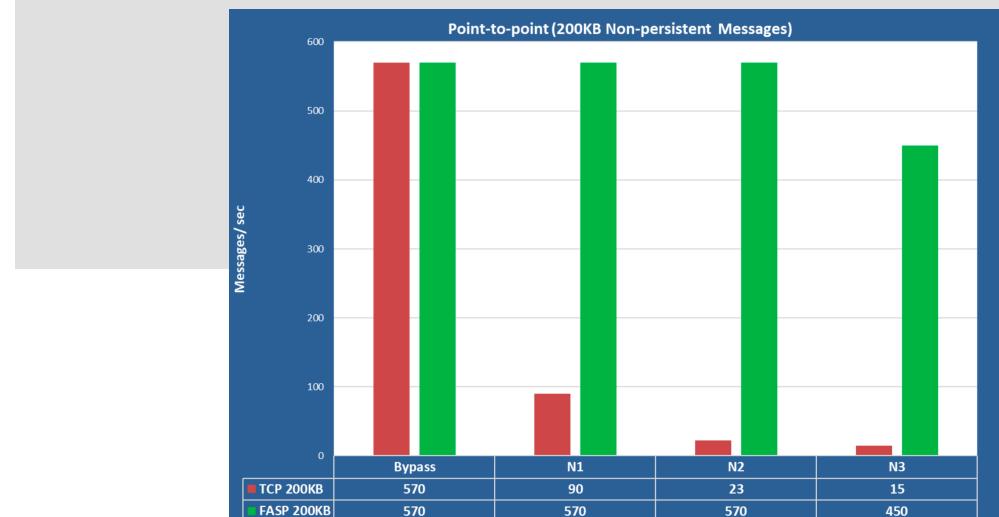
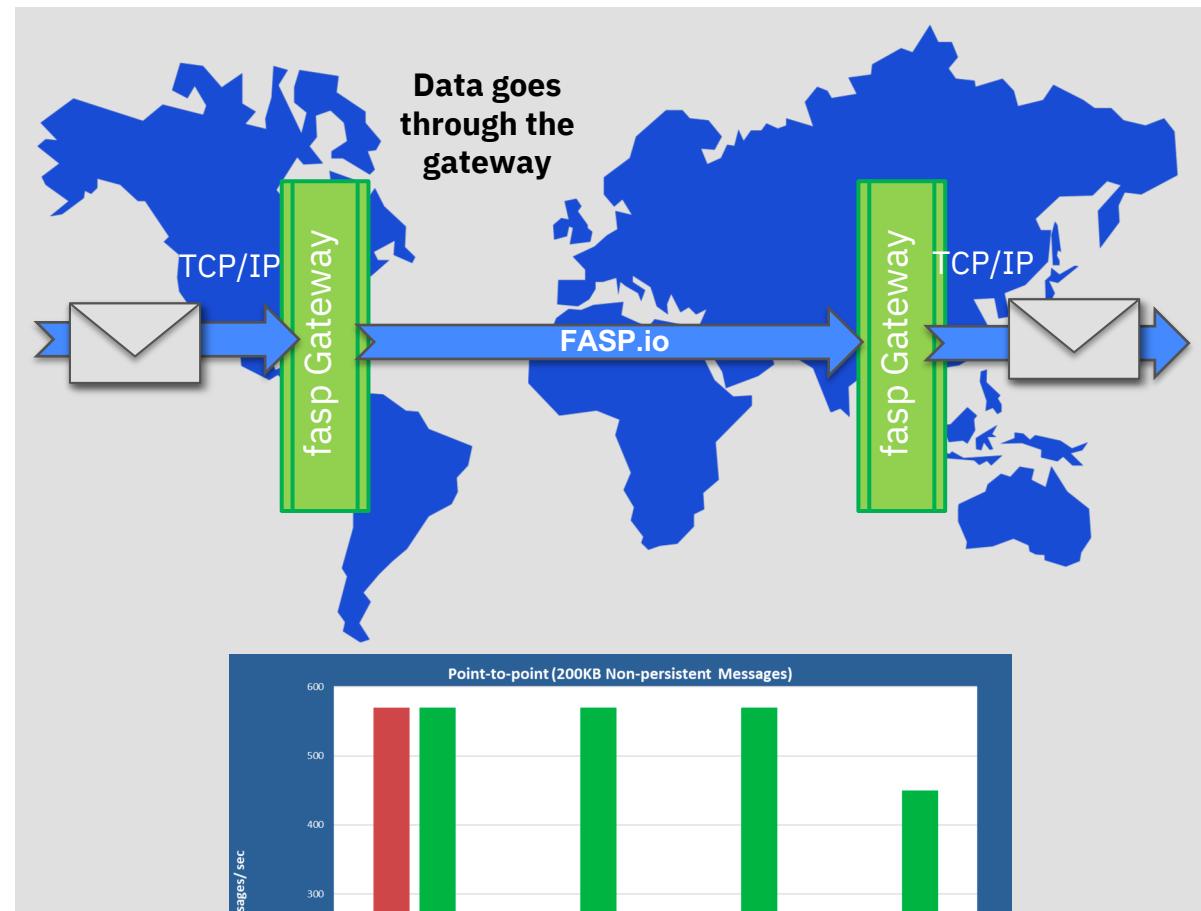
Moving a 10GB file

	Network Bandwidth	Across US	US-Europe	US-Asia
Legacy Transport	100 Mbps			
	1 Gbps	10–20 hours	15–20 hours	Impractical
	10 Gbps			
Aspera FASP®	100 Mbps	14 min	14 min	14 min
	1 Gbps	1.4 min	1.4 min	1.4 min
	10 Gbps	8.4 sec	8.4 sec	8.4 sec

IBM MQ: Power long distance transfer with IBM Aspera

Accelerate the speed of data transfer across long distances and/or poor networks with the **IBM Aspera fasp.io Gateway**:

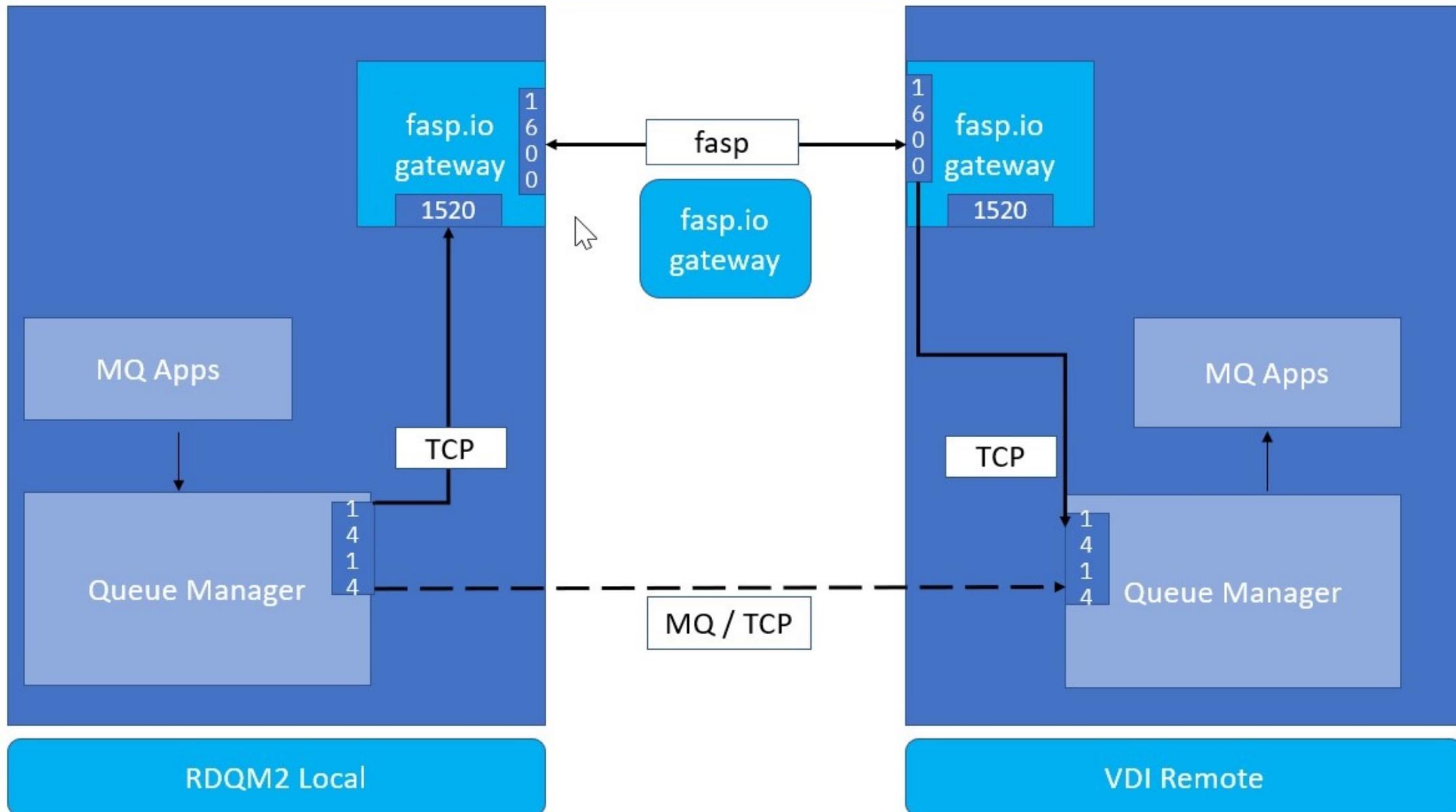
- The **Fast and Secure Protocol (FASP)** is a network optimized protocol at the heart of IBM Aspera
- Dramatically increase capacity without requiring any network changes - go from millions to billions of messages per day!
- For more information about performance, see [IBM Messaging on GitHub](#)



Bypass: 0ms network latency (no packet loss)
N1: 25ms network latency (no packet loss)

N2: 40ms network latency (0.1% packet loss)
N3: 50ms network latency (0.5% packet loss)

MQ & fasp.io Gateway



IBM MQ provides the most versatile, reliable and secure messaging capabilities for your most important solutions



IBM MQ

IBM Event Streams is based on the Apache Kafka project providing a backbone for your event streaming needs



IBM Event Streams

IBM Aspera securely moves data at high speed
regardless of size, distance, or network conditions



IBM Aspera

Available MQ Labs

Explore key MQ capabilities such as

Setup MQ within Cloud Pak for Integration.

Labs included:

- 1. Native HA Queue Manager on Cloud Platforms
- 2. Streaming Queues for MQ
- 3. MQ Source connector to Kafka from Streaming Queues
- 4. Uniform Cluster and Application Load Balancing



