



API first integration with WSO2

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Director - Solution Architecture

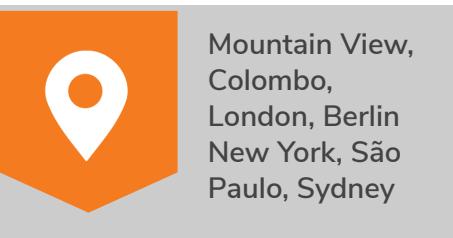
Agenda

- Introduction to WSO2
- API first integration
- WSO2 API Manager and Enterprise Integrator
- References
- Demo
- Subscription Model

About WSO2

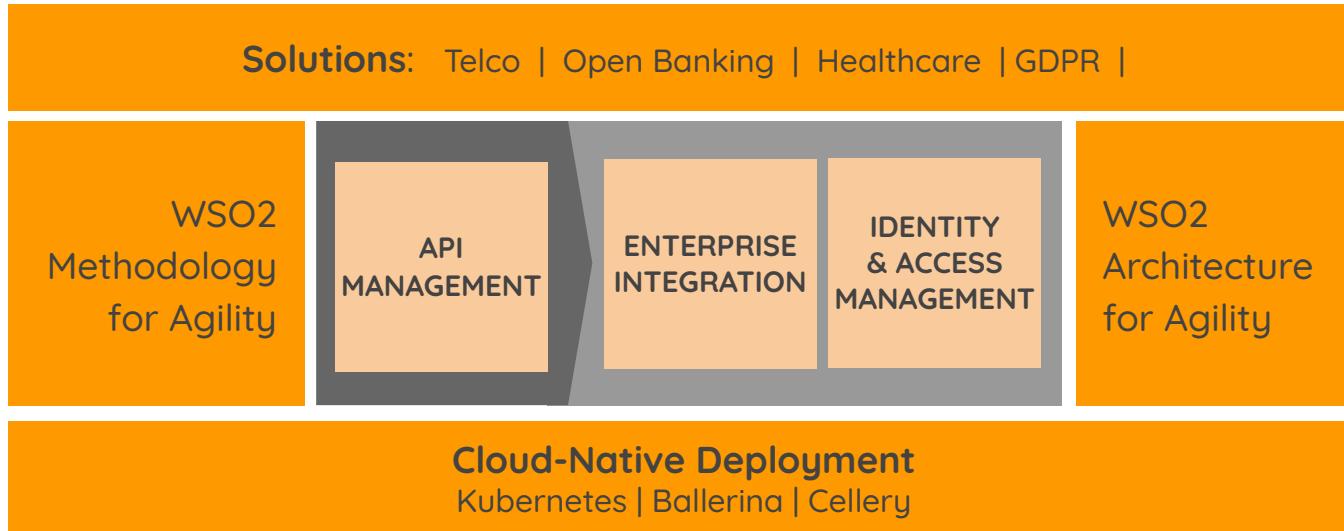


WSO2 At-A-Glance

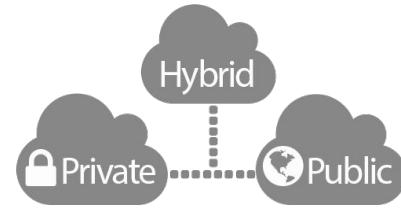


The WSO2 Integration Agile Platform

API Mgmt is central to solving the integration challenges enterprises face today



On premises, cloud, hybrid



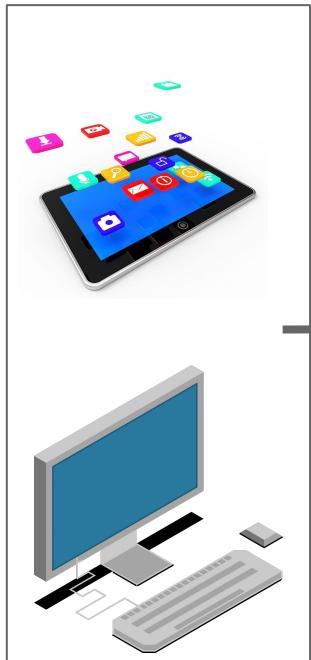
WSO2 API Cloud	WSO2 Managed Cloud	Private On-Premises
<ul style="list-style-type: none">• Multi-tenant, shared-everything• WSO2-hosted and managed• Pay-as-you-go• Multi-region availability• VPN tunnel to private DC• Guaranteed uptime• Limited customization options	<ul style="list-style-type: none">• Privately hosted• WSO2 managed• Upgrades, patches, installation• Guaranteed uptime• Full flexibility in customization• Better control	<ul style="list-style-type: none">• Self-hosted• Self-managed• Full flexibility• DevOps learning curve• Self-managed upgrades
Hybrid API Management		
<ul style="list-style-type: none">• Gateway can be deployed in any containerised environment• Multiple deployment options including on-prem/cloud, cloud/cloud		

Cloud Availability Regions: us-east-1 (North Virginia), us-west-2 (Oregon), ap-southeast-2 (Sydney), eu-central-1 (Frankfurt), eu-west-1 (Ireland), and sa-east-1 (Brazil).

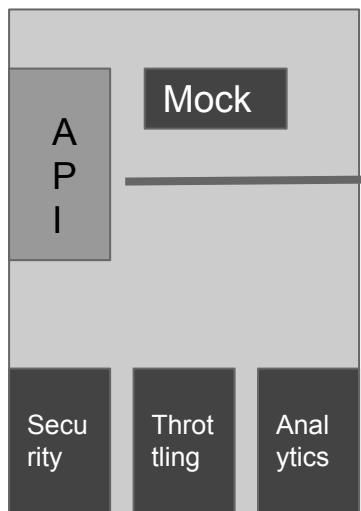
WSO2 API first integration

API facade

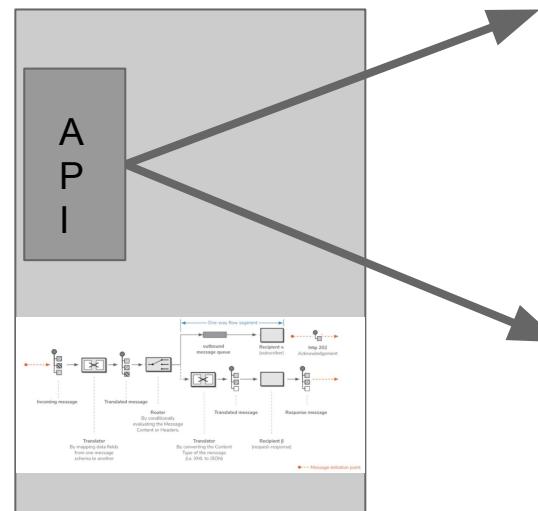
External and internal client apps



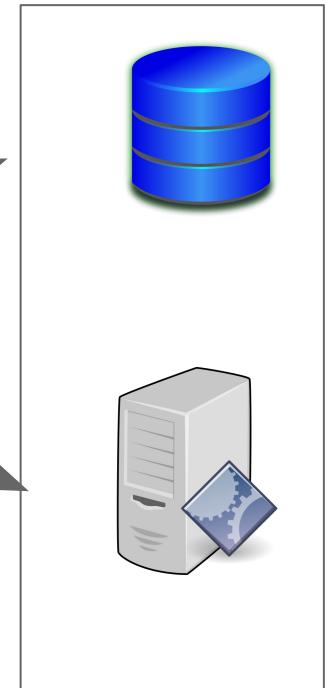
API Manager



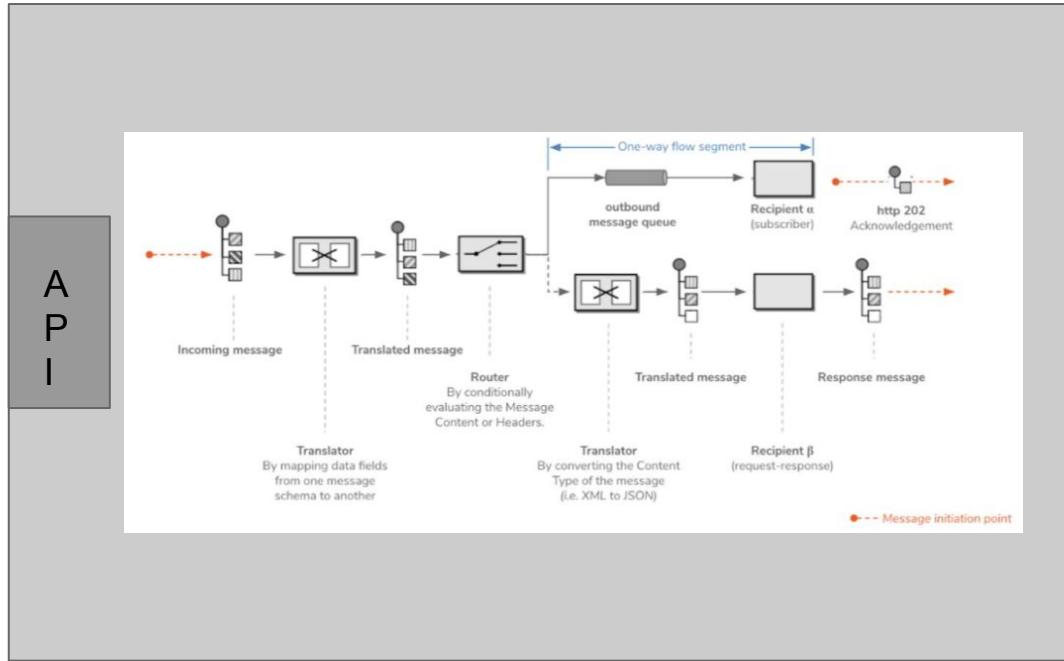
Integration Layer



Functional backends



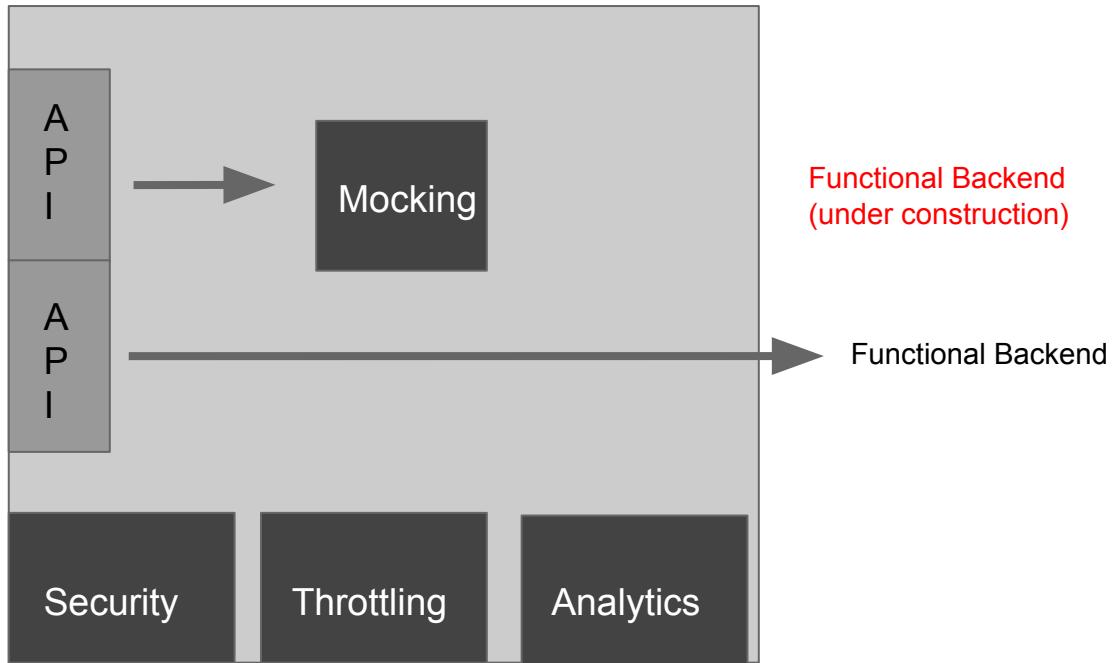
Integration Layer



Main functionalities:

- Data and protocol transformation (expose services as xml/json over http)
- Orchestration
- Service Chaining
- Filtering

API Management Layer

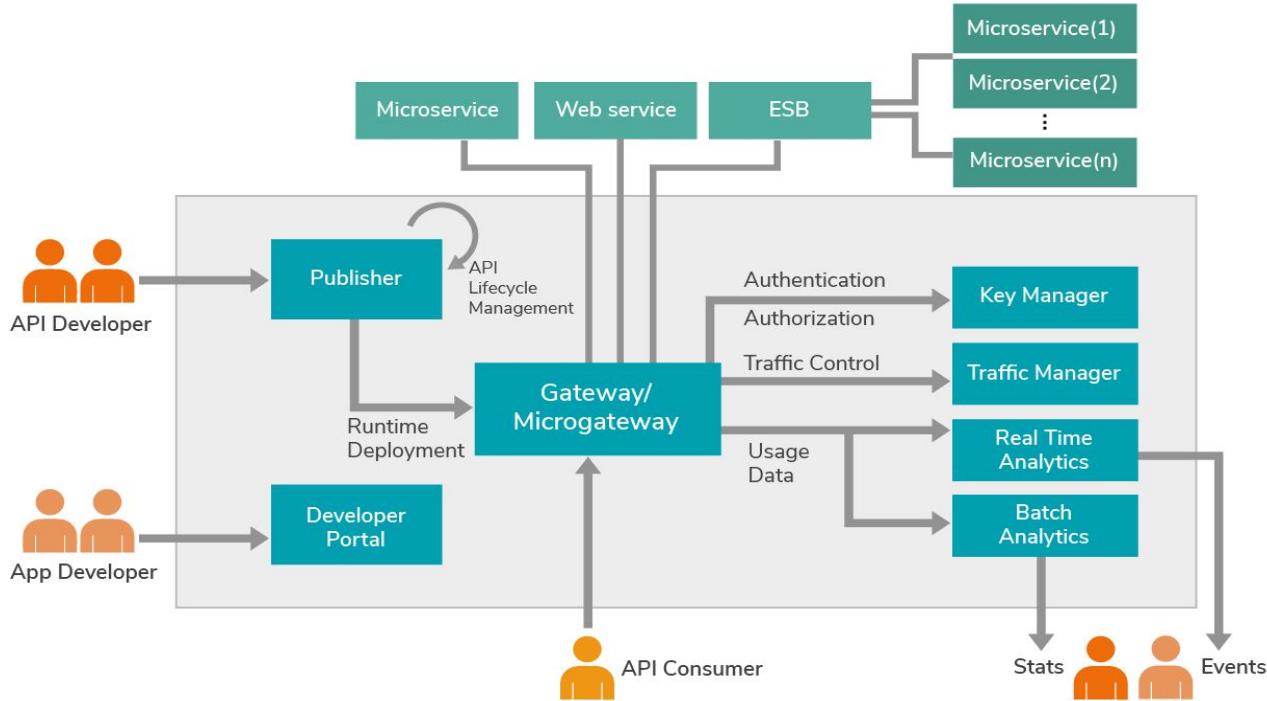


Main functionalities:

- Security and Authorization
- Throttling
- Analytics
- Single point of access

WSO2 API Manager

WSO2 API Manager



API Manager: Core Competencies

Broad portfolio of API management functionality

Internal and External API Management

Gateway

- Policy Enablement
- Protocol Handling
- Transformation
- Microgateway
- Data & Data as a Service
- GraphQL / AWS Lambda Endpoints

Security

- OAuth2, API Keys
- Basic Auth.
- MSSL /TLS
- OIDC
- Federated ID
- SSO
- JWT
- AI driven API Security

Analytics

- Business value reporting
- Streaming & event-driven analytics
- Real-time alerting
- Traffic management
- Monetization

Cloud Native

- Istio integration
- Installations - Kubernetes, Docker, PCF.
- Monitoring with Prometheus / Grafana
- Improved CI/CD

Portal/Store

- API Marketplaces
- Monetization hooks / partners
- Flexible theme-based architecture
- Registry and versioning model

Multiple plug-points and extensibility | Open source projects | Flexible deployment options

API Publisher

The Portal for API Designers and Product Managers.

Designers

Design, mock and document REST and SOAP APIs.

Create new versions of APIs.

Gain API usage insights for operational purposes.

Import API definitions.

Apply policies for security, rate limits and message transformations.

Product Managers

Validate and publish APIs for public discovery and consumption.

The central point for managing the API's Lifecycle.

Monetize APIs through business plans.

Gain API usage insights for business purposes.

API Publisher

Start with an existing endpoint/contract or design and prototype a new API

- Exposing SOAP services (convert to REST or as a passthrough)

- Expose an API with GraphQL support

- Exposing streaming APIs (WebSocket endpoints)

The screenshot shows the WSO2 API Manager API Publisher interface. At the top, there's a navigation bar with 'PUBLISHER' (highlighted in orange), 'APIs', 'API Products', a search bar, 'SETTINGS', and 'ADMIN'. Below the navigation is a sidebar titled 'APIs' (Displaying 1 API(s)) with a 'CREATE API' button. The main area shows a card for 'PizzaShackAPI' (Version 1.0.0, Context /pizzashack) which is 'PUBLISHED'. A modal window is open, titled 'Design a New REST API' with the sub-instruction 'Design and prototype a new REST API'. It contains five options:

- I Have an Existing REST API: 'Use an existing REST endpoint or Swagger definition'
- I Have a SOAP Endpoint: 'Use an existing SOAP or import the WSDL'
- I Have a GraphQL SDL schema: 'Import a GraphQL SDL schema'
- Design New Websocket API: 'Design and prototype a new WebSocket API'

At the bottom of the modal, there are buttons for 'Cancel' and 'Create API'. The footer of the page includes 'Rows per page: 10', '1-1 of 1', and navigation arrows. The bottom left corner shows 'WSO2 API-M v3.0.0 | © 2019 WSO2 Inc' and the bottom right corner has the WSO2 logo.

Developer Portal

The Application Developer Portal known as the API Store.

ReactJS based, production ready Dev Portal available out-of-the-box.

○ Discover, test and subscribe to APIs

○ Search through APIs and their documentation

○ Rate, comment and participate on discussion forums of the Portal

○ Try out the API SDKs for faster go-to-market of applications

○ Brand the developer portal to suit your needs

○ Manage the lifecycle of applications across environments

○ Integrate with third party authorization servers

The screenshot shows a table with columns 'Name' and 'Value'. The data rows are:

Name	Value
Amount Paid	0
Description	
Amount Due	54
Total Tax Amounts	0
Subtotal	54
Paid	false
Tax	
Invoice ID	
Account Name	provider 1
Next Payment Attempt	Monday, January 19
Customer Email	
Currency	aud
Total	54

Productization of APIs and Monetization

Integration with Billing Engines

- Out of the box integration with Stripe
- Ability to integrate with any other billing engines
- Supports multiple pricing models
 - Fixed
 - Pay as you go

The Stripe logo is displayed in its signature blue color, consisting of the word 'stripe' in a lowercase sans-serif font.

Key Manager and Traffic Manager

Security

Scalable and flexible authentication and authorization policy enforcement based on OAuth 2.0 and other protocols.

Integration with third party authorization services

Supports a wide range of application types such as mobile, web, SPA, wearable devices, biometrics, etc

Social integration for login via social networks and other IDPs.

Rate Limiting

Rate limits used for billing and metering purposes

Fair usage policy enforcements

Rate limits based on user privilege, location, device type, etc.

Rate limits for target services

Gateways - API Runtime options

Multiple Gateway options

- Micro-GW : Immutable, container native, ideal for greenfield projects
- Regular : Robust, API driven, ideal for brownfield projects
- Both use the same management plane
- Both can be used together in the same deployment

Hybrid option: Gateways close to services, Mgt. plane on cloud

- Both can scale without management plane
- Gateways are identity provider agnostic -> Can work with any key manager as long as trust is established and a signed token is used

Standard Gateway

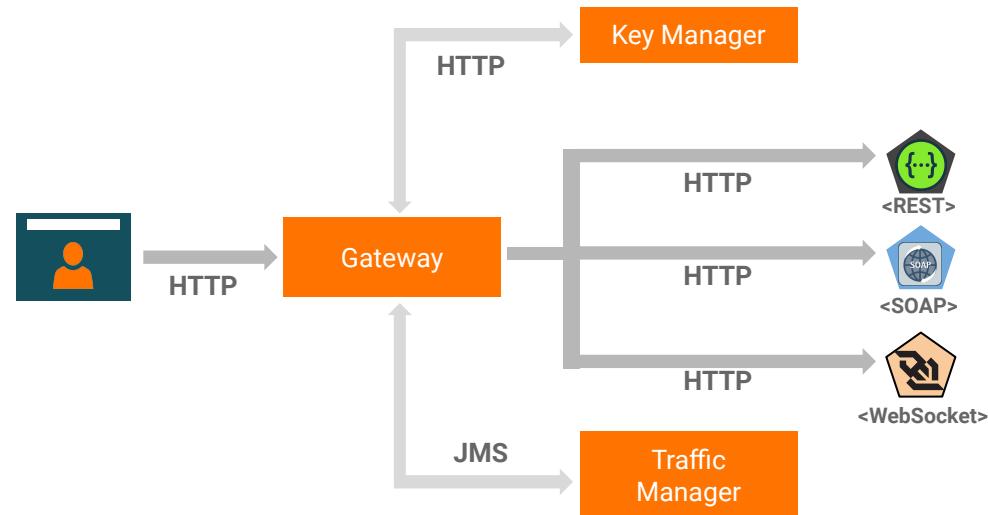
Can scale with or without Key Manager

Manager

Supports SOAP/GraphQL and
WebSocket based APIs in addition to
REST

Automatic SOAP to REST conversion

Config driven mediation support



WSO2 API Microgateway

- Designed to scale
 - Self-validating tokens
 - Localized rate limiting
 - Offline analytics
 - Immutable
 - Stateless
- Ideal to be deployed in a locked-down env such as DMZ
- Native support for Docker/K8S
- Private Jet Gateway for microservices
- First-class support for lifecycle management across environments

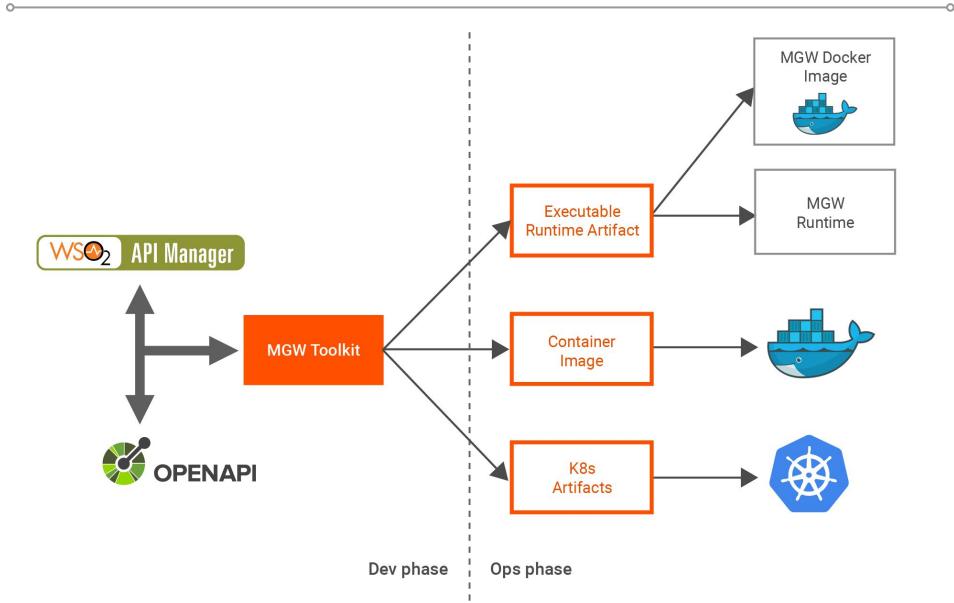
WSO2 API Microgateway

Components

Gateway runtime

Toolkit

Architecture



Cloud-native Capabilities of Microgateway

Lean footprint

- < 100 MB of distribution size.
- < 250 MB of memory.
- < 2 core CPU.

Observable

- Metrics available through Prometheus
- Tracing available through Jaeger.

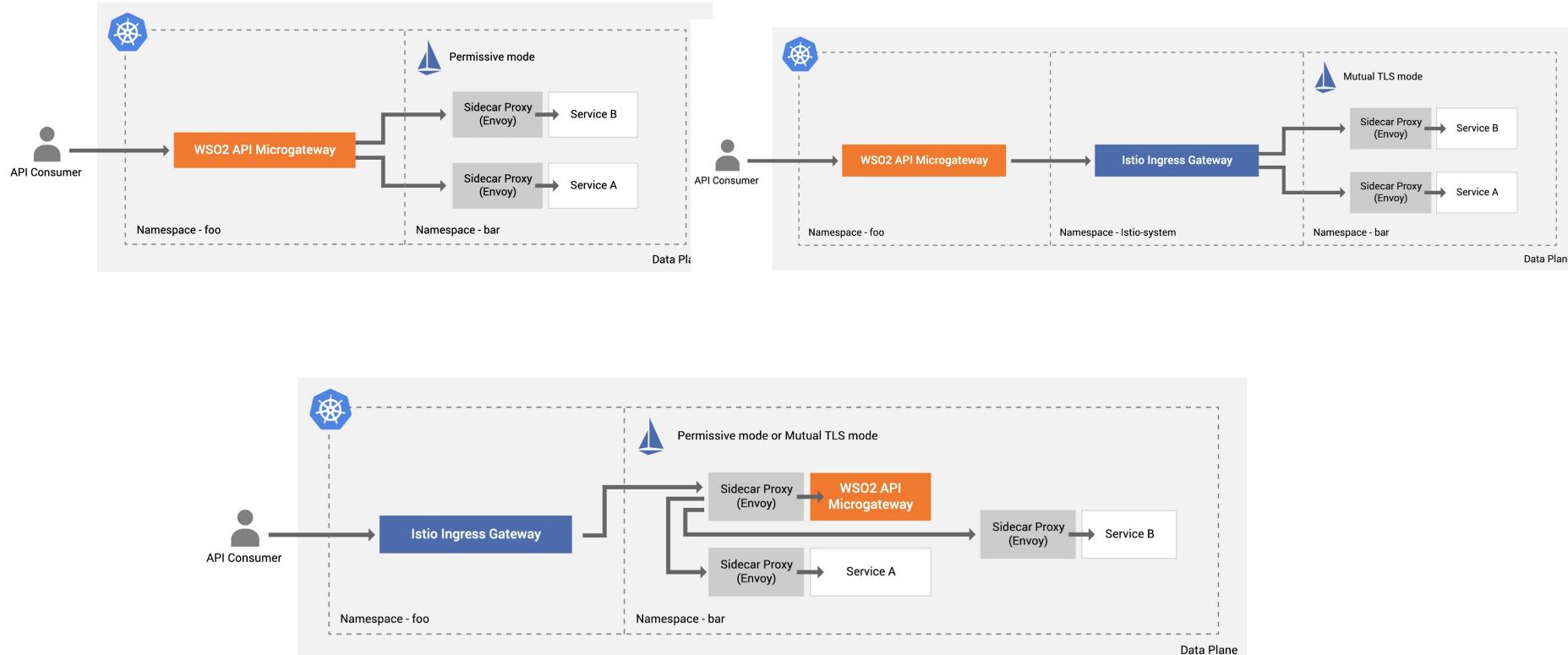
Faster scaling

- < 1s startup time (fixed)
- Independent execution with no dependencies
- on other components.
- ~2500 TPS

Portability

- Works natively on Docker/Kubernetes.
- Immutable gateway runtimes.
- Fully automated CI/CD.
- Platform independent.

WSO2 MGW and Service Mesh



API Analytics

Provides statistics on various runtime operations within API gateway runs on an asynchronous model which does not impact the performance of the API consumer

- Can be used for generating real-time alerts/notifications for abnormal usage patterns

- Can be integrated with external monitoring tools via the API exposed by the analytics runtime

- Near real-time calculations makes reports updated instantly with latest data

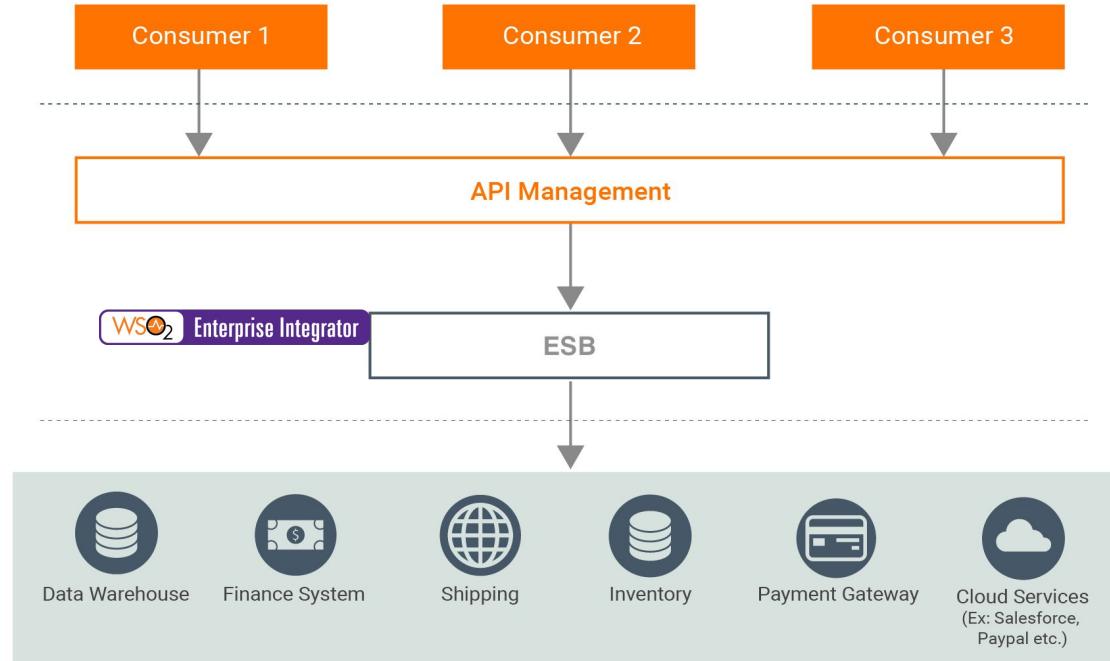
March



WSO2 Enterprise Integrator

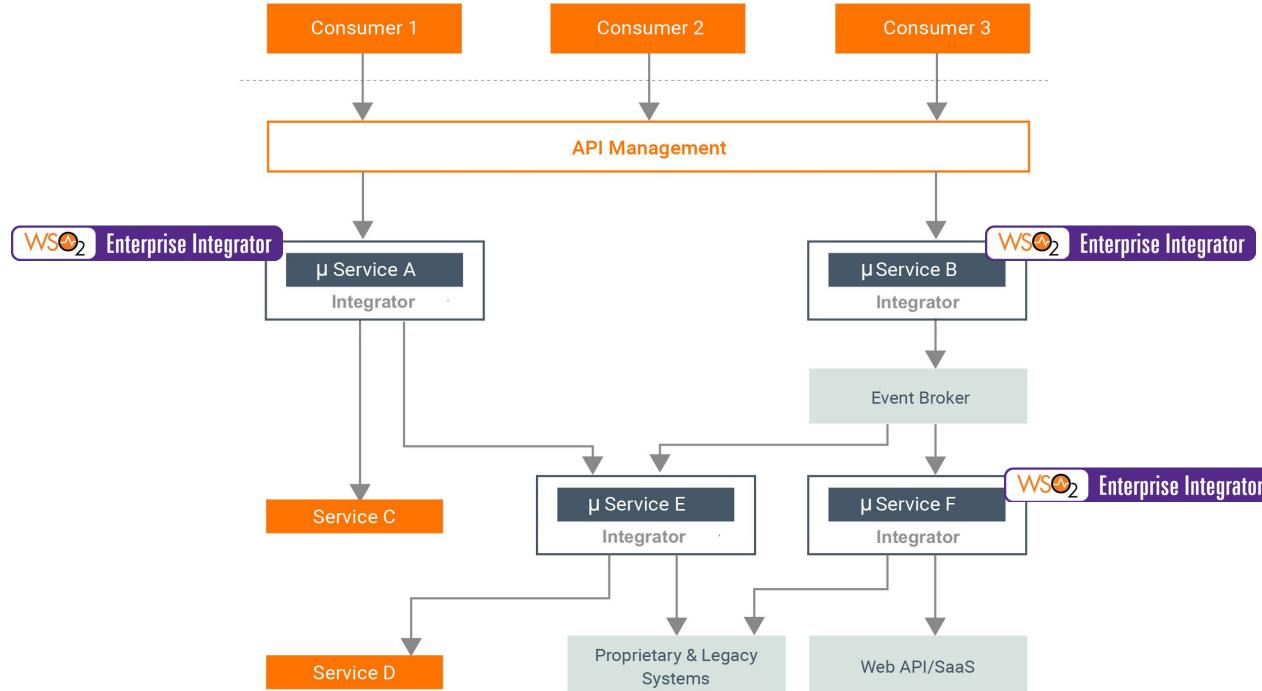
Application Integration Landscape

- Conventional ESB-based centralized integration



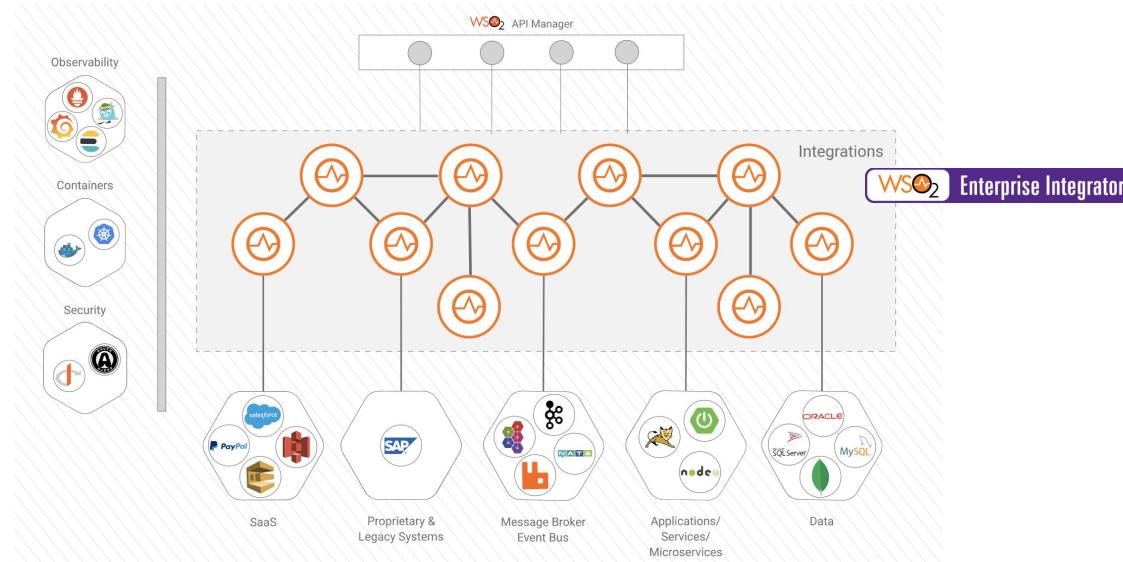
Application Integration Landscape

- Cloud native integration with Microservices



What is WSO2 EI?

- An open-source, cloud-native, distributed, hybrid integration platform for integrating **APIs**, **data**, and **event streams** using **microservices**, **cloud-native** or centralized **ESB** style architectures.



WSO2 Enterprise Integrator - Components



LOW-CODE INTEGRATION

Micro Integrator

An intuitive low-code configuration driven integrator with a graphical drag and drop designer based on the same WSO2 EI/ESB runtime.



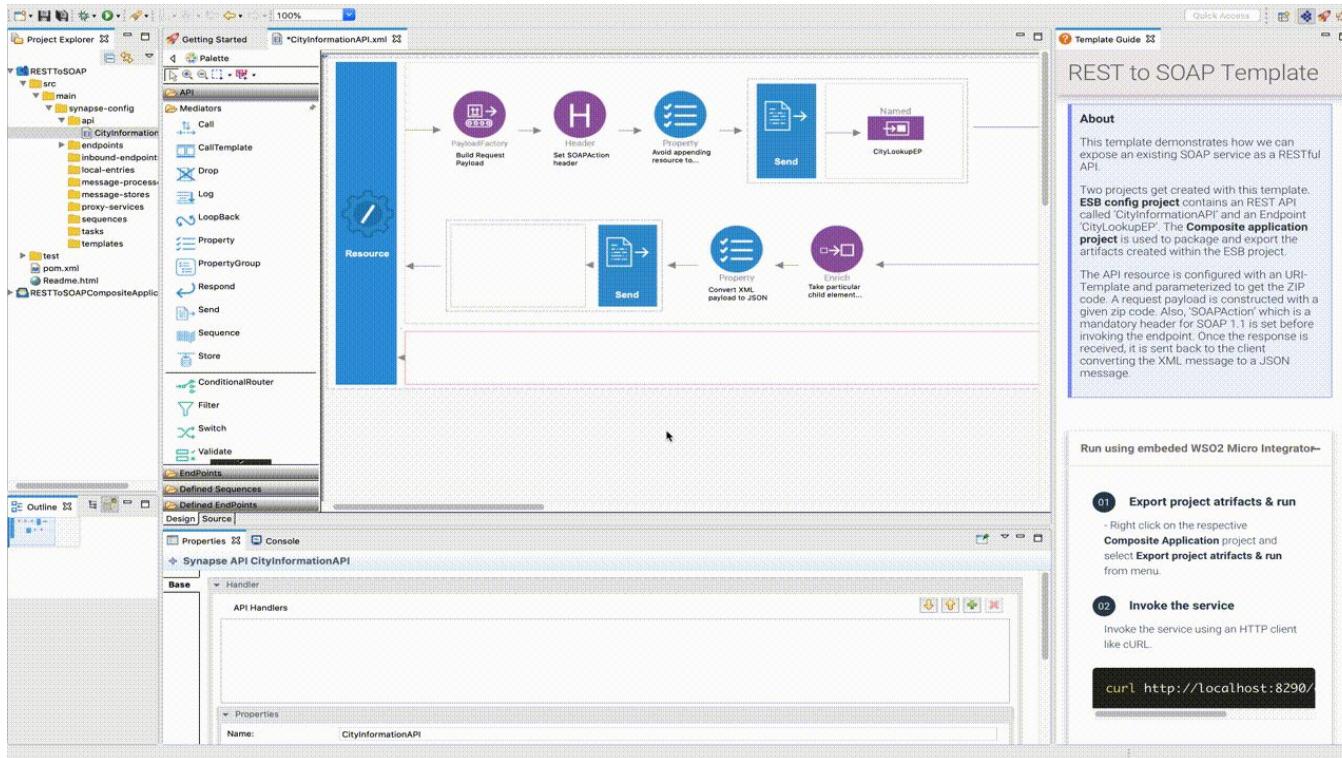
STREAMING INTEGRATION

Streaming Integrator

Streaming Integrator can connect any event stream to any destination and act on streaming data using Micro Integrator.

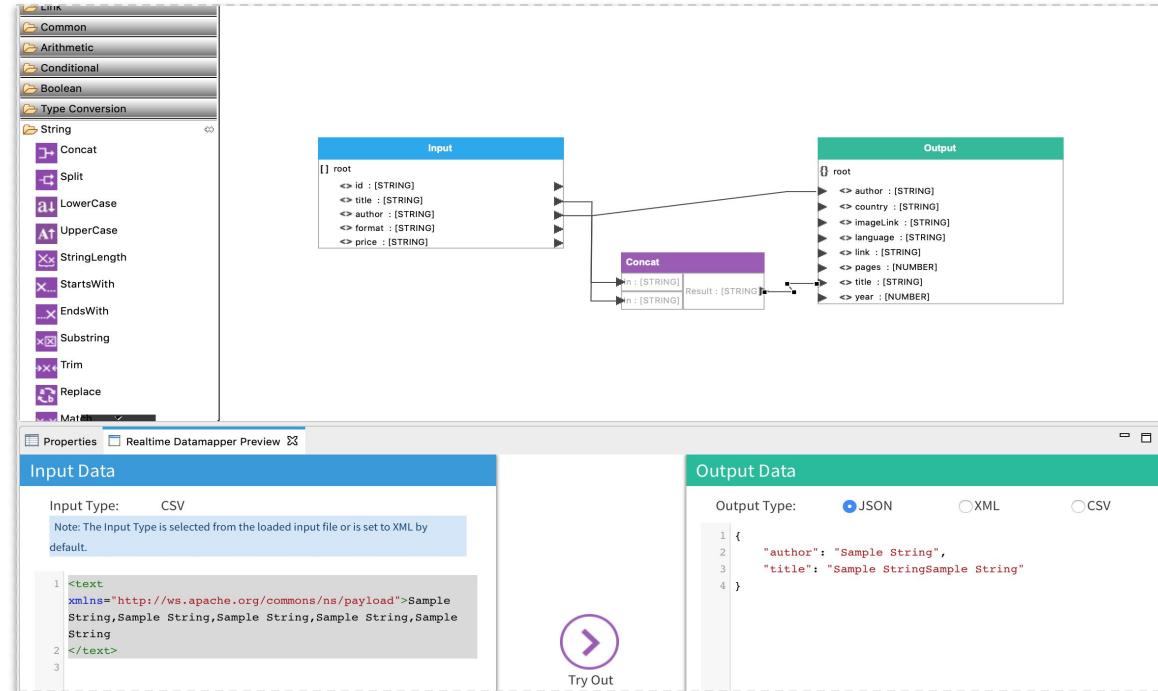


Low-code Integration with Micro Integrator



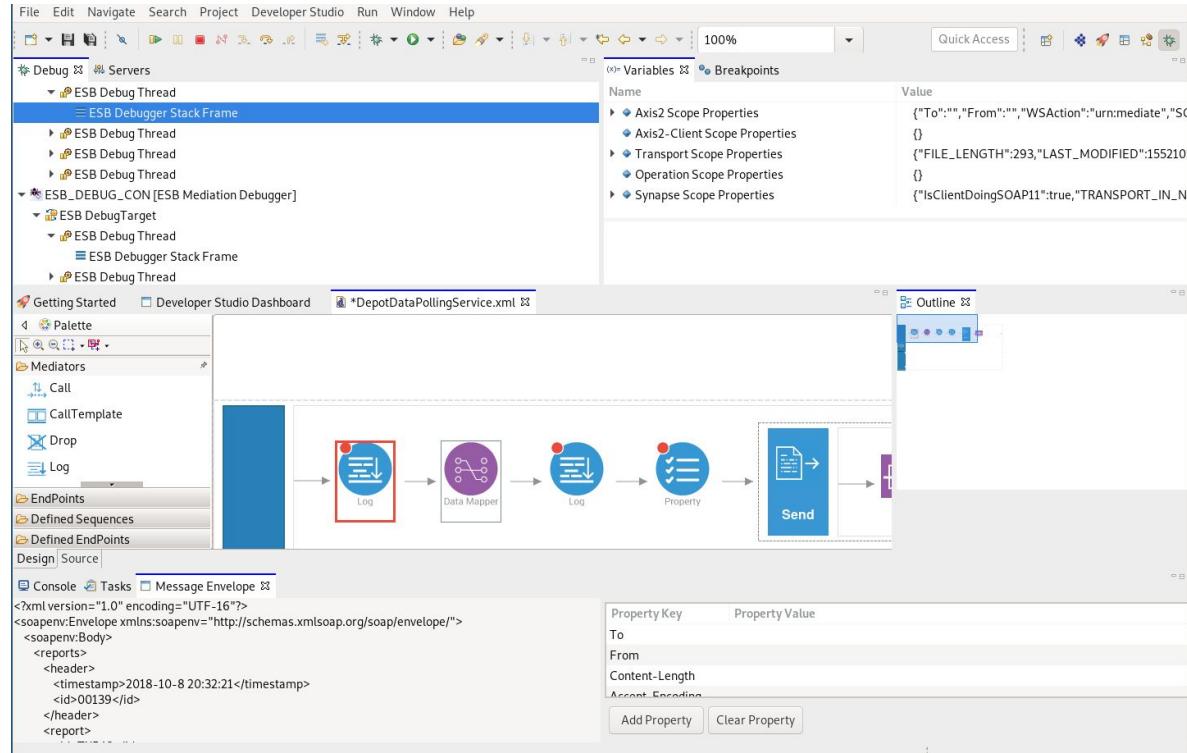
Data Mapping

- Visual Data Mapping experience
- Capability to try-out mapping in the development time



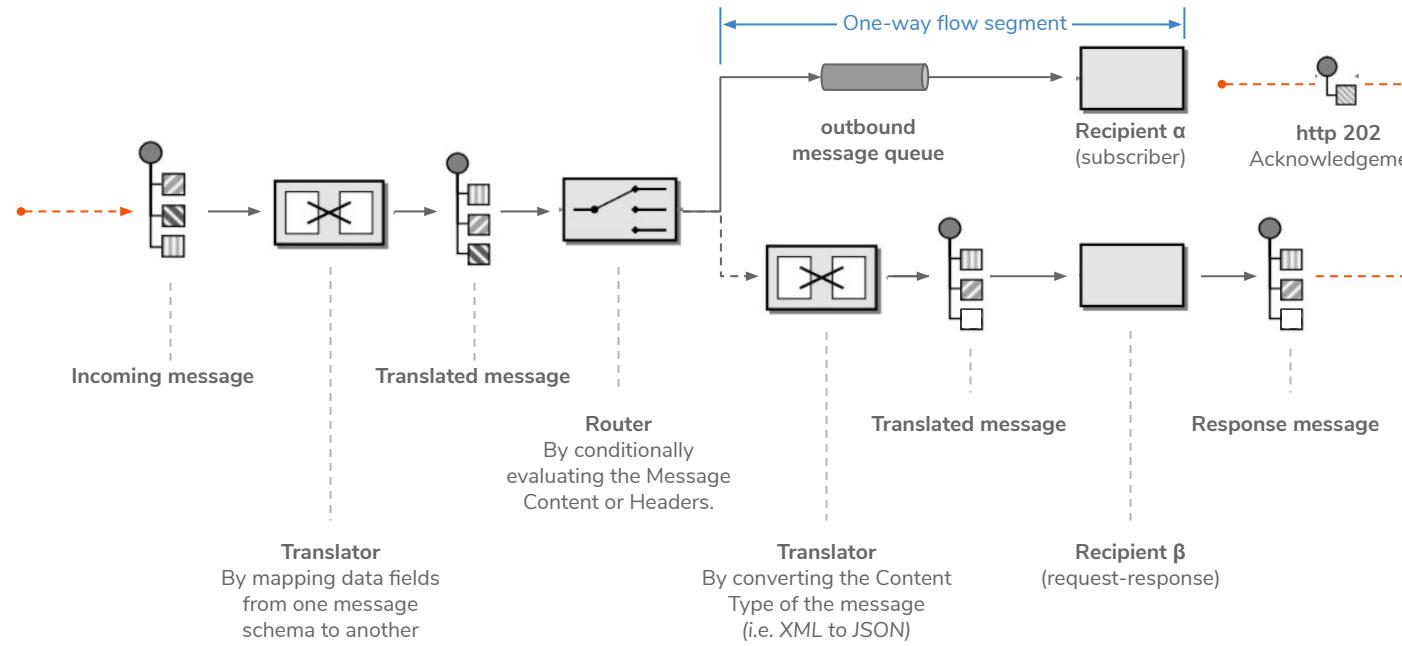
Debugging

- Debugging integration flows with a graphical debugger for troubleshooting issues



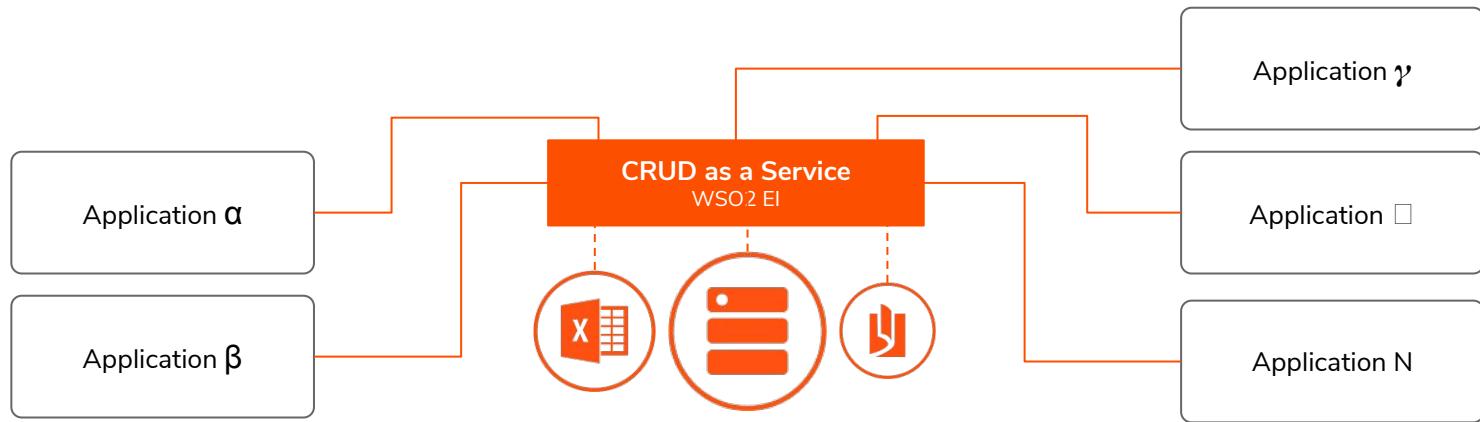
An example : Enterprise Integration Patterns (EIP)

Combining Many EIPs to Model an Integration Flow



Data Integration with WSO2 EI

All Create, Read, Update, Delete operations as Services



Internal / external data in many forms.
(i.e. databases, spreadsheets)

Integration Standards Supported

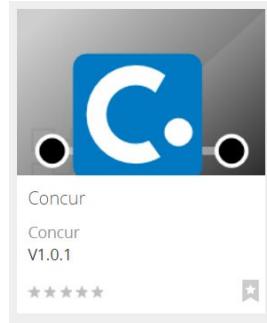
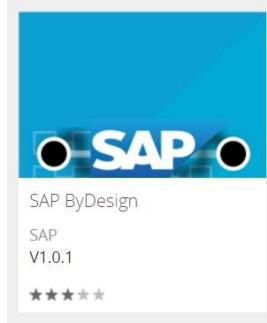
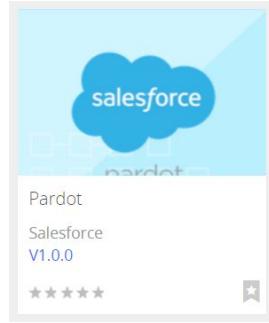
Open Interoperability

- HTTP(S)
- JMS-1.1/ 2.0, AMQP, MQ, MSMQ
- MQTT
- WebSockets
- VFS
- TCP, UDP
- FIX, HL7
- BPMN 2.0, WS-BPEL 2.0
- JSON, SOAP-1.1 / 2.0
- XSLT, XPath, Smooks
- JDBC, NO-SQL, CSV, OData-v4
- UT, OAuth, SAML, XACML, WS-Sec
- and more

Connectors to connect The Enterprise

The Connectors Store

- To connect and integrate with common systems & platforms



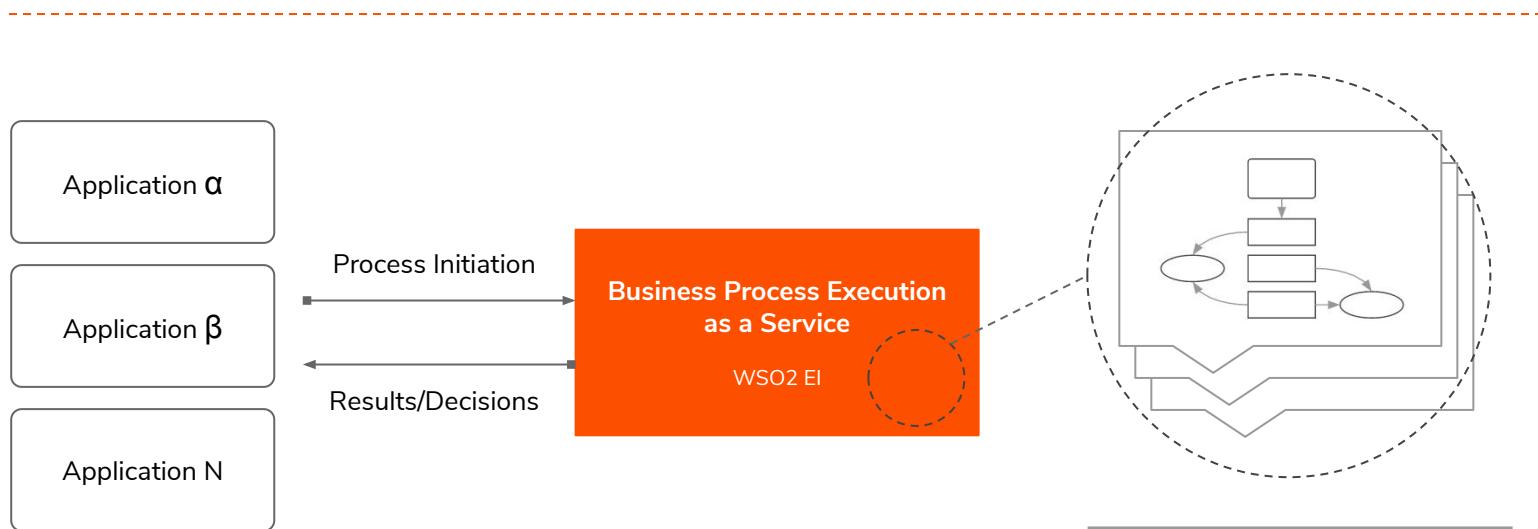
Connectors

- Salesforce
- SAP
- Google
- PeopleHR
- SugarCRM
- Twilio
- Youtube
- eBay
- Bugzilla
- Zuora
- Nest
- ...

- No additional cost. Download and Install.
- <https://store.wso2.com/store/assets/esbconnector/list>

Business Process Execution with WSO2 EI

Processes/Workflows and Human Tasks



Defined business rules, processes and workflows which may also consist of human tasks

Observability

- Observe your integrations with leading observability tools.
 - Metrics : Prometheus, Grafana, ELK
 - Logs : ELK
 - Tracing: Jaeger



Prometheus



JAEGER

Streaming integration

A cloud-native, lightweight streaming integrator that understands streaming SQL queries to capture, analyze, process, and act on events in real-time.

- **Advanced stream processing**

Powered by Siddhi, a proven cloud-native stream processing engine recognized by CNCF as a streaming and messaging system along with other industry leaders such as Kafka and Talend.

- **Sophisticated tooling**

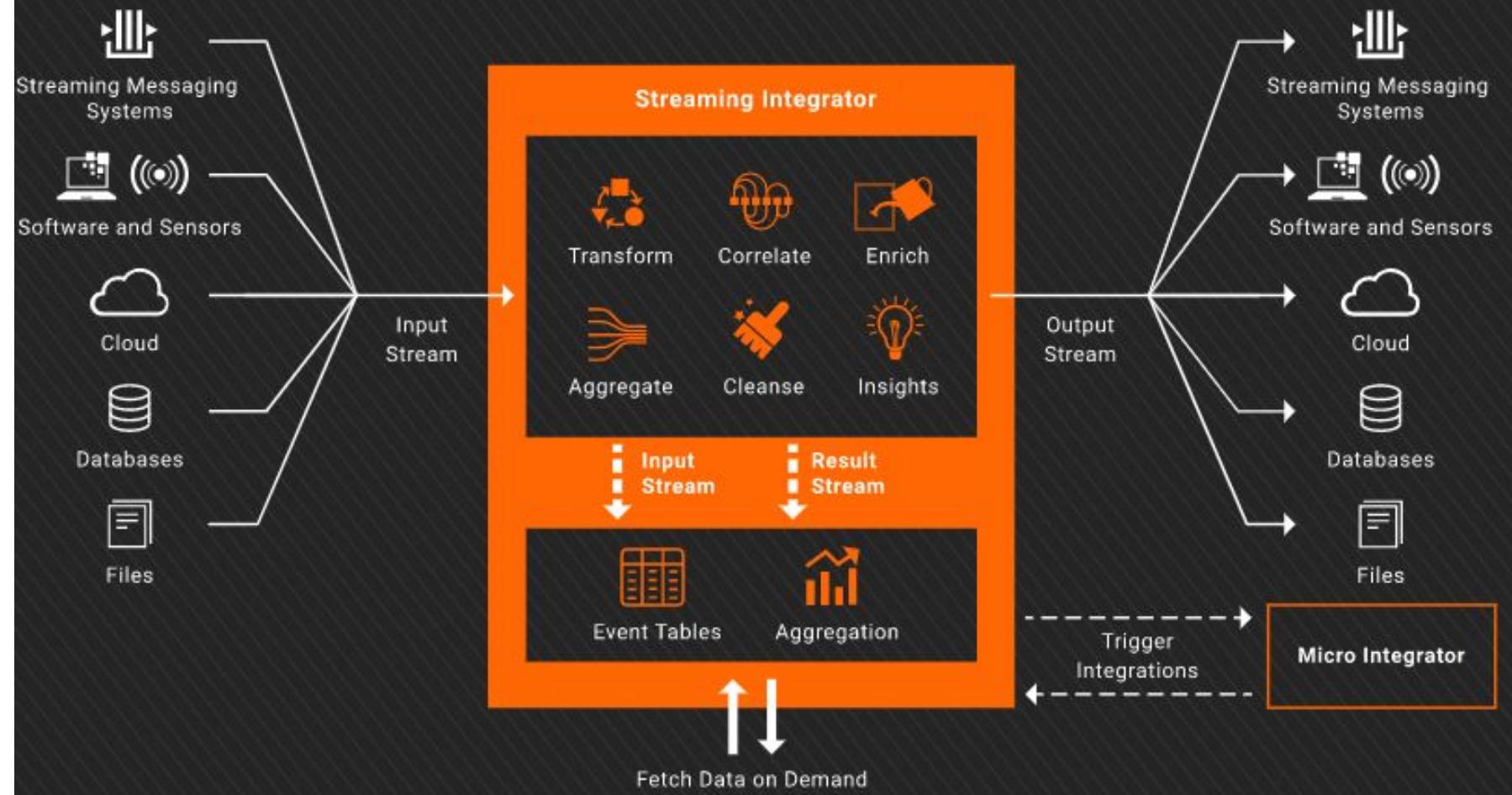
Provides a rich and agile developer experience along with a graphical drag-and-drop editor that enables faster development for non-technical users.

- **Native support for streaming systems**

Fully compatible with messaging systems, such as Kafka and NATS, to fully leverage the potential of your streaming data.

- **Rich connectivity**

Includes over 60 pre-built connectors for well-known sources and destinations and out-of-the-box support for various transports, protocols, and data formats.



Streaming Integrator

The screenshot shows the WSO2 Streaming Integrator Tooling interface. The top navigation bar includes File, Edit, Run, Tools, Deploy, Export, and several icons. The left sidebar shows a workspace with files like 'DesignViewDemo.siddhi' and 'TestSidhiApp.siddhi'. The main area displays a Siddhi script:

```
1 @App:name('DesignViewDemo')
2 @App:description('This siddhi application checks for sudden production drops more than 20% and sends out an alert')
3 @source(type = 'http', receiver.url = "http://localhost:8006/SweetProduction",
4         @map(type = 'json'))
5 define stream SweetProduction (sweetName string, producedAmount int);
6 define stream DecreasedAlertStream (sweetName string, decreasedAmount int);
7
8 @info(name = 'patternCalculator')
9 from every e1 = SweetProduction -> e2 = SweetProduction[e1 sweetName == sweetName and (e1 producedAmount > producedAmount + (e1 producedAmount*20) /
100)]
10 select e1 sweetName as sweetName, e1 producedAmount - e2 producedAmount as decreasedAmount
11 insert into DecreasedAlertStream;
```

Below the script editor is a 'Console' tab. In the bottom right corner, there is a button labeled 'Design View'.

References



WSO2 Customers in Telco Industry

- Somos
- Dialog Axiata
- West Corp.
- Jazz
- Proximus
- Apigate
- Mobitel
- Etisalat (Sri Lanka)
- Tele2
- Telecom Italia Mobile
- Orange X
- Vodafone
- TIM Brasil
- Algar Telecom Brasil
- Telekom Albania
- Telekom Malaysia Berhad
- Telstra
- Verizon

West Corp.

Business requirements

- Transforming existing Legacy IT infrastructure into a more efficient SOA platform
- Provide connectivity to legacy systems as well as 3rd party business applications in an agile manner
- Deliver services through multiple channels including mobile, web and portal apps

Solution

- Extensible integration platform providing mediation, orchestration and connectivity to legacy and 3rd party business applications
- WSO2 Enterprise Integrator is used as the glue which connects their legacy systems
- WSO2 Identity Server is used to secure enterprise applications

Vodafone

Business requirements

- Multiple siloed applications and portals having their own IAM implementations
- Bringing new applications/portals was challenging
- Modern IAM capabilities like SSO, Social login, Federation were lacking
- Need for a centralized IAM solution with all new features

Solution

- WSO2's open source IAM solution was chosen as the central IAM platform
- WSO2 Identity Server deployment with HA enabled their portals to offer modern IAM features
- IAM solution provides SSO, MFA, CIAM capabilities to the onboarded portals.



Business requirements

- Become more agile with an API first approach
- Needed to look at reusable, functionally shaped building blocks that are loosely coupled and not overlapping in their quest to provide great digital services to their customers.
- Offer better quality services for their customers, reduce time to market - all at lower costs

<https://wso2.com/blogs/thesource/2019/02/delightng-customers-with-an-api-first-approach-at-proximus/>

Solution

- Proximus's new architecture is powered by WSO2 API Manager.
 - Fully distributed API Deployment
 - Key Manager is a fully fledged Identity Server
 - Throttling is handled through centralized Traffic Manager
 - Analytics captures all API activity on this deployment
 - As traffic (TPS) increases the scaling components will scale up
 - Gateways
 - Traffic Managers (1:10 GWs)
 - Identity Server
 - Analytics

Business requirements

- Expose applications such as TIM Music, TIM Reading, and TIM Series, etc. via EasyAPI platform for internal and external partners.
- Need is to securely expose the backend APIs with mediations.
- APIs are mediated through the Enterprise Integrator and then exposed via APIM to the public.

Solution

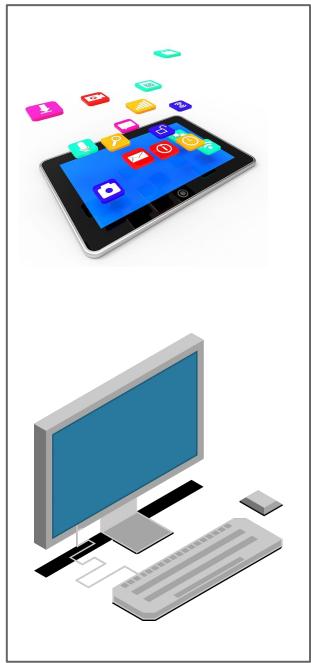
- Telecom Italia Mobile's architecture is powered by WSO2 Integration Platform including WSO2 API manager and WSO2 Enterprise Integrator.
 - Telco based core systems at the back-end are fronted by WSO2 Enterprise Integrator
 - Distributed API Manager Deployment is used to expose services
 - Key Manager is a fully fledged Identity Server

Demo

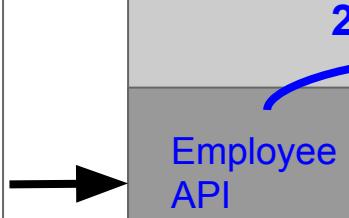


Bottom up approach: digitalize your assets

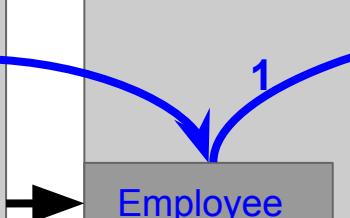
External and internal
client apps



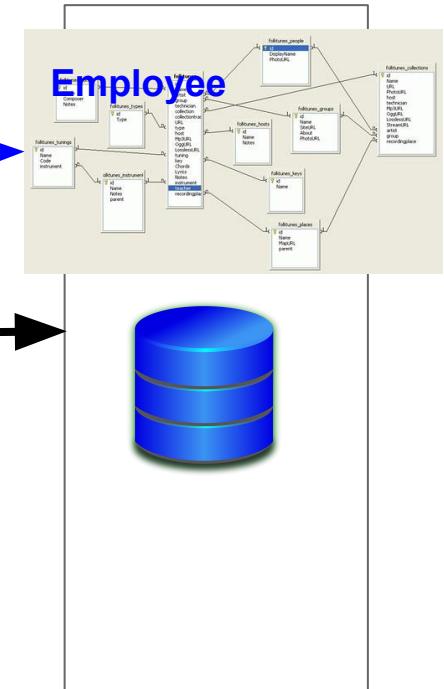
API
Manager



Integration
Layer

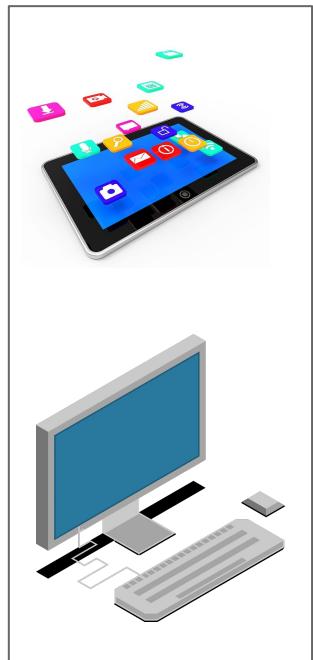


Functional
backends

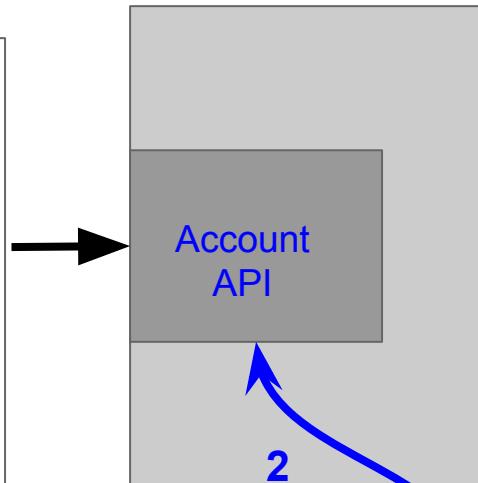


Top down approach

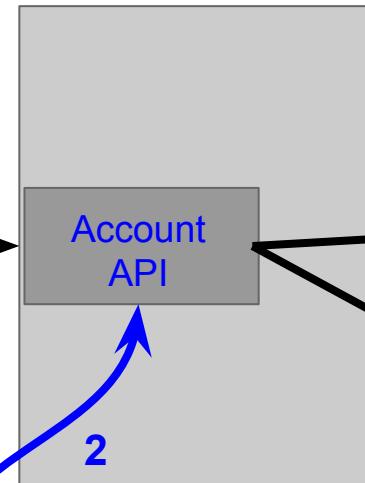
External and internal client apps



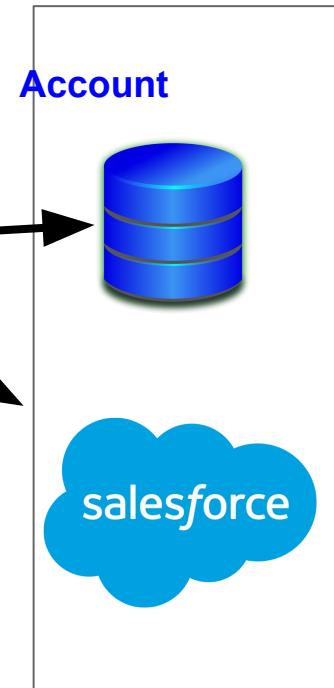
API Manager



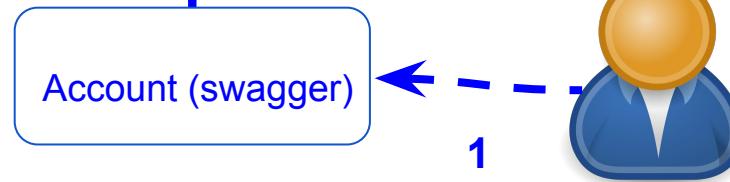
Integration Layer



Functional backends



Account (swagger)



Subscription Model



The WSO2 Subscription & Support

Get the most from your WSO2 product with enterprise-grade services:



WSO2 Subscription Highlights

Product maintenance	WSO2 Update: Continuous access to product update binaries, bug fixes, security updates, and performance enhancements.
Enhanced security	Private security bulletins and early access to security updates (Aggressively uncovered by constant monitoring of hundreds of projects, collecting third-party security reports, and automated code-scanning tools)
Incident response	WSO2 Support offers 24x7 expert support with aggressive response and resolution times, with option for a dedicated WSO2 Technical Account Manager
Developer productivity	Query support to keep development moving forward
Operational simplicity	Outsource operations to WSO2 with public or private WSO2 Managed Cloud hosting
Skills	WSO2 Consulting services to nurture skills or fill skills gaps

WSO2 Training and Certification

WSO2 Provides



Training material free online; learn at your own pace



Standard training (onsite and online)

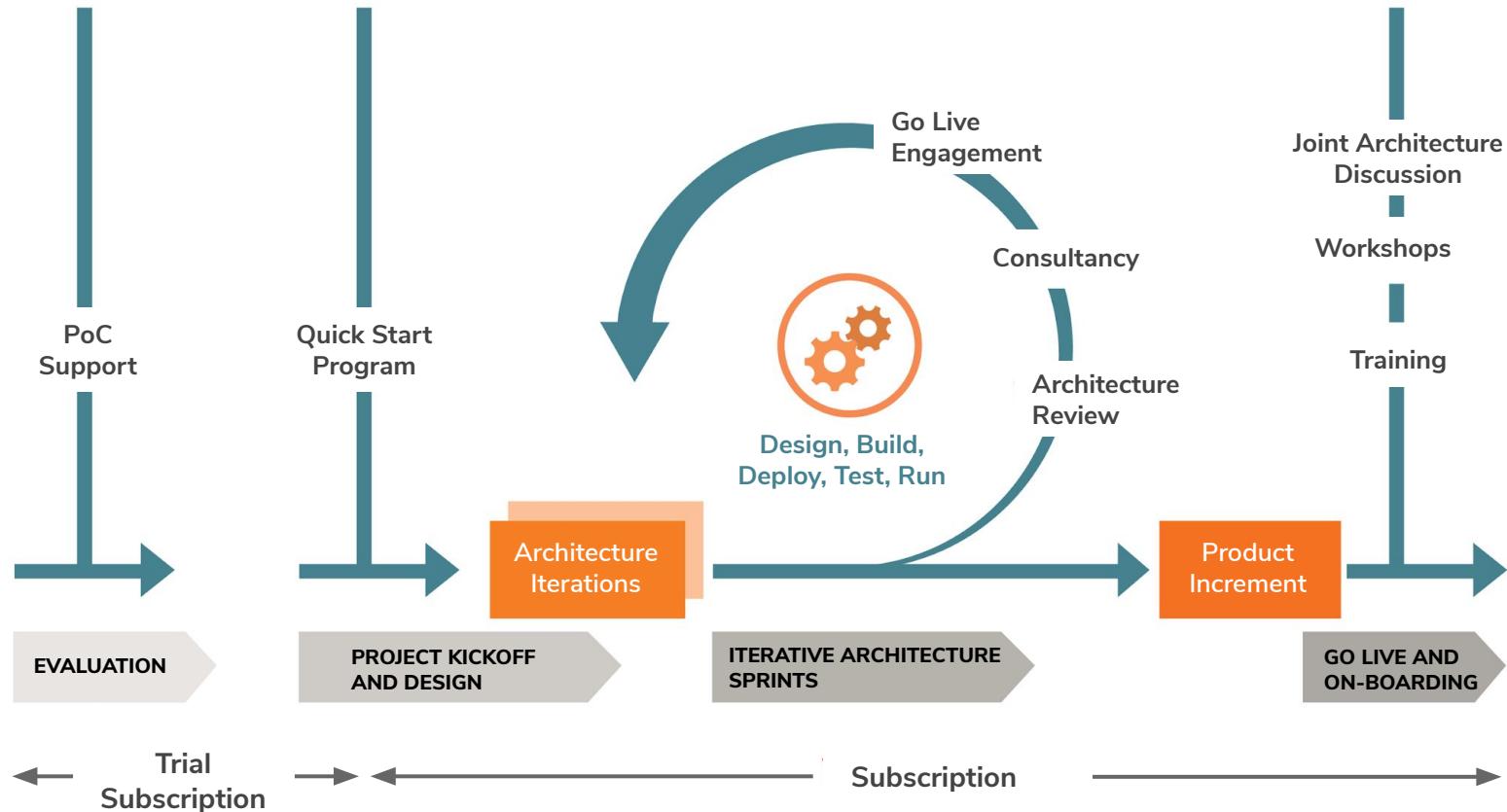


Customized training (on-site) in-depth, personalized training for your specific need



Certification a verifiable way to present skills to team, employers, customers, partners.

WSO2 Customer Engagement Model



THANK YOU

WSO2.COM

