20TH ANNIVERSARY EDITION

WSO2CON ASIA

PLATFORMLESS MODERNIZATION

Design an Enterprise API Management Architecture



Pubudu Gunatilaka
Head of Architecture - APIM BU
WSO2



Introduction & Lab Overview

Introduction & Lab Overview

- **Objectives**
  - Understand Core API Management Concepts & Architecture Patterns
  - Explore Advanced API Design & Governance with AI Integration
  - **Hands-on Experience:** See API Management in Action through Live Demos!
- **What You'll Discover:**
  - The Power of API Gateways & Developer Portals
  - Robust Security, Policy Enforcement & Analytics
  - Key Considerations for Enterprise Architectures (Multi-tenancy, High Availability, CI/CD)
  - Evolution with WSO2 API Manager & Bijira (AI-Native SaaS)
  - **The Future is Here**: Extend API Management architecture for AI Gateway and MCP Servers

Introduction to WSO2 API Manager

WSO2 API Manager

- 100% open source
- Full Lifecycle API management
- Secure API Management: Secure APIs, enforce authorization rules and access policies
- API Discovery and Governance: Portals for API Design and Consumption, Approval workflows for API publishing and API subscription
- API Monetization
- Insightful Analytics and Observability
- Customisable Portals, Workflows and Extension points

One product – open source or SaaS

WSO2 API Manager

WSO2 API Control Plane

WSO2 Kubernetes Gateway

K8s-native design, lightweight, Envoy based

WSO2 Immutable Gateway

Offline mode, immutability, edge gateway

WSO2 Universal Gateway

Inbuilt mediation, range of protocols

Third-Party Gateways

AWS API Gateway, Solace, and more

Bijira by WSO2

AI-native, fully-powered SaaS API and MCP Server management

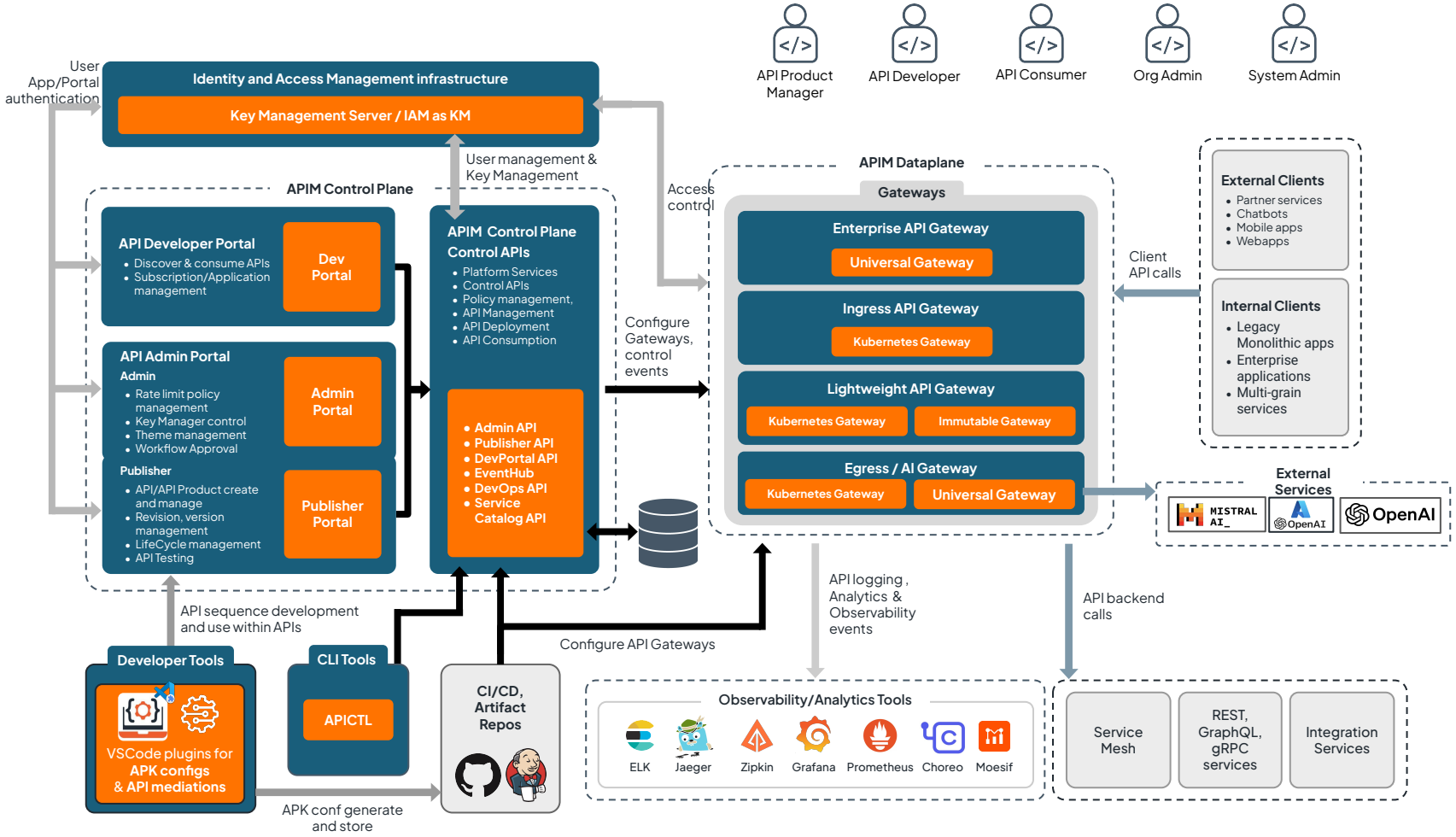
Powered by WSO2 API Manager

Built on Choreo

AI: Design / Testing / Search / Governance

Component Architecture

WSO2 API Management Software Components



Use Case Overview

Business Use Case: Grand Union Bank

- **Scenario:**
  - Grand Union Bank is a financial institution serving retail, corporate, and digital banking sectors.
  - While the bank has a solid internal infrastructure, it faces challenges in:
    - Enabling secure third-party access to services (e.g., card offers, payments)
    - Allowing AI assistants and modern apps to access services in a governed manner
- **Solution:**
  - Grand Union Bank adopts a multi-tenant API platform to expose internal APIs, external APIs, and MCP servers, enabling secure access, observability, and AI-driven interactions.

End Users

Bank Customers

Partners

Fintechs, Third party services

Grand Union Bank

Web & Mobile Apps



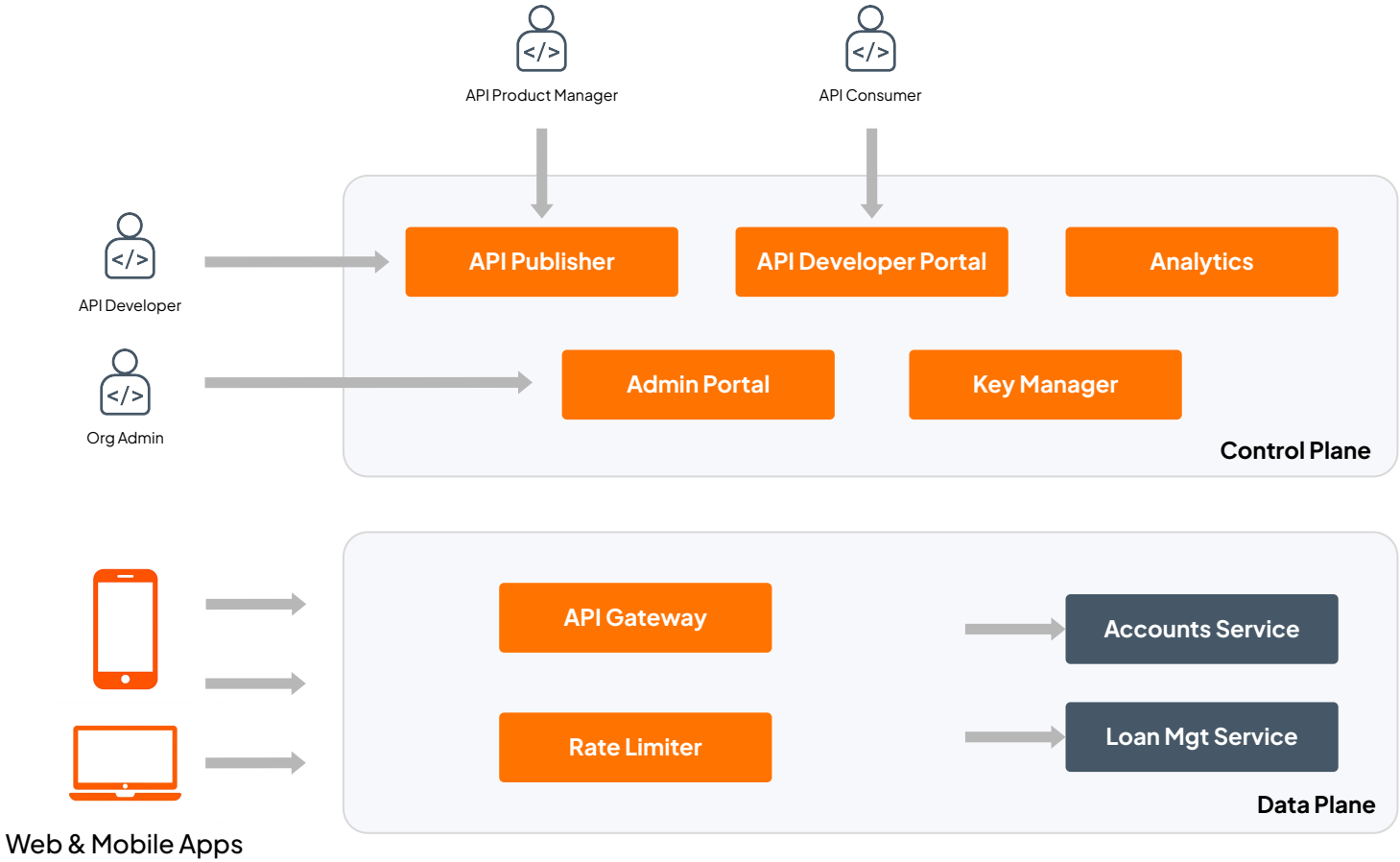
Departments

- Retail Banking
- Digital Commerce
- Marketing & Customer Engagement
- Wealth Management

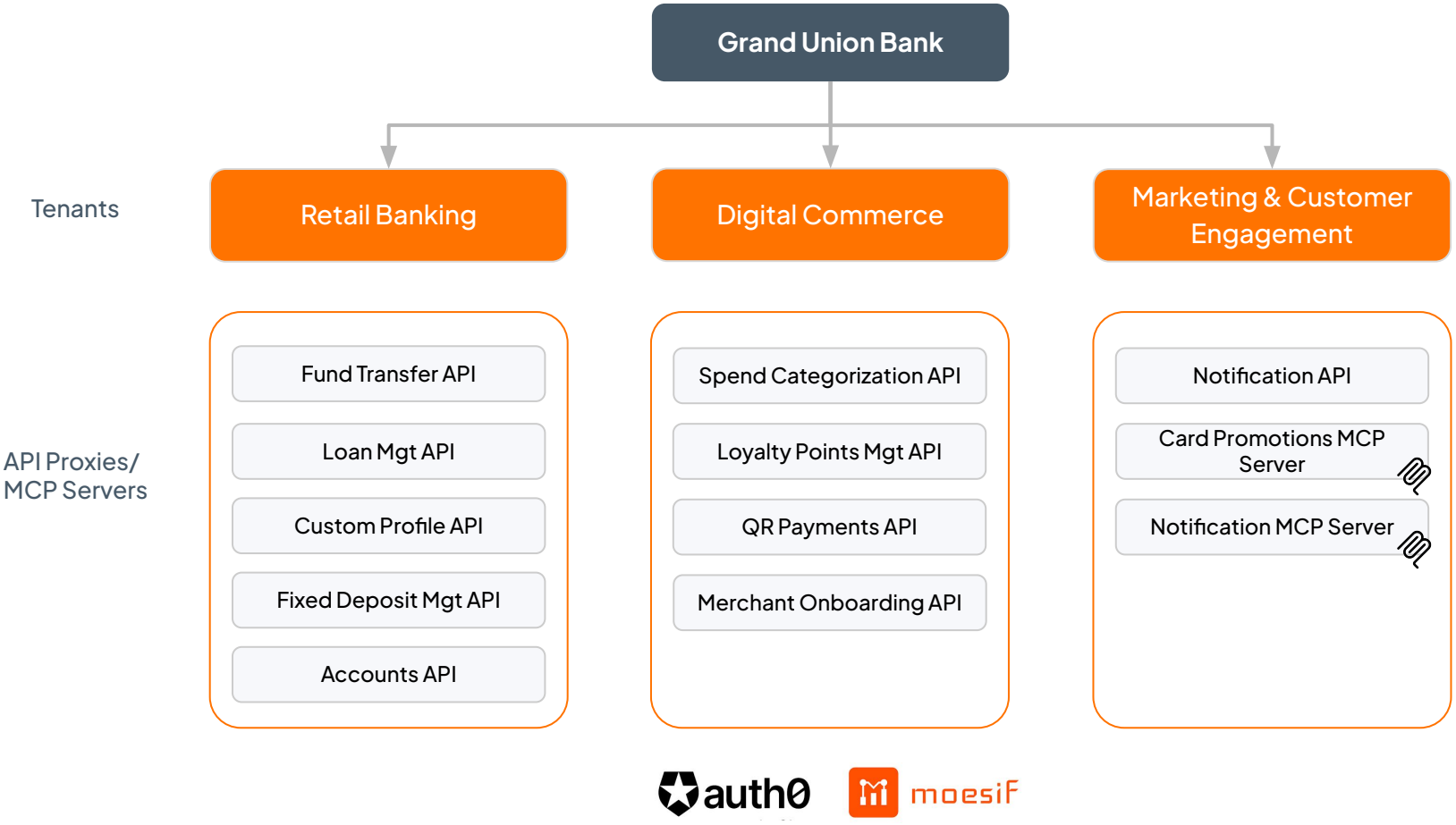
Personas

Username	Role	Responsibility
Larry	API Developer (Internal/creator)	Designing and Implementing APIs
Emily	API Product Manager (Internal/publisher)	Manage API lifecycle, documentation, and ensuring quality and security standards
David	API Consumer/ (Internal/subscriber)	Discover, subscribe and utilize APIs
Admin	Org Admin/ (admin)	Manage users and system administration

High-Level Solution Diagram



Demo #1


Grand Union Bank
Tenants
Retail Banking
Digital Commerce
Marketing & Customer Engagement
API Proxies/ MCP Servers
Fund Transfer API
Loan Mgt API
Custom Profile API
Fixed Deposit Mgt API
Accounts API
Spend Categorization API
Loyalty Points Mgt API
QR Payments API
Merchant Onboarding API
Notification API
Card Promotions MCP Server
Notification MCP Server
auth0
moesif

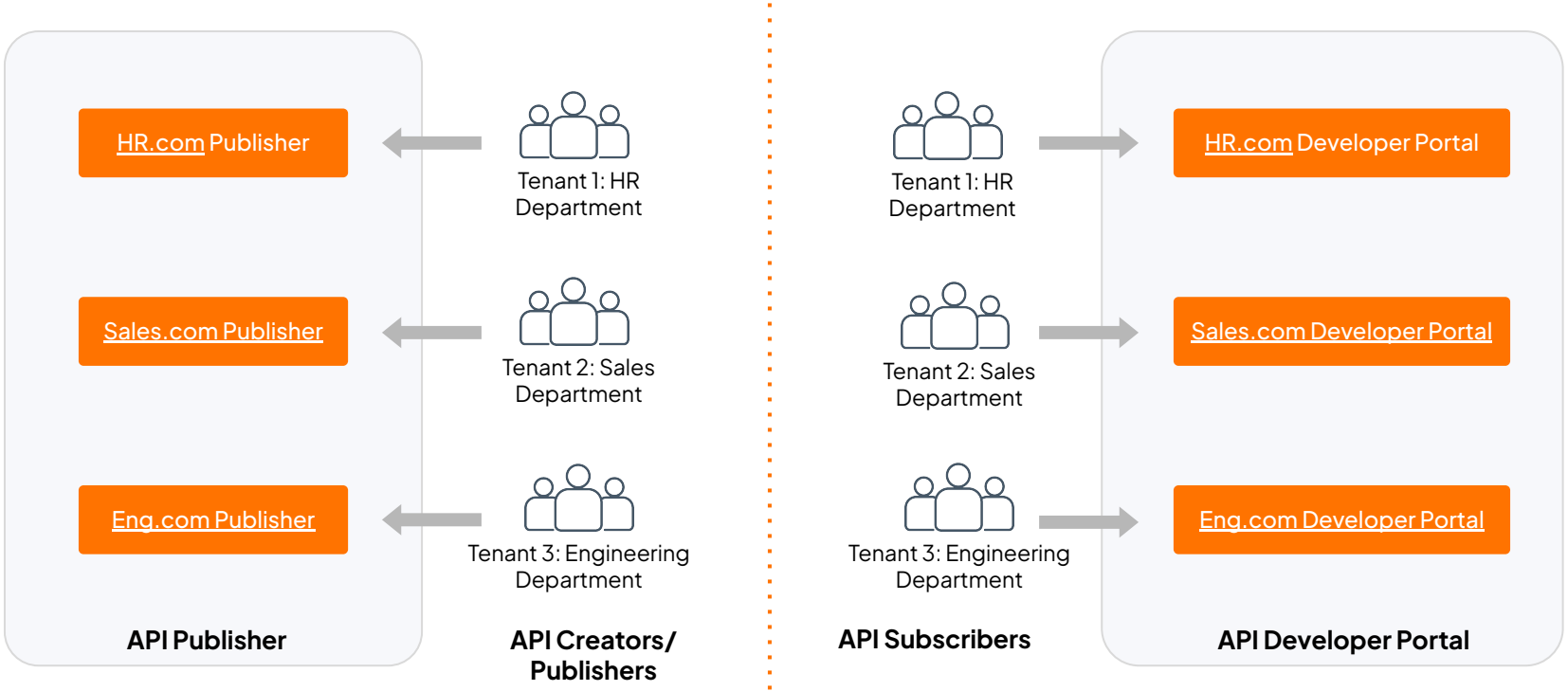
Designing Enterprise Architecture

API Management Use Case Patterns

Use Case Category	Primary Objective	Target Audience	Key Benefits
Internal API Exposure	Efficiency, Integration, Microservices	Internal Teams, Developers	Legacy modernization, Streamlined communication, Data access
Partner API Exposure (B2B)	Collaboration, Process Integration	Suppliers, Distributors, Integrators	Optimized supply chains, Enhanced B2B, Ecosystem building
Public/B2C API Exposure	New Revenue, CX Enhancement, Open Innovation	Consumers, Third-Party Devs, Community	Seamless omnichannel, Developer ecosystems, Direct monetization
Emerging Use Cases	New Tech Paradigms	IoT, AI/ML, Event-Driven Systems	Secure device integration, Cost-optimized AI, Real-time responsiveness

Multi Tenancy

Isolated access for multiple users or organizations within a shared API management environment.



API Versioning vs Revisioning

API Versions

Represents a specific release or iteration of an API with unique features, functionalities, or changes.

- Deep copy of an existing API with backward incompatible changes
- Managed independently
  - Lifecycle
  - Documentation
  - Policies
- New subscription can be optional or mandatory for API consumers

API Revisions

Changes at a more granular level, such as modifying individual endpoints, parameters, or response formats.

- Copy of an existing API with backward compatible changes
- Maintained within the same API
- Enable continuous improvement of the API
- Supports rollback
- New subscription is not required.

API Security

Authentication

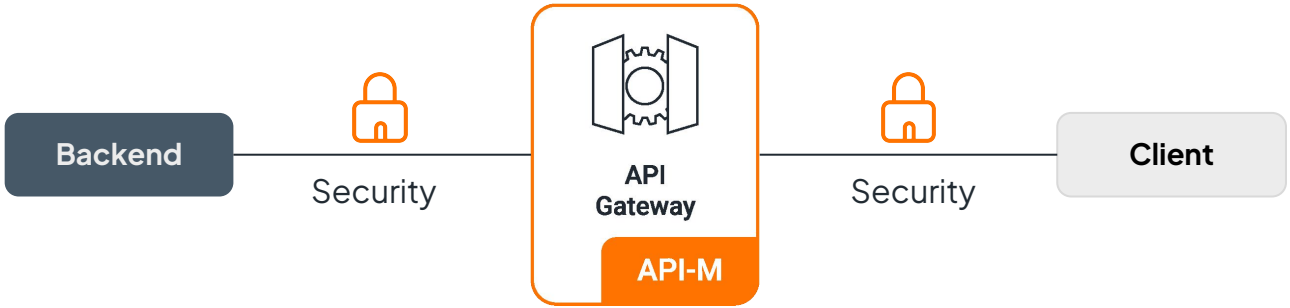
- Application Level
  - OIDC/OAuth 2.0
  - API Key
  - Basic Auth
- Transport Level
  - Mutual SSL

Authorization

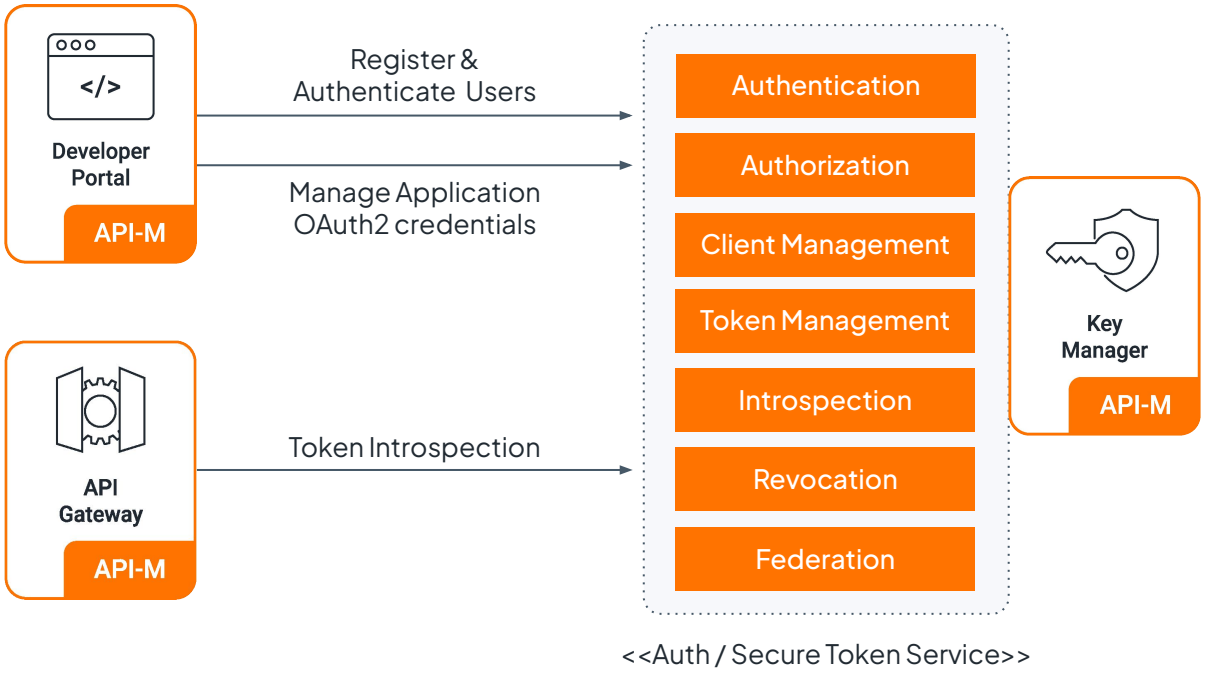
- Role Based Access Control with OAuth 2.0 Scopes
- OPA Policies

API Protection

- CORS
- Malicious Payload Scanning
  - Schema Validation
  - JSON/XML Threat Protectors
  - Injection Attack Detection



Key Manager Extensibility – Plug In Your Preferred Option



WSO2 Identity Server

KEYCLOAK

okta

auth0

PingFederate

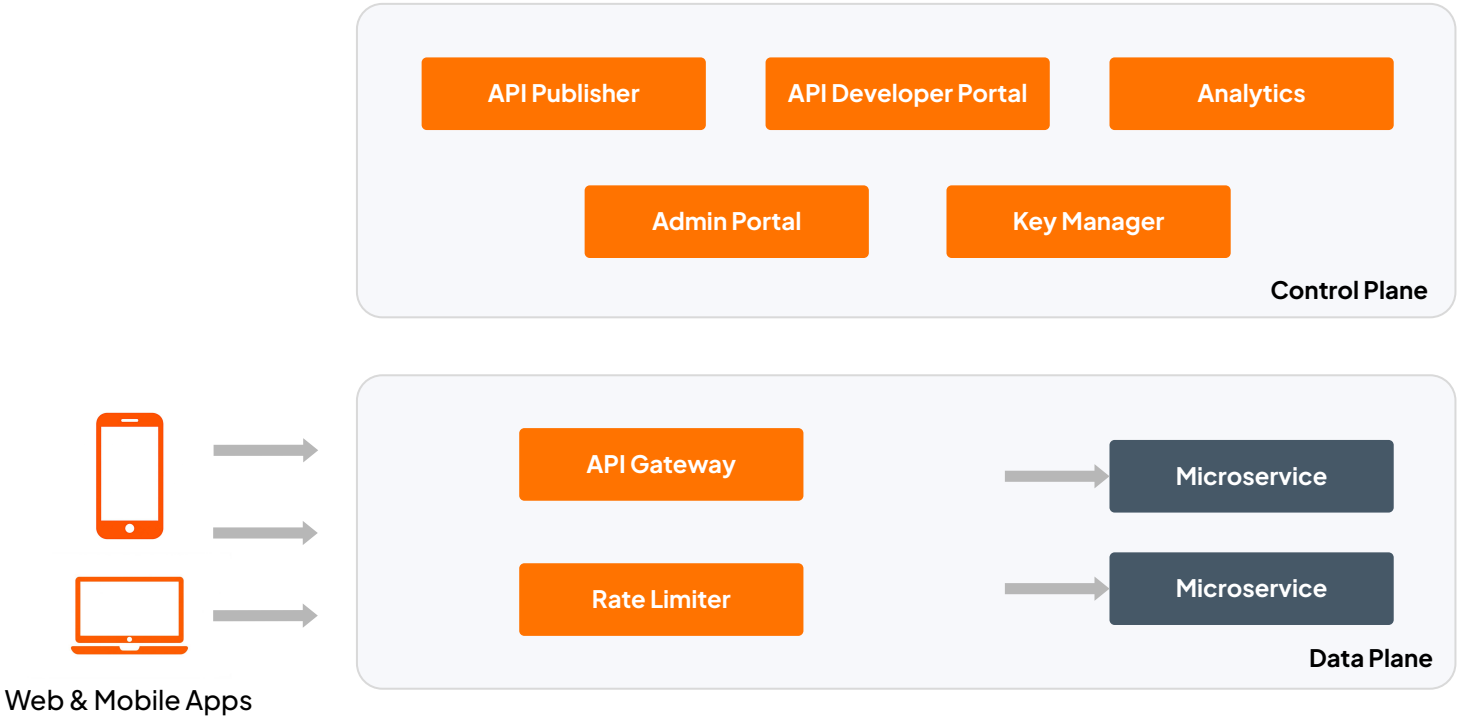
ForgeRock

Microsoft Entra ID

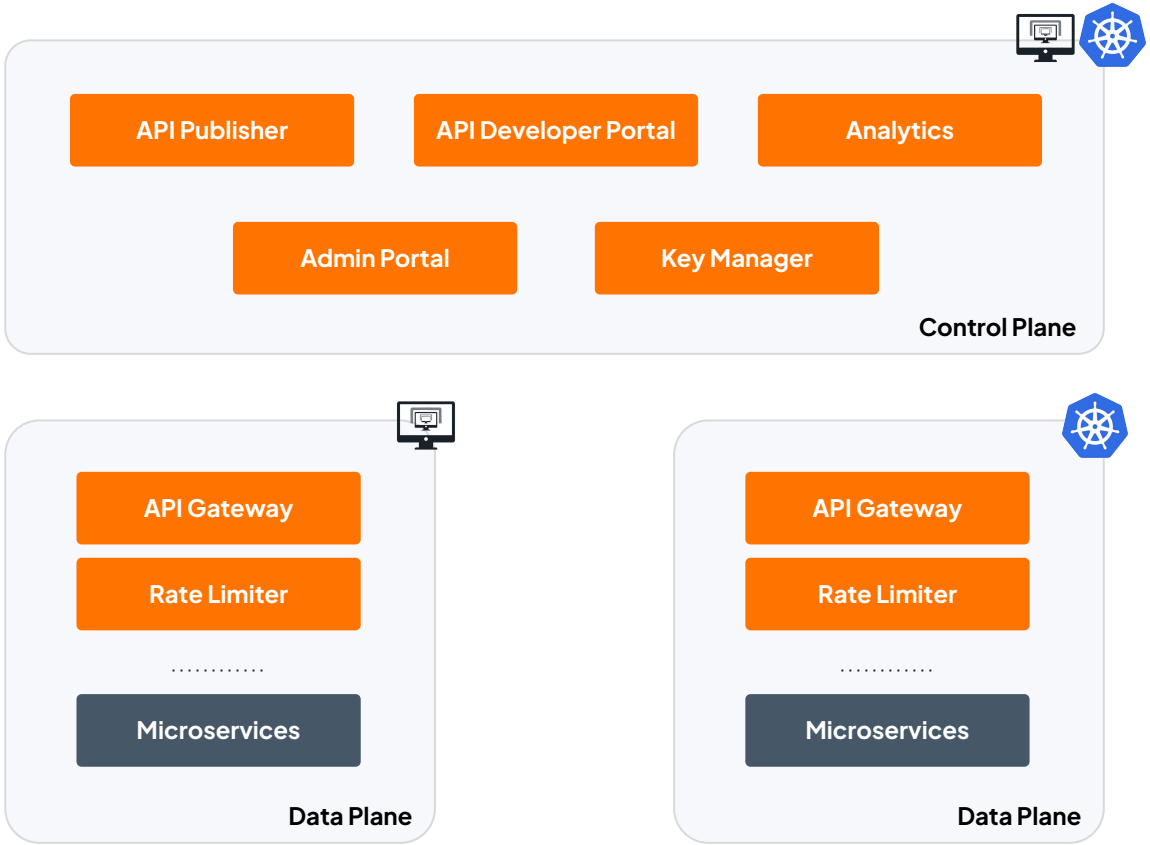
Bring Your Own

Deployment Architecture

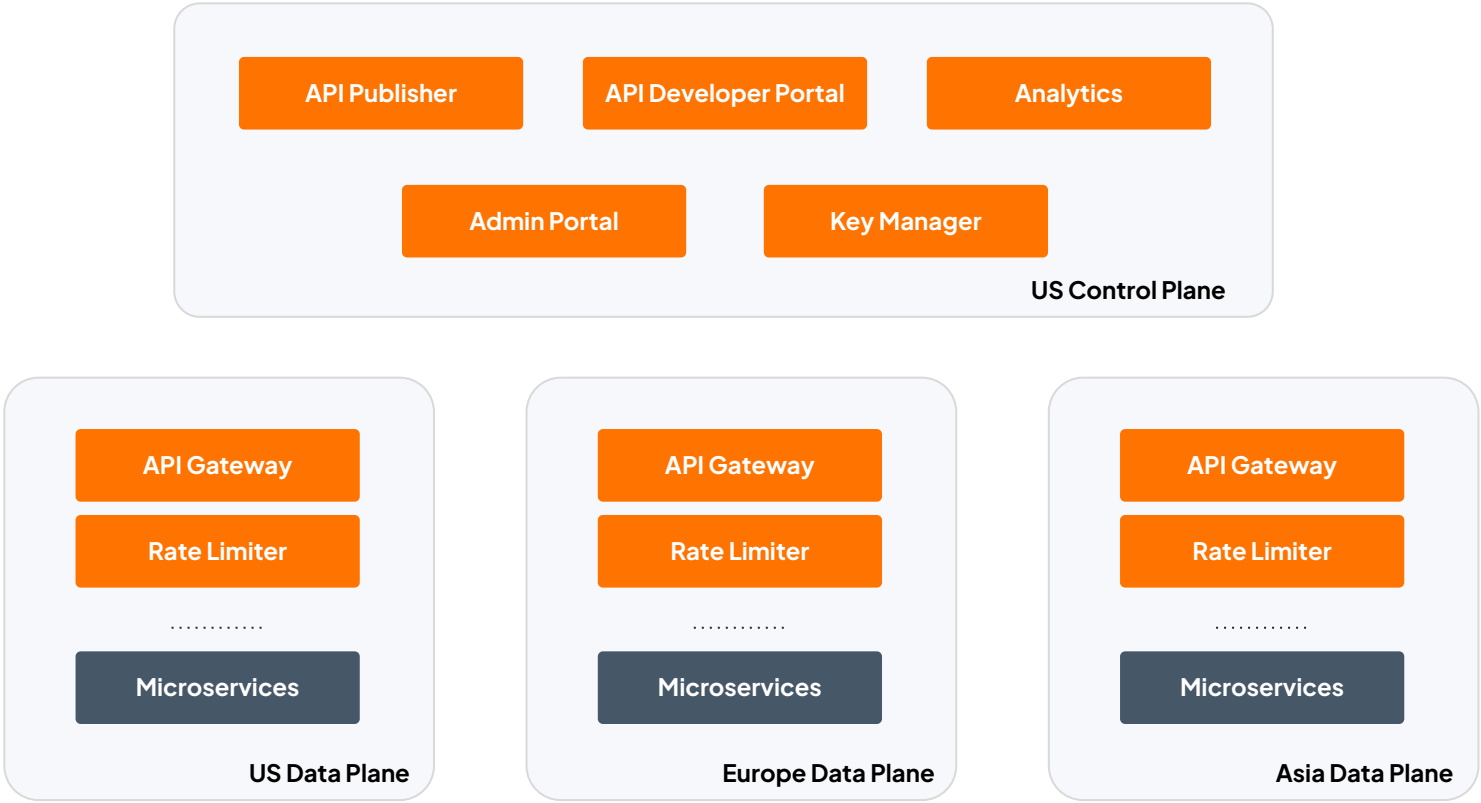
The Control Plane and Data Plane Separation



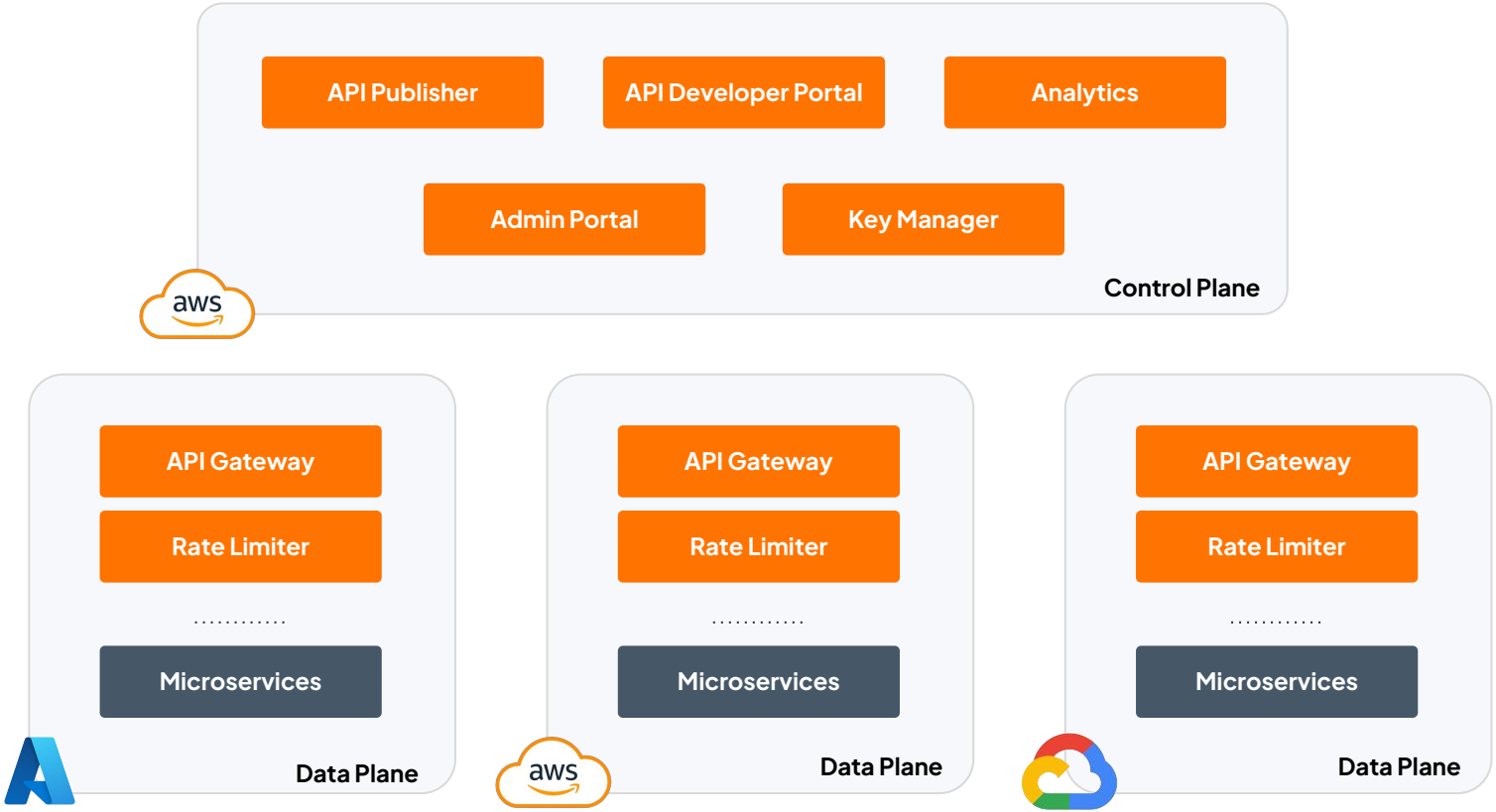
Control Plane with Multiple Data Planes (VMs & Kubernetes)



Control Plane with Multiple Data Planes (US/Europe/Asia…)



Control Plane with Multiple Data Planes (Multi Cloud)

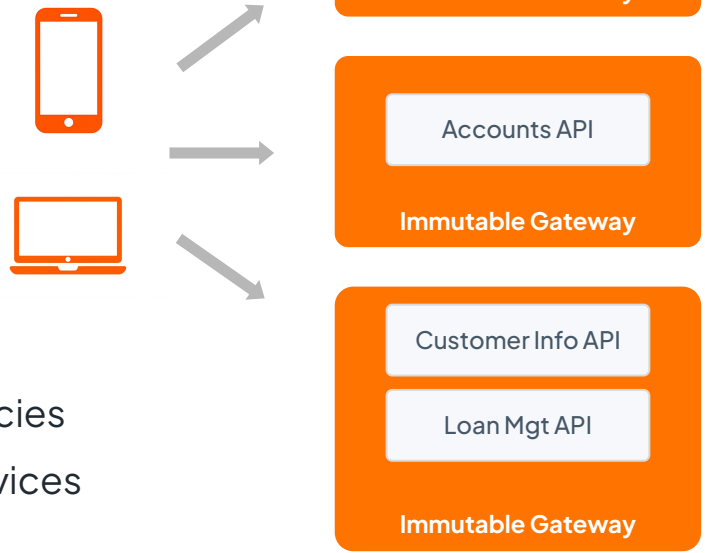


Scalability Considerations

- **Independent Component Scaling** – Scale Gateway, Control Plane, Traffic Manager, and Key Manager separately based on demand.
- **High Availability via Horizontal Scaling** – Add more nodes to handle increased load and ensure fault tolerance
- **Multi-Region & Cloud Deployment** – Supports globally distributed traffic across multiple regions or clouds
- **Dynamic Auto-Scaling** – Leverage Kubernetes HPA and scaling policies to adapt to real-time workloads
- **Efficient Caching at the Gateway** – Improve performance and reduce backend/token validation load with distributed caching

Decentralized API Management Architecture

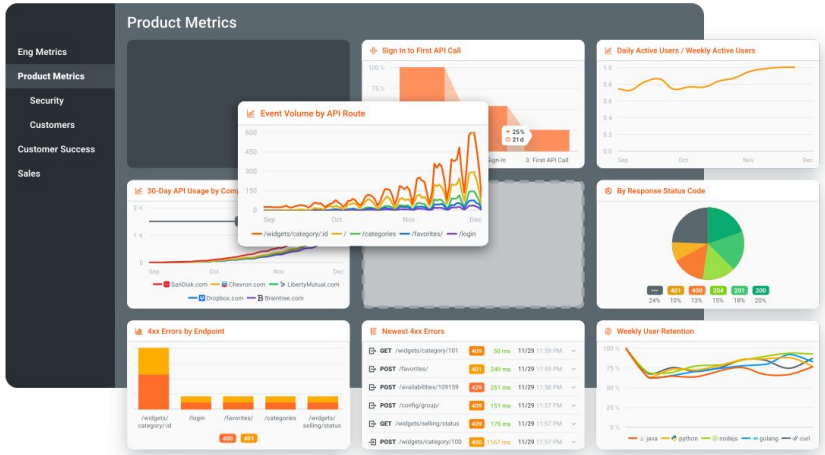
- Centralized API management struggles in large, distributed environments. Decentralization empowers teams, speeds delivery, and improves scalability.
- Benefits
  - Team Autonomy – Teams own their APIs and lifecycles
  - Faster Innovation – Parallel API development & rollout
  - Scalability – Independently scale gateways & policies
  - DevOps-Friendly – Aligns with GitOps & microservices



API Analytics and Monetization

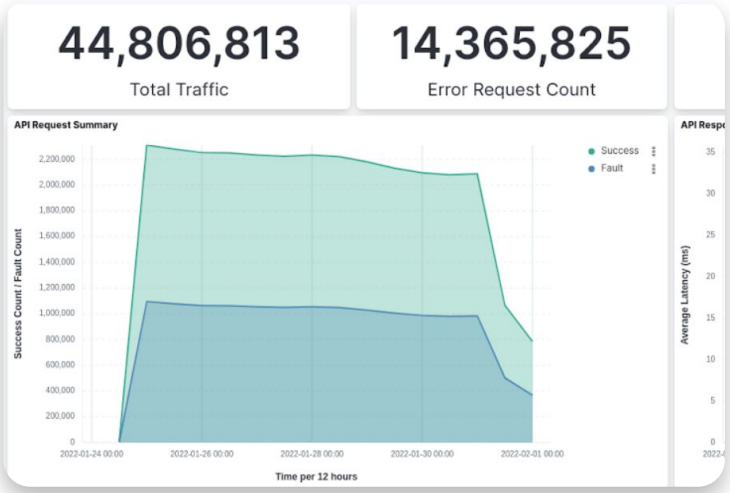
API Analytics

Moesif



Available by default with WSO2 Support Subscription
Plug and play solution
Highly customizable

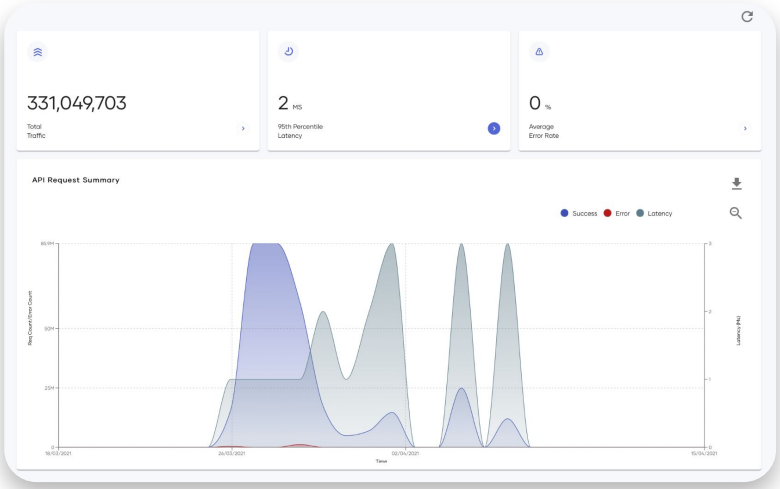
ELK Based Analytics



Open Source Option
Maintained by the customer
Highly customizable

API Analytics

Choreo Insights Analytics

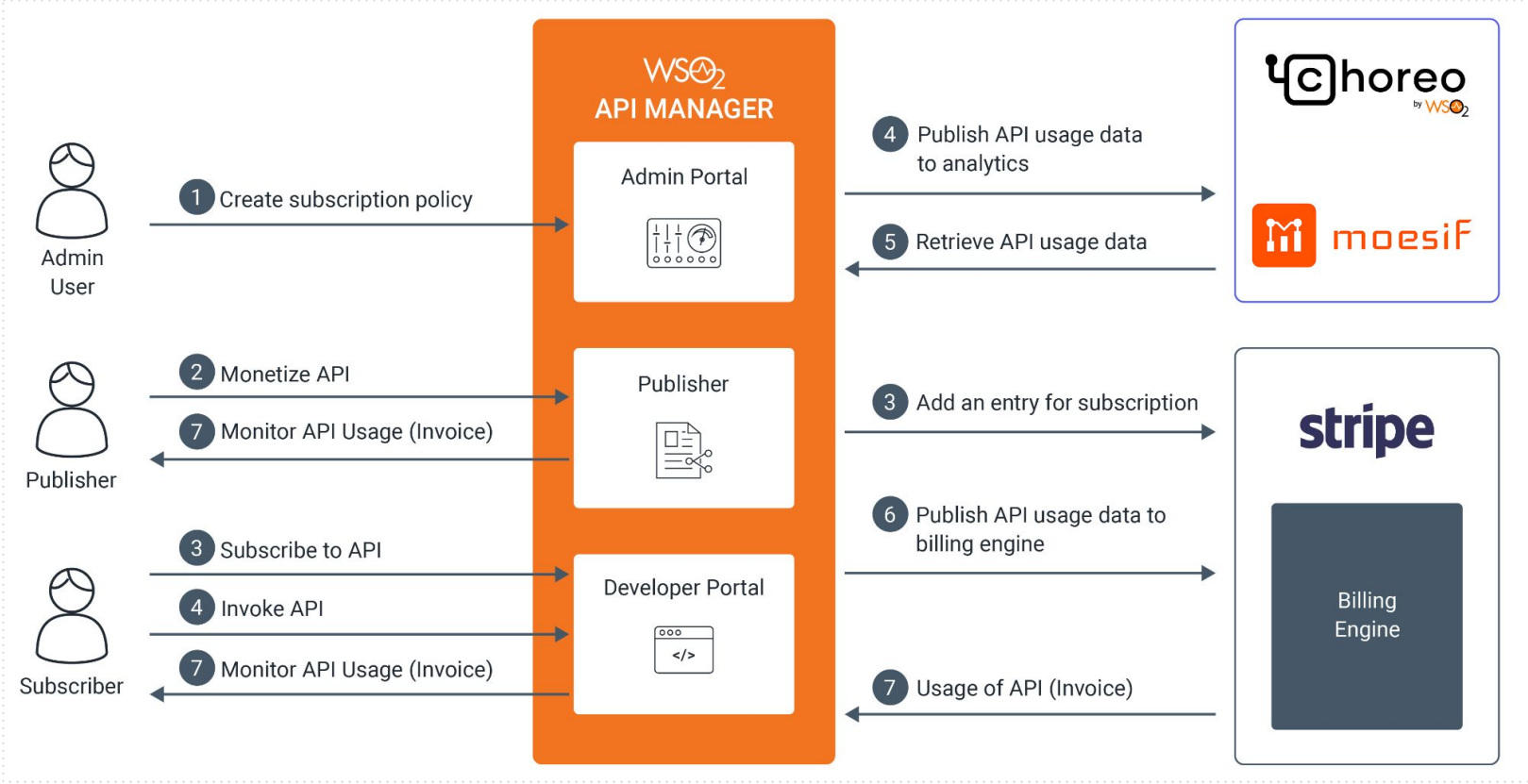


Available by default with WSO2 Support Subscription
Plug and play solution
Limited customizations

Other Analytics Solutions

- Datadog
- Open Search
- Plug with any Analytics Solution

API Monetization



API Observability

- **Key Pillars**
  - Metrics: Track API usage, latency, error rates, and throughput
  - Logs: Capture detailed request/response data and gateway events
  - Traces: Understand end-to-end request flows across services


ELK

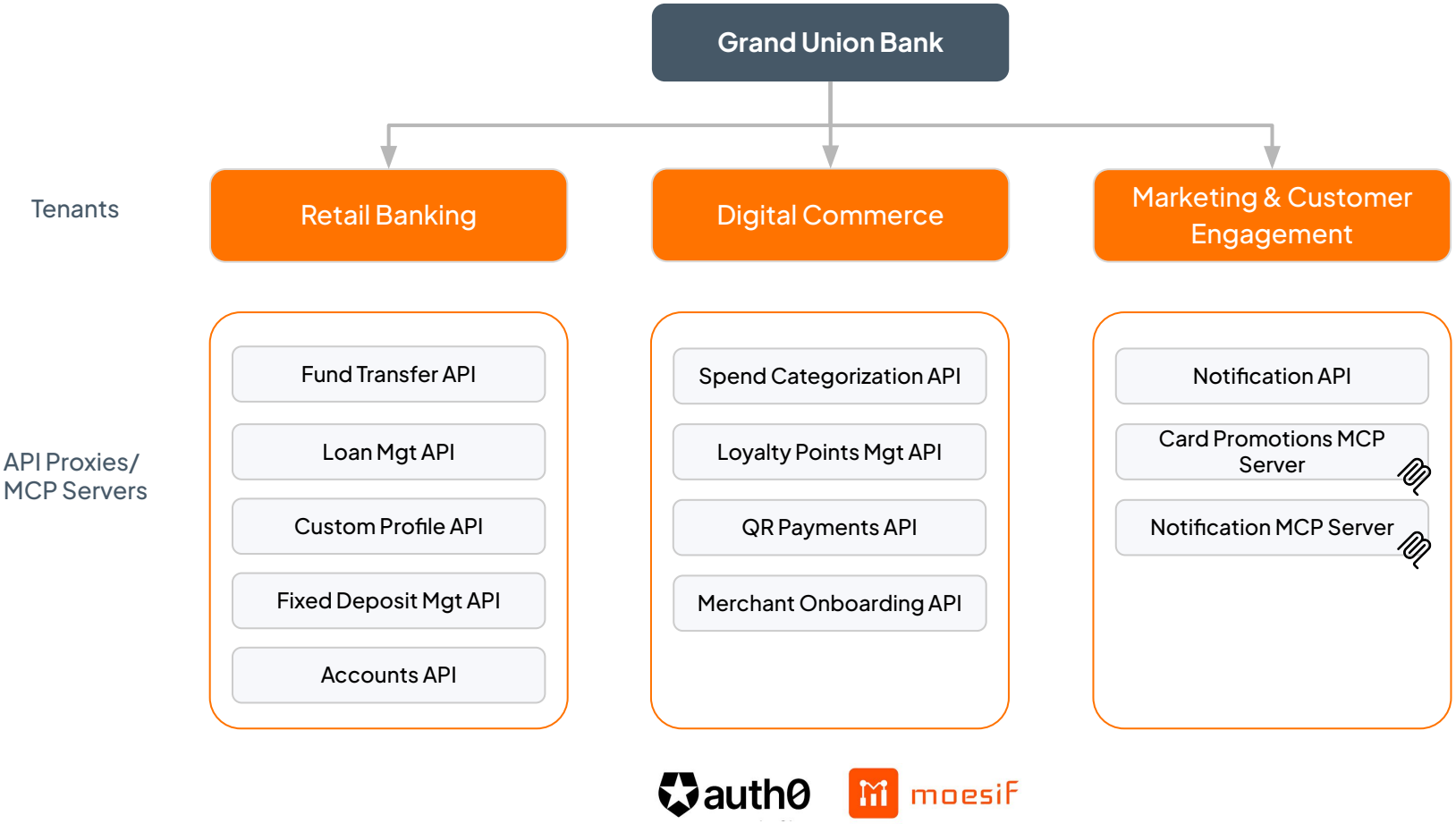

Jaeger


Zipkin


Grafana


Prometheus

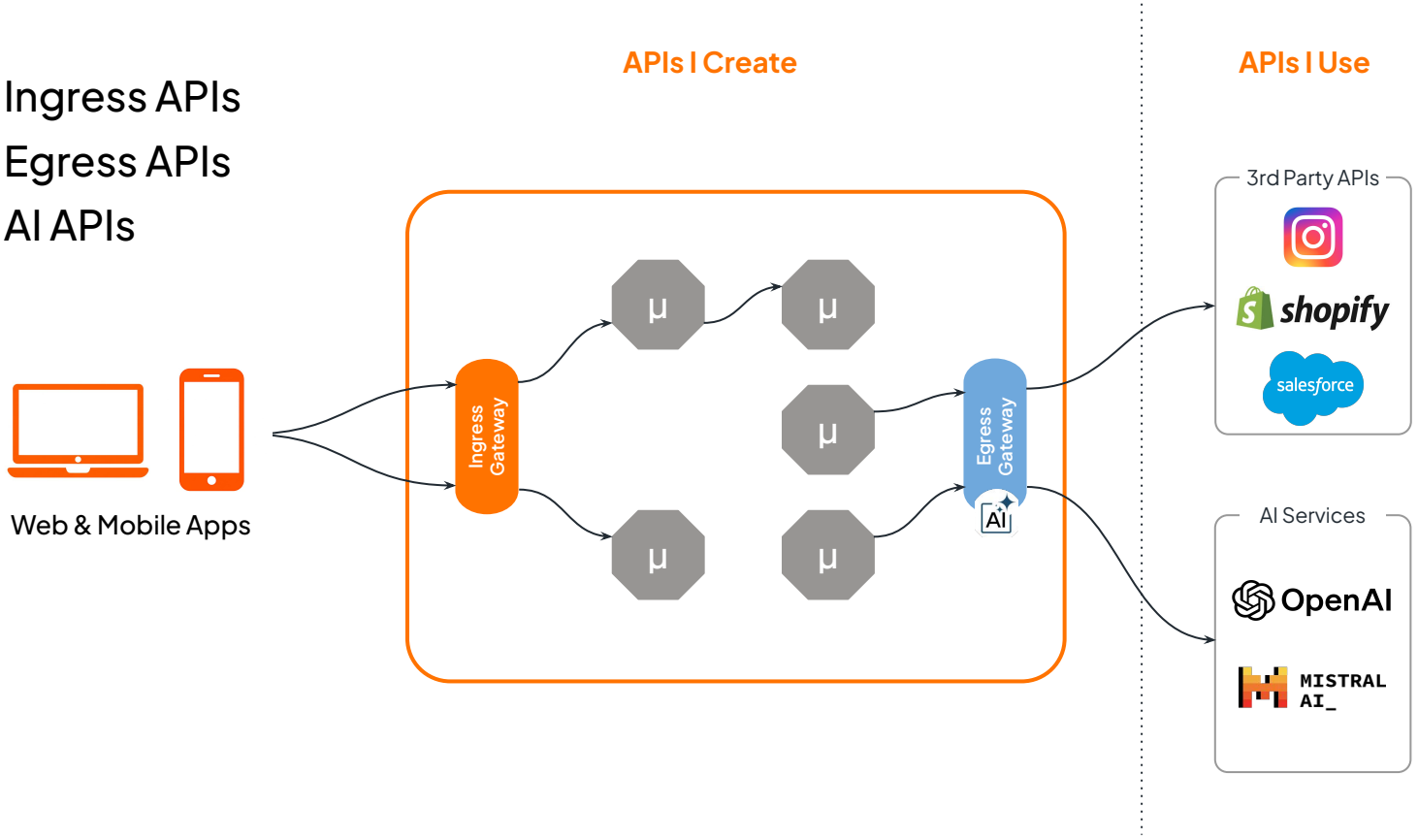
Demo #2


Grand Union Bank
Tenants
Retail Banking
Digital Commerce
Marketing & Customer Engagement
API Proxies/ MCP Servers
Fund Transfer API
Loan Mgt API
Custom Profile API
Fixed Deposit Mgt API
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Spend Categorization API
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Egress API Management

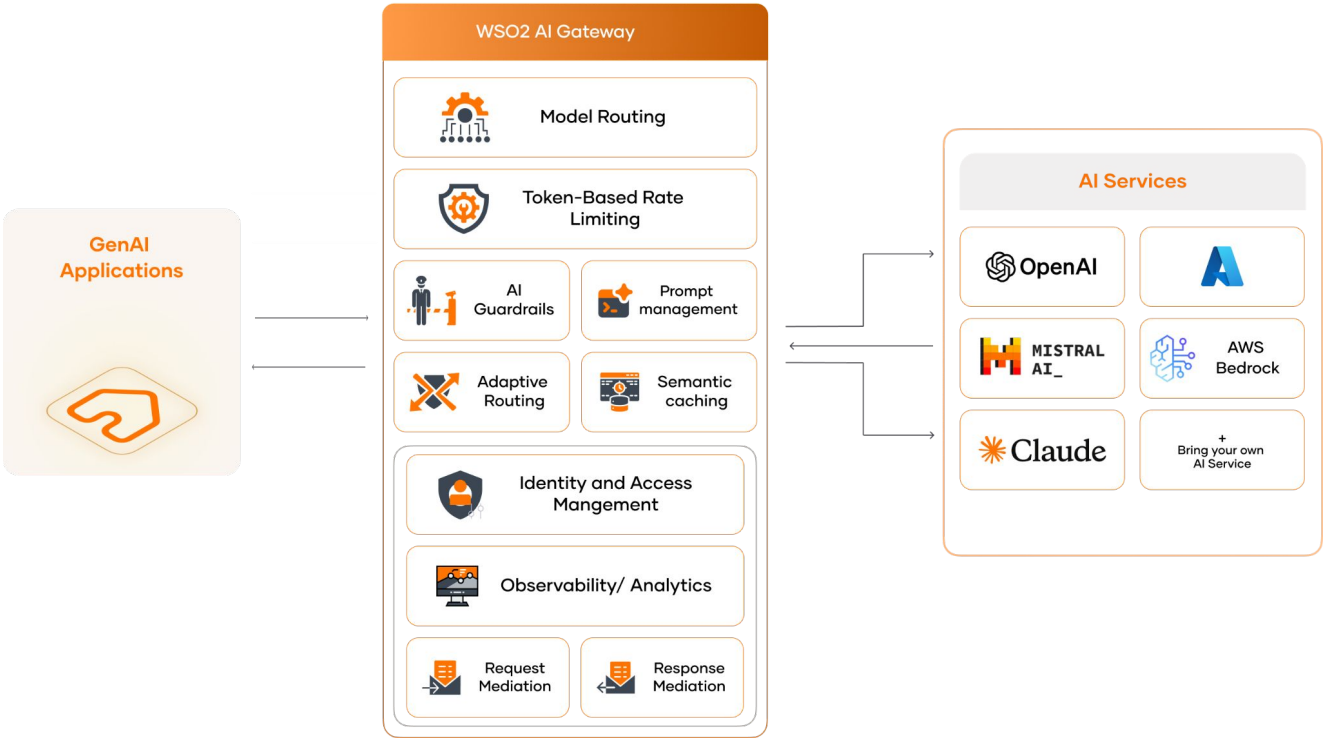
Complete Control Over Your API Traffic

- Ingress APIs
- Egress APIs
- AI APIs

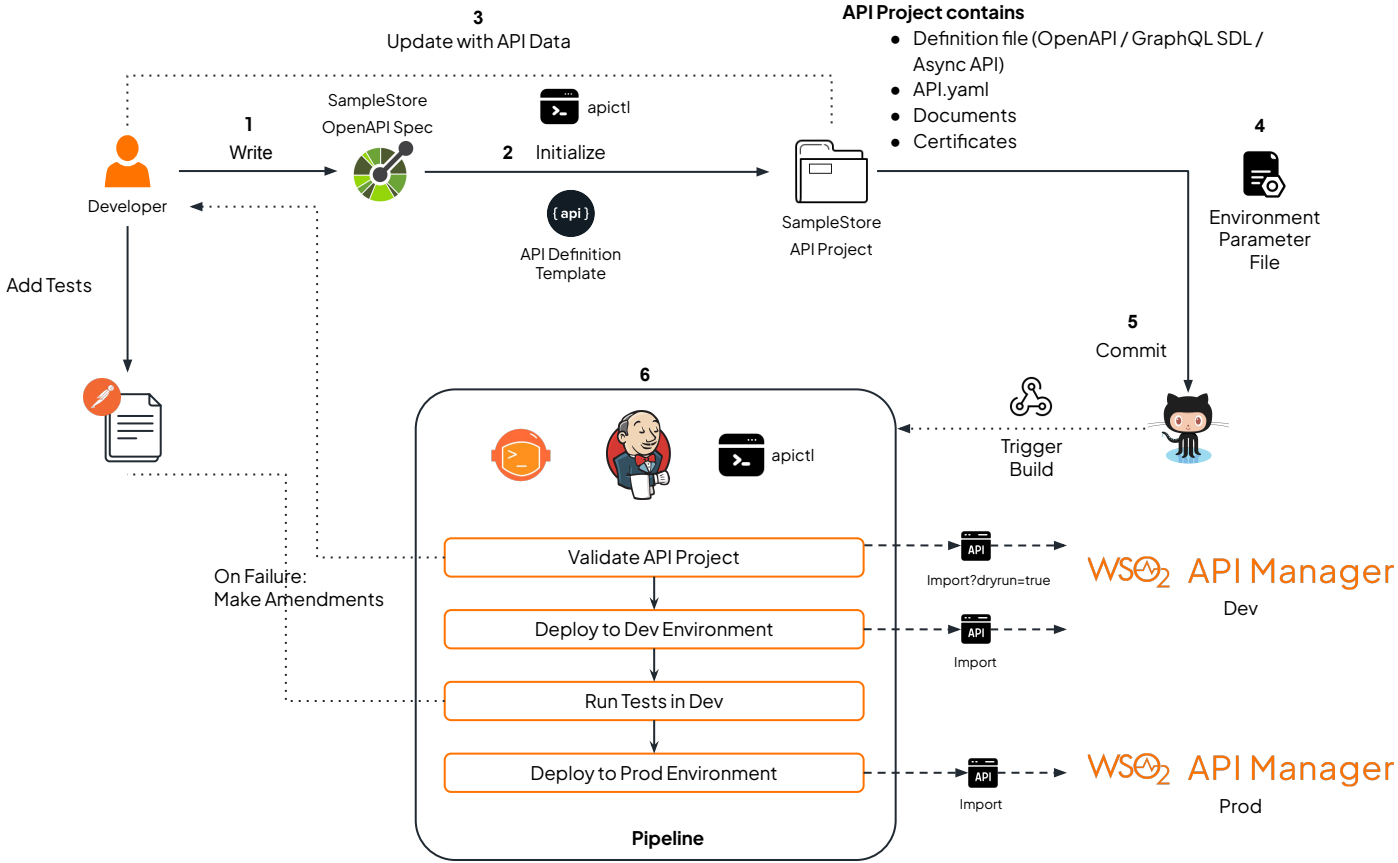


Egress API Management: WSO2 AI Gateway

Governs, secures, and enhances the use of Generative AI APIs.



CI/CD for APIs



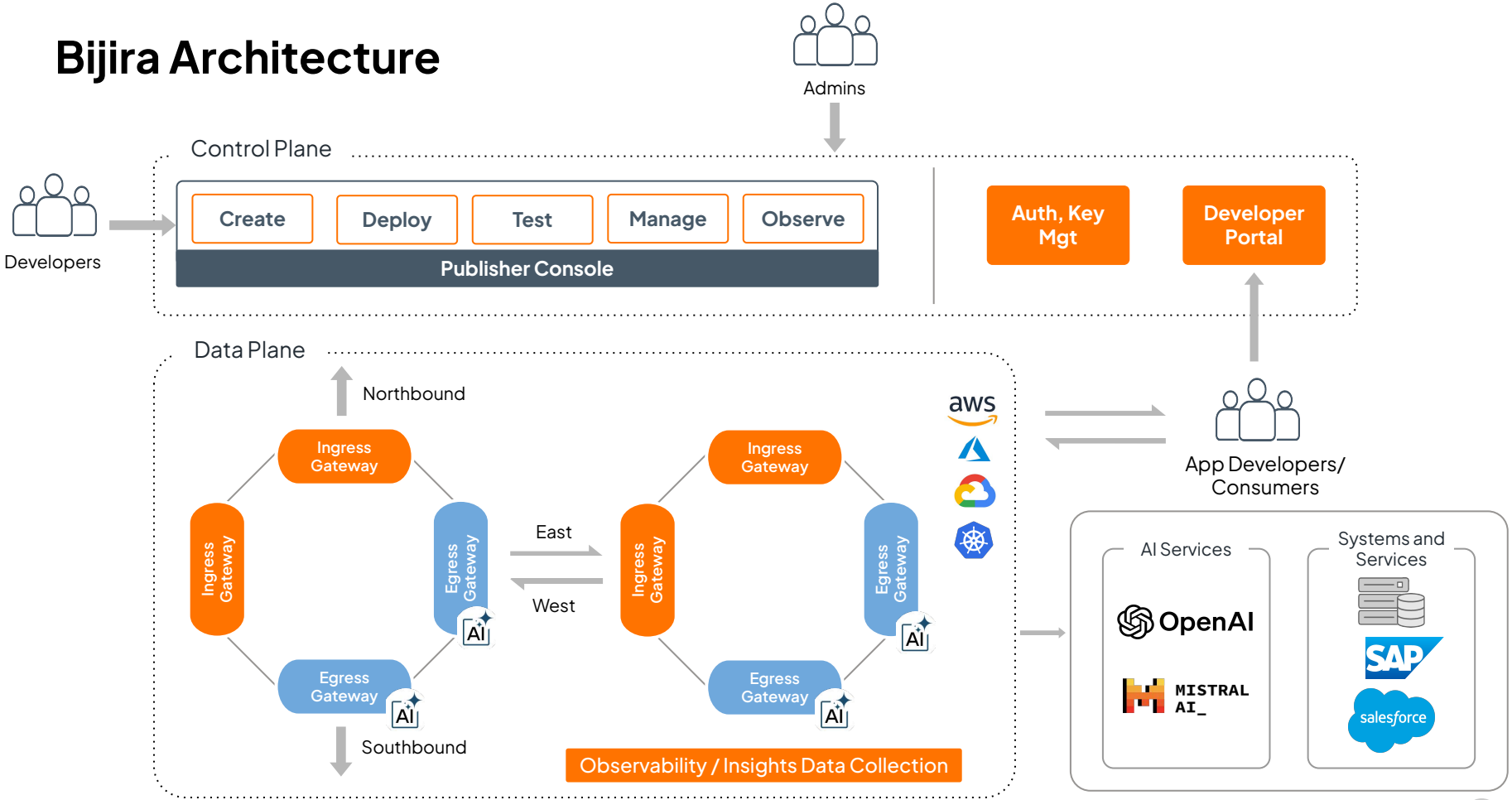
Bijira: AI-Native, Scalable SaaS API and MCP Server Management

WSO2 API Manager SaaS – Bijira

- **Enhanced User Experience:** Visual mapping UI and interactive policy management
- **Unified Control Plane:** Seamlessly manage APIs across cloud & private dataplanes.
- **AI for APIs:** AI-driven API design assistance, testing and developer portal theming.
- **APIs for AI:**
  - AI Governance for intelligent compliance, traffic control, and automation.
  - Governs, secures, and enhances the use of Gen AI APIs with AI Gateway.
- **Complete Control Over Your API Traffic**
  - Efficiently govern ingress, egress, and AI APIs for any use case.
- **Built for AI Agents**
  - MCP server support and tooling to power intelligent agent-based interactions.
- **Built on Choreo: Delivering a enhanced and focused APIM experience**



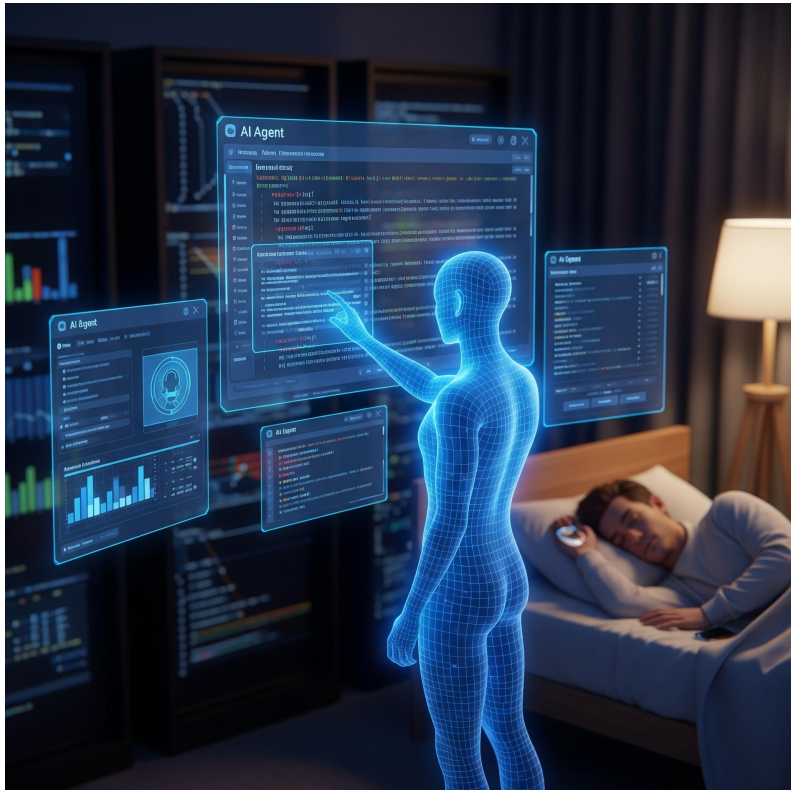
Bijira Architecture



Connect APIs to AI Agents

When Production Breaks at 3:00 AM…

- 3:00 AM – Production Error Hits
  You're not woken up.
- AI Ops Agent Responds Instantly
  It pulls logs, pinpoints the issue, and applies a config fix.
- 8:00 AM – You Arrive
  A detailed Slack report awaits—with the fix already in review.
- Too Good to Be True? It’s Real.



How Agentic Workflows Operate

Plan



The agent formulates a step-by-step plan, dividing the task into manageable subtasks.

Execute



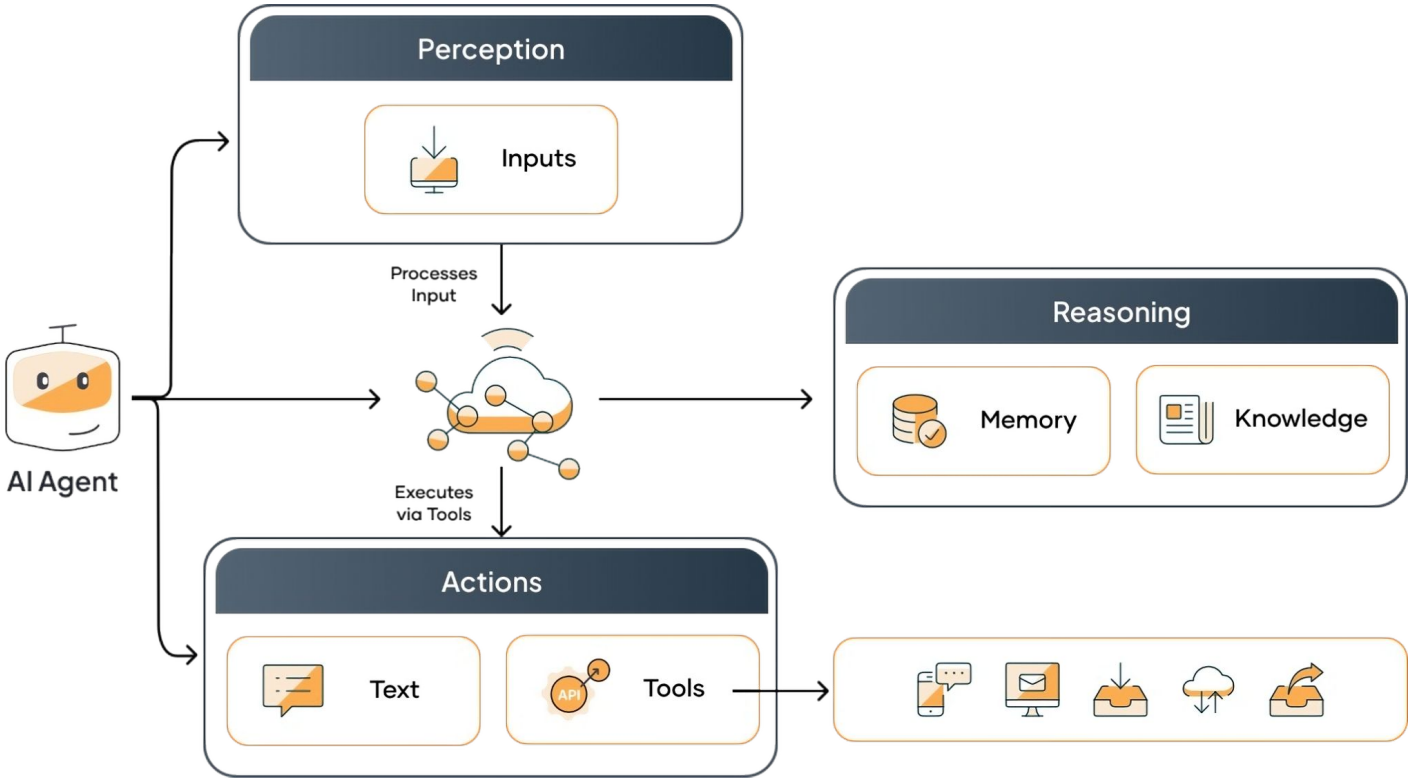
It uses the right tools/APIs for each step (e.g. calls a service, runs code) to carry out the plan

Reflect & Iterate



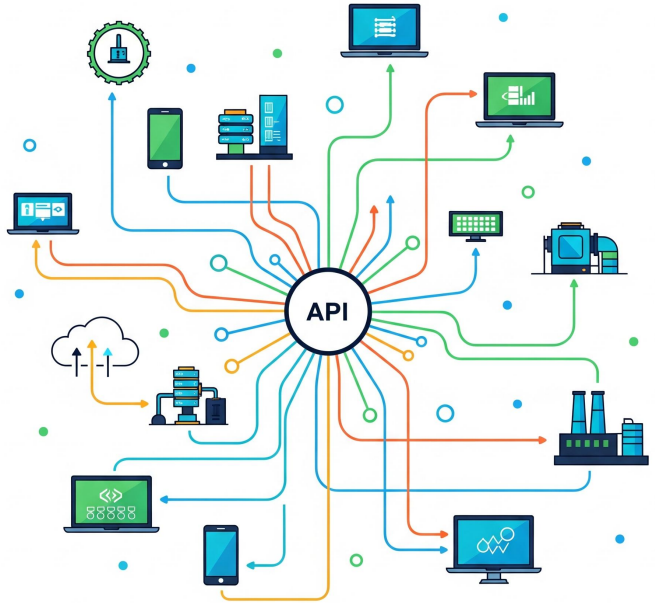
It checks results at each step, adjusts the plan, and repeats until the goal is achieved.

How Agents Operate



APIs: Our Most Powerful Building Blocks

- APIs = the backbone of modern software (connecting services, data, microservices)
- From REST to GraphQL to webhooks – we built structured, fixed endpoints for every service
- APIs are not obsolete—they're foundational.
- Every API is a potential AI tool, if exposed with context and intent.



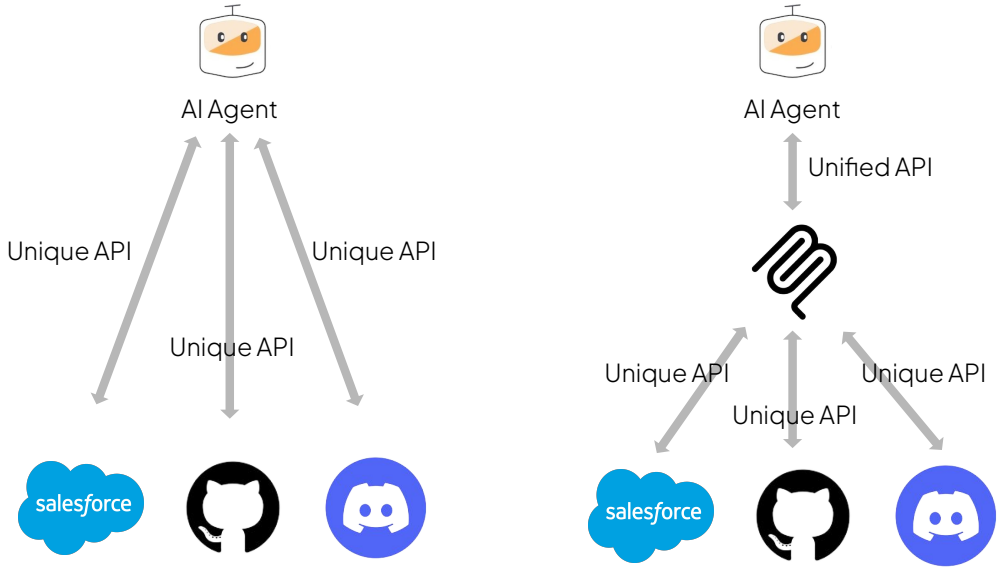
Why Traditional APIs Fall Short for AI

- AI agents struggle with rigid interfaces
- They need session-level context to stay coherent
- Each integration needs custom glue code — not scalable
- Request-response APIs can't support multi-step reasoning or adaptive interactions
- Most APIs lack machine-readable semantics, memory, and reusable tool-like behavior

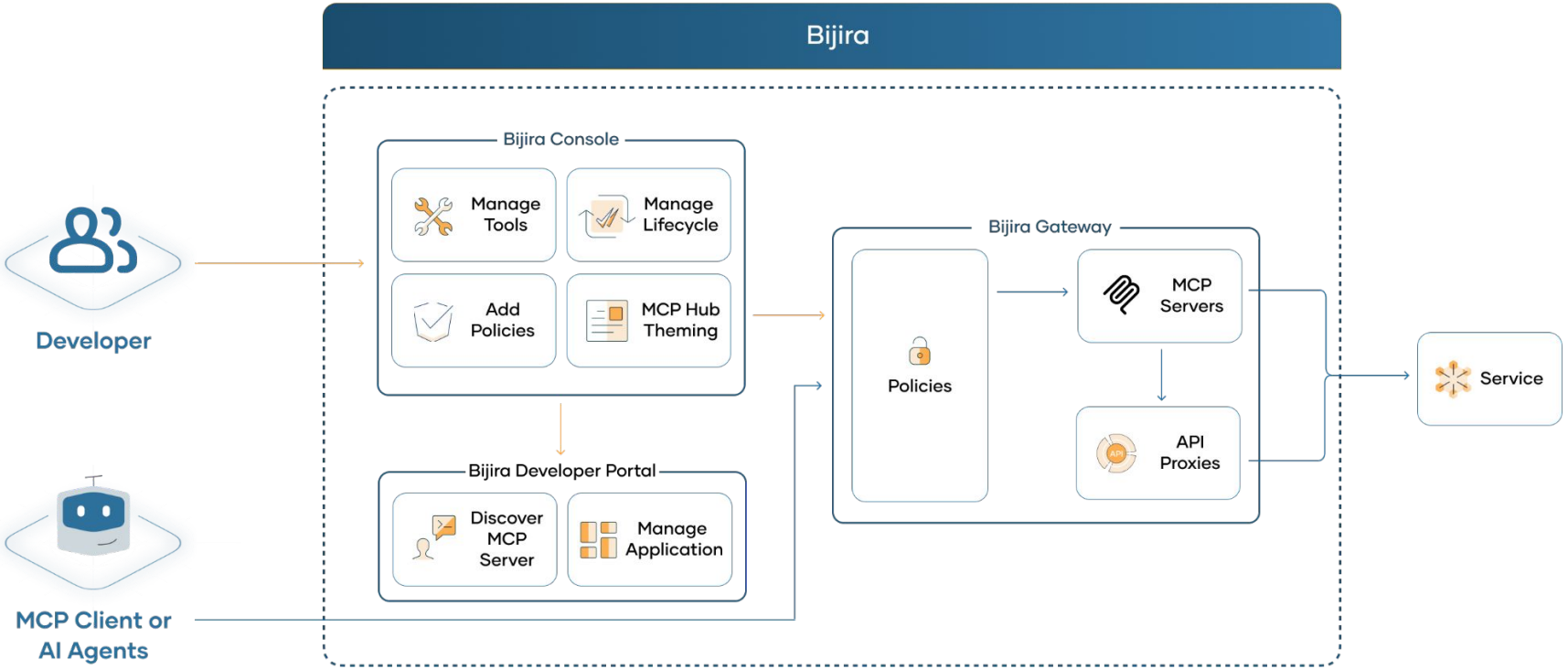
Meet MCP - The New Open Standard

Model Context Protocol is an open protocol that standardizes how applications provide context to LLM.

A universal adapter for AI agents.

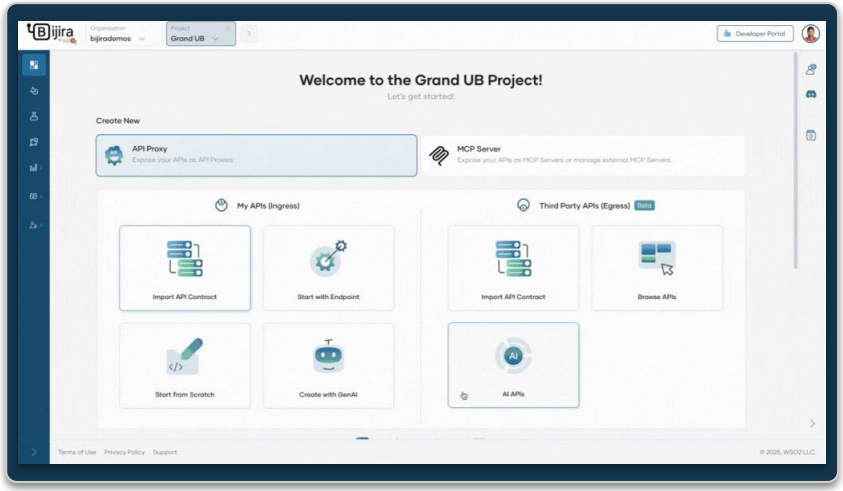


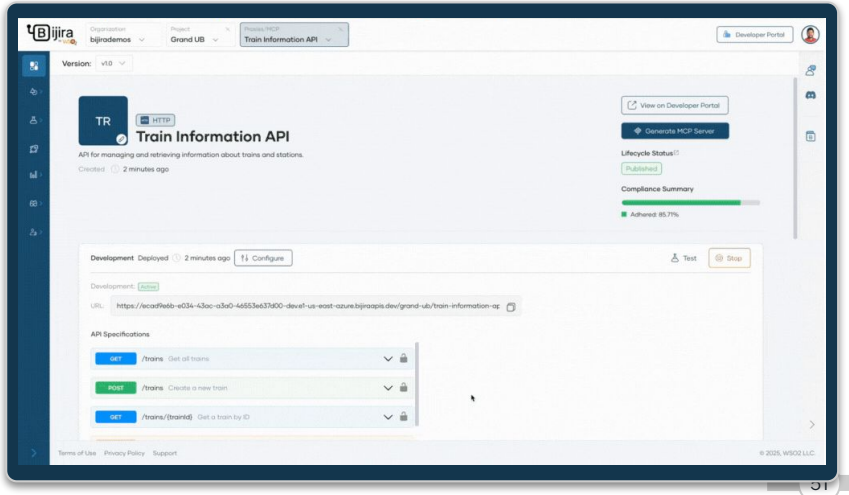
Connecting APIs to AI Agents: MCP Server Management



Expose APIs as MCP Server Tools

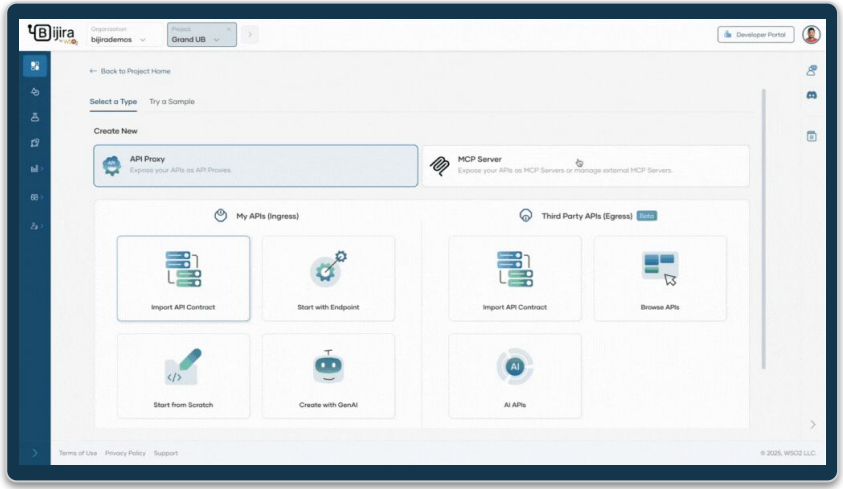
- Transform APIs or API Proxies as Tools
  - Turn existing APIs into reusable, callable functions for AI agents.
- Add Structured Metadata
  - Include descriptions and other metadata
- Apply Policies
  - Enforce security, rate limiting, and other governance policies on tools.
- Publish MCP Servers to the MCP Hub
  - Make your APIs discoverable as tools for AI agent developers.





Govern Access to Remote MCP Servers

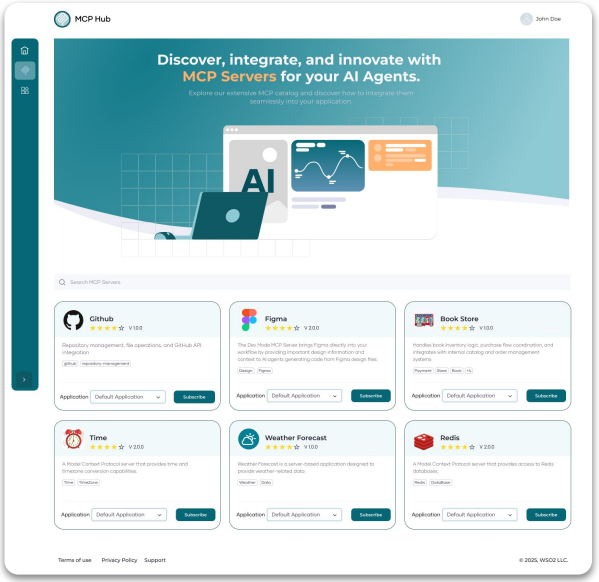
- Bring External Tools to Your Control Plane
  - Connect AI-ready tools hosted outside your environment.
- Register with Metadata
  - Provide tool descriptions, endpoints, and capabilities to enable AI agent usage.
- Policy Enforcement
  - Apply centralized security, rate limiting, and access controls
- Discover via MCP Hub
  - Expose remote MCP servers through the hub for AI agent developers

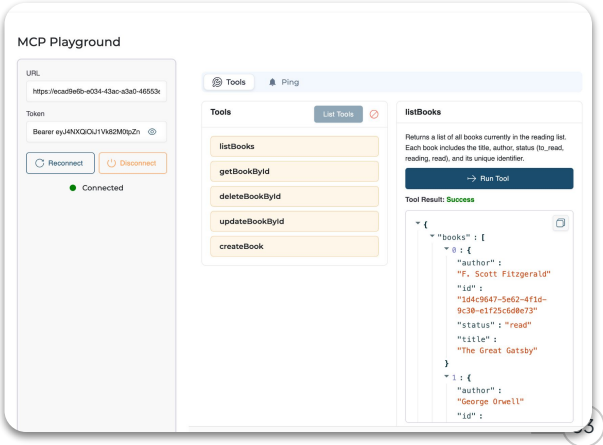


MCP Hub — A Dedicated Discovery Portal for AI Agents

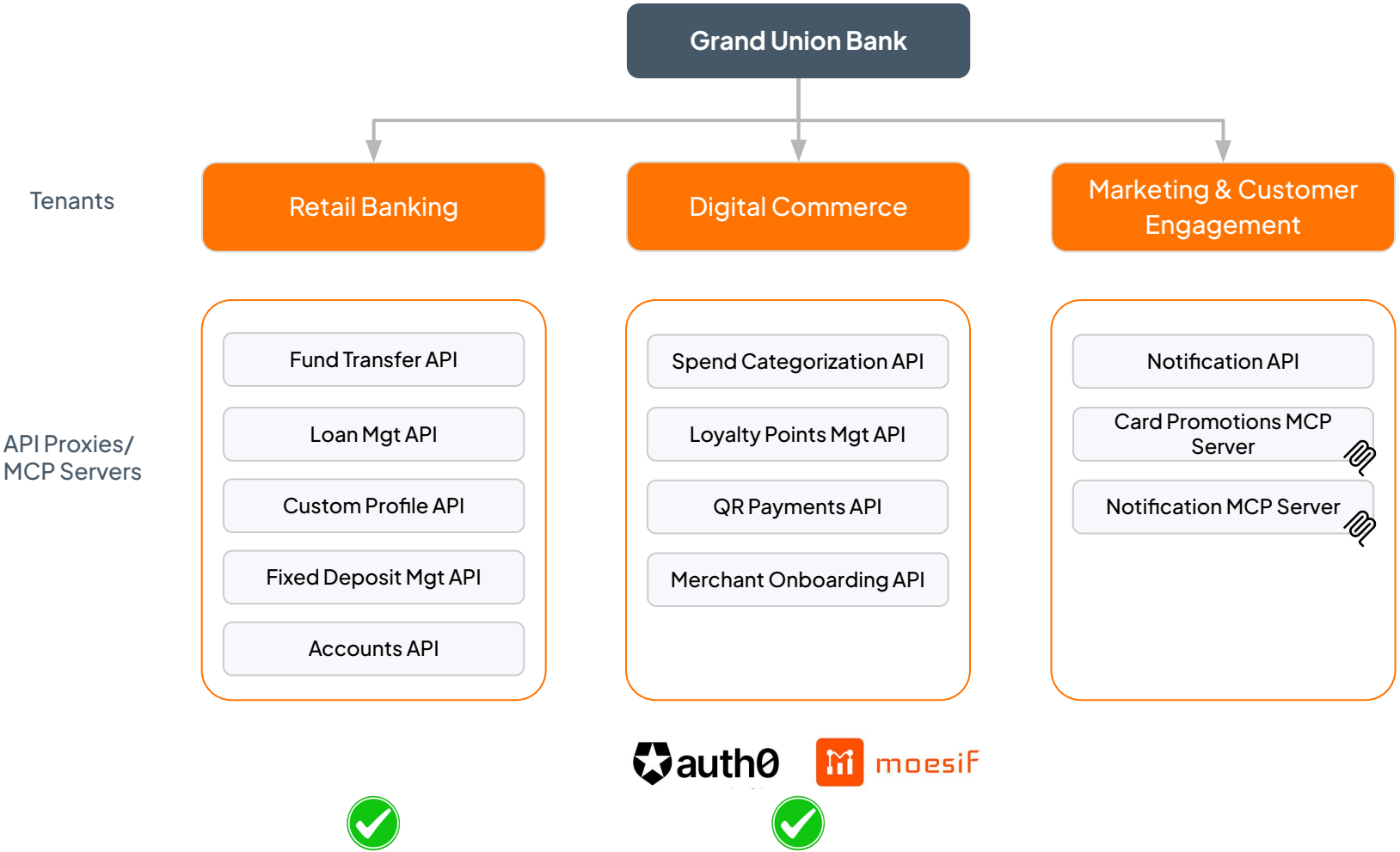
A curated and clutter-free marketplace within Bijira's developer portal, purpose-built for discovering MCP Servers.

- **Focused Experience:** Only MCP tools, no REST/GraphQL noise
- **Agent-Friendly Docs:** Clear capabilities, parameters & usage
- **Custom Theming:** Tailor the look & feel of your hub
- **Built-In Playground:** Try out MCP server functionality instantly





Demo #3


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Spend Categorization API
Loyalty Points Mgt API
QR Payments API
Merchant Onboarding API
Notification API
Card Promotions MCP Server
Notification MCP Server
auth0
moesif

Key Takeaways & Next Steps

Key Takeaways

- End-to-End API Management:
  - WSO2 API Manager covers the full API lifecycle—security, governance, monetization, analytics, and customization.
- Core Building Blocks of an Enterprise API Management Architecture:
  - Includes multi-tenancy, API lifecycle management, versioning, security, governance, traffic control, policy enforcement, and developer engagement.
- Flexible Deployment Patterns:
  - Supports hybrid, multi-cloud, and decentralized setups with separate control/data planes and multiple regions.
- AI Native API Management with Bijira:
  - Manage APIs and MCP servers with AI-driven design, governance, and agent-ready APIs via MCP.

Try WSO2's API Management Solutions Today!

- Run Anywhere
  - 🔗 WSO2 API Manager - https://wso2.com/api-manager



- WSO2 APIM SaaS - Bijira
  - 🔗 Sign Up & Explore Bijira – https://bijira.dev
  - 🔗 For more information – https://wso2.com/bijira



- Lab Session Materials
  - 🔗 https://github.com/wso2con/2025-cmb-apim-tutorial

Upcoming API Management Sessions

Upcoming API Management Sessions

- **Conference Day 1 (Tuesday, July 29th)**

Build and Govern APIs with AI in WSO2 API Manager →

Arshardh Ifthikar
Technical Lead, WSO2

Anusha Jayasundara
Senior Technical Lead, WSO2

Control Ingress and Egress Across Multiple API Gateways with WSO2 API Manager →

Malintha Amarasinghe
Senior Technical Lead, WSO2

Krishan Wijesena
Technical Lead, WSO2

Upcoming API Management Sessions

- **Conference Day 3 (Thursday, July 31st)**

WSO2 API Manager Roadmap and Vision →

Christopher Davey
Vice President & General Manager - APIM, WSO2

Bijira: API PaaS for the Cloud and AI-Native Era →

Pubudu Gunatilaka
Associate Director & Head of Architecture, APIM BU, WSO2

Managing APIs Across Federated Gateways →

Thilini Shanika
Associate Director and Head of Engineering, APIM BU, WSO2

What You Can Do with the AI Gateway →

Arshardh Ifthikar
Technical Lead, WSO2

Modern Enterprise Architecture with APIs →

Vidura Gamini Abhaya
Vice President, Solutions Architecture, WSO2

Customer Panel: Journeys in Enterprise Modernization Through API Management →

Question Time!




Thank you!
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PLATFORMLESS MODERNIZATION