Integration as Code

Mifan Careem
VP - Solutions Architecture, WSO2

- Mifan Careem, Vice President of Solution Architecture @ WSO2
- Oversees Solution Architecture and customer facing technical interactions at WSO2
- Has worked with 200+ customers in API Strategy, Integration strategy and API led digital transformation initiatives

WSO2 API-Led Integration Platform

Open Source API Management, Integration, Identity

Start with API management...

Complement APIs with integration, security and analytics to connect apps and data.

API MANAGER

API design, creation, reuse, governance, and analytics

20K APIs for 200K orgs

- API analytics
- API designer
- API gateway
- API microgateway
- API publisher
- API storefront/marketplace
- API repository/registry
- API Analytics

ENTERPRISE INTEGRATOR

Quick, iterative integration of any app, data, or system

6 trillion transactions / yr

- ESB
- Integration designer
- Message broker
- Workflows
- Business rules
- Streaming engine
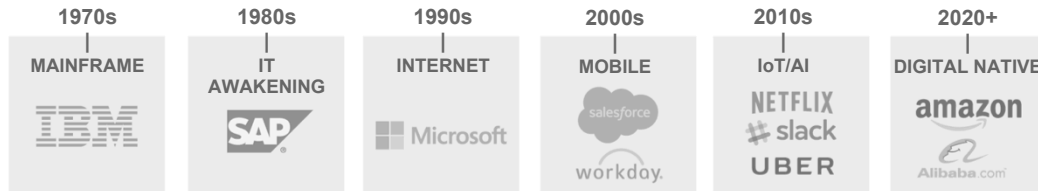- Stream processing
- Integration analytics

IDENTITY SERVER

Secure and federated identity For APIs and integration

60M identities managed

- Identity management
- Identity federation / SSO
- Identity bridging
- API and microservices security
- Strong and adaptive Auth
- Access control
- Privacy control
- IAM and security analytics
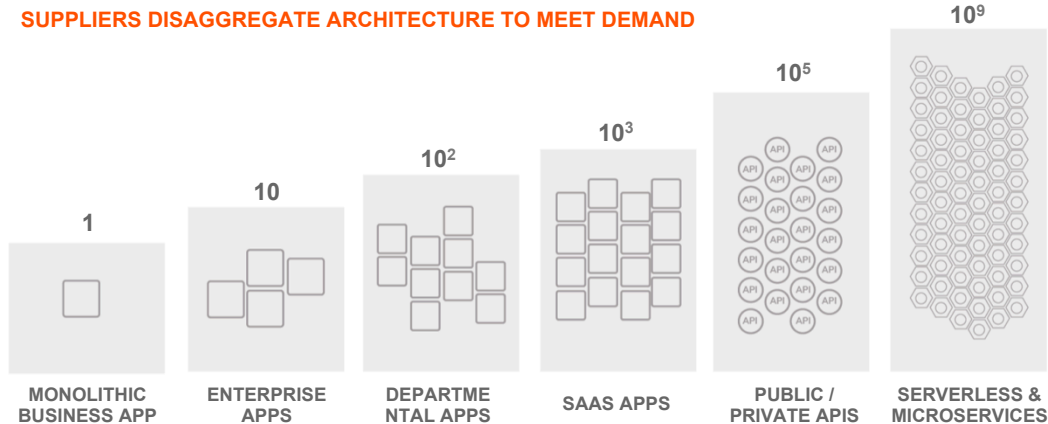
From Integration Imperative to Exploding Endpoints

Disaggregated architectures drive 50 billion endpoints, growing >1 trillion

1970s	1980s	1990s	2000s	2010s	2020+
MAINFRAME	IT AWAKENING	INTERNET	MOBILE	IoT/AI	DIGITAL NATIVE
IBM	SAP	Microsoft	salesforce / workday	NETFLIX / slack / UBER	amazon / Alibaba.com

CONSUMER DEMAND

Scale and agility are pushing app disaggregation...

SUPPLIERS DISAGGREGATE ARCHITECTURE TO MEET DEMAND

10^9

10^5

10^3

10^2

10

1

...that makes hybrid integration the unspoken challenge of all cloud services

MONOLITHIC BUSINESS APP	ENTERPRISE APPS	DEPARTMENTAL APPS	SAAS APPS	PUBLIC / PRIVATE APIS	SERVERLESS & MICROSERVICES

Disaggregation leads to more endpoints

Everything is An Endpoint

- Functions
- APIs
- Data
- SaaS
- Legacy
- Devices

PROGRAMMABLE ENDPOINTS

10^9					
10^8					
10^7					
10^6					
10^5					
10^4					
10^3					
10^2					
10	MONOLITHIC BUSINESS APP	ENTERPRISE APPS	DEPARTMENTAL APPS	SAAS APPS	PUBLIC / PRIVATE APIS	SERVERLESS AND MICROSERVICES

| 1970s | 1980s | 1990s | 2000s | 2010s | 2020+ |

DECADES
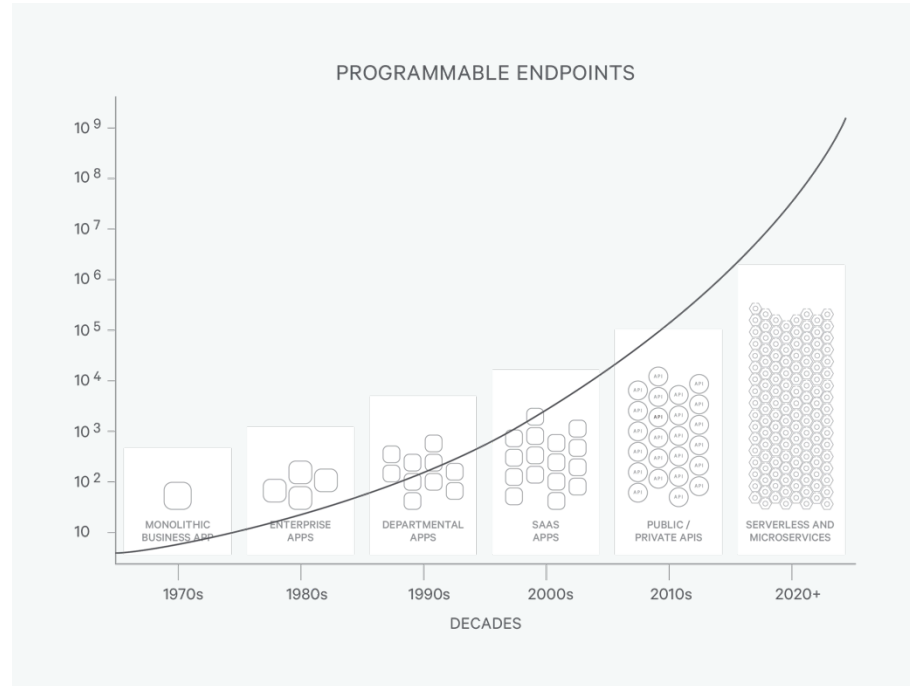
Integration in an increasingly disaggregated world

ENDPOINT

ENDPOINT

ENDPOINT

CLOUD NATIVE APPS

ENDPOINT

ENDPOINT

ENDPOINT

Transactions
Circuit Breaking
Protocols
Payloads
Events
Security
Workflow
Streams
Compensation
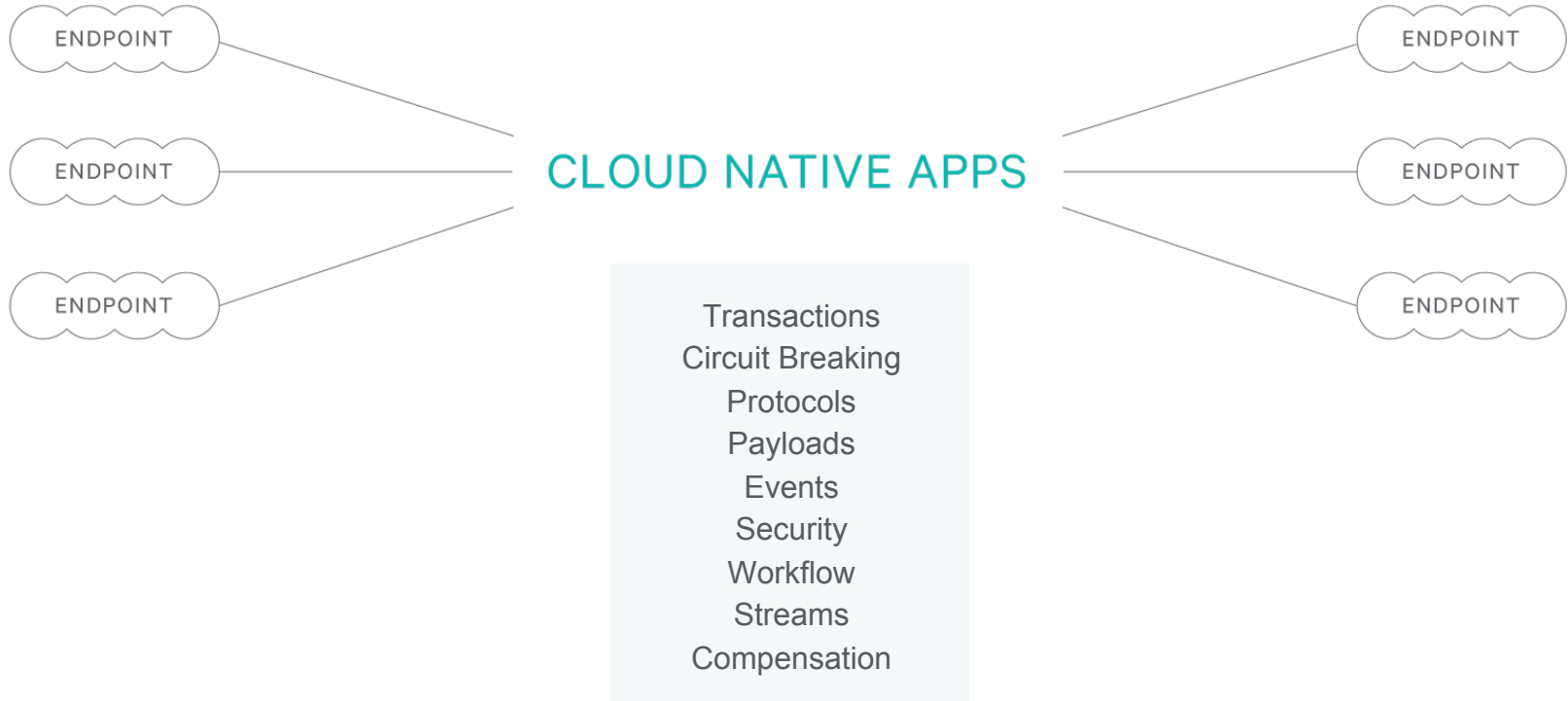
INTEGRATION
PRODUCTS

ESB, BPMN, EAI

NOT AGILE

The
Integration
Gap

GENERAL PURPOSE
PROGRAMING LANGUAGES

Java / Spring
JavaScript / Node

NOT INTEGRATION SIMPLE

Through 2020, integration work will account for **50% of the time and cost** of building a digital platform.

Use a Hybrid Integration Approach for Digital Transformation

Smarter With **Gartner**

50% of software development will be integration

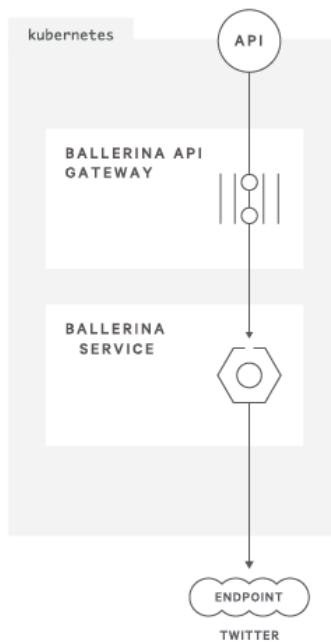# Ballerina
Cloud Native Programming Language

```
@kubernetes:Deployment{
  image: "corp/microsocial",
}

@apiGateway:{
  security: "OAuth",
  transactionPerSec: 15
}

service<http> myService {

  @http:ResourceConfig {
    methods: ["POST"]
  }
  resource(caller, request) {

    endpoint twitter:client t {};
    transaction {
      t -> tweet( ... );
      caller -> respond( ... );
    }
  }
}
```
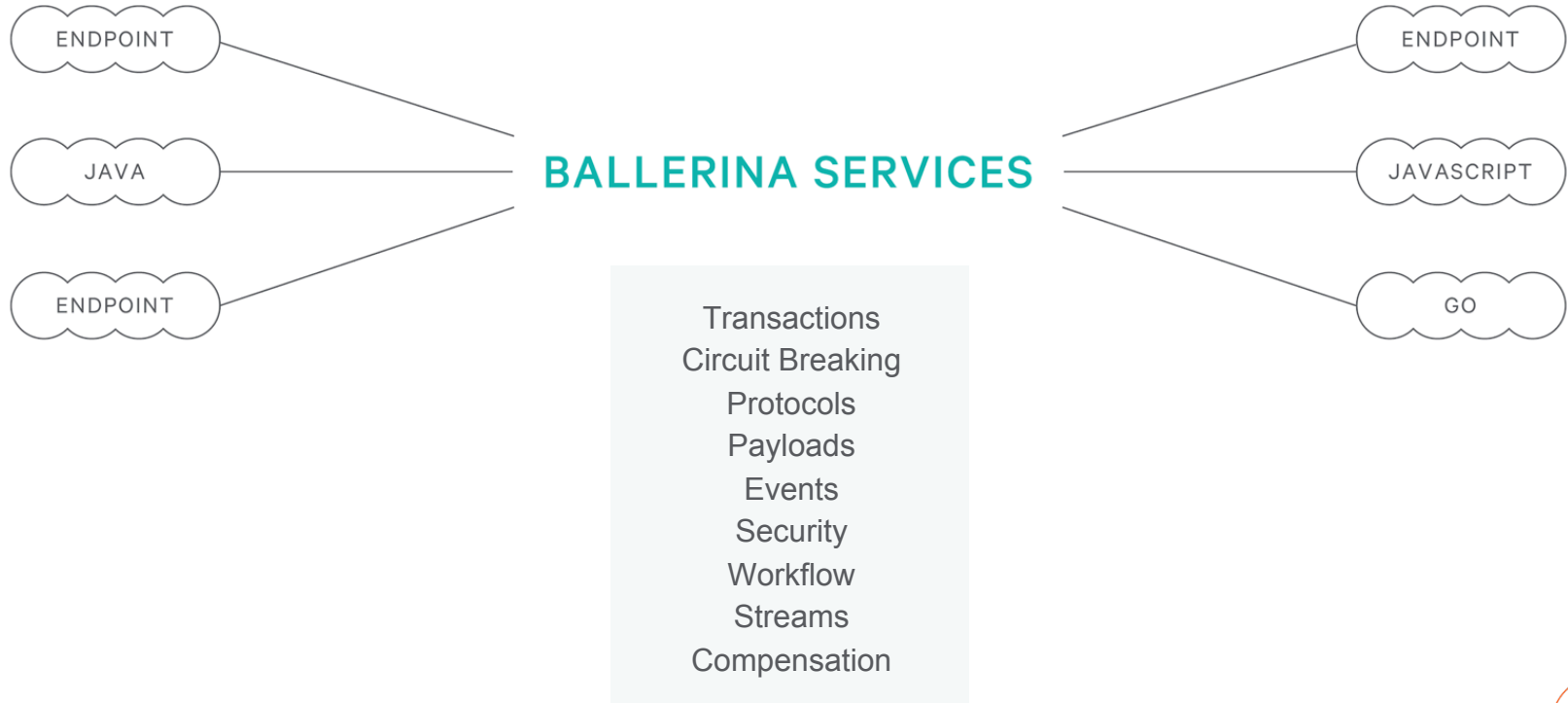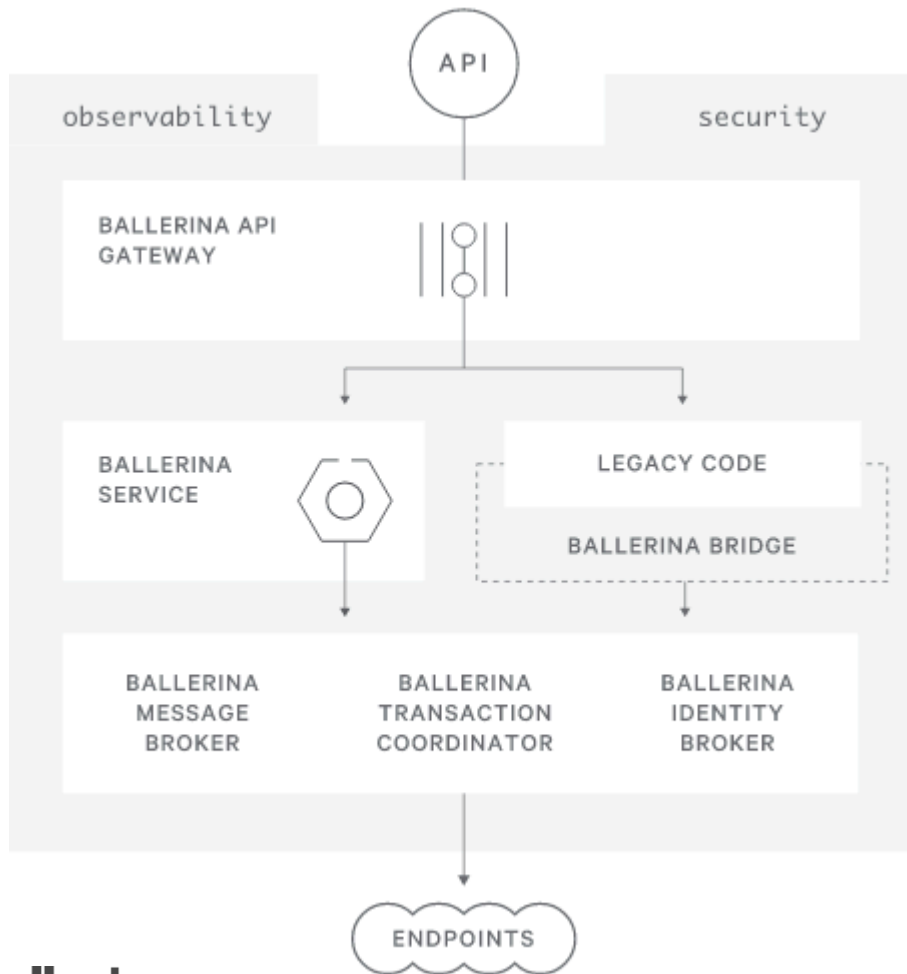
kubernetes

API

BALLERINA API
GATEWAY

BALLERINA
SERVICE

ENDPOINT

TWITTER

AGILE
INTEGRATION SIMPLE

Ballerina is a compiled, type safe, Turing-complete, concurrent programming language.

Ballerina

Ballerina is the glue between microservices

ENDPOINT

JAVA

ENDPOINT

BALLERINA SERVICES

ENDPOINT

JAVASCRIPT

GO

Transactions
Circuit Breaking
Protocols
Payloads
Events
Security
Workflow
Streams
Compensation

Ecosystem extensions for disaggregated architecture

Kubernetes	Jaeger
Docker	Prometheus
etcd	OAuth2 / OIDC
Istio / Envoy	
LinkerD	RabbitMQ
Consul	AMQP
	Swagger/OpenAPI
MySQL	gRPC / Protobuf
Postgres	WebSub
Cassandra	
	Spring/Java
Visual Studio Code	
Intellij IDEA	

Ballerina bridges the Integration Gap

Discover at ballerina.io

Agile

Edit / Build / Run	Module management
Language server	Ballerina Central
IDE plugins	Type safety
Projects	Union types
Docker and K8S	Flow control
Debugger	Observability
Testerina: unit tests	CI/CD
Doc generation	Table, vector, map
CLI extensions	Struct
Dev tracing	Lambda
I/O	Tasks, scheduling
Projects	Dependency mgmt

Integration Simple

Services	Transformations
Endpoints	JSON primitive
Resources	Annotations
Connectors	Circuit breaker
->	Async
Workers, fork/join	gRPC
Message broker	Protobuf
Versioning	XML type
Bridge	Streams
Swagger	CSV
Databases	Session mgmt

Composites for the enterprise
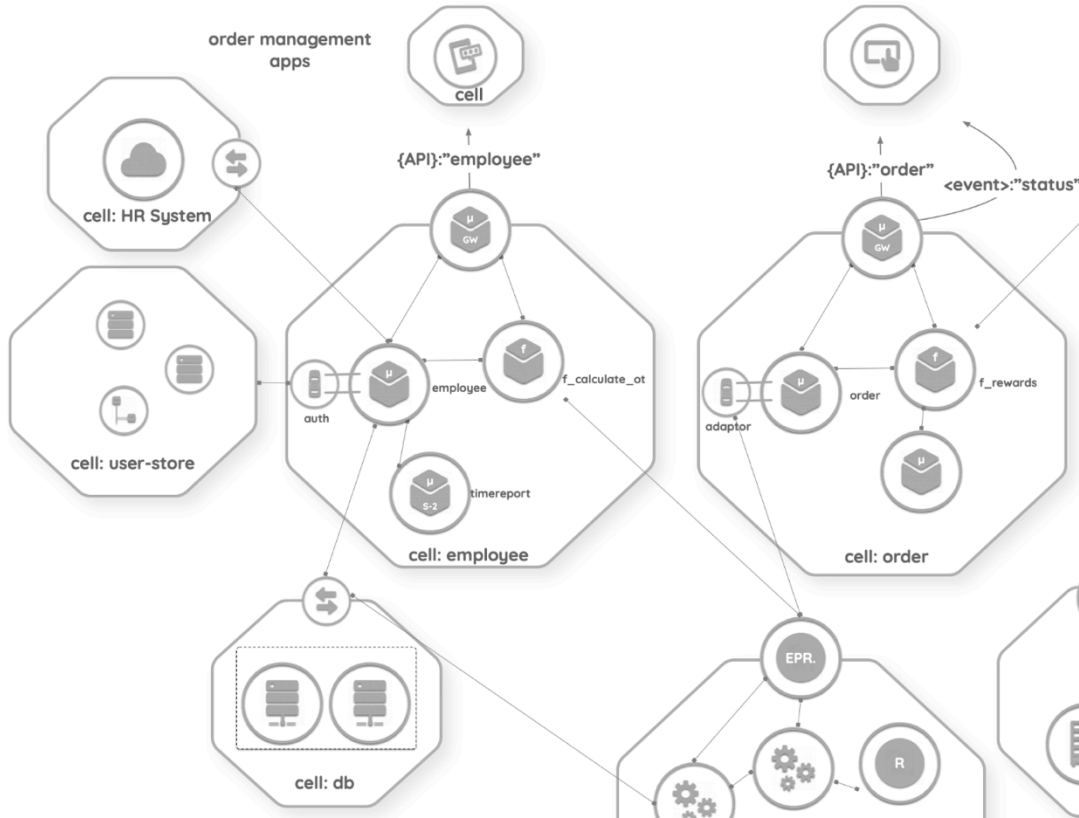
How to get involved

Learn more → http://ballerina.io

Open source → http://github.com/ballerina-platform/

Get support → Stack Overflow #ballerina tag

Learn about the company → http://wso2.com/
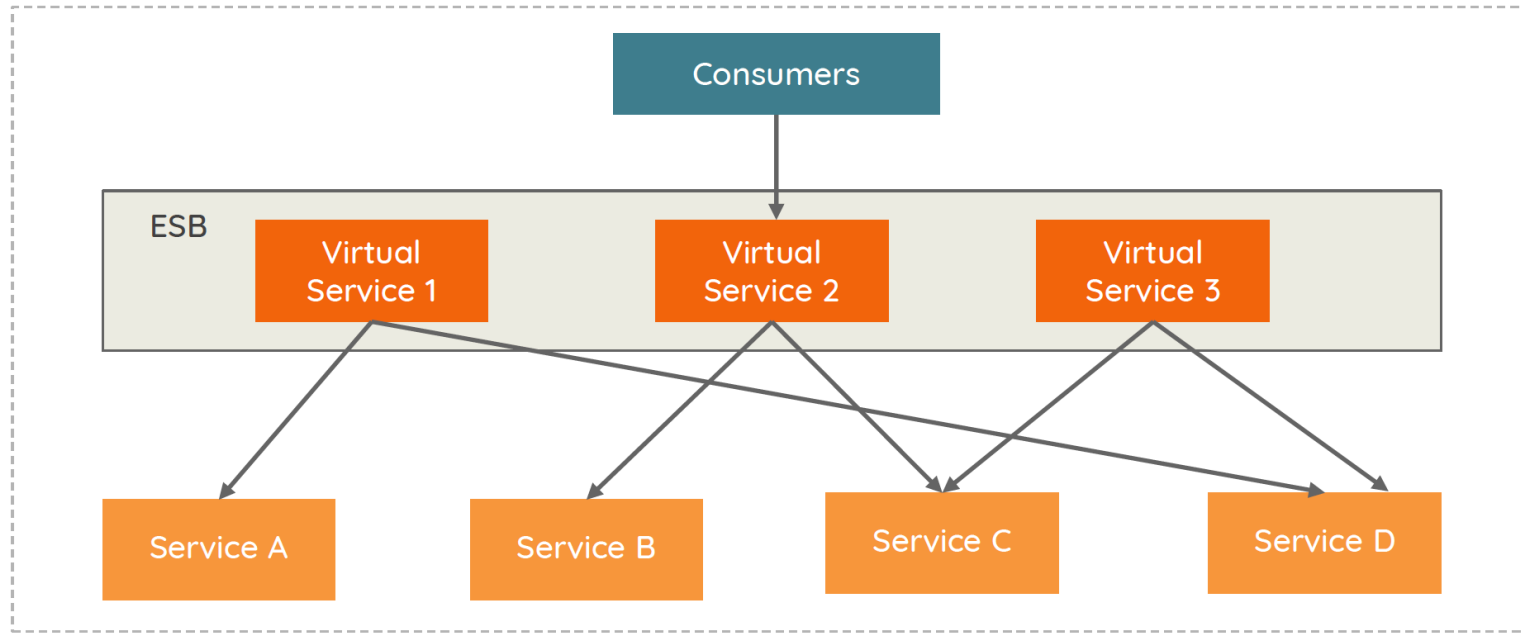
Ballerina

From ESBs to Smart Endpoints and Dumb Pipes

Microservices architectures promotes the elimination of a central ESB in places of smart endpoints connected by dumb pipes

ESB as the central integration bus

- Centralized ESB layer provides integration and network communications along with governance

Smart endpoints and dumb pipes

- Microservices code has to take care of network communications and governance of services