

# Innovative Foundation For an Open Source API Management Platform

Asanka Abeysinghe  
@asankama



# APIs ?



Photo credit : <http://blogs.ukoln.ac.uk/good-apis-jisc/>





# Business APIs

**An API** is a business capability delivered over the Internet to internal or external consumers

Network accessible function

Available using standard web protocols

With well-defined interfaces

Designed for access by third-parties

**A Managed API** is:

Actively advertised and subscribe-able

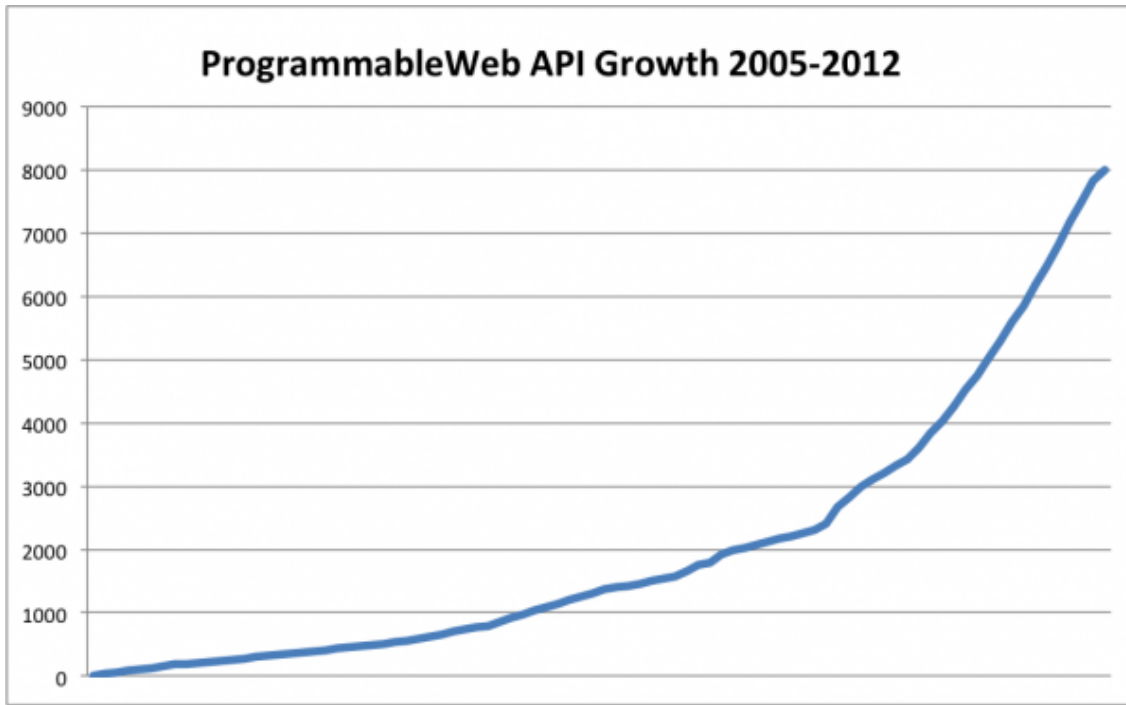
Available with SLAs

Secured, authenticated, authorized and protected

Monitored and monetized with analytics



# Growth which can't be ignored

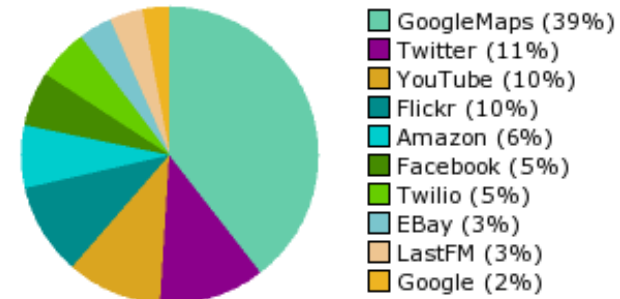


### Top APIs for Mashups

Last 14 days

See all time

Click on a slice or label to see details



ProgrammableWeb.com 05/02/12

# The API billionaires



More than 15 billion calls per day, 75% through APIs



More than 1 billion calls per day



More than 5 billion calls per day

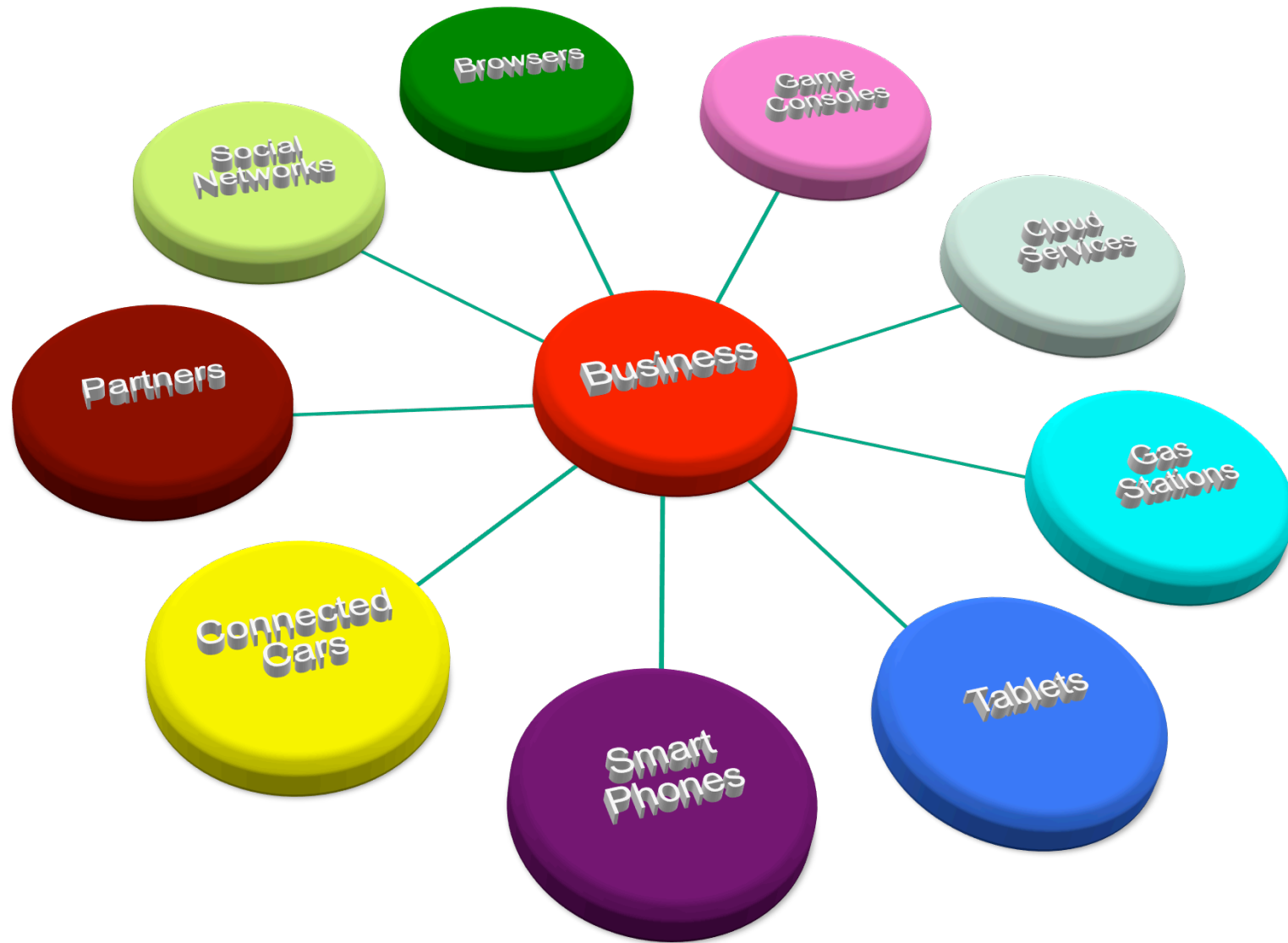


More than 260 billion objects stored in S3



More than 3.1 billion transactions per day

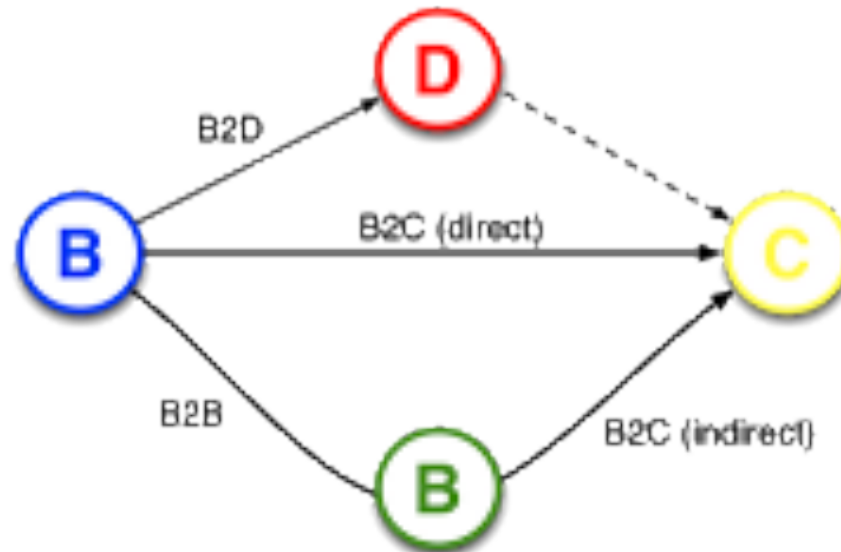
# APIs and Business Consumers





# APIs Create a New Relationship

# B2D



# API Usage

External

Public API

Private API

Internal

Public API

Private API

# Demand for APIs



Picture Credit : <http://www.newscientist.com/blogs/onepercent/2012/01/letting-gamers-experience-the.html>



# Demand for APIs – cont..

RESTful

JSON

OAuth

WEB API Design

# Business Services

## - Heterogeneous

- Styles
  - SOAP
  - RESTful
- Bindings
  - SOAP/HTTP/s
  - POX/HTTP/s
  - POX/JMS
  - JSON/HTTP/s
  - File {CSV, EDA, COBOL}
- Development languages {Java, WCF, PHP, C/C++, JavaScript}
- Functionality {Focused on internal service consumers/ applications}
- Silos, owned by various BUs, no control



# API Façade Pattern

External Format (Demand)

Façade

Mediation

Backend Services





# API Ecosystem Model

**From SOA lessons learned, best practices roles**

## •API Creator

- Builds, manages, and versions API
- Understand business and technical requirements
- Cares about usage and scaling
- Seeks feedback, ratings, usage

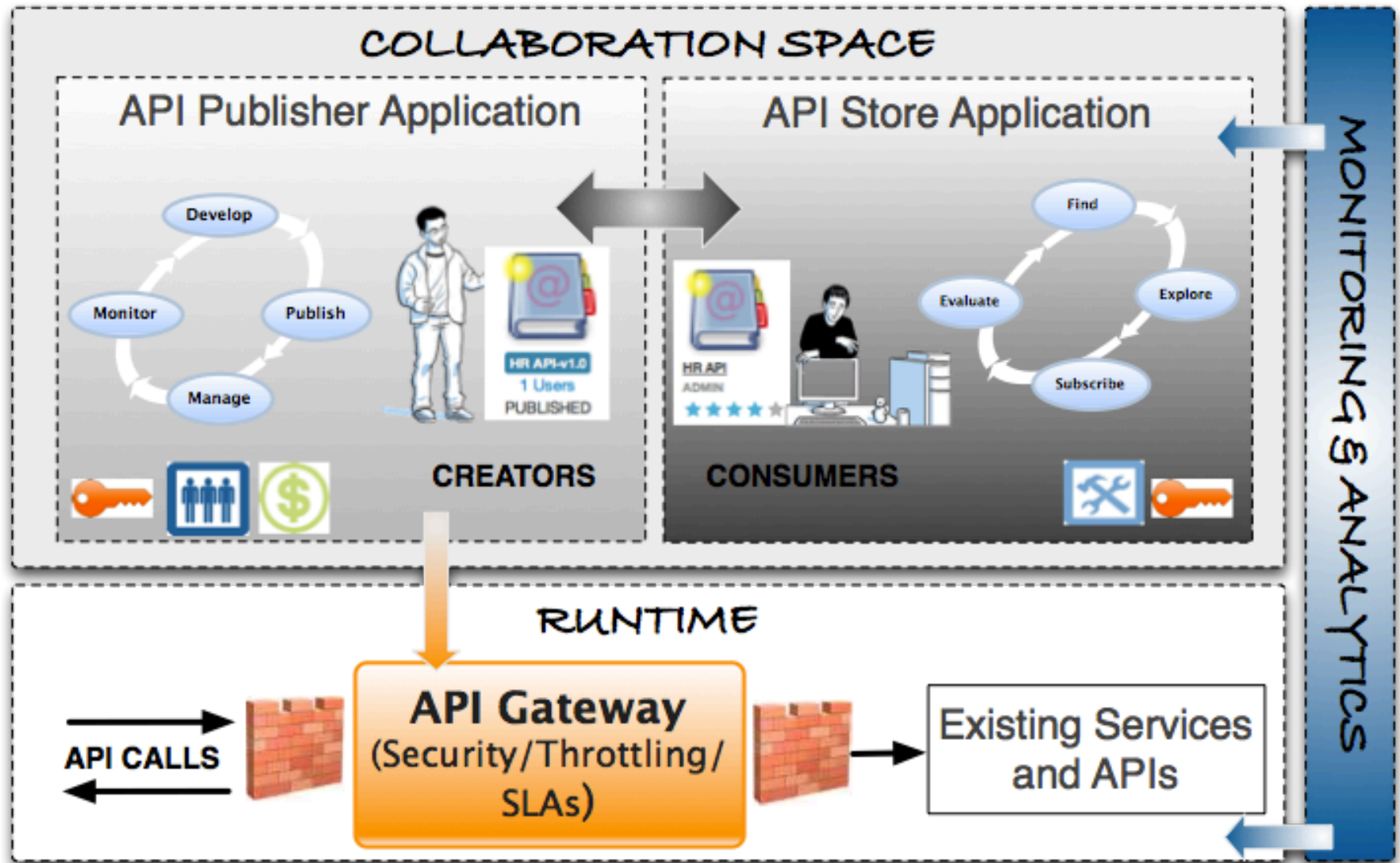
## •API Publisher

- Publishes, Promotes and encourages consumers to adopt APIs
- Determines usage patterns and how to best monetize asset
- Monitors and secures

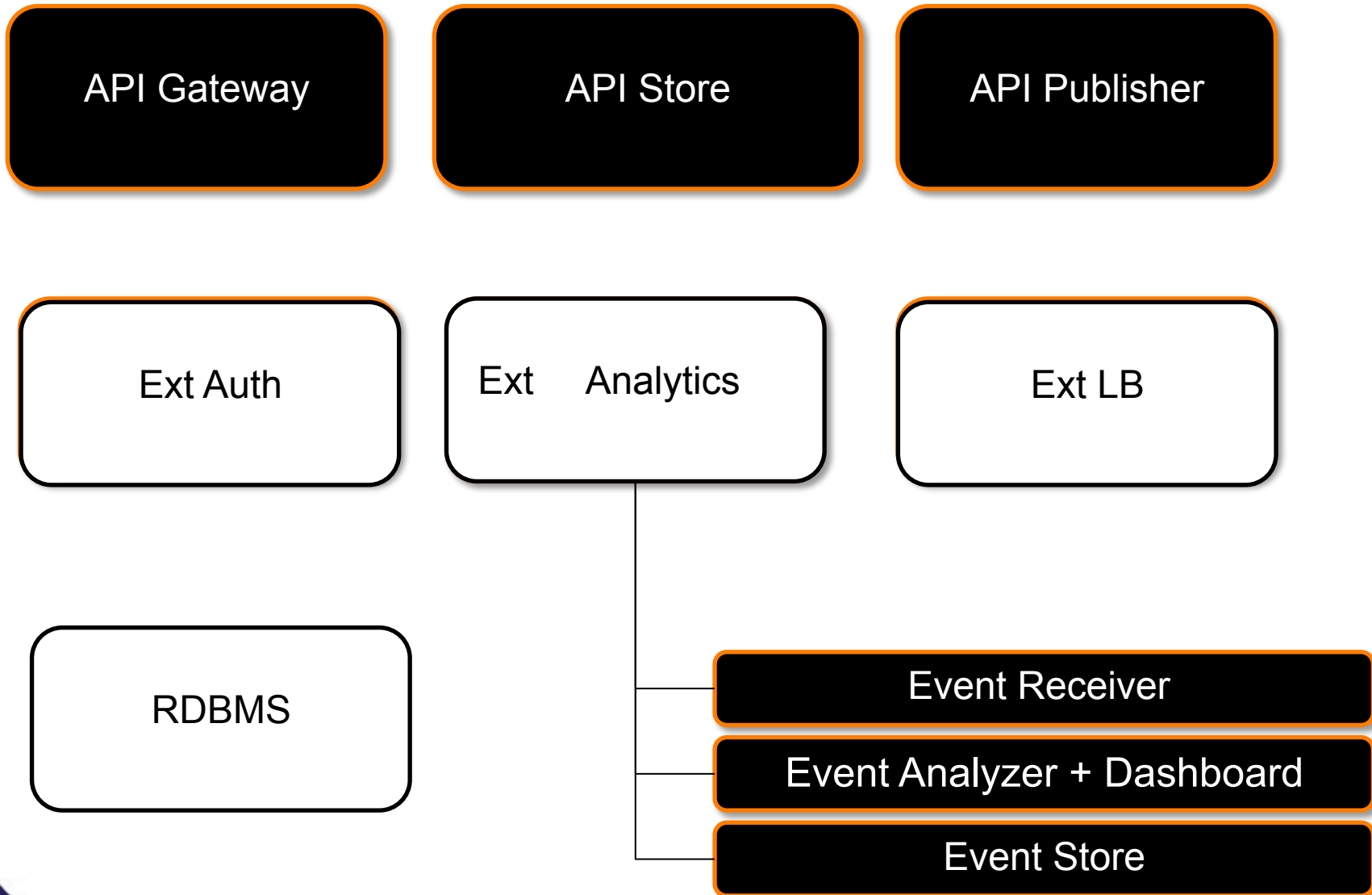
## •API Consumer

- Understands the interface definition
- Subscribes and connects application to API
- Monitors own usage and cost basis
- Provides feedback and ratings

# API Manager Components



# Component Architecture





# Apache Family

API Gateway



ELB



API Auth Server



Event Receiver

Apache Thrift™

API Store

API Publisher

Event Analyzer



Event Store



# Apache Modules and Carbon

OSGify



# APIs in Action

WSO2 API Manager

API Publisher



Create



Publish



API Subscriber



Subscribe

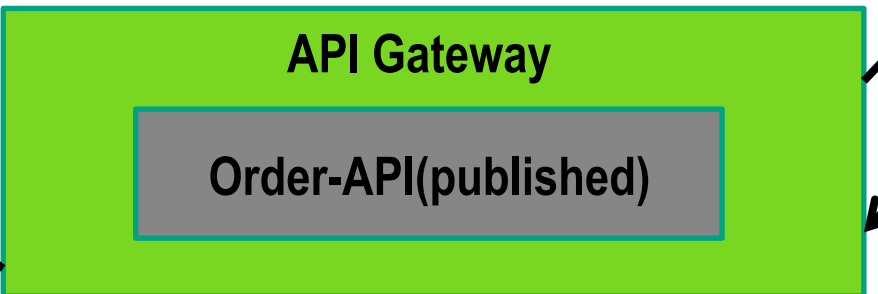
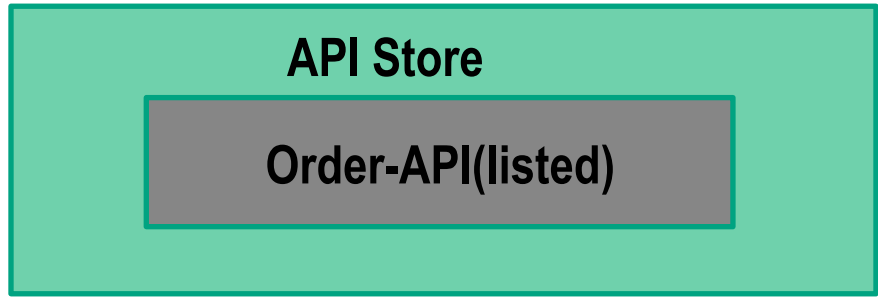
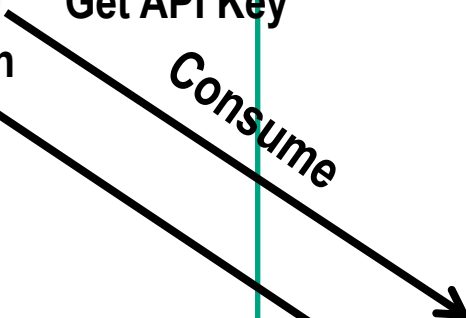


Get API Key



Application

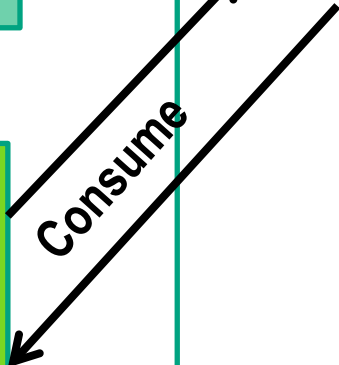
Consume



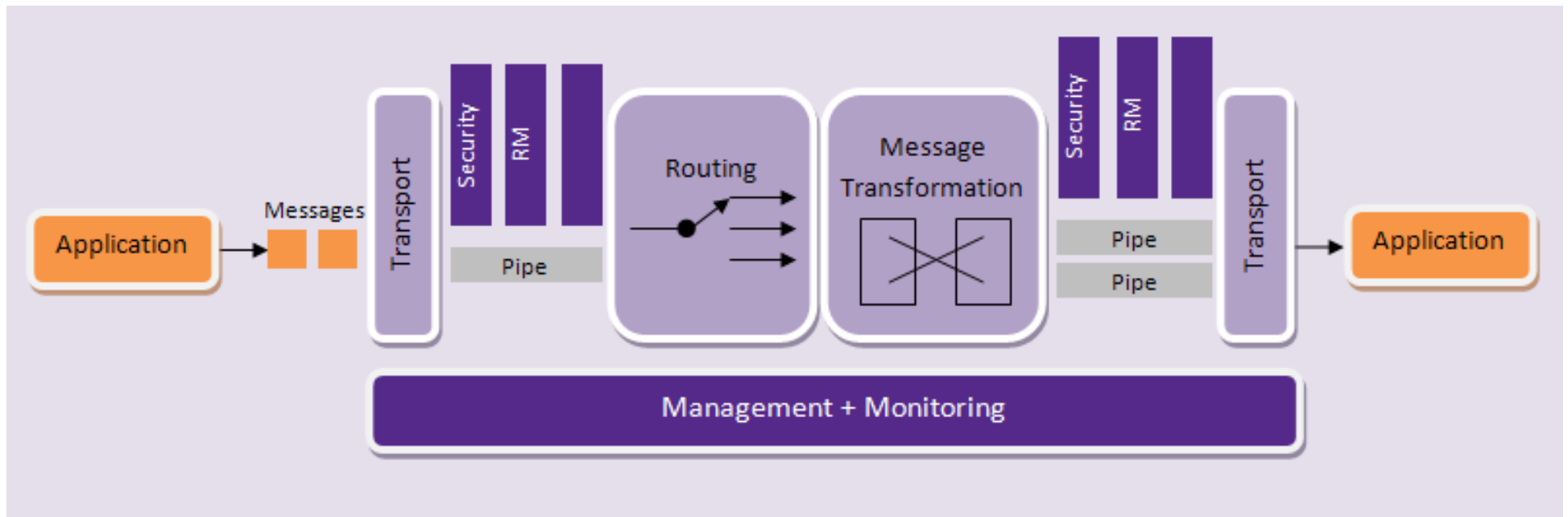
Order Service



Consume

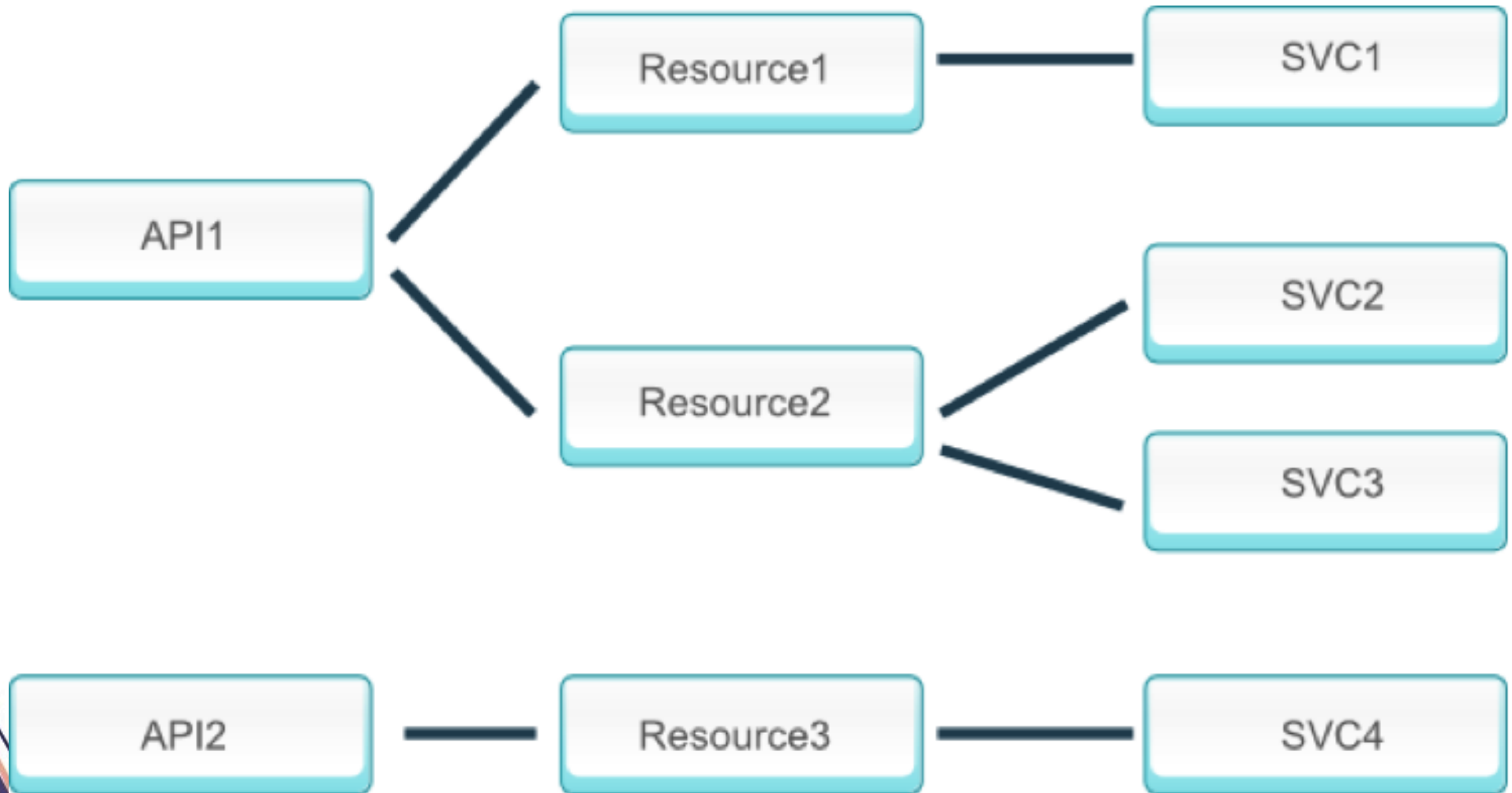


# Synapse Runtime



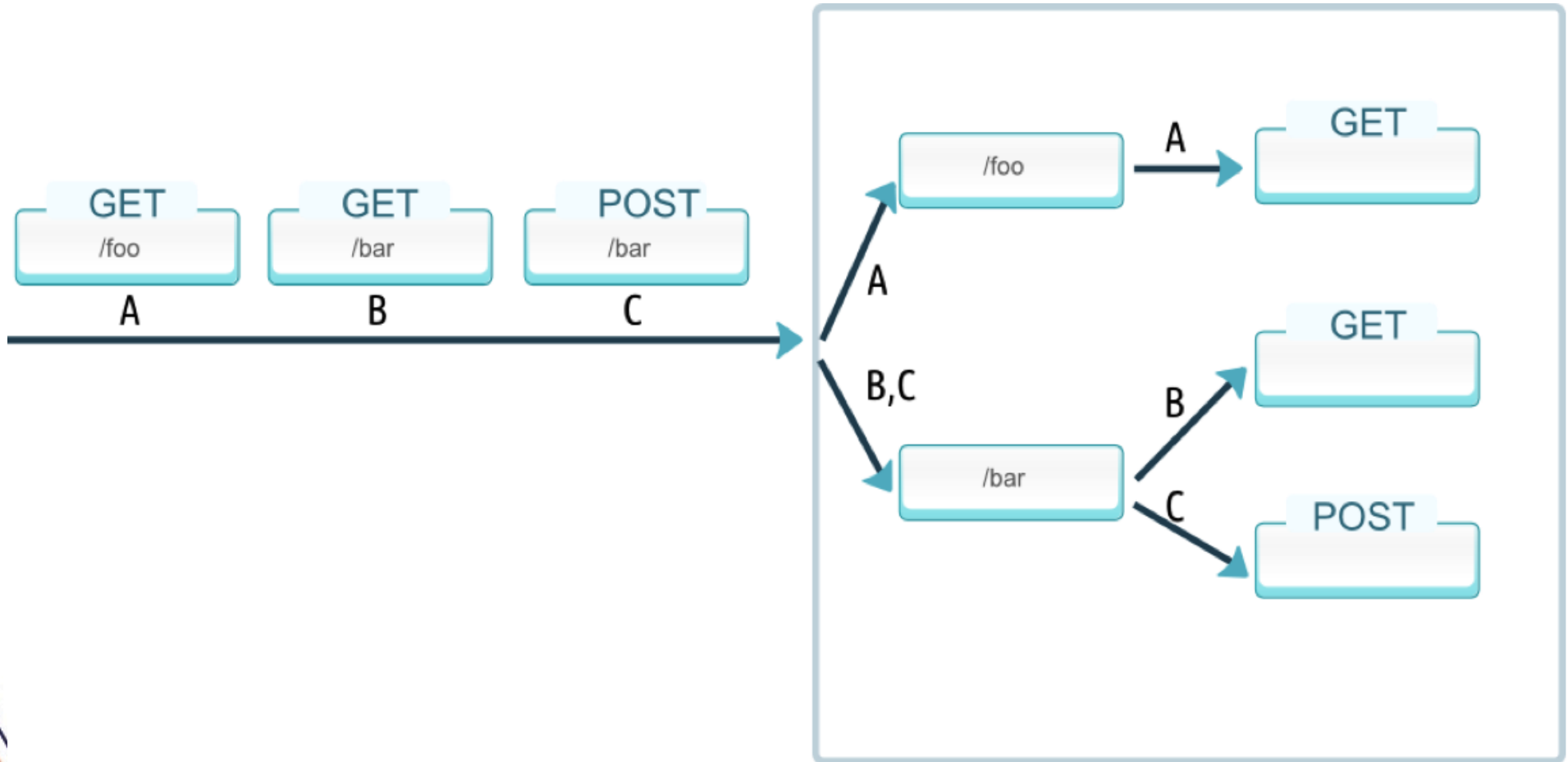


# APIs and Resources



**URI = Schema://host:port/authority/path[?query]**  
e.g. **http://localhost:8280/trade/1.0.0/order/{orderId}**

# APIs Map to HTTP Methods



# Sample Configuration

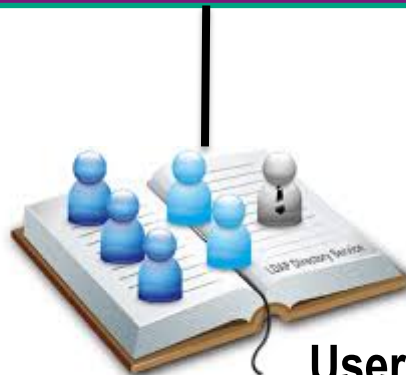
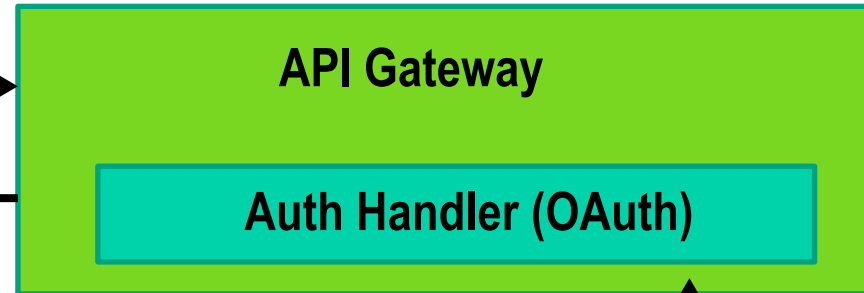
```
<api xmlns="http://ws.apache.org/ns/synapse" name="provider1--TwitterSearch:v1.0.0" context="/twitter">
  <resource methods="POST" url-mapping="/*">
    <inSequence>
      <property name="POST_TO_URI" value="true" scope="axis2"/>
      <filter source="$ctx:AM_KEY_TYPE" regex="PRODUCTION">
        <then>
          <send>
            <endpoint name="provider1--TwitterSearch_APIEndpoint_0">
              <address uri="http://search.twitter.com">
                <timeout>
                  <duration>30000</duration>
                  <responseAction>fault</responseAction>
                </timeout>
                <suspendOnFailure>
                  <errorCodes>-1</errorCodes>
                  <initialDuration>0</initialDuration>
                  <progressionFactor>1.0</progressionFactor>
                  <maximumDuration>0</maximumDuration>
                </suspendOnFailure>
                <markForSuspension>
                  <errorCodes>-1</errorCodes>
                </markForSuspension>
              </address>
            </endpoint>
          </send>
        </then>
        <else>
          <sequence key="_sandbox_key_error_"/>
        </else>
      </filter>
    </inSequence>
    <outSequence>
      <send/>
    </outSequence>
  </resource>
</api>
```

# APIs in Action - OAuth

API Subscriber



Application



User Store



# OAuth-2.0

## Keys

Consumer Key

Consumer Secret

Access Token

## Profiles

OAuth Core Specification

Bearer Token Profile

JSON Web Token (JWT) Bearer Profile

SAML2.0 Bearer Assertion Profile

# CMD \$:.....

```
step01: ~$ curl -v -d "grant_type=password" -d "client_id=S_F1eLxAqn0f28wLSwQGpgAX96Ea" -d "client_secret=R2urcSu35gYBbofh0HJ3BatHFloa" -d "username=subscriber" -d "password=subSubscriber@1" -X POST http://localhost:8280/login
```

**HTTP/1.1 200 OK**

**Content-Type: application/json;charset=UTF-8**

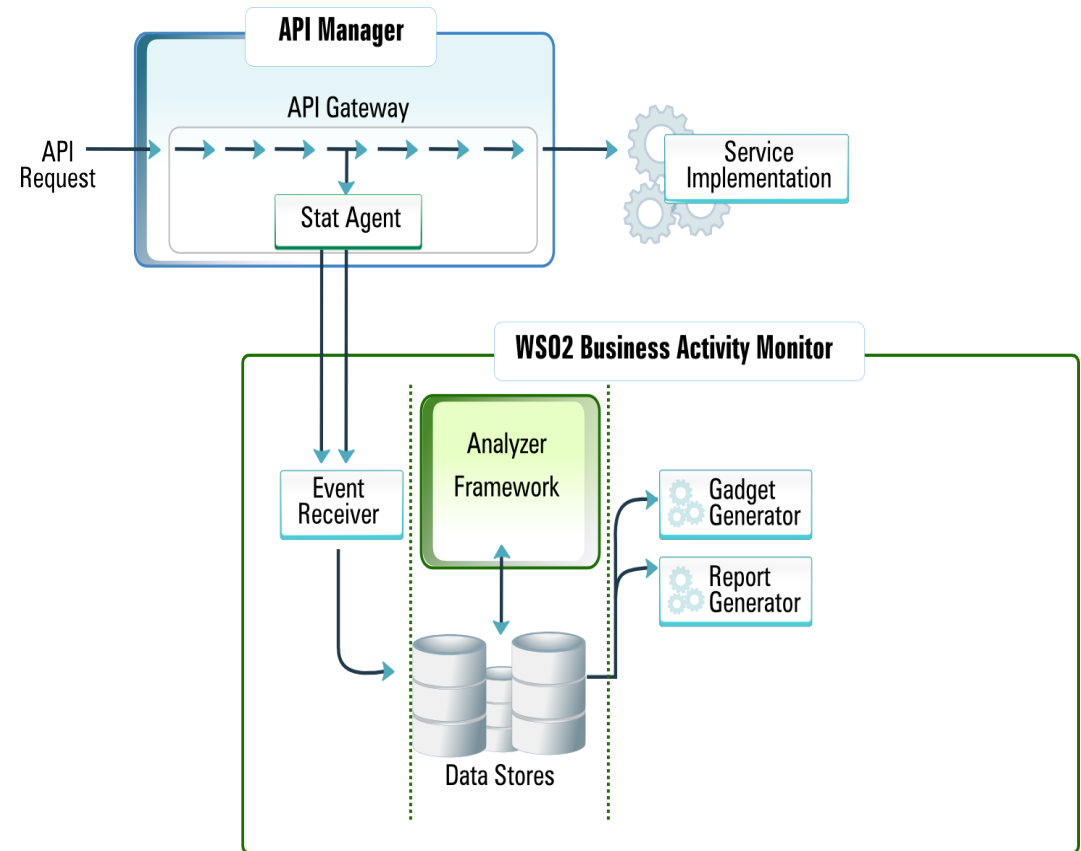
**Cache-Control: no-store**

**Pragma: no-cache**

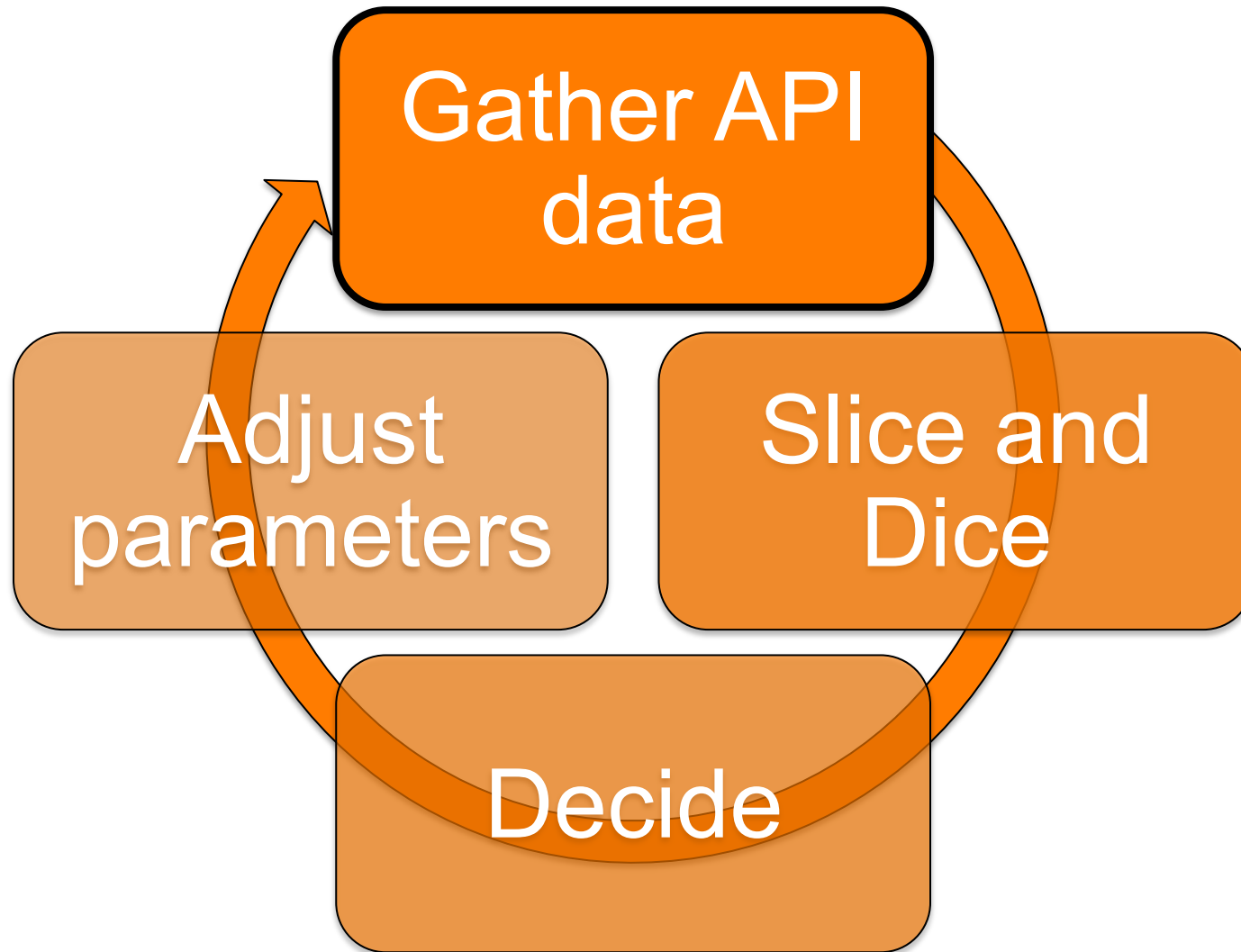
```
{
  "access_token": "mF_9.B5f-4.1JqM",
  "token_type": "Bearer",
  "expires_in": 3600,
  "refresh_token": "tGzv3JOkFOXG5Qx2TlKWIA"
}
```

```
curl -v -H "Authorization: Bearer 572bb3c42f95568575293f6794cd2dcc" -X GET http://localhost:8280/order/1.0.0/order
```

# Data to Scale : API Statistics



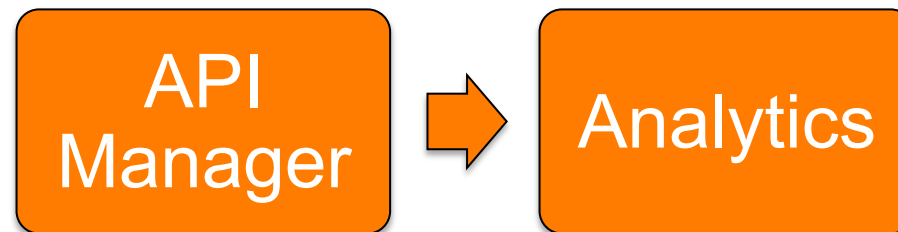
# The Feedback Cycle





# Gathering API data

- What if you want custom data off of API requests?
- Plug-in a monitoring extension – mediator
- Net total of each order – total=259

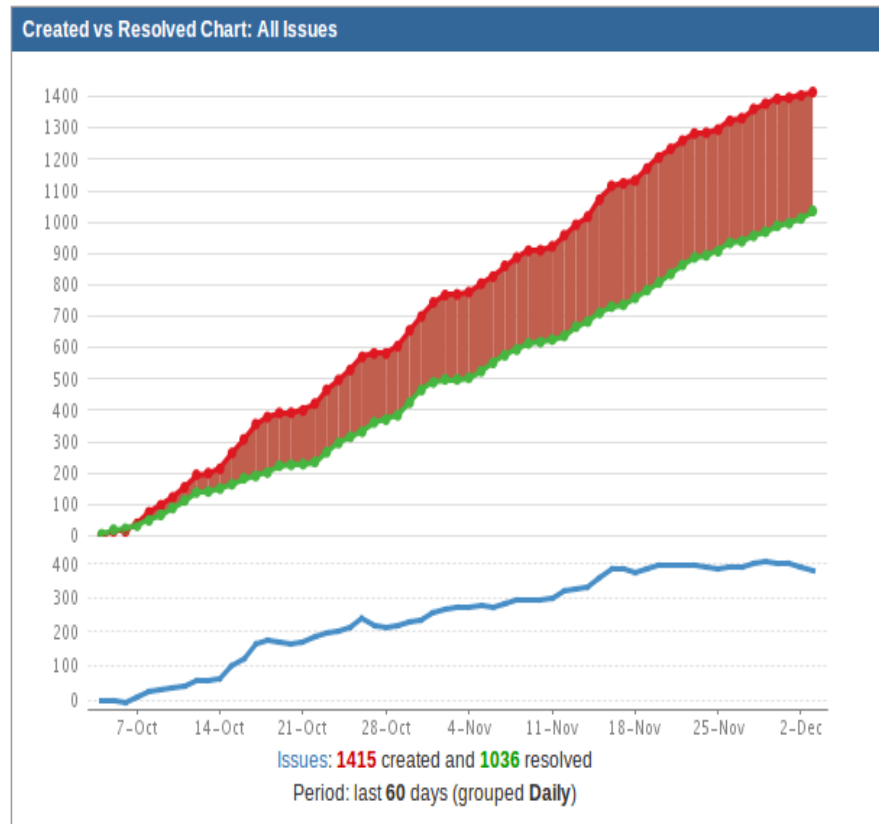


# Slice and Dice

- Customers who have placed orders above 2 mil USD
- Select customer\_name, sum(order\_amount) from Orders groupby customer\_name

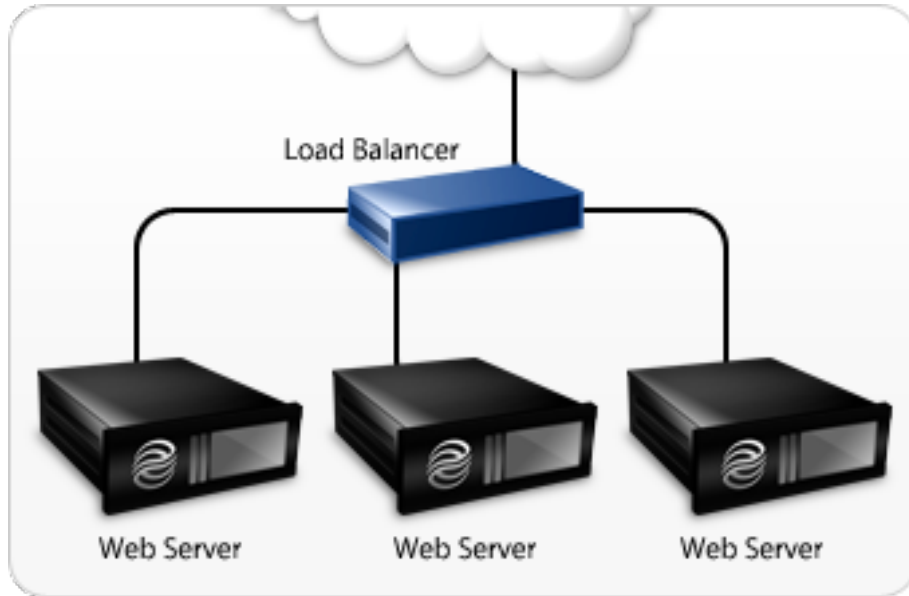
Customer_name	Sum(order_amount)
Coyote	2,332,223
Acme	10,654,333

# Decide



- Check for trends
- Compare past results
- Get help with Reporting & Dashboards

# Adjust Parameters

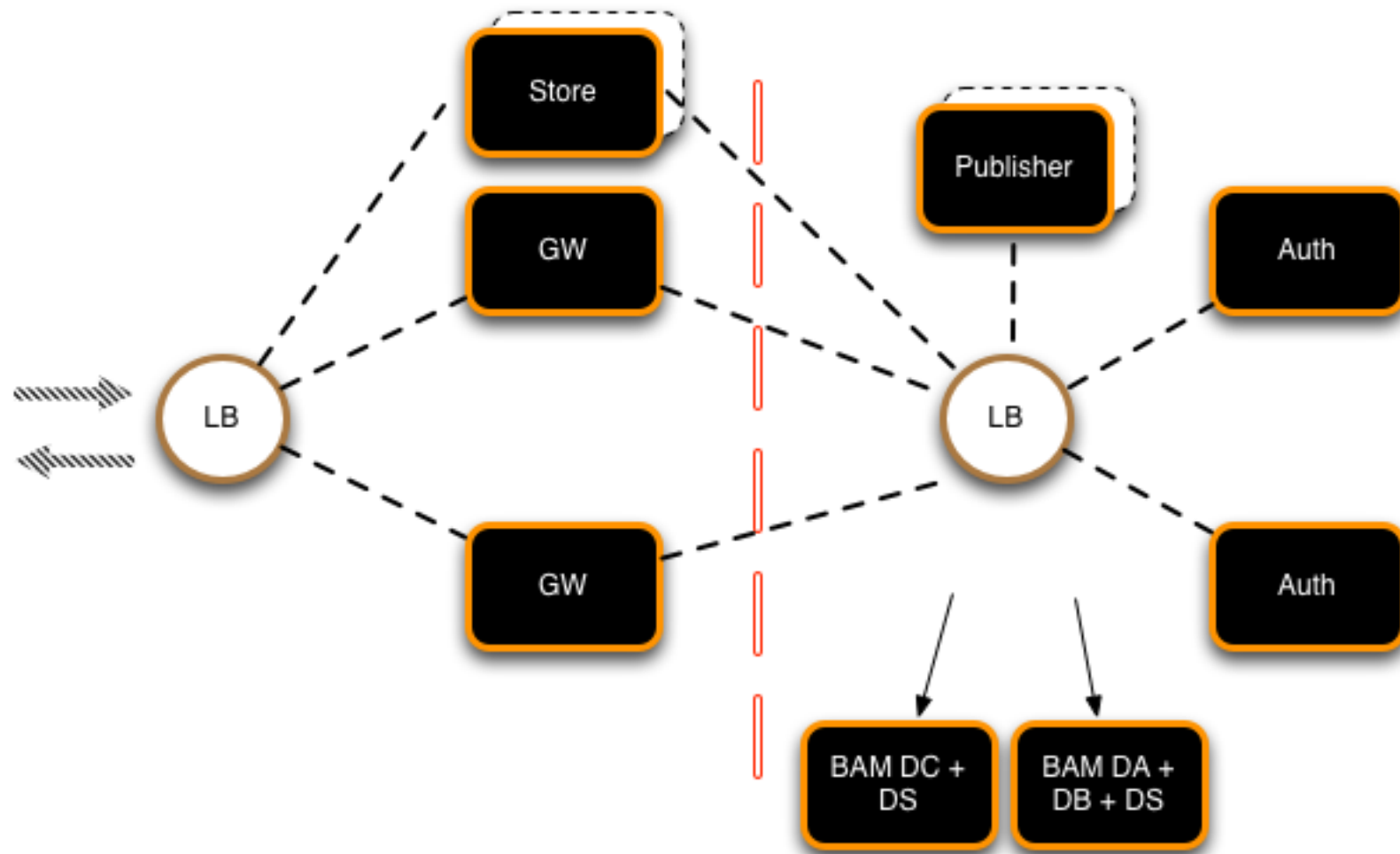


EXAMPLE OF A LOAD BALANCED HOSTING ENVIRONMENT

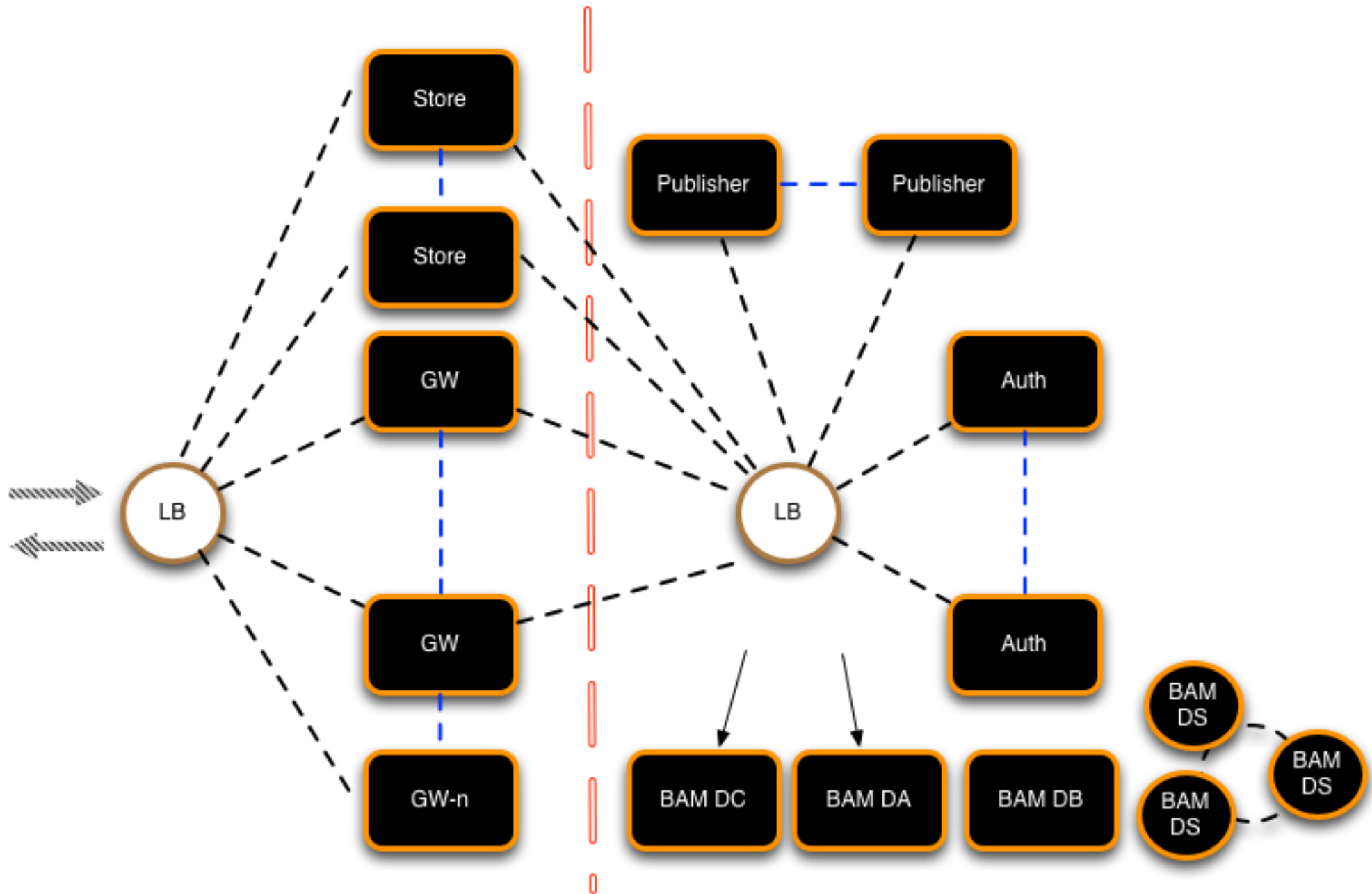
- Increase server capacity
- Increase redundancy
- Retire APIs
- Introduce new versions



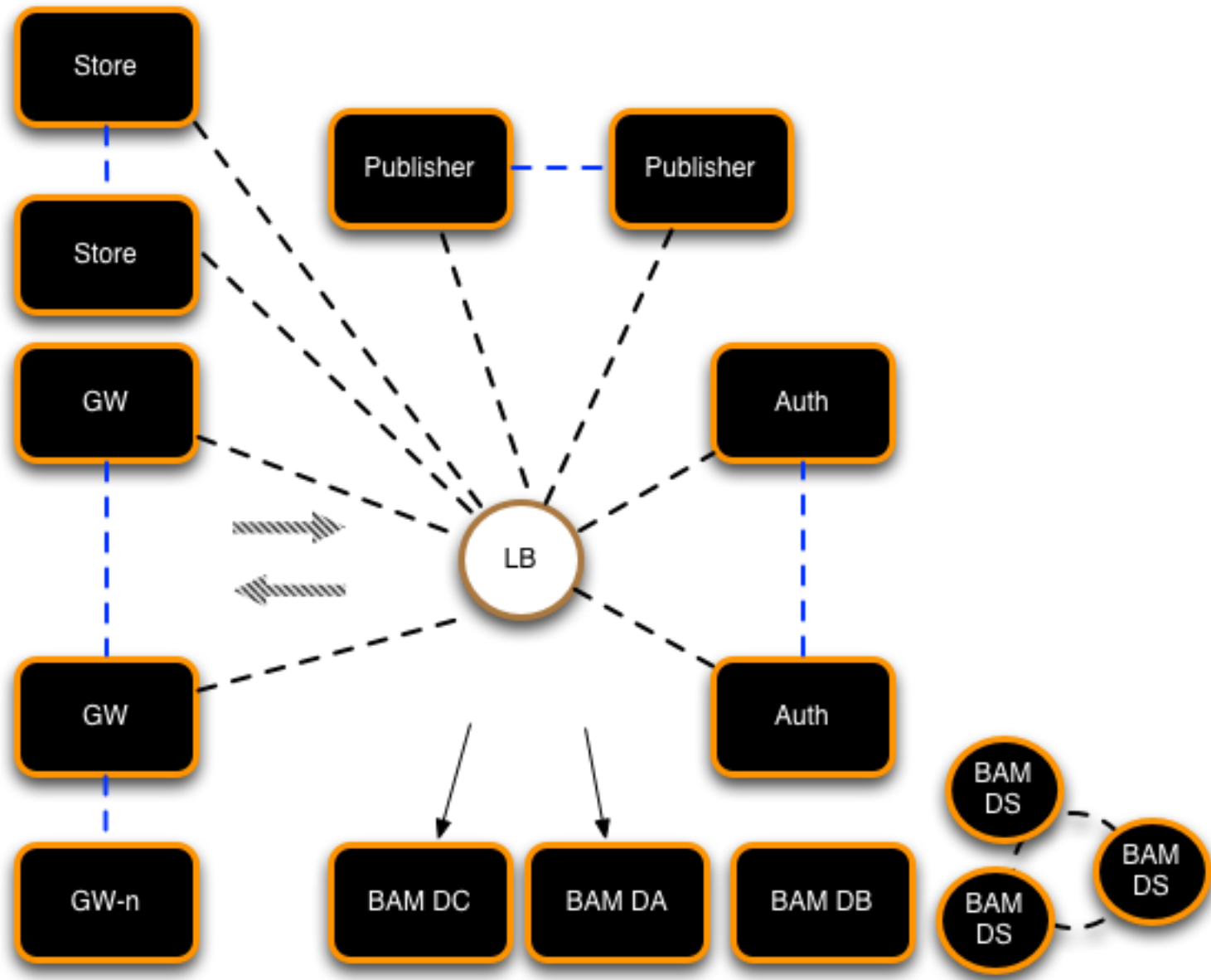
# Deployment : Pattern 1



# Deployment : Pattern 2



# Deployment : Pattern 3



## WSO2 API Manager



WSO2 API Manager is a complete solution for publishing APIs, creating and managing a developer community and for scalably routing API traffic. It leverages proven, production-ready, integration, security and governance components from the WSO2 Enterprise Service Bus, WSO2 Identity Server, and WSO2 Governance Registry. In addition, as it is also powered by the WSO2 Business Activity Monitor, the WSO2 API Manager is ready for massively scalable deployment immediately.

As with all WSO2 products, the WSO2 API Manager is 100% open source. Designed for easy customization, it is extensively pluggable to integrate with existing infrastructure in your enterprise.

### Features

#### Create a Store of all Available APIs:

- Graphical experience similar to Android Marketplace or Apple App Store.
- Browse APIs by provider, tags or name.
- Self-registration to developer community to subscribe to APIs.
- Subscribe to APIs and manage subscriptions on per-application basis

### Analyst Reports

WSO2 cited as leader in  
The Forrester Wave™:  
API Management Platforms, Q1 2013

[Read the Report](#)

### Download

[Version 1.3.1](#)[Release Notes](#)[Binary](#)[Source \(SVN\)](#)[Previous Releases](#)

### Cloud Virtual Machine

[AMI ID : ami-7f45cf16](#)[AMI User Guide](#)

### Getting Started

[Getting Started Guide \(PDF\)](#)[Installation Guide](#)[User Guide](#)[Samples](#)

APIs / [Add New API](#)

APIS

[Browse](#)

**[Add](#)**

[All Statistics](#)

MY APIS

[Subscriptions](#)

[Revoke Tokens](#)

[Statistics](#)

## Add New API

Name:\*

Context:\*

Version:\*

Description:

Visibility:\*  ?

Thumbnail Image:  No file chosen

- Max Size 1 MB.
- Recommended Image size: 100 x 100 pixels.

Endpoint Security Scheme:\*

Production URL:\*



Tier Availability:\*

- Bronze
- Gold
- Silver
- Unlimited

?

Business Owner:

Business Owner Email:

Technical Owner:

Technical Owner Email:

API Resources: [+ Add New Resource](#)

URL Prefix	URL Pattern	HTTP Verb	Auth Type	Action
/{context}/{version}	/*	<input checked="" type="checkbox"/> GET	Application ▾	▼ Move Down
		<input checked="" type="checkbox"/> POST	Application ▾	
		<input checked="" type="checkbox"/> PUT	Application ▾	▲ Move Up
		<input checked="" type="checkbox"/> DELETE	Application ▾	Delete
		<input checked="" type="checkbox"/> OPTIONS	Application ▾	



APIs / All / ApacheDemo-1.0.0

APIS

**Browse**

Add

All Statistics

MY APIS

Subscriptions

Revoke Tokens

Statistics

## ApacheDemo - 1.0.0

Overview

Edit

Life Cycle

Versions

Docs

Users



1 User

PUBLISHED

1.0.0

Docs

Apache Demo

Context	/apache
Production URL	http://localhost:9766/order-1.0.0/order
Date Last Updated	2/28/2013 11:00:59 AM
Tier Availability	Unlimited

Copy



## APIs

Search API



Tags

### RECENTLY ADDED



ApacheDemo-1.0.0

admin



OrderAPI-1.0.2

admin



TwitterSearch-1....

provider1



ApacheDemo (1.0.0)

admin



OrderAPI (1.0.2)

admin



TwitterSea.. (1.0.0)

provider1

open social twitter

## APIs



### MORE APIS FROM 'ADMIN'



OrderAPI-1.0.2



## ApacheDemo - 1.0.0

[Try me](#)

admin



Rating:

Your rating: N/A



Version:

1.0.0

Status:

PUBLISHED

Updated:

Thu Feb 28 11:00:59 PST 2013

Applications

Select Application...

Tiers

Unlimited

Allows unlimited requests

[Subscribe](#)

Overview

Documentation

URLs:

- <http://192.168.5.35:8280/apache/1.0.0>
- <https://192.168.5.35:8243/apache/1.0.0>

Description:

Apache Demo

Comments:

### RECENTLY ADDED



**ApacheDemo-1.0.0**

admin




**OrderAPI-1.0.2**


admin



**TwitterSearch-1....**

provider1

 DefaultApplication

 apache-app

#### Keys


Production		<a href="#">Re-generate</a>   <a href="#">Hide Keys</a>
Access Token	RWZILYLEH8_dxMu_iKmpIsUZjMa	
Consumer Key	2i06IVS97mGKS_QoS8GTNdj40Qka	
Consumer Secret	g3OD4BrJJU5T7k0KfYEBQsP7deQa	

#### Sandbox

Sandbox keys are not yet generated for this application.

[Generate](#)

#### APIs



**ApacheDemo - 1.0.0** ✕

admin

Unlimited Subscription



# API Analytics

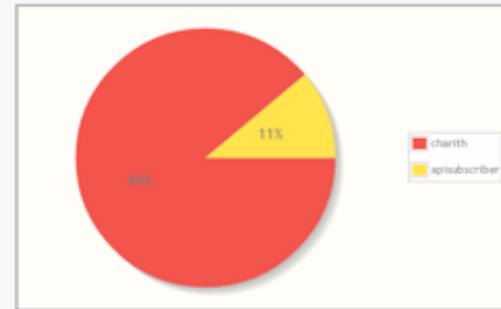
## PhoneVerification-v1.0.1

Overview Edit Life Cycle Versions Docs Users

### Active Subscriptions

Name	Date of Subscription
 charith	2012-06-21 12:30:25.707
 apisubscriber	2012-06-20 22:46:44.042

### Usage by Current Subscribers (v-1.0.1)

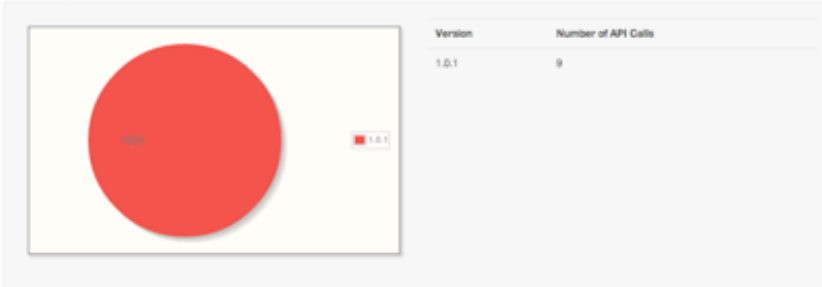


Subscriber	Number of API Calls
charith	8
apisubscriber	1

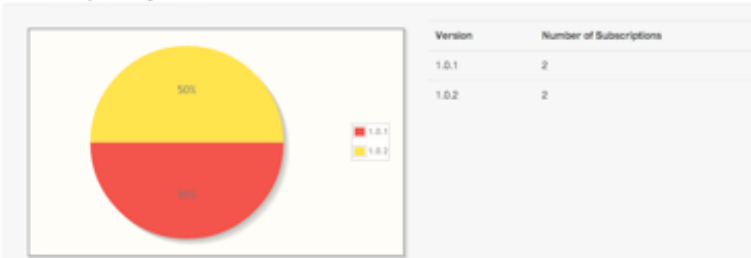
## PhoneVerification-v1.0.1

Overview Edit Life Cycle Versions Docs Users

### API Usage by Versions



### API Subscriptions by Versions



## API Response Times (Across All Versions)



API Name	Average Response Time (ms)
CdynePhoneVerify (isabelle)	3793.65
PhoneVerification (apicreator)	2791
PlaceFinder (isabelle)	597.74
TwitterSearch (isabelle)	853.59

# Summary

## Open Source Enterprise API Management Platform, utilizing Apache Modules

- Find and subscribe/buy APIs
  - API Store and Governance
- Manage, secure and protect APIs
  - API Management and Gateway
- Monitor and Monetize APIs
  - API Monitoring and Analytics

