

API Connect

Arnauld Desprets - arnauld_desprets@fr.ibm.com
Technical Sale



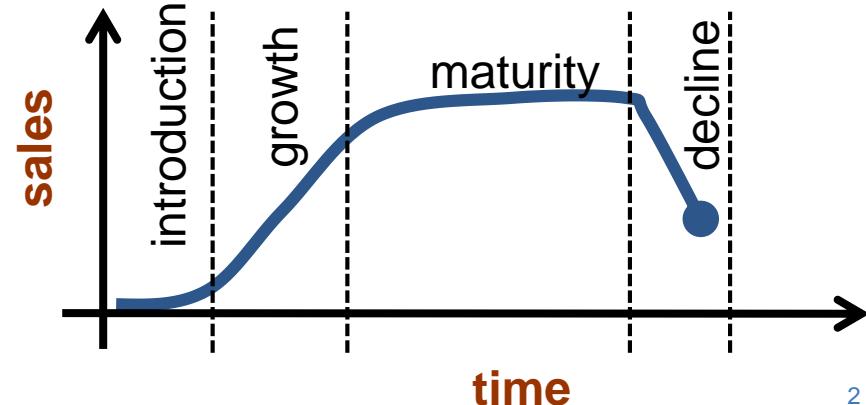
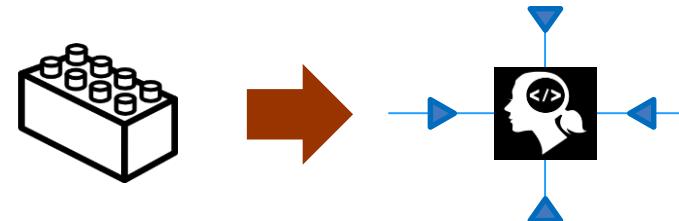
1. API – Understanding the space
2. API Connect
3. Sample implementations
4. Démonstration

API = standard interface
based on web technologies

- HTTP
- TLS
- REST
- JSON / XML
- OAuth2.0
- Open API
- ...



API ~ Product



Open API – Swagger 2.0



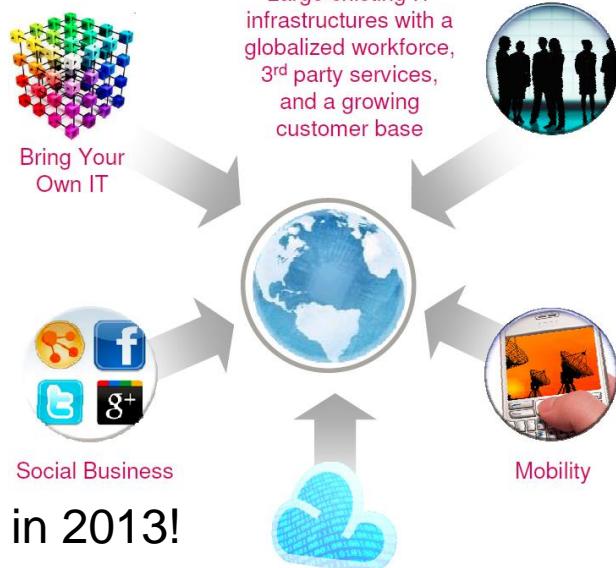
- The **OpenAPI Specification** (aka **Swagger Specification**): specification for machine-readable interface files for describing, producing, consuming, and visualizing RESTful web services.
- Development of the OpenAPI Specification (OAS) is overseen by the Open API Initiative: open source collaborative project of the Linux Foundation.

The screenshot shows the Swagger UI interface. At the top, there's a navigation bar with links for 'TOOLS' and 'SPECIFICATION'. Below the navigation, a large heading says 'THE WORLD'S MOST POPULAR API FRAMEWORK' with the word 'POPULAR' in green. A sub-section below it says 'Swagger is a powerful open source framework backed by a large ecosystem of tools that helps you design, build, document, and consume your RESTful APIs.' On the left side, there's a code editor window displaying an OpenAPI specification (YAML). The code editor has syntax highlighting for YAML and JSON. On the right side, there are several panels: 'Loans' (listing 'Loans API for Banka demo' and 'Version 1.0.0'), 'Security' (with a 'clientID (API Key)' field and an 'Authenticate' button), and 'Paths' (listing a 'GET /quote' operation with its 'Description' and 'Parameters' table). The 'Parameters' table includes columns for 'Name', 'Located In', 'Description', and 'Required Schema'. The 'loanAmount' parameter is defined as 'query' with type 'integer' and 'annualInterestRate' as 'query' with type 'number'.

```
swagger: "2.0"
info:
  title: Loans API for Banka demo
  version: 1.0.0
  x-tx-name: loans
  x-description: Loans API for Banka demo
  basePath: /loans/v1
paths:
  /quote:
    get:
      responses:
        '200':
          description: 200 OK
          schema:
            $ref: '#/definitions/quoteResponse'
      parameters:
        - name: loanAmount
          type: integer
          required: true
          in: query
          description: loan Amount
          format: int64
        - name: annualInterestRate
          type: number
          required: true
          in: query
          description: annual Interest Rate
          format: float
        - name: termInMonths
          type: integer
          required: true
          in: query
          description: term In Months
          format: int32
      operations:
        quote:
          post:
            responses:
              '200':
                description: 200 OK
                schema:
                  $ref: '#/definitions/quotePostCalculate'
            operations:
              quotePostCalculate:
                description: POST resource to quote a loan using loan amount, annual interest rate and term in months
                parameters:
```

- Cloud, mobile analytics, and social are fueling the hypergrowth of API-centric, business as-a-service economies

Embracing New Technologies, Adopting New Business Models



Needs in 2013!

Exploding and Interconnected Digital Universe

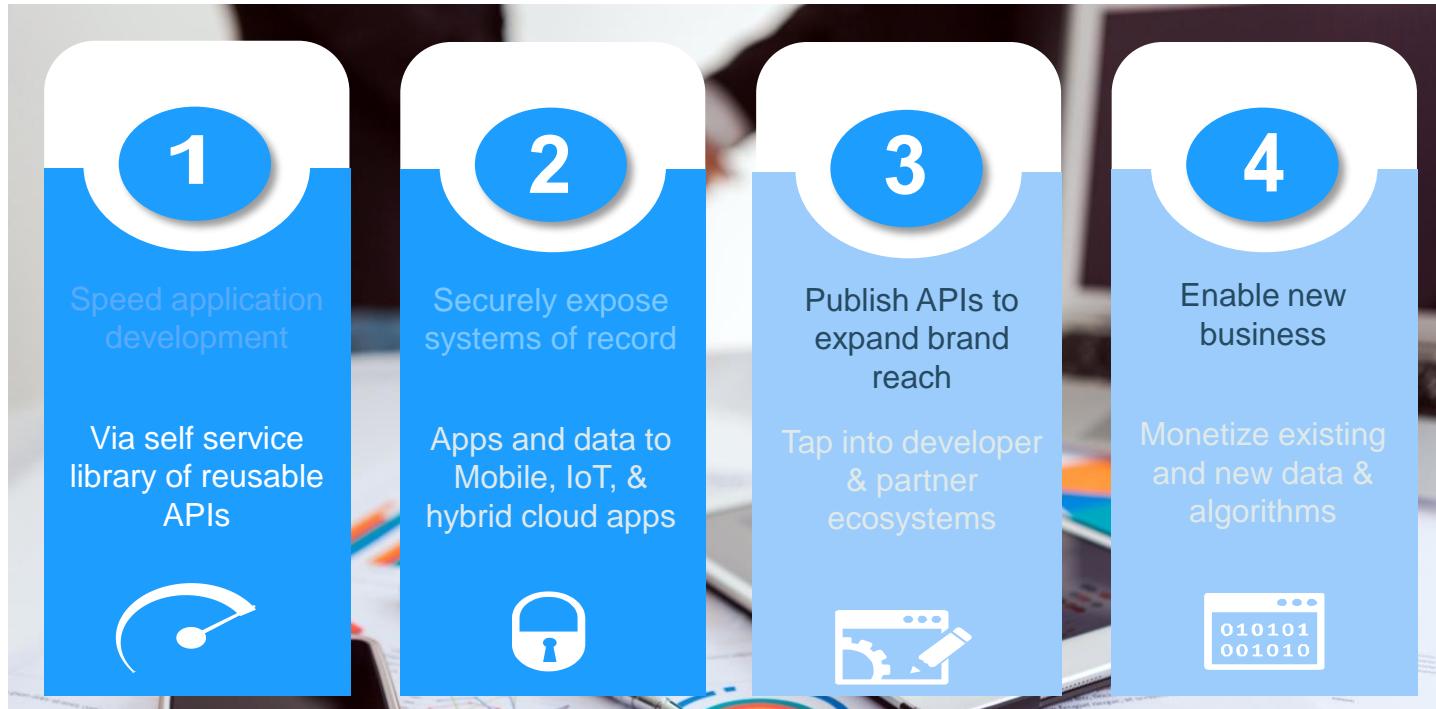


Improved Time To Market

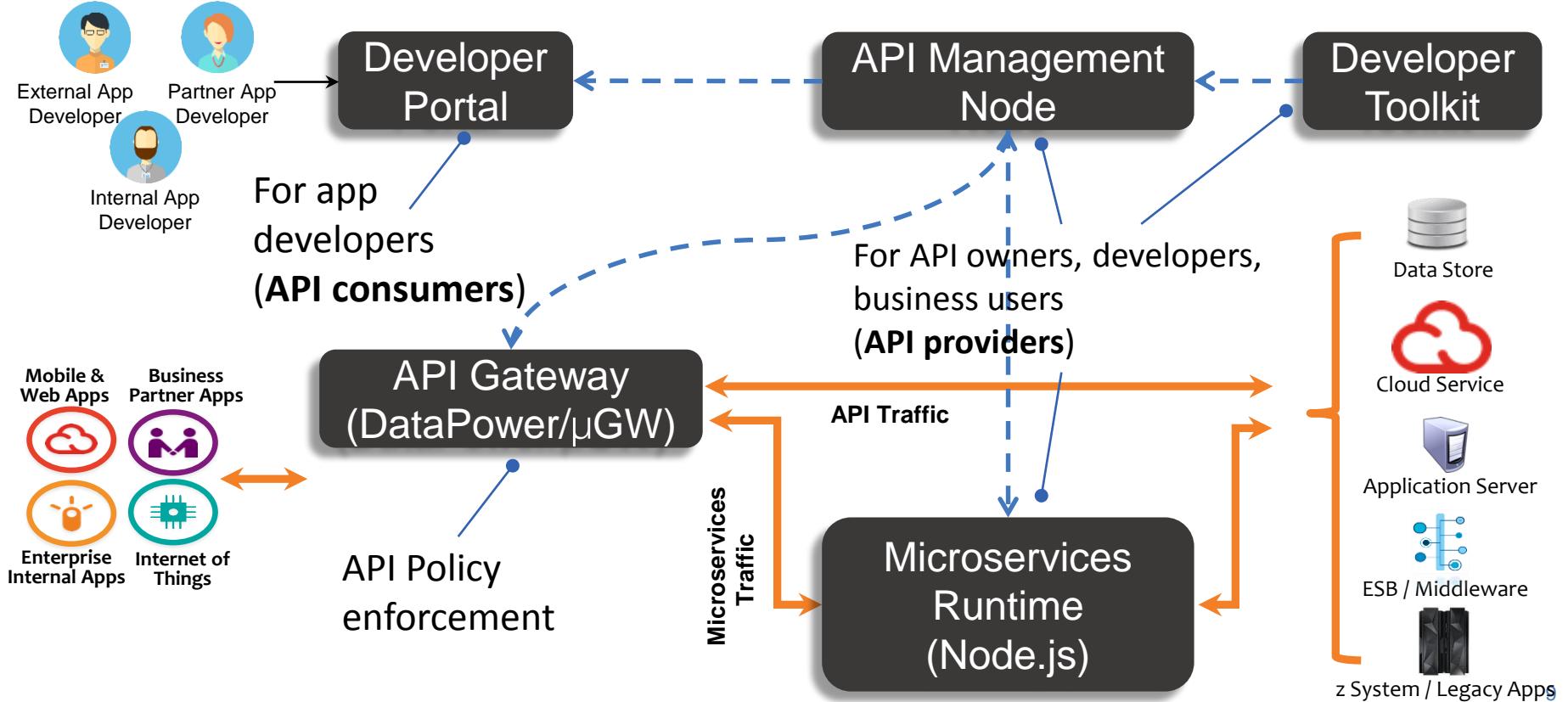
Internal Mobile Projects	20%
Internal Social Media Projects	30%
Internal Data & Analytics Projects	30%
Internal Other Projects	20%
External Partner Projects	25%
Public Projects	35%

- Source: Forrester TEI study based on surveys of 32 US-based API Connect Customers, The Total Economic Impact(TM) Of An API Management Solution, a commissioned study conducted by Forrester Consulting on behalf of IBM, February 2017

An API Strategy To...



1. API – Understanding the space
2. **API Connect**
3. Sample implementations
4. Démonstration



API Connect == Facade to DataPower



The screenshot shows the IBM DataPower Gateway interface. At the top, there's a navigation bar with 'IBM DataPower Gateways', 'internalGateways', 'admin', and 'IBM'. Below it is a 'Services' section with 'All Services' listed. Under 'All Services', there are two entries: 'mpg_Proxy' (Status: Up, Service Type: Multi-Protocol Gateway, Front side URL: http://0.0.0.9999) and 'mpg_authenticationService' (Status: Up, Service Type: Multi-Protocol Gateway, Front side URL: http://0.0.0.8001). A 'Configure Multi-Protocol Gateway Style Policy' dialog is open for 'mpg_authenticationService'. The policy name is 'mpg_authenticationService'. The rule direction is 'Client to Server'. The rule name is 'mpg_authenticationService_rule_basicAuth'. The rule description is 'Create rule: Click New, drag action icons onto line. Edit rule: Click on rule, double-click on action.' Below the policy configuration, there's a 'Related Links' sidebar with links like WSDL Validation and B2B Transaction Viewer.

- Security
- SOAP Support
- High performance
- SLM
- B2B use cases

90%

[+] Response

Response Headers Response Body (Raw) Response Body (Highlight) Response Body (Preview)

```
1. {
2.     "_links":
3.     [
4.         {
5.             "self":
6.             {
7.                 "href": "/mgmt/status/default/CPUUsage"
8.             }
9.         },
10.        {
11.            "doc":
12.            {
13.                "CPUUsage":
14.                {
15.                    "tenSeconds": 0,
16.                    "oneMinute": 3,
17.                    "tenMinutes": 3,
18.                    "oneHour": 2,
19.                    "oneDay": 2
20.                }
21.            }
22.        }
23.    ]
24. }
```

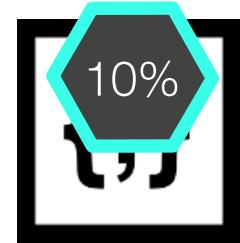
Access Manager all
Access Manager Proxy 9.0.1.0
Coproc 1.2
DCO 5.13
DCO Oracle 1.0
JMS 2.0.3
MQ 8.0.0.0
ODBC 7.15
ODR ODRLIB855.ODRLIB_a1635.01

```
idgJog:idg#
idgJog:idg#
idgJog:idg# show domain

domain: APIMgmt_A09570A292 [up]
-----
admin-state enabled
visible-domain default [up]
file-permissions CopyFrom+CopyTo+Delete+Display+Exec+Subdir
config-mode local
import-format ZIP
local-ip-rewrite on
maxchkpoints 3

domain: default [up]
```

```
20
21 var open = require('os').platform() === 'Darwin' ? require('opener') : require('open');
22
23 if (error) {
24     session.out.write("Request failed");
25     code = error.code || "Request failed";
26 }
27 else {
28     response.readableBuffer(function(error, responseData){
29         if (error) {
30             throw error;
31         }
32         else {
33             // decode the base64 content that has been received
34             var result = new Buffer(responseData.toString(), 'base64').toString();
35             // format the string in order to delete some special characters
36             var formattedString = result.replace(/\u000d\u000a/g, '\n');
37             var jsonRes = JSON.parse(formattedString);
38             // test the 200x response
39             if (jsonRes.error_code === "ERROR") { // ERROR
40                 session.out.write("Error: " + jsonRes.error_details[0].value); // error caught if any
41             }
42         }
43     });
44 }
```



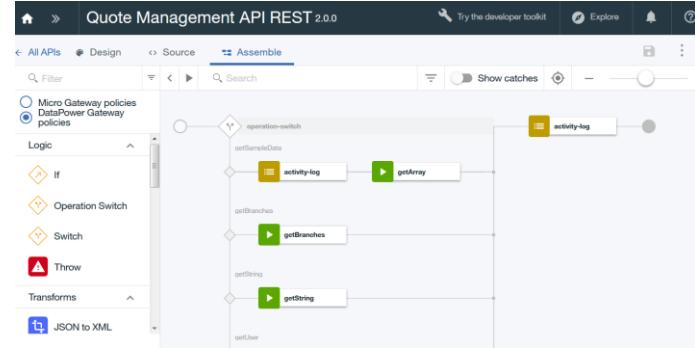
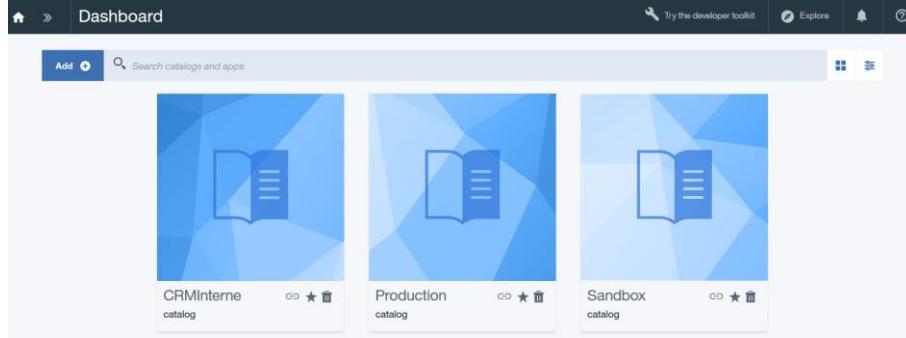
API Connect Topology – API Manager



Dashboard

Add Search catalog and apps

CRMInterne catalog Production catalog Sandbox catalog



Quote Management API REST 2.0.0

All APIs Design Source Assemble

Info Schemes Host Base Path Consumes Produces Lifecycle Policy Assembly Security Definitions Security Extensions Properties Paths /banka/v1/branches /extbranches

```
1 "swagger": "2.0"
2 "info":
3   "description": Sample API for Quote and others
4   "version": "2.0.0"
5   "title": "Quote Management API REST"
6   "contact":
7     "name": Arnaud Desprets
8     "url": "http://thequoteapi/terms.html"
9     "email": arnaud.desprets@fr.ibm.com
10    "x-lbe-name": quote-management-api
11    "host": "$catalog.host"
12    "tags":
13      "name": Quote management
14    "consumes":
15      - "application/json"
16    "produces":
17      - "application/json"
18    "definitions":
19      "QuoteRequest":
20        "type": "object"
21        "required":
22          "annualInterestRate"
23          "loanAmount"
24          "termMonths"
25        "properties":
26          "loanAmount":
27            "type": "integer"
28            "format": "int32"
29            "example": "10000"
30            "description": Total amount of loan
31          "annualInterestRate":
32            "type": "number"
```

Quote Management API REST 2.0.0

All APIs Design Source Assemble

/banka/v1/branches

Path * /banka/v1/branches

Parameters

Add Parameter +

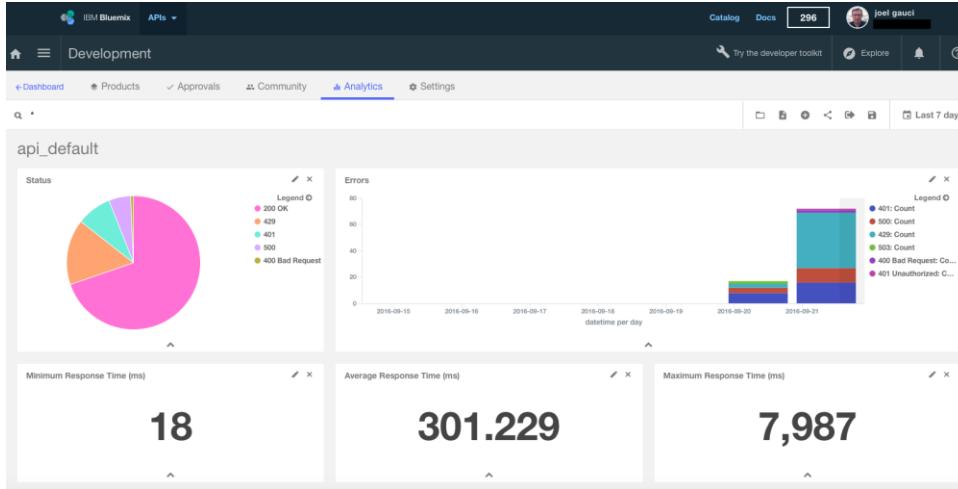
No parameters defined

Add Operation +

GET /banka/v1/branches

Deprecated

Manager Analytics



- Event (details)

transaction_id:	client_ip:	app_name:	headers.ht
versenong	uri_path:	request_method:	
Q	Descending : Q	Descending : Q	Descending : Q
September 21st 2016, 14:29:41.088	/jog-poc [REDACTED] /dev/beneficiaire-14:29:41.088 as400/details	GET	4966233
			{ "numeroMatricule": "fremunt ceisa", "civilite": "JOG", "nomBeneficiaire": "sceptra tenens", "prenomBeneficiaire": "turbine corrupt scopuloue", "IDPprofil": "flammatu secum deus", "adresseLigne1": "profundum quippe ferant", "adresseLigne2": "nubibus ignem disiectique", "adresseLigne3": "ac vincere et", "adresseLigne4": "rapidum laculata e" }
September 21st 2016, 14:29:31.015	/jog-poc [REDACTED] /dev/beneficiaire-14:29:31.015 as400/details	GET	4589731
			{ "numeroMatricule": "B224", "civilite": "0000000000", "nomBeneficiaire": "NOM MOAD24", "prenomBeneficiaire": "D. PRENOM MOAD24", "IDPprofil": "0000000000", "adresseLigne1": "B_1 rue des fleurs 254", "adresseLigne2": "{}", "adresseLigne3": "92220", "adresseLigne4": "GENEVILLEURS" }
September 21st 2016, 14:27:41.431	/jog-poc [REDACTED] /v1/information	POST	3431557
			{ "IsSuccess": "false", "code": "cum murmure", "message": "aeolian venti", "type": "ventus tempestasque", "gravity": "gravitatis temperat iras" }
September 21st 2016, 14:26:32.125	/jog-poc [REDACTED] /dev/beneficiaire-14:26:32.125 /v1/information	POST	5091169
			<soap-env:Envelope xmlns:soap=> http://schemas.xmlsoap.org/soap/envelope /><soap-env:Header><wsse:wsSecurityHeader

- **Kibana implementation**
 - High customization of the visualisations
 - Third party externalisation

API Connect Portal



PSA developer

Home Documentation API Products Blogs Support Create an account Login

Welcome on board and imagine the future.

PSA Group for Developers

Last blog entry

• 14/09 MEETUP PARIS: PG4D + IBM Bluemix + IoT WATSON

Submitted by patxi.hastoy@mpsa... on Mon, 09/12/2016 - 10:56

PG4D & IBM Bluemix Meetup 14/09: <http://bit.ly/pg4dmeetup>

Plus de 240 inscrits: Développez vos applications "Santé, Bien-être" pour la voiture connectée !

[read more](#) patxi.hastoy@mpsa.com's blog log in or register to post comments

• PG4D offer a development option with an

Tweets by @GroupePSA

Groupe PSA Retweeted

Peugeot Sport @peugeotSport

Selfie 1ers de la classe ! #DreamTeam
@s_peterhansel @DanosElena @cyrildespres
@LucasCruz74 avec JP. Cottret & team manager
B.Famin #Dakar

<https://developer.psa-peugeot-citroen.com/>

Request

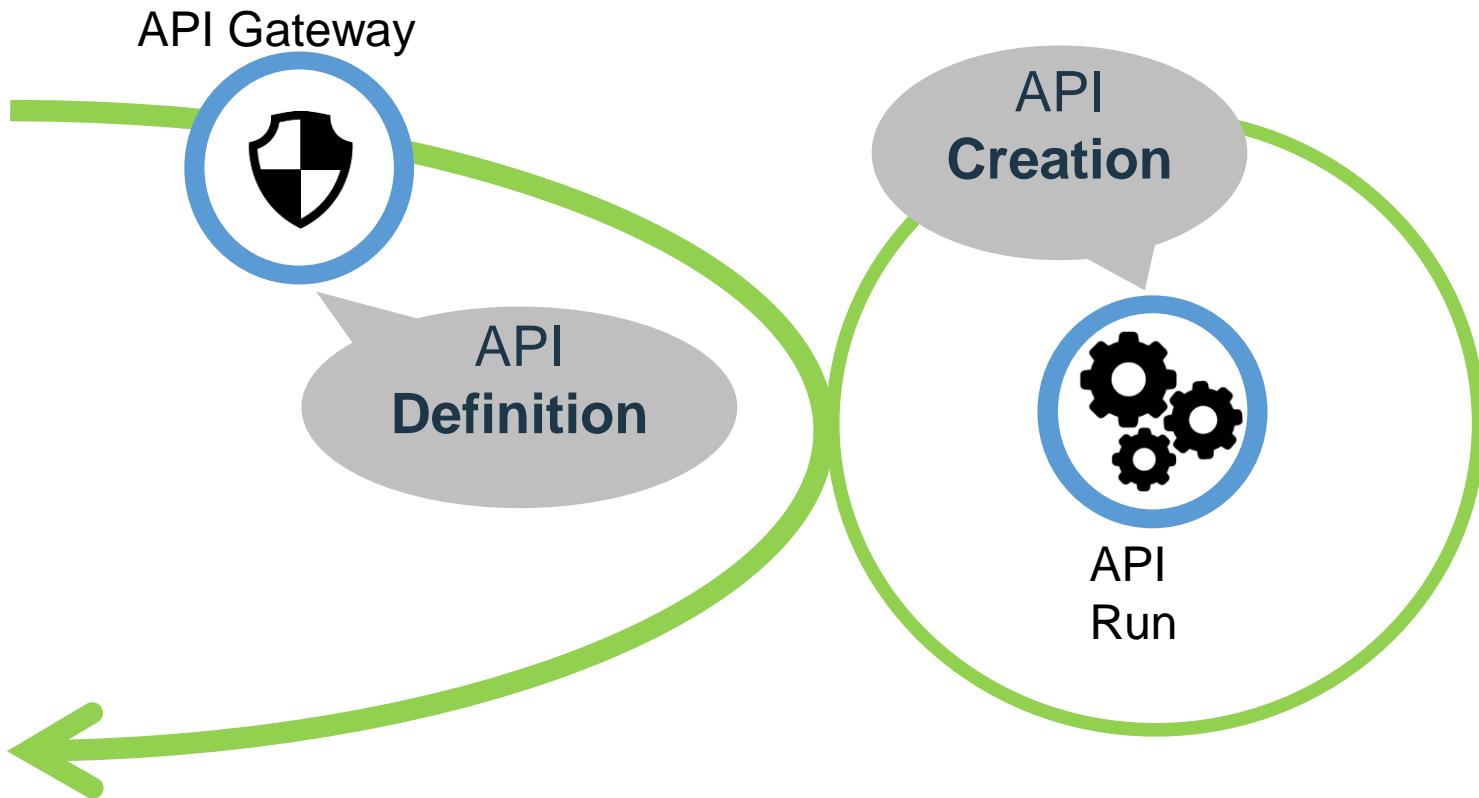
```
GET https://api.eu.apiconnect.ibmcloud.com/jog-poc/.../dev/beneficiaire-as400/detalls?codeFinanceur=123&codeBeneficiaire=123&email=gautier@fr.ibm.com
X-IBM-Client-Id: 6aebeb13-5252-466f-b42a-2f1b04696b9
Content-Type: application/json
Accept: application/json
Authorization: Bearer R-W-44k4Hzzu_h14wLiAVjLcn6z0TzmFW-os314xkTCFzjlqR6YnAcdc7HFQ16
```

Response

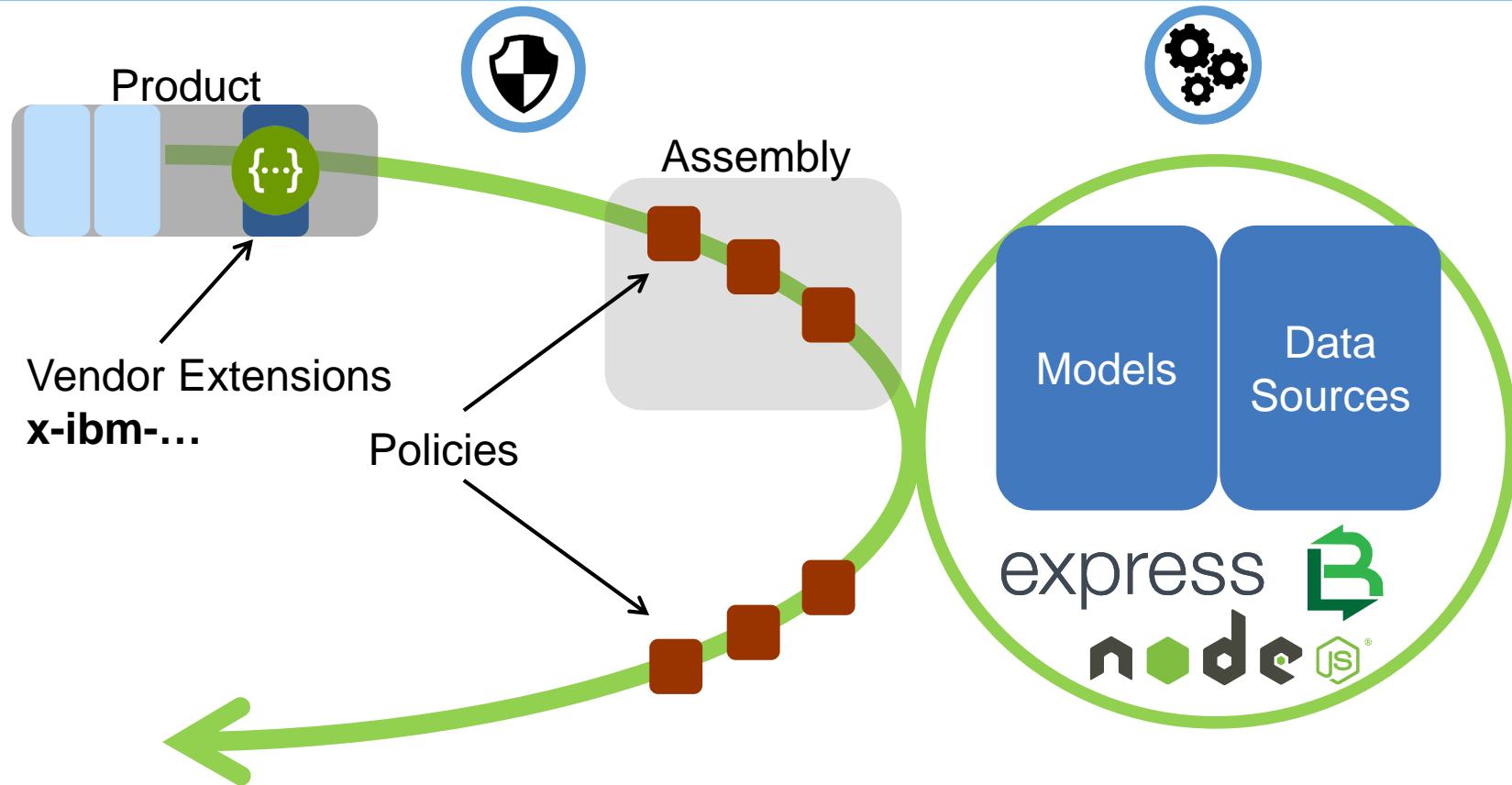
```
200 OK
Content-Type: application/json
X-Globl-Transaction-Id: 5272721
X-Ratelimit-Limit: name=rate-limit-1,10;
X-Ratelimit-Remaining: name=rate-limit-1,9;
{
  "numeroMatricule": "B254",
  "civilite": "000000065",
  "nomBeneficiaire": "B_NOM_M0AD254",
  "prenomBeneficiaire": "B_PRENOM_M0AD254",
  "IDProfil": "000000004",
  "adresseLigne1": "B_1 rue des fleurs 254",
  "adresseLigne2": "0",
  "adresseLigne3": "92230",
  "adresseLigne4": "GENNEVILLIERS"
}
```

- **Drupal implemenation**
- High customization
- Testing
- Apps management
- Product/Plan subscription

API Connect combines API creation & API definition



API Connect combines API creation & API definition



Data sources supported by Loopback applications

- In-memory db
- In-memory key-value connector
- Email
- IBM DB2
- UBM Dash DB
- IBM MQ Light
- IBM Cloudant DB
- IBM DB2 for z/OS
- Redis key-value connector
- MongoDB
- MySQL
- PostgreSQL
- Oracle
- Microsoft SQL
- REST services
- SOAP webservices
- Couchbase
- Neo4j
- SAP HANA
- ElasticSearch

IBM API Connect – Deployment possibilities



andorsoft

Virtualisation



Docker Container



Node.JS



Software Solution



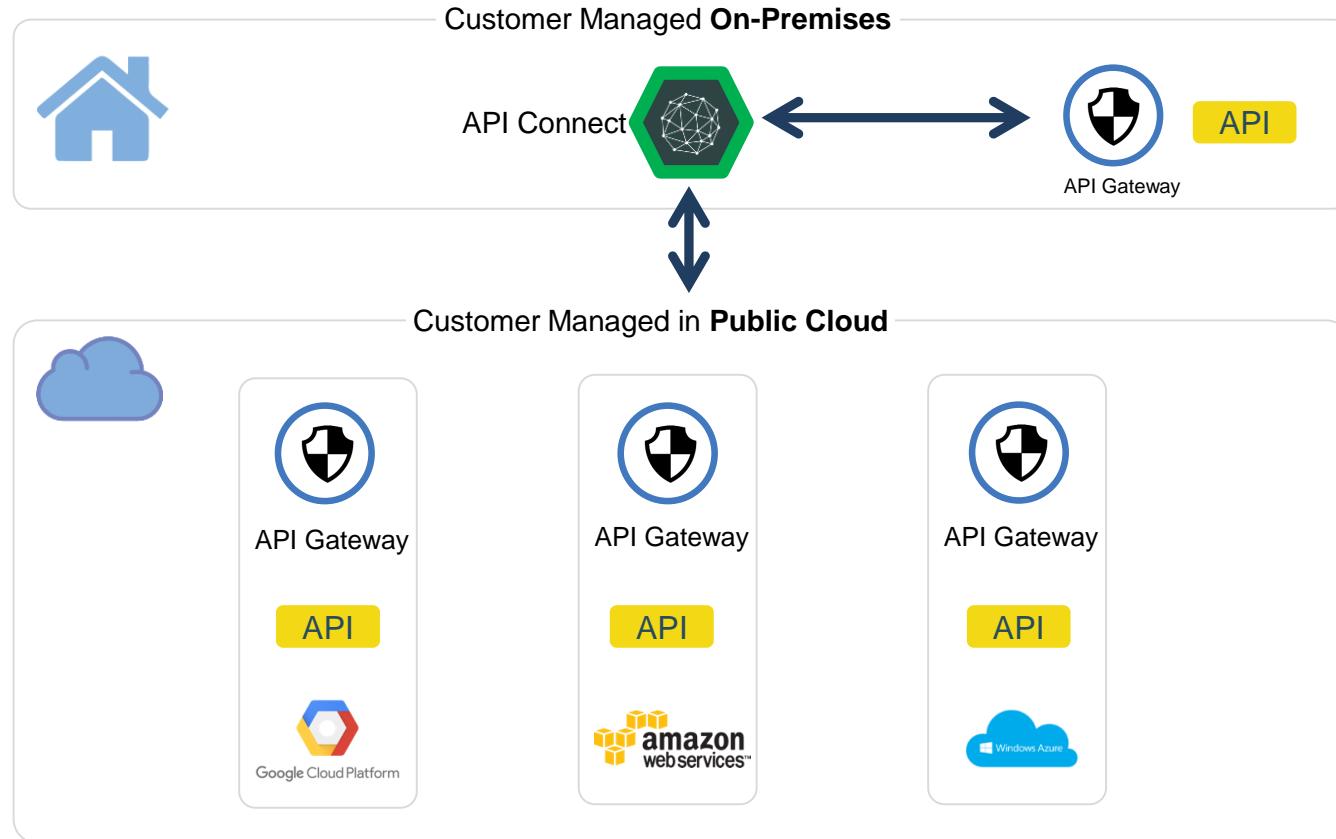
Physical Appliance



- | | | | | |
|---|------------------------------------|-----------------------|-----------------|-----------------|
| • IBM DataPower Gateway Virtual Edition | • IBM DataPower Gateway for Docker | • µGateway | • IBM DataPower | • IBM DataPower |
| • API Connect Manager | • API Connect Manager | • API Connect Toolkit | | |
| • API Connect Portal | • API Connect Portal | | | |
- And also ...
- API Connect on Cloud (Managed instance)



Hybrid Deployment – Your APIC with Co-located Gateways Anywhere





Deployment

Deploy where it's most convenient for you

- Deploy on IBM Bluemix
- Deploy to 3rd party clouds
- Deploy on-premises



Licensing

Pay only for what you need

- Subscription (API calls/month)
- Perpetual (per PVU, unlimited API calls)



IBM apiconnect

Number of APIs & API Products	Unlimited
-------------------------------	-----------

Number of API Application Developers	Unlimited
--------------------------------------	-----------

Cloud infrastructure on IBM Cloud	Included
-----------------------------------	----------

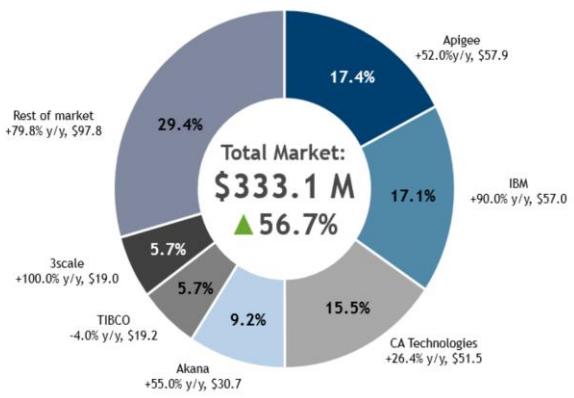
Data transfer on IBM Cloud	Included
----------------------------	----------

Analyst view of Connect



IDC August 2016

Worldwide API Management 2015 Share Snapshot

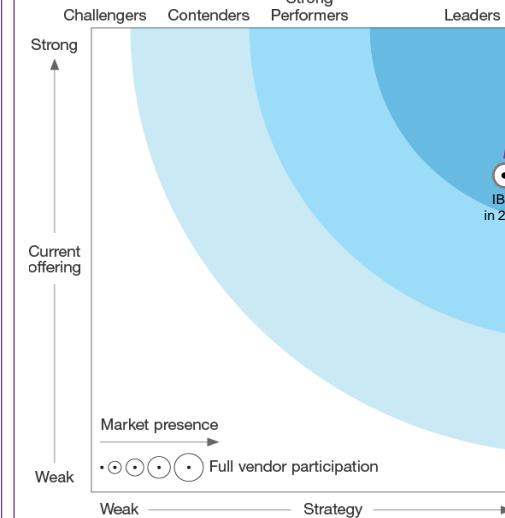


Gartner October 2016

Gartner Full Lifecycle API Management MQ



Forrester November 2016



1. API – Understanding the space
2. API Connect
3. **Sample implementations**
4. Démonstration

Samples - Public



<https://developer.psa-peugeot-citroen.com/inc/>



The screenshot shows the homepage of the PSA Group for Developers website. The header includes the PSA developer GROUPE logo, navigation links for Home, Documentation, API Products, Blogs, and Support, and a search bar with a 'Create an account' and 'Login' button. The main visual is a black and white photograph of a car on a test stand in a workshop, with several people working around it. A central overlay features a dark blue button with the text 'Discover our API' and the slogan 'Welcome on board and imagine the future.' Below this, the text 'PSA Group for Developers' is displayed in large, bold, white letters. The overall theme is industrial and technological.

Last blog entry

- **14/09 MEETUP PARIS: PG4D + IBM BLUEMIX + IoT WATSON**

Submitted by patxi.hastoy@mp... on Mon, 09/12/2016 - 10:56

PG4D & IBM Bluemix Meetup 14/09: <http://bit.ly/pg4dmeetup1>

Plus de 240 inscrits. Développez vos applications "Santé, Bien-être" pour la voiture connectée !

Twitter

Tweets de @PSA_news

Samples - Public



<https://developer.fr.carrefour.io/>



The image shows the homepage of the Carrefour API Store. The background features a blurred photograph of a person's hands interacting with a smartphone and a laptop keyboard. Overlaid on this image is a large, bold text: "Bienvenue sur l'API Store de Carrefour". Below this, a smaller text reads: "* Développez, enrichissez et propulsez vos projets avec les APIs *". At the bottom center is a green button with white text that says "COMMENCER GRATUITEMENT". The top navigation bar includes links for "API Store", "Accueil" (highlighted in green), "Nos produits", "Documentations", "Getting started", "Devenir partenaire", "Register" (with a plus sign icon), and "Log in".

Samples - Public



<https://developer.royalmail.net/start>

A screenshot of the Royal Mail API Portal homepage. The header is red with the Royal Mail logo and the text "Welcome to the API Portal". It also includes links for "Home", "Getting Started", "API Library", "Support", "Create an account", and "Login", along with a search bar.

It's easy to get started

Get set up in no time and be ready for API integration. Follow our four-step guide to get started.



Step 1



Find the right API for your business

Whether it's printing your own postage or letting your customers track their deliveries, we've a range of APIs that can help you make your business better. Take a look through our API library to find one that suits your business needs.

Step 2



Create your free API account

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4. **Démonstration**

API Management Resources



- Product Page
 - ibm.com/apimanagement
- API developer community
 - developer.ibm.com/api
- Twitter
 - @ibmapimgt
- YouTube Channel
 - youtube.com/ibmapimanagement
- Slideshare
 - slideshare.net/ibmapimgmt
- PSD2
 - developer.ibm.com/apiconnect/2017/07/14/api-connect-delivers-open-banking-api-support-psd2-requirements/

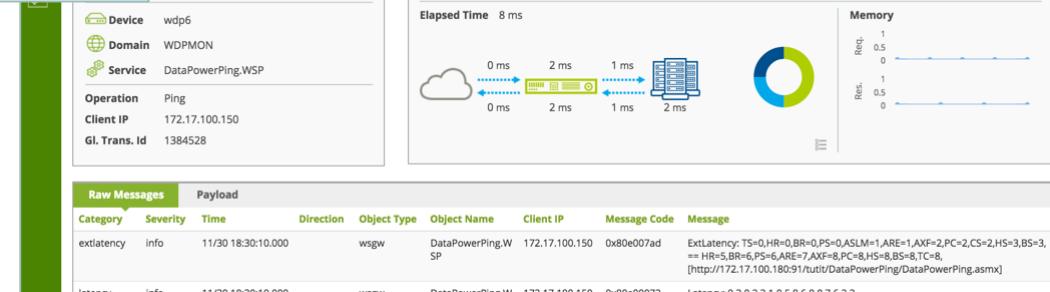
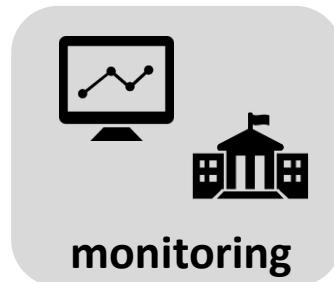
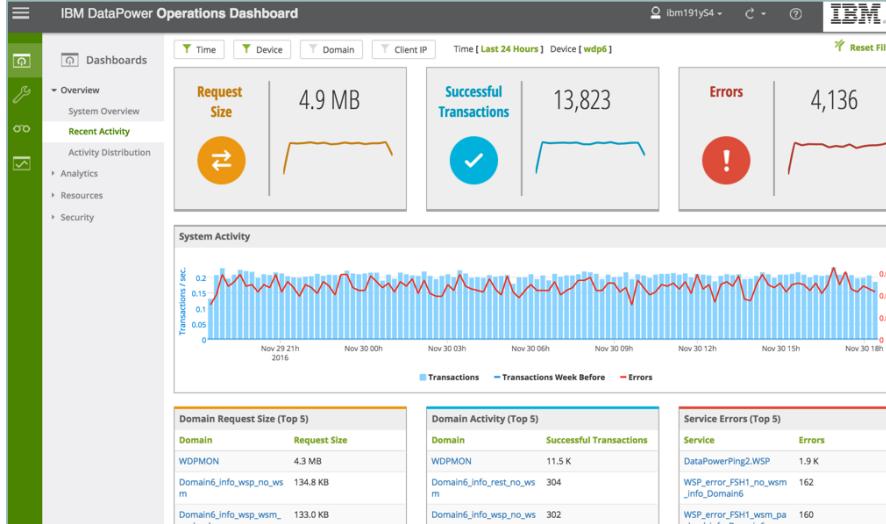


Where to find information



- Proof of Technology – 1 day workshop
 - <http://www-05.ibm.com/fr/events/tec/new/Cloud.html>
- Formation avec Arrow – 4 days training
 - https://edu.arrow.com/fr/trainings/open/ibm/9/trainings_list.html
- Knowledge center
 - http://www.ibm.com/support/knowledgecenter/SSMNED_5.0.0/mapfiles/getting_started.html
- Github lab
 - <https://github.com/ADesprets/bluemix-labs/tree/master/Lab%20API%20-%20Manage%20your%20APIs%20with%20API%20Connect>

DataPower Operations Dashboard



Démonstration - APIC



Screen captures



Experience IBM API Connect for Free

```
GET /apiconnect?price=free
{
  "create" : "APIs in minutes",
  "run"    : "APIs and microservices based on Node.js and Java",
  "manage" : "API lifecycle",
  "secure" : "APIs via programmable micro gateway"
}
```



Laptop

Developers:

Create and run APIs on your laptop



IBM Bluemix (Coming Soon)

Developers, Admins, Business Users:

Create, run, manage and secure APIs on
Bluemix



Everywhere Else

Developers, Admins:

Create, run, manage and secure APIs on
premises or on your hybrid cloud

Start at developer.ibm.com/apiconnect

Create APIs



IBM API Connect AcmeAir 1.0.0

← All APIs Design ↗ Source ⇤ Assemble ▶ Run ⚙ Explore ⚠⚠⚠

Info Host Base Path Schemes Consumes Produces Lifecycle Policy Assembly Security Definitions Security Properties Paths /Users/count /CustomerProfiles/findOne /Users/{id}/accessToken /CustomerProfiles/{id}/exists /Users/update /Users /Users/confirm

Info

Title Customer Profiles

Name

Version 1.0.0

Description

The CustomerProfiles API enables access to key customer data, backed by DB2. This customer data includes the

Contact

Name Acme Air

Email acmeair@acmeair.com

URL

Terms and License

Terms of Service

In using Acme Air's APIs you, as an application developer, accept the API as-is. You furthermore agree to develop the

Create APIs



IBM API Connect Flight Information 1.0.0

All APIs Design Source Assemble ...

Info Host Base Path Schemes Consumes Produces Lifecycle Policy Assembly Security Definitions Security Swagger Extension Properties Paths /airlines/bookings /airlines/ /airlines/bookings/{id} /airlines/availability Parameters Definitions Flight Airline Booking CreditCard Tags

Paths

Path /airlines/bookings

Parameters No parameters defined

GET /airlines/bookings

POST /airlines/bookings

Add Operation Delete

Path /airlines/

Parameters No parameters defined

GET /airlines/

Add Operation Delete

Path /airlines/bookings/{id}

Parameters No parameters defined

Add Operation Delete

Create APIs



IBM API Connect Flight Information 1.0.0

All APIs Design Source Assemble

Filter Search Show catches

operation-switch
if
map
xml-to-json
json-to-xml
validate
invoke
proxy
activity-log
transform-xslt
gatewayscript
javascript
redact
set-variable

operation-switch

- createBooking
 - invoke
- getBookings
 - invoke
- deleteBooking
 - invoke
- getFlights
 - invoke

```
graph LR; Start(( )) --> operationSwitch[operation-switch]; operationSwitch --> createBooking[createBooking]; operationSwitch --> getBookings[getBookings]; operationSwitch --> deleteBooking[deleteBooking]; operationSwitch --> getFlights[getFlights];
```

Create APIs



IBM API Connect Flight Information 1.0.0

Source Assemble

← All APIs Design ↳ Source ↳ Assemble

Info Host Base Path Schemes Consumes Produces Lifecycle Policy Assembly Security Definitions Security Swagger Extension Properties Paths

/airlines/bookings /airlines/ /airlines/bookings/{id} /airlines/availability Parameters Definitions Flight Airline Booking CreditCard Tags

```
1  swagger: '2.0'
2  -
3  info:
4    description: The Flight Information API enables access existing flight data that was exposed from an existing WebSphere Application Server Application. It
           provides you with a list of flights from the ACME AIR database to search for your flights.
5    version: 1.0.0
6    title: Flight Information
7    x-ibm-name: flightinfo
8    contact:
9      name: Arthur De Magalhaes
10     email: arthurd@ca.ibm.com
11   termsOfService: "In using Acme Air's APIs you, as an application developer, accept the API as-is. You furthermore agree to develop the most awesome
           application possible to build Acme Air's revenue and customer base."
12   license:
13     name: AcmeAir Application Developer License 2.0
14     url: 'http://developers.acmeair.com/license'
15   host: 'aurelius.ca.lab.ibm.com:8020'
16   basePath: /flights
17   paths:
18     /airlines/bookings:
19       get:
20         tags:
21           - Airline Booking API
22         summary: Retrieve all bookings for current user
23         description: ''
24         operationId: getBookings
25         parameters: []
26         responses:
27           '200':
28             description: successful operation
29             schema:
30               type: array
31               items:
32                 $ref: '#/definitions/Booking'
33             produces:
34               - application/json
35             post:
36               tags:
37                 - Airline Booking API
38               summary: Create a booking
39               description: ''
40               operationId: createBooking
41               parameters:
42                 - schema:
43                   $ref: '#/definitions/Booking'
44                 name: body
45                 required: false
46                 in: body
47               responses:
48                 '201':
49                   description: Booking created
50                   schema:
51                     type: string
52                     consumes:
53                       - application/json
```

API Toolkit commands



```
testuser@ubuntu:~$ apic
Usage: apic COMMAND OPTIONS

Options
-h, --help      command usage
-v, --version   toolkit version

Commands (type apic COMMAND -h for additional help):

Creating and validating artifacts
config          manage configuration variables
create          create development artifacts
edit            run the API Designer
validate        validate development artifacts

Creating and testing applications
loopback        create and manage LoopBack applications
microgateway    create Micro Gateway applications
start           start services
stop            stop services
logs            display service logs
props           service properties
services        service management

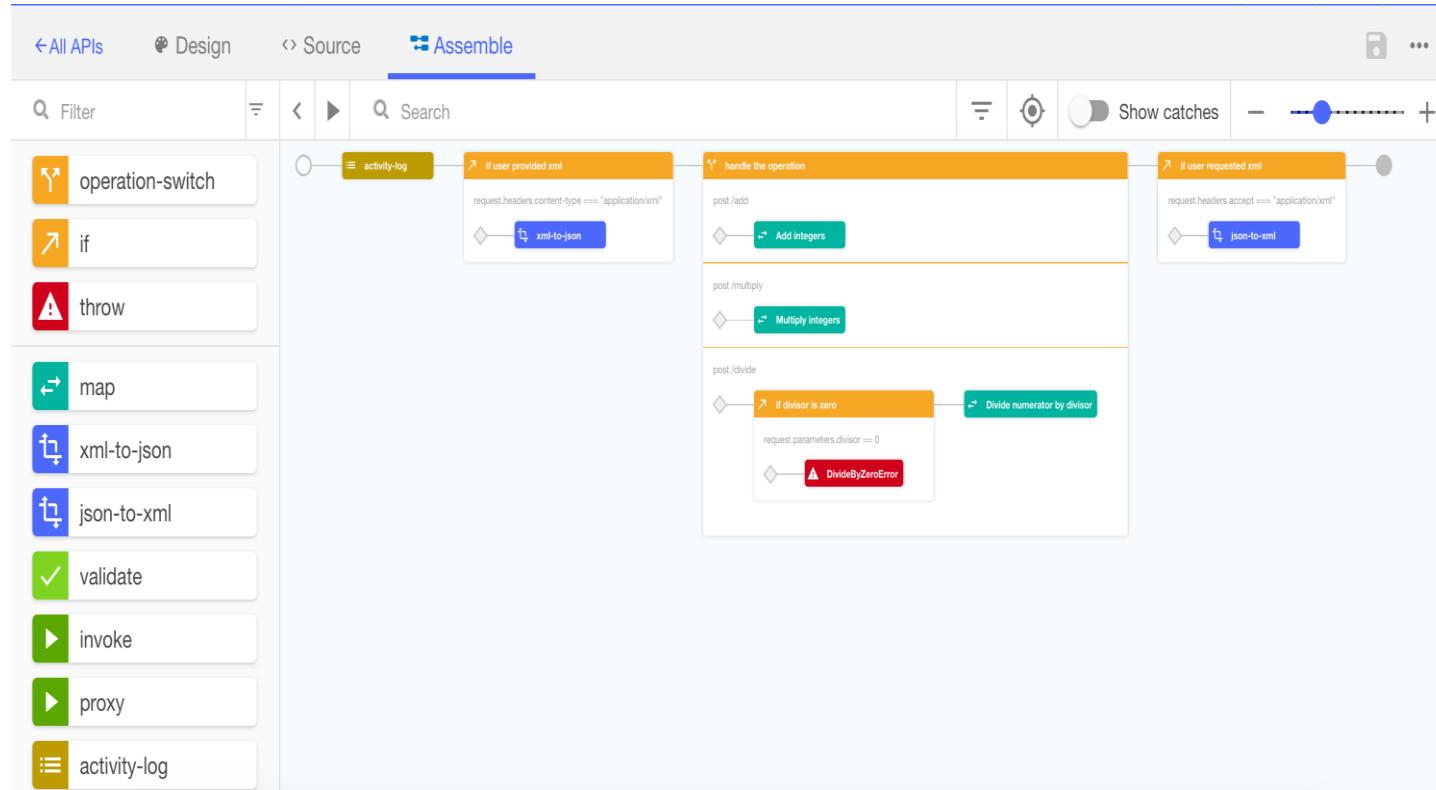
Publishing to the cloud
login           log in to an IBM API Connect cloud
logout          log out of an IBM API Connect cloud
organizations   manage organizations
catalogs        manage catalogs in an organization
publish         publish products and APIs to a catalog
products        manage products in a catalog
apps            manage provider applications
drafts          manage APIs and products in drafts
```

API Policy Management

using graphical & source views



Policies



Micro Gateway and DataPower Gateway Policies



Micro Gateway policies

DataPower Gateway policies

-  operation-switch
-  if
-  throw
-  invoke
-  javascript
-  set-variable

Micro Gateway policies

DataPower Gateway policies

-  operation-switch
-  if
-  throw
-  map
-  xml-to-json
-  json-to-xml
-  validate
-  invoke
-  proxy
-  activity-log
-  xslt
-  gatewayscript
-  redact
- set-variable

Calculator API 1.0.0

[Source](#) [Assemble](#)

```
62     - clientID: []
63     x-ibm-configuration:
64     assembly:
65     execute:
66     - activity-log:
67       title: activity-log
68       content: activity
69       error-content: payload
70     - if:
71       title: if user provided xml
72       condition: 'request.headers.content-type === "application/xml"'
73       execute:
74         - xml-to-json:
75           title: xml-to-json
76     - operation-switch:
77       title: handle the operation
78       case:
79         - operations:
80           - verb: post
81           path: /add
82         execute:
83           - map:
84             title: Add integers
85             inputs:
86               input:
87                 schema:
88                   $ref: '#/definitions/IntegerArray'
89                   variable: request.body
90             outputs:
91               output:
92                 schema:
93                   $ref: '#/definitions/integerResult'
94                   variable: message.body
95             actions:
96               - set: output.result
```

Unit Test Assembly flow



All APIs Design Source Assemble

Setup Catalog

Choose a catalog to test within:

Catalog Sandbox

Product

Choose a product containing this API, or create a new one:

Choose an existing product

Product MyProduct 1.0.0

Republish product

The screenshot shows the 'Assemble' tab in MuleSoft Anypoint Studio. On the left, there's a sidebar with tabs for 'All APIs', 'Design', 'Source', and 'Assemble'. Below these are sections for 'Setup' (catalog selection) and 'Product' (product selection). At the bottom, there's a button labeled 'Republish product'. The main area is titled 'Catalog' and contains a search bar. It displays a flow diagram for handling arithmetic operations based on XML input and output. The flow starts with an 'activity-log' component, followed by a decision point 'if user provided xml' (with a condition 'request.headers.content-type === "application/xml"'). This leads to a 'handle the operation' component which branches into three cases: 'post /add' (leading to 'Add integers'), 'post /multiply' (leading to 'Multiply integers'), and 'post /divide' (leading to 'Divide numerator by divisor'). The 'divide' case includes a decision 'if divisor is zero' (with a condition 'request.parameters.divisor == 0') leading to an error 'DivideByZeroError'. There are also 'xml-to-json' and 'json-to-xml' message processors along the flow.

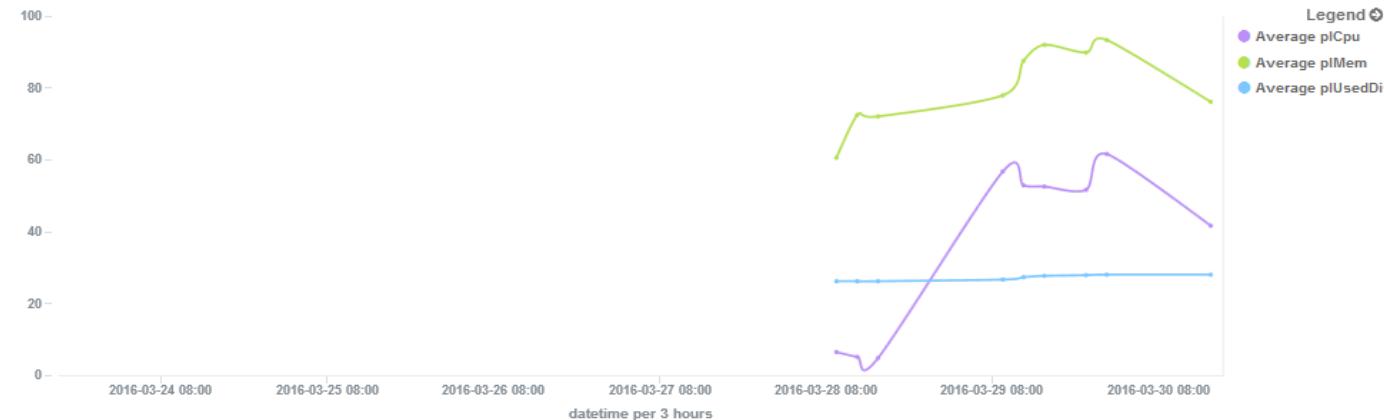
Cloud Manager



Services Overview

Last 7 days

Management Service



Gateway Service



Cloud Manager to configure and administer API Cloud

Search Servers



Management Services

Management

[Add Server](#)

Status

ACTIVE

Server Name

management.pot.ibm

Address

management.pot.ibm

CPU

52

Memory

89

Disk

28

 ...

DataPower Services

[Add DataPower Service](#)

Gateway

[Add Server](#)

Status

ACTIVE

Server Name

gateway1

Address

192.168.225.52

CPU

0

Memory

0

Disk

0

 ...

Collectives

[Add Collective](#)

AppSvr

[Add Controller](#)

Controller Title

Address

Controller1

appsvr.think.ibm

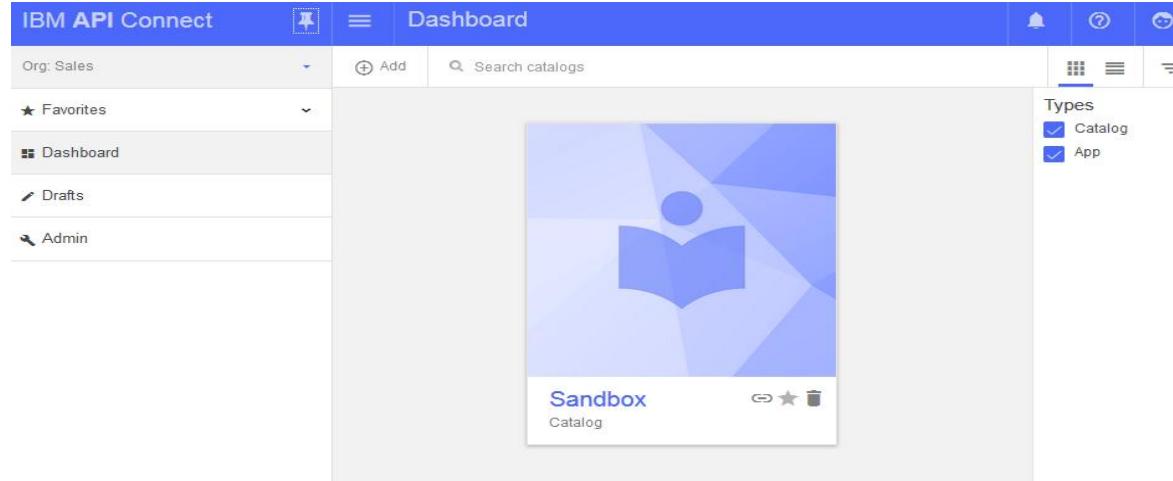
Actions

 ...

Cloud Manager to configure and administer API Cloud

API Manager console for API providers





API Manager to configure and administer API Cloud

Catalogs Dashboard



IBM API Connect Dashboard

Add Search catalogs

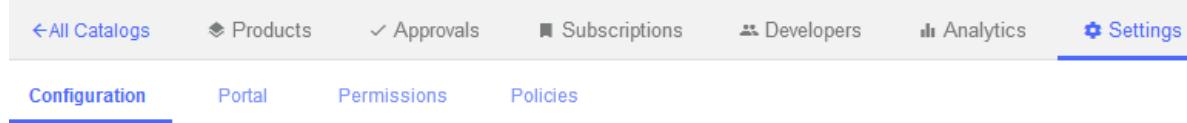
The dashboard displays three catalog entries:

- Sandbox Catalog**: A blue card with a person reading a book icon. It includes a star rating and a trash bin icon.
- Quality Assurance Catalog**: A blue card with a person reading a book icon. It includes a star rating and a trash bin icon.
- Staging Catalog**: A blue card with a person reading a book icon. It includes a star rating and a trash bin icon.

Types

- Catalog
- App

Manage Catalog



IBM API Connect Sandbox

All Catalogs Products Approvals Subscriptions Developers Analytics Settings

Configuration Portal Permissions Policies Save

Display Name: Sandbox

Name: sb

DataPower Service or Collective

DataPower Service: StageGateway

Configure Gateway

Sandbox
If enabled, any staging and publishing actions will be forced. If conflicts are found, they will be automatically resolved by the system. Unpublish actions will happen automatically.

API Endpoint

Base URL: <https://192.168.225.52/organization1/sb>

Default
The default catalog can be accessed using a shorter URL, omitting the catalog name.

Custom Gateway URL Custom API URL

Portal API Endpoint

Hostname for Developer Portal API Calls

For a catalog,
configure gateway clusters to stage & deploy Product/APIs



Portal Configuration

- None
- IBM Developer Portal

URL:

<http://dev.org1.ibm>

- Other

URL:

<http://dev.org1.ibm>

User Registration and Invitation

User Registry

[Sandbox](#)

Developers can invite collaborators and assign the following roles:

- Viewer
Viewers can only view applications and application activity.
- App Developer
App developers can create and edit applications, manage client keys and subscribe to plans.
- Viewer and App Developer

Self-service onboarding

For an environment,
manage portals to publish APIs

[All Catalogs](#)[Products](#)[Approvals](#)[Subscriptions](#)[Developers](#)[Analytics](#)[Settings](#)[Configuration](#)[Portal](#)[Permissions](#)[Policies](#)

Owner has all catalog permissions

Product Management

Permission Description	Role
Stage Allow staging of products to this catalog	Administrator X Product Manager X Publisher X API Developer X + Role
View Allow viewing and listing of products in this catalog	Administrator X Product Manager X Publisher X API Developer X + Role
Manage Allow management of product lifecycle (publishing, deprecating, retiring and archiving)	Administrator X Product Manager X Publisher X API Developer X + Role

Permissions for approving product lifecycle state changes are disabled in a Sandbox catalog. To disable Sandbox, go to Configuration.

Policy Management

Permission Description	Role
Manage Allow management of policies	Administrator X Product Manager X Publisher X API Developer X + Role

For an environment,
manage permissions for approving lifecycle state changes

API Provider user management





Users

Roles

TLS Profiles

User Registries

Add

Roles

Owner Administrative owner for the API provider organization	Role Name Owner	Description Administrative owner for the API provider organization
Administrator Administers users and catalog configuration	Roles View and edit user roles	<input checked="" type="checkbox"/> View <input checked="" type="checkbox"/> Edit
Product Manager Manages API plans	Users View and edit users and user accounts	<input checked="" type="checkbox"/> View <input checked="" type="checkbox"/> Edit
API Developer Configures API definitions	TLS Profiles View and edit TLS profiles	<input checked="" type="checkbox"/> View <input checked="" type="checkbox"/> Edit
Publisher Publishes and manages API plans	User Registries View and edit user registries	<input checked="" type="checkbox"/> View <input checked="" type="checkbox"/> Edit
	Draft APIs View and edit draft APIs	<input checked="" type="checkbox"/> View <input checked="" type="checkbox"/> Edit
	Draft Products View and edit draft products	<input checked="" type="checkbox"/> View <input checked="" type="checkbox"/> Edit
	Subscriptions View and approve subscription requests	<input checked="" type="checkbox"/> View <input checked="" type="checkbox"/> Approve
	Catalog Administration View and edit catalog configuration and permissions	<input checked="" type="checkbox"/> View <input checked="" type="checkbox"/> Edit
	Developers View and manage developer accounts	<input checked="" type="checkbox"/> View <input checked="" type="checkbox"/> Manage
	Analytics View catalog analytics	<input checked="" type="checkbox"/> View

Add and remove users,
assign roles & define custom roles

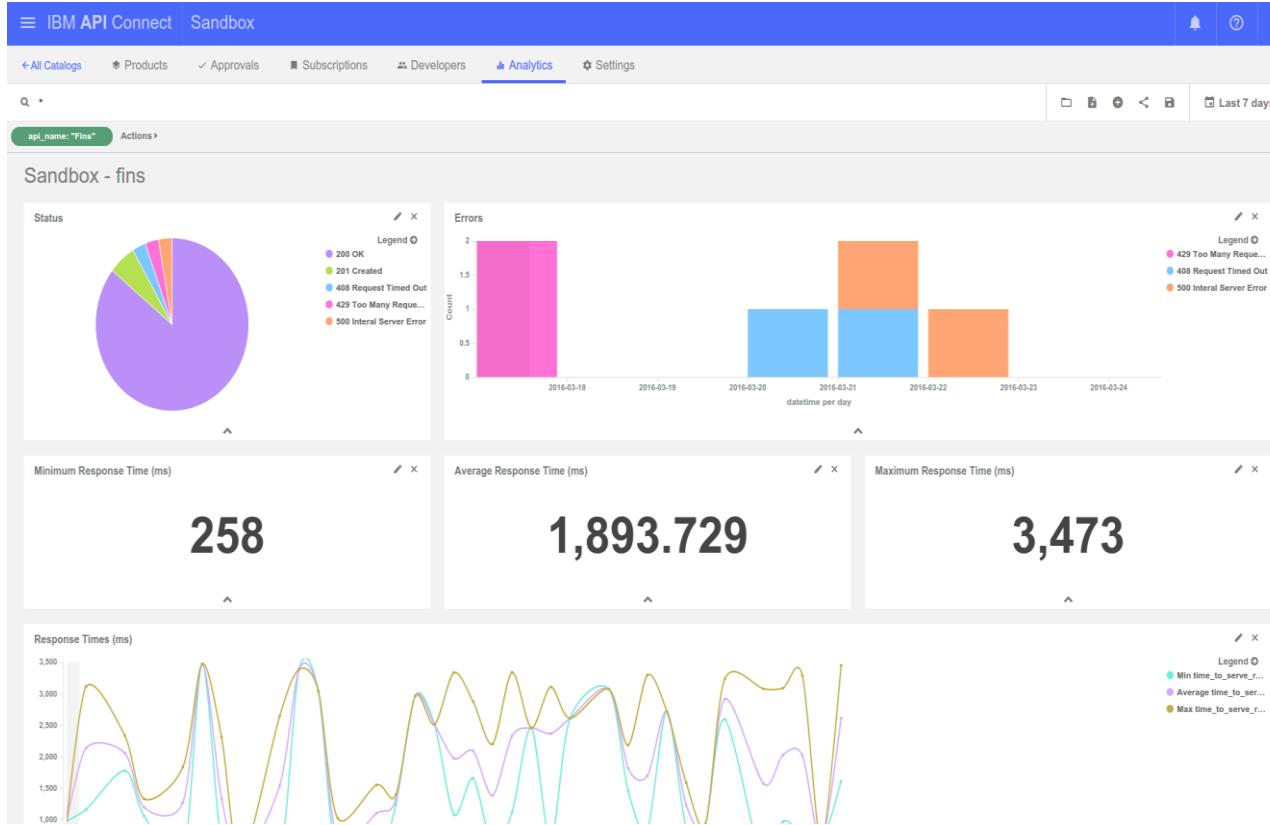
Analytics Gain Business Insights



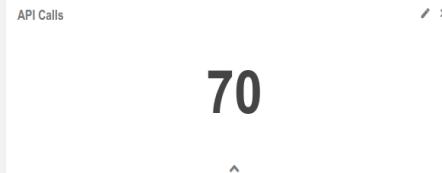
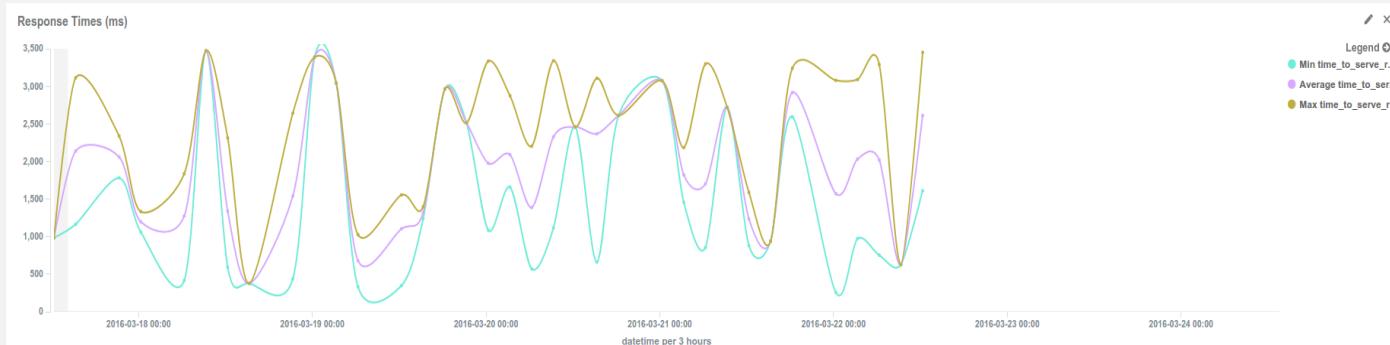
Analytics: Active APIs and Products



Analytics: Response times



Analytics: API call volume



Developer Portal for API Consumers





Innovate with our APIs

Welcome to our API portal where you will find a great selection of APIs for your awesome innovative apps

Popular APIs



Customer Profiles 1.0.0

An API for accessing, updating, creating, and deleting customer profile data, backed by DB2.

[Detail](#)

Flight Information 1.0.0

An API to obtain Acme Air flight pricing and schedules. Backed by Websphere Application Server.

[Detail](#)

Hotels 1.0.0

API for searching available hotels in a given zip code with specified amenities. This API is powered by IBM Z Systems.

[Detail](#)

Payments 1.0.0

API for handling Acme Air payments. This API enables developers to utilize IIB for payment through a simple REST interface.

[Detail](#)

Developer Portal



Travel 1.0.0

APIs

Customers 1.0.0

Flight Information 1.0.0

Hotels 1.0.0

Payment 2.0.0

Plans

Travel 1.0.0

★★★★★
Average: 5 (1 vote)

Description
AcmeAir Travel APIs

Customers 1.0.0

User CustomerProfile

GET /Users/count

Summary
Count instances of the model matched by where from the data source.

Parameters

Name	Located in	Required	Schema
where	query	No	Criteria to match model instances

Content-Type

header

No

application/xml
text/xml
application/x-www-form-urlencoded
application/json

Accept

header

No

application/xml
application/json

Contact information

Example Try Code

Definition

GET https://apimdev0071.hursley.ibm.com/demo-org/acme-air-production/api/Users/count

Example Response

"fecsup"

Cloud





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@IBMBluemix

In SF for @DeveloperWeek or #NodeSummit. Attend the #bluemix garage event for some drinks, food, and #bluemix demos.

Bluemixdevnight.eventbrite.com

Posted: About 17 hours ago. Source: IBM Bluemix™

@IBMBluemix

RT @jsloyer: Attendee posing for a #selfie instead of a #selfie at the @IBMBluemix booth at #NodeSummit. #bluemix #inception <http://t.co/HY...>

Posted: About 19 hours ago. Source: IBM Bluemix™

@IBMBluemix

Love is in the air at #NodeSummit. #bluemix ❤'s #nodejs. Drop by our booth to display your own message! vine.co/v/OUI0q7deiU6e

Posted: About 19 hours ago. Source: IBM Bluemix™

API Connect comes to Bluemix

IBM Hybrid Integration Services



IBM API Connect on Bluemix

An integrated solution to manage the API lifecycle for all of your Bluemix APIs

Value: Create, Run, Secure, Control, Publish, Analyze and Manage your APIs.



API Connect
IBM

PUBLISH DATE
03/25/2016

TYPE
Service

[VIEW DOCS](#)

IBM API Connect is a comprehensive end-to-end API lifecycle solution that enables the automated creation of APIs, simple discovery of systems of records, self-service access for internal and third party developers and built-in security and governance. Using automated, model-driven tools, create new APIs and microservices based on Node.js and Java runtimes—all managed from a single unified console. Ensure secure & controlled access to the APIs using a rich set of enforced policies. Drive innovation and engage with the developer community through the self-service developer portal. IBM API Connect provides streamlined control around various lifecycle stages of the API and also enables businesses to gain deep insights around API consumption from its built-in analytics.

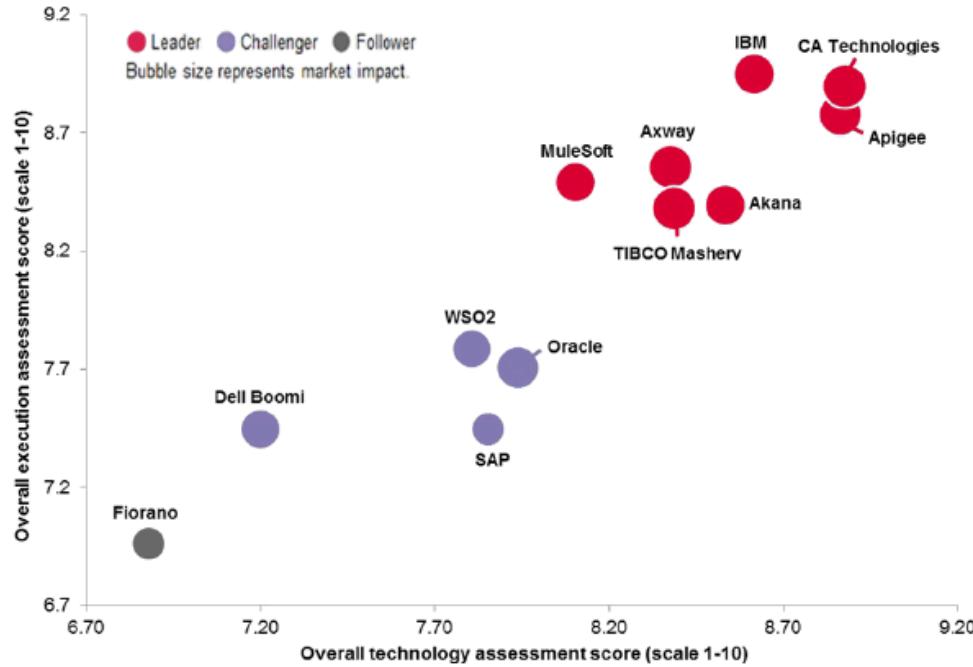
- **Securely unlock existing IT assets**
Rapidly generate Swagger compliant APIs from backend datasources. Iteratively design and test APIs thereby shortening development cycles.
- **Graphical API assembly**
Graphically assemble the API invocation flow and apply policies that need to be enforced for secure controlled access.
- **Community & Subscription management**
Create developer communities to publish and share APIs and engage with them through a self-service portal. Also manage the subscriptions of the API to ensure easy consumption.
- **Gain insights about API consumption**
Built-in analytics and customized dashboards empower businesses to make informed decisions.



Key Capabilities:

- **Create** – create high-quality, scalable and secure APIs for application servers, databases, enterprise service buses (ESB) & mainframes in minutes
- **Run** – Run—take advantage of integrated tooling to build, debug and deploy APIs and microservices using the Node.js or Java
- **Manage** – create and manage portals that allow developers to quickly discover and consume APIs and securely access enterprise data, and monitor APIs to improve performance
- **Secure** - Secure—Administrators can manage security and governance over APIs and the microservices. IT can set and enforce API policies to secure back-end information assets and comply with governance and regulatory mandates

A Bluemix service which seamlessly launches an API Connect experience to extend your API reach

Figure 4: Expanded view of Ovum Decision Matrix: API management, 2016-2017

Source: Ovum