API Gateway @ NIE

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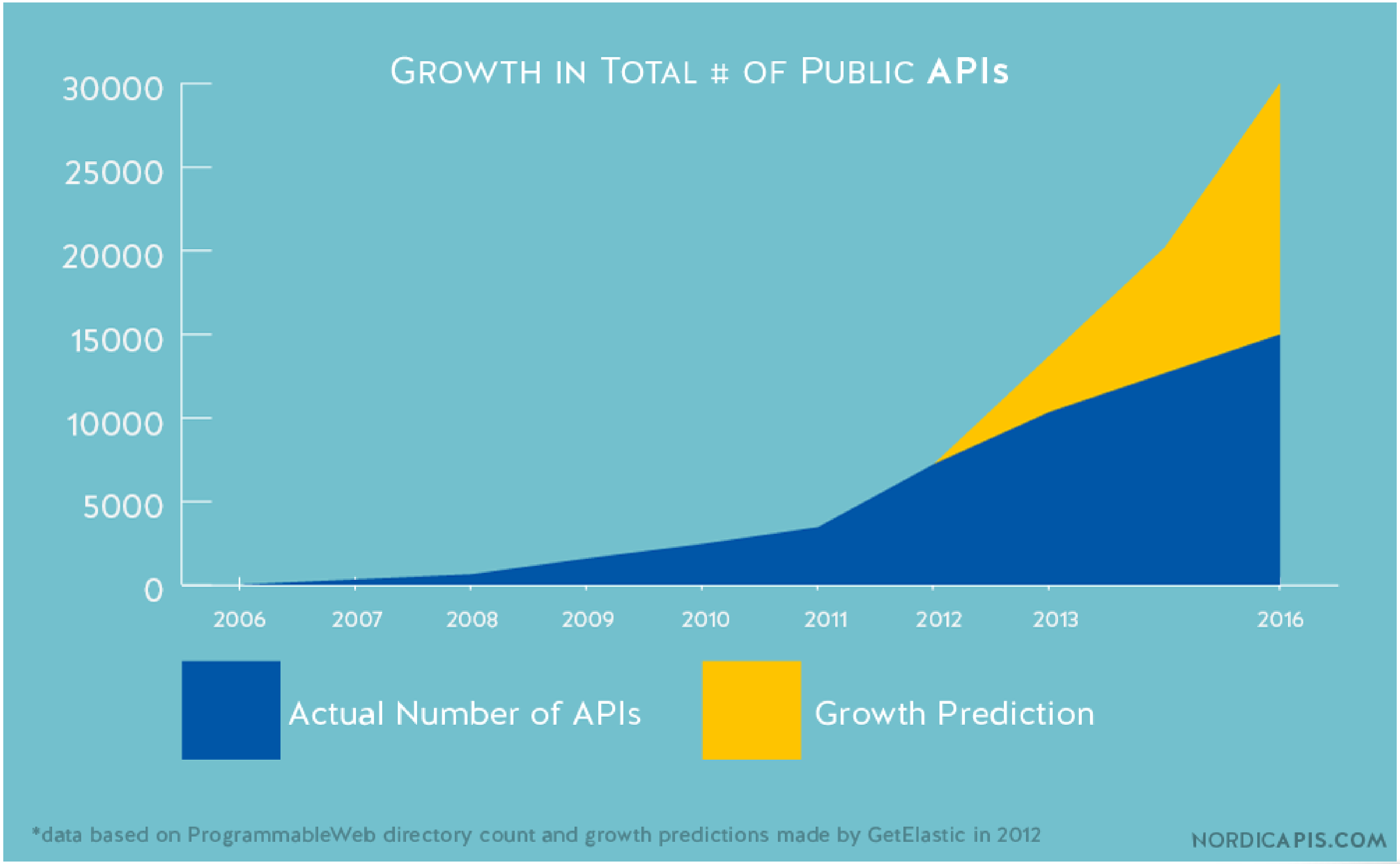
TRANSFORMING TEACHING
INSPIRING LEARNING

Agenda

- What is an API?
- API economy
- What problem does it solve?
- Various types of API gateway
- NIE high level deployment
- Demo using NIE API gw
- QnA

What is API?

API economy

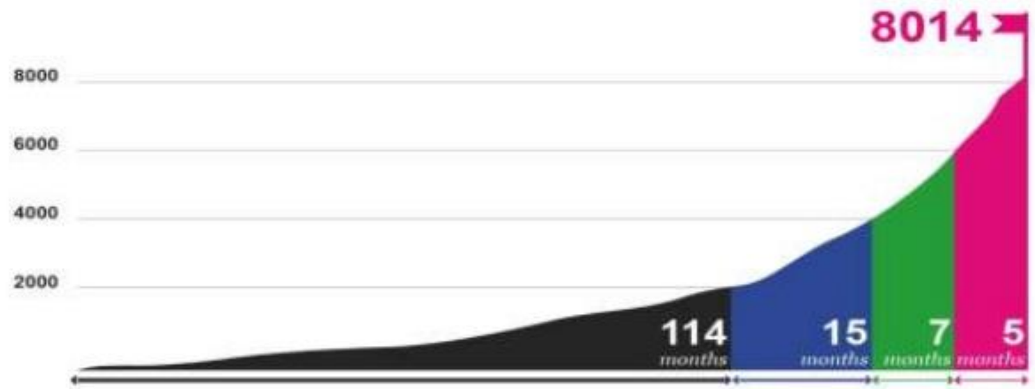


*data based on ProgrammableWeb directory count and growth predictions made by GetElastic in 2012

NORDICAPIS.COM

API Frenzy

🐦	15B+ API calls a day	salesforce	1B+ API calls a day
g	10B+ API calls a day	ebY	1B+ API calls a day
f	7B+ API calls a day	NETFLIX	1.5B+ API calls a day



API Growth Rate
Source: Programmable Web

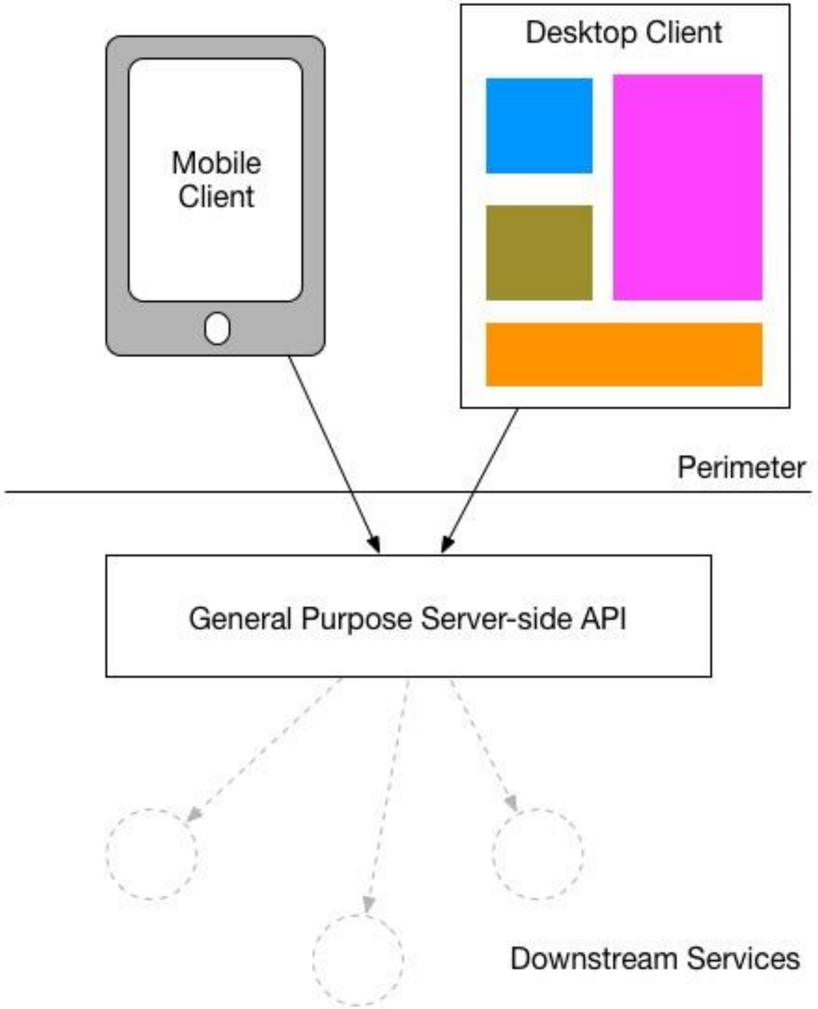
SOA software™
Powering the API Economy

Types of API

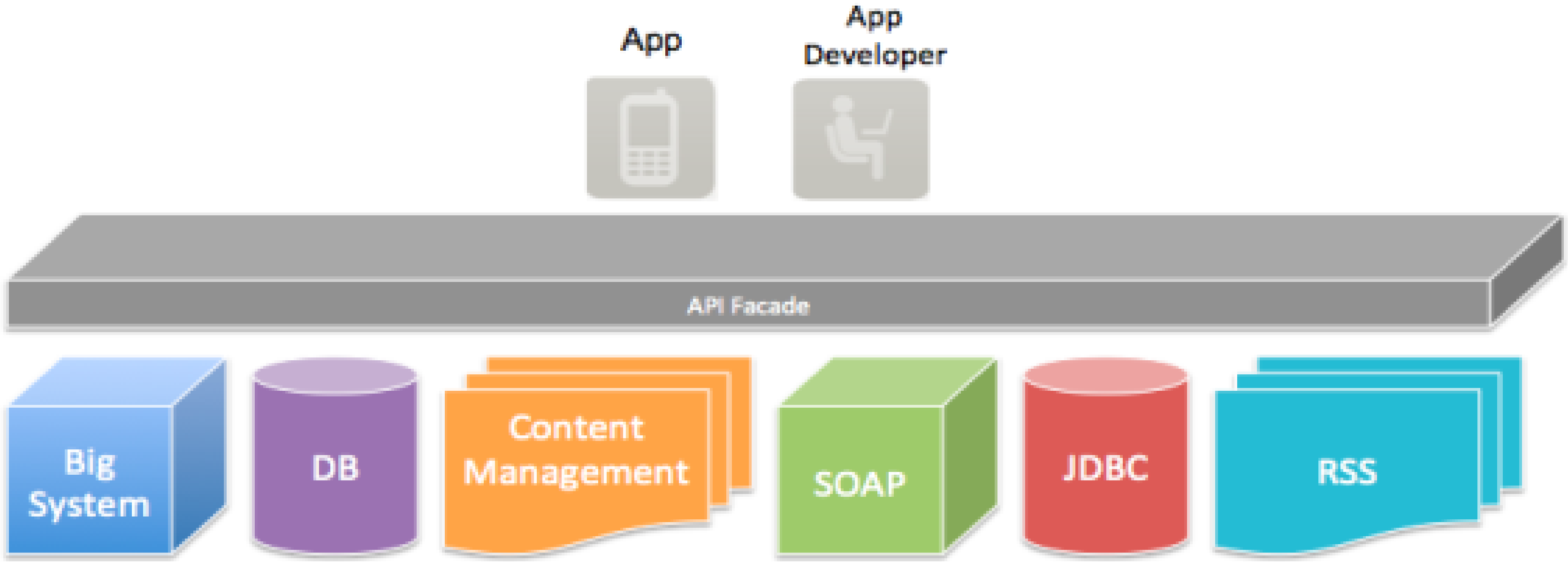
- Three types of APIs :
  - – Open APIs: these APIs are publicly available on the web. They are made available to all developers through a simple online contract.
  - – Semi-open APIs: these APIs are accessible to a limited number of partners selected by the company.
  - – Closed APIs: these APIs are for the company's internal operations; their use is reserved for internal developers.

What problem does a gateway solve?

- Abstraction of backend servers – Facade pattern
- BFF pattern – Backend for Frontend pattern
- Micro-services
- Single entry point for integration
- Policy management
- Service bus



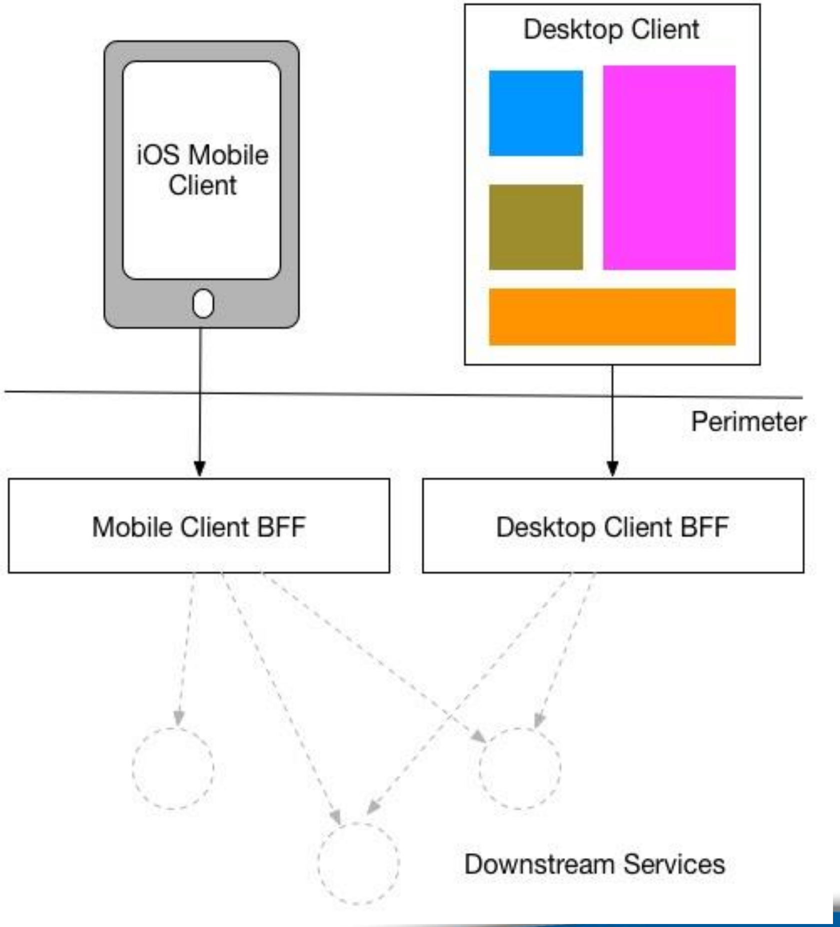
API facade pattern



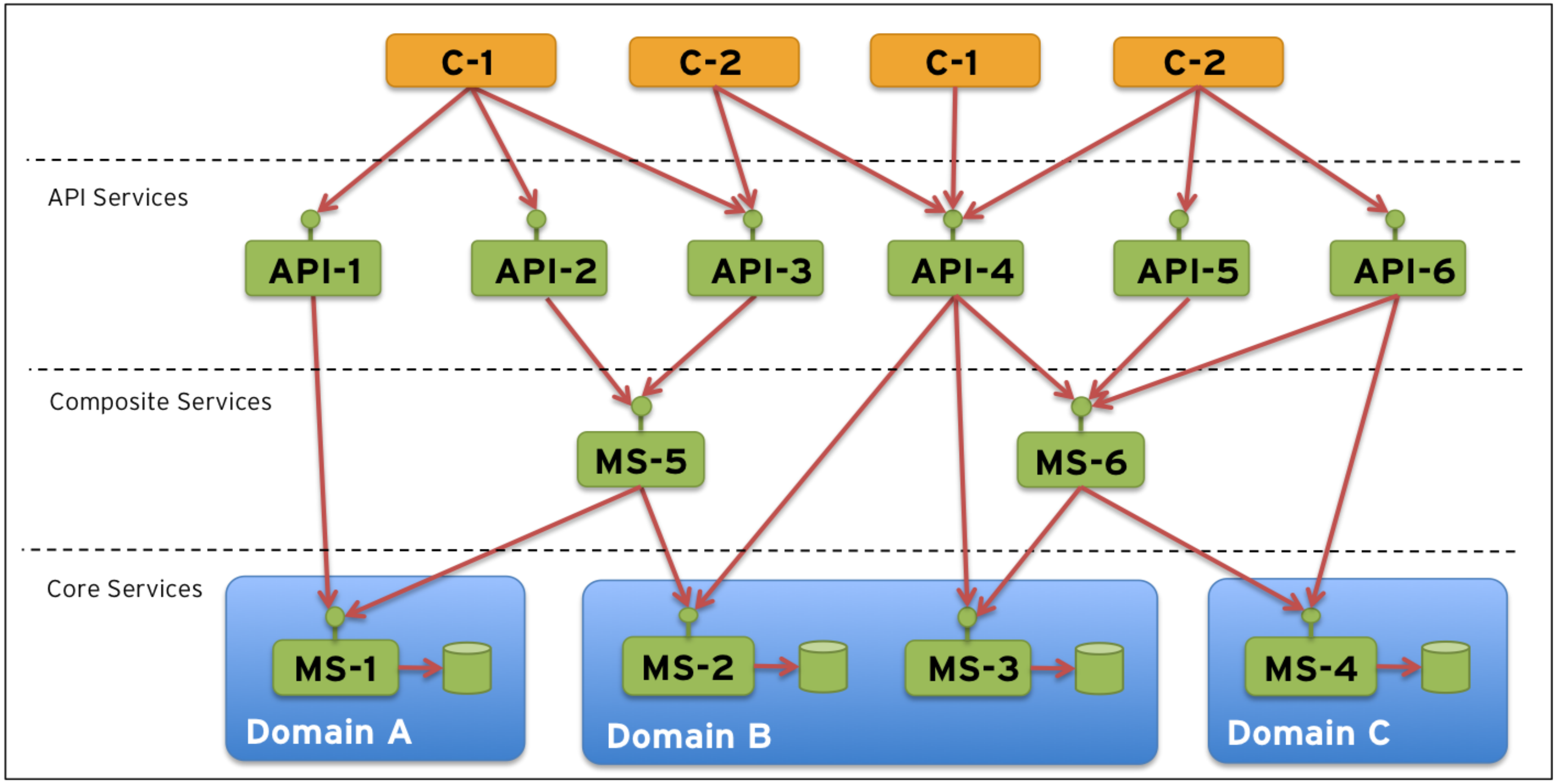
- Simple interface to a complex system
- Future-proof your systems
- Hiding the internal implementation (abstraction)

BFF pattern

- https://microservices.io/patterns/apigateway.html
- A layer of BFF services that mesh up the next layer of micro-services
- One BFF per mobile experience
- Provides Optimal call for each client



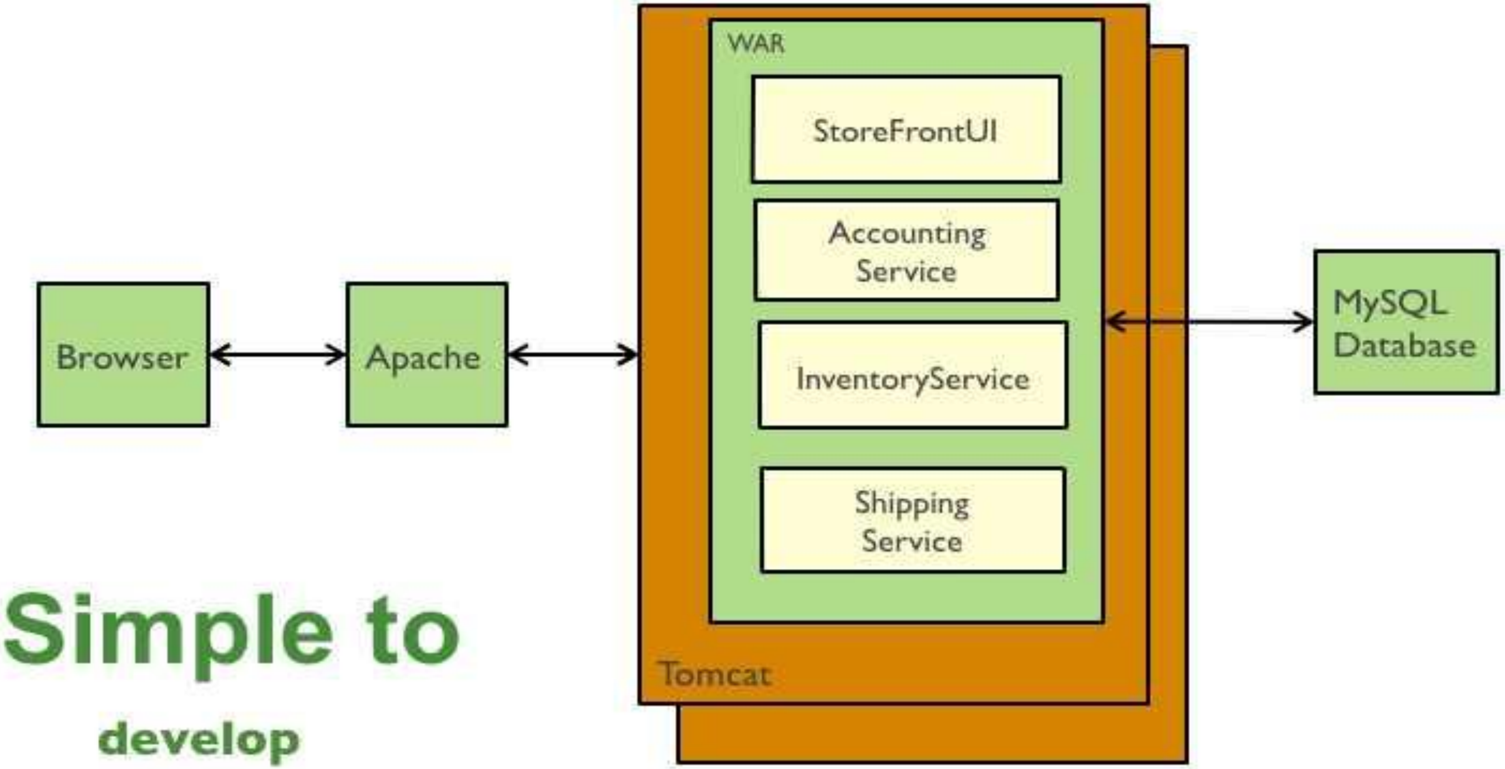
Micro-services architecture



- An architectural style that structures an application as a collection of loosely coupled service

Monolithic Architecture

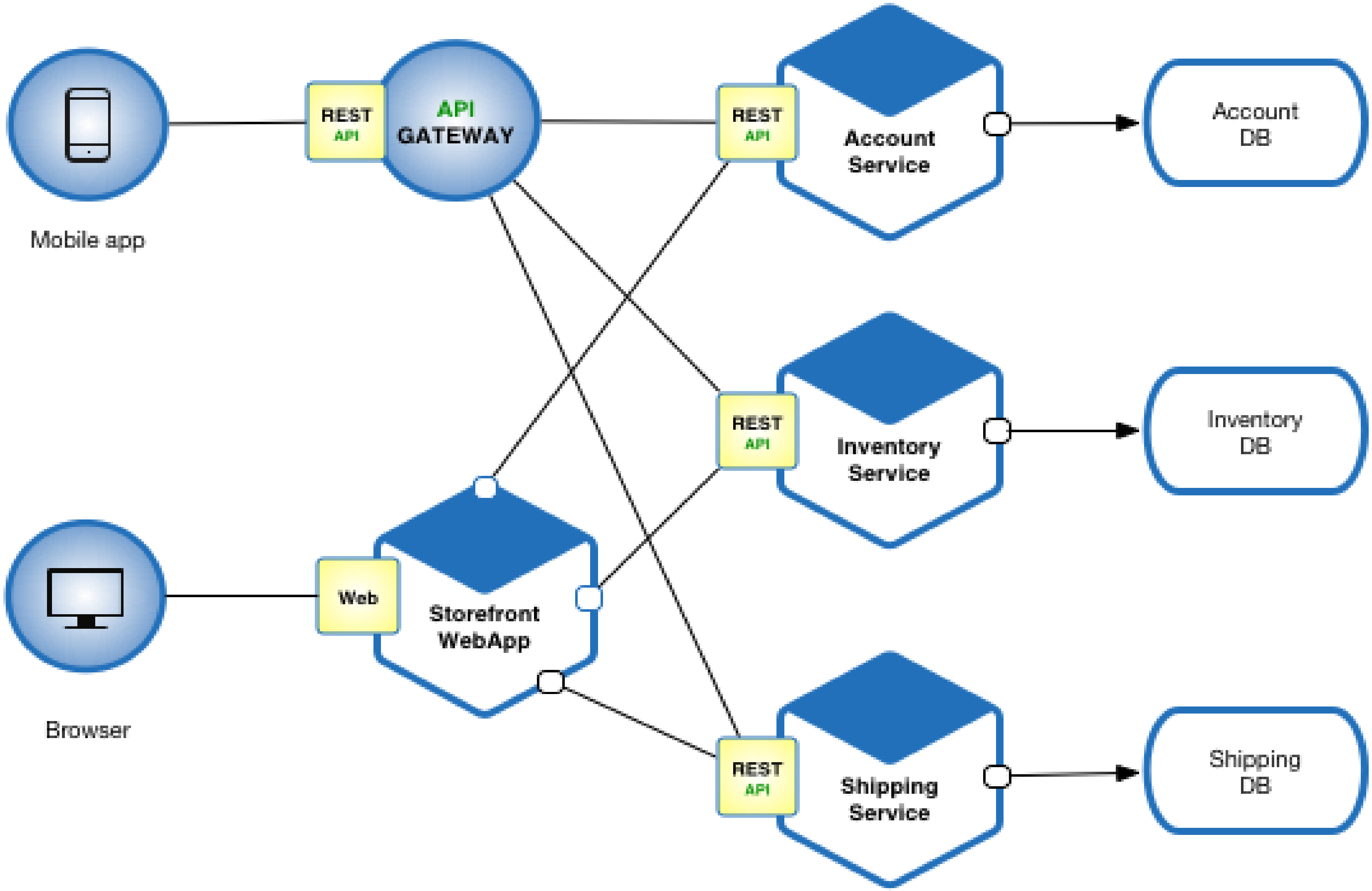
Traditional web application architecture



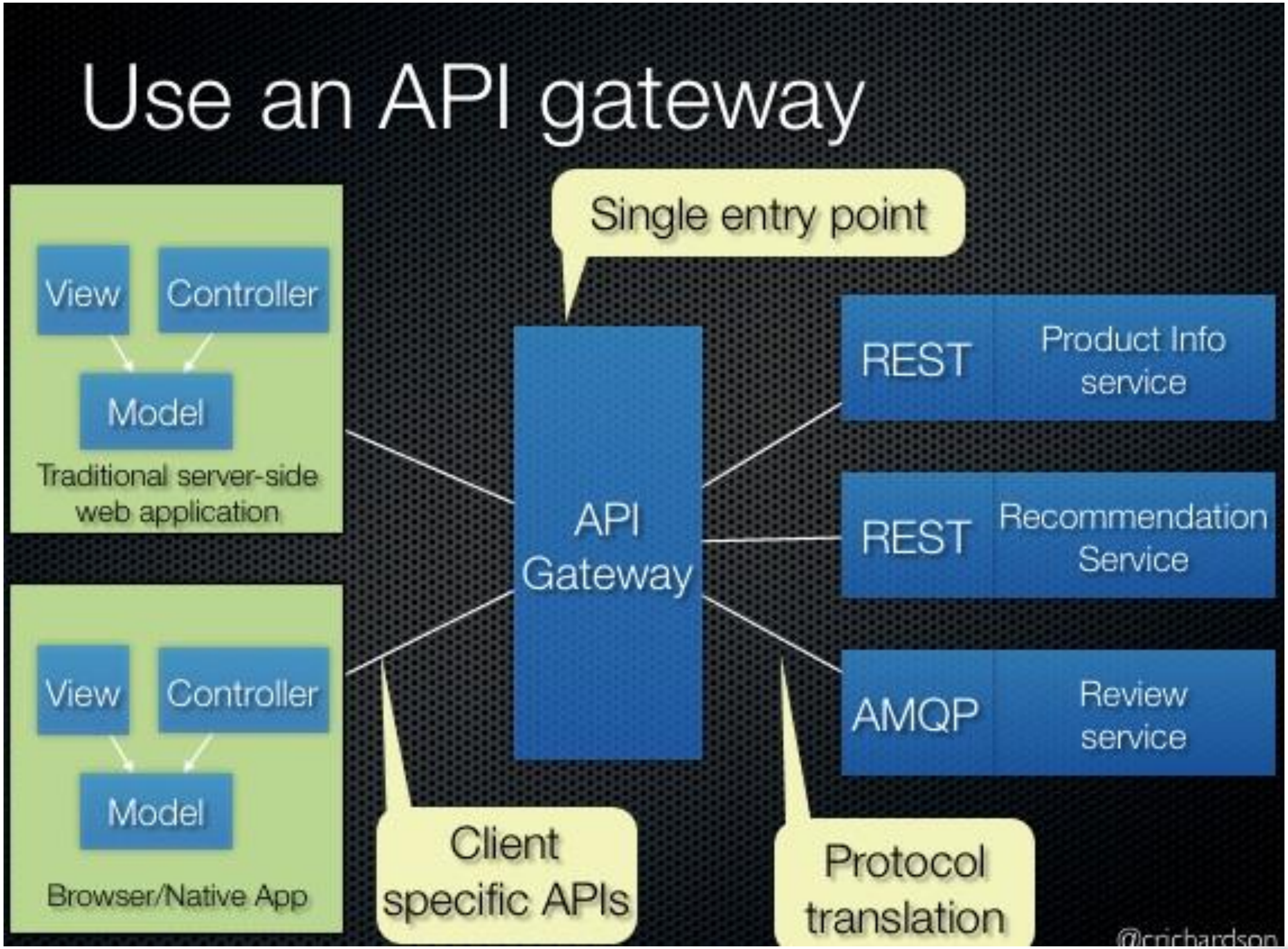
Simple to

- develop
- test
- deploy
- scale

Micro services architecture



Use an API gateway



Single entry point

Client specific APIs

Protocol translation

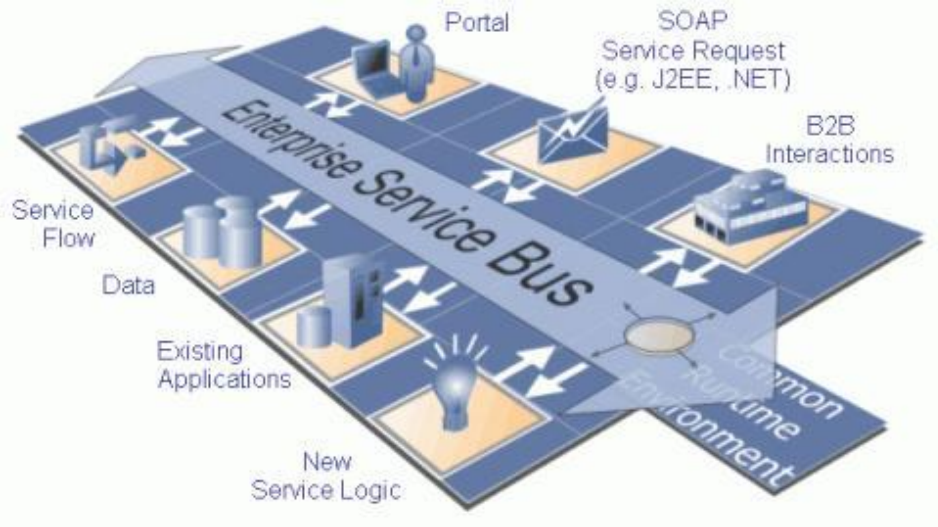
@crichardson

API policies

- Access restriction policies
  - – Parameters type check
  - – Restrict caller IP
  - – Authorization protocol (OAUTH, SAML)
  - – Limit call rate (throttling)
- Authentication policy
  - – Cert verification
- Advance flow
- Caching
- Transformational
  - – Conversion of JSON to XML

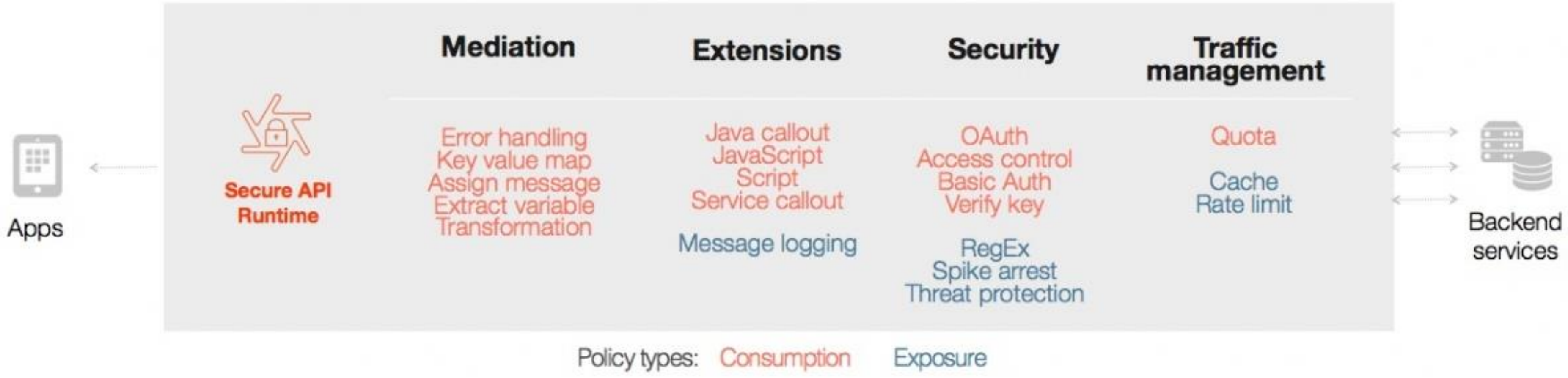
Enterprise Service Bus

- Integrate systems by a communication bus
- Decouples systems from each other, communicate without knowledge of other systems on the bus.
- Move away from point-to-point integration, which is hard to manage over time

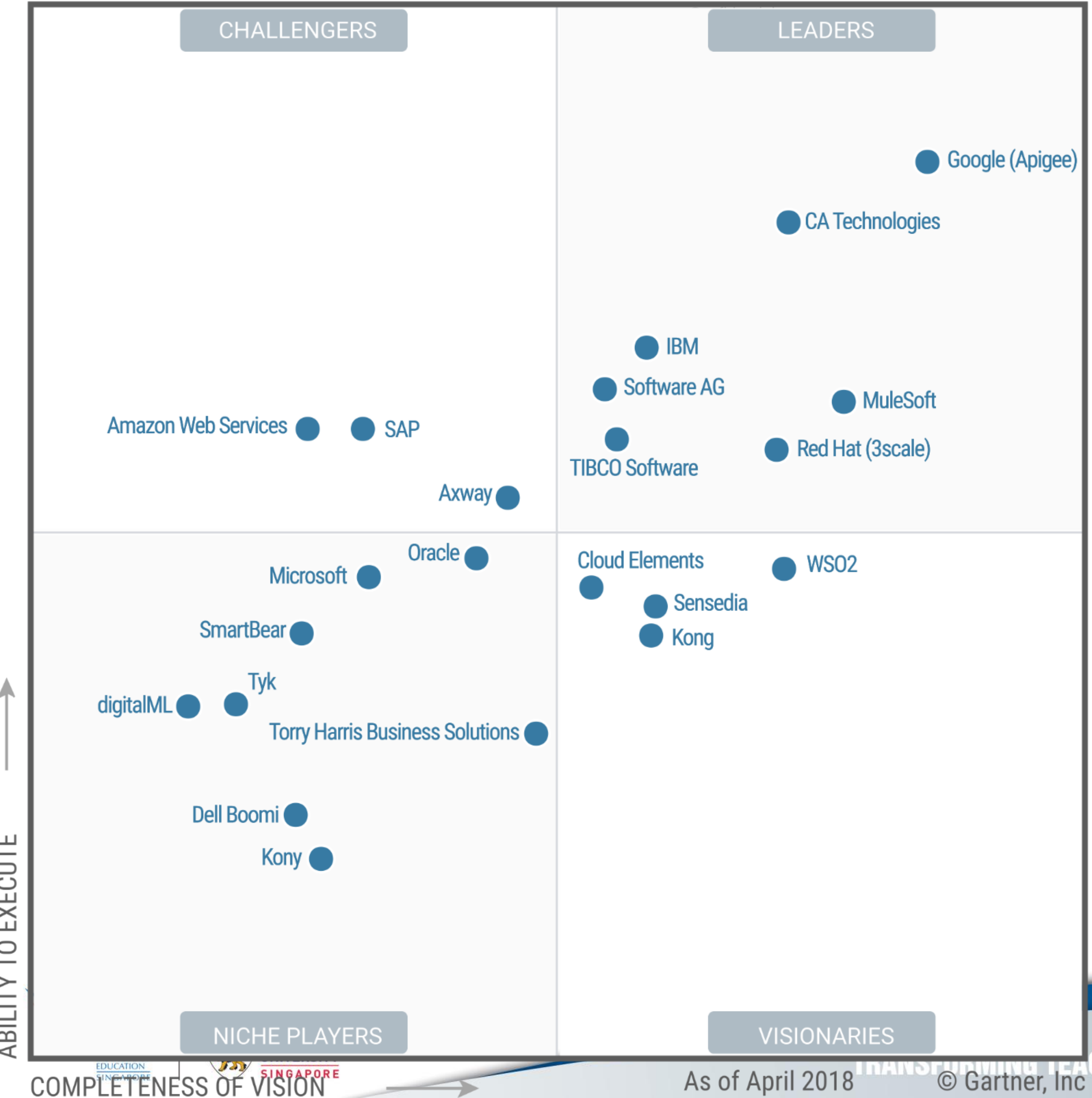


2 main differences

- APIs are consumption-centric, whereas services exposed through ESB are exposure/reuse focused.
- The logic for “orchestration” is not a significant driver for the API layer



Gartner Magic Quadrant for full API Lifecycle management



As of April 2018

© Gartner, Inc

Enterprise API gateway

MuleSoft®

ca technologies

apigee

- Feature rich
- On premise or on cloud

Cloud-base API gateways

amazon web services

Microsoft Azure

Google Cloud apigee

- Pay as you go
- Important abstraction component of cloud architecture

Open source Gateway

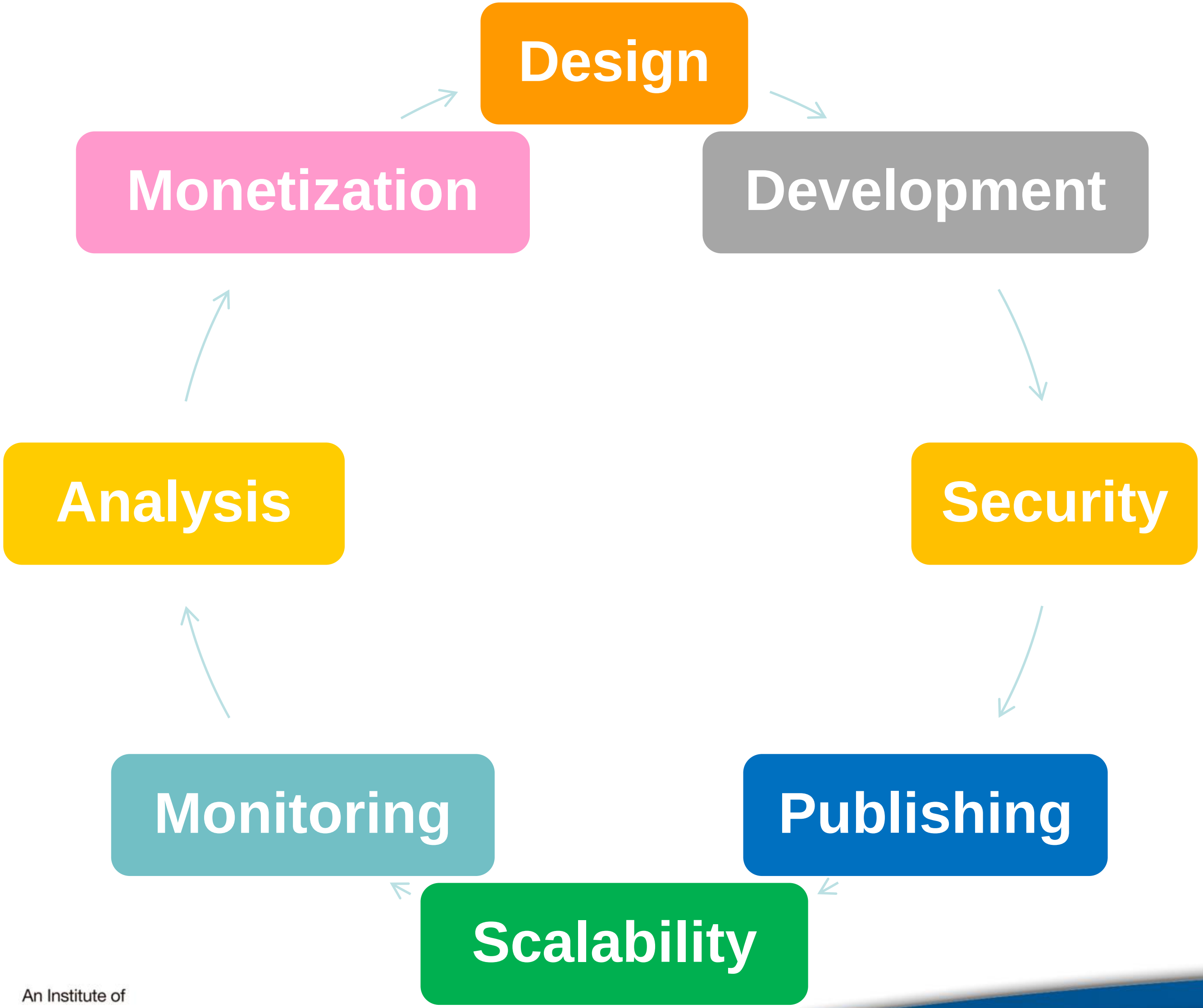
Kong

NETFLIX ZUUL

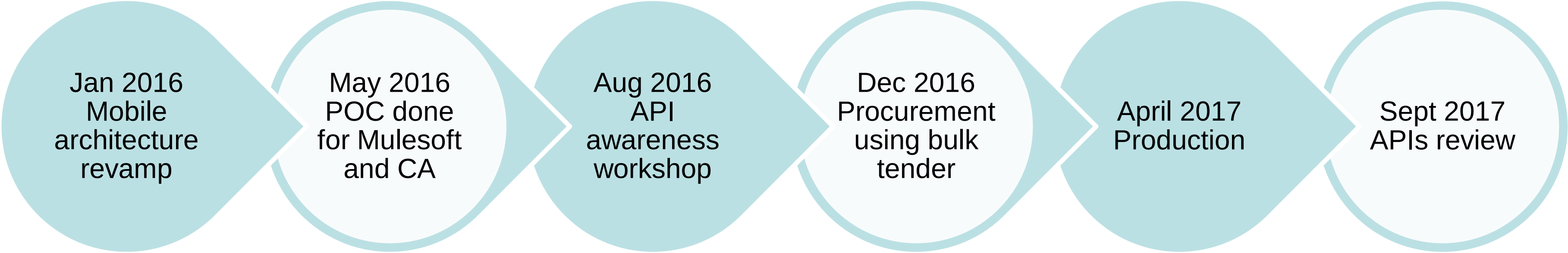
WSO2

- Open source version alternative
- Up and coming niche player
  - –Kong build on Nginx (high performance load balancer)

API management



API journey timeline



Jan 2016 Mobile architecture revamp

May 2016 POC done for Mulesoft and CA

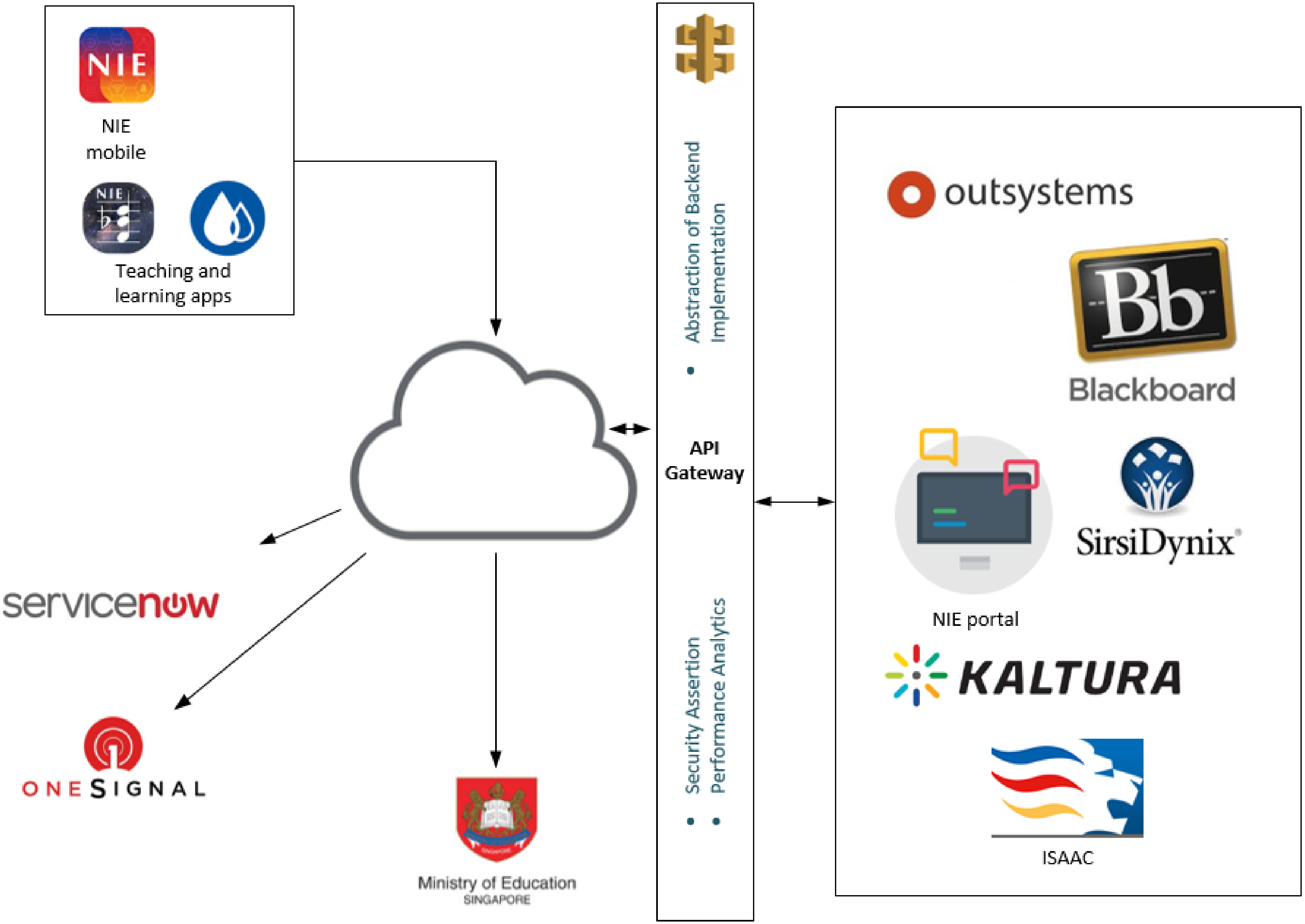
Aug 2016 API awareness workshop

Dec 2016 Procurement using bulk tender

April 2017 Production

Sept 2017 APIs review

NIE API deployment



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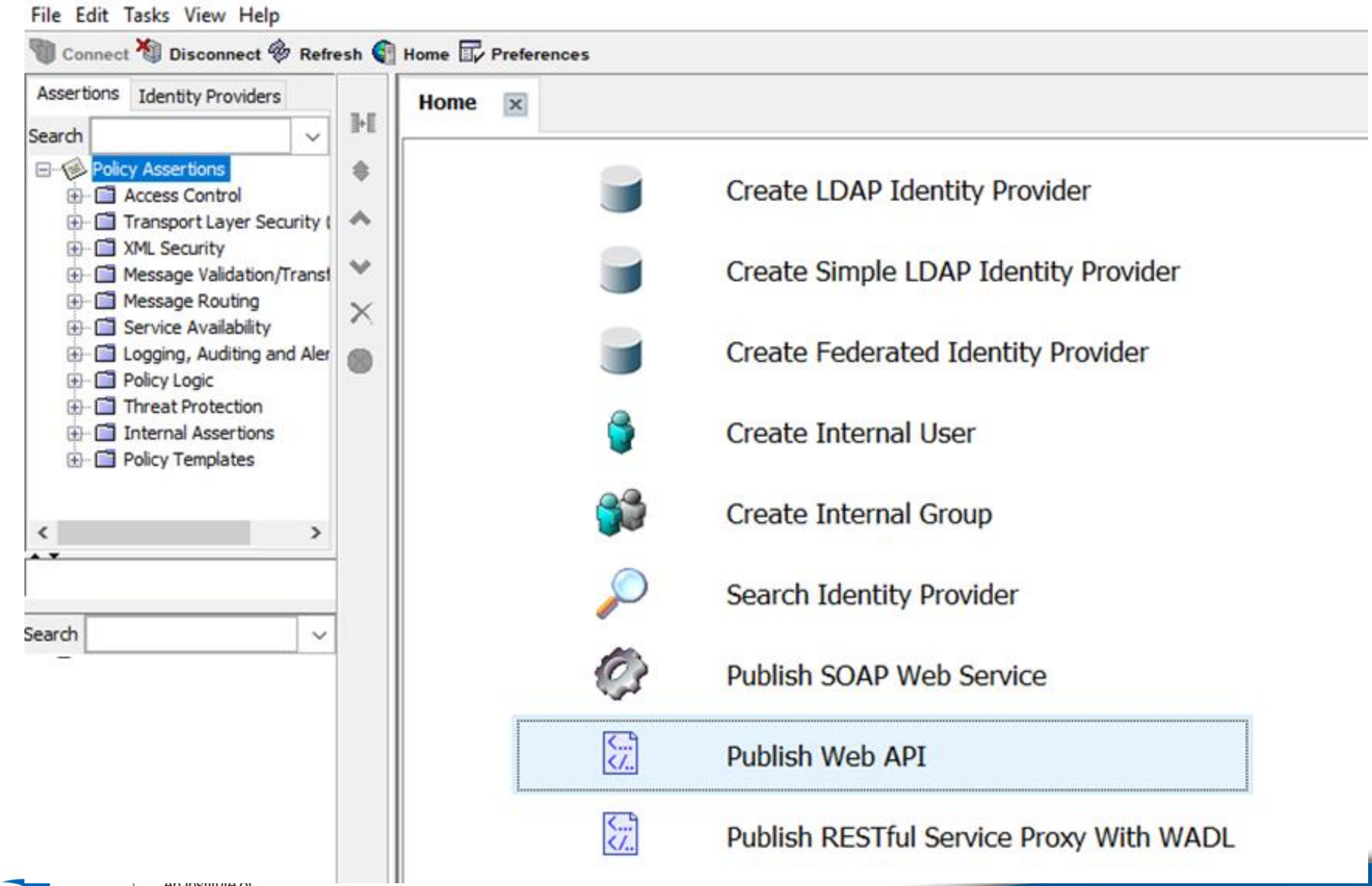
Publish an API in Gateway

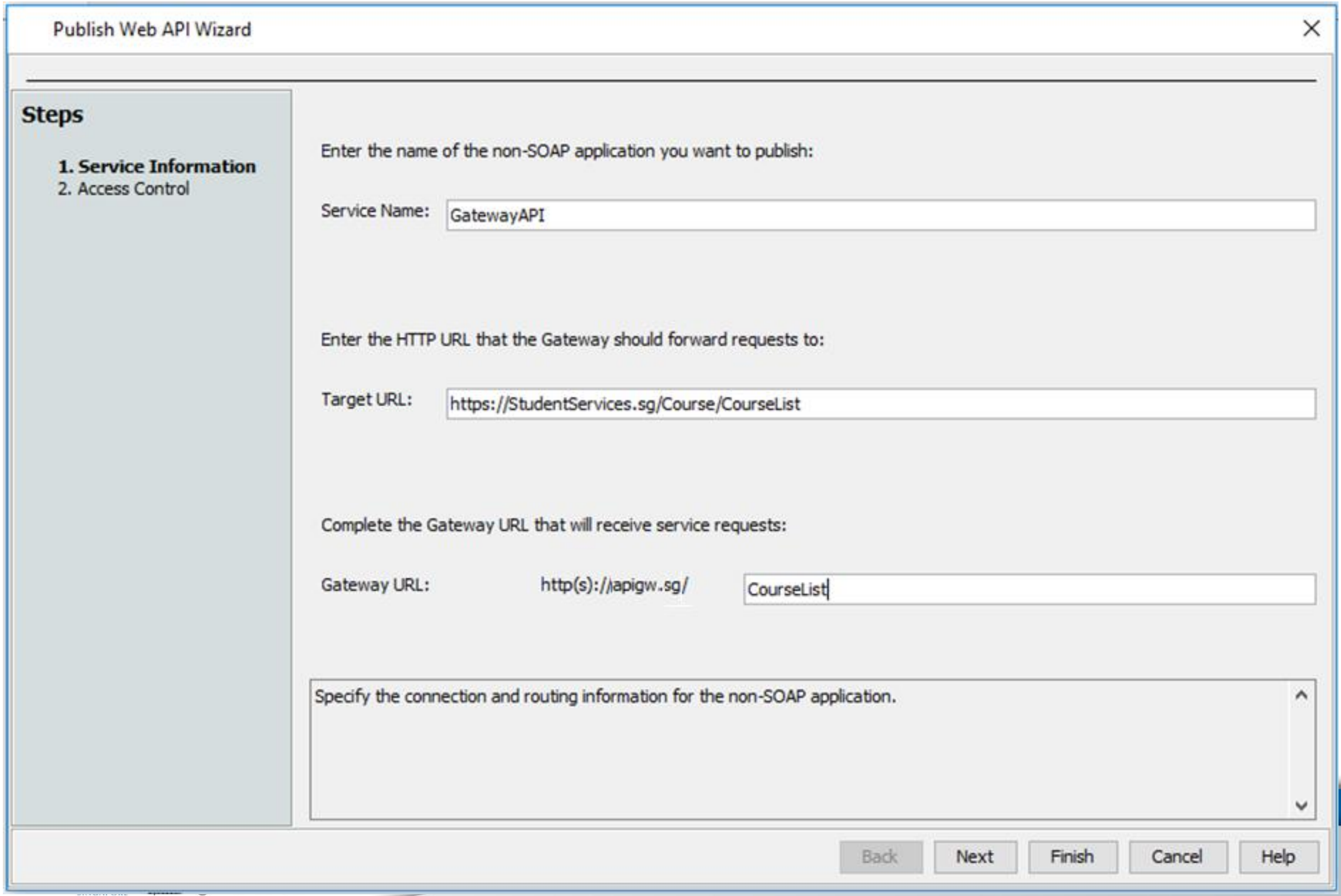
Use Case

- To Publish “CourseList” API from StudentService application in Gateway.
- Apply Policies
  - Audit log
  - Protect URL from SQL Attack

Gateway IDE


File Edit Tasks View Help
Connect
Disconnect
Refresh
Home
Preferences
Assertions
Identity Providers
Search
Policy Assertions
Access Control
Transport Layer Security (
XML Security
Message Validation/Transf
Message Routing
Service Availability
Logging, Auditing and Aler
Policy Logic
Threat Protection
Internal Assertions
Policy Templates
Search
Home
Create LDAP Identity Provider
Create Simple LDAP Identity Provider
Create Federated Identity Provider
Create Internal User
Create Internal Group
Search Identity Provider
Publish SOAP Web Service
Publish Web API
Publish RESTful Service Proxy With WADL

Publish API



Enter the name of the non-SOAP application you want to publish:

Service Name: GatewayAPI

Enter the HTTP URL that the Gateway should forward requests to:

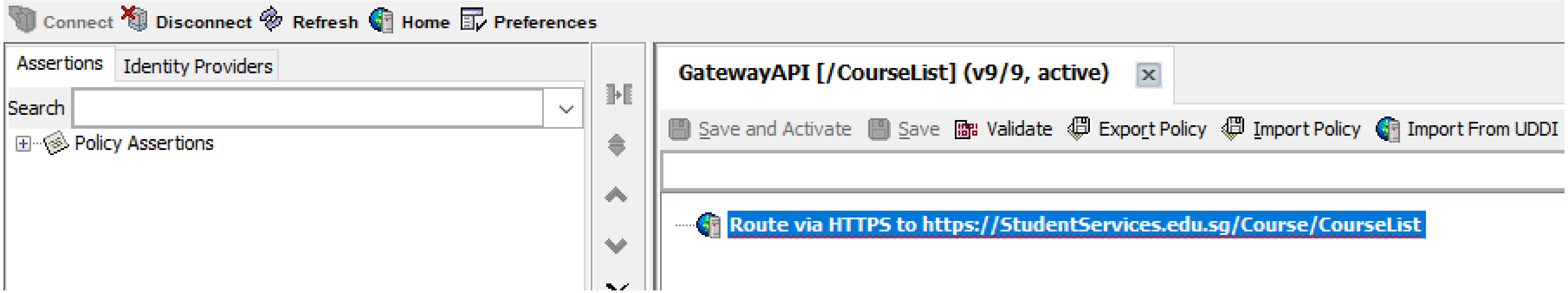
Target URL: https://StudentServices.sg/Course/CourseList

Complete the Gateway URL that will receive service requests:

Gateway URL: http(s)://apigw.sg/ CourseList

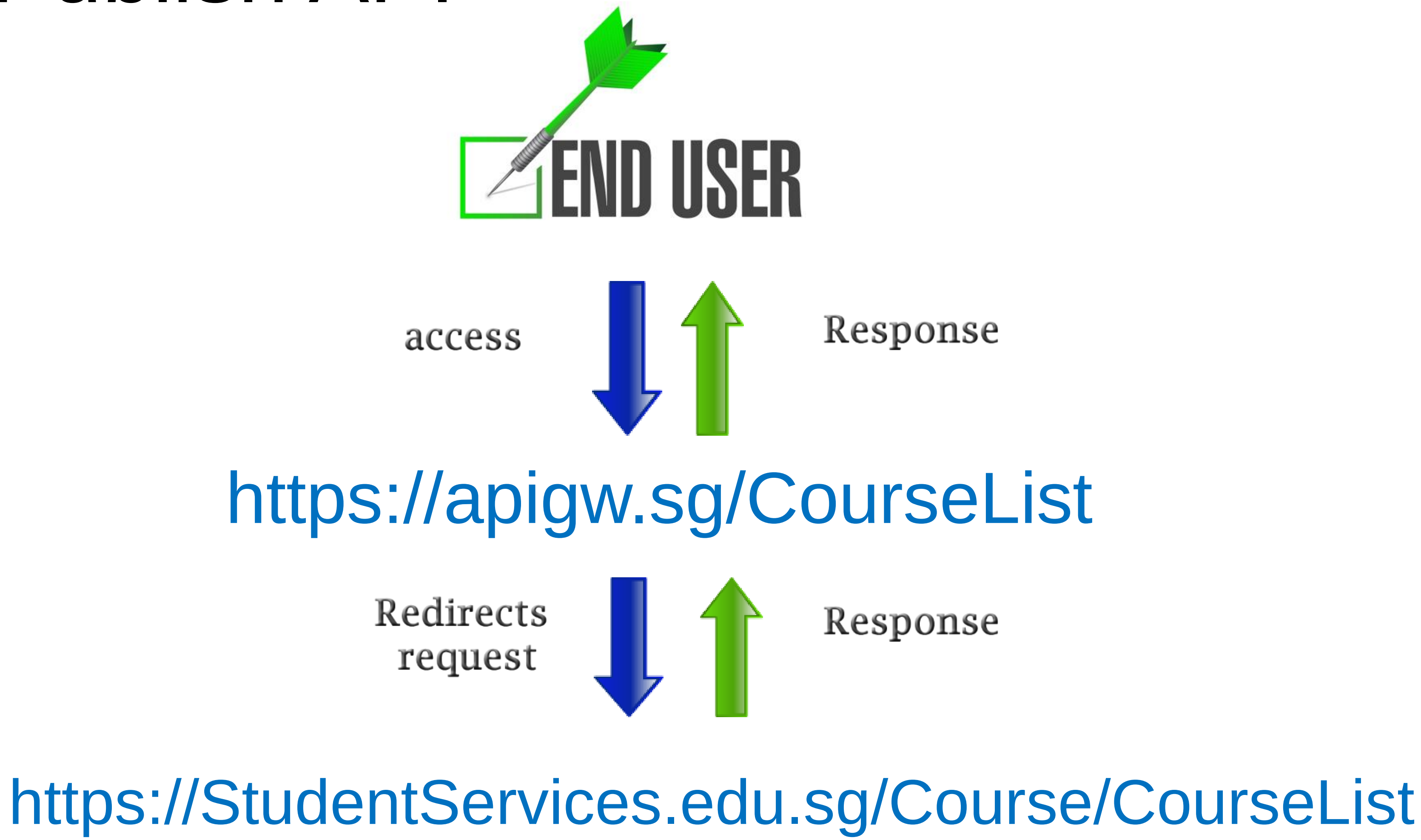
Specify the connection and routing information for the non-SOAP application.

Publish API



Route via HTTPS to https://StudentServices.edu.sg/Course/CourseList

Publish API



END USER

access

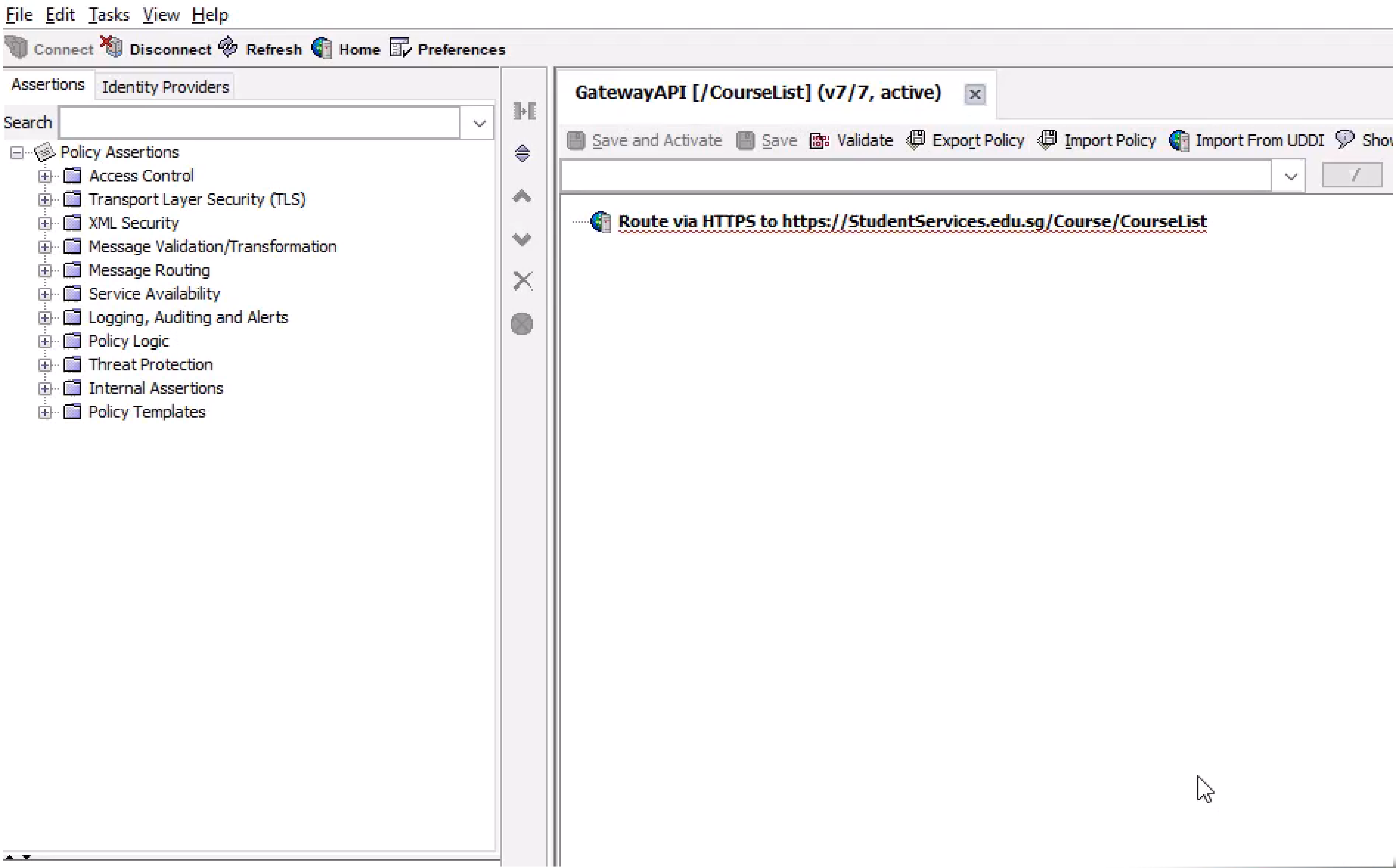
Response

https://apigw.sg/CourseList

Redirects request

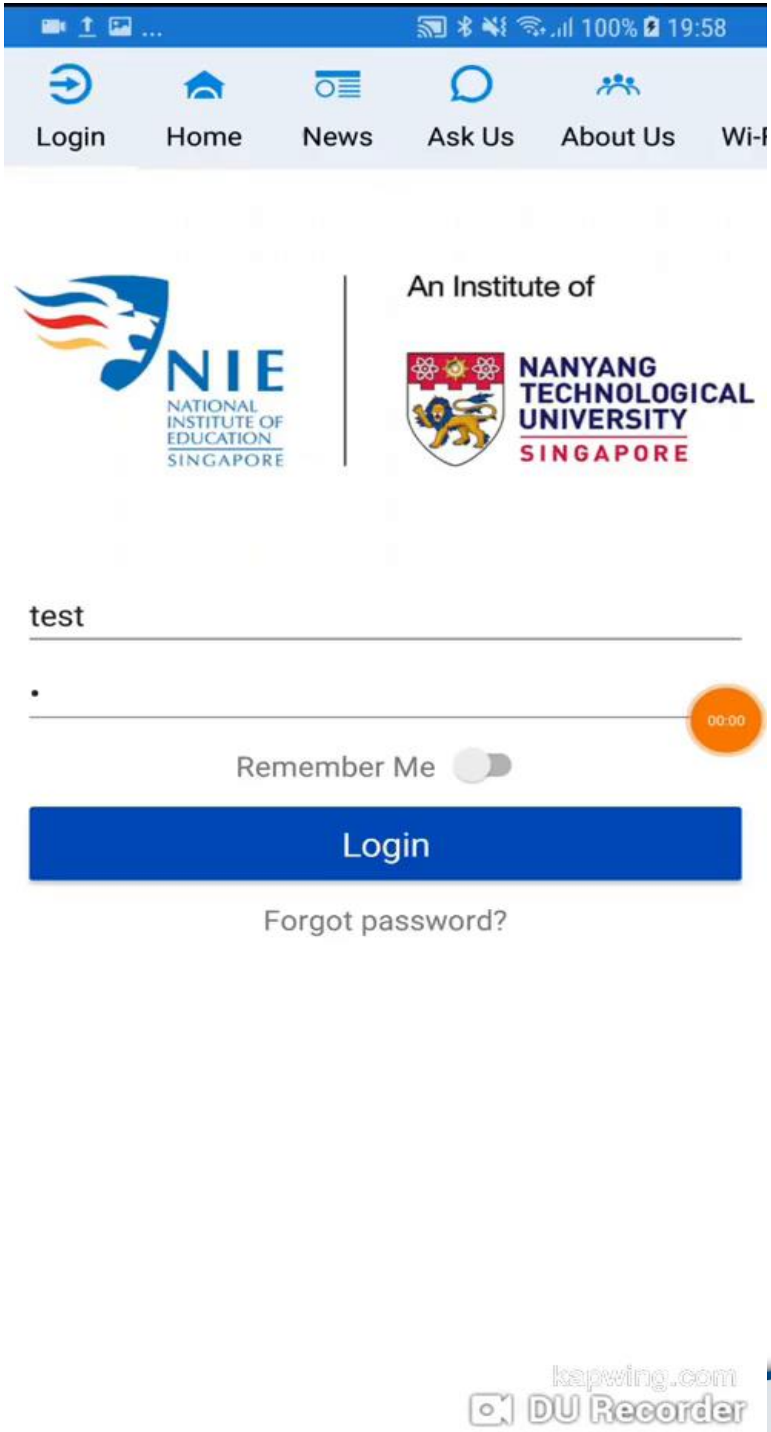
Response

https://StudentServices.edu.sg/Course/CourseList



Route via HTTPS to https://StudentServices.edu.sg/Course/CourseList

NIE Mobile App Consuming APIs via Gateway



An Institute of

NIE NATIONAL INSTITUTE OF EDUCATION SINGAPORE

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

test

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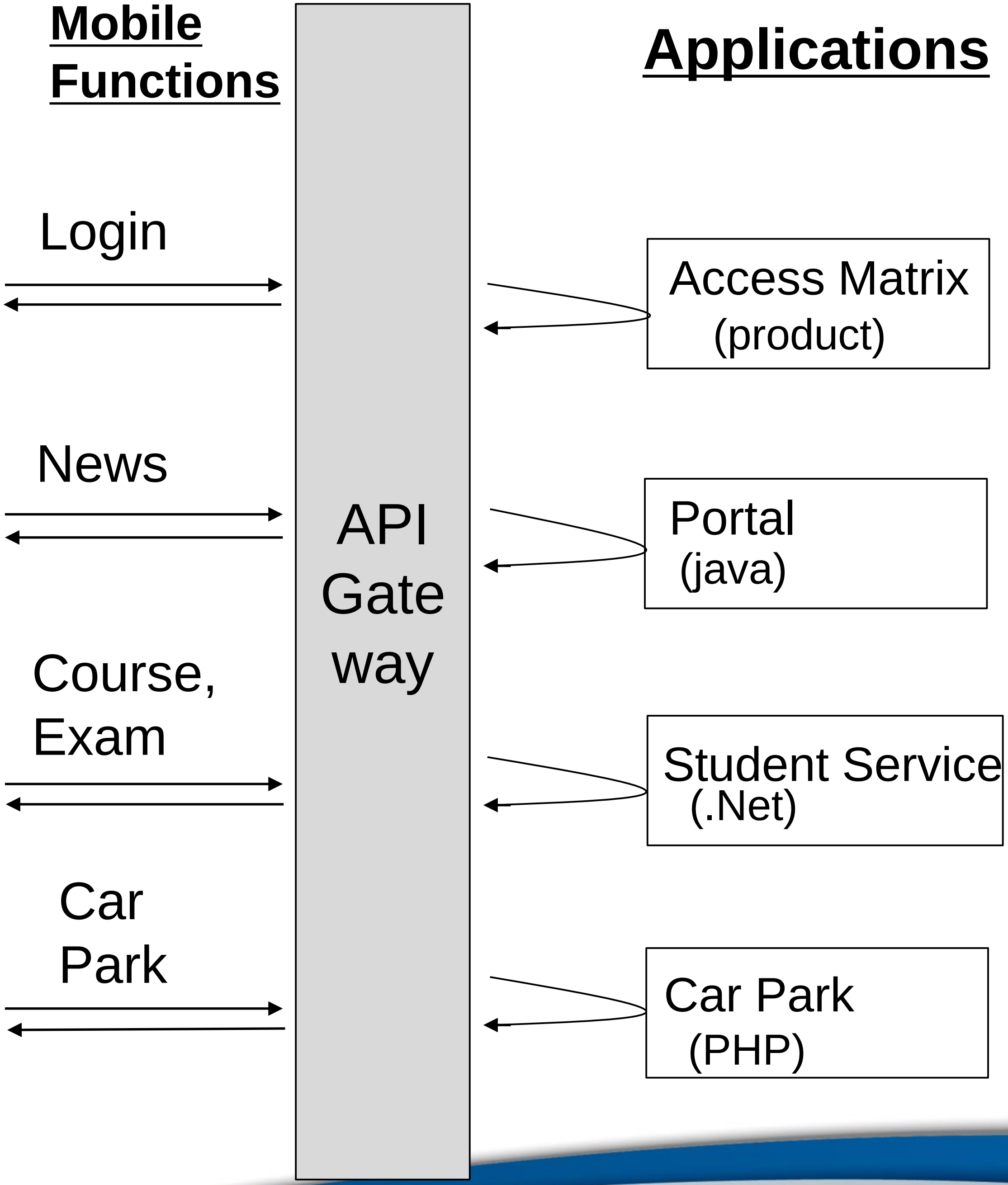
Remember Me

Forgot password?

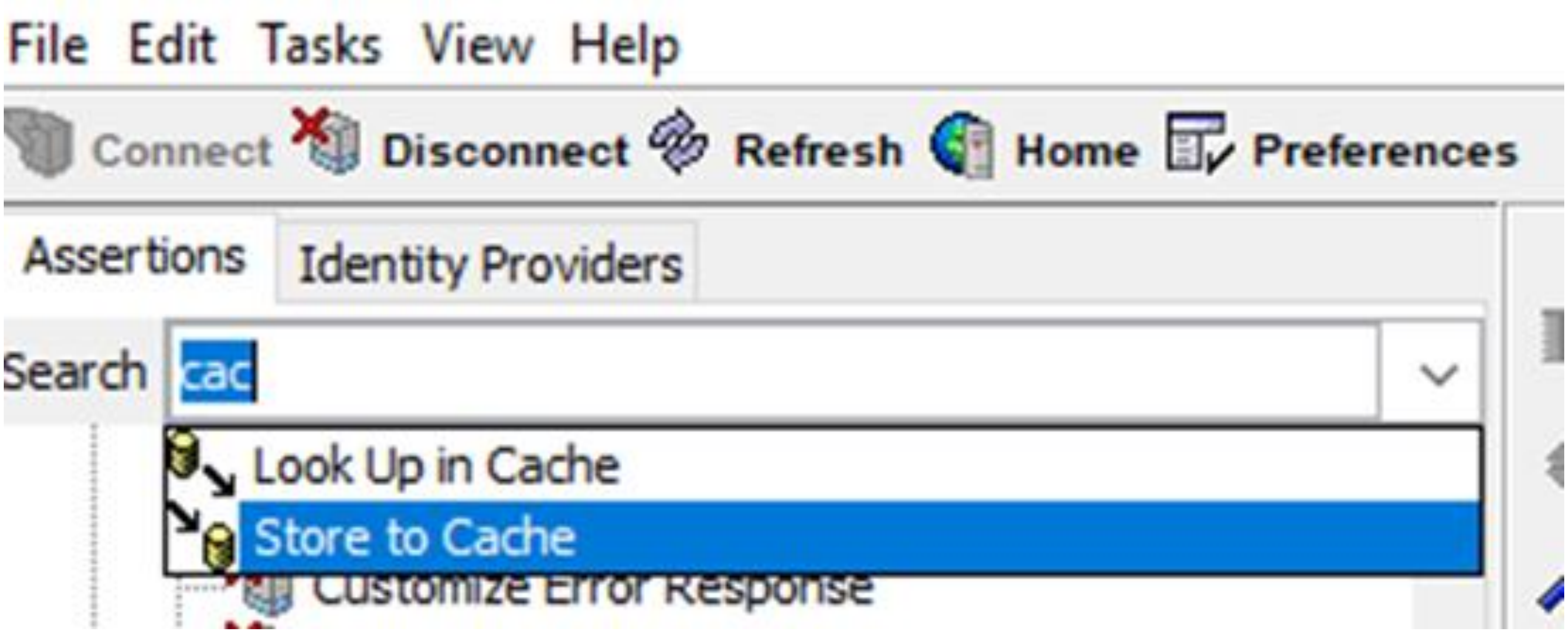


Gateway Policies

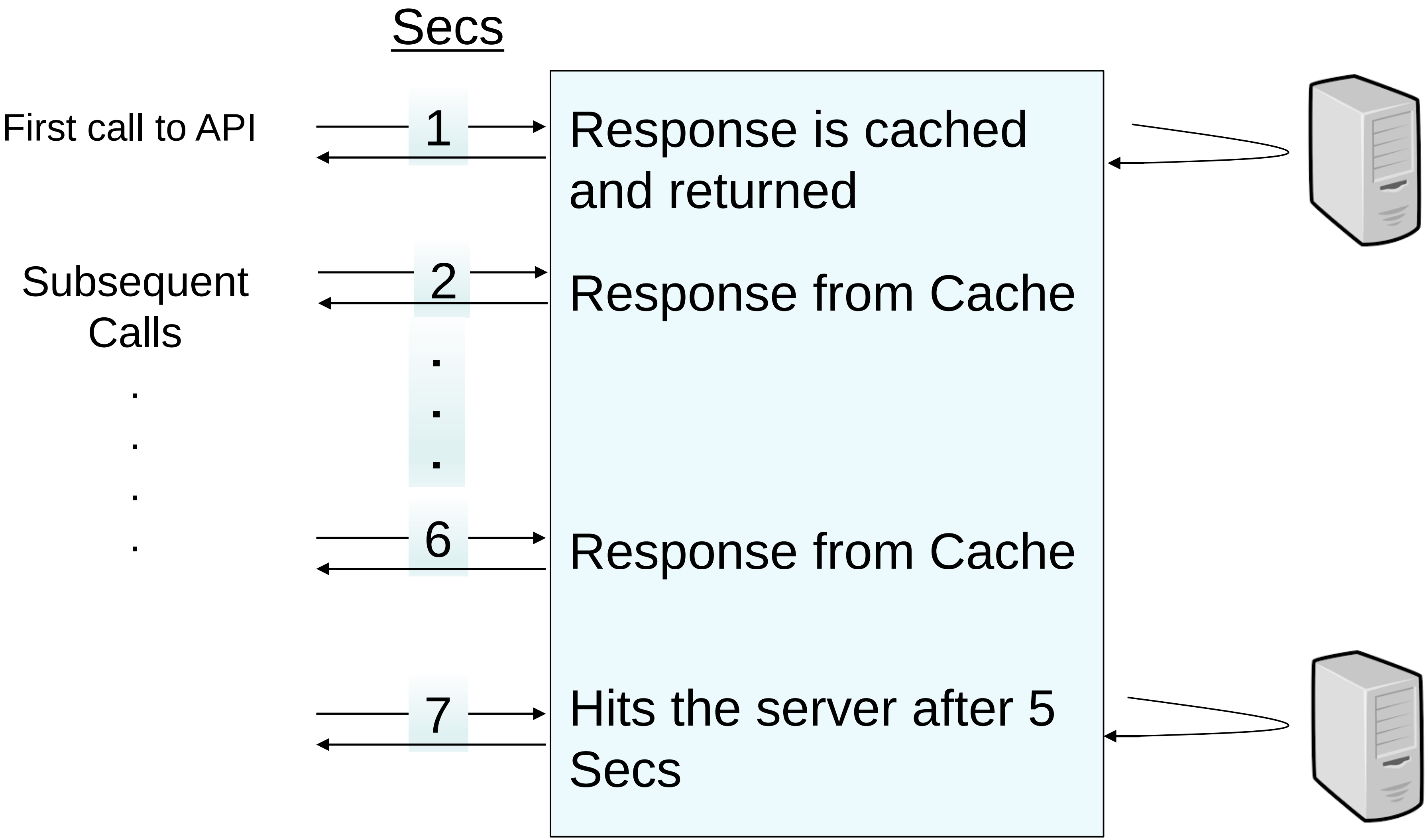
- ❖ Caching
- ❖ Throttling

Caching

Gateway can cache the response from API for a “user defined period” of time.



Eg: Cache Response for 5 secs



Secs

First call to API

1

Response is cached and returned

Subsequent Calls

.

.

.

.

2

Response from Cache

.

.

.

6

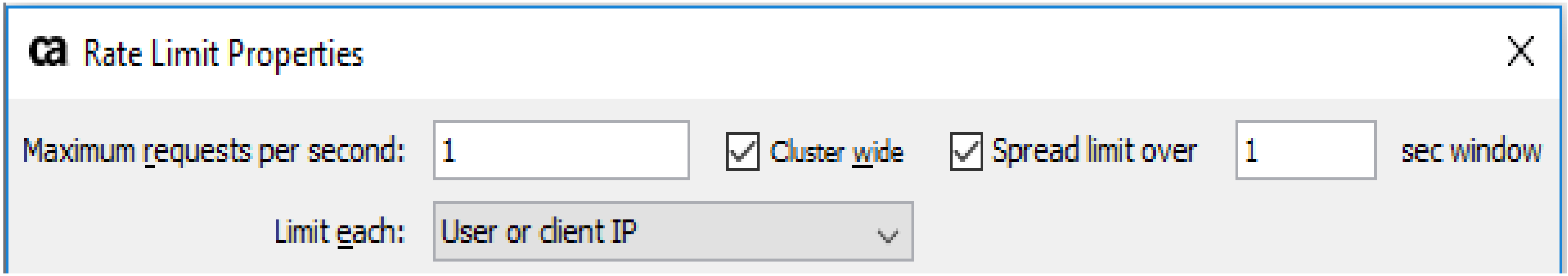
Response from Cache

7

Hits the server after 5 Secs

Throttling

Gateway helps to regulate the rate at which the request is processed per unit time

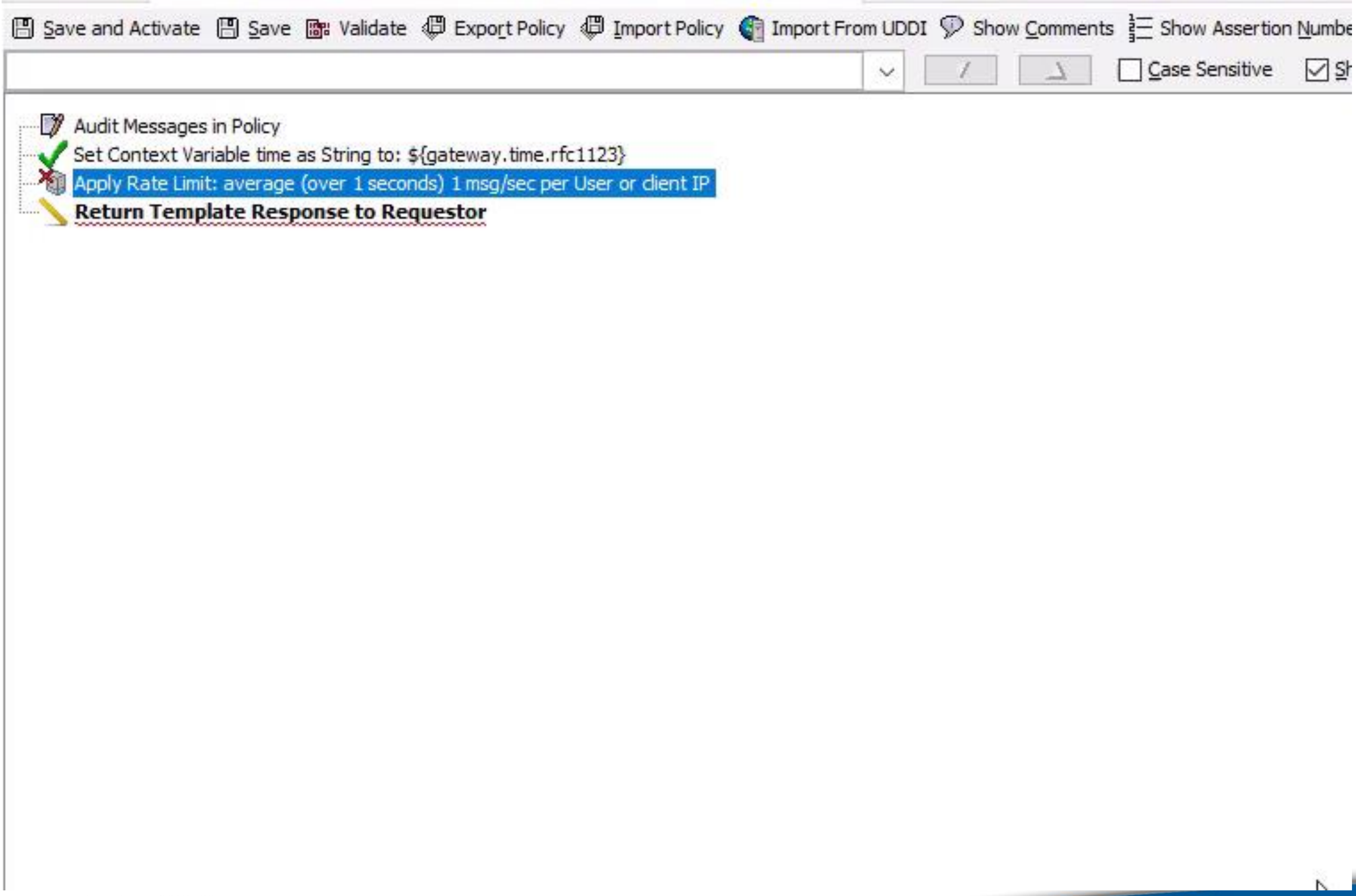


Rate Limit Properties

Maximum requests per second: 1 ☑ Cluster wide ☑ Spread limit over 1 sec window

Limit each: User or client IP

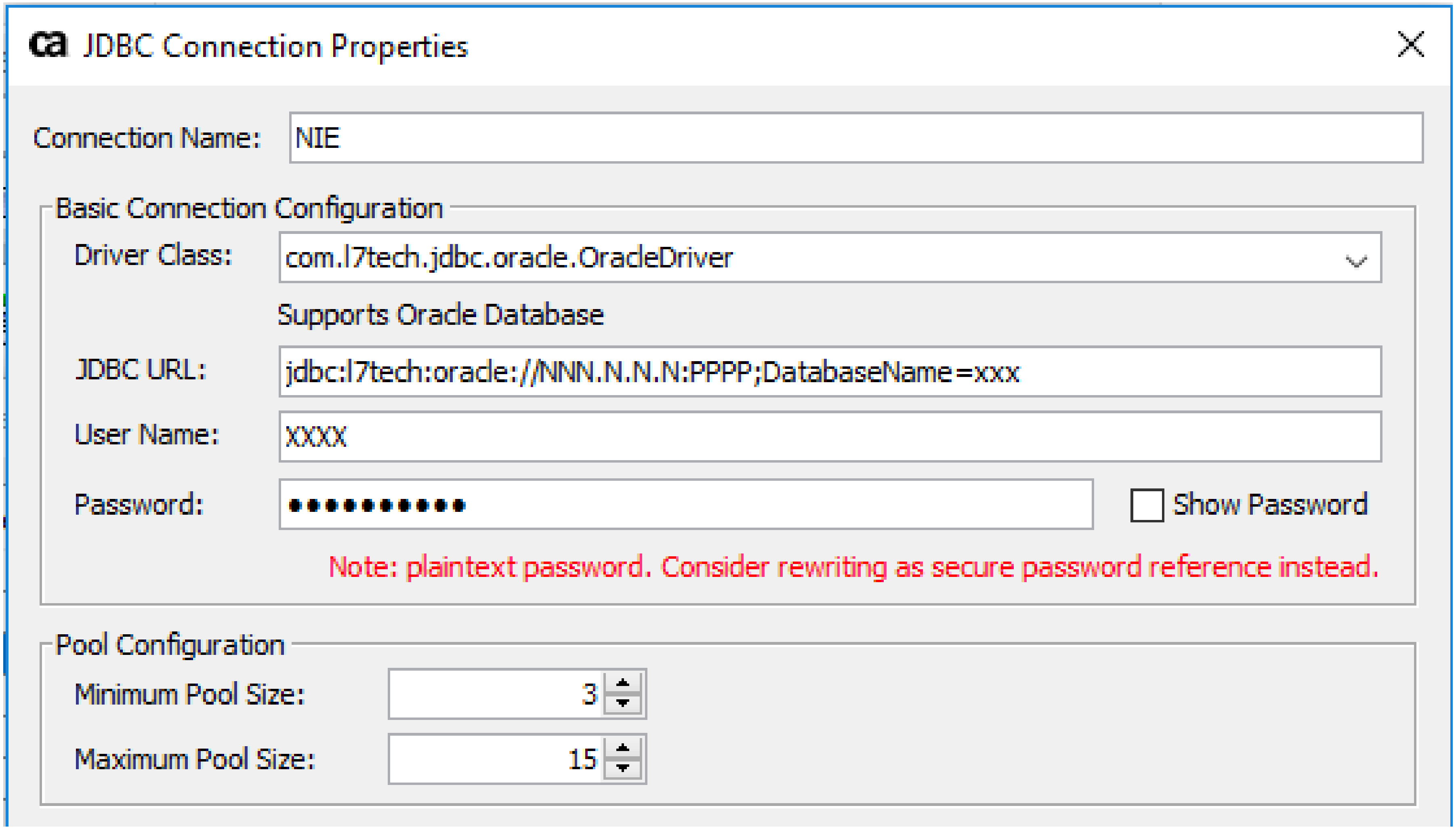
Throttling



- Audit Messages in Policy
- Set Context Variable time as String to: ${gateway.time.rfc1123}
- Apply Rate Limit: average (over 1 seconds) 1 msg/sec per User or client IP
- **Return Template Response to Requestor**

Database API

Database API



JDBC Connection Properties

Connection Name: NIE

Basic Connection Configuration

Driver Class: com.l7tech.jdbc.oracle.OracleDriver

Supports Oracle Database

JDBC URL: jdbc:l7tech:oracle://NNN.N.N.N:PPPP;DatabaseName=xxx

User Name: XXXX

Password: ●●●●●●●●●●● □ Show Password

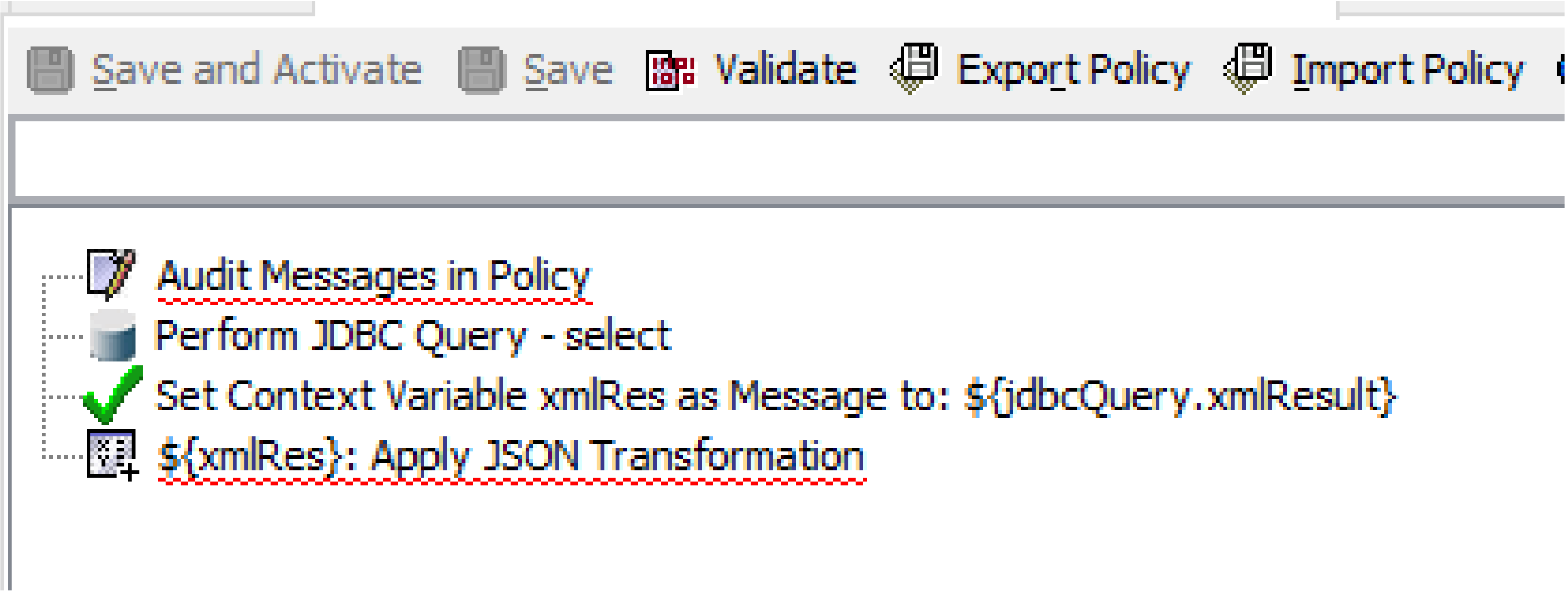
Note: plaintext password. Consider rewriting as secure password reference instead.

Pool Configuration

Minimum Pool Size: 3

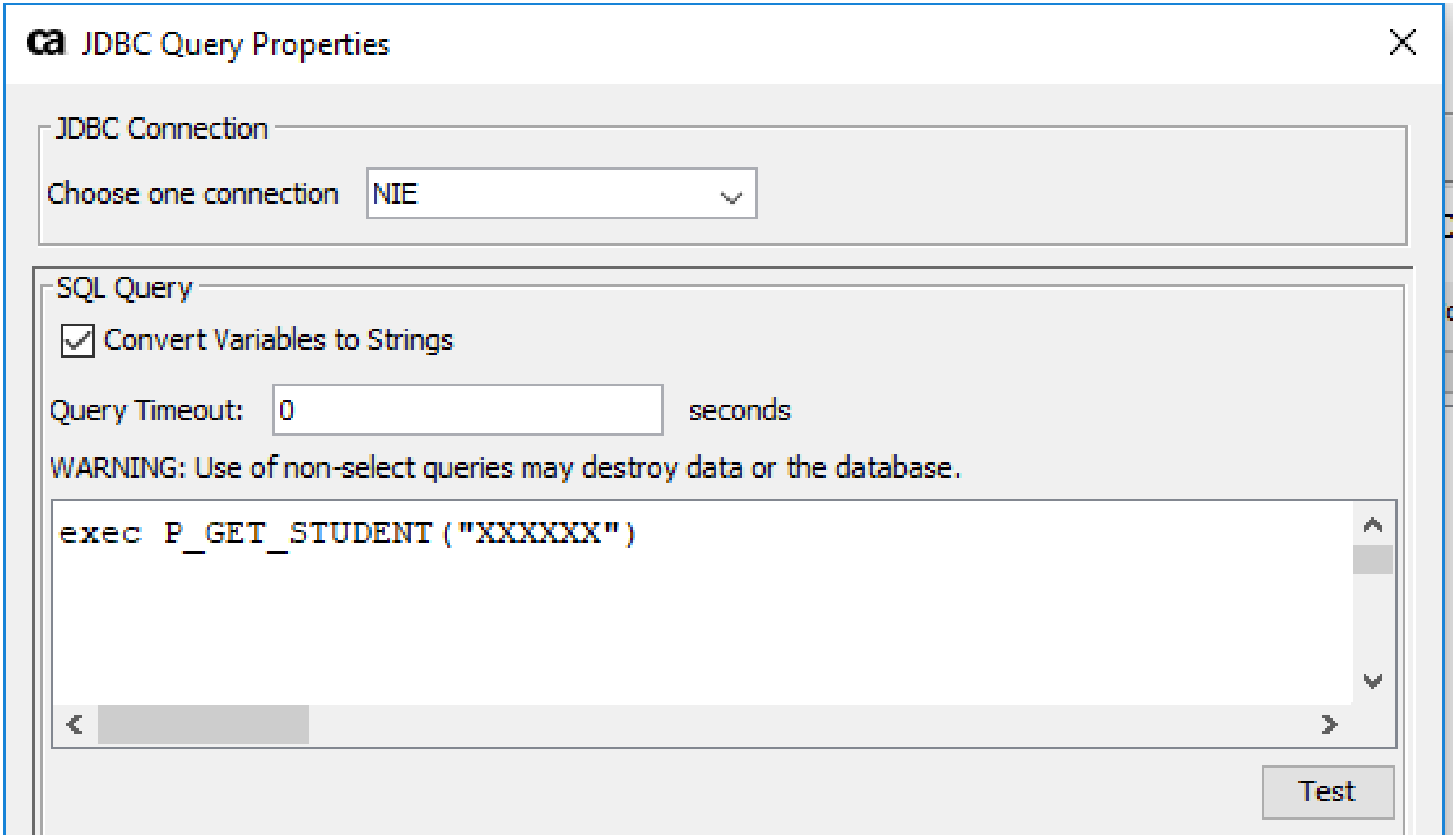
Maximum Pool Size: 15

Database API



- Audit Messages in Policy
- Perform JDBC Query - select
- Set Context Variable xmlRes as Message to: ${jdbcQuery.xmlResult}
- ${xmlRes}: Apply JSON Transformation

Database API



JDBC Connection

Choose one connection: NIE

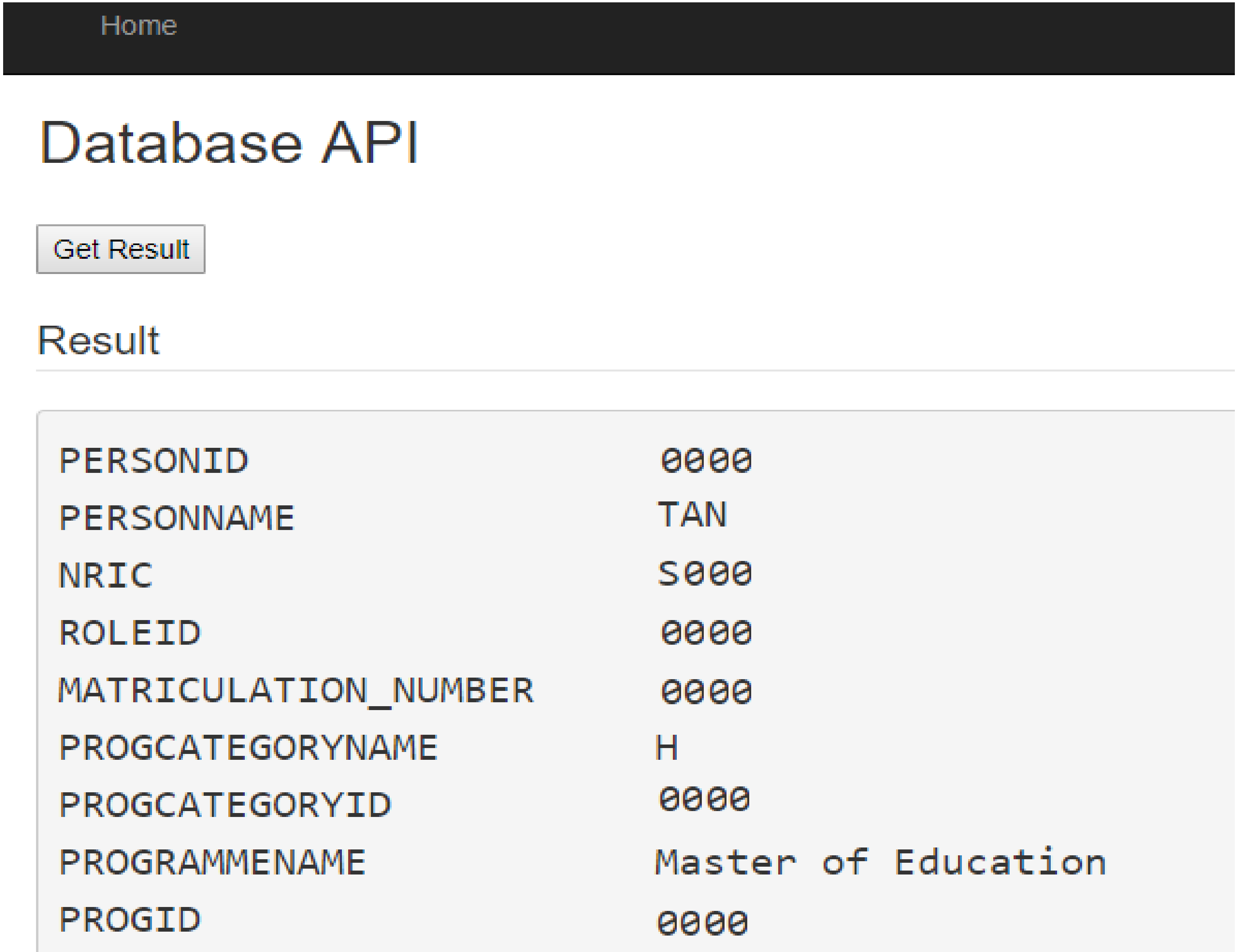
SQL Query

☑ Convert Variables to Strings

Query Timeout: 0 seconds

WARNING: Use of non-select queries may destroy data or the database.

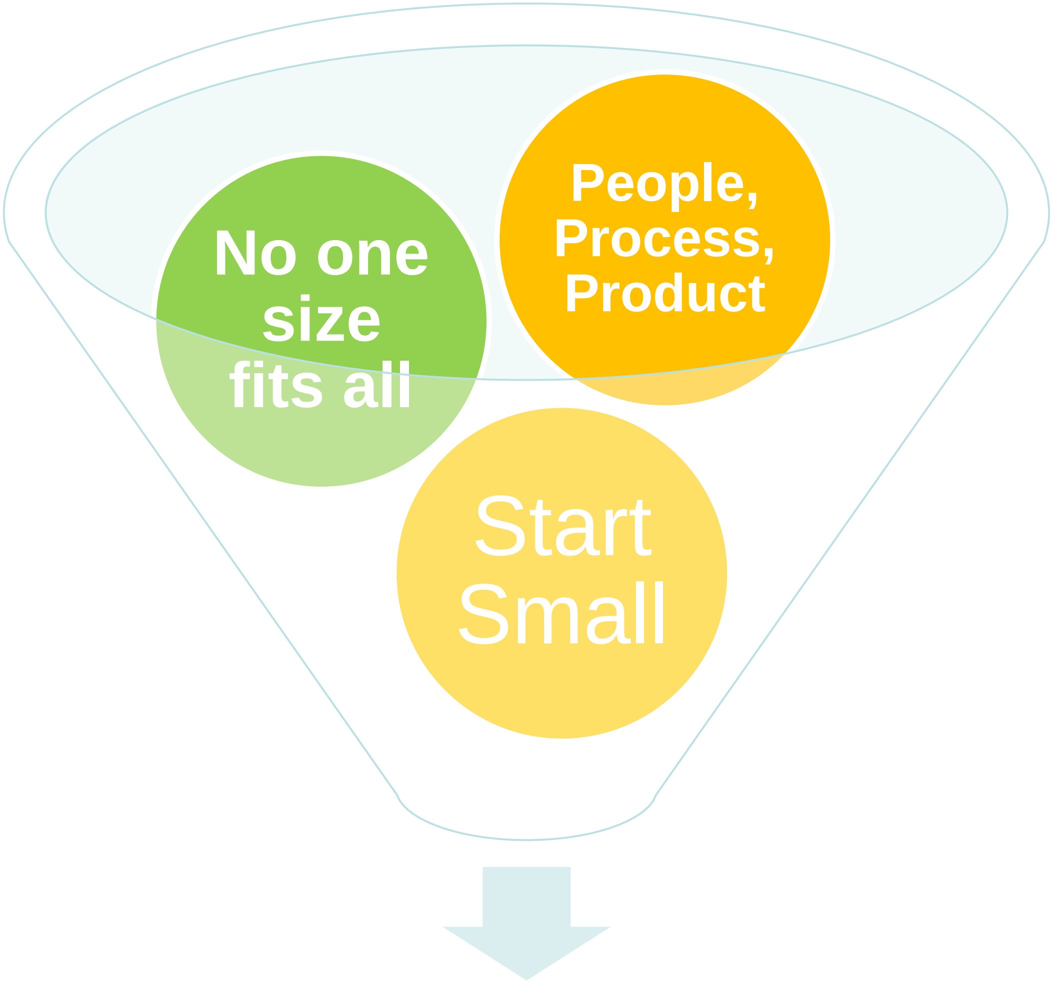
```
exec P_GET_STUDENT("XXXXXX")
```



Database API

Result

```
PERSONID                  0000
PERSONNAME                TAN
NRIC                      S000
ROLEID                    0000
MATRICULATION_NUMBER      0000
PROGCATEGORYNAME          H
PROGCATEGORYID            0000
PROGRAMMENAME             Master of Education
PROGID                    0000
```



Successful API implementation

delete
Q & A
shift
alt

Thank You