Profit4Cloud

professionals in cloud engineering

TECH UPDATE

Serverless APIs with AWS

About Us

Company

- 40 employees we're hiring!
- **MISSION:** Helping clients with our Cloud expertise
- Resident of Entrada 100

Me

- Dick Eimers, Cloud Solution Architect
- 12+ years experience designing and creating software
- **Convinced the future of IT is in the Cloud** one way or another ;-)

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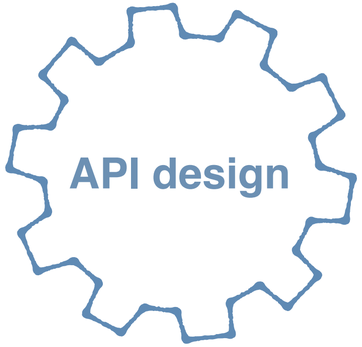
Plan

Part 1

API design



Share basic API design tips to create APIs that work learned from doing it wrong a few times

Part 2

Serverless implementation

Introduce Amazon's serverless building blocks for creating such APIs

Show you example code!

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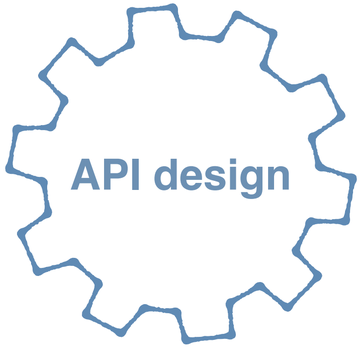
Part 1



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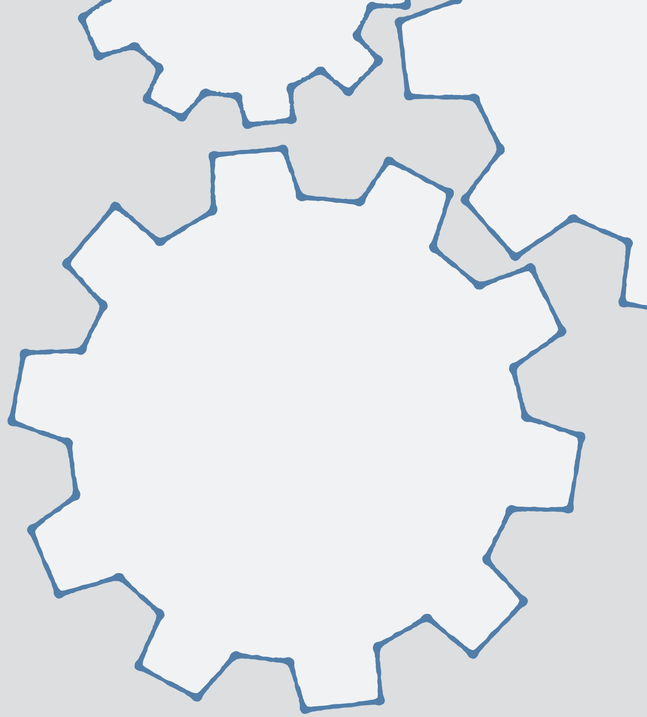
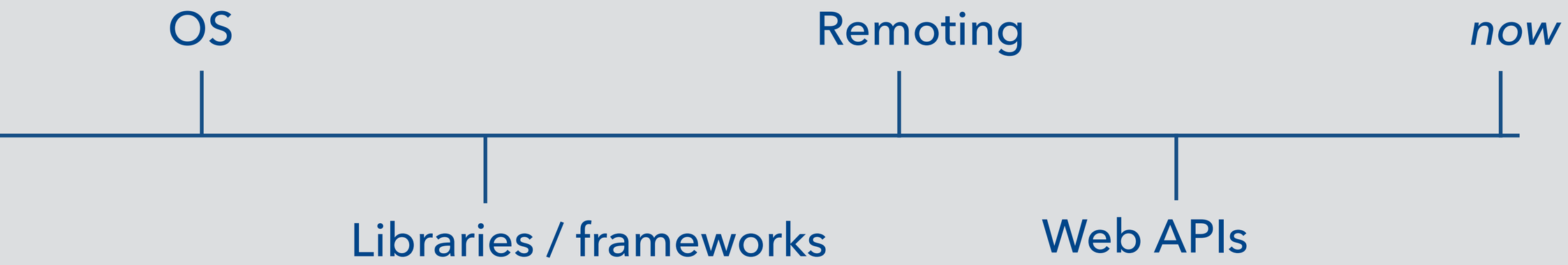
History of APIs

In general terms, it is a set of clearly defined methods of communication between various software components.





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Web APIs

- Online networked service available via a **URL** communicating **HTTP**:

  http(s)://so.me.host:someport/some/path?some=param

  path query

- Input by interpreting the **path**, **query parameters**, **headers** and **request body**
- Output by **response codes** (e.g. 200 OK), **headers** and **response body**

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Body Content-Type

```
<?xml version="1.0" encoding="UTF-8" ?>
<product>
      <price>10</price>
      <product_id>12345</product_id>
      <name>some product</name>
      <description>none</description>
</product>
```

XML


```
{
  "product": {
    "price": 10,
    "product_id": "12345",
    "name": "some product",
    "description": “none"
  }
}
```

JSON

```
---
product:
  price: 10
  product_id: 12345
  name: some product
  description: none
```

YAML

easier on the eyes →

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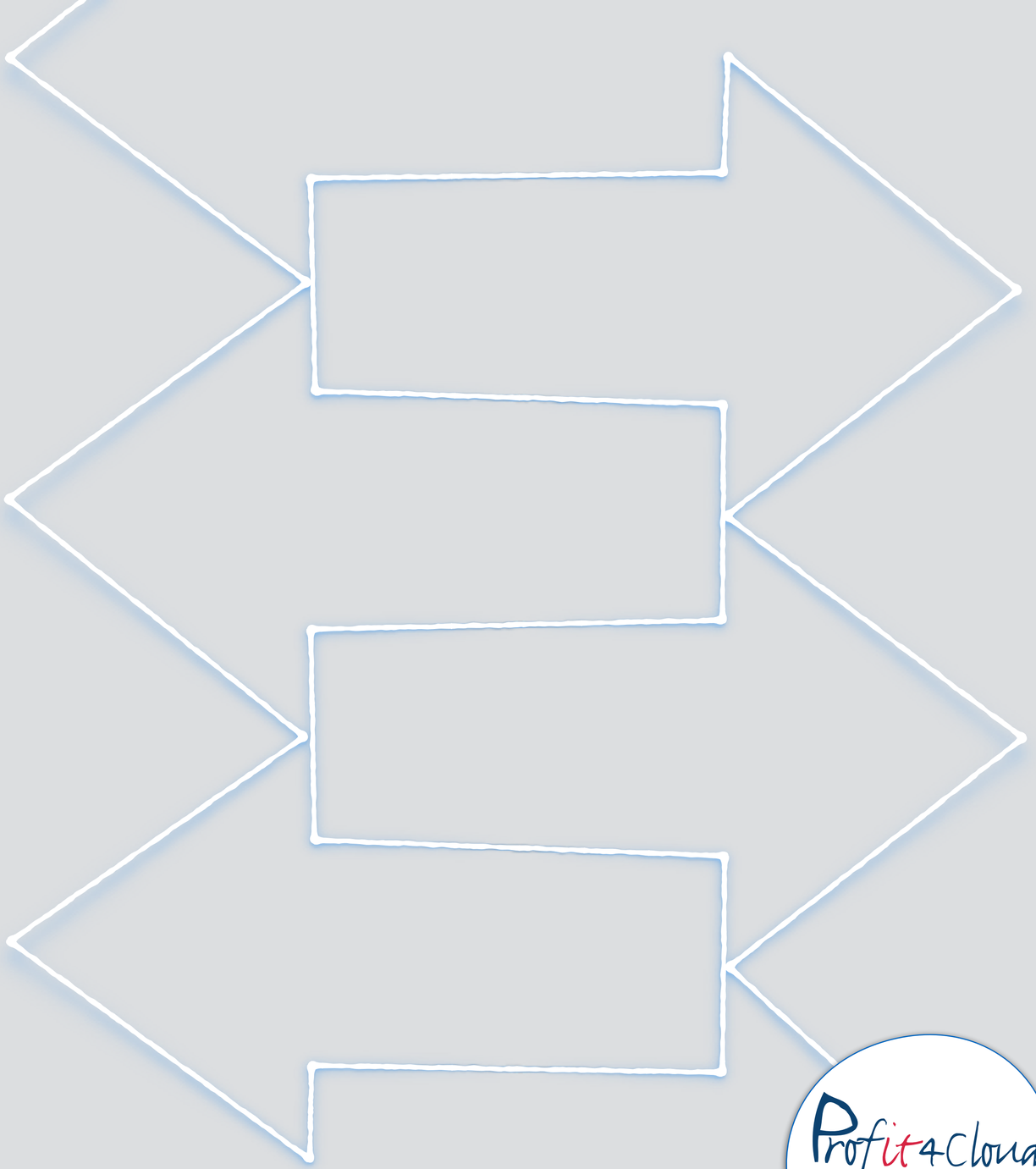
API Design

Who to think of when designing APIs?



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API Design

Roy T. Fielding
@fielding
Following

I'd really like to figure out how Microsoft manages to screw up every decision they make that involves deploying an HTTP header field.

1:48 AM - 1 Jun 2012

Roy T. Fielding
@fielding
Following

Replying to @kragen

Probably not. I have my own REST guidelines. Adobe has its own API guidelines. At some point, we need to publish a mix tape.

1:47 AM - 20 Jul 2016

Roy T. Fielding
@fielding
Following

Replying to @mnot

@mnot Oy, yes, PATCH was something I created for the initial HTTP/1.1 proposal because partial PUT is never RESTful. ;-)

6:27 AM - 3 Dec 2012

Roy T. Fielding
@fielding
Following

The reason to make a real REST API is to get evolvability … a "v1" is a middle finger to your API customers, indicating RPC/HTTP (not REST)

12:33 AM - 9 Sep 2013

Roy T. Fielding
@fielding
Following

WTF is a "REST endpoint"?

Glass Explorer Edition | Google Developers
Develop Glassware
developers.google.com

11:04 AM - 17 Apr 2013

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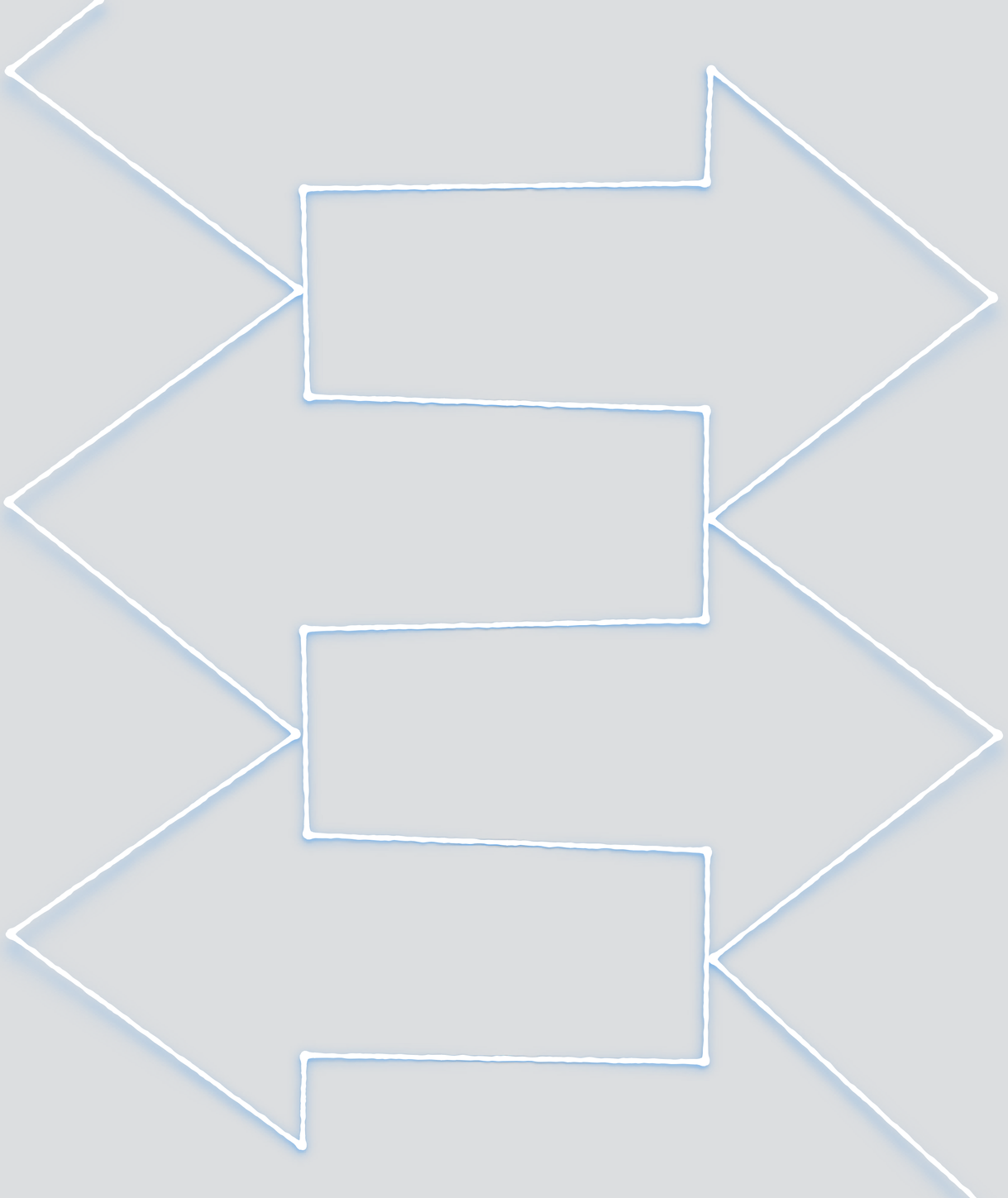

Design for

<**developers**>

<you>

<me>

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<**developers**>

<you>

An API that works for <me> is

intuitive

and

well documented

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Being **intuitive** is not easy..

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General Principles

Try to build what the user expects

(don't try to be smart)

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Care about the documentation;

include examples where ever you can

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Be conservative in what you send
and liberal in what you accept

a.k.a. Postel's law, see https://en.wikipedia.org/wiki/Robustness_principle

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Specifics

URIs are preferably resource-oriented

	https://ap.i/products	https://ap.i/products/{id}
GET	List products	Get a product
POST	Create a new product	
PUT		Update or create a product
DELETE		Delete a product

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	https://ap.i/products	https://ap.i/products/{id}
GET	List products	Get a product
POST	Create a new car	
PUT		Update or create a product
PATCH		Partial update
DELETE		Delete a product

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Resources preferred, actions allowed..

- The **resource-oriented alternative feels far-stretched**:

  POST **/messages/123/resend**

  POST **/products/456/rate**

- Search for multiple resource

  GET /**search?q=term**

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Use of..

path	query params
Use for what is mandatory	Use for what is optional
GET **/products**	GET **/products?sort=asc.name**
GET **/products/456**	
GET **/products/456/parts/4**	

Use the path to select a specific service and params to modify its behavior

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Use of..

headers

Use for what is stable during the conversation

Content negotiation	Accept / Content-Type
Authentication	Authorization

body

Use for communication (partial) resource representation

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Use of..

status codes	status codes
Minimal	Better
200 - OK	200 - OK
	201 - Created
	204 - No Content
400 - Bad Request	400 - Bad Request
	401 - Unauthorized
	403 - Forbidden
404 - Not Found	404 - Not Found
500 - Internal Server Error	500 - Internal Server Error

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Server-side conversation state is evil

A stateful service is harder to scale and less resilient (but that is your problem)

For <developers>, an API that requires **special flows of service calls are more complicated**

GETs with side-effects are evil

It is not allowed per HTTP specification;
<developers> (and hence libraries)
expect GET calls to be safe

Add hypermedia for optional use

- A hypermedia-driven API is one that **informs the client what we can do next**
- Allows for a class of changes to the API such that these **changes will not break the client**
- HAL, JSON-LD, Collection+JSON, SIREN, JSON-API, .. too many standards

```
{
 "price":10,
 "product_id":"123",
 "name":"some product",
 "description":"none",
 "_links":{
   "self":{
    "href":"https://ap.i/products/123"
   },
   "rate":{
    "href":"https://ap.i/products/123/rate",
    "method":"POST
   }
   …
 }
}
```

JSON
with links

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Important API topics we don't have time for today..

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Part 2

Serverless API implementation

aws

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Serverless

- No servers (you need to care about)
- Autoscaled with true pay as you go
- Always on

If you don't have to care about infrastructure you can focus on creating ~~business value~~.

cool stuff

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Serverless building blocks on AWS

AWS Lambda

- Lets you **just run code** without provisioning or managing servers
  - Node.js, Java, .Net Core, Python
- **Event-driven** with many supported event sources
  - S3, SNS, RDS, API Gateway, ..
- Billed compute time *x* memory usage

logo

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Serverless building blocks on AWS

logo

Amazon API Gateway

- Managed service that makes it easy for developers to create, publish, monitor, and secure APIs at any scale
  - SDK generation
  - OpenAPI 2.0 (Swagger) support
  - Authentication integrations
- Billed per call + data out

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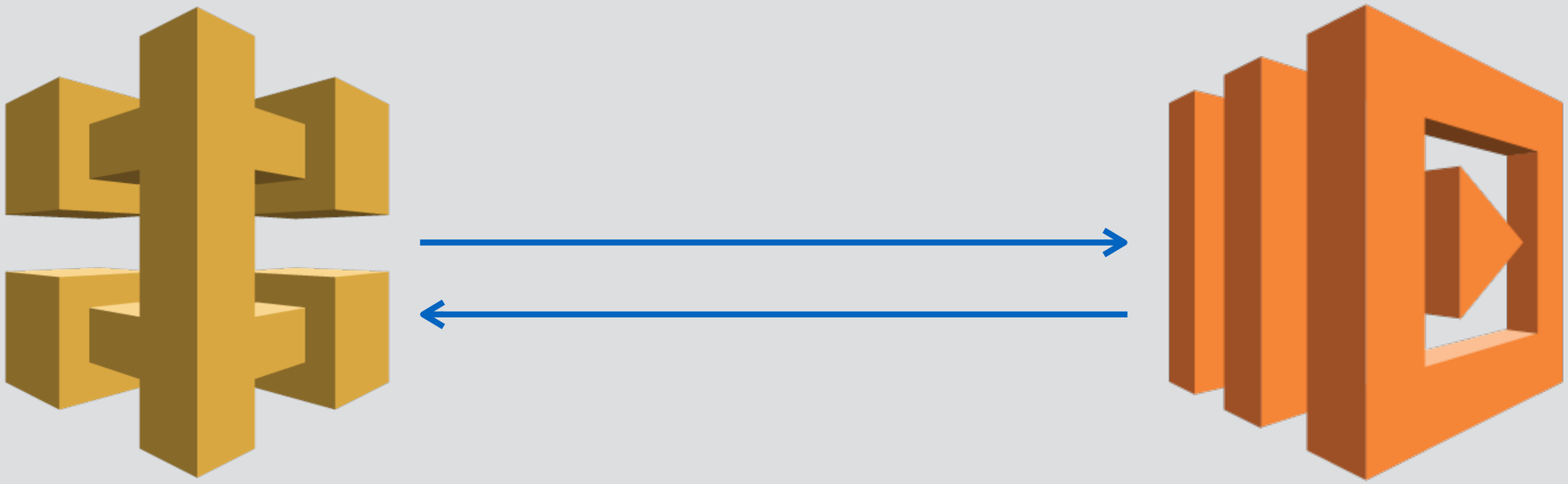
Serverless APIs on AWS

API Gateway

Lambda



The combination of these services is an interesting alternative to traditional backends

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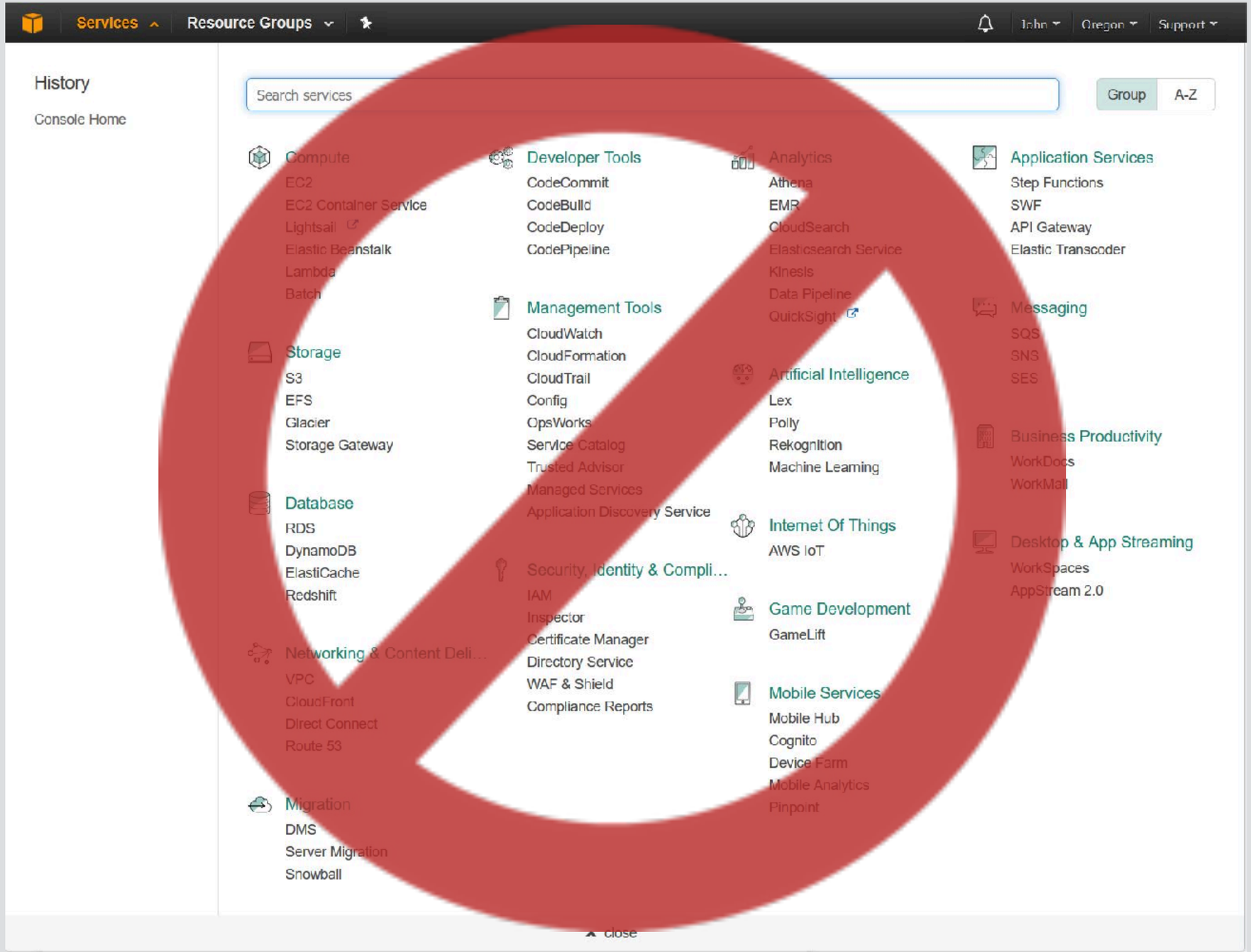

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Serverless APIs on AWS

AWS CloudFormation

Infrastructure-as-code

- Use *template* files to declaratively define infrastructure resources
- Use CLI tools to deploy and update *stacks* based on the template

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Programmable infrastructure allows you to manage your infrastructure like you manage your code.

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Serverless APIs on AWS

AWS Serverless Application Model

- CloudFormation extension optimised for serverless applications
- Support anything CloudFormation supports
- Open specification (Apache 2.0)

Convention-over-configuration

by transformation

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Demo1

Minimalistic API

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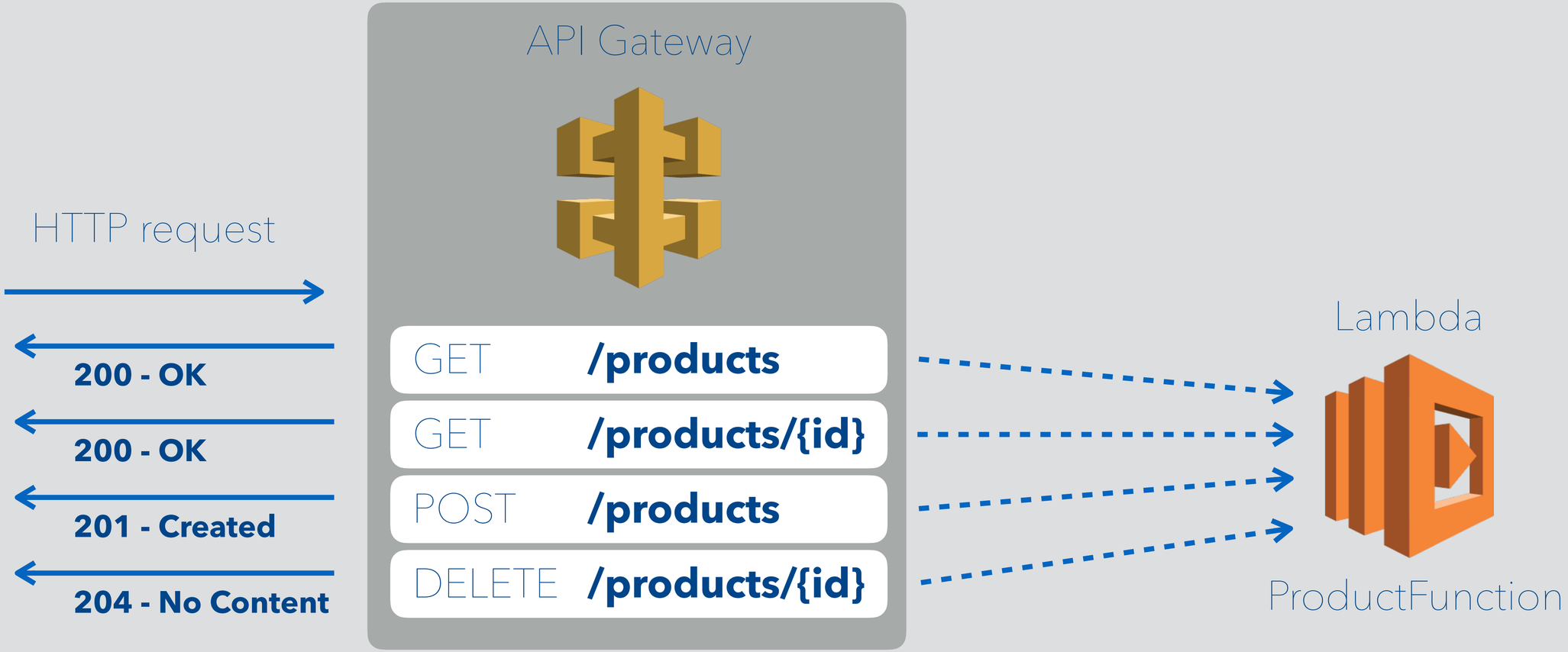
Demo1



Demo2

Swagger-ish API

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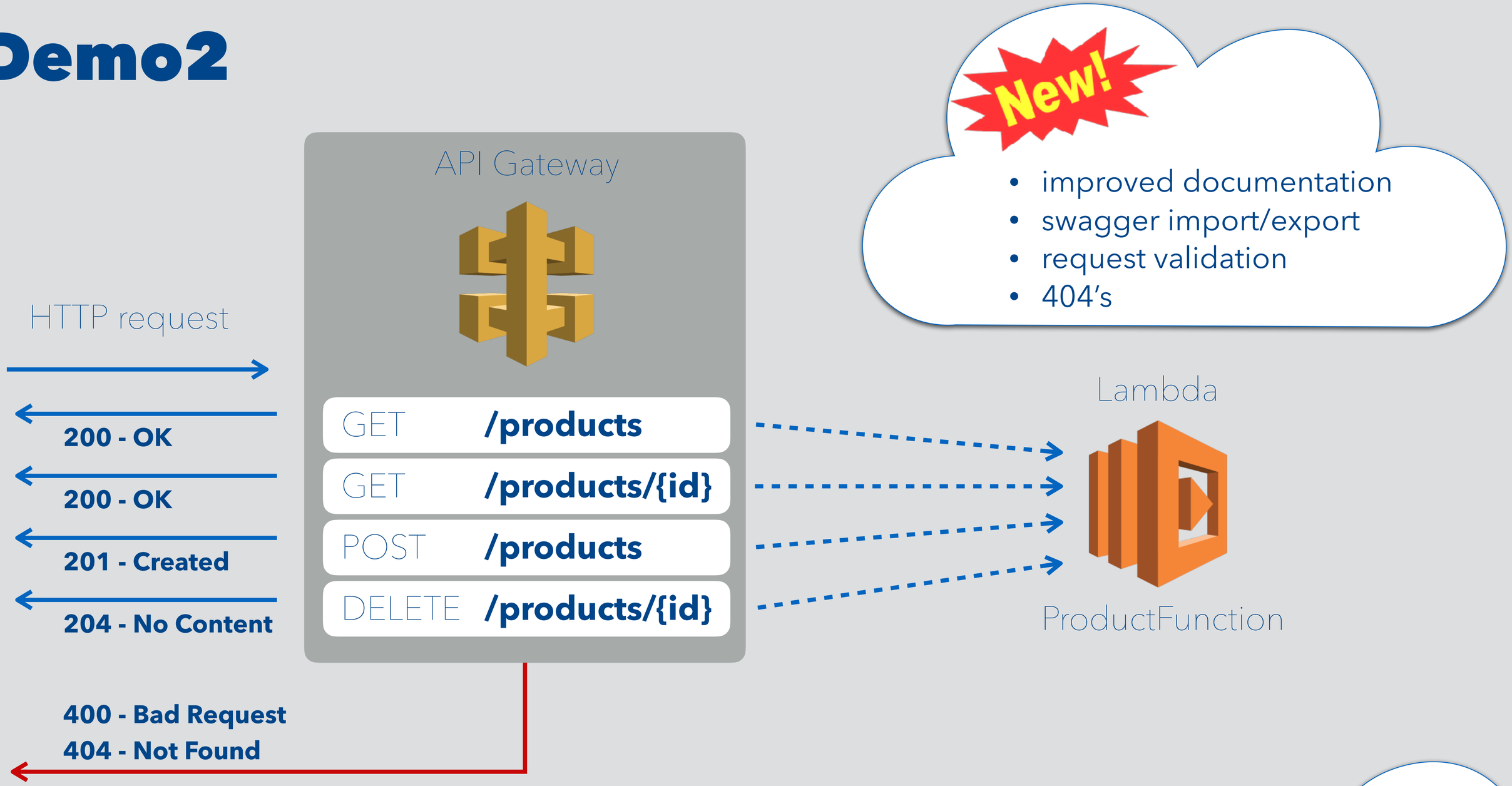
Demo2



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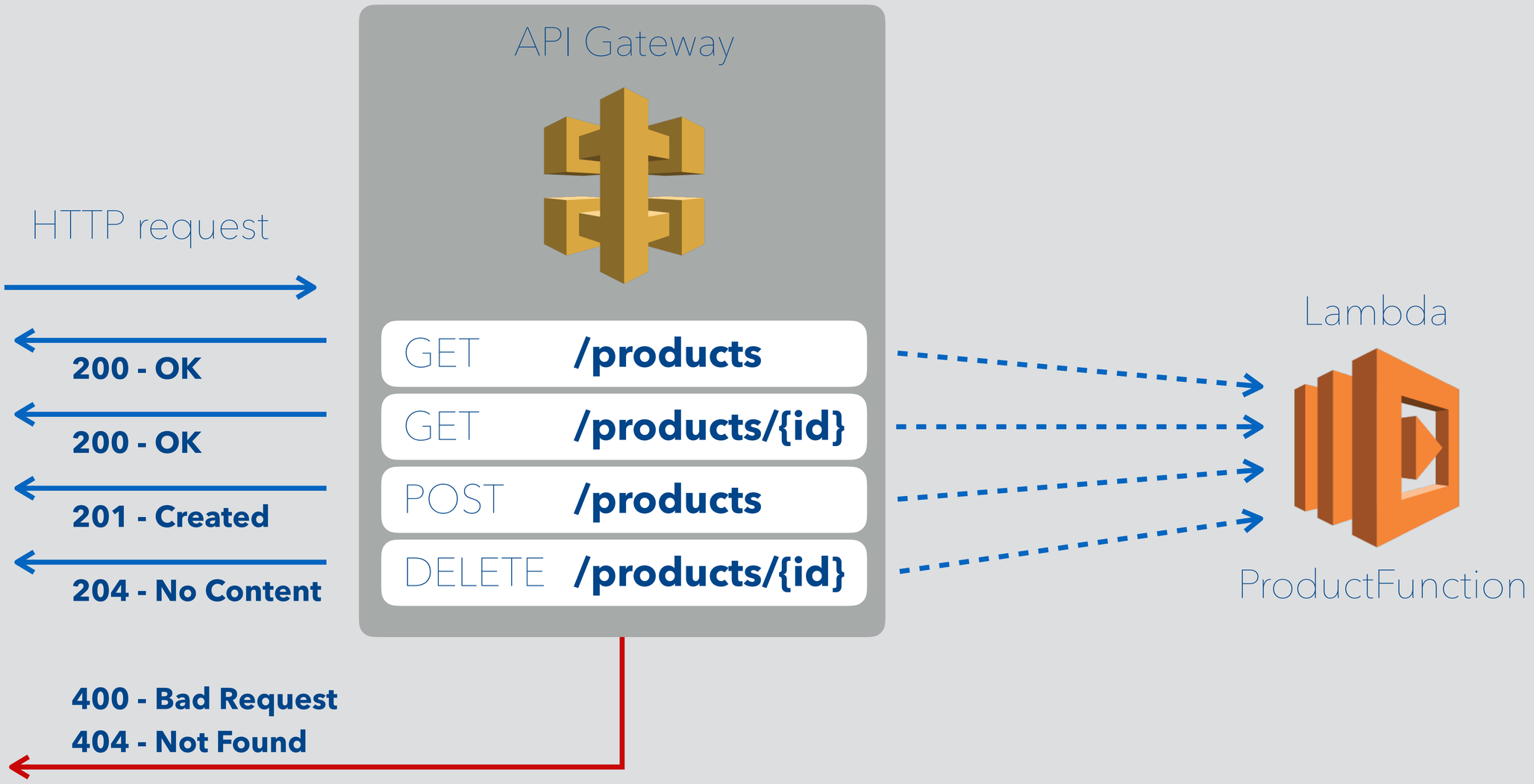
Demo2



Demo3

API with Authorization

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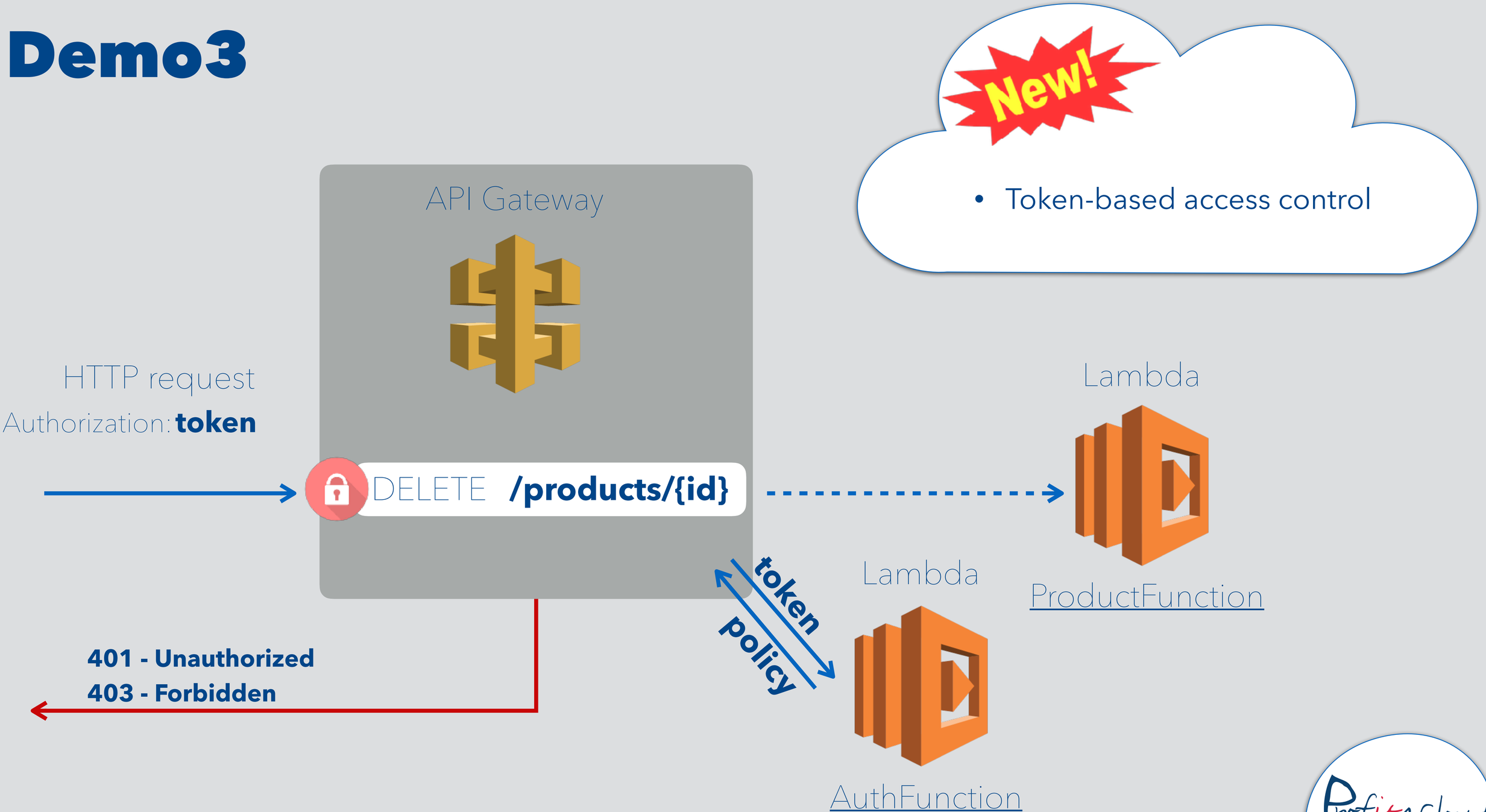
Demo3



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To conclude

Recap

- Shared API design tips yeah, we only scratched the surface
- Introduced Amazon's serverless building blocks for creating such APIs

Reproducible (infra-as-)code to production APIs that scale

- Using SAM/CloudFormation to provision API Gateway and Lambda's
- With Swagger-ish configuration and documentation
- Awaiting (micro)frameworks to increase productivity even further..

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