AWS API Gateway

DE HOGESCHOOL MET HET NETWERK

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REST(ful) APIs

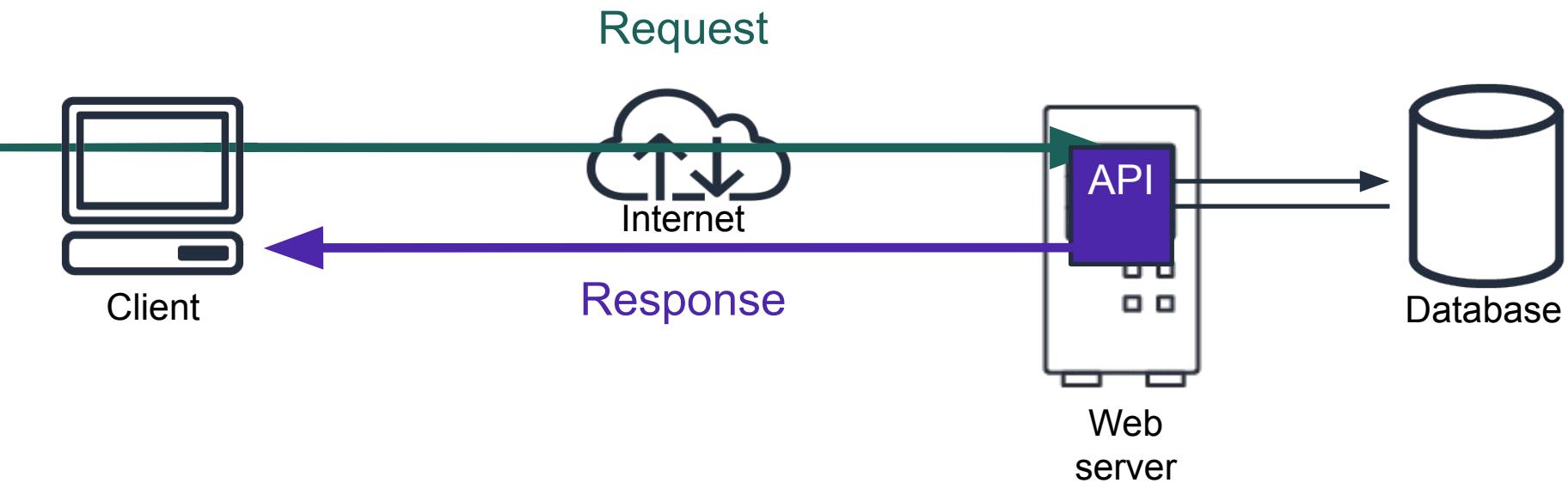
An API is a software mechanism that simplifies development by doing the following:

Abstracting implementation details

Exposing only objects or actions that a developer needs

Establishing how an information provider and an information user communicate

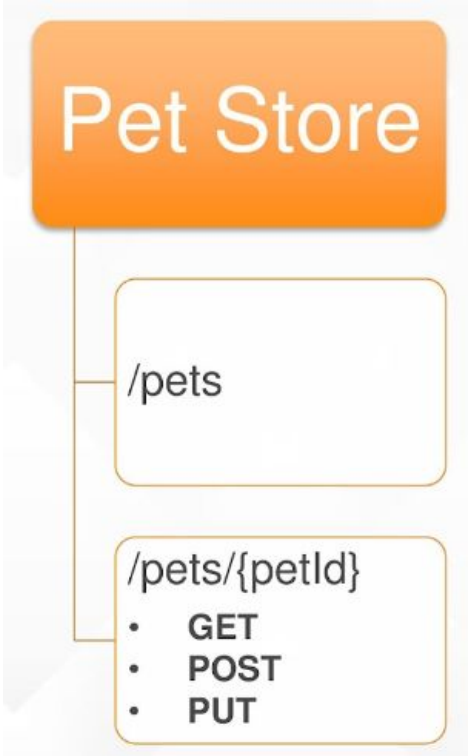
REST(ful) APIs



REST(ful) APIs

Representational State Transfer (REST)

- Architectural style
- Standard way of structuring requests from a client to a server

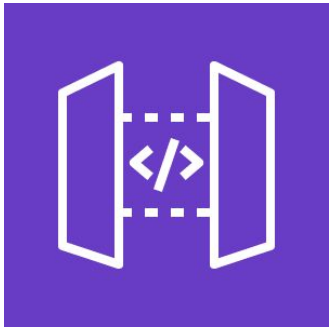


RESTful API

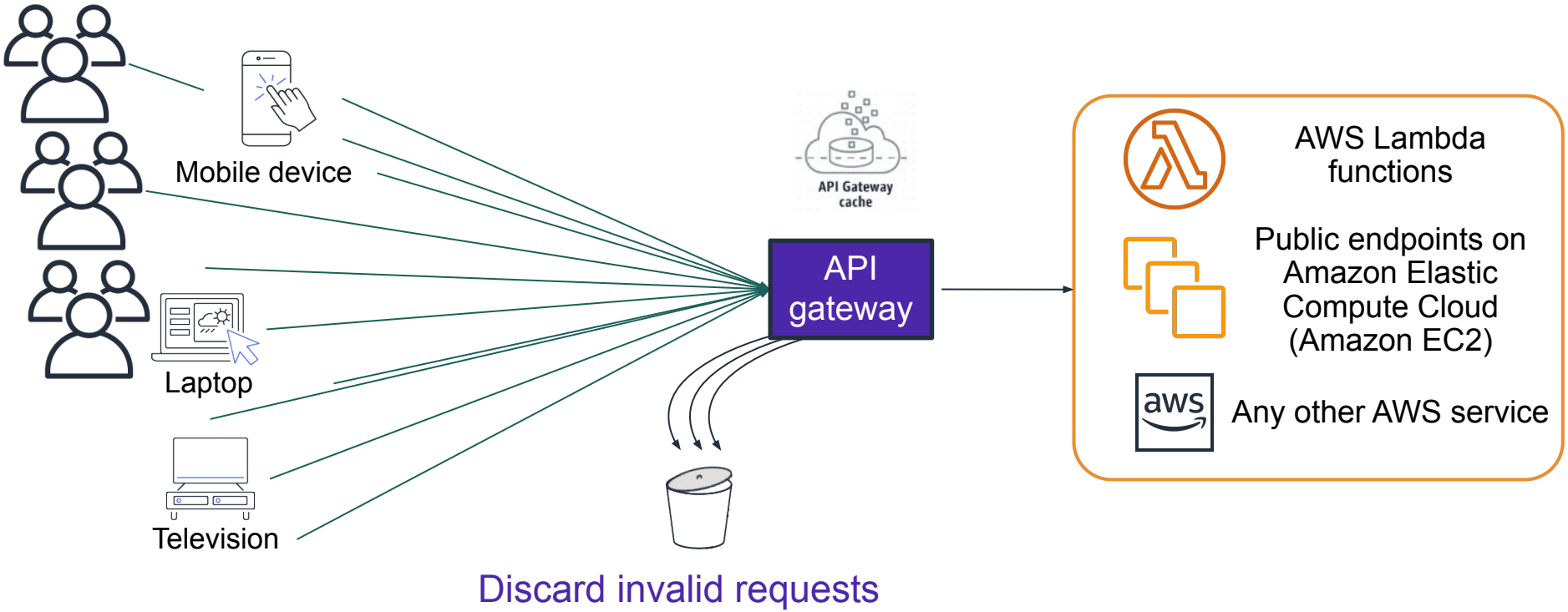
- An API that adheres to REST principles

API Gateway

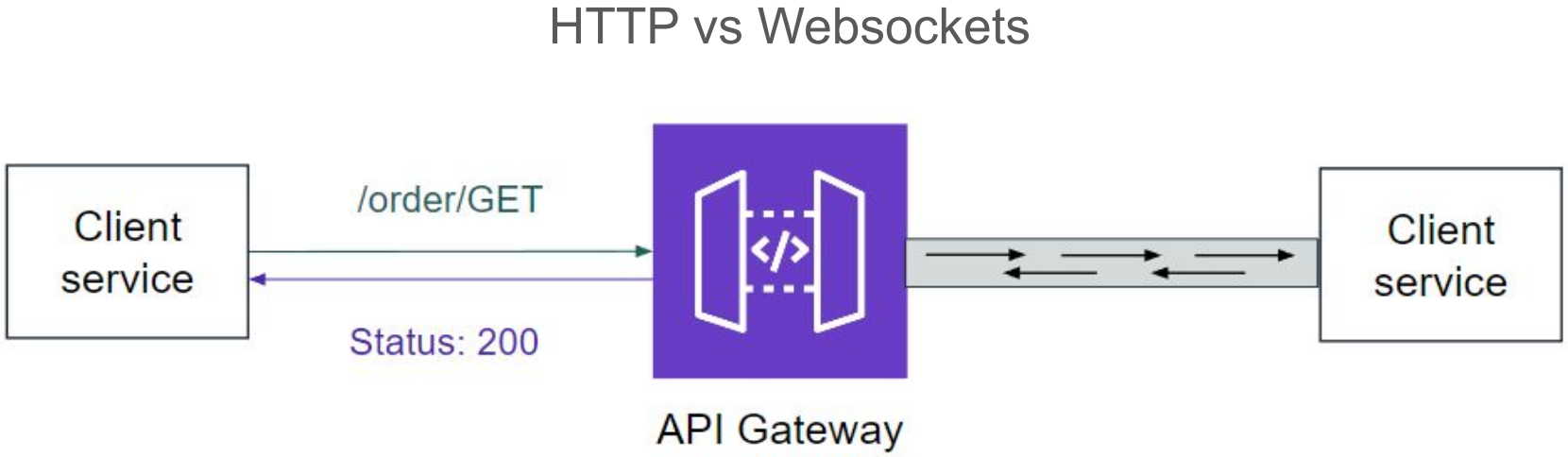
- Fully managed, serverless service
- Servers as a proxy that:
  - Abstract common functionality from the server
  - Reduce the number of requests that reach the server
  - Limit the request rate
  - Allow or disallow requests by source
  - Validate the developer key
  - …



API Gateway


Mobile device
Laptop
Television
API Gateway cache
API gateway
AWS Lambda functions
Public endpoints on Amazon Elastic Compute Cloud (Amazon EC2)
aws
Any other AWS service
Discard invalid requests

Supported protocols



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Types of HTTP Gateways

REST API

- Gives the developer full control over API requests and responses
- Supports features that are not yet available in HTTP APIs

HTTP API

- Simplifies the development of APIs that require only API proxy functionality
- Designed for the lowest cost and lowest latency

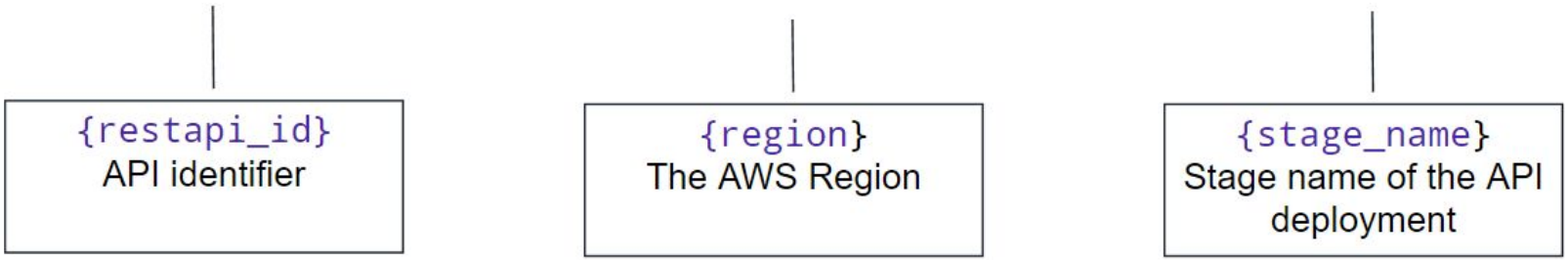
Creating an API Gateway

Using the CLI:

```
aws apigatewayv2 create-api --name my-api --protocol-type HTTP --target
arn:aws:lambda:us-east-2:123456789012:function:function-name
```

General url structure of an API gateway:

```
https://{restapi_id}.execute-api.{region}.amazonaws.com/{stage_name}/
```



Stages

- API configuration can be deployed to a stage
- Stages are different environments

  For example:

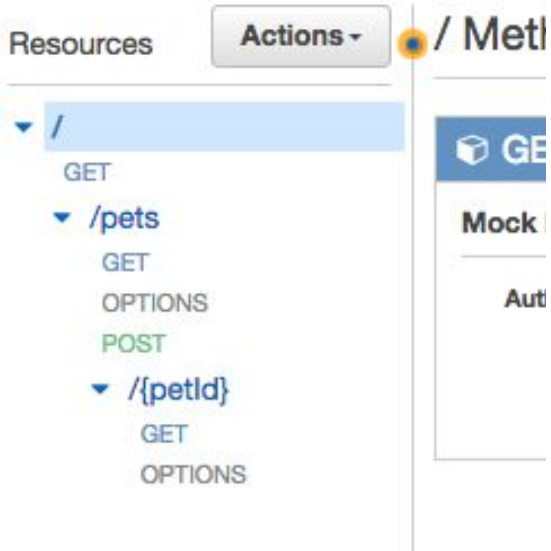
  - apiV1
  - dev*
  - beta
  - prod*
  - As many stages as you need

** Best practise for environments is to have multiple AWS accounts per environment*

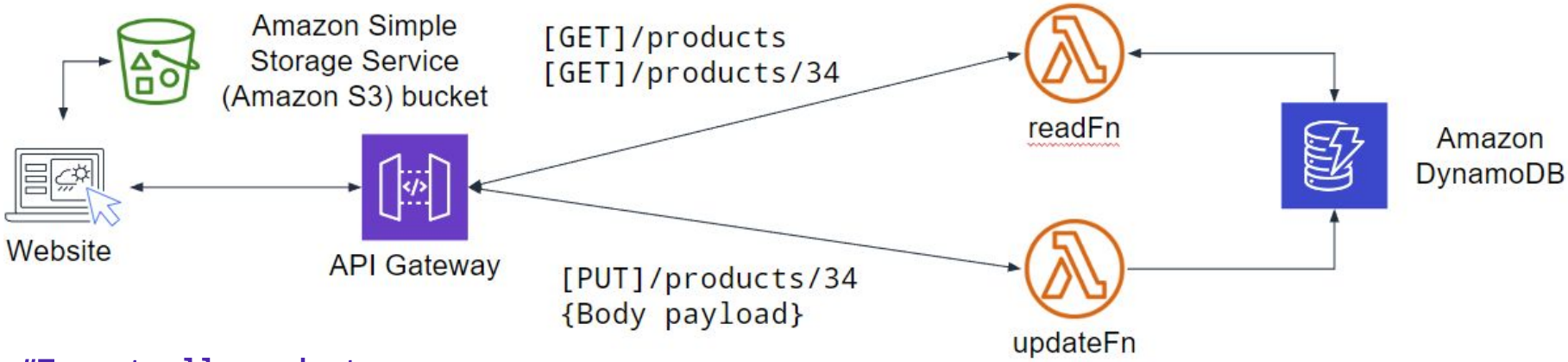
Resources

- Structure of the API is shown as a tree of nodes
  - Each resource is a new endpoint in the API gateway
- API methods defined on each resource
- Each method can be linked to an endpoint

  eg. Lambda, EC2 http endpoint, …



Resources




```
#To get all products
[GET] https://api-id.execute-api.us-east-2.amazonaws.com/products

#To get a specific product by ID (34)
[GET] https://api-id.execute-api.us-east-2.amazonaws.com/products/34

#To update (replace) a specific product by ID (34)
[PUT] https://api-id.execute-api.us-east-2.amazonaws.com/products/34
[BODY] #some keys and values
```

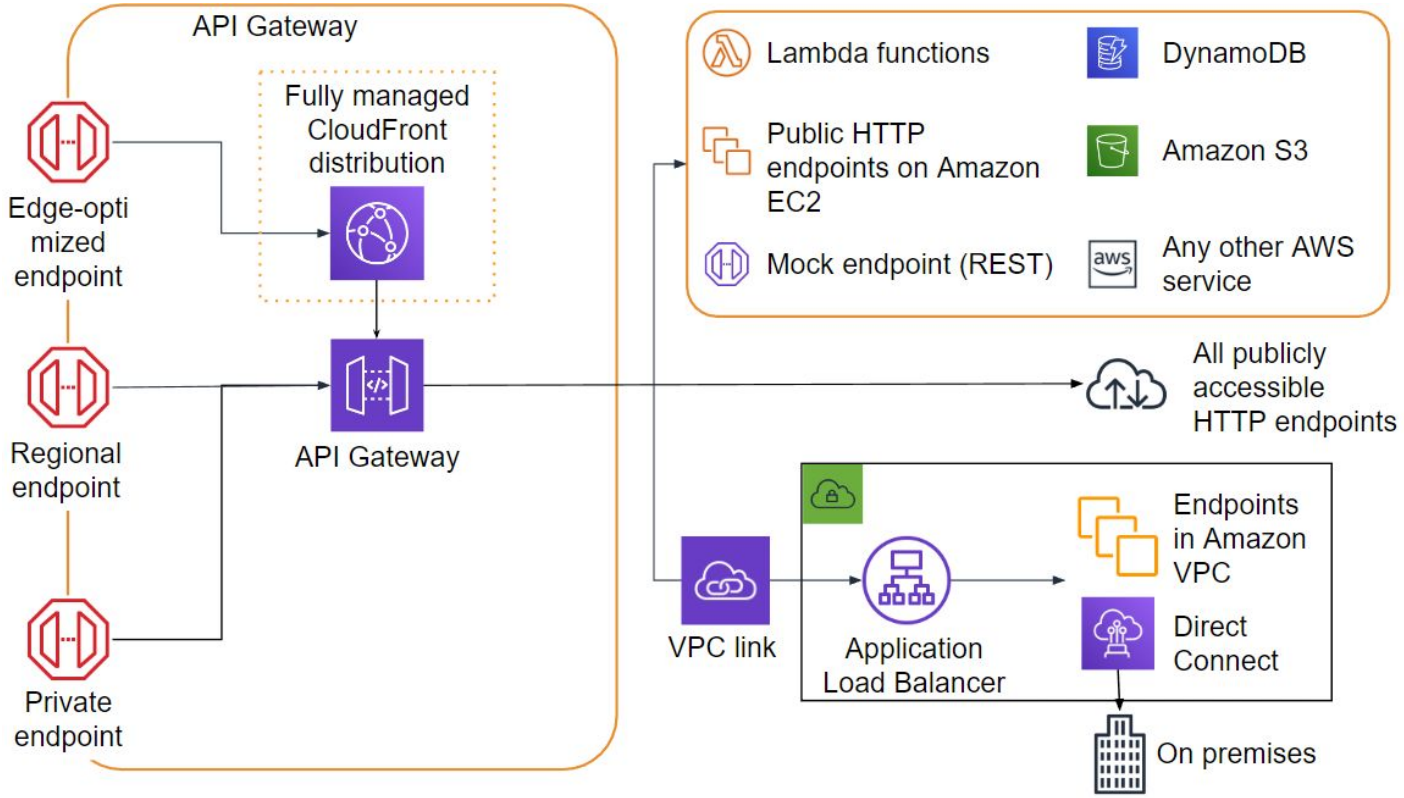
Endpoint types

- **Edge optimised**: when the clients accessing the API are distributed globally. Creates a CloudFront distribution that is configured to route requests to your API

- **Regional endpoint**: when majority of the clients accessing the API are located in the same region as the API itself

- **Private endpoint**: when the API needs to be accessible only from within your Amazon VPC or through a Direct Connect connection

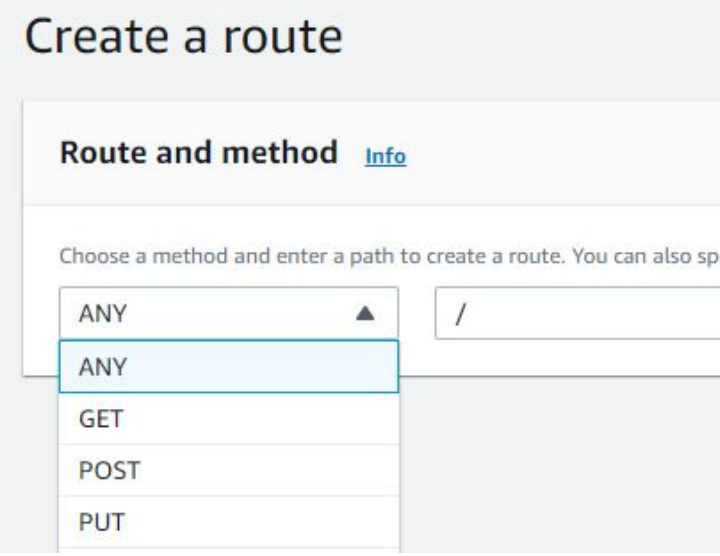
Backend integrations

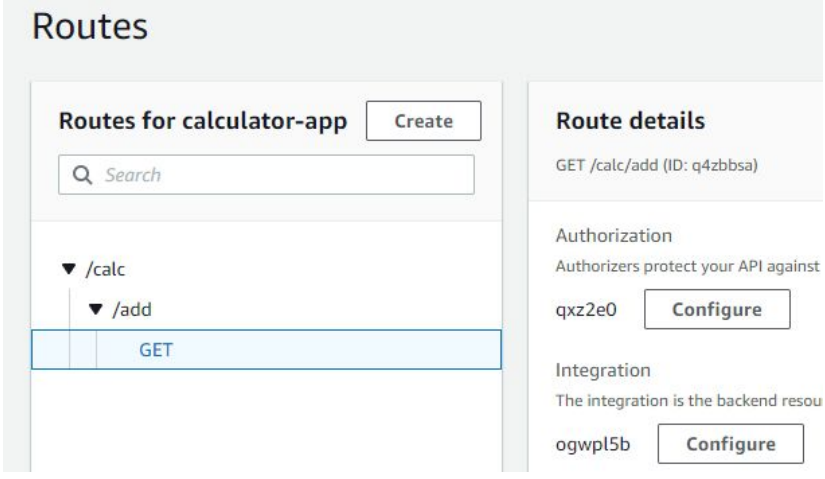


Creating an endpoint

Using the AWS console

- Choose the request type and URI
- Choose the linked resource (lambda, ec2, ...)
- Multiple request types per URI are possible



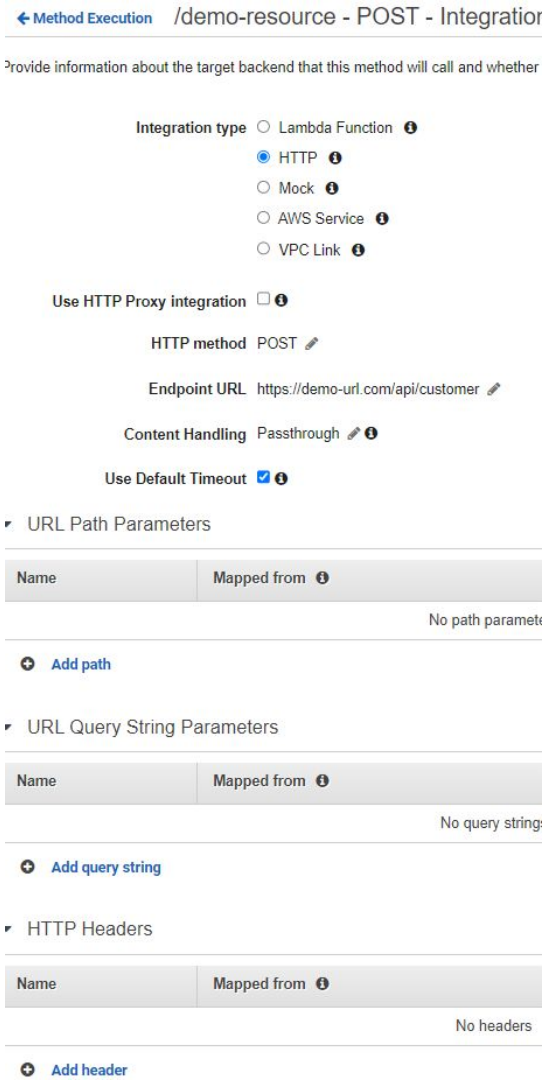


Transforming requests / responses

Transform data before going to your endpoint

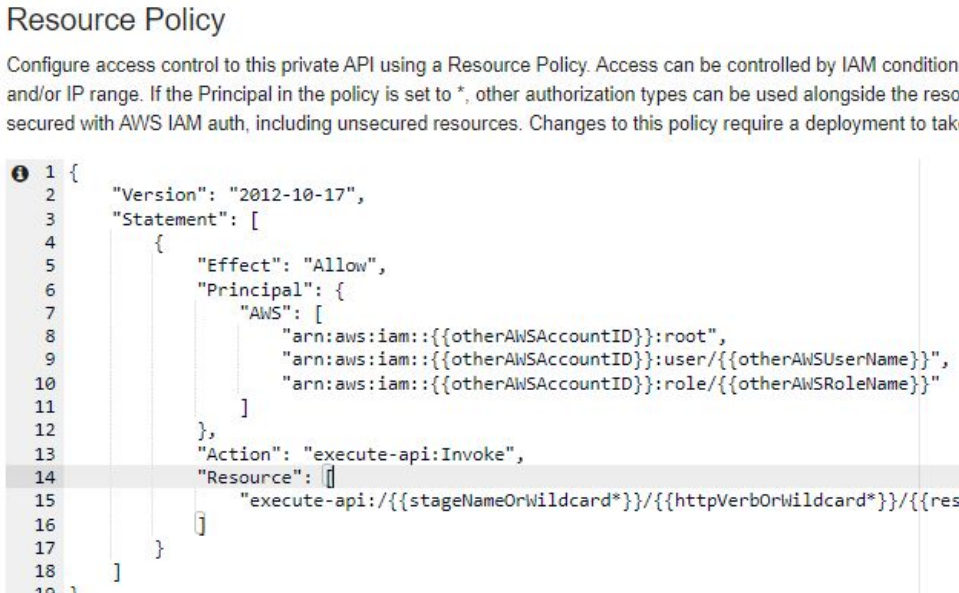
eg. Lambda functions cannot handle headers/params
-> convert data to a json object

Note: Lambda's have integrated prebuild proxies



Controlling access to REST APIs

- IAM Resource policies
  - Allow only certain AWS resources to access your API
  - More about this later in this course

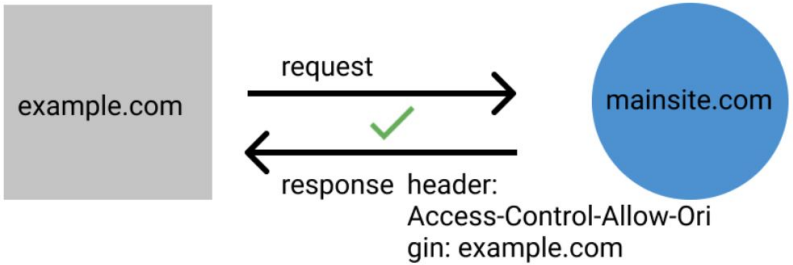


Controlling access to REST APIs

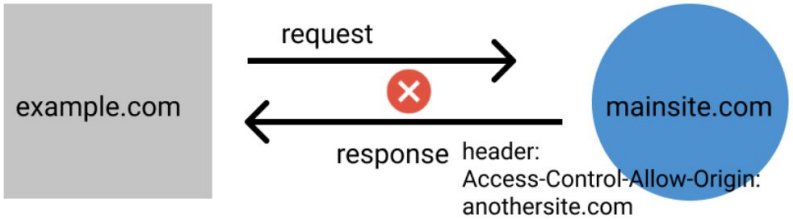
- AWS WAF (Web Application Firewall)
  - Protect APIs from common web exploits such as:
    - SQL injection
    - XSS
    - …
  - Block request based on origination (geo, ips, user-agents, bots, …)

Controlling access to REST APIs

- CORS (Cross Origin Resource Sharing)
  - Browser based security
  - Blocks requests based on
    - origin
    - request type
    - headers



Good: Origin is in response header



Error: Origin not in response header

Controlling access to REST APIs

- Rate limiting
  - Throttle rates per stage or per method
  - Can be linked to API keys

    eg. 10k requests / month for a free tier API key

    100K req / month for a premium type API key that costs 5$ / month

    example: Twitter API, Google Maps API

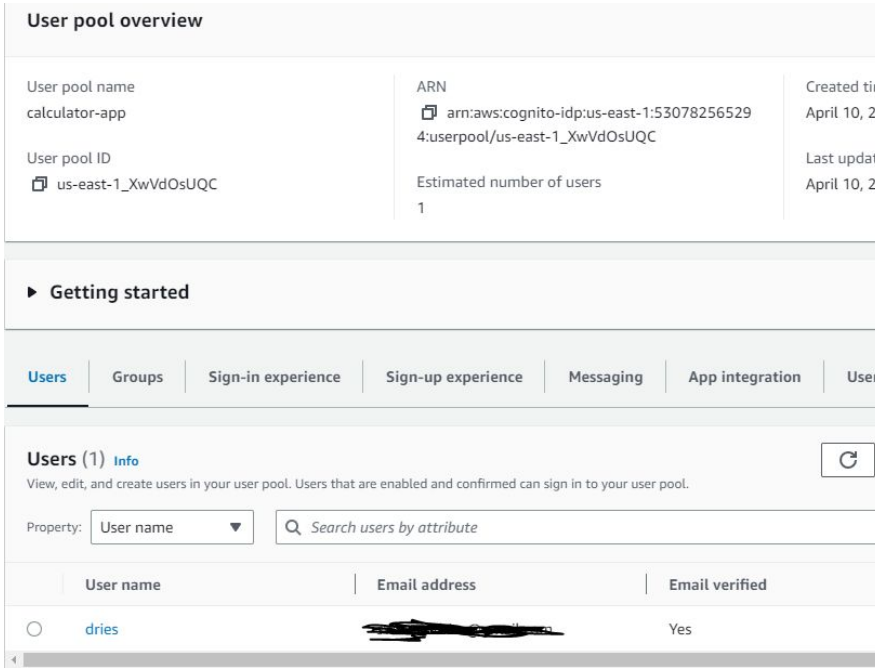
Authentication on REST APIs

- Open APIs, no authentication
- IAM authentication
- JWT-based authentication
    - integrates with identity providers such as Amazon Cognito
    - OpenId Connect / OAuth2
- Lambda authorizers
    - Seperate function that validates a bearer token

The API gateway validates the tokens

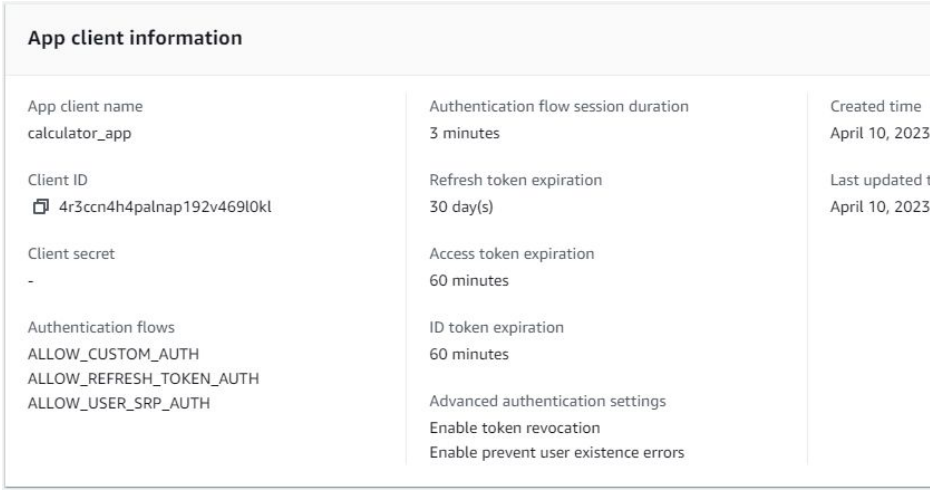
Simple Authentication example (1/3)

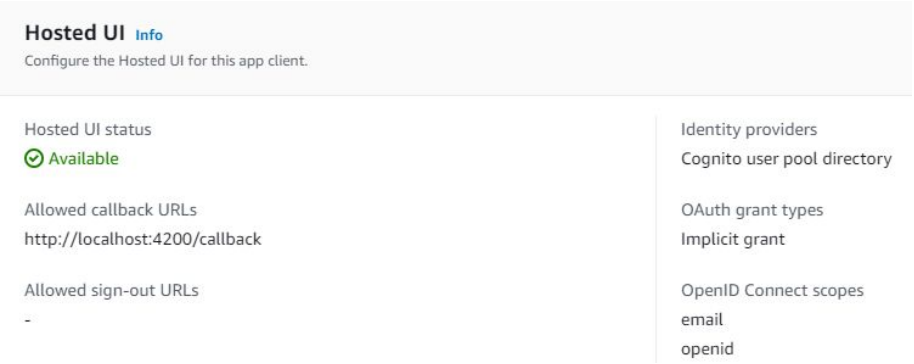
- Create an AWS cognito user pool
  - AWS provides a web page (Cognito Hosted UI)
    - This web app provides simple user registration / login / forgot password features
    - Alternative is to use the AWS sdk to inject users in to the pool from your app



Simple Authentication example (2/3)

- Create an app client for that user pool
  - allows unauthenticated API calls to that user pool
  - Defines token settings
  - Provide a callback URL to our frontend application that receives the token



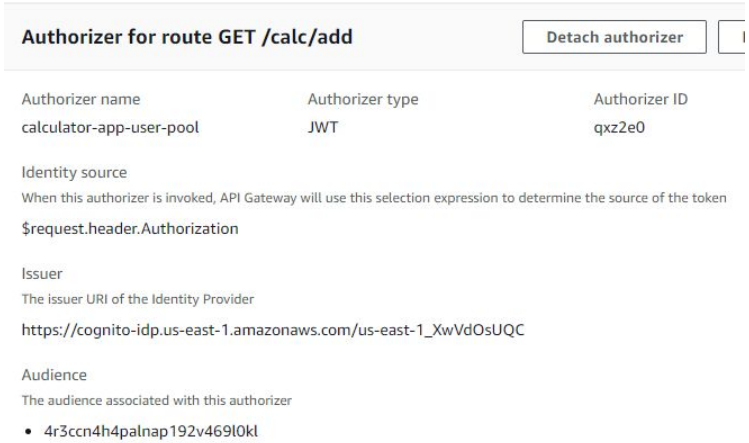


Simple Authentication example (3/3)

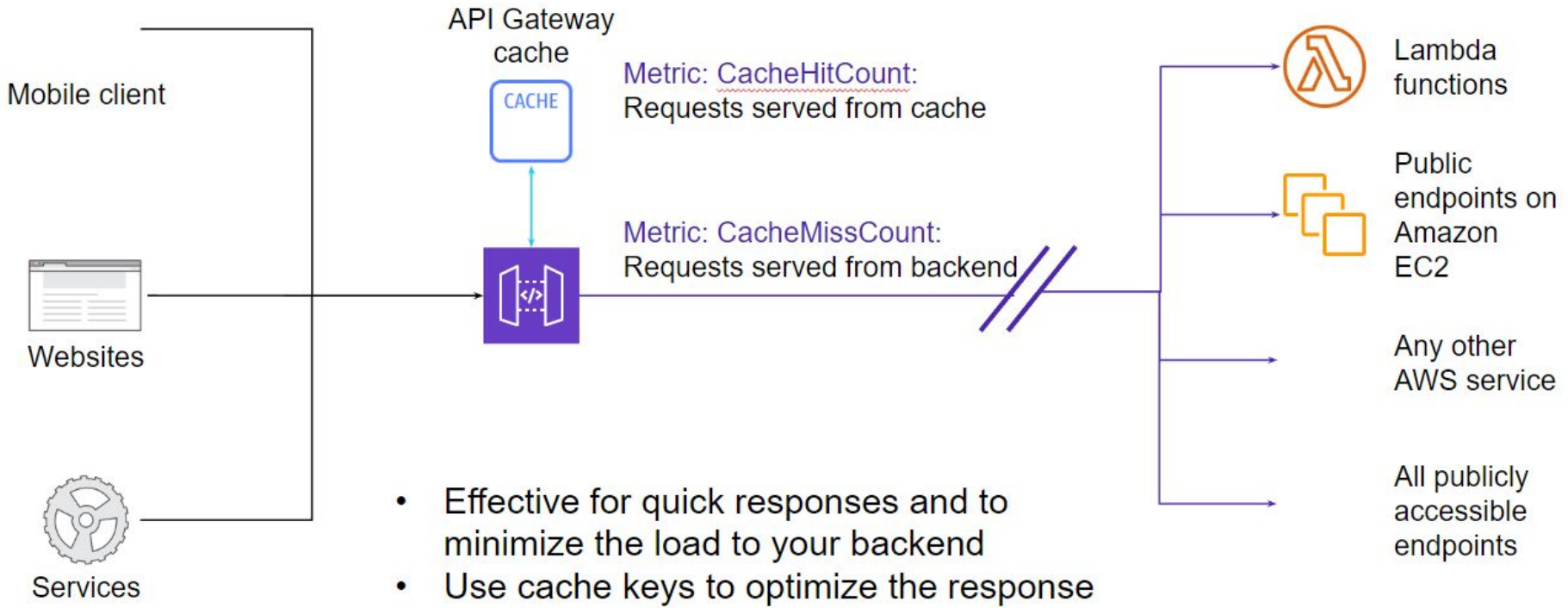
- Link the user pool and app client to a route in the API gateway
    - The issuer URI has the following structure:

https://cognito-idp.{region}.amazonaws.com/{userPoolId}

- The Audience contains the app client identifier

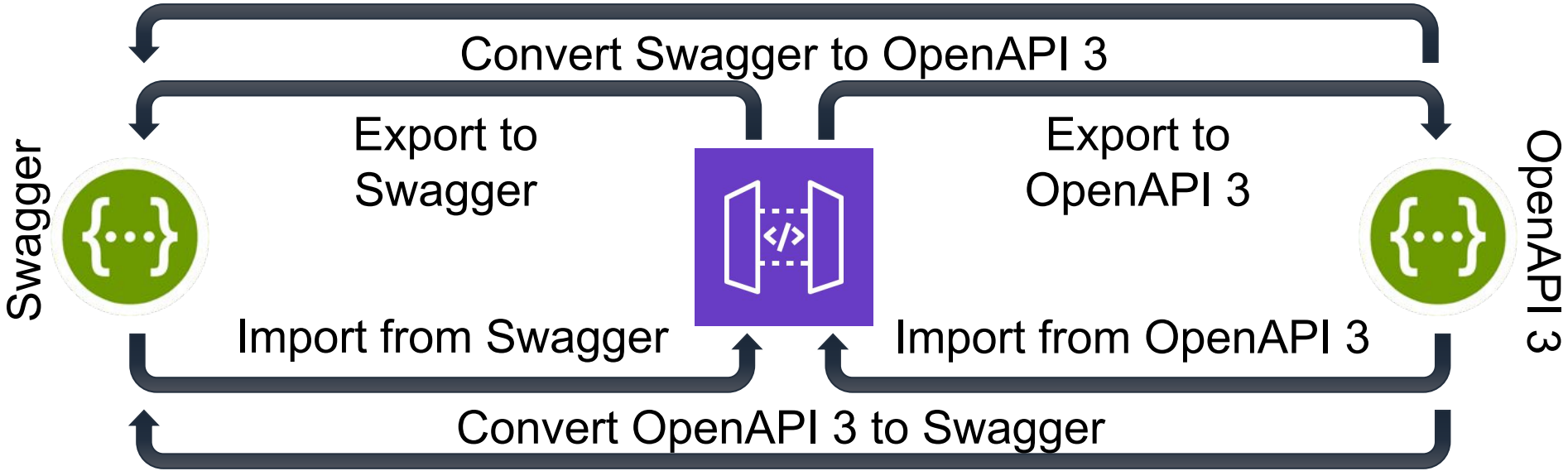


Caching



- Effective for quick responses and to minimize the load to your backend
- Use cache keys to optimize the response
  - Path, headers, query strings
- Can be set up per stage or method

Import / Export APIs



API gateway labs

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- Online lab platform
  - AWSGen (Lambda)
  - Deploy a lambda function an in AWS VPC