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API Gateway

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Oracle Cloud Infrastructure
February 2020

Safe harbor statement

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Objectives

After completing this lesson, you should be able to;

- Describe Oracle Cloud Infrastructure API Gateway service
- Configure and Create API Gateway Service

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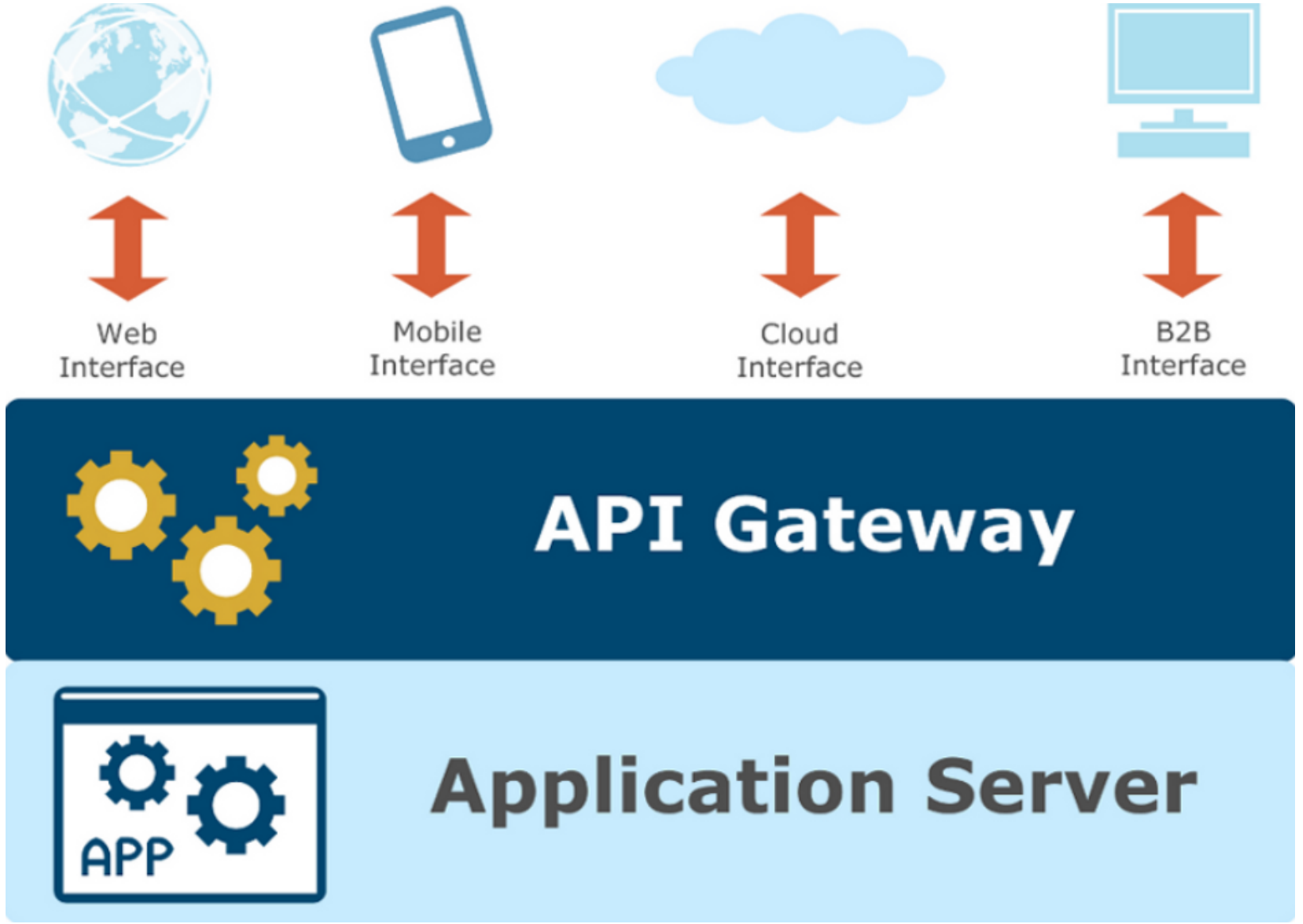
API Gateway Service

API Gateway Overview

- Microservices and Serverless deployment at scale can result in complex series of endpoints that need to be managed for front end and mobile applications
- APIs are common software interface that allows communication with these and other API enabled end points
- Can use a single API gateway to link multiple back-end services (such as load balancers, compute instances, and Oracle Functions) into a single consolidated API endpoint.
- API Gateway act as a "single point of entry" for all clients interacting with the end points, including:
  - Private endpoints that are accessible from within your network
  - Expose with public IP addresses if you want them to accept internet traffic
- API Gateways also give you the ability to easily implement (at Gateway level):
  - API validation
  - Request and response transformation
  - CORS (Cross-Origin Resource Sharing)
  - Authentication and authorization, and request limiting

API Gateway Overview

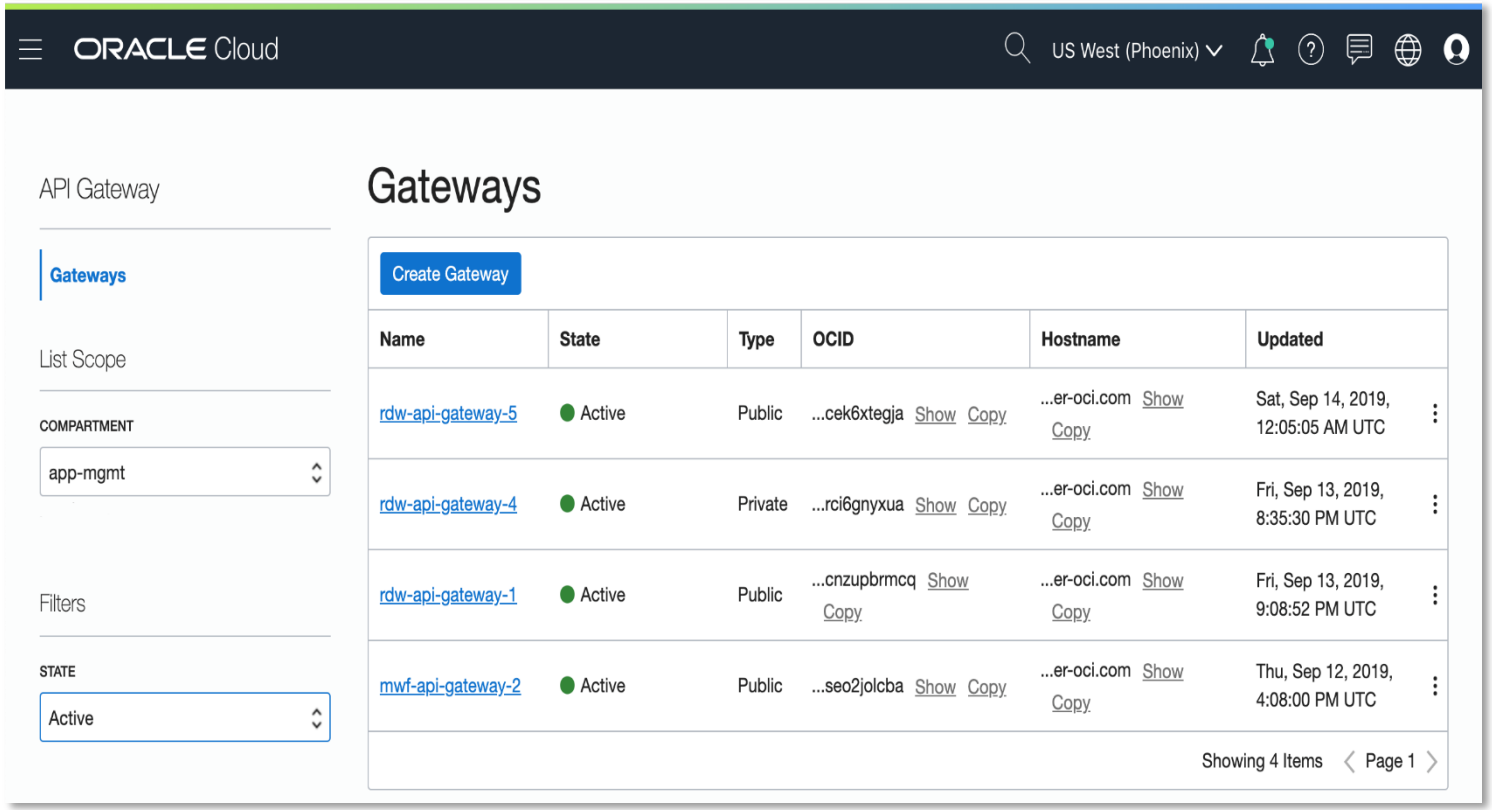


API Gateway Use Cases

- RESTful APIs for Functions
  - Extend applications
  - Manages security access
  - No SDK required
  - Manages security context
- APIs for custom development
  - Use with Oracle Kubernetes Engine
  - API interface for services on K8s
  - Use with services on Compute
- Protect SaaS Services
  - Rate-limit/protect access to SaaS RESTful services
  - Native service on OCI to support SaaS, and Autonomous Database

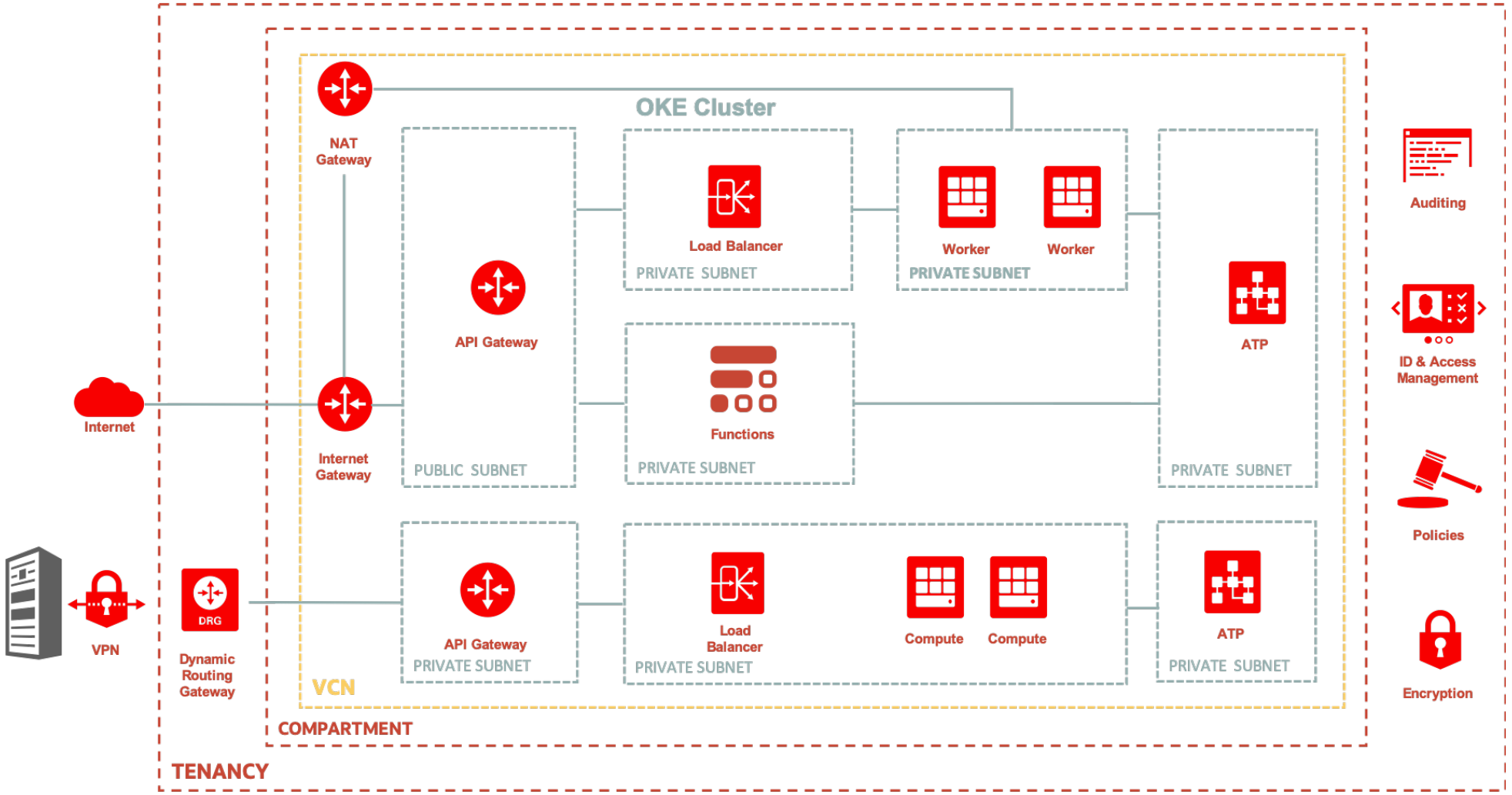
API Gateway Features

- REST APIs for OCI Services
  - Oracle Functions, K8S
  - HTTPS Back-ends
- Routing
- Rate-limiting
- Cross-origin Resource Sharing (CORS)
- Custom Authentication
- Metrics/Logging
- Fully Oracle Managed
- Terraform



Deployment scenario

- Example scenario of Using API Gateway for both Private and Public End point



API Gateway Concepts

APIs

- API is a set of resources, and methods (for example, GET, PUT) that can be performed on each resource in response to requests sent by a caller (a user or system)

API Deployments

- API deployment is the means by which you deploy API on API gateway
- When you create API deployment, you define properties for the API deployment
- Can deploy multiple APIs on the same API gateway

API Deployment Specifications

- Describes some aspects of API deployment:
  - Defines one or more back-end resources
  - Route to each back-end resource
  - Methods (for example, GET, PUT) that can be performed on each resource
  - How the API gateway integrates with the back end to execute those methods
  - Can also include request and response policies
- Can create using dialogs in the Console, or using JSON file

API Gateway Concepts

Front ends
- Means by which requests flow into an API gateway.
- Can have either a public front end or a private front end:
  - A public front end exposes the APIs deployed on an API gateway via a public IP address.
  - A private front end exposes the APIs deployed on an API gateway to a VCN via a private endpoint.

Back ends
- Means by which a gateway routes requests to the back-end services that implement APIs
  - Could be a private endpoint back end
  - Could be other services such as Oracle Functions

API Callers
- A person or system that calls an API by sending requests to the API gateway

API Gateway Developers
- A user responsible for creating API deployment specifications and deploying them to API gateways

API Gateway Administrators
- A person responsible for setting up the API Gateway service. For example, by setting up IAM policies

API Gateway Concepts

Routes

- Mapping between a path, one or more methods, and a back-end service.
- Routes are defined in API deployment specification

Policies

- Different than IAM polices
- Request policy describes actions to be performed on an incoming request from a caller before it is sent to a back end. Can be used to:
  - Limit the number of requests sent to back-end services
  - Enable CORS (Cross-Origin Resource Sharing) support
  - Provide authentication and authorization
- Can add request policies to an API deployment specification that apply globally to all routes

- Response policy describes actions to be performed on a response returned from a back end before it is sent to a caller

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Create API Gateway and access Oracle Function

Configuration Tasks

- Below is a list of tasks needed. We will look at Policy tasks in more detail in the next slide

Task #	Tenancy Configuration Task
1	Create Groups and Users to Use API Gateway, if these don't exist already
2	Create Compartments to Own Network Resources and API Gateway Resources in the Tenancy, if they don't exist already
3	Create a VCN to Use with API Gateway, if one doesn't exist already
4	Create Policies to Control Access to Network and API Gateway-Related Resources, and more specifically: • Create a Policy to Give API Gateway Users Access to API Gateway-Related Resources • Create a Policy to Give API Gateway Users Access to Network Resources • Create a Policy to Give API Gateway Users Access to Functions • Create a Policy to Give a Dynamic Group of API Gateways Access to Functions

Required Policy

- Before using the API Gateway service to create API gateways and deploy APIs on them, number of policies are needed.
- In addition to granting access to user you can also grant API gateways access to functions (If a user specifies a serverless function defined in Oracle Functions as the API back end)

For User access;

- Give API Gateway Users Access to API Gateway-Related Resources

Allow group <group-name> to manage api-gateway-family in compartment <compartment-name>

- Give API Gateway Users Access to Network Resources

Allow group <group-name> to manage virtual-network-family in compartment <compartment-name>

- Give API Gateway Users Access to Functions

Allow group <group-name> to use functions-family in compartment <compartment-name>

Required Policy

For function as an API back end; (Grant API gateways access to functions defined in Oracle Functions)

- First create a dynamic group Before creating the API gateway (API Gateway service verifies that the new API gateway will have access to the specified function through its membership of a dynamic group to which a policy grants appropriate access).
- Enter a rule(For Dynamic group) that includes some or all of the API gateways in the compartment

ALL {resource.type = 'ApiGateway', resource.compartment.id = '<compartment-ocid>'}

- Create a IAM policy (Ensure the compartment_name is the compartment where function was created)

Allow dynamic-group <dynamic-group-name> to use functions-family in compartment <compartment-name>

- You also have to create a policy to give users access to Oracle Functions (As described previously)

Create API Gateway and access Oracle Function

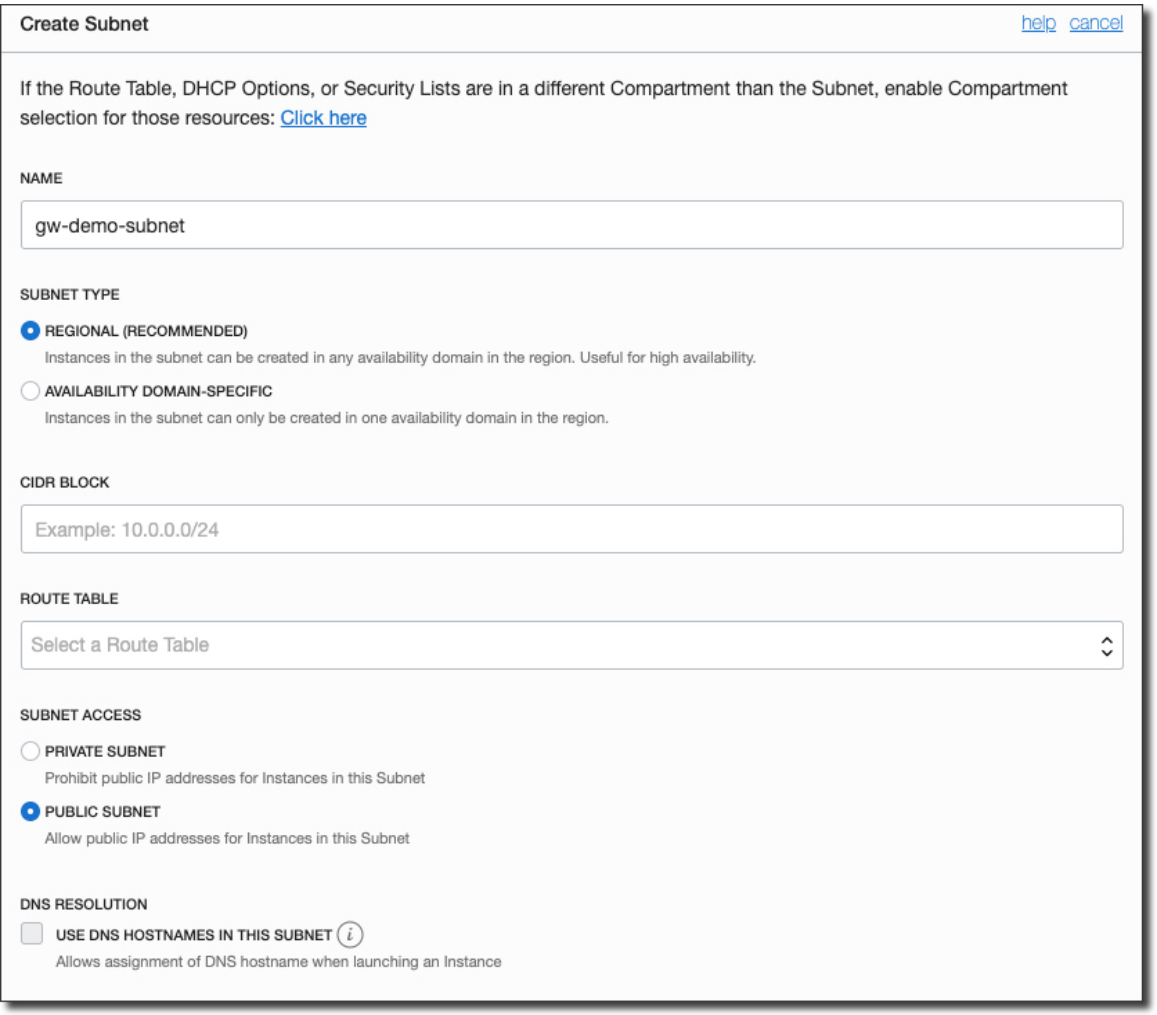
- Assuming user has already deployed an app called ‘Hello World’ using Oracle Fn
- We can invoke this Fn with the Fn CLI but not directly via HTTP(s) without signing the request or using the OCI SDK

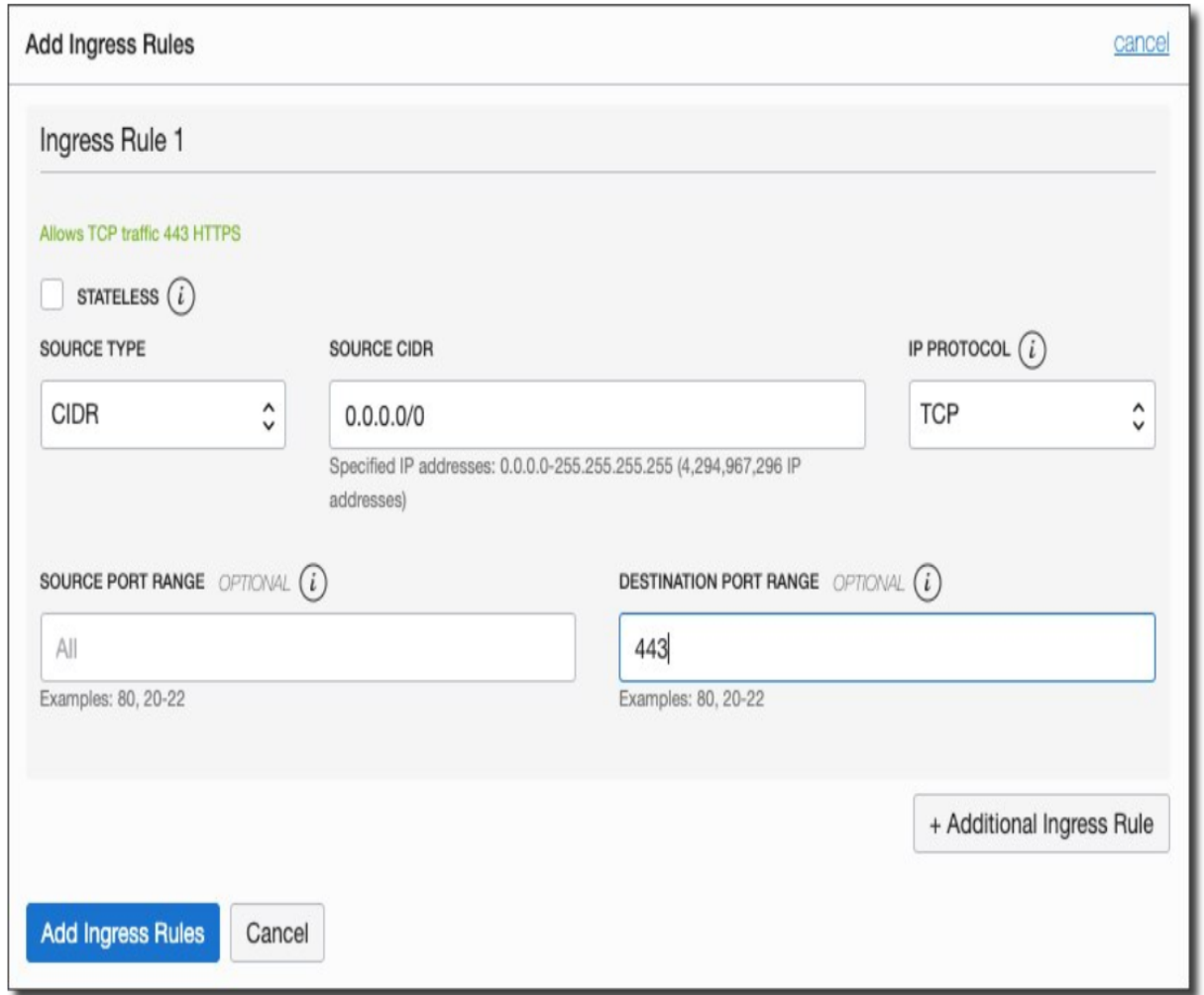
```
$ curl -i -X GET https://[redacted].us-phoenix-1.functions.oci.oraclecloud.com/20181201/functions/ocid1.fnfunc.oc1.phx..../actions/invoke
HTTP/1.1 401 Unauthorized
Date: Fri, 22 Nov 2019 14:24:33 GMT
Content-Type: application/json
Content-Length: 57
Connection: keep-alive
Opc-Request-Id: /01DT9R03K21BT1A2RZJ0005QSH/01DT9R03K21BT1A2RZJ0005QSJ
Www-Authenticate: Signature headers="date (request-target) host"

{"code":"NotAuthenticated","message":"Not authenticated"}
```

- Next, we will put this Fn behind API gateway and invoke it successfully.

Creating API Gateway

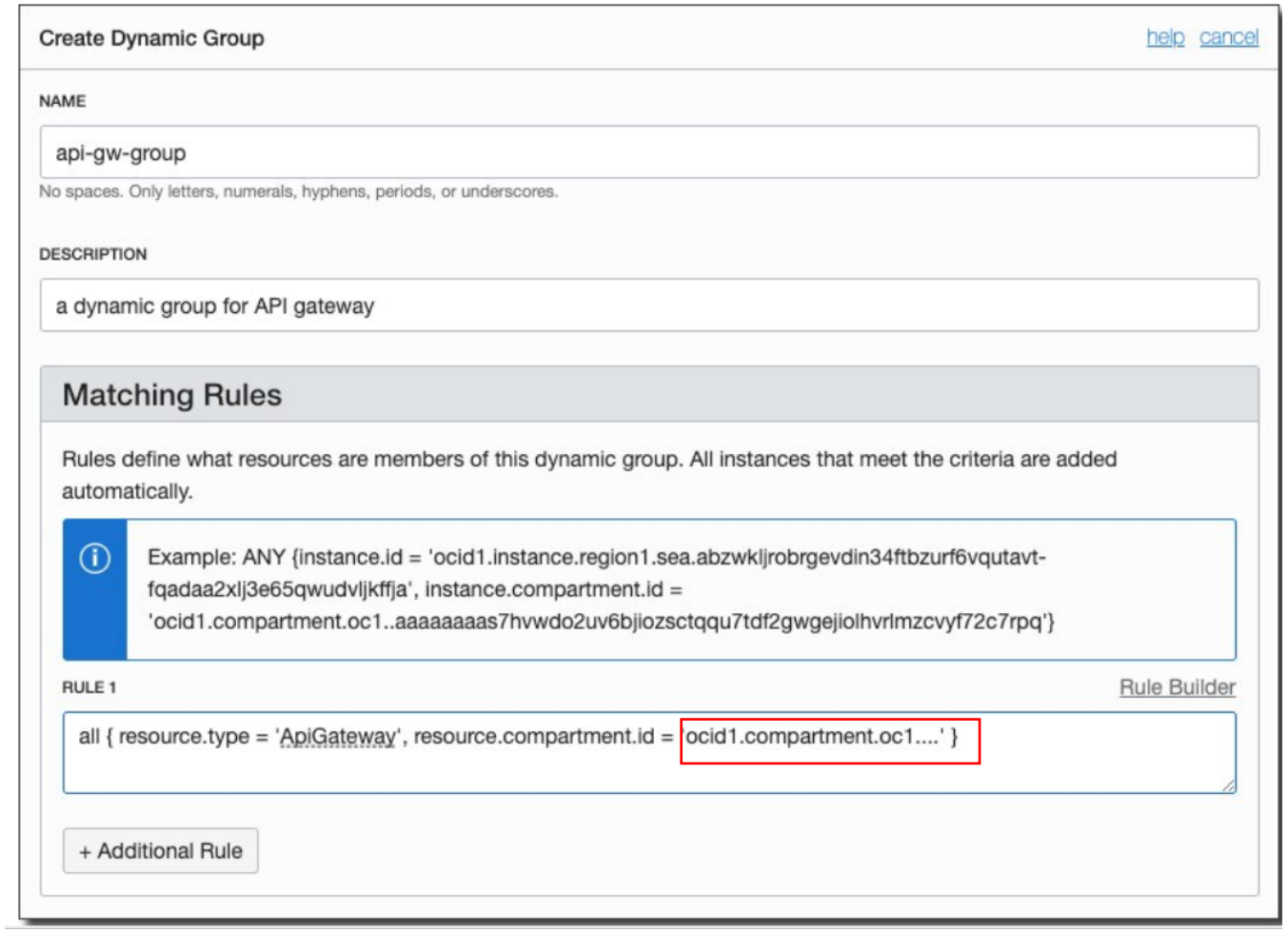
- Create a regional Public subnet that has an ingress rule for HTTPS traffic
  - ➢ Existing subnet can be used as well as long as HTTPS rule is added





Creating API Gateway

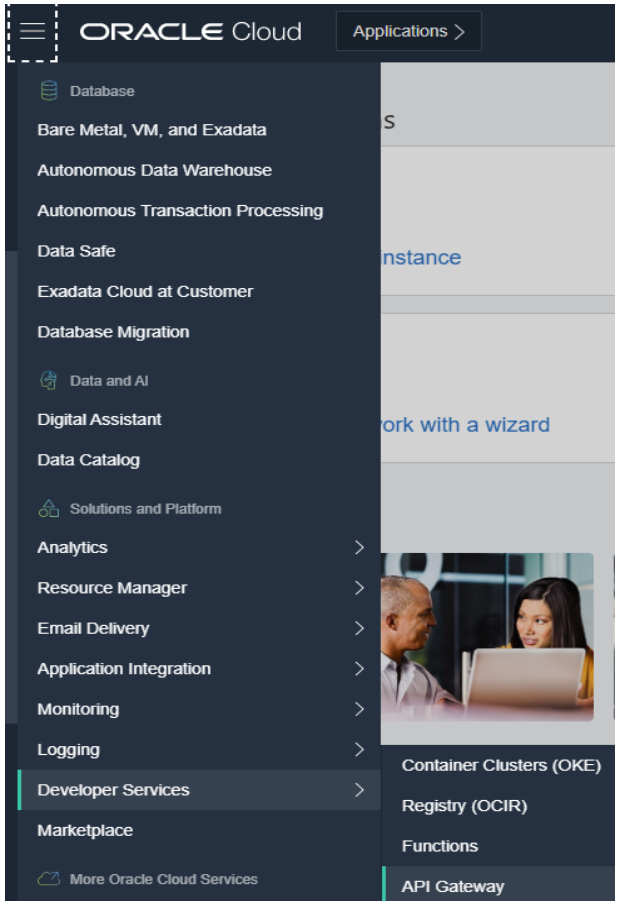
- Create dynamic group and Rules (Replacing OCID appropriately)



- **Also create IAM Policies as described earlier (Not covered in this Presentation)**

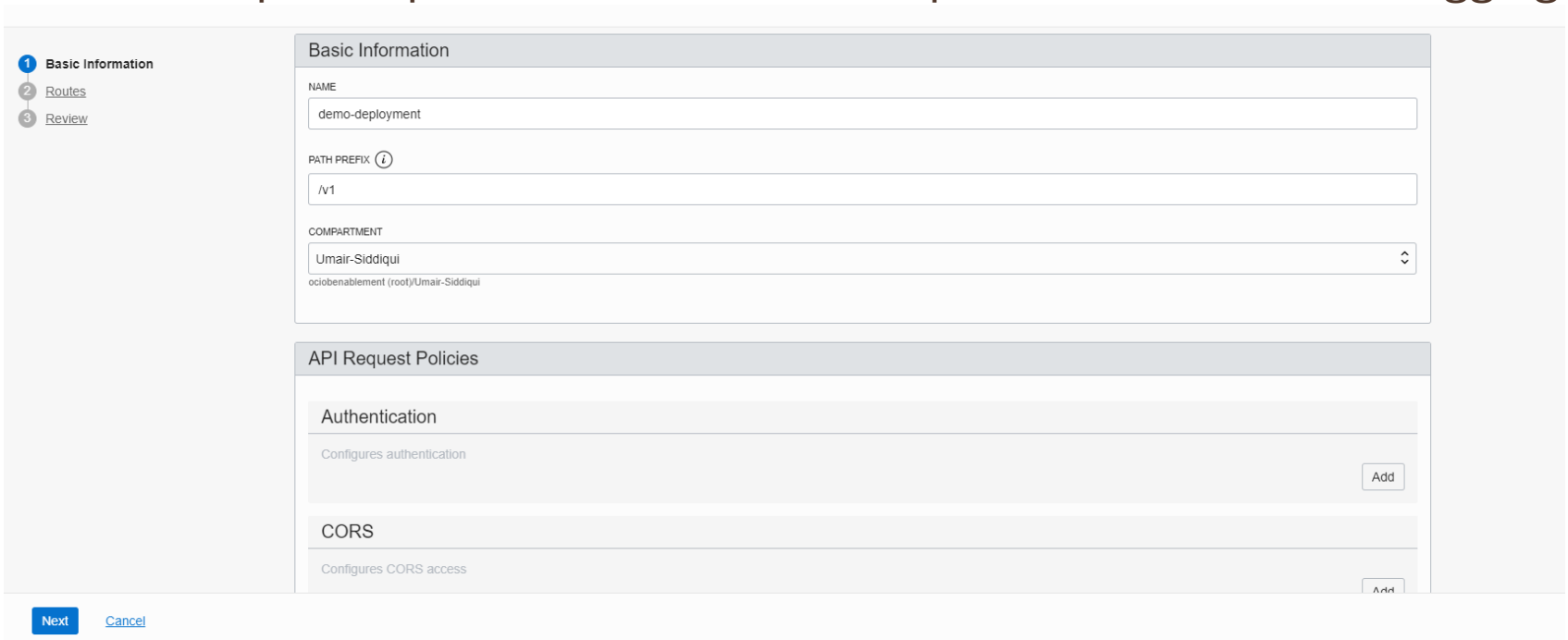
Creating API Gateway

- Can use Console, CLI or SDK
- From OCI console, navigate to ‘Developer Services’ and then ‘API Gateway’



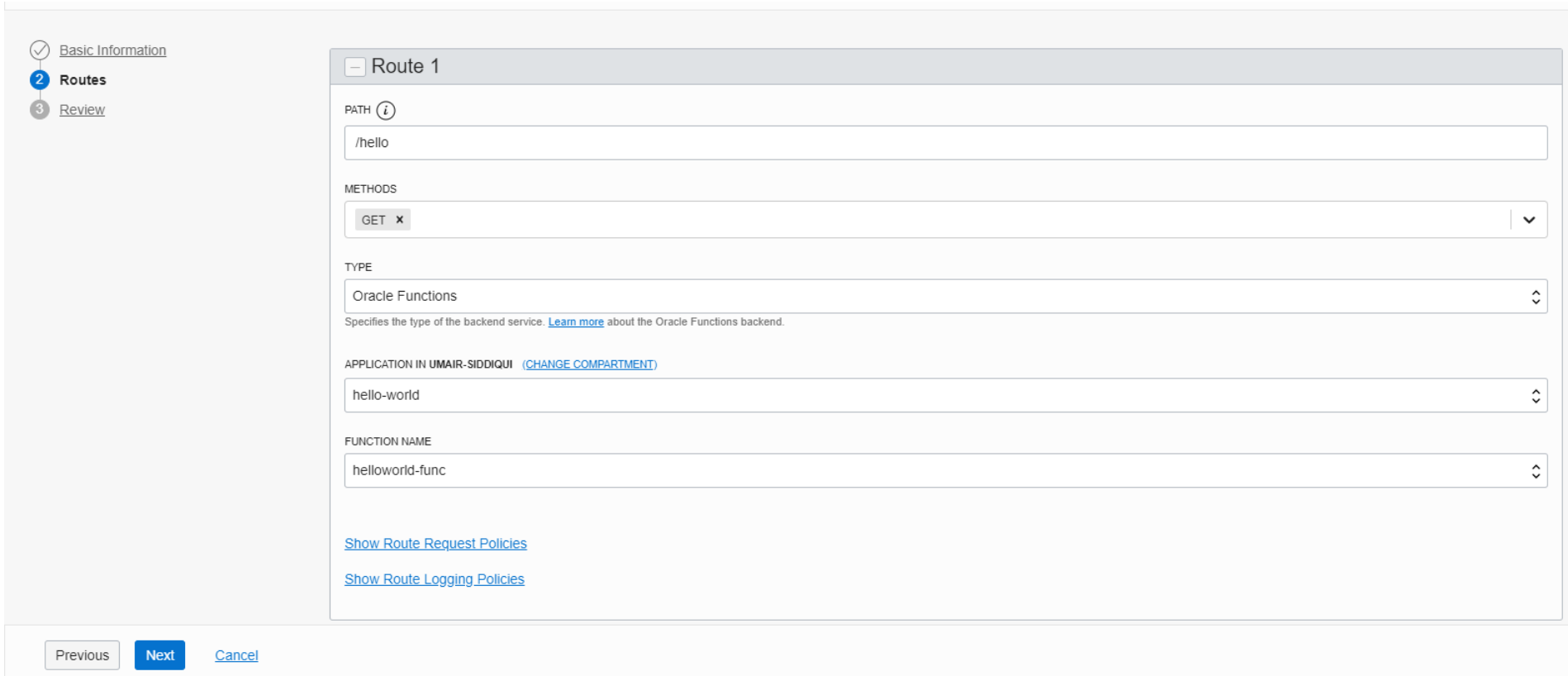
Creating API Gateway

- Once Gateway is available, Click ‘Deployments’ then ‘Create Deployment’
- You have option to create ‘From scratch’ or upload a JSON file. We will use ‘From Scratch’
  - Json Example file is shown later on
- Fill out the multi screen dialog box to configure your Gateway. Under ‘Basic Information’:
  - Provide a ‘Name’, ‘Path Prefix’ and ‘compartment’ (where Fn is deployed)
  - Can leave optional parameters under ‘API Request Policies’ and ‘API Logging policy’ to default



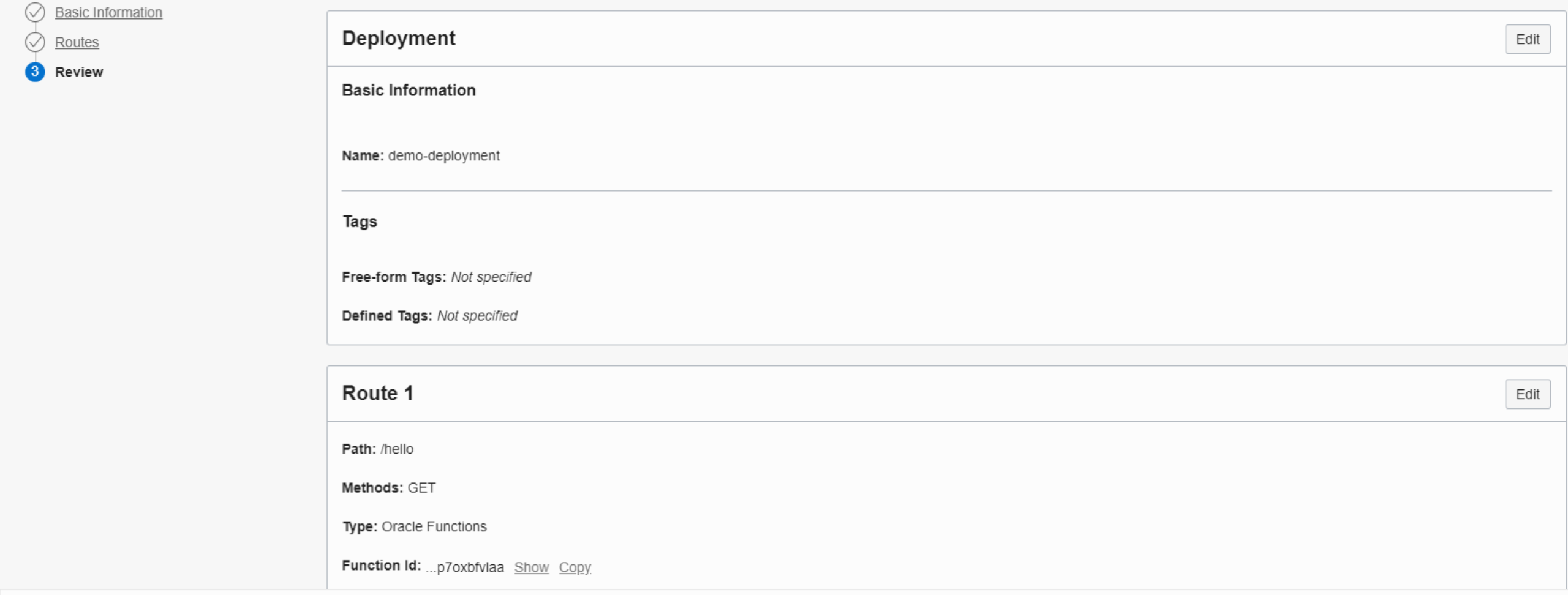
Creating API Gateway

- In ‘Routes’ screen, Under ‘Route 1’
  - ➢ Provide ‘Path’ (is relative to the deployment ‘path prefix’)
  - ➢ ‘Methods’ is GET, ‘Type’ is Oracle Functions
  - ➢ Choose the Application and Function Name using drop down



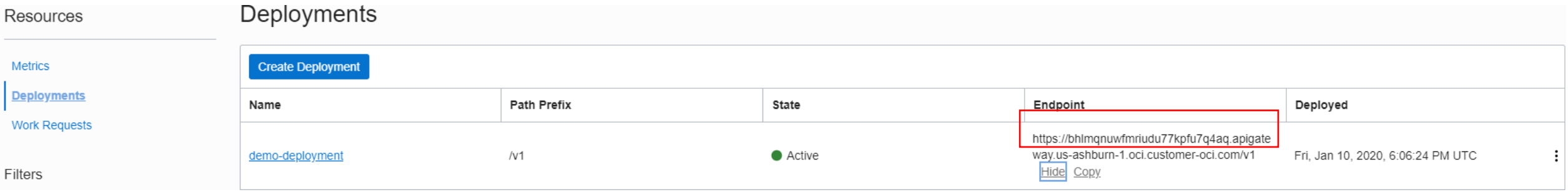
Creating API Gateway

- Review the information and click ‘Create’



Creating API Gateway

- Once Deployment is ‘Ready’, copy the ‘End Point’.



- Access the App again, replacing the end point and verifying Function was invoked

```
$ curl -i -X GET https://[redacted].apigateway.us-phoenix-1.oci.customer-oci.com/v1/hello
HTTP/1.1 200 OK
Date: Fri, 22 Nov 2019 15:04:11 GMT
Content-Type: application/json
Connection: keep-alive
Content-Length: 25
Server: Oracle API Gateway
Strict-Transport-Security: max-age=31536000
X-XSS-Protection: 1; mode=block
X-Frame-Options: sameorigin
X-Content-Type-Options: nosniff
opc-request-id: /429E9723BB6BED8DB8D237876894DDF6/3E4A5D8760D59242A98AB8A91E2B0107

{"message":"Hello World"}
```

Creating API Gateway

- Example JSON file

```
{
  "requestPolicies": {},
  "routes": [
    {
      "path": "<api-route-path>",
      "methods": ["<method-list>"],
      "backend": {
        "type": "<backend-type>",
        "<backend-target>": "<identifier>"
      },
      "requestPolicies": {}
    }
  ]
}
```

Trouble Shooting API Gateway

- Ensure your API Gateway is created in a VCN with at least 1 public subnet
- Ensure port 443 is open in Security list for the subnet
- Ensure ALL IAM policies are defined
- Ensure dynamic group is created

Additional Information

- For additional information on API Gateway, please refer to:

https://docs.cloud.oracle.com/iaas/Content/APIGateway/Concepts/apigatewayoverview.htm

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Thank you