Oracle Functions

Level 100

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Oracle Cloud Infrastructure
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Safe harbor statement

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Objectives

After completing this lesson, you should be able to understand:
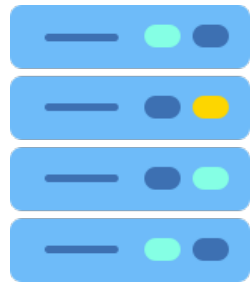
 Overview and key features

 Core concepts

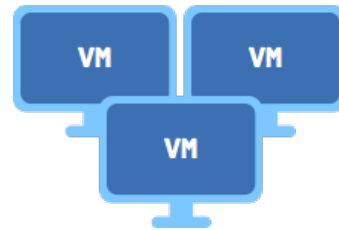 IAM policies

 How Functions work?

 Functions metrics

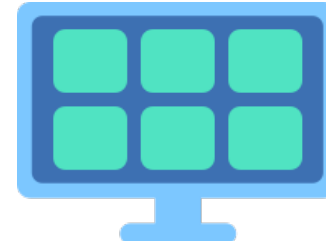 Common use-cases of Functions

 Demo

Serverless Compute – Functions-as-a-service (FaaS)

Bare Metal

Virtual machines

Containers

Functions

Code
App Container
Language Runtime
Operating System
Hardware

Code
App Container
Language Runtime
Operating System

Code
App Container

Code

Serverless is a category of cloud services that raises the abstraction level so that developers don't need to think about servers, VMs or other IaaS components

Oracle Functions

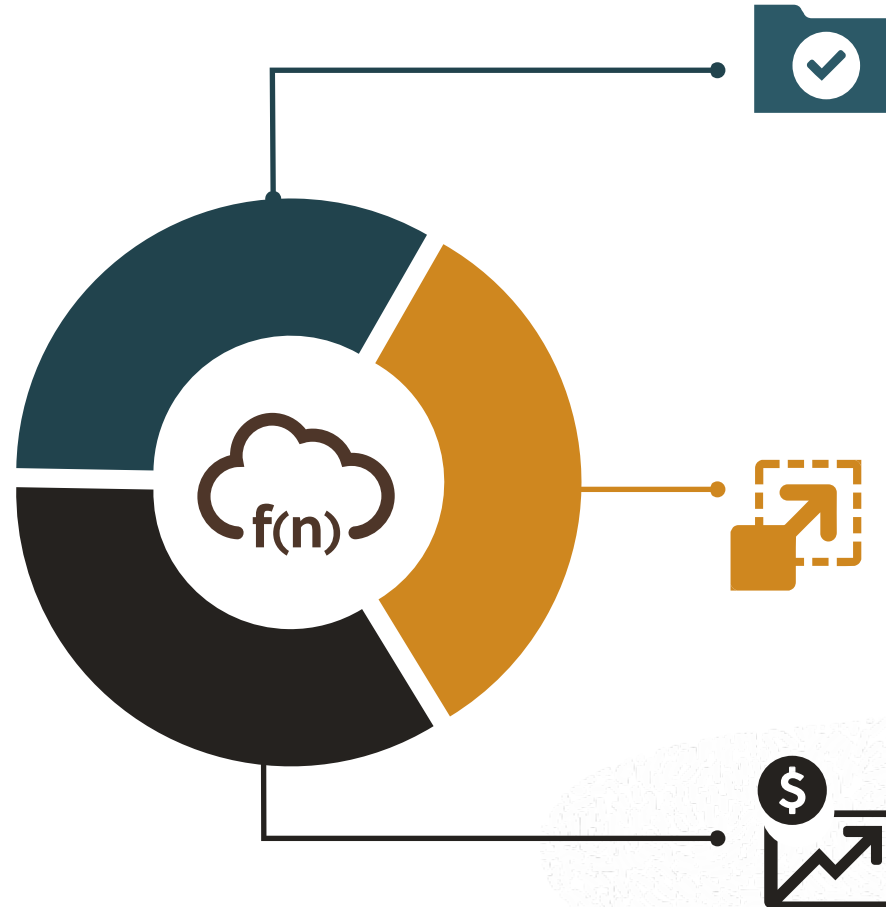**fn** http://fnproject.io

Functions-as-a-Service

Oracle Cloud Integrated

Container Native

Open Source Engine

Multi-tenant

Secure

f(n)

No Lock-in
- Built on open-source Fn Project and Docker
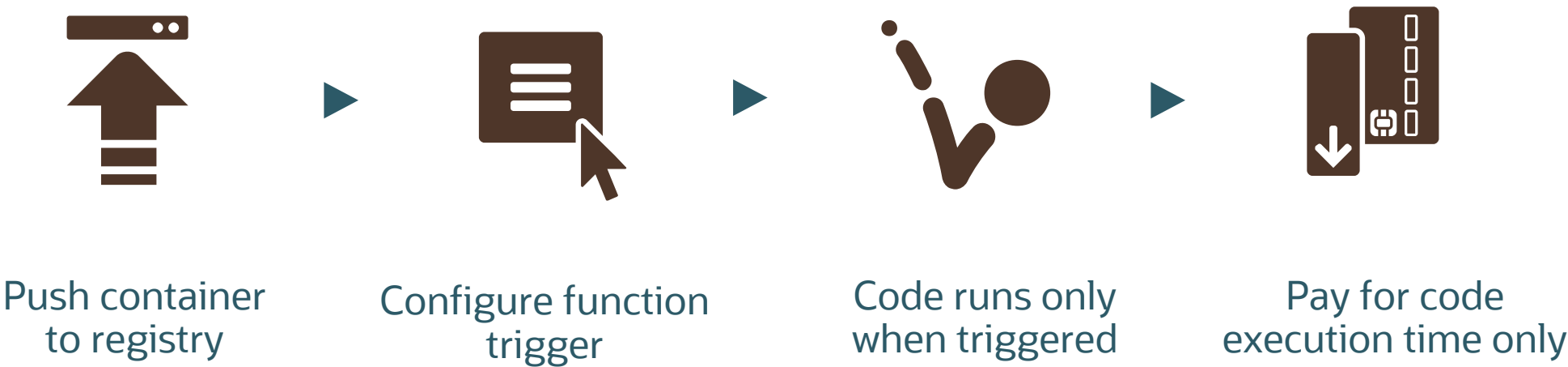- Platform independent: laptop, server, cloud

Autonomous
- Platform auto-scales functions
- No servers to provision, manage

Pay Per Use
Pay for execution, not for idle time

Functions Overview

Push container to registry ▶ Configure function trigger ▶ Code runs only when triggered ▶ Pay for code execution time only

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Function Triggers

Direct Invoke (SDK/CLI/API) → f(n)

OCI Events → f(n)

Function Integrations

f(n) → Monitoring

f(n) → Identity

f(n) → Registry

f(n) → Logging

f(n) → Network
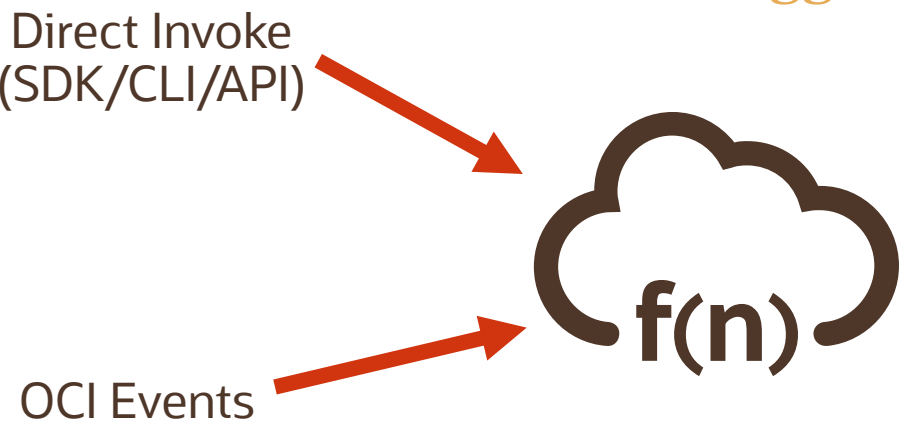
f(n) → OCI Services
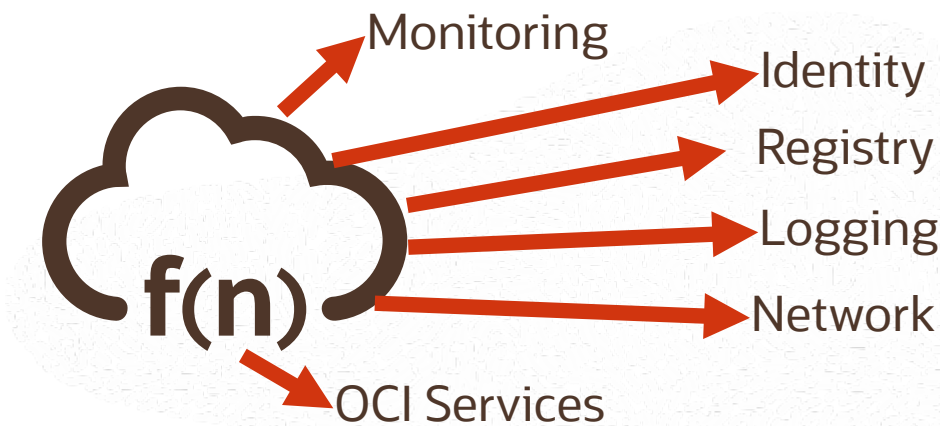
Example Java Function

```java
1    package com.example.fn;
2
3    public class HelloFunction {
4
5        public String handleRequest(String input) {
6            String name = (input == null || input.isEmpty()) ? "world" : input;
7
8            return "Hello, " + name + "!";
9        }
10
11   }
```

Function Development Kits (FDKs)

Simply write a `handler` function that adheres to the FDK's interface and the FDK will provide the input to your function, as well as deal with returning the proper output format.
FDKs make it easy to write functions

Oracle Functions Concepts – Applications

In Oracle Functions, an application is:
* a logical grouping of functions
* a common context to store configuration variables that are available to all functions in the application

When you define an application in Oracle Functions, you specify the subnets in which to run the functions in the application.

Oracle Functions shows applications and their functions in the Console.

Oracle Functions Concepts - Functions

In Oracle Functions, functions are:
- small but powerful blocks of code that generally do one simple thing
- grouped into applications
- stored as Docker images in a specified Docker registry
- invoked in response to a CLI command or signed HTTP request

When you deploy a function to Oracle Functions using the Fn Project CLI, the function is built as a Docker image and pushed to a specified Docker registry.

Oracle Functions Concepts – Invocations

In Oracle Functions, a function's code is run (or executed) when the function is called (or invoked). You can invoke a function that you've deployed to Oracle Functions from:
- The Fn Project CLI.
- The Oracle Cloud Infrastructure SDKs.
- Signed HTTP requests to the function's invoke endpoint. Every function has an invoke endpoint.
- Other Oracle Cloud services (for example, triggered by an event in the Events service) or from external services.

When a function is invoked for the first time, Oracle Functions pulls the function's Docker image from the specified Docker registry, runs it as a Docker container, and executes the function.

If there are subsequent requests to the same function, Oracle Functions directs those requests to the same container. After a period being idle, the Docker container is removed.

Oracle Functions Concepts - Triggers

A trigger is the result of an action elsewhere in the system, that sends a request to invoke a function in Oracle Functions.

For example, an event in the Events service might cause a trigger to send a request to Oracle Functions to invoke a function.

Alternatively, a trigger might send regular requests to invoke a function on a defined, time-based schedule.

A function might not be associated with any triggers, or it can be associated with one or multiple triggers.

IAM Policies required to work with Oracle Functions

Select the tenancy's root compartment, and create a new policy with the following two policy statements for the Oracle Functions service:

Allow service FaaS to read repos in tenancy

Allow service FaaS to use virtual-network-family in compartment <compartment-name>

If one or more Oracle Functions users is not a tenancy administrator, add the following policy statements to the new policy:
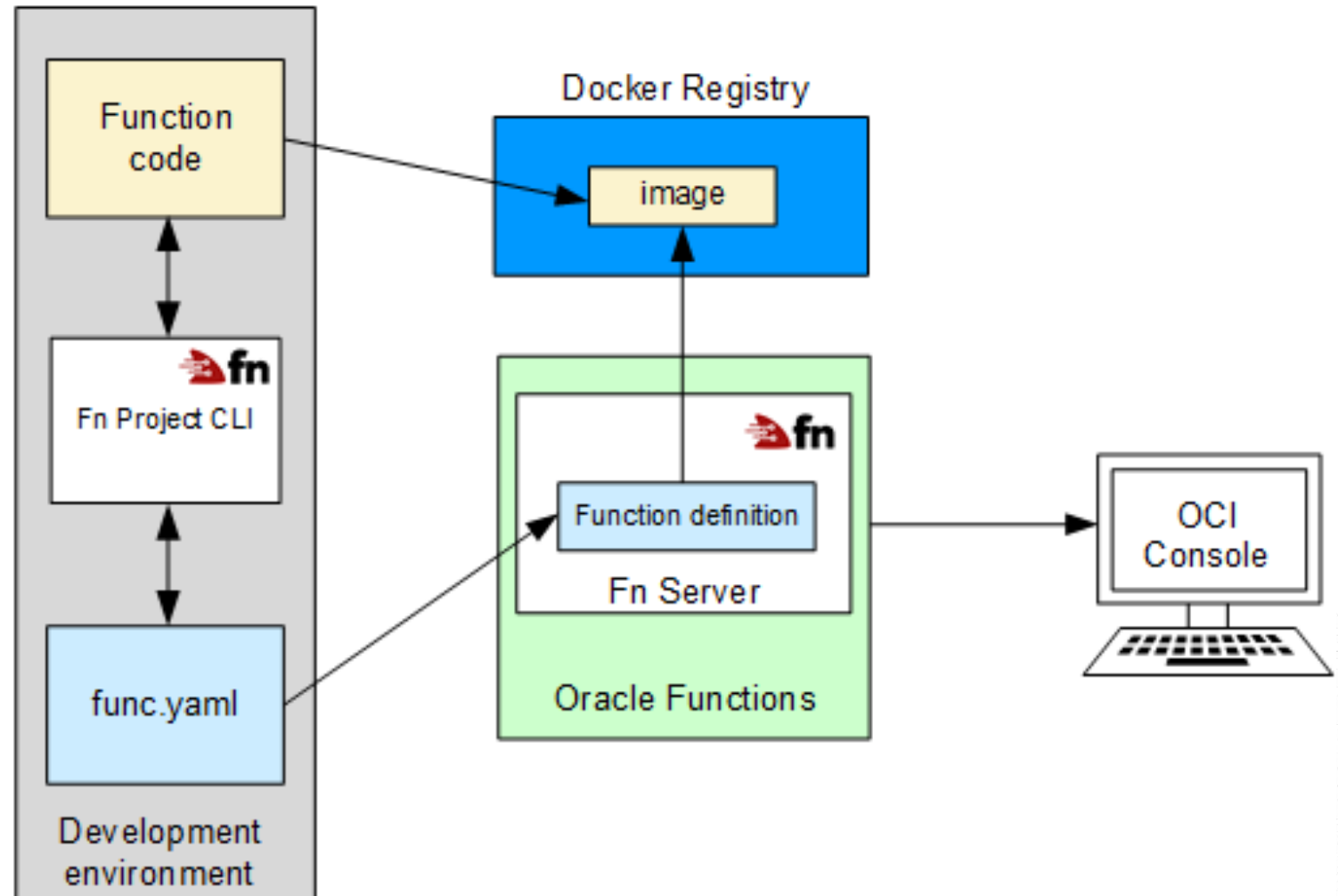
Allow group <group-name> to manage repos in tenancy

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

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

Allow group <group-name> to read metrics in compartment <compartment-name>
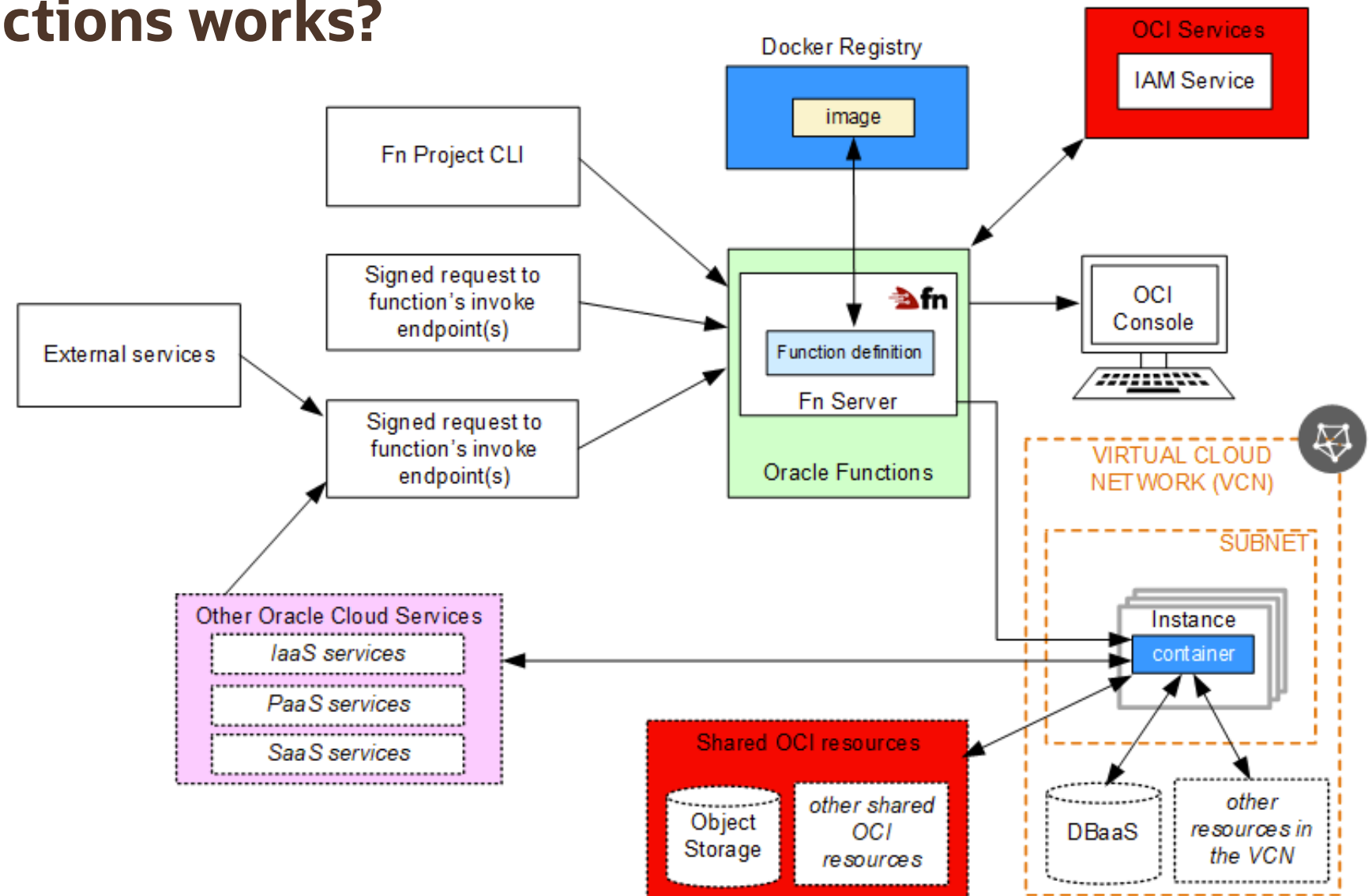
How Oracle Functions works?
Deploying a Function

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How Oracle Functions works?
Invoking a Function

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Functions Metrics

- FunctionExecutionDuration: Total function execution duration in milliseconds

- FunctionInvocationCount: Total number of function invocations

- FunctionResponseCount: Total number of function responses
  - Errors: The number of times a function failed
  - **Throttles:** The number of requests to invoke a function that returned a '429 Too Many Requests' error in the response

Functions Use Cases

Use Cases – *"Run Code in Response to Events"*

Glue Cloud Services, Event-driven	Web, Mobile, IoT Backends	Real-time File, Stream Processing	DevOps, Batch Processing

Use Functions to Glue Cloud Services

Cloud Applications (SaaS)

ERP	HCM	Supply Chain
Data	Analytics	CX

Functions

Cloud Platform (PaaS)

Mobile	Data Mgmt	Custom Apps
Integration	Business Insight	Collaboration

Network	Compute	Storage	Au	Events

Cloud Infrastructure (IaaS)
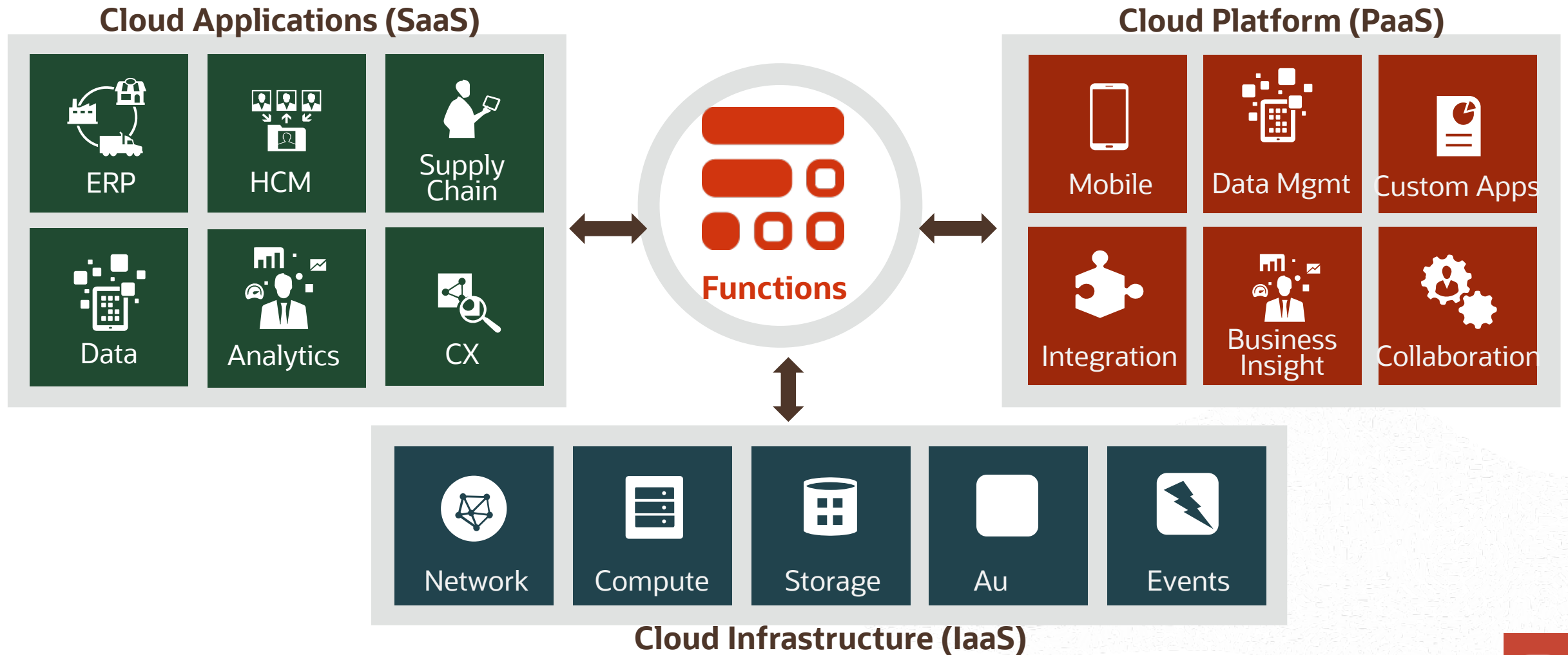
Infrastructure Event Driven Architectures

ORACLE CLOUD

Network

ATP/ADW

Compute

Storage

Events

Trigger functions

Functions

Functions can use DB, Storage, and other services
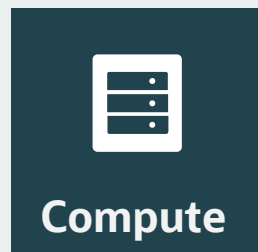
ATP

Storage
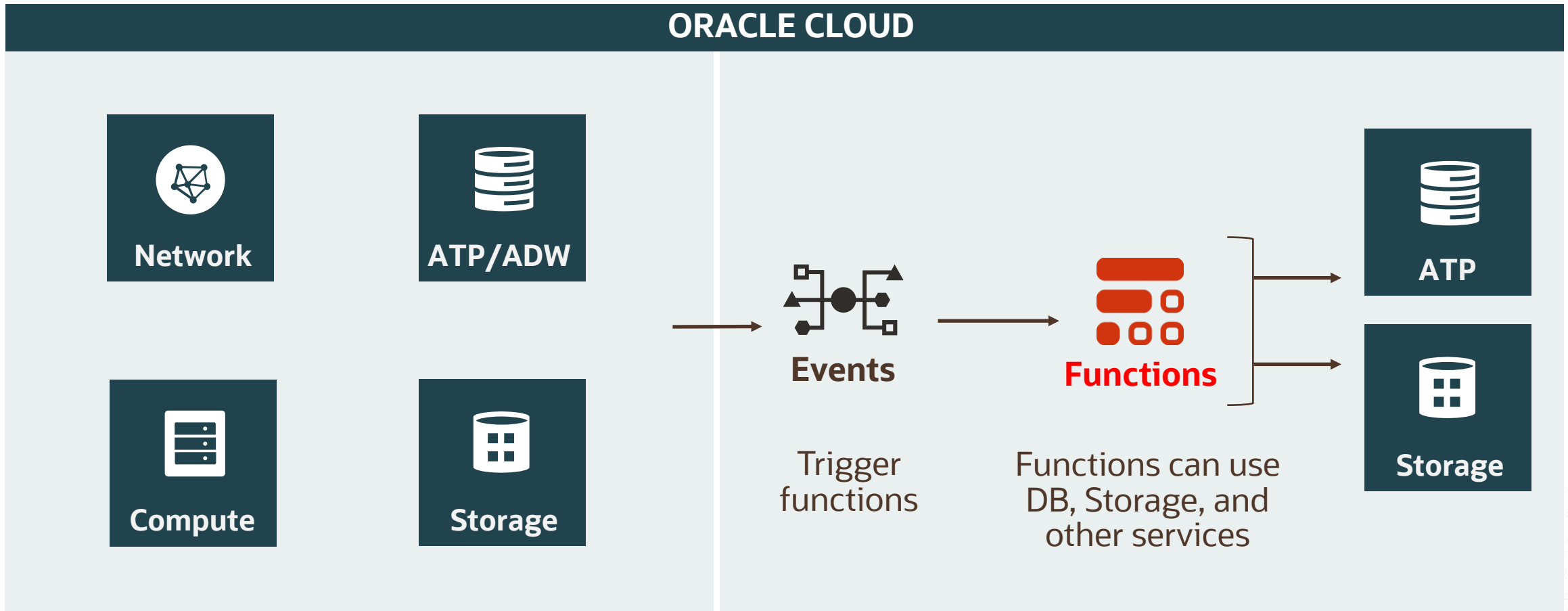
ATP = Autonomous Transaction Processing

ADW = Autonomous Data Warehouse

Automate Corporate Security Actions

ORACLE CLOUD
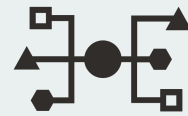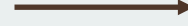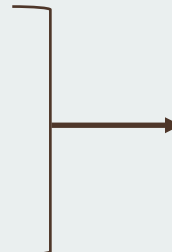

Compute

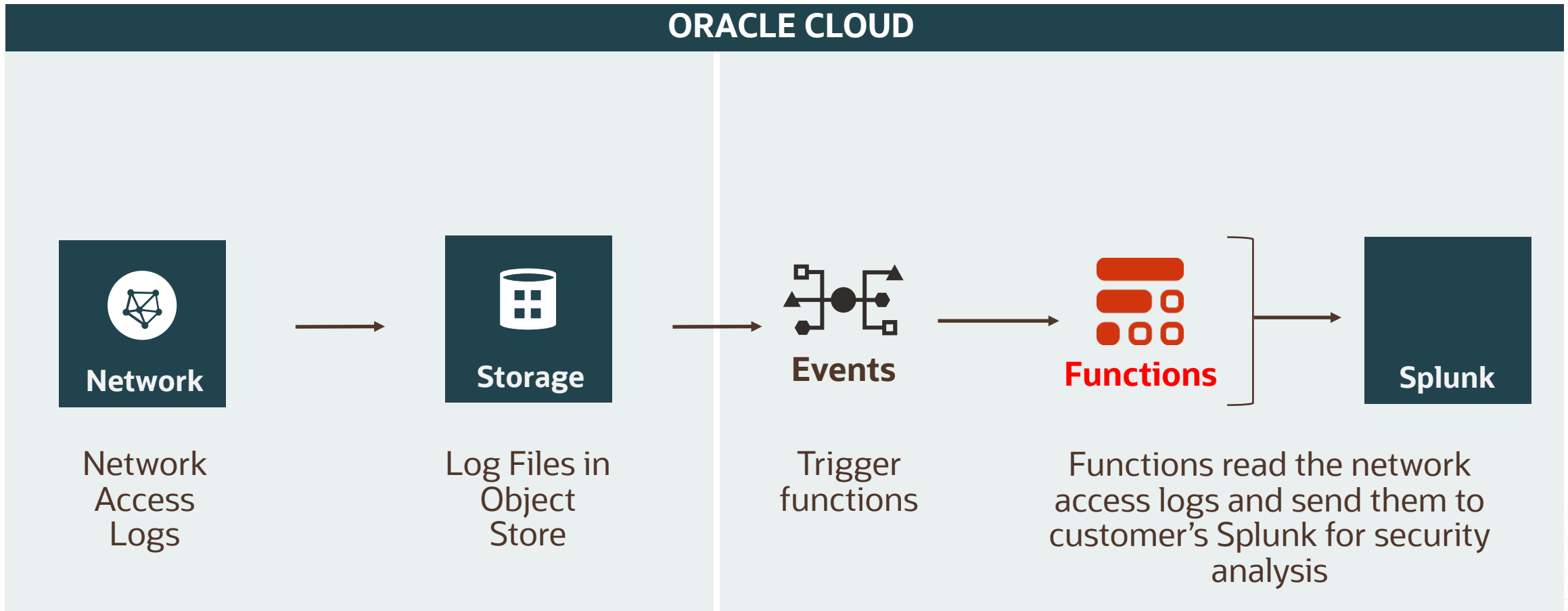Provision Instance Request

Events

Trigger functions

Functions

Functions check if the instance complies with security policies. If not, kill the instance & send a new provision instance request
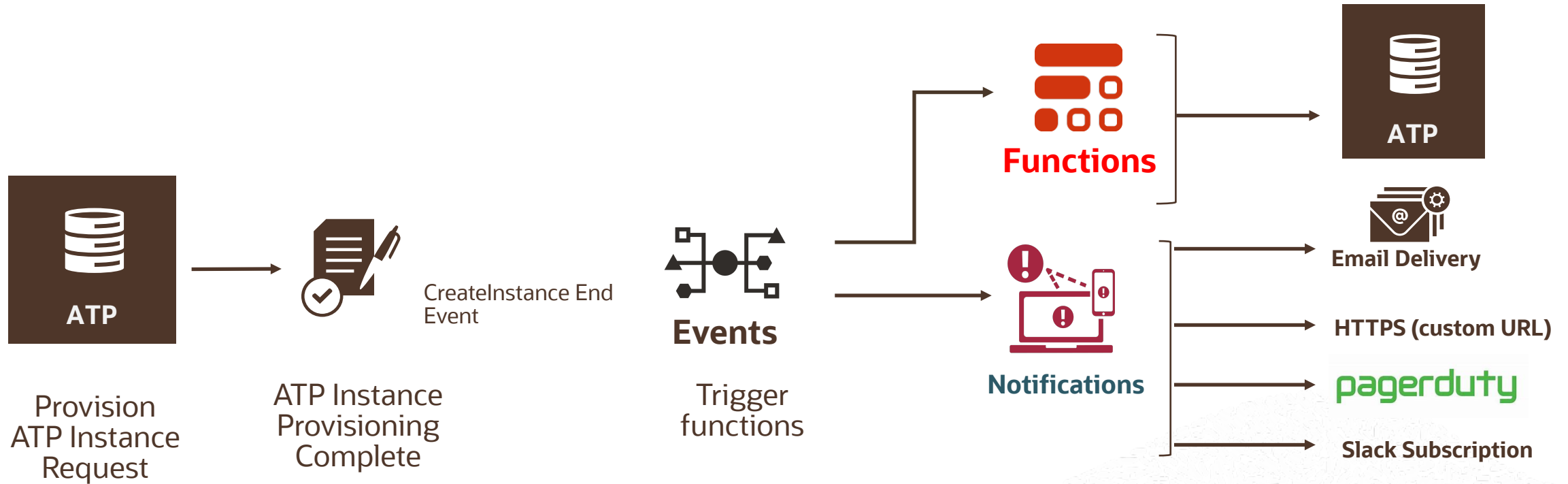
Instance Provisioning Complete

Compute

Network Security Analysis

ORACLE CLOUD

Network

Network Access Logs

Storage

Log Files in Object Store

Events

Trigger functions

Functions

Functions read the network access logs and send them to customer's Splunk for security analysis
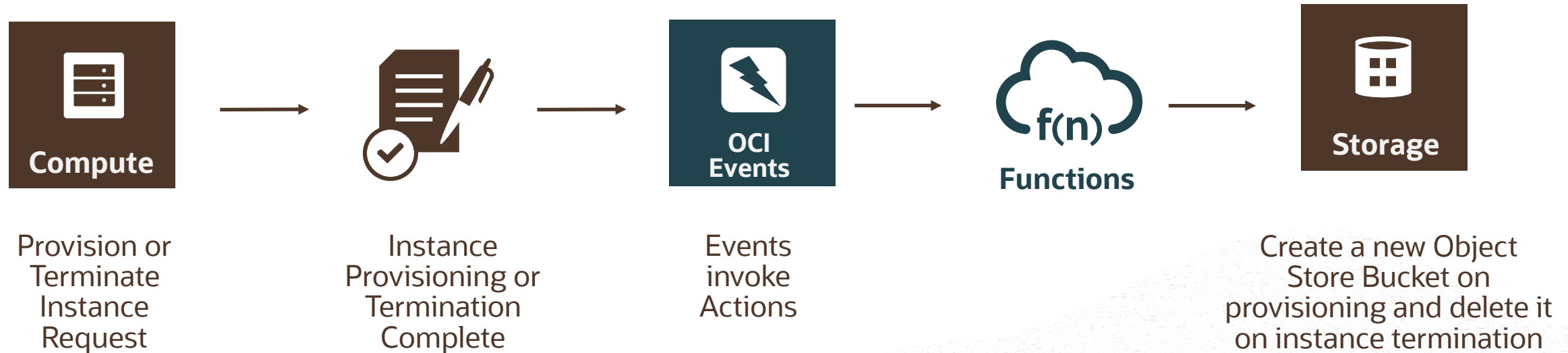
Splunk

Automate Database Environment Setup

- Functions runs scripts to create schemas, tables and import golden data.
- Notifications triggers email and PagerDuty alerts.

Demo: Integrating an OCI Service event with Oracle Functions

Compute		Instance Provisioning or Termination Complete		OCI Events		Functions		Storage
Provision or Terminate Instance Request		Instance Provisioning or Termination Complete		Events invoke Actions				Create a new Object Store Bucket on provisioning and delete it on instance termination

Summary

- Fully managed event ingestion and routing platform that enables users to automatically detect changes on their resources and act upon them.
- Customers simply pick the services they care about, the type of event they want to monitor, and the actions they want to take.
- **Free** service with a native **CNCF** cloudevents support.
- Integrated with IAM and Monitoring
- Accessible through REST APIs, OCI console, SDKs, CLI, Terraform
- Roadmap
  - Support for custom events via OSS
  - Support for "Advanced" flow, which allows users to input custom verbose json for more complex rules.

ORACLE

Oracle Cloud always free tier:
oracle.com/cloud/free/

OCI training and certification:
cloud.oracle.com/en_US/iaas/training
cloud.oracle.com/en_US/iaas/training/certification
education.oracle.com/oracle-certification-path/pFamily_647

OCI hands-on labs:
ocitraining.qloudable.com/provider/oracle

Oracle learning library videos on YouTube:
youtube.com/user/OracleLearning