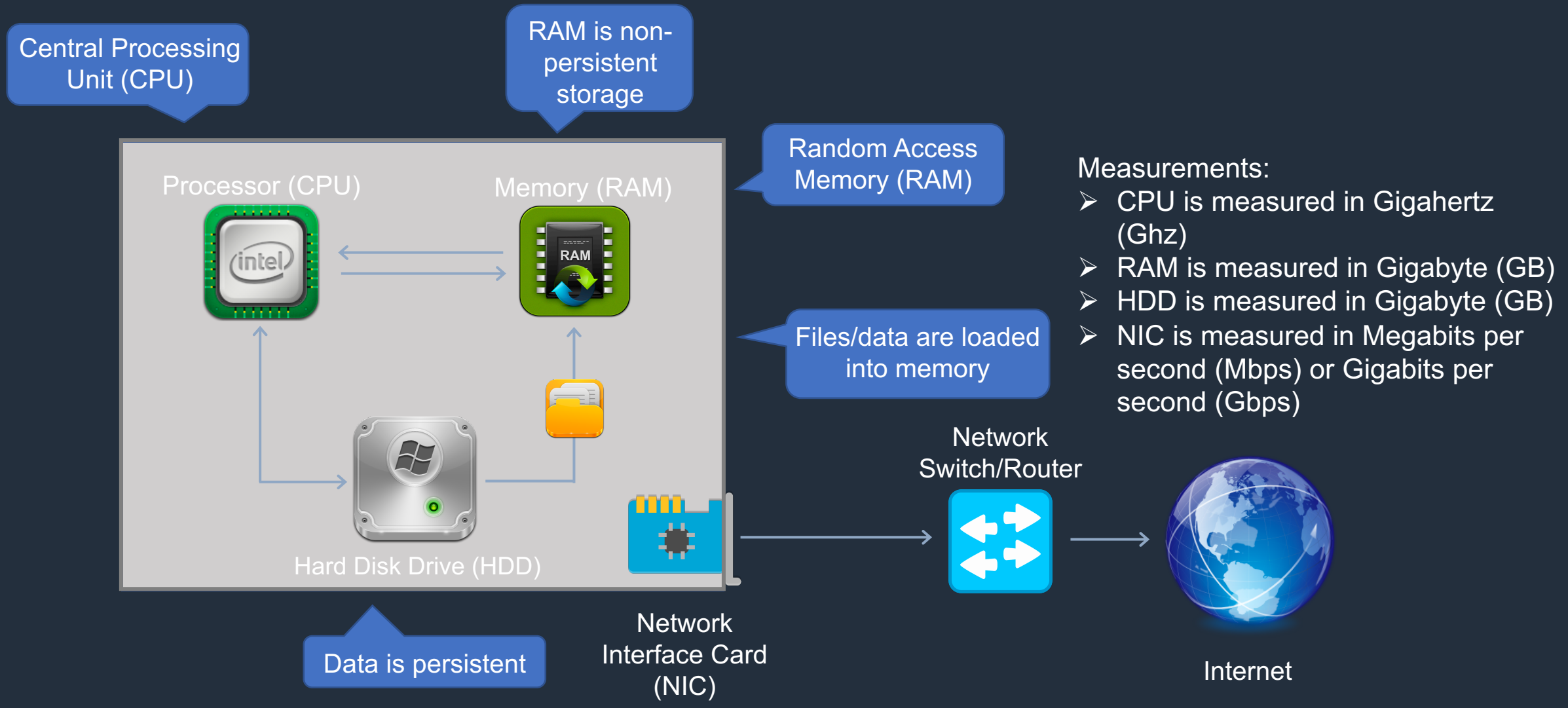
SECTION 2

The Building Blocks of Cloud Computing

Compute – Basic architecture of a computer

DigitalCloud TRAINING

Compute – Basic architecture of a computer

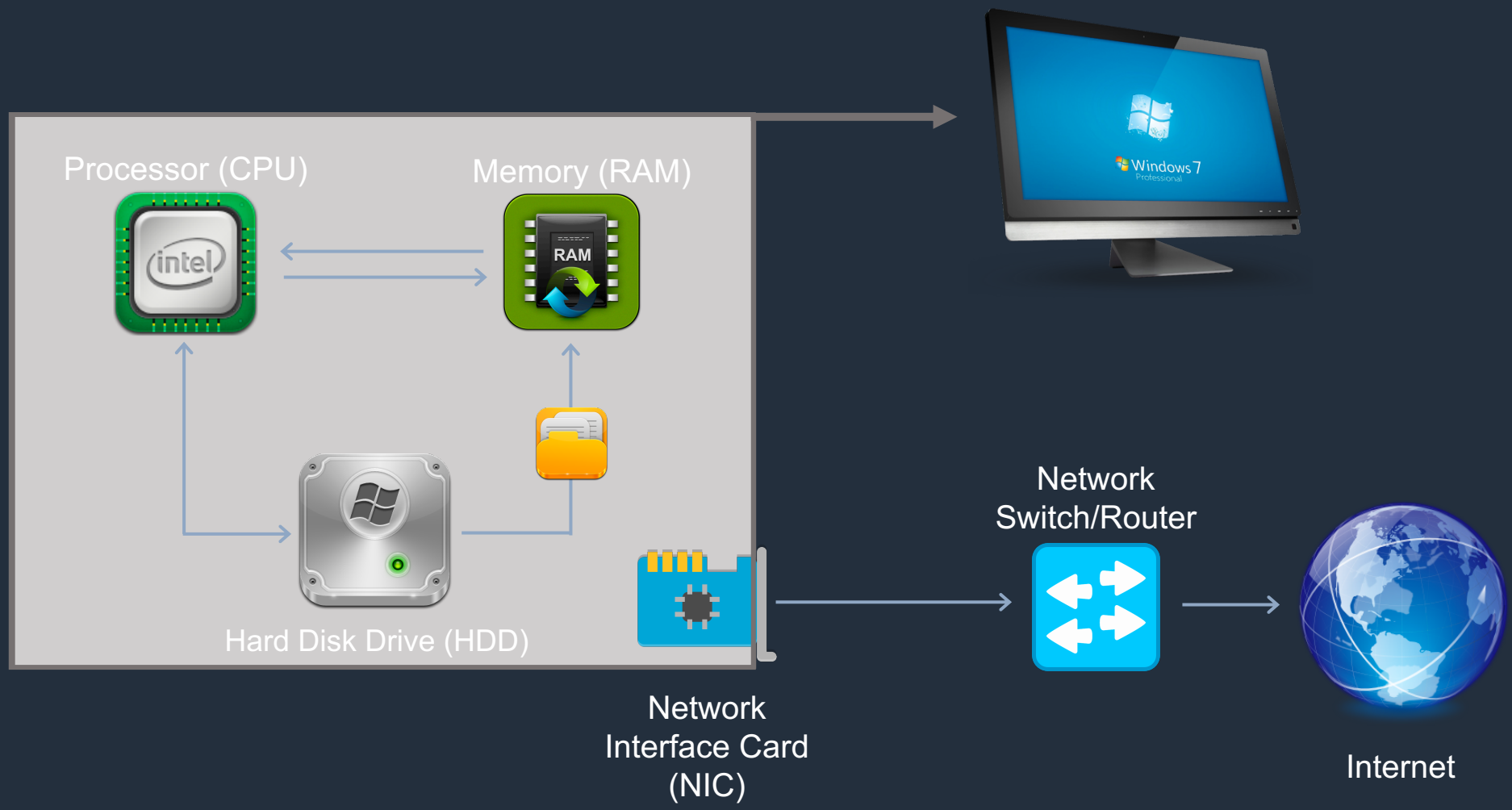


Measurements:

- CPU is measured in Gigahertz (Ghz)
- RAM is measured in Gigabyte (GB)
- HDD is measured in Gigabyte (GB)
- NIC is measured in Megabits per second (Mbps) or Gigabits per second (Gbps)

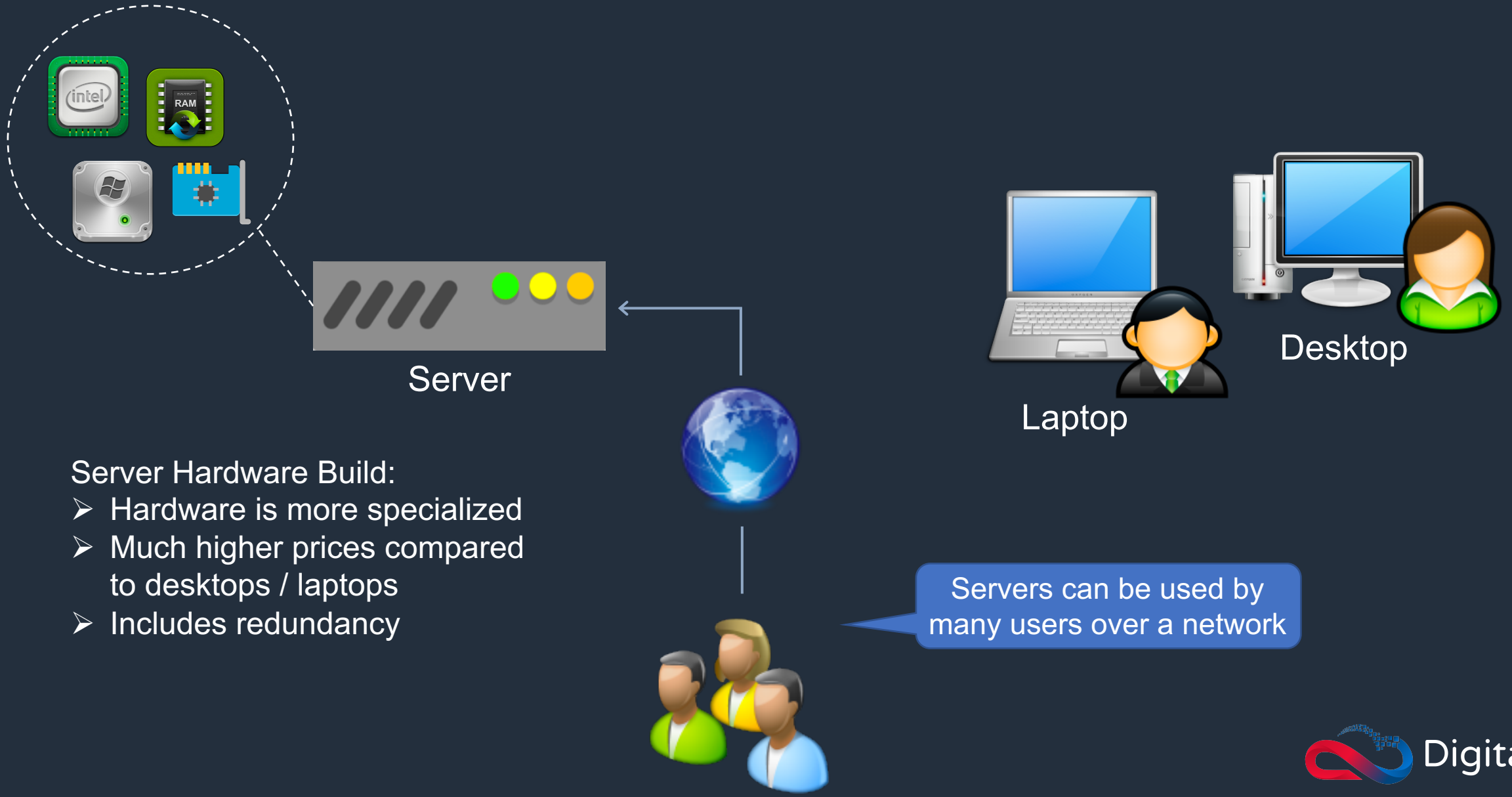
DigitalCloud TRAINING

Compute – Basic architecture of a computer



DigitalCloud TRAINING

Compute – Servers vs Desktops/Laptops



Server Hardware Build:

- Hardware is more specialized
- Much higher prices compared to desktops / laptops
- Includes redundancy

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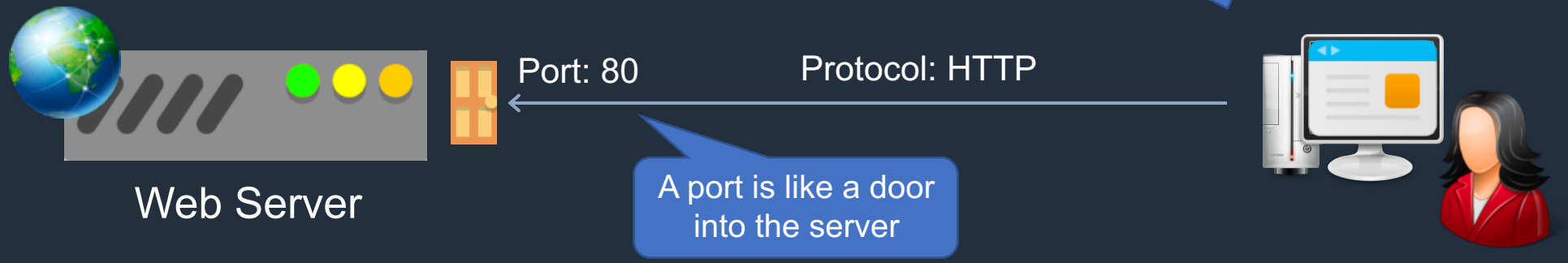
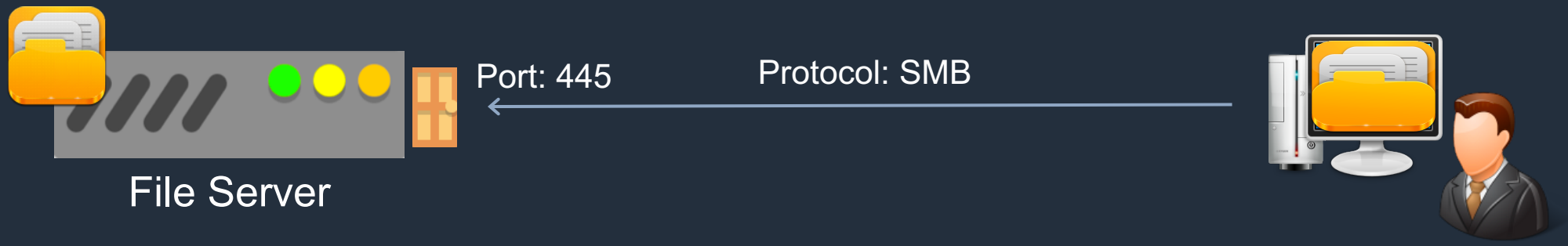
Compute – Client / Server Computing

The client application finds the server by IP address





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Storage – Hard Drives

Hard Disk Drive (HDD)

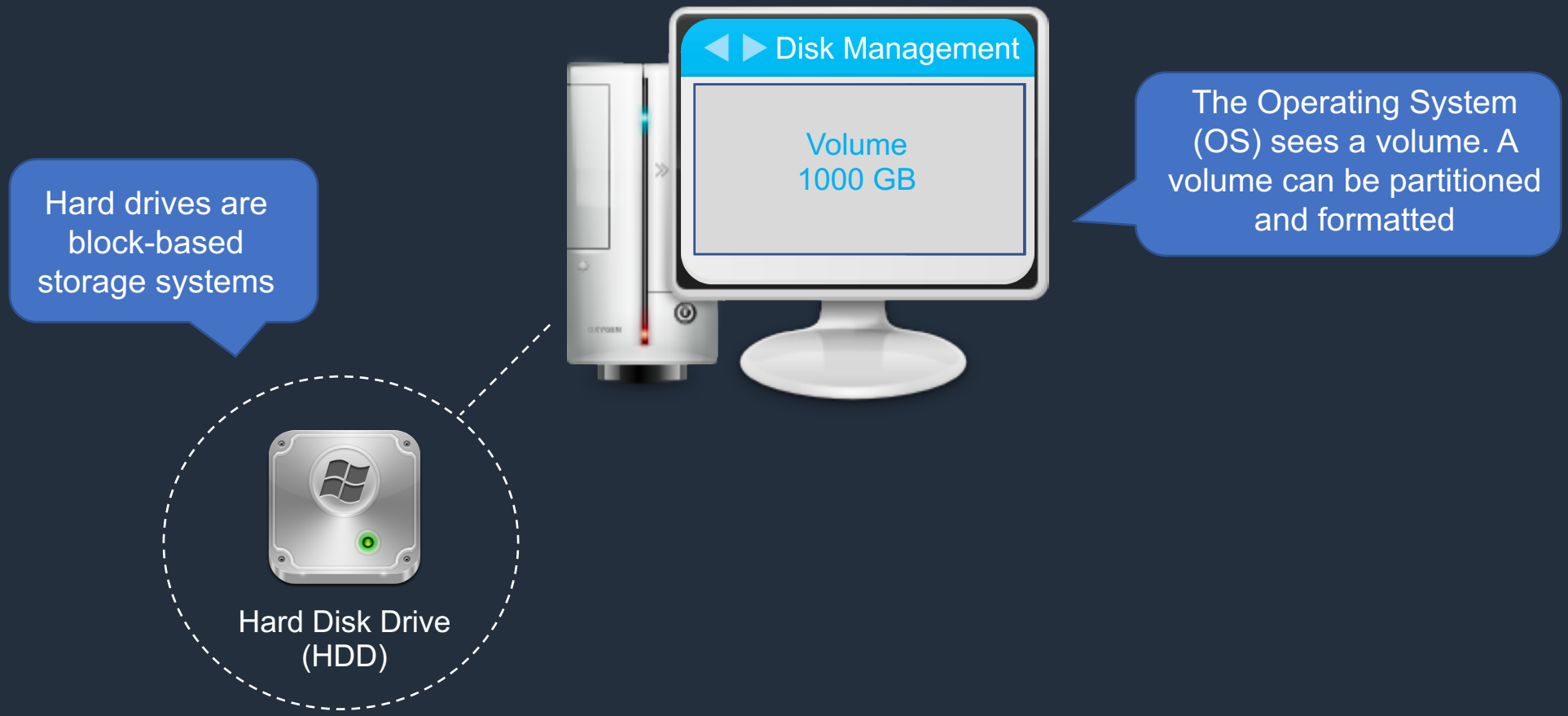
- Also known as magnetic drives
- Older technology
- Much slower than SSD
- Much cheaper than SSD

Solid State Drive (SSD)

- Uses flash memory
- Newer technology
- MUCH faster than HDD
- More expensive than HDD

DigitalCloud TRAINING

Storage – Hard Drives



Hard drives are block-based storage systems

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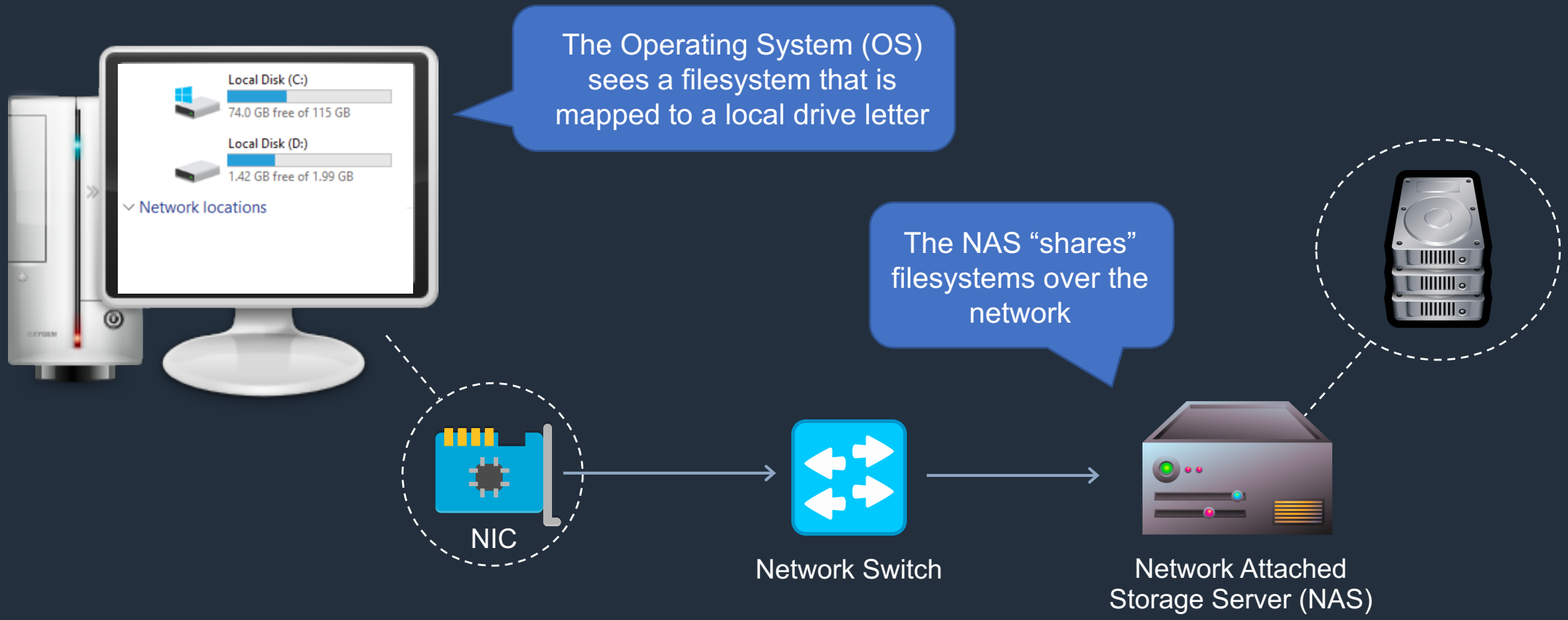
Storage – Network Attached Storage



NAS devices are file-based storage systems

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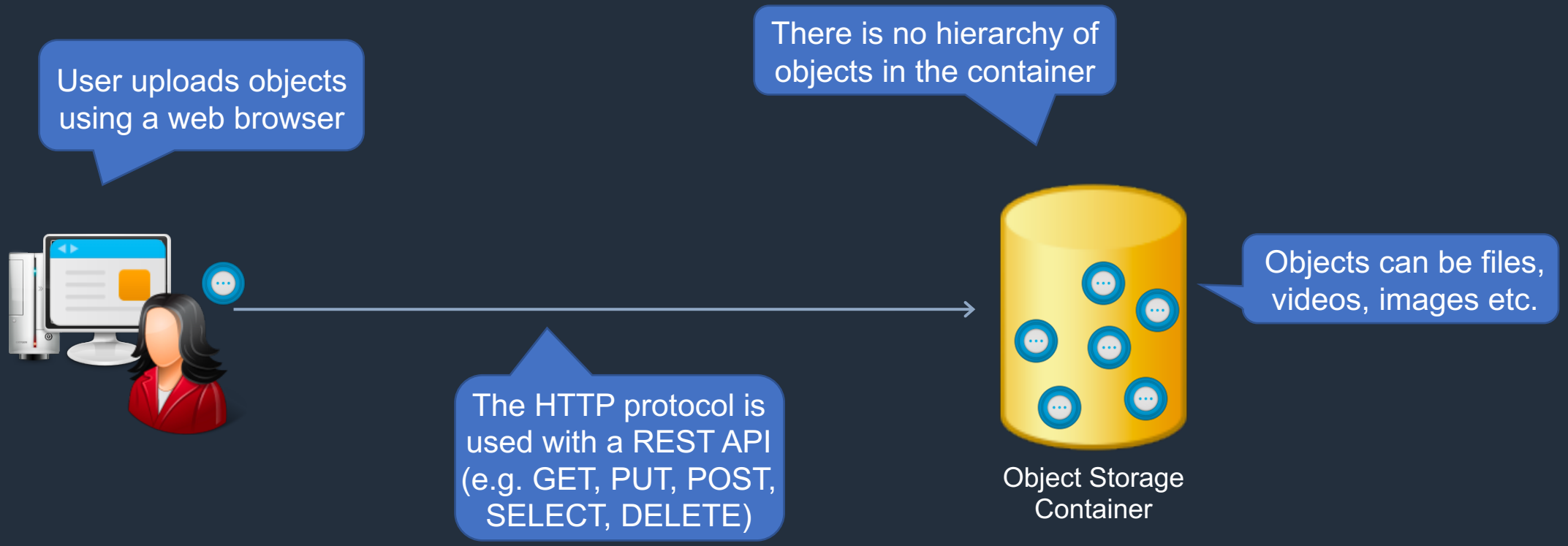
Storage – Object Storage Systems



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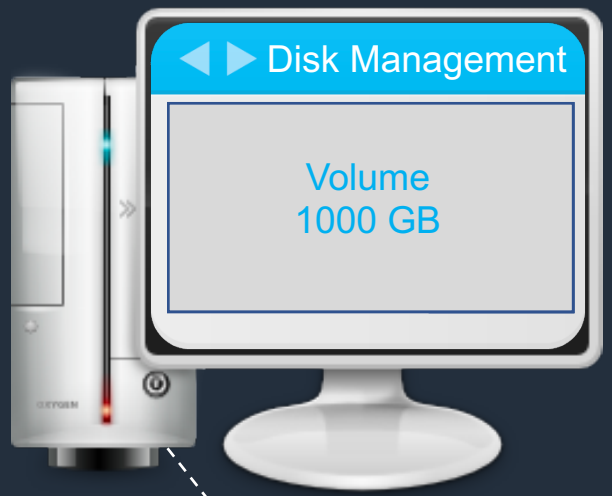
Storage – Block vs File vs Object

The OS sees volumes that can be partitioned and formatted

A filesystem can be shared by many users

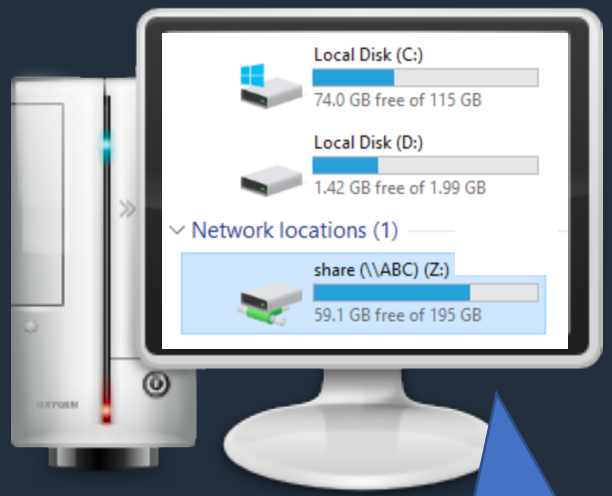
Massively scalable, low cost

Block Storage



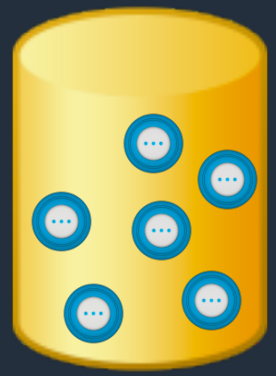
The OS reads/writes at the block level. Disks can be internal, or network attached

File Storage



A filesystem is "mounted" to the OS using a network share

Object Storage



Object Storage Container

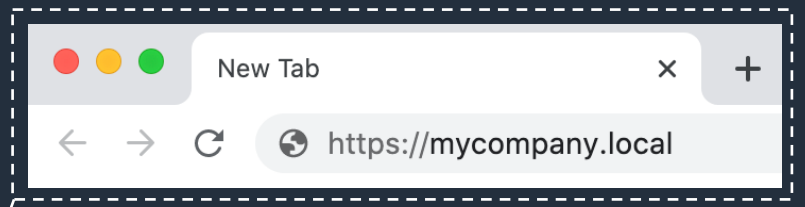
There is no hierarchy of objects in the container

Uses a REST API

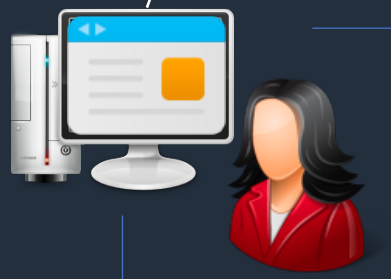
DigitalCloud TRAINING

IP Addressing Primer

User enters website address in browser



Name	Type	Value
mycompany.local	A	192.168.0.1
emailserver.local	A	192.168.0.2



DNS Server

Domain name is resolved to the IP address of the webserver

Computer connects to 192.168.0.1

Web Server

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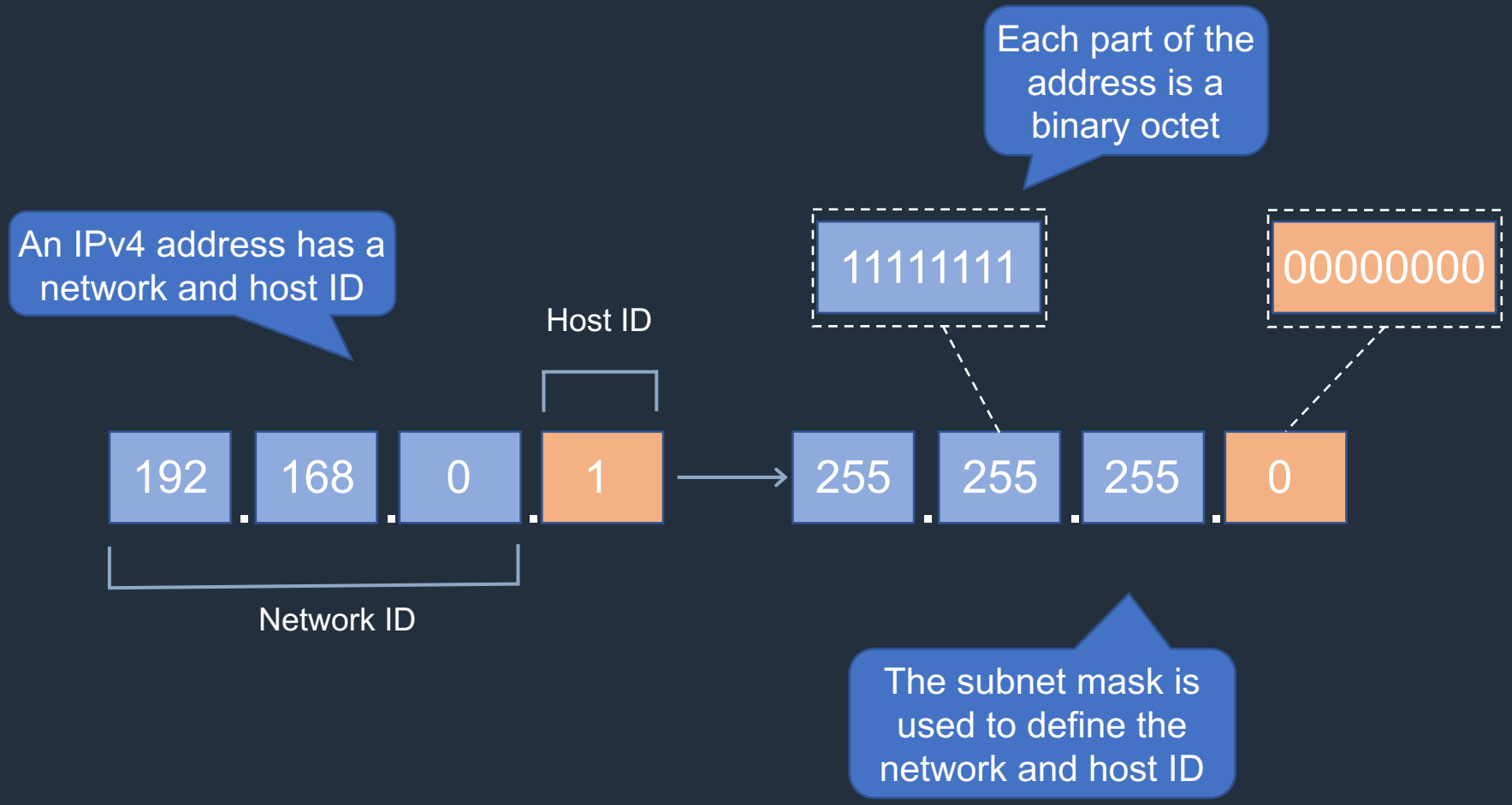
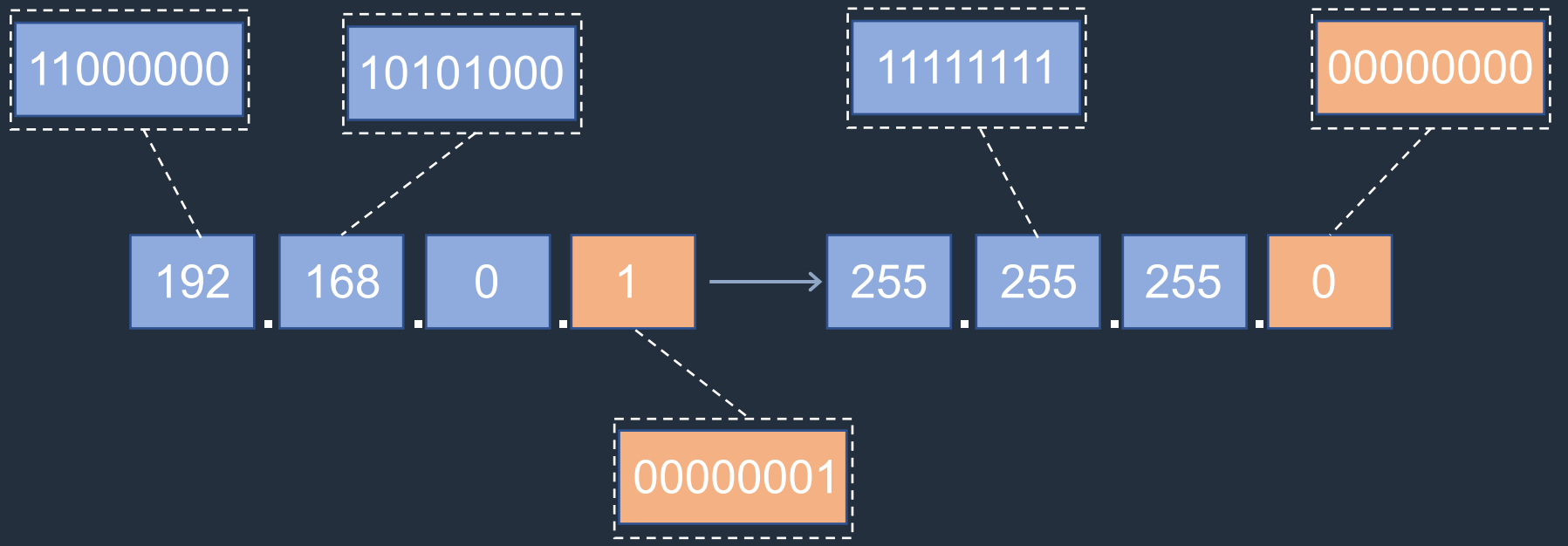
IP Addressing Primer



DigitalCloud TRAINING

IP Addressing Primer



Most significant bit →

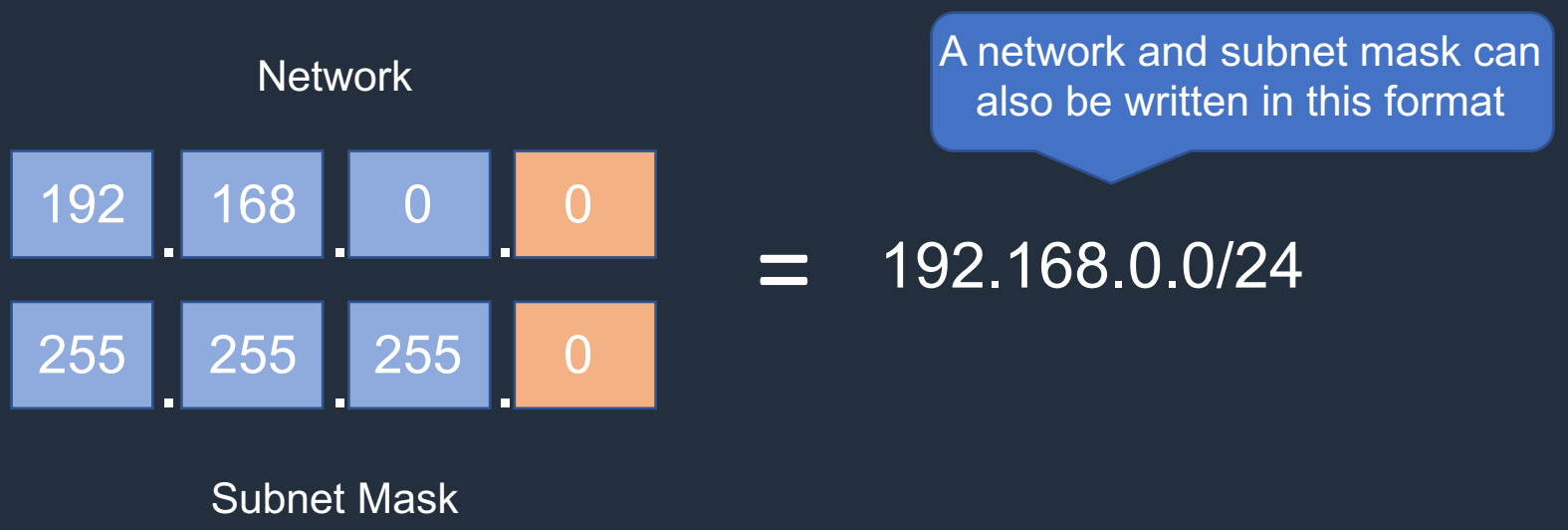
1	1	1	1	1	1	1	1
128	64	32	16	8	4	2	1

← Least significant bit

Binary Values

DigitalCloud TRAINING

IP Addressing Primer



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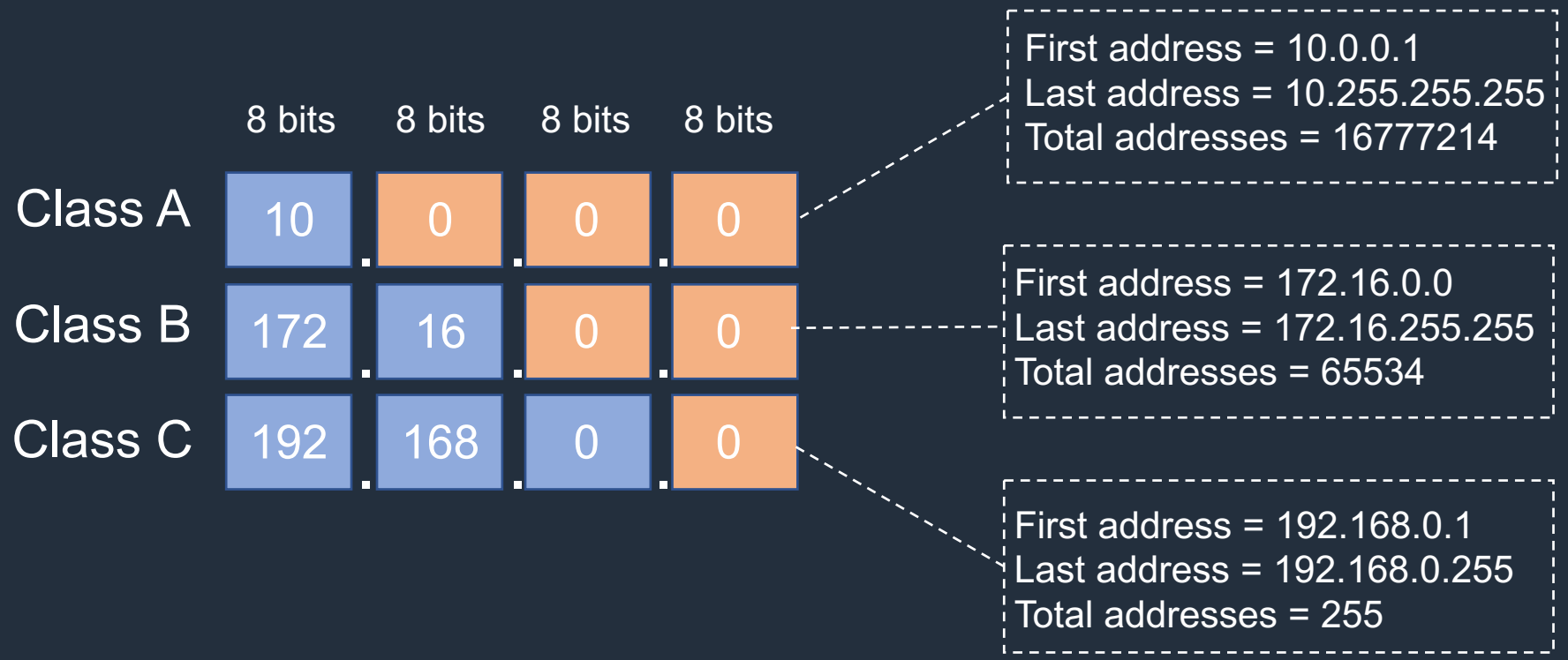
IP Addressing Primer – How many host addresses?



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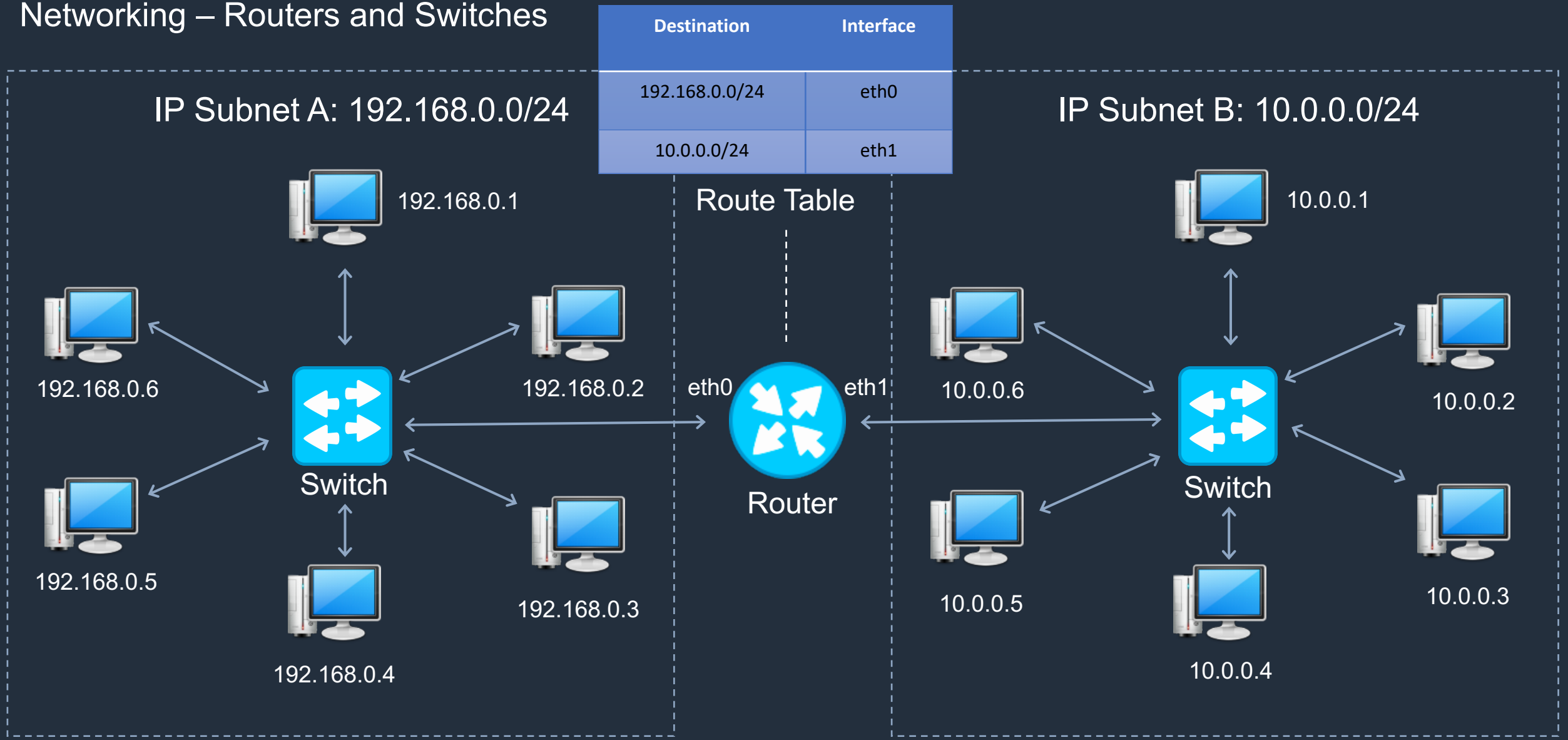
Networking – Routers and Switches

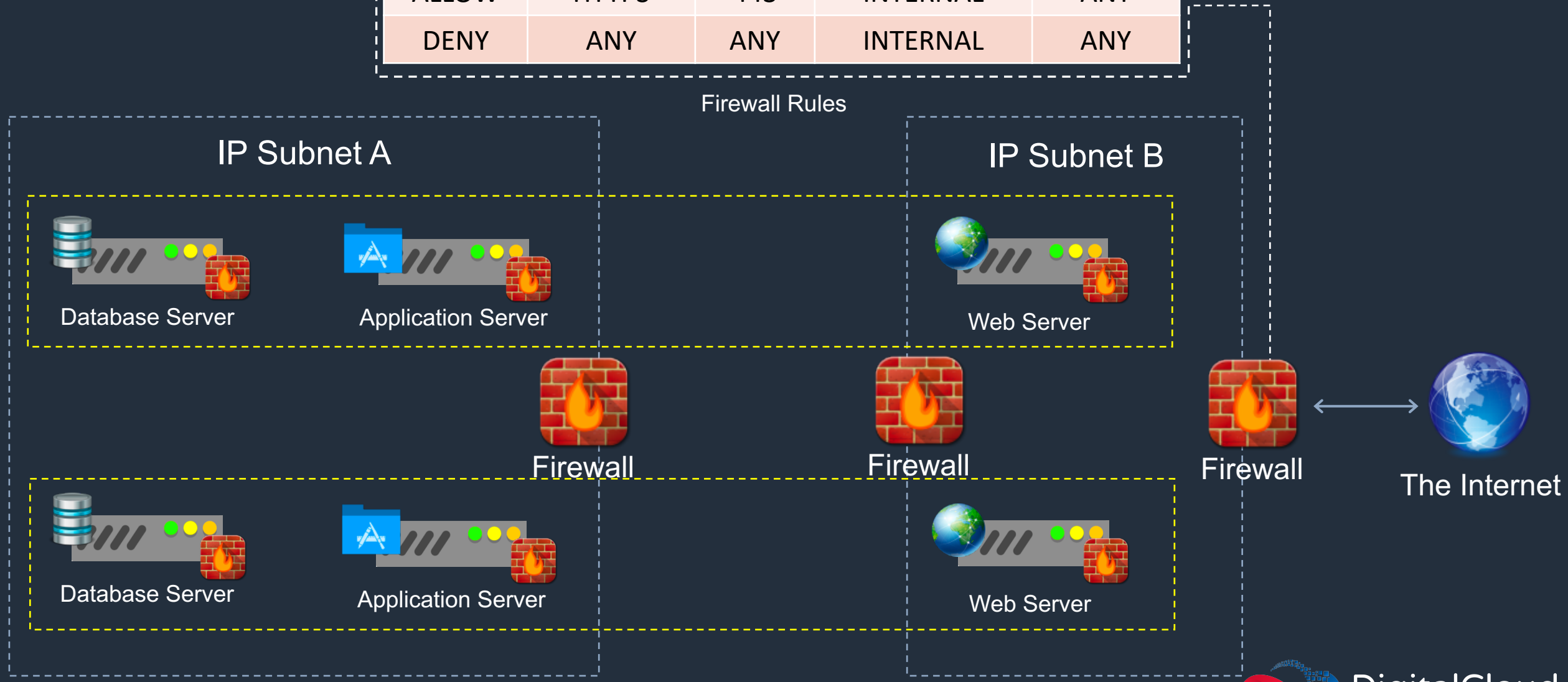


DigitalCloud TRAINING

Networking - Firewalls

POLICY	PROTOCOL	PORT	DESTINATION	SOURCE
ALLOW	HTTP	80	INTERNAL	ANY
ALLOW	HTTPS	443	INTERNAL	ANY
DENY	ANY	ANY	INTERNAL	ANY

Firewall Rules



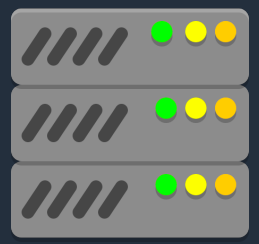
DigitalCloud TRAINING

Databases

Structured Query Language (SQL) query:

```
SELECT FirstName
FROM employees
WHERE Location = Sydney
```

Application servers are specialized computers running software



Application Servers

Database Server

Database servers are specialized computers running a database engine

EmployeeID	FirstName	LastName	JobRole	Location
00001	Paul	Peterson	Senior Developer	Sydney
00002	Kaleigh	Annette	Assistant Manager	Brisbane
00003	Carl	Wood	Sales Support	Sydney
00004	Vinni	Jones	Customer Services	Melbourne
00005	Stefanie	Howard	IT Architect	Brisbane

Popular database engines:

- Microsoft SQL Server
- MySQL
- Oracle
- PostgreSQL
- DB2
- SAP HANA

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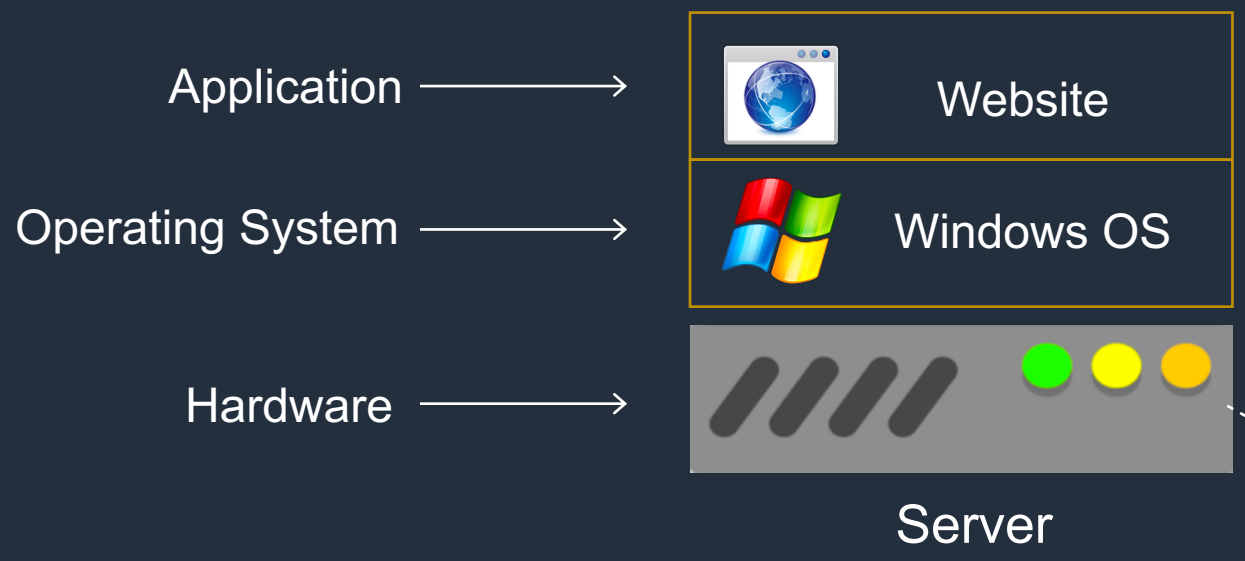
Server without Virtualization



Limitations:

- OS is tied to hardware (no portability)
- Hardware resources may be underutilized

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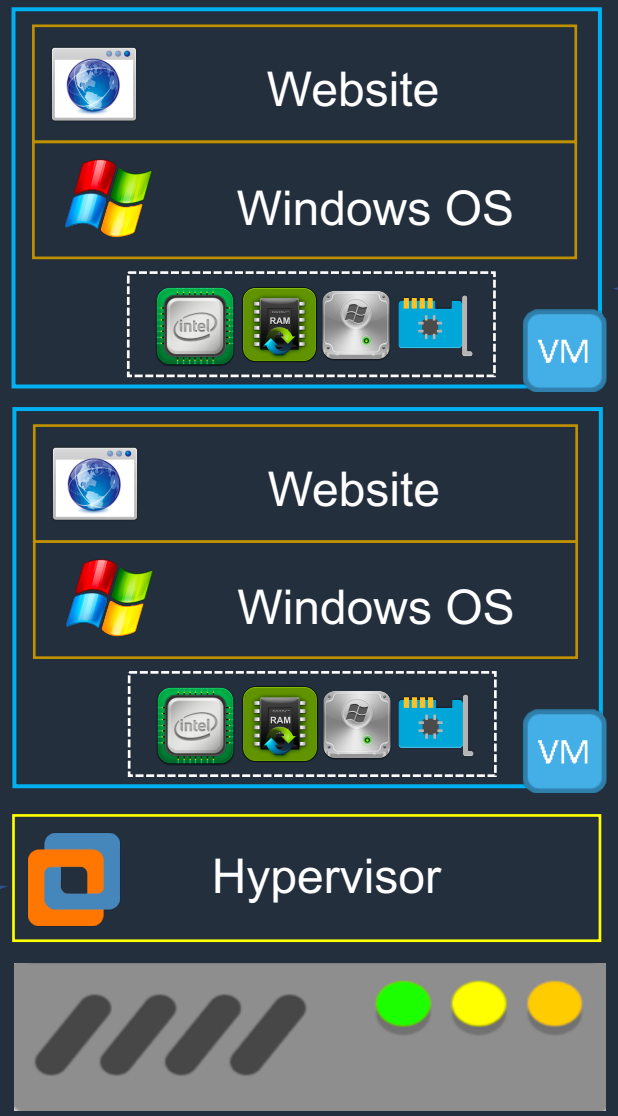
Server with Virtualization



Many VMs can run on the same physical hardware

This is known as a virtual server or "virtual machine"

Virtual hardware is presented to the OS

The hypervisor creates a layer of abstraction

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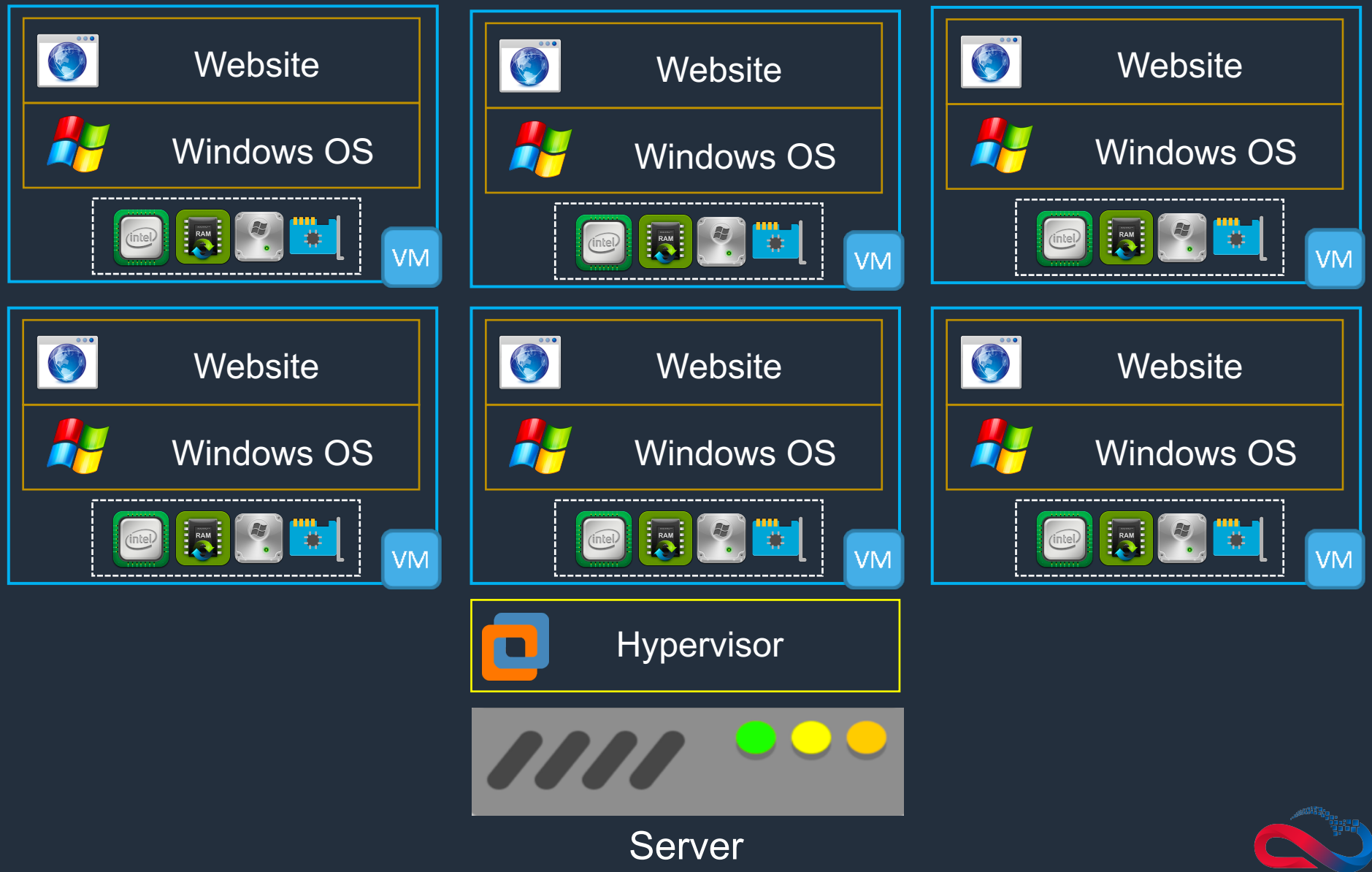
Server with Virtualization



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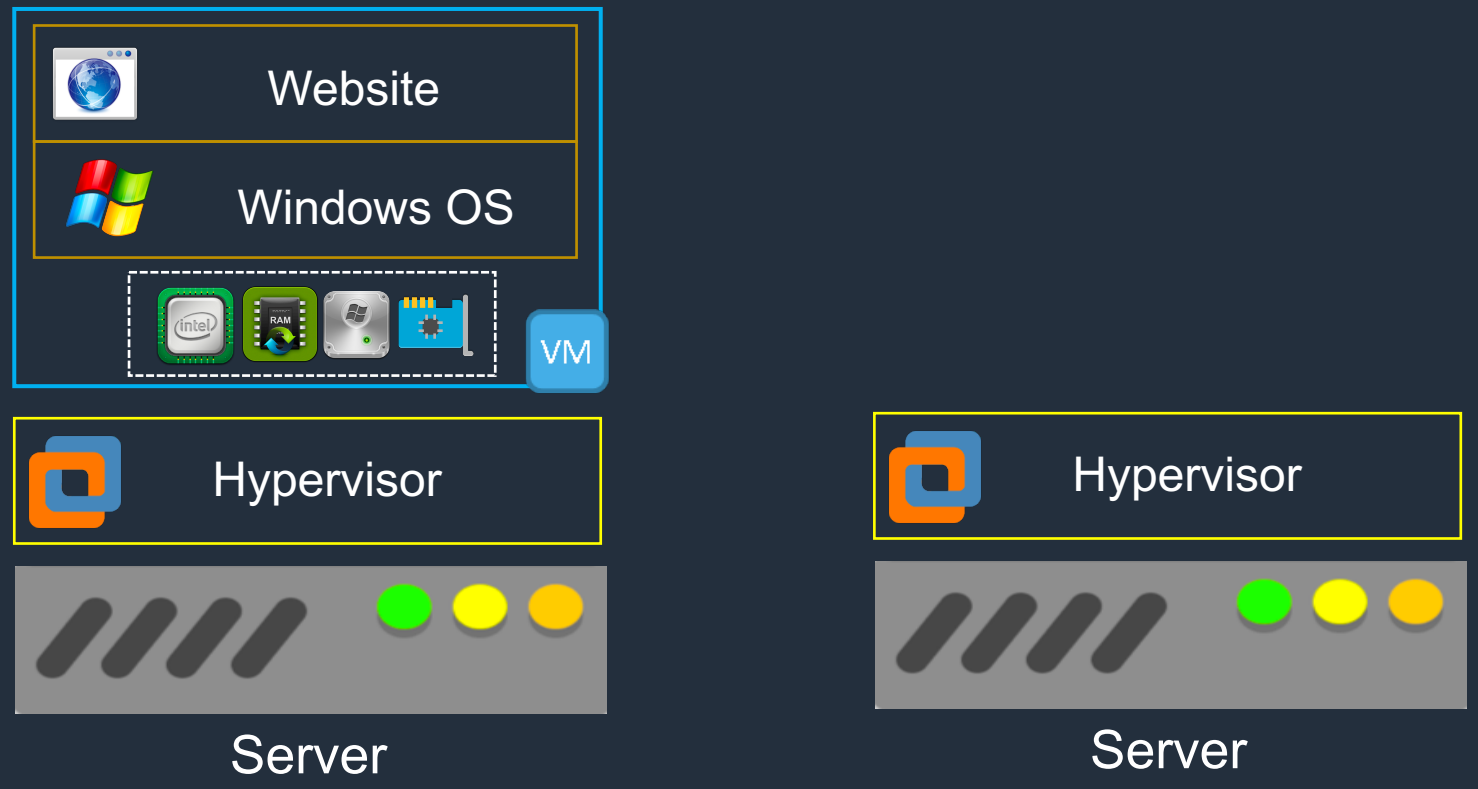
Server Virtualization: Portability



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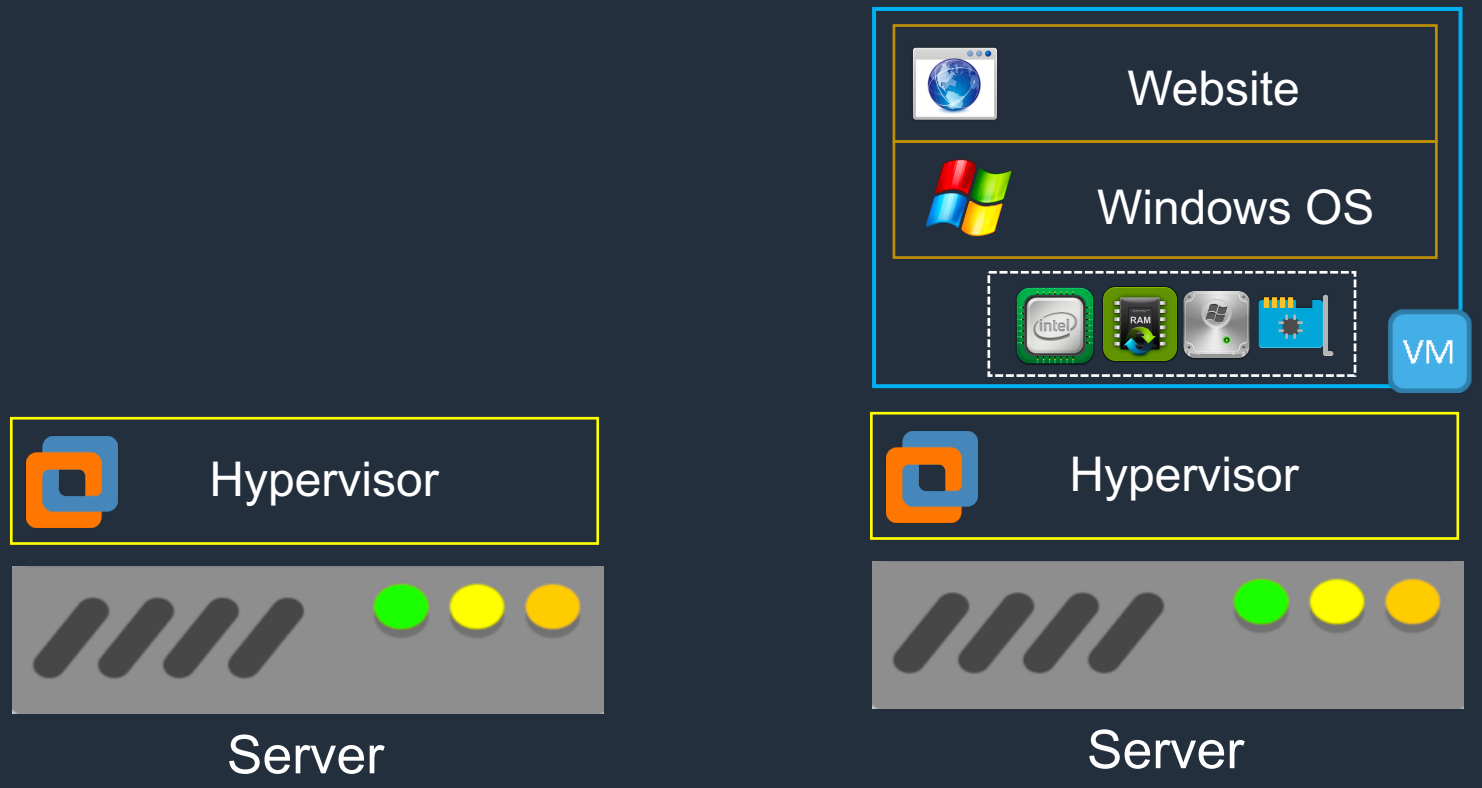
Server Virtualization: Portability



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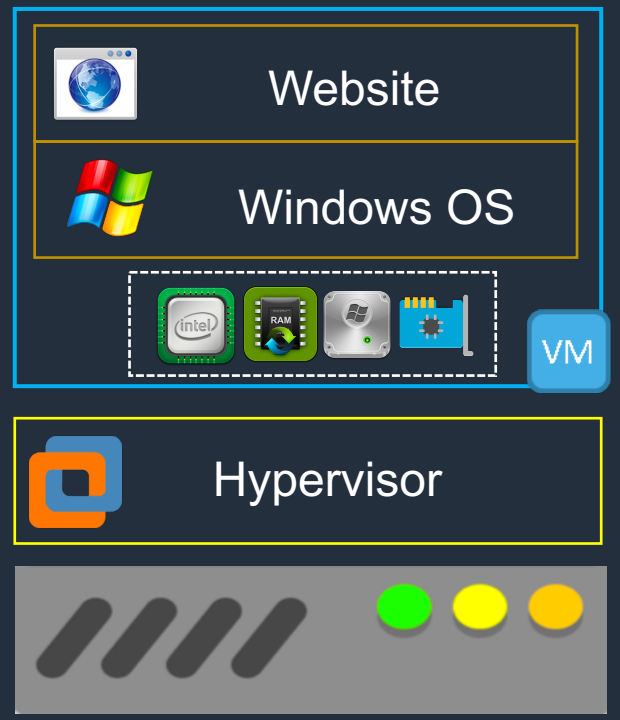
Docker Containers

Every VM needs an operating system which uses significant resources



DigitalCloud TRAINING

Docker Containers

Containers start up very quickly

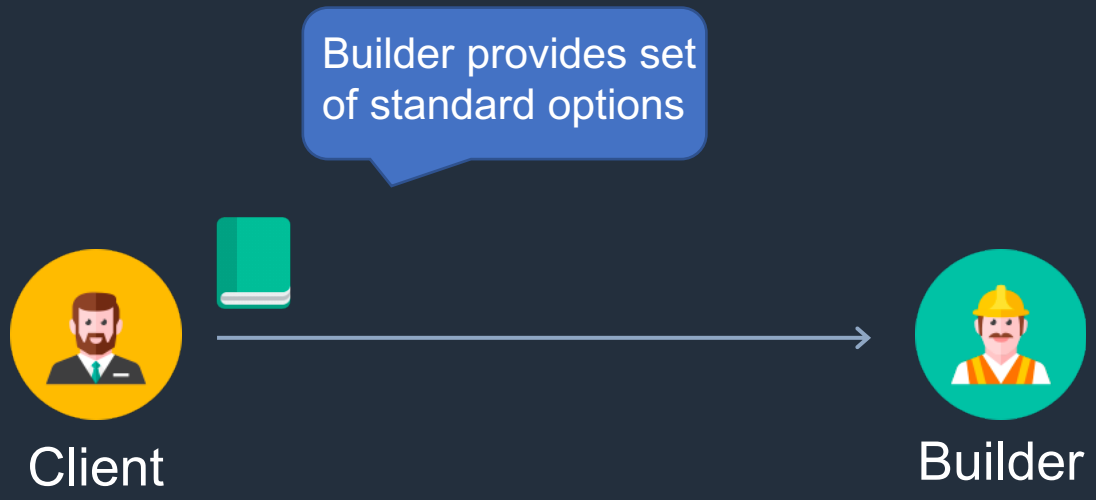
A container includes all the code, settings, and dependencies for running the application

Containers are very resource efficient

Each container is isolated from other containers

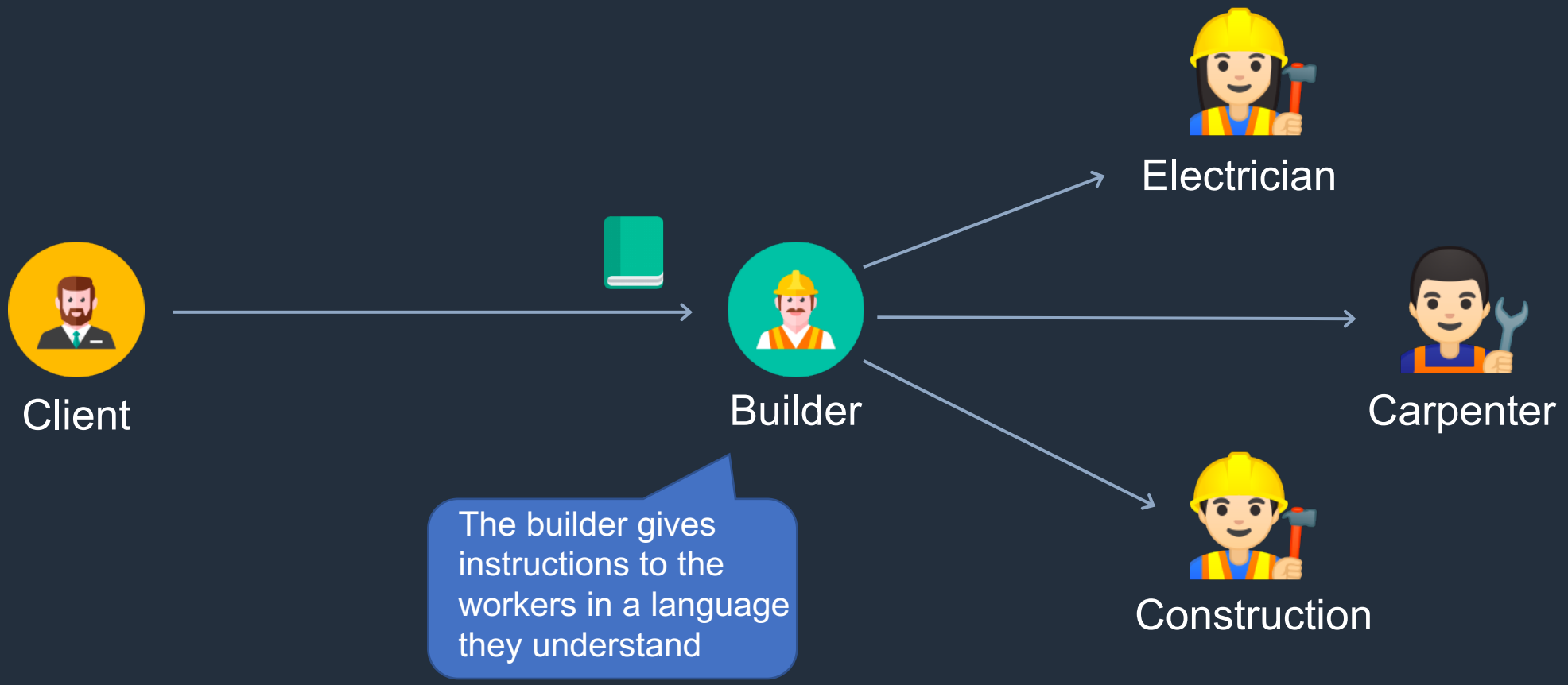
DigitalCloud TRAINING

Application Programming Interfaces (APIs) – Building a house analogy



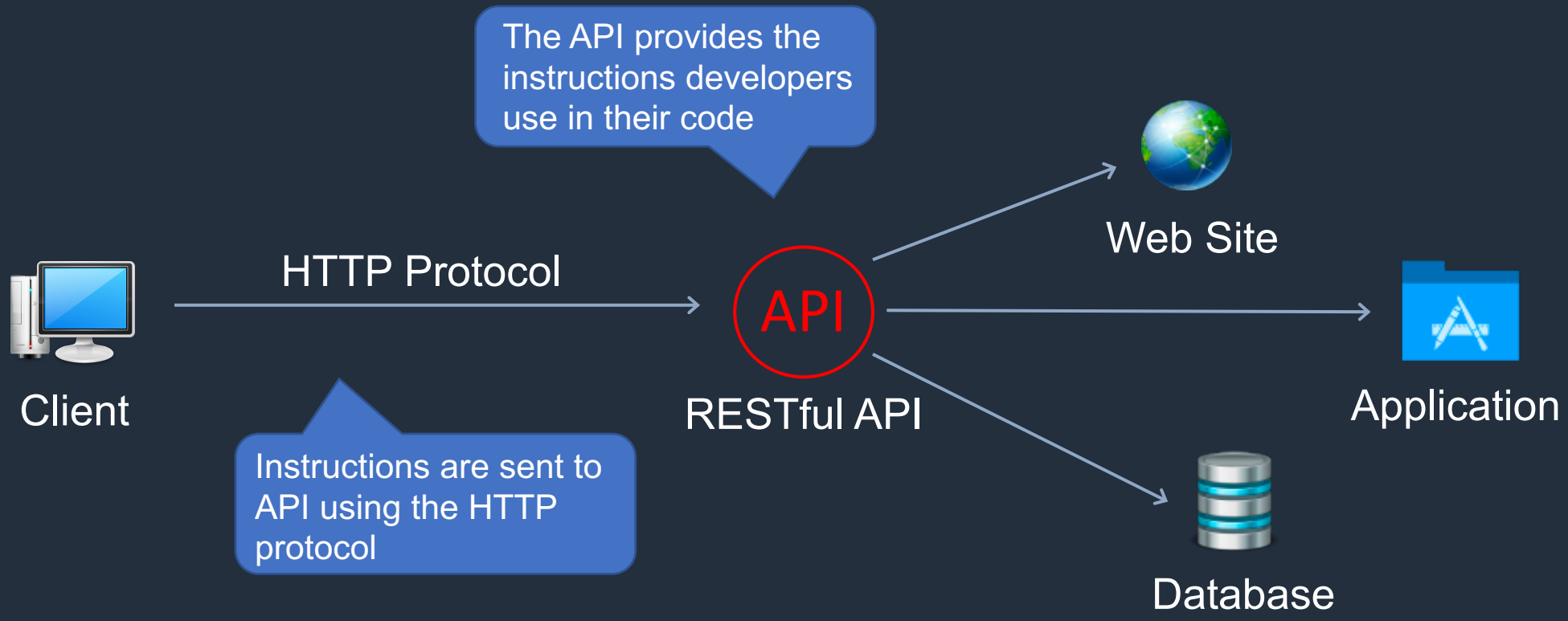
DigitalCloud TRAINING

Application Programming Interfaces (APIs) – Building a house analogy



DigitalCloud TRAINING

Application Programming Interfaces (APIs)



DigitalCloud TRAINING

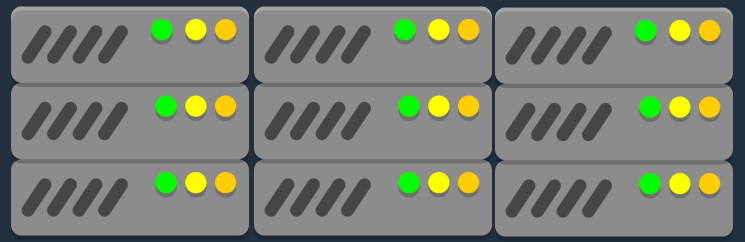
SECTION 3

Cloud Computing Overview

Legacy IT / Traditional IT

This model is very capital intensive

Corporate data center



Servers

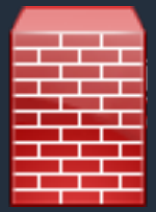
Storage Servers

The IT equipment is owned by the company

A company typically leases space in a data center, or may own the whole building

Router

Switch



Firewall

Backup System

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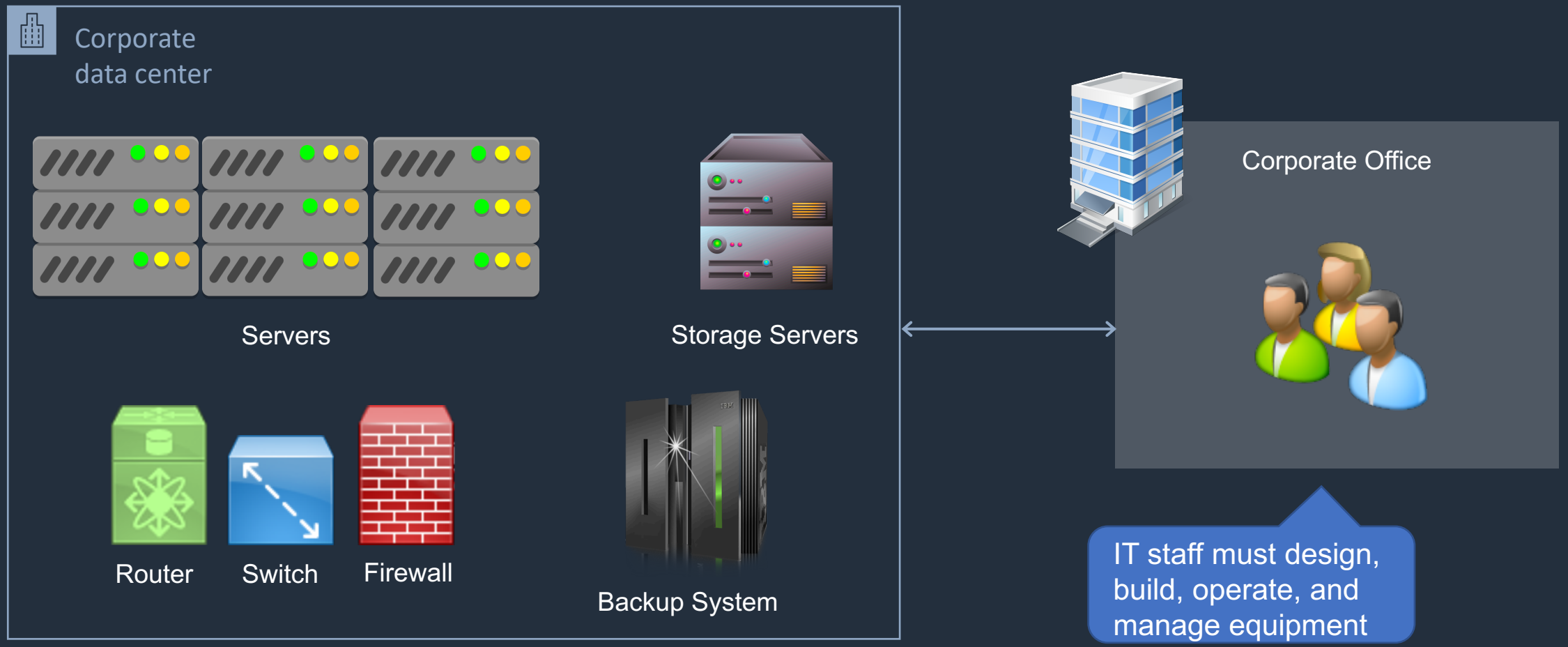
Legacy IT / Traditional IT



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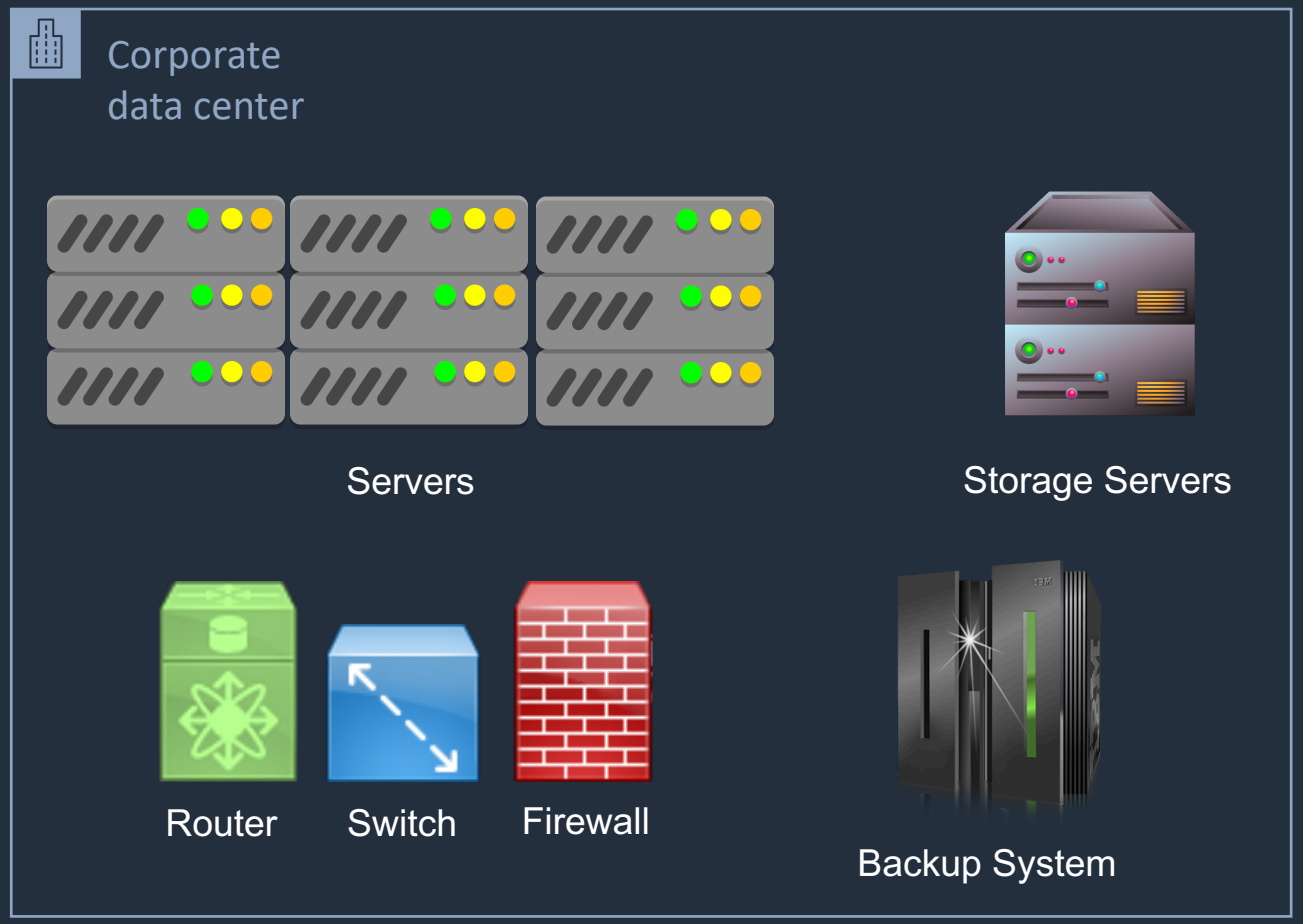
Legacy IT / Traditional IT



Costs:

- Data center building
- Data center security
- Physical IT hardware
- Software licensing costs
- Maintenance contracts
- Power
- Internet connectivity
- Staff wages (design, build, operations, maintenance)

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What is Cloud Computing? Well-known examples

Non-Cloud Services:

Email Server

File Server

Customer Relationship Management (CRM)

Cloud Services:

Gmail

You don't own or manage the infrastructure on which the service runs

Dropbox

Cloud services are offered on a subscription / consumption model

Salesforce

The service scales as demand changes

DigitalCloud TRAINING

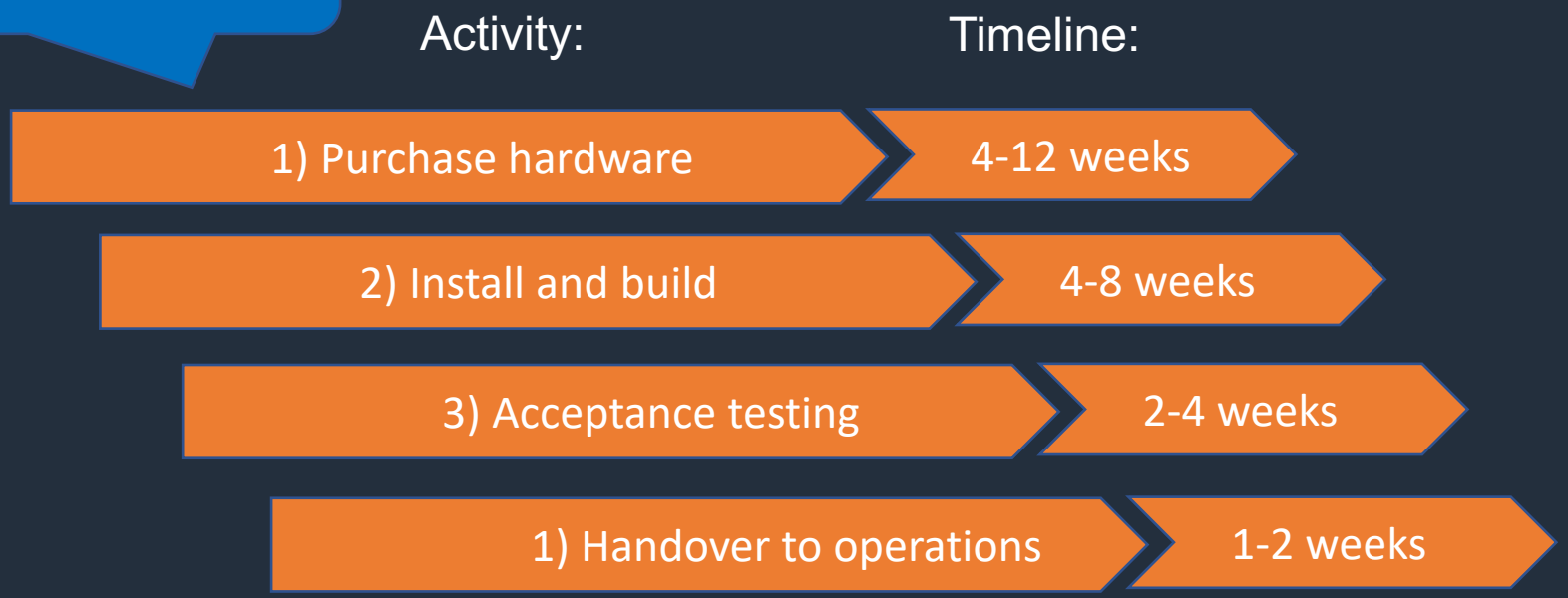
What is Cloud Computing? The Key Characteristics

Name	Description
On-demand, self-service	A user can consume cloud resources, as needed, automatically, and without human interaction
Broad network access	Capabilities are available over the network using standard mechanisms. Can be the Internet or a Wide Area Network (WAN)
Resource pooling	The providers resources are pooled and serve multiple consumers using a multi-tenant model
Rapid elasticity	Capabilities can scale “elastically” based on demand
Measured service	Resource usage is monitored and metered

DigitalCloud TRAINING

Deploying an eCommerce Website on-premises (aka the old way)

Assumes you don't have a private cloud, or don't have enough capacity



3-6 months

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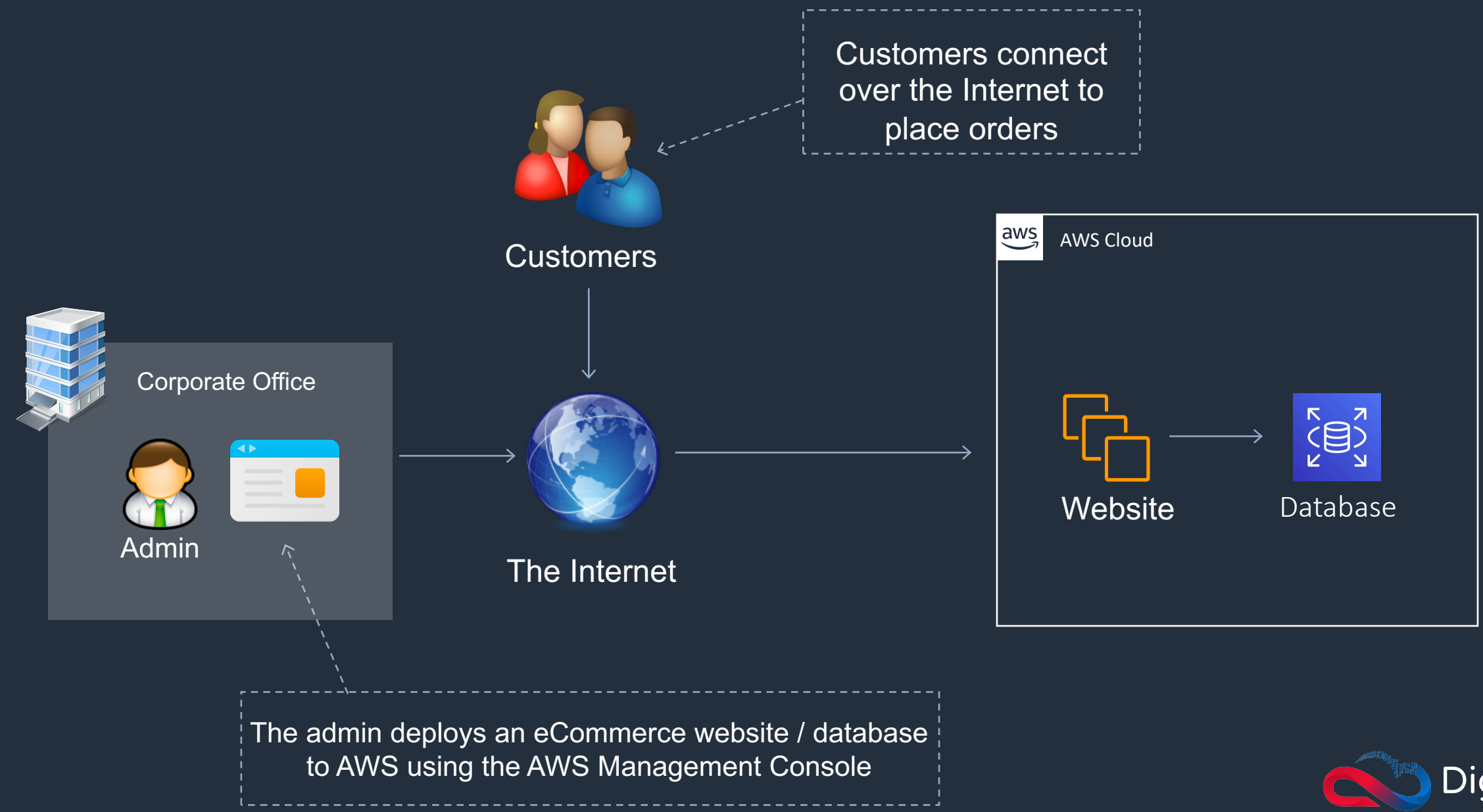
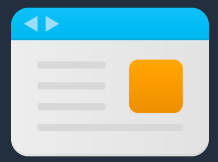
Deploying an eCommerce Website in the Cloud



DigitalCloud TRAINING

Launching Cloud Services: Management Console



Management Console

A web-based console accessed through a standard web browser

Compute
- EC2
- Lightsail
- Lambda
- Batch
- Elastic Beanstalk
- Serverless Application Repository
- AWS Outposts
- EC2 Image Builder

Storage
- S3
- EFS
- FSx
- S3 Glacier
- Storage Gateway
- AWS Backup

Database
- RDS
- DynamoDB
- ElastiCache
- Neptune
- Amazon Redshift
- Amazon QLDB

Blockchain
- Amazon Managed Blockchain

Satellite
- Ground Station

Quantum Technologies
- Amazon Braket

Management & Governance
- AWS Organizations
- CloudWatch
- AWS Auto Scaling
- CloudFormation
- CloudTrail
- Config
- OpsWorks
- Service Catalog
- Systems Manager
- AWS AppConfig
- Trusted Advisor
- Control Tower
- AWS License Manager
- AWS Well-Architected Tool

Analytics
- Athena
- EMR
- CloudSearch
- Elasticsearch Service
- Kinesis
- QuickSight
- Data Pipeline
- AWS Data Exchange
- AWS Glue
- AWS Lake Formation
- MSK

Security, Identity, & Compliance
- IAM
- Resource Access Manager
- Cognito
- Secrets Manager
- GuardDuty
- Inspector
- Amazon Macie
- AWS Single Sign-On
- Certificate Manager
- Key Management Service
- CloudHSM
- Directory Service

Business Applications
- Alexa for Business
- Amazon Chime
- WorkMail
- Amazon Honeycode

End User Computing
- WorkSpaces
- AppStream 2.0
- WorkDocs
- WorkLink

Internet Of Things
- IoT Core
- FreeRTOS
- IoT 1-Click
- IoT Analytics
- IoT Device Defender
- IoT Device Management
- IoT Events
- IoT Greengrass
- IoT SiteWise
- IoT Things Graph

DigitalCloud TRAINING

Launching Cloud Services: Command Line

Command Line

This command launches a virtual server (instances) on Amazon Web Services

```
aws ec2 run-instances --image-id ami-xxxxxxxx --count 1 --instance-type
t2.micro
```

```
aws s3 ls s3://mys3databucket
```

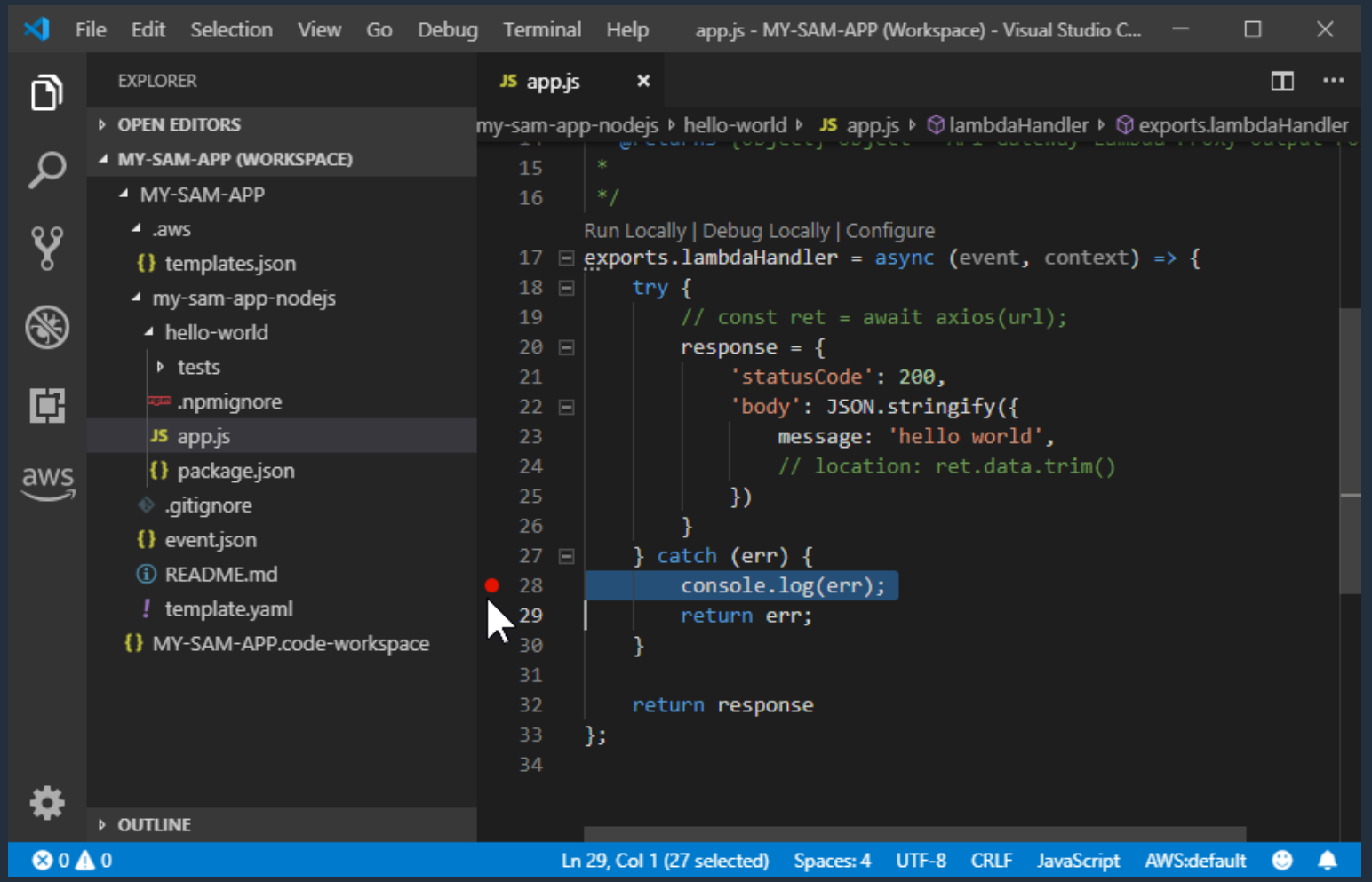
This command lists the contents of a storage container (bucket) on Amazon S3

DigitalCloud TRAINING

Launching Cloud Services: Software Development Kit

Code (SDK)

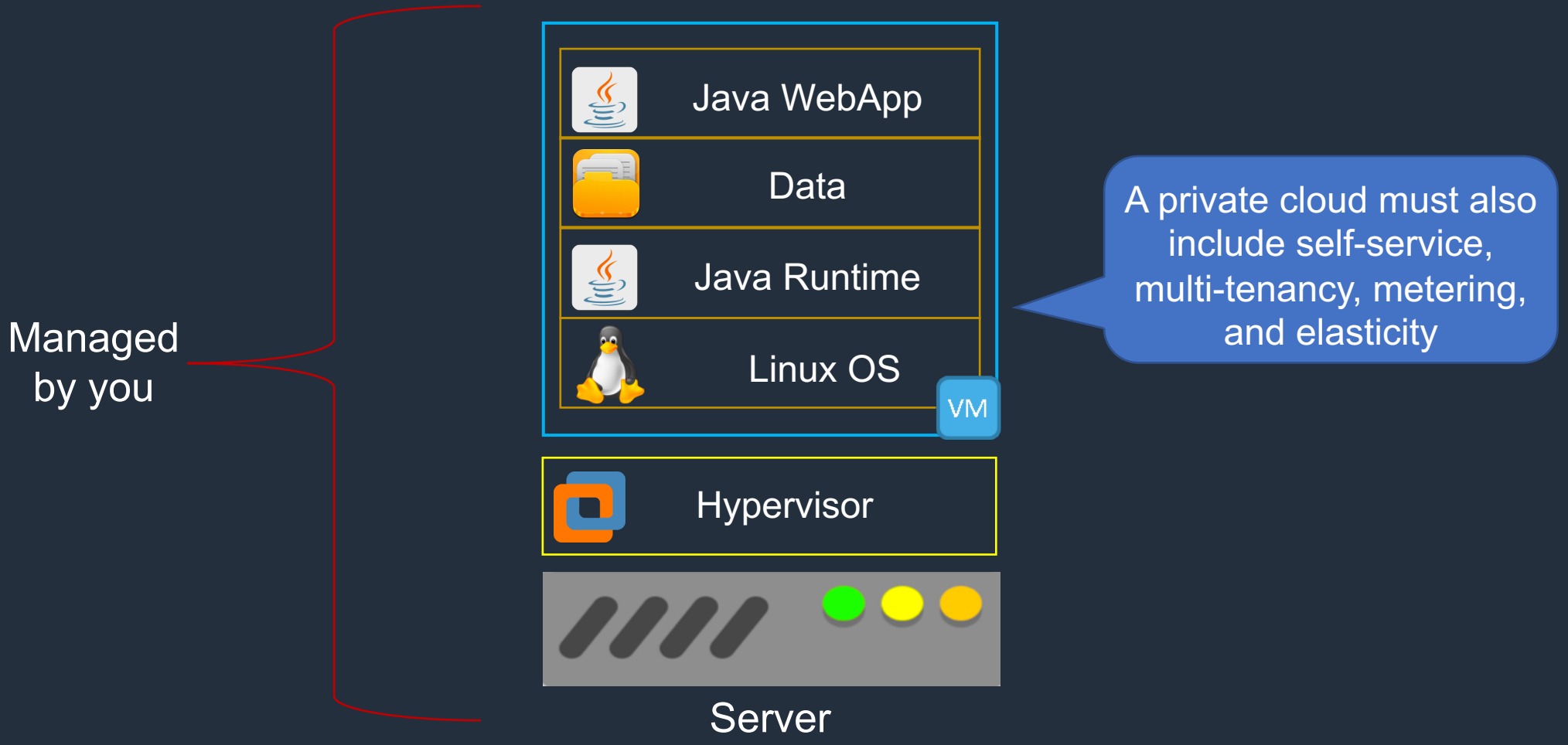
A developer writes code in an integrated development environment (IDE)



The code leverages the SDK to work with cloud services

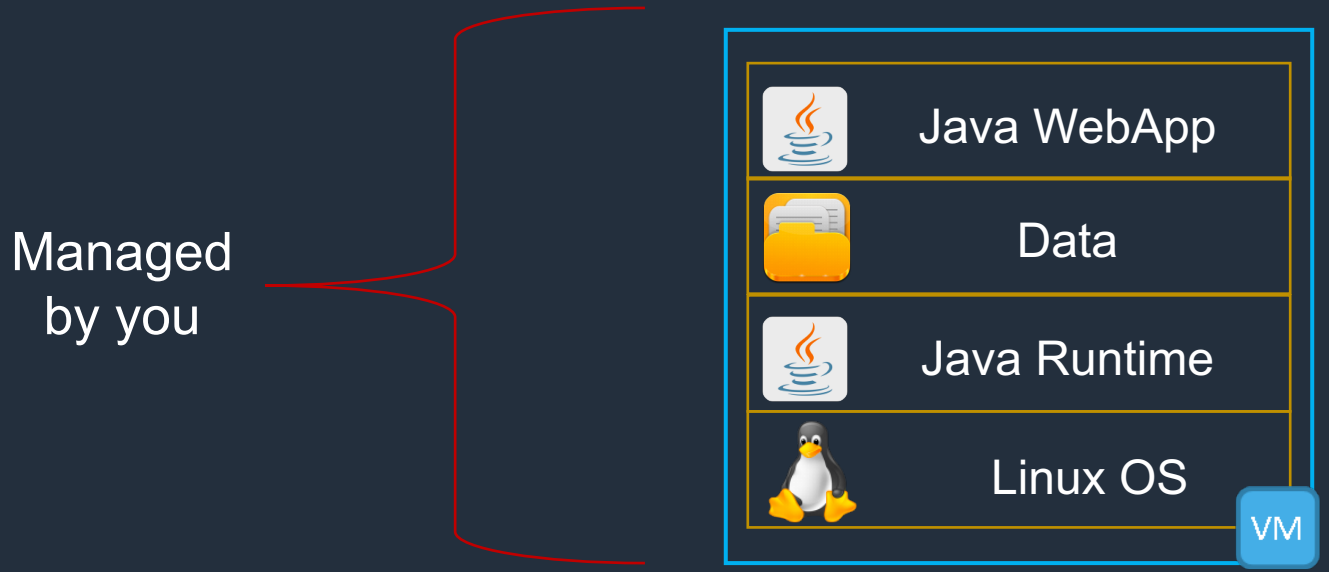
DigitalCloud TRAINING

Cloud Service Models: Private Cloud



DigitalCloud TRAINING

Cloud Service Models: Infrastructure as a Service (IaaS)

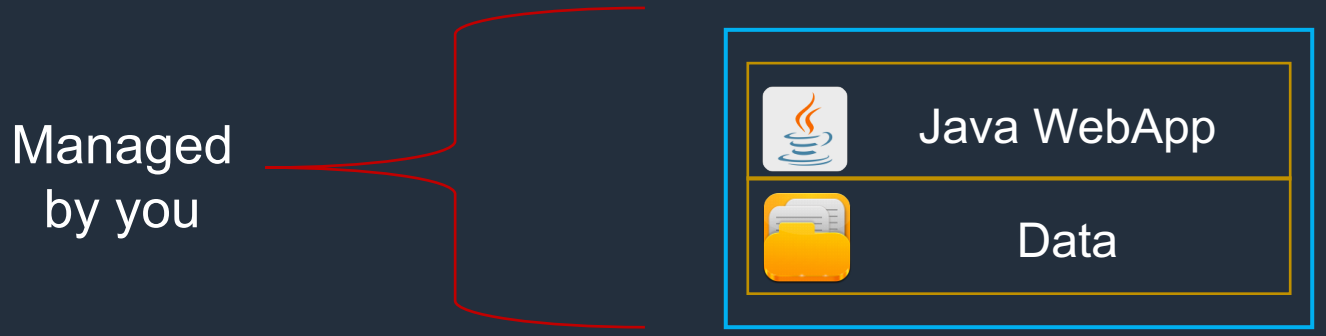


Examples:

- Amazon Elastic Compute Cloud (EC2)
- Azure Virtual Machines
- Google Compute Engine

DigitalCloud TRAINING

Cloud Service Models: Platform as a Service (PaaS)



Examples:

- AWS Elastic Beanstalk
- Azure WebApps
- Compute App Engine

DigitalCloud TRAINING

Cloud Service Models: Software as a Service (SaaS)

~~Managed by you~~

Pure consumption model

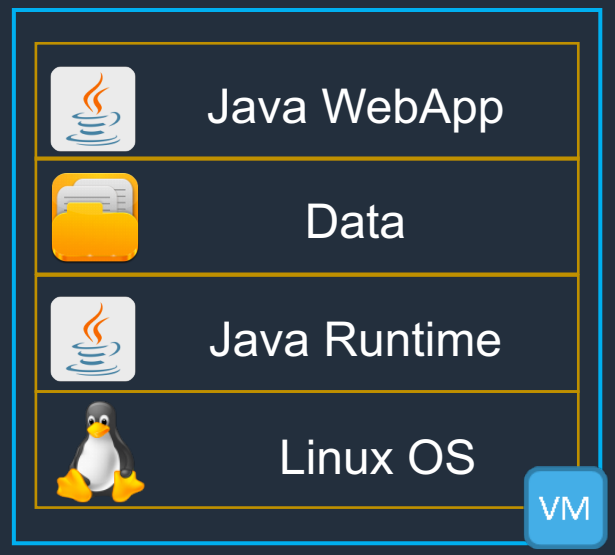
Examples:

- Google Apps
- Salesforce.com
- Zoom

DigitalCloud TRAINING

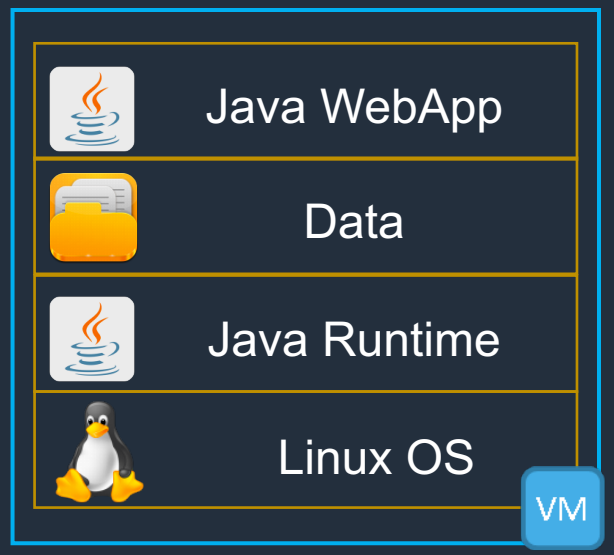
Cloud Service Models: Comparison

Private Cloud



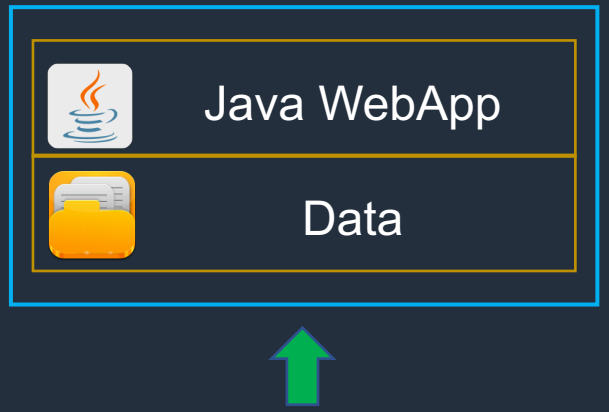
You manage everything - greater responsibility + greater control

IaaS



You manage from the virtual server upwards

PaaS



You simply upload your code/data to create your application

SaaS

You simply consume the service - little responsibility + little control

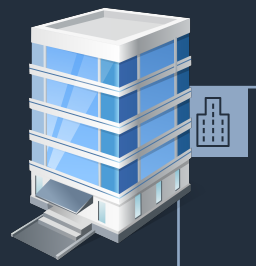
DigitalCloud TRAINING

Cloud Computing Deployment Models

Name	Description	Examples
Private Cloud	An enterprise deploys their own infrastructure and applications into their own data center	VMware, Microsoft, RedHat, OpenStack
Public Cloud	The IT services that you consume are hosted and delivered from a third-party and accessed over the Internet	AWS, Microsoft Azure, Google Cloud Platform
Hybrid Cloud	A combination of on-premises, private cloud, and public cloud services are consumed	
Multicloud	Usage of two or more public clouds at a time, and possibly multiple private clouds	

DigitalCloud TRAINING

Deployment Models – Private Cloud



Data center

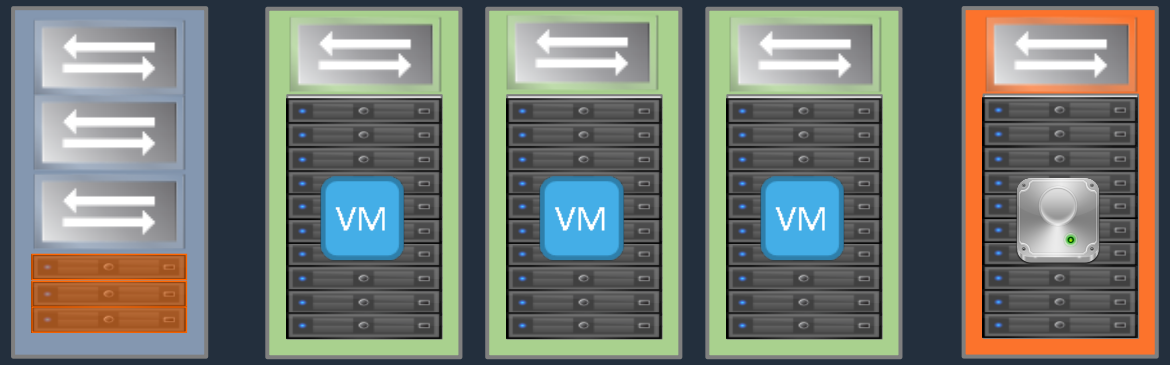
Self Service Portal / Service Catalog

Automation and Configuration Management

Billing and Reporting

Multi-tenancy controller

Cloud management software layer



Network & Firewall

Virtualization Cluster

Storage & Backup

Benefits

- Complete control of the entire stack
- Security – in a few cases, organizations may need to keep all or some of their applications and data in house

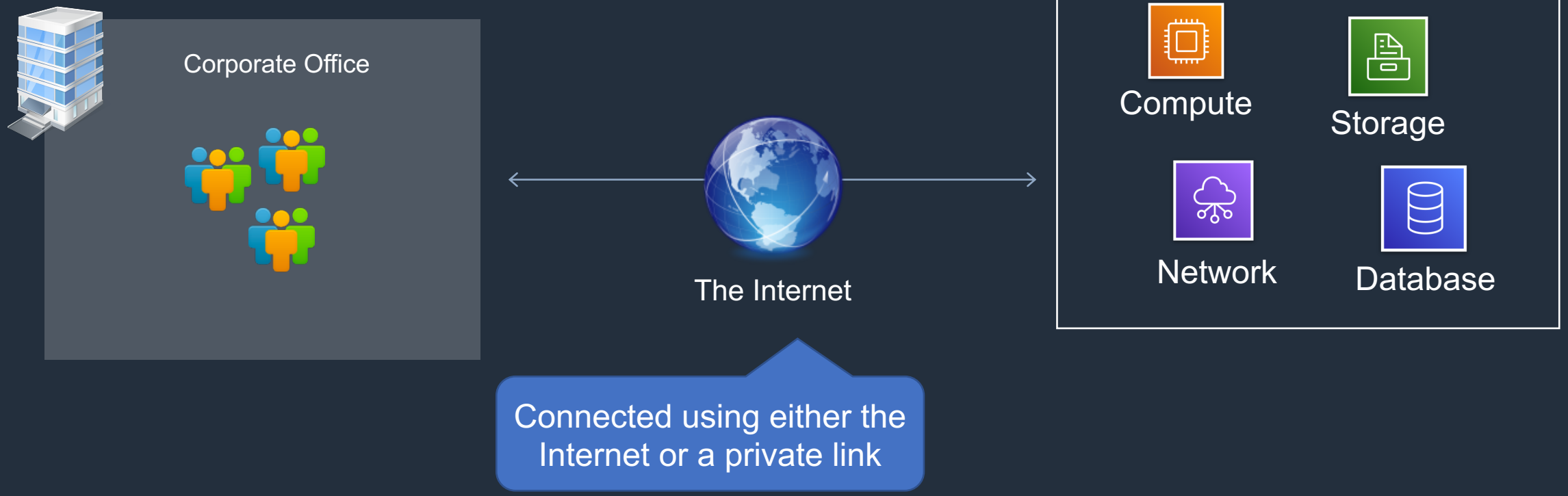
You build and manage the cloud deployment

DigitalCloud TRAINING

Deployment Models – Public Cloud

Benefits:

- Variable expense, instead of capital expense
- Economies of scale
- Massive elasticity

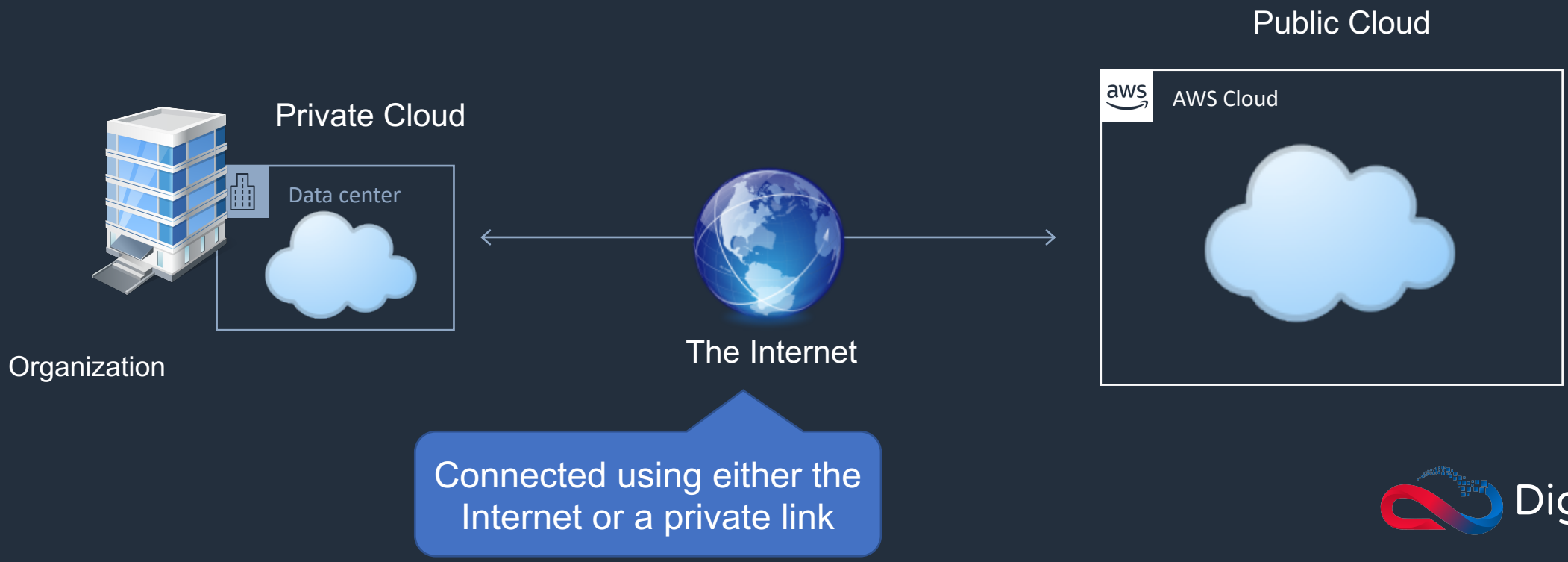


DigitalCloud TRAINING

Deployment Models – Hybrid Cloud

Benefits:

- Allows companies to keep the critical applications and sensitive data in a traditional data center environment or private cloud
- Take advantage of public cloud resources like SaaS, for the latest applications, and IaaS, for elastic virtual resources
- Facilitates portability of data, apps and services and more choices for deployment models



DigitalCloud TRAINING

SECTION 4

Demystifying Cloud Architecture

Stateful vs Stateless Applications

Stateless:

No “state” is recorded about the user's session

Person check a news website

Stateful:

Netflix records what has been watched

Person logs into Netflix

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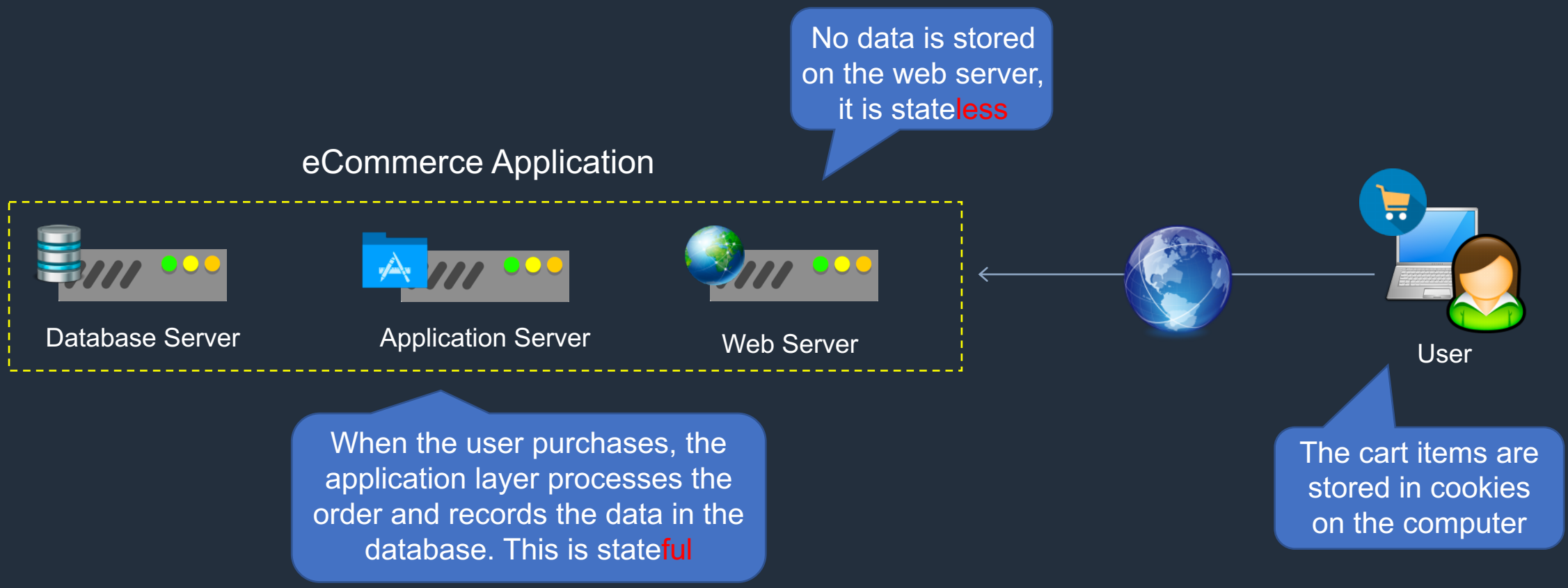
Stateful vs Stateless Applications



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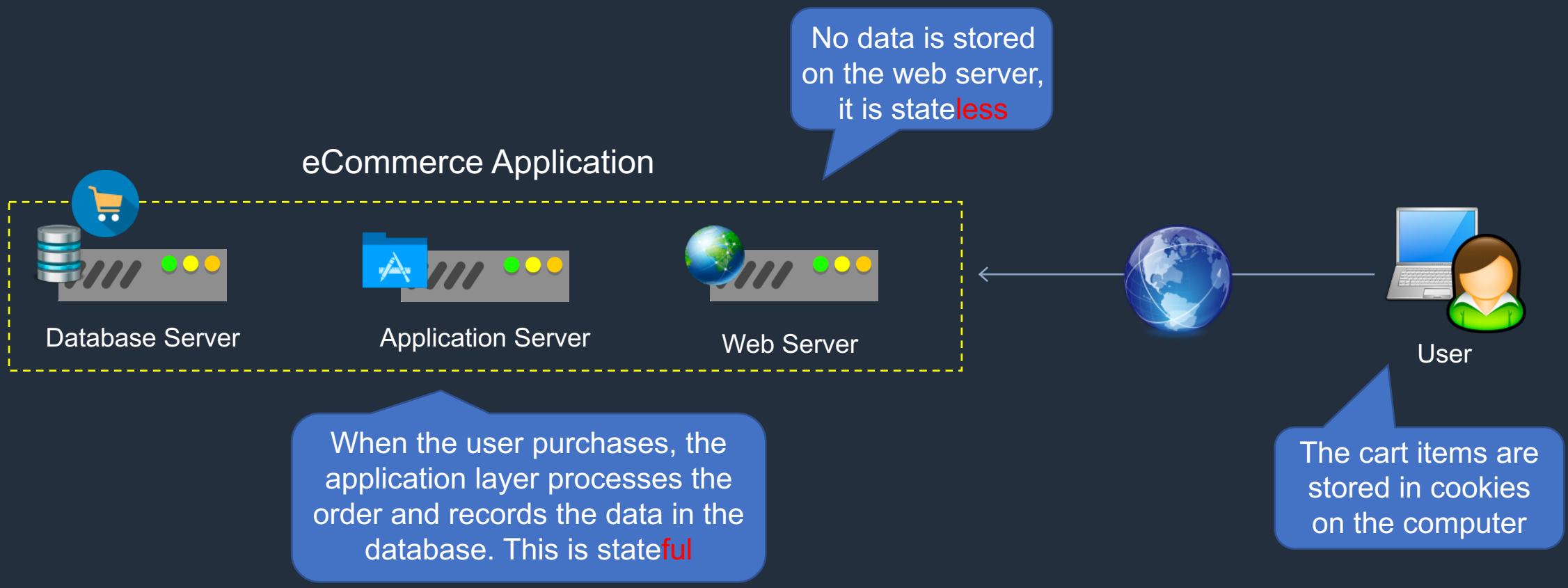
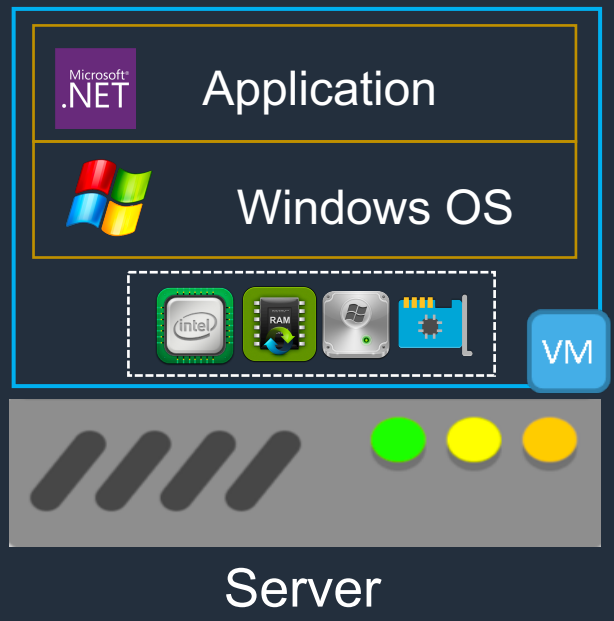
Stateful vs Stateless Applications



DigitalCloud TRAINING

Scalability and Elasticity: Scaling Up



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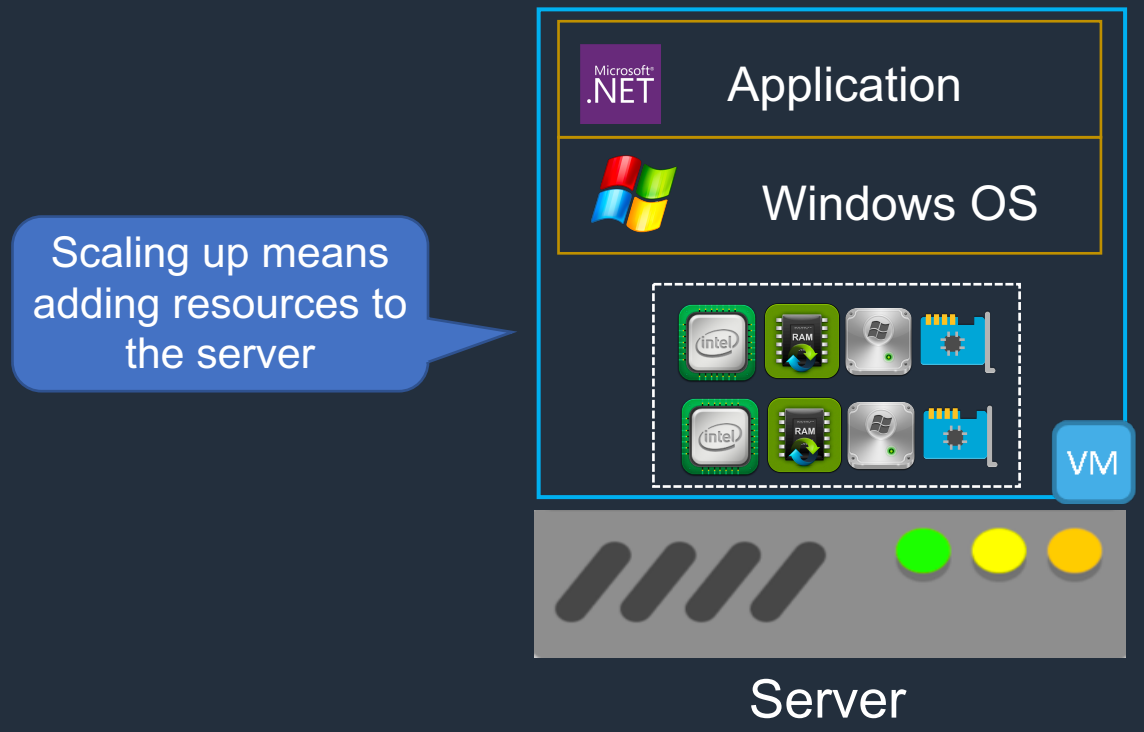
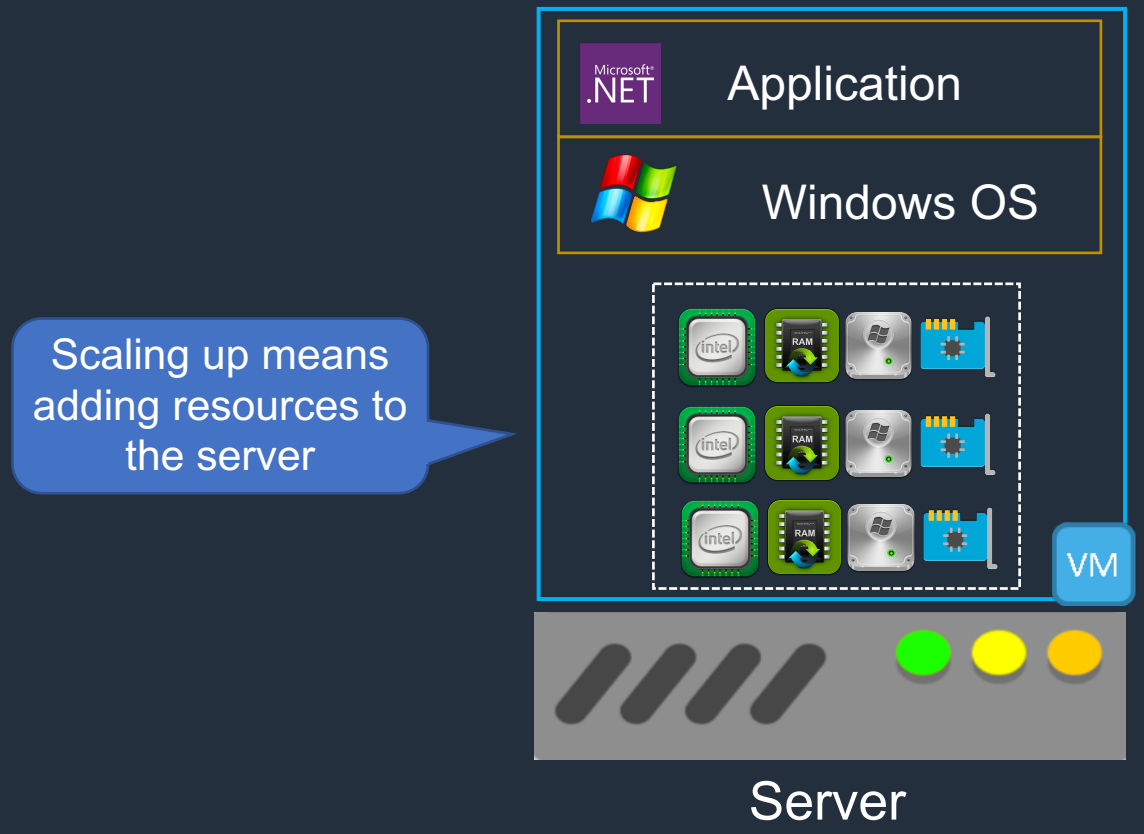
Scalability and Elasticity: Scaling Up



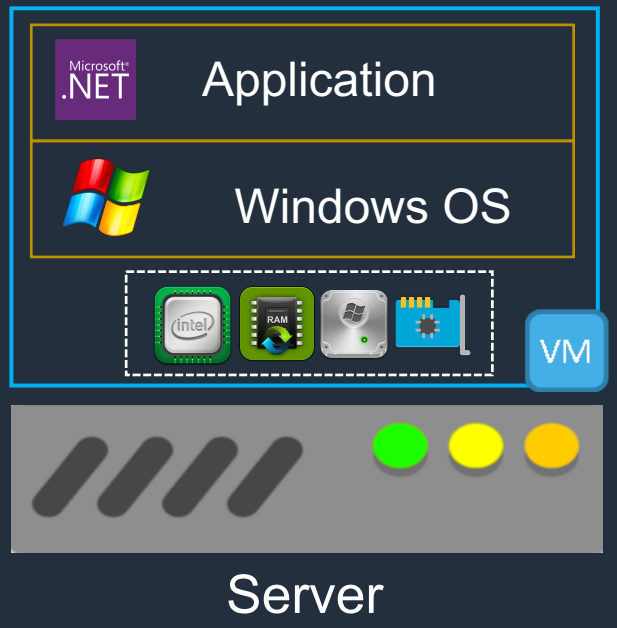
DigitalCloud TRAINING

Scalability and Elasticity: Scaling Up



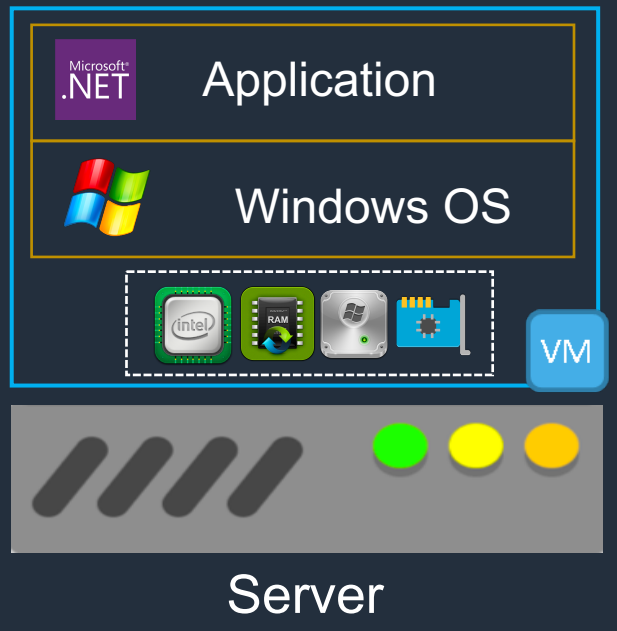
DigitalCloud TRAINING

Scalability and Elasticity: Scaling Out



DigitalCloud
TRAINING

Scalability and Elasticity: Scaling Out



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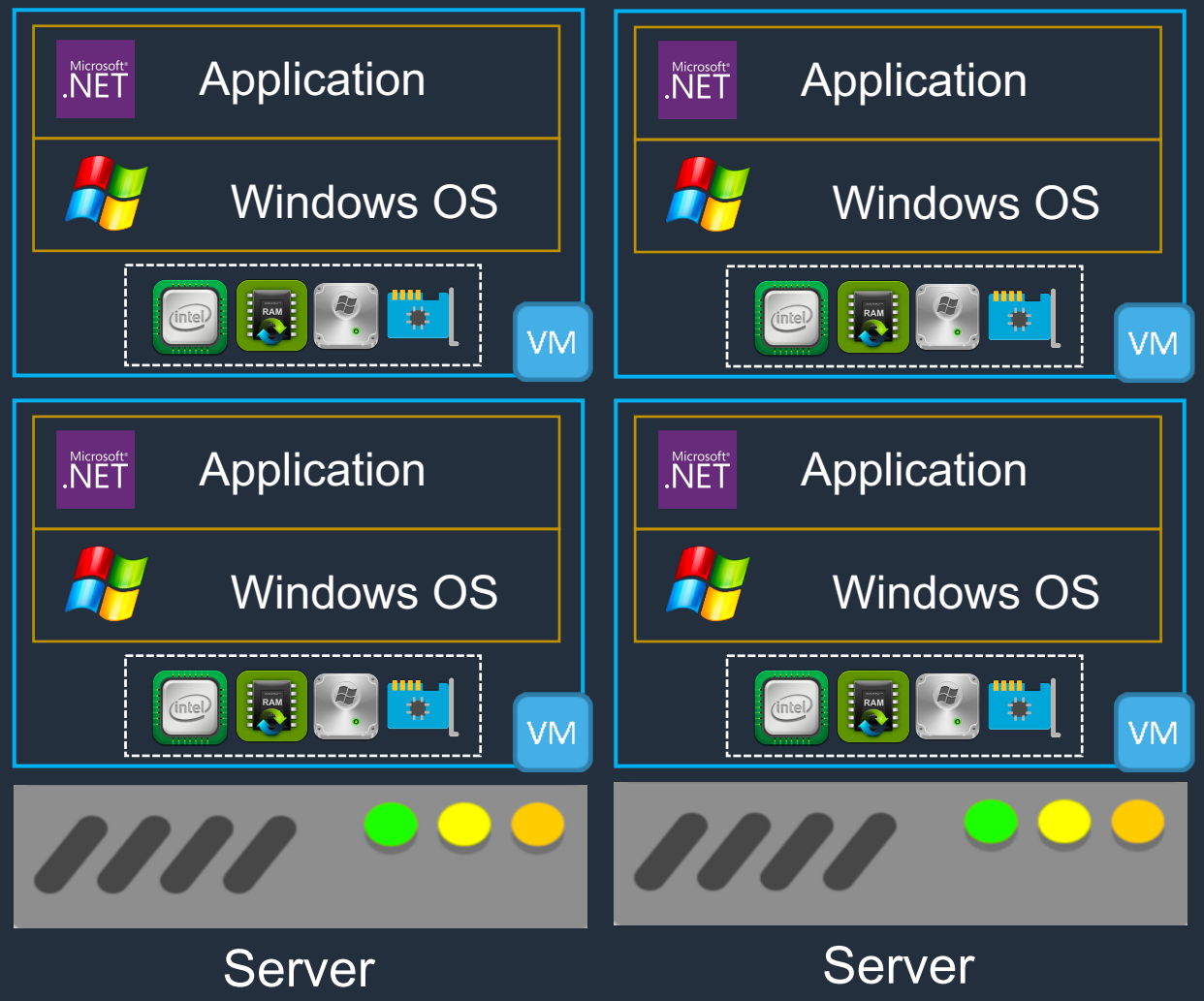
TRAINING

Scalability and Elasticity: Scaling Out

Scaling out means adding additional servers



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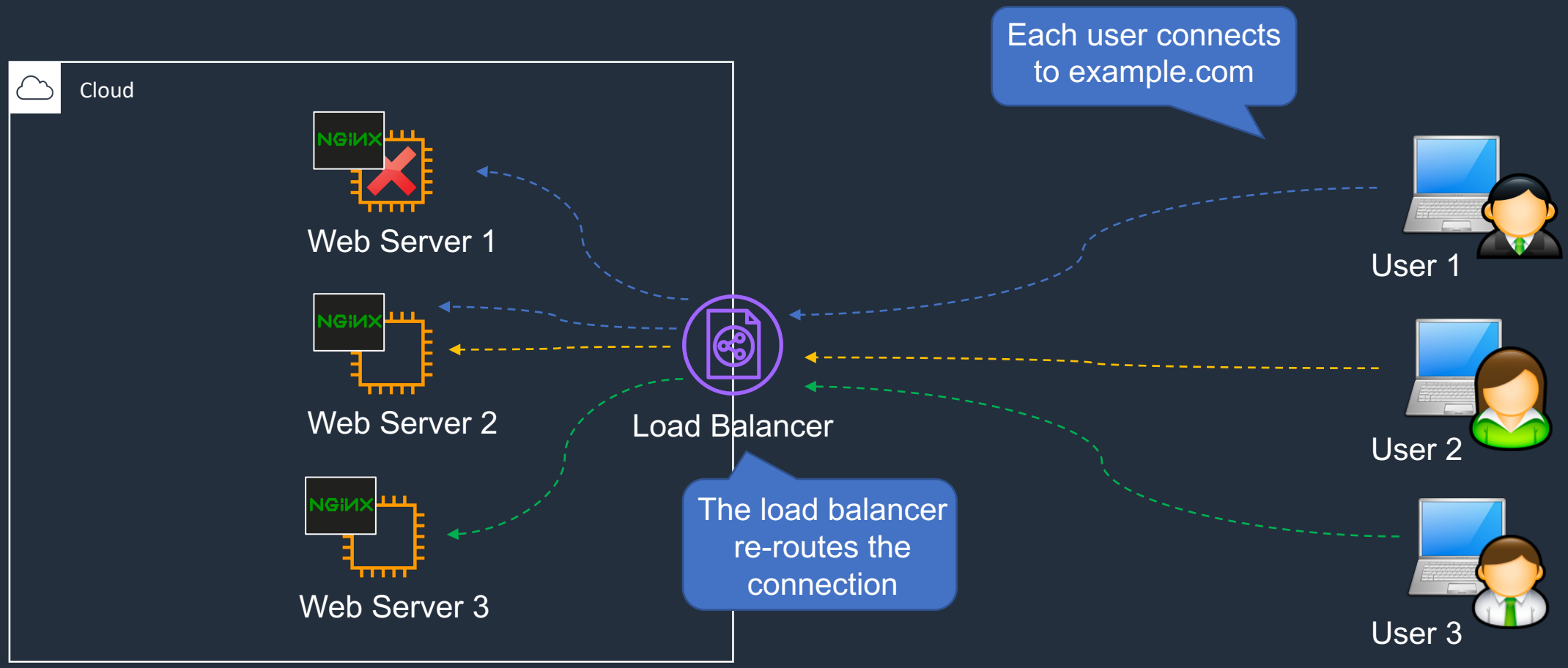
Load Balancing



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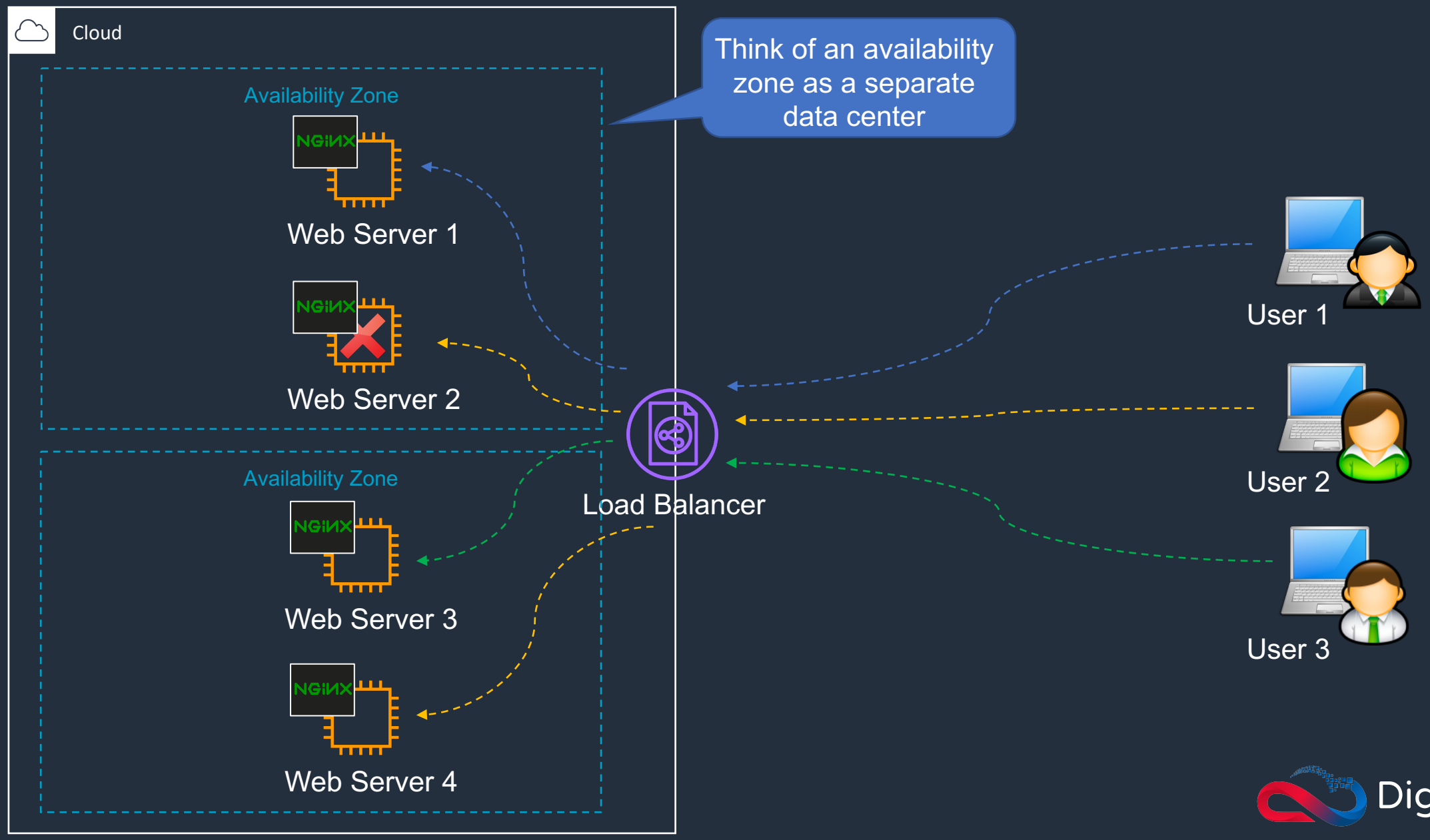
Fault Tolerance

Redundant components allow the system to continue to operate

The system may fail if there is no built-in redundancy

DigitalCloud TRAINING

High Availability and Fault Tolerance



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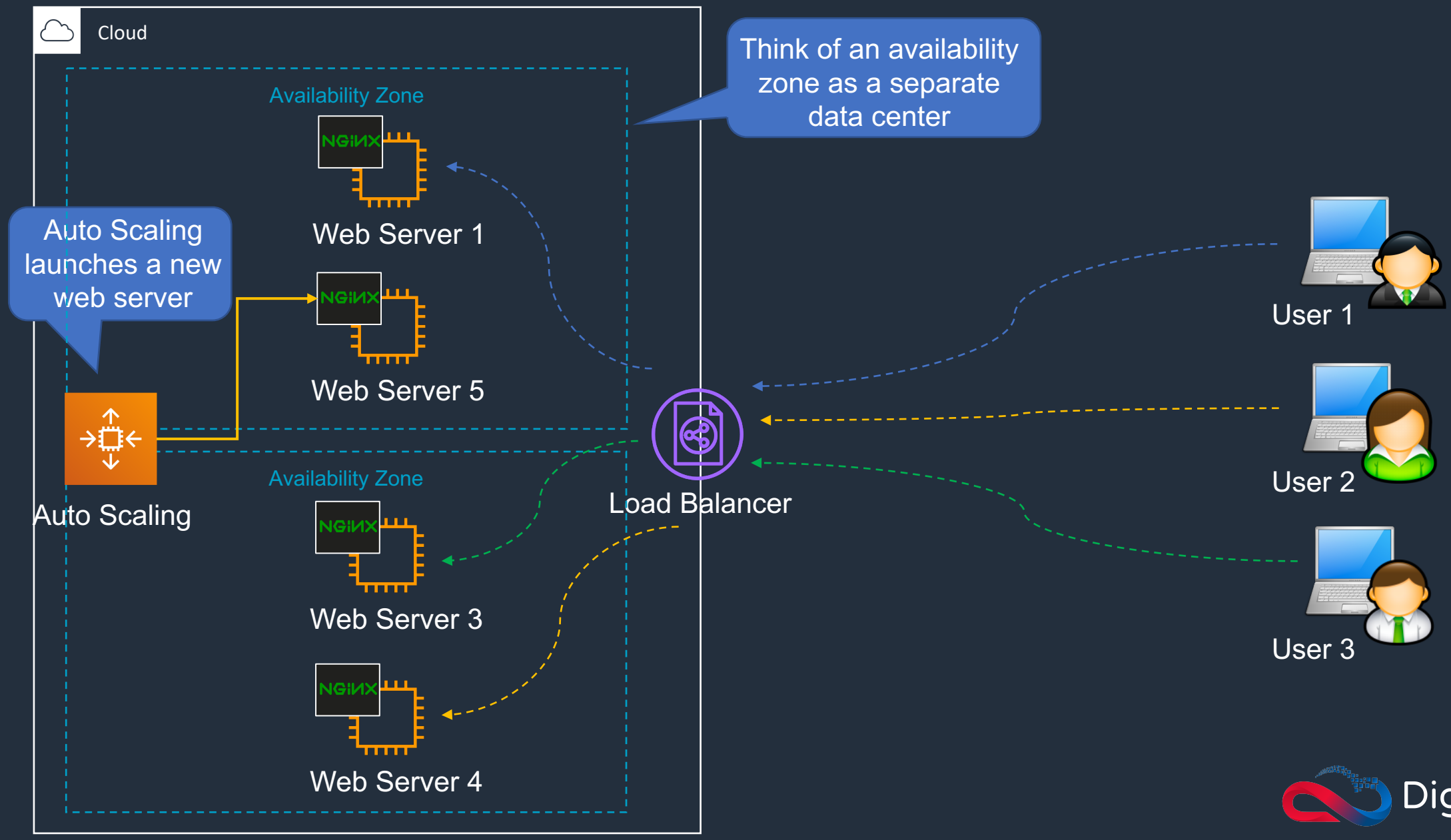
High Availability and Fault Tolerance



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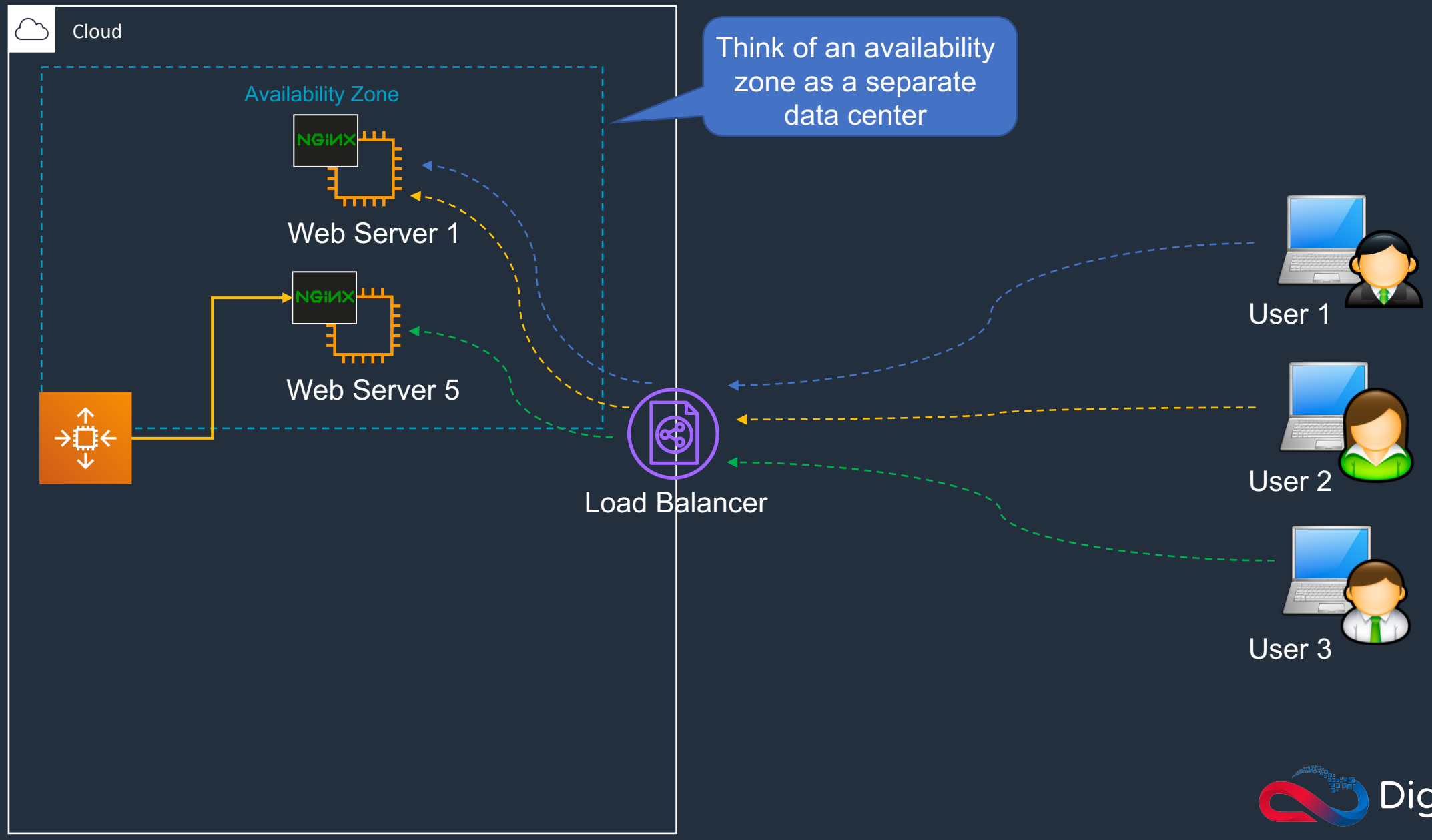
High Availability and Fault Tolerance



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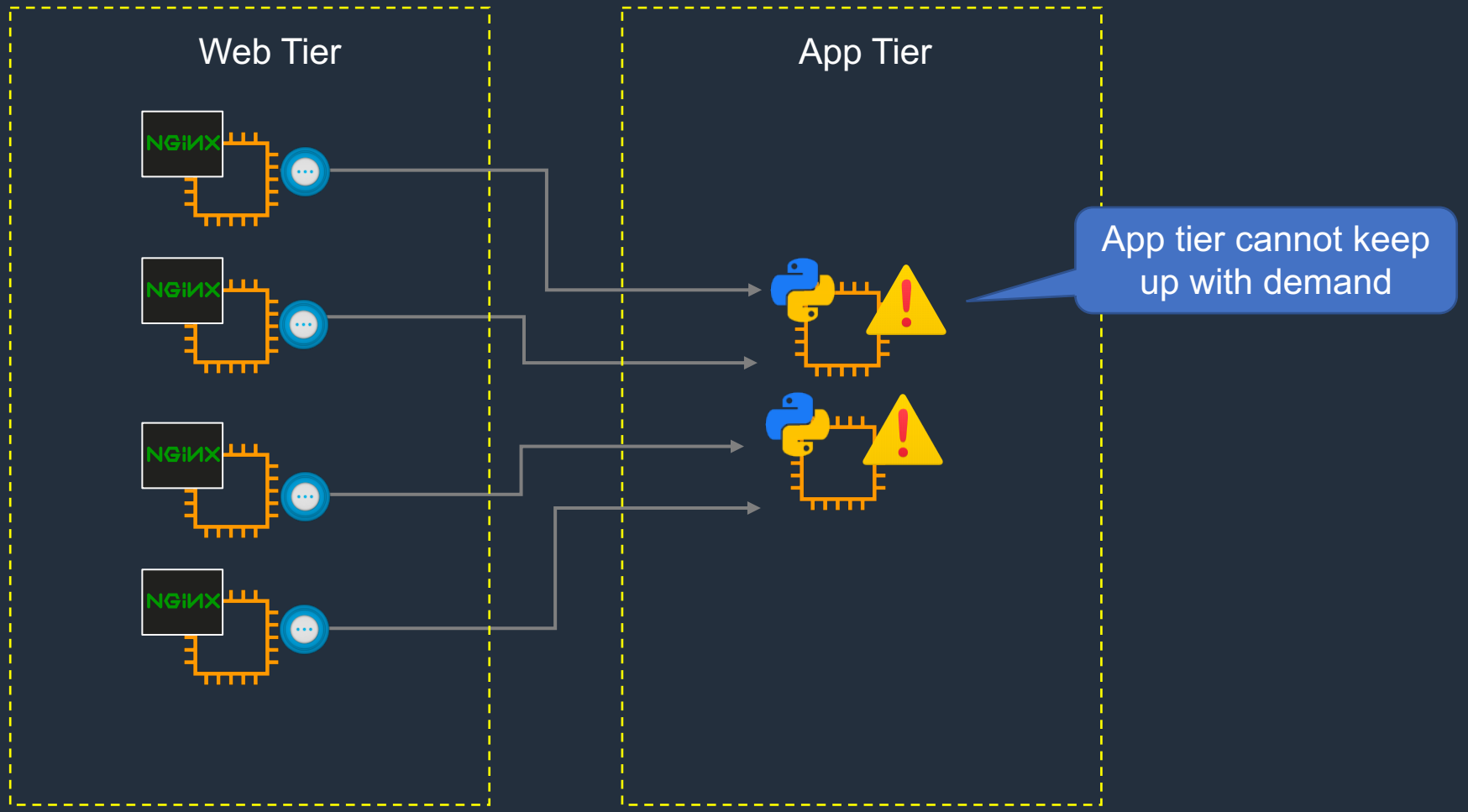
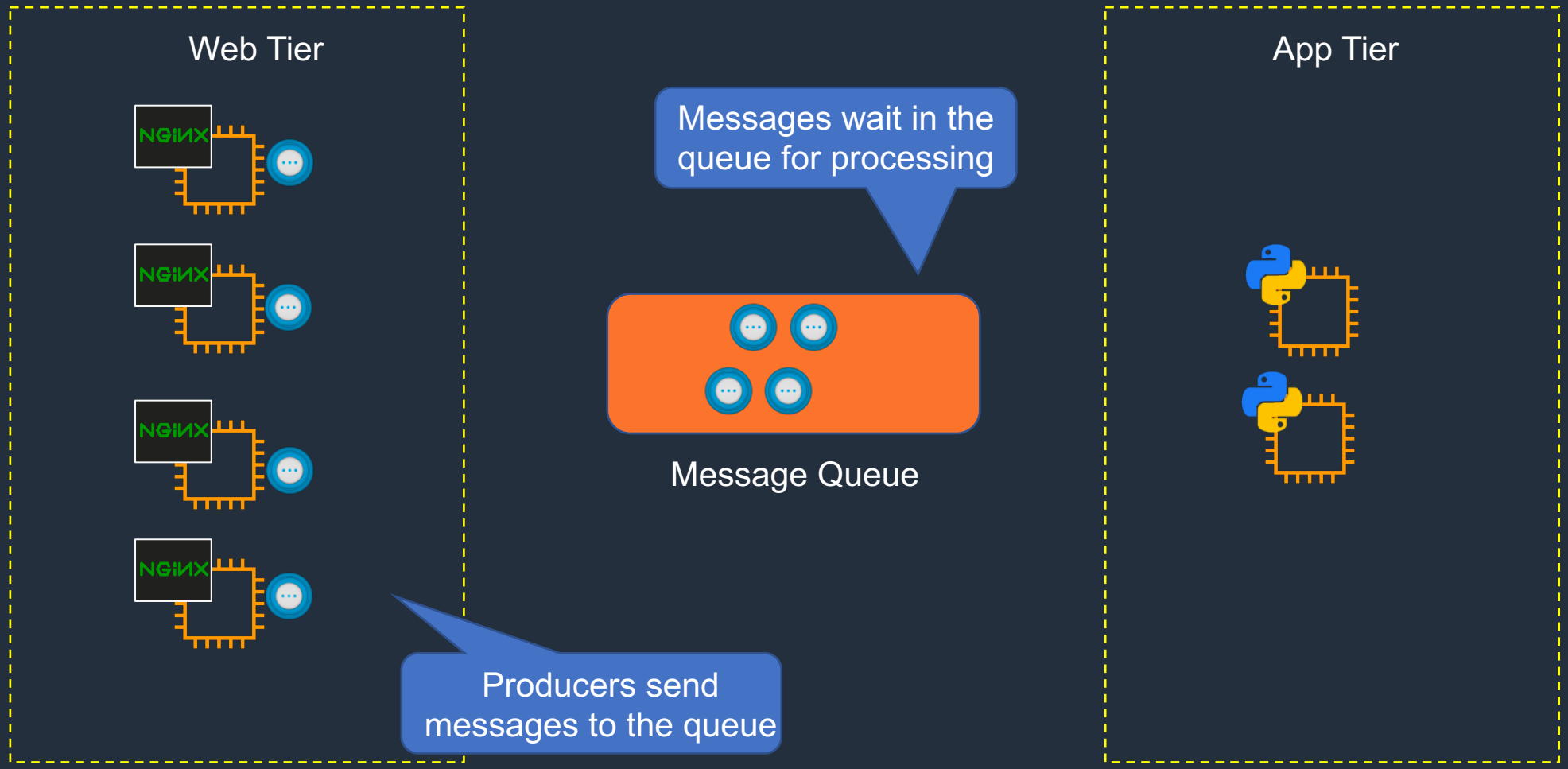
Tight Coupling



DigitalCloud TRAINING

Loose Coupling



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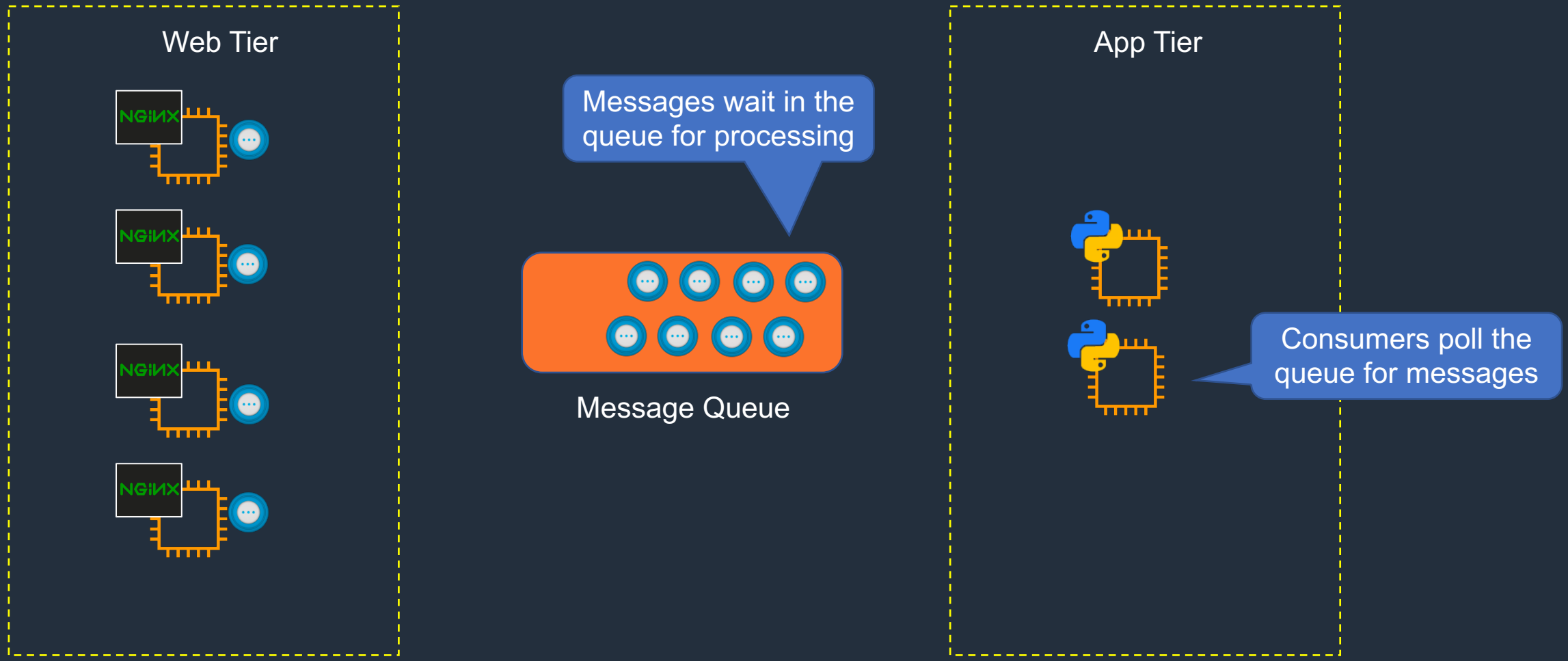
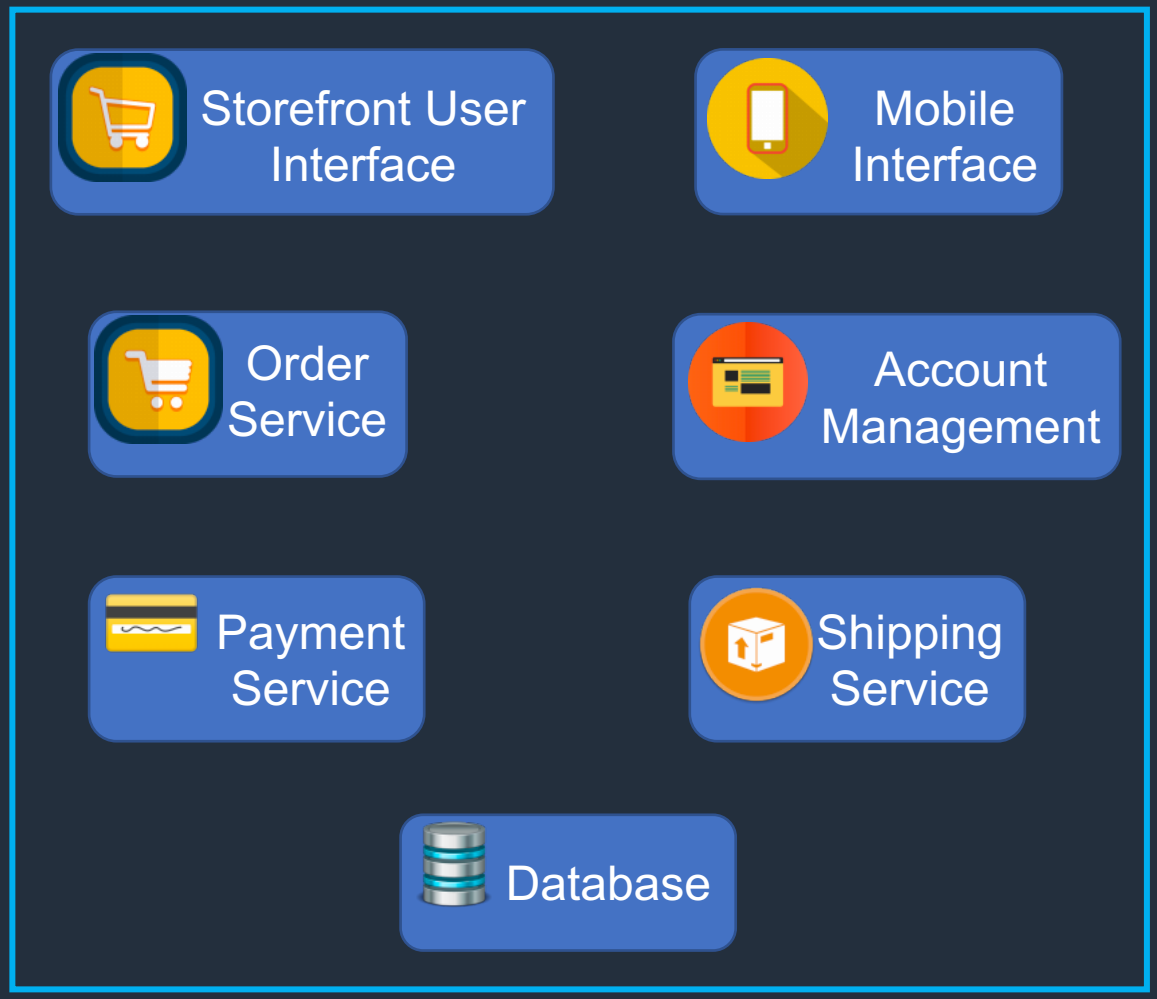
Loose Coupling



DigitalCloud TRAINING

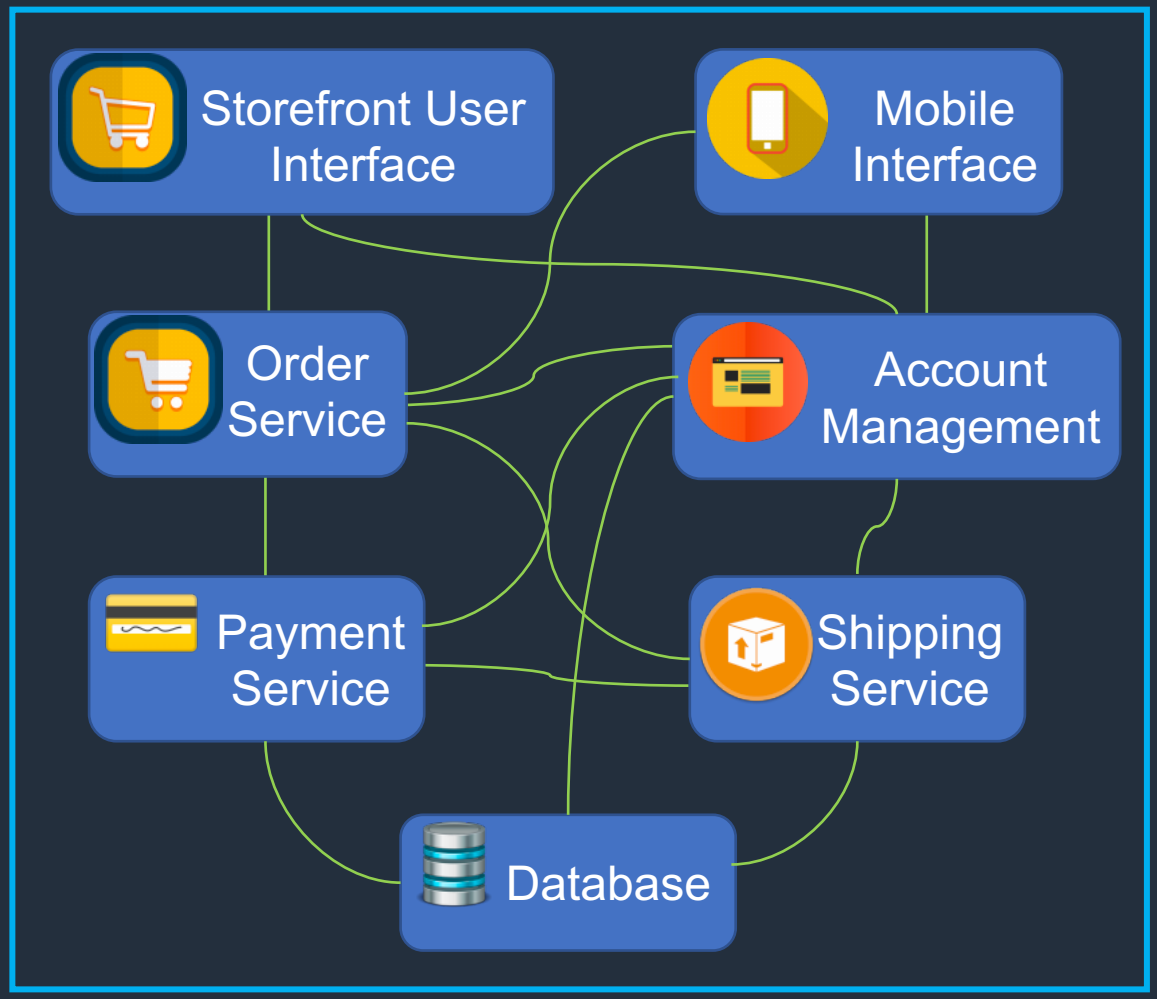
Monolithic Application



DigitalCloud TRAINING

Monolithic Application

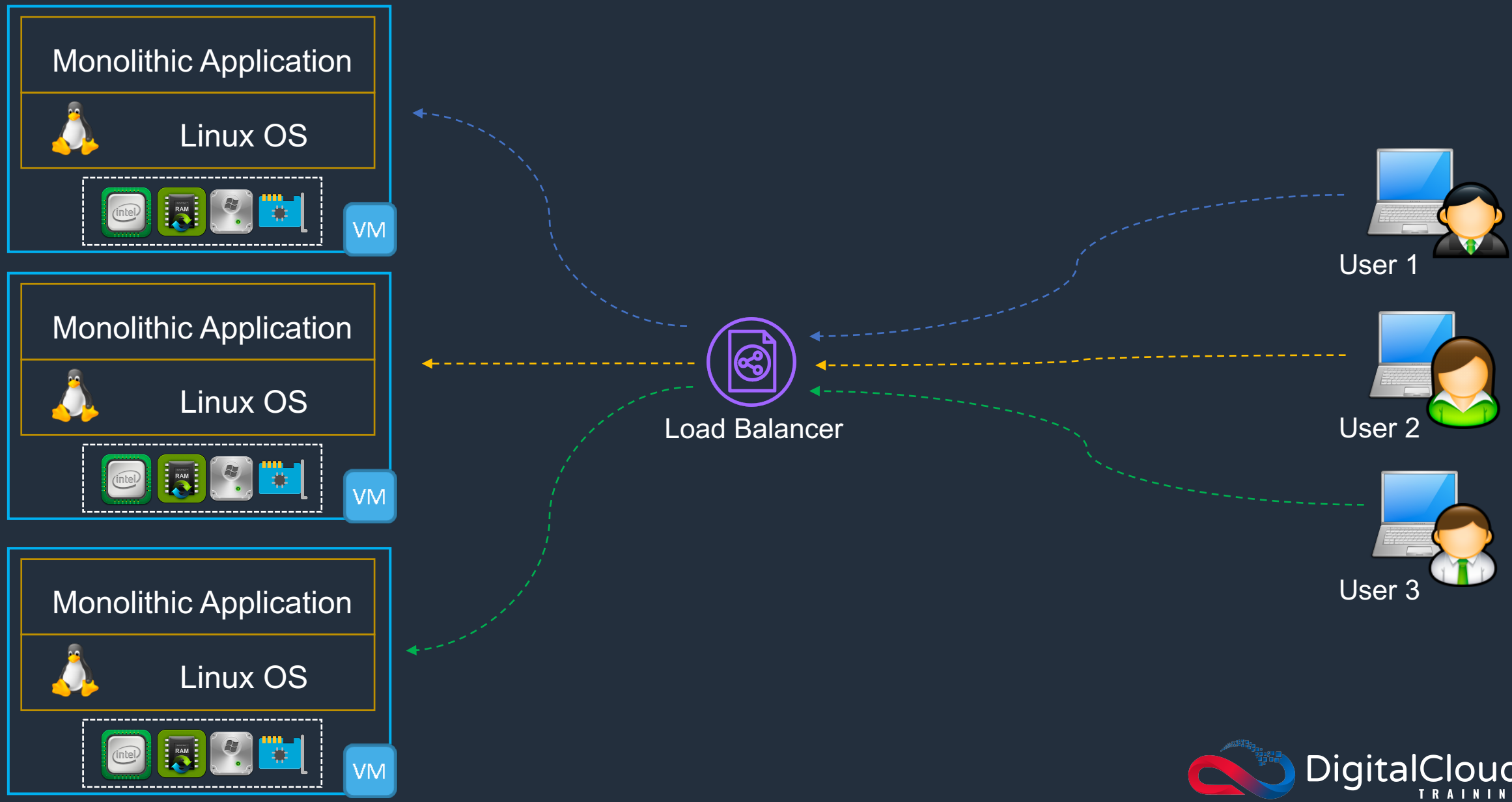
Updates to, or failures of, any single component can take down the whole application



The user interface, business logic, and data access layer are combined on a single platform

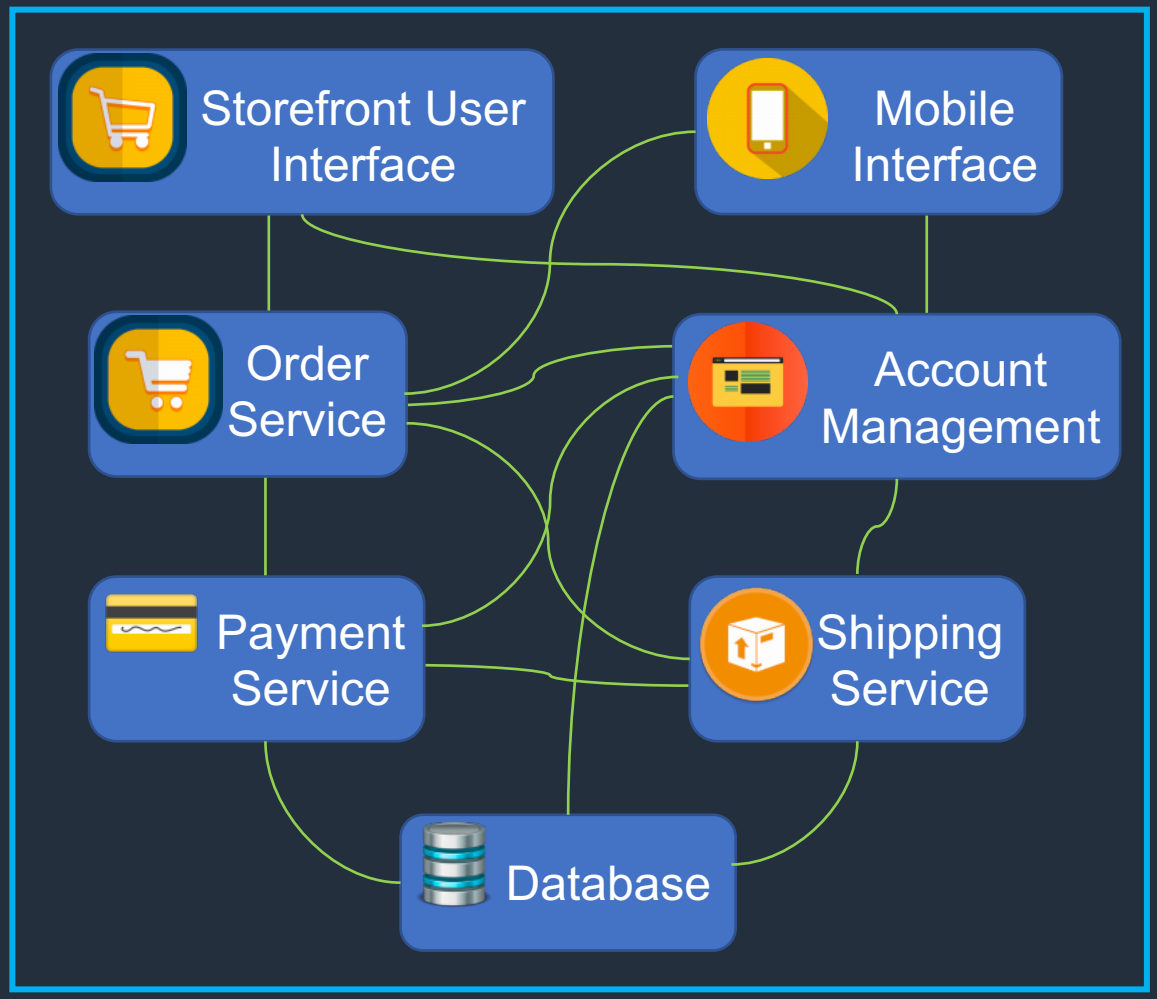
DigitalCloud TRAINING

Monolithic Application



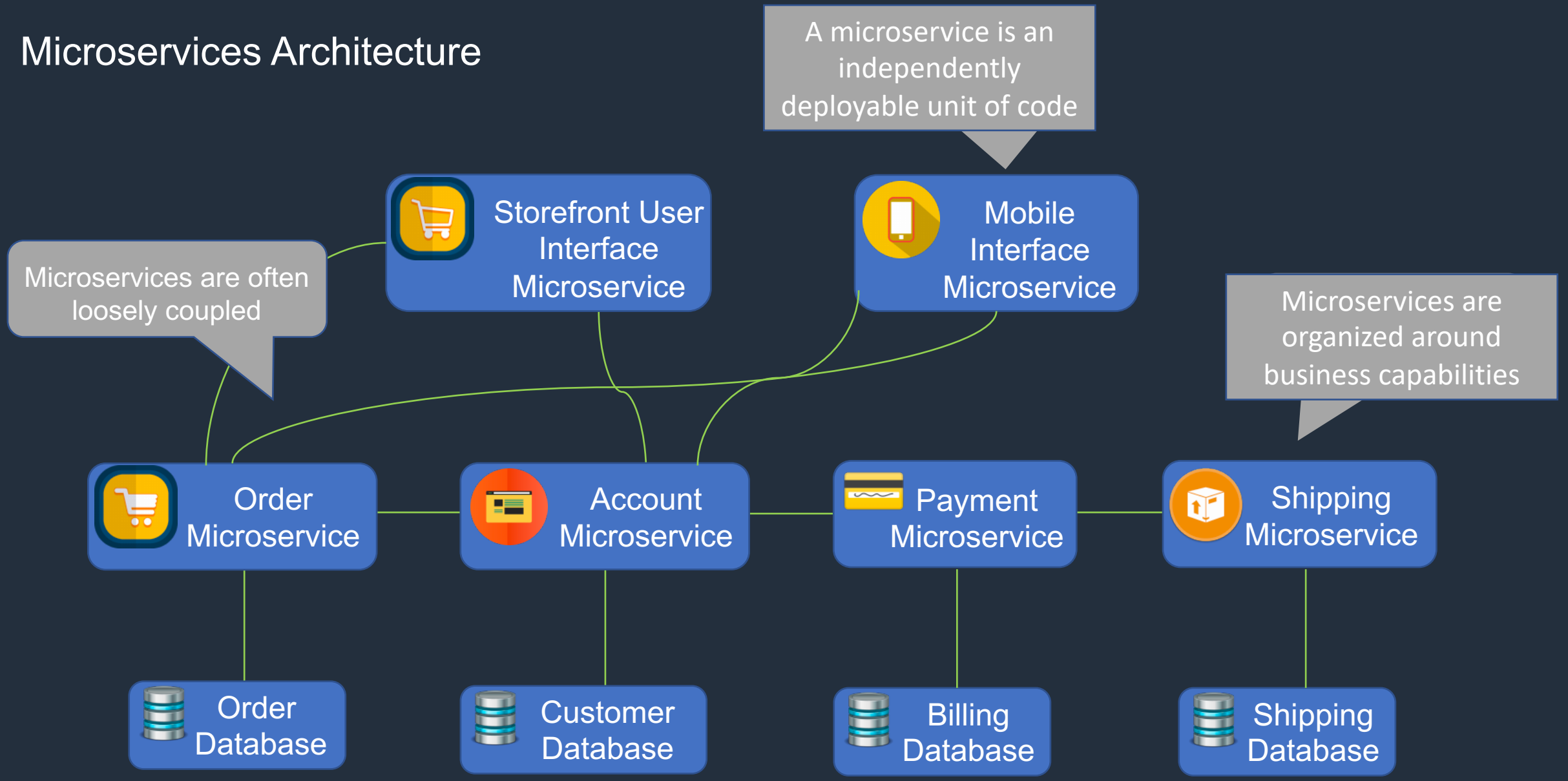
DigitalCloud TRAINING

Monolithic Application



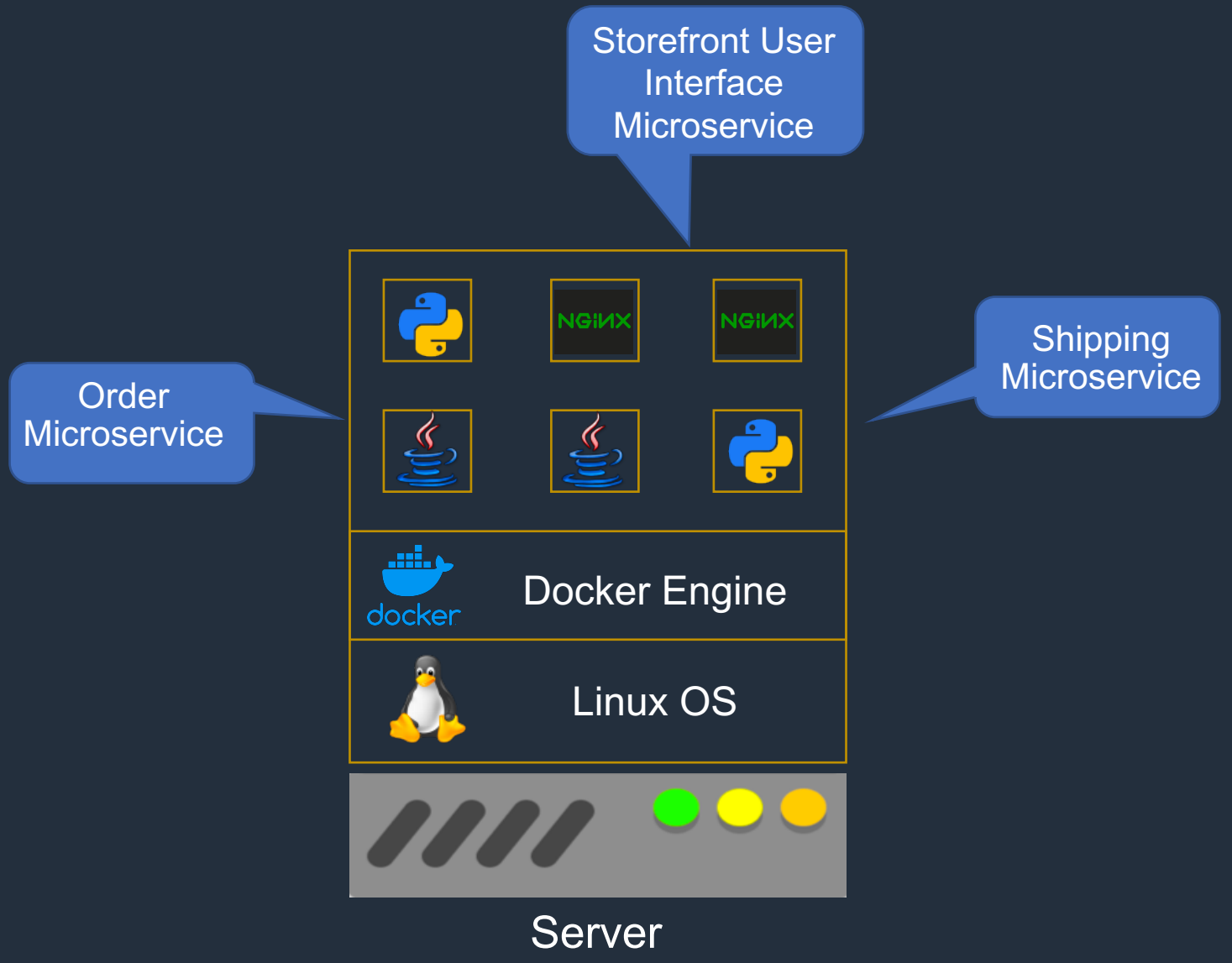
DigitalCloud TRAINING

Microservices Architecture



DigitalCloud TRAINING

Microservices using Docker Containers



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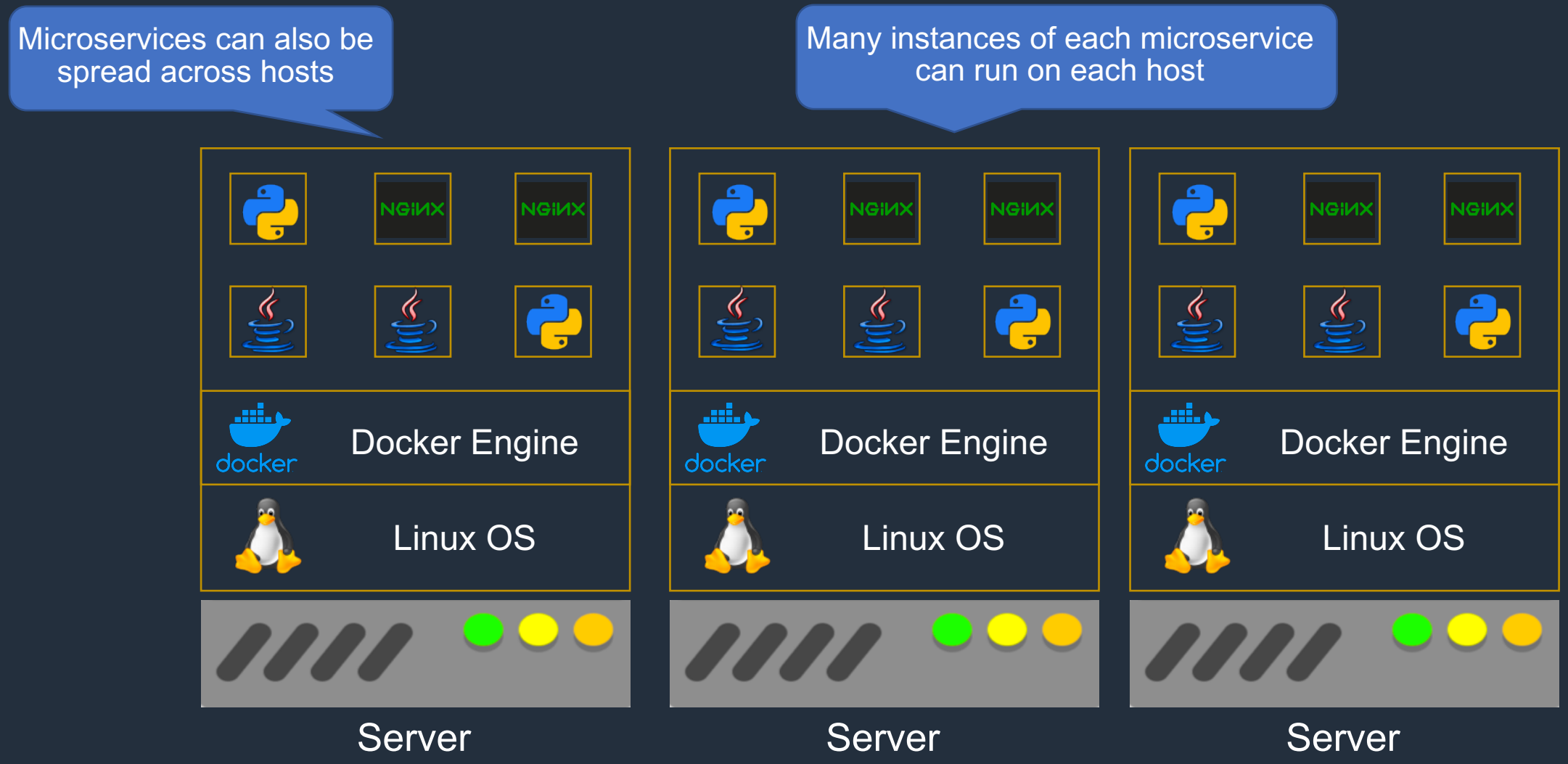
Microservices using Docker Containers



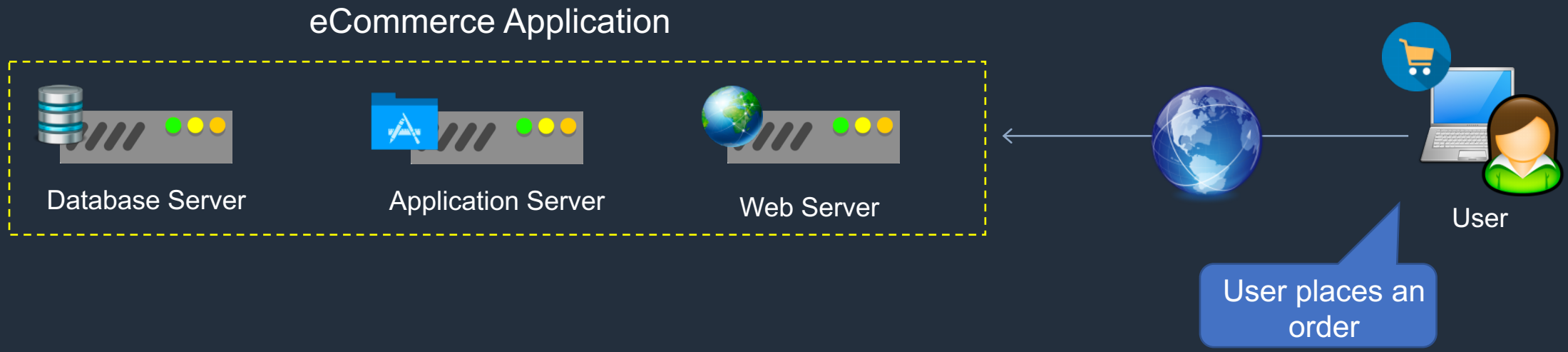
DigitalCloud TRAINING

Microservices: Attributes and Benefits

Microservices Attribute	Microservices Benefit
Use of Application Programming Interfaces (APIs)	Easier integrations between application components; assists with loose coupling
Independently deployable blocks of code	Can be scaled and maintained independently
Business-oriented architecture	Development organized around business capabilities; teams may be cross-functional and services may be reused
Flexible use of technologies	Each microservice can be written using different technologies (e.g. programming languages)
Speed and agility	Fast to deploy and update. Easy to include high availability and fault tolerance for each microservice

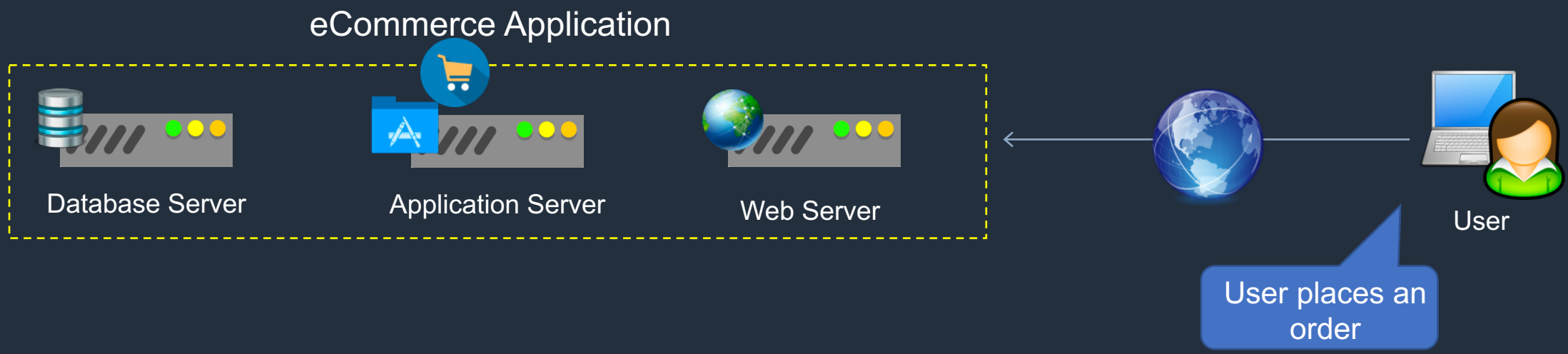
DigitalCloud TRAINING

Event-driven Architecture



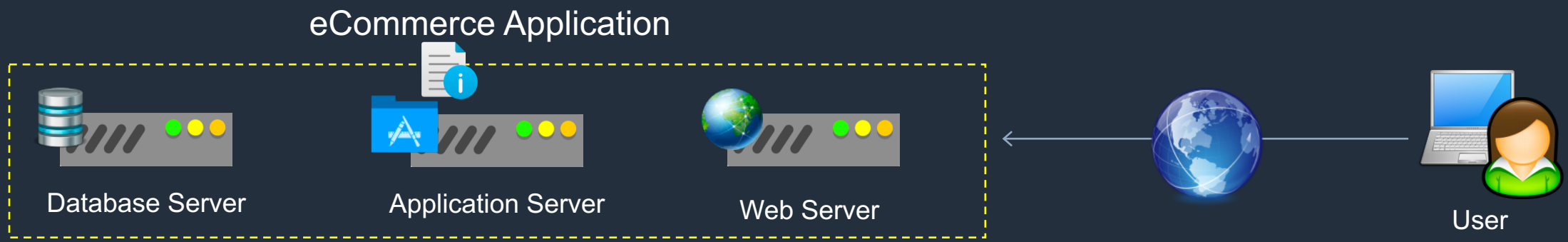
DigitalCloud TRAINING

Event-driven Architecture



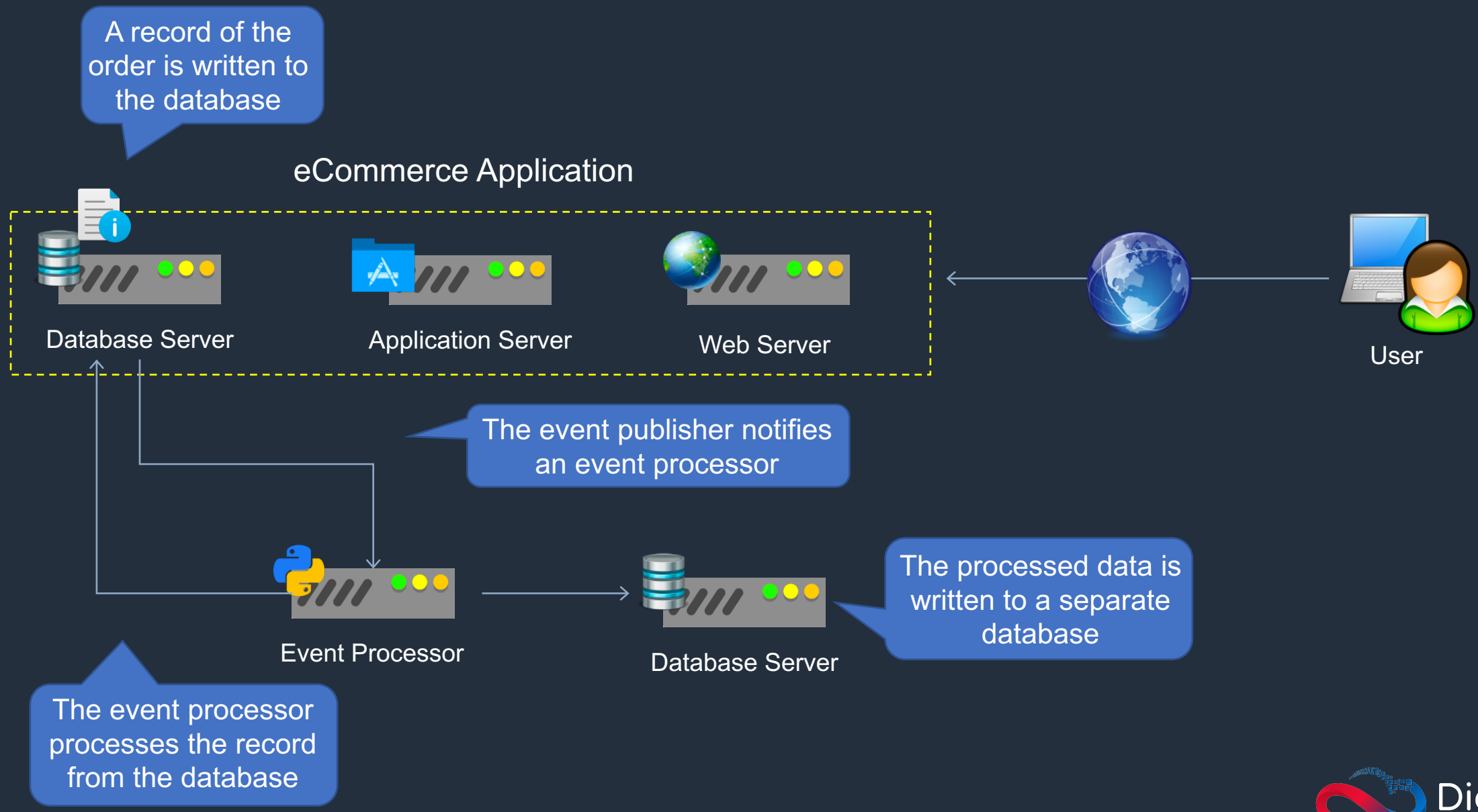
DigitalCloud TRAINING

Event-driven Architecture



DigitalCloud TRAINING

Event-driven Architecture

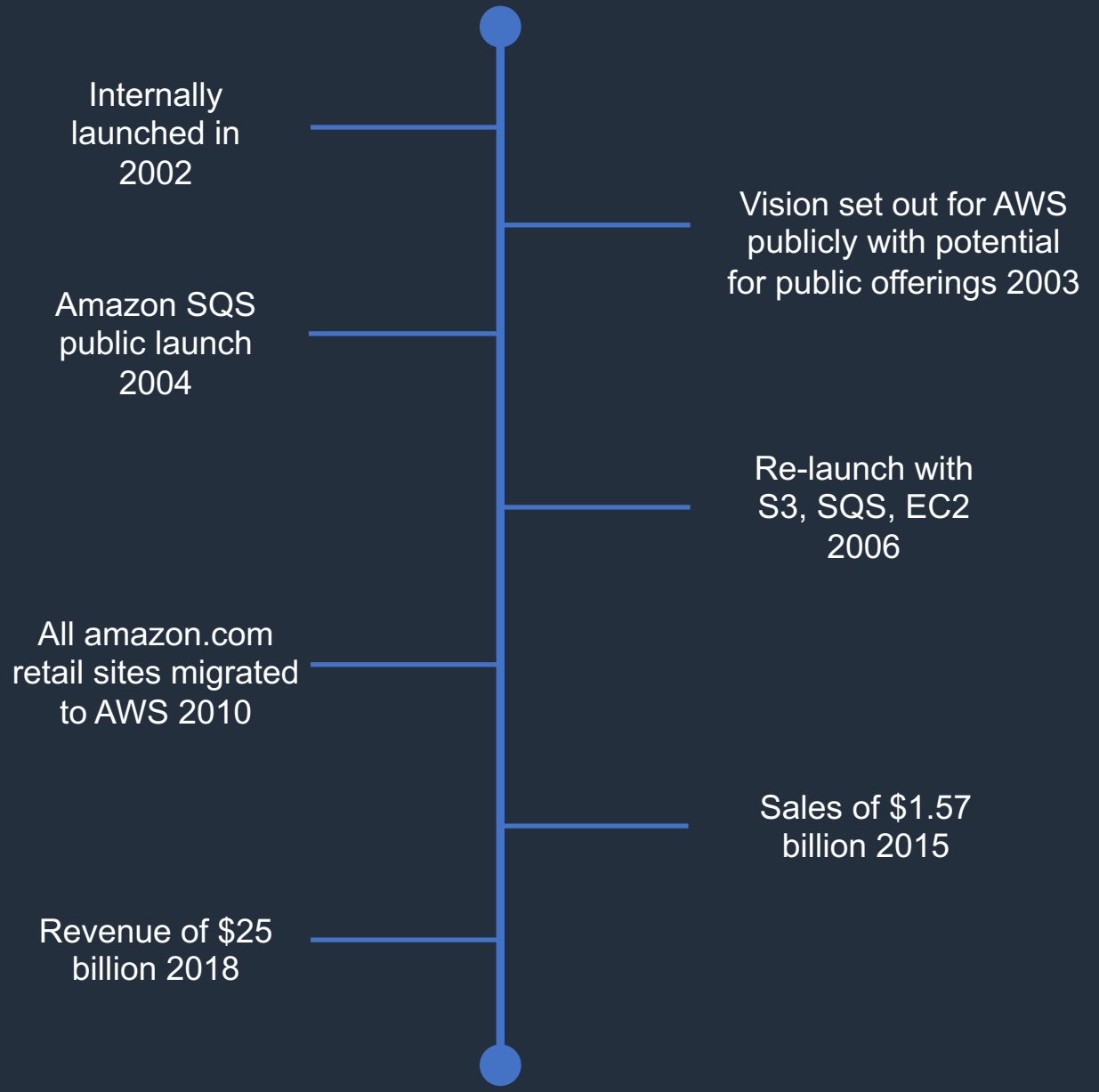


DigitalCloud TRAINING

SECTION 5

Getting Started with AWS

Amazon Web Services History



DigitalCloud TRAINING

Amazon Web Services (AWS)

This is actually a snapshot of AWS services from a few years ago..

Compute
- **EC2** — Virtual Servers in the Cloud
- **EC2 Container Service** — Run and Manage Docker Containers
- **Elastic Beanstalk** — Run and Manage Web Apps
- **Lambda** — Run Code in Response to Events

Storage & Content Delivery
- **S3** — Scalable Storage in the Cloud
- **CloudFront** — Global Content Delivery Network
- **Elastic File System** — Fully Managed File System for EC2
- **Glacier** — Archive Storage in the Cloud
- **Snowball** — Large Scale Data Transport
- **Storage Gateway** — Hybrid Storage Integration

Database
- **RDS** — Managed Relational Database Service
- **DynamoDB** — Managed NoSQL Database
- **ElastiCache** — In-Memory Cache
- **Redshift** — Fast, Simple, Cost-Effective Data Warehousing
- **DMS** — Managed Database Migration Service

Networking
- **VPC** — Isolated Cloud Resources
- **Direct Connect** — Dedicated Network Connection to AWS
- **Route 53** — Scalable DNS and Domain Name Registration

Developer Tools
- **CodeCommit** — Store Code in Private Git Repositories
- **CodeDeploy** — Automate Code Deployments
- **CodePipeline** — Release Software using Continuous Delivery

Management Tools
- **CloudWatch** — Monitor Resources and Applications
- **CloudFormation** — Create and Manage Resources with Templates
- **CloudTrail** — Track User Activity and API Usage
- **Config** — Track Resource Inventory and Changes
- **OpsWorks** — Automate Operations with Chef
- **Service Catalog** — Create and Use Standardized Products
- **Trusted Advisor** — Optimize Performance and Security

Security & Identity
- **Identity & Access Management** — Manage User Access and Encryption Keys
- **Directory Service** — Host and Manage Active Directory
- **Inspector** — Analyze Application Security
- **WAF** — Filter Malicious Web Traffic
- **Certificate Manager** — Provision, Manage, and Deploy SSL/TLS Certificates

Analytics
- **EMR** — Managed Hadoop Framework
- **Data Pipeline** — Orchestration for Data-Driven Workflows
- **Elasticsearch Service** — Run and Scale Elasticsearch Clusters
- **Kinesis** — Work with Real-Time Streaming Data
- **Machine Learning** — Build Smart Applications Quickly and Easily

Internet of Things
- **AWS IoT** — Connect Devices to the Cloud

Game Development
- **GameLift** — Deploy and Scale Session-based Multiplayer Games

Mobile Services
- **Mobile Hub** — Build, Test, and Monitor Mobile Apps
- **Cognito** — User Identity and App Data Synchronization
- **Device Farm** — Test Android, iOS, and Web Apps on Real Devices in the Cloud
- **Mobile Analytics** — Collect, View and Export App Analytics
- **SNS** — Push Notification Service

Application Services
- **API Gateway** — Build, Deploy and Manage APIs
- **AppStream** — Low Latency Application Streaming
- **CloudSearch** — Managed Search Service
- **Elastic Transcoder** — Easy-to-Use Scalable Media Transcoding
- **SES** — Email Sending and Receiving Service
- **SQS** — Message Queue Service
- **SWF** — Workflow Service for Coordinating Application Components

Enterprise Applications
- **WorkSpaces** — Desktops in the Cloud
- **WorkDocs** — Secure Enterprise Storage and Sharing Service
- **WorkMail** — Secure Email and Calendaring Service

There are now well over 200 services!

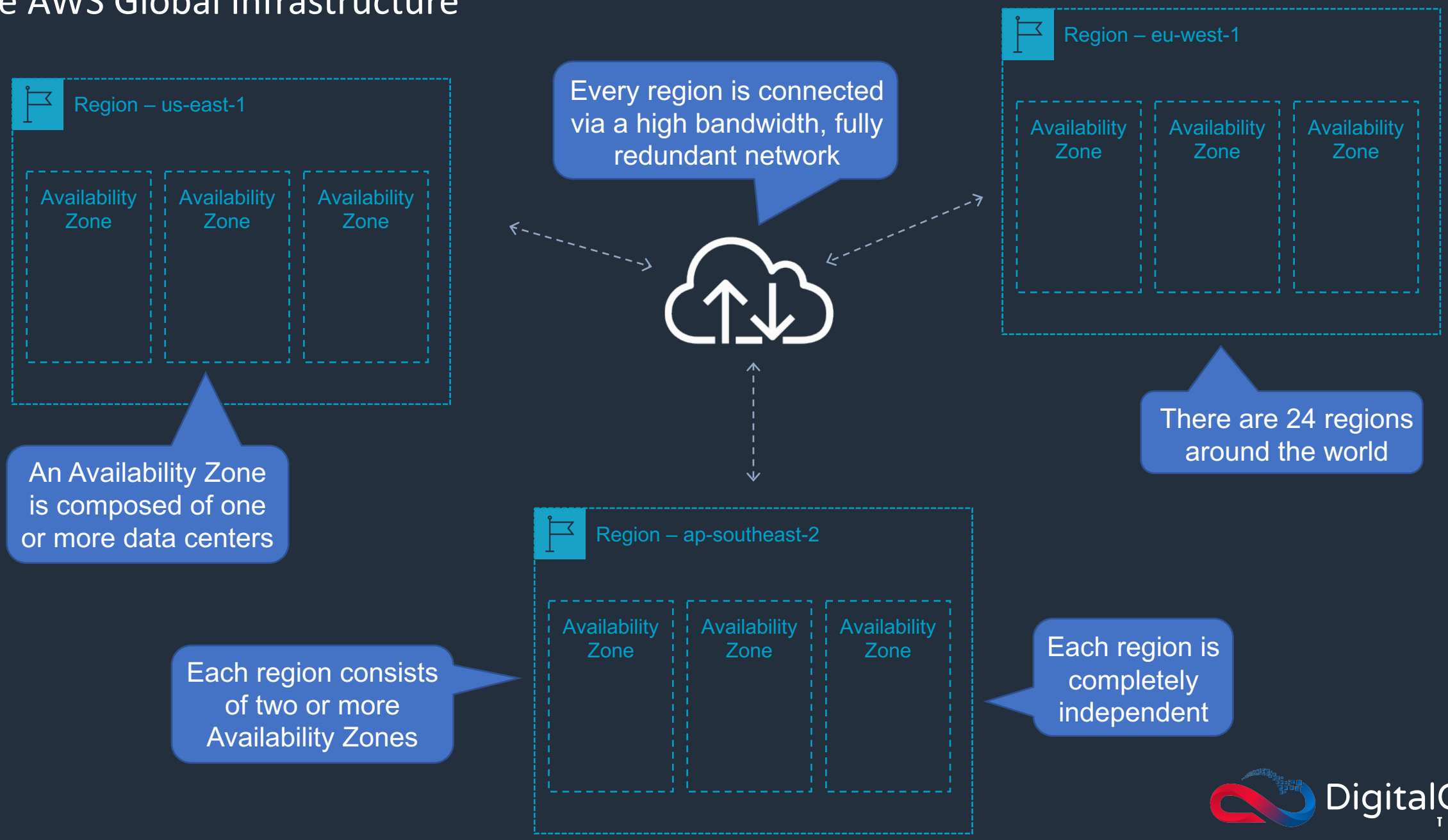
DigitalCloud TRAINING

Gartner Magic Quadrant 2019

- According to Gartner in 2018 AWS was the leader in IaaS with over 48% share
- AWS has been the leader for 10 years in a row!
- $40 billion in revenue in 2019

DigitalCloud TRAINING

The AWS Global Infrastructure



DigitalCloud TRAINING

Fundamentals of AWS Pricing

Compute

Amount of resources such as CPU and RAM and duration

Storage

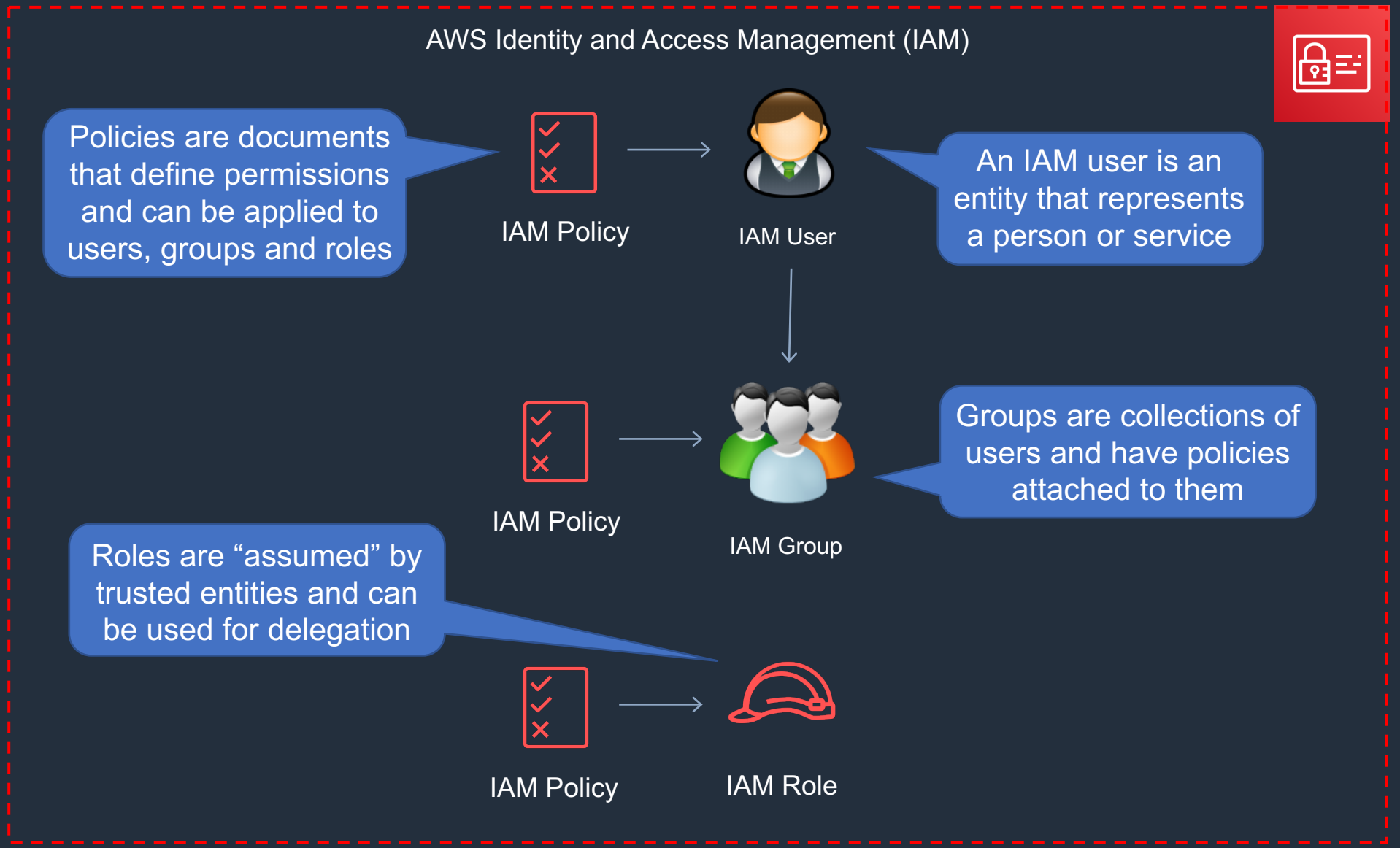
Quantity of data stored

Outbound Data Transfer

Quantity of data that is transferred out from all services

DigitalCloud TRAINING

AWS Identity and Access Management Service (IAM)



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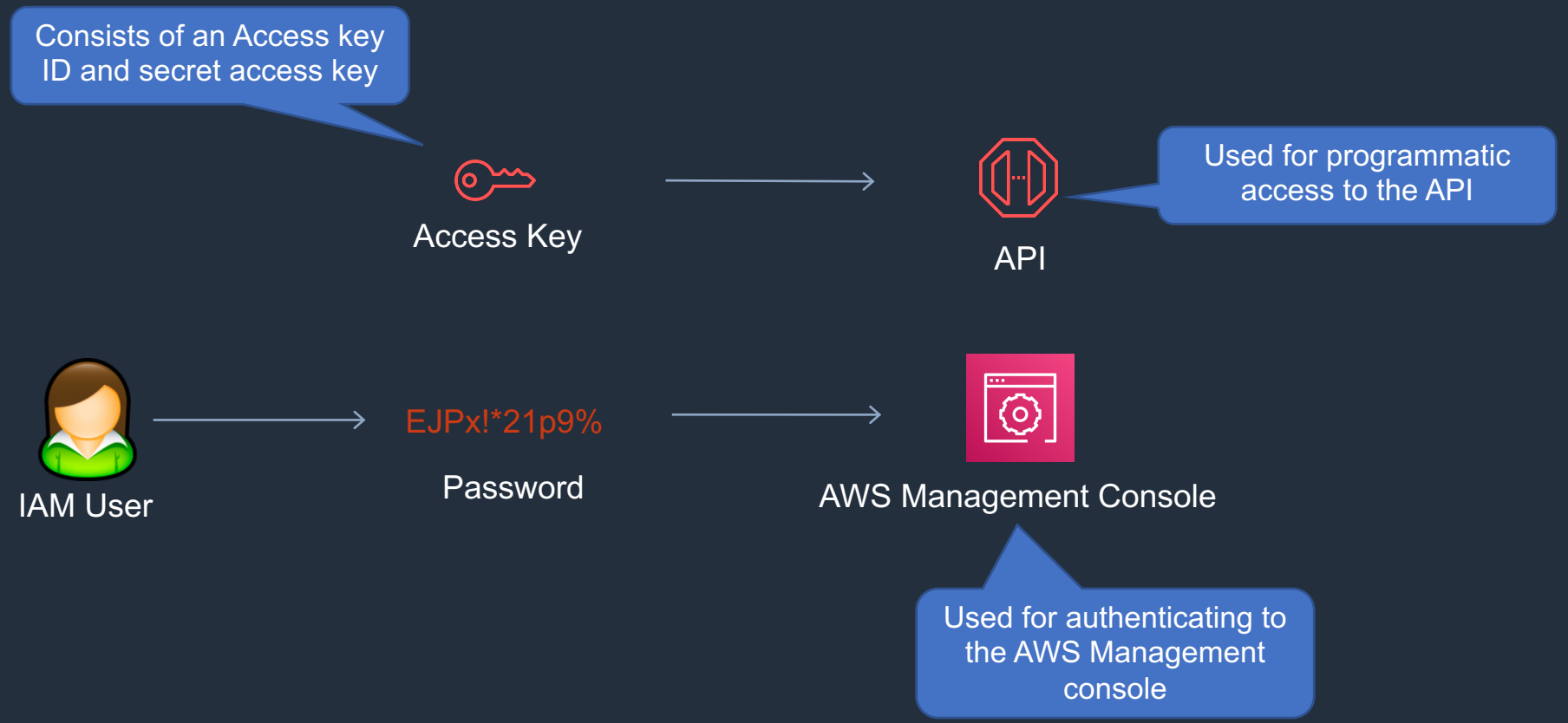
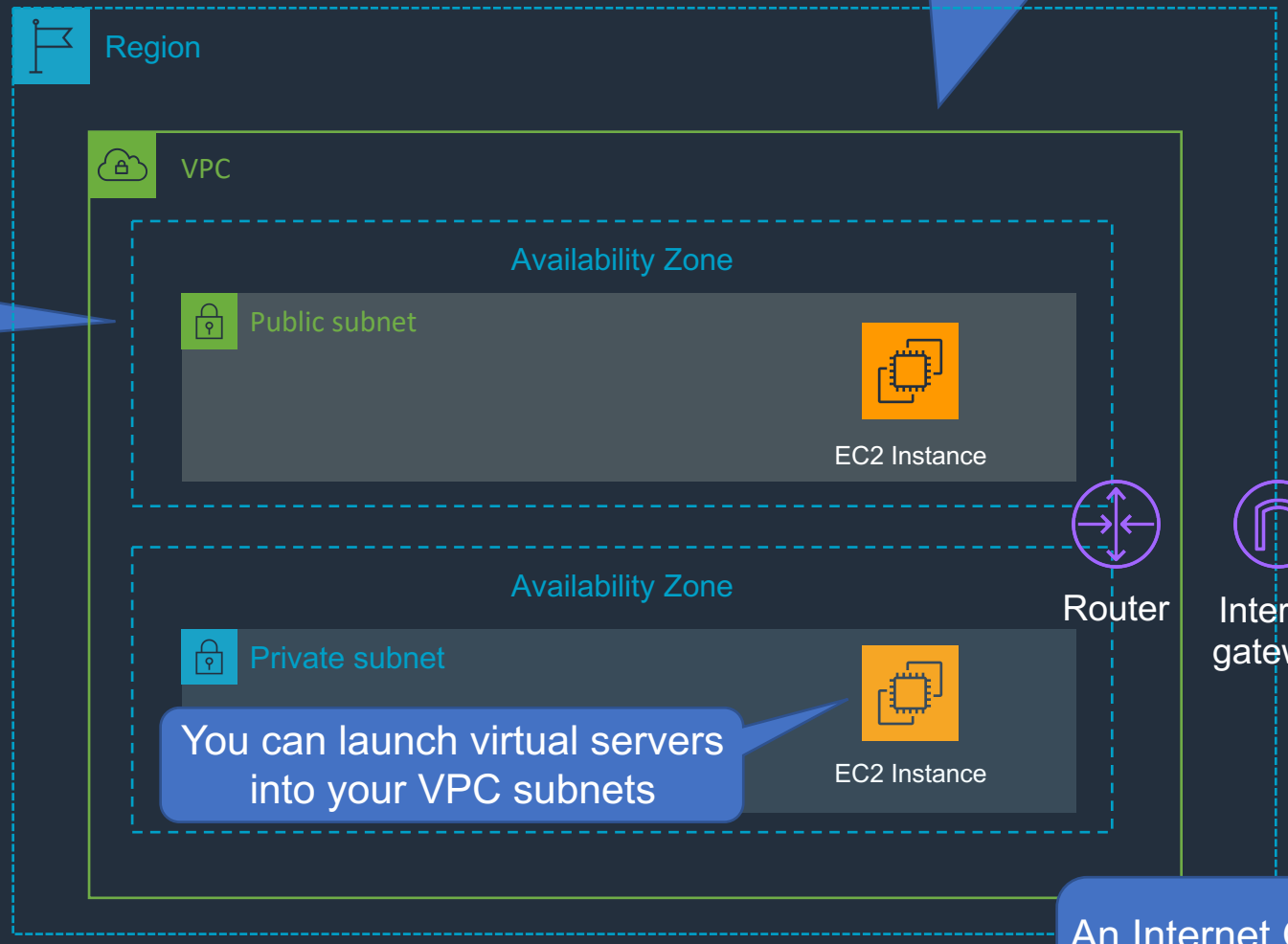
Authentication Methods



DigitalCloud TRAINING

Amazon Virtual Private Cloud (VPC)

A VPC is a logically isolated portion of the AWS cloud within a region



Subnets are created within AZs

You can launch virtual servers into your VPC subnets

An Internet Gateway is used to connect to the Internet

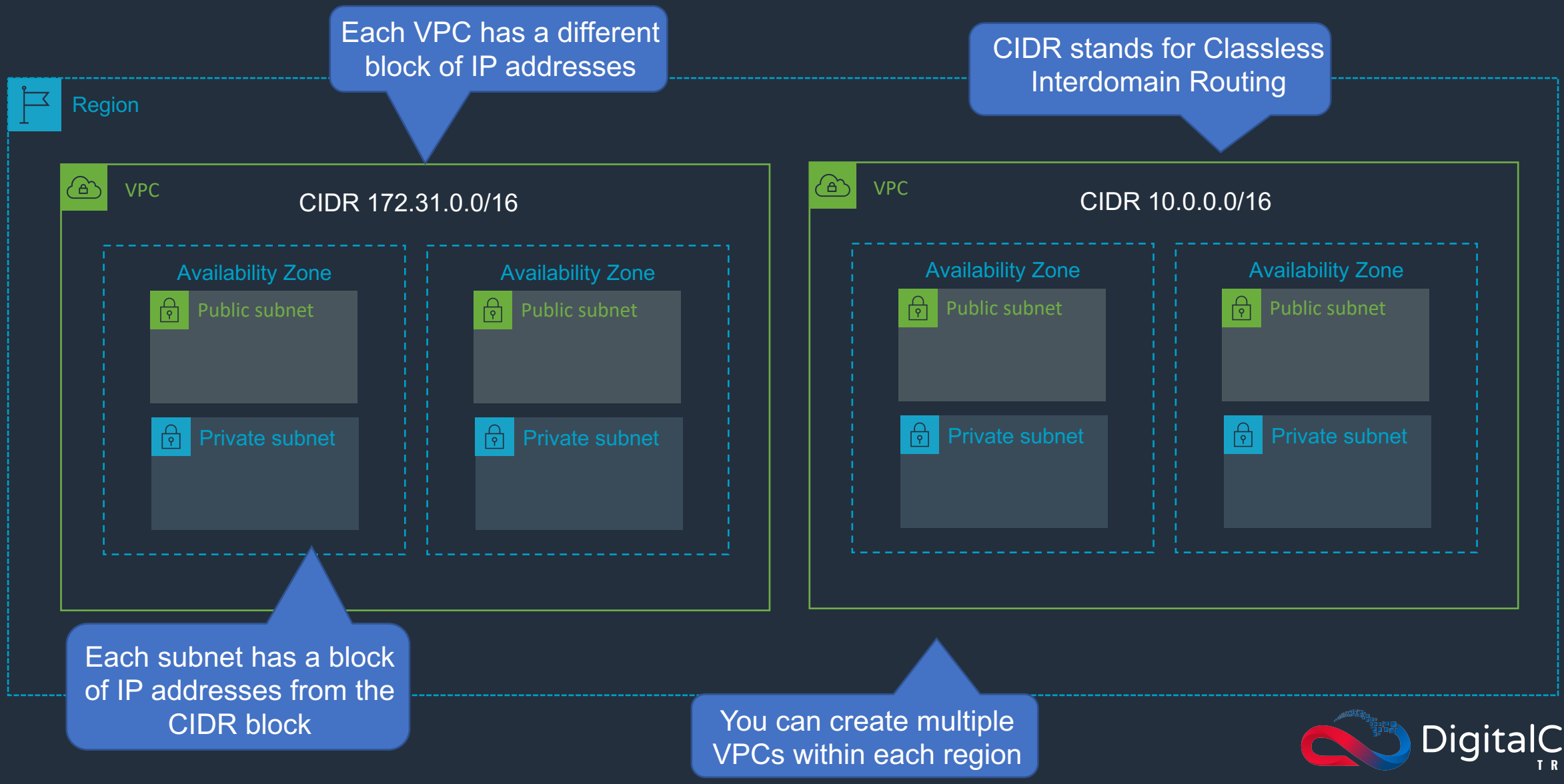
Main Route Table

Destination	Target
172.31.0.0/16	Local
0.0.0.0/0	igw-id

The route table is used to configure the VPC router

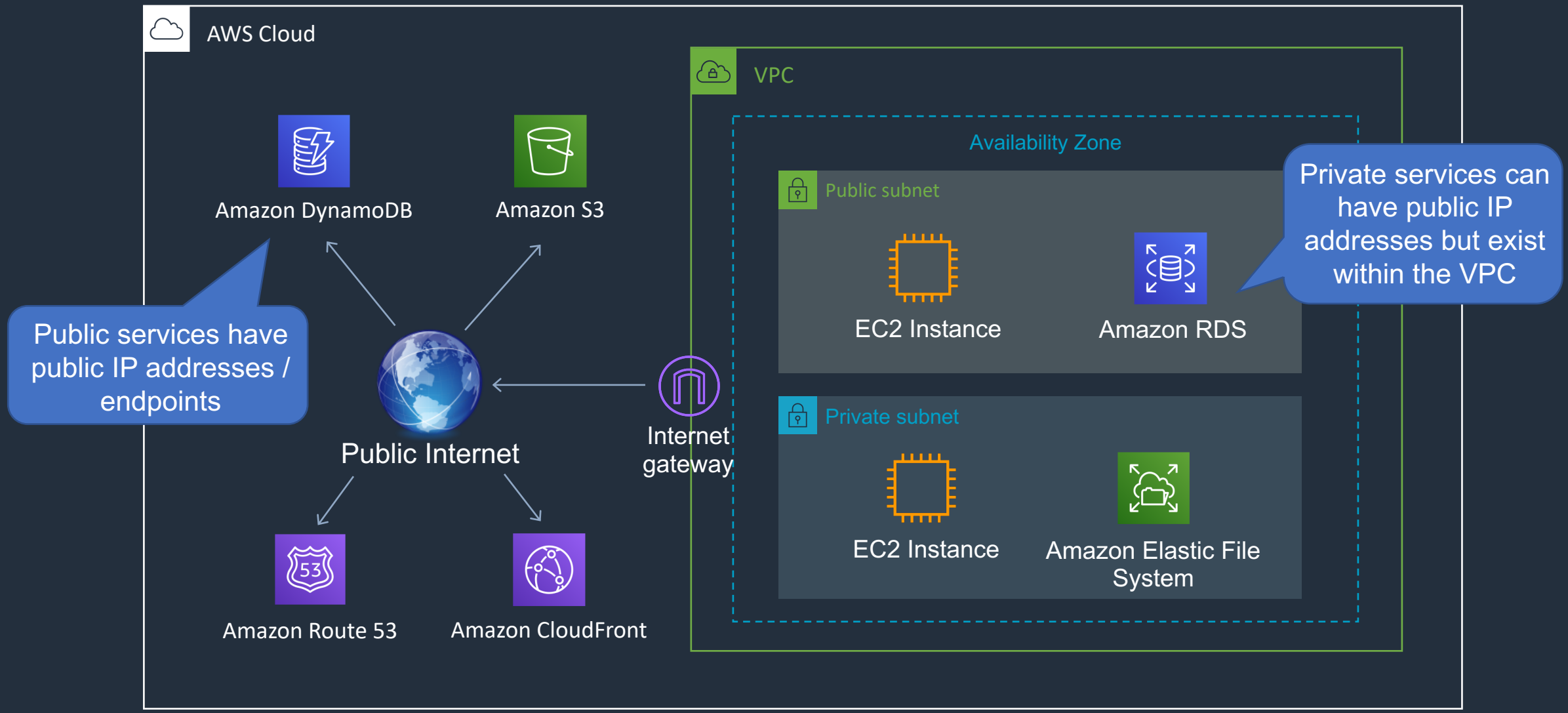
DigitalCloud TRAINING

Multiple VPCs



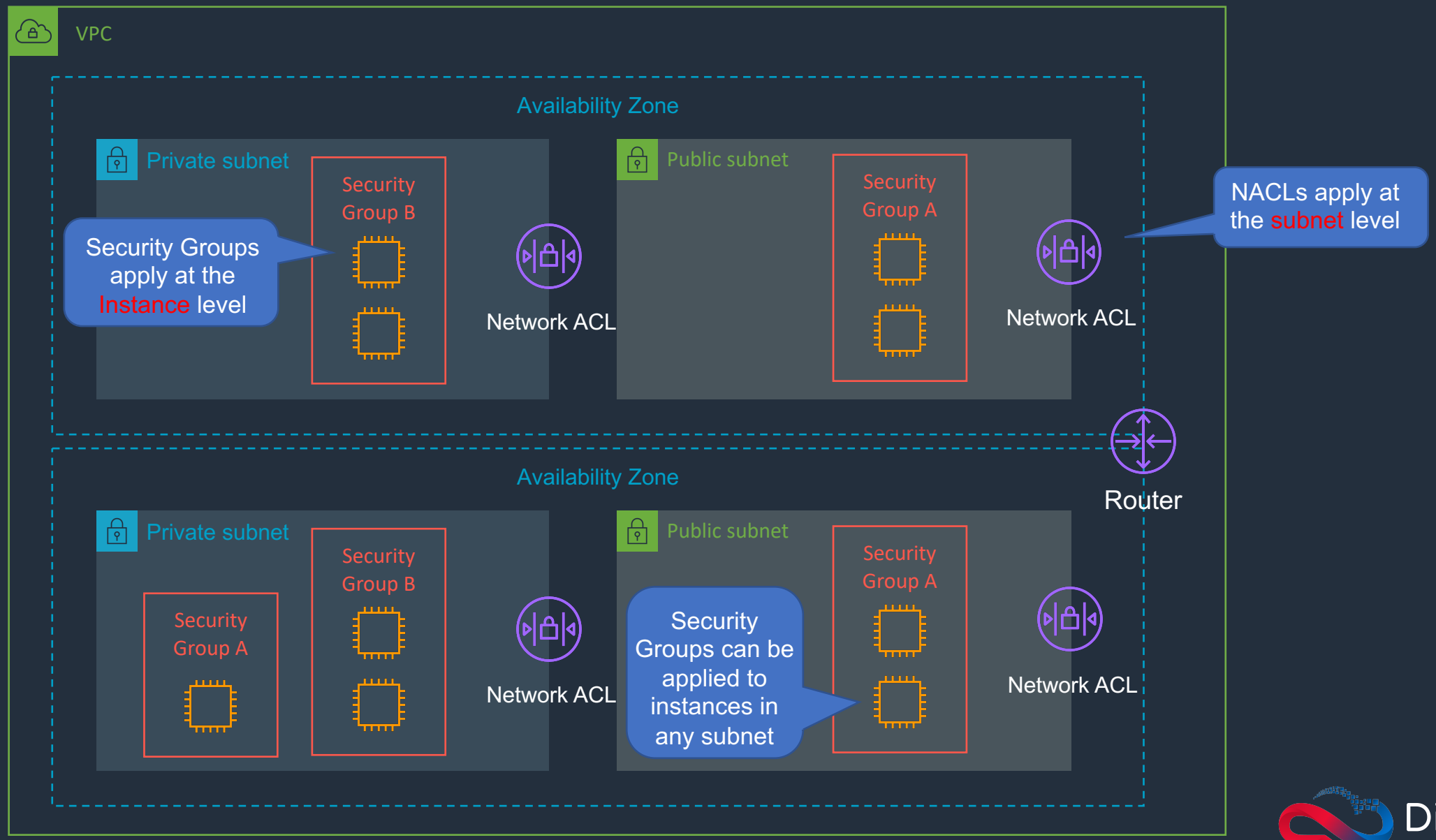
DigitalCloud TRAINING

AWS Public and Private Services



DigitalCloud TRAINING

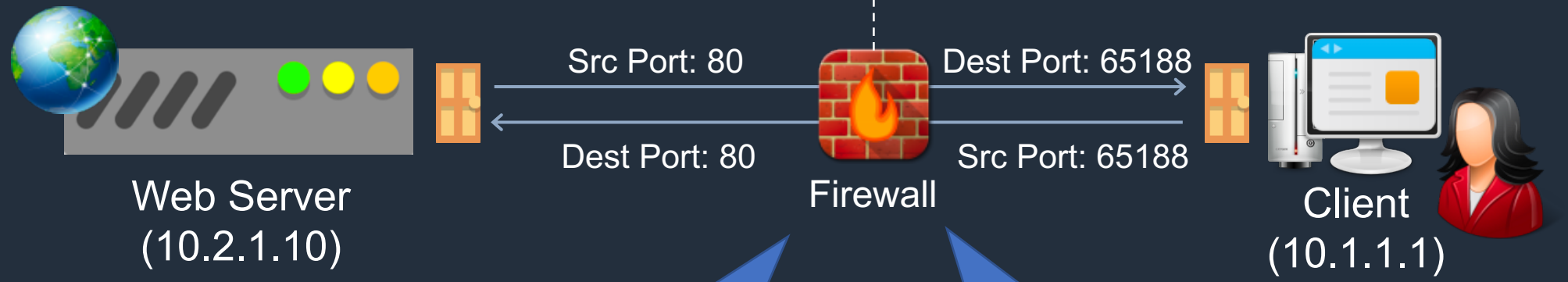
Security Groups & Network Access Control Lists (NACLs)



DigitalCloud TRAINING

Stateful vs Stateless Firewalls

PROTOCOL	SOURCE IP	DESTINATION IP	SOURCE PORT	DESTINATION PORT
HTTP	10.1.1.1	10.2.1.10	65188	80
HTTP	10.2.1.10	10.1.1.1	80	65188



A stateful firewall allows the return traffic automatically

A stateless firewall checks for an allow rule for both connections

DigitalCloud TRAINING

Security Groups & Network Access Control Lists (NACLs)

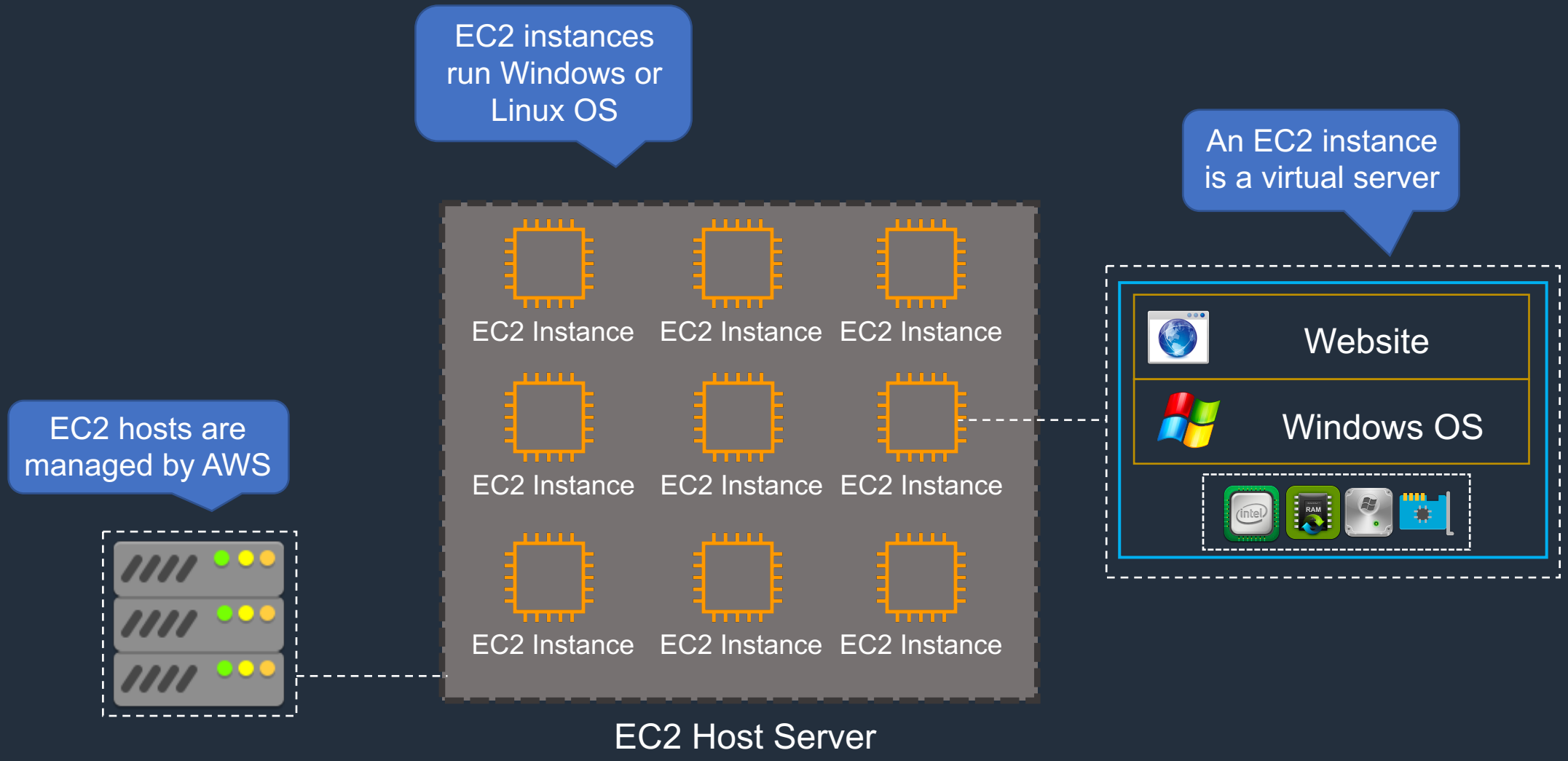
Security Group	Network ACL
Operates at the instance (interface) level	Operates at the subnet level
Supports allow rules only	Supports allow and deny rules
Stateful	Stateless
Evaluates all rules	Processes rules in order
Applies to an instance only if associated with a group	Automatically applies to all instances in the subnets its associated with

DigitalCloud TRAINING

SECTION 6

Amazon Elastic Compute Cloud (EC2)

Amazon Elastic Compute Cloud



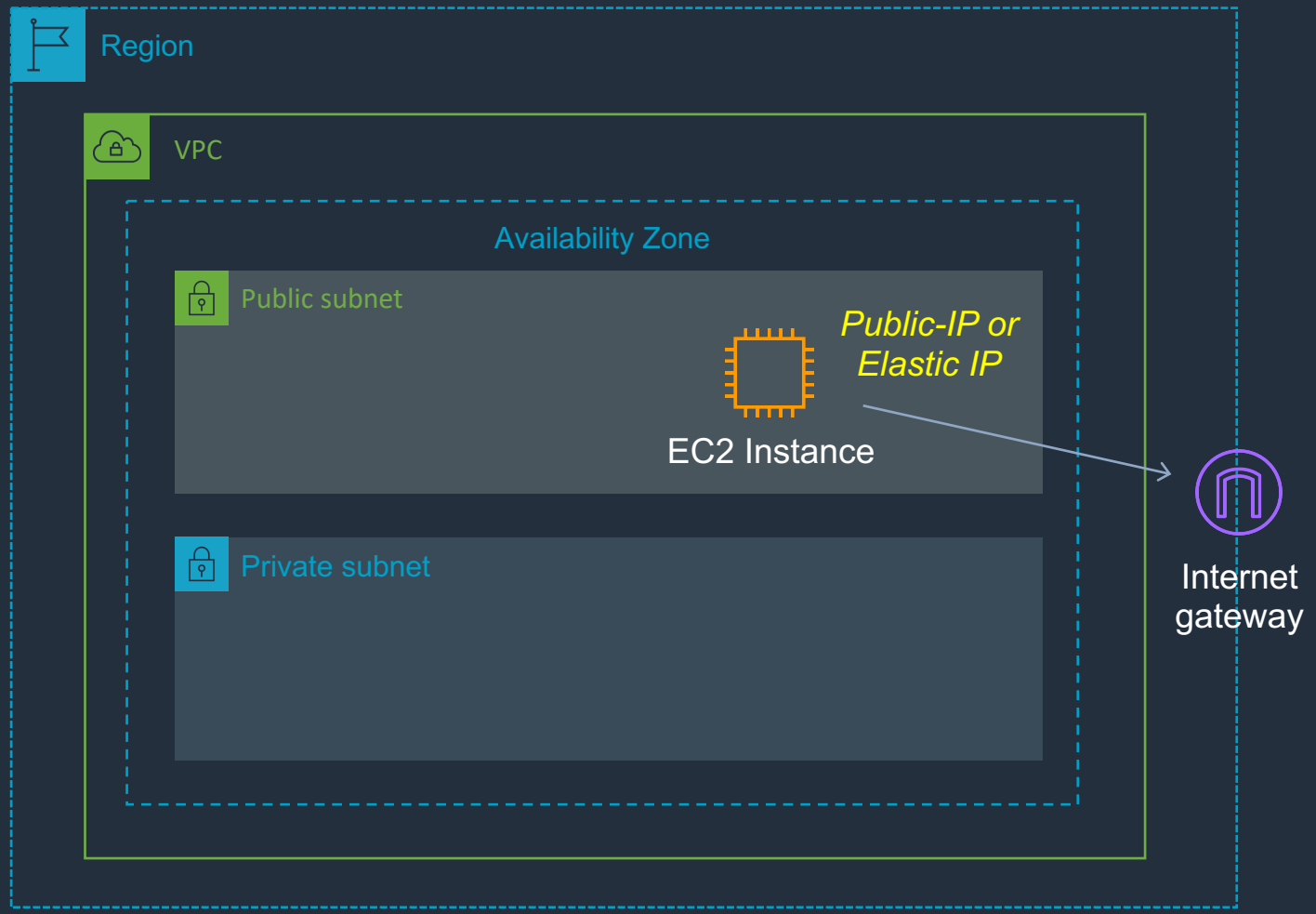
DigitalCloud TRAINING

Public, Private, and Elastic IP addresses

Type	Description
Public IP address	Lost when the instance is stopped Used in Public Subnets No charge Associated with a private IP address on the instance Cannot be moved between instances
Private IP address	Retained when the instance is stopped Used in Public and Private Subnets
Elastic IP address	Static Public IP address You are charged if not used Associated with a private IP address on the instance Can be moved between instances and Elastic Network Adapters

DigitalCloud TRAINING

Public Subnets



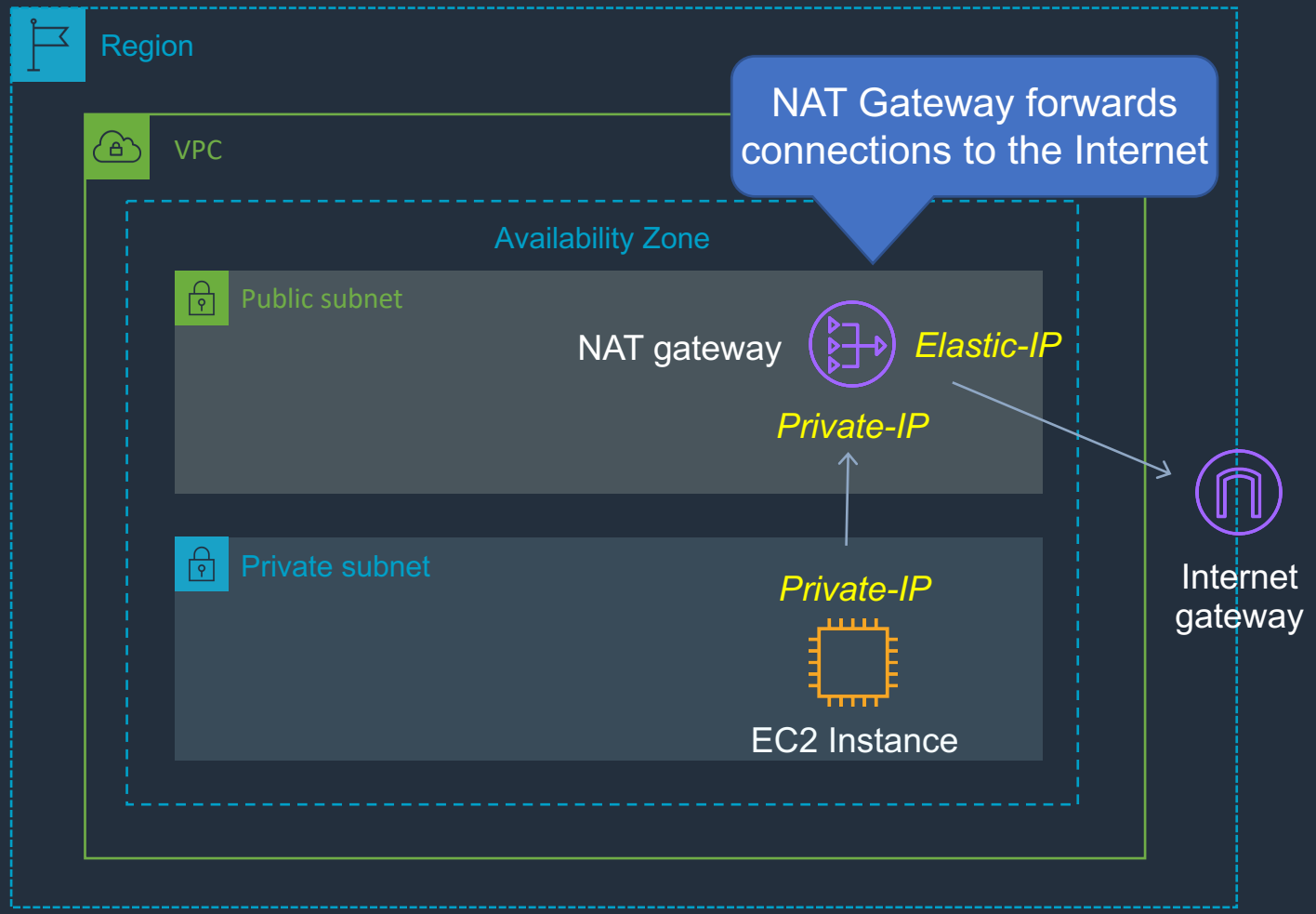
Public Subnet Route Table

Destination	Target
172.31.0.0/16	Local
0.0.0.0/0	igw-id

DigitalCloud TRAINING

Private Subnets

NAT = Network Address Translation



Public Subnet Route Table

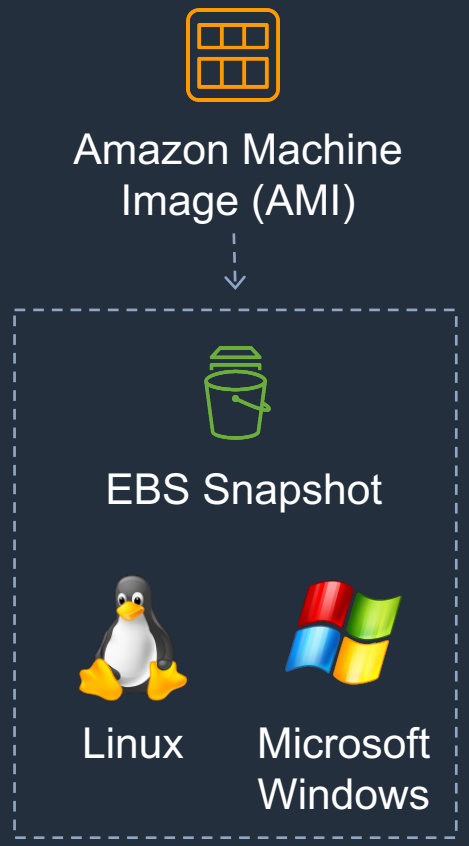
Destination	Target
172.31.0.0/16	Local
0.0.0.0/0	igw-id

Private Subnet Route Table

Destination	Target
172.31.0.0/16	Local
0.0.0.0/0	nat-gateway-id

DigitalCloud TRAINING

Launching an Amazon EC2 instance

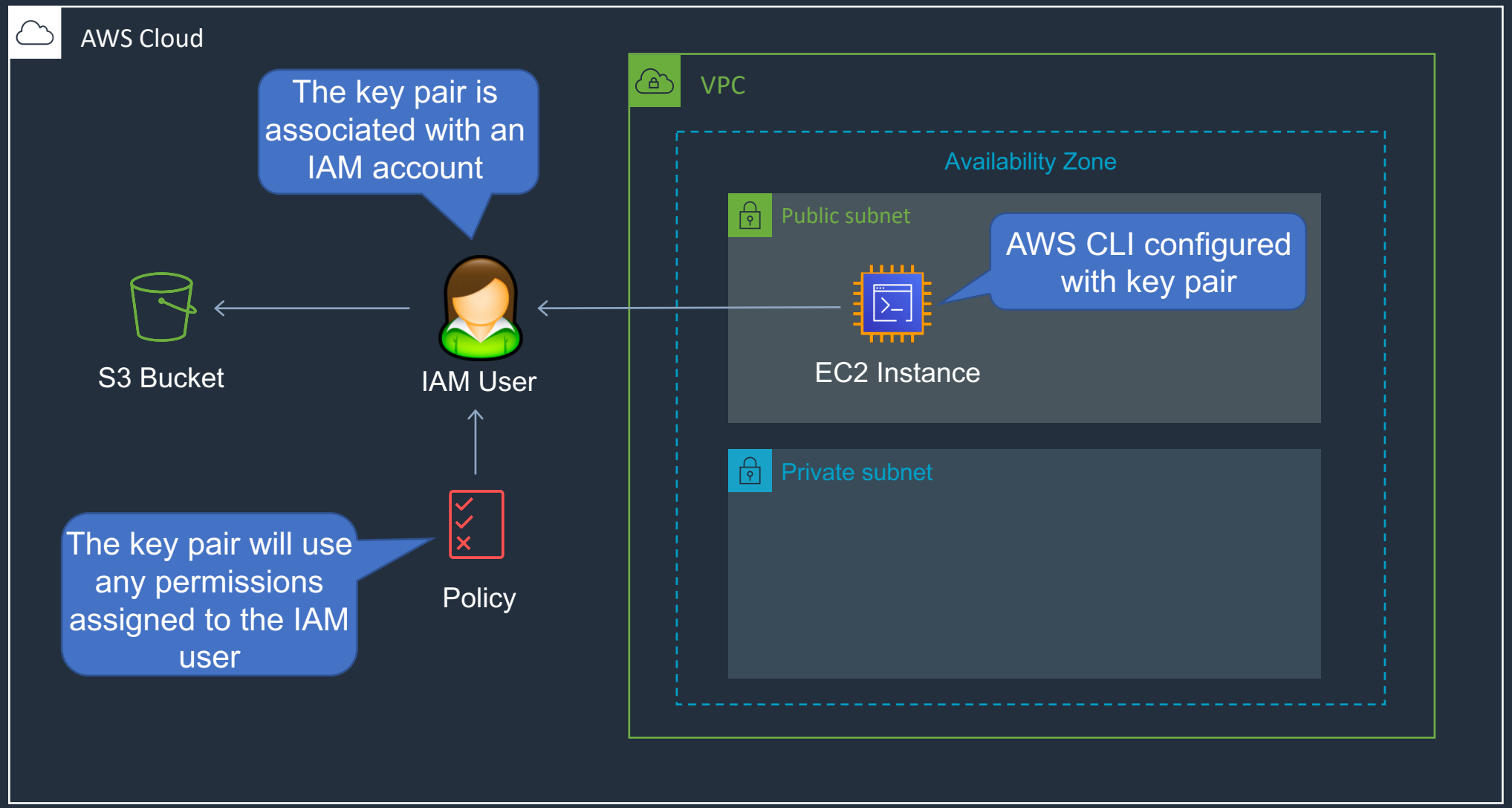


Instance Type

Family	Type	vCPUs	Memory (GiB)
General purpose	t2.micro	1	1
Compute optimized	c5n.large	2	5.25
Memory optimized	r5ad.large	2	16
Storage optimized	d2.xlarge	4	30.5
GPU instances	g2.2xlarge	8	15

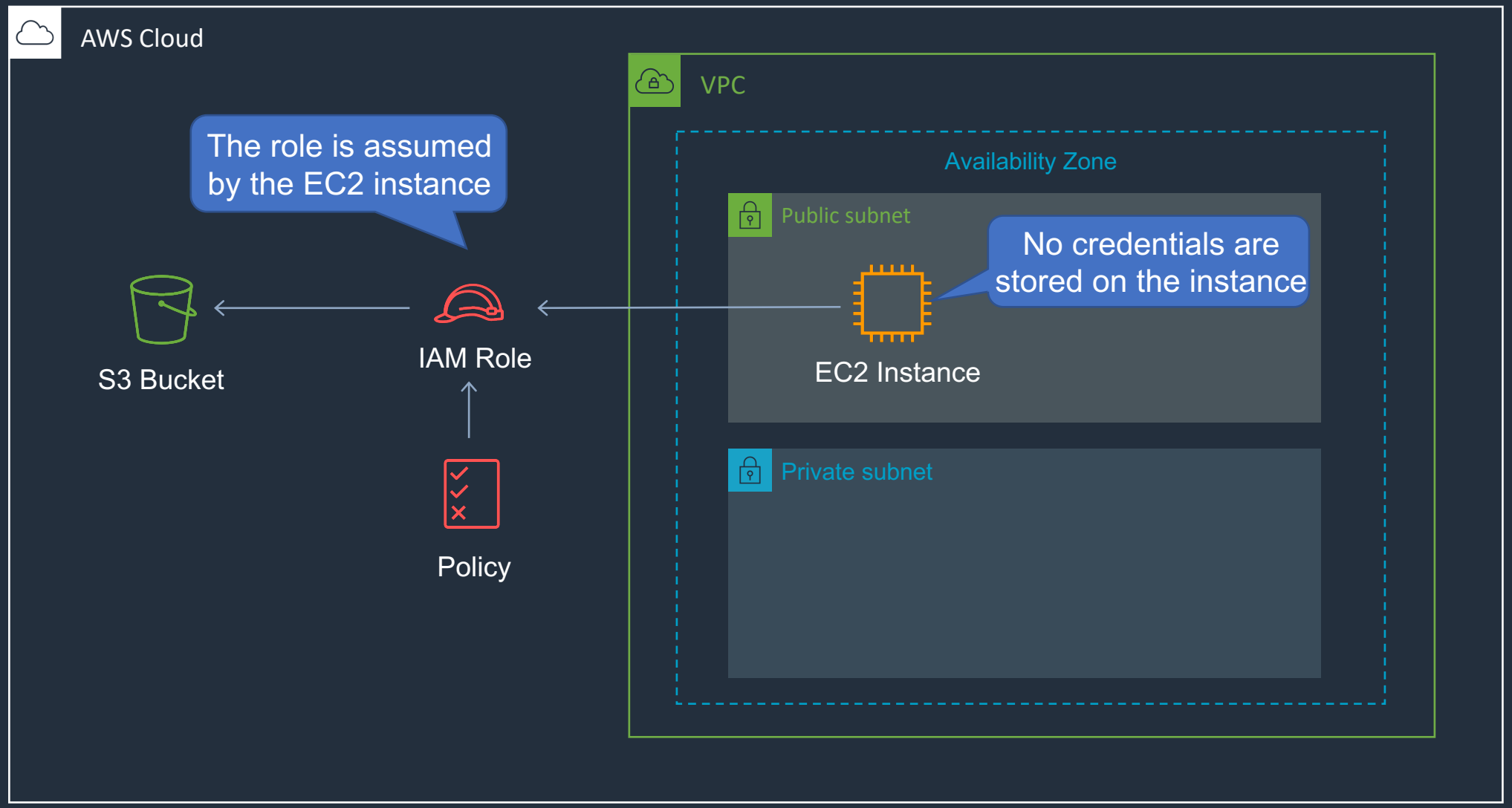
DigitalCloud TRAINING

Using Key Pairs with Amazon EC2



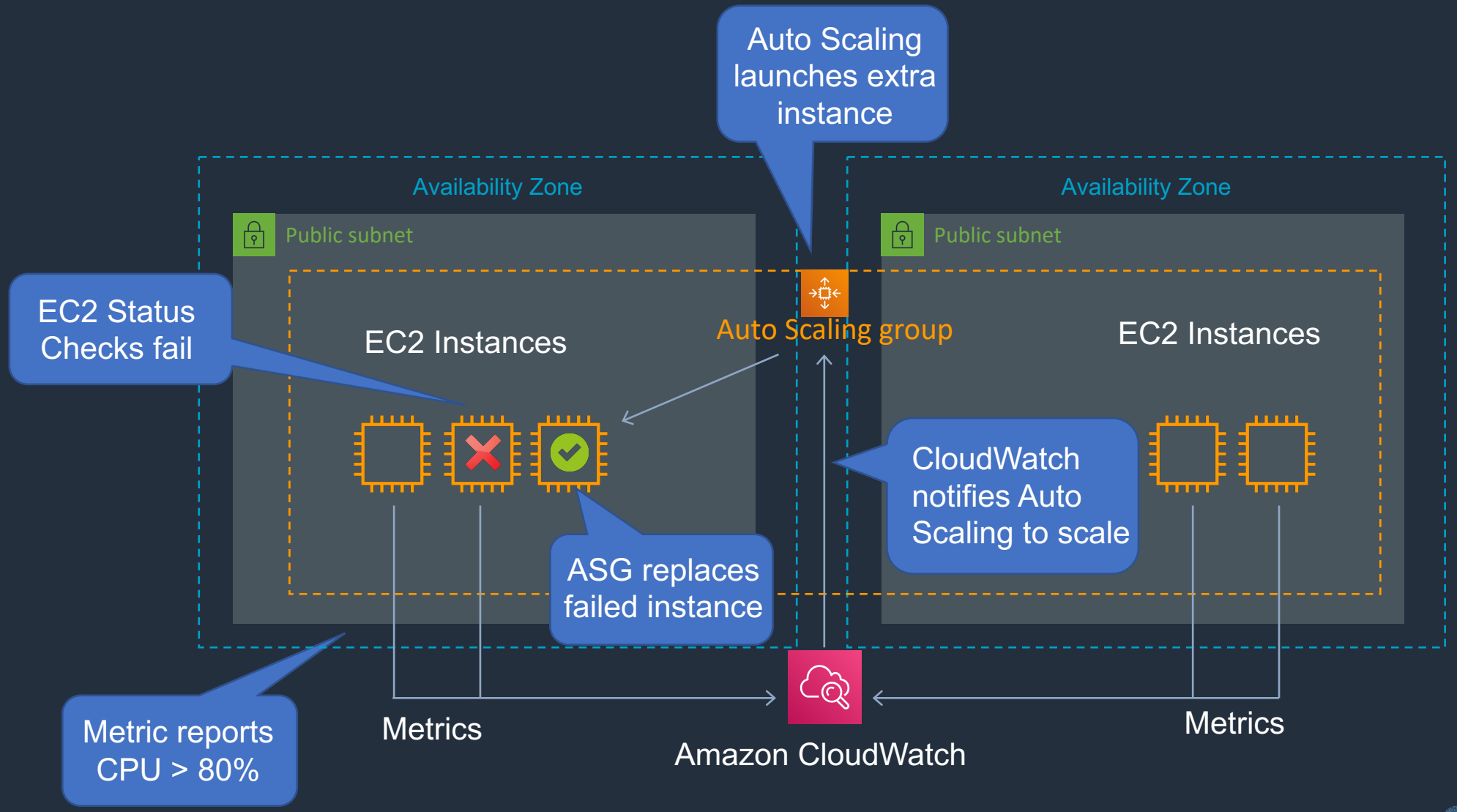
DigitalCloud TRAINING

Using Roles with Amazon EC2



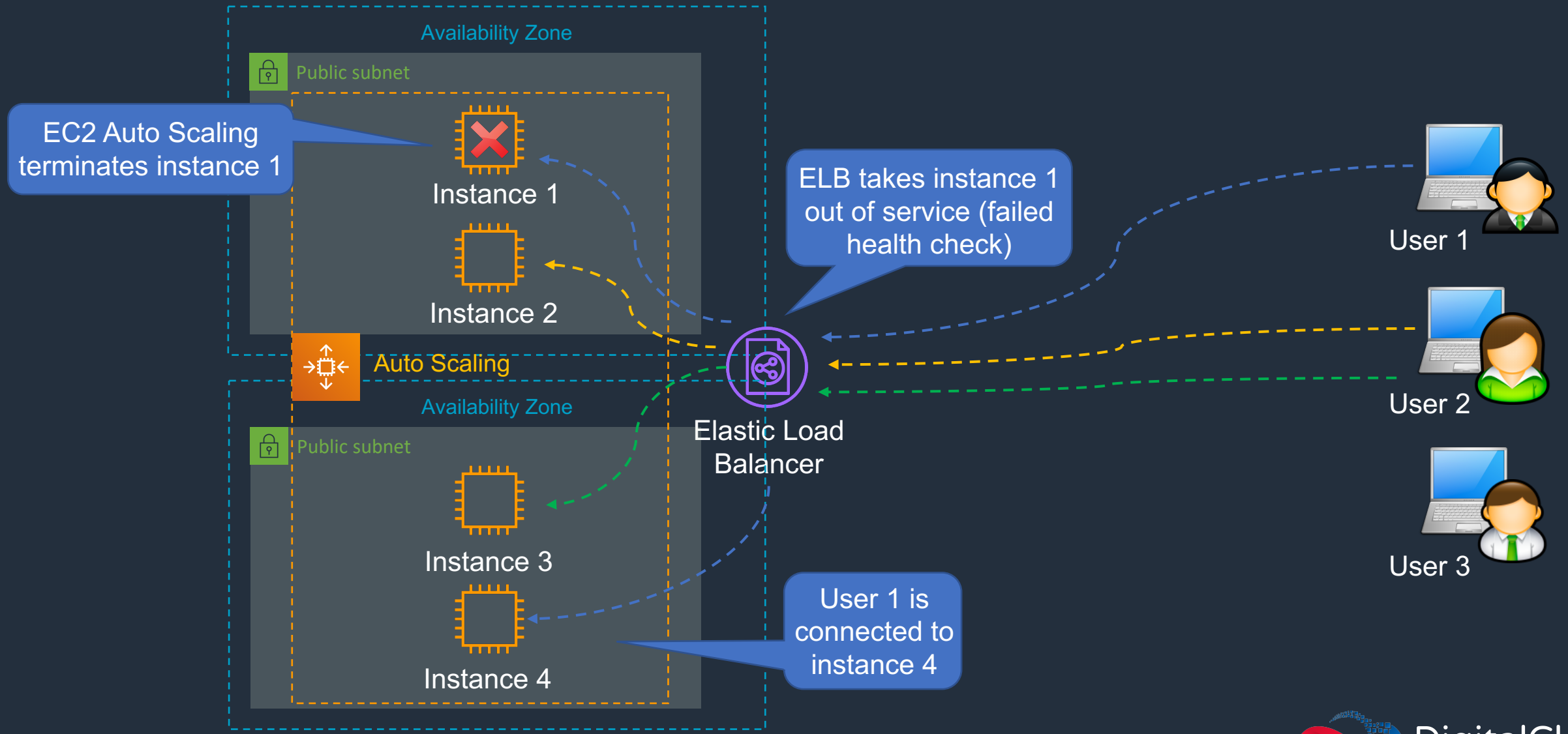
DigitalCloud TRAINING

Amazon EC2 Auto Scaling



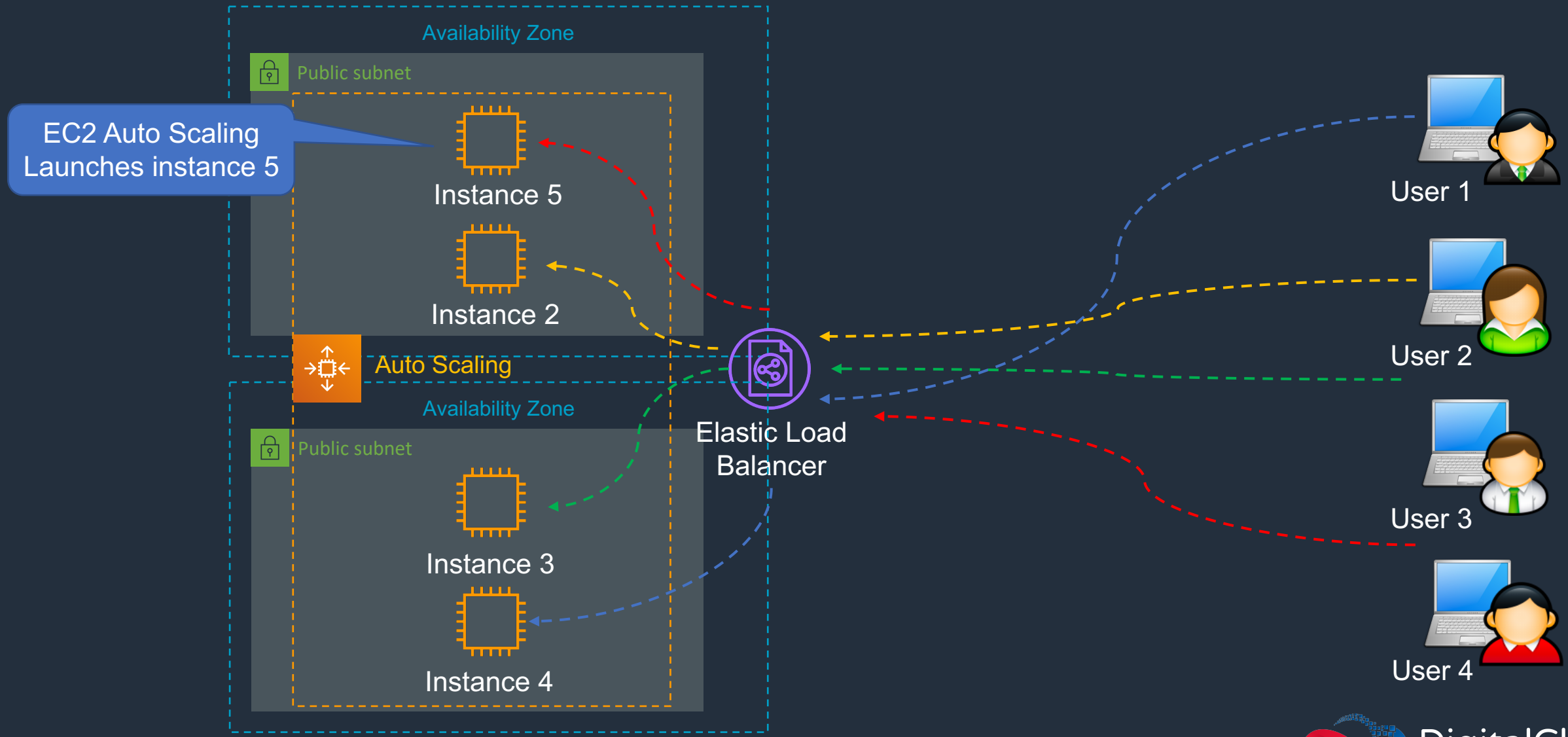
DigitalCloud TRAINING

Amazon Elastic Load Balancing



DigitalCloud TRAINING

Amazon Elastic Load Balancing



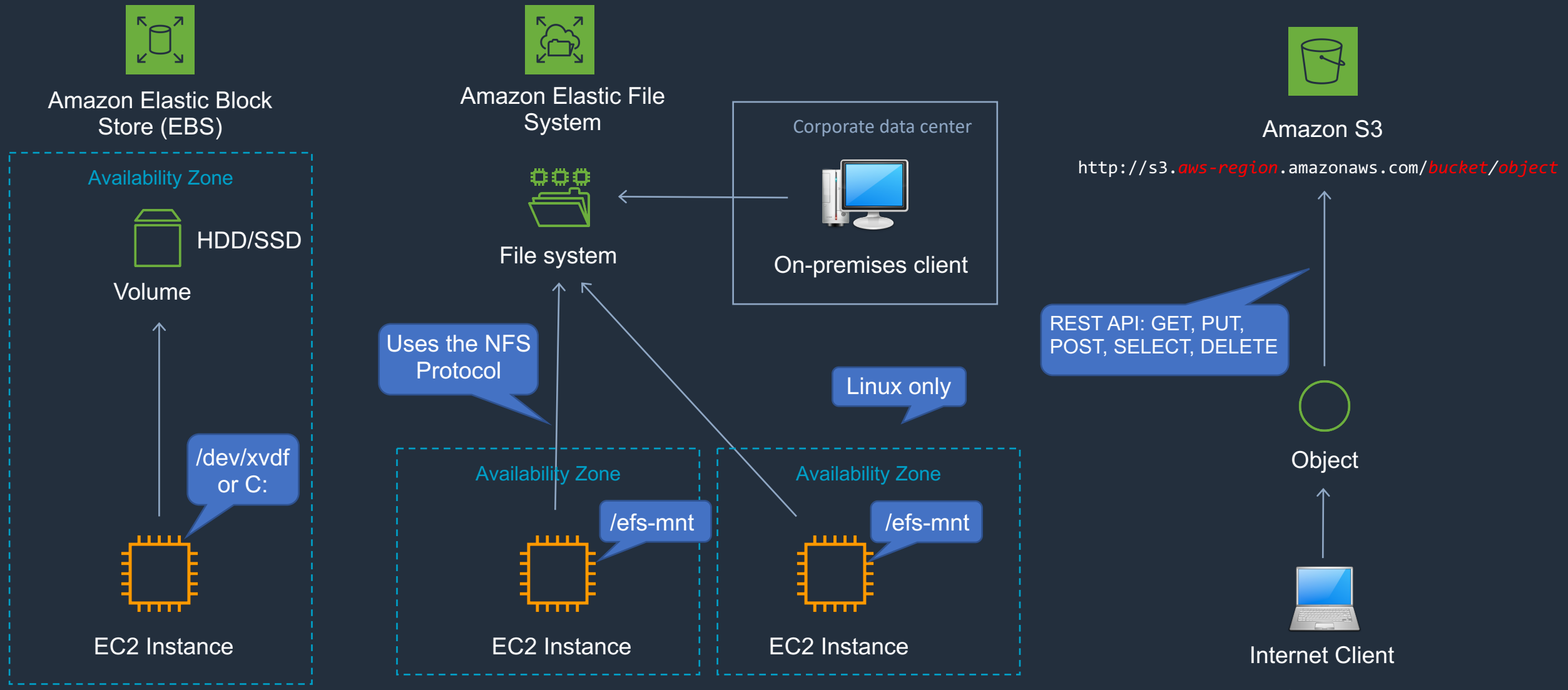
This architecture includes high availability and fault tolerance

DigitalCloud TRAINING

SECTION 7

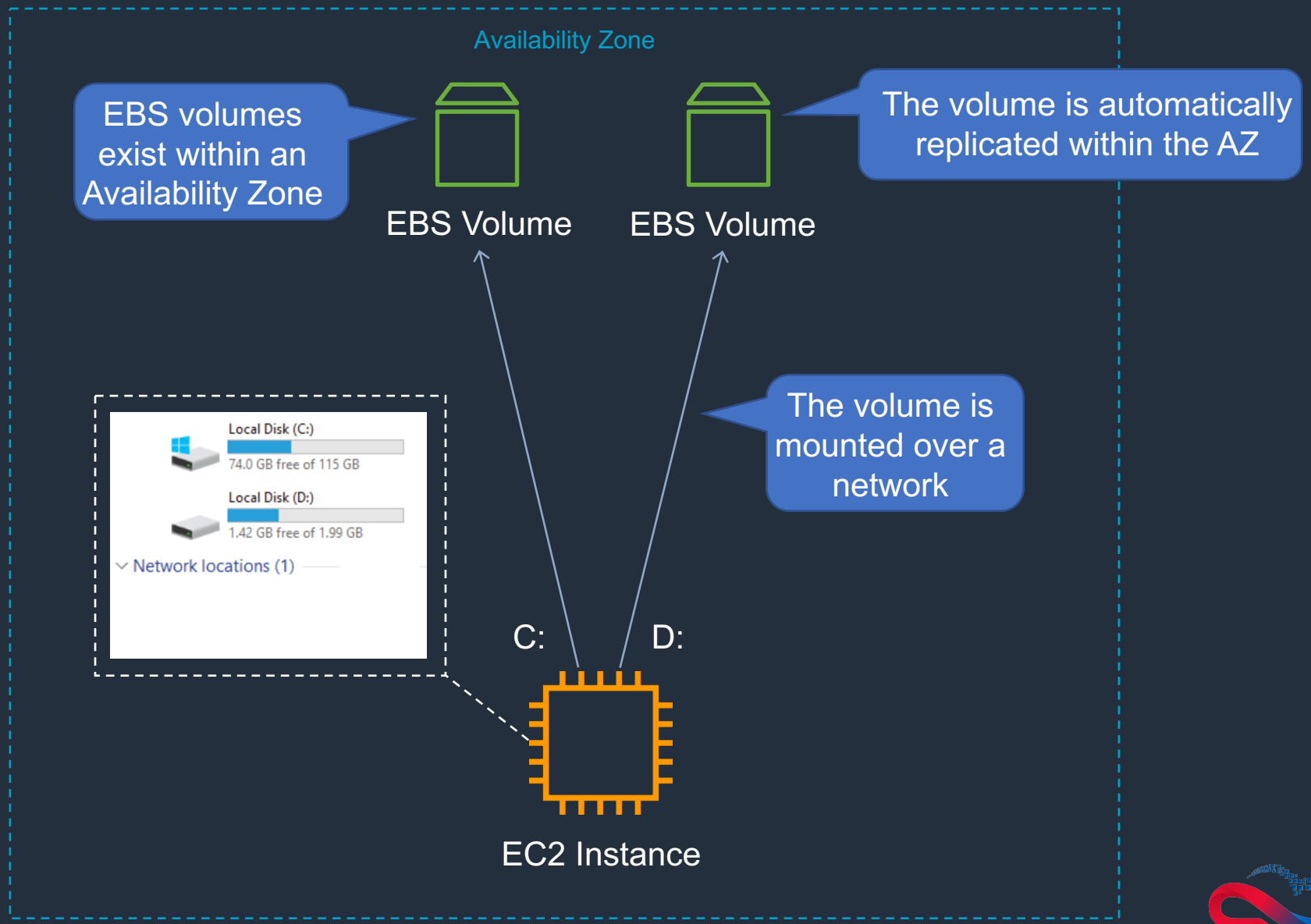
AWS Storage

Block, File, and Object Storage



DigitalCloud TRAINING

Amazon Elastic Block Store (EBS)



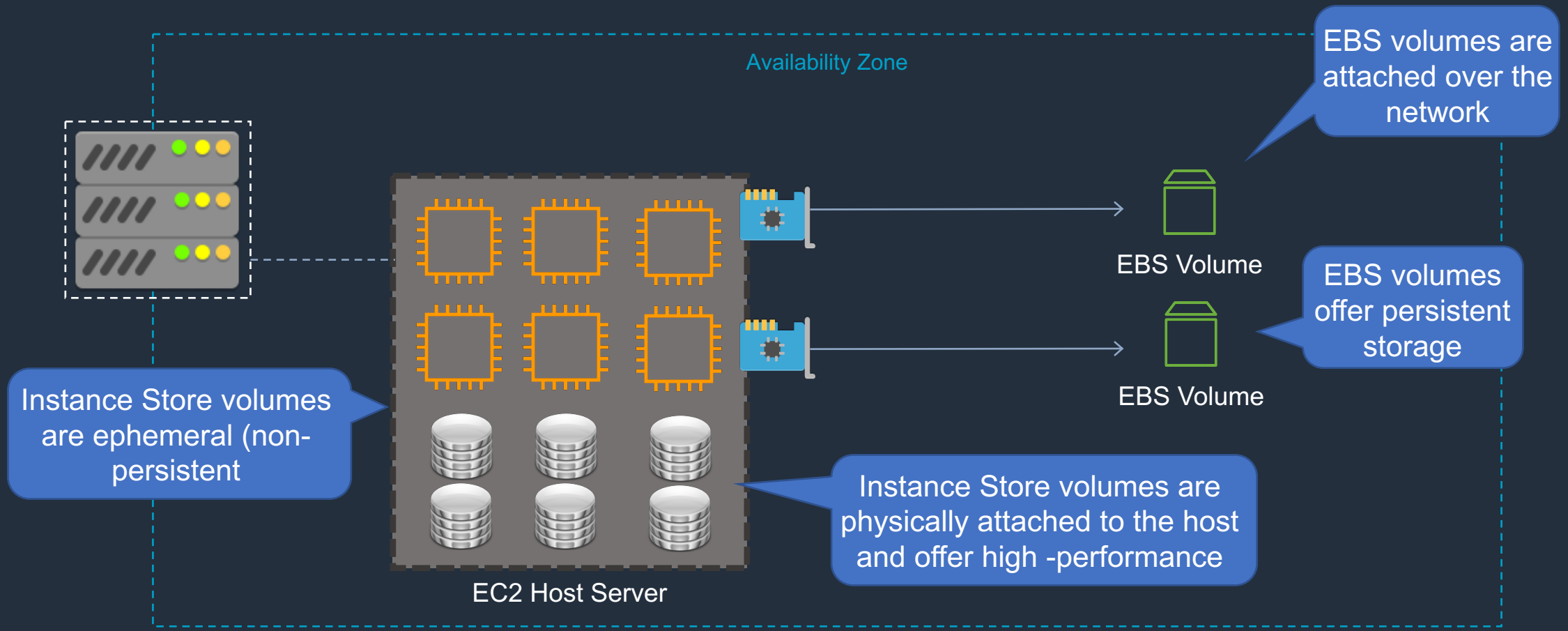
DigitalCloud TRAINING

Amazon Elastic Block Store (EBS)

	Solid State Drives (SSD)		Hard Disk Drives (HDD)	
Volume Type	EBS Provisioned IOPS SSD (io1)	EBS General Purpose SSD (gp2)	Throughput Optimized HDD (st1)	Cold HDD (sc1)
Short Description	Highest performance	General Purpose SSD volume	Low cost HDD volume	Lowest cost HDD
Use Cases	I/O-Intensive NoSQL and relational databases	Boot volumes, low-latency interactive apps, dev & test	Big data, data warehouses, log processing	Colder data requiring fewer scans per day
Volume Size	4GB – 16TB	1 GB – 16 TB	500 GB – 16 TB	500 GB – 16 TB
Max IOPS/Volume	64,000	16,000	500	250
Max Throughput/Volume	1,000 MB/s	250 MB/s	500 MB/s	250 MB/s

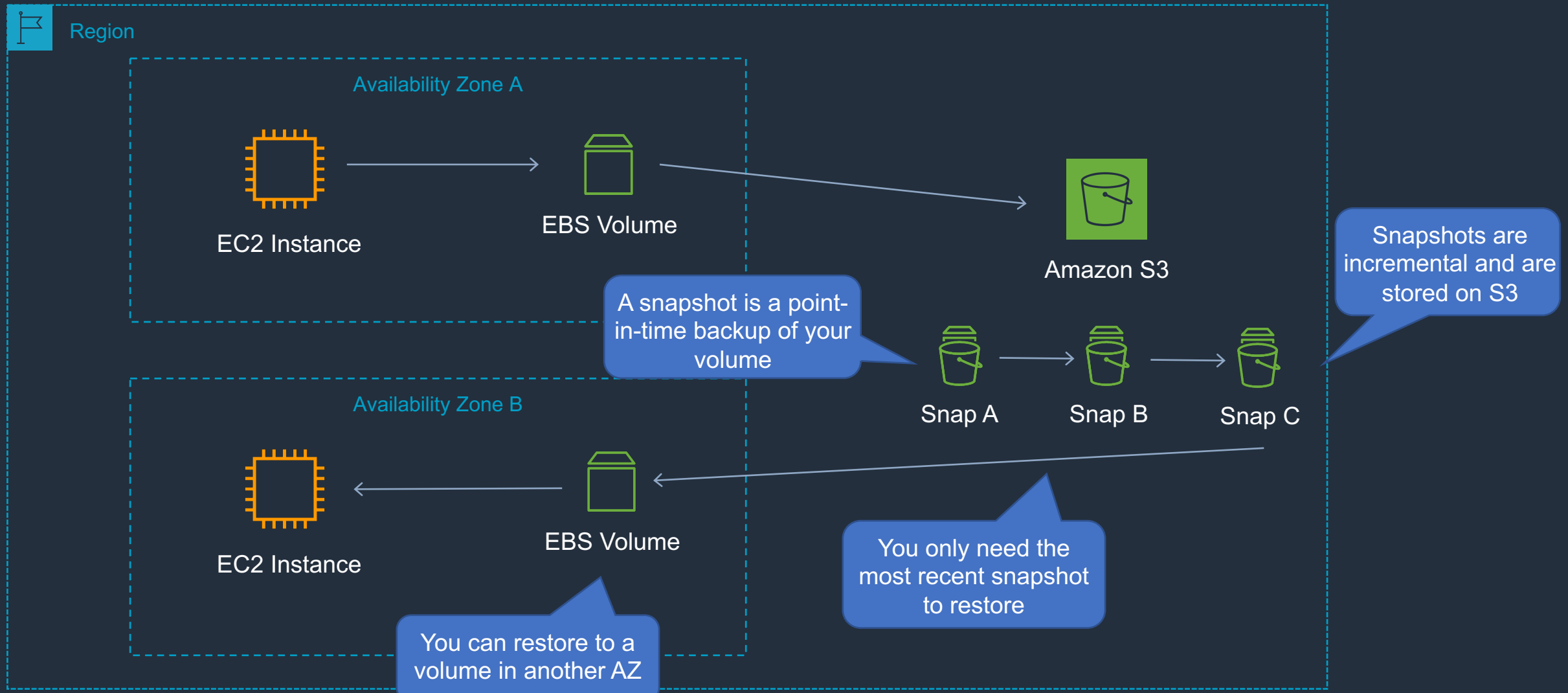
DigitalCloud TRAINING

Amazon Elastic Block Store (EBS) vs Instance Store



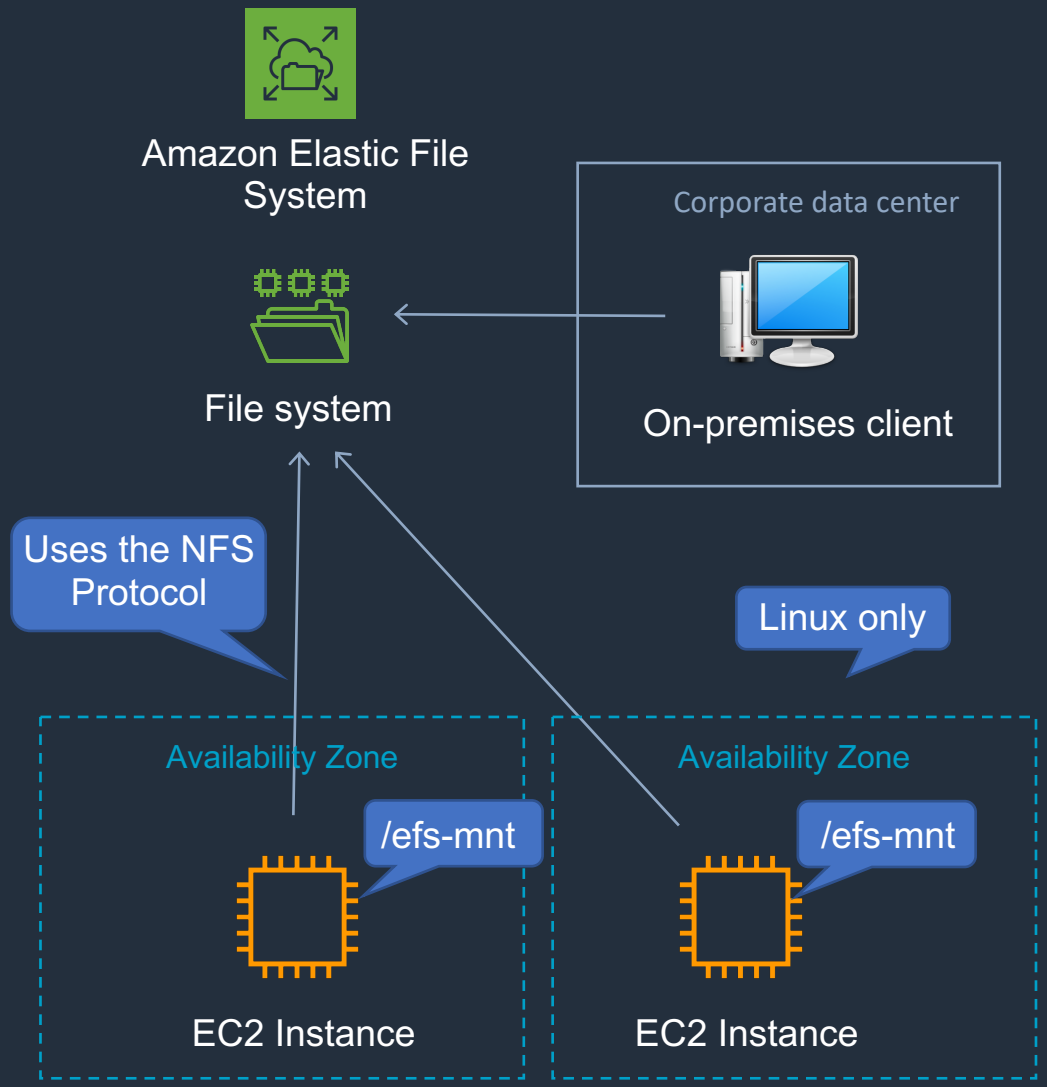
DigitalCloud TRAINING

Amazon EBS Snapshots



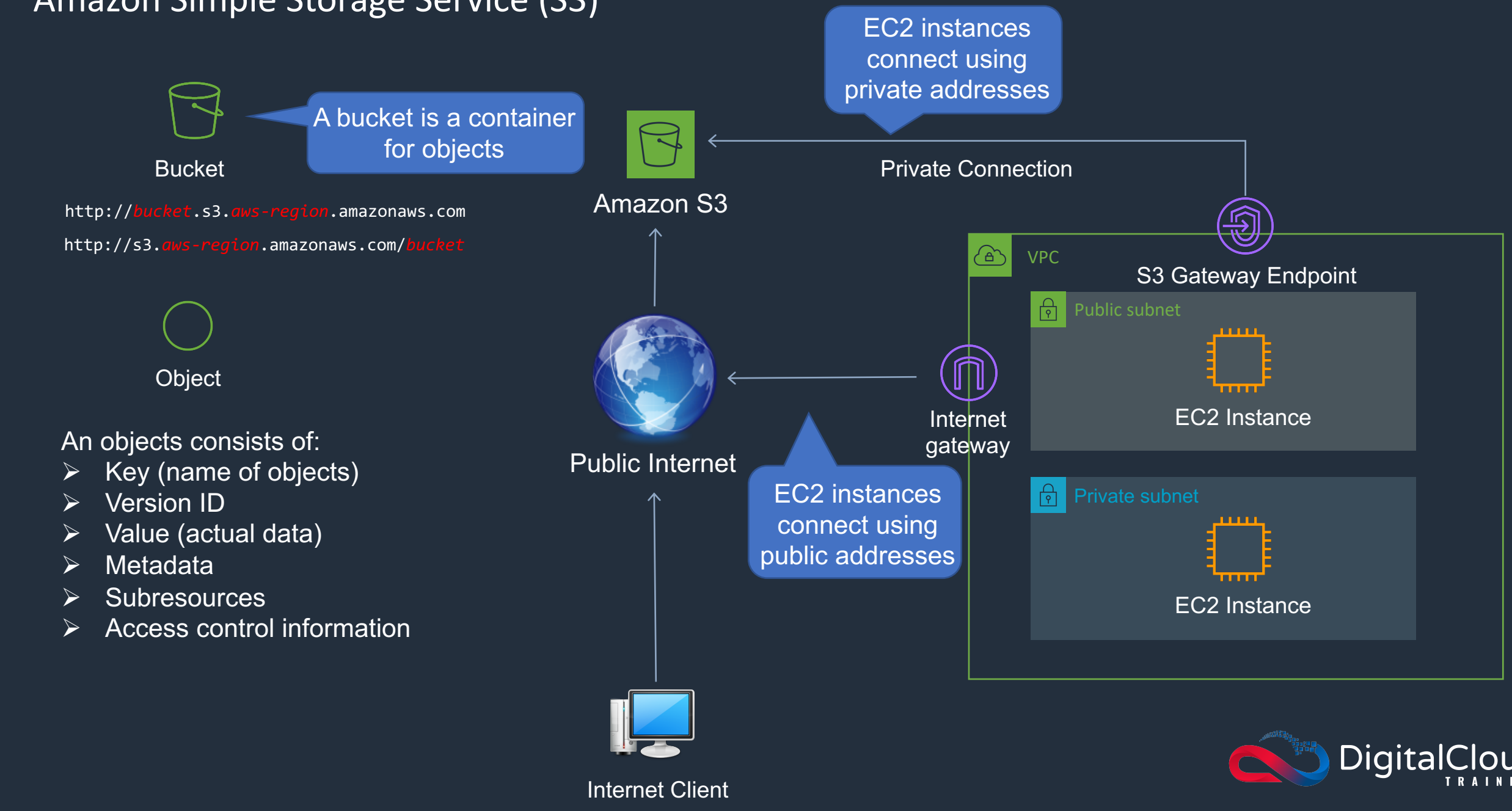
DigitalCloud TRAINING

Amazon Elastic File System (EFS)



DigitalCloud TRAINING

Amazon Simple Storage Service (S3)



An objects consists of:

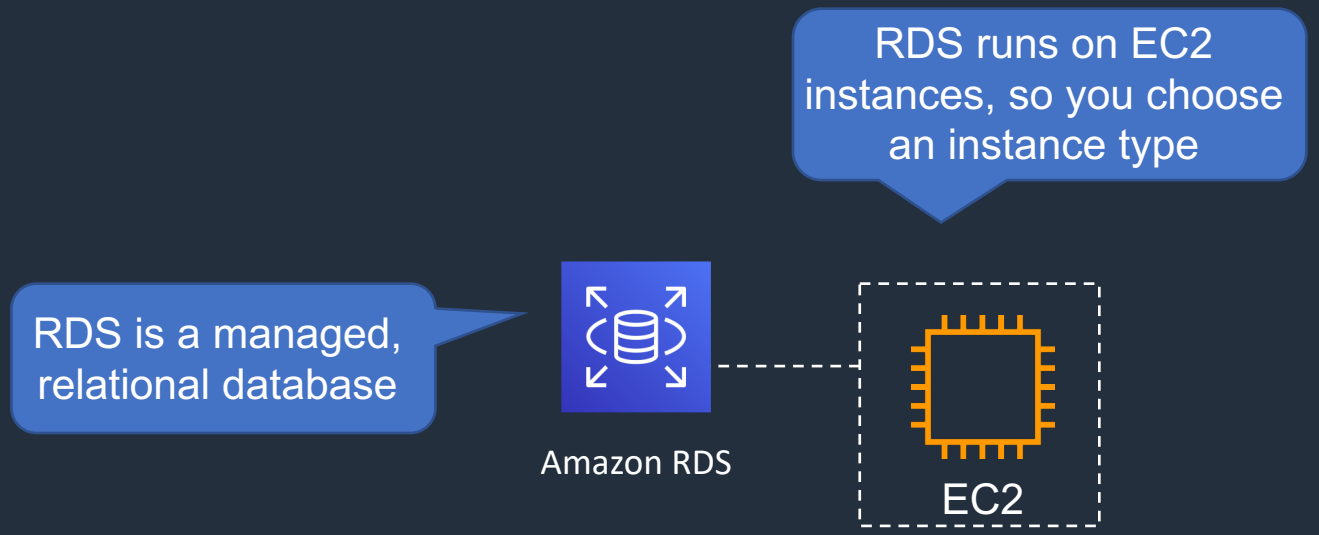
- Key (name of objects)
- Version ID
- Value (actual data)
- Metadata
- Subresources
- Access control information

DigitalCloud TRAINING

SECTION 8

AWS Databases

Amazon Relational Database Service (RDS)

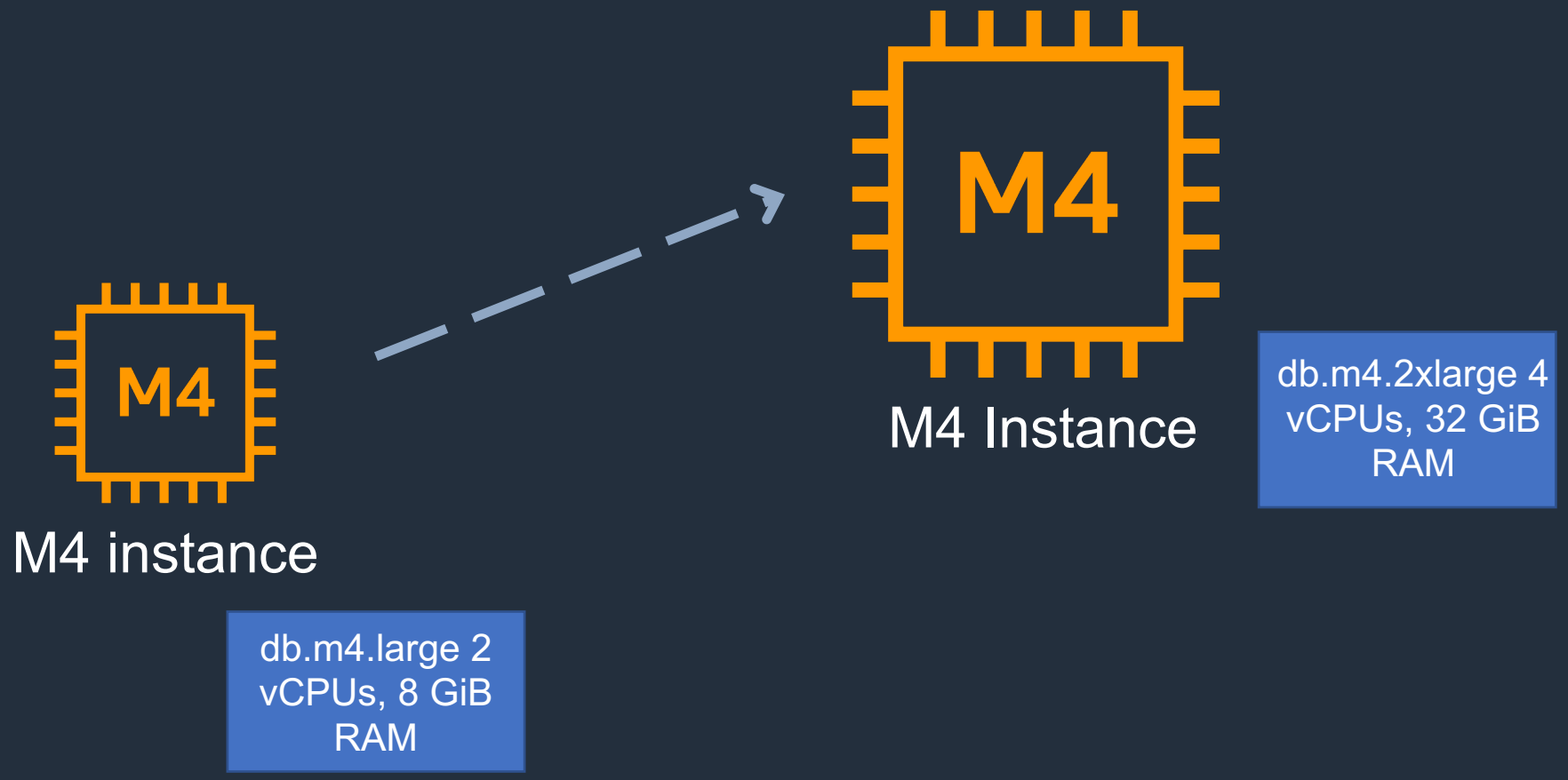


RDS supports the following database engines:

- Amazon Aurora
- MySQL
- MariaDB
- Oracle
- Microsoft SQL Server
- PostgreSQL

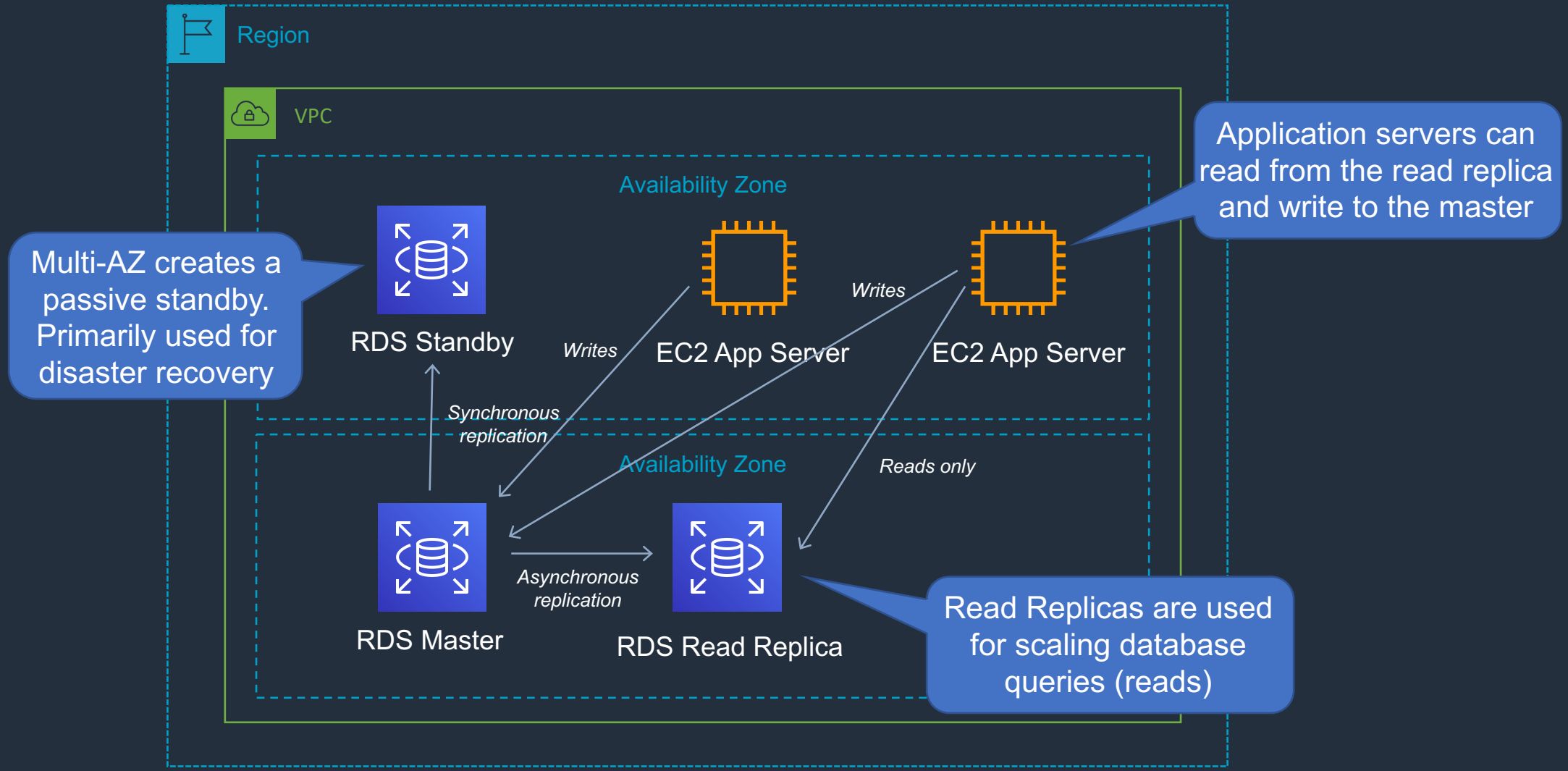
DigitalCloud TRAINING

Amazon RDS – Scaling up (vertically)



DigitalCloud TRAINING

Amazon RDS – Disaster Recovery (DR) and Scaling Out (horizontally)

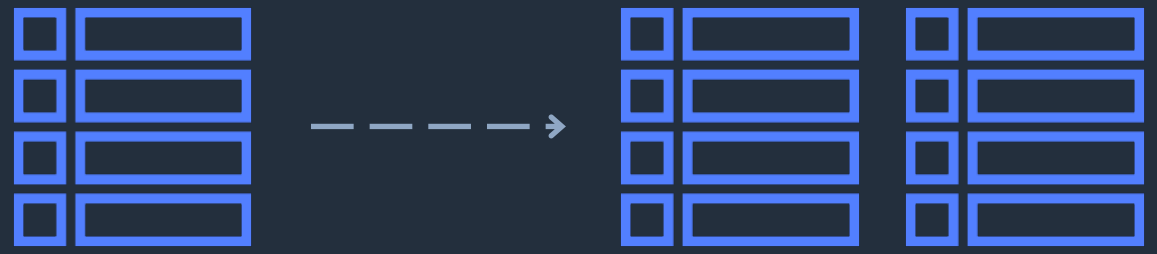


DigitalCloud TRAINING

Amazon DynamoDB

Fully managed service. You create tables on an existing database

Offers seamless, horizontal, scaling



DynamoDB Table

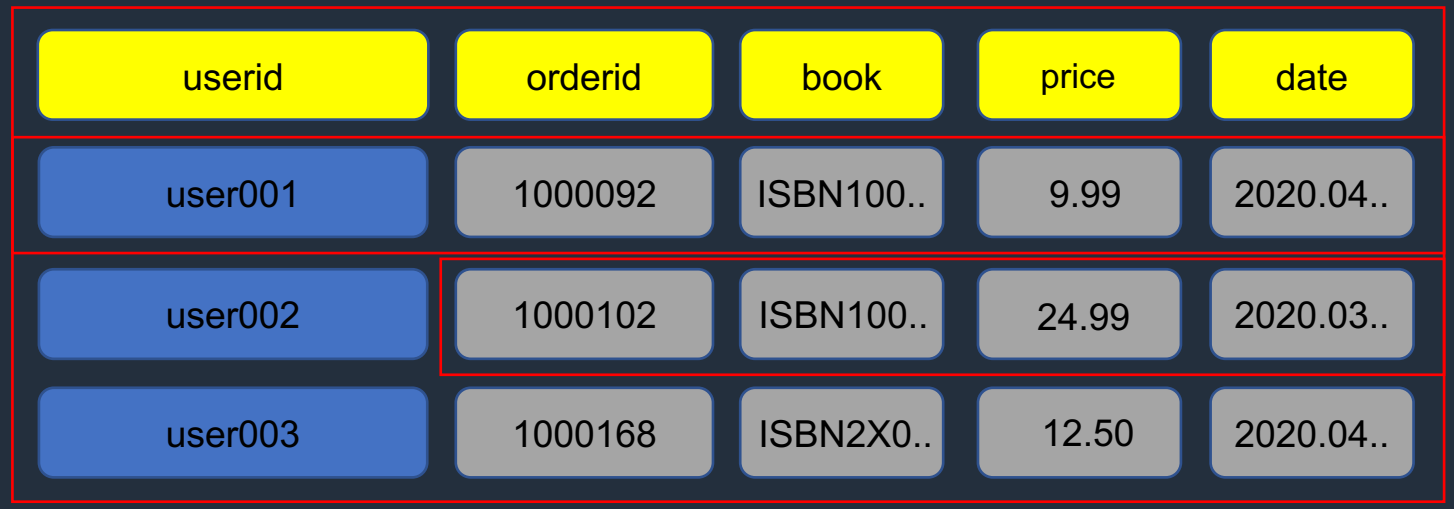
DynamoDB is a NoSQL, key-value type of database

Data is replicated across multiple AZs within a region

DigitalCloud TRAINING

Amazon DynamoDB

- DynamoDB is made up of:
  - Tables
  - Items
  - Attributes



DigitalCloud TRAINING

SECTION 9

Automating Your Deployments

AWS CloudFormation

CloudFormation deploys infrastructure using code

template1

Choose template language: JSON YAML

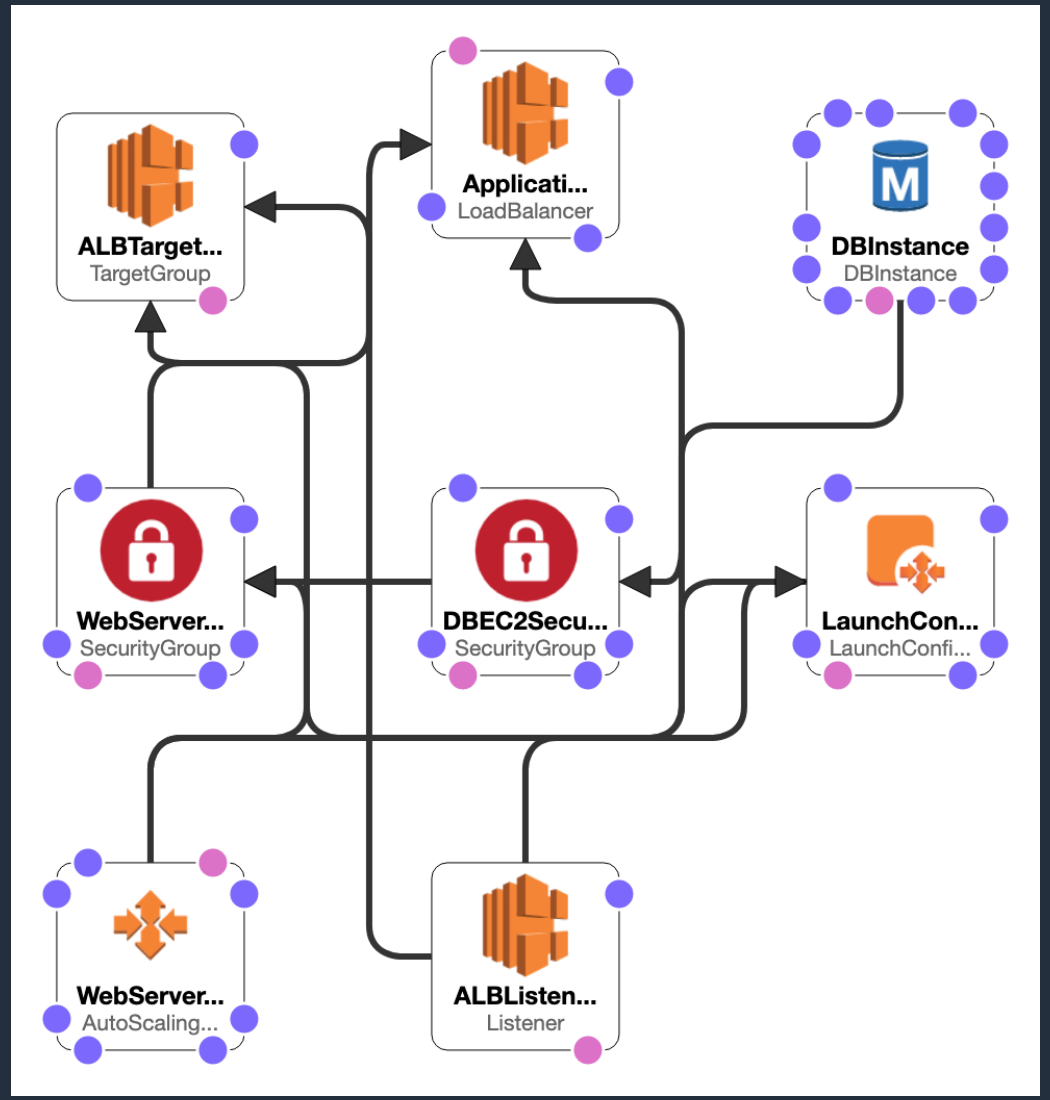
```
{
"AWSTemplateFormatVersion": "2010-09-09",
"Description": "AWS CloudFormation Sample Template LAMP_Single_Instance: Create a LAMP stack using a single EC2 instance a
"Parameters": {
    "KeyName": {
        "Description": "Name of an existing EC2 KeyPair to enable SSH access to the instance",
        "Type": "AWS::EC2::KeyPair::KeyName",
        "ConstraintDescription": "must be the name of an existing EC2 KeyPair."
    },
    "DBName": {
        "Default": "MyDatabase",
        "Description": "MySQL database name",
        "Type": "String",
        "MinLength": "1",
        "MaxLength": "64",
        "AllowedPattern": "[a-zA-Z][a-zA-Z0-9]*",
        "ConstraintDescription": "must begin with a letter and contain only alphanumeric characters."
    },
    "DBUser": {
        "NoEcho": "true",
```

You define the AWS services to create in a template

DigitalCloud TRAINING

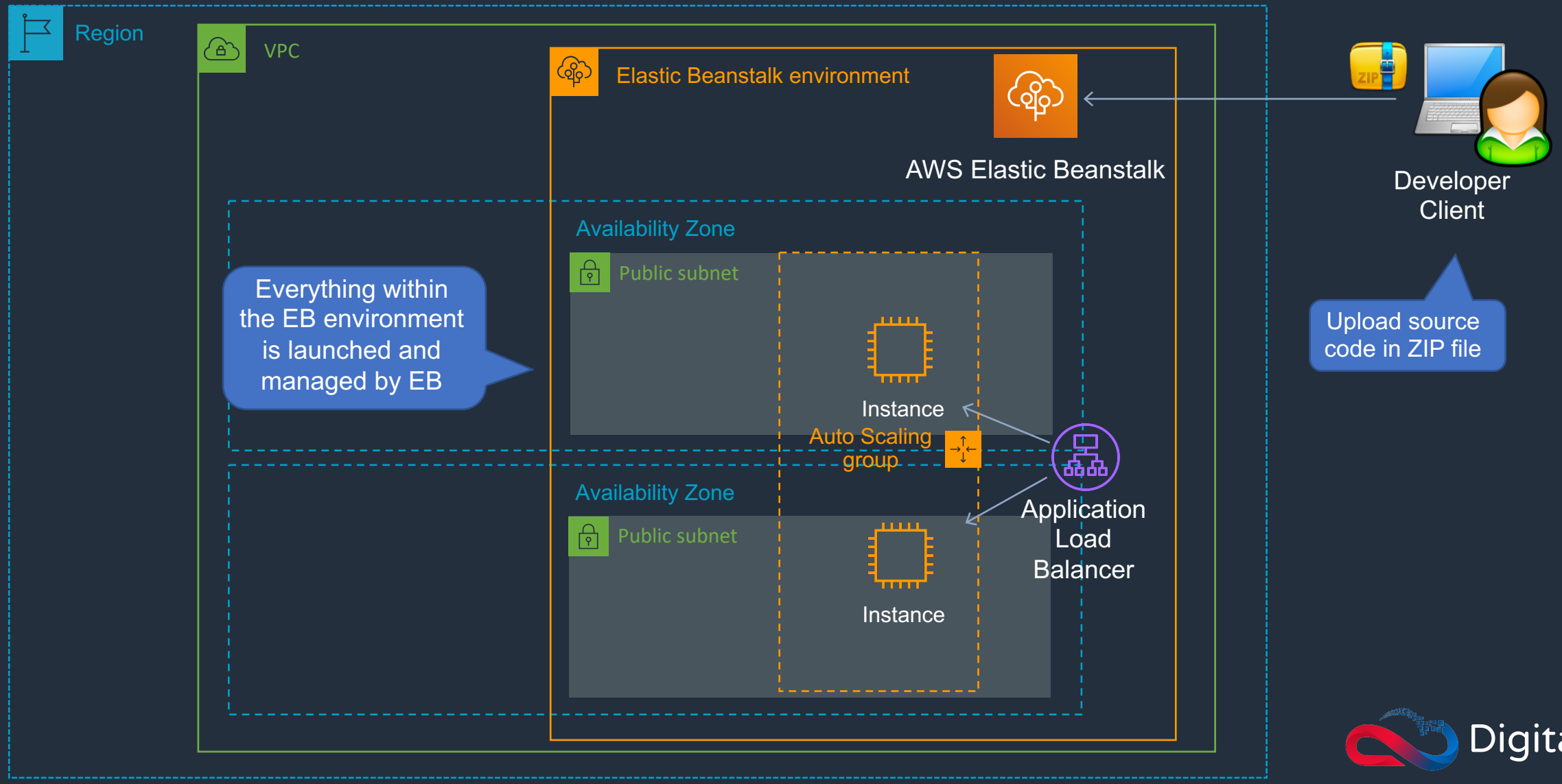
AWS CloudFormation

CloudFormation creates and configures resources according the the template



DigitalCloud TRAINING

AWS Elastic Beanstalk

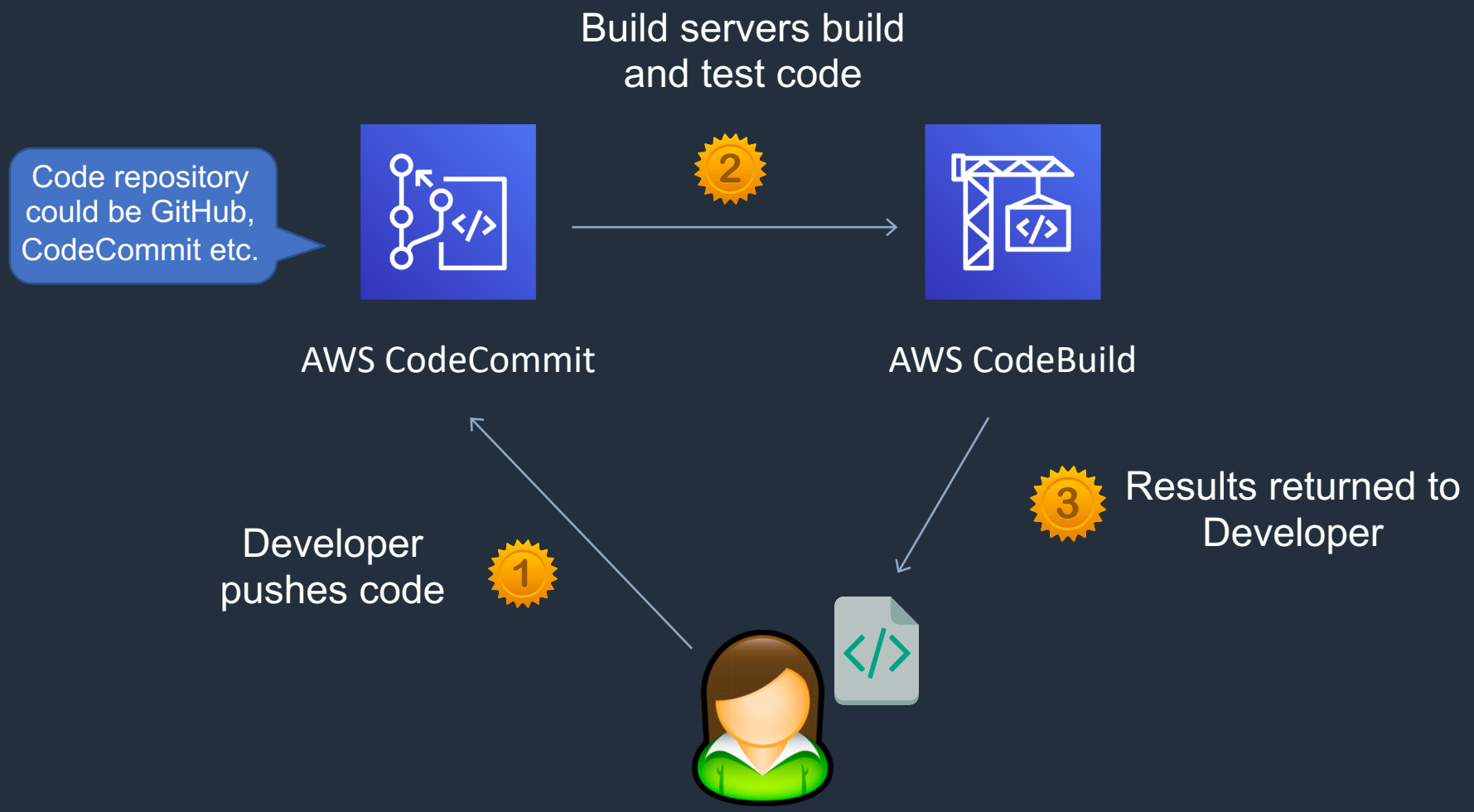


DigitalCloud TRAINING

SECTION 10

DevOps on AWS – Creating a Code Pipeline

Continuous Integration



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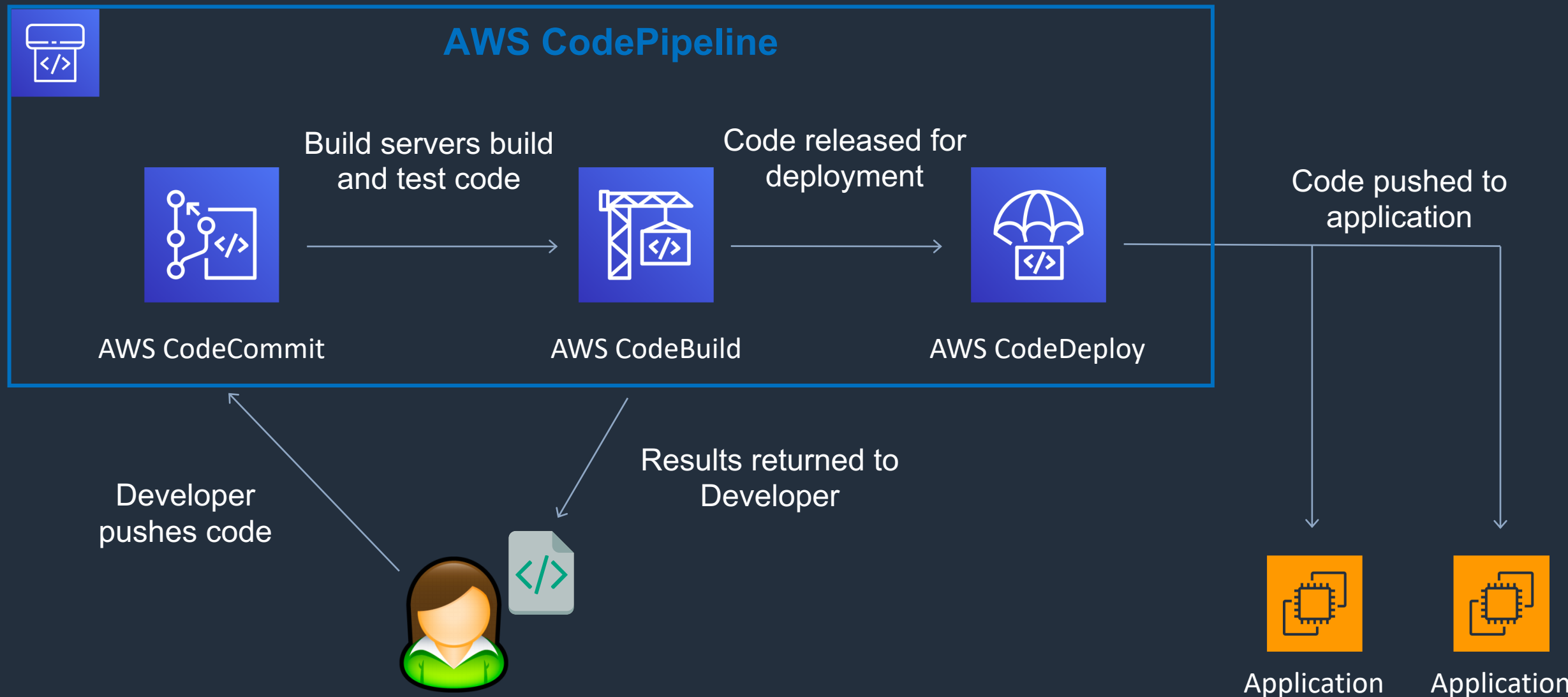
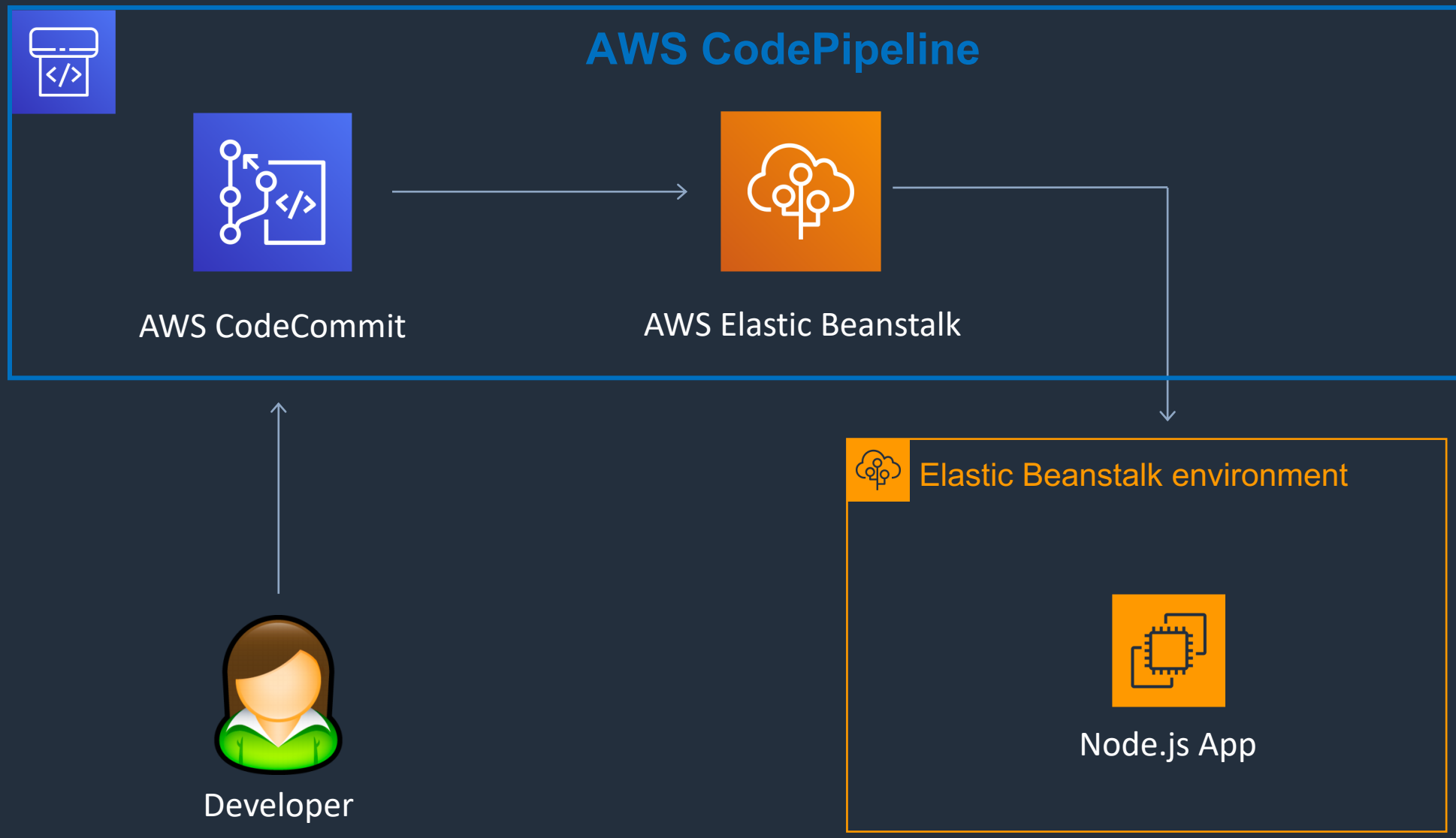
Continuous Integration & Continuous Delivery



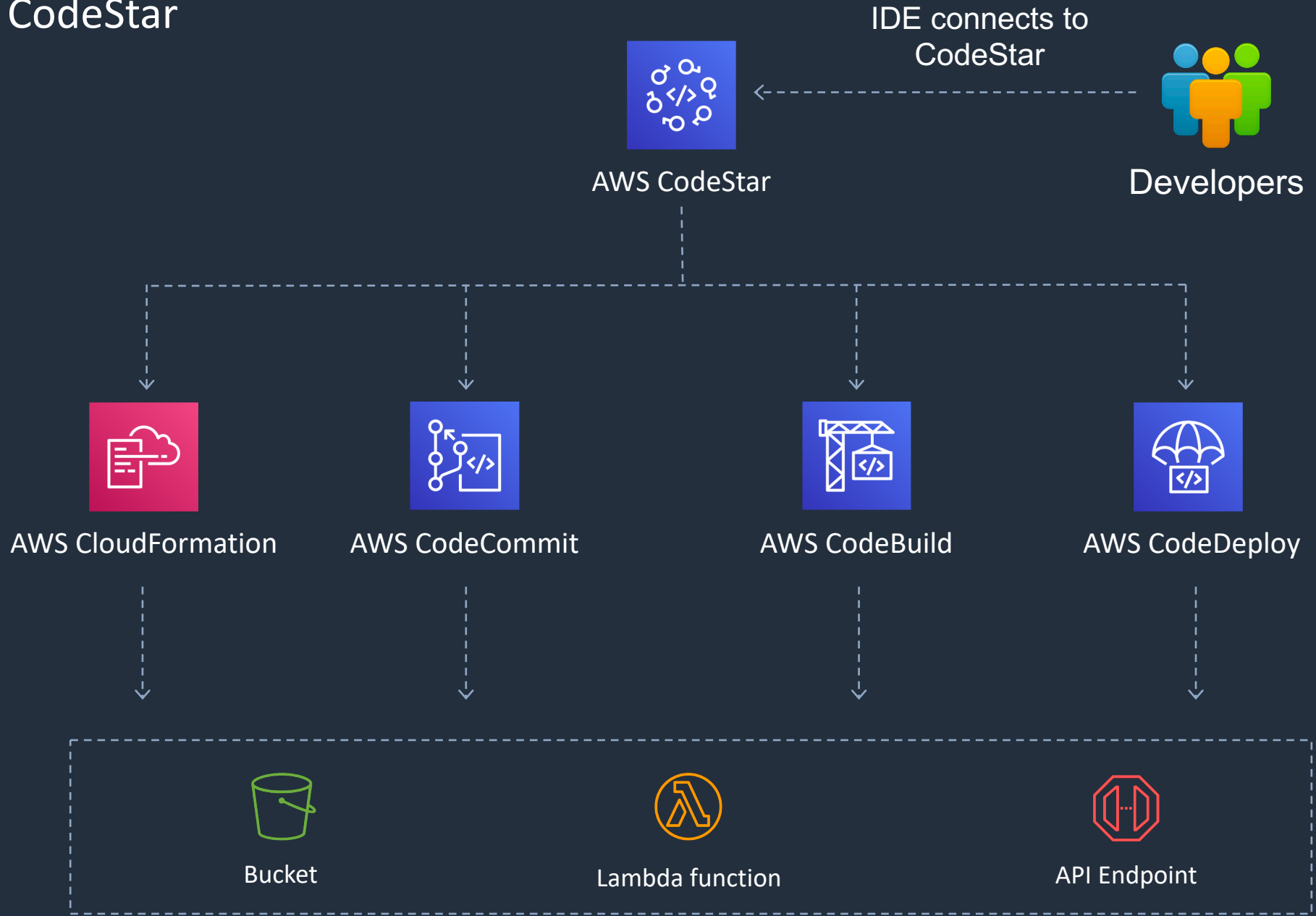
DigitalCloud TRAINING

AWS CodePipeline with Elastic Beanstalk



DigitalCloud TRAINING

AWS CodeStar



DigitalCloud TRAINING

SECTION 11

Content Delivery and DNS Services

Amazon Route 53

Amazon Route 53

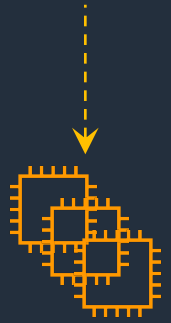
Domain Registration

.net
.com
.org

Hosted zone

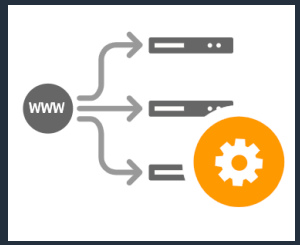
example.com
dctlabs.com

Health Checks



EC2 Instances

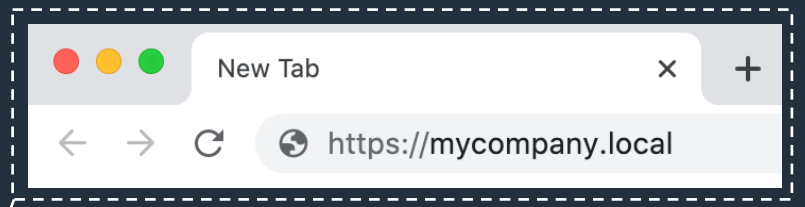
Traffic Flow



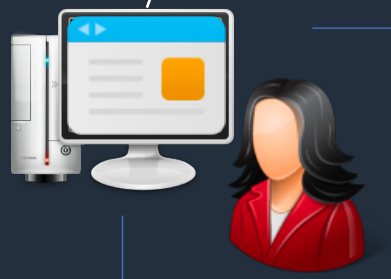
DigitalCloud TRAINING

DNS Resolution

User enters website address in browser



Name	Type	Value
mycompany.local	A	192.168.0.1
emailserver.local	A	192.168.0.2



DNS Server

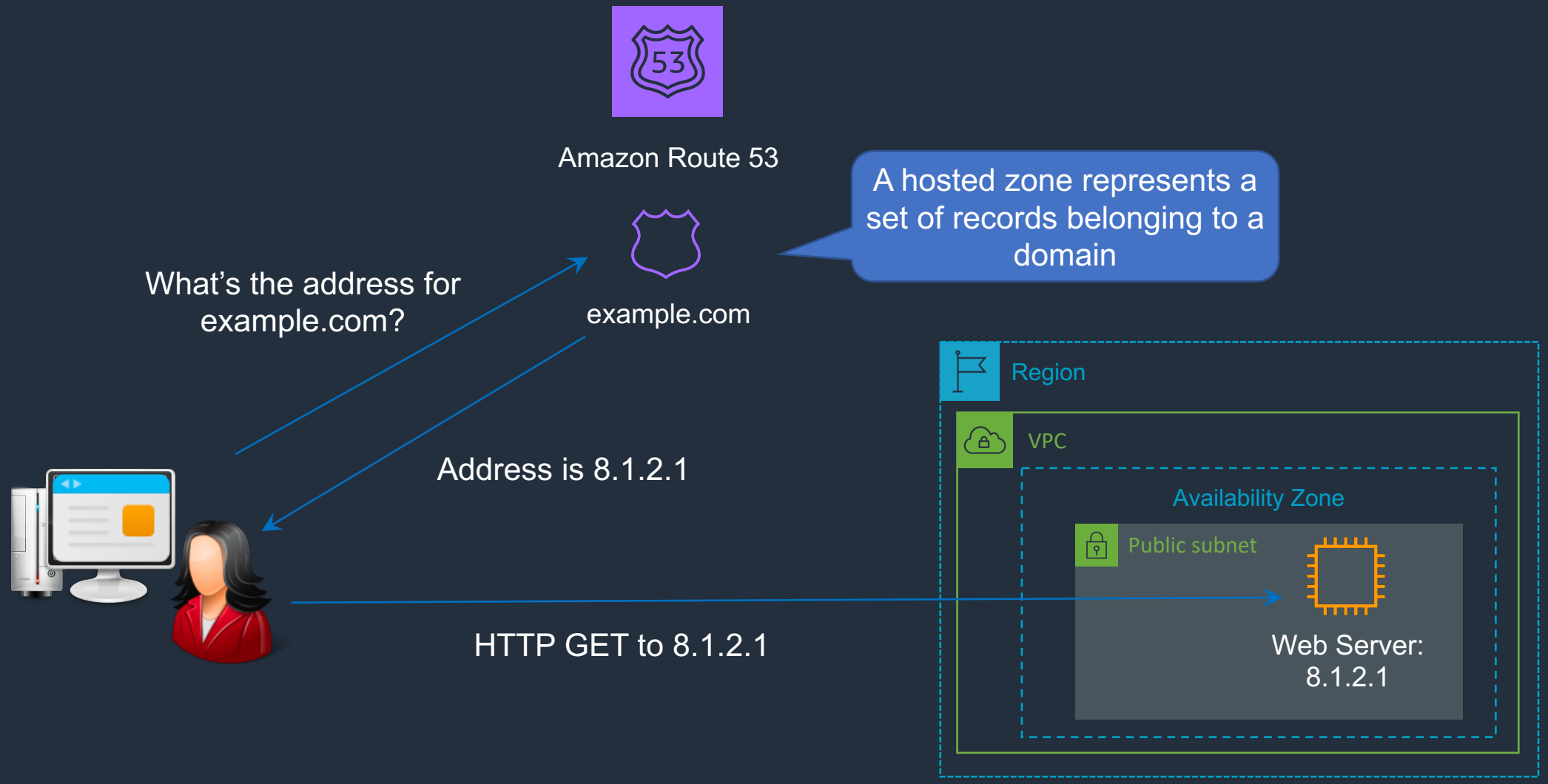
Domain name is resolved to the IP address of the webserver

Web Server

Computer connects to 192.168.0.1

DigitalCloud TRAINING

DNS Resolution with AWS Route 53



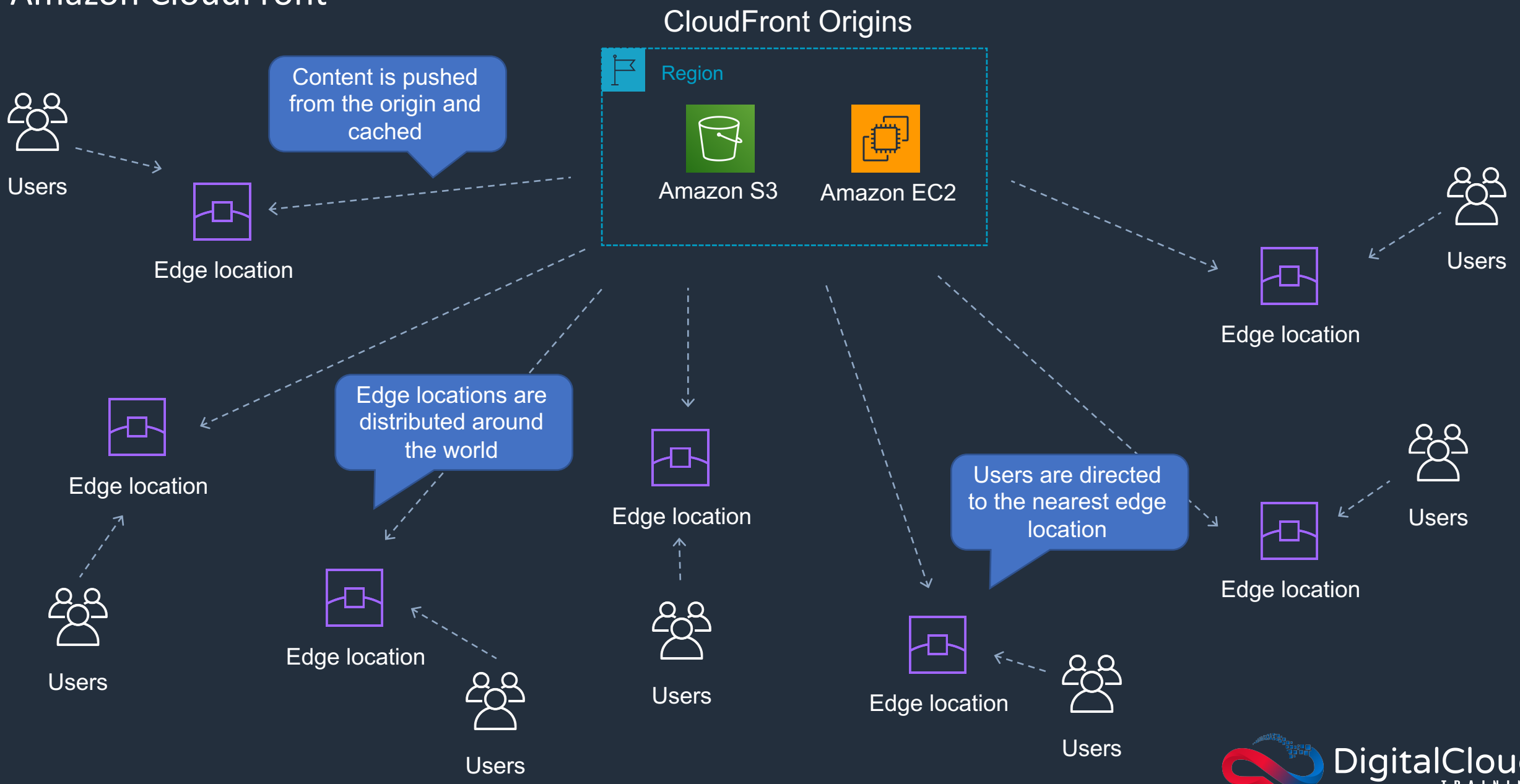
DigitalCloud TRAINING

Route 53 DNS Record Types

Routing Policy	What it does
Simple	Simple DNS response providing the IP address associated with a name
Failover	If primary is down (based on health checks), routes to secondary destination
Geolocation	Uses geographic location you're in (e.g. Europe) to route you to the closest region
Geoproximity	Routes you to the closest region within a geographic area
Latency	Directs you based on the lowest latency route to resources
Multivalue answer	Returns several IP addresses and functions as a basic load balancer
Weighted	Uses the relative weights assigned to resources to determine which to route to

DigitalCloud TRAINING

Amazon CloudFront

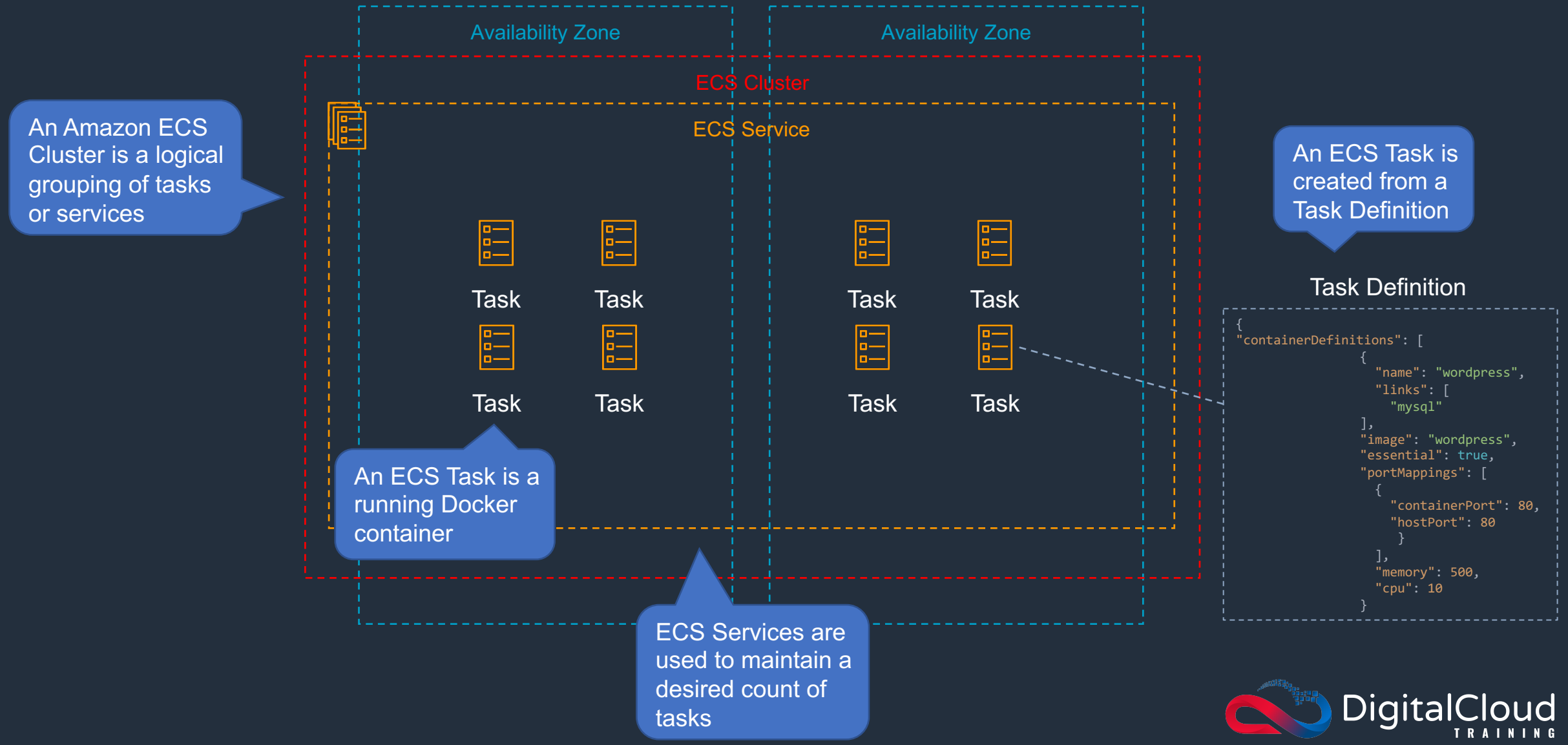


DigitalCloud TRAINING

SECTION 12

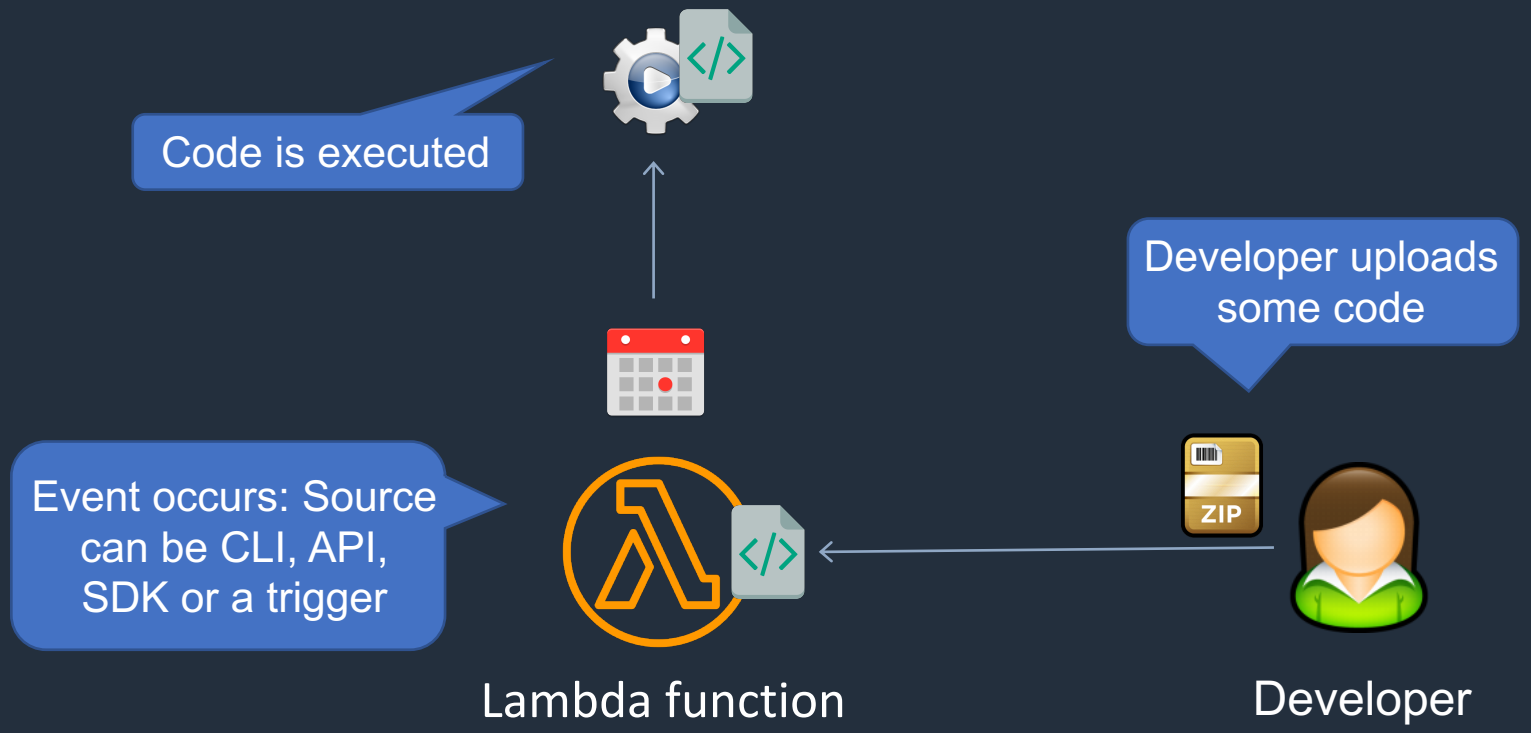
Containers and Serverless

Amazon Elastic Container Service (ECS)



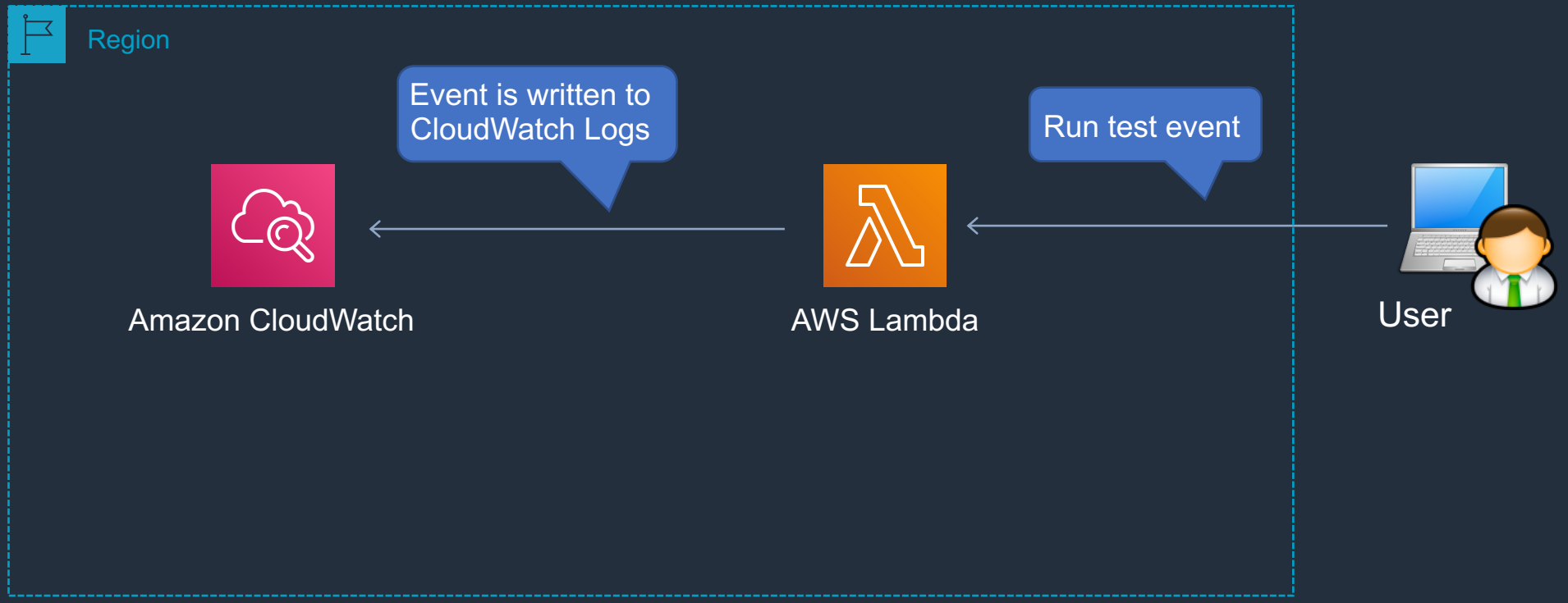
DigitalCloud TRAINING

AWS Lambda



DigitalCloud TRAINING

AWS Lambda – Hello World



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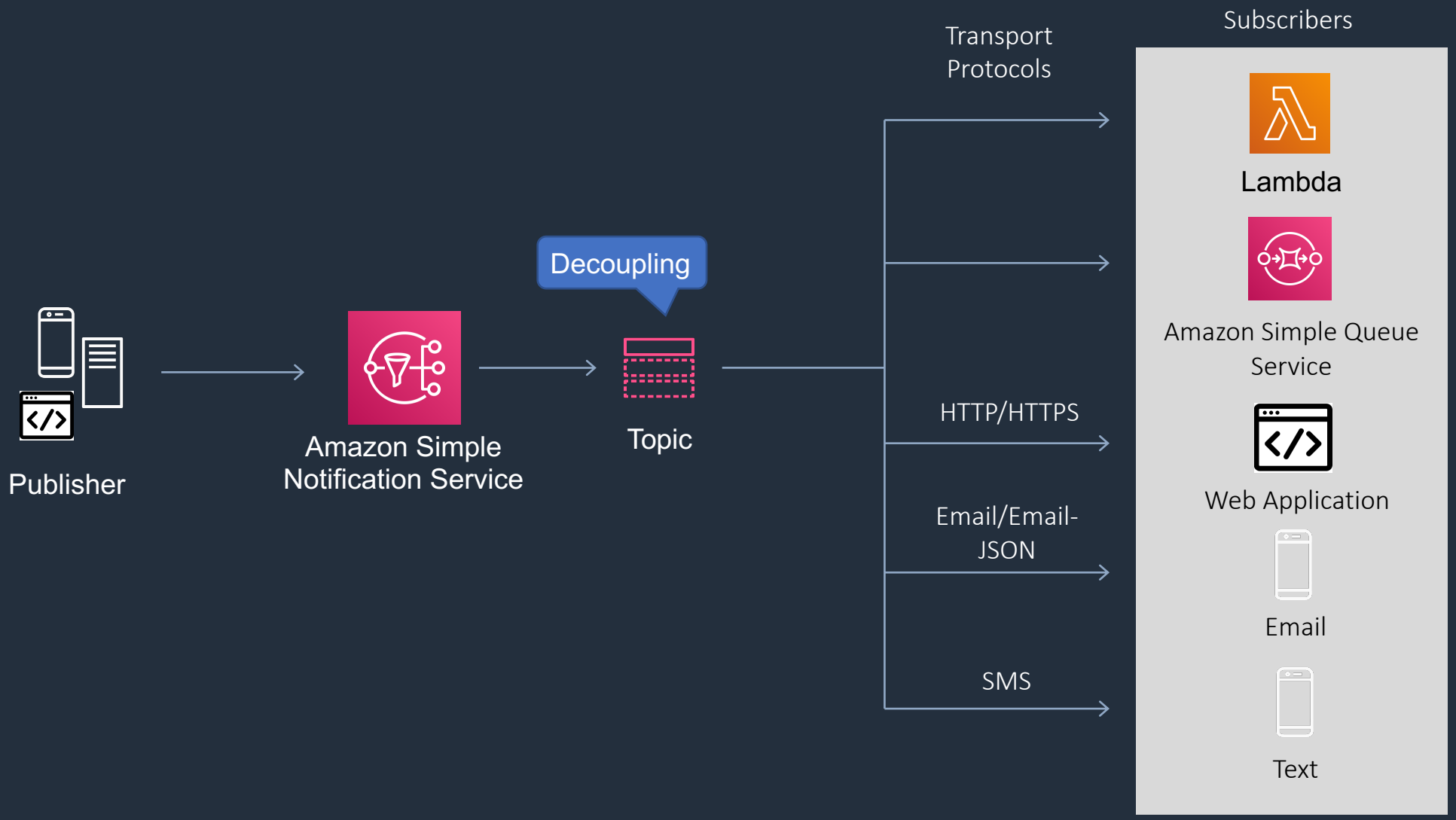
SECTION 13

Loose Coupling

Amazon Simple Notification Service (SNS)



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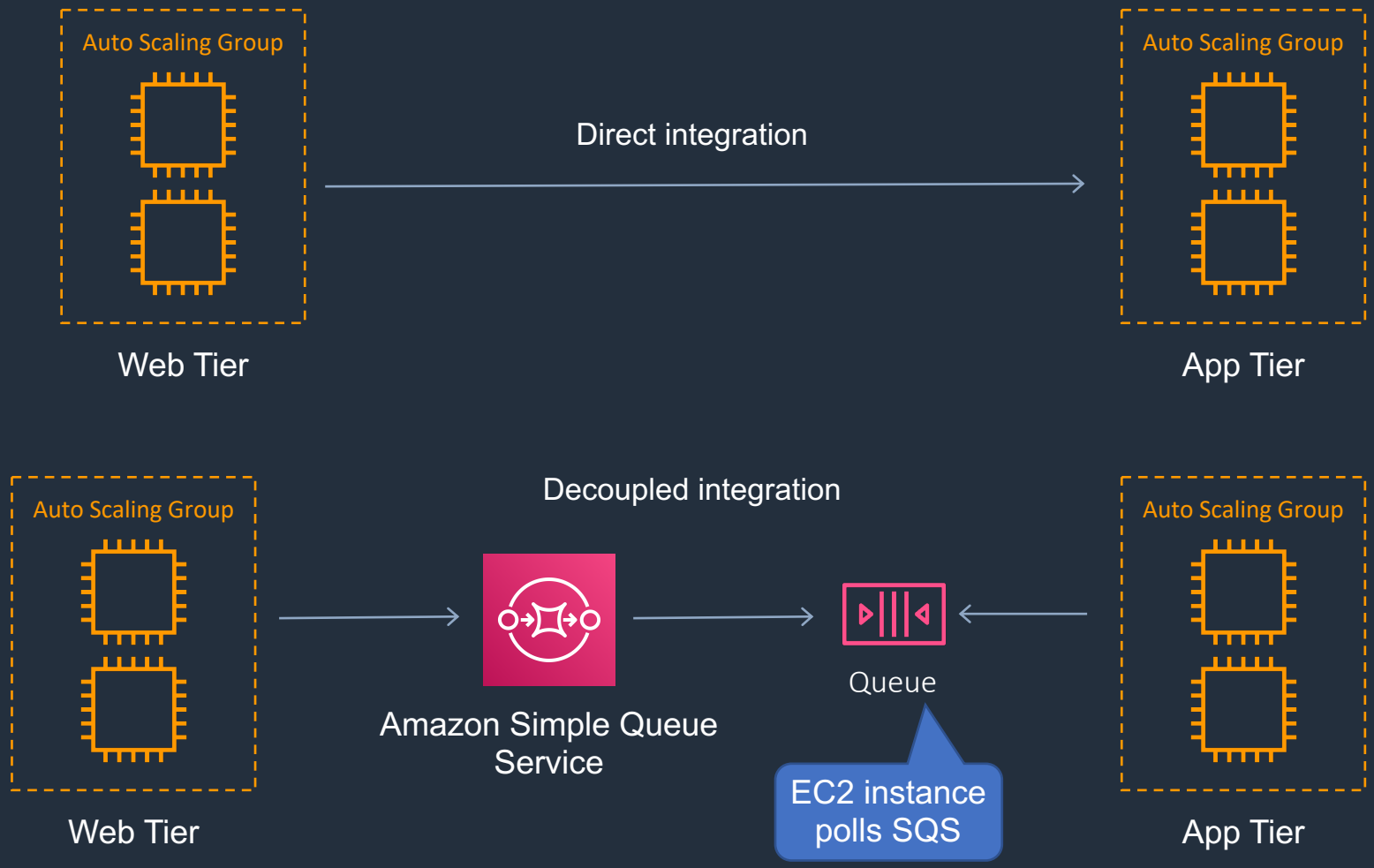
Amazon Simple Queue Service (SQS)



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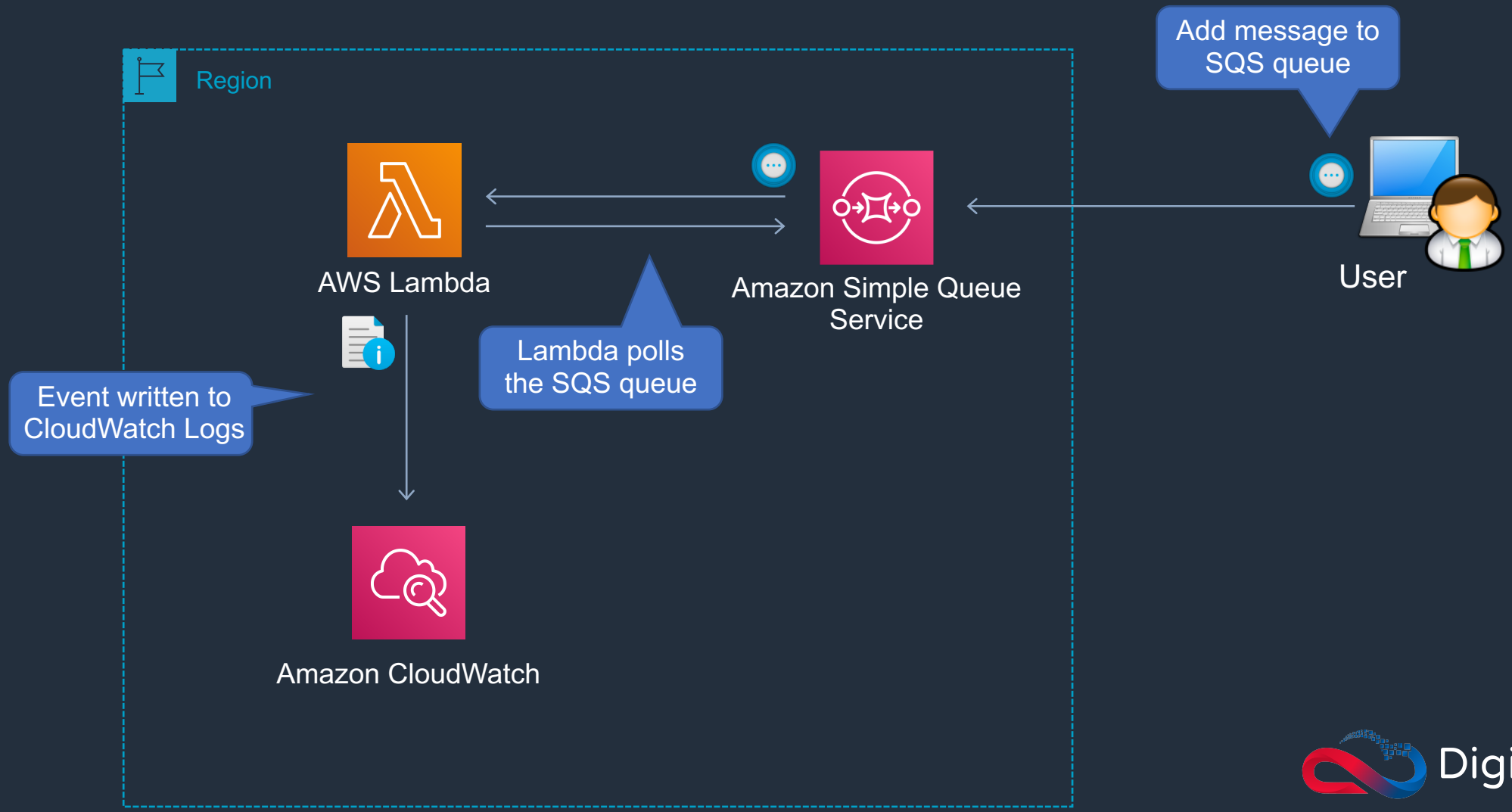
AWS Lambda to Amazon SQS Event Source Mapping



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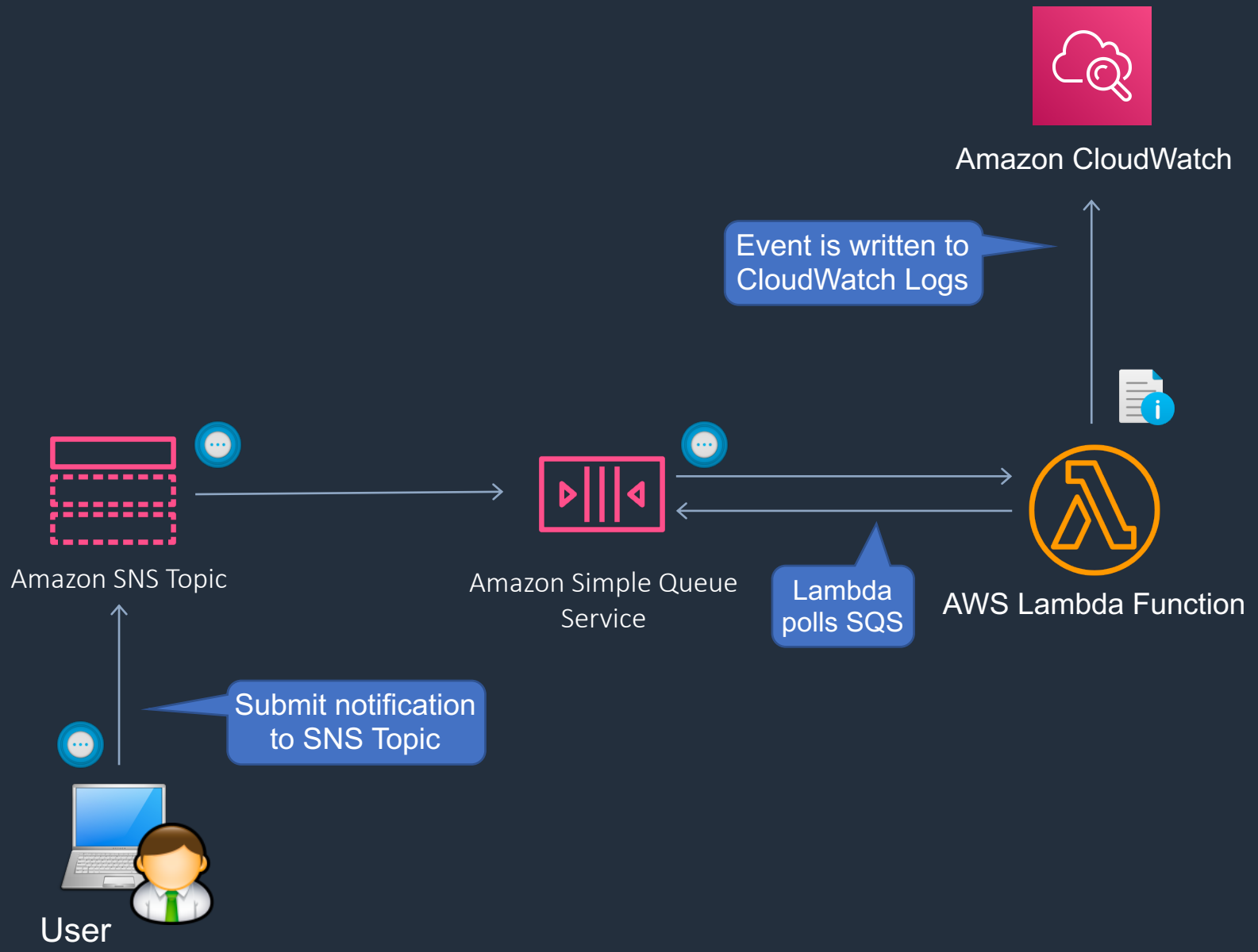
Serverless application: Amazon SQS, SNS, and Lambda



DigitalCloud TRAINING

SECTION 14

Get Certified on AWS

Why work in cloud computing?

1) Job demand
2) Globally relevant skills
3) Rewarding career paths
4) Great salaries

DigitalCloud TRAINING

Why get AWS certified?

1) Demonstrate skills to employers
2) Differentiate yourself
3) Gain knowledge
4) Develop practical skills

DigitalCloud TRAINING

AWS Certification

Professional

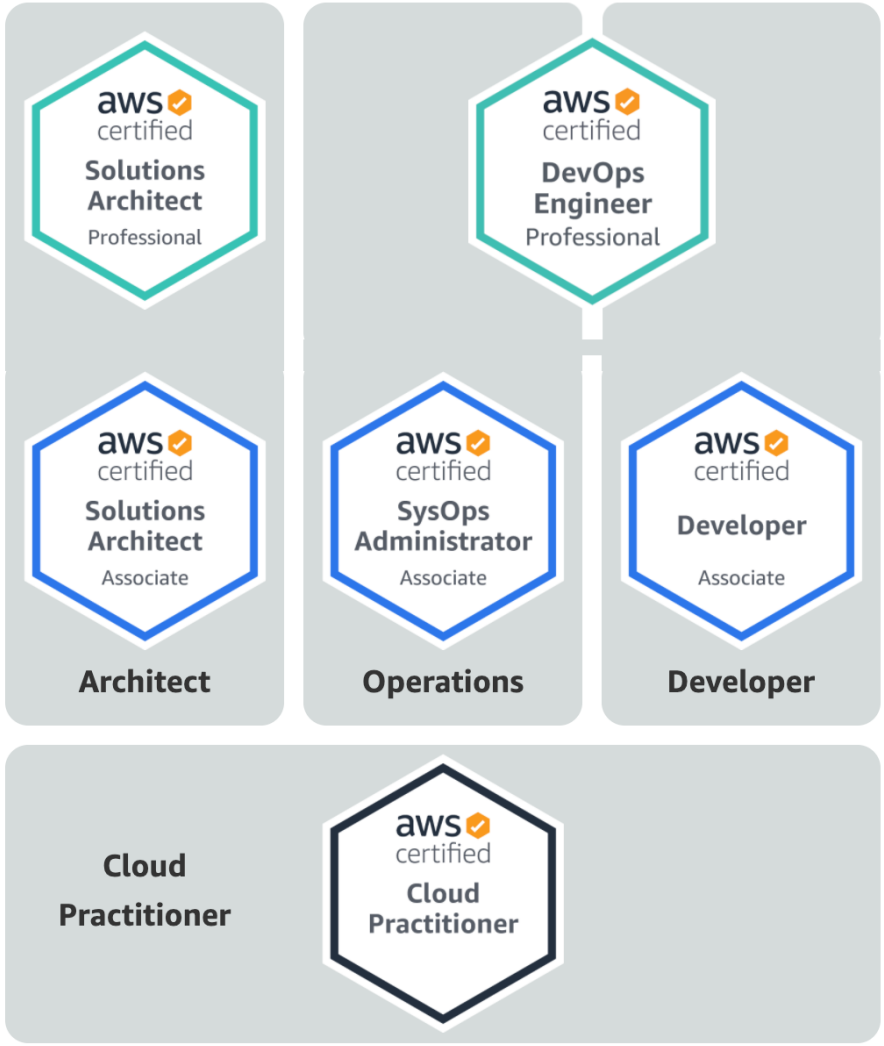
Two years of comprehensive experience designing, operating, and troubleshooting solutions using the AWS Cloud

Associate

One year of experience solving problems and implementing solutions using the AWS Cloud

Foundational

Six months of fundamental AWS Cloud and industry knowledge



Specialty

Technical AWS Cloud experience in the Specialty domain as specified in the **exam guide**

DigitalCloud TRAINING

THE END

Hope you enjoyed the course!

DigitalCloud TRAINING