AWSOME DAY

ONLINE CONFERENCE

Module 2:
Getting started with the cloud

Patrick Do
Technical Trainer
AWS

Getting started
with AWS services

AWS products

Cloud journey

Build your infrastructure

What is Amazon EC2?

On-premises servers

- ✓ Application server
- ✓ Web server
- ✓ Database server
- ✓ Game server
- ✓ Mail server
- ✓ Media server
- ✓ Catalog server
- ✓ File server
- ✓ Computing server
- ✓ Proxy server

Amazon EC2 instances
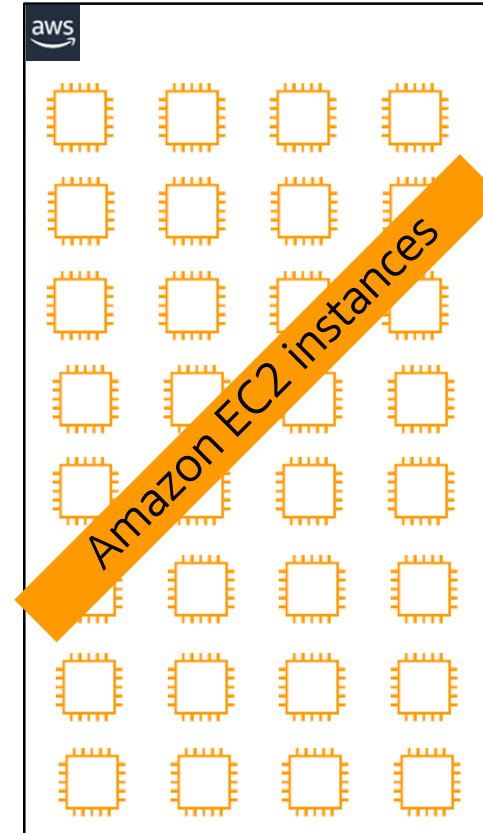
Benefits of Amazon EC2

- Elasticity

Benefits of Amazon EC2

- Elasticity
- Control

Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility

Step 2: Choose an Instance Type

applications. Learn more about instance types and how they can meet your computing needs.

Filter by: Compute optimized ▾   Current generation ▾   Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

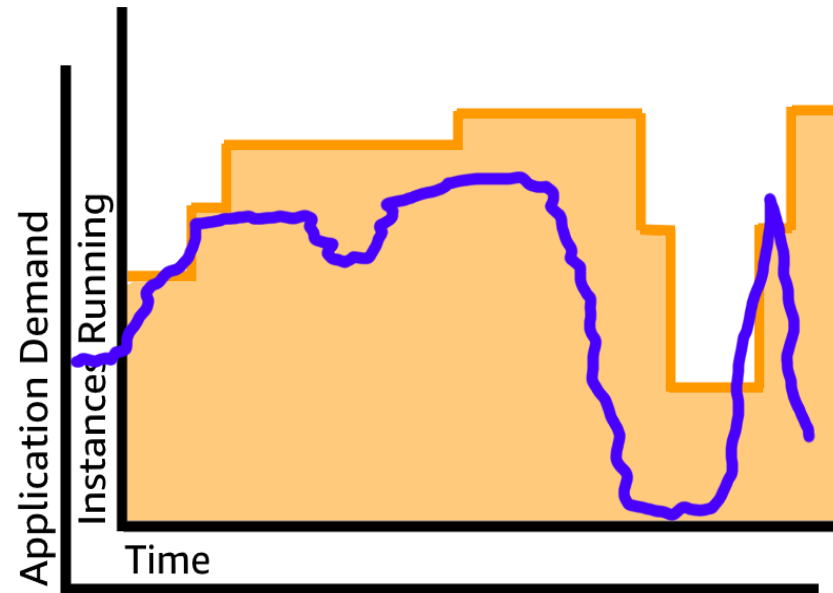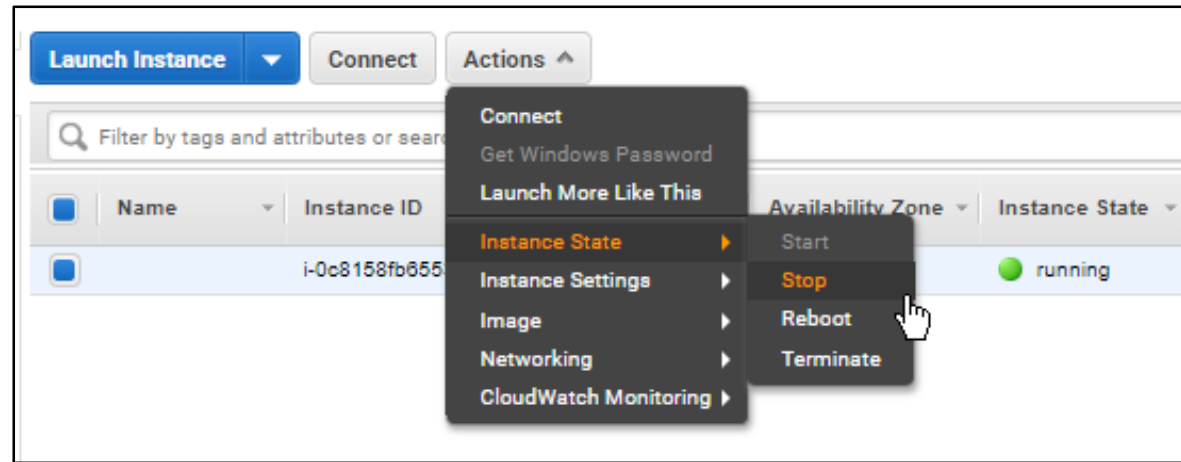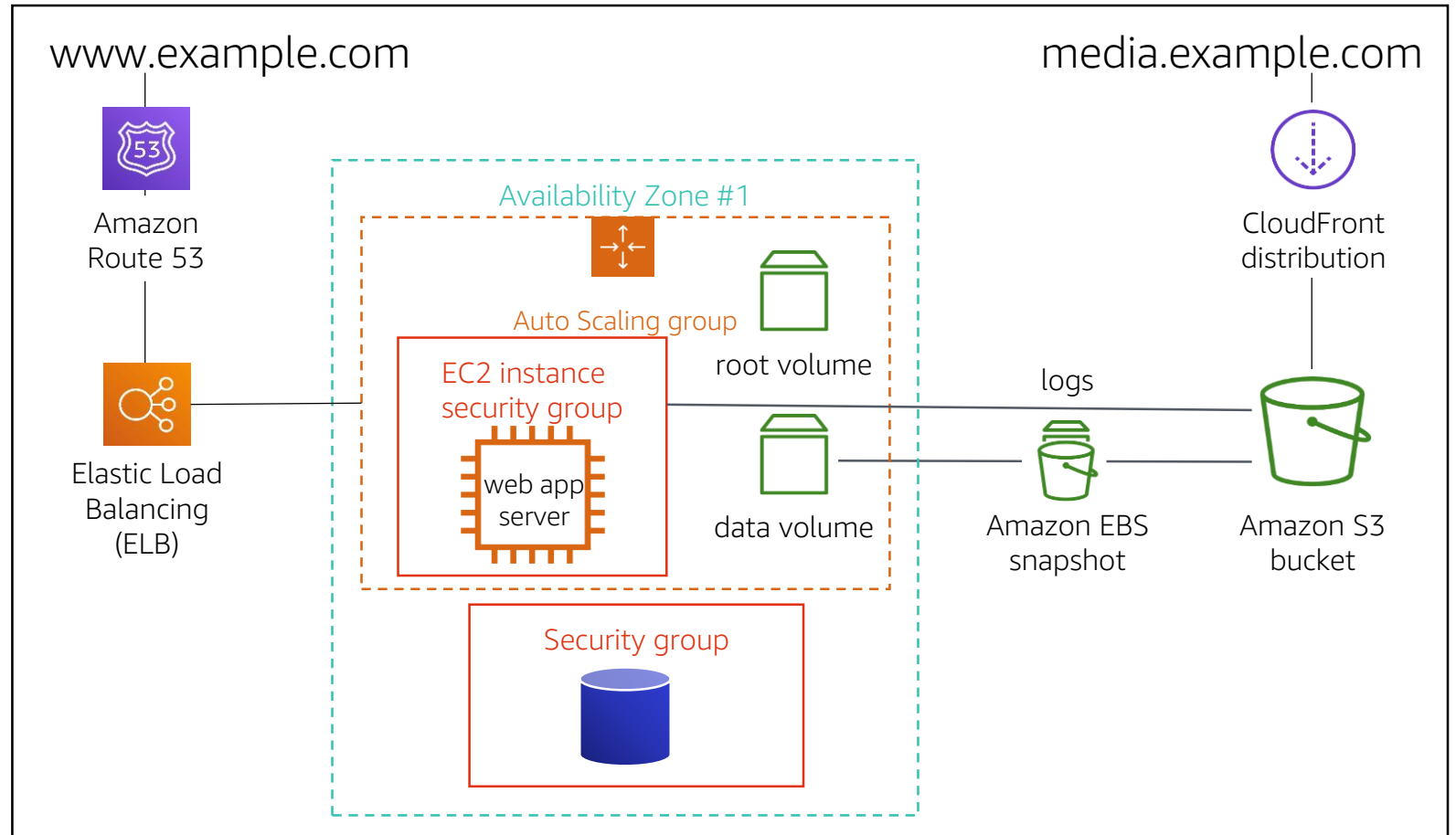|	Family	Type	vCPUs ⓘ	Memory (GiB)	Instance Storage (GB) ⓘ	EBS-Optimized Available ⓘ	Network Performance ⓘ	IPv6 Support ⓘ
☐	Compute optimized	c5d.large	2	4	1 x 50 (SSD)	Yes	Up to 10 Gigabit	Yes
☐	Compute optimized	c5d.xlarge	4	8	1 x 100 (SSD)	Yes	Up to 10 Gigabit	Yes
☐	Compute optimized	c5d.2xlarge	8	16	1 x 200 (SSD)	Yes	Up to 10 Gigabit	Yes
☐	Compute optimized	c5d.4xlarge	16	32	1 x 400 (SSD)	Yes	Up to 10 Gigabit	Yes
☐	Compute optimized	c5d.9xlarge	36	72	1 x 900 (SSD)	Yes	10 Gigabit	Yes
☐	Compute optimized	c5d.18xlarge	72	144	2 x 900 (SSD)	Yes	25 Gigabit	Yes
☐	Compute optimized	c5.large	2	4	EBS only	Yes	Up to 10 Gigabit	Yes
☐	Compute optimized	c5.xlarge	4	8	EBS only	Yes	Up to 10 Gigabit	Yes
☐	Compute optimized	c5.2xlarge	8	16	EBS only	Yes	Up to 10 Gigabit	Yes
☐	Compute optimized	c5.4xlarge	16	32	EBS only	Yes	Up to 10 Gigabit	Yes
☐	Compute optimized	c5.9xlarge	36	72	EBS only	Yes	10 Gigabit	Yes
☐	Compute optimized	c5.18xlarge	72	144	EBS only	Yes	25 Gigabit	Yes
☐	Compute optimized	c4.large	2	3.75	EBS only	Yes	Moderate	Yes
☐	Compute optimized	c4.xlarge	4	7.5	EBS only	Yes	High	Yes

Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility
- Integrated

www.example.com

Amazon Route 53

Elastic Load Balancing (ELB)

Availability Zone #1

Auto Scaling group

EC2 instance security group

web app server

root volume

data volume

Security group

logs

Amazon EBS snapshot

media.example.com

CloudFront distribution

Amazon S3 bucket

Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility
- Integrated
- Reliable

99.99% AVAILABILITY

aws | intel

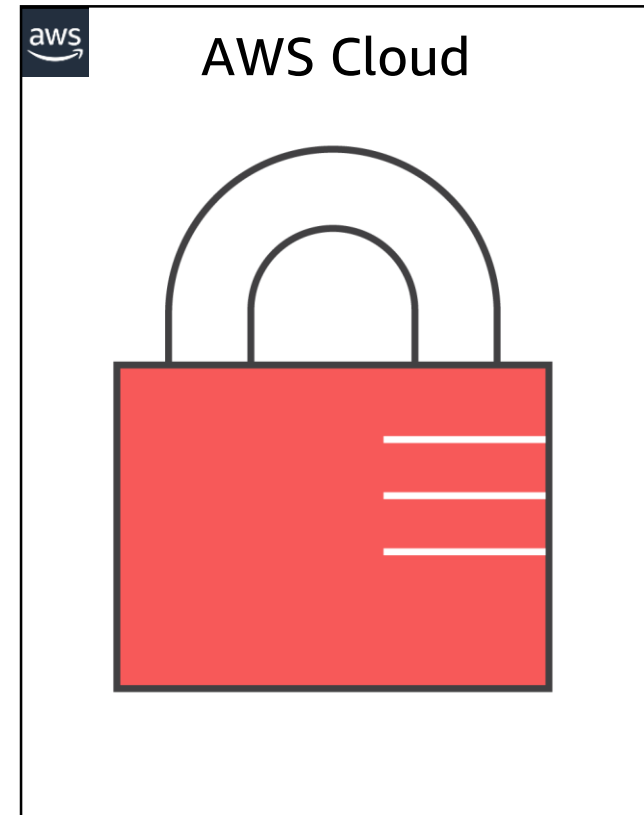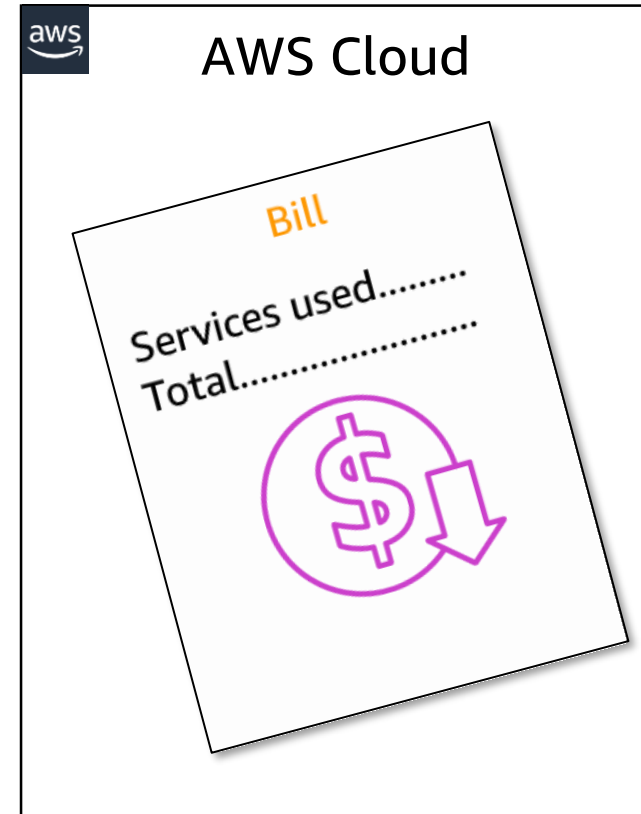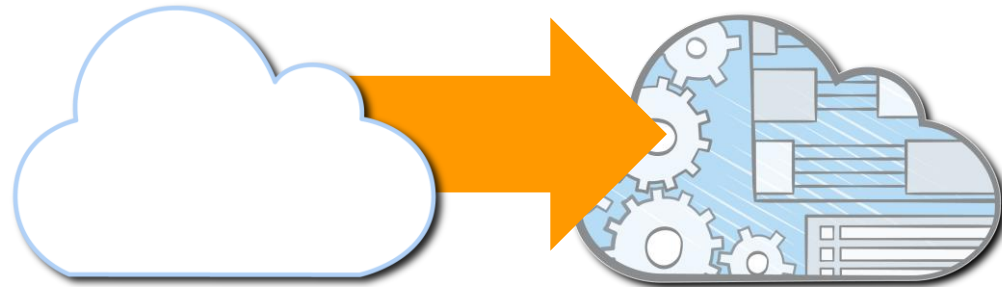# Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility
- Integrated
- Reliable
- Secure

AWS Cloud

Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility
- Integrated
- Reliable
- Secure
- Inexpensive

AWS Cloud

Bill

Services used.........

Total.........................

Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility
- Integrated
- Reliable
- Secure
- Inexpensive
- Easy

Choosing the right Amazon EC2 instances

- EC2 Instance types are optimized for different use cases, workloads & come in multiple sizes. This allows you to optimally scale resources to your workload requirements.

- AWS utilizes Intel® Xeon® processors for EC2 Instances providing customers with high performance and value.

- Consider the following when choosing your instances: core count, memory size, storage size & type, network performance, I/O requirements & CPU technologies.

- Hurry Up & Go Idle - A larger compute instance can save you time and money, therefore paying more per hour for a shorter amount of time can be less expensive.

EC2 instances powered by Intel Technologies

EC2 instance type	Compute optimized		General purpose			Memory optimized			Storage optimized		
	C5	C4	M5	M4	T2	X1	X1e	R4	H1	I3	D2
Intel processor	Xeon Platinum 8175M	Xeon E5 2666 v3	Xeon Platinum 8175M	Xeon E5 2686 v4 2676 v3	Xeon Family	Xeon E7 8880 v3	Xeon E7 8880 v3	Xeon E5 2686 v4	Xeon E5 2686 v4	Xeon E5 2686 v4	Xeon E5 2676 v3
Intel processor technology	Skylake	Haswell	Skylake	Broadwell Haswell	Yes	Haswell	Haswell	Broadwell	Broadwell	Broadwell	Haswell
Intel AVX	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intel AVX2	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes
Intel AVX-512	Yes	-	Yes	-	-	-	-	-	-	-	-
Intel turbo boost	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Storage	EBS-only	EBS-only	EBS-only	EBS-only	EBS-only	SSD EBS-Opt	SSD EBS-Opt	-	HDD	SSD	HDD

C5: Compute-optimized instances

25% price/performance improvement over C4

C4 · C5
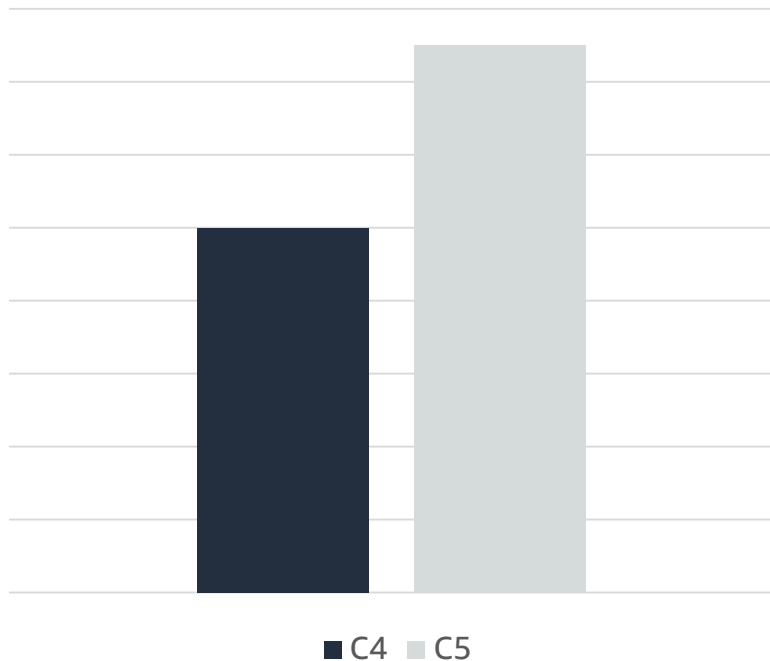
- Based on 3.0 GHz Intel Xeon Scalable Processors (Skylake)

- Up to 72 vCPUs and 144 GiB of memory (**2:1 Memory:vCPU ratio**)

- 25 Gbps NW bandwidth

- Support for Intel AVX-512

NETFLIX · *"We saw significant performance improvement on Amazon EC2 C5, with up to a 140% performance improvement in industry standard CPU benchmarks over C4."*

GRAIL · *"We are eager to migrate onto the AVX-512 enabled c5.18xlarge instance size…. We expect to decrease the processing time of some of our key workloads by more than 30%."*

C5n: fastest networking in the cloud

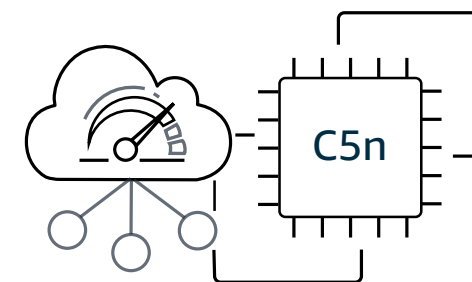Featuring Intel Xeon Scalable processors

100 Gbps
network bandwidth
on largest
instance sizes

25 Gbps
peak bandwidth
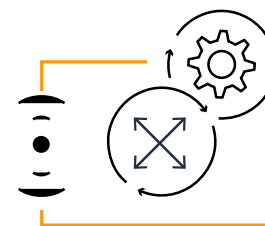on smaller
instance sizes

33%
Increased memory
footprint over
C5 instances

Faster analytics and
big data workloads

Lower costs for
network-bound workloads

All of the elasticity, security,
and scalability of AWS

z1d: high frequency for specialized workloads

High Frequency instances with custom Intel Xeon Scalable processors running at sustained 4 GHz all core turbo

8:1 GiB to vCPU ratio

Up to 25 Gbps network bandwidth and up to 1.8 TB of local NVMe storage
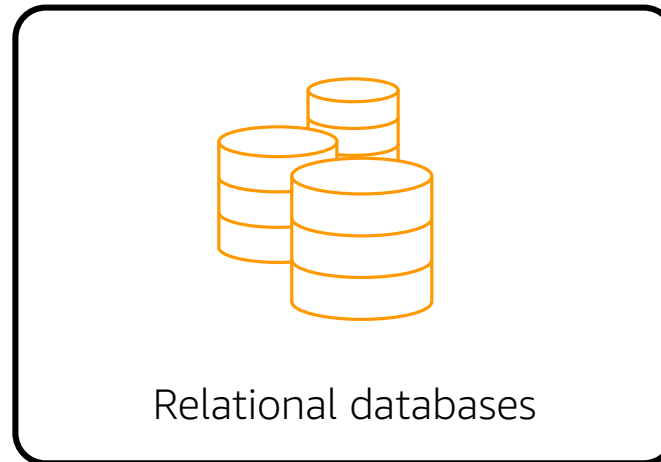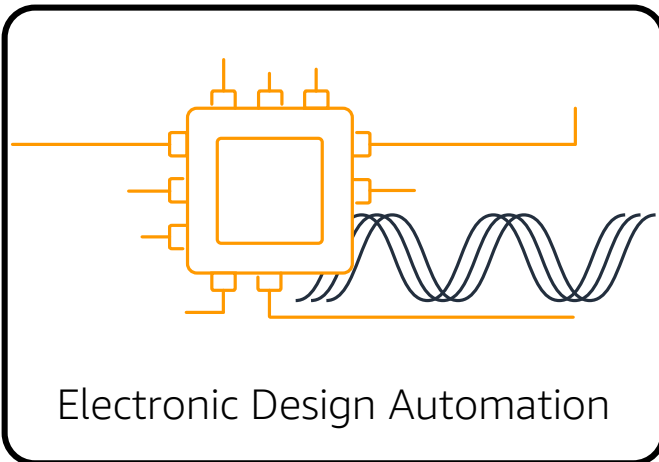
z1d.large

16 GiB

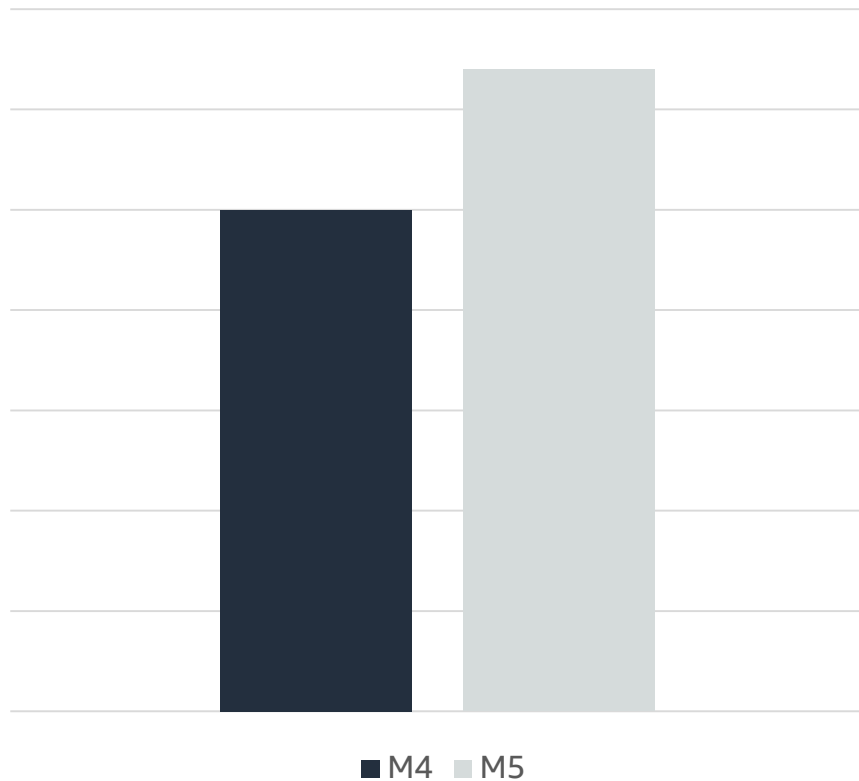2 vCPU

6 sizes

● ● ●

z1d.12xlarge

384 GiB

48 vCPU

Electronic Design Automation

Relational databases

Gaming

z1d.metal Bare Metal instances coming soon

NEW!

aws | intel

M5: Next-gen general purpose instances

14% price/performance improvement With M5

■ M4 ■ M5

- Powered by 2.5 GHz Intel Xeon Scalable Processors (Skylake)

- New larger instance size—m5.24xlarge with 96 vCPUs and 384 GiB of memory (4:1 Memory:vCPU ratio)

- Improved network and EBS performance on smaller instance sizes

- Support for Intel AVX-512 offering up to twice the performance for vector and floating point workloads

T3: burstable general-purpose instances

- Balance of compute, memory, and network

- Baseline level of CPU performance with the ability to burst CPU usage when needed at any time for as long as required

- Lowest cost instance at $0.0052 per hour and up to 30% better price performance over T2 using Intel Xeon Scalable Processors

t3.nano

0.5 GiB

2 vCPU

Base perf 5%

7 sizes
● ● ●

t3.2xlarge

32 GiB

8 vCPU

Base perf 40%

NEW!

With T3 Unlimited bursting over baseline is only $0.05 per vCPU-hour, averaged over 24 hours
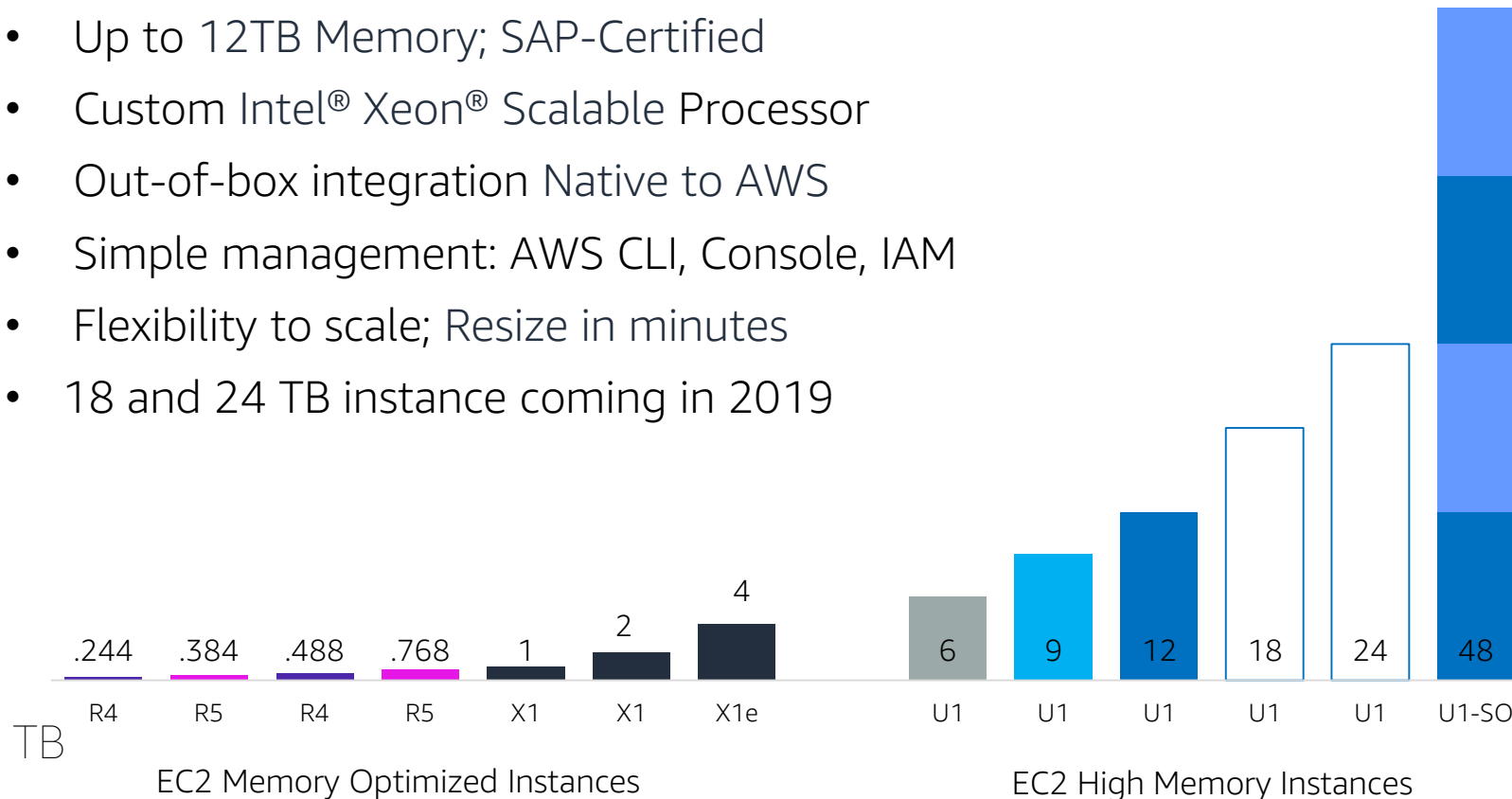
Amazon EC2 instances for SAP HANA

Introducing 48TB support for S/4HANA Deployments

- Up to 12TB Memory; SAP-Certified
- Custom Intel® Xeon® Scalable Processor
- Out-of-box integration Native to AWS
- Simple management: AWS CLI, Console, IAM
- Flexibility to scale; Resize in minutes
- 18 and 24 TB instance coming in 2019

EC2 Memory Optimized Instances

.244	.384	.488	.768	1	2	4
R4	R5	R4	R5	X1	X1	X1e

TB

EC2 High Memory Instances

6	9	12	18	24	48
U1	U1	U1	U1	U1	U1-SO

Flexibility — Grow-as-you-Go

TCO — Linear Pricing

Breath — Seamless access to all AWS Services

Scale — Near Infinite Elastic Scalability for Mission-Critical Deployments

Secure — AWS owned and operated

Speed — <1 hour provisioning times 100% Software Defined

intel XEON PLATINUM inside

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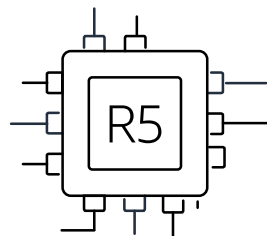# R5: memory-optimized instances

2.5 GHz Intel Xeon Scalable processors (Skylake)

Memory-optimized instances with 8:1 GiB to vCPU

Up to 25 Gbps NW bandwidth

R5d instances include up to 3.6 TB of local NVMe SSD
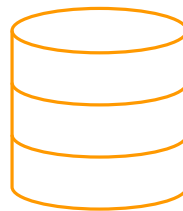
r5.large

16 GiB

2 vCPU

6 sizes ●●●
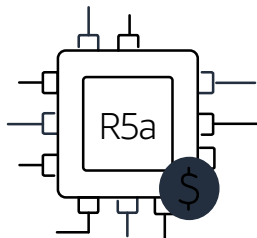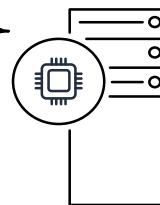
r5.24xlarge

768 GiB

96 vCPU

In-memory caches

High performance databases

Big data analytics

R5a: Now available with AMD EPYC 7000 processor

NEW

R5.metal Bare Metal instances coming soon on Intel Xeon Scalable processors

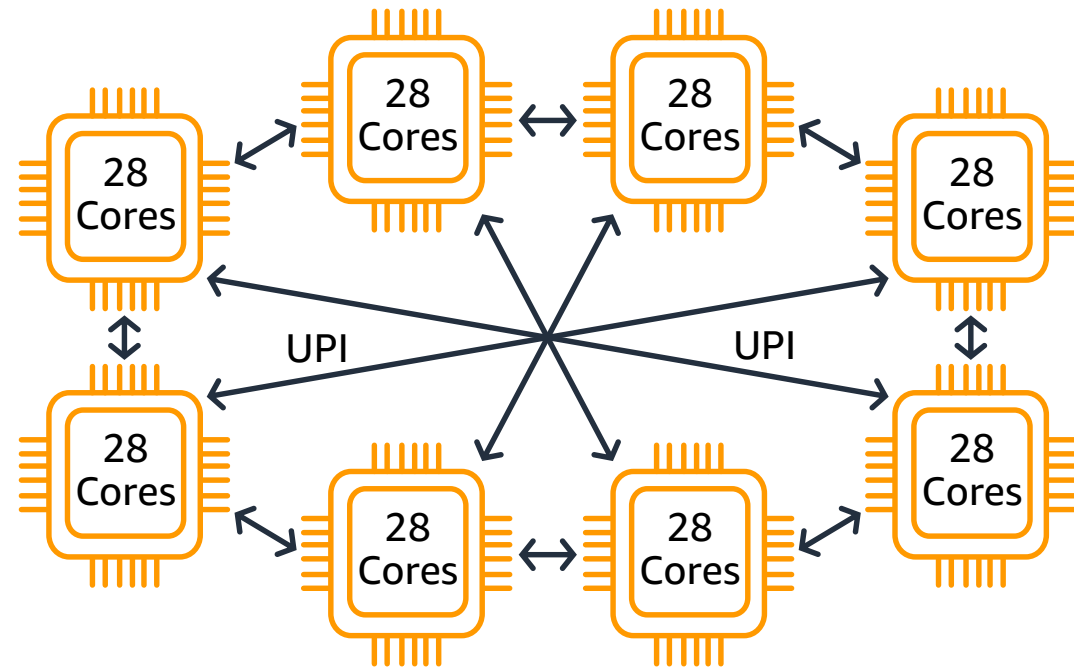# EC2 High Memory Instance architecture

The most memory of any EC2 Instance SAP-certified

12 TB of memory

8x Intel Xeon Platinum 8176M (Skylake) processors with total of 224 cores / 448 Hyperthreads

18TB and 24TB coming in 2019

What's your platform?

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SAP | AWS innovations

11 years of industry firsts

R/3

BW

A1/B1

10's — Suite on AnyDB

2008

2012

2015

HANA Developer Edition 244GB

SuccessFactors

High Memory Instance 12TB / 50TB

Concur

FAST Migration

2017

1,000's

SAP Cloud Platform

X1 Cloud Native HANA 2TB/14TB

2016

intel

2018

1,000's

Industry Solutions

HANA Cloud

SAP Analytics Cloud

5,000+

Elastic Metal 48TB/100TB

S/4Move

2019

X2 Cloud Native HANA 6, 9, 12, 18, 24TB

Data Warehouse As a Service

2020

aws

The Most Choice

Resources to run the largest and most demanding SAP Workloads

Scale-up options

- Up to 24TB Memory; SAP-Certified
- Custom Intel® Xeon® Scalable Processors
- Out-of-box integration Native to AWS
- Simple management: AWS CLI, Console, IAM
- Flexibility to scale; Resize in minutes

Memory in TB

| .244 | .384 | .488 | .768 | 1 | 2 | 4 | 6 | 9 | 12 | 18 | 24 |

R4   R5   R4   R5   X1   X1   X1e   High Memory Instances

Scale-out options

OLTP Scale-Out (S/4HANA)   48 TB

OLAP Scale-Out[1]   12 TB

OLAP Scale-Out[1]   50 TB

OLAP Scale-Out[1]   100 TB
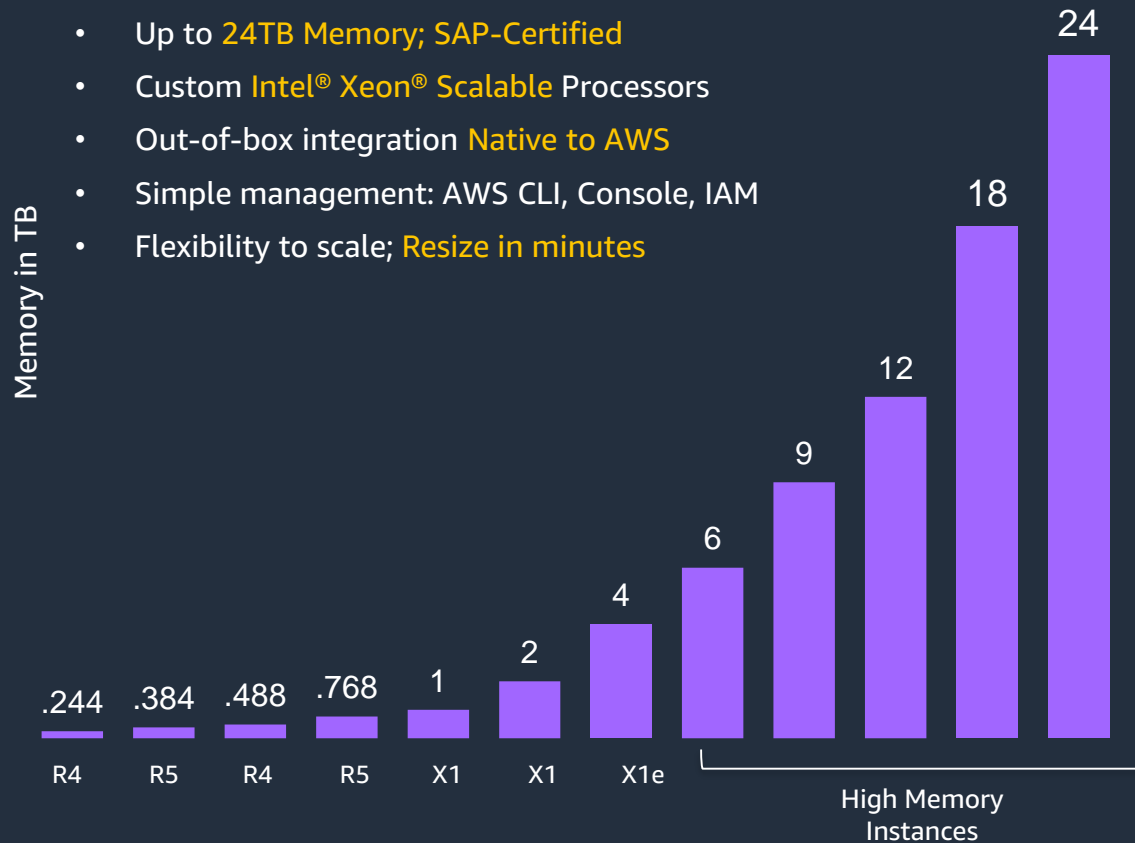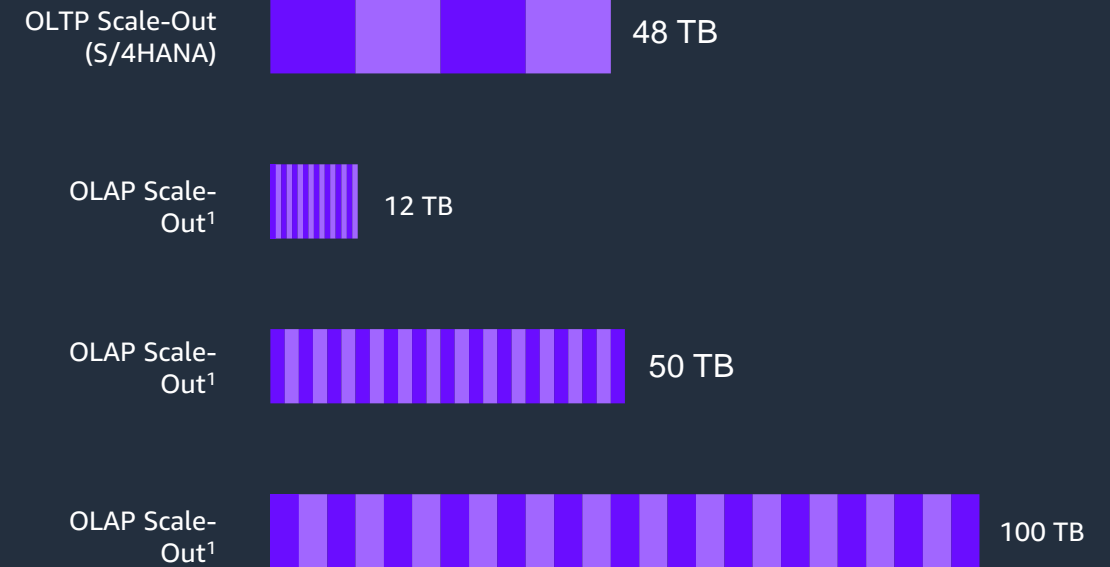
[1] BWoH, BW/4HANA and Datamart

aws

AWS "Nitro for SAP" system
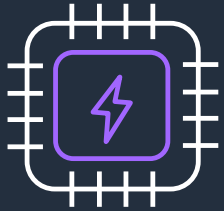
Makes 100% of the server addressable

Provides the highest core count in the industry

Seamless integrated experience

EC2 Instances (Virtual)

HANA Instances

Hypervisor

Network

Storage

EC2 Bare Metal Instances

HANA Instance

Nitro Platform

Management, Security, and Monitoring

HANA Scale up Size

2x the scale-up capacity

Performance (SAPS)

Up to 480k SAPS
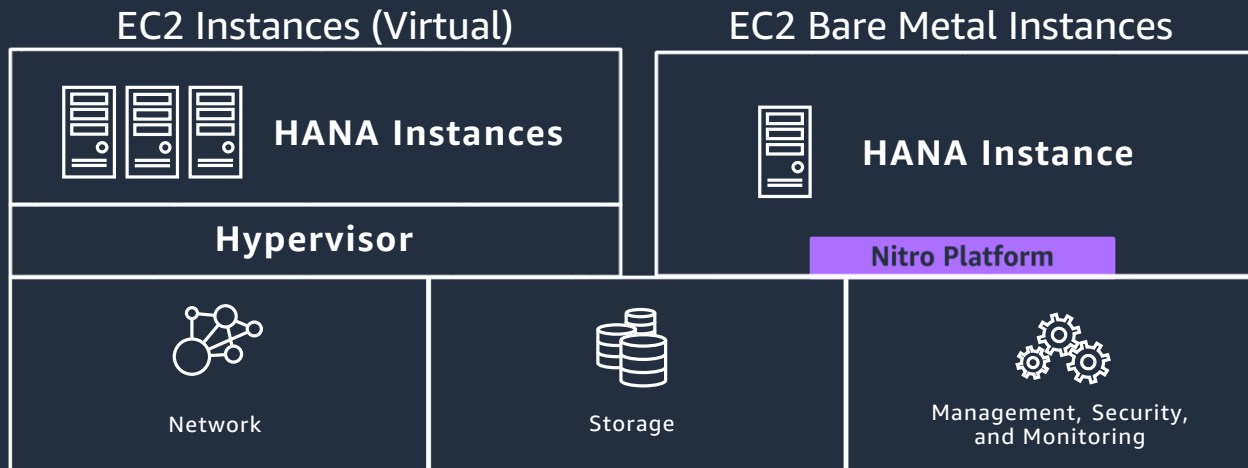
R5: memory-optimized instances

R5

r5.large		r5.24xlarge
16 GiB	7 sizes ●●●	768 GiB
2 vCPU		96 vCPU

In-memory caches

High performance databases

Big data analytics

3.1 GHz Intel® Xeon® Scalable Processors (Skylake)

Memory-optimized instances with 8:1 GiB to vCPU

Up to 25 Gbps NW bandwidth

R5d instances include up to 3.6 TB of local NVMe SSD

SAP HANA Certified: r5.12xlarge ,r5.24xlarge and r5.metal.
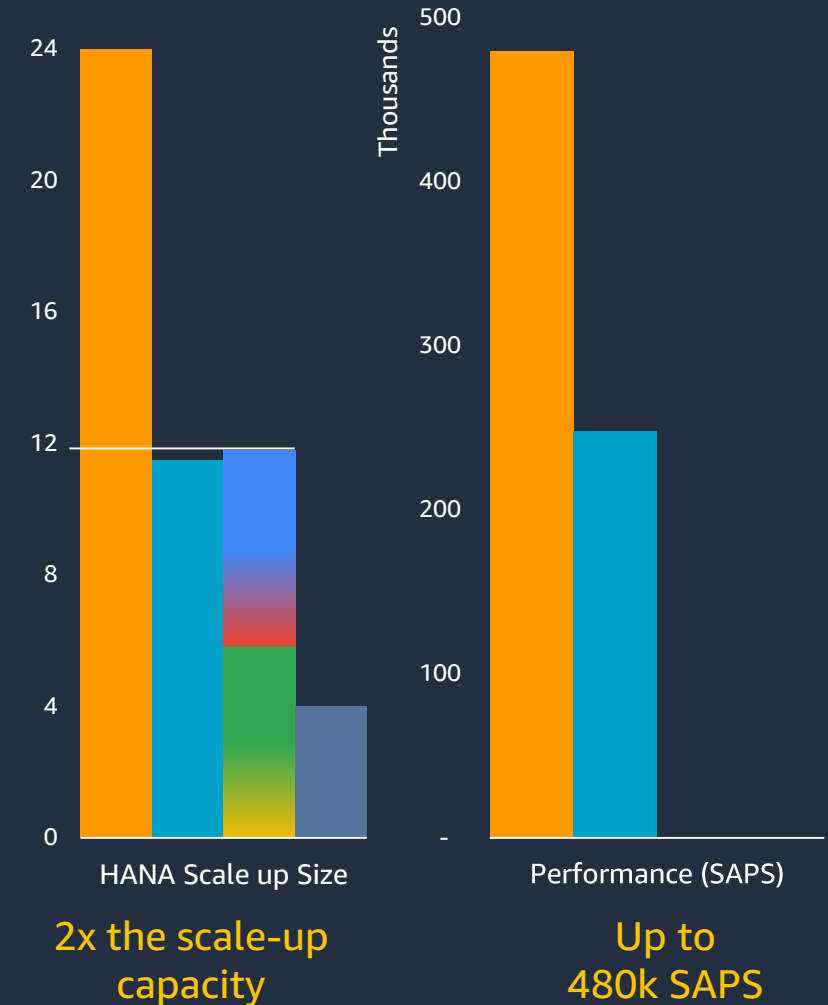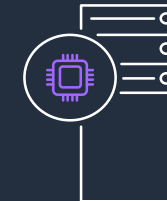
Best Price to Performance

R5.metal Bare Metal instances now available on Intel Xeon Scalable processors

intel **XEON** PLATINUM inside™

aws

EC2 High Memory Instance architecture
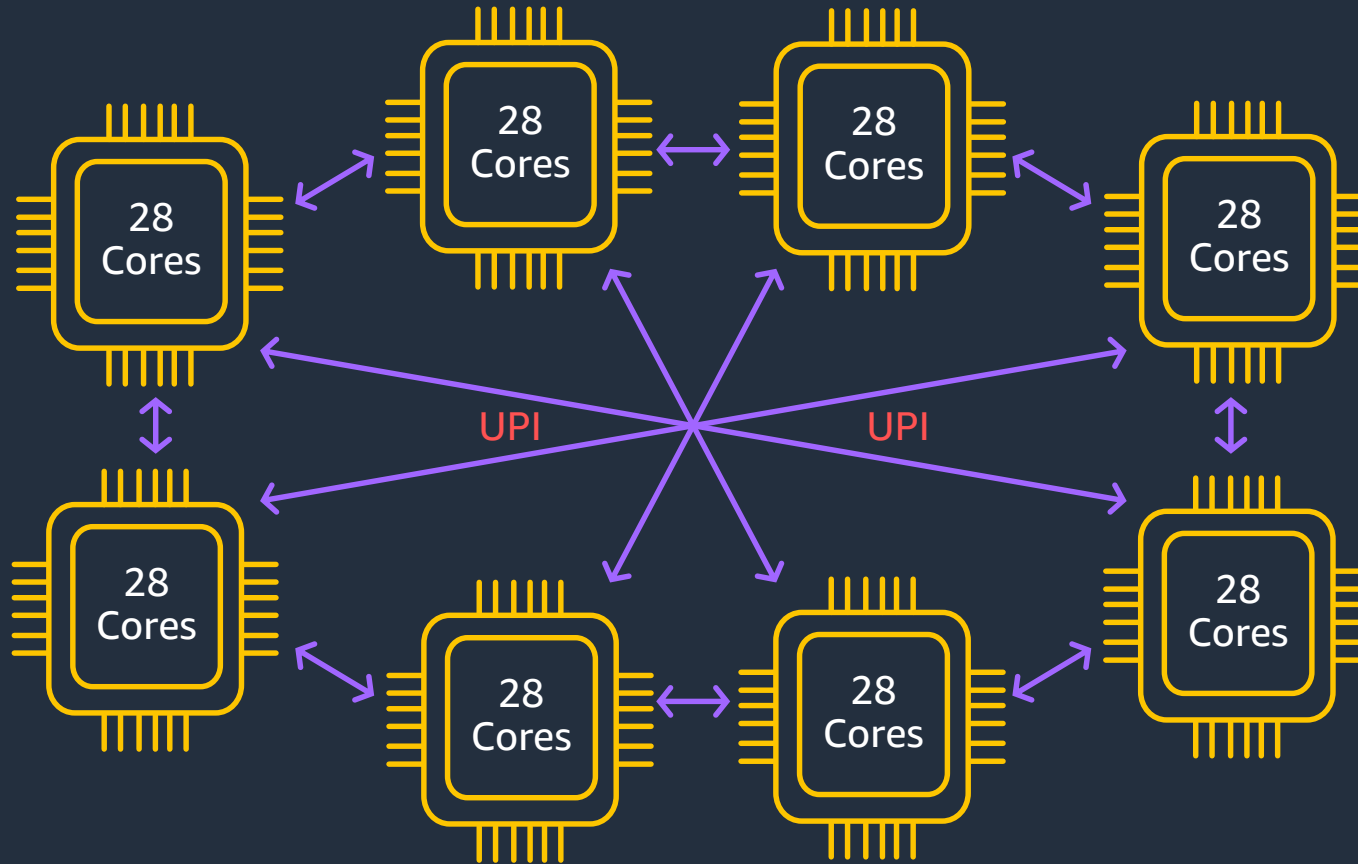
The Most Memory of any EC2 Instance

SAP-Certified

24TB of Memory

8x 2nd Generation Intel Xeon Platinum 2.7GHz (Cascade Lake) processors with total of 224 cores / 448 Hyperthreads offering 480,600 SAPS

X1 and X1e: large-scale memory-optimized

X1
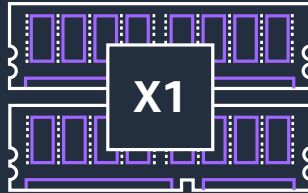
For large in-memory workloads

16:1 GiB to vCPU ratio

In-memory databases (e.g., SAP HANA), big data processing engines (Apache Spark, Presto), in-memory analytics

x1.16xlarge	x1.32xlarge
1 TB	2 TB
64 vCPU	128 vCPU

X1e
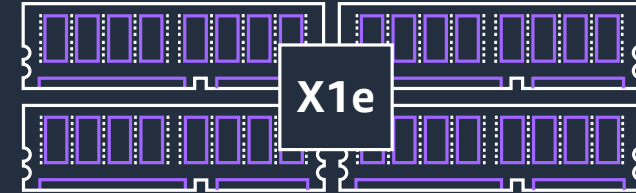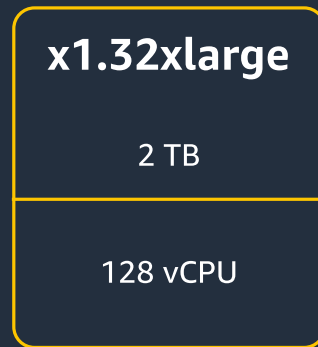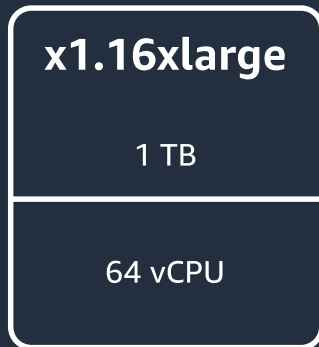
For memory-intensive workloads and very large in-memory workloads

32:1 GiB to vCPU ratio

High-performance databases, large in-memory databases (e.g., SAP HANA), and DB workloads with vCPU based licensing (Oracle, SAP)

x1e.xlarge	6 sizes	x1e.32xlarge
122 GiB	• • •	4 TB
4 vCPU		128 vCPU

intel XEON inside
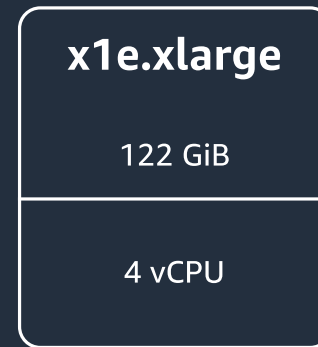
aws

Current Generation Amazon EC2 instances Certified for SAP Workloads

General Purpose

Name	vCPU	Memory (GiB)	Network (Gbps)	Storage (Mbps)	SAPS
m5.24xlarge	96	384	25	10,000	135,230
m5.12xlarge	48	192	10	5,000	67,215
m5.4xlarge	16	64	High	2,120	22,538
m5.2xlarge	8	32	High	2,120	11,269
m5.xlarge	4	16	High	2,120	5,634
m5.large	2	8	High	2,120	2,817

Compute Optimized

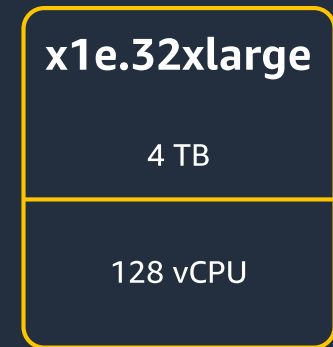| Name	vCPU	Memory (GiB)	Network (Gbps)	Storage (Mbps)	SAPS
c5.18xlarge	72	144	25	9,000	95,400
c5.9xlarge	36	72	10	4,500	47,700
c5.4xlarge	16	32	Up to 10	2,250	21,200
c5.2xlarge	8	16	Up to 10	2,250	10,600
c5.xlarge	4	8	Up to 10	2,250	5,300
c5.large	2	4	Up to 10	2,250	2,650

Memory Optimized

Name	vCPU	Memory	Network	Storage	SAPS
x1e.32xlarge	128	3,904	25	14,000	131,500
x1.32xlarge	128	1,952	25	14,000	131,500
x1e.16xlarge	64	1,952	10	7,000	32,875
x1.16xlarge	64	976	10	7,000	65,750
x1e.8xlarge	32	976	Up to 10	3,500	32,875
x1e.4xlarge	16	488	Up to 10	1,750	16,437
x1e.2xlarge	8	244	Up to 10	1,000	8,219
r5.large	2	16	EBS-Only	up to 3,500	Up to 10
r5.xlarge	4	32	EBS-Only	up to 3,500	Up to 10
r5.2xlarge	8	64	EBS-Only	up to 3,500	Up to 10
r5.4xlarge	16	128	EBS-Only	3,500	Up to 10
r5.12xlarge	48	384	EBS-Only	7,000	10
r5.24xlarge	96	768	EBS-Only	14,000	25
r5.metal	96*	768	EBS-Only	14,000	25
r5d.metal*	96*	768	4 x 900 NVMe SSD	14,000	25
u-12tb1.metal*	448	12	25	14	25 Gigabit

- 42 instances certified across the R3, R4, M4, M5, C4, C5, X1 and X1e instance families
- * Additional r5d and High Memory instances available. For more information visit: https://aws.amazon.com/ec2/instance-types/

aws

Store your data

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Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances

AWS Cloud

Amazon EC2 instance
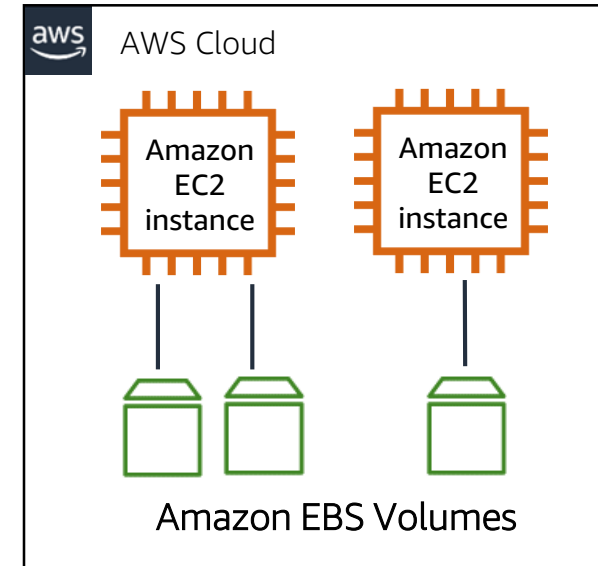
Amazon EC2 instance

Amazon EBS Volumes
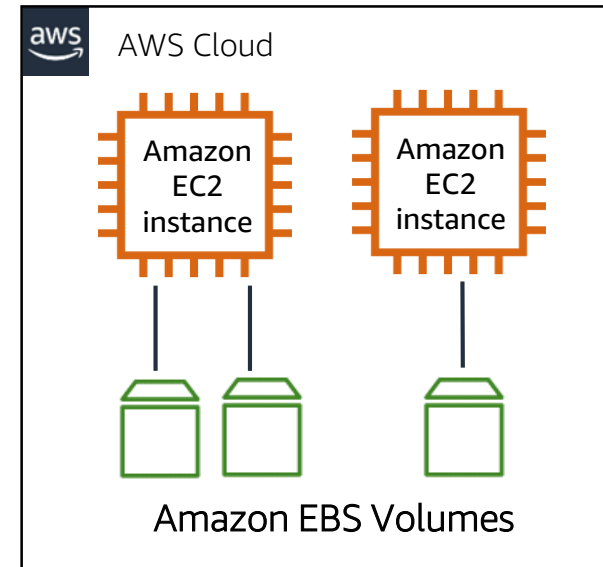
Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances
- Protected through replication

Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances

- Protected through replication

- Different drive types

AWS Cloud
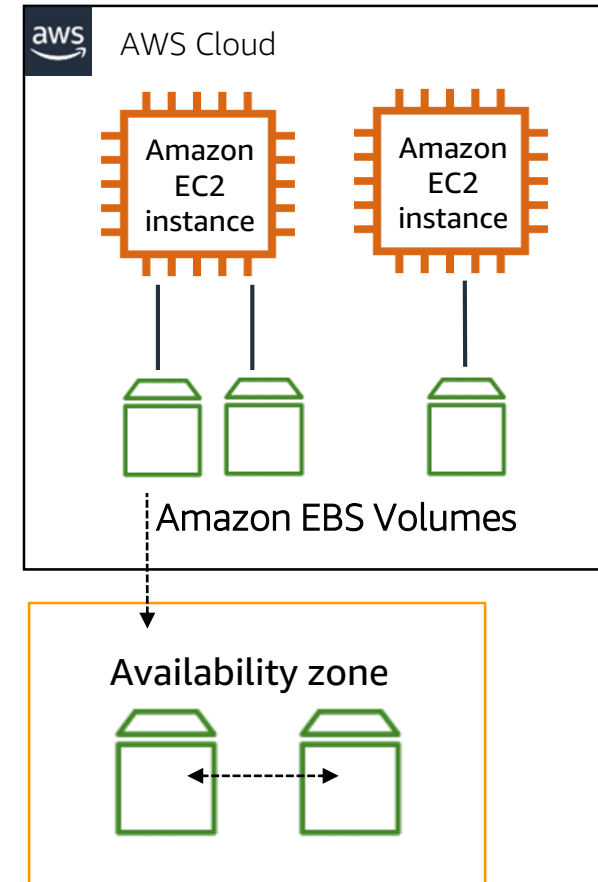
Amazon EC2 instance

Amazon EC2 instance

Amazon EBS Volumes

Solid State Drives (SSD)
- Provisioned IOPS SSD (io1) Volumes
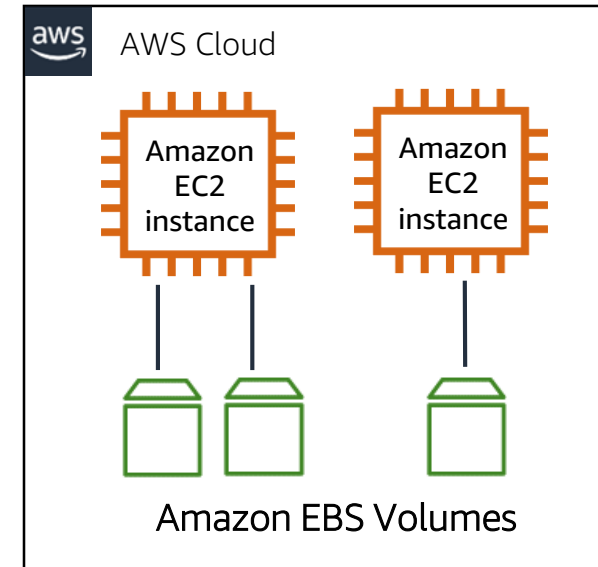- General Purpose SSD (gp2) Volumes

Hard Disk Drives (HDD)
- Throughput Optimized HDD (st1) Volumes
- Cold HDD (sc1) Volumes

aws | intel

Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances

- Protected through replication

- Different drive types

- Scale up or down in minutes

Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances
- Protected through replication
- Different drive types
- Scale up or down in minutes
- Pay for only what you provision

AWS Cloud

Amazon EC2 instance

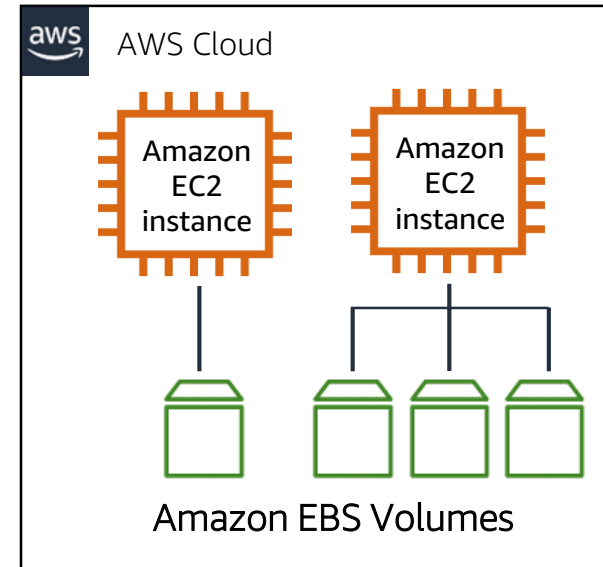Amazon EC2 instance

Amazon EBS Volumes

Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances
- Protected through replication
- Different drive types
- Scale up or down in minutes
- Pay for only what you provision
- Snapshot functionality

AWS Cloud

Amazon EC2 instance

Amazon EC2 instance

Amazon EBS Volumes

Monday's snapshot

Tuesday's snapshot

Wednesday's snapshot

Thursday's snapshot
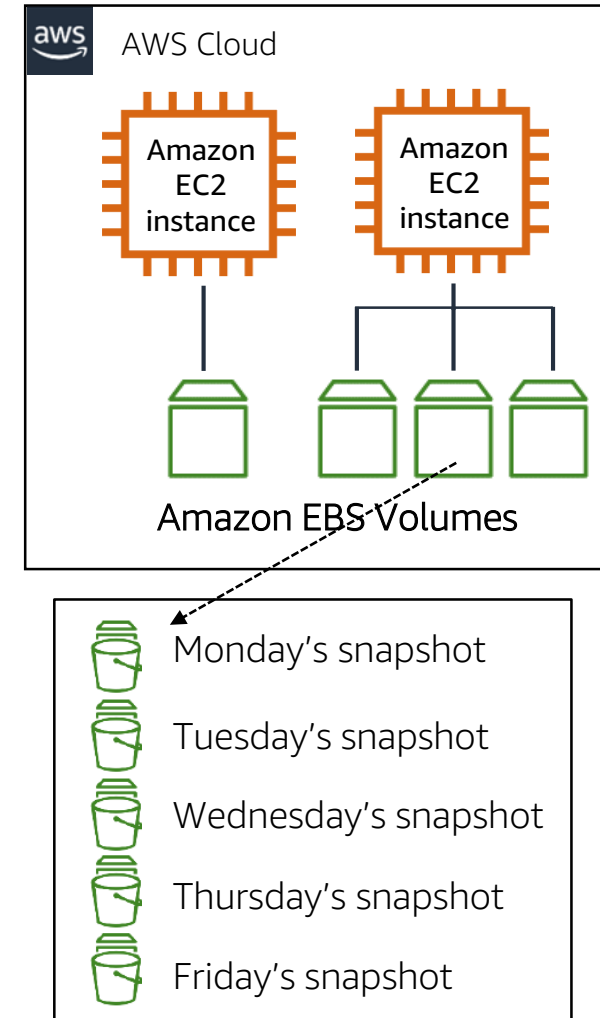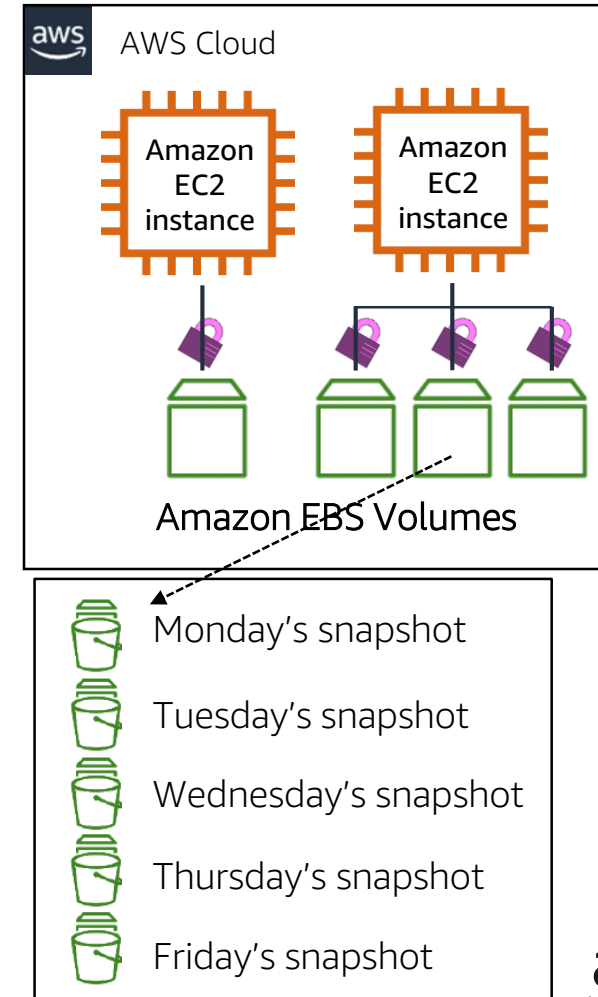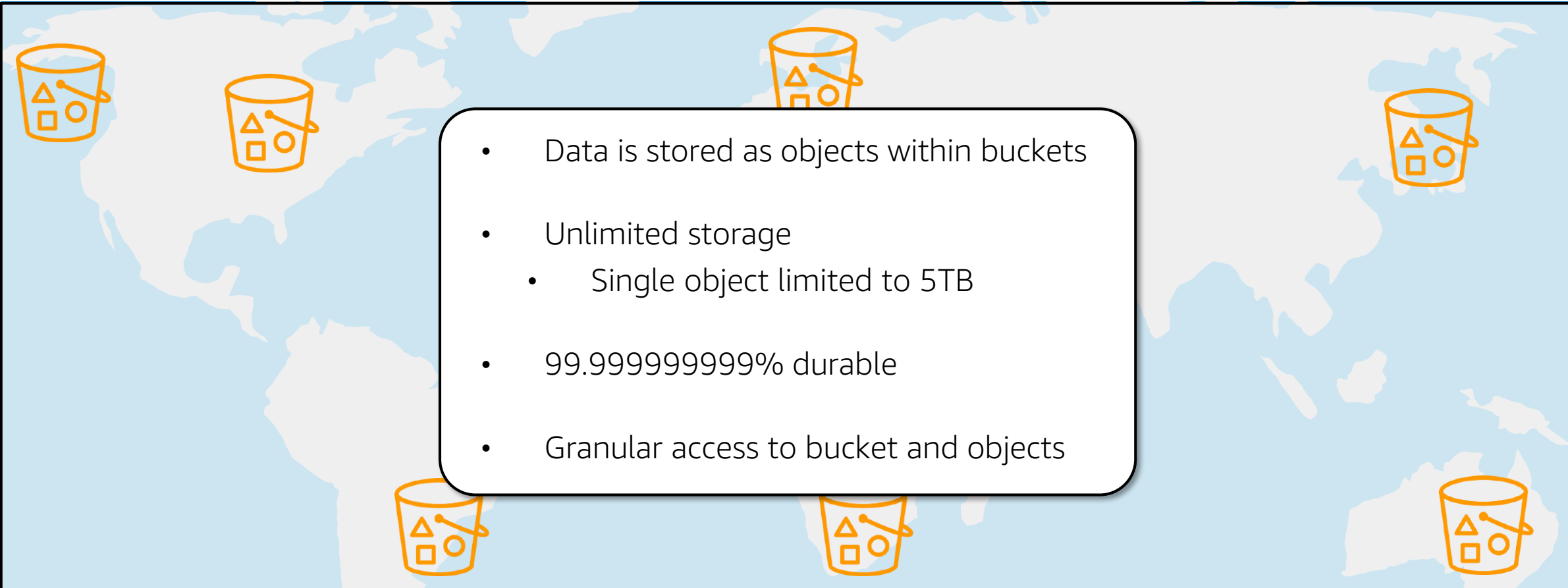
Friday's snapshot

Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances

- Protected through replication

- Different drive types

- Scale up or down in minutes

- Pay for only what you provision

- Snapshot functionality

- Encryption available

AWS Cloud

Amazon EC2 instance

Amazon EC2 instance

Amazon EBS Volumes

Monday's snapshot

Tuesday's snapshot

Wednesday's snapshot

Thursday's snapshot

Friday's snapshot

What is Amazon S3?

- Data is stored as objects within buckets

- Unlimited storage
  - Single object limited to 5TB

- 99.999999999% durable

- Granular access to bucket and objects

Amazon S3 core functionality

- Fast, durable, highly available key-based access to objects
- Object storage built to store and retrieve data
- Not a file system

Your App

Amazon S3 bucket

CLI sends GET request via S3 API →

← Object returned

aws | (intel)
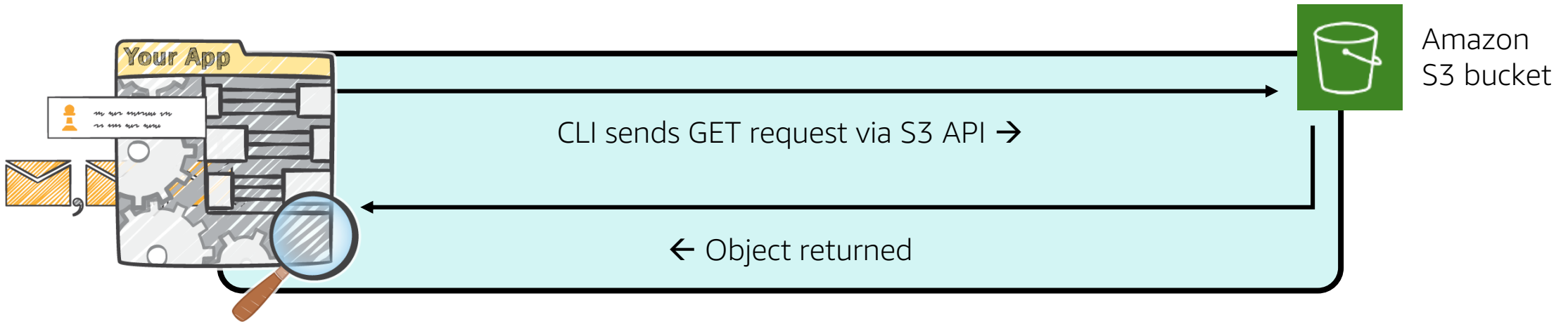
Amazon S3 common scenarios

- Backup and storage

- Application hosting

- Media hosting

- Software delivery

Amazon S3 buckets

Amazon EC2 instances

Corporate Datacenter

Your App

APP

aws | intel
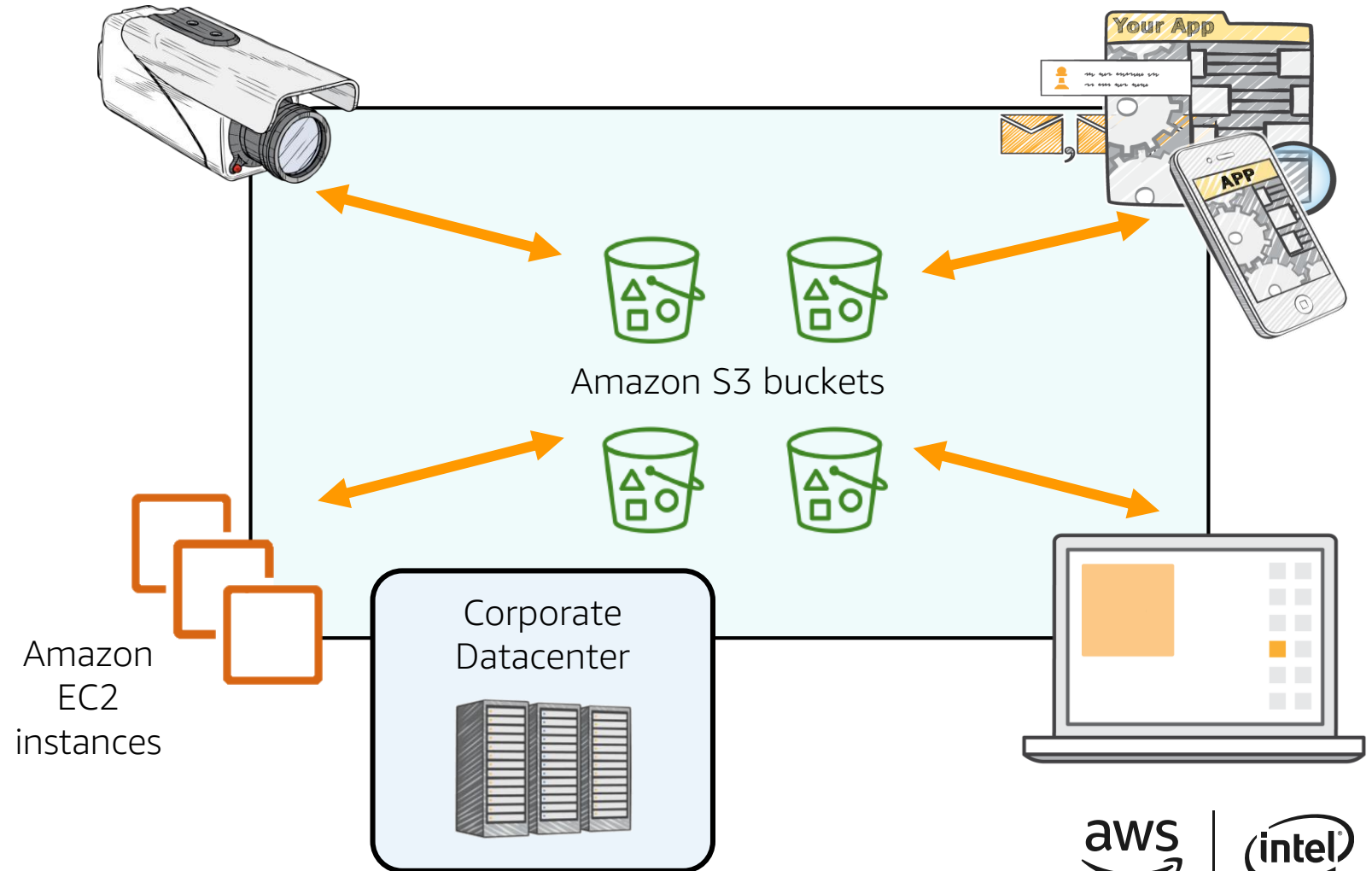
Demo

AWSOME DAY
ONLINE CONFERENCE

What is Amazon S3 Glacier?

- Low-cost data archiving and long-term backup

- 3- to 5-hour or within 12 hours*

- Can configure lifecycle archiving of Amazon S3 content to Amazon Glacier

Archive after
30 days

Delete after
5 years

Amazon
S3 bucket

Amazon
S3 Glacier

Amazon S3 Glacier use cases

Media asset workflows

Healthcare information archiving

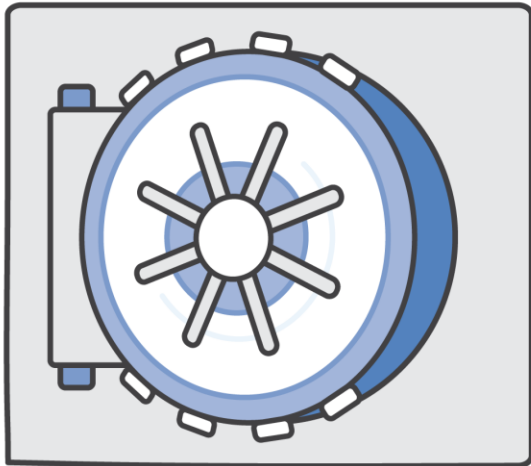Regulatory and compliance archiving

Scientific data storage

Digital preservation

Magnetic tape replacement
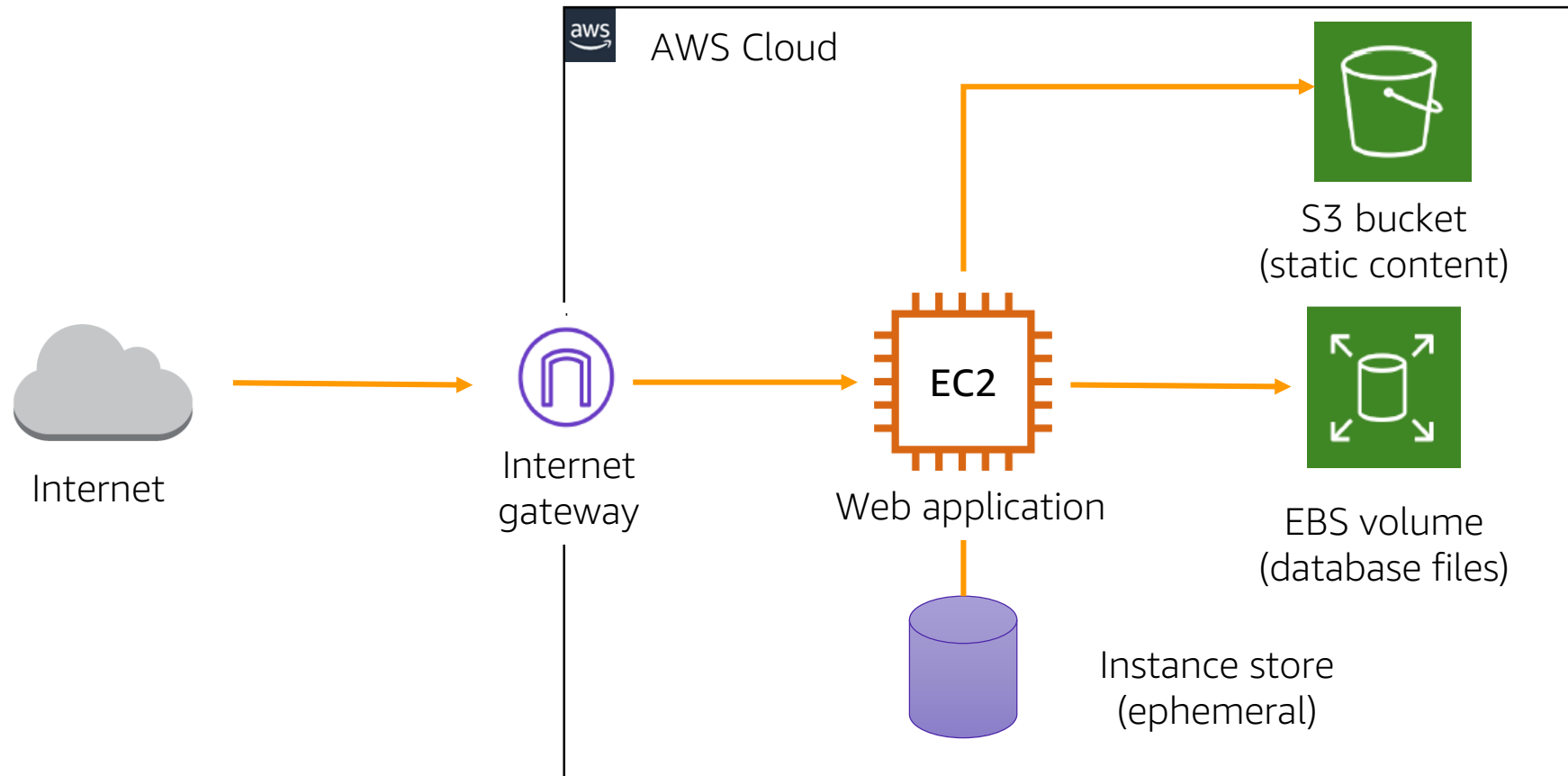
Amazon S3 Glacier vault lock policy

- Deploy and enforce compliance controls on individual Amazon Glacier vaults

- Vault becomes immutable once locked

Amazon S3 storage classes

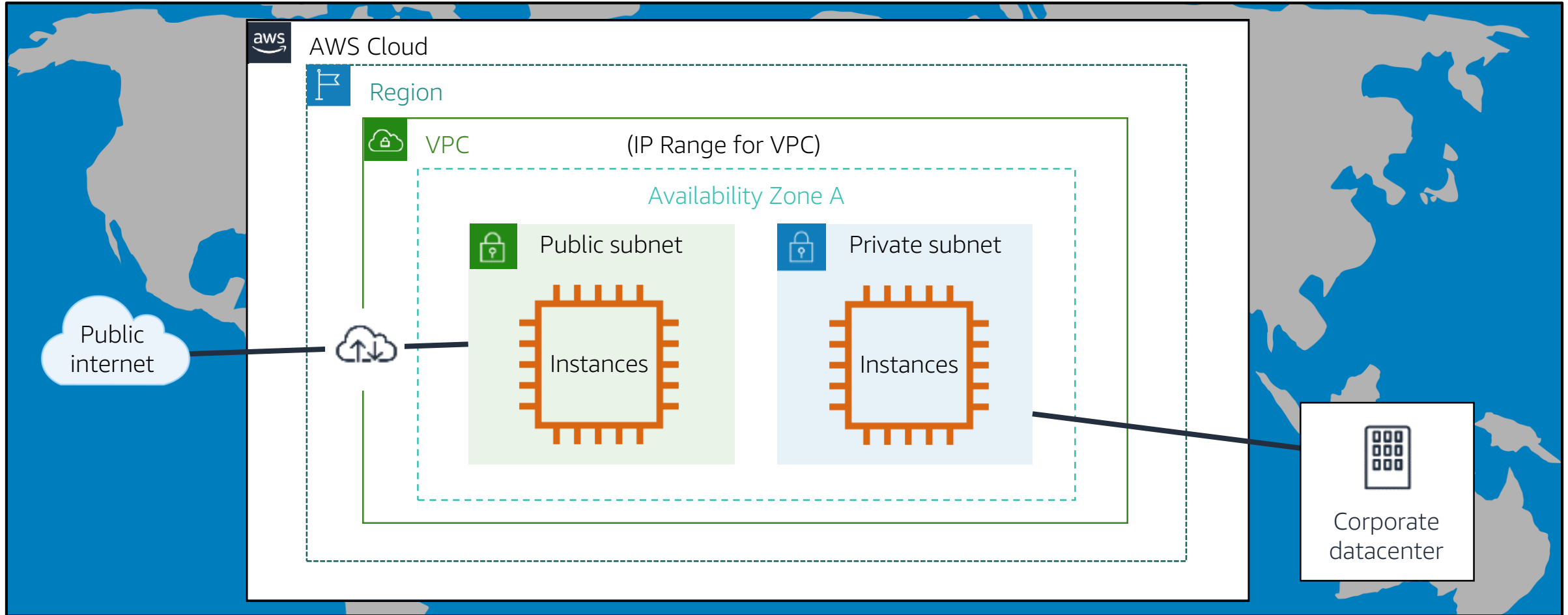| Storage class	Features
S3 Standard	• ≥3 availability zones
S3 Standard – Infrequent Access (IA)	• Retrieval fee associated with objects • Most suitable for infrequently accessed data
S3 Intelligent- Tiering	• Automatically moves objects between tiers based on access patterns • ≥3 availability zones
S3 One Zone-IA	• 1 availability zone • Costs 20% less than S3 Standard-IA
S3 Glacier	• Not available for real-time access • Must restore objects before you can access them • Restoring objects can take 1 minute - 12 hours
S3 Glacier Deep Archive	• Lowest cost storage for long term retention (7-10 years) • ≥3 availability zones • Retrieval time within 12 hours

aws | (intel)
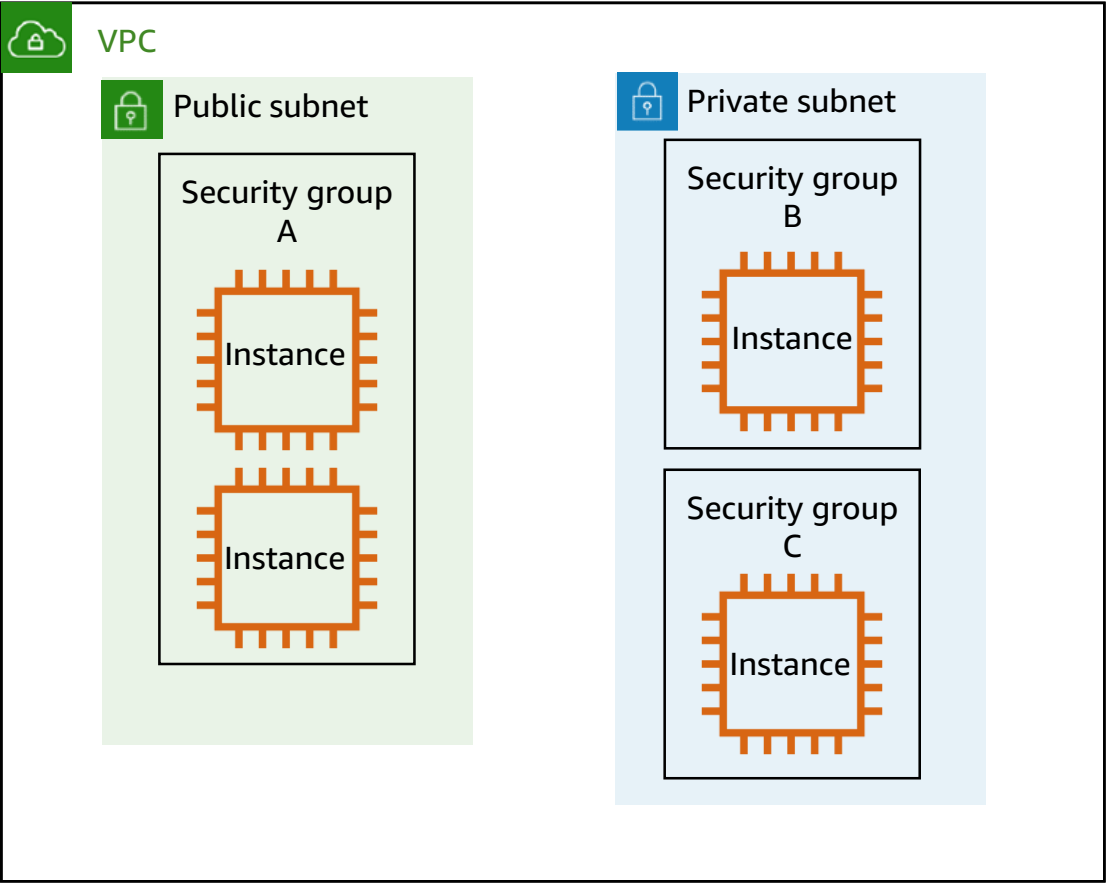
Architecture example

Internet → Internet gateway → EC2 (Web application) → S3 bucket (static content), EBS volume (database files), Instance store (ephemeral) — AWS Cloud

Secure your data

Amazon Virtual Private Cloud (Amazon VPC)

Security groups

Security Group A

Inbound		
Source	Protocol	Port Range
0.0.0.0/0	TCP	80
0.0.0.0/0	TCP	443

Security Group-B
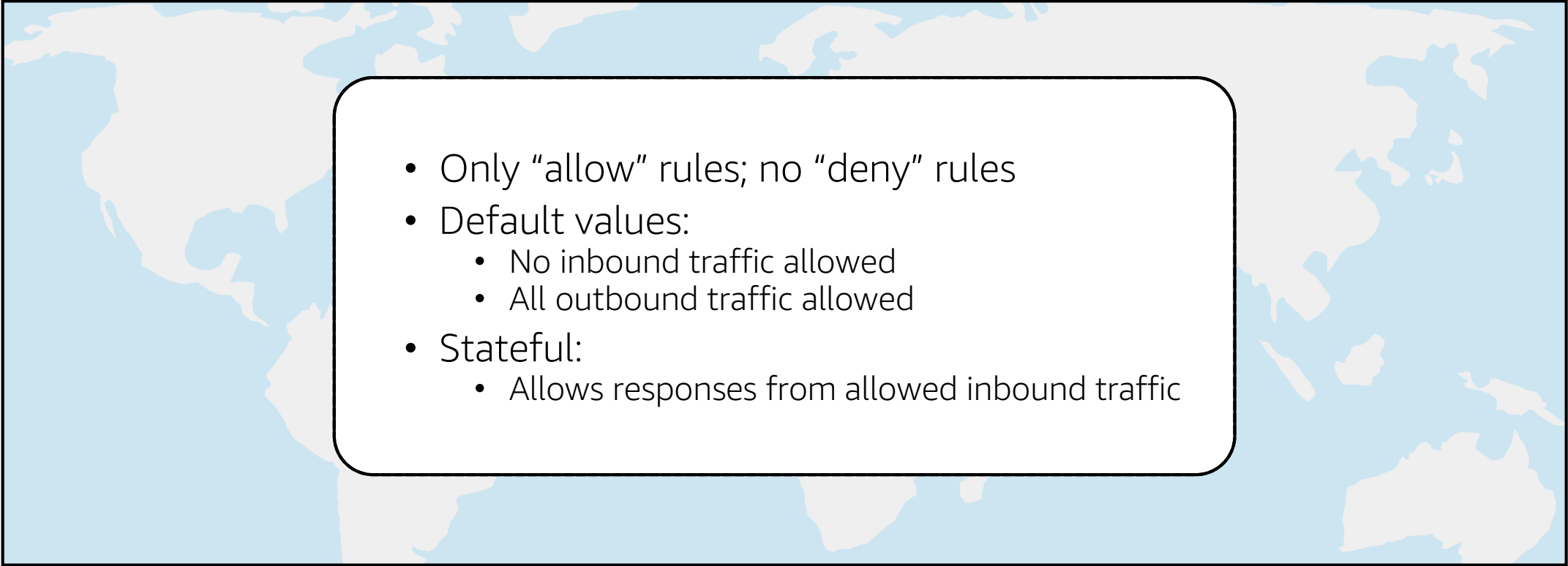
Inbound		
Source	Protocol	Port Range
10.0.1.0/24	TCP	22

Security Group-C

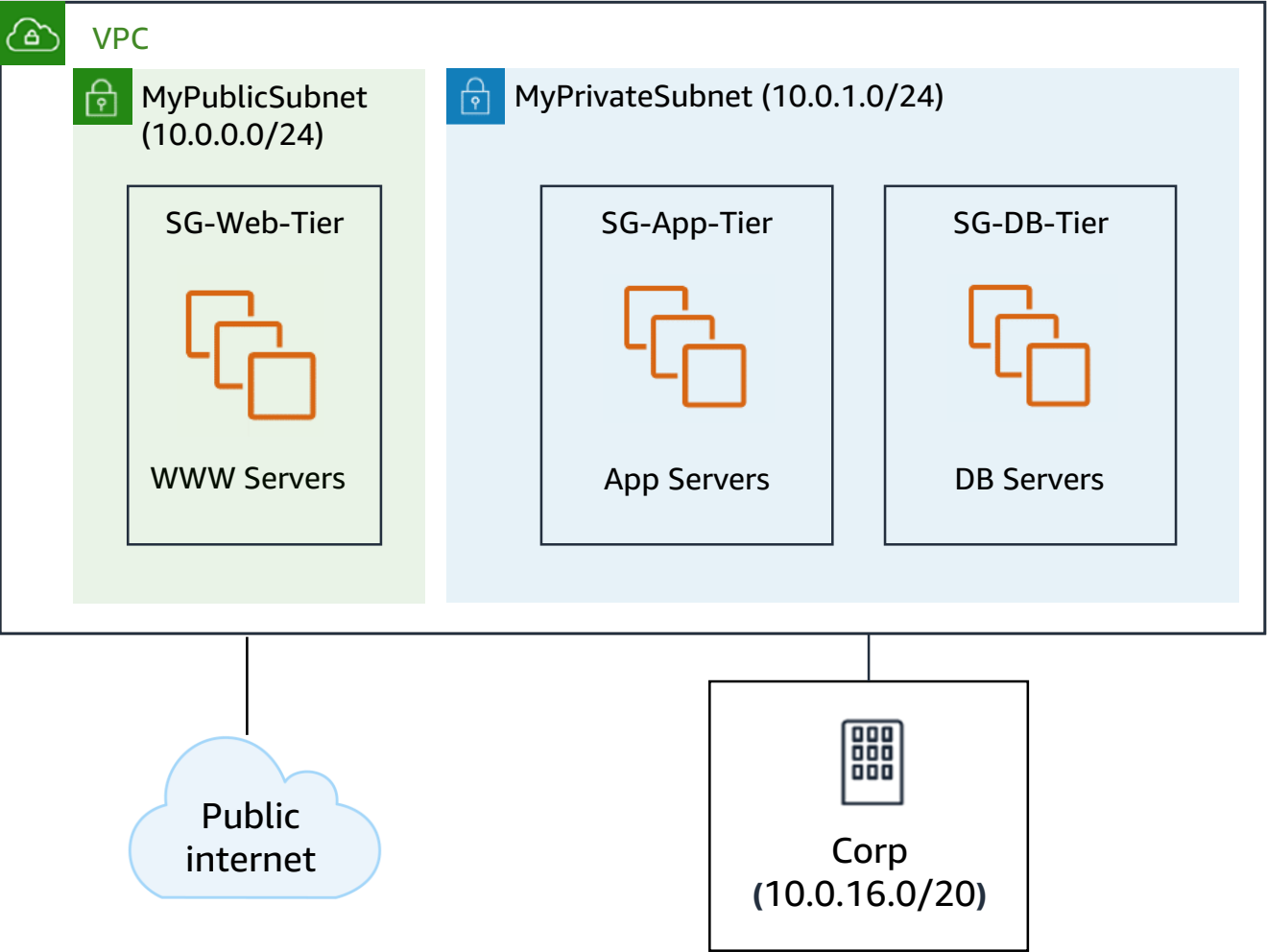| Inbound		
Source	Protocol	Port Range
ID of Security Group B	All	All
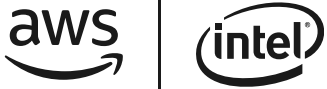
Security group details

- Only "allow" rules; no "deny" rules
- Default values:
  - No inbound traffic allowed
  - All outbound traffic allowed
- Stateful:
  - Allows responses from allowed inbound traffic

Security groups example

Inbound		
Source	**Protocol**	**Port Range**
0.0.0.0/0	TCP	80
0.0.0.0/0	TCP	443
10.0.16.0/20	TCP	22

SG-Web-Tier

Inbound		
Source	**Protocol**	**Port Range**
ID of SG-Web-Tier	TCP	6455
10.0.16.0/20	TCP	22

SG-App-Tier

Inbound		
Source	**Protocol**	**Port Range**
ID of SG-App-Tier	TCP	3306
10.0.16.0/20	TCP	22

SG-DB-Tier

End of Module 2

Test your knowledge