

Module 2: Getting started with the cloud

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AWS

Getting started with AWS services

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AWS products



The screenshot shows the AWS website's product carousel. The main header includes the AWS logo and navigation links: Products, Solutions, Pricing, Documentation, Learn, Partner Network, AWS Marketplace, and Explore More. On the right, there are links for Contact Sales, Support, English, and My Account. The carousel features a large slide for "AWS Deep Learning Containers" with a brain icon and a "Learn more" link. Below this are four smaller product highlights, each with an icon and a brief description. At the bottom, there is a "AWS Customer News" section with a link to a press release about Volkswagen's industrial cloud.

aws Products Solutions Pricing Documentation Learn Partner Network AWS Marketplace Explore More [Contact Sales](#) [Support](#) [English](#) [My Account](#)

AWS Deep Learning Containers

Quickly set up deep learning environments with optimized, pre-packaged Docker images

[Learn more »](#)

Amazon Lightsail
Everything you need to get started on AWS—for a low, predictable price

Amazon EC2 M5ad & R5ad Instances
10% lower cost compute and memory compared to comparable instances

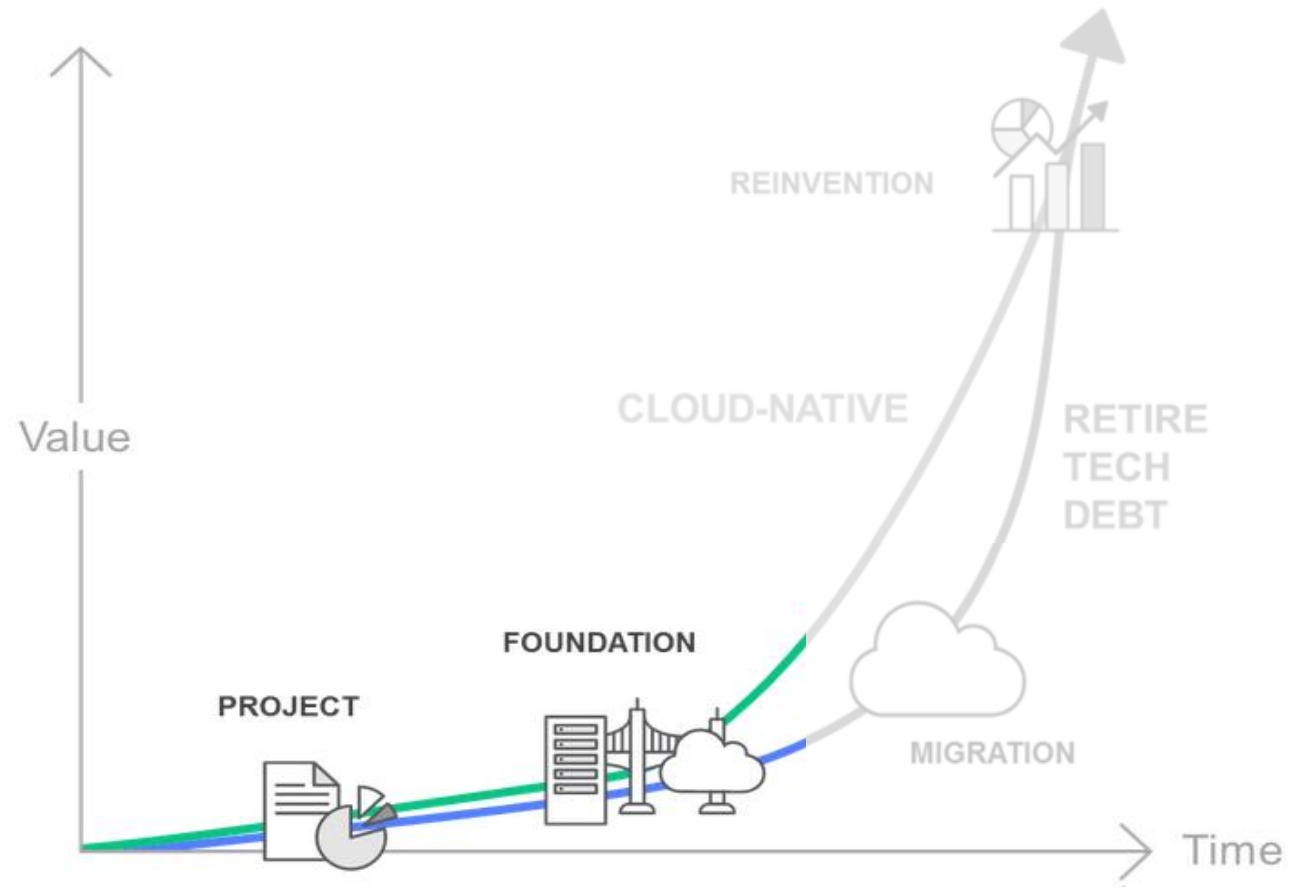
Amazon S3 Glacier Deep Archive
A new S3 storage class that provides secure, durable object storage for long-term data retention

110,000+ Databases Migrated to AWS
Save time & cost—migrate to fully managed databases

AWS Customer News
Volkswagen Group plans to build the Volkswagen Industrial Cloud, an industrial digital production platform that will transform the company's manufacturing and logistics processes, on AWS. [Read the press release »](#)

Explore Our Products

Cloud journey

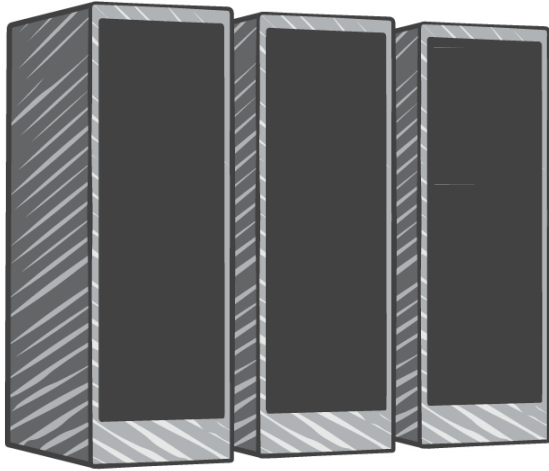


Build your infrastructure

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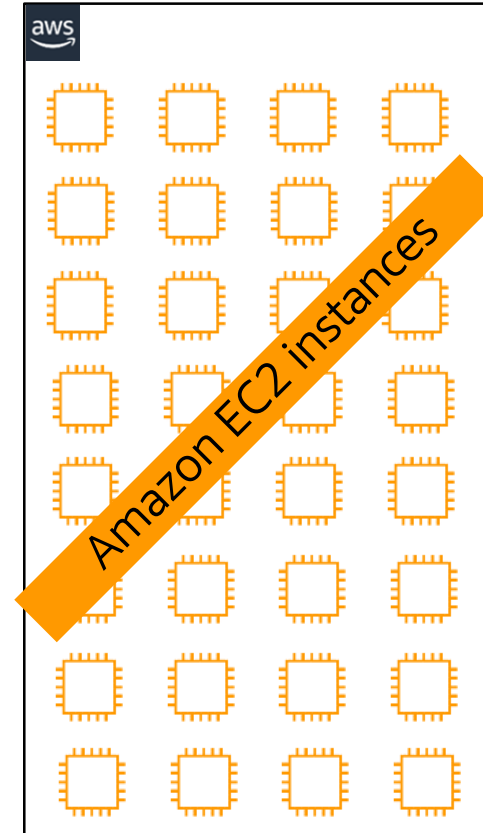
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What is Amazon Elastic Compute Cloud (EC2)?



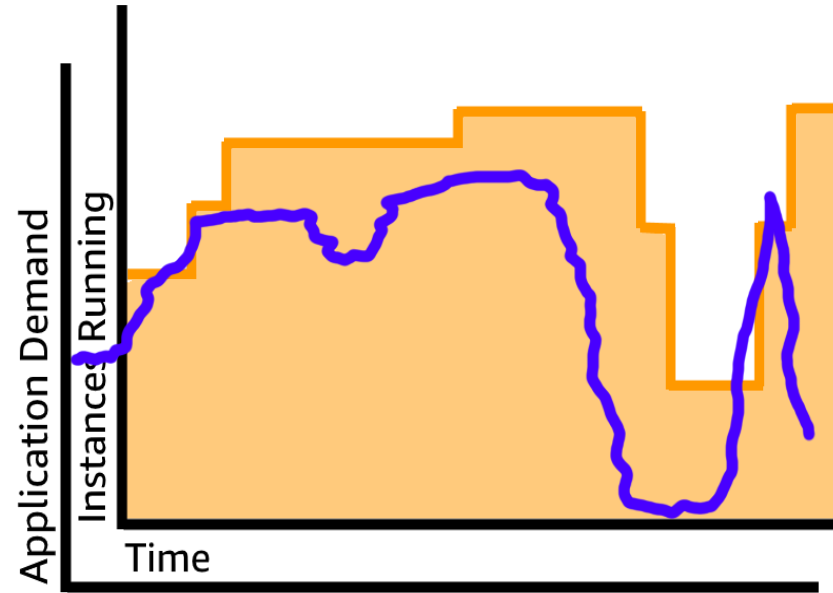
On-premises servers

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



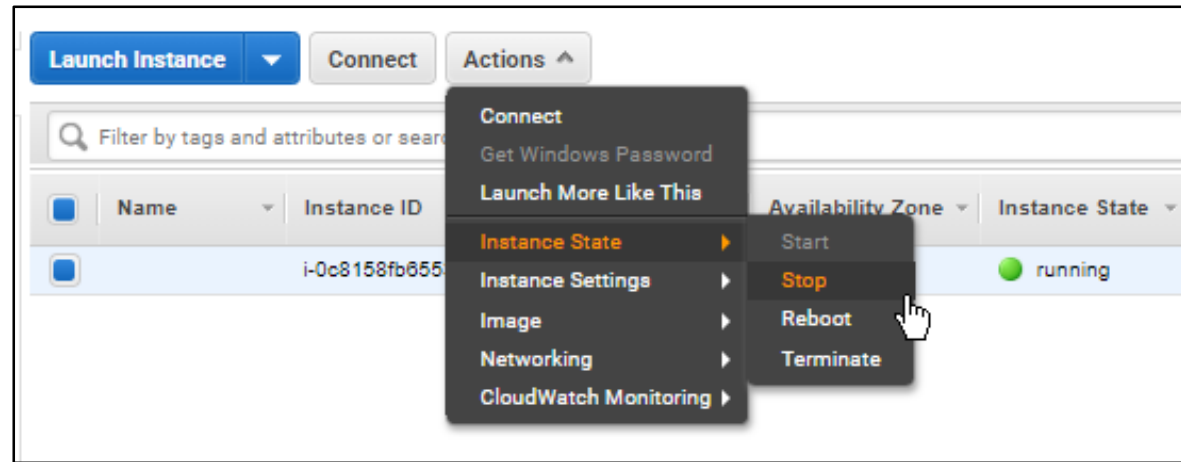
Benefits of Amazon EC2

- 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.

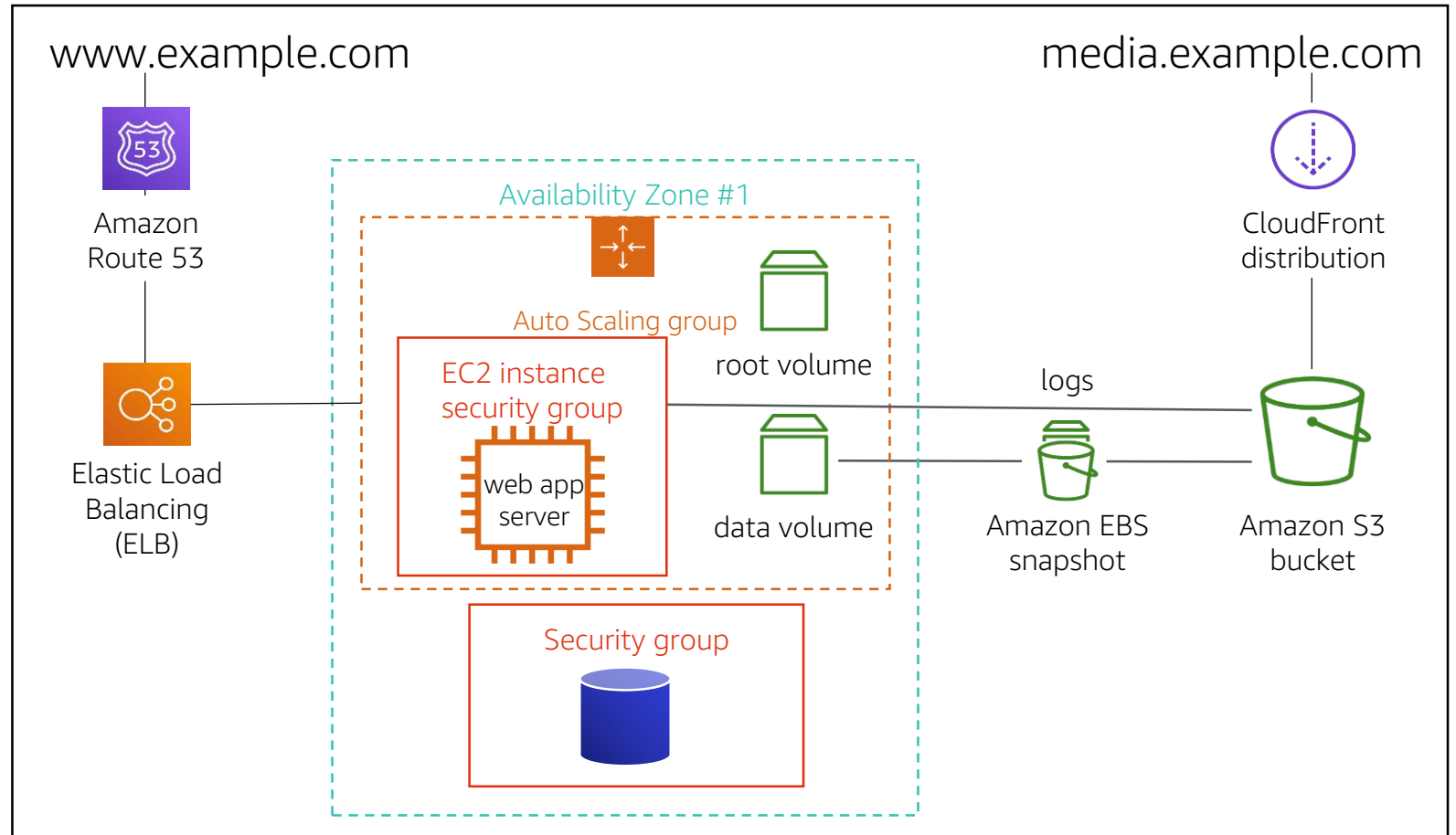
Filter by: Compute optimized Current generation [Show/Hide Columns](#)

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
<input type="checkbox"/>	Compute optimized	c5d.large	2	4	1 x 50 (SSD)	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5d.xlarge	4	8	1 x 100 (SSD)	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5d.2xlarge	8	16	1 x 200 (SSD)	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5d.4xlarge	16	32	1 x 400 (SSD)	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5d.9xlarge	36	72	1 x 900 (SSD)	Yes	10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5d.18xlarge	72	144	2 x 900 (SSD)	Yes	25 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5.large	2	4	EBS only	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5.xlarge	4	8	EBS only	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5.2xlarge	8	16	EBS only	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5.4xlarge	16	32	EBS only	Yes	Up to 10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5.9xlarge	36	72	EBS only	Yes	10 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c5.18xlarge	72	144	EBS only	Yes	25 Gigabit	Yes
<input type="checkbox"/>	Compute optimized	c4.large	2	3.75	EBS only	Yes	Moderate	Yes
<input type="checkbox"/>	Compute optimized	c4.xlarge	4	7.5	EBS only	Yes	10 Gigabit	Yes

Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility
- Integrated



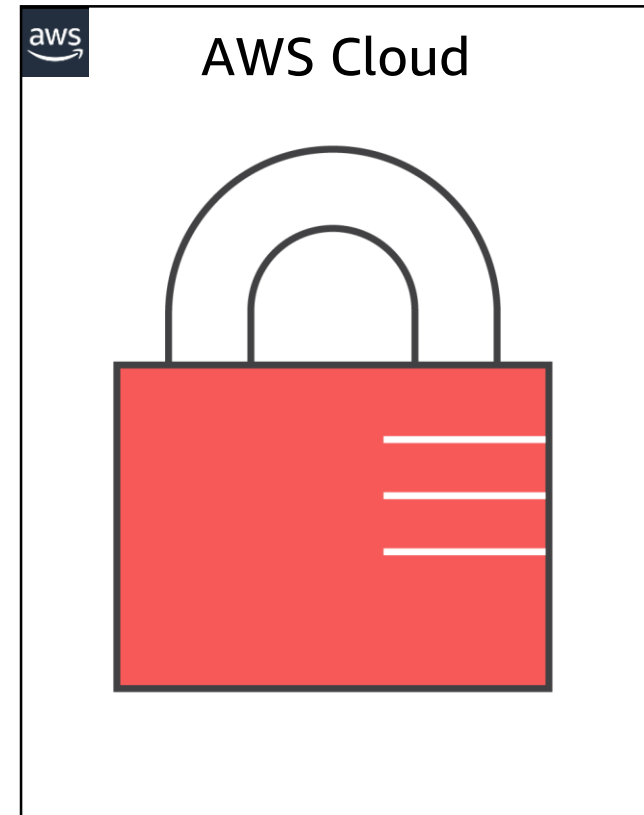
Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility
- Integrated
- Reliable



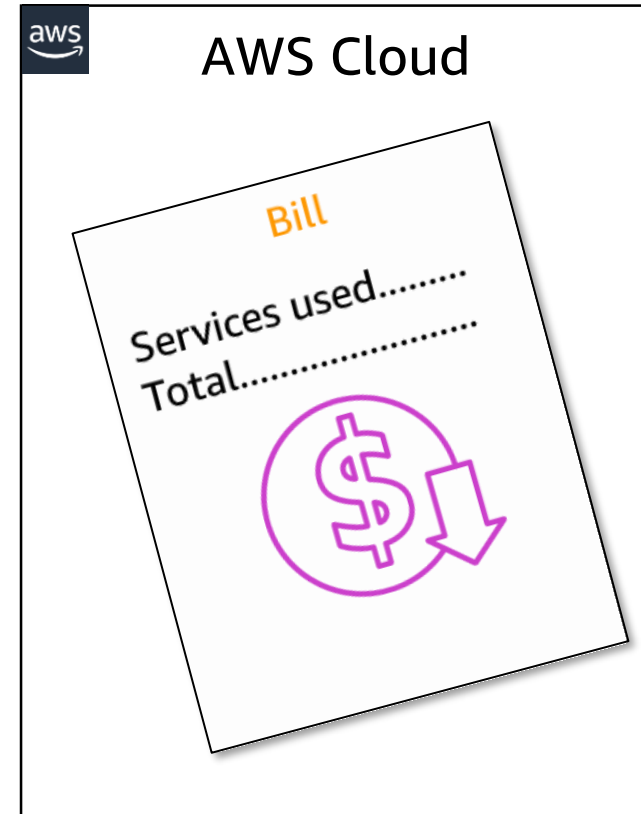
Benefits of Amazon EC2

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



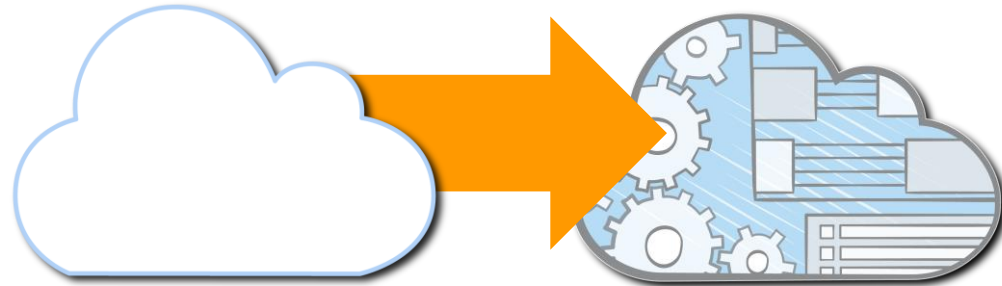
Benefits of Amazon EC2

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



Benefits of Amazon EC2

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



What does Intel do with Amazon

Common history & values

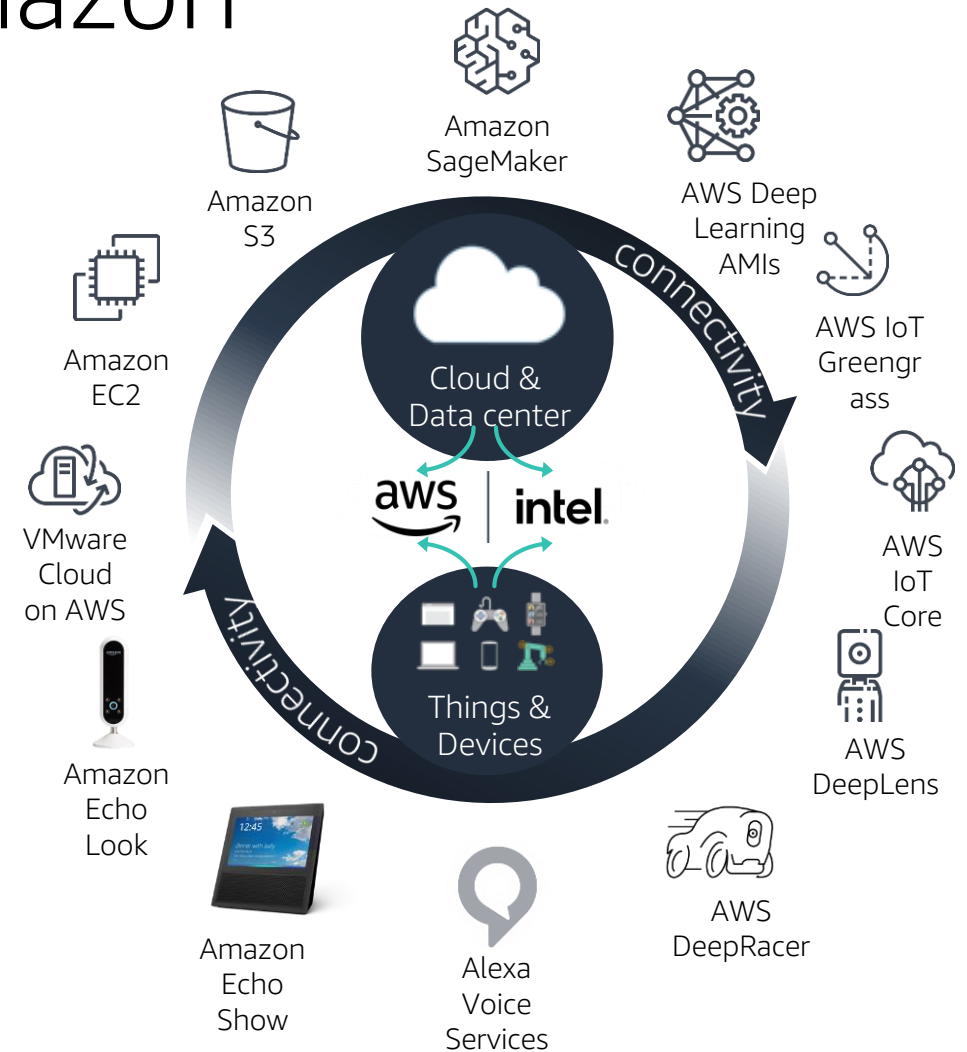
13+ year engineering collaboration

Digital transformation

Shared customer passion

High performance + low costs

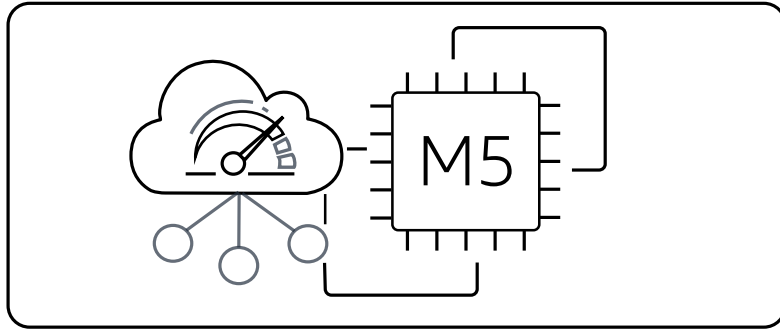
World class supply chain



<https://aws.amazon.com/intel/>

Benefits of Intel® Xeon® Scalable Processors

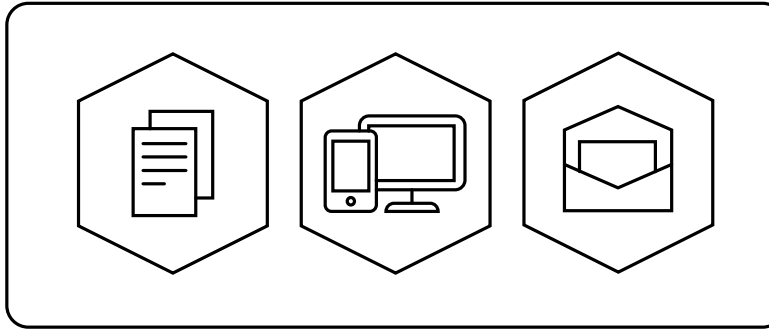
Price / Performance



1.25x Price/Perf
SpecINT

4.1x Price/Perf
High Perf Linpack

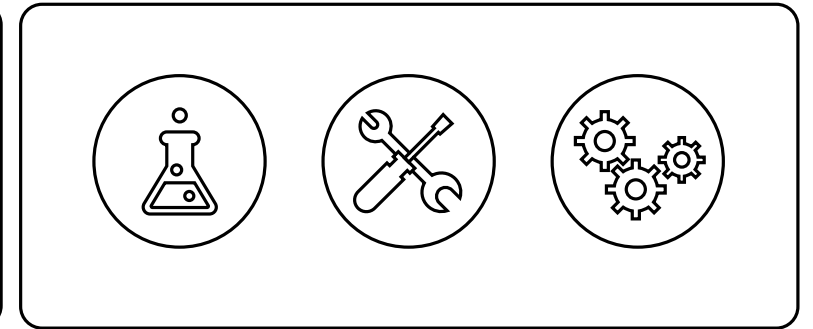
World-Class Ecosystem



20k+ Intel Software
engineers

1k+ ISV applications
optimized for Intel
architecture

Workload Optimizations



Up to
1.7M TPM*
MS SQL

Up to
480k SAPS Benchmark**
SAP

* AWS SQL Server Performance on AWS <https://s3.amazonaws.com/aws-database-blog/artifacts/whitepapers/SQL-Server-Performance-on-AWS.pdf>

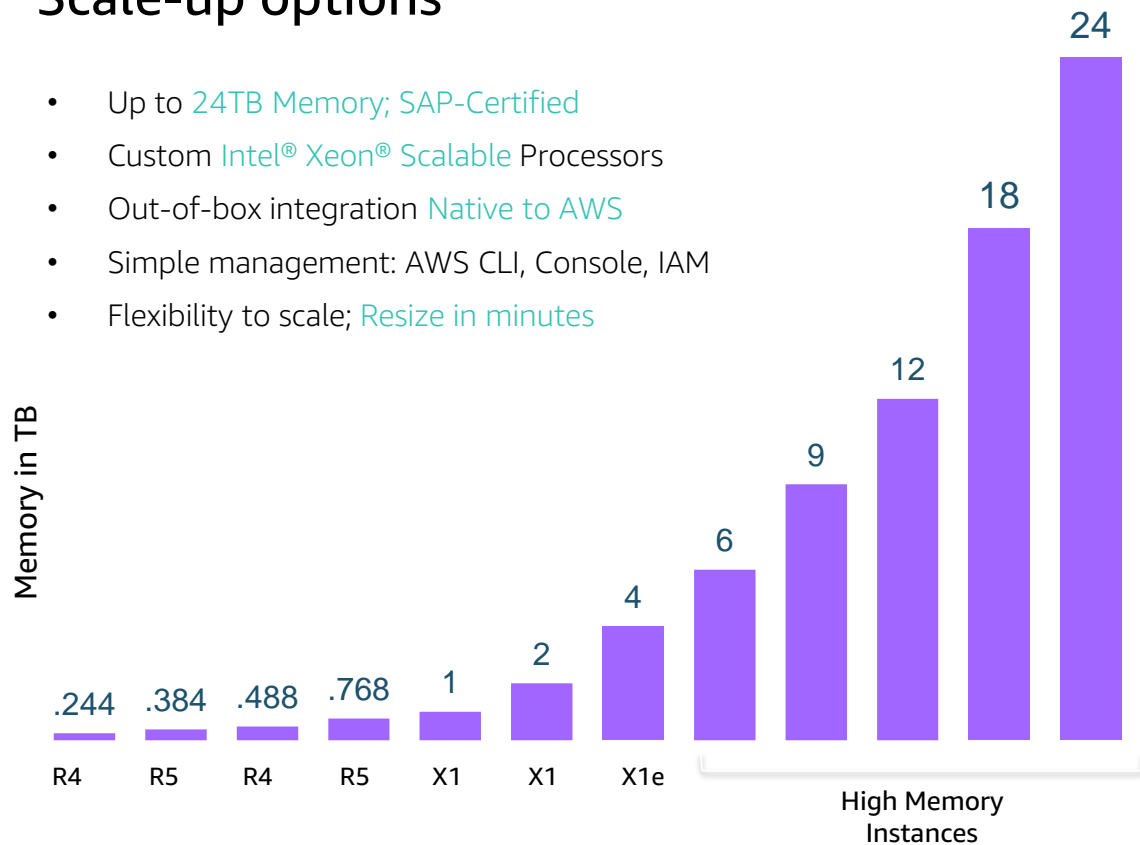
** SAP: <https://www.sap.com/dmc/benchmark/2018/Cert18041.pdf> and AWS: <https://aws.amazon.com/blogs/awsforaws/new-sap-certifications-for-aws-instances-and-world-record-benchmark-results/>

The most choice

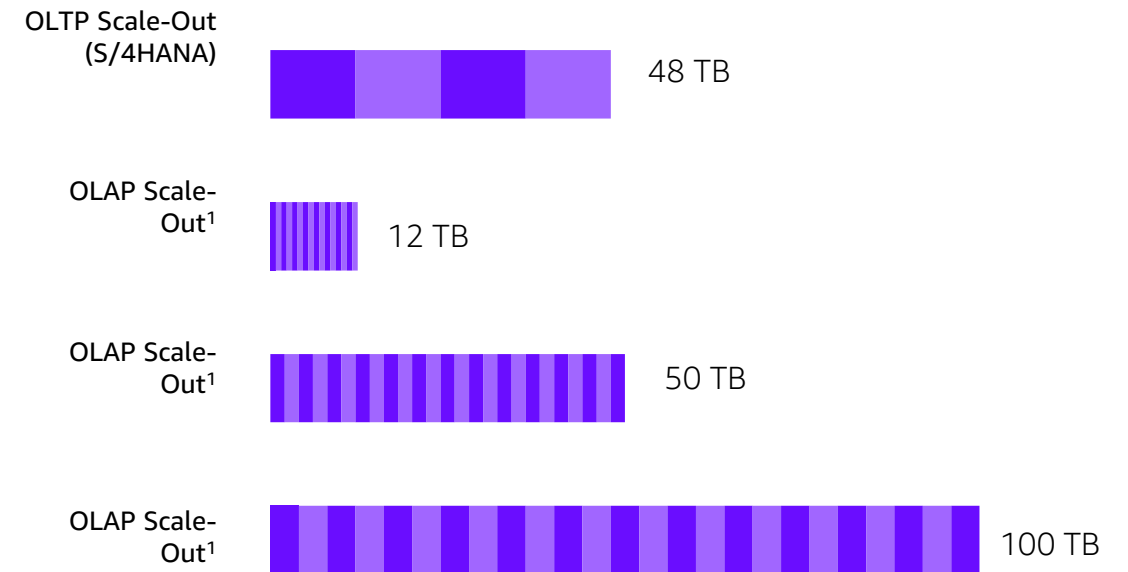
Resources to run the largest and most demanding SAP Workloads

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

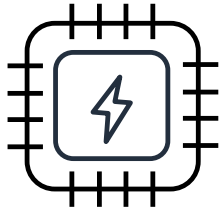


Scale-out options



¹ BWoH, BW/4HANA and Datamart

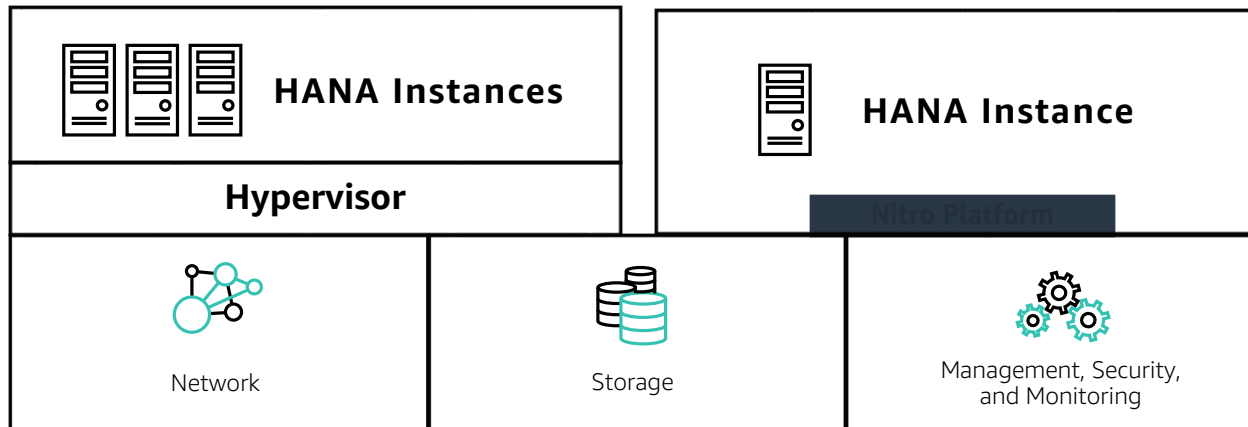
AWS "Nitro for SAP" system



Makes 100% of the server addressable

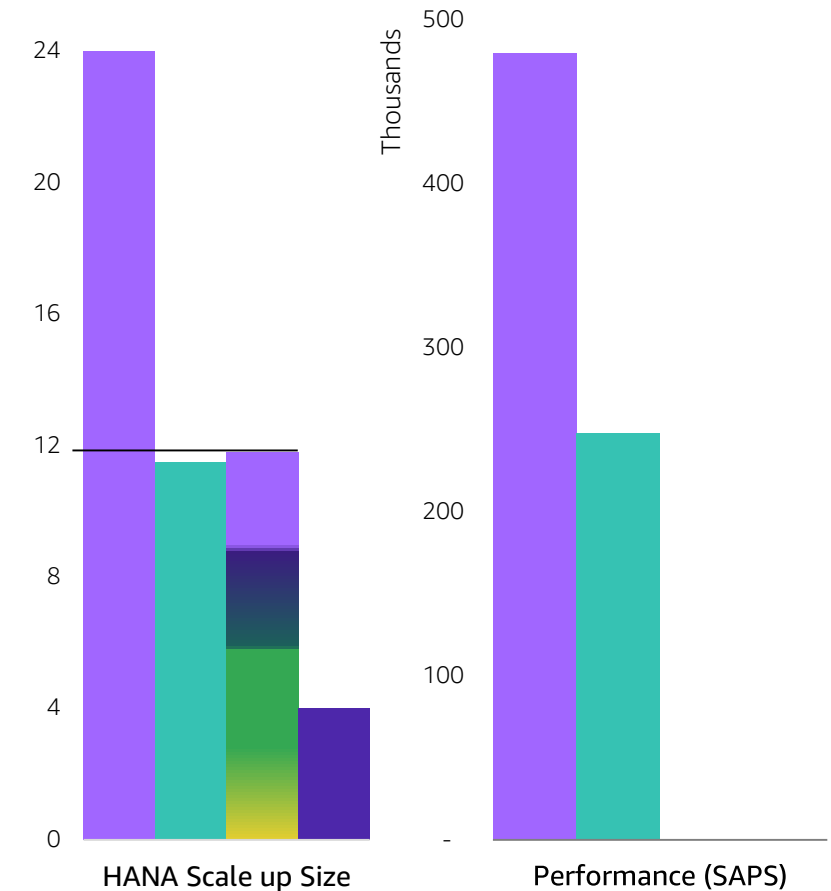
Provides the highest core count in the industry

Seamless integrated experience

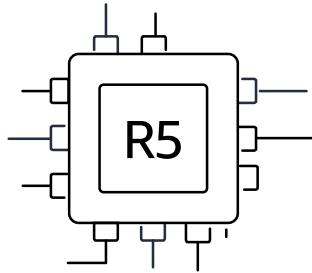


2x the scale-up
capacity

Up to
480k SAPS



R5: memory-optimized instances



r5.large

16 GiB

2 vCPU

7 sizes



r5.24xlarge

768 GiB

96 vCPU

In-memory caches



High performance databases



Big data analytics



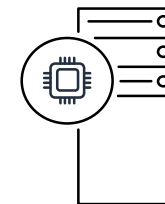
3.1 GHz Intel® Xeon® Scalable Processors (Skylake)

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

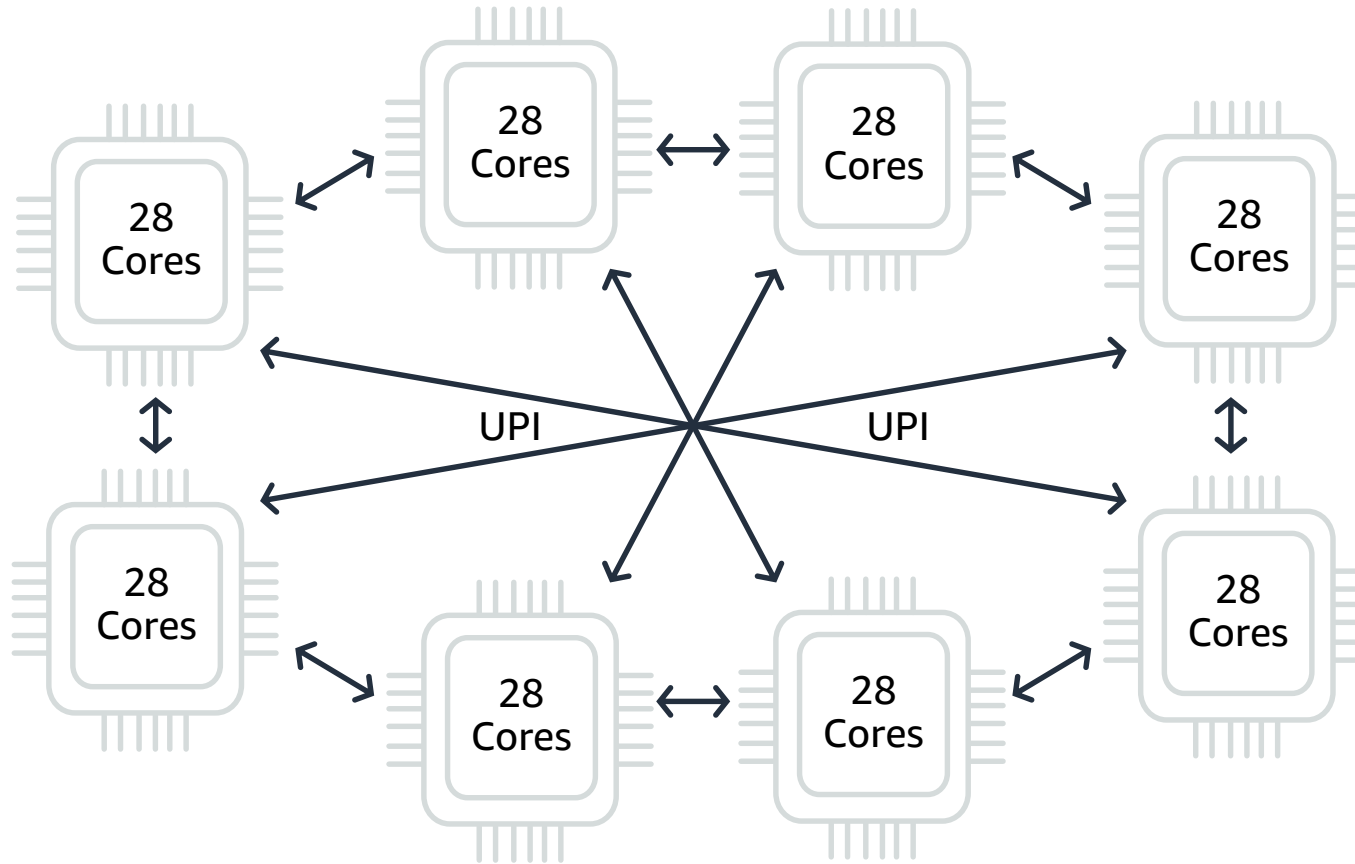
SAP HANA Certified: r5.12xlarge ,r5.24xlarge and r5.metal.



Best Price to Performance

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

EC2 high memory instance architecture

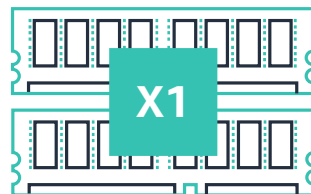


The most memory of any EC2 Instance
SAP-Certified

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

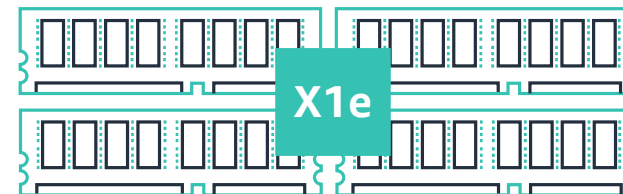
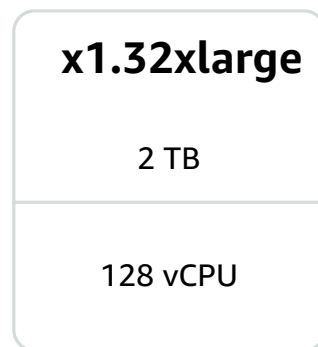
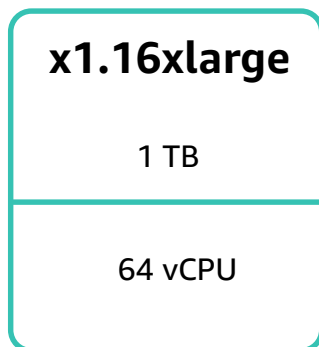
X1 and X1e: large-scale memory-optimized



For large in-memory workloads

16:1 GiB to vCPU ratio

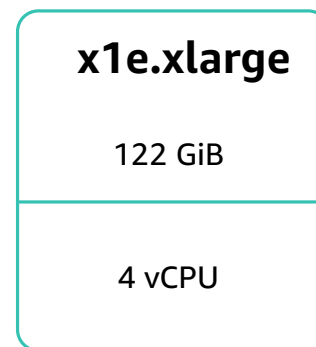
In-memory databases (e.g., SAP HANA), big data processing engines (Apache Spark, Presto), in-memory analytics



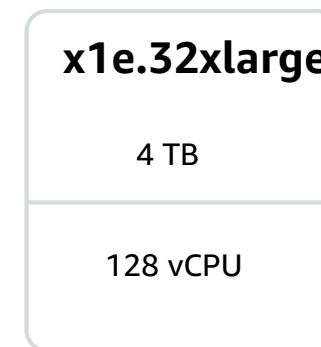
For memory-intensive workloads and very large in-memory workloads

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)



6 sizes



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					
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 instance types and Intel technologies

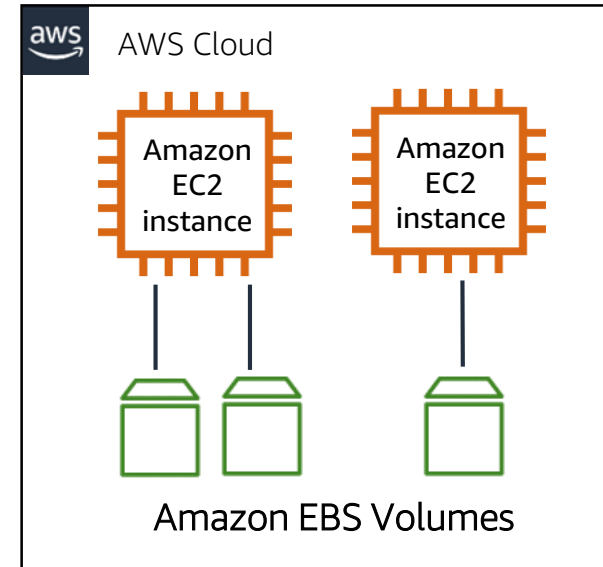
14 years of partnership with over 200 instance types

AWS Instance Type	General Purpose			Compute Optimized		Memory Optimized					Accelerated Compute (GPU)			Storage Optimized (High I/O)	
	T3 (burstable)	M5	M5n	C5	C5n	R5	R5n	X1e / X1	High Memory	Z1d	P3	G4	F1	I3	I3en
Intel® Processor	Intel® Xeon® Scalable Processors	Intel® Xeon® Platinum 8175M Processors	Intel® Xeon® Scalable Processors	Intel® Xeon® Scalable Processors	Intel® Xeon® Platinum 8124M Processors	Intel® Xeon® Platinum 8175 Processors	Intel® Xeon® Scalable Processors	Intel® Xeon® E7 8880 v3 Processors	Intel® Xeon® Platinum 8176M or Scalable Processors	Intel® Xeon® Platinum 8151 Processors	Intel® Xeon® E5-2686 v4 or P-8175M Processors	Intel® Xeon® Scalable Processors	Intel® Xeon® E5-2686 v4 Processors	Intel® Xeon® E5-2686 v4 Processors	Intel® Xeon® Scalable Processors
Intel® Process Technology	Skylake	Skylake	Cascade Lake	Cascade Lake	Skylake	Skylake	Cascade Lake	Haswell	Skylake or Cascade Lake	Skylake	Broadwell or Skylake	Cascade Lake	Broadwell	Broadwell	Skylake
Intel® Advanced Vector Extensions	AVX-512	AVX-512	AVX-512	AVX-512	AVX-512	AVX-512	AVX-512	AVX2	AVX-512	AVX-512	AVX2 or AVX-512	AVX-512	AVX2	AVX2	AVX-512
Intel® AES New Instructions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intel® Turbo Boost	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intel® Deep Learning Boost	-	-	Yes	Yes	-	-	Yes	-	Yes (18 & 24 TiB)	-	-	Yes	-	-	-

Store your data

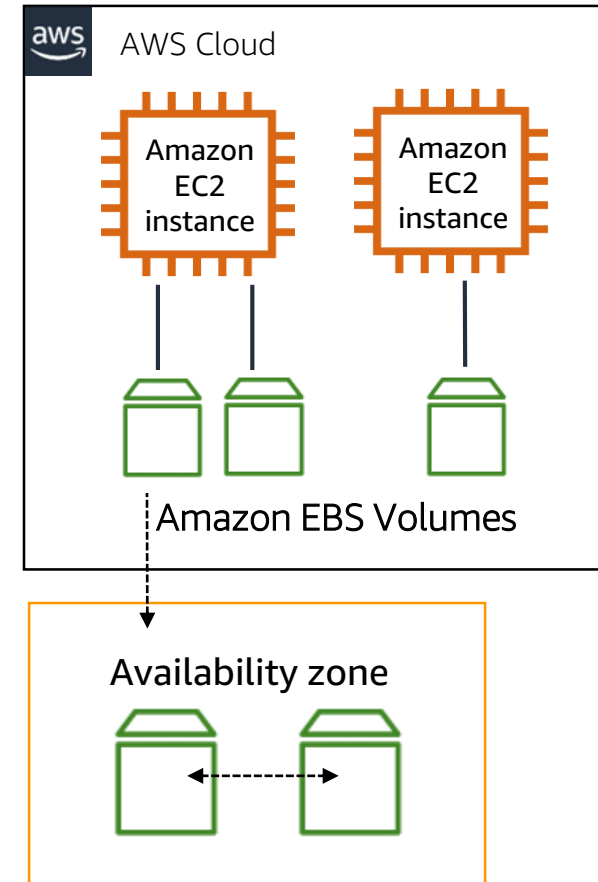
Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances



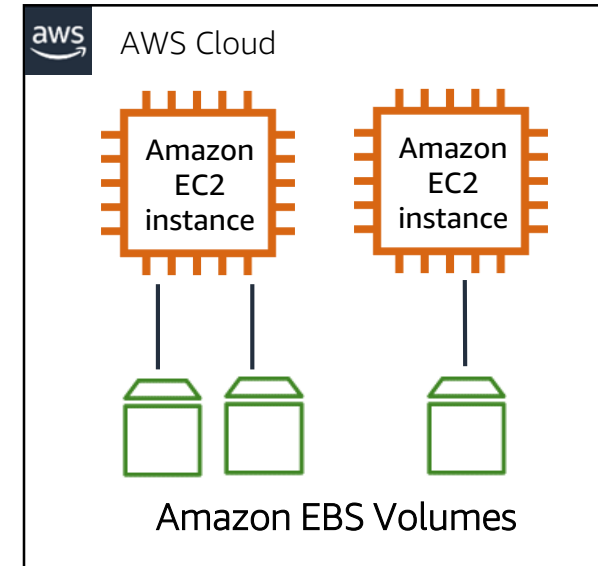
Amazon Elastic Block Store (Amazon EBS)

- 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



Solid State Drives (SSD)

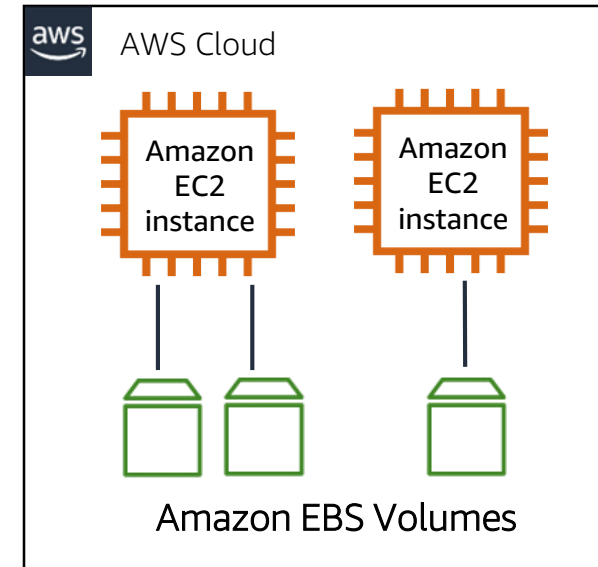
- Provisioned IOPS SSD (io1) Volumes
- General Purpose SSD (gp2) Volumes

Hard Disk Drives (HDD)

- Throughput Optimized HDD (st1) Volumes
- Cold HDD (sc1) Volumes

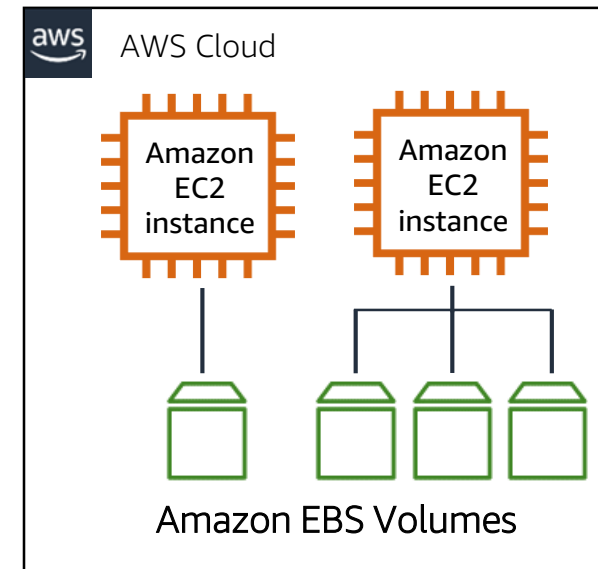
Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances
- Protected through replication
- Different drive types
- Scale up or down in minutes



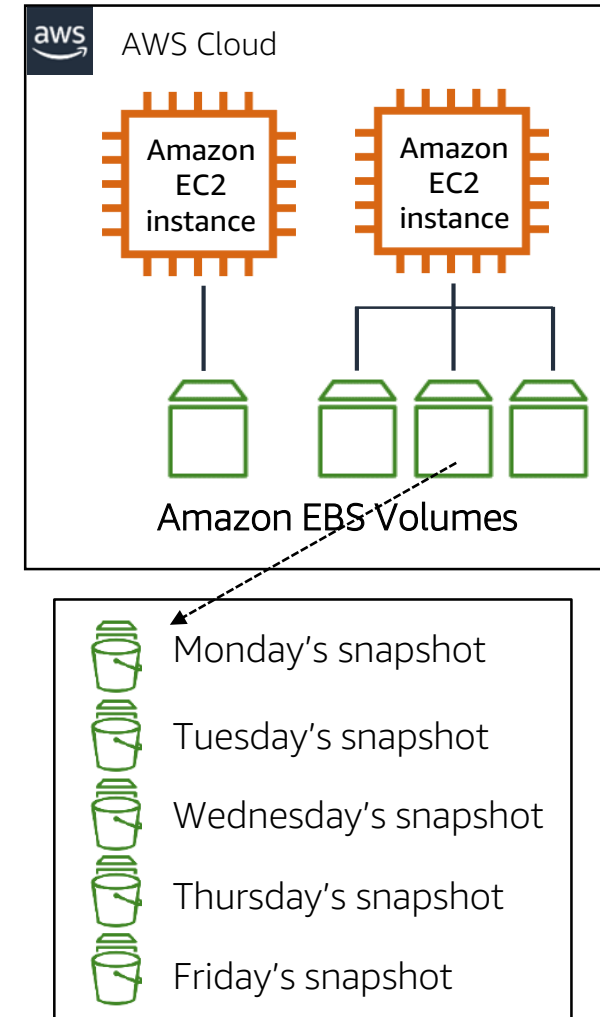
Amazon Elastic Block Store (Amazon EBS)

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



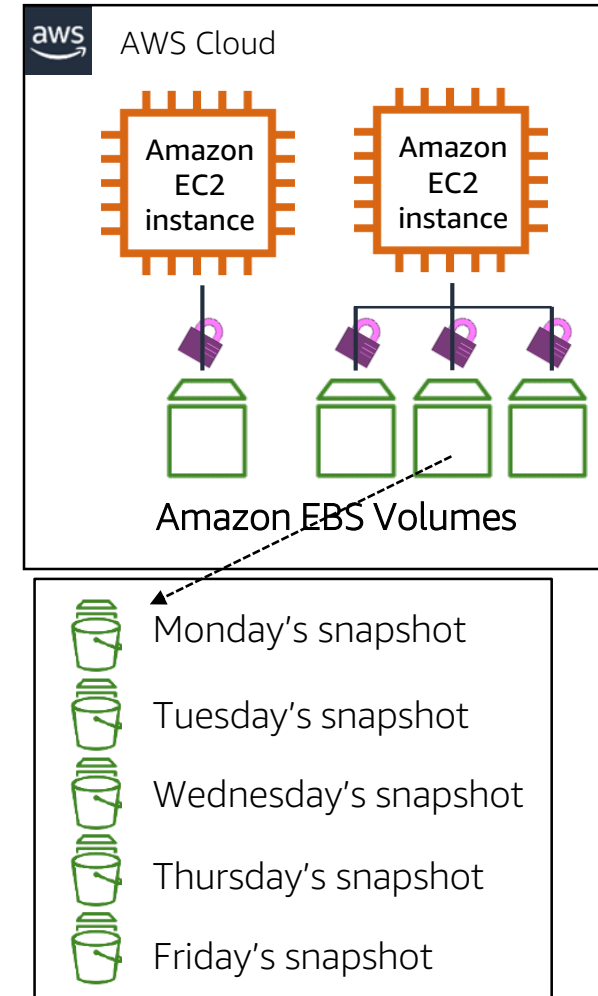
Amazon Elastic Block Store (Amazon EBS)

- 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

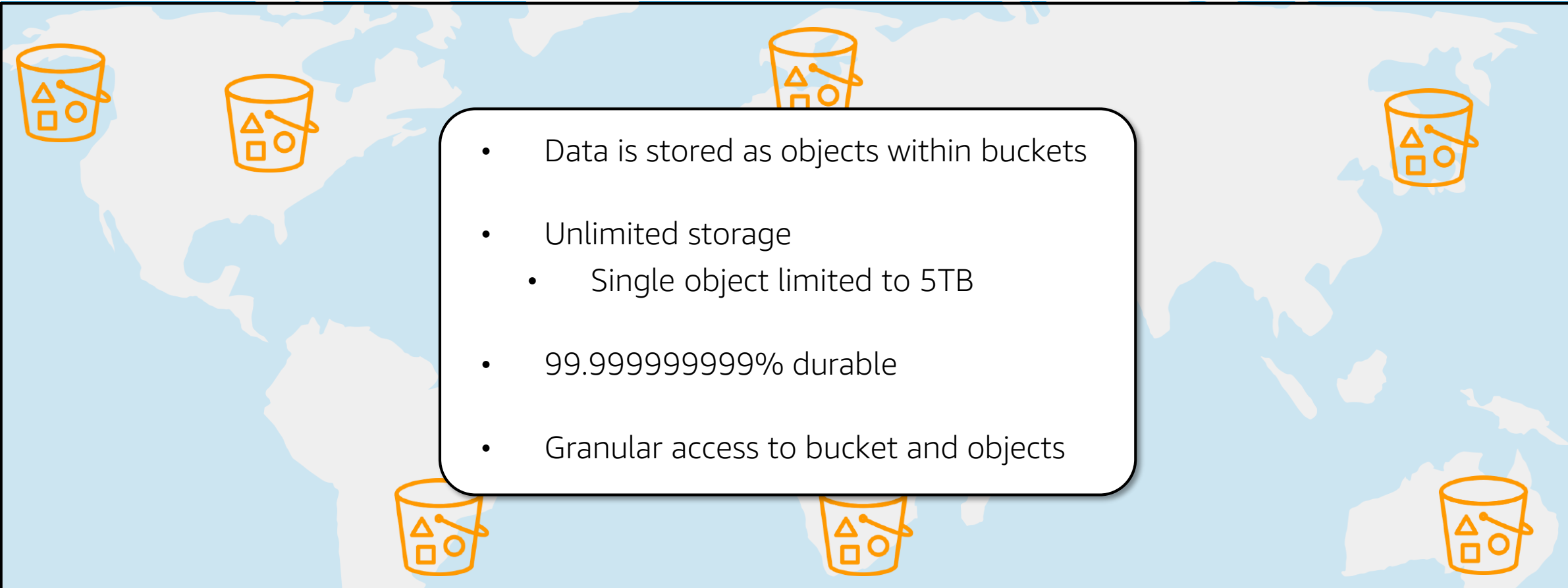


Amazon Elastic Block Store (Amazon EBS)

- 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

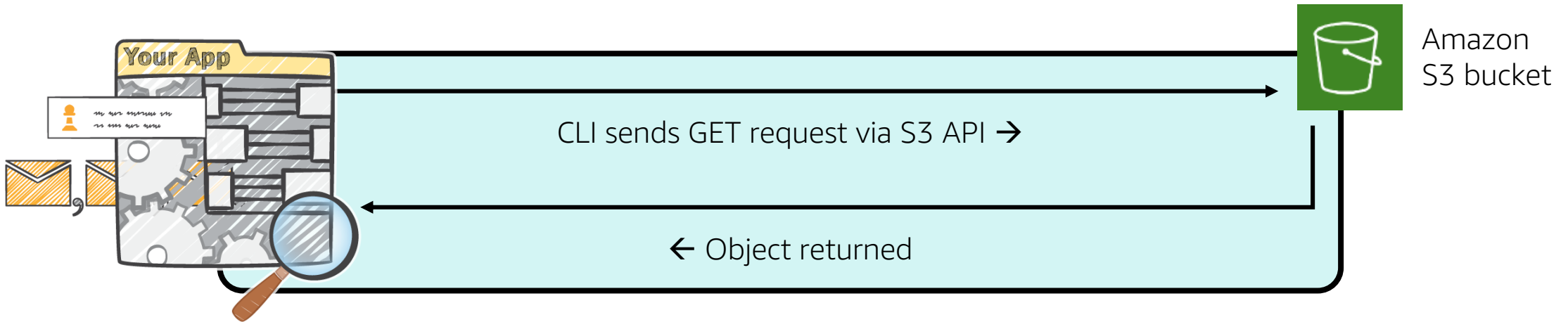


What is Amazon Simple Storage Service (S3)?

- 
- Data is stored as objects within buckets
 - Unlimited storage
 - Single object limited to 5TB
 - 99.999999999% durable
 - Granular access to bucket and objects

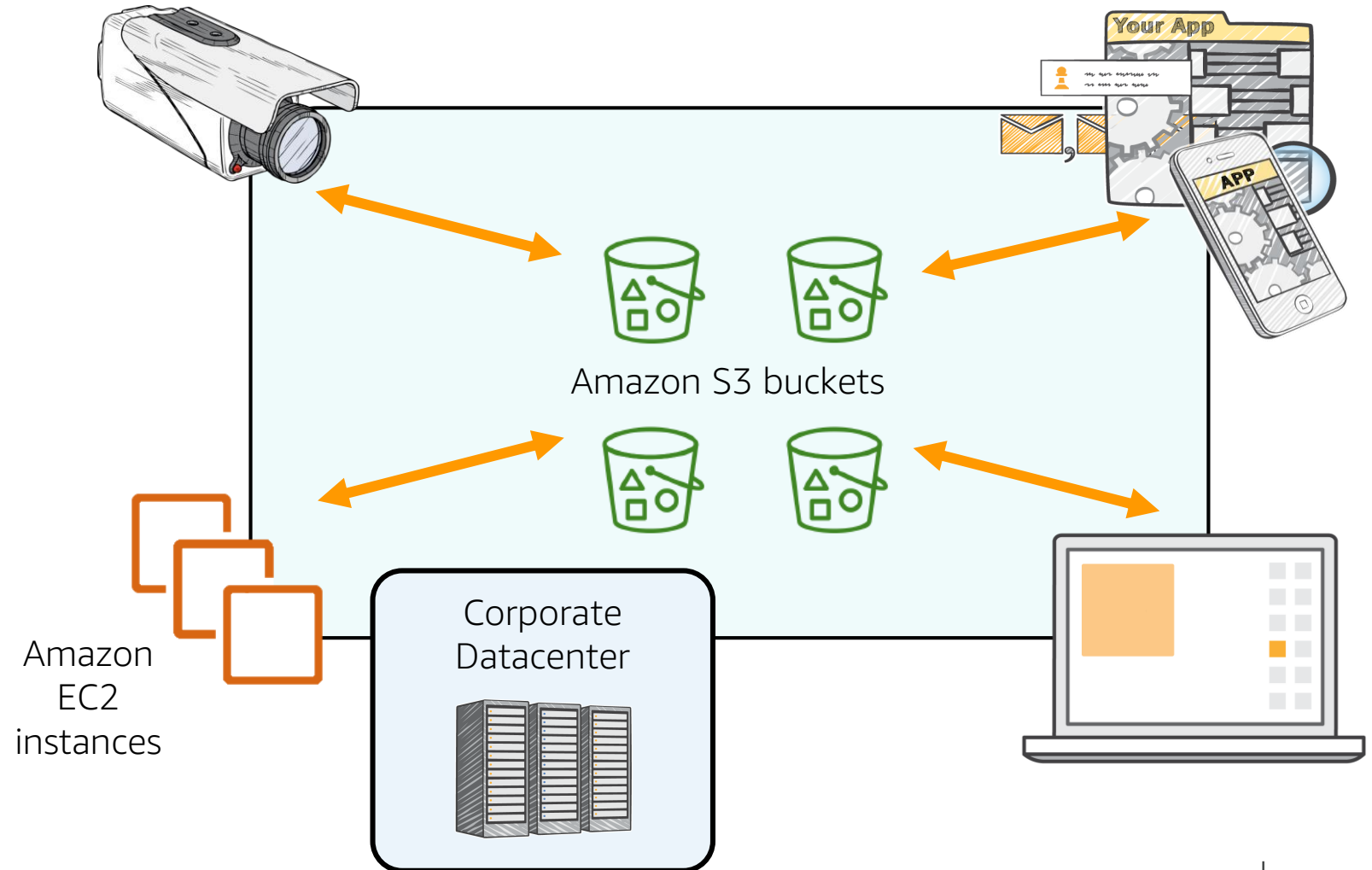
Amazon S3 core functionality

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



Amazon S3 common scenarios

- Backup and storage
- Application hosting
- Media hosting
- Software delivery



Demo

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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



Amazon S3 Glacier use cases



Media asset workflows



Healthcare information archiving



Regulatory and compliance archiving



Scientific data storage

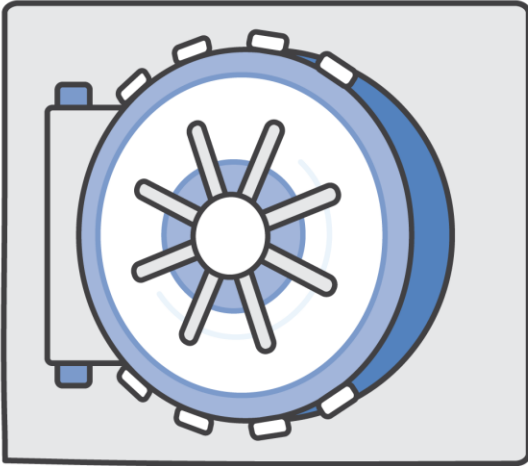


Digital preservation



Magnetic tape replacement

Amazon S3 Glacier vault lock policy

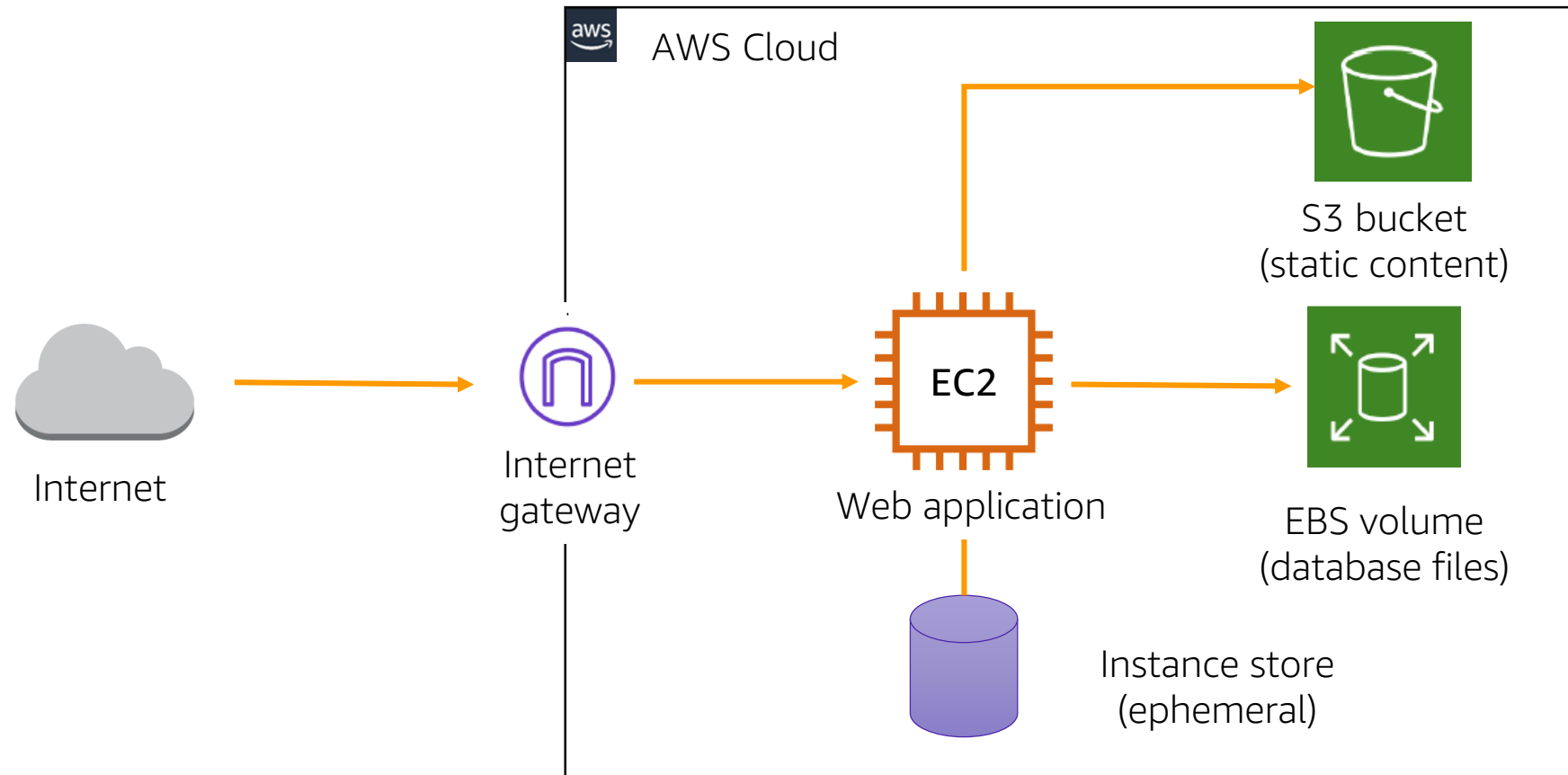


- Deploy and enforce compliance controls on individual Amazon Glacier vaults
- Vault becomes immutable once locked

Amazon S3 storage classes

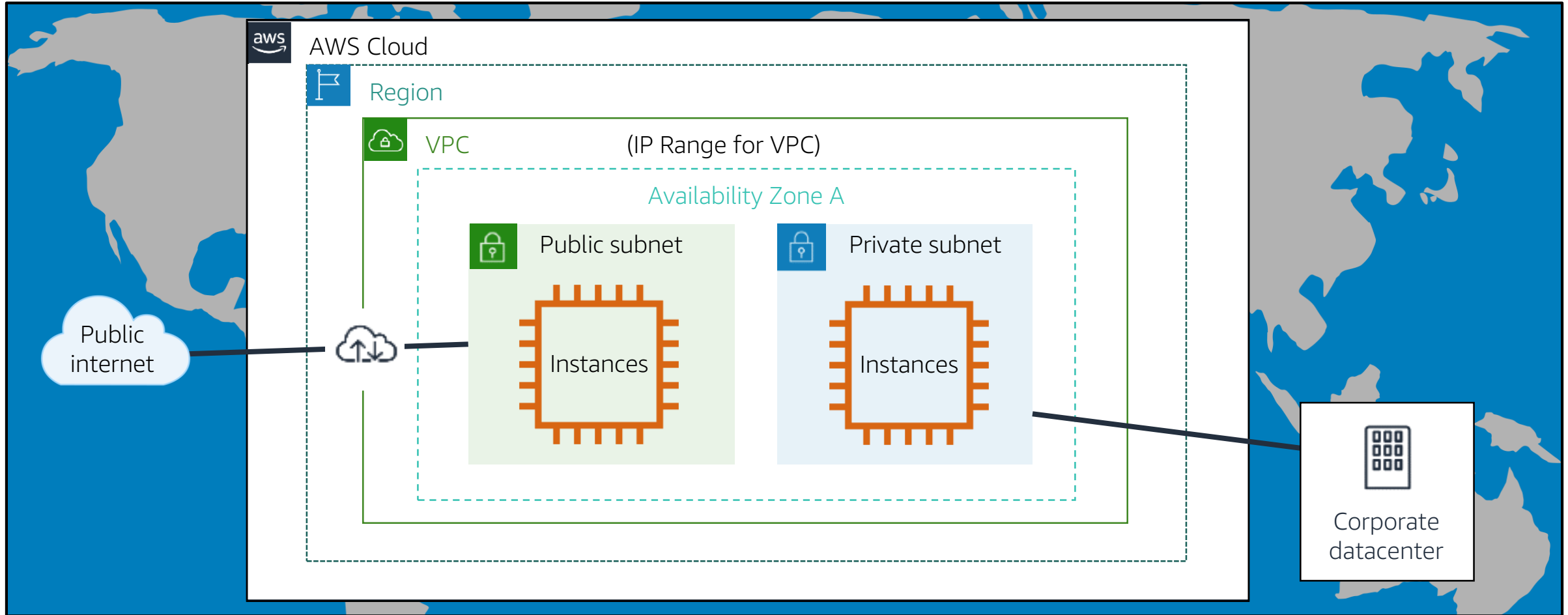
Storage class	Features
S3 Standard	<ul style="list-style-type: none">• ≥ 3 availability zones
S3 Standard – Infrequent Access (IA)	<ul style="list-style-type: none">• Retrieval fee associated with objects• Most suitable for infrequently accessed data
S3 Intelligent- Tiering	<ul style="list-style-type: none">• Automatically moves objects between tiers based on access patterns• ≥ 3 availability zones
S3 One Zone-IA	<ul style="list-style-type: none">• 1 availability zone• Costs 20% less than S3 Standard-IA
S3 Glacier	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Lowest cost storage for long term retention (7-10 years)• ≥ 3 availability zones• Retrieval time within 12 hours

Architecture example

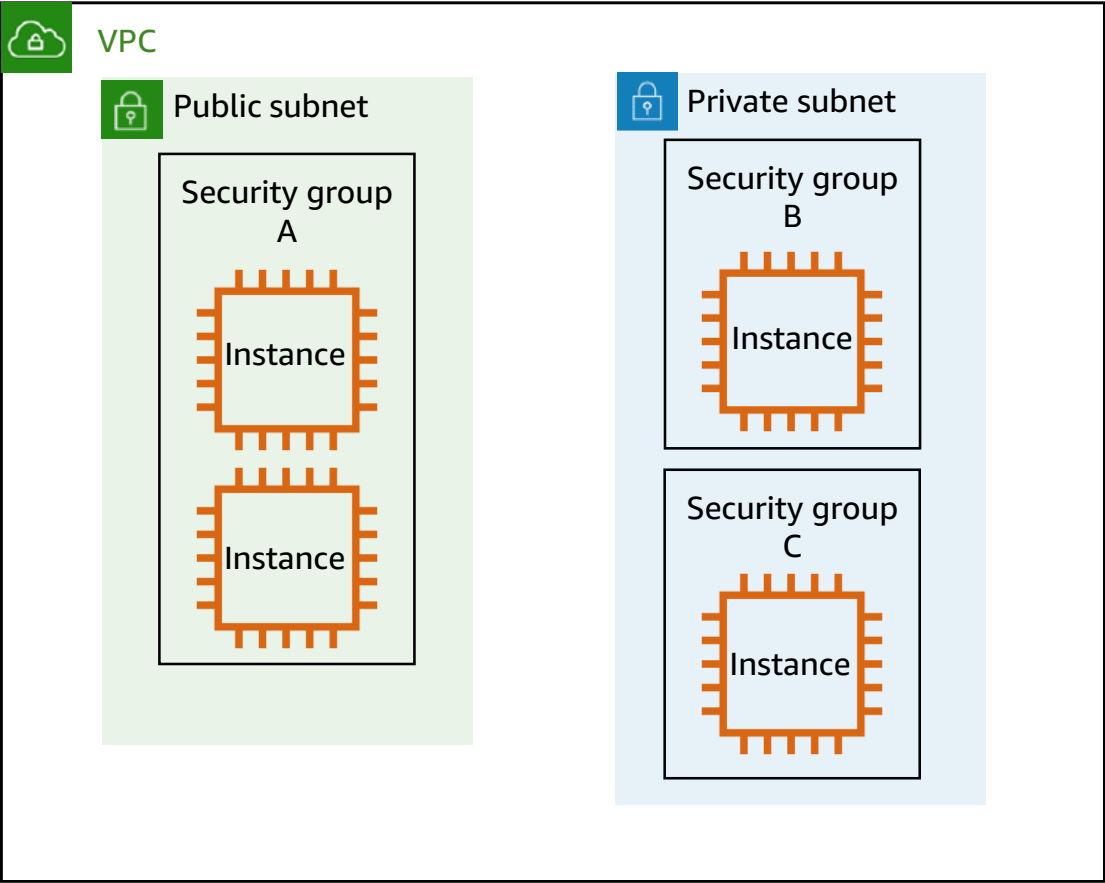


Secure your data

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

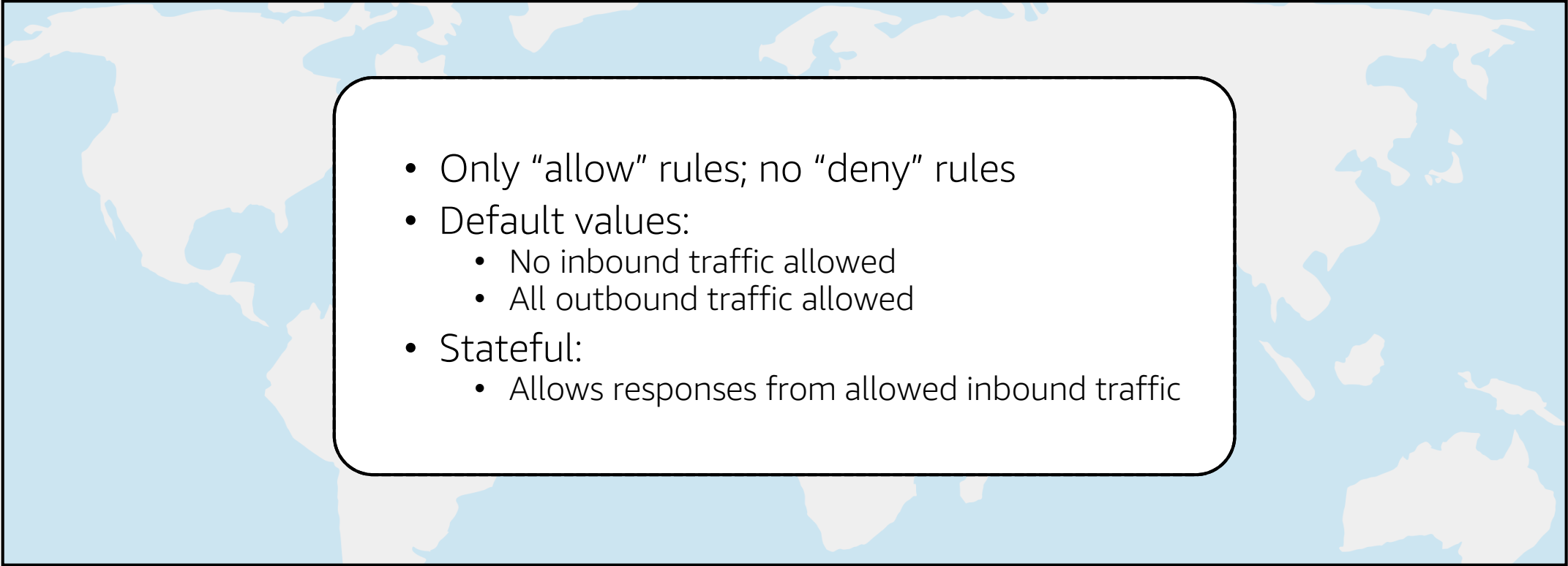
Security Group-B

Inbound		
Source	Protocol	Port Range
10.0.1.0/24	TCP	22

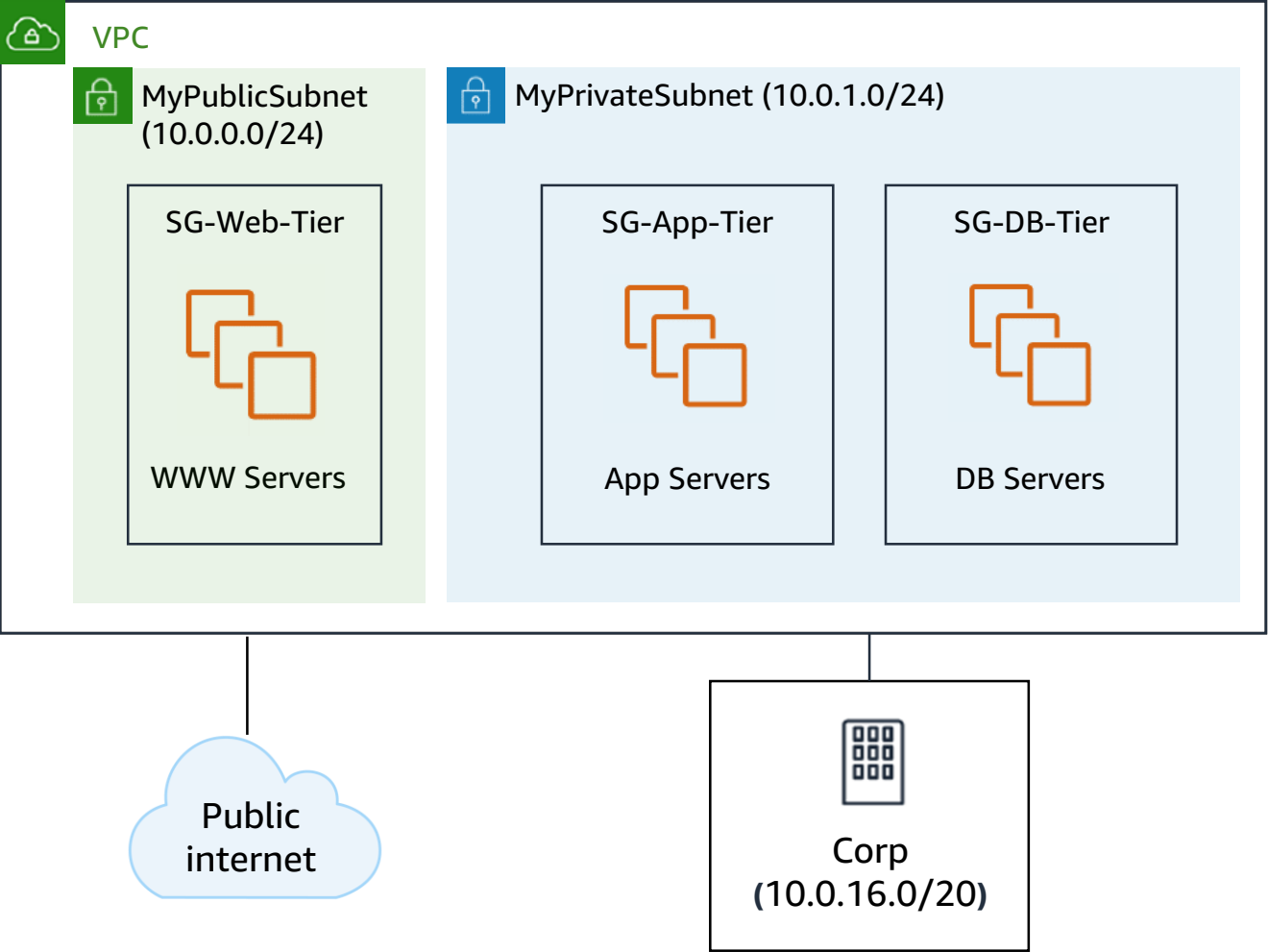
Security Group-C

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

Access the quizzes with the "test your knowledge" button at the bottom of the page.