

Module 2: Getting started with the cloud

Navjot Singh
Technical Trainer
AWS



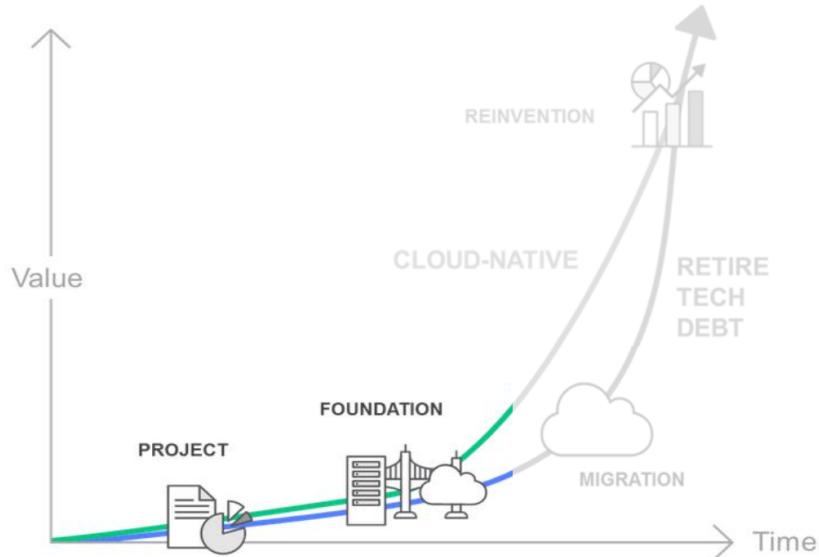
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Getting started with AWS services

AWS products

The screenshot shows the AWS Deep Learning Containers landing page. At the top, there's a navigation bar with links like Products, Solutions, Pricing, Documentation, Learn, Partner Network, AWS Marketplace, Explore More, Contact Sales, Support, English, and My Account. The main heading is "AWS Deep Learning Containers" with a sub-copy: "Quickly set up deep learning environments with optimized, pre-packaged Docker images". Below this is a "Learn more" button and a small illustration of a brain inside a container. The page features a dark blue background with a hexagonal pattern. There are four cards below the main heading: "Amazon Lightsail" (a robot icon), "Amazon EC2 M5ad & R5ad Instances" (a circuit board icon), "Amazon S3 Glacier Deep Archive" (a bucket icon), and "110,000+ Databases Migrated to AWS" (a database icon). A news banner at the bottom left says "AWS Customer News" and mentions Volkswagen's plan to build an industrial digital production platform on AWS. A "Explore Our Products" link is at the bottom right.

Cloud journey



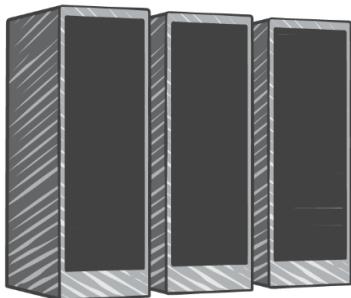
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Build your infrastructure

AWSOME DAY
ONLINE CONFERENCE

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What is Amazon Elastic Compute Cloud (EC2)?



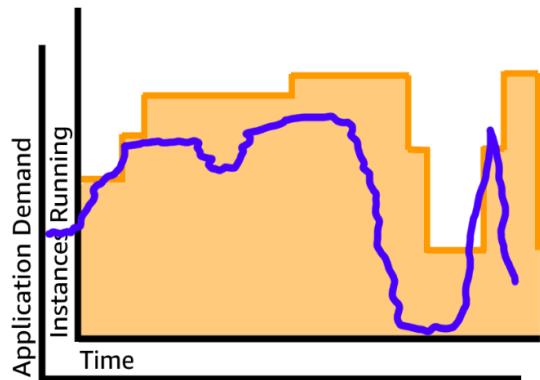
On-premises servers

- ✓ 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

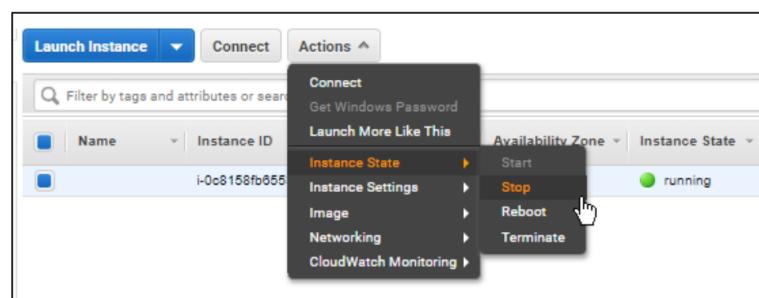


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Benefits of Amazon EC2

- Elasticity
- Control



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Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility

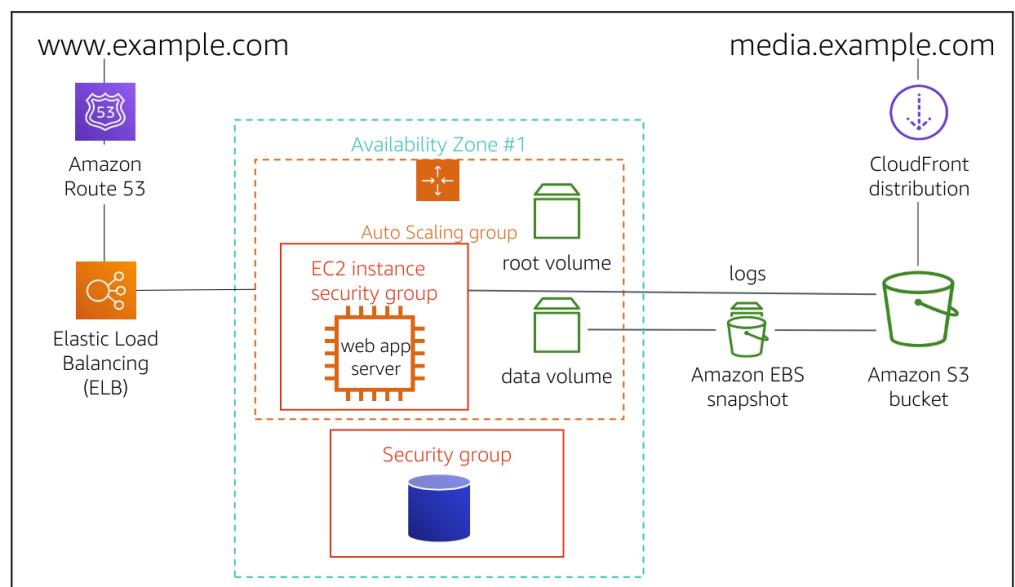
| Step 2: Choose an Instance Type | | | | | | | | | |
|---|--------------|-------|--------------|-----------------------|-------------------------|---------------------|--------------|--|--|
| applications. Learn more about instance types and how they can meet your computing needs. | | | | | | | | | |
| 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 | No | High | Yes | | |

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Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility
- Integrated



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Benefits of Amazon EC2

- Elasticity
- Control
- Flexibility
- Integrated
- Reliable

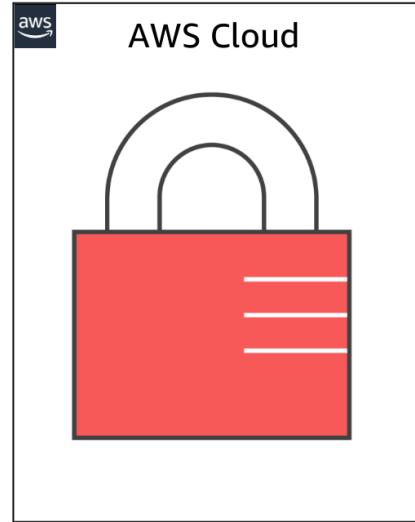


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Benefits of Amazon EC2

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



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Benefits of Amazon EC2

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

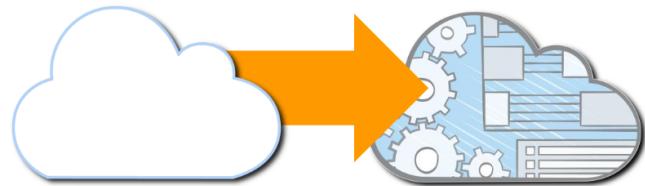


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Benefits of Amazon EC2

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



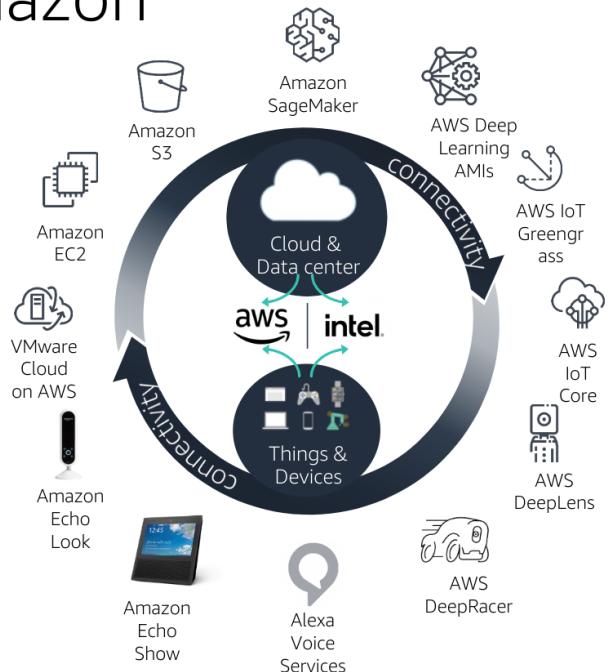
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What does Intel do with Amazon

Common history & values

13+ year engineering collaboration
Digital transformation
Shared customer passion
High performance + low costs
World class supply chain



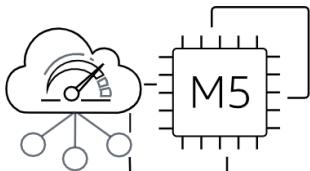
<https://aws.amazon.com/intel/>

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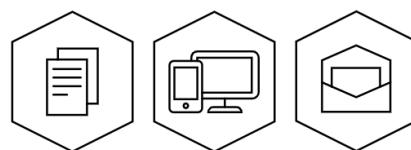
Benefits of Intel® Xeon® Scalable Processors

Price / Performance



1.25x Price/Perf SpecINT

World-Class Ecosystem



20k+

Intel Software engineers

Workload Optimizations



Up to

1.7M

TPM*
MS SQL

4.1x Price/Perf
High Perf Linpack

1k+

ISV applications
optimized for Intel
architecture

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/awsfor sap/new-sap-certifications-for-aws-instances-and-world-record-benchmark-results/>

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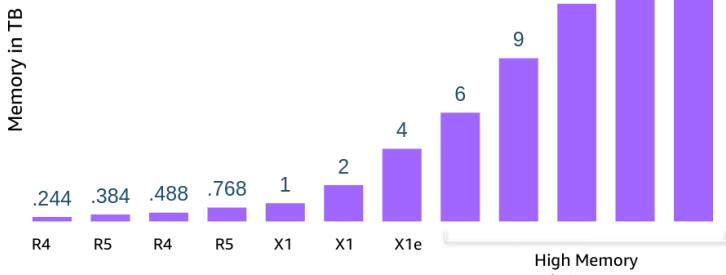


The most choice

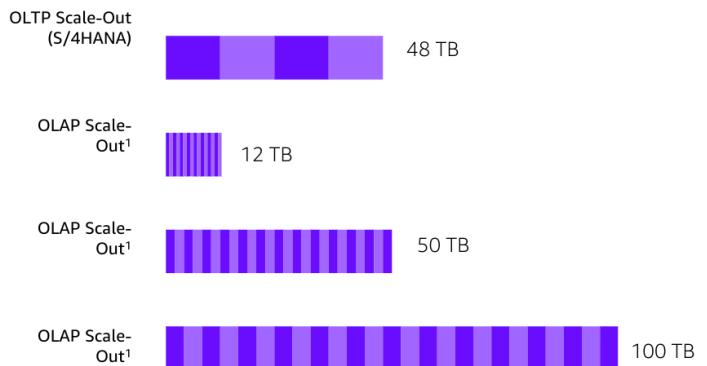
Resources to run the largest and most demanding SAP Workloads

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

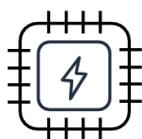


¹ BWoH, BW/4HANA and DataMart

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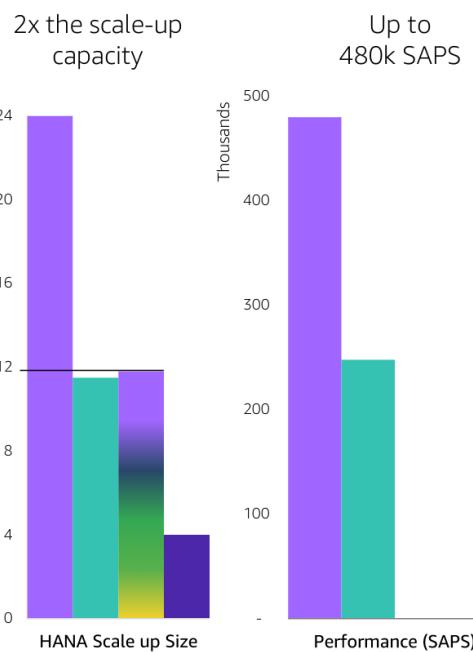
AWS "Nitro for SAP" system



Makes 100% of the server addressable

Provides the highest core count in the industry

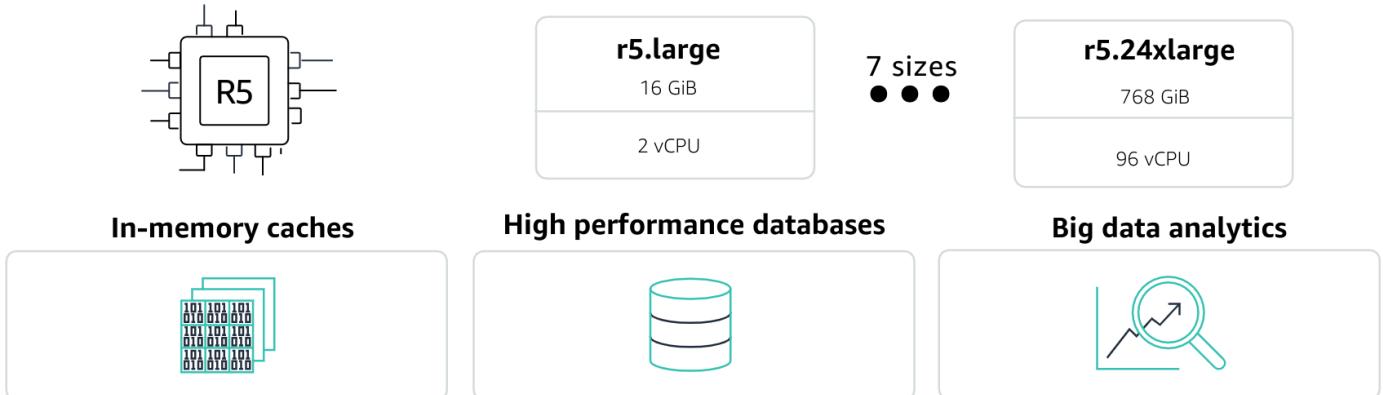
Seamless integrated experience



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R5: memory-optimized instances



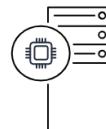
3.1 GHz Intel® Xeon® Scalable Processors (Skylake)

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.



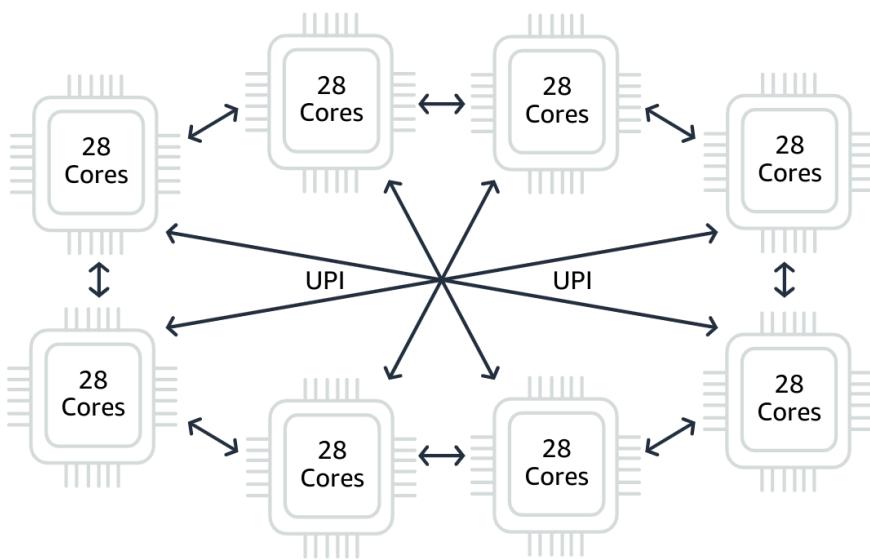
Best Price to Performance

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



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EC2 high memory instance architecture



The most memory of any EC2 Instance

SAP-Certified

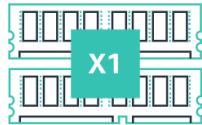
24TB of Memory

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

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X1 and X1e: large-scale memory-optimized



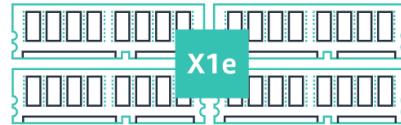
For large in-memory workloads

16:1 GiB to vCPU ratio

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

| x1.16xlarge |
|-------------|
| 1 TB |
| 64 vCPU |

| x1.32xlarge |
|-------------|
| 2 TB |
| 128 vCPU |



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 |
|------------|
| 122 GiB |
| 4 vCPU |

6 sizes
● ● ●

| x1e.32xlarge |
|--------------|
| 4 TB |
| 128 vCPU |

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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 |

| 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/>

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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 | - | - | - |

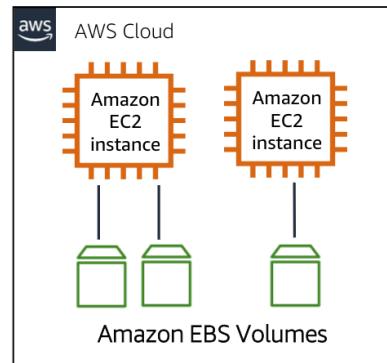
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Store your data

Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances

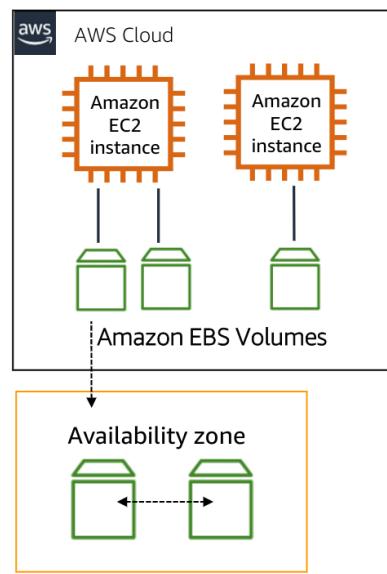


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Amazon Elastic Block Store (Amazon EBS)

- Persistent block storage for instances
- Protected through replication

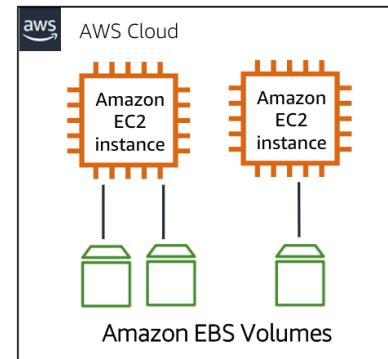


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Amazon Elastic Block Store (Amazon EBS)

- 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)

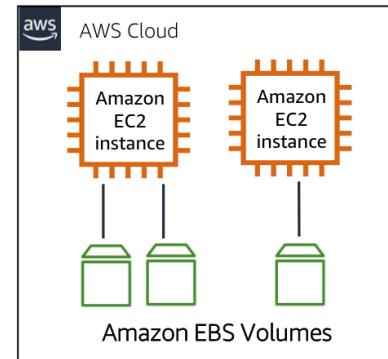
- Throughput Optimized HDD (st1) Volumes
- Cold HDD (sc1) Volumes

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Amazon Elastic Block Store (Amazon EBS)

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

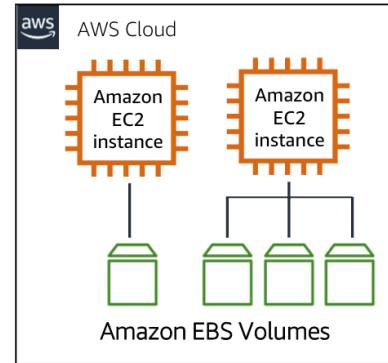


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Amazon Elastic Block Store (Amazon EBS)

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

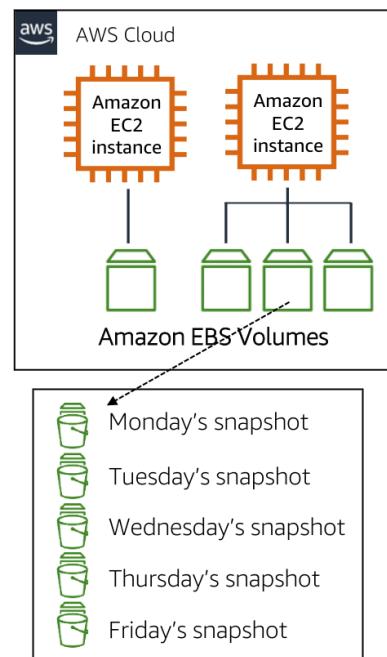


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Amazon Elastic Block Store (Amazon EBS)

- 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

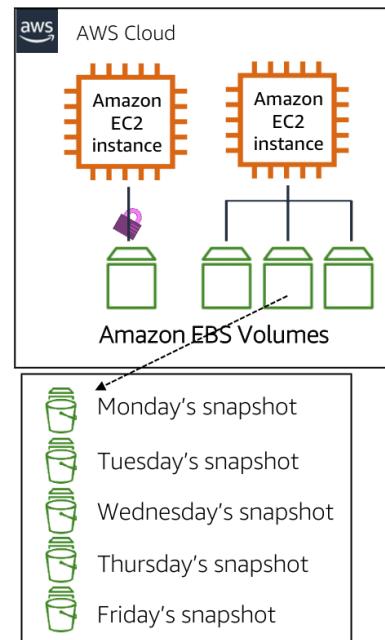


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Amazon Elastic Block Store (Amazon EBS)

- 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



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What is Amazon Simple Storage Service (S3)?

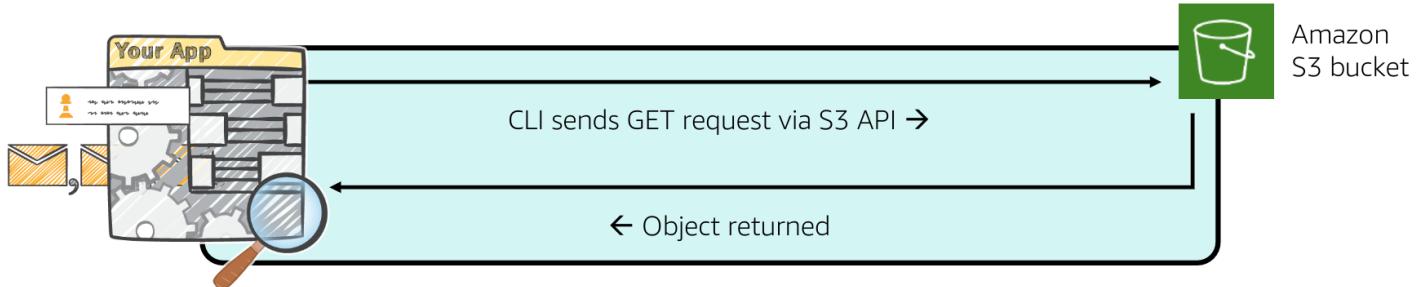
- Data is stored as objects within buckets
- Unlimited storage
 - Single object limited to 5TB
- 99.99999999% durable
- Granular access to bucket and objects

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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

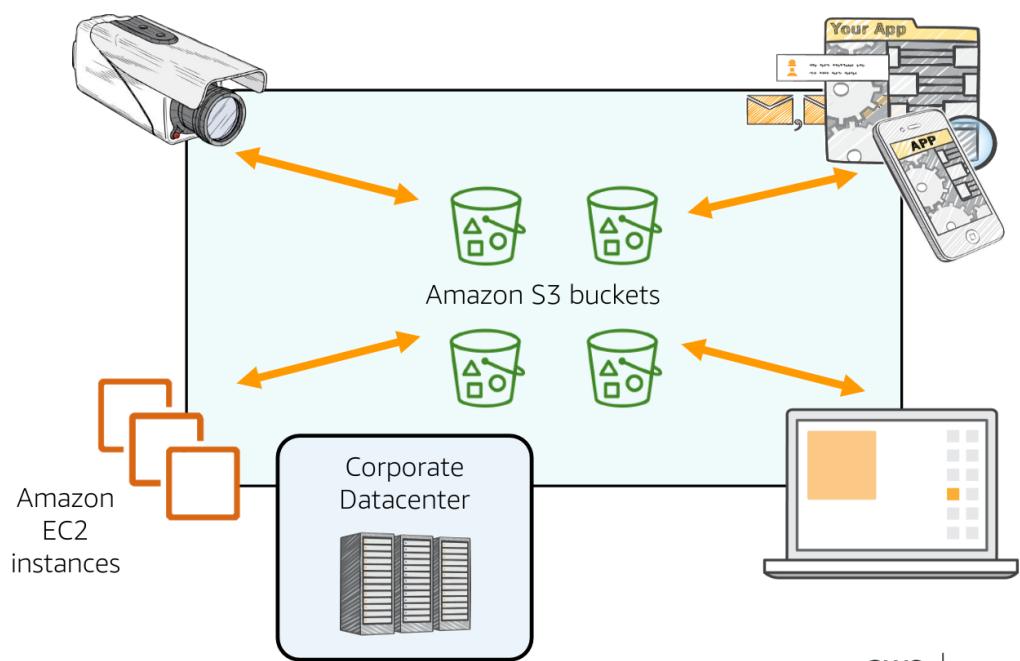


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Amazon S3 common scenarios

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



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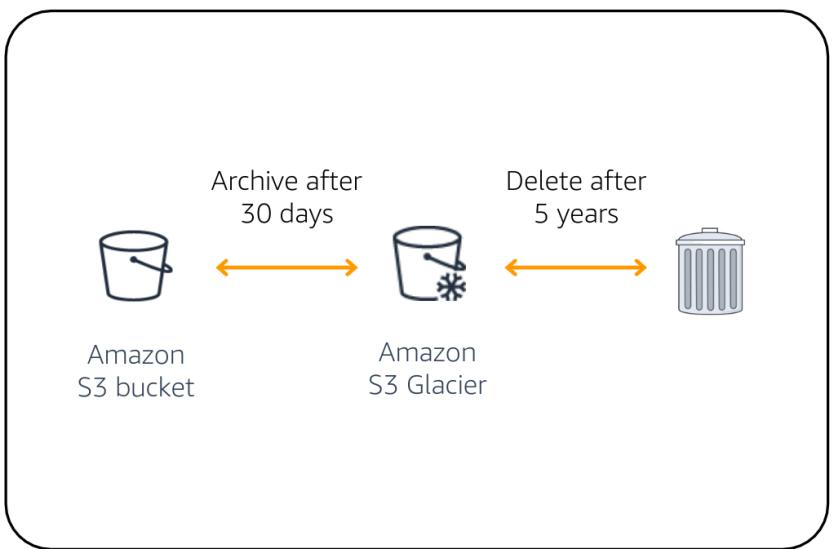
Demo

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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

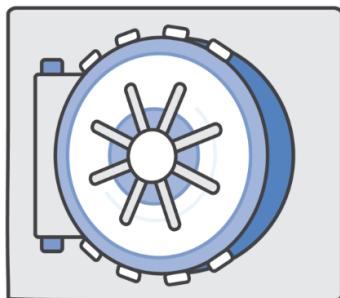


Magnetic tape replacement

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Amazon S3 Glacier vault lock policy



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

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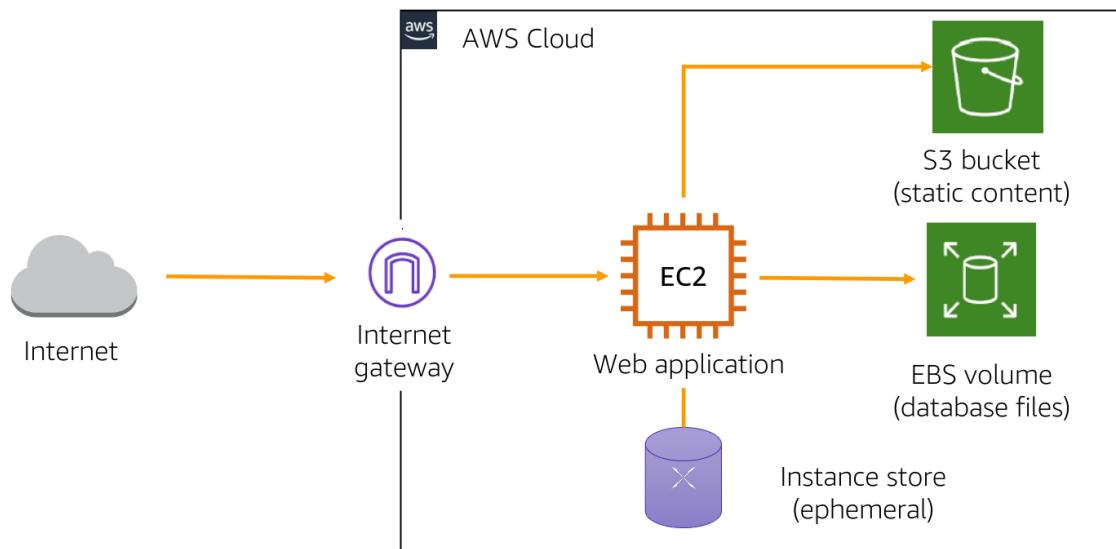
Amazon S3 storage classes

| 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 objectsMost 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 zoneCosts 20% less than S3 Standard-IA |
| S3 Glacier | <ul style="list-style-type: none">Not available for real-time accessMust restore objects before you can access themRestoring 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 zonesRetrieval time within 12 hours |

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Architecture example



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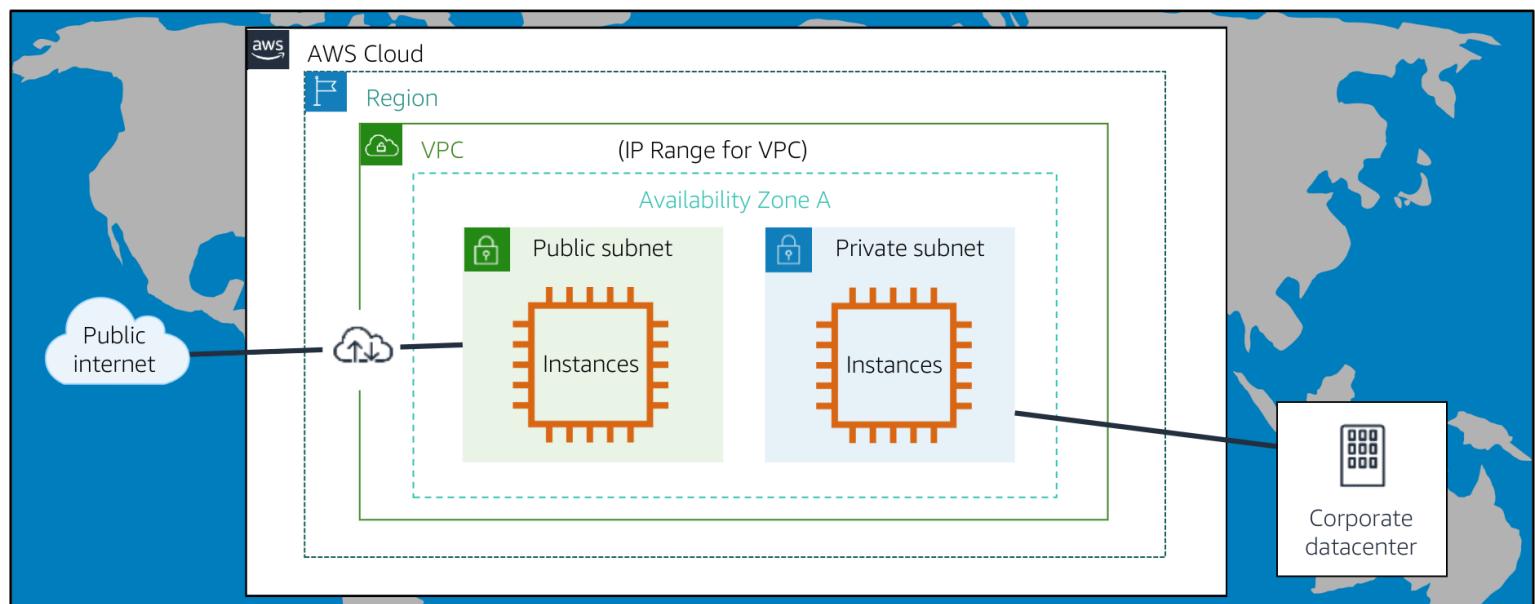


Secure your data

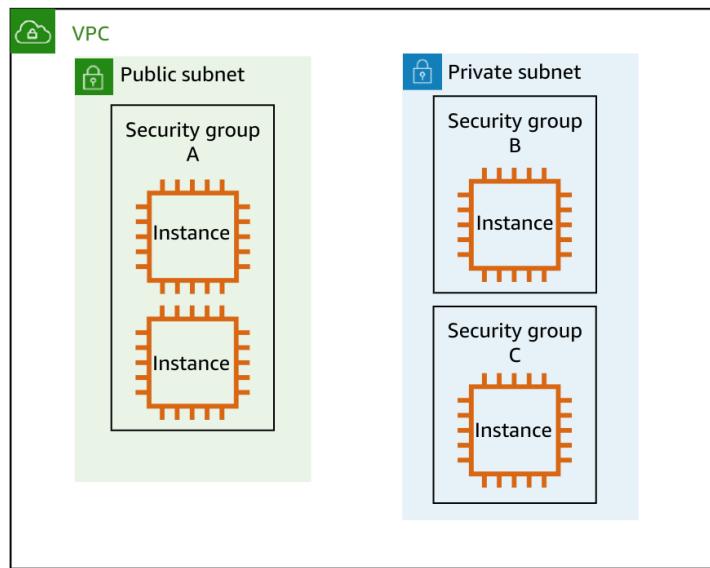
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Amazon Virtual Private Cloud (Amazon VPC)



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 |

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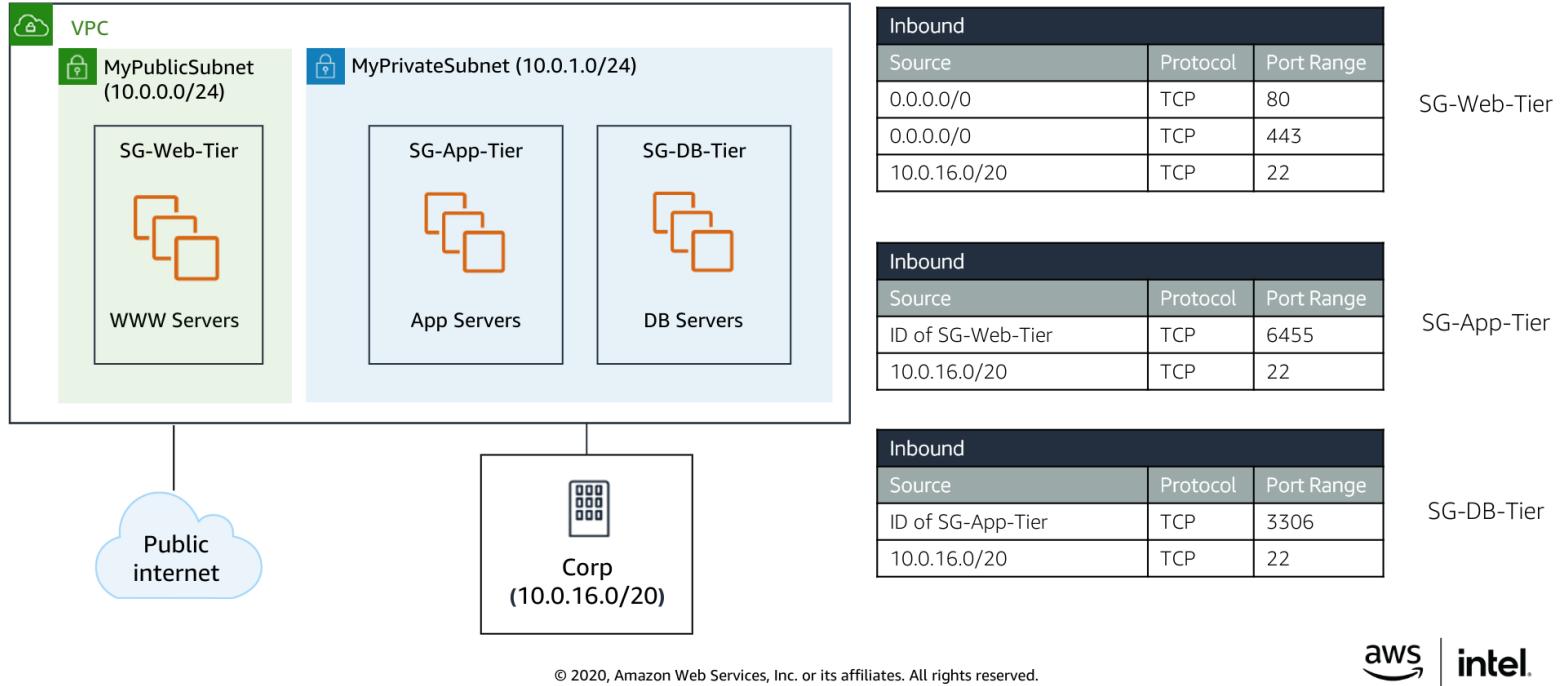
Security group details

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

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Security groups example



End of Module 2

Test your knowledge

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