



# Elastic Compute Cloud (EC2)

AWS Certification Preparation

Instance Lifecycle

Purchasing Options & Instance Types

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Storage Options

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Remote Access

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# EC2 Purchasing Options

- **On-Demand Instances**

- Pay, by the second with no up-front or terminating costs.

- **Spot Instances**

- Request unused EC2 instances, which can lower your Amazon EC2 costs significantly. Generally cheapest option although not always.
- **Maximum price** that you are willing to pay per hour per instance.
- **AWS can interrupt** them when needed (Spot Instance interruption) or when spot price exceeds your max price.
- If your Spot instance is terminated or stopped by Amazon EC2 in the first instance hour, you will not be charged for that usage. Otherwise charged to the nearest second.

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# EC2 Purchasing Options

- **Reserved Instances**

- Purchase, at a significant discount, instances that are always available, for a term from one to three years.

- **Scheduled Instances**

- Purchase instances that are always available on the specified recurring schedule, for a one-year term.

- **On Demand Capacity Reservations**

- Reserve capacity for your EC2 instances in a specific Availability Zone for any duration.

- **Dedicated Instances**

- Pay, by the hour, for instances that run on single-tenant hardware.

- **Dedicated Hosts**

- Pay for a physical host that is fully dedicated to running your instances.

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# EC2 Savings Plans

- Reduced pricing in exchange for consistent usage (\$/hr) over **1 or 3 year** commitment.
- AWS **Cost Explorer** recommendations are used as basis for savings plan.
  - **Compute** Savings Plans:
    - Most flexible, applied to **all** instance types, size, operating system or tenancy.
    - Up to 66 percent off On-Demand rates
  - **EC2 Instance** Savings Plans:
    - Applied to individual **instance family** in a **region**.
    - Up to 72 percent off On-Demand rates
- Payment Options:
  - **No Upfront** (monthly basis)
  - **Partial Upfront** - lower price
  - **All Upfront** (one payment) - lowest price
- Does not provide capacity reservations.

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# EC2 Instance Reserving Options

	Capacity Reservations	Zonal Reserved Instances	Regional Reserved Instances	Savings Plans
<b>Term</b>	No commitment required.		Require fixed one-year or three-year commitment	
<b>Capacity benefit</b>		Capacity reserved in a specific Availability Zone.	Does not reserve capacity in an Availability Zone.	
<b>Billing discount</b>	No billing discount. You can use with Savings Plans or regional RI.		Provide billing discounts	
<b>Instance Limits</b>	On-Demand Instance limits per Region.	Limited to 20 per AZ.*	Limited to 20 per Region.*	No limits.

\* A limit increase can be requested.

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# EC2 Instance Types

## • General Purpose

- Small and mid-size databases, data processing tasks that require additional memory, caching fleets, and for running backend servers for SAP, Microsoft SharePoint, cluster computing, and other enterprise applications. (T2, M3, M4)

## • Compute Optimized

- High performance front-end fleets, web-servers, batch processing, distributed analytics, high performance science and engineering applications, ad serving, MMO gaming, and video-encoding. (C3, C4)

## • Memory Optimized

- High performance databases, distributed memory caches, in-memory analytics, genome assembly and analysis, larger deployments of SAP, Microsoft SharePoint, and other enterprise applications. (X1, R3, R4)

## • GPU / Accelerated Computing

- 3D application streaming, machine learning, video encoding, and other server-side graphics or GPU compute workloads. (G3, G2)

## • Storage Optimized

- NoSQL databases like Cassandra and MongoDB, scale out transactional databases, data warehousing, Hadoop, and cluster file systems. (I3, I2). Massively Parallel Processing (MPP) data warehousing, MapReduce and Hadoop distributed computing, distributed file systems, network file systems, log or data-processing applications. (D2)

## Choice of Linux or Windows

RedHat Linux, Windows Server, SuSE Linux, Ubuntu, Fedora, Debian, Cent OS, Gentoo Linux, Oracle Linux, and FreeBSD

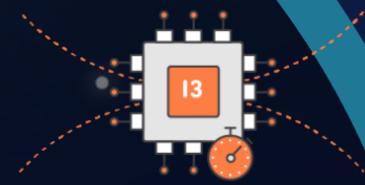
## More info

<https://aws.amazon.com/ec2/instance-types>

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# EC2 Bare Metal Instances



- **Non-virtualized** environments.
- OS running directly on hardware.
- Suitable for:
  - Applications that benefit from deep performance analysis tools
  - Specialized workloads that require direct access to bare metal infrastructure
  - Legacy workloads not supported in virtual environments
  - Licensing-restricted Tier 1 business critical applications
- i3, m5.metal, r5.metal, z1d.metal

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# T2/T3 Burstable Performance Instances

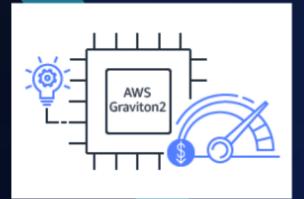
- **Baseline** performance and ability to **burst** are governed by **CPU Credits**.
- Credits are built up and stored for **up to 24 hrs** while instance is operating below the baseline performance.
- Credits are used to **burst above baseline** capacity when needed.
- If your instance does not maintain a positive CPU Credit balance for bursting consider upgrading to larger instance.
- **Unlimited Mode** provides high CPU at a flat additional rate of 5 cents per vCPU-hour for as long as needed.



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# Graviton Instance Types



- 64-bit **Arm** Neoverse cores
- Provide low cost & high performance **compute** capacity.
- First generation **A1** instance type
- **Graviton2** processors provide up to 40% better price performance over comparable current generation x86-based instances
- Perfect for scale out applications that can run on small cores.
- Not all software runs on ARM.

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# EC2 Fleet

- Launch a fleet, or group, of instances.
- **Unlimited** number of **instance types** per EC2 Fleet.
- **On-Demand** and **Spot** purchasing options.
- EC2 Fleet is available only through the **API/SDK or AWS CLI**.
- Multiple Availability Zones
- You need to create a separate EC2 Fleet for each Region.
- **No additional charge** for using EC2 Fleet.

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# Amazon Machine Images (AMI)

Provides the information required to launch an instance:

- A template for the **root volume** for the instance (for example, an operating system, an application server, and applications)
- **Launch permissions** that control which AWS accounts can use the AMI to launch instances
- A **block device mapping** that specifies the volumes to attach to the instance when it's launched



- Market for Amazon Machine Images (AMI)
- Paid, free, trial and BYO license software



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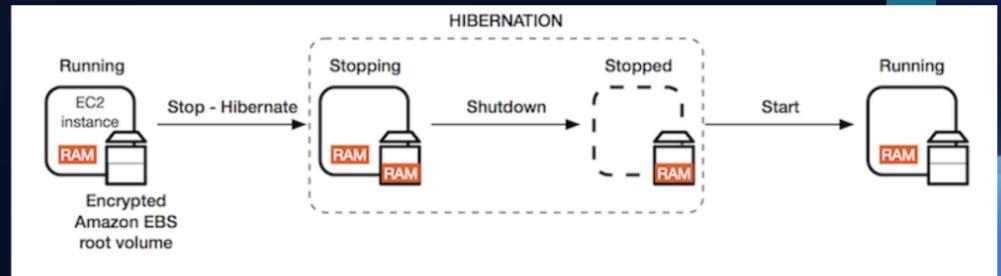


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# EC2 Instance States

- Start
- Stop (EBS Backed only)
  - Instance is shut down with no instance charges
  - Still charged for EBS volumes
  - Minimum of 1 minute charge on restart
- Stop-Hibernate (EBS Backed only)
  - Suspend-to-disk
  - Saves RAM to EBS
- Reboot
  - Operating system reboot.
- Terminate

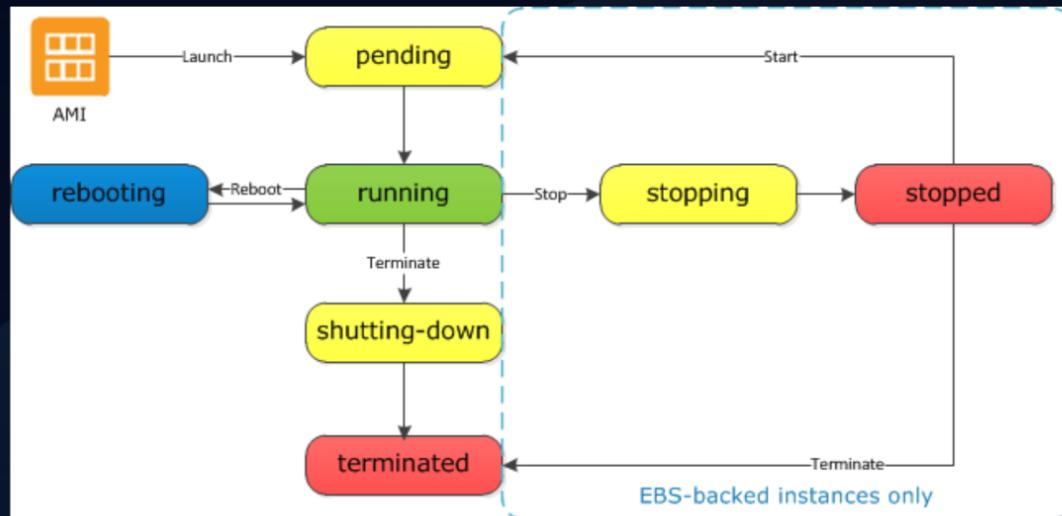


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# EC2 Instance Lifecycle



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# EC2 Storage Options



## Elastic Block Store (EBS)

- Most common.
- Replicated **within AZ**
- EBS volumes attached at instance launch are **deleted when instance terminated.\***
- EBS volumes attached to a **running** instance are **not deleted** when instance is terminated but are detached with data intact.\*

\*Unless delete on terminate flag modified

## Instance Store

- Physically attached to the host server
- Data **NOT LOST** when OS is **rebooted**.
- Data **LOST** when:
  - Underlying **drive fails**
  - Instance is **terminated**
- Do not rely on for valuable, long-term data.
- You **cannot detach** and attach to another instance

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# EBS Storage Options

- **General Purpose SSD (gp2)**
  - default choice
- **Provisioned IOPS SSD (io1)**
  - Consistent and low-latency performance
  - I/O intensive applications such as large relational or NoSQL databases
- **Cold HDD (sc1)**
  - Lowest cost per gigabyte
- **Throughput Optimized HDD**
  - Low cost per gigabyte
  - Frequently accessed workloads

## • **EBS Snapshots**

- Point in time backup of EBS volume to Amazon S3.
- Incremental backup.
- Can be copied to other regions or accounts.

## • **EBS Encryption**

- AWS Key Management Service (KMS) master keys or Customer Master Key (CMK).
- Data stored at rest encrypted (including snapshots created) as well as data in transit between EBS and EC2.

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