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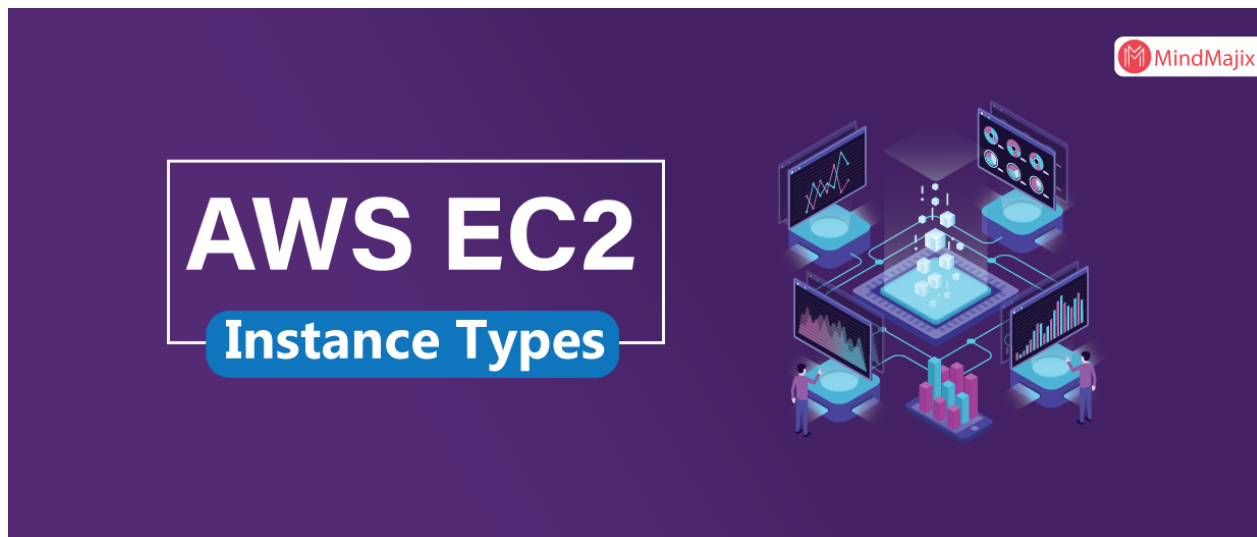


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AWS EC2 Instance Types

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AWS EC2 Instance - Overview

Amazon Elastic Cloud Compute is shortly called AWS EC2 which is probably a web service that delivers secured and resizable compute capacity in the cloud. It is mostly designed to make out the web-scale cloud computing for the developers with ease. It is a very simple web service interface that allows one to obtain and configure the required capacity with minimal friction.

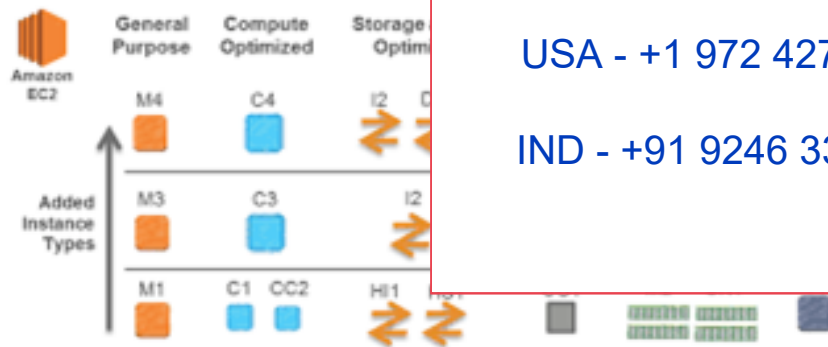
[AWS EC2](#) is here to deliver a wide range of instance types that are probably optimized to fit various use cases. All the **EC2 instance types** have come up with various

combinations like CPU, Storage, Memory and other networking capacities. It also gives flexibility in selecting the right mix of resources for respective applications.

For each and every instance, Amazon EC2 provides a predictable and consistent amount of CPU capacity without any need for hardware. So that you can easily develop applications with ease. It even allows you to deploy applications faster. AWS EC2 helps you in managing and launching the virtual server. Amazon EC2 provides high security, network, and manages storage.

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Amazon EC2: Instance Types



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What are the Different Types of EC2 Instances?

Amazon has come up with a wide range of Instances that are designed to fulfill the wide variety of needs of an organization. We have listed different AWS EC2 instance Types below with the features. Let's get to know about every EC2 instance type in a better manner.

Here are AWS EC2 Instance Types:

1. **General Purpose Instances - (T2, M5, M4, M3)**
2. **Computer Optimized Instances - (C5, C4, C3)**
3. **Memory Optimized Instances - (X1, R4, R3)**
4. **Accelerated Computing Instances - (P3, P2, G3, F1)**
5. **Storage Optimized Instances - (I3)**
6. **Dense Storage Instances - (D2)**

1. General Purpose Instances

T2 Instance

T2 instance is one of the best-performed instances which offers the baseline CPU performances with the effective capability. It has the ability to burst all the performances that are directed by the CPU credits. Generally, on the established rate and the size of an instance credits.

These type of instances will be a great option especially if you require more CPU consistent and well suitable for developer environments.

Features of T2:

- This whole application is built with the Extraordinary
- It will measure the bandwidth of the central processor
- Consistently it will help the CPU in performing
- It will help in balancing the compute, network
- It is the low-cost AWS Instance Types which is used for ordering general types. You will also get an eligible Free Tier which is merely a t2. Micro
- **M5 Instances**

The next available classification of Instance types under the General Purpose EC2 Instance types is the M5 Instances which are the latest generation of the General Purpose Instances. These Instances and the instances of this family provide the perfect balance amongst the Computational, memory and network resources – hence forms the ideal match for many applications.

Features of M5:

- It hosts 2.5GHz Xeon Platinum 8175 processor with the latest Intel advanced Vector extension (AVX-512) instruction set
- Larger and newer instance sizes, m5.24xlarge with an offering of 96 vCPUs and 384GB memory
- EBS-optimized by default and also higher EBS performances on smaller instance sizes
- Provides up to 25GBps network bandwidth using enhanced networking
- It requires HVM AMIs to include drivers for ENA and NVMe

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- These are powered by the new light-weight Nitro systems which are a combination of dedicated hardware and lightweight hypervisors.

M4 Instances

These instances are described as one of the leading and best General purpose EC2 instances. It will offer a great network, memory bandwidth and I/O performance for several applications. They are also providing up to 10 Gbps network bandwidth 4 times equal to the packet rate along with guaranteed throughput of 10 Gbps network. These instances are well devoted to the database operations and EBS optimized.

M4 instances types:

- Large
- Xlarge
- 2xlarge
- 4xlarge
- 10xlarge

Features of M4:

- Hosts a 2.3 GHz Intel Xeon® E5-2686 v4 (Broadwell) processors or 2.4 GHz Intel Xeon® E5-2676 v3 (Haswell) processor
- These Instances are EBS-optimized by default at no additional cost
- Provides support for Enhanced Networking
- Balance of compute, memory, and network resources

M3 Instance

Basically, the M3 instance type is used to balance the network, memory and compute the resources according to it. All these resources are used for the general purpose of virtual machines and mostly to the EC2 instances. These types of instances are well suitable for the small and mid-sized databases for the data processing jobs, which may require the cluster computing and extra money.

Features of M3:

- A high-frequency Intel Xeon E5-2670 v2 (Ivy Bridge) processor
- SSD-based instance storage for faster I/O performance

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- Balance of compute, memory, and network resources.

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2. Compute Optimized Instances

After the General Purpose AWS EC2 Instance types, the Compute Optimized instances which are considered ideal for compute-bound applications that require the higher performance processors that it comes with. The following applications are the best-suited ones for these instances:

- Batch processing workloads
- Media transcoding
- High-performance web servers
- High-performance computing (HPC)
- Scientific modelling
- Massively multiplayer online (MMO) gaming servers
- Machine learning inference and other compute-bound applications

Alongside the most suitable deployments on these instance types, let us take a better look at the infrastructure that constitutes these as such:

Instance Type	VPC Only	EBS Only	SSD Volumes	Placement Group	HVM Only	Enhanced Networking
C3			Yes	Yes		Intel 82599 VF
C4	Yes	Yes		Yes	Yes	Intel 82500 VF
C5	Yes	Yes		Yes	Yes	ENA

C5 Instances

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The instance of C5 is completely optimized for cost and delivers cost-effective high performance with low prices. These types of instances are well suitable for high-performance web servers, batch processing, high-performance computing (HPC), distributed analytics, ad services, and video encoding, etc.

C4 Instances

However, these types of instances are the additional features with the max number of performance and low prices. These types of instances are well suitable for types which mat derives all the advantages of high-performance processors. Mostly the C4 instance types are dependent on the custom processors that are optimized for EC2. The Intel boost technology will help the clock speed of C4 instances to touch.

C4 Instances types:

- Large
- Xlarge
- 2xlarge
- 4xlarge
- 8xlarge
- **C3 Instances**

C3 instance type is greatly used to offer the CPU instance storage based on the SSD which has twice the memory and faster processors when compared to C1. These types of instances are well suitable for the applications that can derive the advantage from the compute capacity of memory, custom intensive application with high performing web servers. However, these are the latest compute-optimized instances from the AWS, but they provide high performances at affordable prices and well fitted for the intensive workloads.

C3 Instances types:

- Large
- Xlarge
- 2xlarge
- 4xlarge
- 8xlarge

Now, let us go through the salient features of C3 instances.

- Amongst the three classifications under the C3 types, only C4 and C5 instances require 64-bit OS (to 144 GiB of RAM) and require a 64-bit OS in comparison to para-virtual (PV) AMIs on higher instance types.
- Exclusively with the C5 Instance types, EBS volumes can be attached as NVMe block devices. These require EBS drivers to be installed. Out of the bunch of available OSes, the following are the requirements:

1. Amazon Linux 2014.03 and above
2. Ubuntu 14.04 and above
3. SUSE Linux Enterprise Server 12 and above
4. Red Hat Enterprise Linux 7.4 and above
5. CentOS 7 and above
6. FreeBSD 11.1-RELEASE
7. Windows Server 2012 R2
8. Windows Server 2016

- Especially the C5 instances do provide support to a maximum number of 27 EBS volumes plus ENI attachments.
- And last but not the least, specifically for the C5 instances – they should have acpid installed to support clean shutdown through API requests.

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3. Memory Optimized Instances

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After the first two sets of AWS EC2 Instance types, next comes the Memory optimized instances that are designed to deliver the fastest performances for workloads that process large data sets in memory. In order to achieve this, there is a further classification of Amazon Instance types to cater to specific needs and requirements of the customers.

X1 Instances

In general, these types of instances are suited for memory-intensive applications and in-memory application at affordable prices with high performance. X1 is one of the latest EC2 instance types. It is defined as one of the latest EC2 instance types. It is intended to perform the high scale executing applications on the cloud.

When compared to the other AWS EC2 instance types, X1 instances offer lower prices for each GiB of RAM and well suited to execute memory-intensive applications. All these instances are SAP certified and can run SAP applications in environments perfectly.

X1 instances are best suited for the following sets of applications:

- In-memory databases like SAP HANA.
- Big-data processing engines like Apache Spark or Presto.
- High performance computing (HPC) applications.

X1e Instances

X1e Instance types are best suited for the following sets of applications:

- In-memory databases such as SAP HANA
- Memory-intensive enterprise applications

R4 Instances

The instances of R4 is completely optimized with memory intensive applications and mostly delivers the best price for GiB of RAM than R3.

Blatantly, the R4 Instance types are best suited for the following set of applications:

1. High performance relational or the RDBMS databases like MySQL.
2. High performance NoSQL databases like MongoDB, Cassandra.

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3. Distributed web-scale cache stores that provide in-memory caching of key-value type data (Memcached and Redis).
4. In-memory databases using optimized data storage formats and analytics for business intelligence (SAP HANA can be considered one of the best examples in this category).
5. Applications performing real-time processing services, Hadoop/Spark clusters).
6. High-performance computing (HPC) applications.
7. Electronic Design Automation (EDA) applications.

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R3 Instances

Generally, the R3 Instances are fully equipped in memory optimized instances for in-memory application, which is less expensive when compared to the other instances. It will offer the greater performance with more bandwidth, supported latency, increased performance and great EBS optimization support. These types of instances are well suitable for in-memory analytics databases in order to acquire the maximum memory performances with the gained high price of units. They can also support the HVM machine images only.

R3 instances are well suited for the following applications:

- High-performance relational databases as like MySQL
- High-performance NoSQL databases like MongoDB, Cassandra
- In-memory analytics.
- Genome assembly and analysis.
- Enterprise applications as like Microsoft SharePoint.

Following is the tabular forum that explains in detail about the features in a brief gist for the Memory Optimized Amazon EC2 instance types (though almost all the well suited applications look to be the same for almost all the instance types, the following table will provide you the best out of each of them):

Instance	VPC Only	EBS Only	SSD	Placement	Enhanced
----------	----------	----------	-----	-----------	----------

Name			Volumes	Group	Networking
R3			Yes	Yes	Intel 82599 VF
R4	Yes	Yes		Yes	ENA
X1	Yes		Yes	Yes	ENA
X1e	Yes		Yes	Yes	ENA

4. Accelerated Computing Instance

The next kind of Amazon EC2 instances that we will discuss are Accelerated Optimized Amazon EC2 instances. Accelerated Optimized Amazon EC2 instances are best found to be used where you want to run compute-intensive workloads – as these provide access to hardware-based co-processors.

Processing Units (GPUs) or Field Programmable Gate Arrays (FPGAs). Accelerated Optimized Amazon EC2 instances enable the performance and throughputs on compute-intensive workloads.

The way these Amazon instances work are a bit different from the standard instance types – accelerated computing instances use hardware accelerators or co-processors to the maximum utilization.

These instances are designed to perform specific functions as like the floating-point number calculation or the graphics processing or even the data pattern matching. Based on the ways and the means that the instance families work, there is a broader classification that has been made for these instances, which we will be discussing below:

P3 Instances

The classification under the Accelerated Optimized Amazon EC2 Instances comes to the first type – the P3 instances. These instances use NVIDIA Tesla V100 GPUs and are specifically designed for general-purpose GPU computational needs using also CUDA or OpenCL programming models or machine learning framework.

These P3 instances provide the required higher bandwidths, networking, powerful half, single, double-precision floating point capabilities and also 16GB memory per GPU. The configuration described above will be considered perfect or an ideal configuration for deep learning, computational fluid dynamics, computational finance, seismic analysis and so on and so forth.

The following are the significant points which we need to know about P3 Instances,

- P3 Instances support enhanced networking with Elastic Network Adapter

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- P3 Instances are EBS-Optimized by default
- P3 Instances support NVIDIA NVLink peer to peer transfers
- The p3.16xlarge instance type provides the ability to an operating system to control processor C-states and P-states.

P2 Instances

Coming to the next classification item under the Accelerated Optimized Amazon EC2 Instances, comes the P2 Instances which use NVIDIA V100 GPUs specifically for the general GPU computing using CUDA and OpenCL models. These P2 Instances provide the highest performance single and double-precision floating-point capabilities to make them an ideal choice for deep learning, machine learning performance databases.

The following are the significant points which we need to know about P2 Instances,

- P2 Instances support enhanced networking with Elastic Network Adapter
- P2 Instances are EBS optimized by default
- There are several GPU setting optimization options to improve performances on P2 Instances
- P2 Instances support NVIDIA GPUDirect peer to peer transfers
- The p2.16xlarge Instance type provides the ability for an operating system to take control over the Control processor C-states and the P-states

G3 Instances

Coming to the next set of classification of the Accelerated Optimized Amazon EC2 Instances, comes the G3 Instances that come along with NVIDIA Tesla M60 GPUs that prove to cost-effective, highly performing platform for Graphics applications using DirectX or OpenGL. These G3 Instances provide NVIDIA GRID Virtual Workstation related features as like support for 4 monitors with resolutions to the range of 4096 x 2160. The G3 Instances are pretty well suited for 3D Visualizations, graphics-intensive remote workstations, 3D rendering, Video reality, video encoding and etc.

The following are the significant points which we need to know about G3 Instances,

- G3 Instances support enhanced networking with the Elastic Network Adapter
- G3 Instances are EBS-optimized by default

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- G3 instances provide their support to NVIDIA GRID Virtual Workstation and NVIDIA GRID Virtual applications as well
- There are a pretty long list of GPU settings or optimizations that can be applied to the G3 Instances to provide best of the performance on them
- The g3.16xlarge Instance type also provides the most powerful ability for an OS to gain control over control processor C-states and P

F1 Instances

Upcoming Batches

17	Tuesday	22	Sunday
DEC	6:30 AM IST	DEC	7:00 AM IST
28	Saturday		
DEC	6:30 AM IST		

More Batches

The classification under the Accelerated Optimized Amazon EC2 Instances comes to the first type – the F1 instances. These instances use the Xilinx UltraScale+ VU9P FPGAs (Field Programmable Gate Arrays) to provide the required acceleration in the computational power with the use of intensive algorithms (like the data-flow or highly parallel operations which are not generally suited for the general-purpose CPUs).

The developers can make use of the FPGA developer AMI and AWS hardware development kit to create and invent the custom hardware acceleration techniques for using on the F1 instances. These include the full-cycle FPGA development in the cloud and cloud alone. With the use of these tools, the developers can create and also share the Amazon FPGA images which can further be loaded into the other F1 instances.

5. Storage Optimized Instances

The next EC2 instance type that we are going to take a look at is called the Storage Optimized Instances. These Amazon instances are specifically designed to work with workloads that require the highest of the order of sequential read and

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write accesses to huge data sets on local storages. These are said to be optimized to deliver tons of thousands of low-latency and also random I/O operations per second to all the applications that are hosted upon these instances.

D2 instances which we are going to take a deeper look into, in the next section of the article are very well suited for the following kinds of applications:

- Massive parallel processing data warehouse
- MapReduce and Hadoop distributed computing
- Log or data processing applications/systems

Apart from these, there can be two more types of instances in the next section of Amazon EC2 instances, namely **H1 instances**. We will take a closer look at each of these instances and the table of instance types brings to the table:

As discussed, the **H1 instances** are very well suited for the following applications:

- Data-intensive workloads that deal with the humongous loads of data on systems.
- Applications or systems that require sequential access to humongous loads of data on direct-attached instance storage.
- Applications or systems that require high throughput access again to the humongous quantities of data.

On the other hand, the next kinds of Amazon instances – the **I3 instances** find its usage in these following scenarios:

- High-frequency OLTP systems (Online Transaction Processing systems)
- The traditional relational databases
- The NoSQL databases
- Cache for in-memory databases (example, Redis)
- Data warehousing applications
- Low latency ad-tech serving applications

Following are the pointers denoting the storage optimized instances:

The following table shows that the primary storage of the I3 instances is basically on the non-volatile memory express (NVMe) SSD instance store volumes, whereas there is no

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such specification on the H1 instances. As per the table below, both the H1 and the I3 instances can be enabled with the enhanced networking abilities, which allows and provides significantly higher packet per second (PPS) performance, and hence lower network lags or latencies.

Instance Name	VPC Only	SSD Volumes	Placement	Enhanced
H1 Instances	Yes			
I3 Instances	Yes	NVMe		

6. Dense Storage Instances

There are innumerable customers out there who would be other AWS users who want to store their data in the cloud. The Dense storage amazon instances are designed to cater needs of such customers who have large amounts of data – by providing them with additional terabyte data sets.

D2 Instances

These storage optimized instances will offer up to 48TB by providing the huge disk by providing them at an affordable price for each disk type performance on AWS EC2 instances. The D2 instances are specifically designed for workloads which are greater sequential write and get the read access for large data storage. All these are well-suited for data warehouses, processing computing and Hadoop. These instances are optimized by EBS which offers dedicated block storage for your AWS account that ranges from 750 Mbps to 4000 Mbps with free usage. It also allows users to access them regularly by achieving great network traffic.

Instance Name	vCPU Count	RAM	Instance Storage	Network Performance	Disk read-throughput	Linux On-Demand Price
d2.xlarge	4	30.5GB	6TB	Moderate	437 MBps	\$0.690
d2.2xlarge	8	61GB	12TB	High	875 MBps	\$1.380
d2.4xlarge	16	122GB	24TB	High	1750 MBps	\$2.760
d2.8xlarge	36	244GB	48TB	High	3500 MBps	\$5.520

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With all these features discussed, you can also launch multiple of these D2 instances in a placement group for high bandwidth low latency networking between the instances.

Following are also the features that come along with Amazon's EC2 instances:

- Amazon EBS-Optimized by default
- Bringing Power to the people
- Available worldwide now
- Storage

AWS EC2 Instance Sizes and Amazon EC2

The instance store is here to provide temporary instance. The complete storage is located on ce computers in a physical way. The instance can e instance storage volume which is completely ex

What is the Amazon EC2 Reserved Instan

The Amazon EC2 Reserved Instance (RI) is complete or importance which is compared with On-Demand pricing that provides a capacity reservation that is generally used for specific Availability Zone.

Amazon EC2 Instance Scheduled For Retirement

This Amazon EC2 instance is completely scheduled with respective retirement when AWS detects an irreparable failure of the hardware hosting the instance.

Amazon EC2 Instance Pricing

One can easily pay only for the usage of EC2 instances where the costs and complexities of planning, purchasing, and maintenance of hardware that can easily transform with a certain fixed amount of costs.

Conclusion:

In this article, we have thoughtfully dealt with the concepts of Amazon's Elastic Compute Cloud (AWS EC2) ecosystem and its importance.

Also, we have discussed the features, advantages, disadvantages, and also the pricing details about all the AWS instances and their types.

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We hope you have gained knowledge of all these concepts. However, if you feel any information is missing here, please comment on the same in the below comments section and we will update the blog as soon as possible.

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244 Fifth Avenue, Suite 1222 New York(NY) United States (US) - 10001

USA : +1 917 456 8403

info@mindmajix.com

91Springboard, 512/10, Service Lane, Outer Ring Road, Mahadevapura, Next to More Megastore,
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