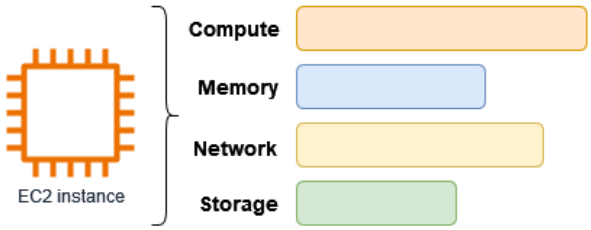
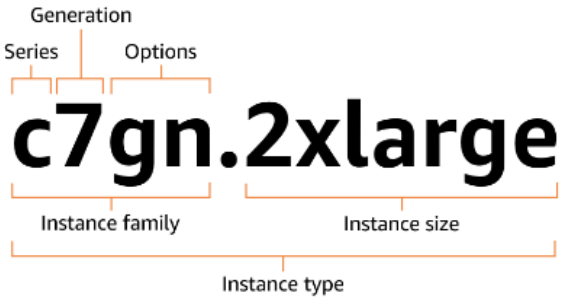
EC2:Elastic cloud compute

Provides on-demand, scalable computing capacity in the Amazon Web Services (AWS) Cloud.

An EC2 instance is a ***virtual machine runs as server*** in the AWS Cloud.

You can launch as many or as few virtual servers as you need, configure security and networking, and manage storage.





Types of Ec2:

1. General purpose
2. Compute optimized
3. Memory optimized
4. Storage optimized
5. Accelerated computing
6. High performance computing

Instance Type	Use case	Examples
General Purpose	Balanced CPU,Memory and networking	t3,M5
Compute Optimized	High performance processor	c5,c6g
Memory Optimized	Large RAM for DB and caching	r5,x2idn
Storage Optimized	High disk throughput for big data processing	i3,d2
Accelerated Computing	GPU or FPFA based instances for AI/ML	p4,inf1

EC2 Pricing Models:

Purchasing Option	Cost	Use Cases
On-Demand Instance	Pay per hour/second, no upfront commitment	Short-term, unpredictable workloads
Savings Plans	Discounted rates with 1 Or 3 year commitment	Flexible pricing for steady workloads
Reserved Instance - Standard	Up to 75% savings with 1 or 3 year commitment	Predictable, long-term workloads
Reserved Instance - Convertible	Offers flexibility to change instance type or family	Changing workload needs with savings
Spot Instance	Up to 90% discount for unused capacity	Fault-tolerant and flexible workloads
Dedicated Host	Physical server fully dedicated to your use	Compliance and regulatory needs
Dedicated Instance	Virtual machine on a dedicated server	Isolation for workloads with strict security requirements
Capacity Reservations	Reserved capacity without long-term commitment	Ensuring availability in a specific region

EC2 Storage Options:

1.Amazon Elastic Block Store (**EBS**): Persistent block storage for EC2.

- ➢ Data remains even if the EC2 instance is stopped or terminated.
- ➢ SSD-backed storage for transactional workloads
  - General Purpose SSD (gp3): Balanced performance for most workloads.
  - Provisioned IOPS SSD (io2): High performance for I/O-intensive applications
- ➢ HDD-backed storage for throughput intensive workloads

- Throughput Optimized HDD (st1): For large, sequential workloads.
- Cold HDD (sc1): for infrequently accessed data

EBS Snapshots: Allows you to create backups of your EBS volumes, stored in Amazon S3.

EBS Use Cases: Operating system drives, Databases,Applications requiring persistent storage.

2.Instance Store: Ephemeral storage tied to the instance.

- ➢ Data is lost when an instance is terminated or stopped.
- ➢ Useful when you need fast I/O operation.
- ➢ High-speed local storage for caching, temporary data, or swap space,Buffers.
- ➢ ***No additional charges*** for the storage (included in the instance price).

3.Amazon S3: Object storage for backups and logs.

4.Amazon EFS: Managed file system for multiple instances.

Provides a scalable, fully managed network file system that can be shared by multiple EC2 instances.

EFS Use Cases: Web servers. Content management systems. Shared data repositories.

5.FSx for Windows/Linux: Specialized file storage.

EC2 Security & Networking in EC2:

- ➢ Security Groups: Firewall rules.Control inbound and outbound traffic.Stateful(Only allow rule required)
- ➢ Key Pairs: Secure SSH or RDP access.
- ➢ Virtual Private Cloud (VPC): Isolated network environment.
- ➢ Subnets: Divide VPC into smaller networks.
- ➢ Network ACLs: Control traffic at the subnet level. Stateless(Both allow and deny needs to be defined)
- ➢ Elastic Load Balancer (ELB): Distributes traffic across instances.
- ➢ AWS Shield & WAF: Protection against DDoS attacks.

AMI - Amazon machine image AWS AMI

AMI is a pre-configured template that provides the information required to launch an EC2 instance in AWS.

Key Characteristics:

- Templates: AMIs are templates, not running instances.
- Region-Specific: AMIs are specific to an AWS Region.
- Customizable: You can create your own AMIs or use pre-built ones from AWS Marketplace or the AWS community.
- Multiple Options: AMIs are available with various operating systems (Linux, Windows, etc.) and software packages.

Key points about AMIs:

- Base OS: An AMI includes the operating system (e.g., Linux, Windows, etc.).
- Software Packages: You can include specific applications, web servers, databases, or any other software pre-installed in the AMI.
- Configuration: The AMI contains configurations, settings, and permissions that define how the instance behaves.
- Processor architecture
- Launch permissions(public/explicit/implicit)
- Root device type(*Amazon EBS* or *instance store)*
- Virtualization type(***paravirtual*** (PV) or ***hardware virtual machine*** (HVM).)
- Instance Launching: When you launch an EC2 (Elastic Compute Cloud) instance in AWS, you select an AMI as the base template for the instance.
- Customizable: You can create your own custom AMI or use public AMIs offered by AWS, third parties, or the community.

EC2 Image Builder:

- A fully managed service provided by Amazon Web Services (AWS)
- Simplifies the process of building, testing, and maintaining custom Amazon Machine Images (AMIs) for EC2 instances.
- It automates the creation, validation, and distribution of AMIs, reducing the complexity and time required to manage custom AMIs in your environment.
- ***Free service*** (only pay for the underlying resources)

EC2 image builder Key Features:

- *Pipelines*:Image Builder uses pipelines to define the steps involved in building and testing your images.
- *Recipes*:Recipes define the components and configurations that are included in your images.There are recipe components for operating system updates, application installations, and security configurations.
- *Components*:Components are the building blocks of recipes. They are used to perform specific tasks, such as installing software or applying security patches.
- *Testing*:Image Builder allows you to automate testing of your images to ensure they meet your requirements.
- *Distribution*:You can distribute your images to multiple AWS Regions and accounts.
- *Security*:Integrates with AWS security services, such as IAM and AWS Security Hub.
- *Versioning*: Image builder keeps track of image versions

EC2 image builder benefits:

- *Improved Security*:Helps you create secure images by automating security patching and configuration.
- Reduced Operational Overhead:
- Automates image creation and management, reducing the manual effort required.
- Increased Consistency:Ensures consistency across your EC2 instances by using standardized images.
- Faster Image Creation:Automates the image creation process, reducing the time required to build images.
- Simplified Compliance:Helps you meet compliance requirements by creating secure and consistent images.