**1. EC2 Types (Pricing Models in AWS)**

These are different **ways AWS lets you pay** for EC2 virtual servers depending on your use case and budget.

**Description:**

EC2 pricing types define **how you are charged** for using instances. They help you choose between flexibility, cost savings, or guaranteed capacity.

**Table: EC2 Pricing Models**

| EC2 Type | Description | Best For |
|---|---|---|
| **On-Demand Instances** | Pay by the second/hour, no upfront payment. Flexible but costlier long-term. | Short-term, unpredictable workloads |
| **Reserved Instances** | Commit to 1 or 3 years for big discounts (up to 75%). | Long-term, steady-state workloads (e.g., web servers) |
| **Spot Instances** | Buy unused EC2 capacity at steep discounts (up to 90%). | Flexible, fault-tolerant jobs (batch, ML) |
| **Savings Plans** | Commit to a $/hour spend for 1 or 3 years; flexible instance usage. | Cost-saving for variable workloads |
| **Dedicated Instances** | EC2 on single-tenant hardware but billed like On-Demand. | Compliance or licensing needs |
| **Dedicated Hosts** | Full physical server rental, visibility into sockets/cores. | Bring-your-own-license, regulatory requirements |
| **Capacity Reservations** | Reserve capacity in an Availability Zone ahead of time. | Mission-critical apps requiring guaranteed resources |

**2. Instance Types (EC2 Instance Families in AWS)**

These are different **hardware configurations** optimized for various kinds of applications.

**Description:**

Instance types determine **how much CPU, memory, storage, and networking power** your virtual machine gets. Each is suited for different workloads like ML, databases, websites, or big data.

**Table: EC2 Instance Types (Families)**

| Instance Family | Prefix | Optimized For | Example Types | Best For |
|---|---|---|---|---|
| **General Purpose** | t, m | Balanced compute, memory, and networking | t4g, m5, t3a | Web servers, Dev/Test, small DBs |
| **Compute Optimized** | c | High-performance CPU | c6g, c7i, c5n | Gaming servers, ML inference, batch jobs |
| **Memory Optimized** | r, x, z, u | Large RAM for big datasets | r6g, x2idn, z1d | In-memory DBs, real-time analytics |
| **Storage Optimized** | i, d, h | High IOPS, local storage (SSD or HDD) | i3, d2, h1 | Big data, NoSQL DBs, file storage |
| **Accelerated Computing** | p, g, f, inf, trn | GPU, FPGA, ML/AI | p4, g5, f1, inf1 | Deep learning, 3D rendering, inference |
| **High Performance (HPC)** | hpc, c7gn | High-throughput, low latency | hpc6id, hpc6a | Scientific modeling, genomics |
| **Bare Metal** | .metal suffix | Full access to physical hardware | m5.metal, u-12tb1.metal | Legacy apps, full control, licensing |

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✅ **Summary**

| Topic | EC2 Type | Instance Type |
|---|---|---|
| **Meaning** | How AWS charges you for using EC2 | The kind of virtual machine you run |
| **Focus** | Billing / Cost Management | CPU, RAM, storage, and network performance |
| **Examples** | On-Demand, Reserved, Spot, Dedicated | t2.micro, c5.large, g4dn.xlarge, r6g.2xlarge |
| **Controlled by** | AWS Pricing Plans | AWS EC2 Hardware Families |