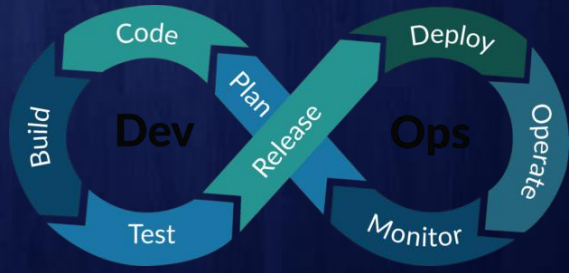
AWS SAA + SysOps + Developer + DevOps Course #Day-22

We will start at 8 AM,
Stay tuned



RAKESH TANINKI
LEARN TO UNLEARN

Recap:

- VPC
  - Flow Logs
  - Private Endpoints
    - Gateway
    - Interface
  - Peering
- Demos

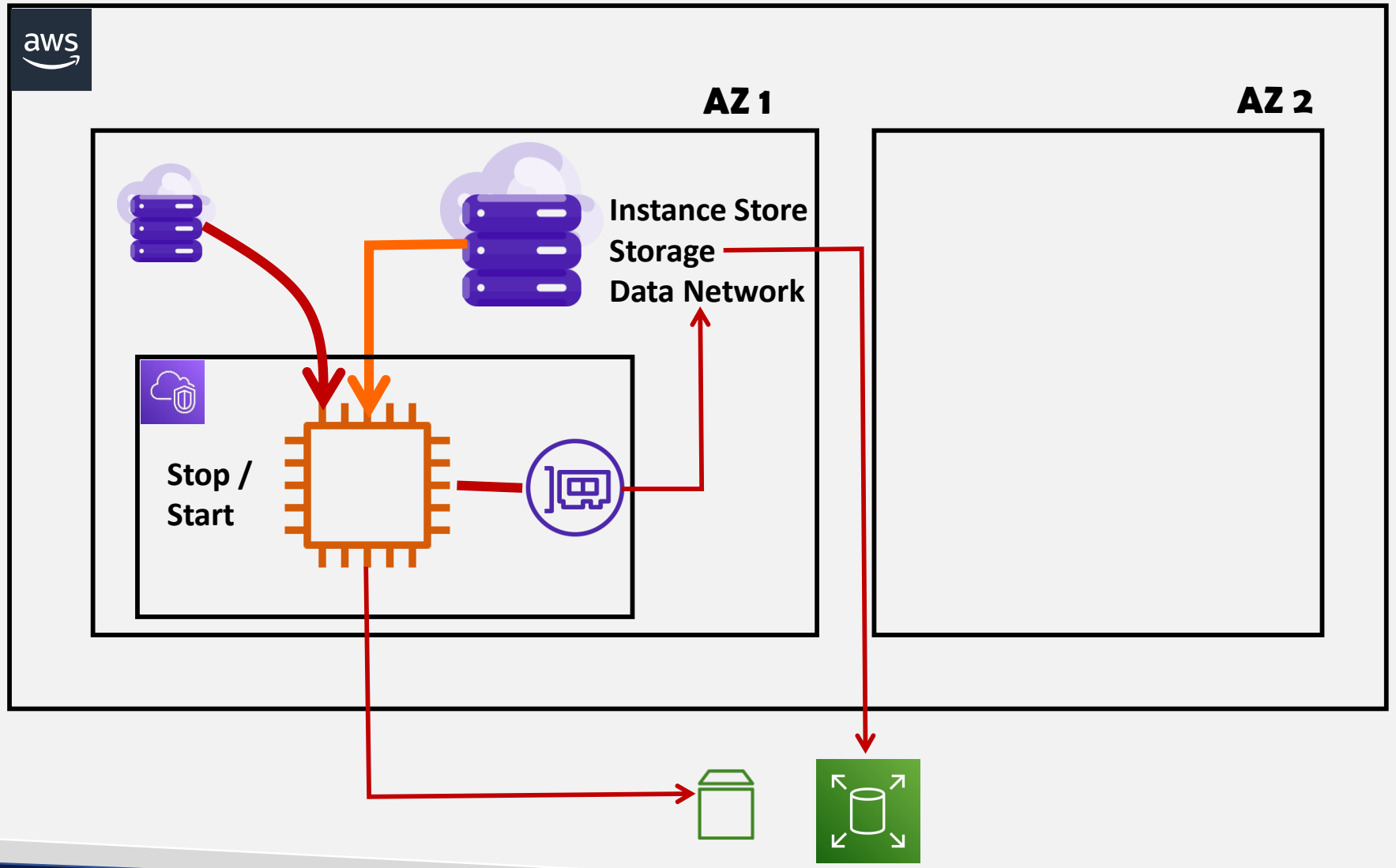
Today's topics:

- EC2
  - Instance Types
  - Instance Type Families
  - Decoding EC2 instance types
- Storage
  - Performance
  - EBS Volumes
  - EBS Volume Types
    - SSD
- Pricing

Elastic Compute Cloud

- EC2 Instances are virtual machines (virtualization)
- … runs on EC2 hosts (Physical server)
- EC2 hosts are shared or dedicated
- Hosts are AZ resilient
  - If AZ fails instance also fails

EC2 Architecture



EC2 suitable for

- Lift and Shift – migration
- … Monolithic applications
- Traditional OS + App compute
- Long running compute – 24x7
- Server style application like PHP, WordPress, etc.

EC2 Instance Types

- Raw CPU, memory, local storage
- Resource ratio's
- Storage, data, network traffic (bandwidth)
- System architecture
  - x64 → Intel, Arm → AMD
- GPU, FGPA related compute

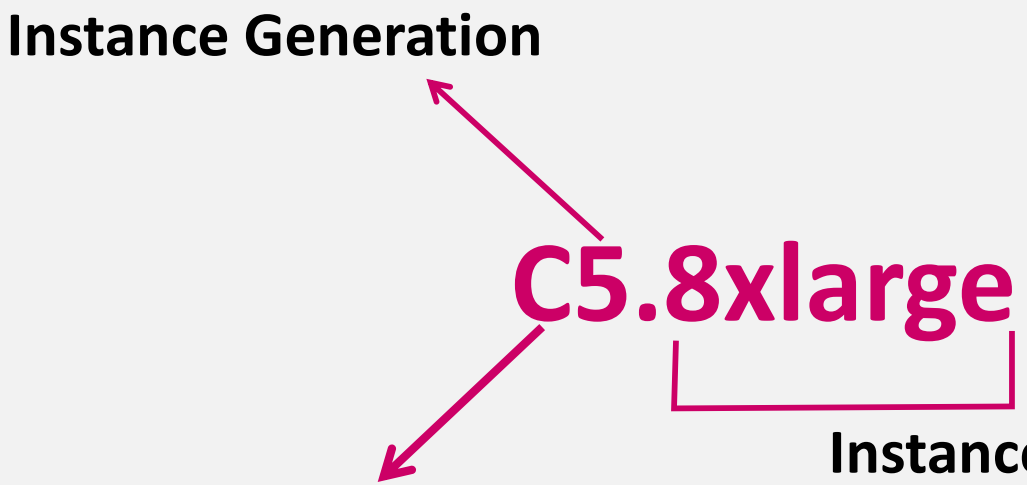
EC2 Instance Type - Families

1. **General Purpose** – Default instance type for diverse workloads
   - Equal resource ratio. Ex: t2.micro, t3.micro, m5.large, etc.
2. **Compute Optimized** – more compute power than memory
   - Media processing, HPC, Scientific Modelling, Gaming, ML
     - Ex: c5.large, c6.2xlarge, etc.
3. **Memory Optimized** – more memory than compute
   - Processing large in-memory data sets and database workloads
   - Ex: r5.8xlarge, r6.2xlarge, etc.
4. **Accelerated Computing** – Hardware GPU, FGPA
5. **Storage Optimized** – Sequential and random IO, data ware housing, elastic search, analytical workloads

Decoding EC2 instance type

Ref: Instance Families

Cost: Pricing



Instance Size

- Nano
- Micro
- Medium
- Large
- Xlarge
- 2xlarge
- 4xlarge
- 8xlarge

Storage – Key Terms

1. **Ephermal Storage** – Temporary storage
    - Ex: Instance Store (local)
2. **Persistent Storage** – Permanent storage
    - EBS – Elastic block store

Storage – Key Terms

- **Block Storage** – volume presented to OS as a collection of blocks for Mountable / Bootable. It has no structure.
  - Ex: EBS
- **File Storage** – Presented as a file share. It has a structure. It is mountable / not bootable.
  - Ex: EFS, FSx
- **Object Storage** – It has a flat structure. It is not mountable / not bootable.
  - Ex: S3

Storage – Performance (EBS)

Block Size (KB) X IOPS = Throughput

Input Output per second

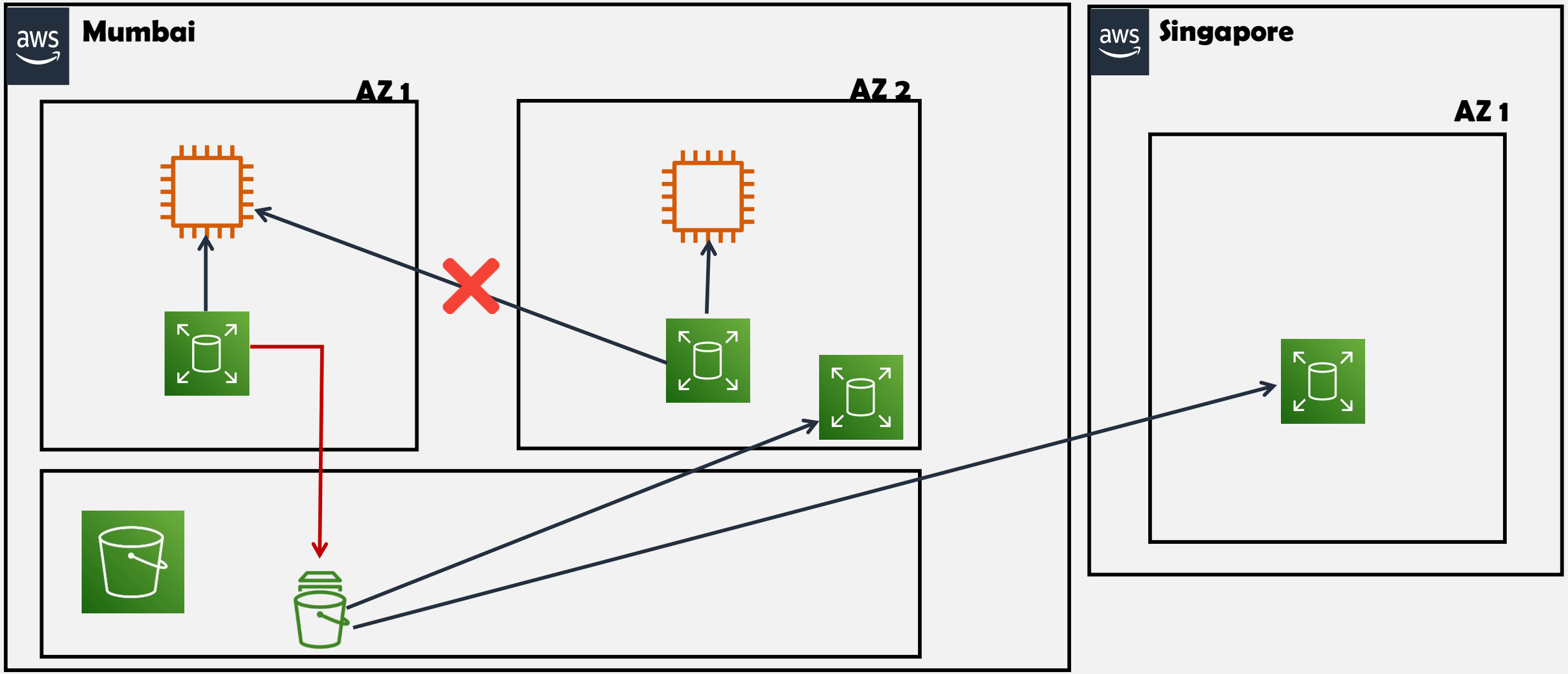
16 X 100 IOPS = 1600 = 1.6 MB/s

100 X 5000 IOPS = 500000 = 500 MB/s

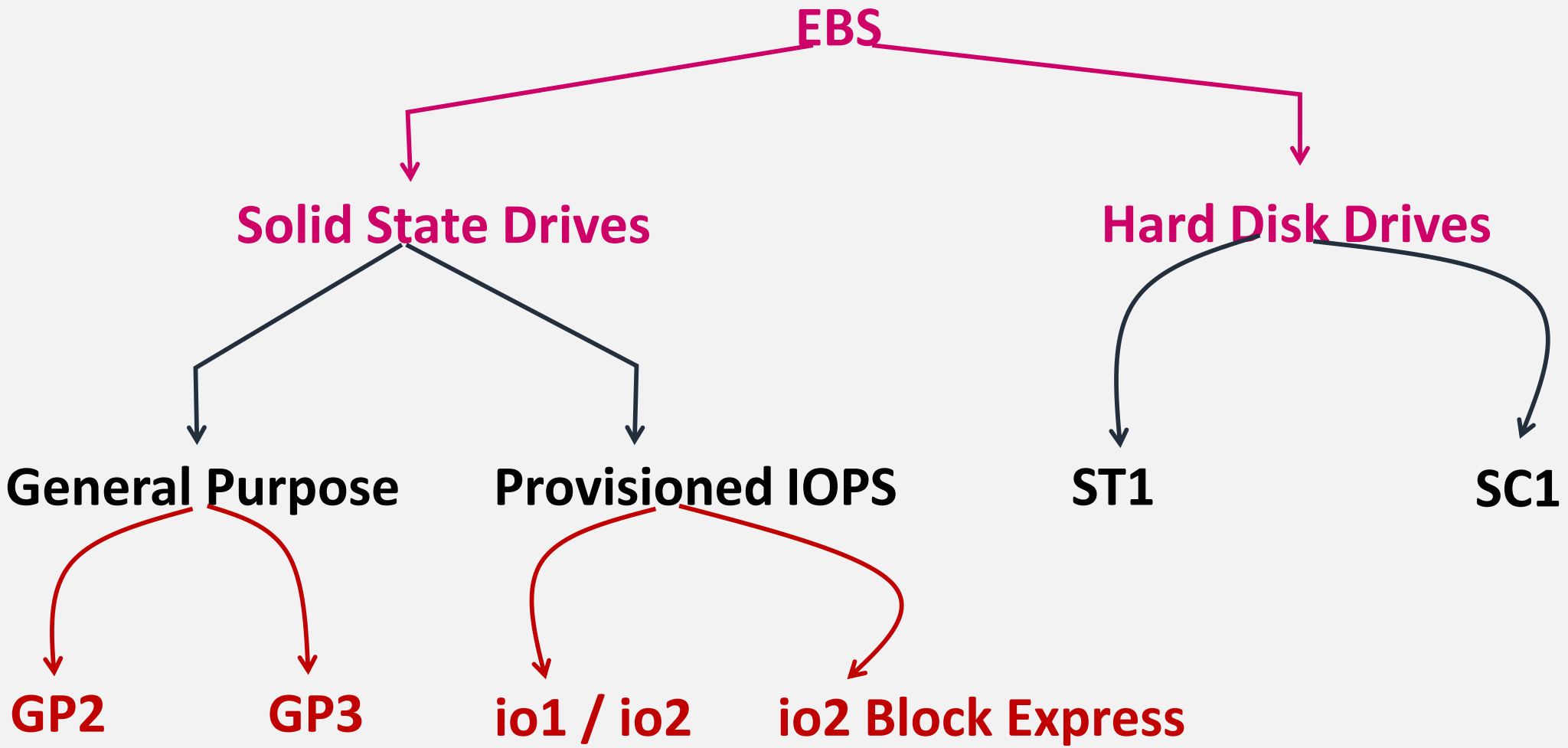
Elastic Block Store (EBS)

- **Block Level Storage** – raw disk allocations (volumes)
- Can be encrypted with **KMS (Data at rest)**
- Instance see the attached block devices and creates the file system (ext3/ext4, XFS)
- EBS – **AZ resilient**
- **Persistent Storage –** attached to one or another EC2 over storage network
- … volume can be detached or reattached to instances
    - Only root volume deleted if you do not specify
- **Snapshot(backup) –** into S3 and create volume from snapshot
- Different storage types, performances, sizes
- Billed based on the **GB-month and performance**

EBS Architecture



Types of EBS

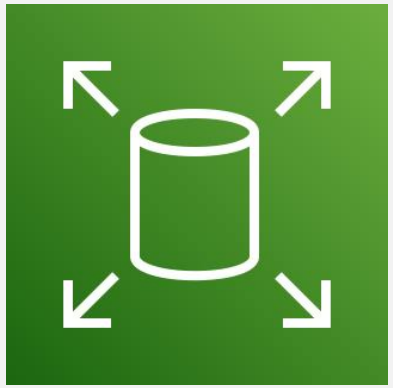


EBS - GP2

Volume can be as small as 1 GB,
or as large as 16 TB

3 IO per GB allocated
100 GB ➔ 100 x 3 = 300 IOPS

Min 100 IOPS assigned as base performance



Max 16,000 IOPS irrespective of size

Types of EBS

	General Purpose SSD volumes		Provisioned IOPS SSD volumes		
Volume type	`gp3`	`gp2`	`io2` Block Express ‡	`io2`	`io1`
Durability	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)		99.999% durability (0.001% annual failure rate)		99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)
Use cases	• Transactional workloads • Virtual desktops • Medium-sized, single-instance databases • Low-latency interactive applications • Boot volumes • Development and test environments		Workloads that require: • Sub-millisecond latency • Sustained IOPS performance • More than 64,000 IOPS or 1,000 MiB/s of throughput		• Workloads that require sustained IOPS performance or more than 16,000 IOPS • I/O-intensive database workloads
Volume size	1 GiB - 16 TiB		4 GiB - 64 TiB		4 GiB - 16 TiB
Max IOPS per volume (16 KiB I/O)	16,000		256,000		64,000 †
Max throughput per volume	1,000 MiB/s	250 MiB/s *	4,000 MiB/s		1,000 MiB/s †
Amazon EBS Multi-attach	Not supported		Supported		
Boot volume	Supported				

Types of EBS

	Throughput Optimized HDD volumes	Cold HDD volumes
Volume type	st1	sc1
Durability	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)	
Use cases	• Big data • Data warehouses • Log processing	• Throughput-oriented storage for data that is infrequently accessed • Scenarios where the lowest storage cost is important
Volume size	125 GiB - 16 TiB	
Max IOPS per volume (1 MiB I/O)	500	250
Max throughput per volume	500 MiB/s	250 MiB/s
Amazon EBS Multi-attach	Not supported	
Boot volume	Not supported	

Thank you, will meet in tomorrow's session