AWS –Volumes

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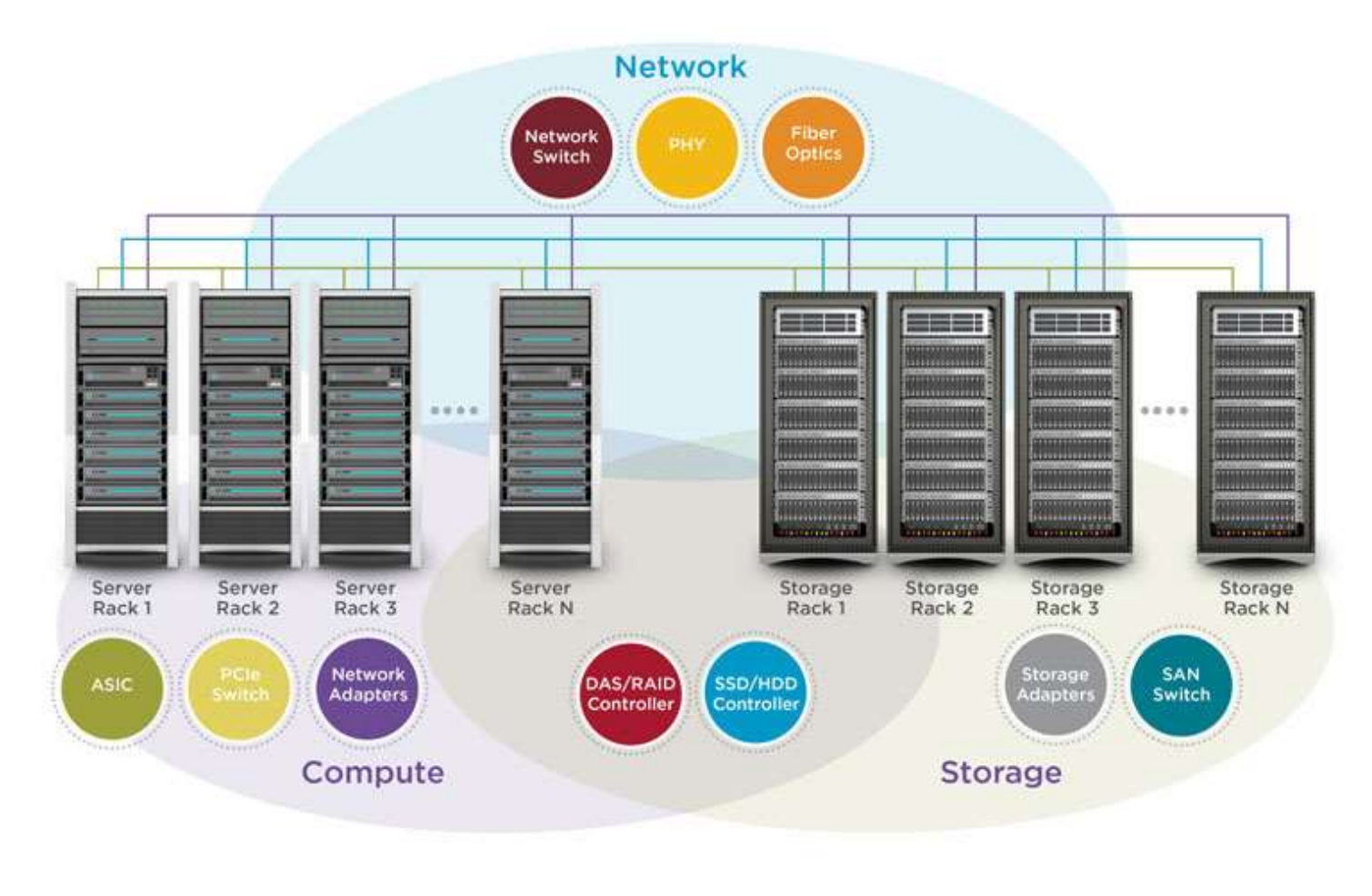
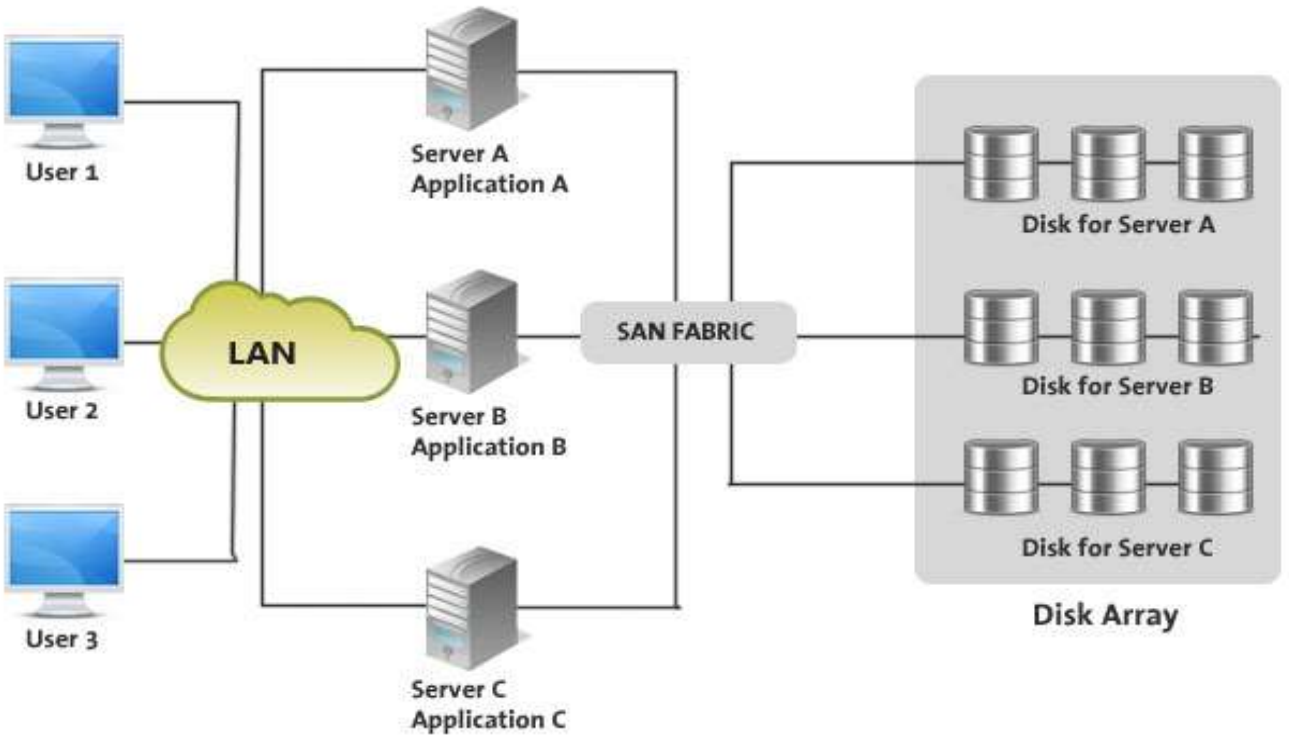
Agenda

- Volumes
  - What is Block Level Storage?
  - What is EBS
  - Volume Types
  - Benefits of Volumes
  - What is Instance Store?

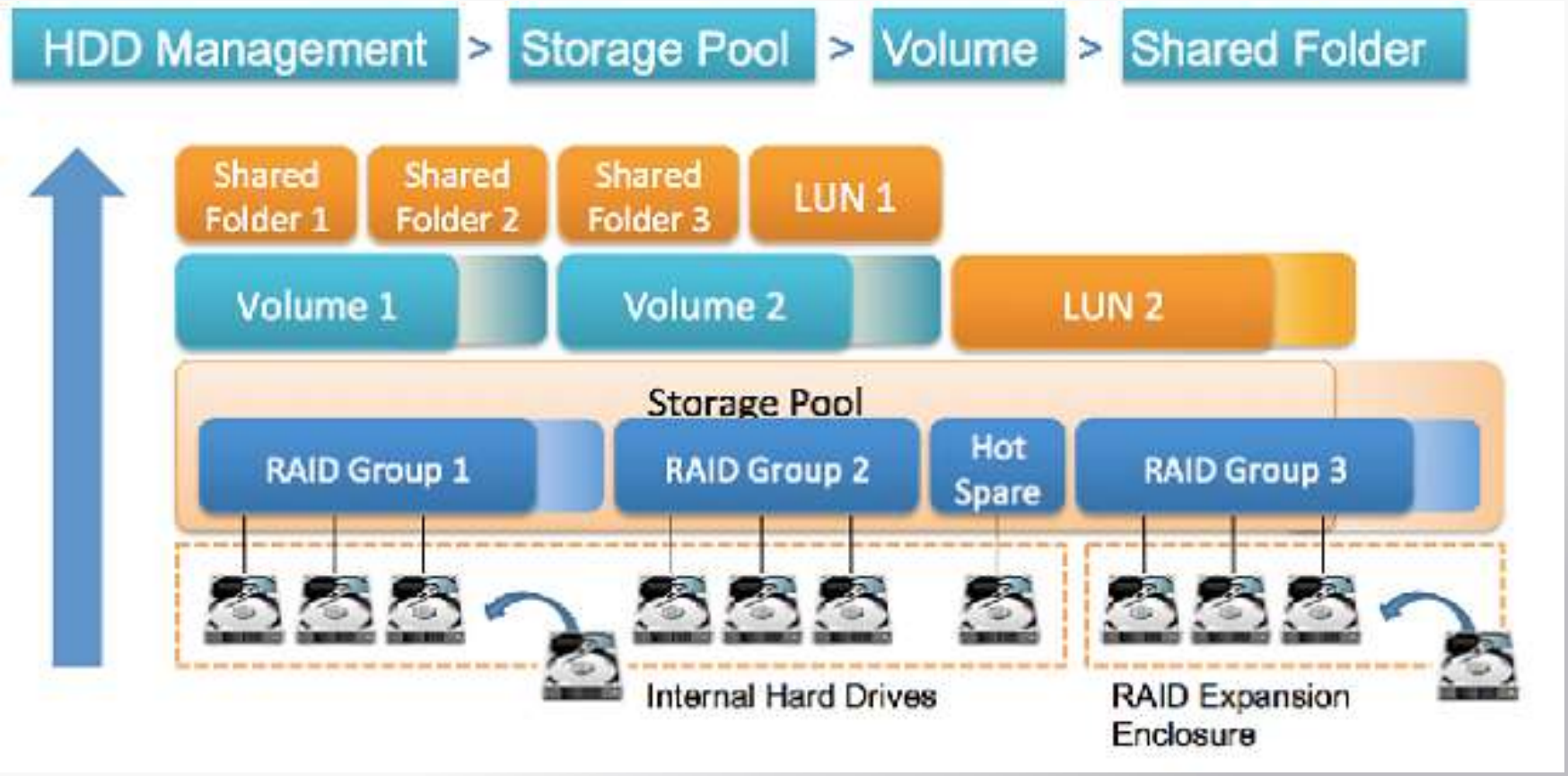
Physical Appearance of Datacenter



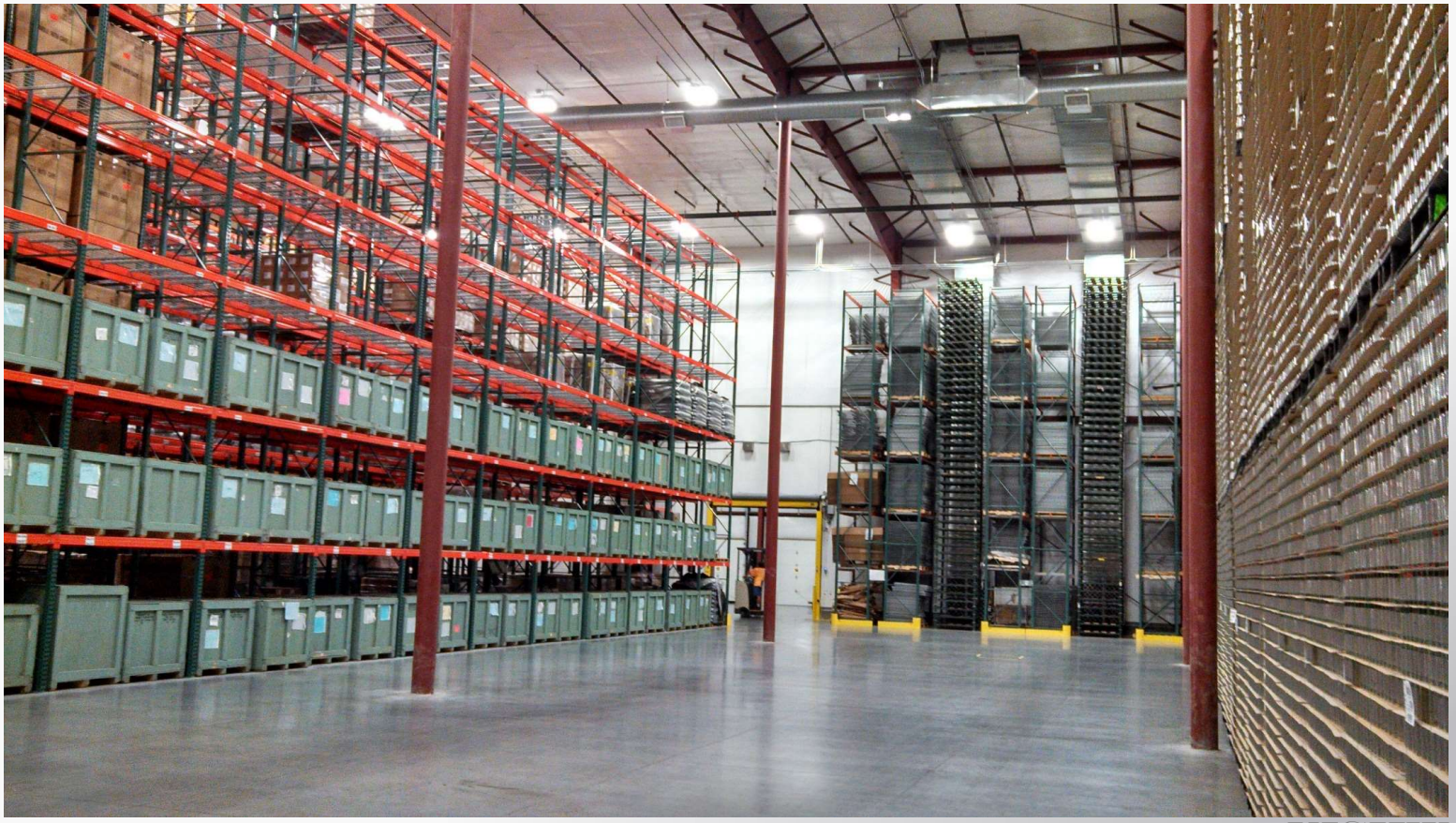
Server and Storage Connectivity



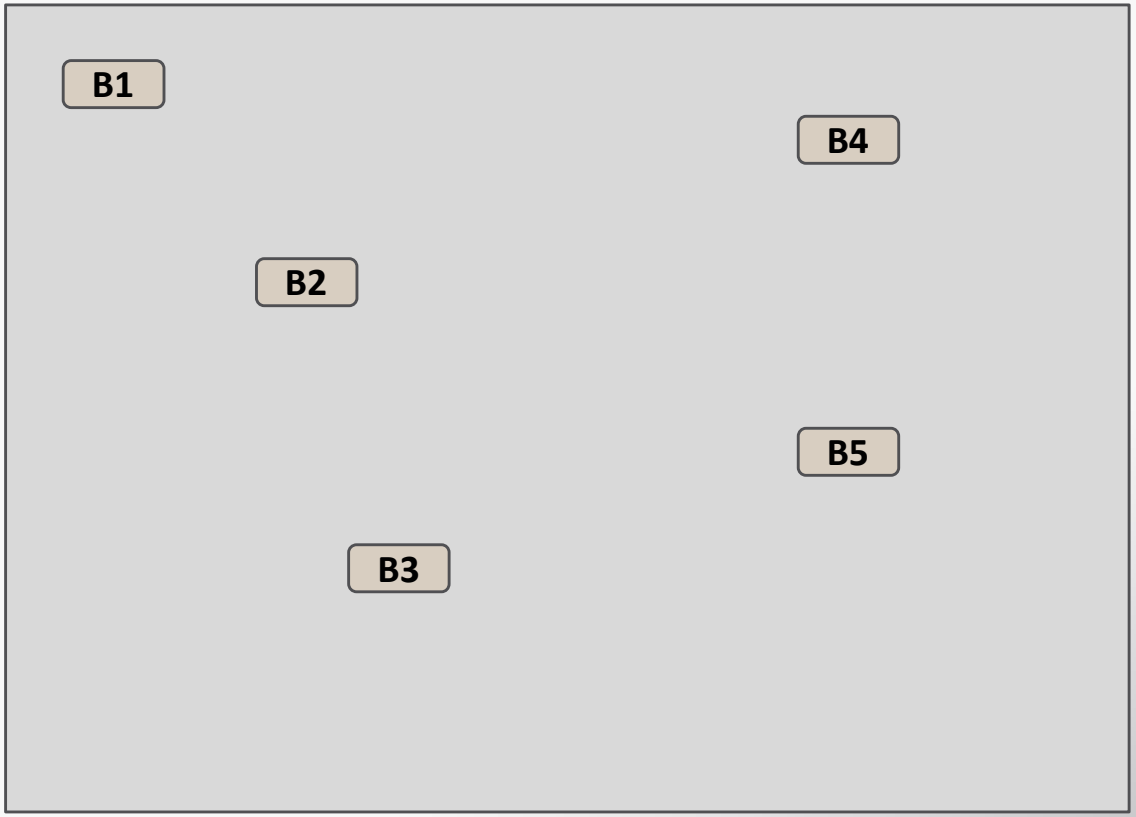
Storage Concepts



BLOCK STORAGE

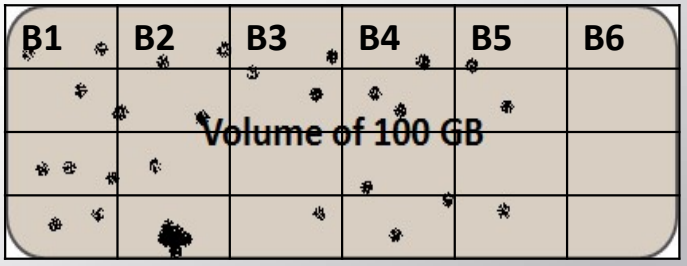


Block Level Storage - Concepts



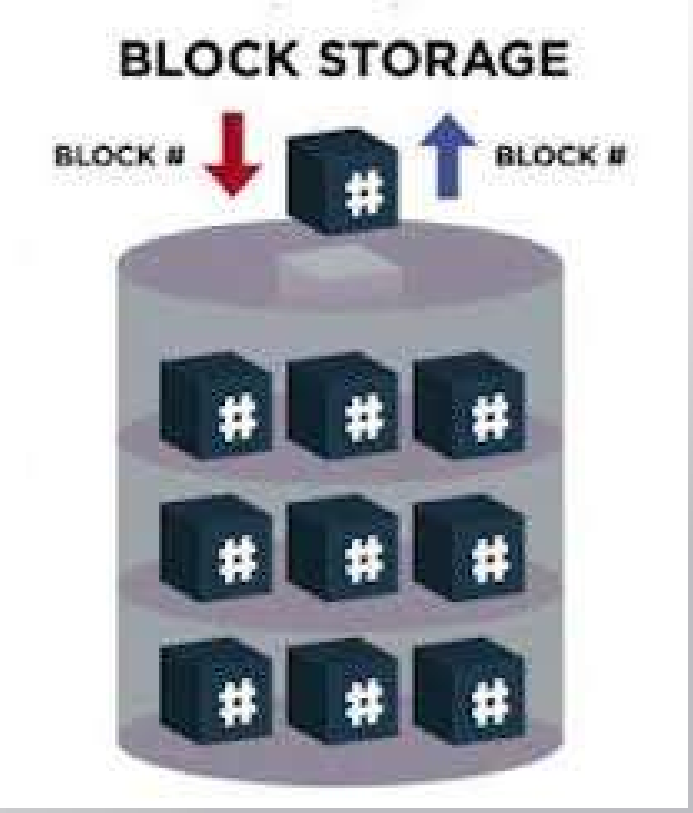
Storage Device – 1 Peta Byte

Volume of 100 GB



Volumes – BLOCK Level Storage

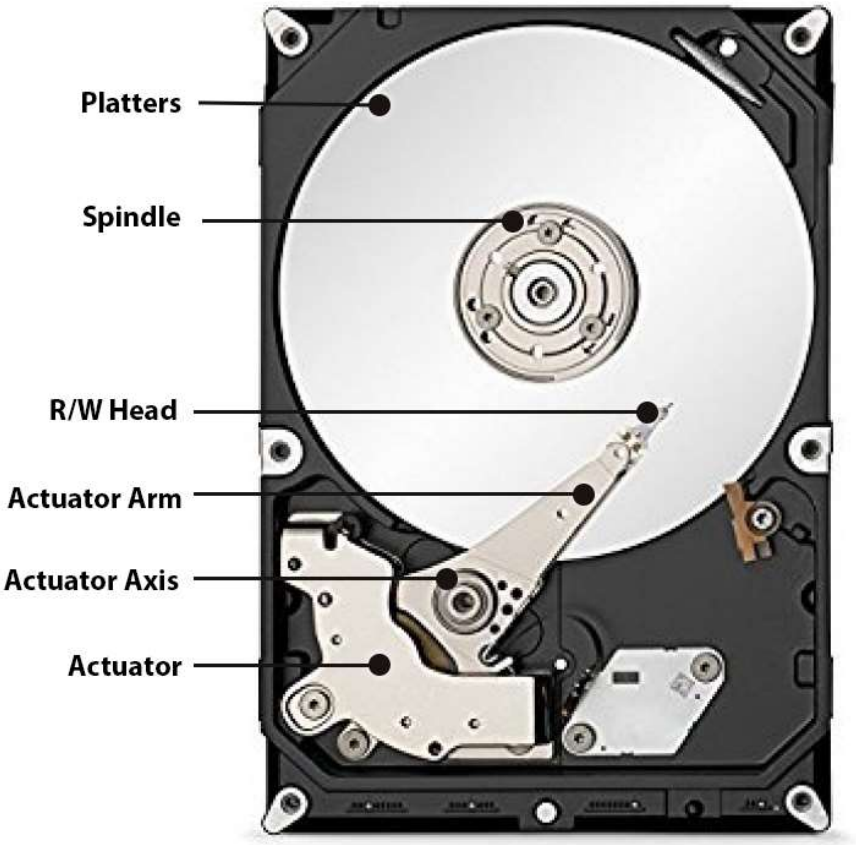
- Volumes are Block-level storage that can be attach to a single EC2 instance.
- It is Assigned to a particular Availability Zone.
- In turn part of an **“Region”.**
- **Volumes are of 2 Types.**
  - **EBS (Elastic Block Store)**
  - **Instance Store**



Amazon EBS Volume Types

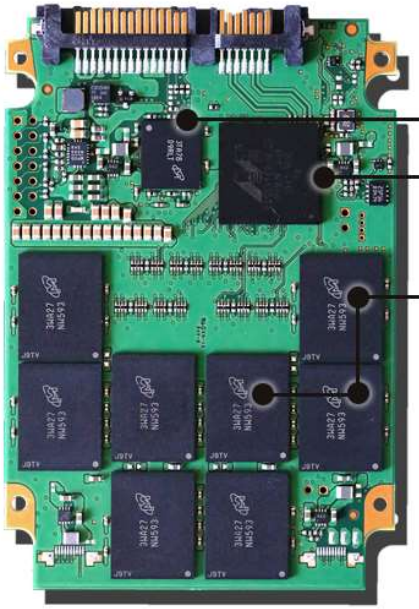
- Solid-State Drives (SSD)
- Hard Disk Drives (HDD)

HDD
3.5″



Shock resistant up to 55g (operating)
Shock resistant up to 350g (non-operating)

SSD
2.5″



Shock resistant up to 1500g
(operating and non-operating)

HDD vs SSD

The performance of Storage devices are measured in terms of **IOPS.**

IN HDD, the disk rotation ranges from 5k RPM to 15K RPM.

In turn, the IOPS for HDD ranges from **70 IOPS to 200 IOPS** per Disk.

But, in case of **SSD**, there is **NO RPM** as it is a **Flash Memory** concept/

The **IOPS** starts from **1500 to 20k** per **Drive**.

Amazon EBS Volume Types

- Solid-State Drives (SSD)
  - General Purpose SSD (gp2)
  - Provisioned IOPS SSD (io1)
- Hard Disk Drives (HDD)
  - Throughput Optimized HDD (st1)
  - Cold HDD (sc1)
  - Magnetic

Amazon EBS Volume Types

- For current-generation volumes attached to current-generation instance types,
  - Dynamically volume can be increased.
  - Provisioned IOPS capacity can be modified on the fly.
  - Also can change volume type on live production volumes.

- IOPS are measured as 256KB (or less) , Anything above 256KB of data is processed as next IOPS, (Example– if the data is 650KB, it would be 3 IOPS).

- General Purpose SSD (gp2) – Will have 3 IOPS per GB
- Provisioned IOPS SSD (io1) – Can be configured max of 50 IOPS per GB

	Solid-State Drives (SSD)		Hard Disk Drives (HDD)	
Volume Type	General Purpose SSD (gp2)*	Provisioned IOPS SSD (io1)	Throughput Optimized HDD (st1)	Cold HDD (sc1)
Description	General purpose SSD volume that balances price and performance for a wide variety of workloads	Highest-performance SSD volume for mission-critical low-latency or high-throughput workloads	Low-cost HDD volume designed for frequently accessed, throughput-intensive workloads	Lowest cost HDD volume designed for less frequently accessed workloads
Use Cases	Recommended for most workloads	Critical business applications that require sustained IOPS performance, or more than 16,000 IOPS or 250 MiB/s of throughput per volume	Streaming workloads requiring consistent, fast throughput at a low price	Throughput-oriented storage for large volumes of data that is infrequently accessed
	System boot volumes	Large database workloads, such as:	Big data	Scenarios where the lowest storage cost is important
	Virtual desktops		Data warehouses	Cannot be a boot volume
	Low-latency interactive apps	MongoDB , Cassandra, MySQL	Log processing	
	Development and test environments	Microsoft SQL Server	Cannot be a boot volume	
		PostgreSQL, Oracle		
API Name	gp2	io1	st1	sc1
Volume Size	1 GiB - 16 TiB	4 GiB - 16 TiB	500 GiB - 16 TiB	500 GiB - 16 TiB
Max. IOPS/Volume**	16,000***	64,000****	500	250
Max. Throughput/ Volume	250 MiB/s***	1,000 MiB/s†	500 MiB/s	250 MiB/s
Max. IOPS/Instance	80,000	80,000	80,000	80,000
Max. Throughput /Instance	1,750 MiB/s	1,750 MiB/s	1,750 MiB/s	1,750 MiB/s
Performance Attribute	IOPS	IOPS	MiB/s	MiB/s

EBS Pricing

Amazon EBS General Purpose SSD (gp2) Volumes

Region: US West (Oregon)

$0.10 per GB-month of provisioned storage

Amazon EBS Provisioned IOPS SSD (io1) Volumes

$0.125 per GB-month of provisioned storage

$0.065 per provisioned IOPS-month

Benefits of Using EBS Volumes

- Data Availability
  - An EBS volume and the instance to which it attaches must be in the same Availability Zone.
  - You can get monitoring data for your EBS volumes, including root device volumes for EBS-backed instances, at no additional charge.
- Data persistence
  - An EBS volume is off-instance storage that can persist independently from the life of an instance.
- Data encryption
  - Amazon EBS encryption uses 256-bit Advanced Encryption Standard algorithms (AES-256).
  - The encryption occurs on the server that hosts the EC2 instance.
  - Also can change volume type on live production volumes.

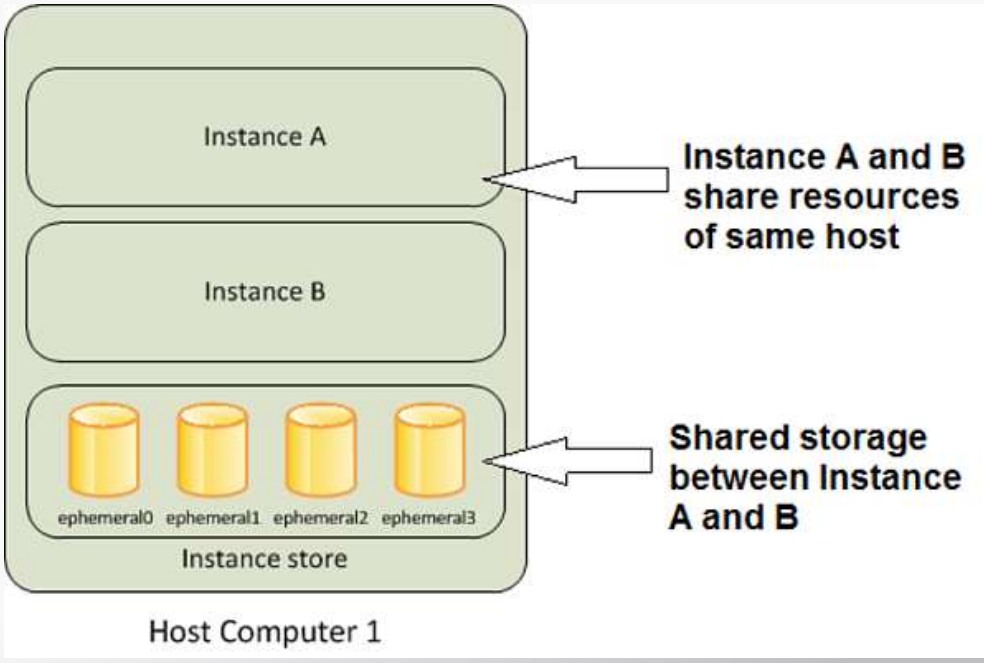
EBS–Optimized Instances

- EBS–optimized instances deliver dedicated bandwidth to Amazon EBS
- Bandwidth would be between **425 Mbps and 14,000 Mbps.**

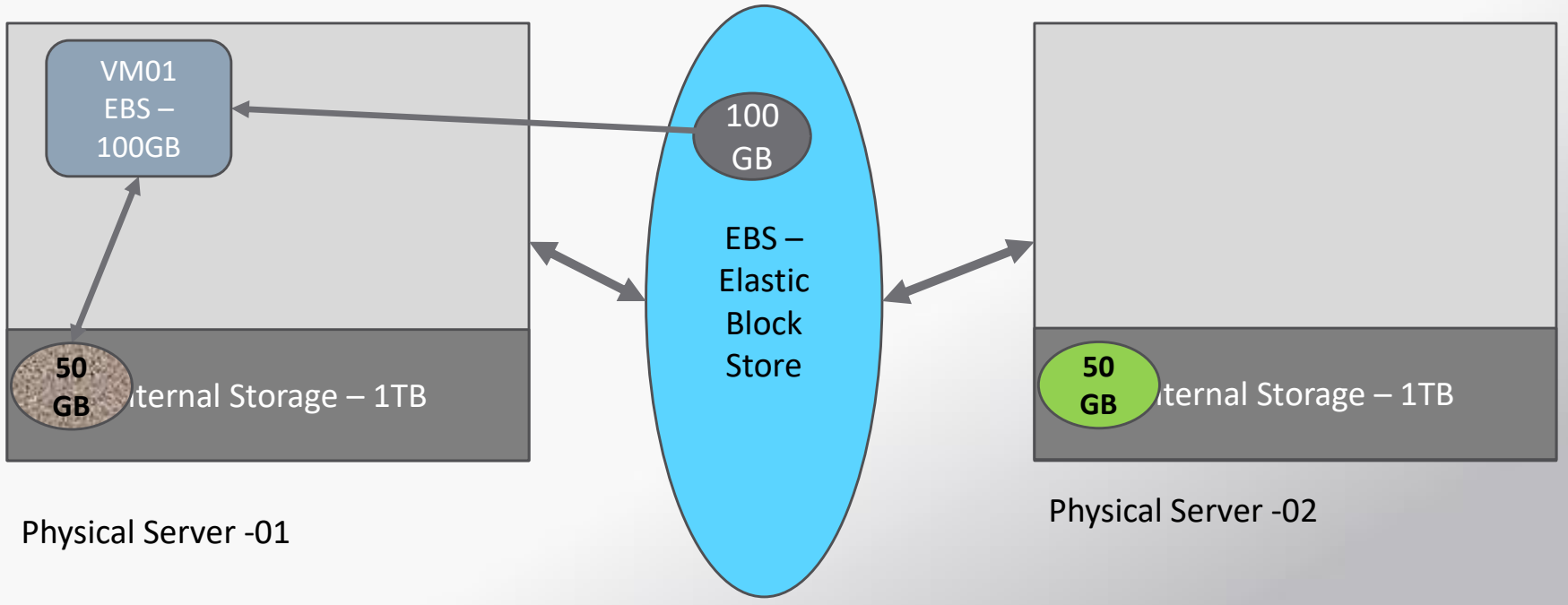
Instance type	EBS-optimized by default	Maximum bandwidth (Mbps)	Maximum throughput (MB/s, 128 KB I/O)	Maximum IOPS (16 KB I/O)
a1.medium	Yes	3,500	437.5	20,000
a1.large	Yes	3,500	437.5	20,000
a1.xlarge	Yes	3,500	437.5	20,000
a1.2xlarge	Yes	3,500	437.5	20,000
a1.4xlarge	Yes	3,500	437.5	20,000

Amazon EC2 Instance Store

- An instance store provides temporary block-level storage for your instance.
- The Virtual devices for instance store volumes are *ephemeral[0-23].*
- *D*ata in the instance store is lost under any of the following circumstances:
  - The underlying disk drive fails
  - The instance stops
  - The instance terminates



EBS vs Instance Store



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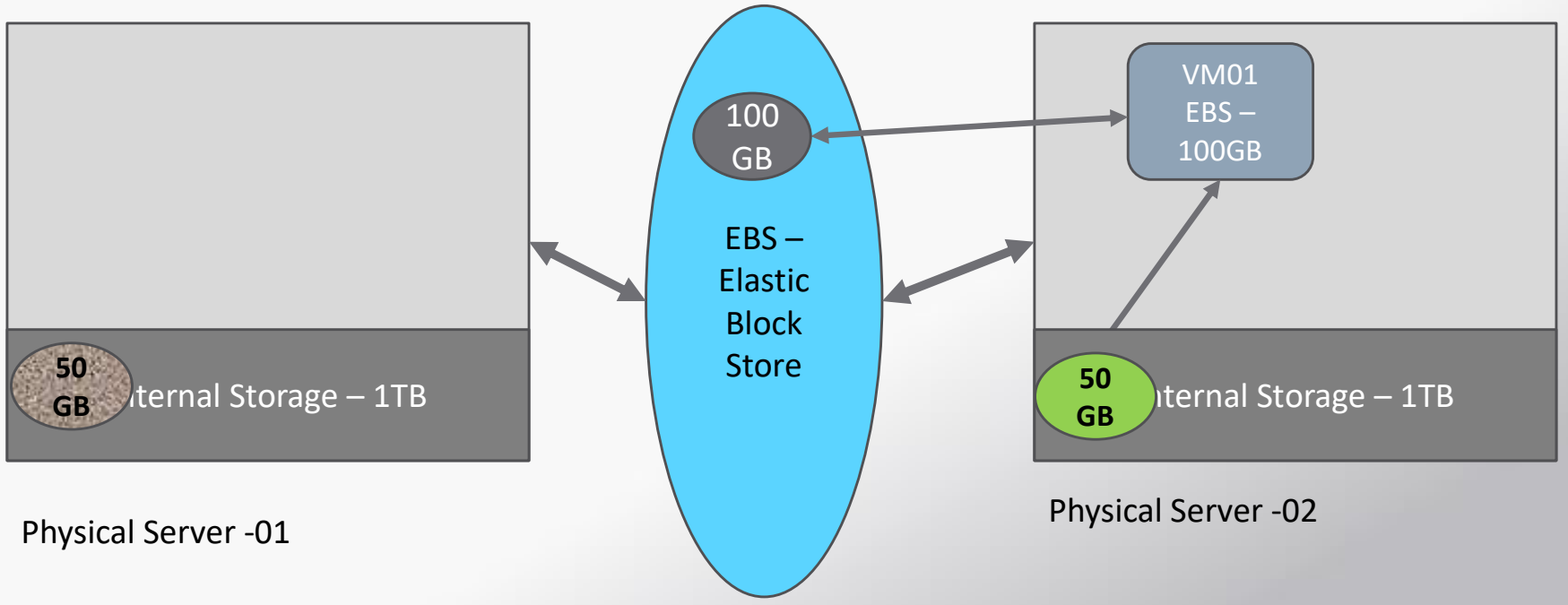
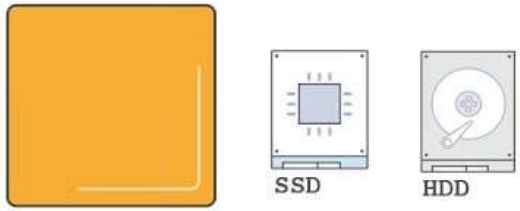


EC2 Instance Store *vs* EBS

EC2 Instance Store

- Local to instance
- Non-persistent data store
- Data not replicated (by default)
- No snapshot support
- SSD or HDD



Elastic Block Store

- Persistent block storage volumes
- 99.999% availability
- Automatically replicated within its Availability Zone (AZ)
- Point-in-time snapshot support
- Modify volume type as needs change
- SSD or HDD
- Auto recovery