
AWS
re:Invent

CMP205

What’s new with Amazon EBS

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AWS

AWS re:Invent

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Agenda

– What’s Amazon EBS?

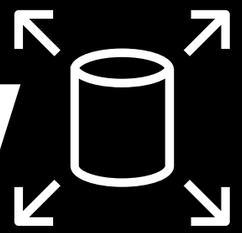
– What’s new in Amazon EBS?



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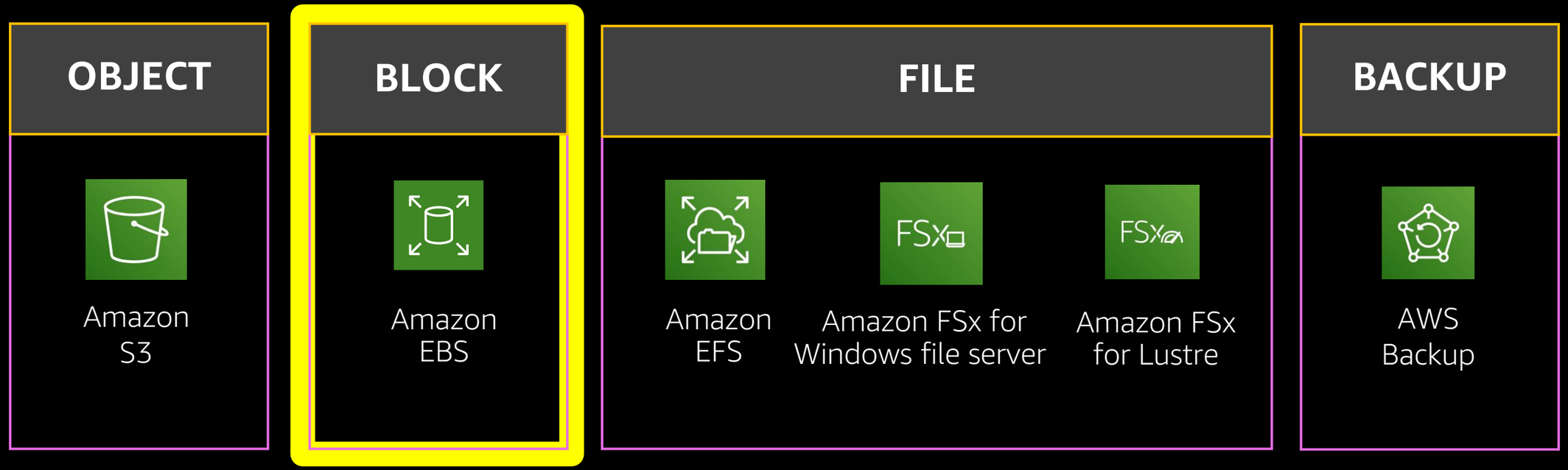
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Amazon EBS overview



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AWS storage portfolio



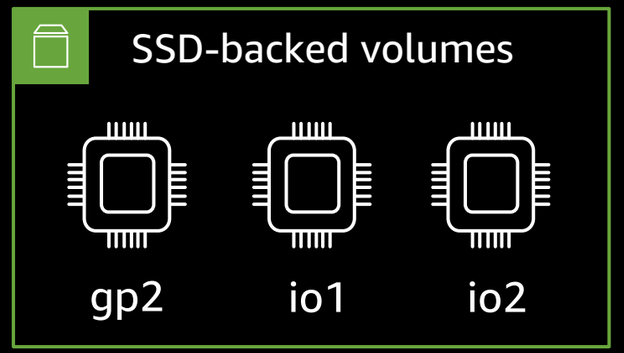
What is Amazon EBS?

Block storage **volumes** as a service attached to Amazon EC2 instances

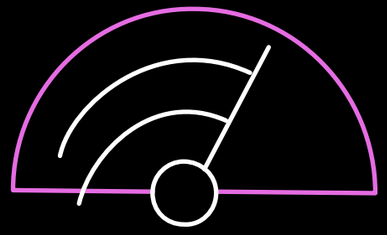
Create, attach, and manage volumes through **API**, **SDK**, or **AWS console**

Flexible storage and performance for dynamic workloads such as stateful containers

Point-in-time **snapshots** and tools to automate backup and retention via policies



What do customers care about in Amazon EBS?



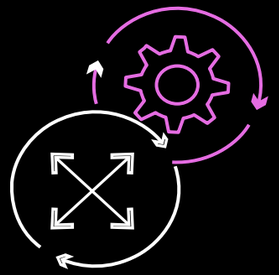
High performance

Up to 64,000 IOPS and 1,000 MiB/s throughput with single-digit millisecond latency



Reliability

99.999% availability and between 0.001% and 0.02% AFR



Scalability

Use a single gigabyte or scale up to petabytes of data for dynamic workloads such as stateful containers



Easy to use

Easily increase capacity, performance, switch volume types, and manage backups



Security

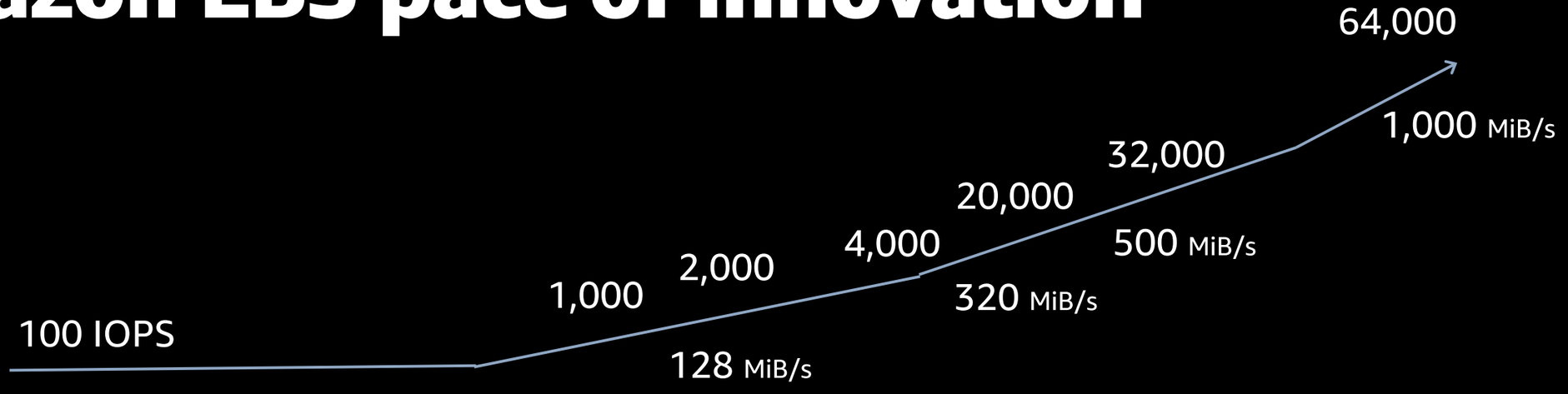
Encrypt all volumes using default encryption keys or custom managed keys



Cost effective

Pay as low as $0.025/GB-month for HDD and $0.08/GB-month for SSD

Amazon EBS pace of innovation



006 2008 2010 2012 2014 2016 2018 2020

Standard and snapshots (2008)

io1 (2012)

gp2 (2014)

sc1/st1 (2016)

Data lifecycle manager (2018)

Fast snapshot restore (2019)

io2 (2020)

EBS optimized (2013)

Encrypted volumes (2015)

Elastic volumes (2017)

Direct APIs (2019)

Multi-attach (2020)

What's new in Amazon EBS?



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General purpose SSD (gp2)



gp2

(2014)

Simple to use storage only provisioning, IOPS scale at 3 per GiB up to 16K, and throughput up to 250 MiB/s

Burst performance of 3,000 IOPS for volumes less than 1 TiB

Low priced SSD for general use cases

Ideal for boot volumes and general low-latency SSD workloads

New General purpose SSD (gp3)



gp3 NEW

(2020)

Storage **20% lower price** than gp2

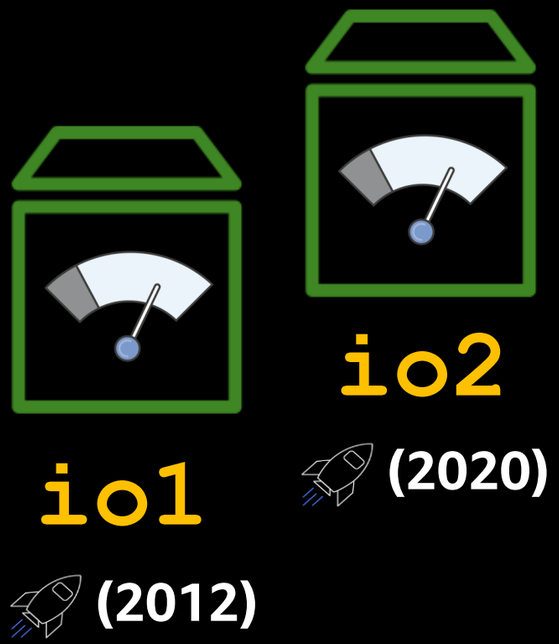
Consistent 3,000 IOPS and 125 MiB/s throughput

Flexibility to provision IOPS, capacity, and up to **4x gp2 throughput**

Up to 1,000 MB/s and 16,000 IOPS

Ideal for boot volumes and general low-latency workloads

Provisioned IOPS SSD (io1 / io2)



Predictable, high performance

Up to 1,000 MiB/s

Up to 64,000 IOPS

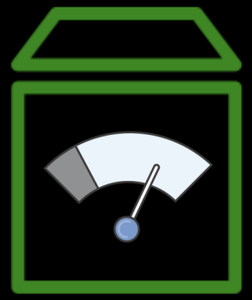
Dynamically right-size IOPS and storage separately at a rate up to 500 IOPS per GiB (io2 only)

99.999% durability for io2 volumes

Single-digit millisecond average latency

Ideal for critical applications and databases with sustained IOPS

New io2 Block Express **Preview!**



io2

Block Express NEW



Next-generation architecture

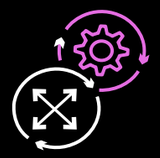


4x throughput and **4x** IOPS

Up to 4,000 MiB/s

Up to 256,000 IOPS

1000:1 IOPS to GB



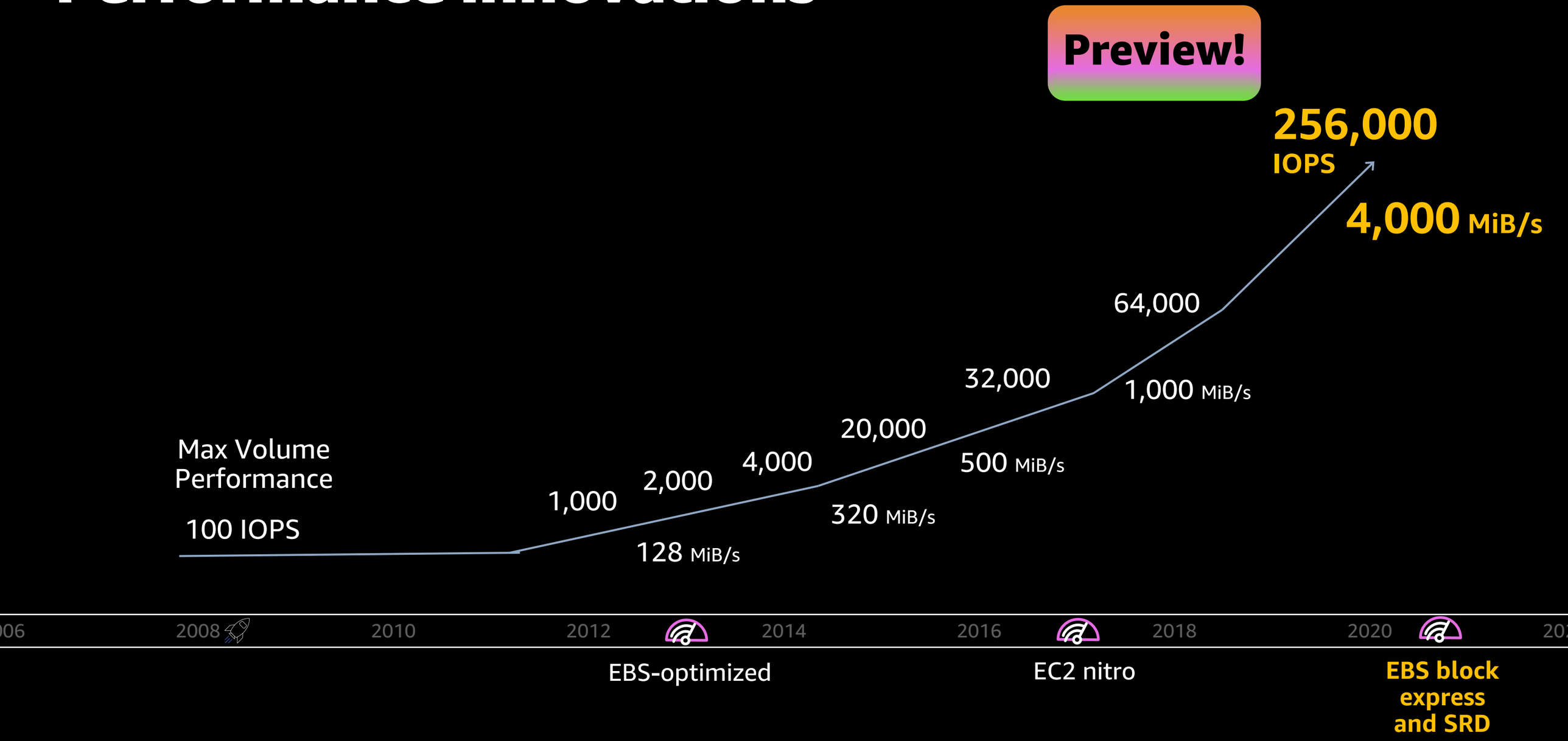
4x volume size up to 64 TB per volume



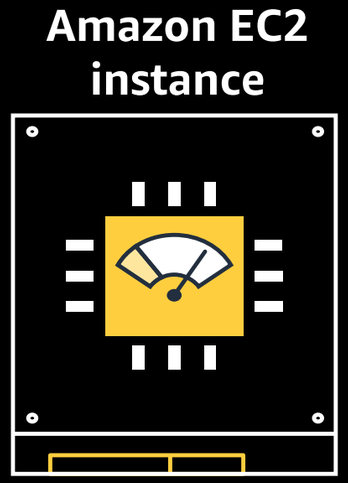
Sub-millisecond latency

Ideal for critical applications and databases with sustained IOPS

Performance innovations



R5b instances for higher performance



R5b

Built with SRD

NEW

4x higher EBS-optimized bandwidth

7,500 MiB/s and 260K IOPS

Innovative network protocol

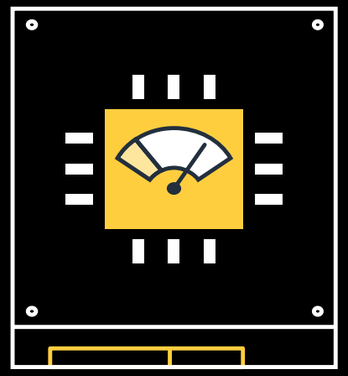
Scalable Reliable Datagram (SRD)

Reduced latency outliers

Use R5b for IO or throughput heavy database use cases

SAN in the cloud

Amazon EC2 instance



R5b

Built with SRD NEW

+

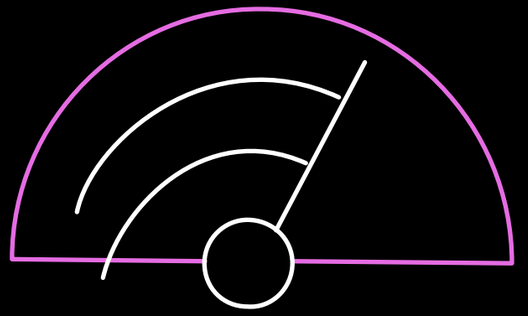
Preview!



io2

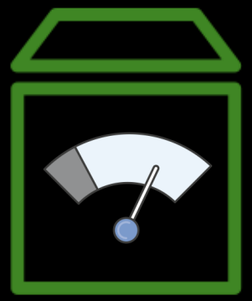
Block Express NEW

=



3x-4x IOPS and throughput for high-performance applications

New io2 price drop



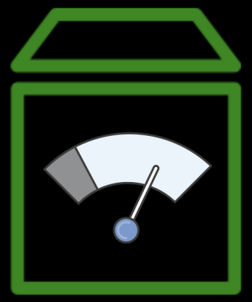
io2

Provisioned IOPS	Price per IOPS-Months
100 to 32,000	$0.065
32,001 to 64,000	$0.046
> 64,000	$0.032

20% lower IOPS price than previous io1

Ideal for critical applications and databases with sustained IOPS

New io2 price drop



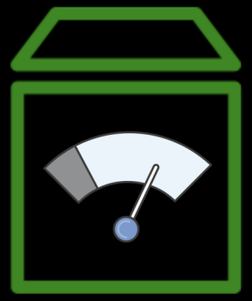
io2

20% lower IOPS price than previous io1

Price per IOPS-Month	$0.065	$0.046	$0.032
Compared to io1		27.7% lower	50.7% lower
Provisioned IOPS	Up to 32,000	32,000 to 64,000	> 64,000

Ideal for critical applications and databases with sustained IOPS

New lower price for io2 Provisioned IOPS



io2

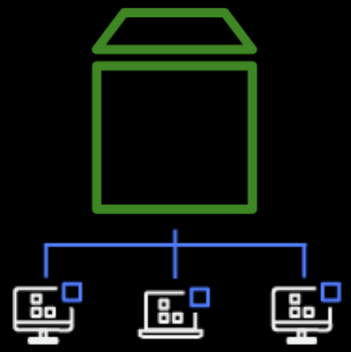
IOPS Provisioned	Up to 32,000	32,000 to 64,000	> 64,000*
Price per IOPS-Month	$0.065	**$0.046**	**$0.032**

27% - 50% lower price than io1 Provisioned IOPS

Economical for **higher performance** on io2

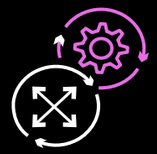
*available only on io2 Block Express

New Shared storage workloads on io2



Multi-attach

on io2 NEW



Attach **up to 16 instances** to a volume



99.999% durability



Clustered Amazon EC2 instance performance



Netflix saw a **4x improvement** in time to warm up EVCache while limiting the network impact to clients by using EBS multi-attach and EBS-optimized network

Ideal for cluster-aware, shared storage applications such as GFS2

Amazon EBS HDD volume family



sc1

Cold HDD



st1

Throughput optimized HDD

High throughput up to 500MB/s (st1) and 250 MB/s (sc1)

Optimized for sequential I/O up to 1 MB

Cold HDD (sc1) lowest cost Amazon EBS volume type

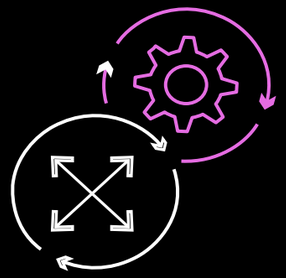
 (2016)

Ideal for sequential, throughput-intensive and big data workloads

Lower cost and more flexibility



40% price reduction for Cold HDD (sc1)



Create volumes as small as 125 GiB to right-size storage with 75% smaller volumes

Optimize costs for log processing and nearline storage workloads

New Amazon EBS optimizations by compute optimizer



Optimize provisioned IOPS settings

io1 / io2



Optimize size of gp2 volumes to meet performance

IOPS and throughput recommendations for gp3 volumes

gp2 / gp3

Eliminates manual optimization and available at no additional charge

Backup Amazon EBS with Snapshots



Amazon EBS Snapshots

(2008)

Cost-effective incremental backups only
charges you for changes between snapshots

Simple to use and **flexible** to share across accounts,
copy across regions, and create AMIs

Ideal for booting from custom AMIs and restoring volumes for DR

Fast Snapshot Restore (FSR)



Fast Snapshot Restore

(2019)

Immediate, full-performance volumes created from FSR-enabled snapshots

Predictable performance without the need to pre-warm data in an Amazon EBS volume

Ideal for booting from custom AMIs and restoring volumes for DR

Accelerate shared snapshots and AMIs



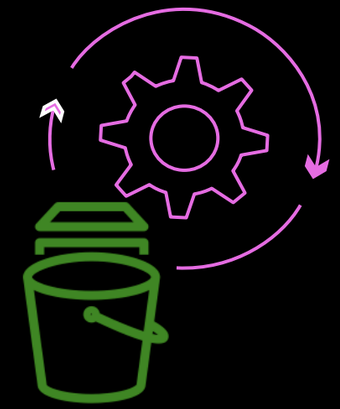
FSR for shared snapshots to accelerate snapshots shared with you



Now **available worldwide** in all commercial, Gov Cloud, and China regions

Ideal for booting from shared or custom AMIs and restoring volumes for DR

Data Lifecycle Manager (DLM)



Data Lifecycle Manager

(2019)

Simple to define and manage backup and retention schedules

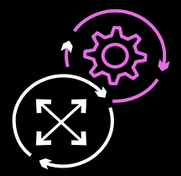
Define **flexible** policies for one to many Amazon EBS volumes

Simple to create policies and manage backup and retention schedules

DLM expands to AMI management



Create and manage EBS-backed Amazon Machine Images (AMIs)



Granular scheduling

- cron expressions
- multiple schedules in a single policy

Simple to optimize costs of snapshots and EBS-backed AMIs

Direct APIs to read / write to snapshot



Snapshot direct APIs

(2019)

Reduce backup times by tracking incremental snapshot changes

Achieve business continuity at a lower cost

Store data regardless of where it resides

Write on-premises data directly to snapshots

Ideal for optimizing recovery times and hybrid deployments

Cloud continuum

DELIVER CLOUD WHERE CUSTOMERS NEED IT

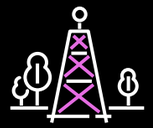
AWS REGIONS



On premises



Metro centers



5G networks

IoT



Rugged edge

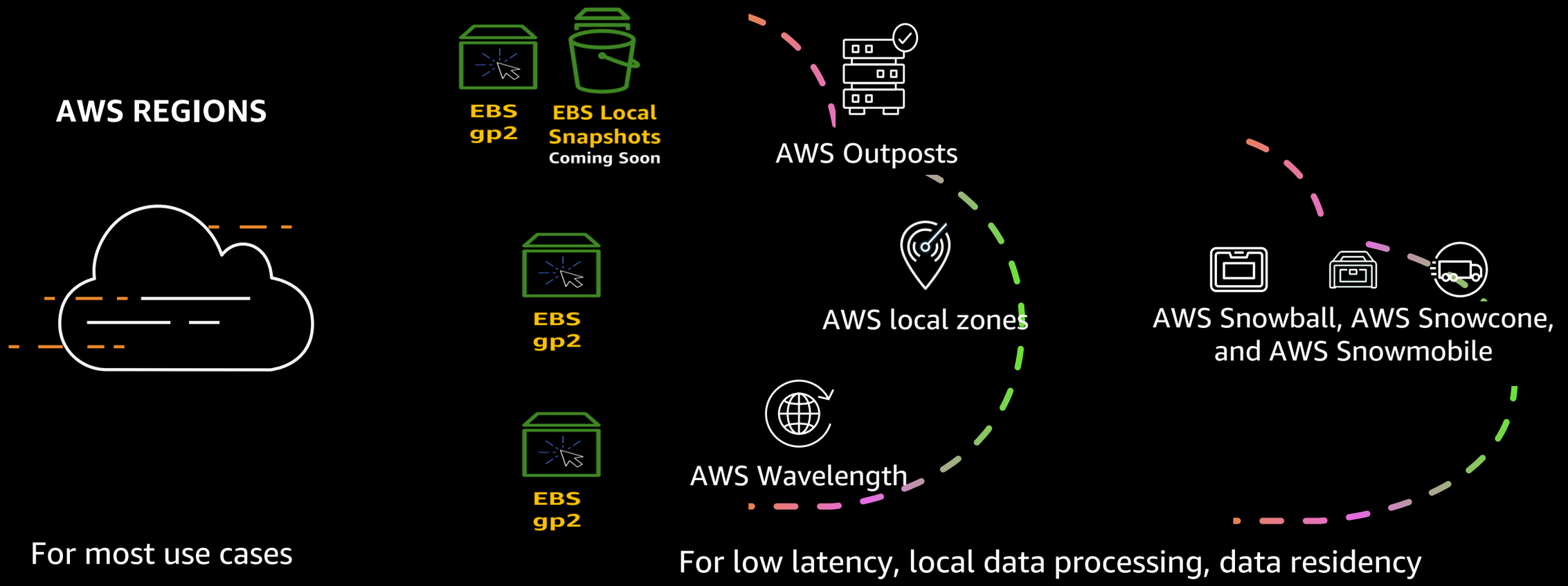


For most use cases

For low latency, local data processing, data residency



Bring the cloud closer to you



Key takeaways

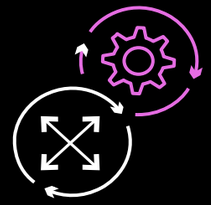


Continue to **lower costs** for customers



Innovative **performance** and **reliability**





Flexible tools to scale and manage



Simple to use and manage **securely**



Thank you!

Nathan Thomas, GM EBS

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