aws SUMMIT

AWS Cloud Storage Services

Ian Perez Ponce

Sr. Business Development Manager, Amazon Web Services

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Learning objectives

- ✓ Establish a foundational understanding of core AWS storage services – including Amazon Simple Storage Service (Amazon S3), Amazon Glacier, Amazon Elastic Block Store (Amazon EBS), and Amazon Elastic File System (Amazon EFS)
- ✓ Learn how data transfer services such as AWS Snowball, Snowball Edge, and AWS Snowmobile, plus hybrid storage solutions such as AWS Storage Gateway can simplify large scale data ingest and egress
- ✓ Hear of new storage features and offerings along with leading use case examples from a mix of customers

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What’s driving storage relevance?

Natural Language Processing

Artificial Intelligence

Internet Of Things

Information Assets

Data Trust Frameworks

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IN SHORT…

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EVERYTHING.

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AWS cloud storage is core

Gives you unique scale…

Greatest reliability
Broad security and compliance
Diverse portfolio
Fastest innovation

Yielding bigger insights…

Most big data & data lake deployments
Most managed databases
Easiest data warehousing
Singular query-in-place analytics

Data matters at any scale

Building on or migrating an application to AWS…

Advanced developer tools
Experienced consulting and support
Methodical migration services
The most data movement services

Helping you innovate faster…

Artificial Intelligence & Machine Learning
IoT

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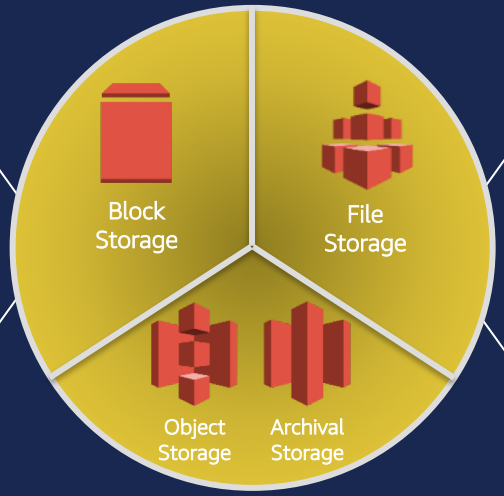
Complete set of building blocks

Data movement

- Hybrid Storage
- Streaming Data
- File Sync
- WAN Acceleration
- Private Networks
- 3rd Party Applications
- Physical Appliances



Data security and management

- Data Discovery and Protection
- Data Visualization
- Serverless Computing
- Automation
- Audit Trails
- Monitoring and Metrics
- Access Controls
- Encryption

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The broadest range of storage services

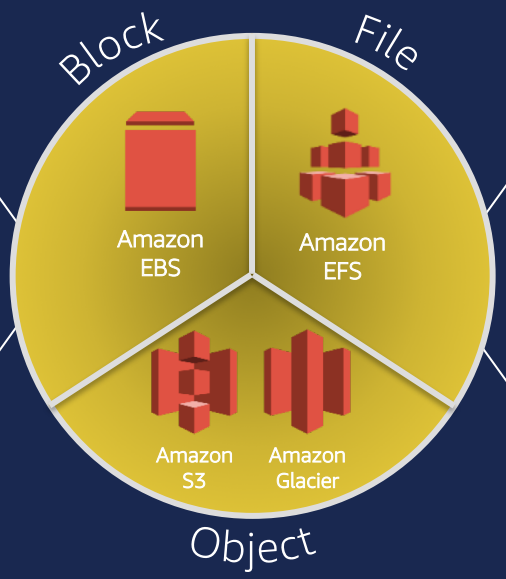
Data movement

Online

- AWS Storage Gateways
- Amazon Kinesis Firehose
- EFS File Sync
- S3 Transfer Acceleration
- AWS Direct Connect
- 3rd Party Applications

Offline

- AWS Snow Family



Data security and management

- Amazon Macie
- AWS QuickSight
- AWS Lambda
- AWS CloudFormation
- AWS CloudTrail
- AWS CloudWatch
- AWS IAM
- AWS KMS

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AWS storage customers

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What are customers building?

Backup and Restore

Non-disruptive

Easy place to start

Integrated with all major vendors

Active Archive

Media workflows

Tape replacement

Public Sector, FinServ, Healthcare/Life Sciences

Data Lakes & IoT

400% faster queries

Built for streaming data

Data visualization

Compliance

Industry certifications

Lockable with audit trails

Secure

Databases & Analytics

Bespoke database lift-and-shift

Tailored Hadoop workloads

Enterprise Applications

Integrated with major vendors

Fully managed infrastructure

Lift-and-shift migrations

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Where can we help you start?

Backup and Restore

S3 & Glacier

Storage Gateway

Snow family

EFS

Active Archive

S3 and the S-IA tier

Glacier (with Bulk and Expedited retrieval tiers)

Data Lakes & IoT

S3, Athena and Redshift Spectrum

EFS

Storage Gateway (hybrid)

Compliance

S3

Glacier and the Vault Lock feature

Databases & Analytics

EC2 and EBS

EMR, Redshift

Enterprise Applications

EFS

EBS

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Amazon Object Storage

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Amazon S3 by the numbers

One of first three
AWS Services
(2006)

52 Availability Zones
(12 more coming in 2018/19)

18 Regions
(4 more coming in 2018/19)

99.999999999%
Durability

Millions of requests
per second

Trillions of
objects

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Object storage classes

S3 Standard

Active data
Millisecond access
Min 3 AZs
$0.023

S3 Standard - Infrequent Access

30 day min duration
Millisecond access
Min 3 AZs
$0.0125

S3 One Zone - Infrequent Access

30 day min duration
Millisecond access
Min 1 AZ
$0.01

Glacier

Archive data
Minutes to Hours
Min 3 AZs
$0.004

Automated Lifecycle Policies

Pricing is per GB per month in the US East (N. Virginia) region

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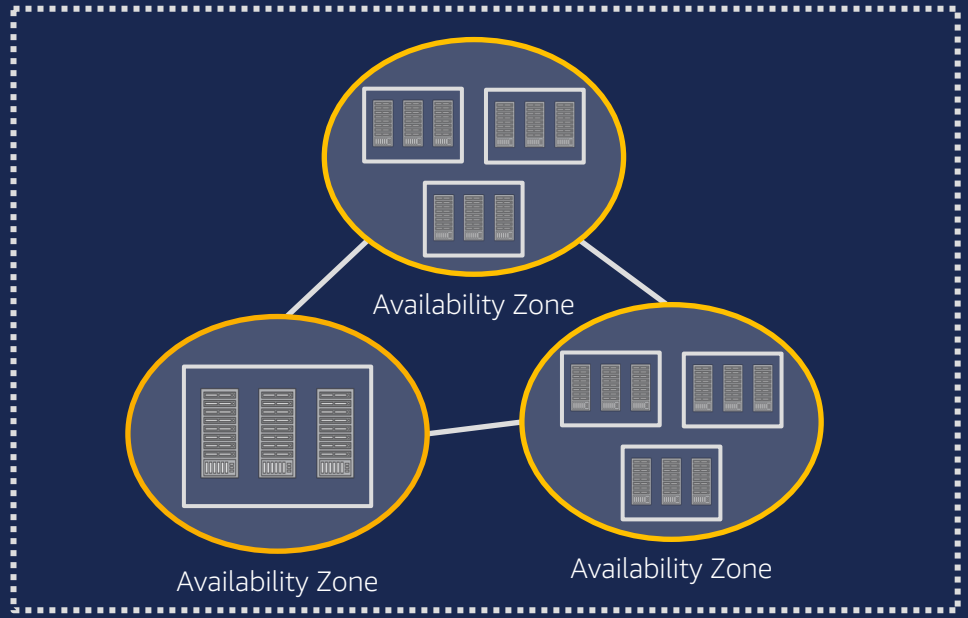
How do AWS object storage classes differ in design?

S3 Standard
S3 Standard-IA
Glacier



AWS Region

S3 One Zone-IA

AWS Region

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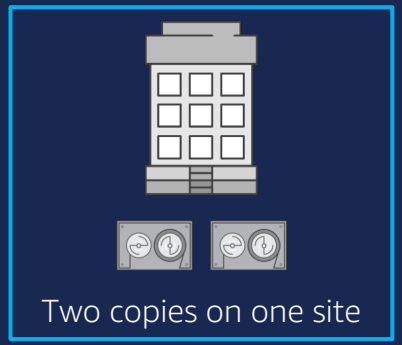
Understanding Durability



designed for
99.99%
durability

designed for
99.999%
durability

designed for
99.999999999%
durability

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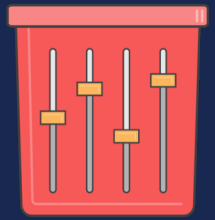
Value of Amazon S3 and Glacier

Durable, Available, & Scalable

Security & Compliance

Query In Place



Flexible Management

Ecosystem

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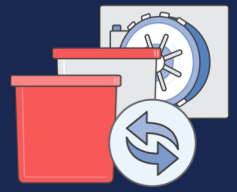
Storage management made simple

Cross-Region Replication



Lifecycle Policies

Event Notifications

Object Tags

Amazon CloudWatch Request Metrics

Amazon S3 Inventory

Storage Class Analysis

AWS CloudTrail Data Events

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Amazon S3 Security, Encryption & Compliance

The broadest set of tools in the industry

Security

- IAM and Bucket Policies
- Access Control Lists
- Audit logging with CloudTrail & Alerts with CloudWatch
- Secure CloudFormation templates
- Amazon Macie
- S3 Console Permission Checks

Encryption

- Encryption in transit with TLS
- SSE-S3 – Amazon S3 manages data & keys
- SSE-C – Customer managed keys
- SSE-KMS – Master keys in KMS
- CSE – 100% Customer managed
- Default Bucket Encryption
- Encryption Status in Inventory

Compliance

- PCI-DSS
- HIPAA/HITECH
- FedRAMP
- FISMA
- EU Data Protection Directive

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Cross-region Replication

Automatically replicate data to any other AWS Region

- Replicate by object, bucket, or prefix
- Support for SSE-KMS encrypted objects
- Ownership overwrite
  - ✓ Change the object owner in the destination region

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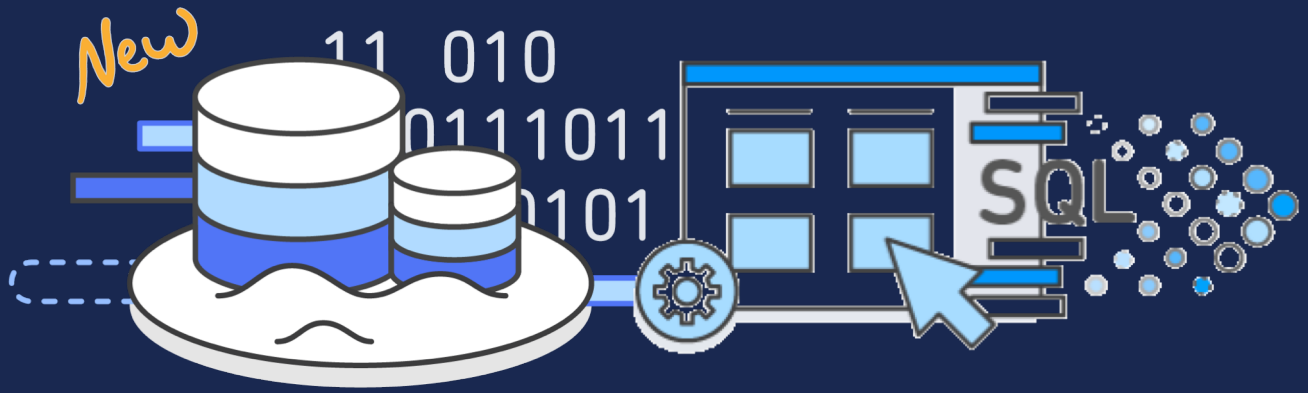
Introducing S3 and Glacier Select for query-in-place



Issue standard SQL queries against objects and archives (in-place)

You no longer have to retrieve entire object

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Do more with your data in place

Data Lake Storage

- Athena
- Redshift Spectrum
- QuickSight
- EMR

IoT Storage

- AWS IoT
- Greengrass
- Other IoT sensors

Machine Learning & AI Storage

- Rekognition
- LEX
- Polly
- MXNet & TensorFlow

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Data Lakes

"AWS storage is fully redundant, multi-region, more secure, and faster at less than half the cost."

- Paul Fisher
Technical fellow

Security-as-a-Service for 4000 customers using 25PB and growing 110% per year

Co-lo simply not agile enough or cost effective

- Built an S3 data lake and avoided $1.6M CAPEX - in the first year alone
- Stress-tested 100x larger load with zero CAPEX
- 4x better "I/O per $" ratio
- Gained new insights into their customers through S3 data management capabilities

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Active Archive

Sony DADC

"We have 20 petabytes of content on AWS, the equivalent of more than 800,000 hours of video, available on our platform. We can only move all that content around the world with the scalability we're getting on the AWS Cloud. "

- Andy Shenkler
Chief Solutions and Technology Officer

On-premises infrastructure took weeks to produce customer content

Needed performant, secure, economical media distribution solution

- Amazon S3 and Glacier delivered $5.4M improved TCO over on-premises
- Content delivery improved to < 1 hour
- Workflow pipelines now highly parallel and elastic

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Regulatory Compliance

"What would it have cost us to build a WORM data store, get it certified for SEC Rule 17(a)-4(f) and CFTC Rule 1.31 (b)-(c), and then scale it?"

- Rich Sutton
VP of Engineering

proofpoint™

Controls and enforces over 1M daily social media posts for corporate customers

Required this unregulated social media content in their email archive offering

- Built fully compliant archive/purge workflows using Amazon S3 and Glacier
- Created a compliant two-step legal hold with vault-level tags and Glacier Vault Lock

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Amazon Block Storage

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Amazon Elastic Block Store

Persistent

Highly available (99.999%) multi-AZ design

Move between EC2 instances

Reliable

Built-in backup options (snapshots)

Provisioned IOPS

Scalable

Fully elastic: expand or change on the fly

Optimize based on latency, throughput or cost

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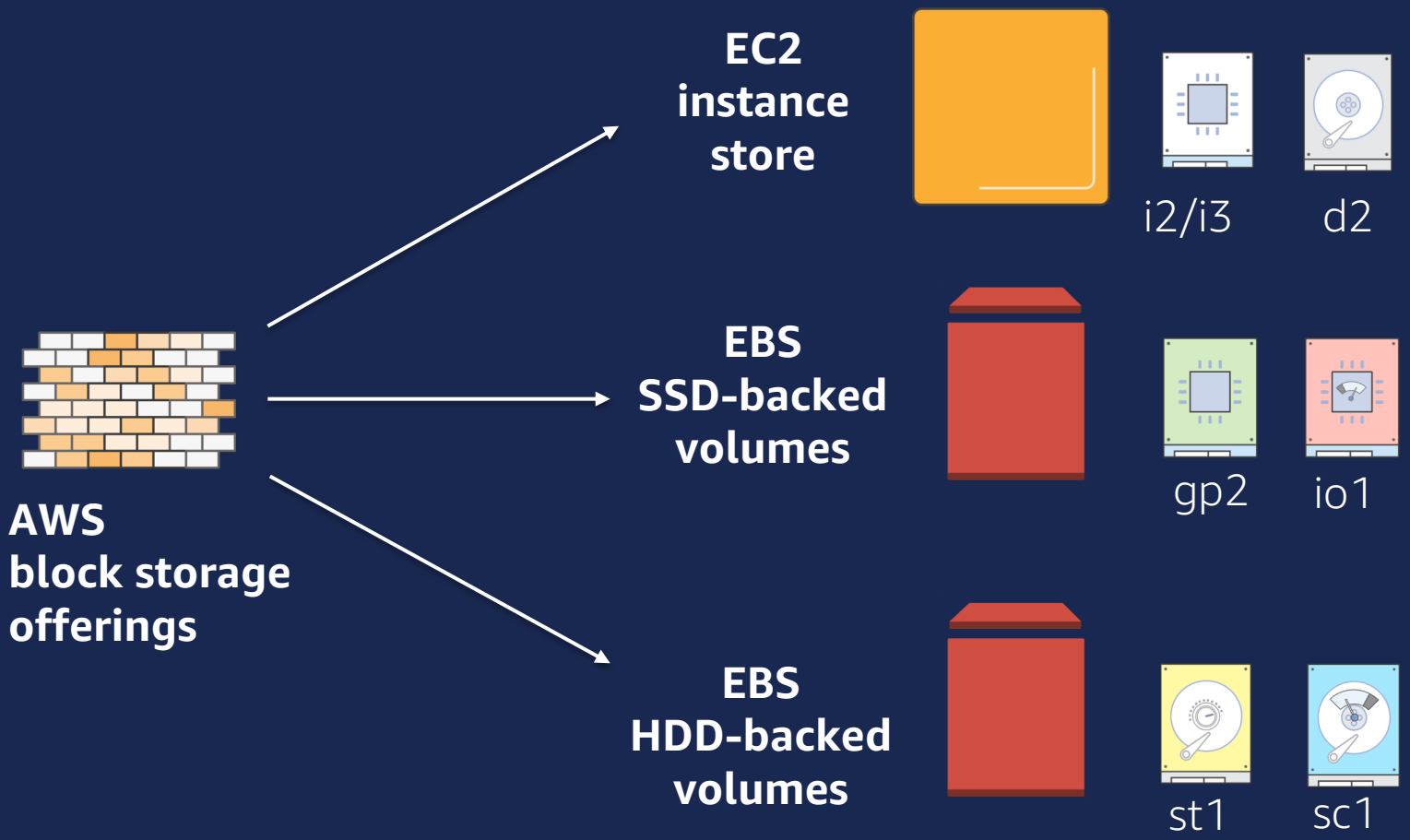

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What is Amazon EC2 instance store?

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

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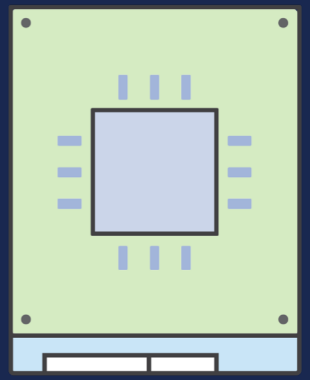
EBS volume types: General Purpose SSD



gp2

General Purpose SSD

Baseline: 100 to 10,000 IOPS; 3 IOPS per GiB

Burst: 3,000 IOPS (for volumes up to 1,000 GiB)

Throughput: Up to 160 MiB/s

Latency: Single-digit ms

Capacity: 1 GiB to 16 TiB

Great for boot volumes, low-latency applications, and bursty databases

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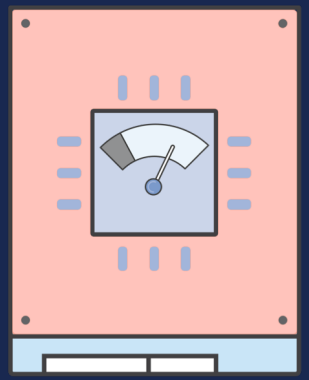
EBS volume types: Provisioned IOPS



io1

Provisioned IOPS

Baseline: 100 to 32,000 IOPS

Throughput: Up to 500 MiB/s

Latency: Single-digit ms

Capacity: 4 GiB to 16 TiB

Ideal for critical applications and databases with sustained IOPS

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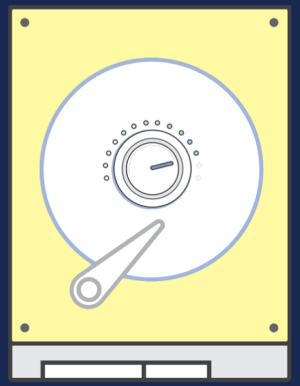
EBS volume types: Throughput Provisioned



st1

Throughput Optimized HDD

Baseline: 40 MiB/s per TiB up to 500 MiB/s

Burst: 250 MiB/s per TiB up to 500 MiB/s

Capacity: 500 GiB to 16 TiB

Ideal for large-block, high-throughput sequential workloads

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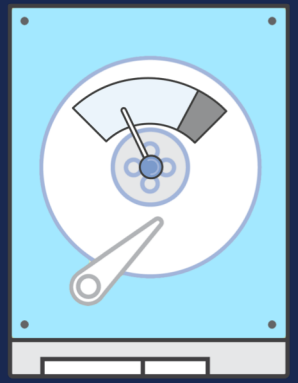
EBS volume types: Throughput Provisioned



sc1

Cold HDD

Baseline: 12 MiB/s per TB up to 192 MiB/s

Burst: 80 MiB/s per TB up to 250 MiB/s

Capacity: 500 GiB to 16 TiB

Ideal for sequential throughput workloads, such as logging and backup

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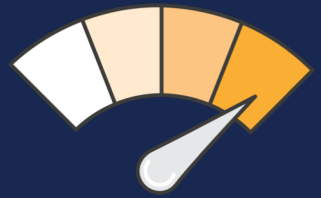
Choosing an EBS volume type

What is more important to your workload?

IOPS

or



Throughput?

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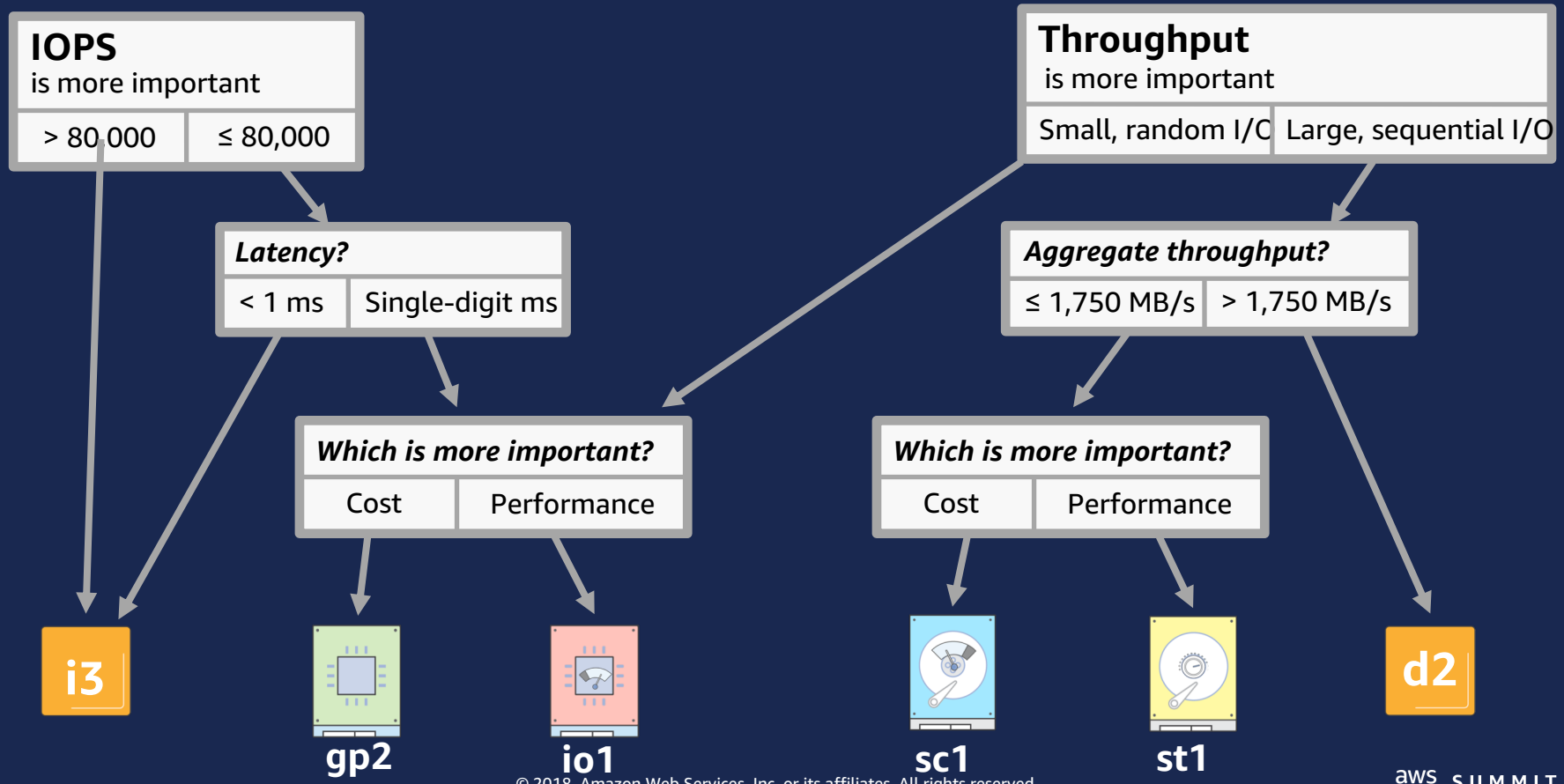
Choosing an EBS volume type



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Elastic Volumes

- Simple; Flexible; Non-disruptive; Automated
- Modify the configuration of live volumes attached to instances
- Dynamically increase ***size***, tune ***performance***, and change the ***type*** of existing and new current generation volumes
- No downtime, no performance impact.
- You can automate changes using CloudWatch with Lambda or CloudFormation
- No need to plan ahead, provision what you need today and change the configuration as business needs change.

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EBS snapshots

- Point-in-time backup of modified volume blocks
- Stored in S3, accessed via EBS APIs
- Subsequent snapshots are incremental
- Deleting snapshot will only remove data exclusive to that snapshot

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Database and Analytics

"AWS storage completely changed our business operations, time to market and manpower. EBS volumes cut our cluster indexing times from weeks to hours. Moving data into S3 saved us 95% and our data lake now outperforms our clusters—the harder we push it the faster it gets for extremely large datasets. We simply could not do this anywhere else."

- Gene Stevens
CTO and co-founder

PROTECTWISE™

Threat analysis company ingesting and analyzing 50TB daily

Right-sizing clusters cost weeks and lost data

- Saved 95% re-architecting to a "hot" index on EBS with an analytics data lake on S3
- EBS shortened indexing times from weeks to hours while cutting OPEX
- Now getting consistent 1-3s search response times across 5PB of growing data in S3
- Managing 1 billion S3 objects and 2,500 instances with just six engineers

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Amazon File Storage

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Amazon Elastic File System

Simple

Fully managed file storage (NFS)

Seamless integration

Secure

Elastic

Scale up and down automatically

Lowest TCO

Scalable

Consistent, scalable performance

Highly available and durable

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Designed for a wide spectrum of needs

Analytics

Media workflows

Web serving

Content management

Database backups

Enterprise apps
and messaging

Dev tooling

Home directories

Container storage

Scale-out jobs — Metadata-intensive jobs

High throughput and parallel I/O — Low latency and serial I/O

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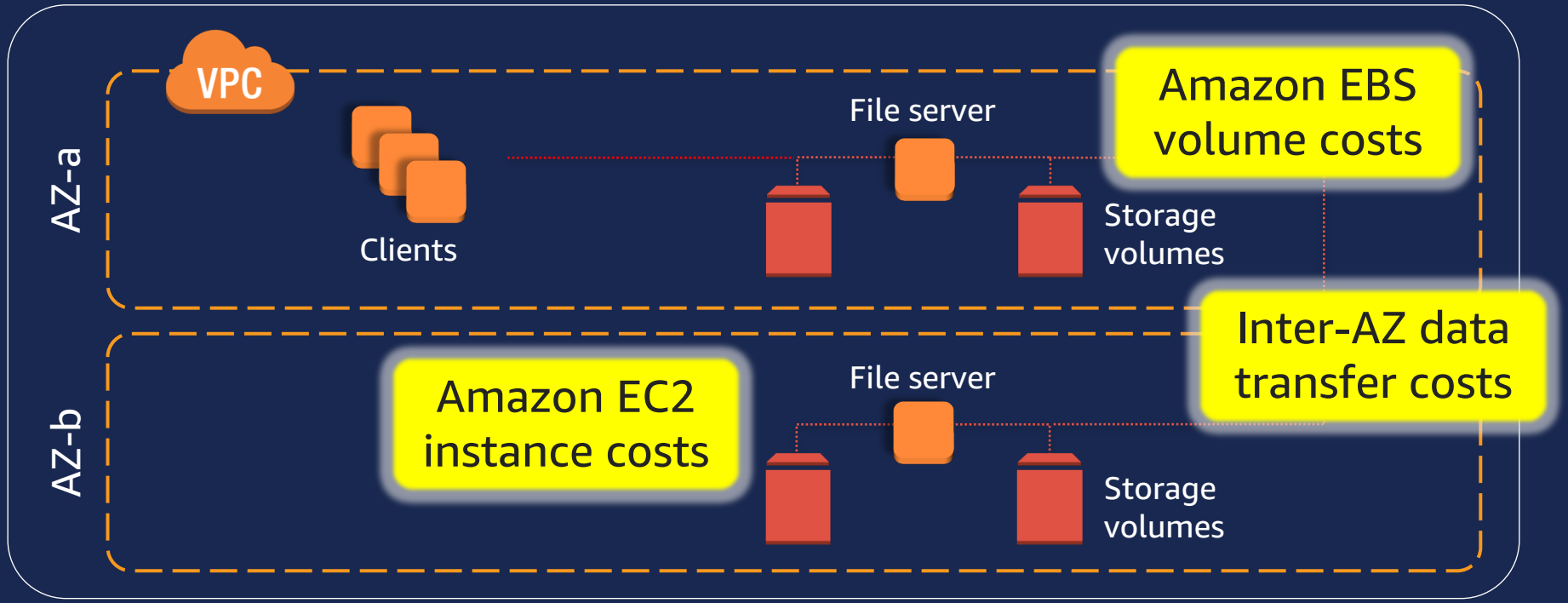
Before EFS… costs of DIY file storage



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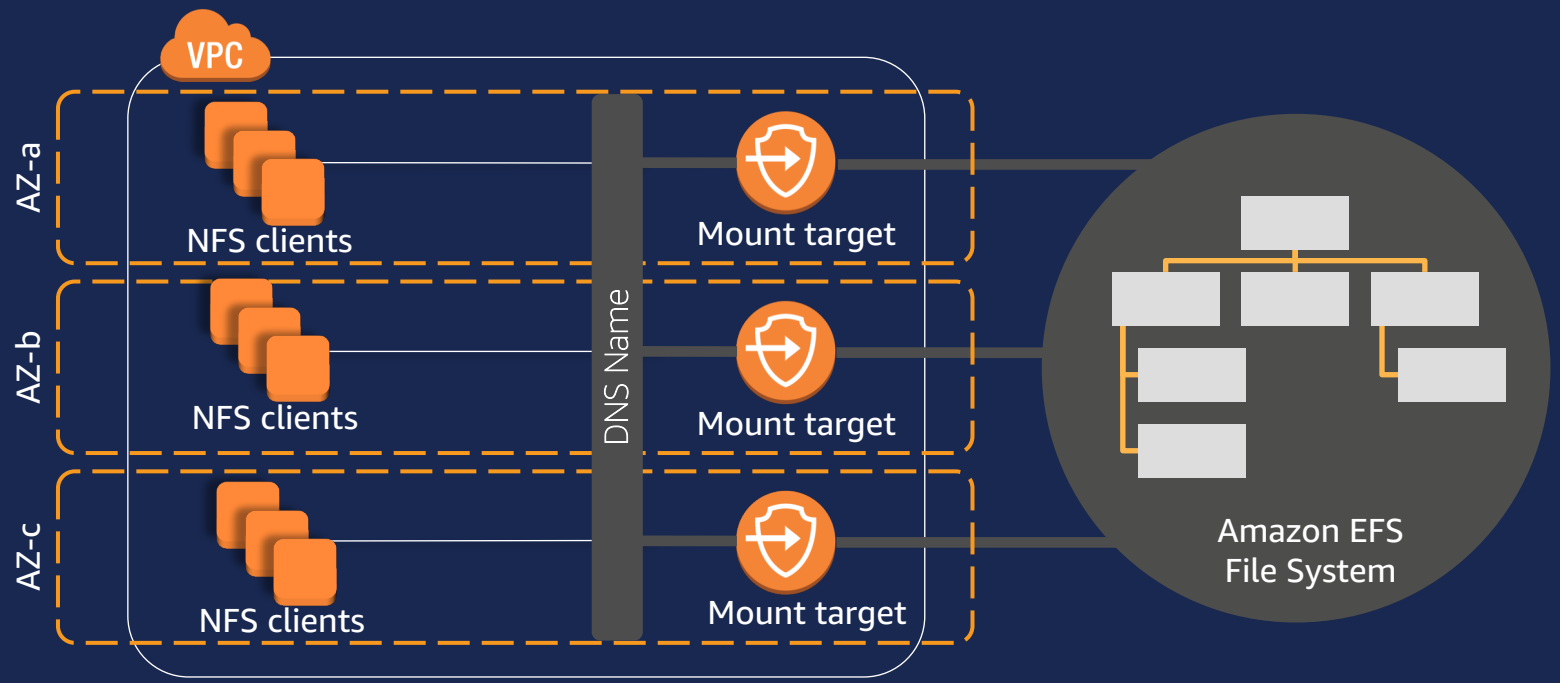
Amazon EFS architecture



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Security model and features

Control network traffic

using Amazon VPC security groups and network ACLs

Control file and directory access

using POSIX permissions

Control administrative access (API access)

using AWS IAM (action-level and resource-level permissions)

Encrypt data at rest

using keys managed in AWS KMS

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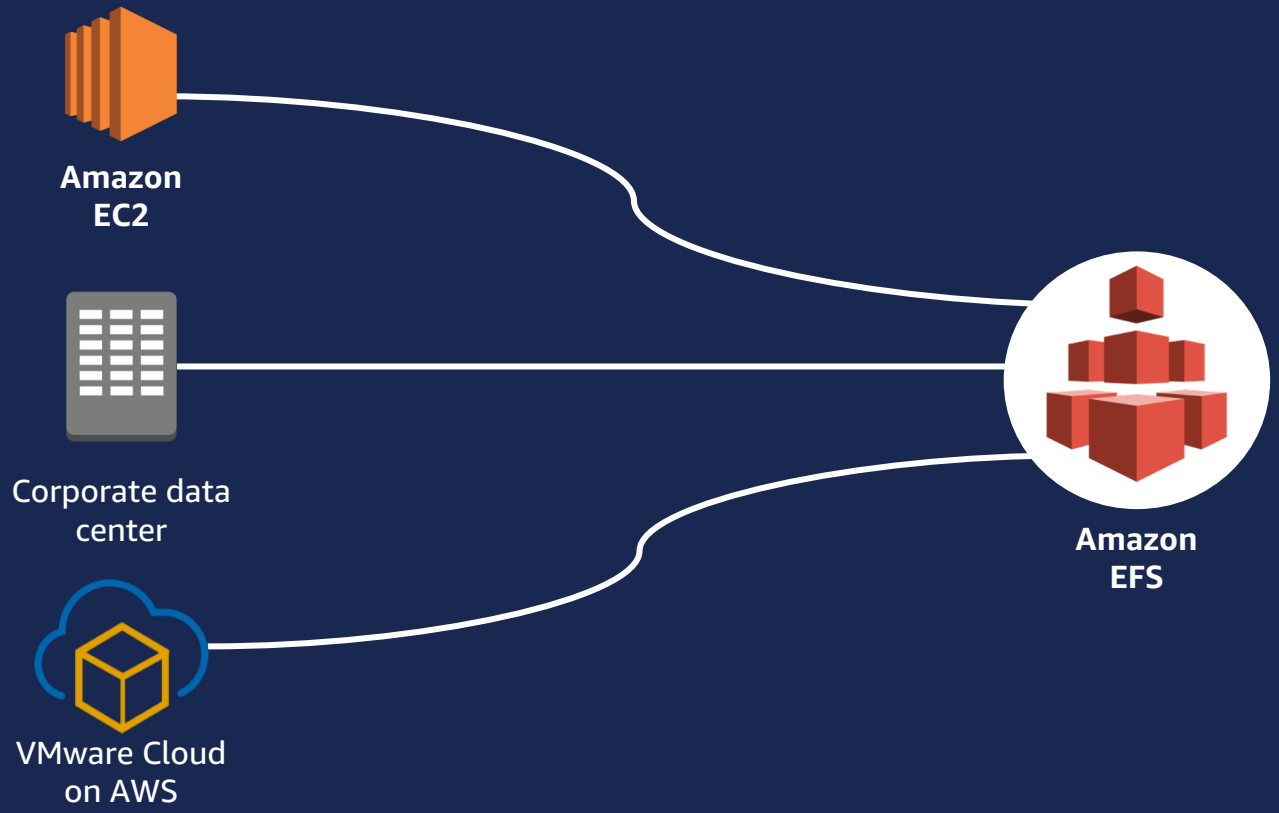
Access EFS from multiple sources



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Amazon EFS economics

No minimum commitments or up-front fees

No need to provision storage in advance

No other fees, charges, or billing dimensions

$0.30/GB-Month (US Regions)
$0.33/GB-Month (EU Ireland)
$0.36/GB-Month (EU Frankfurt)
$0.36/GB-Month (AP Sydney)

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EFS Customers

Database backups

Media and entertainment workflows

Enterprise applications

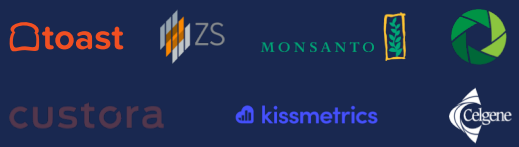
Developer tools

Home directories

Container storage

Web serving + content management

Big data and analytics



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Enterprise applications

"Good, fast, and cheap. We picked two and got all three with EFS. It gave us the agility to deliver a new product on schedule, eliminated scale and performance concerns, and operates below our OPEX expectations."

- Chris DeAcosta
Sr. director software engineering

Newly acquired streaming media product depended on a local file server

Had to launch at global scale in 90 days – with minimal changes

- DIY was too complex and took too long
- Lift-and-shift to EFS took 2 hours
- EFS with EC2 auto-scaling met global scale agility needs
- Seamless integration between partner application and existing AWS systems
- Post-mortem TCO analysis showed that EFS was still the best choice

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Data Migration and Hybrid Storage Tiering

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Moving your data into, out of and across the platform

Networks

AWS Direct Connect

A private connection between your data center, office, or colocation environment and AWS

Amazon S3 Transfer Acceleration

Up to 300% faster transfers into and out of S3. Ideal when working with long geographic distances

Amazon EFS File Sync

Up to 5x faster file transfers than open source tools. Ideal for migrating data into EFS or moving between cloud file systems

Amazon Kinesis Firehose

Capture, trans-form, & load streaming data into S3 for use with Amazon business intelligence and analytics tools

Roads

AWS Snow family

(Snowball, Snowball Edge, Snowmobile)

Secure, physical transport appliances that move up to Exabytes of data into and out of AWS

Hybrid

APN competency partners

Integrations between 3rd party vendors and AWS services. Ideal for leveraging existing software licenses and skills

AWS Storage Gateways

Hybrid storage that seamlessly connects on-premises applications to AWS storage. Ideal for backup, DR, bursting, tiering or migration

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AWS Snow Family

AWS Snowball

- 80 TB capacity/10 G network
- Data encryption end-to-end
- Rugged 8.5 G impact case
- Rain and dust resistant

AWS Snowball Edge

- 100 TB capacity/10GE+ networking
- Compute and storage for hybrid/edge workloads
- Data encryption end-to-end
- Rugged 8.5 G impact case
- Rain and dust resistant
- Rack-mountable, clusterable

AWS Snowmobile

- Exabyte-scale 45ft container
- Data encryption end-to-end
- Dedicated security personnel
- GPS tracking, alarm monitoring, 24/7 surveillance, and optional additional security

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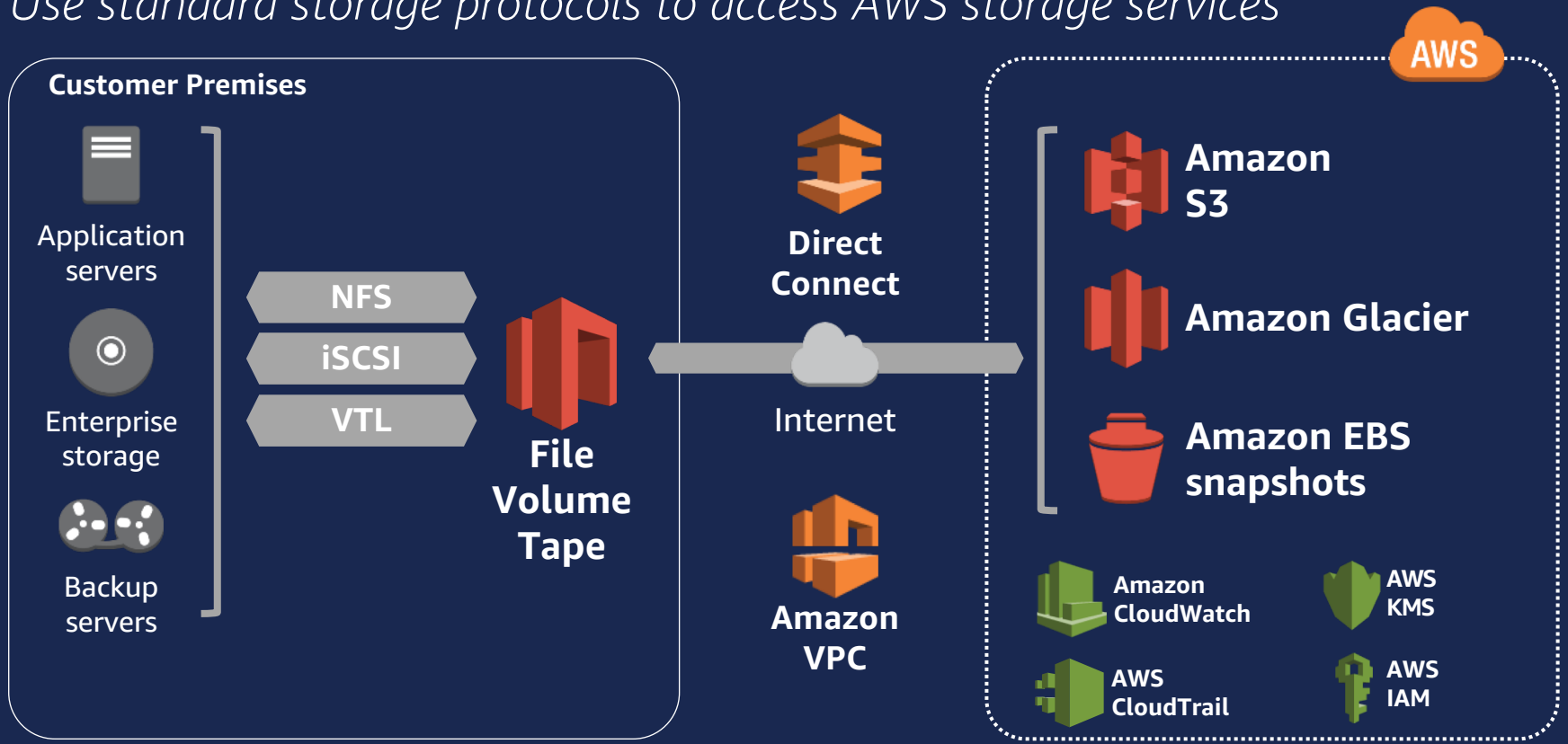
Storage Gateway enables hybrid storage solutions

Use standard storage protocols to access AWS storage services



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Backup and restore

STEMCELL™ TECHNOLOGIES

"It made no sense to keep buying big disk siloes, especially as we opened up new global offices, and now we can recover in the cloud from a snapshot if we ever had to."

- Adam Leggett
IT manager

Canada's largest biotech firm

Data sovereignty required local hot files and tape archives in each of 10 global offices

- AWS Volume Gateway eliminated 50-hour backup windows and tape archive systems
- Cut on-premises storage CAPEX 40%; dropped RTO from 48 hours to 10 minutes
- Meets cloud strategy while retaining local ownership and data sovereignty
- Enabled datacenter exit in next 12 months

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Amazon EFS File Sync

Sync data from existing NFS file systems into EFS file systems

Simple
Set up and manage easily from the AWS Console

Fast
Up to 5x faster than standard Linux copy tools

Secure
Encrypted, parallel data transfer

Use EFS File Sync to copy…

- File systems *from* on-premises *to* EFS
- DIY in-cloud file systems *to* EFS
- EFS file systems *between* AWS Regions

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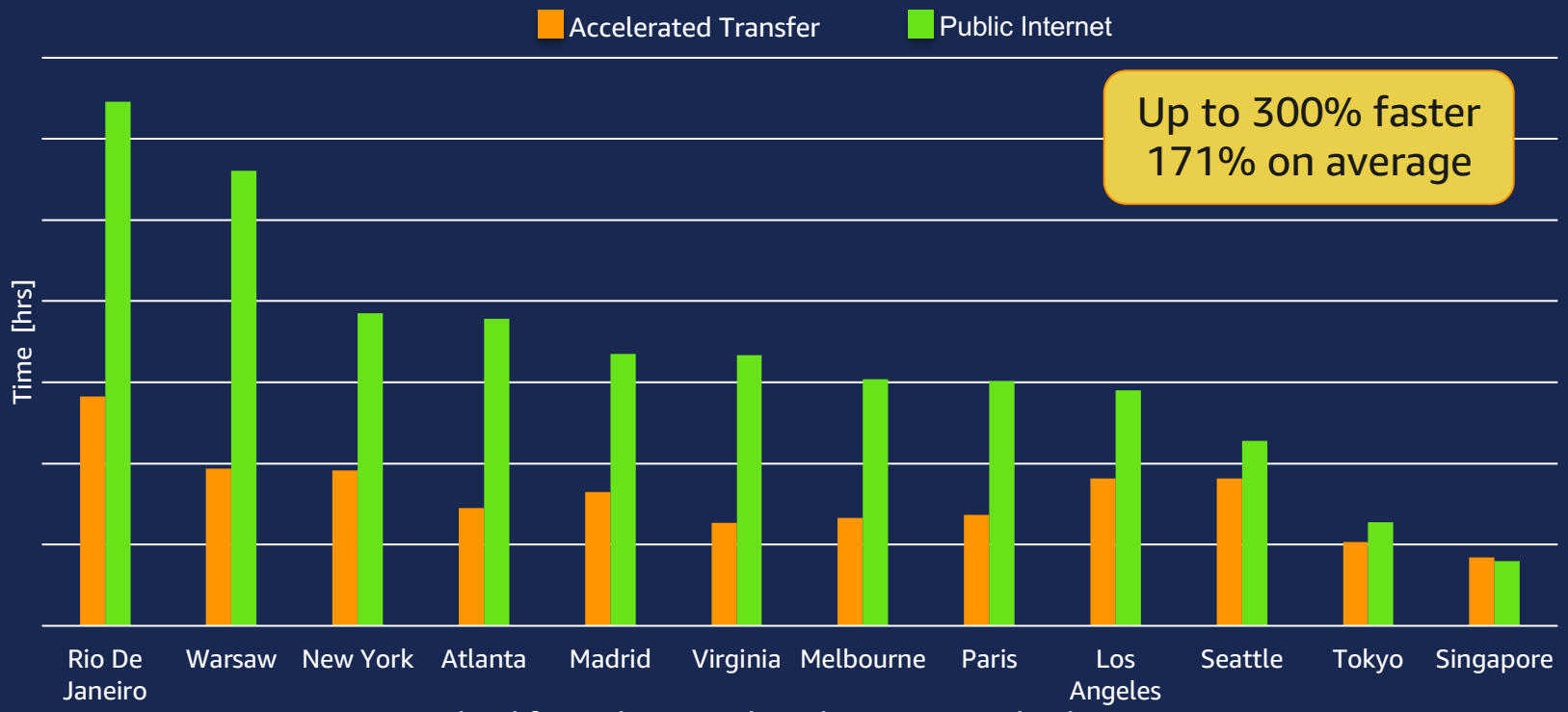
Amazon S3 Transfer Acceleration



500 GB upload from clients in these locations to a bucket in Singapore

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What’s new in AWS Storage?

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Recently announced storage features New

	S3 & Glacier	EBS	EFS	Storage Gateway	Snow Family
April	• Support for Amazon Glacier and S3 One Zone-Infrequent Access to Amazon CloudWatch storage metrics • S3 Select is now Generally Available			• VTL (Tape Gateway) is available in Asia Pacific (Singapore) Region	
May		• Copying encrypted snapshots under custom CMK now completes faster with less storage	• HIPAA-eligible service • Available in Asia Pacific (Seoul) region	• VTL (Tape Gateway) expands backup application support with NovaStor DataCenter	• Snowball Edge now available in Asia Pacific (Singapore) region

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More on Why AWS

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Why AWS storage?

The best reliability and largest scale

The most secure, compliant, and auditable

The most complete portfolio

The most data movement choices

More than twice the partners

The most comprehensive support and consulting

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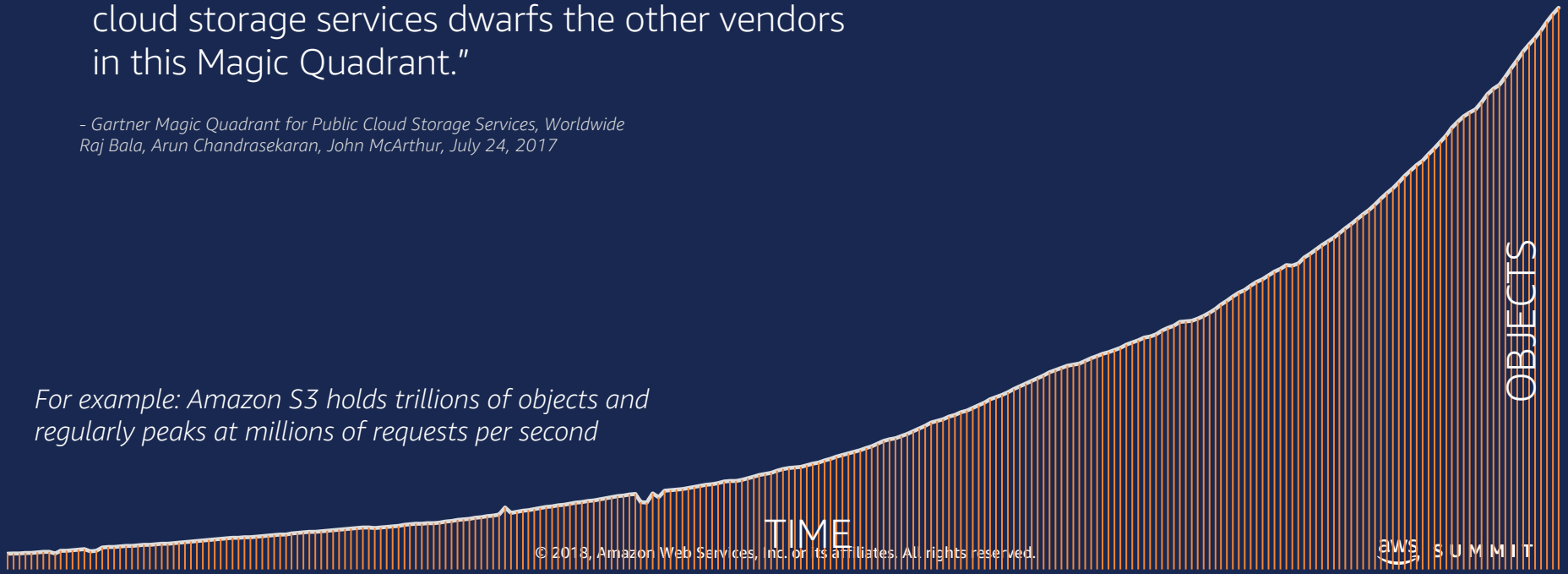
The most reliable and largest scale

"…the scale at which AWS operates its public cloud storage services dwarfs the other vendors in this Magic Quadrant."

- Gartner Magic Quadrant for Public Cloud Storage Services, Worldwide
Raj Bala, Arun Chandrasekaran, John McArthur, July 24, 2017



For example: Amazon S3 holds trillions of objects and regularly peaks at millions of requests per second

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AWS offers the most ways to move data to/from the cloud

Networks

AWS Direct Connect

A private connection between your data center, office, or colocation environment and AWS

Amazon S3 Transfer Acceleration

Up to 300% faster transfers into and out of S3. Ideal when working with long geographic distances

Amazon EFS File Sync

Up to 5x faster file transfers than open source tools. Ideal for migrating data into EFS or moving between cloud file systems

Amazon Kinesis Firehose

Capture, trans-form, & load streaming data into S3 for use with Amazon business intelligence and analytics tools

Roads

AWS Snow family

(Snowball, Snowball Edge, Snowmobile)

Secure, physical transport appliances that move up to Exabytes of data into and out of AWS

Hybrid

APN competency partners

Integrations between 3rd party vendors and AWS services. Ideal for leveraging existing software licenses and skills

AWS Storage Gateways

Hybrid storage that seamlessly connects on-premises applications to AWS storage. Ideal for backup, DR, bursting, tiering or migration

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Twice as many partnerships

panzura
SoftNAS
NetApp

Primary Storage

NetApp
veeam
druva
arcserve
VERITAS
COMMVAULT
DELL
hp

Backup and Restore

NetApp
COMMVAULT
SoftNAS

Archive

Zerto
NetApp
CLOUDVELOX
CloudEndure

Disaster Recovery

Amazon EMR
cloudera
databricks
Amazon Athena
HORTONWORKS
Amazon Redshift Spectrum

Analytics

IBM
TIBCO
informatica
JFrog Artifactory
vmware
Atlassian

Enterprise Applications

Complete partner list at https://aws.amazon.com/backup-recovery/partner-solutions/

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Experienced training, support and consulting

Escalation:
AWS Support Plans

Support packages for environments that are:

- Experimental
- Production
- Business-critical

Operation:
AWS Training

Helping organizations adopt AWS through:

- Digital courses
- Classroom training
- Certification exams

Customization:
AWS Professional Services

Supplemental, specialized experience and skills:

- APN Consulting Partners
- AWS ProServe
- AWS managed services

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Call to action… Learning paths to AWS Storage

Menu | aws | Contact Sales | Products | Solutions | Pricing | Getting Started | More | English | My Account | Create an AWS Account

Learning Paths

Storage

The Storage learning path is designed for enterprise storage engineers to learn how to architect and manage highly available solutions, with a focus on AWS storage services. Progress from the fundamentals to technical deep dives to advance your AWS storage expertise and help your organization migrate to the cloud faster. This path includes both classroom training with guidance from an expert and digital training modules you can take at your own pace.

Find Training

All Paths | Cloud Practitioner | Architect | Developer | Operations | Decision Maker | Partners | Storage

Recommended Training

Foundational Training

AWS Cloud Practitioner Essentials
Digital | 6 Hours

Learn about the fundamentals of AWS and get an overall understanding of the AWS Cloud.

Learn more | Take the digital course

Job Roles in the Cloud
Digital | 30 Minutes

Learn about recommended job roles for AWS Cloud environments. This course compares existing and on-premises roles to cloud roles.

Learn more | Take the digital course

https://aws.amazon.com/training/path-storage/

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Please complete the session survey in the summit mobile app.

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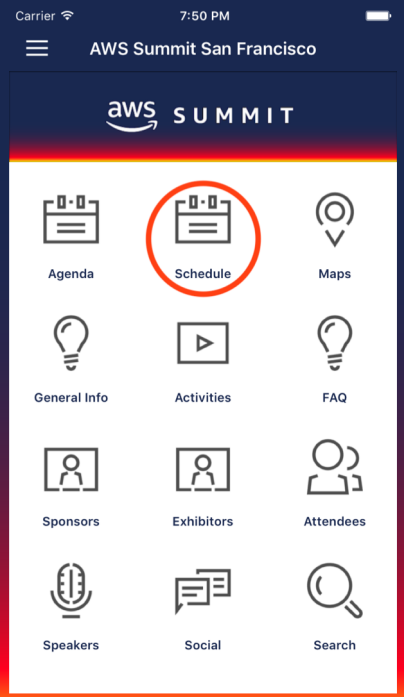
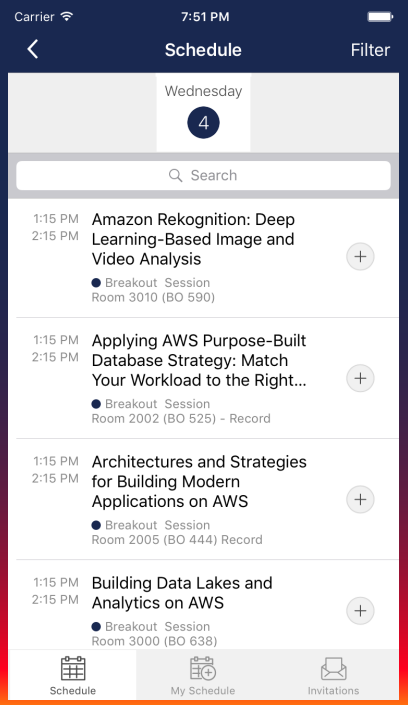
Submit Session Feedback

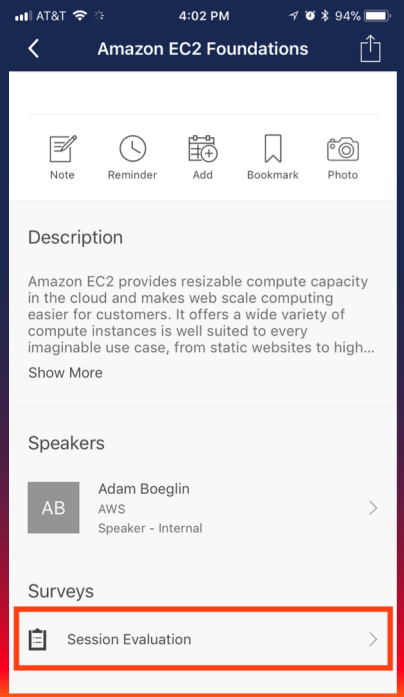
1. Tap the **Schedule** icon.



2. Select the session you attended.



3. Tap **Session Evaluation** to submit your feedback.



Thank you