

Amazon Storage Services

Agenda

- Key use cases for AWS Storage Services
- What's New in Amazon S3
- What's New in Amazon EBS
- What's New in Amazon EFS Amazon FSx
- AWS Backup
- AWS Hybrid-Edge & Data Transfer

More choice for more applications



Block storage

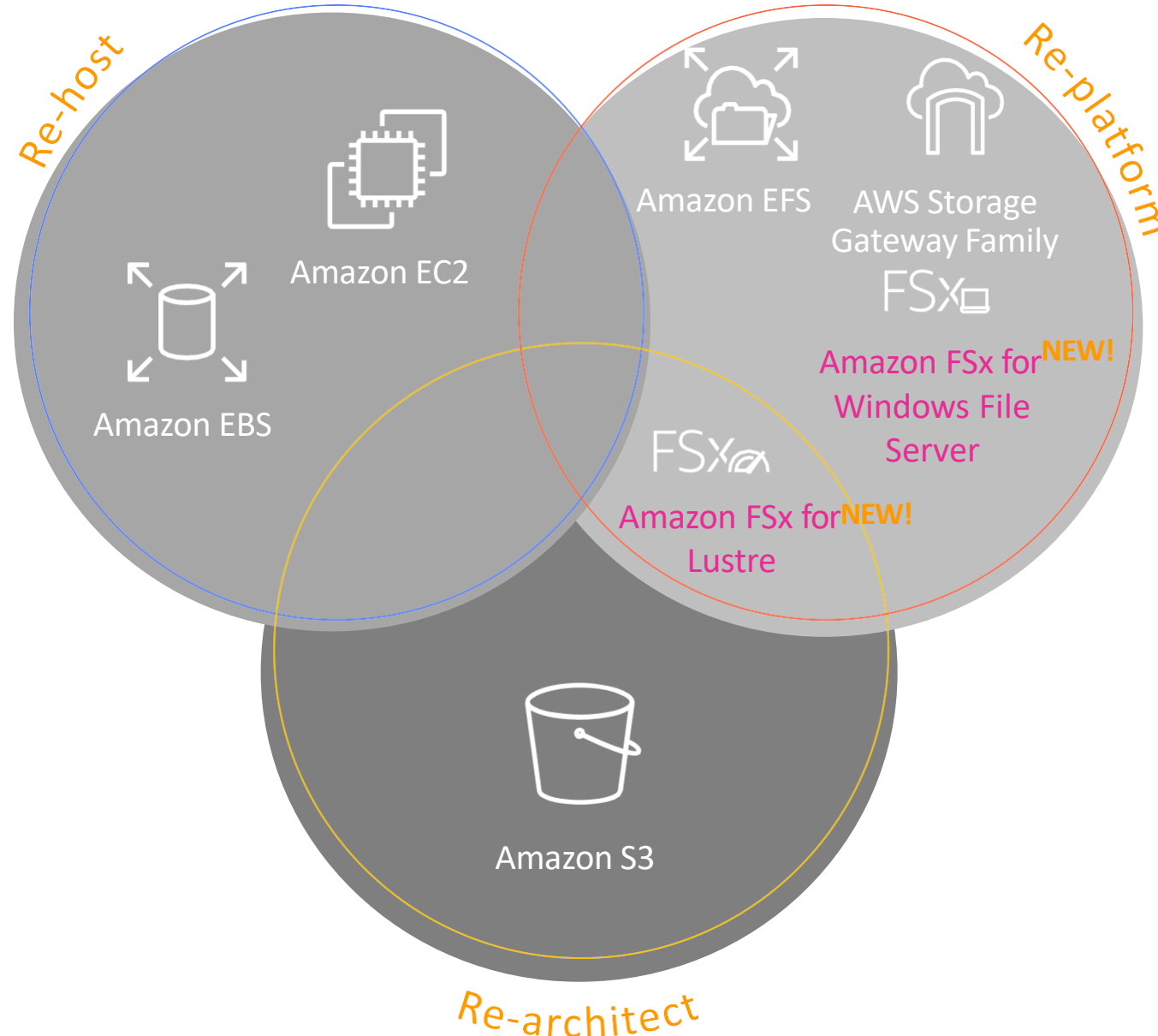


- General Purpose SSD
- Provisioned IOPS SSD
- Throughput Optimized HDD
- Cold HDD
- Elastic Volumes

Backup



- AWS Backup **NEW!**

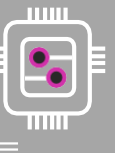


File storage



- Amazon EFS Standard
- Amazon EFS Infrequent Access

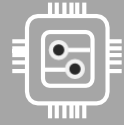
Object storage



- Amazon S3 Standard
- Amazon S3 Standard-IA
- Amazon S3 One Zone-IA
- Amazon S3 Glacier
- NEW!** Amazon S3 Intelligent-Tiering
- NEW!** Amazon S3 Glacier Deep Archive

New AWS storage features in the last year

Object storage



S3 Block Public Access

S3 Select GA (+Parquet, bzip2, JSON Arrays)

S3 Performance Increase to 5,500 reads/3,500 writes/sec

CRR based on object tags

S3 Glacier in S. America (Sao Paulo)

Region S3 Glacier CloudWatch metrics

S3 Batch Operations **NEW!**

S3 Glacier restore notifications **NEW!**

S3 Glacier restore speed upgrade **NEW!**

S3 Object Lock **NEW!**

Direct Glacier access through S3 API **NEW!**

File storage



EFS in US West (N. California), Asia Pacific (Seoul), Asia Pacific (Tokyo), & Asia Pacific (Singapore) Regions

EFS Encryption in transit

EFS HIPAA eligibility

EFS provisioned throughput

EFS PCI-DSS compliance

EFS access over AWS VPN

EFS locks per file increase

EFS multi-VPC access

Block storage



EBS elastic volumes for standard magnetic

EBS-optimized performance increase for c5/m5 to 14gbps

EBS resource-level permissions for Snapshots

Incremental encrypted snapshot copy with custom CMKs

EBS snapshots tag on create

EBS data lifecycle manager

2x EBS-provisioned IOPs performance improvement **NEW!**

60% EBS gp2 SSD volumes performance improvement **NEW!**

Data transfer

Storage Gateway Hardware Appliance

File Gateway SMB support

Tape Gateway in 2 new regions

AWS Snowball Edge Compute Optimized

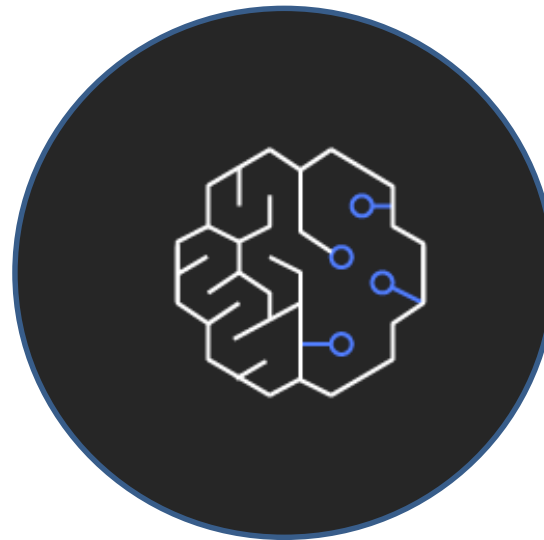
NEW!



AWS has been helping enterprises for 13 years



Increase agility



Accelerate
innovation



Strengthen security



Reduce cost

What are customers building?

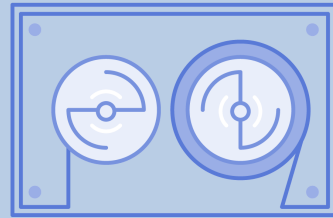


Backup &
restore

Non-disruptive

Easy place to start

Integrated with all
major vendors



Archive &
compliance

Media workflows

Tape replacement

Public Sector,
FinServ,
Healthcare/Life
Sciences



Home directories

Simple to move

Not sensitive to
latency

Significant cost
savings

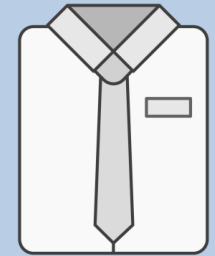


Data lakes

Variety of analytics
tools

Built for
streaming data

Data visualization



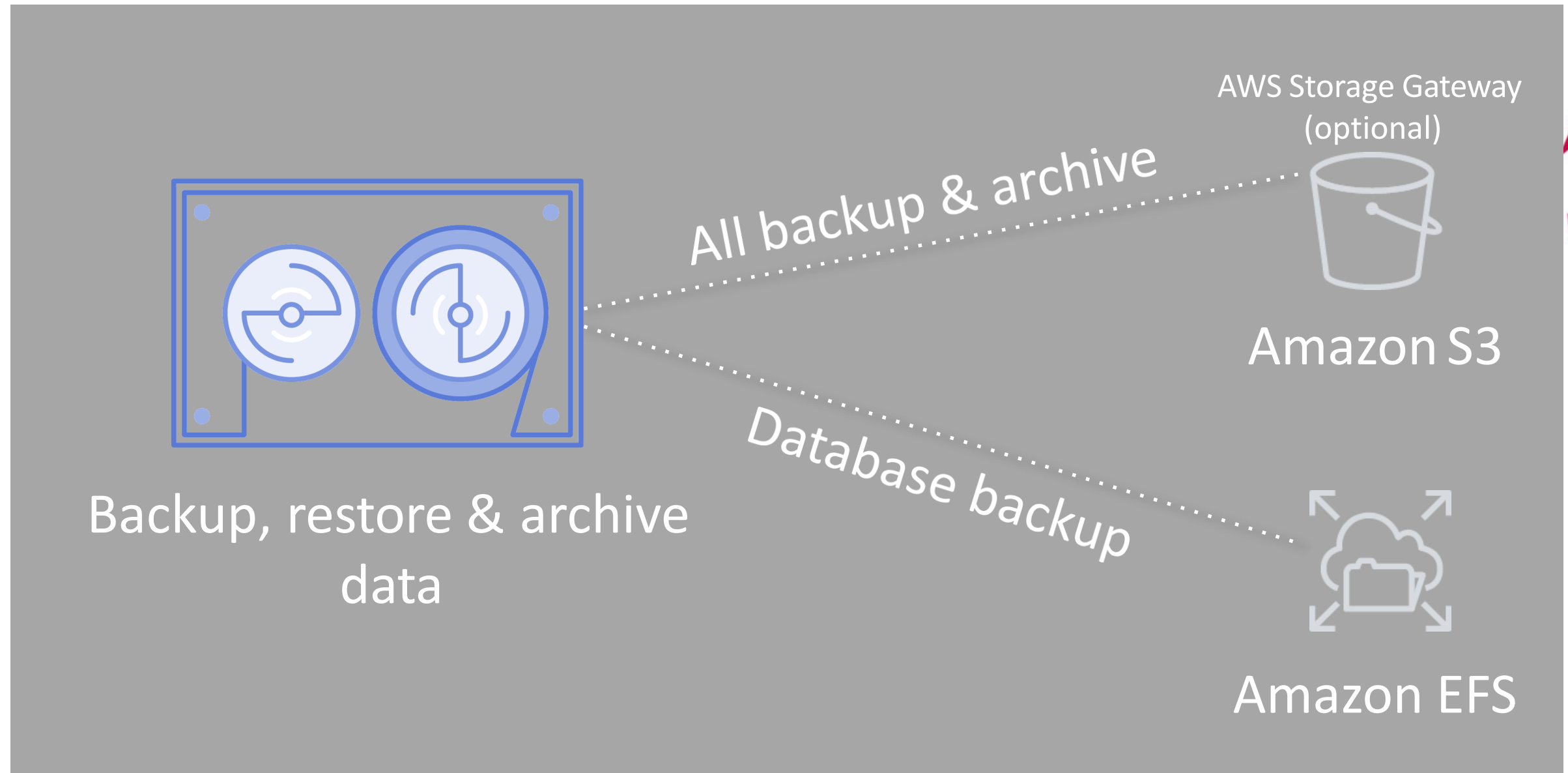
Business- critical
applications

Integrated with
major vendors

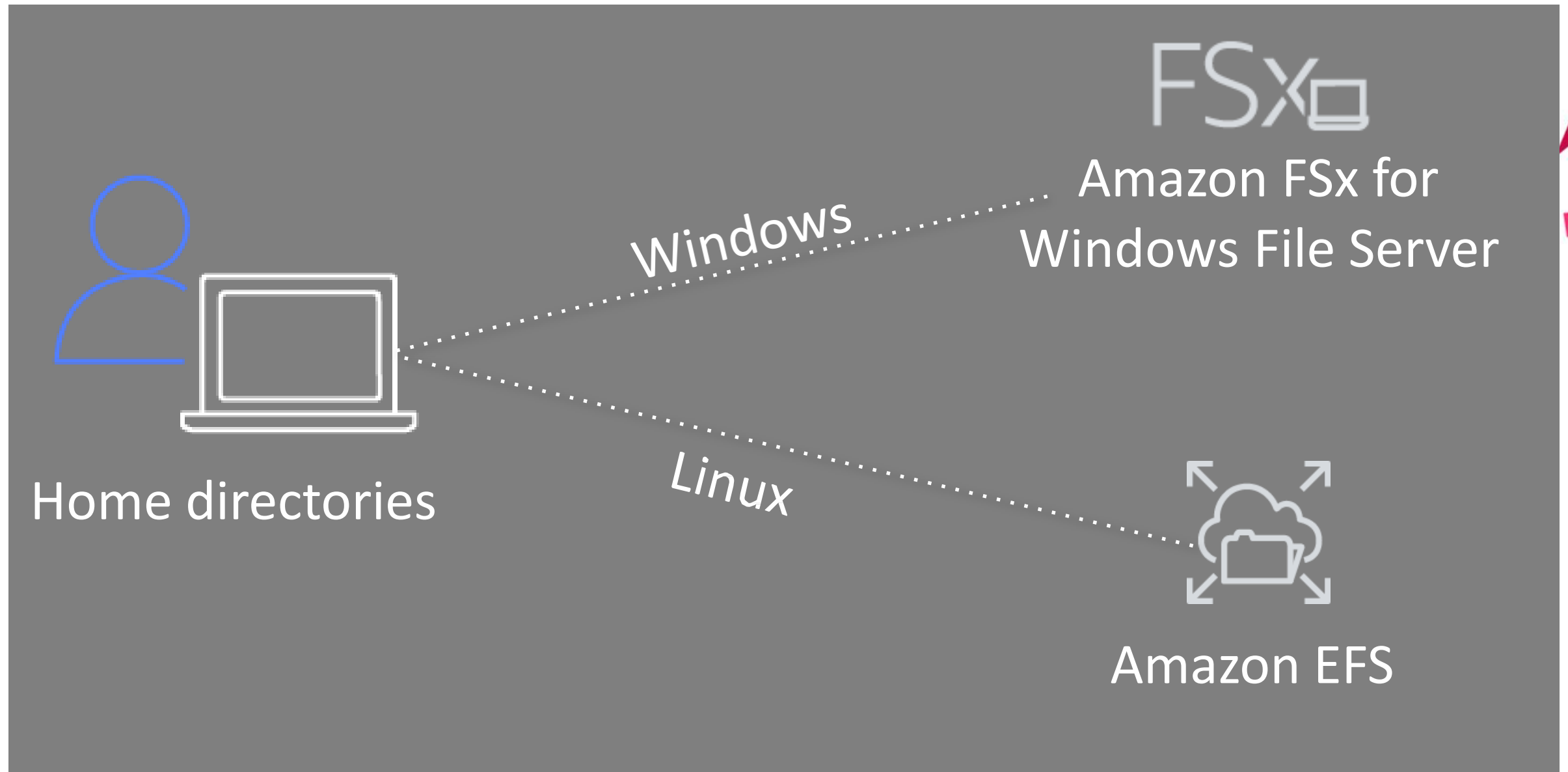
Fully managed
infrastructure

Lift-and-shift
migrations

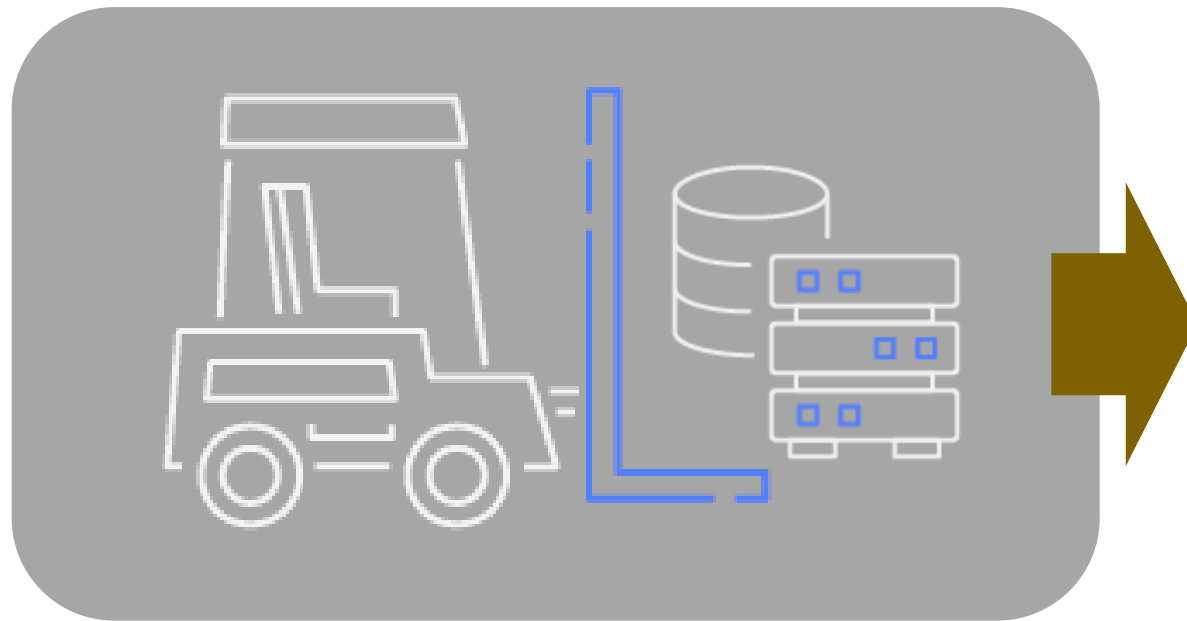
Backup, restore, and archive solutions



Home directories

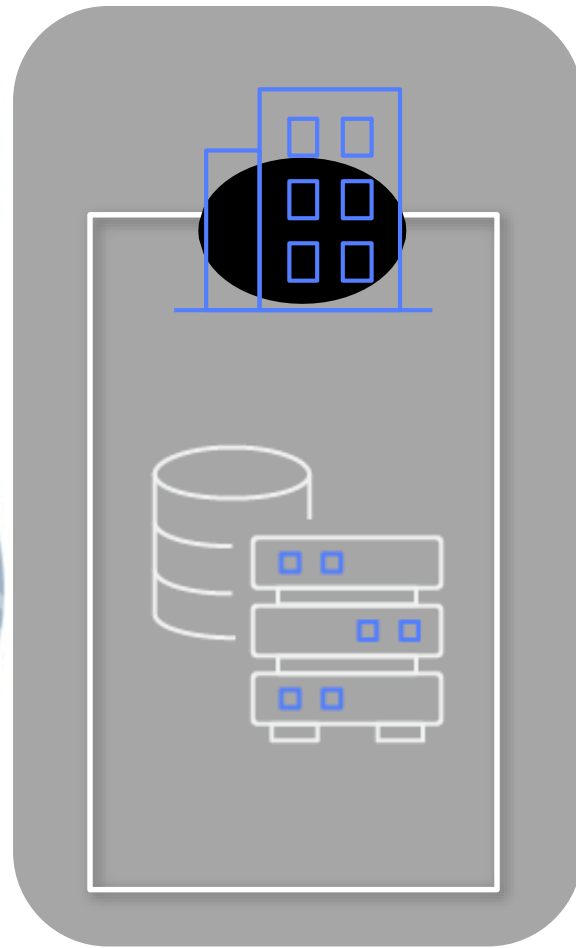


Business-critical applications



Block storage	Linux/NFS file storage	Windows file storage
Amazon EBS	Amazon EFS	Amazon FSx for Windows File Server

Hybrid cloud storage



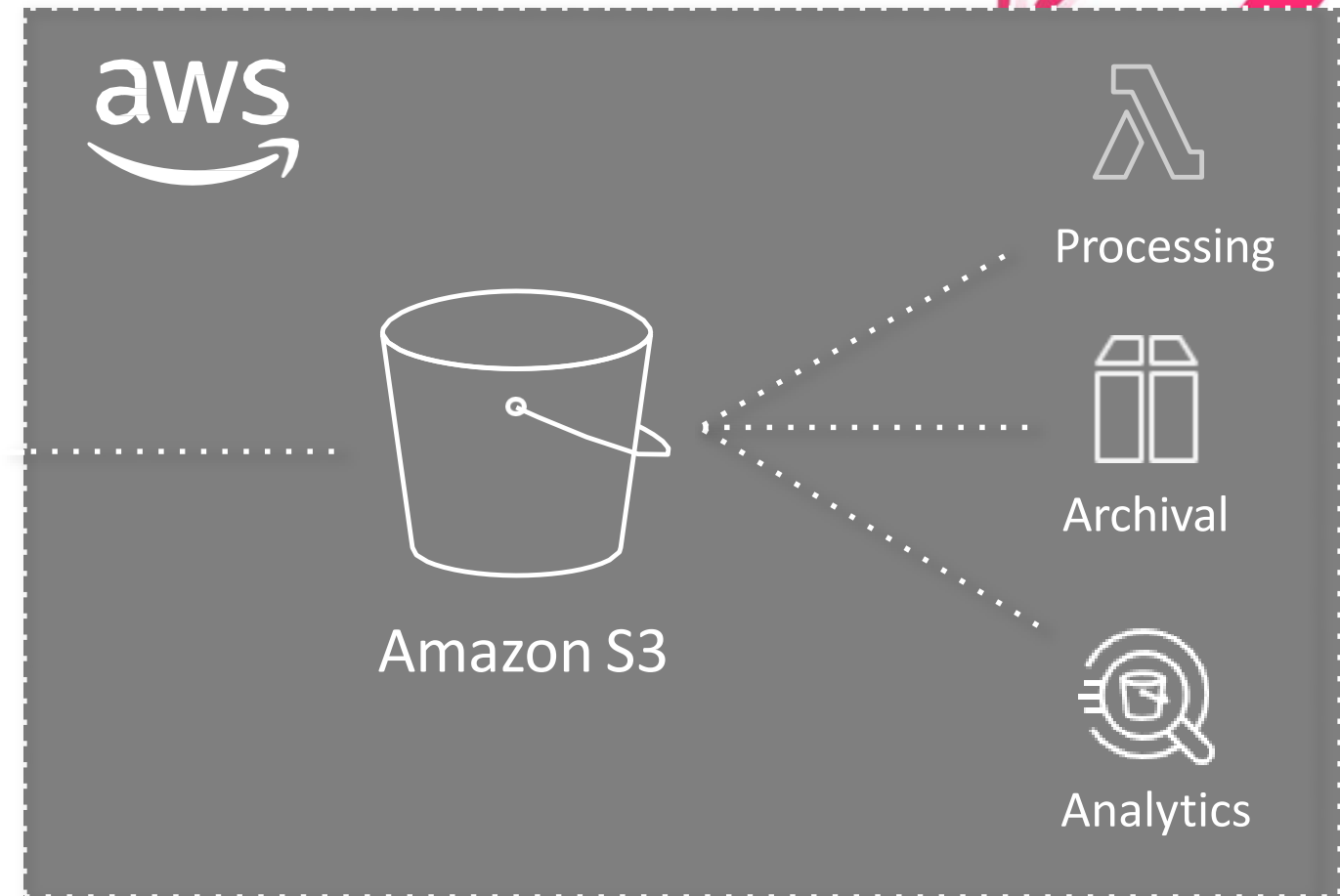
On-premises
data center



AWS Storage Gateway

AWS DataSync

AWS Transfer for SFTP



Data lakes



Consolidate
all your data



Process and
analyze



Simplified data
lake formation



Machine
learning

Amazon S3 is the best place for data lakes



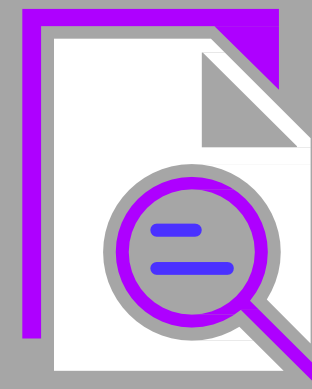
Unmatched
durability,
availability,
and scalability



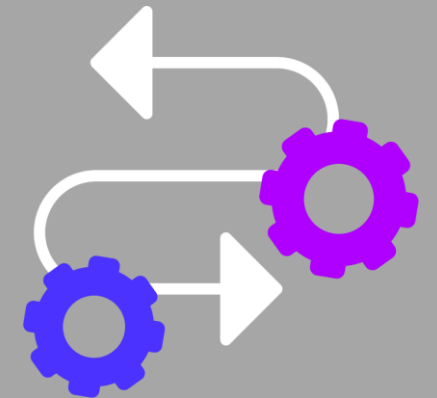
Best security,
compliance,
and audit
capabilities



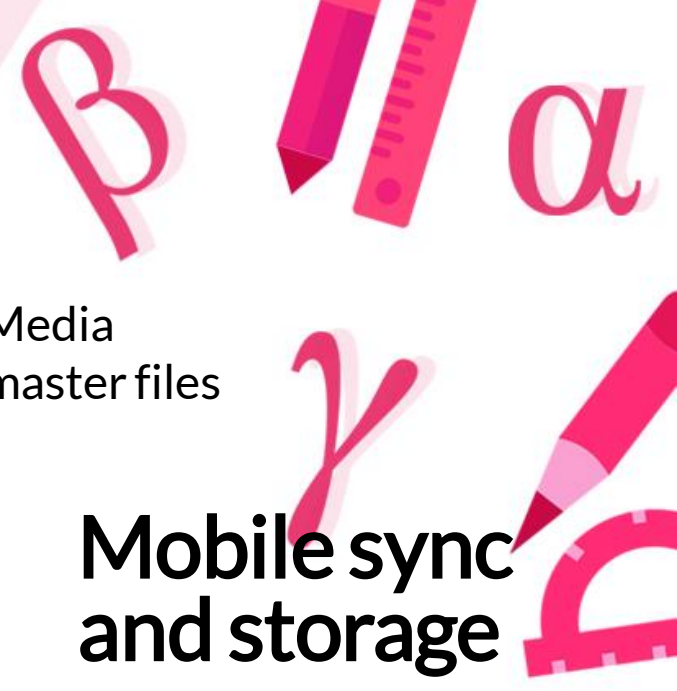
Object-level
controls



Query and
process data in p
lace



Most ways to
bring data in



Medical imagery
and records

Compliance
records

Analytics

Geospatial or lunar
imagery

IoT sensor data

Media
master files

**Mobile sync
and storage**

Pharmac
eutical
study
data

Durable
backups

Seismic &
reservoir
simulation data

**Machine
learning
training data**

Web site
hosting

Autonomous
vehicle data

Oil and gas
topography

**User-generated
content**

Log files

Mappin
g data

Meteorological and
environmental
research

**Media
assets**

Surveillance
video/closed circuit
television

DNA
sequences

Origin storage
for CDN

Home
recording
video

Customer call
center records

**Data
lakes**



aws
SUM
MIT

Amazon S3: Service benefits

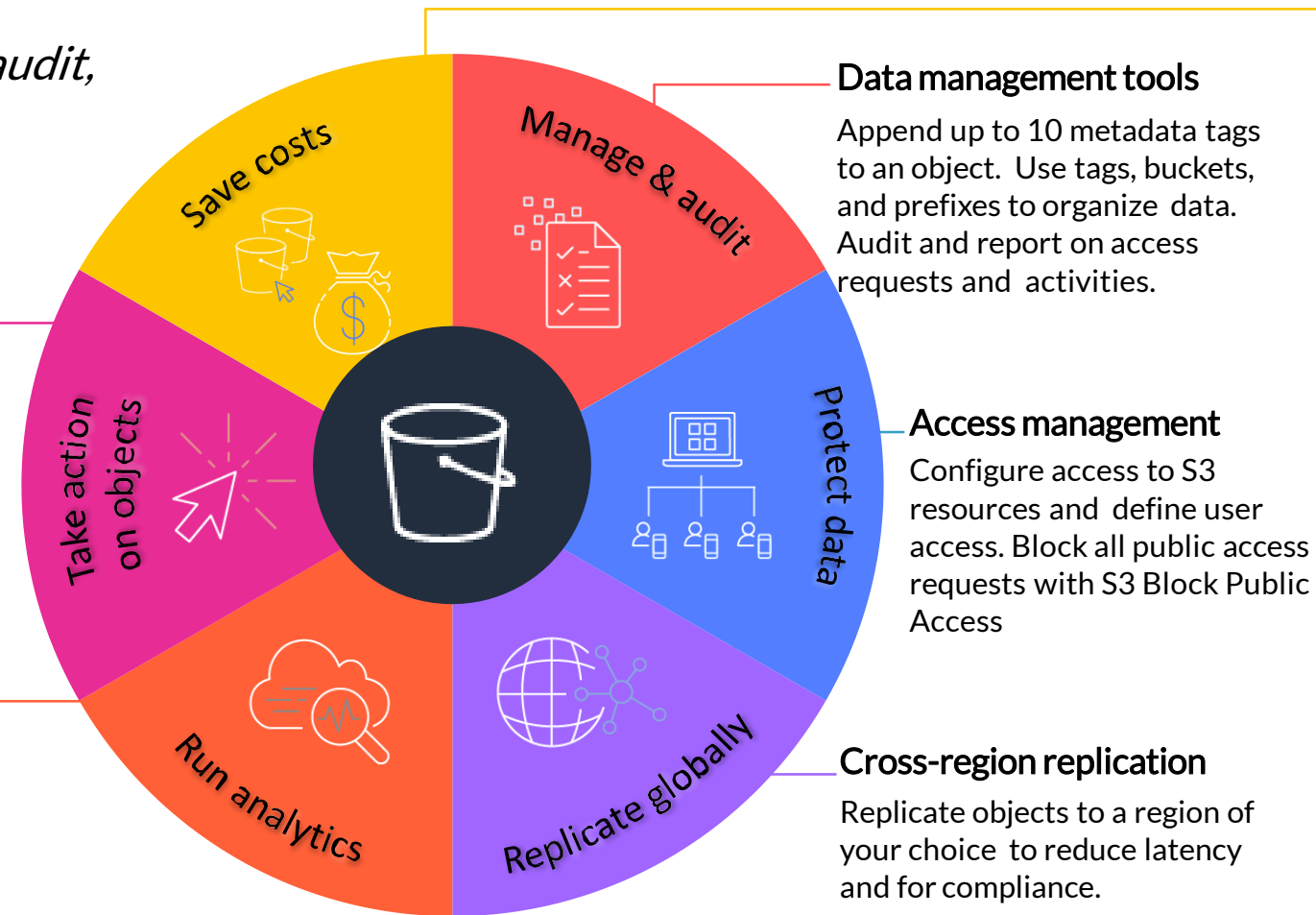
The most features to cost-effectively store, manage, audit, secure, and query data – at virtually any scale.

S3 batch operations





Execute tasks and invoke AWS Lambda across billions of objects – with a single API call or a few clicks in the console.

Analytics & file systems integrations

S3-integrated analytics applications
AWS Lake Formation to stand up a data lake in days
S3 Select to query data in place
FSx for Lustre for HPC, ML, and media data



S3 storage classes

-  S3 Standard
 -  S3 Standard-IA
 -  S3 Intelligent-Tiering
 -  S3 One Zone-IA
 -  S3 Glacier
 -  S3 Glacier Deep Archive
- Use S3 Storage Class Analysis to learn access patterns and S3 Lifecycle policies to move objects between classes

Supported by the most secure, durable, and performant storage infrastructure

Security by design

Compliance programs

Designed for 9.999999999%
durability

Multi-AZ resiliency

Limitless scalability

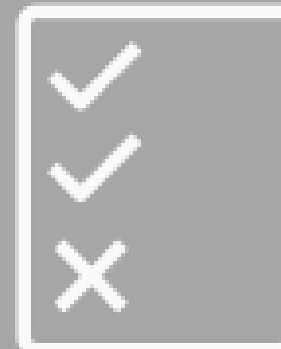
Security is job #1



Free checks with
AWS Trusted
Advisor



S3 default
encryption

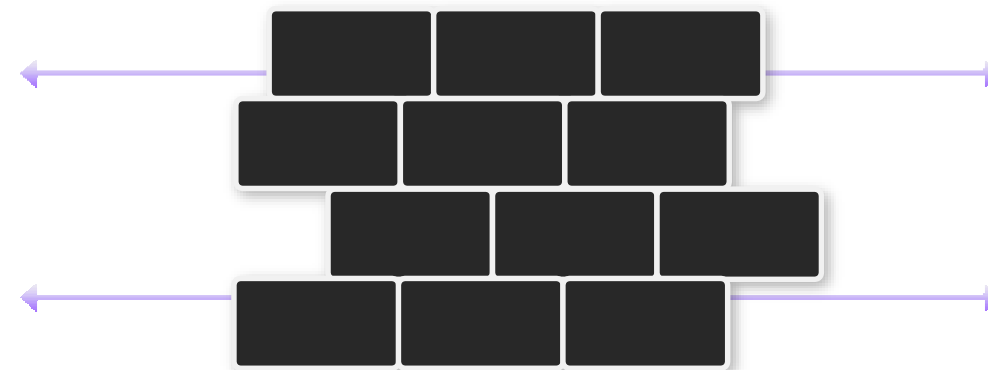
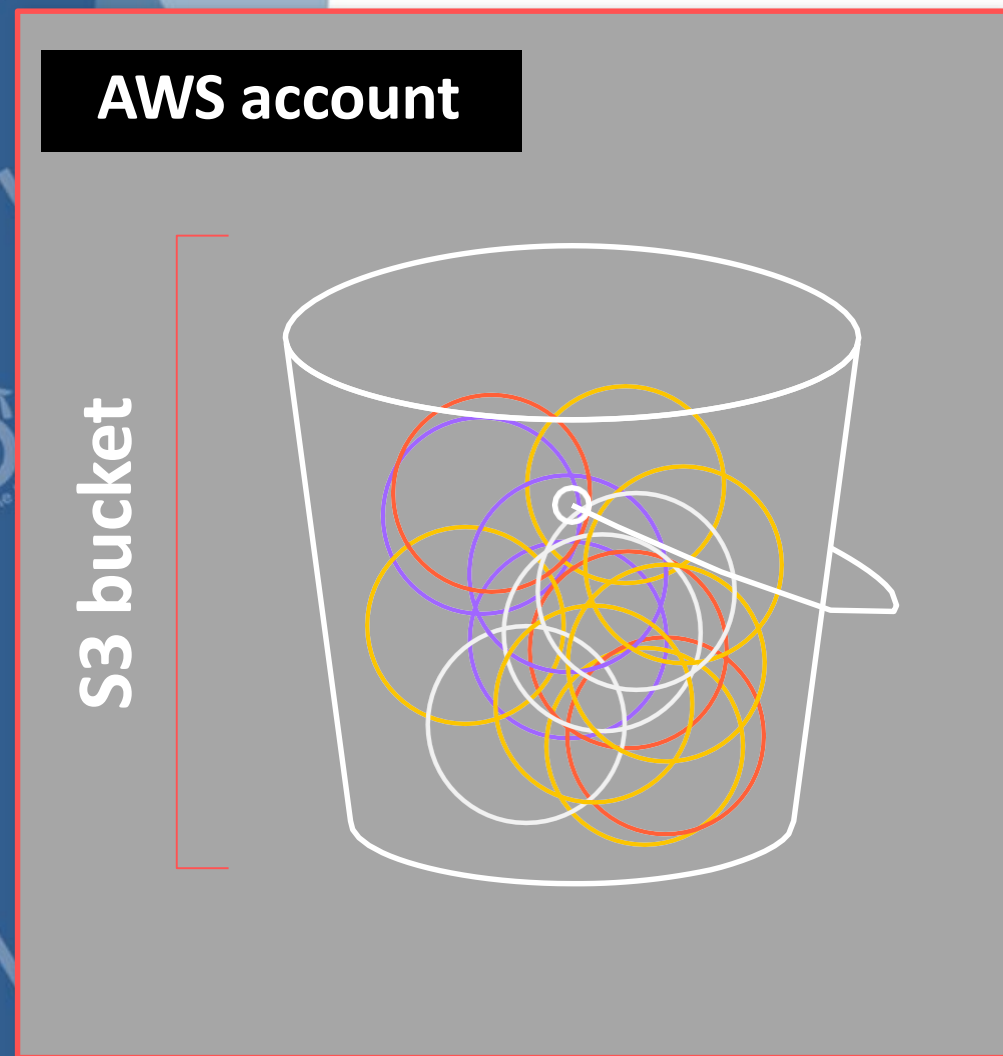


Encryption status in
S3 inventory

Bucket name	Access	Region
jbarr-public	Public	US East (N. Virginia)
jbarr-edge	Public	US East (N. Virginia)
awsroadtrip.com	Public	US East (N. Virginia)
www.awsroadtrip.com	Not public *	US East (N. Virginia)

S3 bucket permissions check

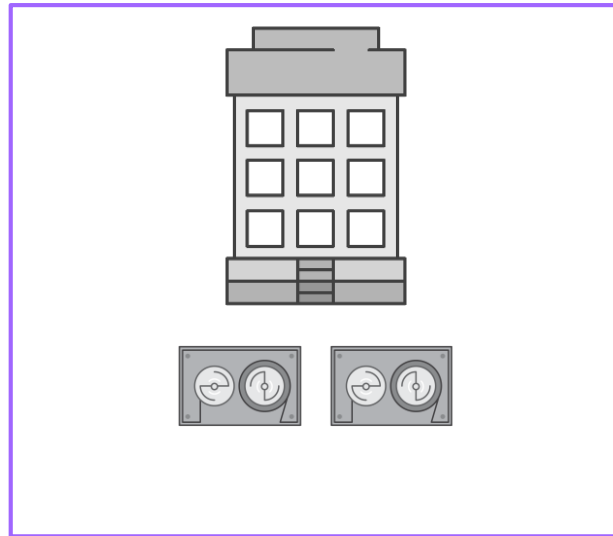
Amazon S3 Block Public Access



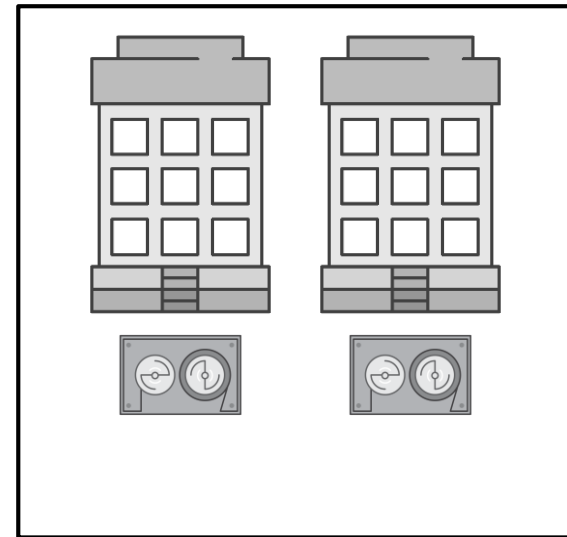
S3 Block Public Access



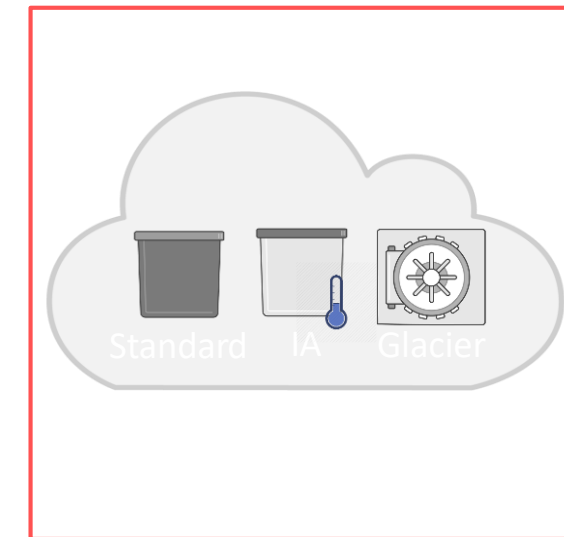
Understanding durability



99.99%
durability



99.9999%
durability



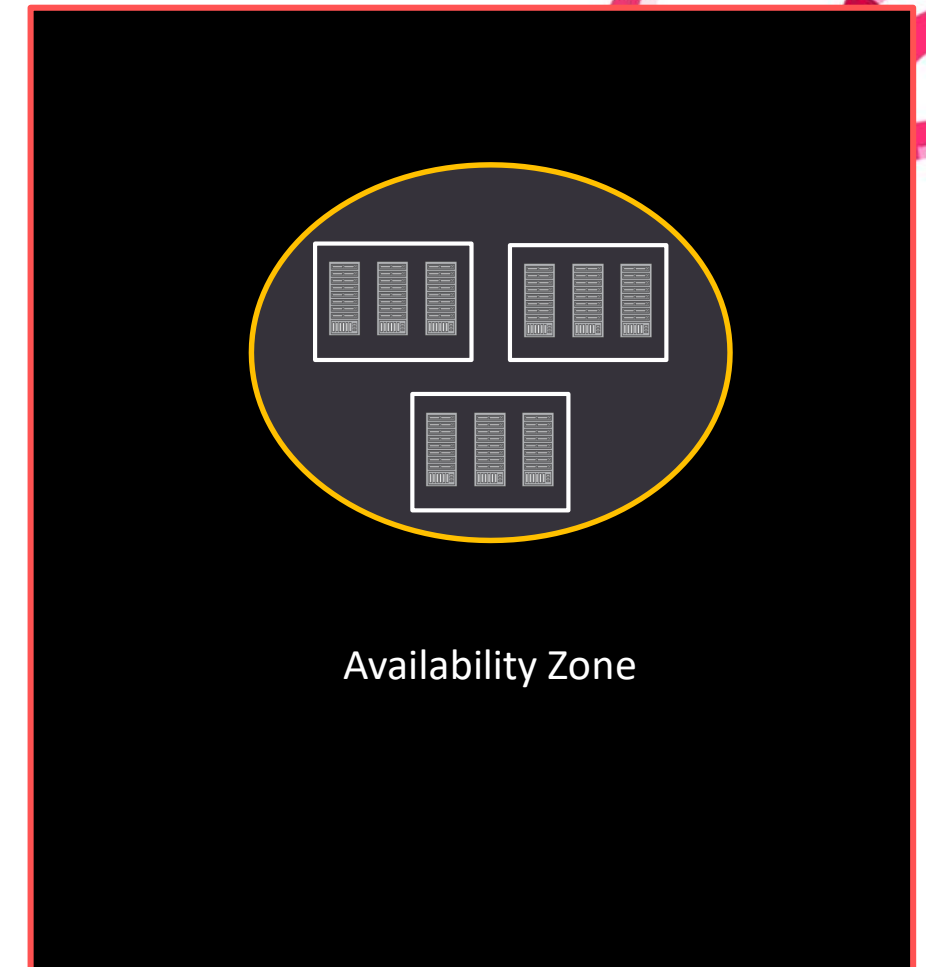
Designed for
99.999999999999%
durability

How do AWS object storage classes differ in design?

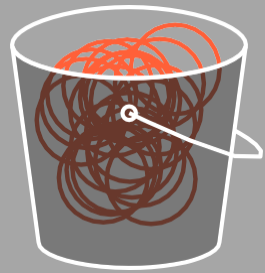
Amazon S3 Standard
Amazon S3 Intelligent-Tiering
Amazon S3 Standard-IA

Amazon S3 Glacier
Amazon S3 Glacier Deep Archive

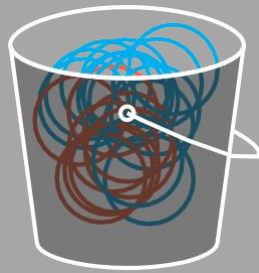
Amazon S3 One Zone-IA



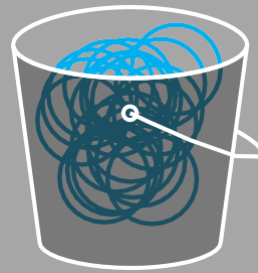
Your choice of Amazon S3 storage classes



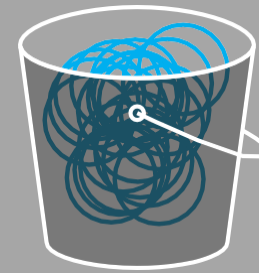
S3 Standard



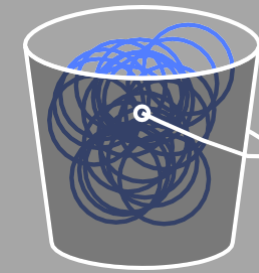
S3 Intelligent-Tiering



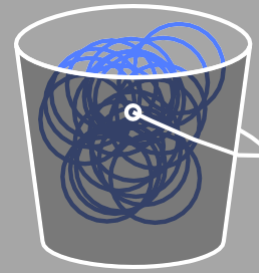
S3 Standard-IA



S3 One Zone-IA



S3 Glacier



S3 Glacier
Deep Archive

Frequent ←

Access Frequency

→ *Infrequent*

- Active, frequently accessed data
- Milliseconds access
- ≥ 3 AZ
- \$0.0210/GB

- Data with changing access patterns
- Milliseconds access
- ≥ 3 AZ
- \$0.0210 to \$0.0125/GB
- Monitoring fee per obj.
- Min. storage duration

- Infrequently accessed data
- Milliseconds access
- ≥ 3 AZ
- \$0.0125/GB
- Retrieval fee per GB
- Min. storage duration
- Min. object size

- Re-creatable, less accessed data
- Milliseconds access
- 1 AZ
- \$0.0100/GB
- Retrieval fee per GB
- Min. storage duration
- Min. object size

- Archive data
- Select minutes or hours
- ≥ 3 AZ
- \$0.0040/GB
- Retrieval fee per GB
- Min. storage duration
- Min. object size

- Archive data
- Select 12 or 48 hours
- ≥ 3 AZ
- \$0.00099/GB
- Retrieval fee per GB
- Min. storage duration
- Min. object size

Amazon S3 One Zone-IA

An S3 storage class built for easily re-creatable data Designed on a **single Availability Zone**

Still designed for **99.999999999%** durability but less resilient— **20% less cost** for

Use it for:

- Mobile or enterprise backup data
- Offsite compliance data
- Disaster recovery data
- Derived analysis data



S3 Intelligent-Tiering

Automated storage tiering for data with changing access patterns

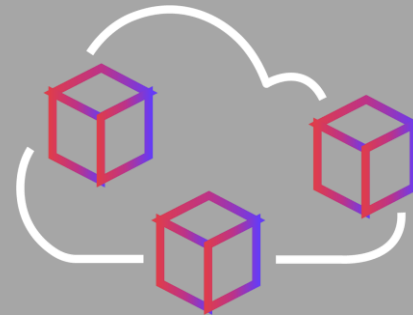


S3 Glacier Deep Archive

Lowest-cost storage class for long-term archiving and digital asset preservation



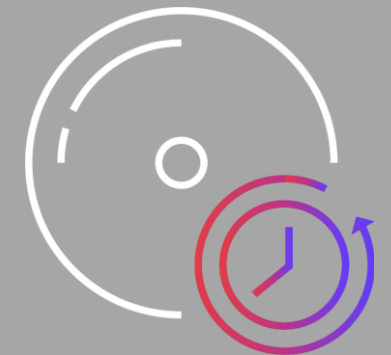
\$0.00099 per GB-month



Fully managed
without tape
burden

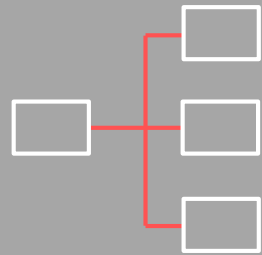


Designed for
99.999999999%
durability



Recover data
in 12 hours

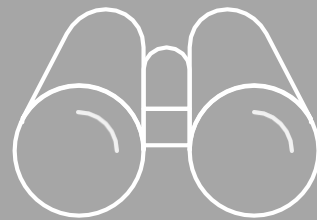
Manageability



Organize

S3 object tagging

S3 prefixes



Monitor

Amazon CloudWatch

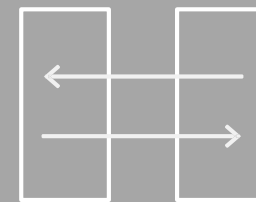
AWS CloudTrail

S3 event notifications

S3 Inventory

S3 storage class analysis

S3 Glacier restore notifications



Replicate & tier

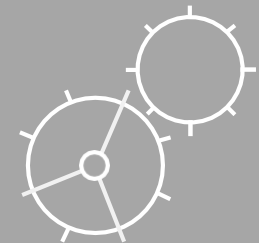
Cross region replication

S3 lifecycle

EBS data lifecycle manager

Cross-region replication to S3 Glacier

Direct PUT to S3 Glacier



Modify

S3 event notifications + Lambda

S3 Glacier restore speed upgrade

S3 object lock

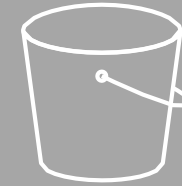
S3 batch operations

S3 batch operations

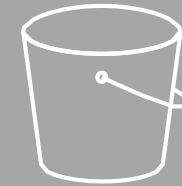
Take large-scale actions on S3 objects



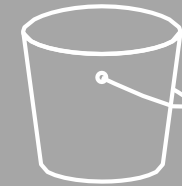
Replace tags



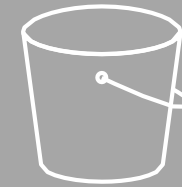
Change access controls



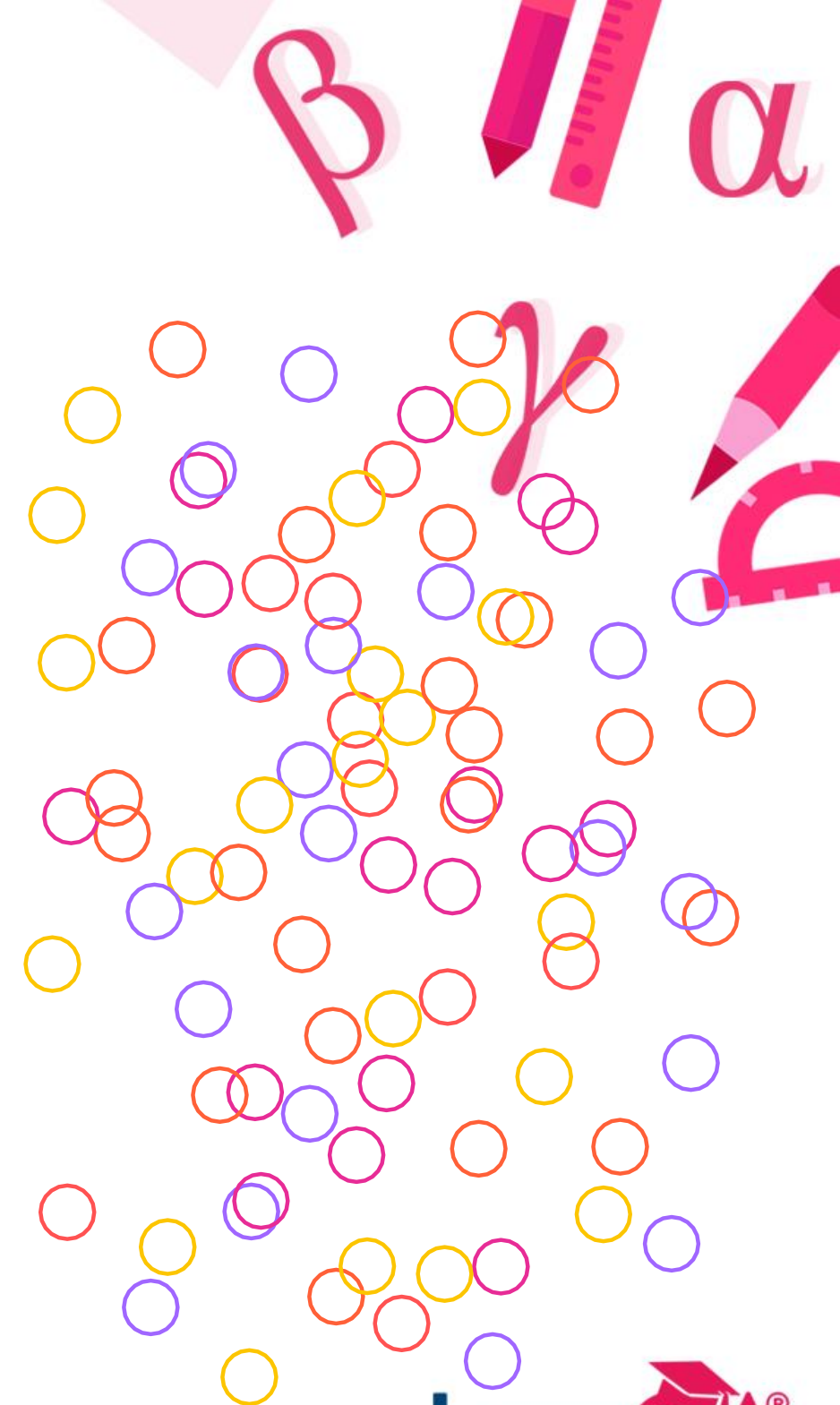
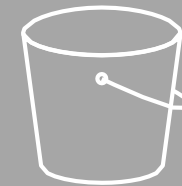
Restore objects
from Amazon S3 Glacier



Copy objects



Run Lambda functions



S3 batch operations

Take large-scale actions on S3 objects



Replace tags



Change access controls



Restore objects
from Amazon S3 Glacier



Copy objects

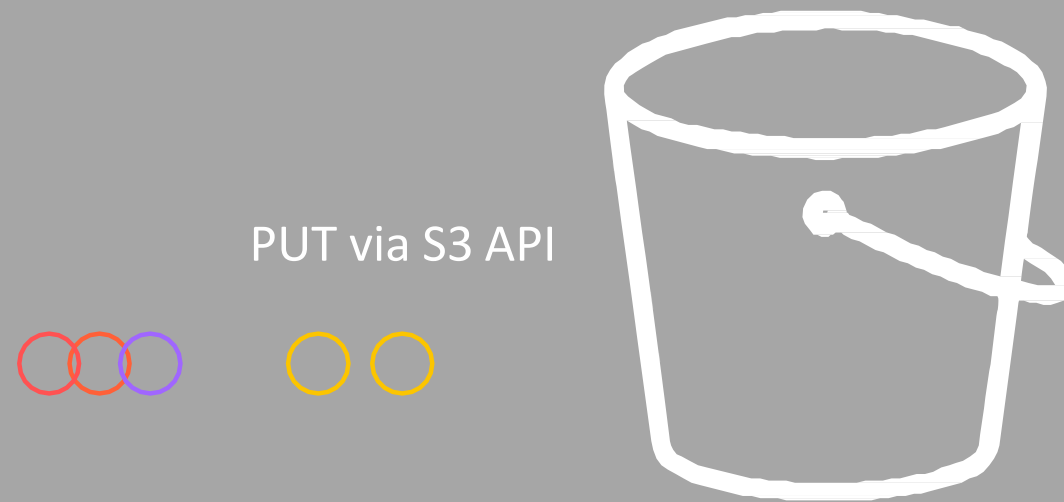


Run Lambda functions



Archival storage through S3 API

Write to S3 Glacier directly via the S3 API—no lifecycle policies necessary



PUT via S3 API

S3 storage class

Move via lifecycle policy

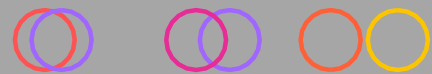


Amazon S3 Glacier

Archival storage through S3 API

Write to S3 Glacier directly via the S3 API—no lifecycle policies necessary

Direct PUT via S3 API



Amazon S3 Glacier

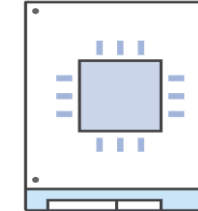
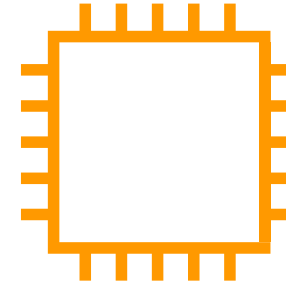
New features

- Direct PUT to S3 Glacier
- S3 object lock (WORM storage)
- S3 Glacier restore speed upgrade
- S3 Glacier restore notifications
- CRR direct to S3 Glacier

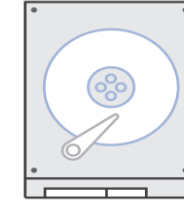
AWS Block Storage

AWS Block Storage Offerings

Amazon EC2 instance store

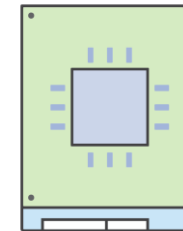


SSD

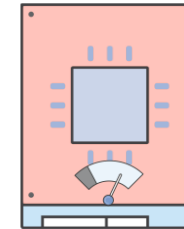


HDD

Amazon EBS SSD-backed volumes

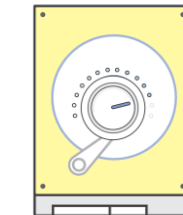


gp2

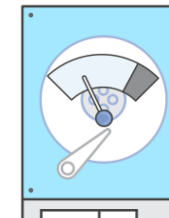


io1

Amazon EBS HDD-backed volumes



st1

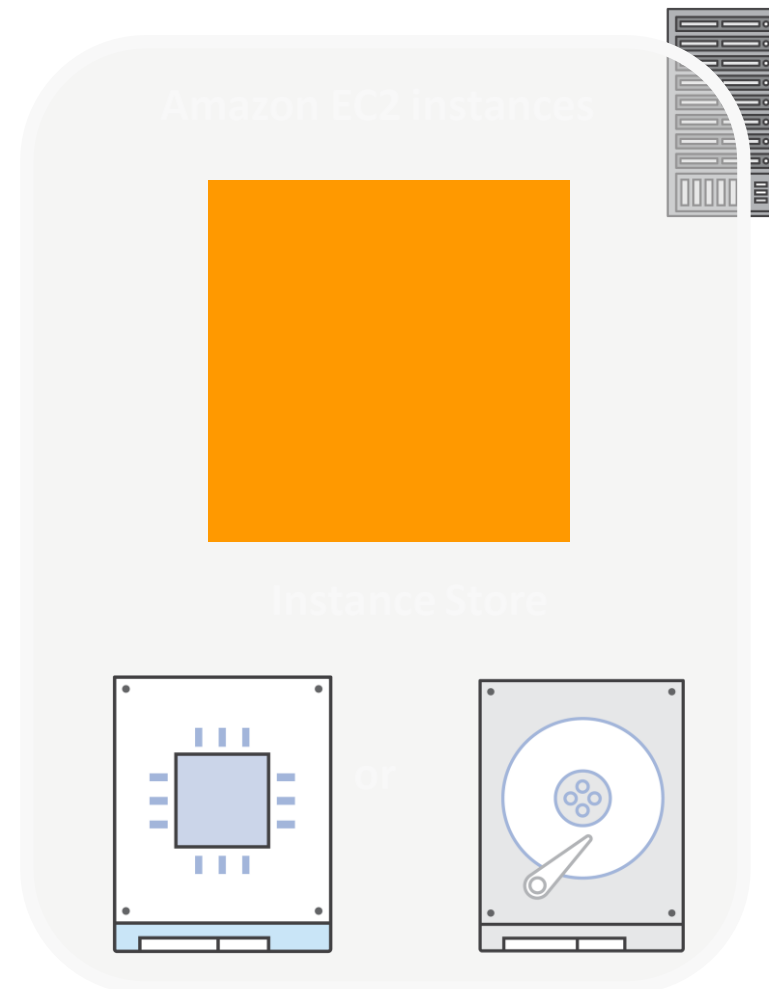


sc1

Amazon EBS Snapshots

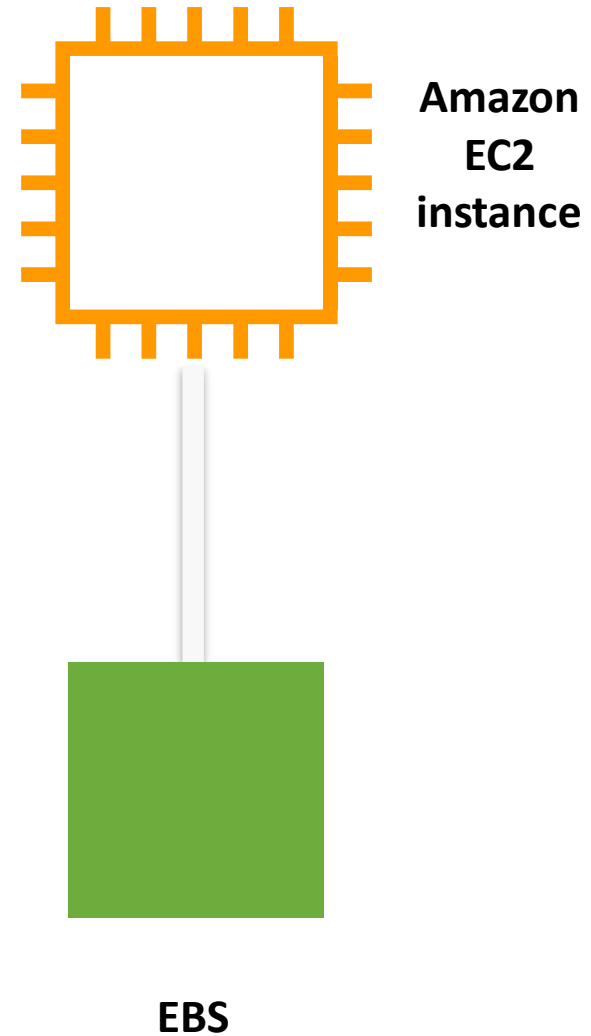


What is Amazon EC2 instance store?



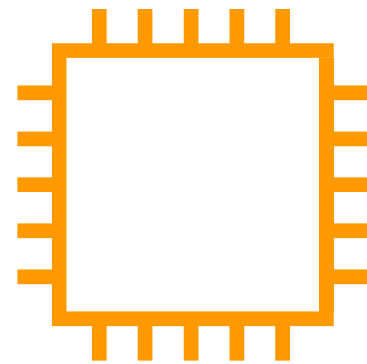
- Local to instance
- Non-persistent data store
- Data not replicated (by default)
- No snapshot support
- SSD or HDD

What is Amazon EBS?



- Block storage as a service
- Create, attach volumes through an API
- Service accessed over the network

What is Amazon EBS?

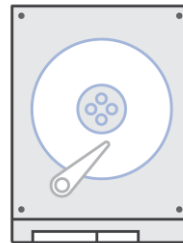


Amazon
EC2
instance



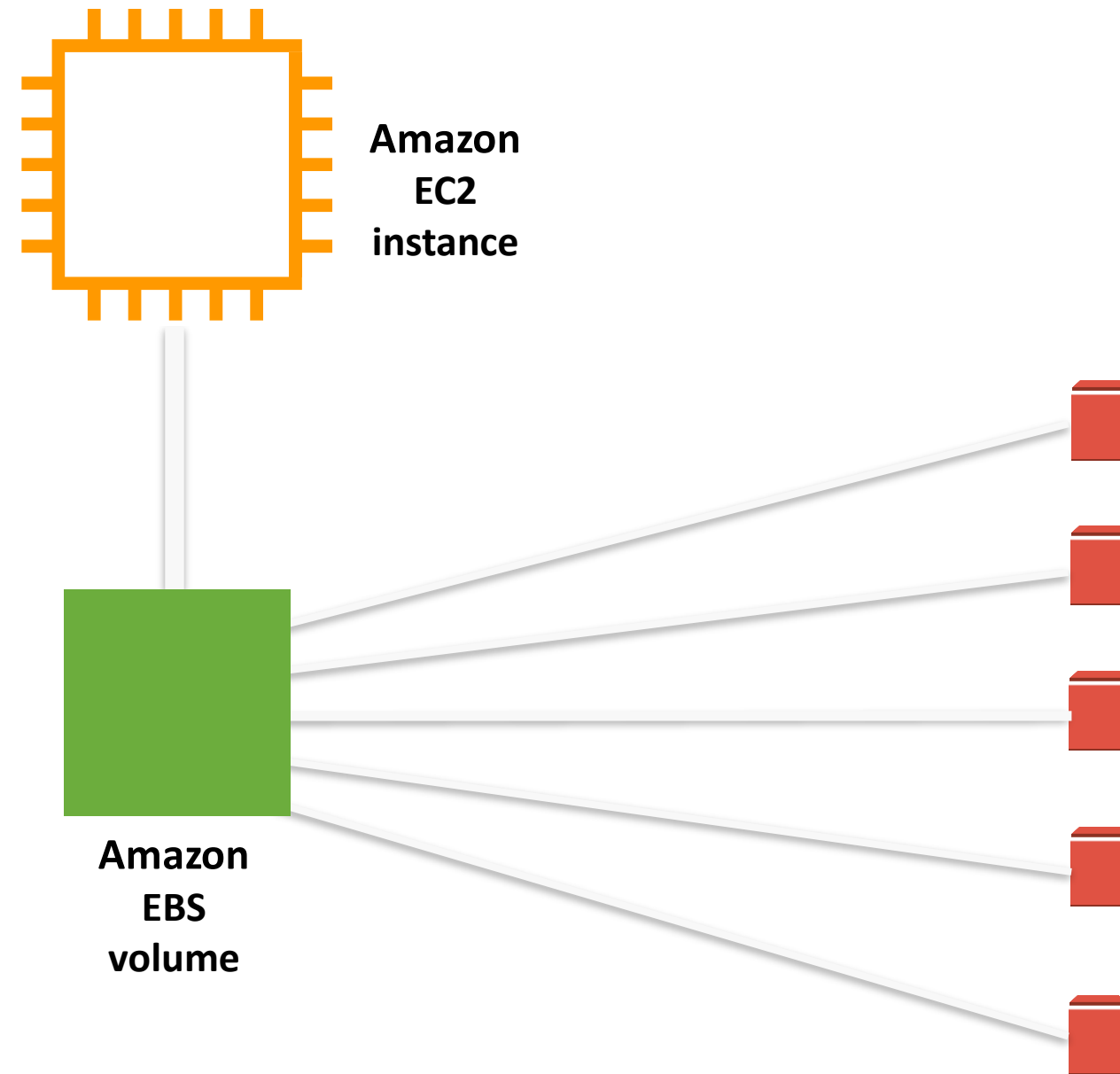
Amazon
EBS
volume

!=

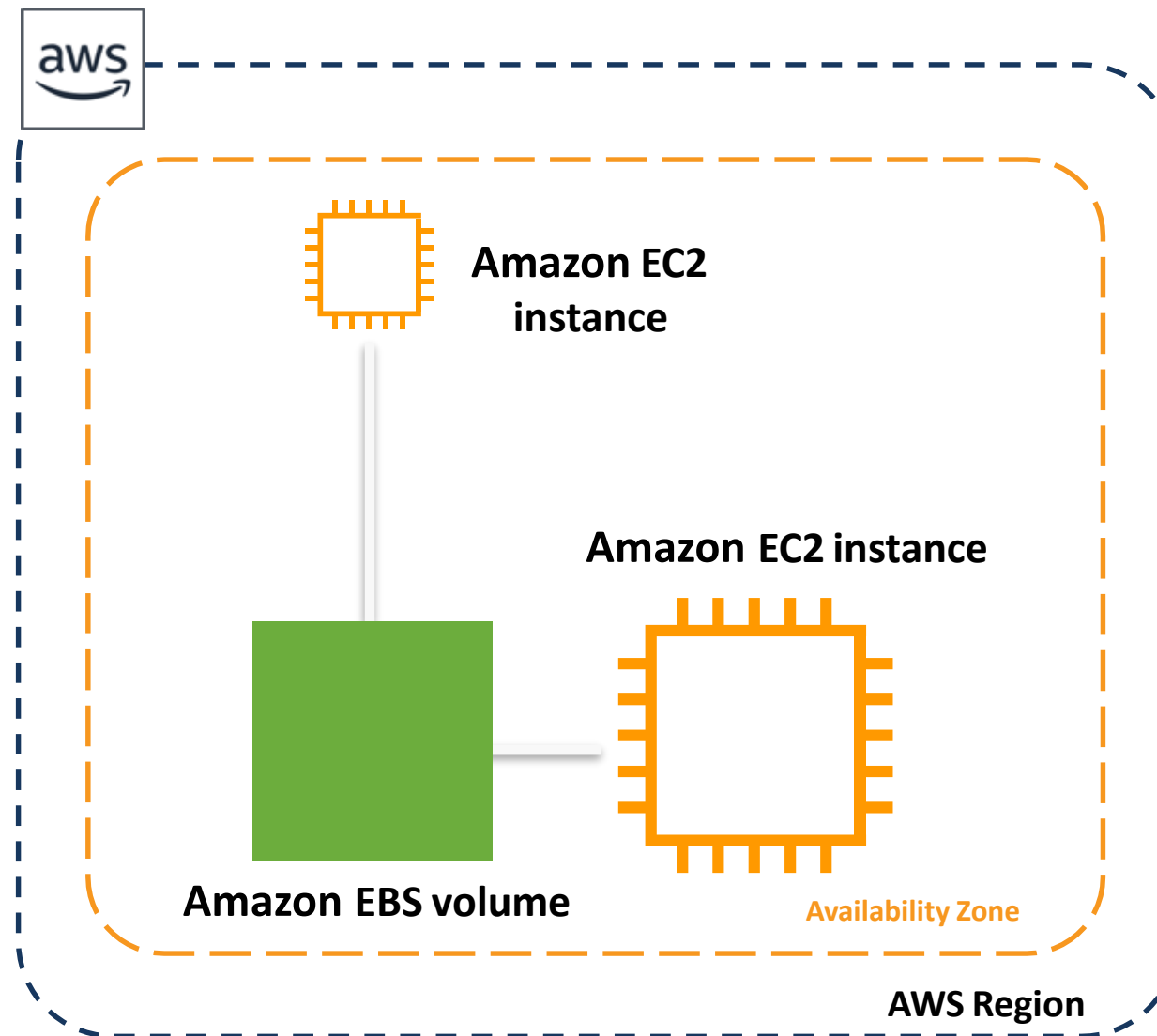


- Block storage as a service
- Create, attach volumes through an API
- Service accessed over the network

What is Amazon EBS?

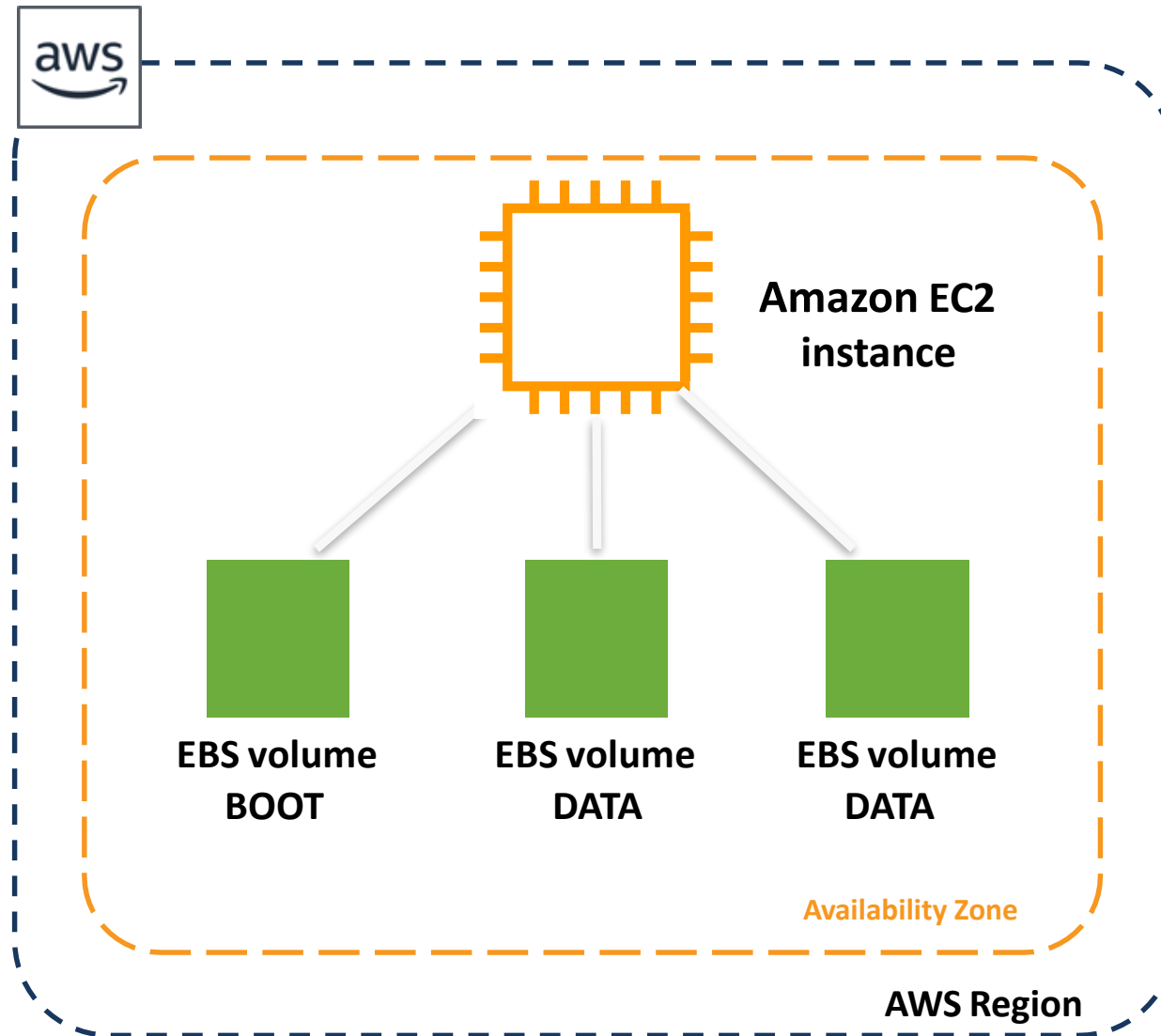


What is Amazon EBS?



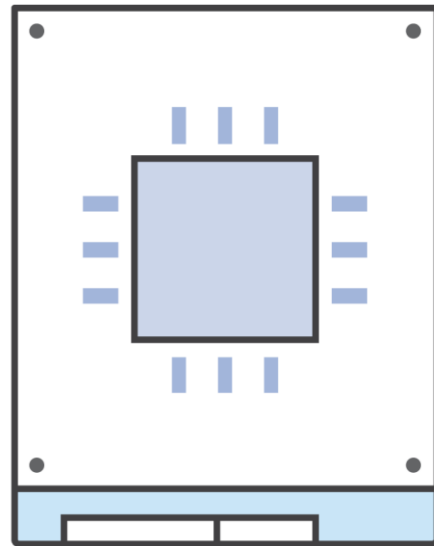
- Volumes persist independent of EC2
- Select storage and compute based on your workload
- Detach and attach between instances within the same Availability Zone

What is Amazon EBS?

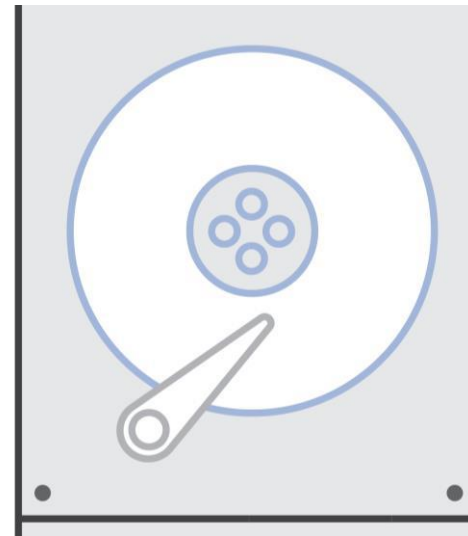


- Volumes attach to one instance
- Many volumes can attach to an instance
- Separate boot and data volumes

Amazon EBS volume types

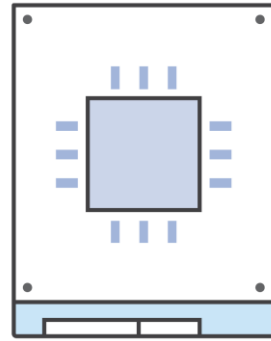


Solid-state drives (SSD)

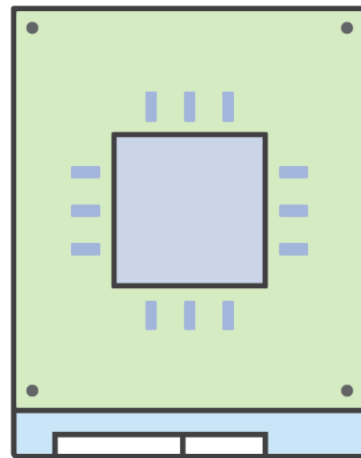
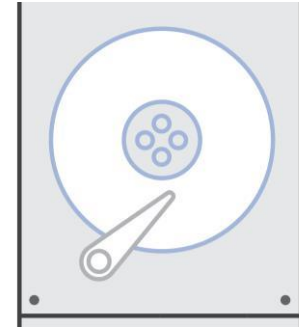


Hard disk drives (HDD)

Amazon EBS volume types

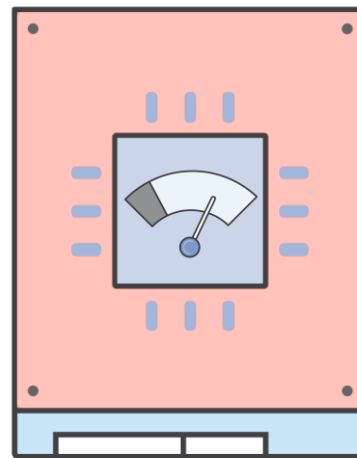


SSD



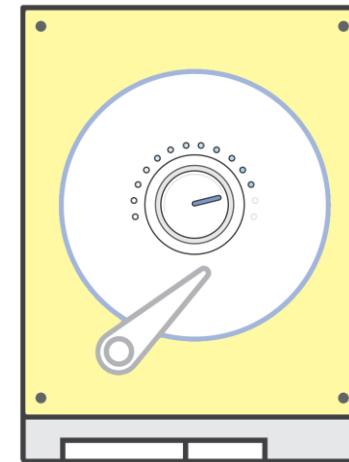
gp2

General
Purpose SSD



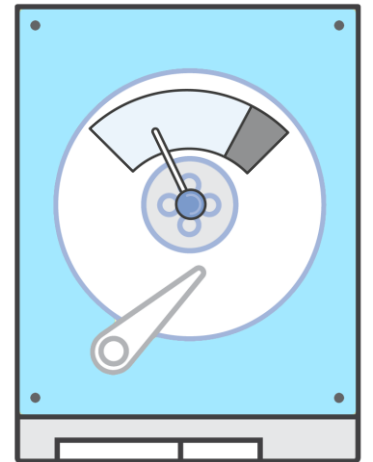
io1

Provisioned
IOPS SSD



st1

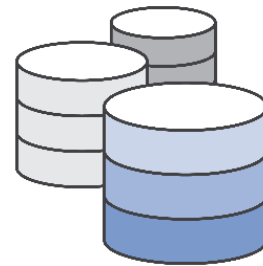
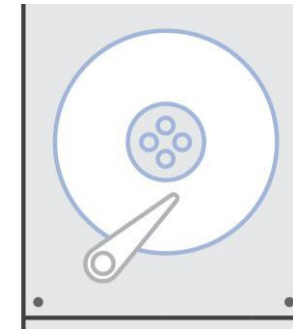
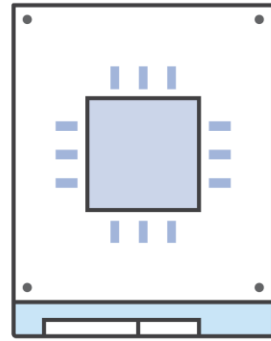
Throughput
Optimized HDD



sc1

Cold
HDD

Amazon EBS use cases



Relational Databases

MySQL, SQL Server,
PostgreSQL, SAP, Oracle

NoSQL Databases

Cassandra, MongoDB,
CouchDB

Big Data, Analytics

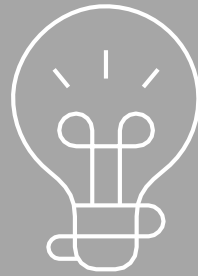
Kafka, Splunk,
Hadoop, Data
Warehousing

File / Media

CIFS/NFS,
Transcoding,
Encoding, Rendering

Amazon EFS

Amazon Elastic File System (Amazon EFS)



Simple

Automatically
grows and shrinks

Lower TCO than DIY
or on premises



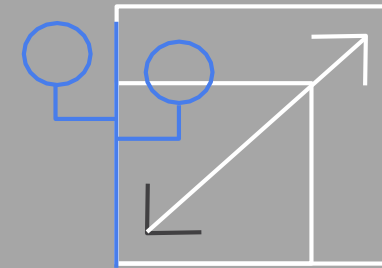
Elastic

Fully managed

Highly reliable
regional design

Secure

No re-architecting
required



Scalable

Consistent IOPS

Consistent throughput

Flexible client
connectivity

EFS Infrequent Access

Lower-cost storage for EFS file data as it becomes less frequently accessed

85% savings for files accessed infrequently

EFS Standard



Frequently
accessed
file system

EFS IA



Infrequently
accessed
file system

New for EFS IA!

Four EFS IA Lifecycle Management policies available

- 14 days **NEW!**
- 30 days
- 60 days **NEW!**
- 90 days **NEW!**

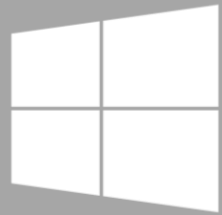
EFS IA is now available for *existing* EFS file systems

NEW!

Amazon FSx file storage services

Amazon FSx for Windows File Server

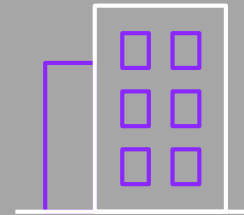
Lift and shift your Windows file storage with fully managed Windows file servers



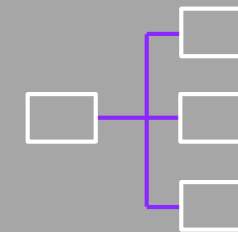
Native Windows compatibility back to Windows 7



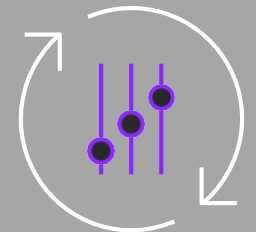
Fast and flexible performance



Ready for Enterprise Apps like ERP & CRM



Connect to Amazon EC2, Amazon WorkSpaces, Amazon AppStream 2.0 & VMware Cloud on AWS



Handles patching and other maintenance

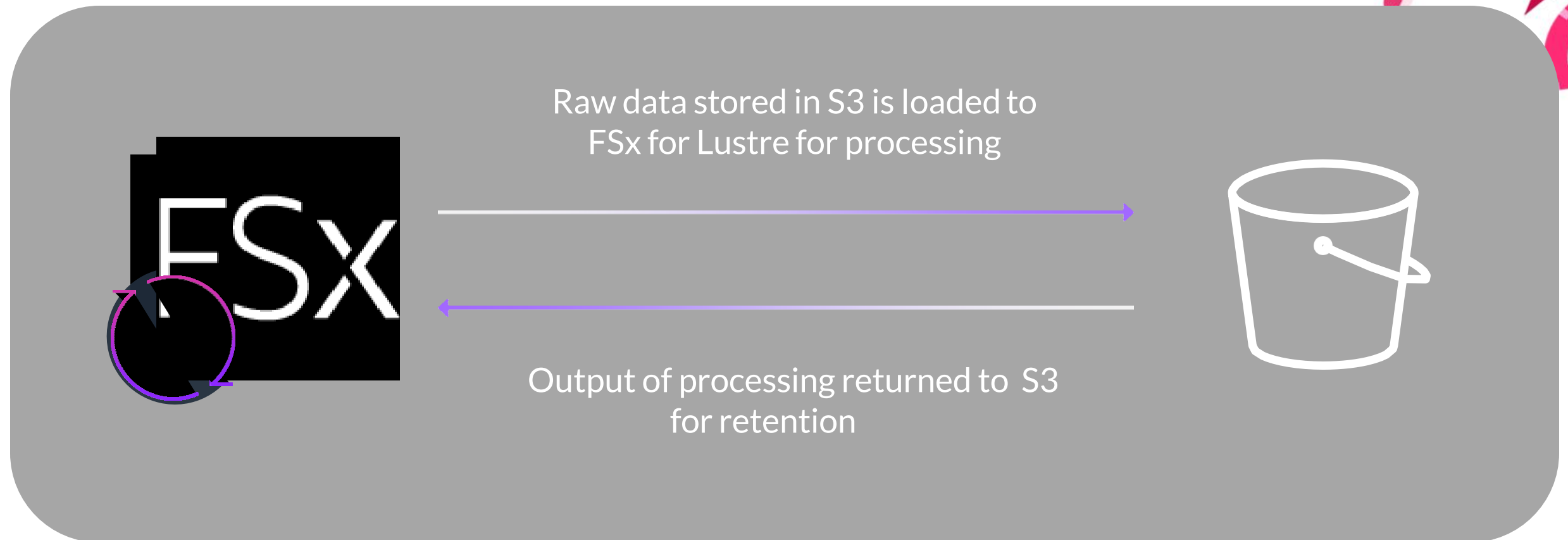
New with FSx for Windows File Server

Added support for self-managed Active Directory

Allows you to use either fully managed AWS Active Directory or your organization's self-managed Active Directory

Amazon FSx for Lustre

For compute-intensive data processing use cases like HPC or machine learning

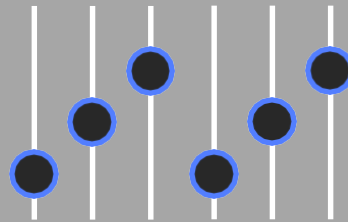


Amazon FSx for Lustre performance

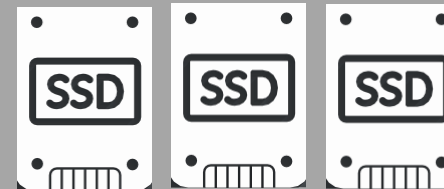
Massively scalable performance

100+ GB/s throughput | Millions of IOPS | Consistent submillisecond latencies

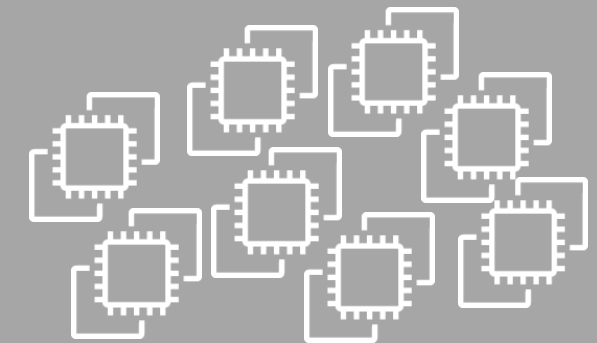
Parallel file system



SSD-based



Supports hundreds of thousands of cores

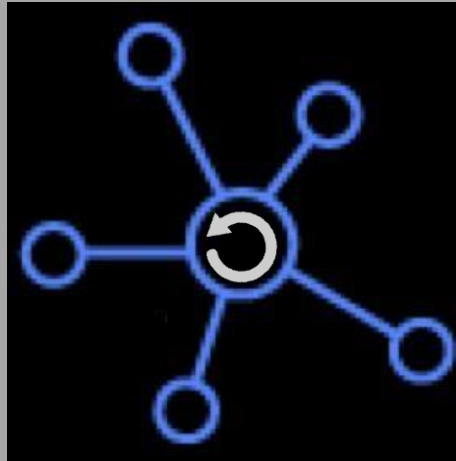


AWS Backup

AWS Backup

Centrally manage backups across AWS services

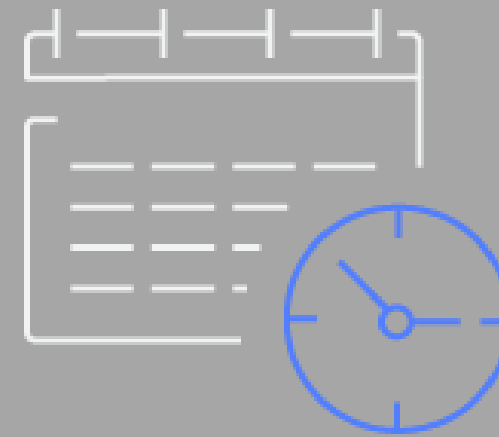
Centralized
backup
management



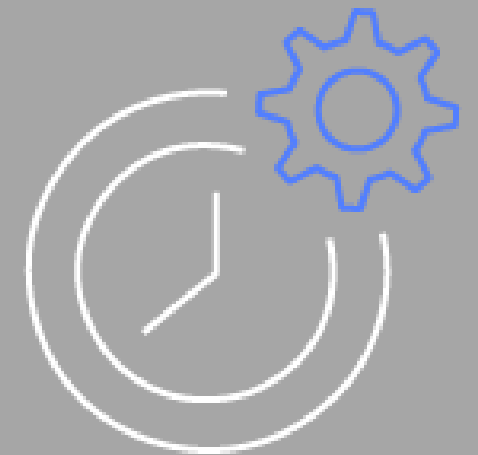
Policy and tag-
based backup
solution



Automated backup
scheduling



Automated retention
and lifecycle
management

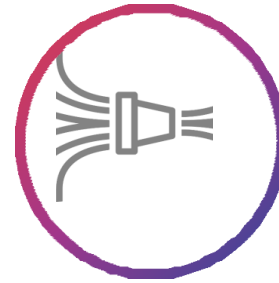


Hybrid edge & data transfer

More options for data transfer



AWS
Direct
Connect



Amazon Kinesis
Data Firehose



Amazon Kinesis
Data Streams



Amazon Kinesis
Video Streams



Amazon S3
Transfer
Acceleration



AWS Storage
Gateway



AWS
Snowball



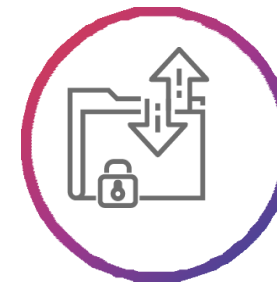
AWS
Snowball Edge



AWS Snowmobile

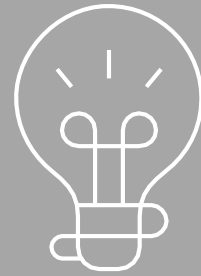


AWS
DataSync



AWS Transfer
for SFTP

AWS Storage Gateway



Simple

Seamless,
nondisruptive
integration

Suitable for a vast range
of use cases



Economical

Accelerates data
center
shutdowns

Eliminates new
NAS/SAN
purchases

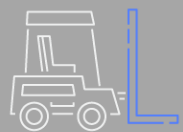
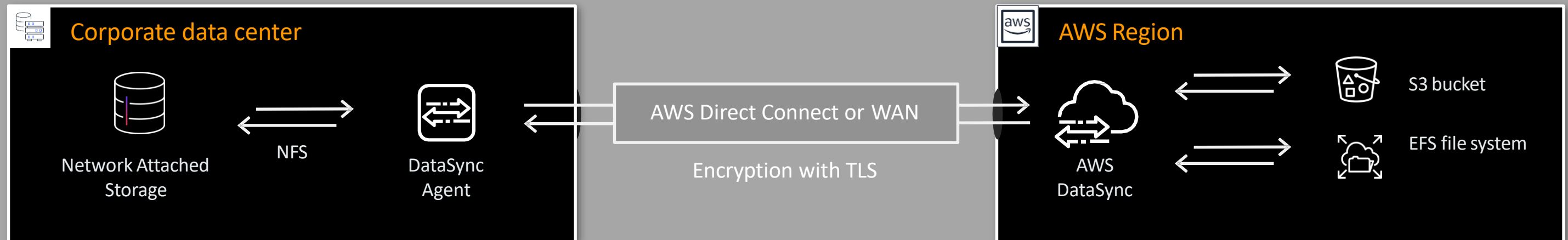


Hybrid

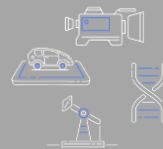
Incorporates cloud
scale and durability with
on-premises operations

AWS DataSync

Simplifies and accelerates online data transfer –
up to 10X faster than open source tools



Migrate active application data to AWS



Transfer data for timely in-cloud analysis



Replicate data to AWS for business continuity

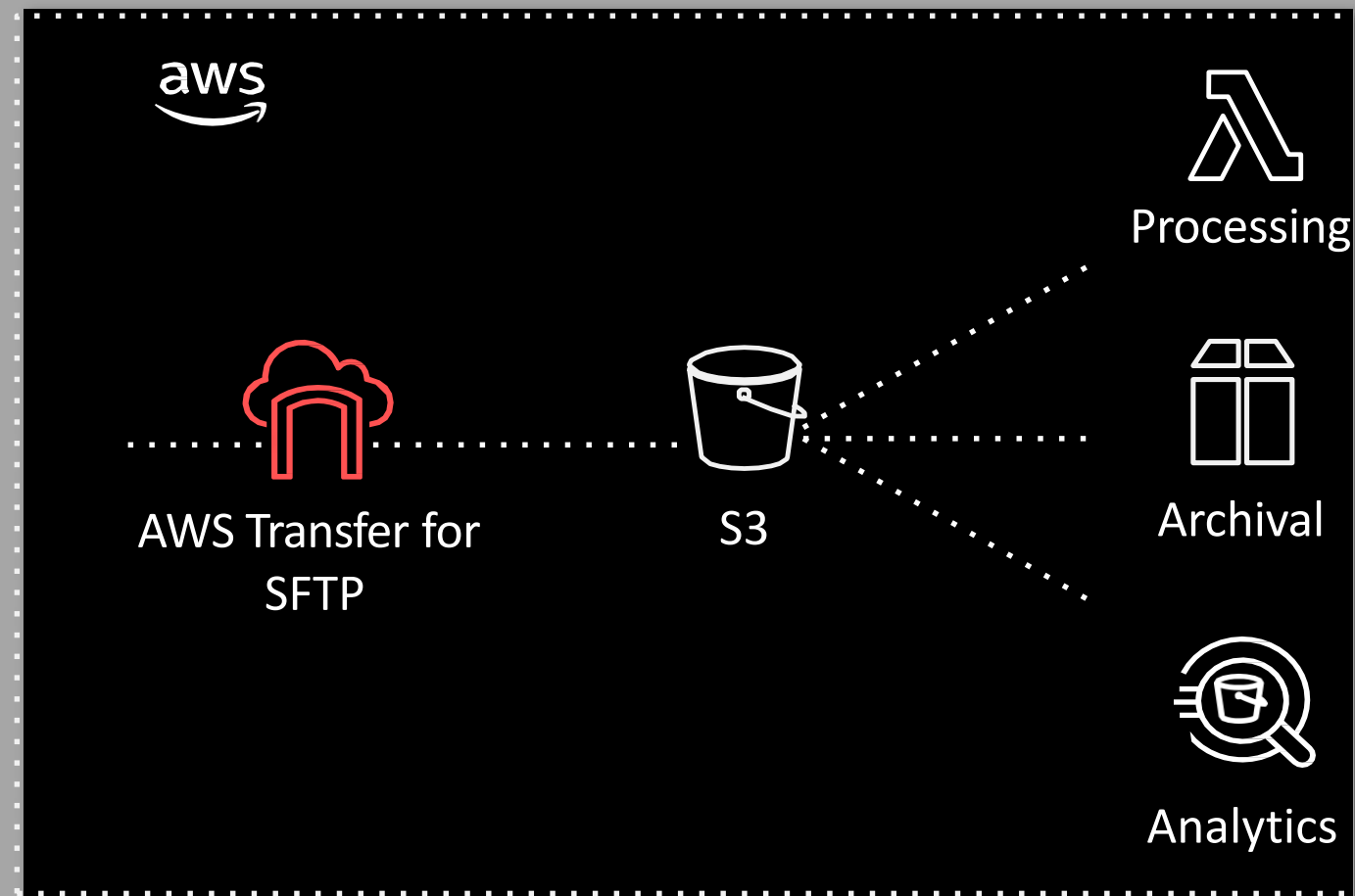
AWS Transfer for SFTP

Fully managed SFTP service for Amazon S3



Your SFTP
end users

FTP over SSH



Integrates with existing
Active Directory or
LDAP



Highly available, and
elastically scalable



Data available immediately for
archiving and processing in S3

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 – storage-optimized

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



AWS Snowball Edge – compute-optimized

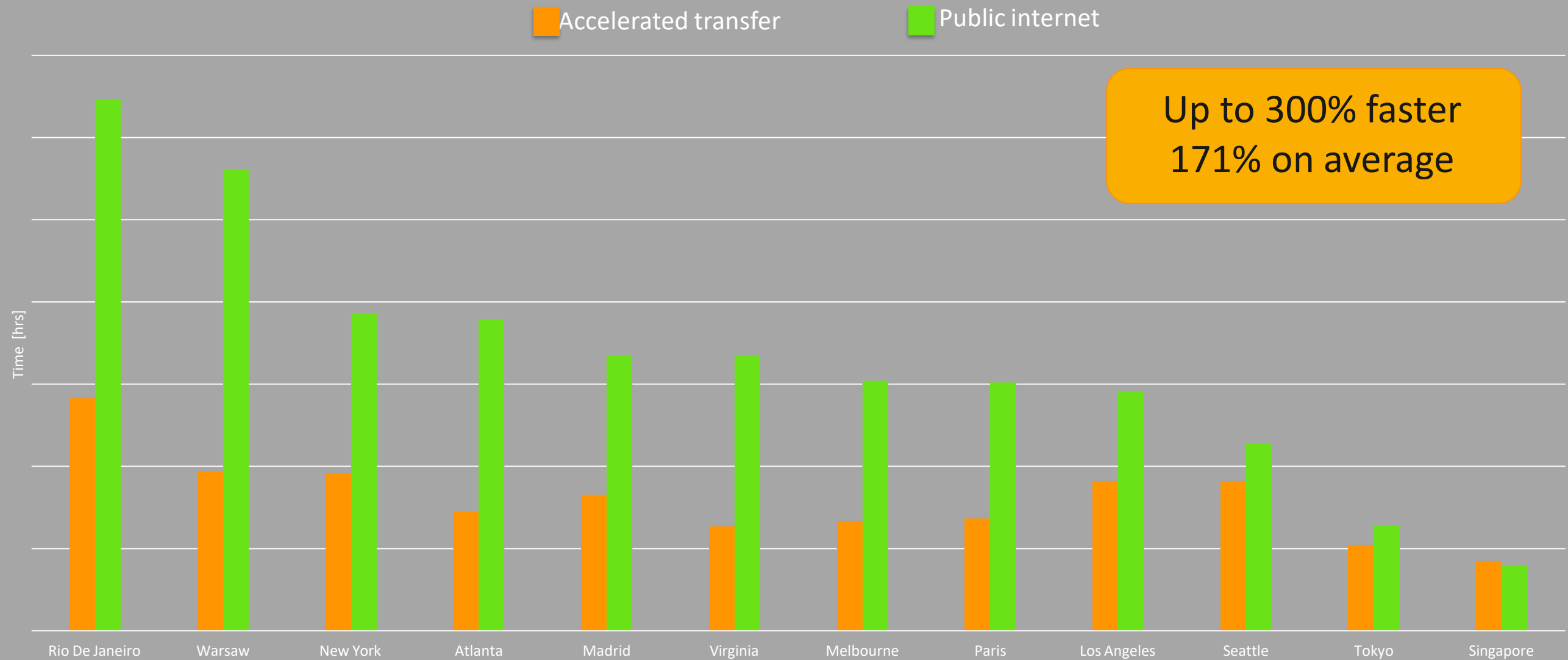
- 52 vCPUs or NVIDIA G100 GPU
- 42 TB capacity/100 Gb/s networking
- Data encryption end-to-end
- Rugged 8.5 G impact case
- Rain and dust-resistant
- Compute and storage for hybrid/edge workloads
- Rack-mountable, clusterable



AWS Snowmobile

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

Amazon S3 Transfer Acceleration



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

Key takeaways

- AWS has storage solutions to fit any use case
- AWS storage solutions provide an unmatched feature set to help you tackle complex problems
- Data security capabilities are stronger in the cloud than they are on premises
- AWS provides the most data transfer options to make cloud migration simple

Thank You!