

AWS
re:Invent

STG 201-L

Storage Leadership Session: Infrastructure, architecture, and business transformation

Kevin Miller

Head of Engineering, Amazon S3
Amazon Web Services

Thank you



Your transformation is a journey



Infrastructure

Improve fundamentals:
security, availability,
performance, and cost



Architecture

Increase agility and
ability to innovate



Business

Maximize your
business results

Your transformation is a journey



Infrastructure

Security

Performance

Availability

Cost optimization

Improve fundamentals:
security, availability, performance, and cost

"IT infrastructure teams will be on average 62% more efficient and application developers will be 25% more productive with AWS"

Source: IDC

Your transformation is a journey



Architecture

Modernization

Data lake

Data services

Edge

Increase agility and ability to innovate

Next-generation data lakes at petabyte-to-exabyte scale

Your transformation is a journey



Business

Innovation culture

AI/ML

Real-time decisions

Industry solutions

Maximizing your business results

*Establishing and nurturing change in
the organization*

Your transformation is a journey

AWS Storage meets you where you are today,
and tomorrow



Infrastructure

Improve fundamentals:
security, availability,
performance, and cost

| | |
|-------------|-------------------|
| Security | Availability |
| Performance | Cost optimization |



Architecture

Increase agility and
ability to innovate

| | |
|---------------|-----------|
| Modernization | Data lake |
| Data services | Edge |



Business

Maximize your
business results

| | |
|--------------------|---------------------|
| Innovation culture | Real-time decisions |
| AI/ML | Industry solutions |

Zillow

Craig Link

Chief Cloud Architect
Zillow Group

AWS
re:Invent

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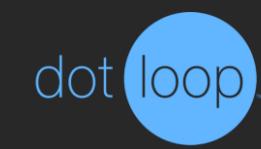
Leading real estate and rental marketplace dedicated to empowering consumers with data, inspiration, and knowledge around the place they call home.

Consumer brands

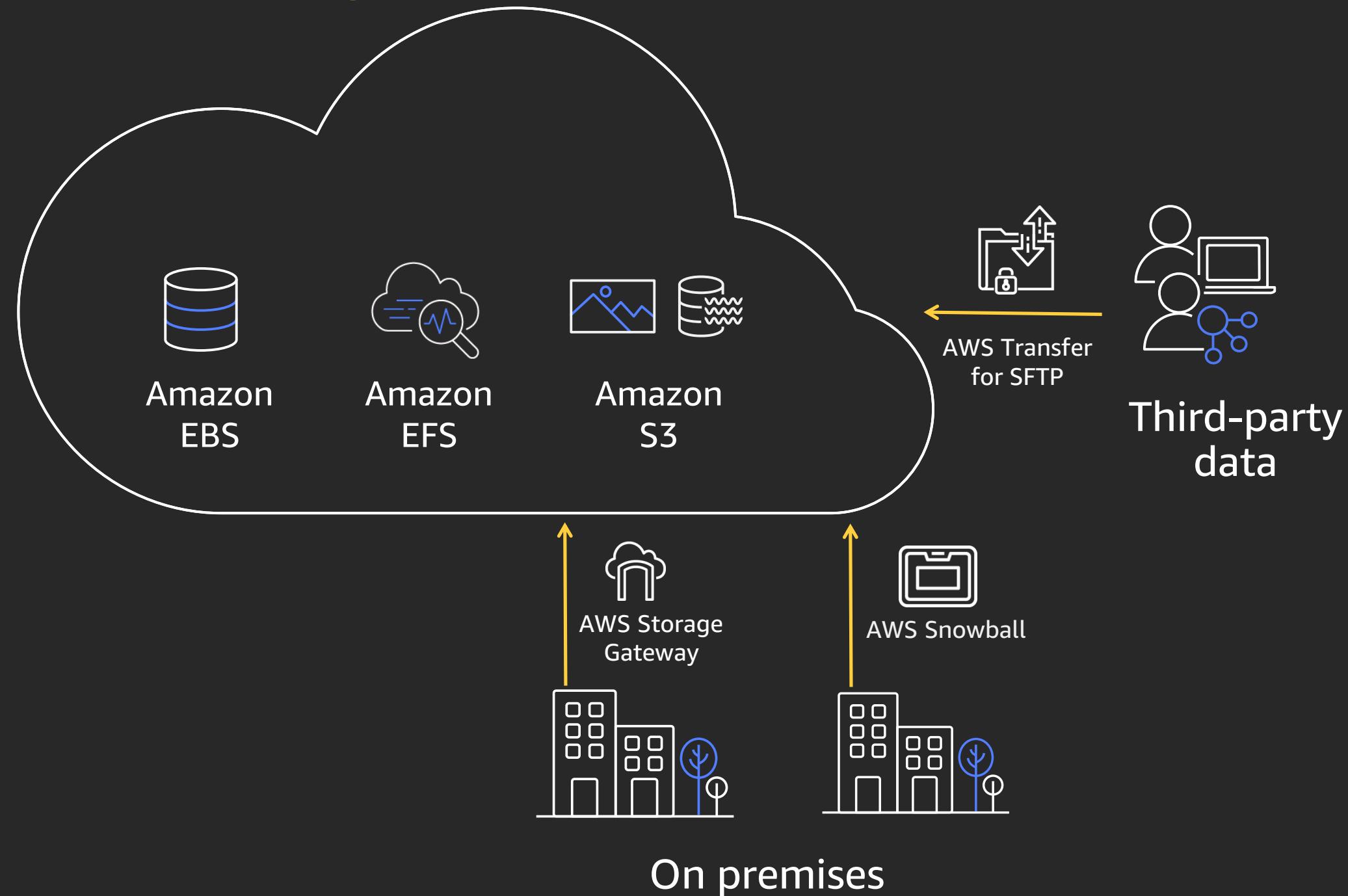


out east

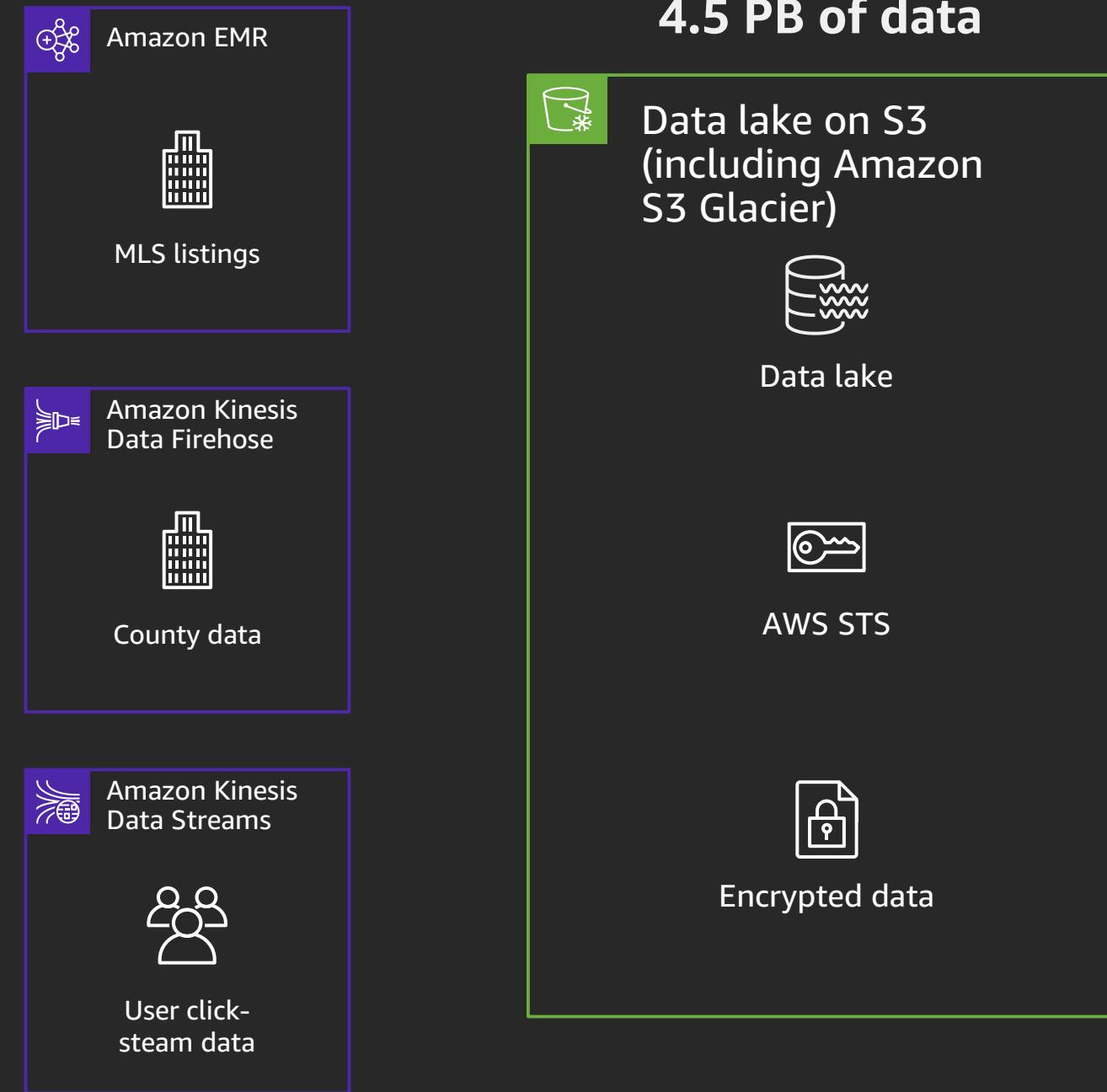
Business brands



All in with AWS Storage



Data lake on S3



Leverage S3 native features



Limit access
with IAM roles
and multiple KMS
encryption keys



Control costs
by leveraging
S3 storage classes
(including S3 Glacier)

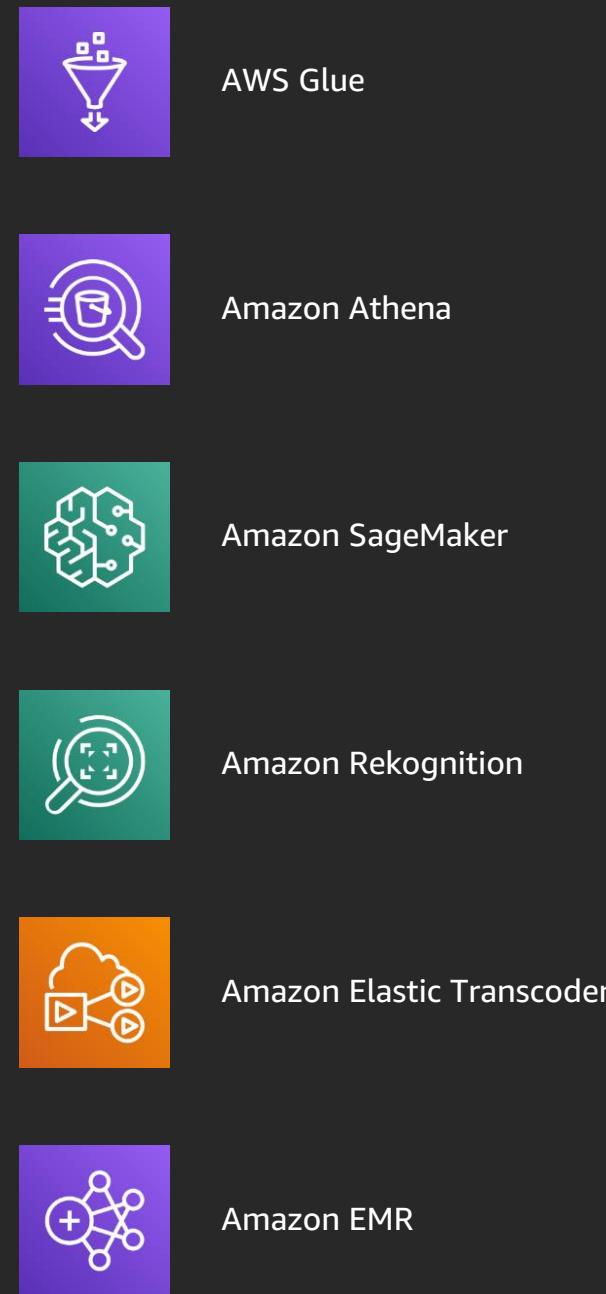
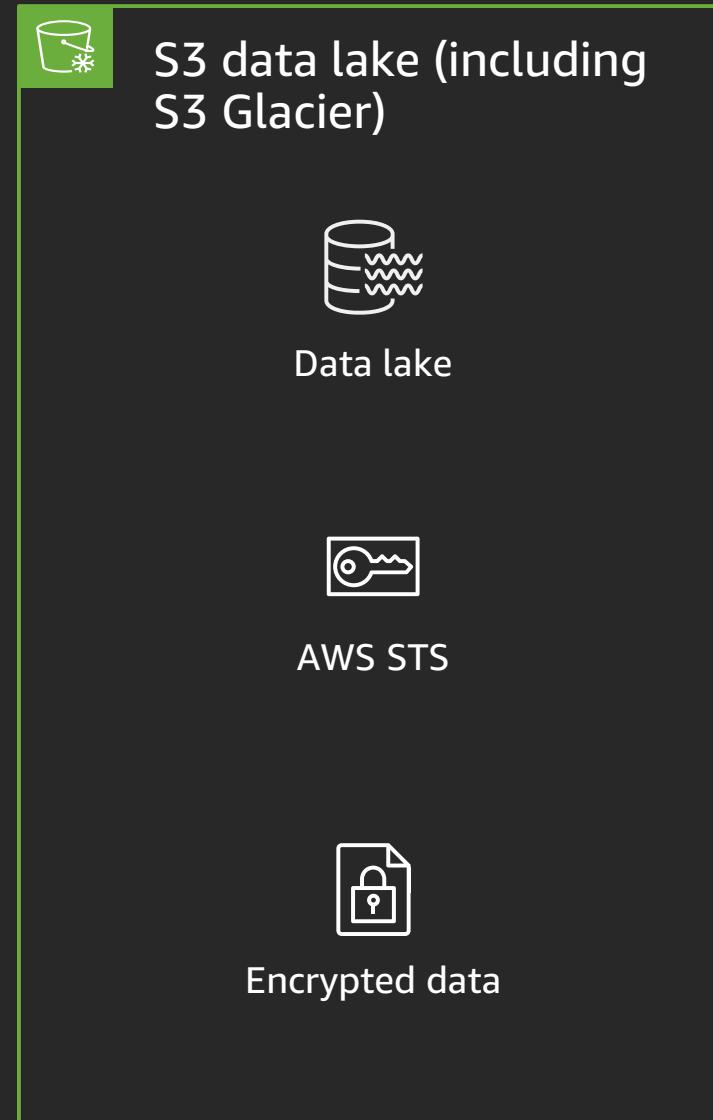


Protect
critical data
via versioning



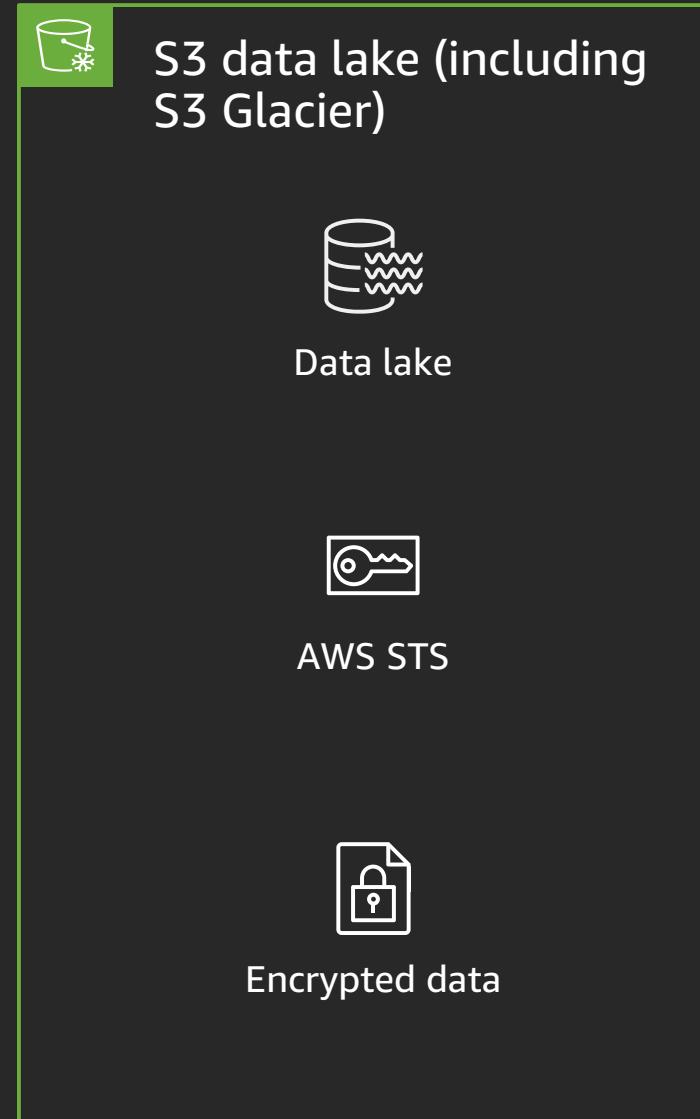
Comply
with legal
requirements via
lifecycle policies

Data enrichment



Powers Zillow's flagship products

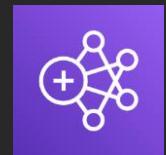
Zestimate within 2% of sale price across 97.5M homes



Amazon Kinesis Data Streams



AWS Lambda

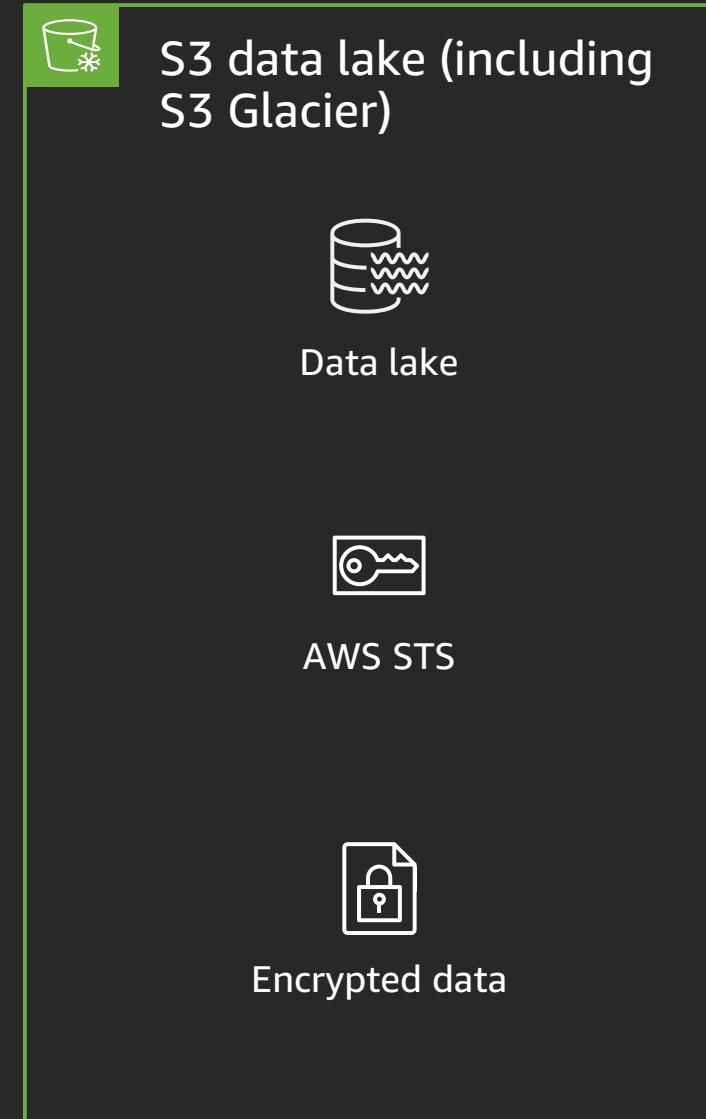


Amazon EMR

Powers Zillow's flagship products

Zestimate within 2% of sale price across 97.5M homes

Zillow offers real-time purchase offer to homeowners



Amazon Kinesis Data Streams



AWS Lambda



Amazon EMR



Amazon SageMaker



Amazon EKS



Transform your infrastructure



Security



Availability



Performance



Cost Optimization

You need the right storage for **any** data

#1

OBJECT



Amazon
S3

#1

BLOCK



Amazon
EBS

#1

FILE



Amazon
EFS



Amazon FSx for
Windows File Server



Amazon FSx
for Lustre

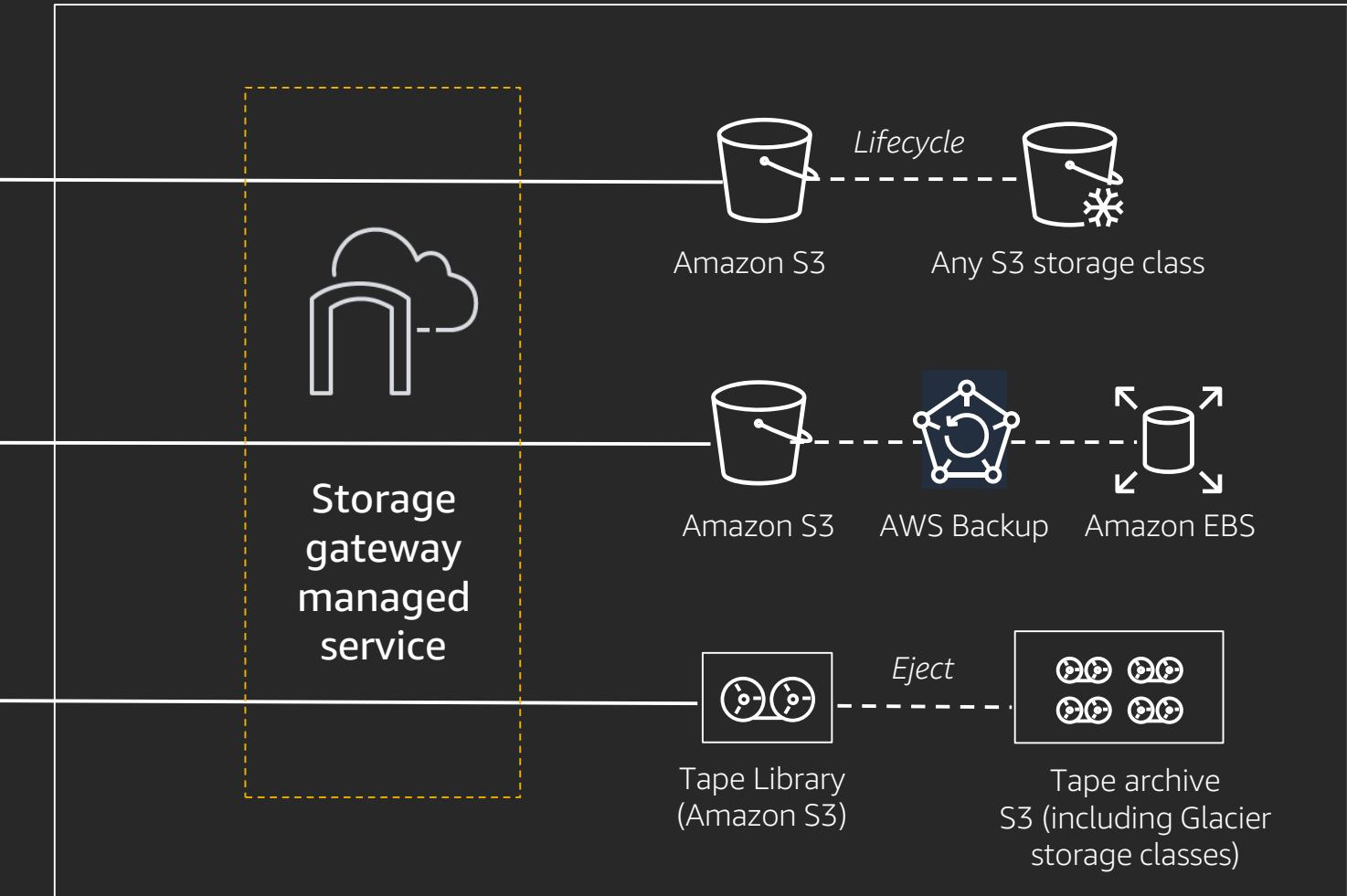
Most complete cloud storage portfolio

You need the right tool to **move data** so you can innovate **anywhere**

From on premises ...



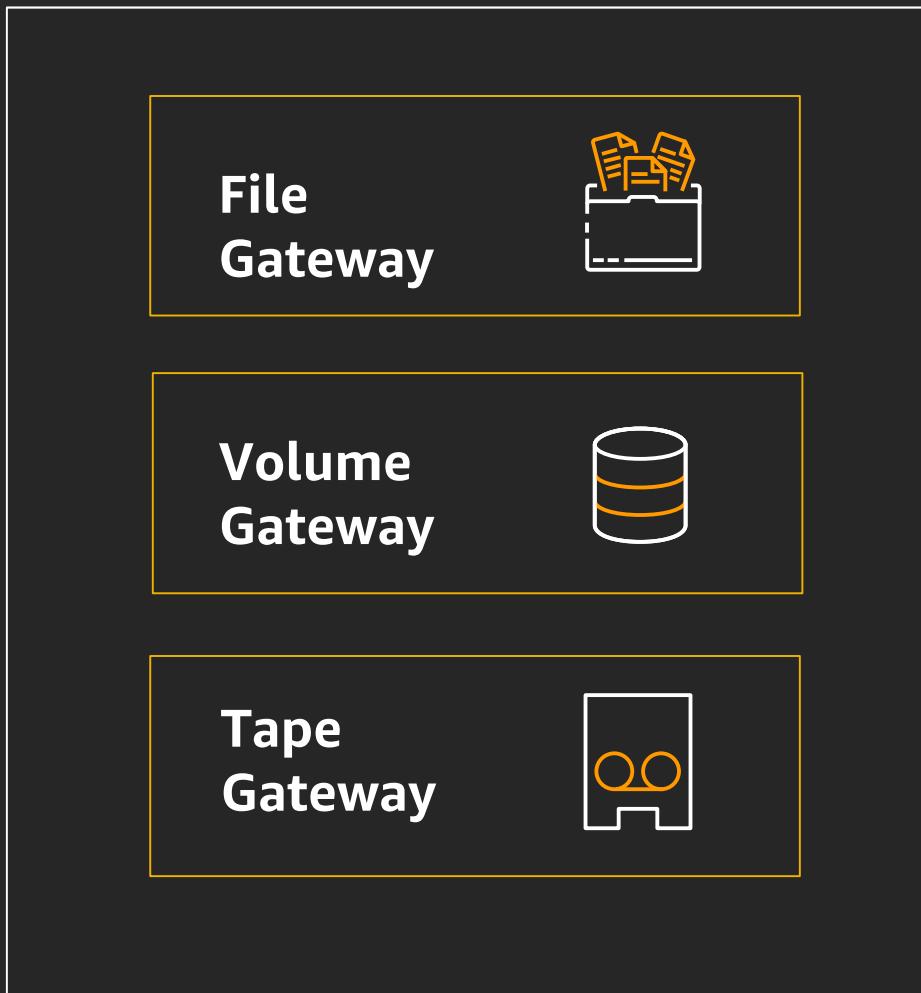
...to virtually unlimited cloud storage



You need the right tool to **move data** so you can innovate **anywhere**

From on premises ...

...to virtually unlimited cloud storage



New on Nov. 20!

- High availability for VMware
- 3X increase in read performance for Tape Gateway
- 4X increase in read performance for File Gateway

You need the right tool to **move data** so you can innovate **anywhere**

On premises

File, block, tape



AWS Storage
Gateway

Online file and object transfer

Rapid transfers



AWS
DataSync

File exchanges



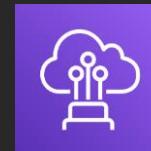
AWS Transfer
for SFTP

Long-distance
uploads and downloads



S3 Transfer
Acceleration

Dedicated network



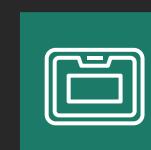
AWS
Direct Connect

Offline transfer

Bulk files, objects, HDFS, databases



AWS Snowball
Edge



AWS
Snowball



AWS
Snowmobile

You need the right tool to **move data** so you can innovate **anywhere**

On premises

File, block, tape



AWS Storage
Gateway

Dedicated network



AWS
Direct Connect

Online file and object transfer



New in 2019

DataSync: SMB support, Amazon VPC endpoints, task scheduling

Transfer for SFTP: Amazon VPC endpoints, logical directories for Amazon S3

Offline transfer



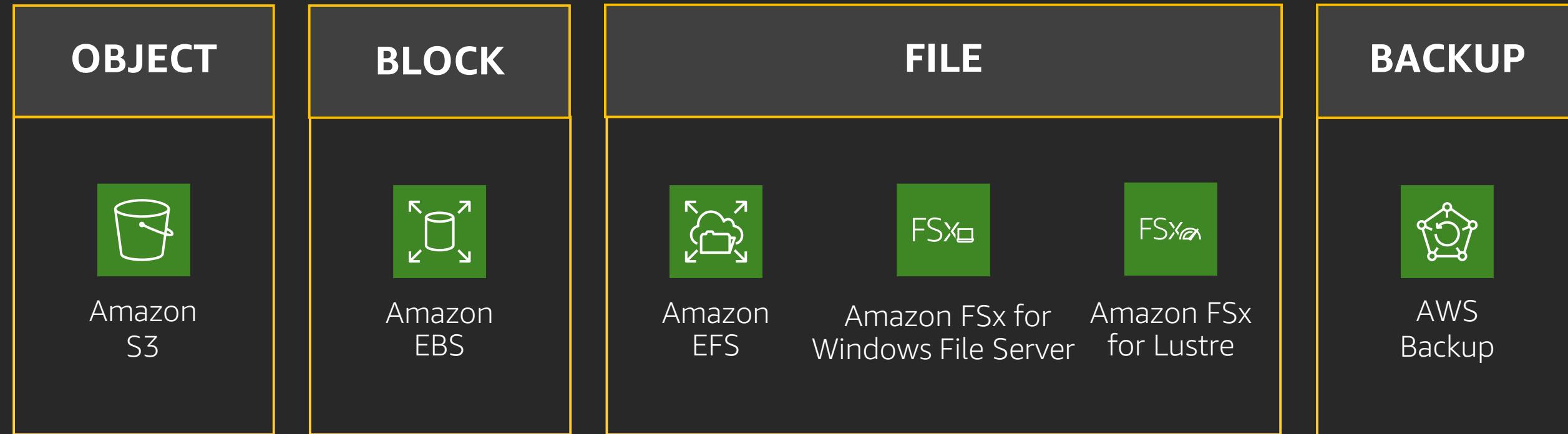
New in 2019

Block storage for edge computing workloads on **Snowball Edge**

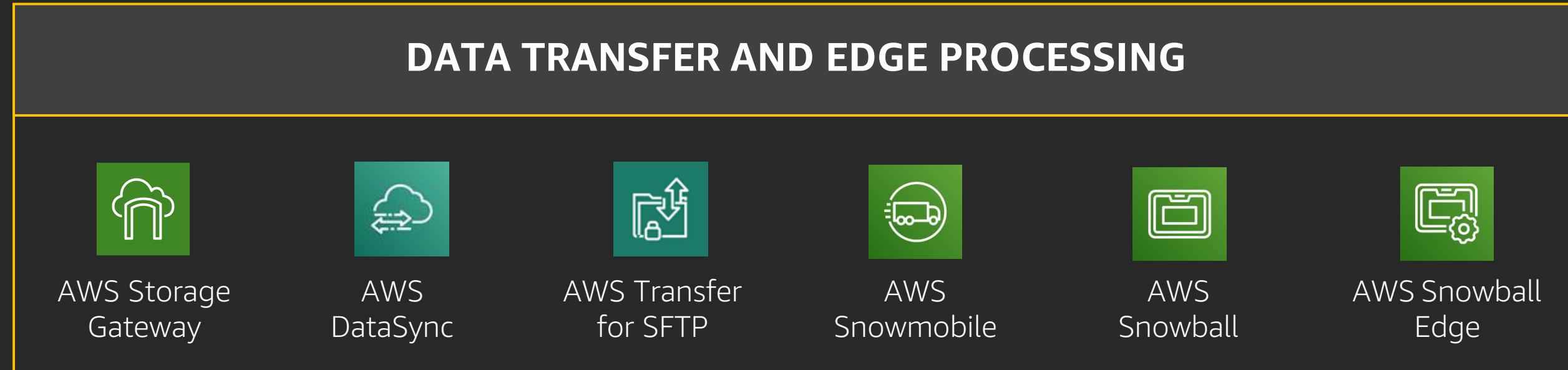
Increased volume size to 10 TB

Offline software updates for devices in air-gapped environments

AWS Storage portfolio



DATA TRANSFER AND EDGE PROCESSING



Our major launches in 2019

Object storage

S3 Glacier Deep Archive
S3 Batch Operations
S3 support for percentiles on Amazon CloudWatch metrics
S3 Same-Region Replication
S3 Inventory access tier reports for S3 Intelligent-Tiering
S3 Replication Time Control
Access Analyzer for S3
S3 Access Points

Block storage

Fast Snapshot Restore
Support for point-in-time, crash-consistent snapshot across multiple EBS volumes
Encryption by Default
Share snapshots encrypted with custom CMKs across accounts
Encrypted volumes from unencrypted snapshots/AMIs
Data Lifecycle Manager (DLM) support for shorter backup intervals

File storage

EFS Infrequent Access
EFS Lifecycle Management
FSx for Lustre minimum file size to 1.2TB
FSx for Windows File Server

- Integration with Active Directory
- Multi-AZ deployment option
- Data deduplication
- Support for Windows Shadow Copies
- Support for smaller file systems
- Support for HA SQL server

Edge/On premises/Data transfer

DataSync task scheduling
DataSync support for SMB file shares
AWS Transfer for SFTP support for logical directories for Amazon S3
AWS Transfer for SFTP support for VPC endpoints
Storage Gateway HA on VMware
Amazon VPC endpoints
Block storage for edge computing workloads
Snowball Edge increased volume size to 10 TB

AWS Backup

Automated backup schedules
Automated retention management
Centralized backup monitoring
KMS integrated backup encryption
Support for AWS CloudFormation templates
Copy tags from resource to backup
Enhanced SNS notifications
12 additional AWS Regions

Our major launches in 2019

Object storage

S3 Glacier Deep Archive

S3 Batch Operations

S3 support for percentiles on Amazon CloudWatch metrics

S3 Same-Region Replication

S3 Inventory access tier reports for S3 Intelligent-Tiering

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S3 Access Points

Block storage

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Support for point-in-time, crash-consistent snapshot across multiple EBS volumes

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Share snapshots encrypted with custom CMKs across accounts

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Storage Gateway HA on VMware

Amazon VPC endpoints

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AWS Backup

Automated backup schedules

Automated retention management

Centralized backup monitoring

KMS integrated backup encryption

Support for AWS CloudFormation templates

Copy tags from resource to backup

Enhanced SNS notifications

12 additional AWS Regions

Access control



- Object-level tags for access control **New!**
- Access Analyzer for S3
- S3 Block Public Access
- File access with POSIX permissions
- FSx integration with Active Directory

Data encryption



- Data encrypted at-rest
- Data encrypted in-transit
- EBS Encryption by Default
- S3 Default Bucket Encryption

Boundary enforcement



- Network traffic access control with VPC security groups
- Amazon S3 VPC endpoint policy

Audit & monitor



- Monitor and log API calls with AWS CloudTrail
- S3 CloudWatch Percentiles Metrics
- Object encryption status with Amazon S3 Inventory
- Storage Gateway performance monitoring with CloudWatch metrics



Access control



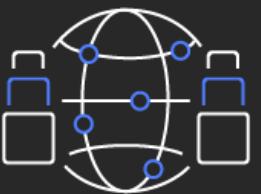
- Object-level tags for access control **New!**
- Access Analyzer for S3
- S3 Block Public Access
- File access with POSIX permissions
- FSx integration with Active Directory **Coming soon!**
- EFS: IAM Authorization for NFS Clients

Data encryption



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Security

Access Analyzer for S3

A single dashboard view for your access policies



New at re:Invent

Access analyzer for S3

Asia Pacific (Singapore) (ap-southeast-1) ▾

The buckets listed below are configured to allow access by anyone using the internet or authenticated AWS users, including AWS users outside of your organization. AWS recommends that you restrict access immediately. Review each bucket to verify the access. View detailed findings on the [IAM console](#). When a bucket policy or ACL is added or modified, Access analyzer generates and updates findings based on the change within 30 minutes. Findings related to account-level Block public access settings may not be generated or updated for up to 6 hours after you change the settings. [Learn more](#)

⚠ 3 buckets are configured to allow access to anyone on the internet or any other AWS users. Review this risky configuration immediately

Explore other Regions to identify other buckets in your account that may also be at risk.

[Download report](#)

⚠ Buckets with public access (3)

These buckets can be accessed by anyone on the internet. Unless you require a public configuration for a specific and verified use case, AWS recommends that you block all public access to your buckets. [Learn more](#)

Status: All

| Bucket name | Discovered by Access Analyzer | Shared through | Status | Access level |
|---------------------|-------------------------------|------------------------------------|--------|-------------------|
| bdemobucket | a few seconds ago | Access control list | Active | List, Read |
| areinventdemobucket | a few seconds ago | Access control list | Active | Write |
| ademobucket | a few seconds ago | Access control list, Bucket policy | Active | Write, Read, List |

Buckets with access from other AWS accounts - including third party AWS accounts (1)

These buckets are conditionally shared with other AWS accounts. To ensure that you only grant access to the intended accounts, AWS recommends that you review access to these buckets.

Status: All

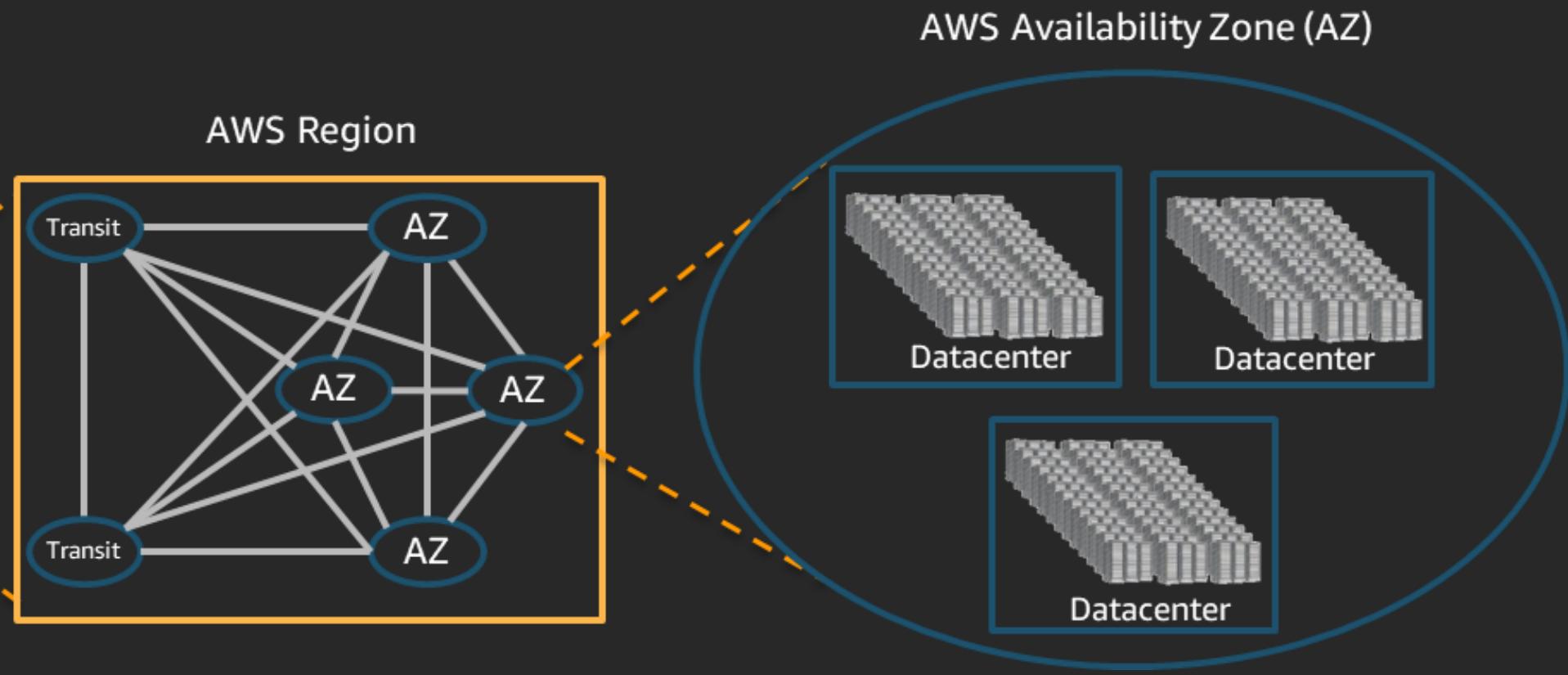
| Bucket name | Discovered by Access Analyzer | Shared through | Status | Access level |
|----------------|-------------------------------|---------------------|--------|-------------------|
| demobucket2019 | a few seconds ago | Access control list | Active | Write, List, Read |



Security

Automatically monitor and analyze access control policies to identify resources with public or cross-account access

Scale globally with resilience in every region



AZs separated by miles

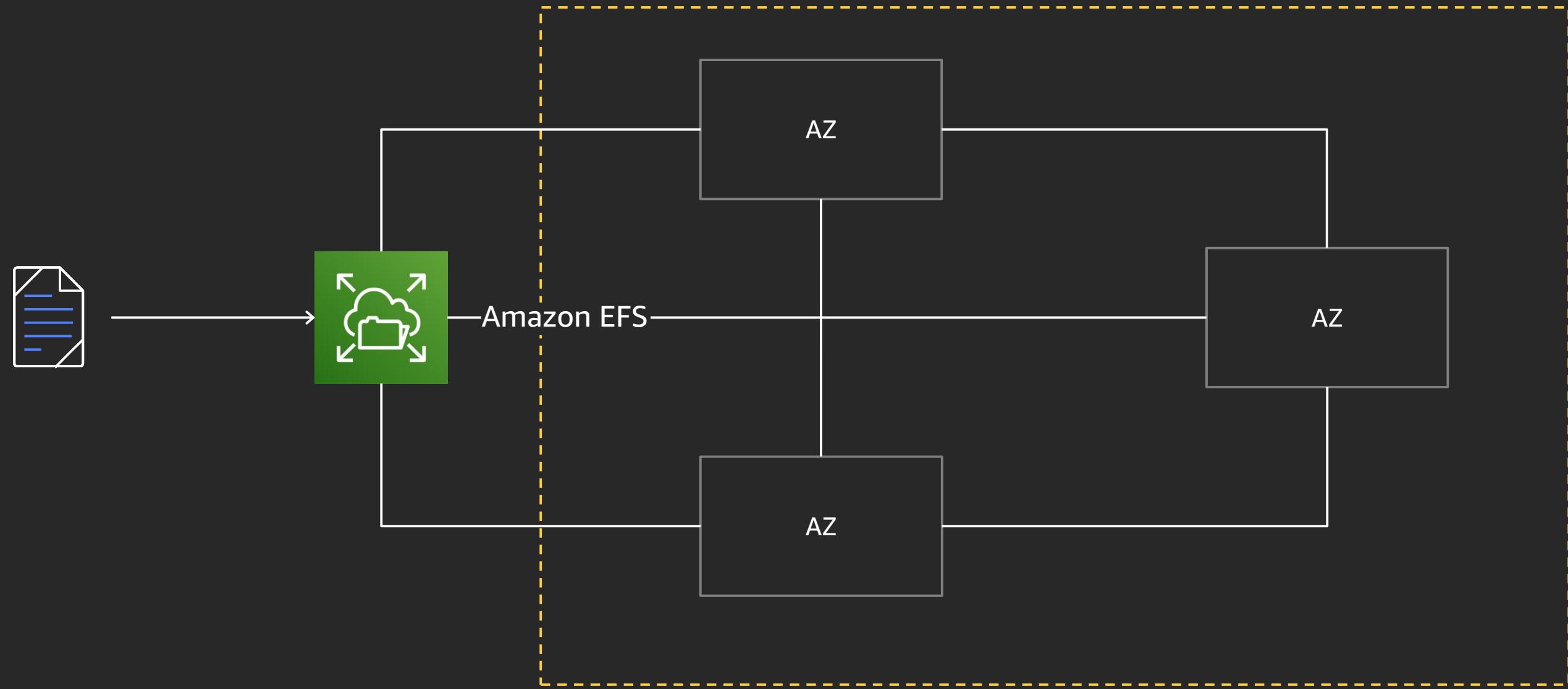
Redundant, dedicated
network interconnect

Each AZ has independent power
infrastructure



Availability

Benefits of 3 independent AZs in each AWS Region



Availability



99.9% Availability SLA



Designed for
99.99999999% durability

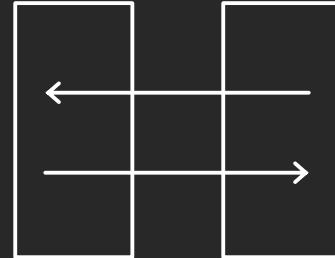
Amazon FSx multi-AZ file systems



Enterprise-ready, native Windows multi-AZ availability and durability



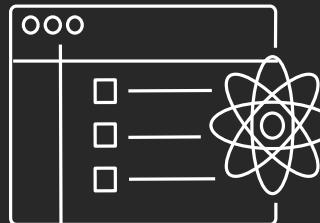
Continually monitors and fails over across AZs



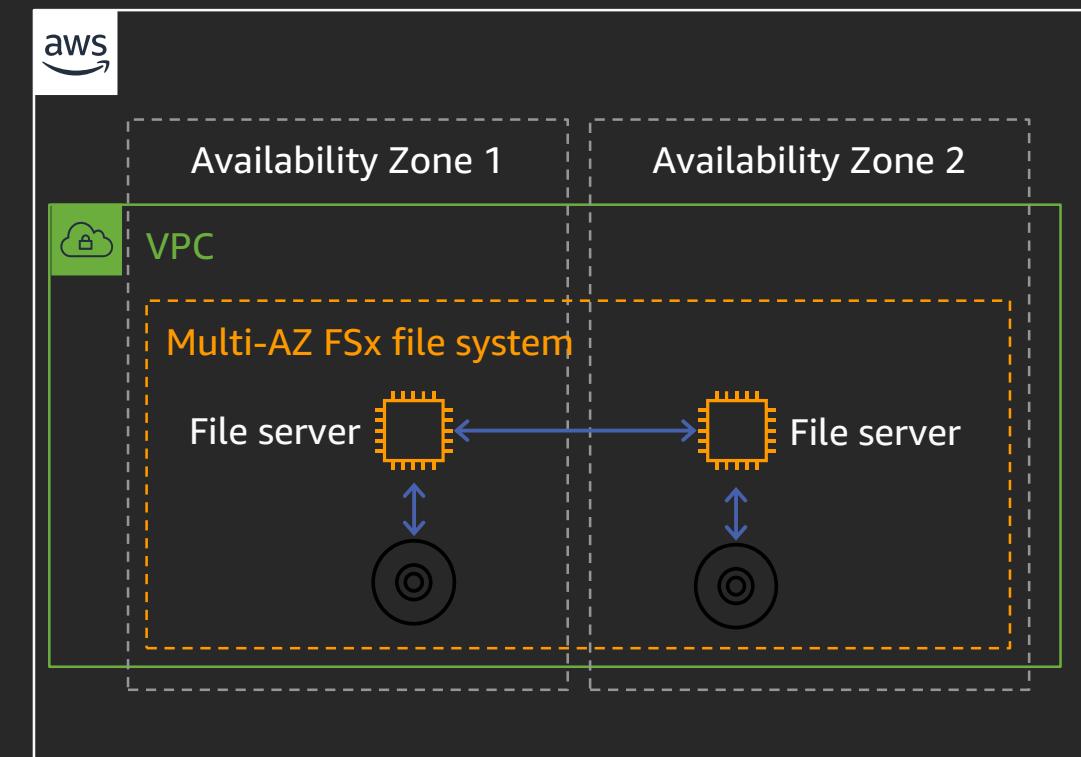
Replicates data across AZs



Support for SMB transparent failover



Native Windows compatibility



Availability

Amazon EFS: Infrequent Access

85% lower price than EFS Standard at launch

Once enabled, automatically tiers

Feb.
2019

EFS Infrequent Access

- \$0.045 per GB-month for EFS IA



Cost Optimization

Amazon S3 Glacier Deep Archive

Lowest cost object storage with 3 data center durability - \$1 per TB-month

Feb.
2019

EFS Infrequent Access

- \$0.045 per GB-month for EFS IA



Cost Optimization

Mar.
2019

S3 Glacier Deep Archive

- ~\$1 per TB-month

Amazon EFS: New lower price

Lowest cost NFS file storage in the cloud

Feb.
2019

EFS Infrequent Access

- \$0.045 per GB-month for EFS IA

Mar.
2019

S3 Glacier Deep Archive

- ~\$1 per TB-month

Sept.
2019

EFS price cut

- \$0.025 per GB-month for EFS IA
- \$0.08 per GB-month for EFS blended



Cost Optimization

AWS DataSync: New lower price

Reduced prices by 68%

Feb.
2019

EFS Infrequent Access

- \$0.045 per GB-month for EFS IA

Mar.
2019

S3 Glacier Deep Archive

- ~\$1 per TB-month

Sept.
2019

EFS price cut

- \$0.025 per GB-month for EFS IA
- \$0.08 per GB-month for EFS blended

Nov.
2019

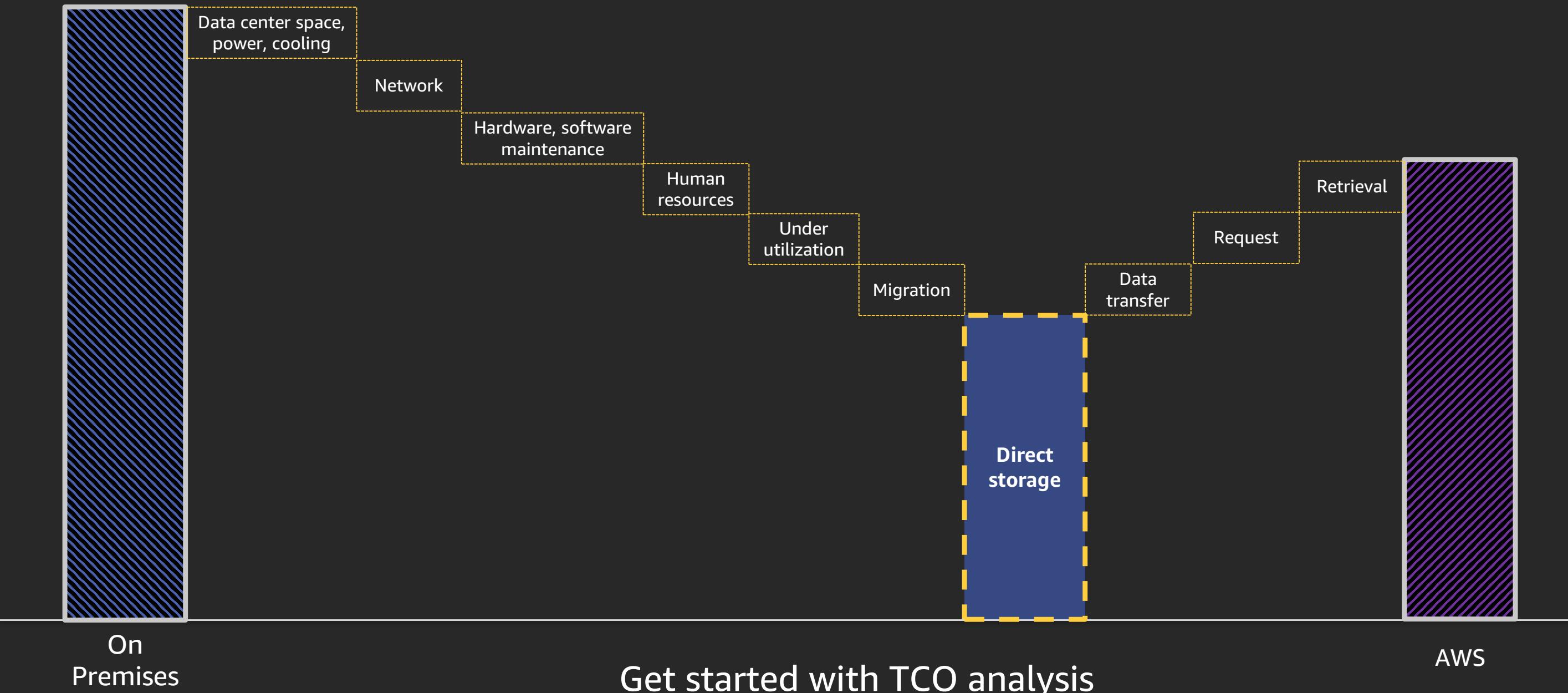
DataSync

- Flat \$0.0125 per GB fee
- No upfront costs
- No minimum fee



Cost Optimization

Understand your true TCO



On
Premises

AWS



Cost Optimization

Get started with TCO analysis
<https://aws.amazon.com/tco-calculator/>

More ways to optimize costs

Storage classes



- S3: Six storage classes
- EFS: Standard and IA
- EBS: Four volume types
- Amazon FSx for Windows File Server: HDD tier

Coming soon!



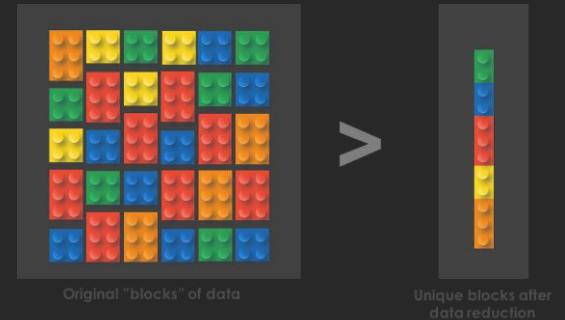
Cost Optimization

Lifecycle management



- S3 Intelligent-Tiering
- Enhanced EFS Lifecycle Management
- EBS Elastic Volumes

Data reduction



- Amazon FSx for Windows File Server support for
 - Data deduplication (~50% cost savings)
 - Smaller file systems
- EBS incremental snapshot

New on
Nov. 20!

New on
Nov. 20!



“AWS storage is **fully redundant, multi-region, more secure**, and at less than half the **cost**.”

—Paul Fisher, Technical Fellow



Achieved **66% higher performance and latency improvements** with Amazon EBS-based cloud infrastructure



Cut backup **cost** by **90%** with File Gateway, Amazon S3, and EBS Snapshots



Security



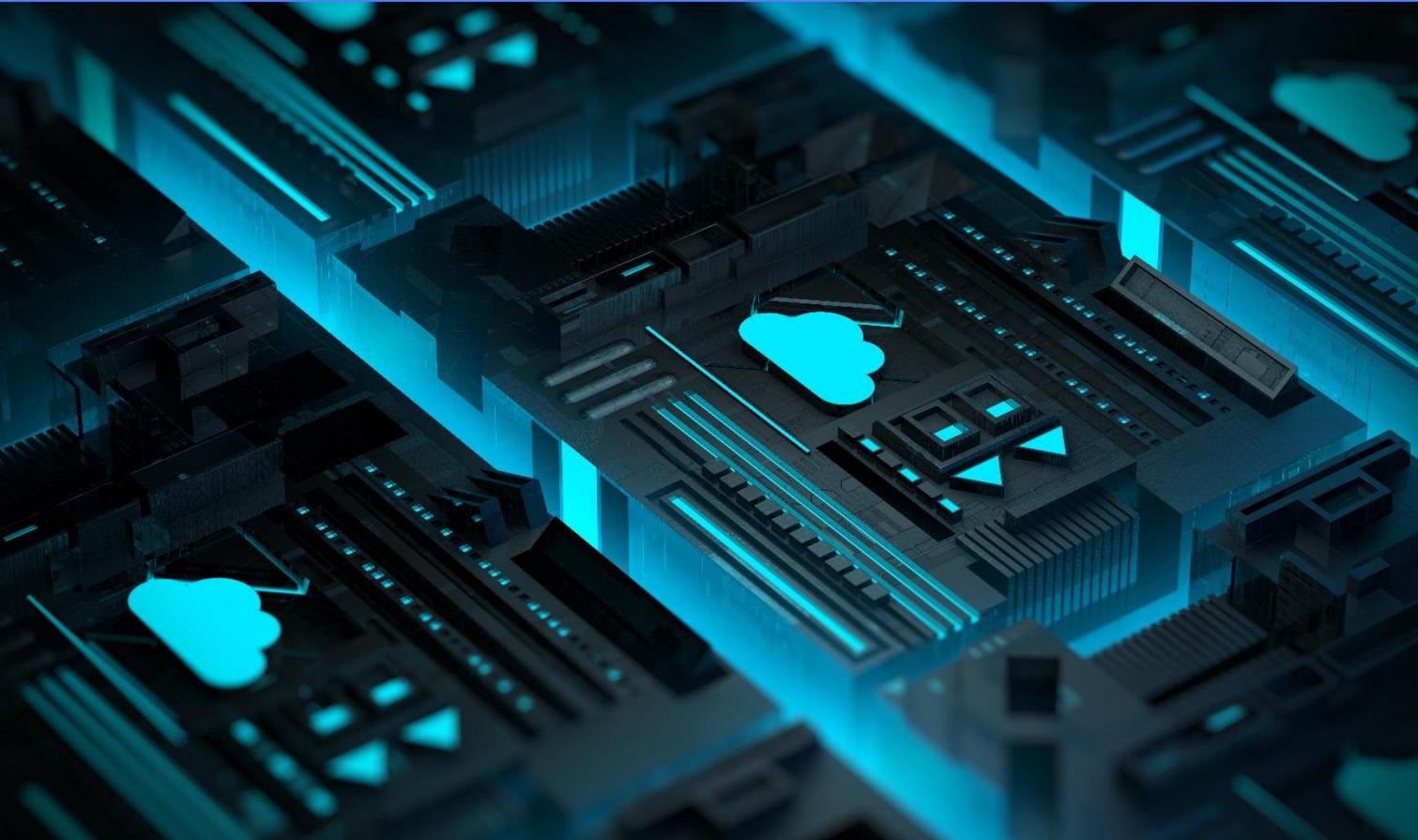
Availability



Performance



Cost Optimization



Transform your architecture



Modernization



Data Lake

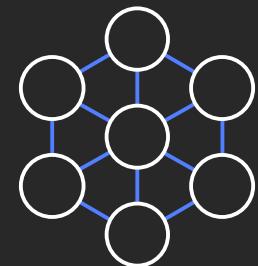


Data Services

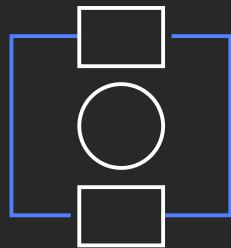


Edge

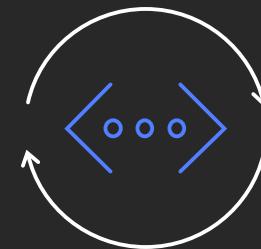
Microservices



Event-driven



Serverless



- EFS support for ECS and Fargate **Coming Soon!**
- EFS support for EKS CSI Driver **Coming Soon!**

- S3 Event Notifications
- S3 Batch Operations
- Amazon CloudWatch Events

- No storage to provision, operate, and patch
- Scales by consumption, not by storage unit



Modernization

Every day is a **peak day** for some of our
customers...

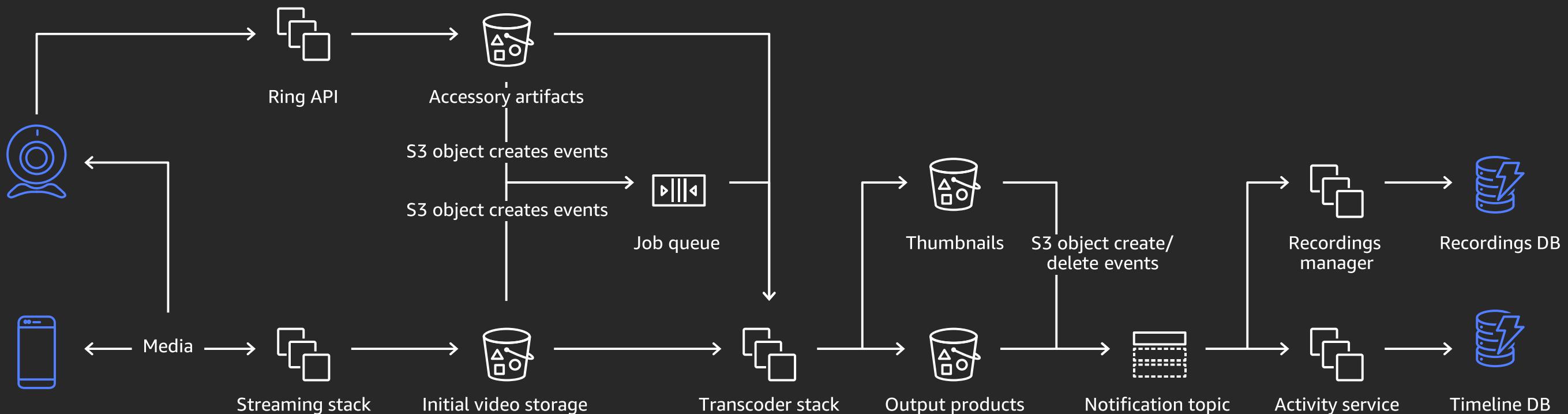
...guess which customer peaks on
Halloween?

ring

Smart doorbells with cameras

- Virtually unlimited scale to meet demand for large-scale event
- Pay for compute power only as needed
- Only take action when it's real

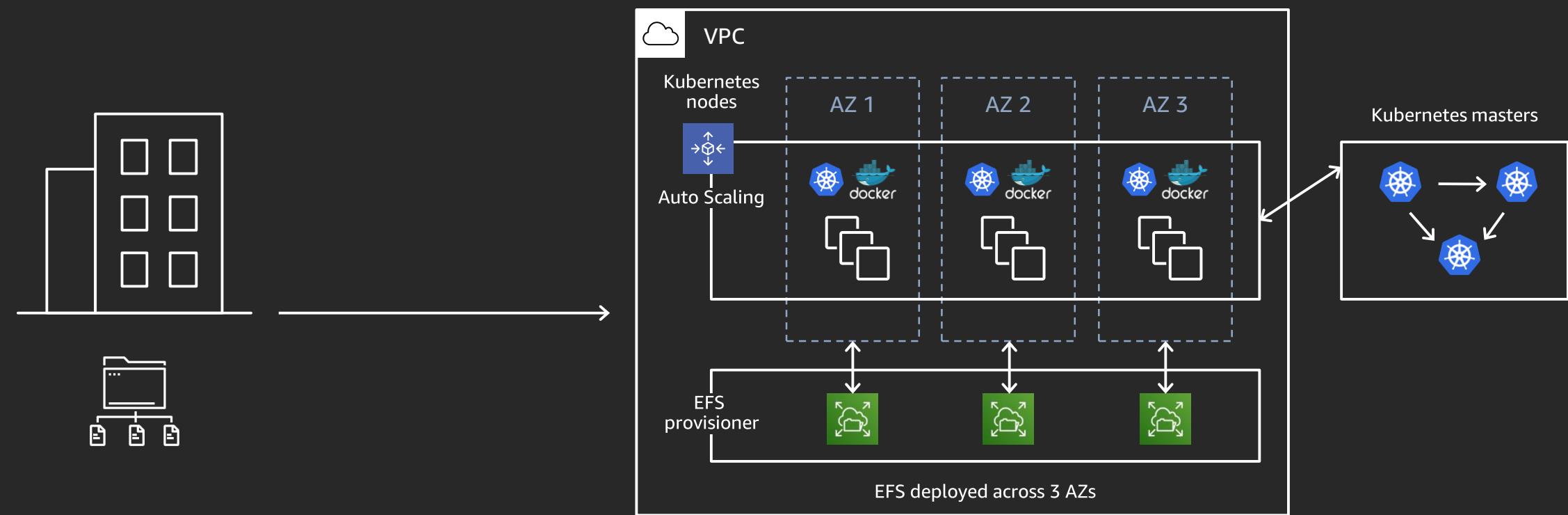
Event-driven architecture with AWS Serverless and Amazon S3 Event Notifications



Modernization

T-Mobile

- Accelerated go-to-market customer experience initiative by up to 15% with **Amazon EFS**
- Increased flexibility in developing applications with on-demand storage needs, reduced complexities of managing file servers
- Saved between 40–70% on storage costs



Modernization

S3 is the best place for data lakes



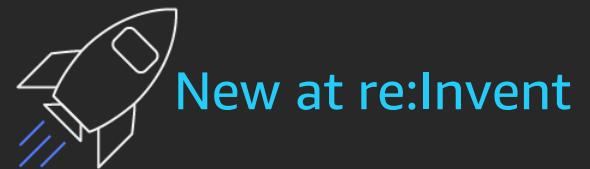
Most secure, durable, and available

Proven at scale

Most cost-effective

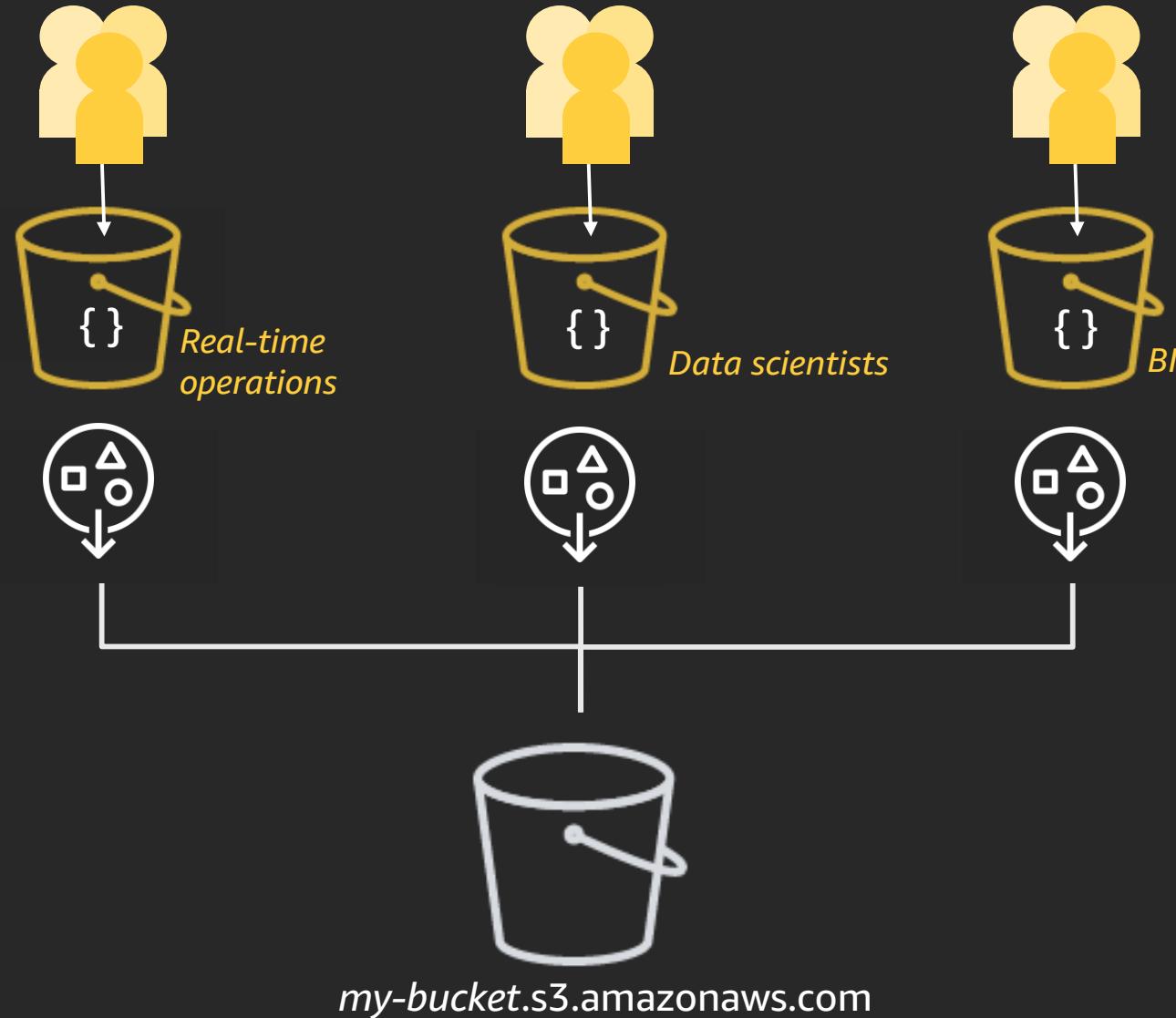
Most options for data transfer

Broadest ecosystem



New S3 Access Points

Simplified control for shared datasets on single bucket



Simple to create custom access to shared datasets on same bucket
Optimized for data lakes with multiple applications

Easy to add access points as your application set grows
Each application or group can get their own access point

Use access points to easily restrict access to VPC
AWS Service Control Policies can be used to ensure all access points are VPC restricted



Data Lake

AWS data services overview



Manage

S3 Lifecycle

S3 Batch Operations

S3 Storage Class Analysis

S3 Inventory

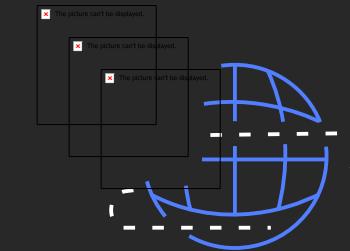
S3 Object Tagging

S3 Versioning

EFS Lifecycle Management

EBS Data Lifecycle Manager

EBS Elastic Volumes



Protect

AWS Backup

EBS Snapshots

EBS Fast Snapshot Restore

EBS support for Volume Shadow Copy

S3 Object Lock

S3 Replication

FSx support for Windows Shadow Copy



Data Services

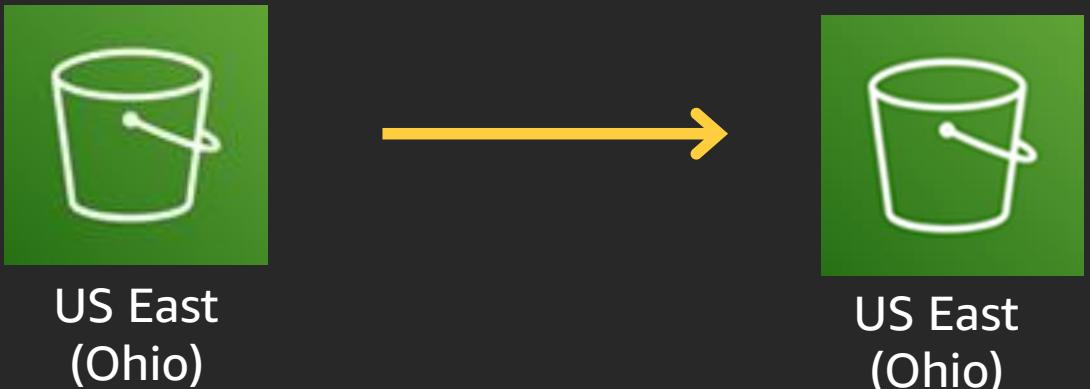
S3 Same-Region Replication



New in 2019

Automatic, asynchronous replication within same region

- Deliver the same capabilities as CRR
- Filter by bucket, prefix, or object tag
- Replicate to any S3 storage class, including S3 Glacier
- Change ownership of replica objects



Use cases:

- Compliance requirements for customers operating in a single region
- Log file and other data aggregation
- Maintain object copies under different ownership



Data Services

Amazon S3 Replication Time Control



New on
Nov 20!

Designed to replicate 99.99% of data in <15 minutes

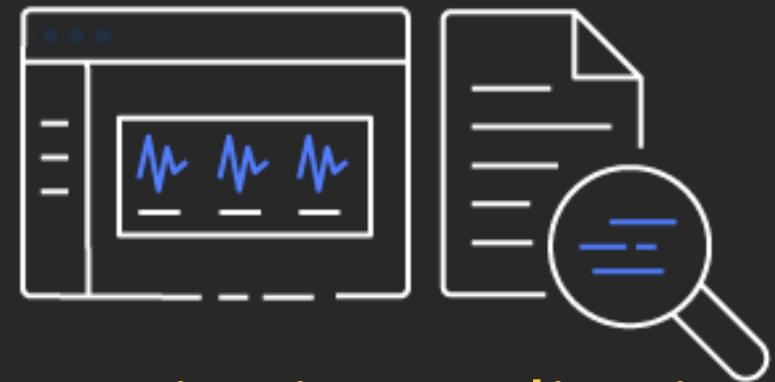
Amazon S3 Replication provides...



Predictable
replication
time



A Service Level
Agreement (SLA)



Monitoring replication
using Amazon
CloudWatch metrics and
S3 Event Notifications



Data Services

EBS Fast Snapshot Restore

6x lower Recovery Time Objective



New on
Nov. 20!

Predictability

Manage RTO based on size and credits

Speed

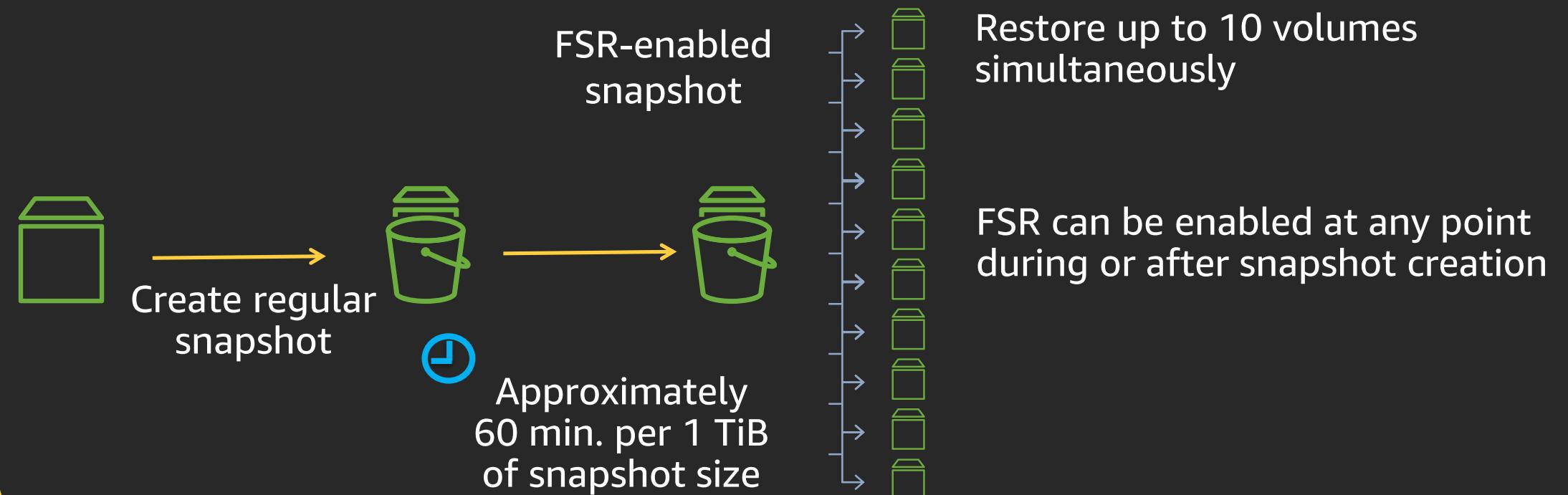
Instant access on volume from snapshots

Scale

Up to 10 volume restores instantly

Cost

No need for additional EC2 instances



Data Services

EBS Direct APIs

Up to 70% faster backups of EBS volumes at lower costs



New at
re:Invent

Speed

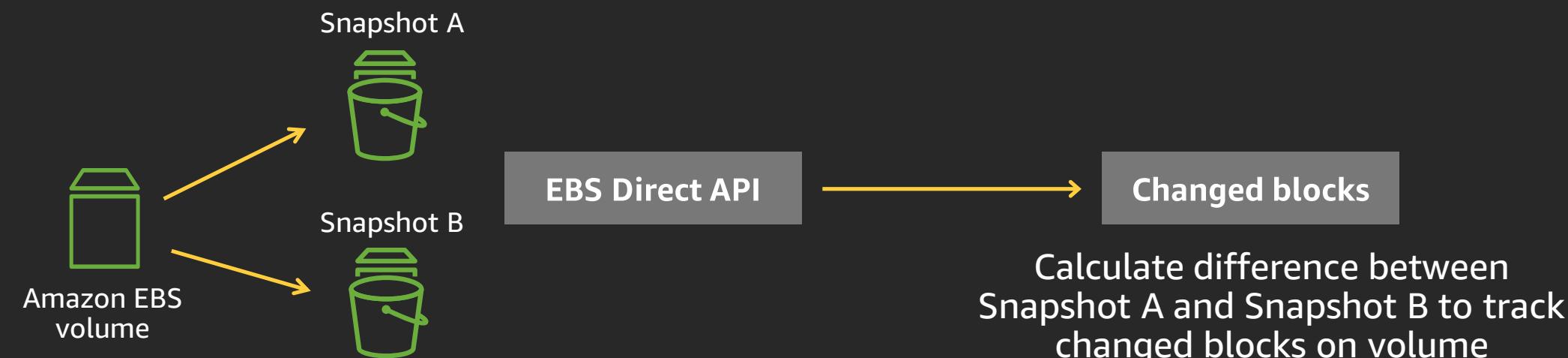
Up to 70% faster backups

Management

More granular recovery point objectives (RPOs)

Cost

Lower cost through reduced usage of AWS resources



Data Services

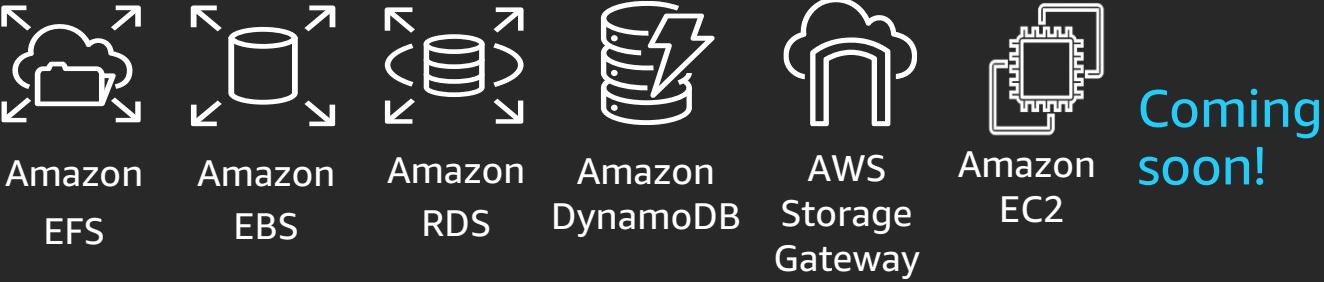


AWS Backup

Centrally manage and automate backups across AWS services



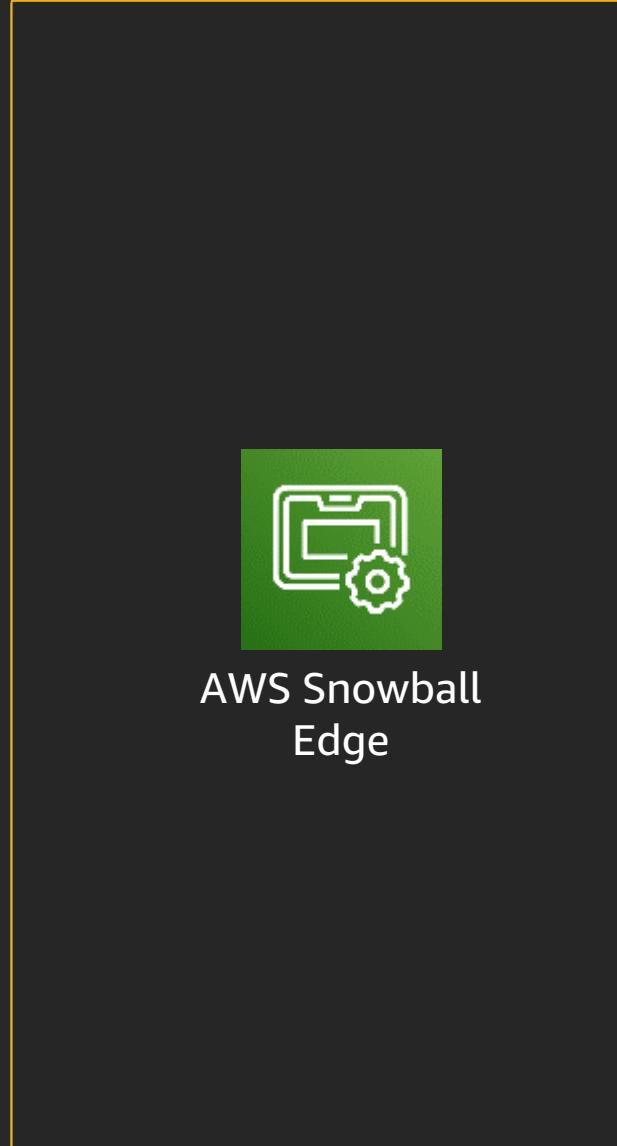
Data Services



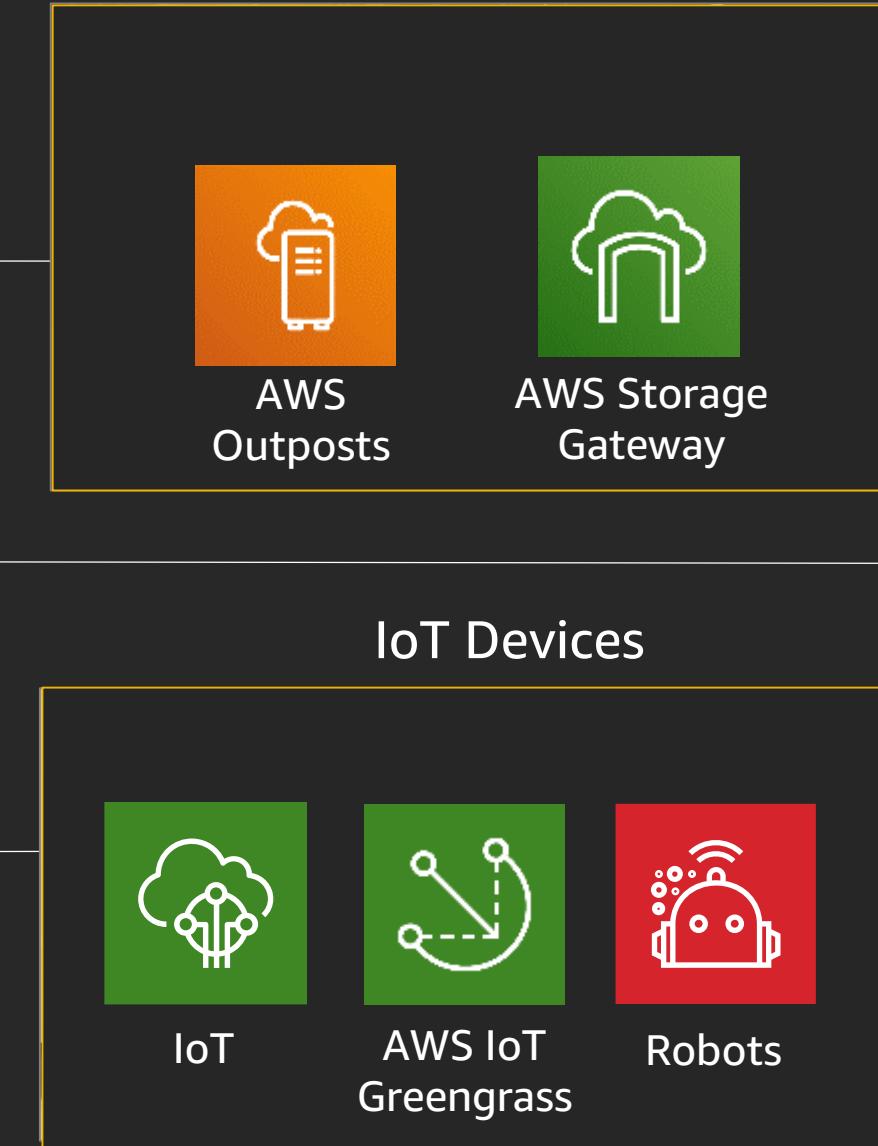
| | Amazon EFS | Amazon EBS | Amazon RDS | Amazon DynamoDB | AWS Storage Gateway | Amazon EC2 |
|---------------------------------------|--------------|------------|------------|-----------------|---------------------|------------|
| Automated backup schedules | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Automated retention management | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Centralized backup monitoring/logging | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| KMS integrated backup encryption | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Lifecycle to cold storage | ✓ | | | | | |
| Item-level restore | Coming soon! | ✓ | | | | |
| Cross-region backup | Coming soon! | ✓ | ✓ | ✓ | ✓ | ✓ |

Edge to cloud

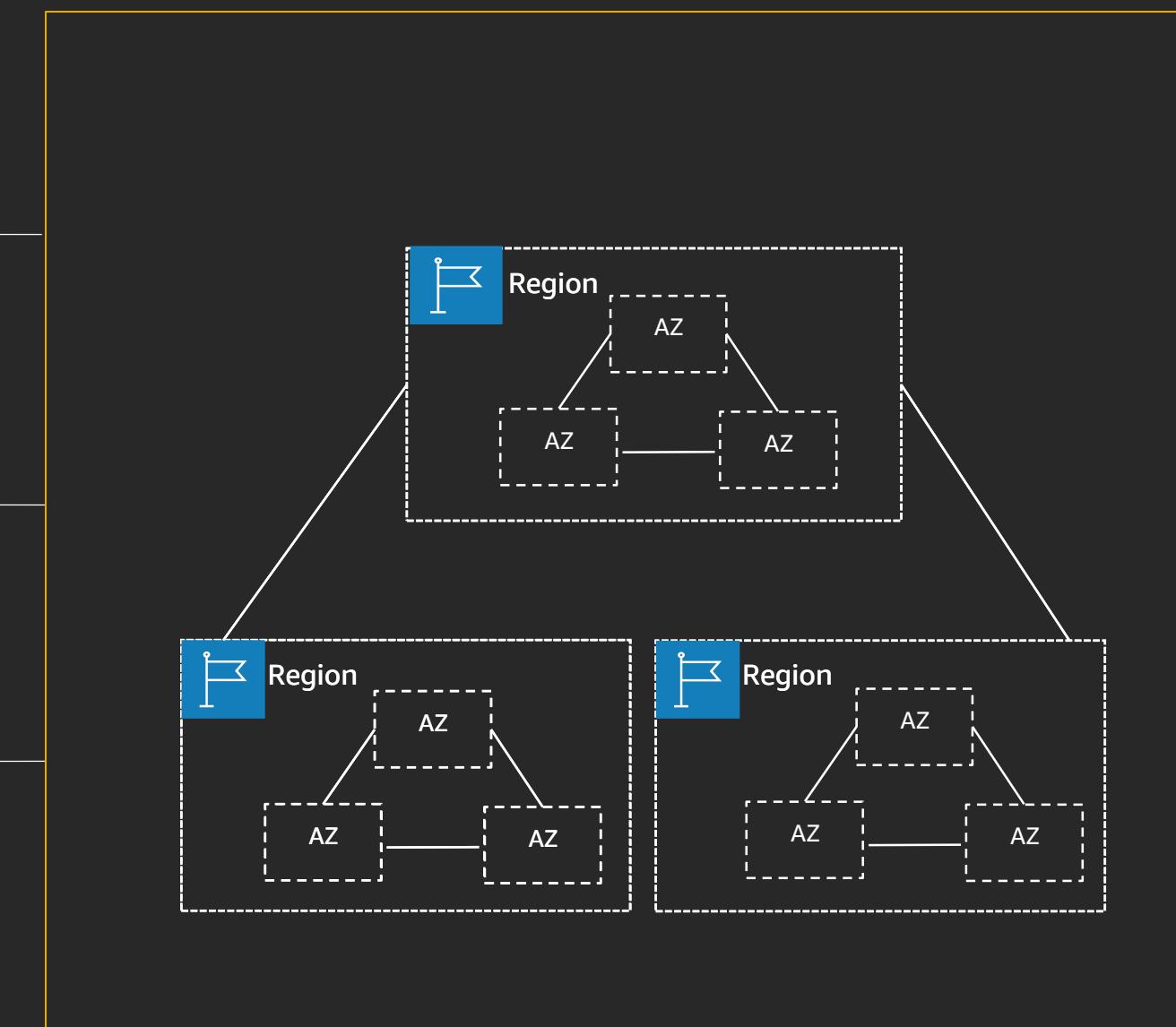
Rugged environments



On premises



AWS Cloud



Edge



Data collection and processing in rugged edge



Edge

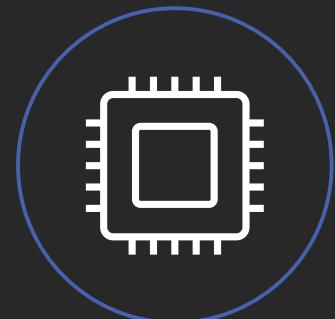
AWS Snowball Edge

Edge compute and data transfer



- Compute optimized and storage optimized
- Up to 52 vCPUs, optional GPU
- Up to 80 TB of HDD for S3-compatible object storage or block volumes

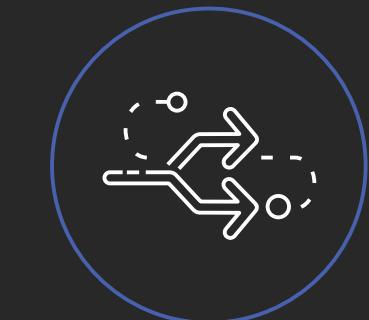
Amazon EC2
Compute



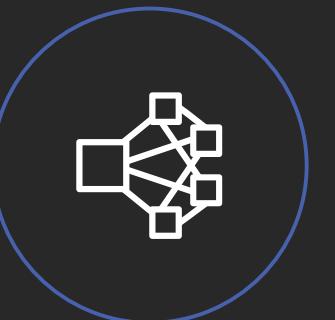
AWS IoT
Greengrass



Hardware-enabled
data encryption



Object, block &
NFS file storage
options



Storage
cluster



OTA software
updates



Edge



Transform your business



Innovation
Culture



Real-Time
Decisions



AI/ML



Industry Solutions

Data-driven insights transform every industry



Financial services

Fraud detection

Loan recommendation



Oil and gas

Predictive maintenance

Uncertainty simulation



Industrials

Smart factory

Proactive capacity planning



Healthcare

Real-time access to records

Medical outcome prediction



Life science

Digitized lab environment

ML optimized trial design



Telecom

Sentiment analysis

Customer churn prediction



Automotive

Connected vehicle services

Digital customer engagement



Utility

Smart home

Smart meter



Retail

Personalized recommendation

Dynamic pricing



Industry Solutions

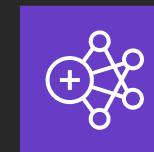
Expedia accelerated real-time lodging recommendations

“Before running analytics workloads on AWS, it took us three hours to analyze five days of performance metrics. Now we can analyze seven days of data in 30 seconds—that’s 360 times faster. With this kind of speed, we can quickly gain insights and drive the innovations that our customers expect as they interact with our brands around the world.”

Tony Donohoe, Chief Technology Officer at Brand Expedia Group



Amazon
S3



Amazon
EMR



Amazon
EC2

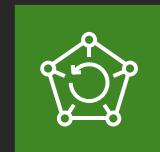
TransferWise scaled quickly to support 10X business growth

“With the reliability and high availability of the AWS Cloud, we have improved debit card application uptime in Europe and rolled the card out to North America, Australia, and New Zealand without requiring development of new data centers in those regions. We could not have done this without AWS.”

Thomas Hewer, Technology Lead at TransferWise



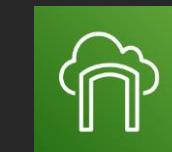
TransferWise



AWS
Backup



Amazon
EBS



AWS Storage
Gateway



Amazon
EFS

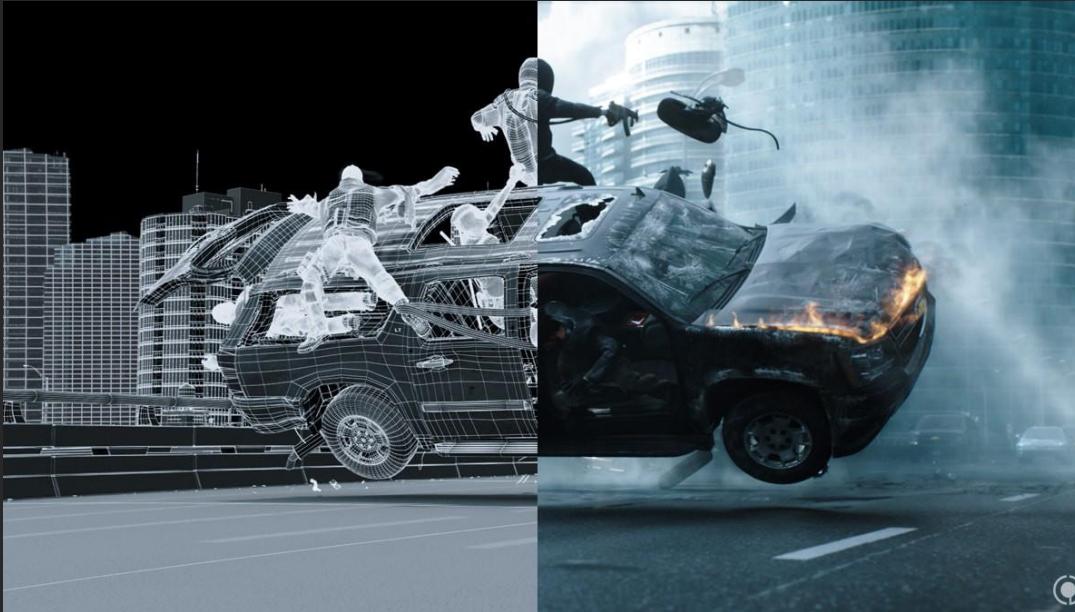


Amazon
RDS

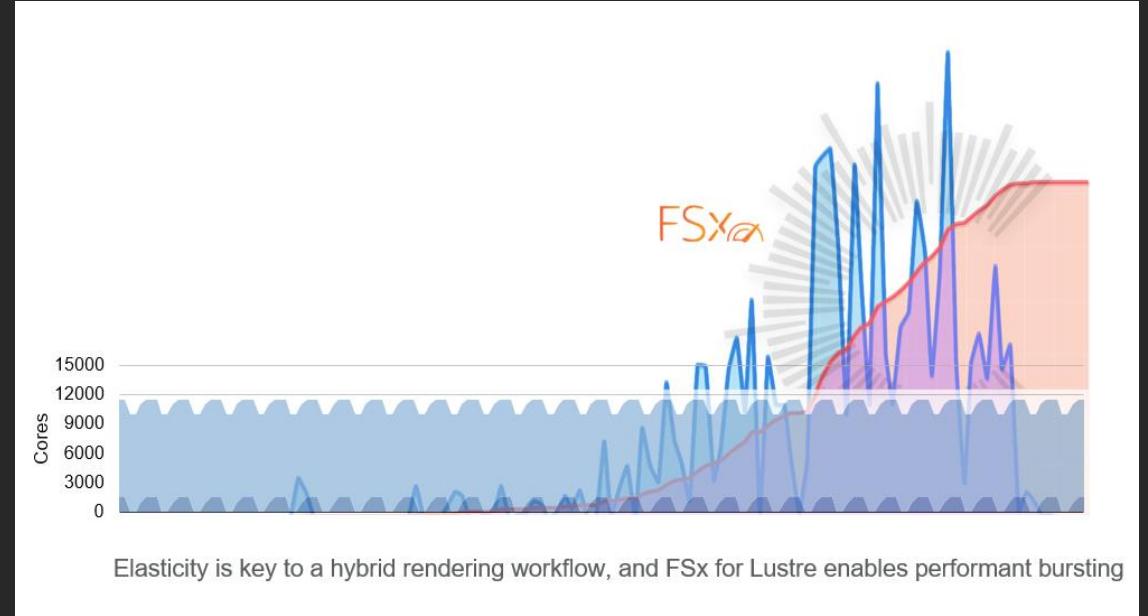
Accelerated rendering to enable cutting-edge effects on blockbuster movies



Rendering is costly



Workload is spiky



- Reduced rendering time **from two hours to 30 minutes** with the high performance of FSx for Lustre
- *“Making it faster and cheaper for studios to render allows studios to deliver even more cutting-edge effects for tomorrow’s biggest films. ... Plan to leverage FSx with SageMaker to predict compute capacity and render times to optimize spend on Amazon EC2 Spot instances.”.*

Georgia-Pacific increased profit by millions

"We are using AWS storage and analytics to predict precisely how fast converting lines should run to avoid tearing. By reducing paper tears, we have increased profits by millions of dollars for one production line."

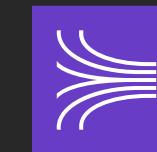
Steve Bakalar, Vice President of IT/Digital Transformation, Georgia-Pacific



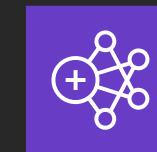
Amazon
S3



Amazon
SageMaker



Amazon
Kinesis



Amazon
EMR

Siemens reduced cybersecurity risk

“Our goal was to use cloud-based artificial intelligence to process these huge amounts of data and make immediate decisions about how best to counter any detected threats. On AWS, our AI-driven cybersecurity platform easily exceeds the strongest published benchmarks in the world.”

Jan Pospisil, Senior Data Scientist, Siemens Cyber Defense Center

SIEMENS



Amazon
S3



Amazon
SageMaker



AWS
Lambda

Working together to transform business

- Start with the **customer** and **work backward**
- Structure that supports rapid **growth** and **change**



LEARN MORE

ENT224-R1: Culture of Innovation

Wed, 12/4 at 8:30am – Aria, Level 1 East, Joshua 9



Innovation
Culture

Thomson Reuters increased customer value by making real-time data accessible

“Combining the breadth and depth of our data with the flexibility and agility of the cloud lowers barriers to entry and helps clients be more nimble as they identify opportunities to build long-term competitive advantage.”

Brennan Carley, Global Head of Enterprise for the Financial & Risk business



Amazon
EFS



Amazon
S3



Amazon
Kinesis



AWS
Lambda

AWS Partner Network storage partners

TECHNOLOGY



CONSULTING



Let's take the next step today



Infrastructure

Improve fundamentals:
security, availability,
performance, and cost

| | |
|-------------|-------------------|
| Security | Availability |
| Performance | Cost optimization |



Architecture

Increase agility and
ability to innovate

| | |
|---------------|-----------|
| Modernization | Data lake |
| Data services | Edge |



Business

Maximize your
business results

| | |
|--------------------|---------------------|
| Innovation culture | Real-time decisions |
| AI/ML | Industry solutions |

AWS Storage breakout sessions this week (and more)

| | | | |
|-----------|--|-----|----------|
| STG359-R1 | Best practices for implementing a data lake on Amazon S3 ft. AppsFlyer | Tue | 7:00 PM |
| STG364 | Securing Amazon EFS for container and data science applications | Tue | 6:15 PM |
| STG217 | Shift your tape backups to AWS to save time and money | Tue | 5:30 PM |
| STG202 | What's new in AWS file storage | Wed | 9:15 AM |
| STG305-R1 | [REPEAT 1] Build hybrid storage architectures with AWS Storage Gateway | Wed | 9:15 AM |
| STG301-R1 | [REPEAT1] Deep dive on Amazon S3 security and management | Wed | 9:15 AM |
| STG204-R1 | [REPEAT 1] Get your data to AWS: How to choose and use data migration services | Wed | 10:00 AM |
| STG303-R1 | [REPEAT 1] Deep dive on Amazon EBS | Wed | 10:00 AM |
| STG213 | Storage for hybrid cloud and edge computing: Bring AWS to you | Wed | 1:00 PM |
| STG214 | Data migration and edge computing with the AWS Snow family | Wed | 10:00 AM |
| STG331-R | [REPEAT] Beyond eleven nines: Lessons from the Amazon S3 culture of durability | Wed | 12:15 PM |
| STG307-R1 | [REPEAT 1] Amazon S3 & FSx for Lustre: Deep dive on high-performance file storage | Wed | 1:45 PM |
| STG203-R1 | [REPEAT 1] What's new with Amazon S3 and Amazon S3 Glacier | Wed | 4:45 PM |
| STG304-R | [REPEAT] Network file system (NFS) evolved: Deep dive on Amazon EFS | Wed | 4:45 PM |
| STG332-R2 | [REPEAT 2] Guidelines and design patterns for optimizing cost in Amazon S3 | Wed | 5:30 PM |
| STG341 | Deep dive on AWS Backup, ft. Rackspace | Thu | 2:45 PM |
| STG302-R2 | [REPEAT 2] Best practices for Amazon S3 (including storage classes), ft. Thomson Reuters | Thu | 3:15 PM |
| STG306-R1 | [REPEAT 1] Deep dive on Amazon FSx for Windows File Server | Fri | 10:45 AM |

39 Breakout Sessions /// 45 Chalk Talks /// 58 Builders Sessions /// 11 Workshops

Thank you!

Kevin Miller

kmiller@amazon.com



Please complete the session
survey in the mobile app.