
AWS
re:Invent
DECEMBER 2 – 6, 2024 | LAS VEGAS, NV

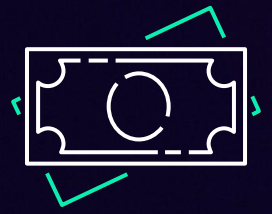
STG332

Accelerate database performance and scalability with AWS storage

Ryan Sayre
Amazon EBS GTM Specialist

Jim White
Amazon FSx GTM Specialist

Why organizations are moving databases to AWS

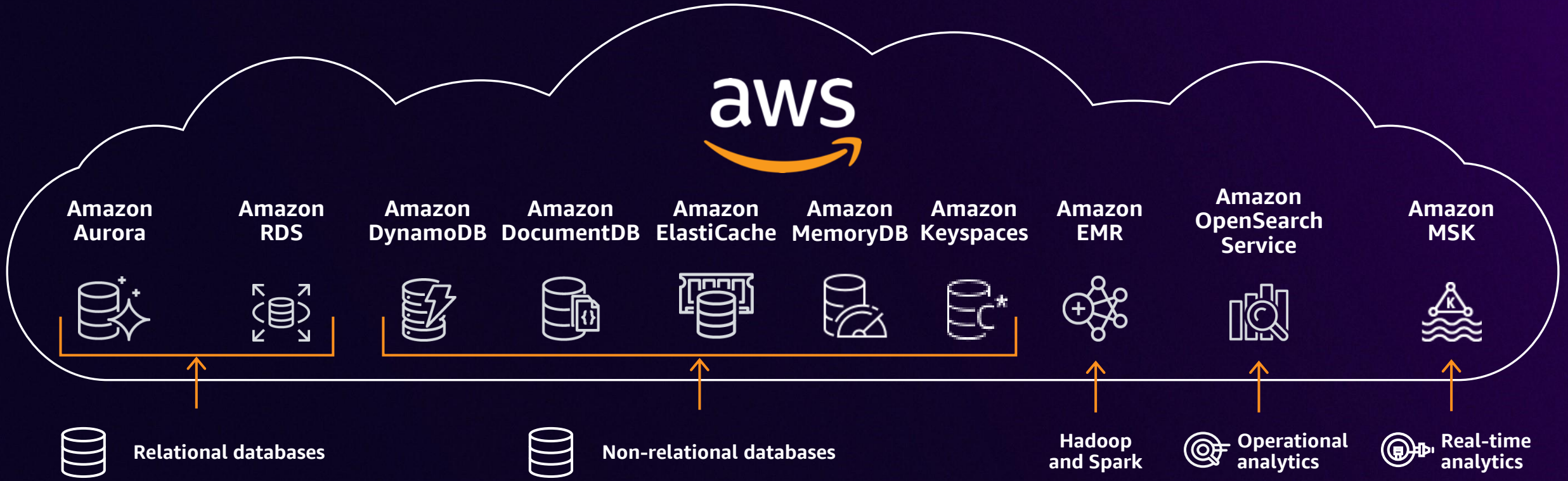


Reduce cost

Innovate faster

Focus on high-value activities

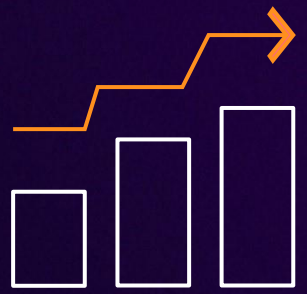
AWS provides many choices for databases



Why self-managed databases?

Control

Flexibility



Scalability

Self-managed database deployment in AWS

Microsoft SQL Server

ORACLE

SAP

MySQL

PostgreSQL

MariaDB

+

Amazon EC2

Amazon EKS

Amazon ECS

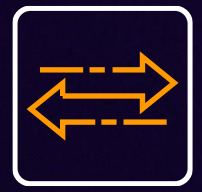
Amazon EBS

Amazon FSx

Choose the right platform: compute, operating system, storage, and database(s)

Factors that influence database choice on AWS

Performance
Instance sizes, Amazon EC2 Auto Scaling, bare metal vs. software layers

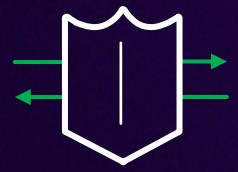


Integration
Ease of use and deployment of software and associated data management

Agility
Portability across platforms

Factors that influence storage choice on AWS

Performance
Deliver high throughput
at low latencies

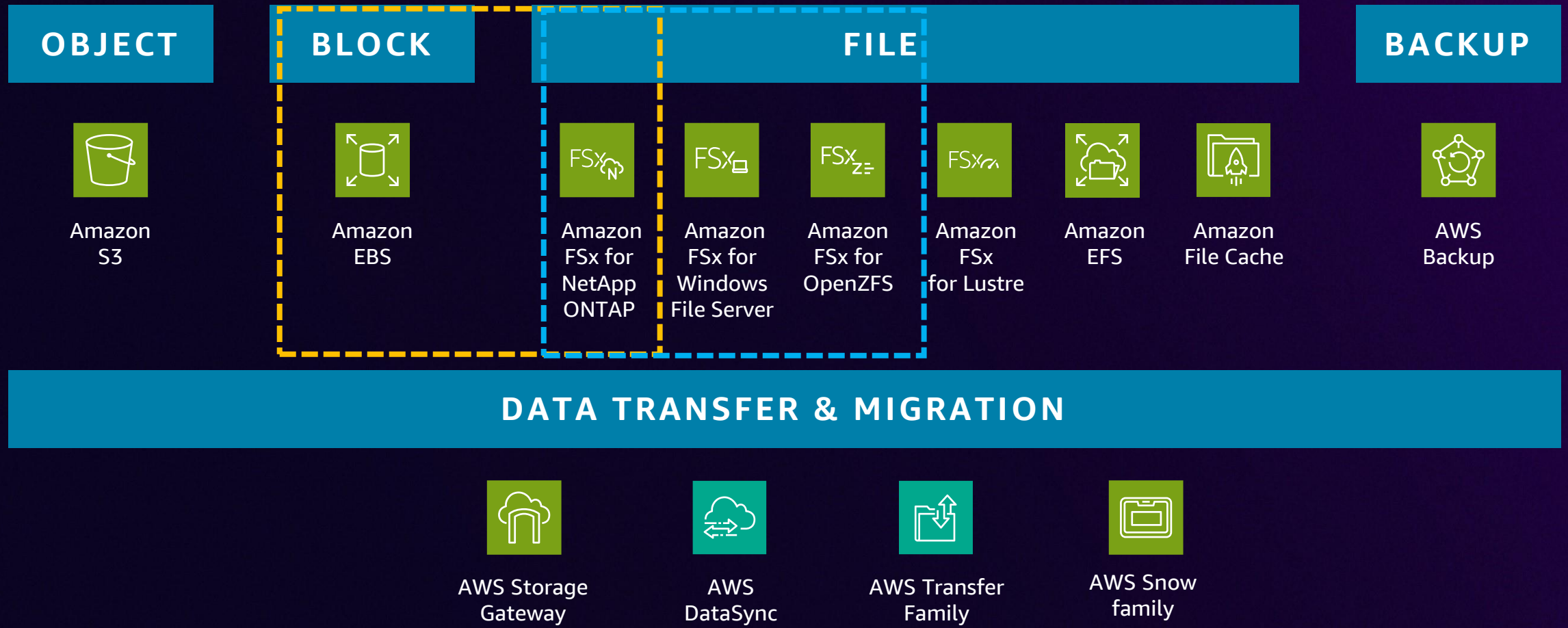


Resilience
Reduce RTO / RPO,
SAZ/MAZ deployment,
cross-Region replication

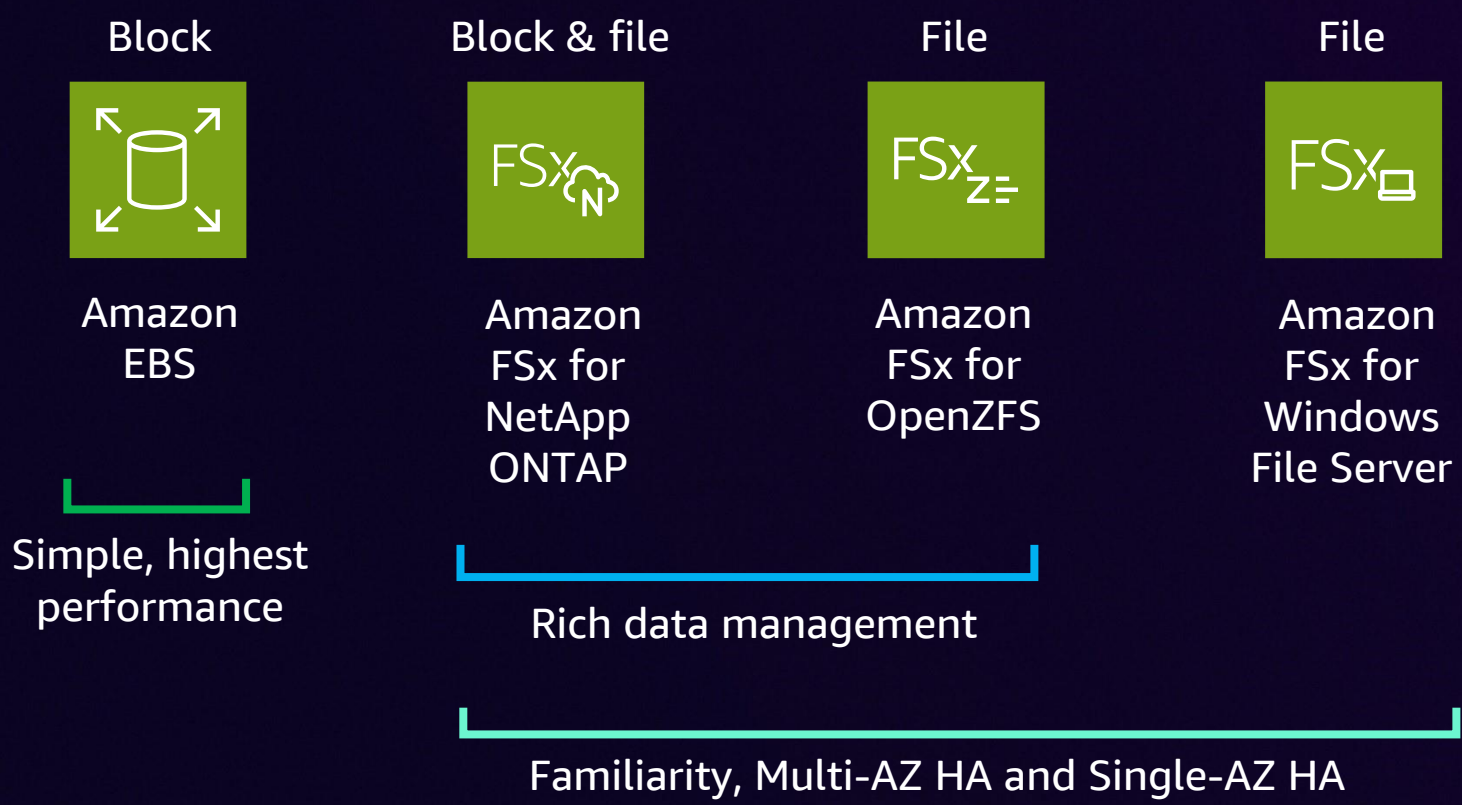
Agility
Deploy quickly, simplify migration,
refresh dev & test environments
quickly, simplify DR testing

TCO
Optimize costs

The AWS storage portfolio



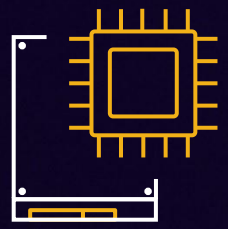
Storage services for self-managed databases



- Each service has **unique** features and capabilities
- **Familiarity** may be a factor
- Match features and capabilities to **your business needs**

Popular Amazon EBS volume types for DB & analytics

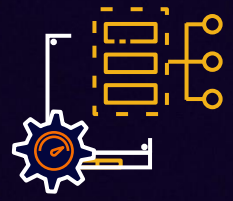
DIFFERENT VOLUME TYPES FOR OPTIMAL PRICE AND PERFORMANCE



SSD

gp3

General-purpose SSD



io2 Block Express

Provisioned IOPS SSD

HDD

st1

Throughput-optimized HDD

sc1

Cold HDD

EBS volumes for popular database use cases

	SSD		HDD	
Volume type	**gp3** General purpose	**io2 Block Express** Provisioned IOPS	**st1** Throughput optimized	**sc1** Cold storage
Use-cases	Relational and non-relational databases, containers, big data, streaming, file system, media workflows	Performance-sensitive, mission-critical databases requiring sub-millisecond latencies and higher durability	Batch process reporting, big data workloads, data warehouses, log processing, test & dev	Database log stores, backup volumes, cost-sensitive workloads
Volume size	1 GB – 16 TB	4 GB – 64 TB	125 GB – 16 TB	125 GB – 16 TB
Max IOPS/ volume	16,000	256,000	500	250
Max throughput /volume	1,000 MB/s	4,000 MB/s	500 MB/s	250 MB/s
Durability	99.8-99.9%	99.999%	99.8-99.9%	99.8-99.9%

EBS snapshots for database backup, copying & AMI deployment

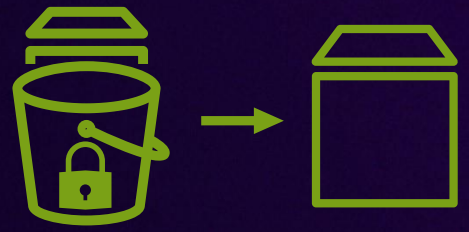
Initial use case

Backup and recovery for Amazon EBS volumes

Expanded use cases

Share Amazon Machine Images (AMIs) to update instances/OS across accounts and Regions

Disaster recovery and ransomware protection across accounts and Regions

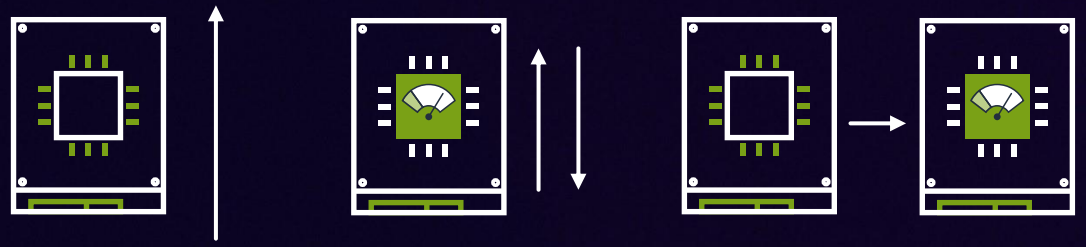


Amazon Data Lifecycle Manager – Automation across use cases

Elastic Volumes and fast snapshot restore for database

Elastic Volumes (EV)

Online volume modification



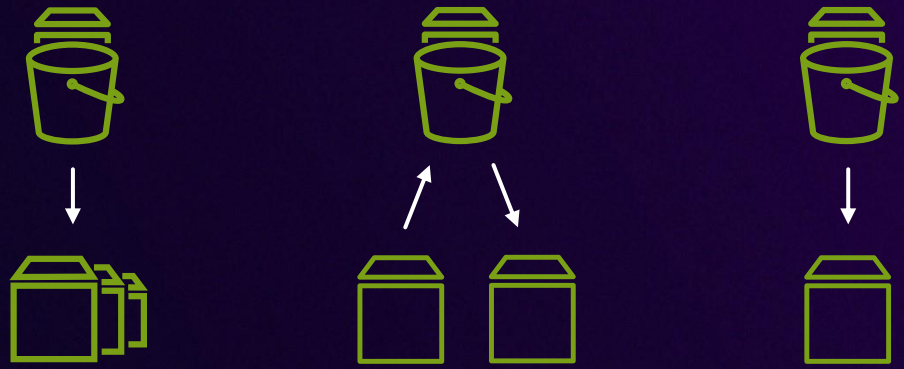
Increase volume size as footprint scales

Increase or decreases volume performance to handle changing demand

Change volume type to best fit your evolving needs

Fast snapshot restore (FSR)

Instantly create fully performant volumes from snapshot



Faster instance launches

Faster and predictable volume copy workflow

Faster and predictable volume recovery

Mapping your database workloads to Amazon EBS

Relational and non-relational databases, containers, big data, streaming, file system, media workflows

Amazon EBS
gp3 volumes

Performance-sensitive, mission-critical applications and databases requiring sub-millisecond latencies, failover within single AZ

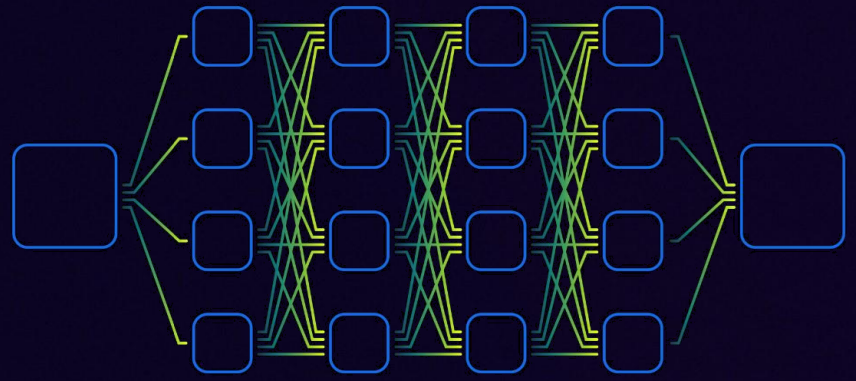
Amazon EBS
io2 Block Express

Batch-centric, cost-sensitive database workloads and log backups – not for interactive use

Amazon EBS
st1/sc1 volumes
(HDD backed)

Proprietary technology in Amazon EBS

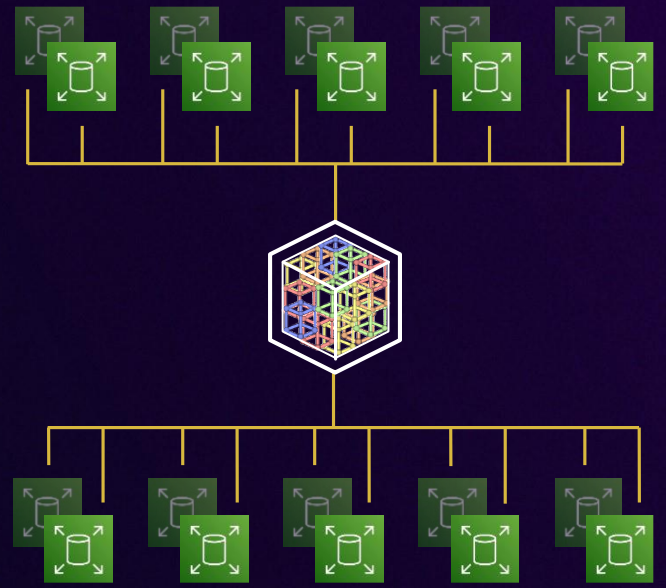
CLOUD-OPTIMIZED NETWORKING



S R D

Scalable Reliable Datagram

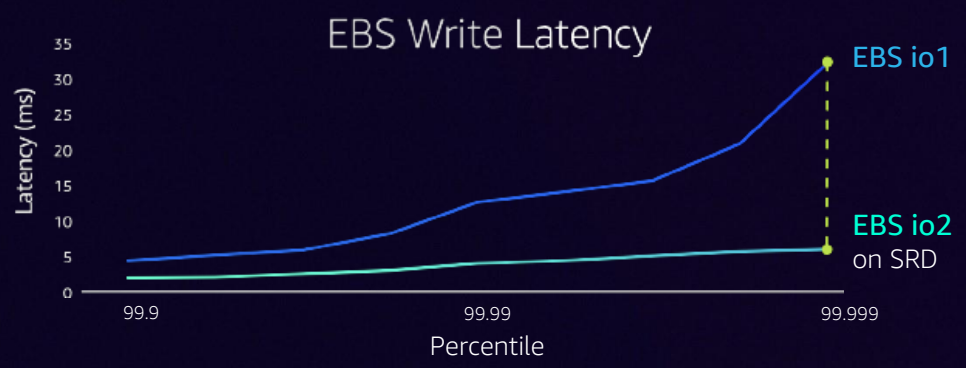
EBS BUILT-IN DATA RESILIENCY



SRD significantly lowers latency and increases throughput for database workloads

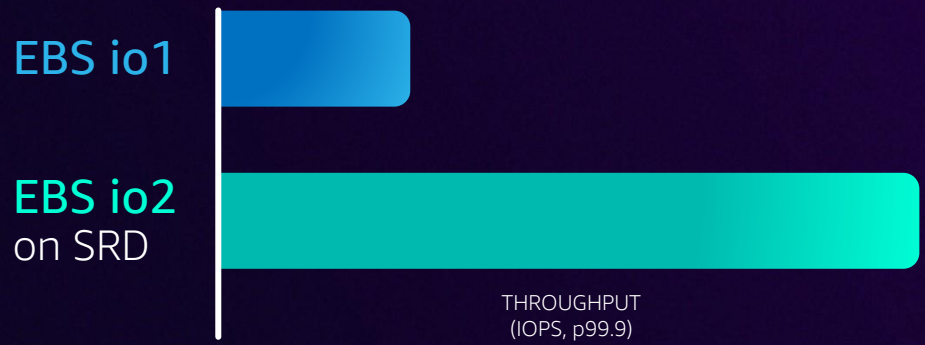
90%

Lower EBS tail latency with SRD



4x

EBS throughput with SRD



When to choose EBS

Migrating from **compute-centric DB servers** on premises not leveraging storage array features

- Block access across multiple volume types (gp3, io2 Block Express, st1)

Performance using cloud-centric feature set

- Simple and fast
- Native AWS integration into EBS snapshots, AMI deployments, Elastic Volumes

Your database engine handles **resiliency / AZ failover**

- Database replication (e.g., Data Guard, SQL Server mirroring/AlwaysOn)
- **EBS** is zonal, snapshots can use DLM pre- and post-hooks

Migrating a Mission-Critical SQL Server Workload to Amazon EBS io2 Block Express with Cvent

Challenges

Cvent completed a major initiative in 2021 to retire its on-premises data centers and migrate all its workloads to AWS. It then needed to migrate its mission-critical, highly transactional SQL Server workload with minimal downtime.

Solutions

Event and hospitality technology company Cvent migrated its mission-critical SQL workload to Amazon EBS io2 Block Express volumes, improving the speed and flexibility of its upgrades.

Results

- Reduced service interruptions by 66% during upgrades
- Accelerated failover recovery by 80–90%
- Increased storage capacity up to 64 TB and improved scalability

> **Using this new architecture based on Amazon EBS io2 Block Express and Always On availability groups, we reduced the impact to customers by 66%.**

Mike Tiffany
Senior Director of Database Engineering, Cvent

CUSTOMER PROFILE

INDUSTRY
Software & Internet

REGION
United States

Cvent is a leading provider of meetings, events, and hospitality technology with over 21,000 customers worldwide. Cvent solutions optimize the event management value chain and have helped clients to manage millions of meetings and events.

Marqeta: Scaling MySQL Databases to 256K IOPS & 64 TB across Regions using Amazon EBS

Challenges

As credit card issuer Marqeta was experiencing a period of hyperscale, the company sought to increase database performance and capacity for its flagship card-payment product.

Solutions

Marqeta turned to AWS solutions such as Amazon EBS io2 Block Express volumes and Amazon EC2 to migrate its most critical databases.

Results

- Raised database IOPS limit, fixing replication lag
- Raised database storage capacity limit
- Enhanced availability of services via multi-Region
- Elevated engineer autonomy and productivity via IaC

> **The AWS experience has been key to solving our scaling problems quickly, providing the runway to invest in re-architecture.**

Jason Zhao
Principal Engineer, Marqeta

CUSTOMER PROFILE

MARQETA

INDUSTRY
Financial Services

REGION
United States

Marqeta provides an open-API solution for card-issuing and card-processing services. Its mission is to set the global standard for modern card issuing, empowering builders to bring innovative products to the world.

Mapping your database workloads to Amazon FSx

RELATIONAL & NON-RELATIONAL DATABASES; OPERATIONAL DATA STORES & DATA WAREHOUSES

SQL Server on Windows; SMB (file) access, ease of deployment

Amazon FSx for Windows File Server

Oracle, PostgreSQL on Linux; NFS (file) access, low latency, rich data management features

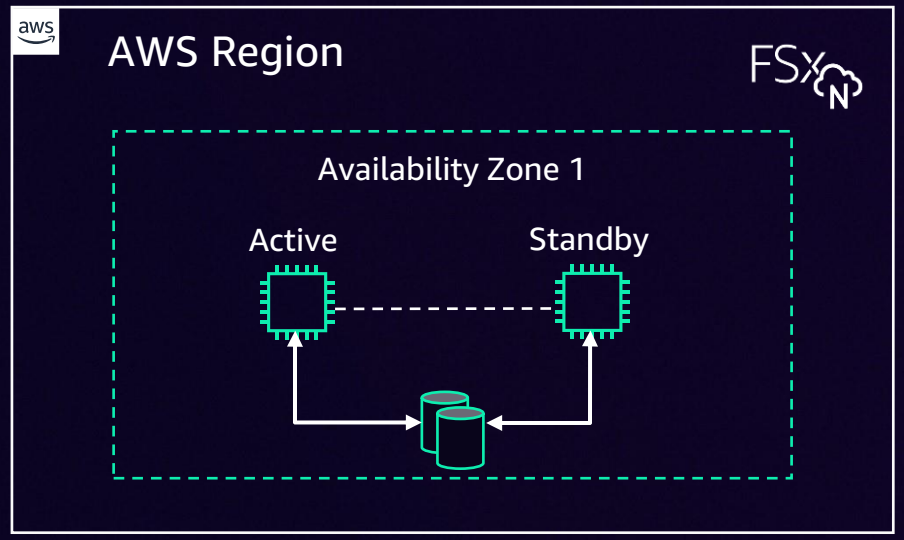
Amazon FSx for OpenZFS

Any database; NVMe/TCP, iSCSI (block) and NFS, SMB (file) access, richest data management features

Amazon FSx for NetApp ONTAP

Amazon FSx resiliency: Single-AZ & Multi-AZ options

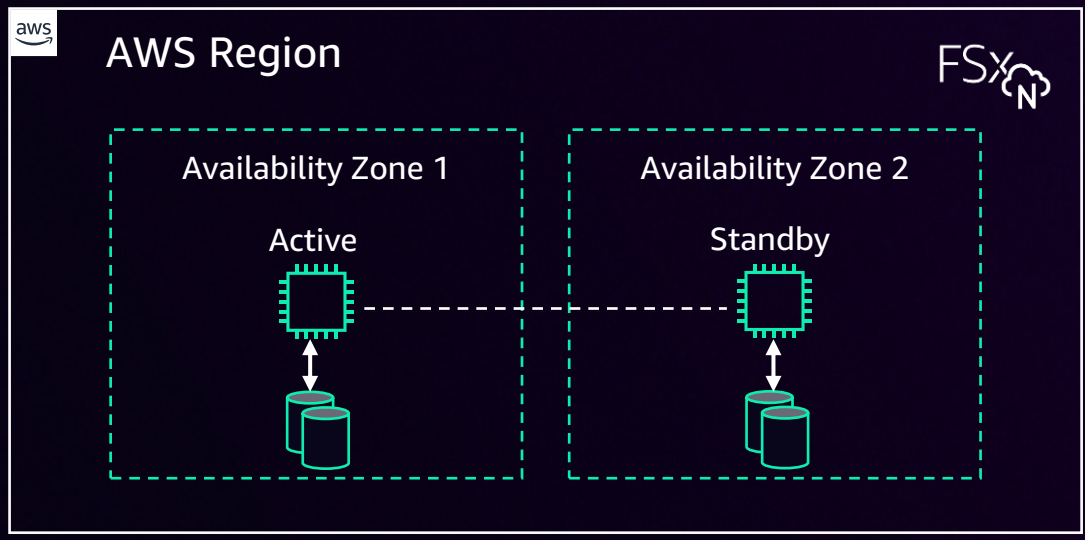
Single-AZ



Equal or better availability and durability than a single data center implementation

Dev/test, DR copies, production workloads with application-level redundancy/replication

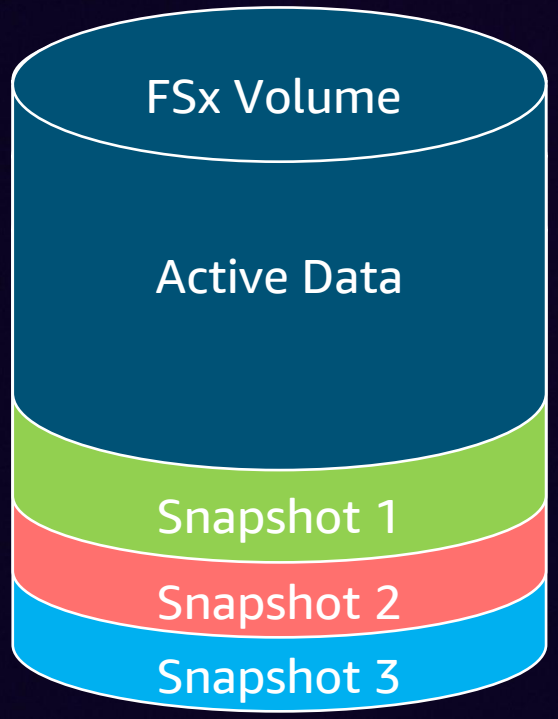
Multi-AZ



Equal or better availability and durability than a multi-data center implementation

Production or other workloads that require cross-AZ resiliency in the same AWS Region

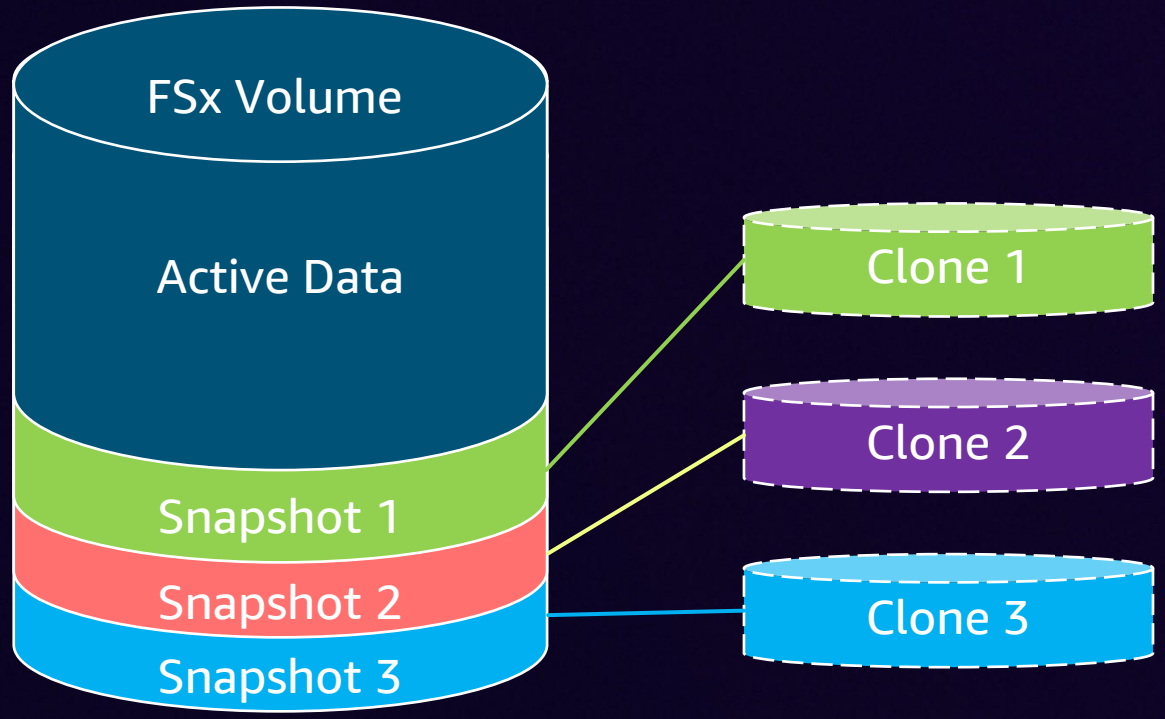
Reduce your database RTO / RPO with Amazon FSx



FSx for ONTAP and FSx for OpenZFS snapshots are **space-efficient** and create **no performance impact** regardless of database size

- Near-instantaneous creation
- Database-consistent
- Enable recoveries in minutes
- Can be efficiently replicated to another AWS Region

Copy databases near-instantaneously with Amazon FSx



- For dev, test, training, and what-if scenarios
- Based on a database consistent point-in-time snapshot
- No capacity consumed until updates are made
- Split to make a full, independant copy

adidas

FSx N

59%

QUICKER RECOVERY TIME THAN SLA MANDATED

60TB+

SAP S/4HANA ENVIRONMENT

One of the largest SAP 4/HANA installations in the world

"Our business benefits from the sheer speed of the infrastructure enabled by Amazon FSx for ONTAP."

Dominik Meier, Sr. Dir. of Platform Engineering, adidas

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Amdocs simplifies database copy management with Amazon FSx for OpenZFS

Challenge

The storage cost and time required to create database copies was unacceptable to the business, and database copies were complex to manage at scale

Solution

Multi-AZ deployment for high resiliency

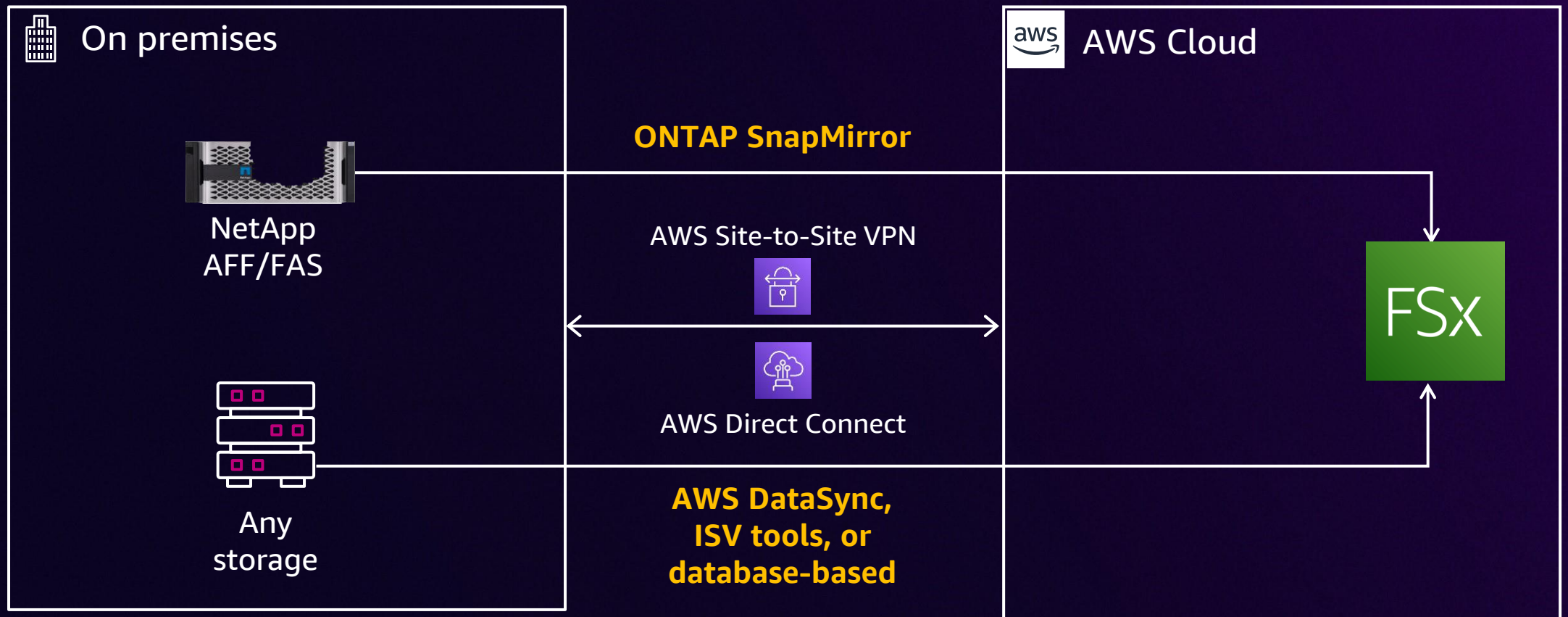
Hundreds of standby databases for reporting, data warehouse, and dev / test created using clones

Snapshots, clones, and storage efficiencies

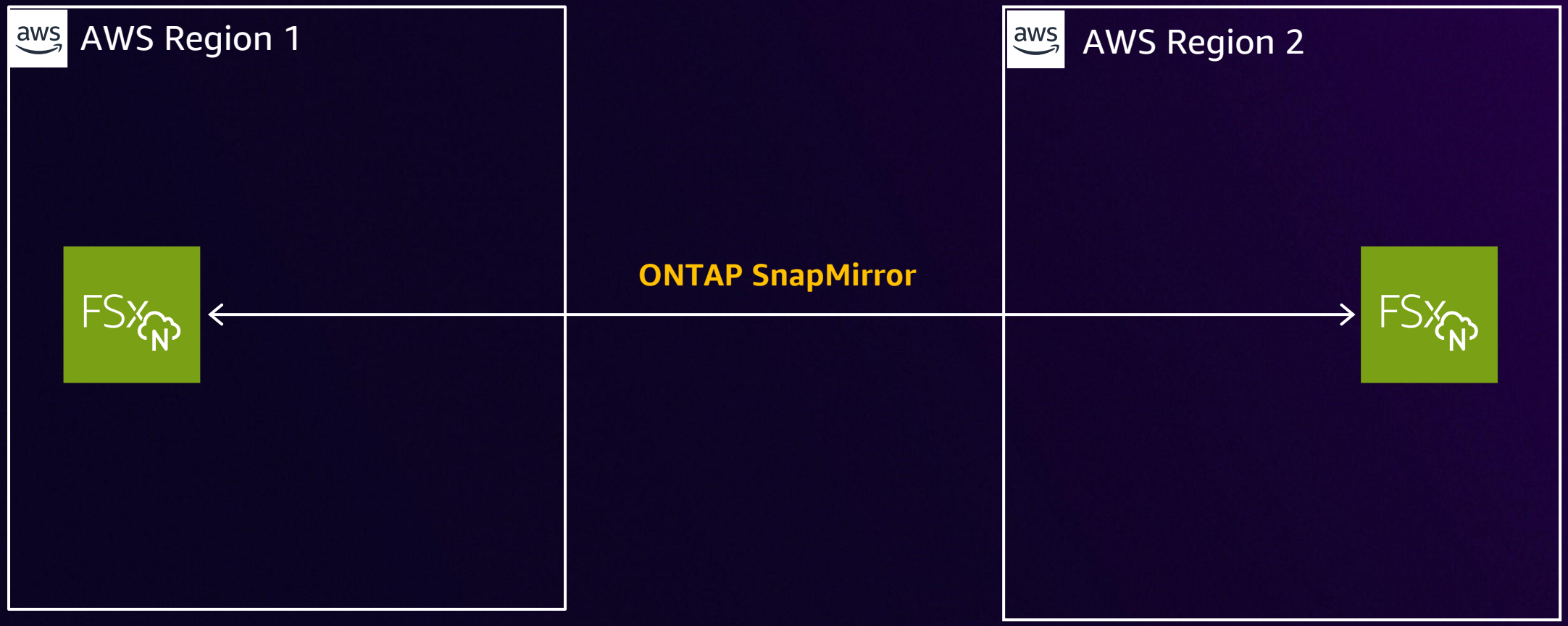
Outcome

- ✓ Reduced operational complexity
- ✓ Reduced storage footprint by 60% due to clones and data compression

Migrating to Amazon FSx



Efficient cross-Region replication with ONTAP SnapMirror



S&P Global
Market Intelligence

FSx N

100s

SQL SERVER DATABASES RUNNING FAILOVER CLUSTERS WITH iSCSI

0

NEED FOR DATABASE-LEVEL REPLICATION

SnapMirror cross-Region replication reduces RPO, delivering cost-effective disaster recovery with built-in efficiencies (compression)

"Amazon FSx for ONTAP SnapMirror greatly reduces our RPO."

Nishanth Charlakola, Associate Director - S&P Global Market Intelligence

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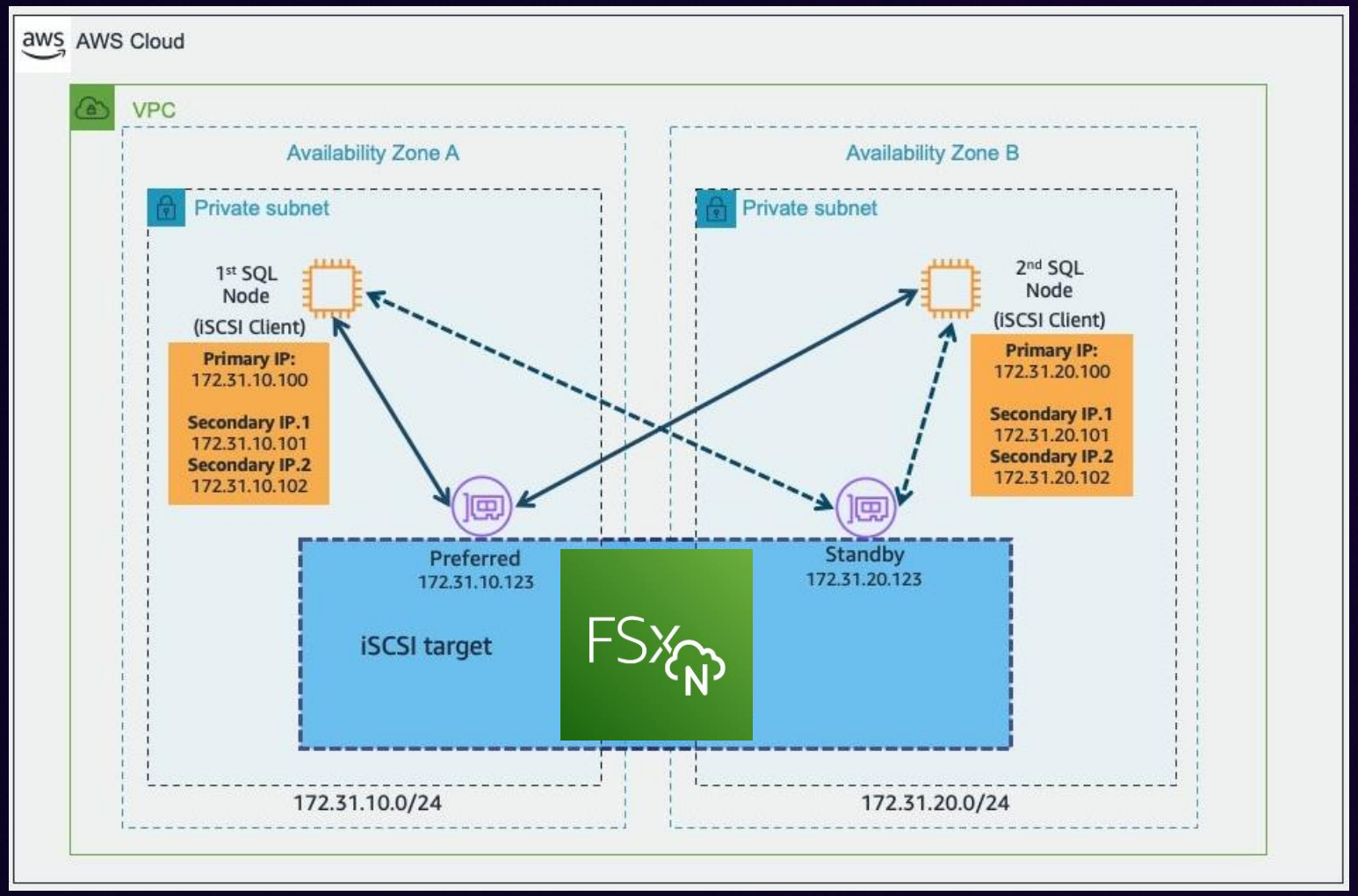
Deploy resilient SQL Server FCI databases on Amazon FSx



- Highly resilient with fast, automatic failover
- Storage-based replication reduces overhead (EC2, SQL Server)
- Storage efficiencies drive TCO reduction

CHANGE HEALTHCARE

FSx

40,000+

SUSTAINED IOPS PERFORMANCE

$3.1M

SAVED IN SQL LICENSING COSTS

Achieved mission-critical RTO/RPO production requirements

"We were able to get highly available and performant storage with Amazon FSx for Windows File Server."

Urs Bertschinger - VP, Research & Development Services, Change Healthcare

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Amazon FSx key capabilities

Capability	FSx for Windows File Server	FSx for OpenZFS	FSx for ONTAP
Infrastructure flexibility: Resilience	SAZ, MAZ	SAZ, MAZ	SAZ, MAZ
Infrastructure flexibility: Access protocols	SMB	NFS	NVMe/TCP, iSCSI, NFS, SMB
Infrastructure flexibility: Performance	Up to 10GB/sec; 400k IOPs; <1ms latency	Up to 10GB/sec; 400k IOPs; <0.5ms latency	Up to 72GB/sec; 2.4m IOPs; <1ms latency
Data protection: Create DB consistent backups	No	Seconds	Seconds
Data protection: Cross-Region replication	No	Yes	Yes
Data recovery: Reduce RTO/RPO	Minutes to hours	Minutes	Minutes
Copy / refresh databases: DB consistent clones	No	Seconds	Seconds
Reduce TCO: Storage efficiencies	Deduplication	Compression	Compression, deduplication, tiering

When to choose Amazon FSx

FSx

A **familiar** storage experience relative to on premises

- ONTAP, Windows, OpenZFS
- Block or file access

Storage resiliency matters

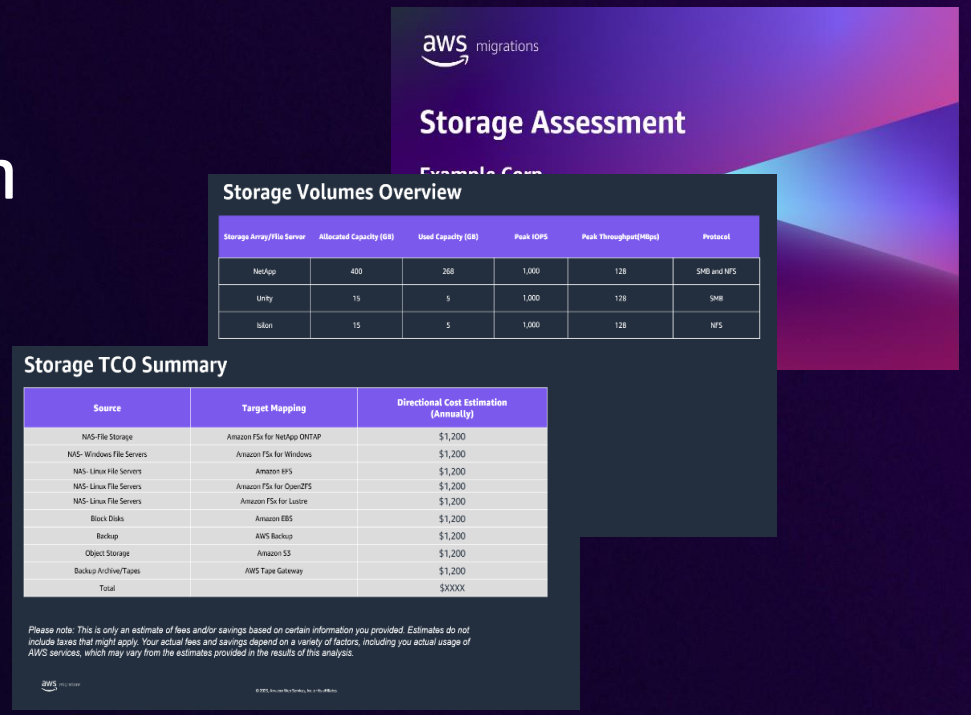
- **Multi-AZ** deployment option
- Storage-based cross-Region **replication**

Rich features create business value

- Back up in seconds, recover in **minutes**
- Refresh dev / test easily with near-instantaneous **clones**
- Reduce TCO with **capacity efficiencies** and **automated tiering**

Where to begin: An AWS assessment

- 30-day discovery period
- Receive summary of your workloads
- Receive cost estimates (ARR) for recommended AWS infrastructure to migrate to
- Detailed output helps expedite migration planning



sessions focused on data resilience

sessions focused on performance

sessions focused on data protection

Time	Monday (12/2)	Tuesday (12/3)	Wednesday (12/4)
8:00 am – 9:00 am	STG307R Chalk Talk – Best practices for operating at scale with Amazon EBS and EBS Snapshots | Mandalay Bay South Seas C		
9:00 am – 10:00 am	STG332 Breakout – Accelerate database performance and scalability with AWS storage | Mandalay Bay Ballroom L		STG313R1 Workshop – Best practices for deploying critical applications with Amazon EBS | MGM Grand 115
10:00 am – 11:00 am			
11:00 am – 12:00 pm		STG345 Chalk Talk – Balancing speed and durability with Amazon EBS and EC2 instance store | Wynn Lafite 1	
12:00 pm – 1:00 pm			
1:00 pm – 2:00 pm	STG330 Chalk Talk – Build resilient architectures with Amazon EBS | MGM 302	STG329 Breakout – Maximizing performance for high-intensity workloads using Amazon EBS | MGM Chairmans 355	STG205 Breakout – Protect critical data with ease using Amazon EBS Snapshots | MGM Chairmans 355 CMP339 Chalk Talk – How customers optimize network and EBS workloads on Amazon EC2 | Mandalay Bay South Seas D
2:00 pm – 3:00 pm		STG331 Chalk Talk – Best practices for deploying containerized applications with Amazon EBS | Caesar Palace Academy 411 STG401R1 Builders – Automate protection and backup compliance using EBS Snapshots | Caesar Palace Summit 232	STG401R2 Builders – Automate protection and backup compliance using EBS Snapshots | Mandalay Bay Surf B
3:00 pm – 4:00 pm	STG313R Workshop – Best practices for deploying critical applications with Amazon EBS | Wynn Cristal 3		
4:00 pm – 5:00 pm	STG213 Breakout – What's new with Amazon EBS | Mandalay Bay Ballroom L	STG311 Workshop – Build protection and cost optimize using EBS Snapshots | Caesar Palace Summit 228	
5:00 pm – 6:00 pm			
6:00 pm – 7:00 pm	STG401R Builders – Automate protection and backup compliance using EBS Snapshots | Mandalay Bay Surf B	STG307R1 Chalk Talk – Best practices for operating at scale with EBS and EBS Snapshots | Caesar Palace Academy 411	

Thank you!

Please complete the session survey in the mobile app

Ryan Sayre
Amazon EBS GTM Specialist

Jim White
Amazon FSx GTM Specialist