
AWS
re:Invent

STG291-L

Innovate faster with applications on AWS storage

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Block and Object Storage
AWS

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Director, Product Management
Splunk

AWS re:Invent

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Agenda

Welcome

AWS Storage portfolio

Innovation

Perfecting your punch: Migrate to the cloud

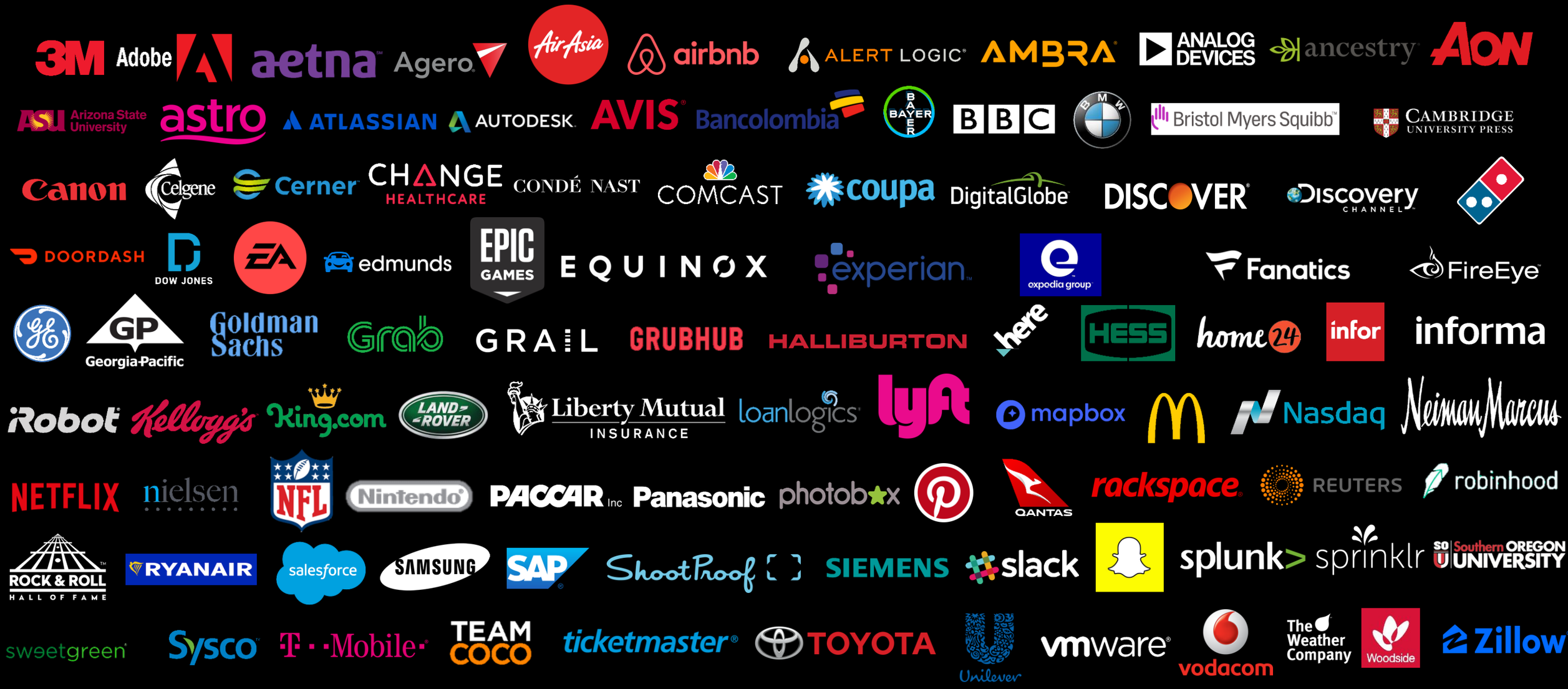
Trying new moves: Modernize your architecture

Putting it all together: Optimize with data



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Storage innovation drives application innovation



AWS Storage partners

TECHNOLOGY

COMPETENCY PARTNERS

BURST
CLOUDBERRY LAB IS NOW MSP360
CLUMIO
COHESITY
COMMVAULT
ctera
druva
N2WS
NASUNI
NetApp
panzura
rubrik
VEEAM
VERITAS
wanDISCO
WEKA.IO
zadara
Zerto

PARTNERS

actifio
arcserve
Barracuda
CARBONITE
DELL Technologies
EditShare
HAMMERSPACE
HITACHI
IBM Storage
IRON MOUNTAIN
komprise
LucidLink
model
NUTANIX
PURESTORAGE
Qumulo
REPLIX
Starrish COMPUTER CORPORATION
TapeArk

CONSULTING

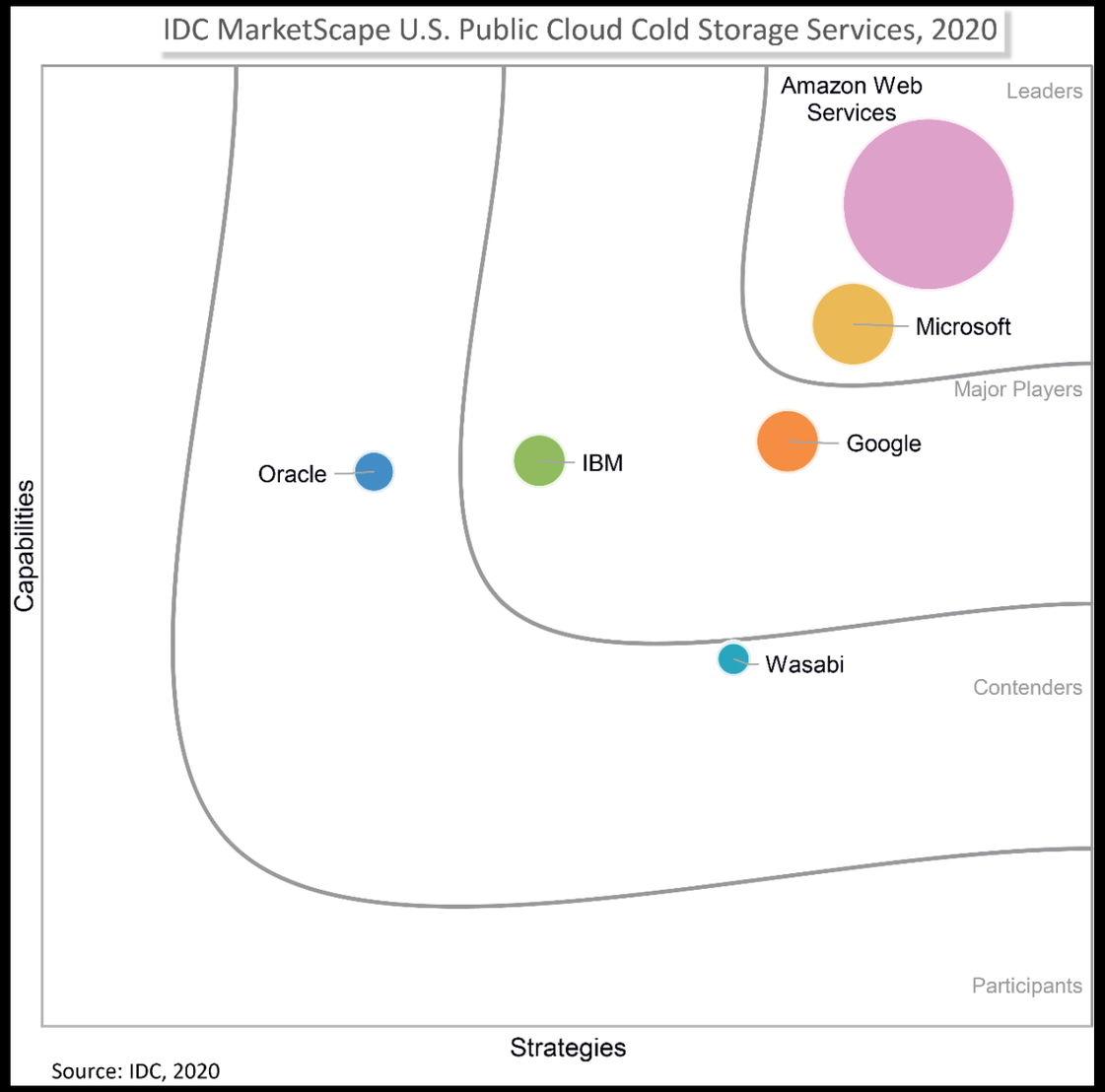
AHEAD
SIRIUS
gekko
GreenPages Technology Solutions Physical. Virtual. Cloud.
we answer the call GROUPWARE TECHNOLOGY
HCL
HITACHI Inspire the Next
InterVision INNOVATION DELIVERED
rackspace
CDW
PROACT
ONICA
InfoFabrica
netmagic An NTT Communications Company
shi
Red River
i-M
Sycomp Delivering Technology Globally
KAIZEN
SUNGARD AVAILABILITY SERVICES
Softcat
NEXTIOS uma empresa locaweb
FRONTIER BUSINESS SYSTEMS PVT LTD
softchoice
TRANSACT

DXC.technology
Insight
CompuNet, Inc.
TRACE3
carahsoft
e+
World Wide Technology
DLT A TECH DATA COMPANY
TechData
PRESIDIO Future. Built.
MEGAZONE CLOUD



AWS recognized as a cloud leader for the 10th consecutive year

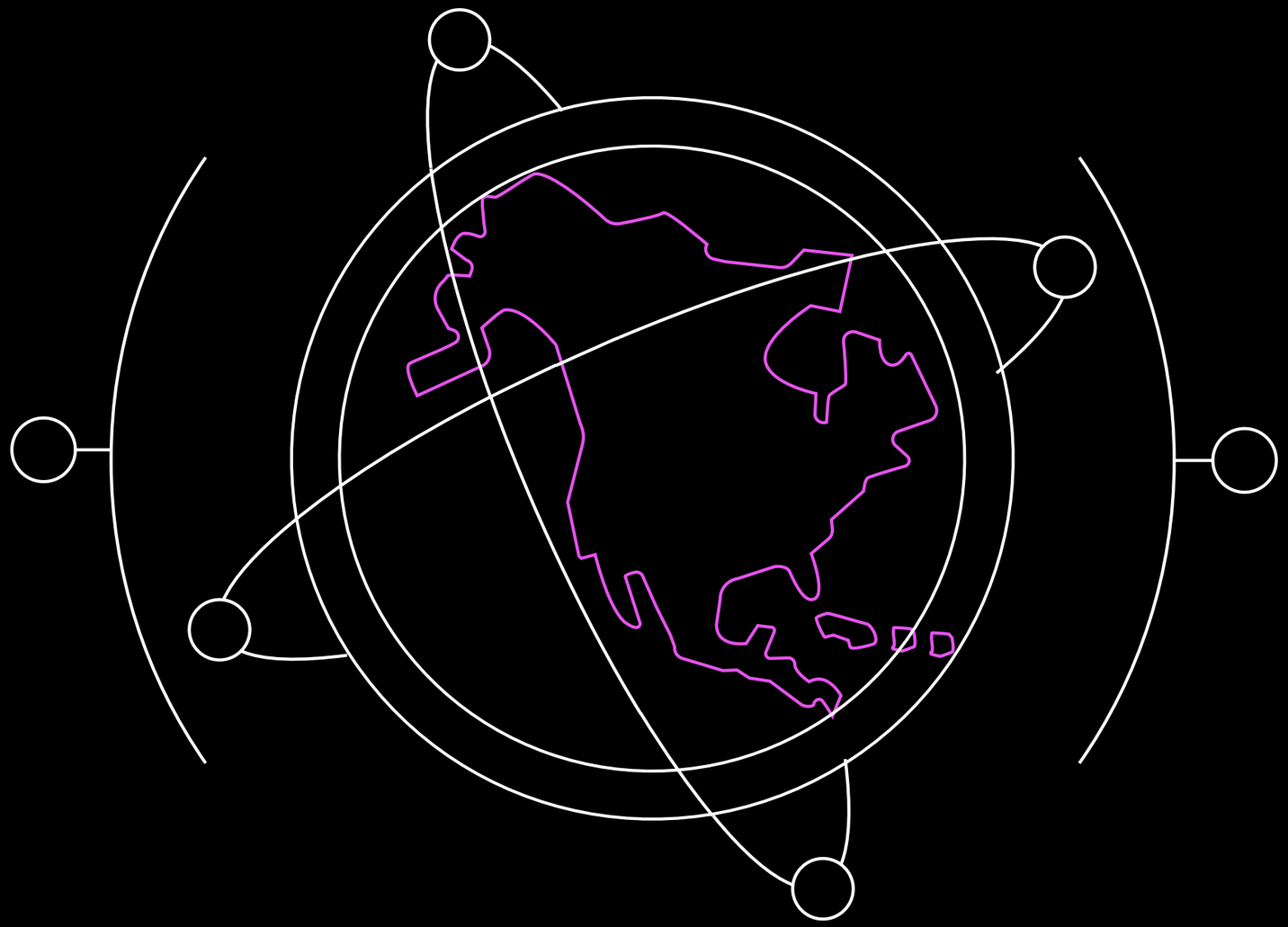
Gartner, Magic Quadrant for Cloud Infrastructure & Platform Services, Raj Bala, Bob Gill, Dennis Smith, David Wright, Kevin Ji, 1 September 2020. Gartner does not endorse any vendor, product or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose. The Gartner logo is a trademark and service mark of Gartner, Inc., and/or its affiliates, and is used herein with permission. All rights reserved.



AWS recognized as a 2020 cloud leader in IDC Public Cloud Cold Storage MarketScape

Source: IDC MarketScape: U.S. Public Cloud Cold Storage Services 2020 Vendor Assessment, Doc # US46855520, September 2020. https://aws.amazon.com/resources/analyst-reports/idc-public-cloud-cold-storage-2020/

Data must be accessible when and where it's needed



Storage infrastructure foundation

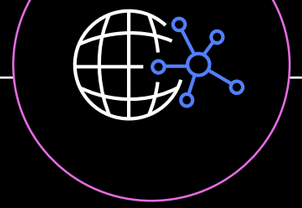


Security

Availability

Durability

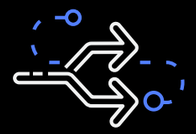
Performance



Accelerate application development



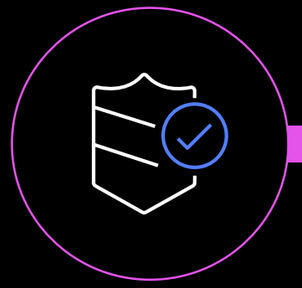
Enable cost-effective growth



Reduce management complexity



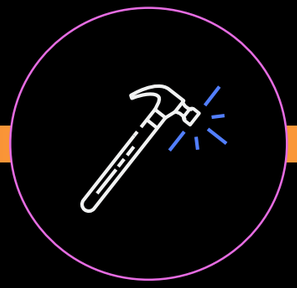
Leverage the power of analytics and ML



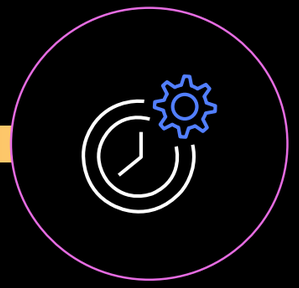
Security



Availability



Durability



Performance

AWS Storage portfolio



AWS re:Invent

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The most complete cloud storage portfolio

Object



Amazon S3
and S3 Glacier

Block



Amazon
EBS

File



Amazon
EFS



Amazon FSx for
Windows File Server



Amazon FSx
for Lustre

Backup

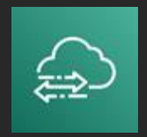


AWS
Backup

Broadest and deepest data transfer and edge processing



AWS Storage
Gateway



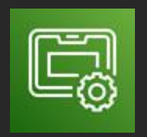
AWS
DataSync



AWS Transfer
Family



AWS
Snowmobile



AWS
Snowball



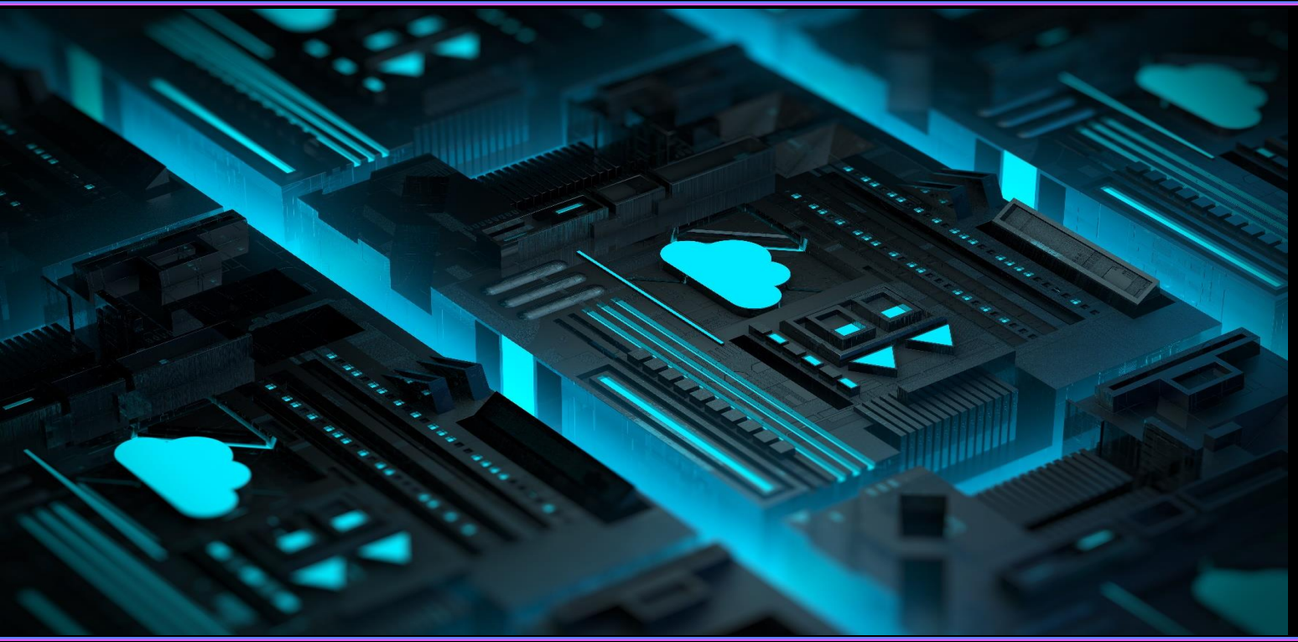
AWS
Snowcone

New additions in 2020



Small, rugged, secure edge computing, storage, and data transfer device

Object storage on AWS Outposts using Amazon S3 APIs



Innovation in Amazon EBS

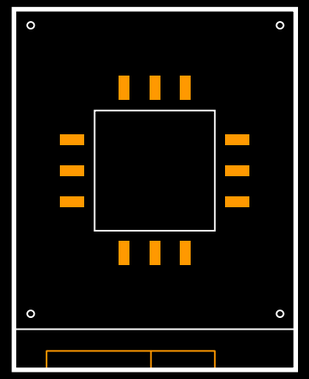
Performance

Cost

Management

Integration

Block volume types for applications

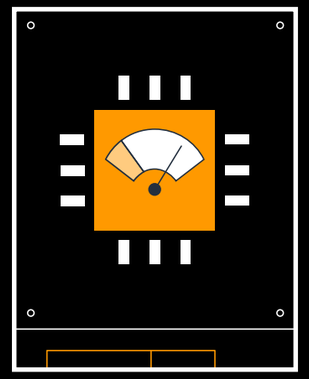


General-purpose SSD

NoSQL databases

Transactional workloads, low-latency applications

Cassandra, MongoDB, CouchDB



Provisioned IOPS SSD

Relational databases

I/O-intensive database applications

MySQL, SQL Server, PostgreSQL, SAP, Oracle



Throughput-optimized HDD

Big data, analytics

Large datasets and large I/O sizes

Kafka, Splunk, Hadoop, data warehousing



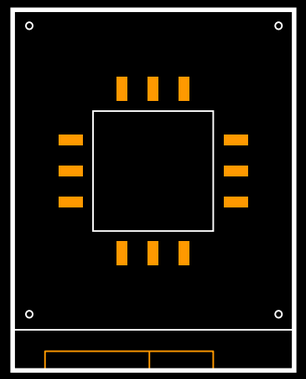
Cold HDD

File, media

Less frequently accessed workloads with large, cold datasets

Transcoding, encoding, rendering

gp2: Our most widely used EBS volume



General Purpose SSD

gp2

Up to 250 MB/s
Throughput

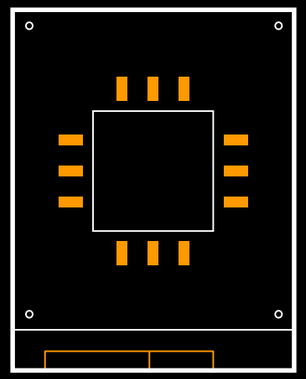
3,000 IOPS (burst)
Baseline Performance

3 IOPS / GB
Scaled Performance

NEW
AT RE:INVENT

gp3: New general purpose SSD volume

INDEPENDENTLY PROVISION IOPS AND THROUGHPUT AT UP TO 20% LOWER PRICE PER GB

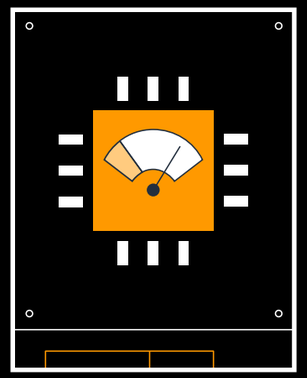


General Purpose SSD

gp2	gp3
	20% lower cost per GB
Up to 250 MB/s Throughput	**Up to 1,000 MB/s** Throughput — 4X
3,000 IOPS (burst) Baseline Performance	**3,000 IOPS (baseline)** Baseline Performance
3 IOPS / GB Scaled Performance	**Independently Scale** IOPS and Throughput

NEW
August ‘20

io2: Performance and durability



Provisioned IOPS SSD

io2

Up to 1,000 MB/s
Throughput

Up to 64,000 IOPS
IOPS

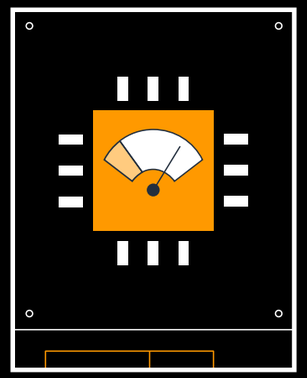
Up to 16 TB
Capacity

Single-digit millisecond
Latency

99.999%
Durability

io2: Tiered pricing for IOPs volume

NEW
AT RE:INVENT



Provisioned IOPS SSD

io2

Up to 1,000 MB/s
Throughput

Up to 64,000 IOPS
IOPS

Up to 16 TB
Capacity

Single-digit millisecond
Latency

99.999%
Durability

Introducing lower cost tiered-pricing for io2

Up to 32,000 IOPS
current rate
(e.g. $0.065 per PIOP-mo)

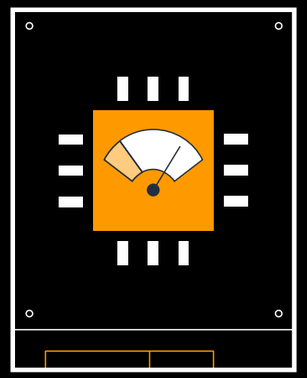
32,001 – 64,000 IOPS
30% lower costs
(e.g. $0.046 per PIOP-mo)

> 64,000 IOPS*
additional 30% lower cost
(e.g. $0.032 per PIOP-mo)

*For io2 Block Express

io2: Multi-Attach support

NEW
AT RE:INVENT



Provisioned IOPS SSD

io2

Up to 1,000 MB/s
Throughput

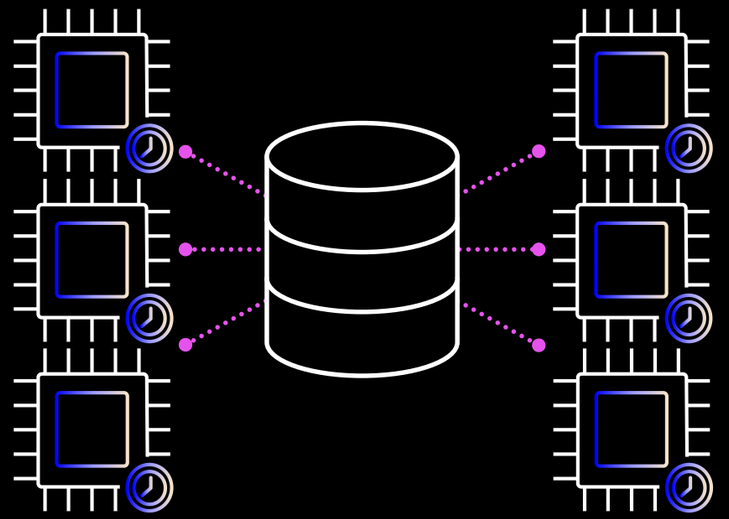
Up to 64,000 IOPS
IOPS

Up to 16 TB
Capacity

Single-digit millisecond
Latency

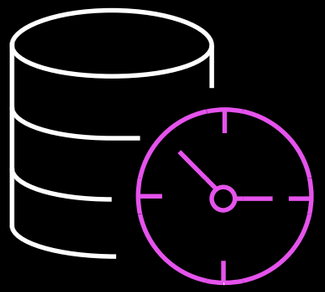
99.999%
Durability

Introducing
EBS Multi-Attach
for io2 volumes





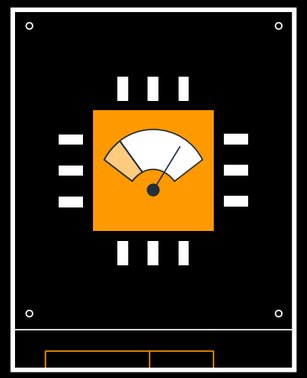
On-premises SAN delivers performance, but not agility or cost savings of cloud



NEW
AT RE:INVENT

Introducing io2 Block Express

THE FIRST SAN BUILT FOR THE CLOUD. AVAILABLE IN PREVIEW

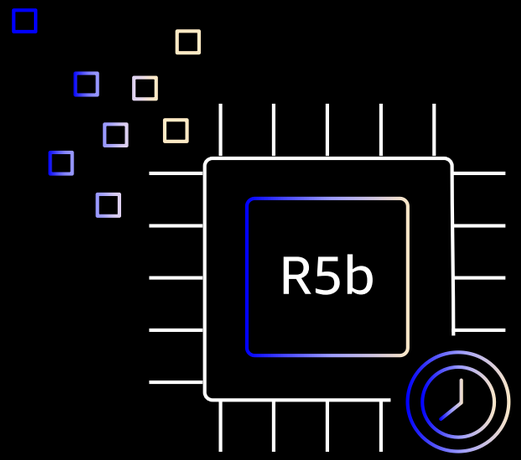


Provisioned IOPS SSD

io2	io2 Block Express
Up to 64,000 IOPs IOPS	**Up to 256,000 IOPs** IOPS (4X)
Up to 1,000 MB/s Throughput	**Up to 4,000 MB/s** Throughput (4X)
Up to 16 TB Capacity	**Up to 64 TB** Capacity (4X)
Single-digit millisecond Latency	**Sub-millisecond** Latency
99.999% Durability	**99.999%** Durability

Introducing Amazon EC2 R5b instances

NEW AT RE:INVENT



Memory-optimized instances delivering 3x faster block storage performance in cloud

Up to **3X** better EBS performance over EC2 R5 instances

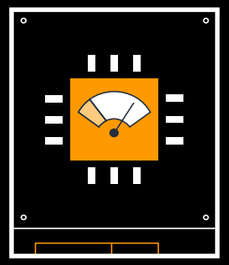
Deliver up to 7,500 MB/second bandwidth and 260k IOPS of EBS performance

Designed for large database and data analytics workloads

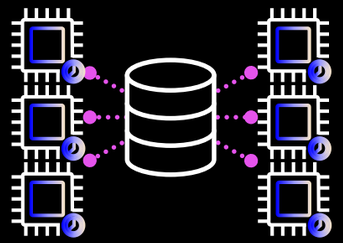
Consolidate workloads sensitive to storage performance by migrating from R5 to R5b

2020: A journey to SAN in the cloud

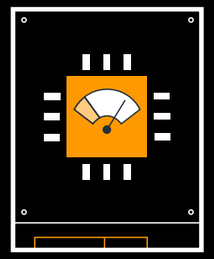
NEW
2020



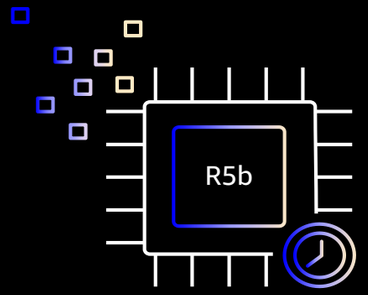
io2



Multi-Attach



io2 Block Express Preview



R5b

Cost innovations in EBS



DRIVING DOWN COST

40% cost reduction in sc1 volumes

NEW in Nov!

sc1 and st1 minimum size reduction

NEW in Nov!



SIMPLIFIED MANAGEMENT

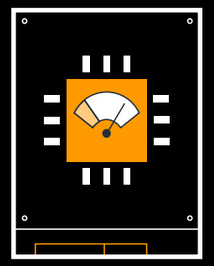
Policy-based snapshots with Amazon Data Lifecycle Manager (DLM)

Amazon Machine Images (AMIs) support in DLM

NEW in Nov!

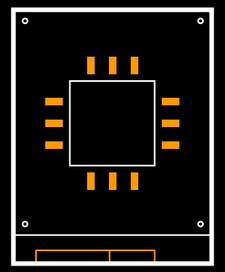
EBS optimizations by Compute Optimizer

NEW AT RE:INVENT



io1/io2

Optimize Provisioned IOPS settings

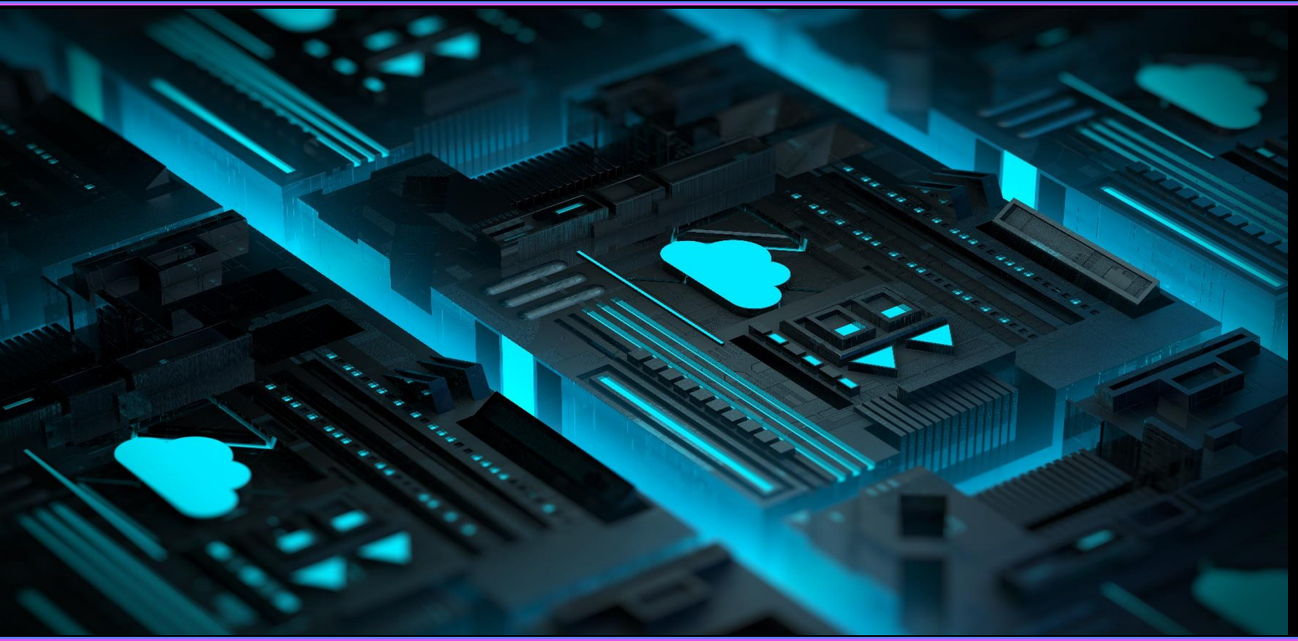


gp2/gp3

Optimize size of gp2 volumes to meet performance

IOPS and throughput recommendations for gp3 volumes

Eliminates manual optimization and available at no additional charge



Innovation in file storage

Performance

Cost

Management

Integration

Broadest file portfolio



Amazon
EFS

Serverless file storage



Amazon FSx for
Windows File Server

Windows-based workloads



Amazon FSx
for Lustre

Compute-intensive workloads

Amazon EFS: Serverless file storage for all AWS compute models

April 2020



Amazon ECS

AWS Fargate

June 2020



AWS Lambda

August 2020



Amazon EKS

AWS Fargate

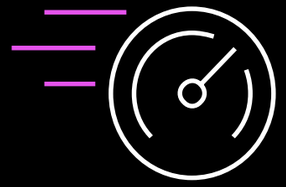
November 2020



Create EFS file systems from EC2 launch instance wizard

Elastic **Simple** **Set and forget**

Innovation in Amazon EFS



PERFORMANCE

INCREASED
read IOPS by **5X**

NEW in 2020!

500K + IOPS with Max I/O performance mode

2x per-client throughput

NEW in 2020!



COST

LOWEST COST
serverless file storage

$0.025 per GB-month for Amazon EFS Infrequent Access storage class

Amazon FSx for Windows File Server: Migrate on-premises NAS to the cloud



Home directory



Content management



Virtual desktops



HA SQL Server databases

Fully managed, built on Windows Server

- No need to manage hardware infrastructure
- Feature parity with on-premises NAS

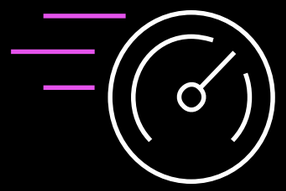
Flexible price and performance options

- $0.013 per GB-month (Single-AZ)
- Single-AZ or Multi-AZ

Easy migration to AWS

- SMB to SMB with AWS DataSync
- No need to replatform or rearchitect

Innovation in Amazon FSx for Windows File Server



PERFORMANCE

INDUSTRY-LEADING
Performance

Submillisecond latencies, millions of IOPs

Unlimited per-client throughput



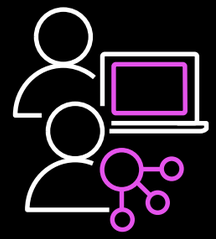
COST

LOWEST COST
Windows file system storage in the cloud

NEW in 2020!

$0.013 per GB-month

50% reduction with deduplication



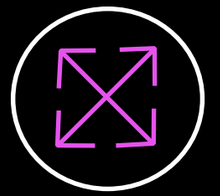
MANAGEMENT

ENTERPRISE CLASS
Fully managed, built on Windows Server

Full SMB support

Microsoft Active Directory

Storage quotas and snapshots



INTEGRATION

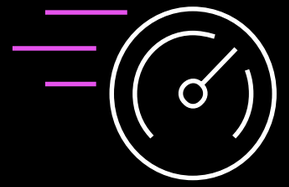
BROAD INTEGRATION
with AWS services

EC2, Amazon AppStream 2.0, Amazon WorkSpaces, VMware Cloud on AWS

AWS Backup

NEW in November!

Amazon FSx for Lustre: Compute-intensive workloads



PERFORMANCE

HIGH PERFORMANCE
for compute-intensive workloads

Submillisecond latencies, 10s of millions of IOPs

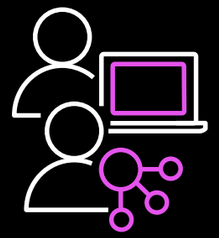


COST

BEST PRICE
per unit of throughput

New in April

$0.025 per GB-month for HDD persistent file storage



MANAGEMENT

ENTERPRISE CLASS
Fully managed

NEW in November!

AWS Backup integration

Live storage scaling NEW in November!



INTEGRATION

BROAD INTEGRATION
with AWS services

Amazon EKS, Amazon Batch, AWS ParallelCluster, Amazon SageMaker, S3

Deployment options optimized for your workload



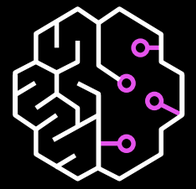
Genome analysis
Financial simulations

NEW in 2020!

HDD persistent storage

For throughput-focused workloads

Starting at 12 MB/second/TB for $0.025/GB-month



SAS Grid
Training ML models

SSD persistent storage

For latency-sensitive, IOPS-focused workloads

50, 100, or 200 MB/second/TB starting at $0.14/GB-month

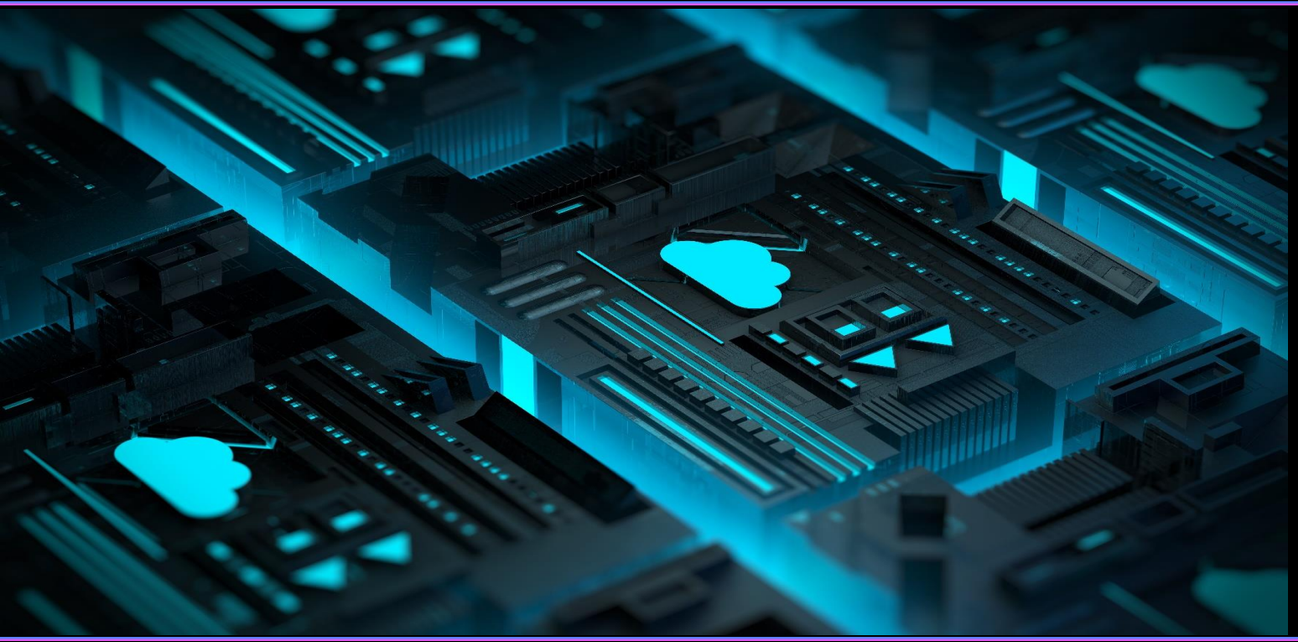


Video rendering

SSD scratch storage

For short-term, latency-sensitive, IOPS-focused workloads

200 MB/second/TB for $0.14/GB-month



Innovation in Amazon S3

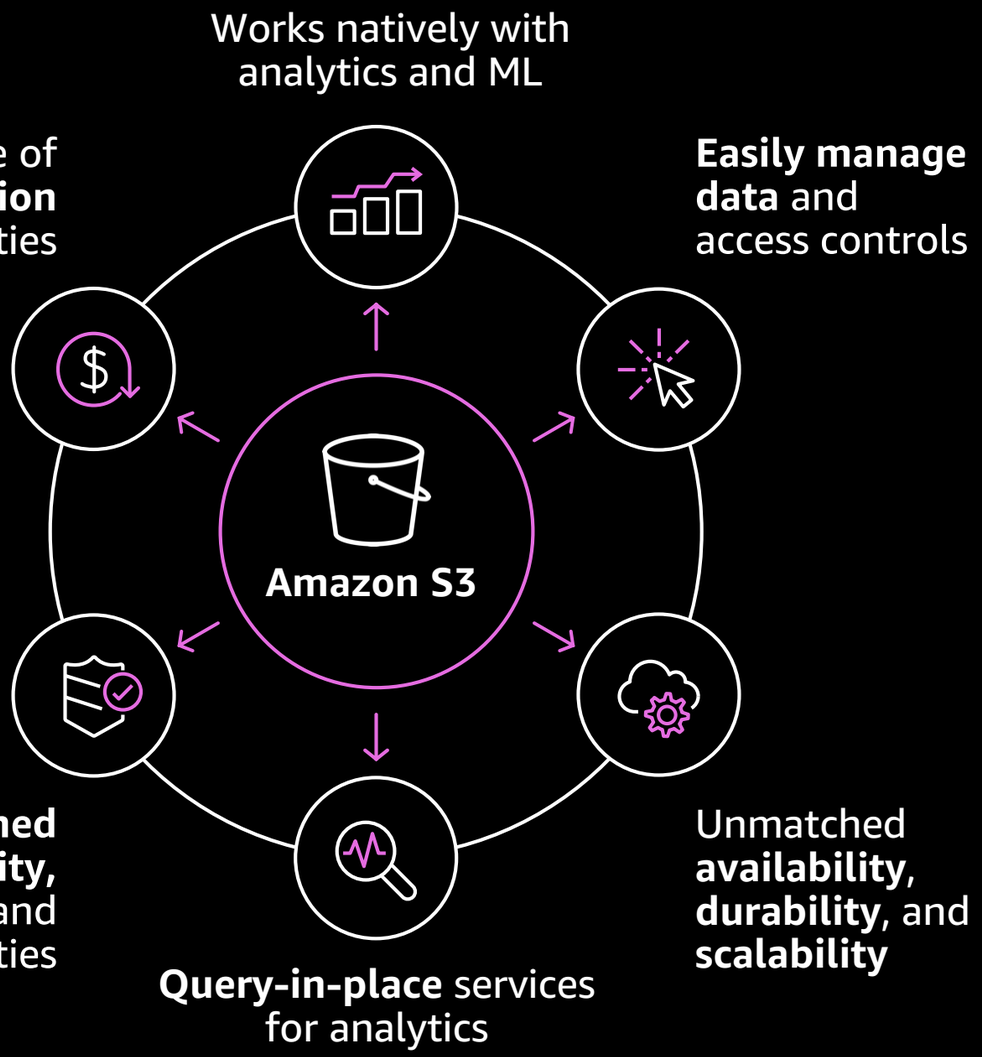
Performance

Cost

Management

Security

Amazon S3 is the best place to build a data lake



Exabytes of storage and trillions of objects

Tens of thousands of data lakes built on Amazon S3

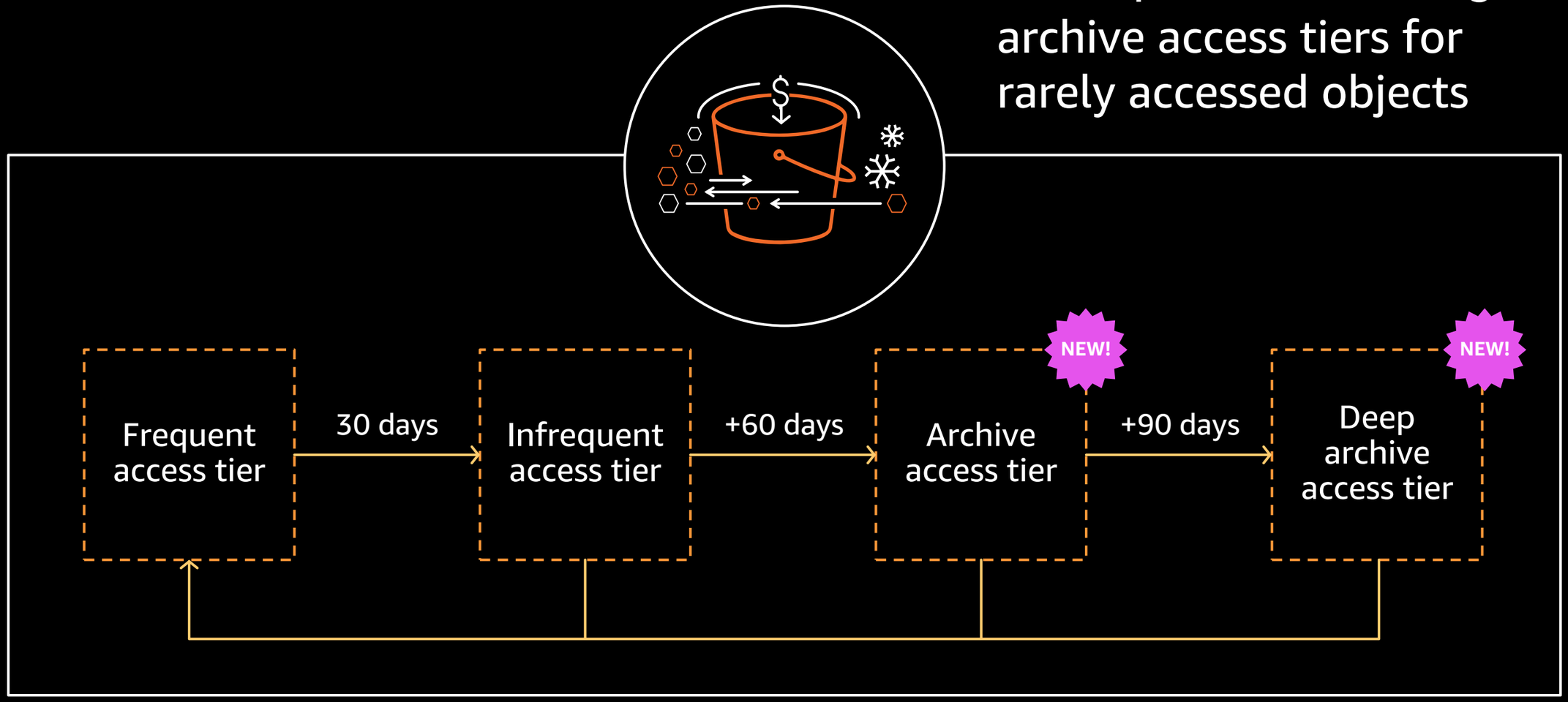
S3 Intelligent-Tiering monitors and adjusts pricing automatically

S3 Glacier Deep Archive offers the lowest-cost object storage in cloud, at a tenth of a cent per GB-month

Purpose-built for data lake storage: Intelligent-Tiering archival tiers

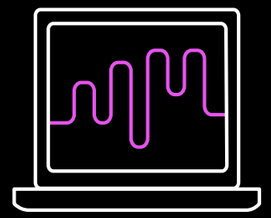
NEW
IN NOVEMBER

Save up to **95%** using archive access tiers for rarely accessed objects



Purpose-built for data lake storage: Analyze your trends with Amazon S3 Storage Lens

NEW
IN NOVEMBER



Visibility

Summary insights

How much has my storage increased across my entire organization in the past 90 days?

Outliers

Are there any unusual trends or spikes in my storage usage or activity?



Recommendation

Data protection

Are all of my buckets encrypted?

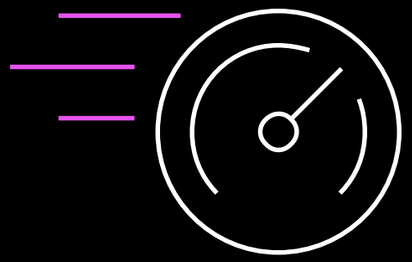
Cost efficiency

Which of my buckets are infrequently accessed?

NEW
AT RE:INVENT

Purpose-built for data lake storage: Amazon S3 Bucket Keys

BUCKET-LEVEL APPROACH TO KEY MANAGEMENT FOR SSE-KMS



Increase performance for encryption

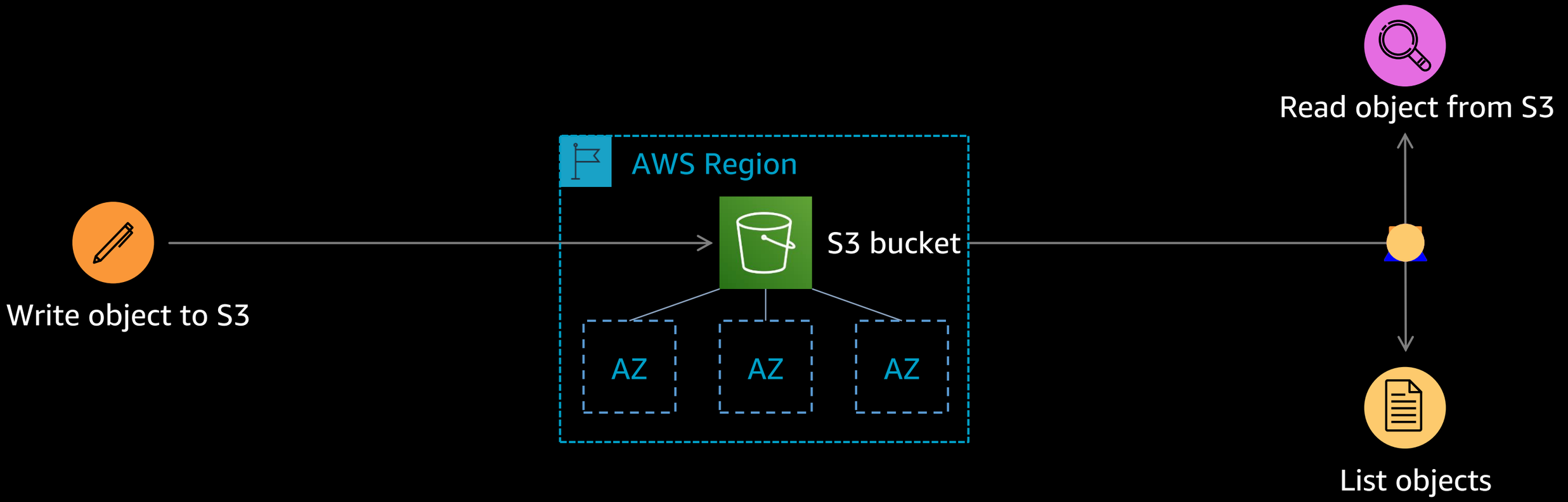


Reduce request costs for KMS-backed server-side encryption by up to

99%

Purpose-built for data lake storage: Strong consistency for every S3 request

NEW
AT RE:INVENT



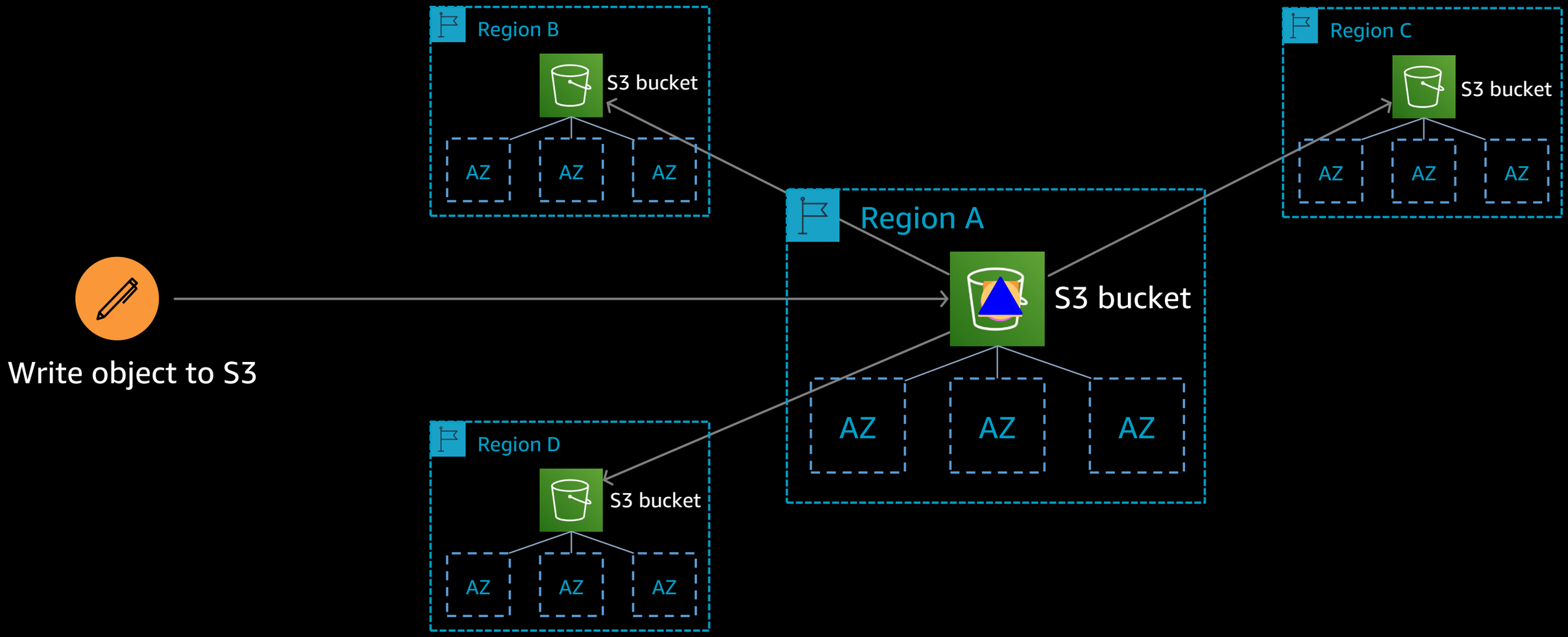
Accelerate and simplify analytics workloads

No additional cost

Multi-destination support for Amazon S3 Replication

NEW AT RE:INVENT

REPLICATE DATA TO MULTIPLE BUCKETS IN THE SAME AWS REGION OR DIFFERENT AWS REGIONS

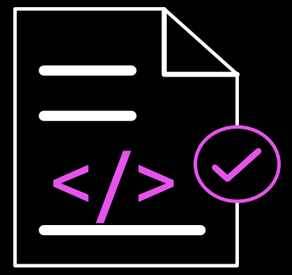


Coming soon: Amazon S3 support for AWS PrivateLink

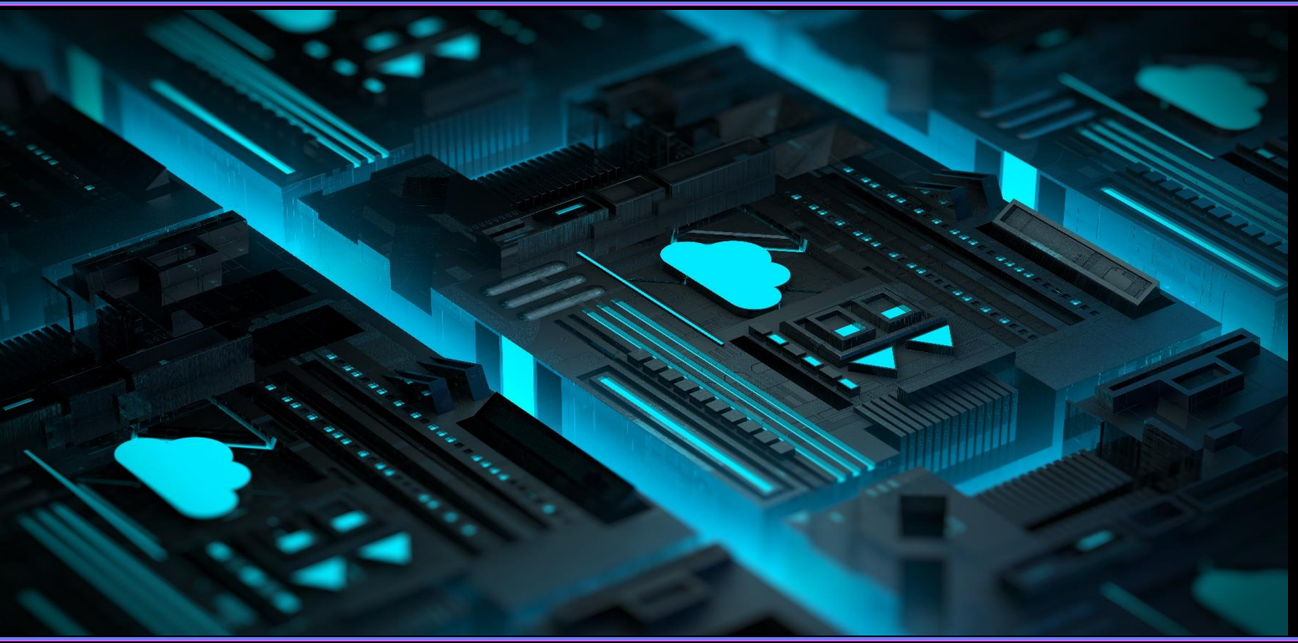
DIRECT PRIVATE CONNECTION TO AMAZON S3 FROM ON-PREMISES NETWORK



Simplify network architecture by connecting to S3 from on-premises without using public IP addresses



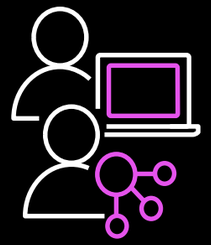
Access S3 in AWS using private IP addresses with interface endpoints in your Virtual Private Cloud without managing proxy servers



Innovation in AWS Backup

Data protection with AWS Backup

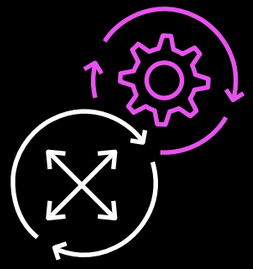
CENTRALIZED POLICIES TO MANAGE DATA PROTECTION AND COMPLIANCE ACROSS AWS SERVICES



Policy-based data management

Policy-driven protection

Create, monitor, and manage backups across AWS resources

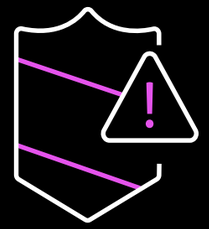


Improve business continuity

Copy secondary data across accounts and Regions via AWS Organizations

Cross-account copy of backups

NEW in November!



Enable compliance and governance for data protection

Real-time monitoring and management

Enable creation of auditor-ready reports

AWS Backup supports AWS services for mission-critical applications

Storage services



Amazon EBS



Amazon EFS

NEW in November!

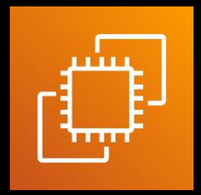


Amazon FSx for Windows File Server



Amazon FSx for Lustre

VMs and applications



Amazon EC2

Windows, SQL Server, Exchange applications

Hybrid workloads



AWS Storage Gateway

Databases



Amazon RDS

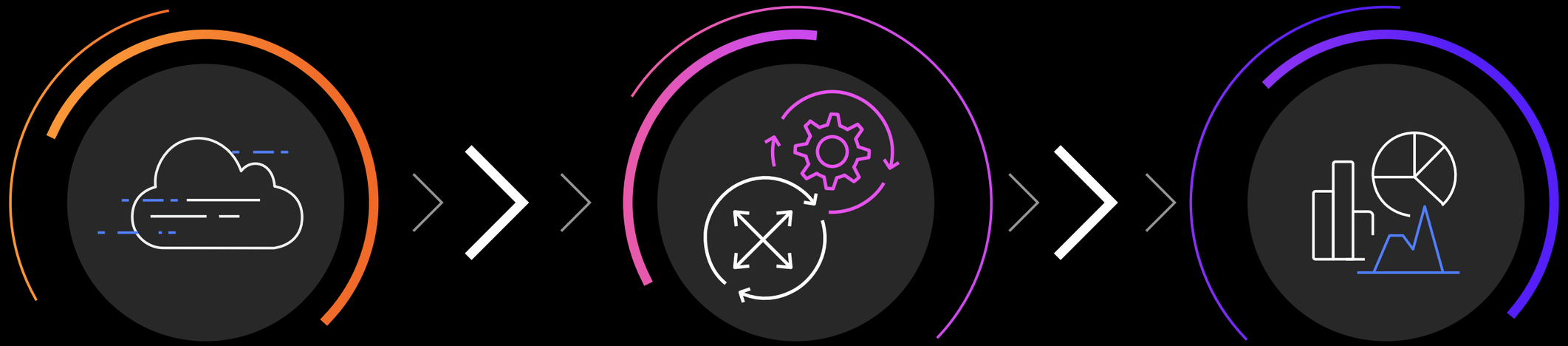


Amazon DynamoDB



Amazon Aurora

Innovate faster with applications on AWS Storage



Migrate
to the cloud

Perfecting your punch

Modernize
your architecture

Trying new moves

Optimize
with data

Putting it all together

Perfecting your punch



Migrate to the cloud

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Cloud storage adoption: From cost optimization to agility and innovation

- Completeness of portfolio
- Data ingestion
- Ongoing investment in portfolio
- Global reach and locality of services
- Integrated analytics and artificial intelligence
- Price predictability

Source: IDC Market Spotlight, Sponsored by AWS, “Cloud Storage Adoption: From Cost Optimization to Agility and Innovation”, Doc. #US46772420, September 2020

IDC ANALYZE THE FUTURE

Customers migrated block and file to AWS



- Migrated 100 TB of data to Amazon EBS. Increased performance rates by 300% compared to on-premises
- Scaled more easily to support growth
- Improved reporting and monitoring from employees



"Amazon FSx for Windows File Server reduces management and maintenance while integrating seamlessly with our existing automation framework. We have reduced our storage cost by 50% and improved application performance by as much as 80%."

Broadest data movement and hybrid cloud storage options

Offline transfer

Bulk data, files, objects, HDFS, databases



AWS Snowcone



AWS Snowball Edge



AWS Snowmobile

Online file and object transfers

Rapid transfers



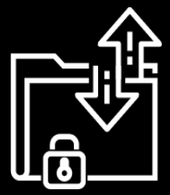
AWS DataSync

Long-distance uploads and downloads



Amazon S3 Transfer Acceleration

File exchanges



AWS Transfer Family

Database and machine migration and recovery



AWS Database Migration Service (AWS DMS)



CloudEndure Migration

Streaming data

Amazon Kinesis family



Amazon Kinesis Data Firehose, Amazon Kinesis Data Streams, Amazon Kinesis Video Streams

Hybrid / edge gateways

File, volume, and tape backup storage for on-premises applications



AWS Storage Gateway

Data transfer and migration tools



AWS Transfer Family

File transfer

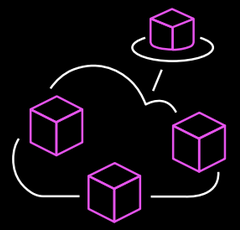
- Support for FTPS and FTP — NEW in 2020!
- AWS GovCloud (US) and FIPS endpoints — NEW in 2020!
- Shared VPC environments — NEW in November!



AWS DataSync

Fast online transfer

- AWS DataSync on Snowcone — NEW in 2020!
- Fully automated transfers between AWS storage services — NEW in November!

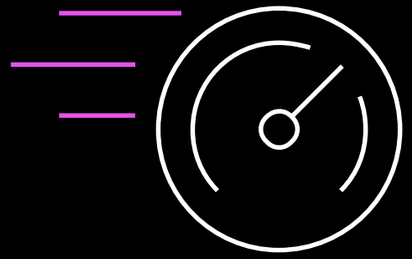


Offline transfer

- AWS Snowcone — 6/17/2020
- Add AMIs in minutes with AWS Snowball Edge — NEW in November!

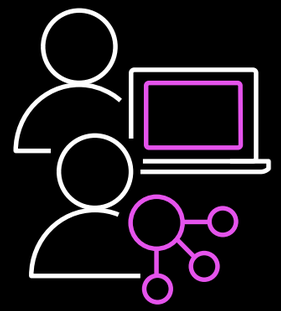
On-premises storage: AWS Storage Gateway

PROVIDE ON-PREMISES ACCESS TO VIRTUALLY UNLIMITED CLOUD STORAGE



Performance increase

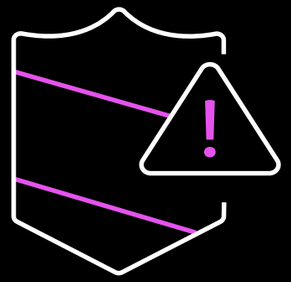
4X



Cache size increase

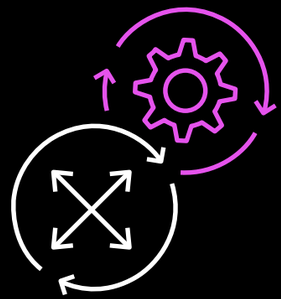
4X

NEW in November!



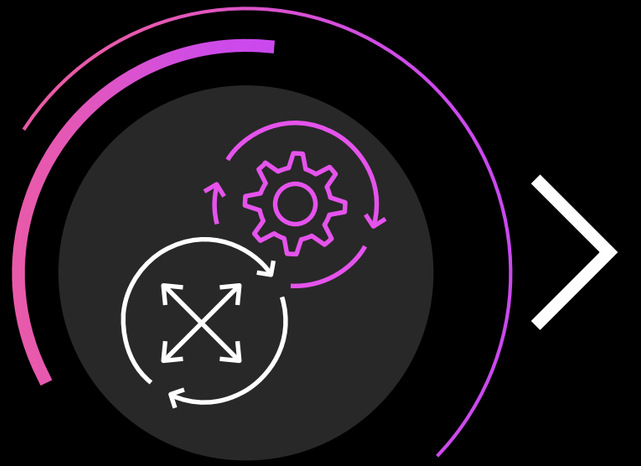
Access-based enumeration

NEW in November!



Support of Amazon S3 Intelligent-Tiering

Trying new moves



Modernize your architecture

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splunk>

Separation of compute and storage

Modernizing data management for petabyte-scale data volumes

Bharath Aleti

Director Product Management
Splunk



AWS re:Invent

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Splunk turning data into business outcomes

UNLOCKING BUSINESS VALUE BY BRINGING DATA TO EVERY QUESTION, DECISION, AND ACTION

90%

Faster incident detection, investigation, and response

82%

Reduction in negative business impact from shorter and fewer incidents

70%

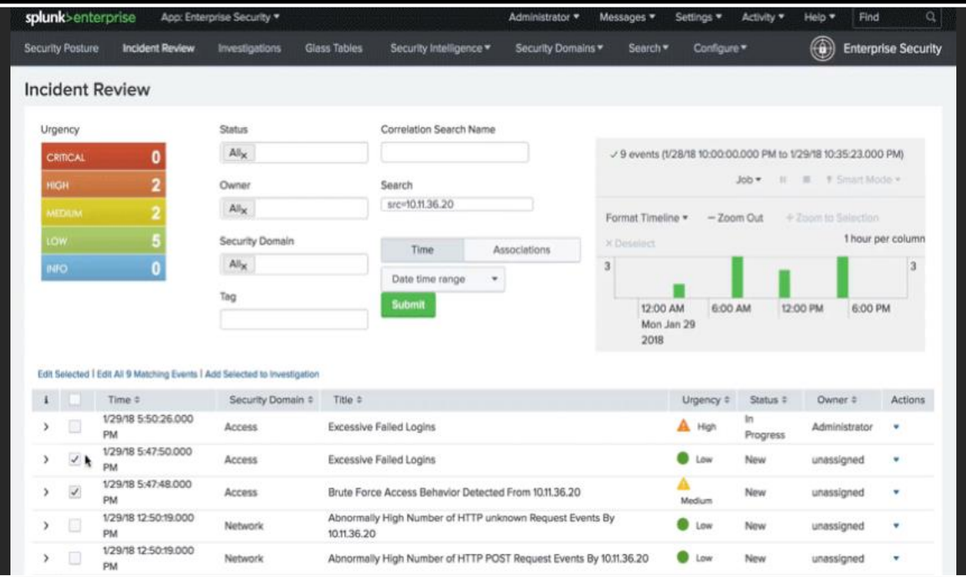
Lowered risk of data breach, IP theft, and fraud

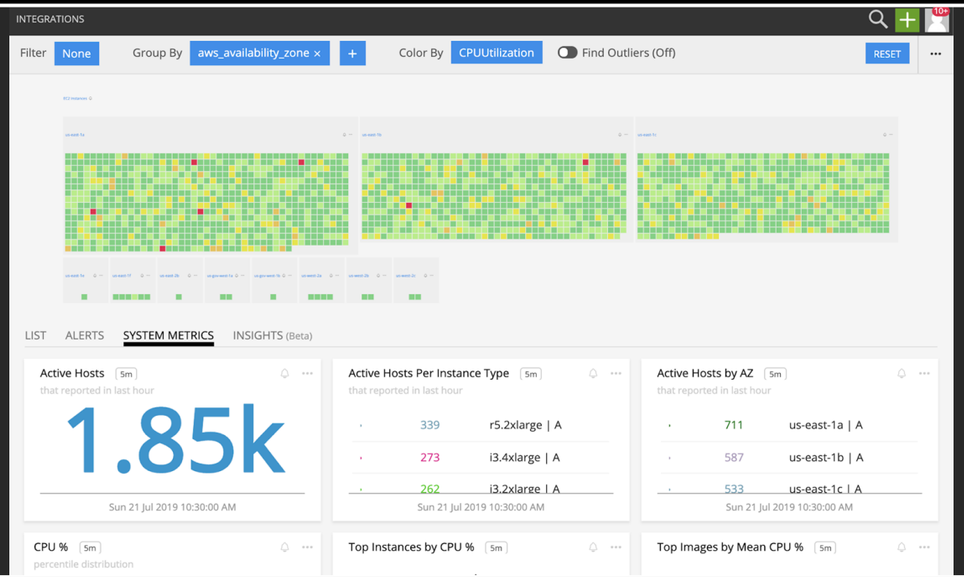
90%

Faster development

50%

Improvement in time to market for applications

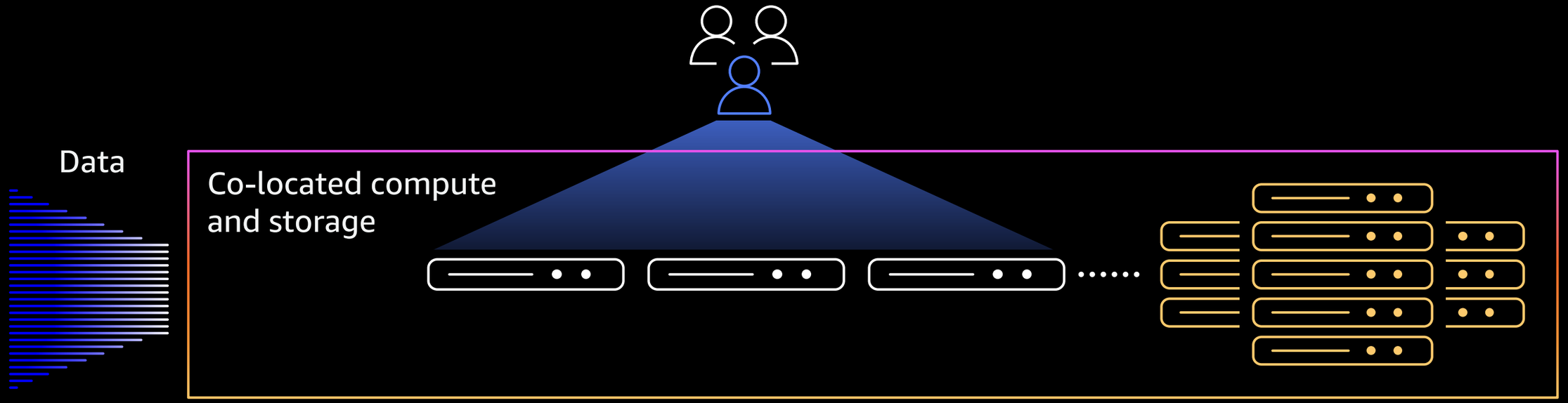




Key challenges

GROWING DATA VOLUMES AND INFRASTRUCTURE COST

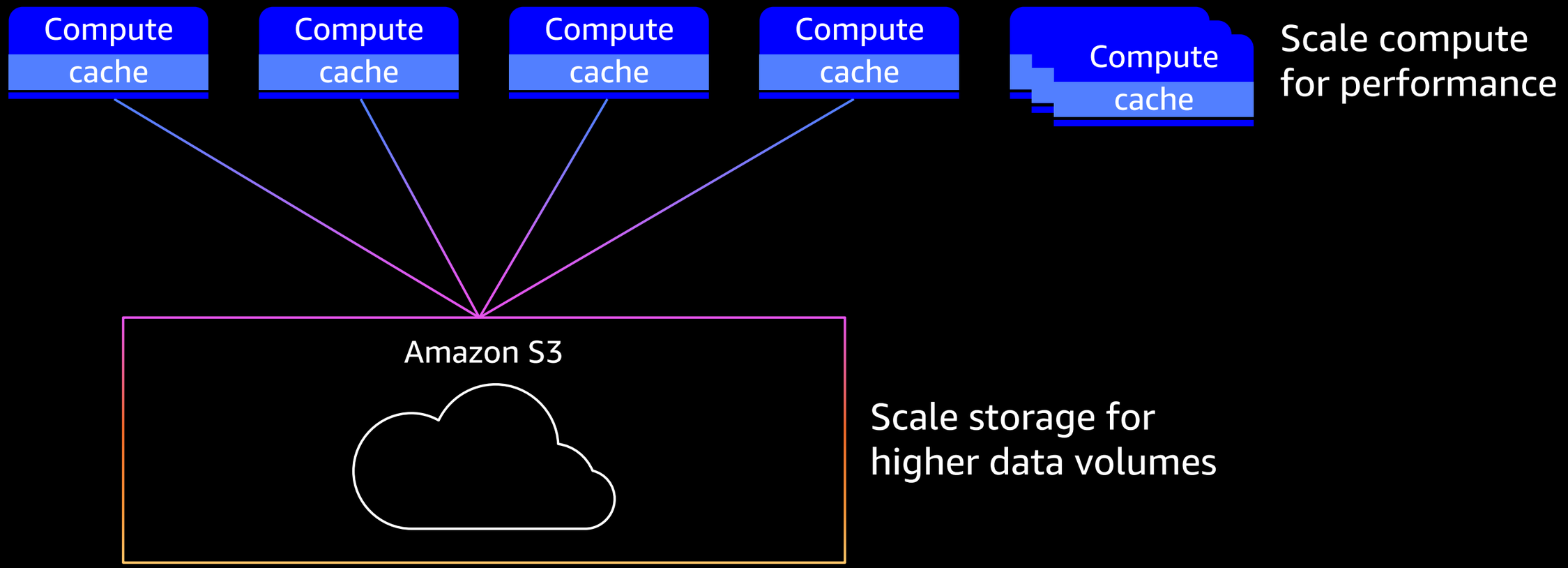
- Adding new compute nodes in response to data growth is expensive => high cost
- Searches typically are over only a partial subset of data => inefficient utilization



Storage and compute co-location is no longer
a good fit for growing data volumes

Splunk SmartStore

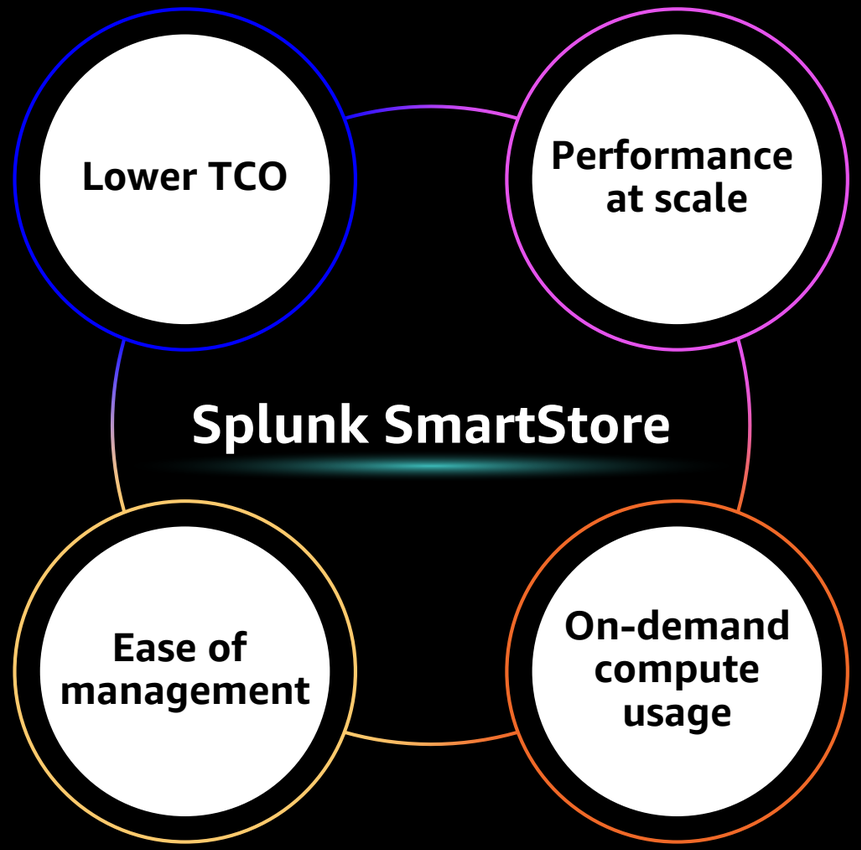
SCALE COMPUTE AND STORAGE INDEPENDENTLY



Optimized search performance
by bringing in data close to compute on-demand

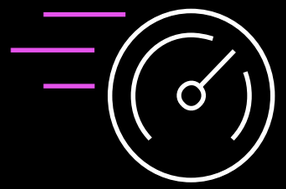
Splunk SmartStore – Key benefits

DELIVERS BUSINESS VALUE FROM GROWING DATA VOLUMES COST-EFFICIENTLY



Splunk leveraging cloud innovation to modernize infrastructure and deliver business value

Innovation in Amazon FSx for Lustre



PERFORMANCE

HIGH PERFORMANCE
for compute-intensive workloads

Submillisecond latencies, 10s of millions of IOPs

Unlimited per-client throughput

Up to hundreds of GBs/second of throughput



COST

BEST PRICE
per unit of throughput

NEW in 2020!

$0.025 per GB-month for HDD persistent file storage



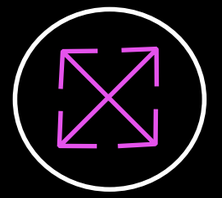
MANAGEMENT

ENTERPRISE CLASS
Fully managed

NEW in November!

AWS Backup integration

Various replication options



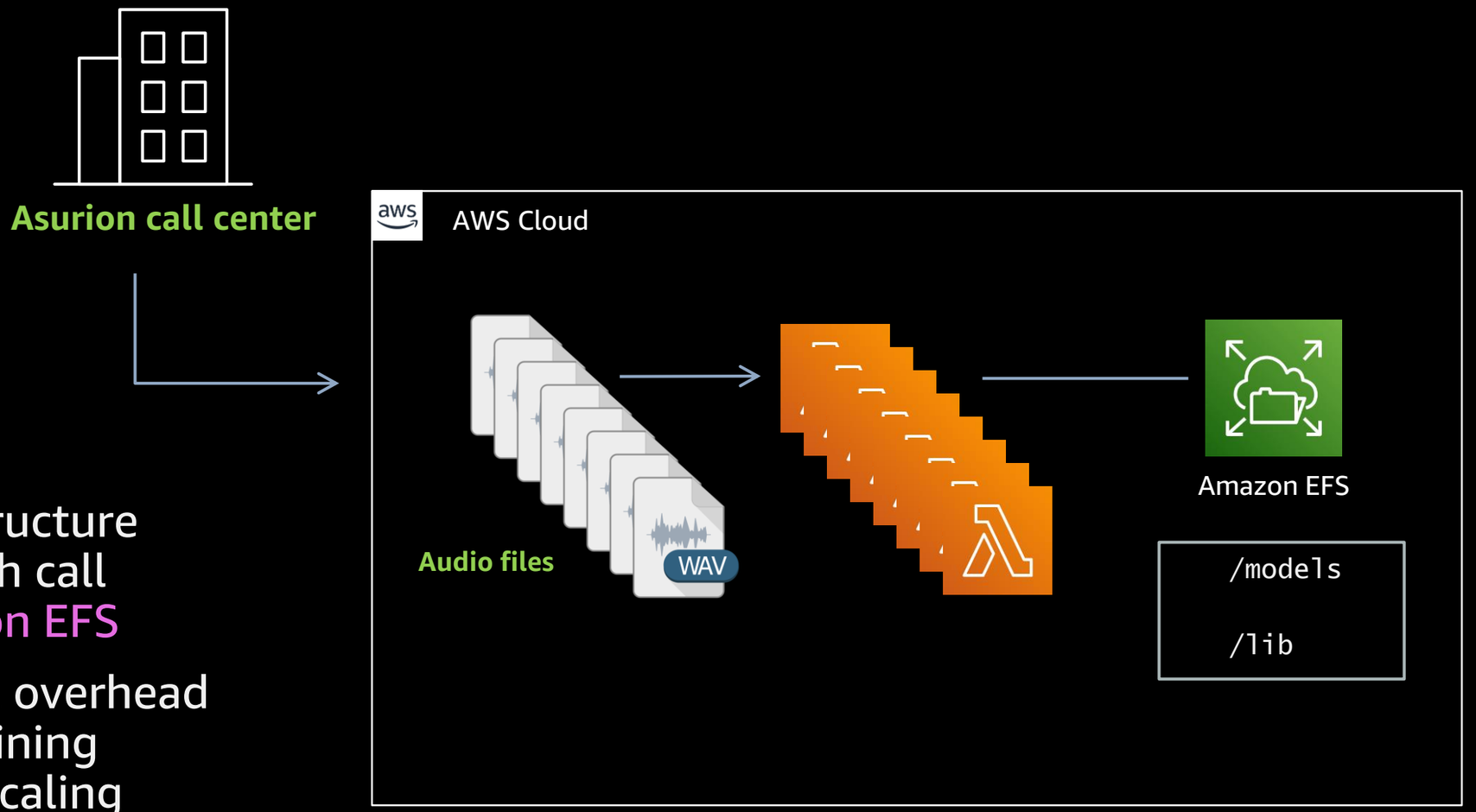
INTEGRATION

BROAD INTEGRATION
with AWS services

Amazon EKS, Amazon Batch, AWS ParallelCluster, Amazon SageMaker

High-performance cache of S3 data

asurion



- ML inference infrastructure scaled elastically with call volume using Amazon EFS
- Reduced operational overhead compared to maintaining instances and auto-scaling

Real-time analysis of customer experience during support calls using ML on AWS Lambda with Amazon EFS



TOYOTA
RESEARCH INSTITUTE

Toyota Research Institute reduced object recognition machine learning training times

"We needed a parallel file system for our ML training datasets and chose Amazon FSx for Lustre... the integration with AWS services, including S3, also made it the preferred option for our high-performance file storage."

David Fluck, Software Engineer
Toyota Research Institute

Putting it all together



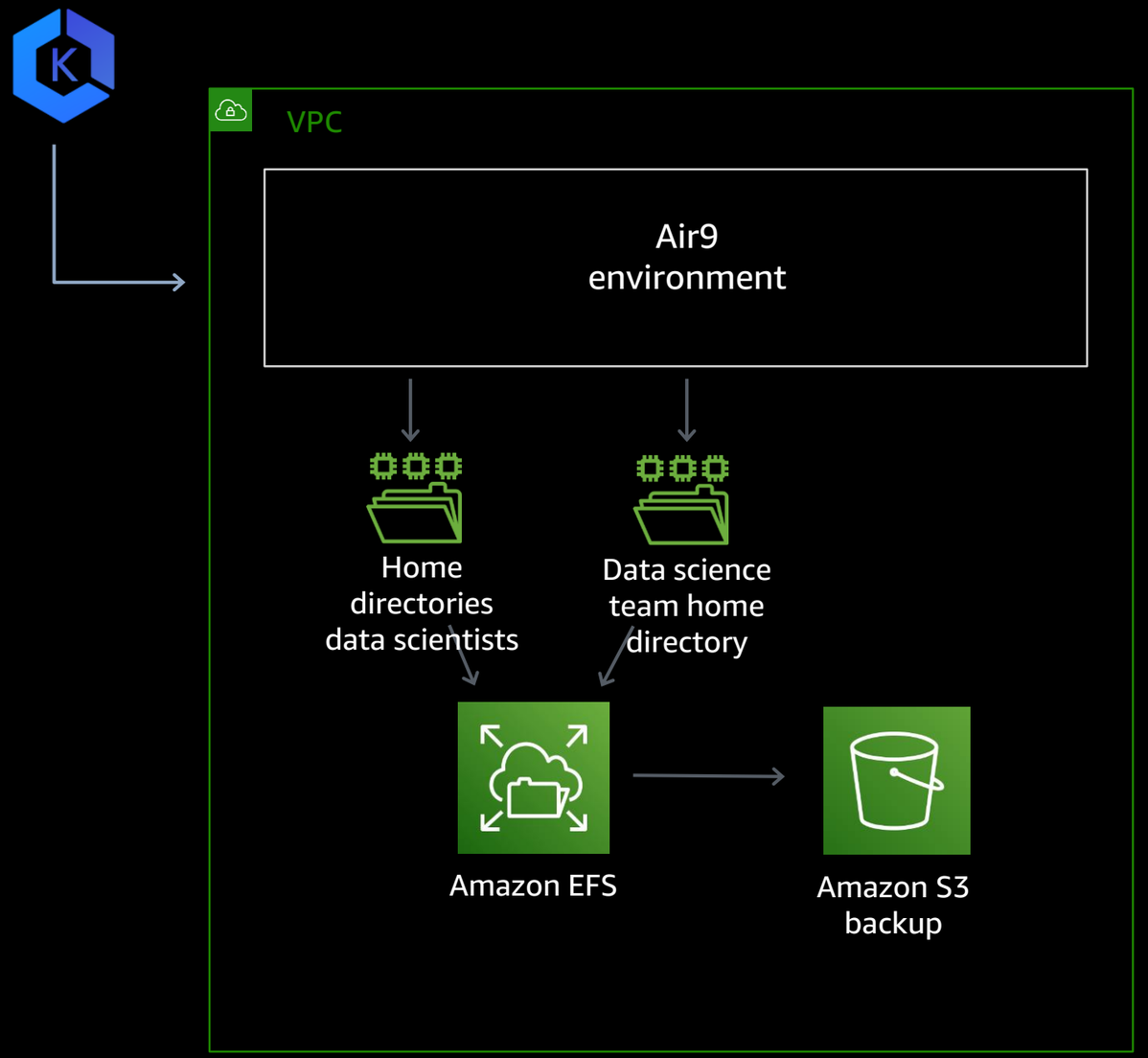
Optimize with data

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Putting AWS Storage services together



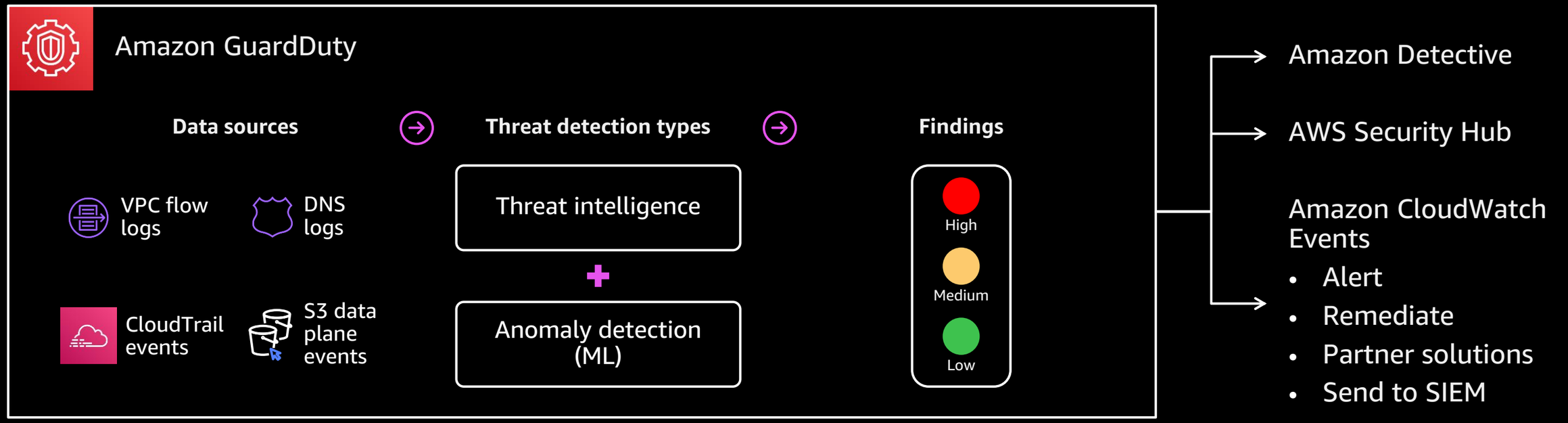
- Data scientists can focus on insights instead of technology
- 50% reduction in storage costs using Amazon EFS for home directories and Amazon S3 for backups
- Cuts storage management time by 90% and costs by 50–60%
- Updates data platform in hours, not weeks



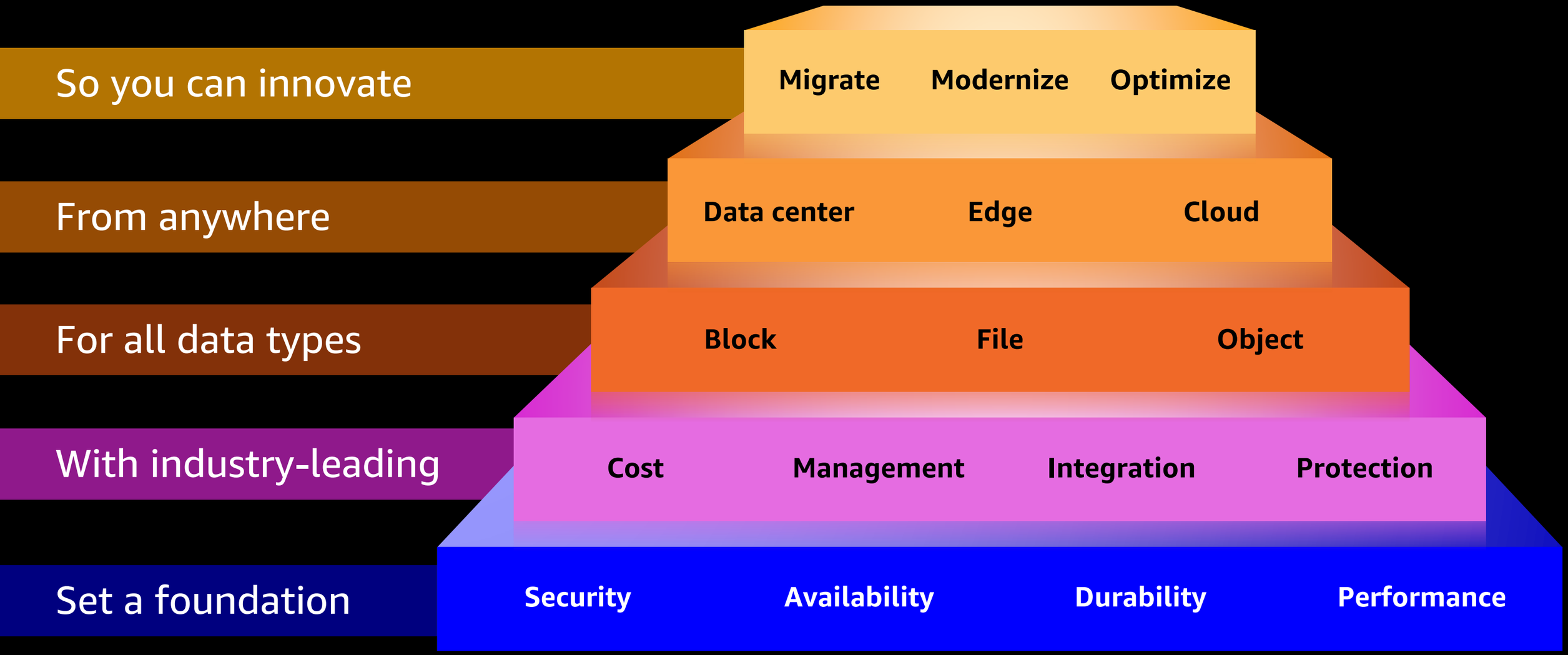
Security risk detection with Amazon GuardDuty for S3

mercado libre

- Enabled Amazon S3 protection across entire organization and 16 Regions with a single click
- Over **36K Amazon S3 access events analyzed every second** for security risks
- **79% lower costs** to monitor Amazon S3 access via Amazon GuardDuty compared with log collection via AWS CloudTrail



AWS storage for application innovation




AWS
re:Invent

Thank you!



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