
AWS
re:Invent

STG 307

Deep dive on Amazon EFS

Abrar Hussain

Principal Product Manager, Amazon EFS

AWS

AWS re:Invent

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Amazon EFS Sessions

STG213 What's new with Amazon EFS

STG306 Security best practices with Amazon EFS

STG307 Deep dive on Amazon EFS

STG310 Modernize your applications with AWS Lambda and Amazon EFS

STG311 Optimizing Amazon EFS for cost and performance, using best practices

STG312 Modernize your applications with containers using Amazon EFS

STG313 Reduce TCO for your Linux file-based applications

STG314 Amazon EFS performance best practices for Linux workloads

Agenda

- What is Amazon EFS?
- Deep dive on Amazon EFS
- AWS integrations
- Customer use cases
- Best practices
- Call to action



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What is Amazon EFS?



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What is Amazon EFS?

SIMPLE, SCALABLE, FULLY MANAGED, HIGHLY DURABLE, AND AVAILABLE SHARED FILE SYSTEM FOR AWS COMPUTE

SIMPLE AND HIGHLY RELIABLE



Elastic

Pay only for capacity used

Performance built-in, scales with capacity



3-AZ durable and all-AZ available

Designed for 11 9s of durability

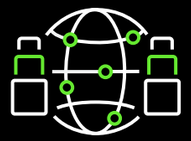
99.99% availability SLA

SERVERLESS SHARED STORAGE



Serverless and scalable

No provisioning, scale capacity, connections, and IOPS



Concurrent access for 10,000s of connections

EC2 Instances, containers, and Lambda invocations

PERFORMANT AND COST OPTIMIZED



Performant

10s of GB/s of and 500,000+ IOPS



Two storage classes

Lifecycle-based cost optimization

Use cases for Amazon EFS



Home directories

Container storage

Application test/dev
(Jenkins, JIRA, Git)

Lift and shift enterprise apps

Web serving (nginx)

Content management
(Wordpress, Drupal)

Database backups

Analytics

Media workflows

Metadata-intensive jobs

Scale-out jobs

Low latency and serial I/O

High throughput and parallel I/O

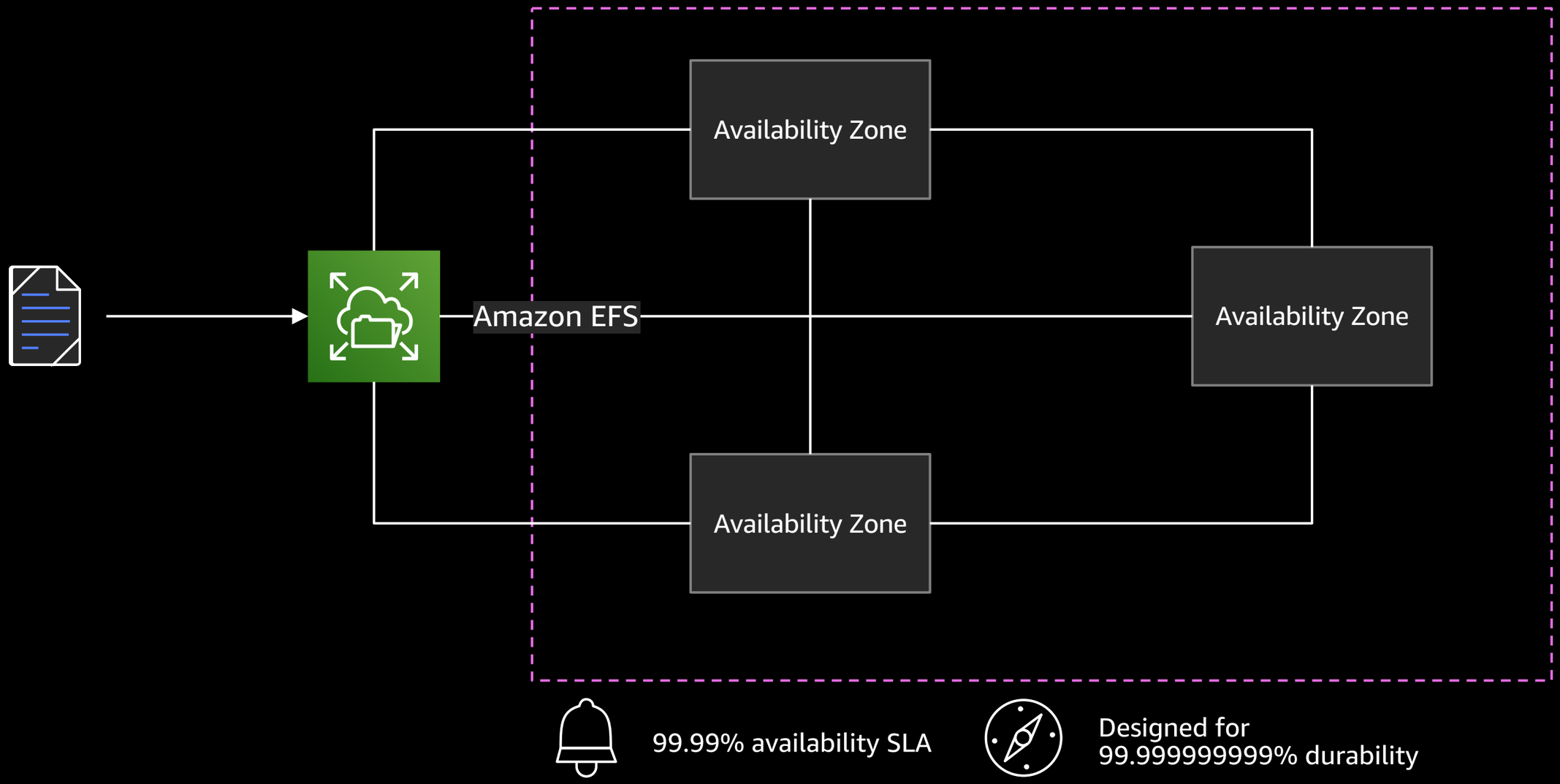
Deep dive into Amazon EFS



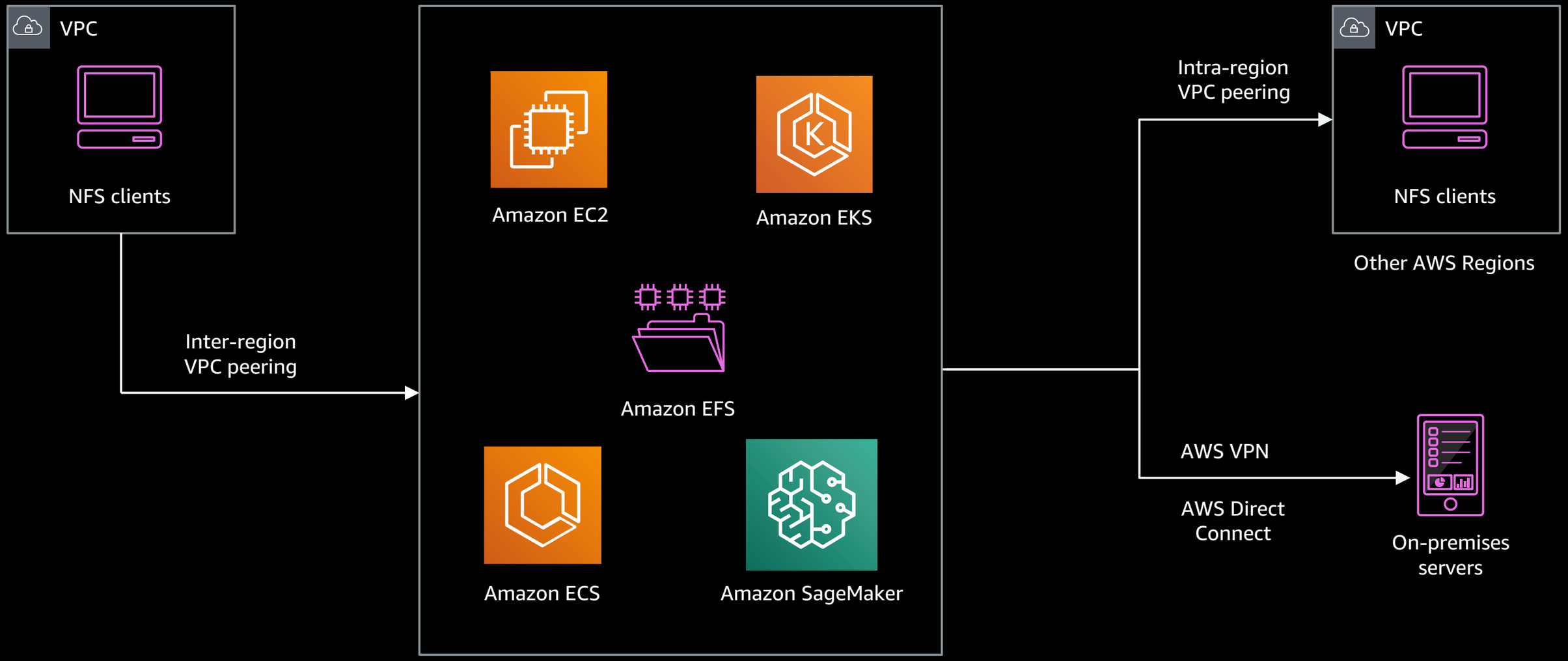
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Highly reliable



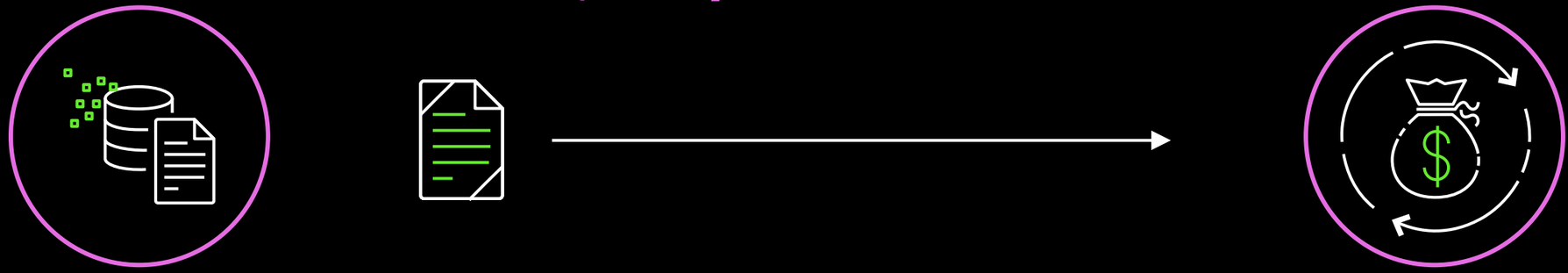
Serverless shared storage



Automatic cost optimization

ENABLE LIFECYCLE MANAGEMENT

Pay-as-you-go, effective storage cost of
$0.08/GB-MONTH*



Standard storage class

General-purpose file storage

$0.30/GB-month*

Infrequent access storage class

Cost-optimized for files not accessed every day

$0.025/GB-month* for storage

$0.01/GB* for access

*Pricing in the US East (N. Virginia) Region. Assumes 80% of the files are infrequently accessed

Enabling EFS lifecycle management

LIFECYCLE POLICIES CAN BE CONFIGURED TO 7, 14, 30, 60, OR 90 DAYS SINCE LAST ACCESS

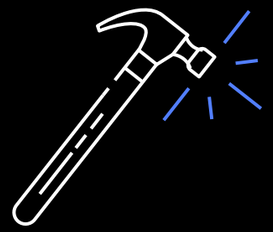


Enable lifecycle management, choose lifecycle policy

Infrequently accessed files automatically moved to Amazon EFS IA

All EFS features are supported with Amazon EFS IA

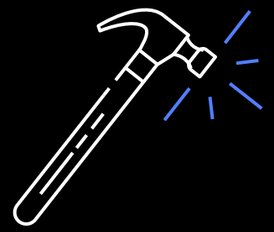
Amazon EFS performance modes



General Purpose (default)

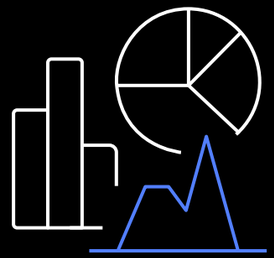
Recommended for the majority of workloads

Amazon EFS performance modes



General Purpose (default)

Recommended for the majority of workloads



Max I/O

Recommended for scale-out workloads

Amazon EFS performance modes: General Purpose



General Purpose (default)

Recommended for the majority of workloads

What it's for

Latency-sensitive applications and general-purpose workloads

Large-scale and data-heavy applications

Advantages

Lowest latencies for file operations

Virtually unlimited ability to scale out throughput / IOPS

Trade-offs

Limit of 35K read and 7K write operations / sec

Slightly higher metadata latencies

When to use

Best choice for most workloads

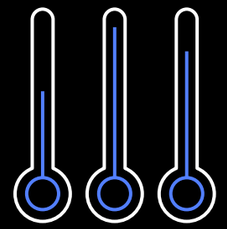
Consider for large scale-out workloads



Max I/O

Recommended for scale-out workloads

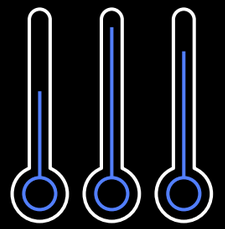
Amazon EFS throughput modes



Bursting Throughput
(default)

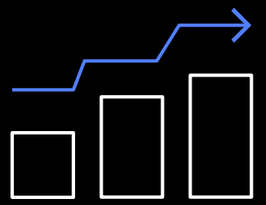
Recommended for the
majority of workloads

Amazon EFS throughput modes



Bursting Throughput (default)

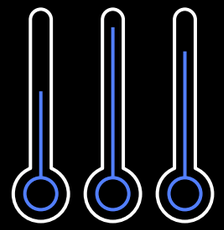
Recommended for the majority of workloads



Provisioned Throughput

Recommended for higher throughput-to-storage ratio workloads

Amazon EFS throughput modes



Bursting Throughput (default)

Recommended for the majority of workloads

What it's for

Varying throughput workloads

Advantages

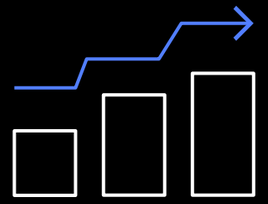
Auto-scaling throughput

Trade-offs

Fixed throughput-to-storage ratio

When to use

Best choice for most workloads



Provisioned Throughput

Recommended for higher throughput-to-storage ratio workloads

What it's for

Higher-consistent throughput workloads

Advantages

User-defined throughput

Trade-offs

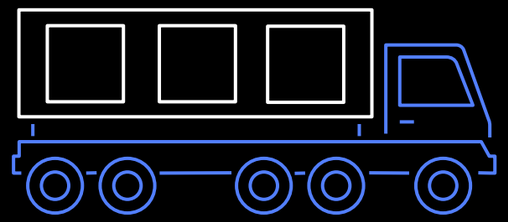
Separate throughput charge

When to use

Higher throughput-to-storage ratio

Loading more than 2.1 TB

Provisioned throughput



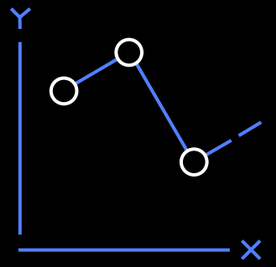
Independent throughput

Provision throughput independently of data stored



Increase

As often as you need

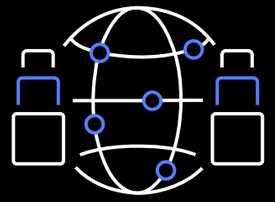


Switch or decrease

Once every 24+ hours

Security and compliance

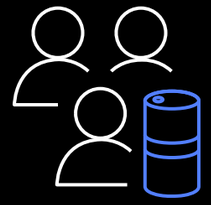
To learn more:
STG306



Control client access

Using Amazon VPC security groups and network ACLs

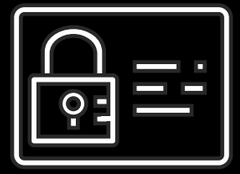
Using IAM identity and resource policies



Control file and directory access

Using POSIX permissions

Using access points



Control administrative (API) access

Using AWS IAM, action-level and resource-level permissions, and identity-based policies



Encrypt data

At rest and in transit



Achieve compliance

HIPAA

GDPR

PCI-DSS

SOC

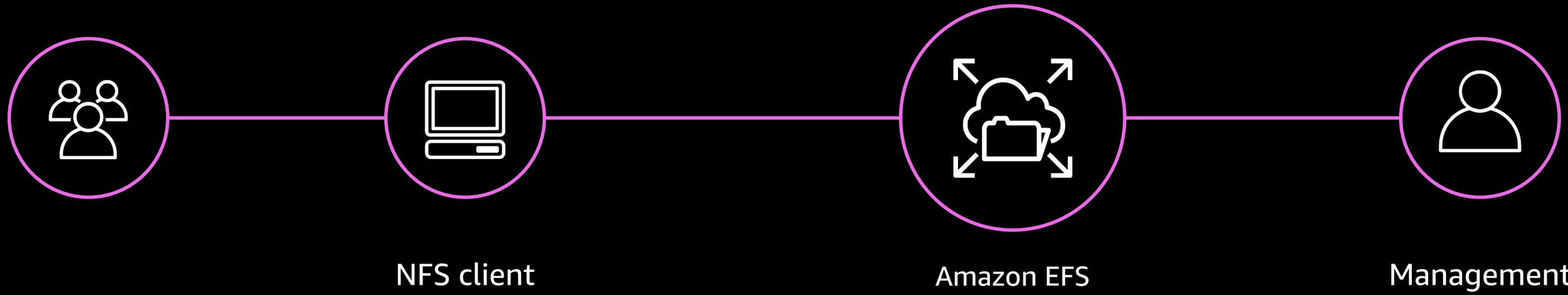
ISO

FedRAMP

Security and compliance

IAM AND ACCESS POINTS

To learn more:
STG306





Industry best practices

Enforce encryption
Prevent privilege escalation
Synchronize user and group access



Cloud native security

Client Authentication using IAM
Access Points for multitenant datasets

AWS integrations



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AWS integrations


Amazon VPC


AWS IAM


AWS KMS


Amazon CloudWatch


AWS CloudTrail


AWS CloudFormation


AWS Direct Connect


AWS VPN

Sep ‘20


AWS Systems Manager


Amazon EFS

July ‘20*

June ‘20


AWS DataSync


AWS Backup


Amazon EC2


Amazon SageMaker


Amazon EKS


Amazon ECS

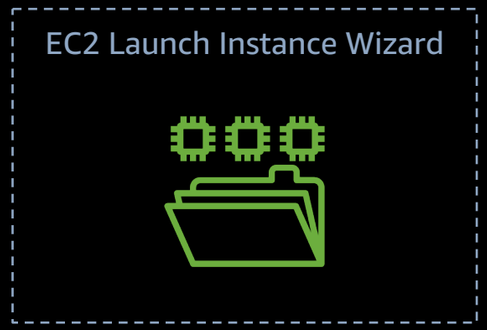

AWS Fargate

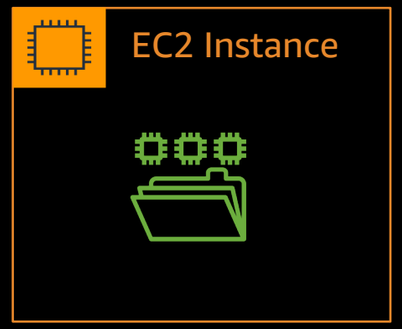

AWS Lambda

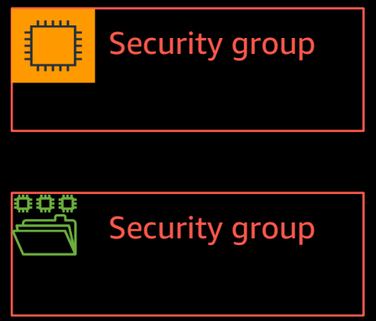
*Added EKS + Fargate support. ECS + Fargate has been supported since April ‘20

AWS integrations

Amazon EFS Quick Create from the Amazon EC2 Launch Instance Wizard







Quickly create Amazon Elastic File System (Amazon EFS) file systems

Create Amazon EFS file systems directly in the Amazon Elastic Compute Cloud (Amazon EC2) Launch Instance Wizard

Automatically mount your newly created Amazon EFS file systems on the instance

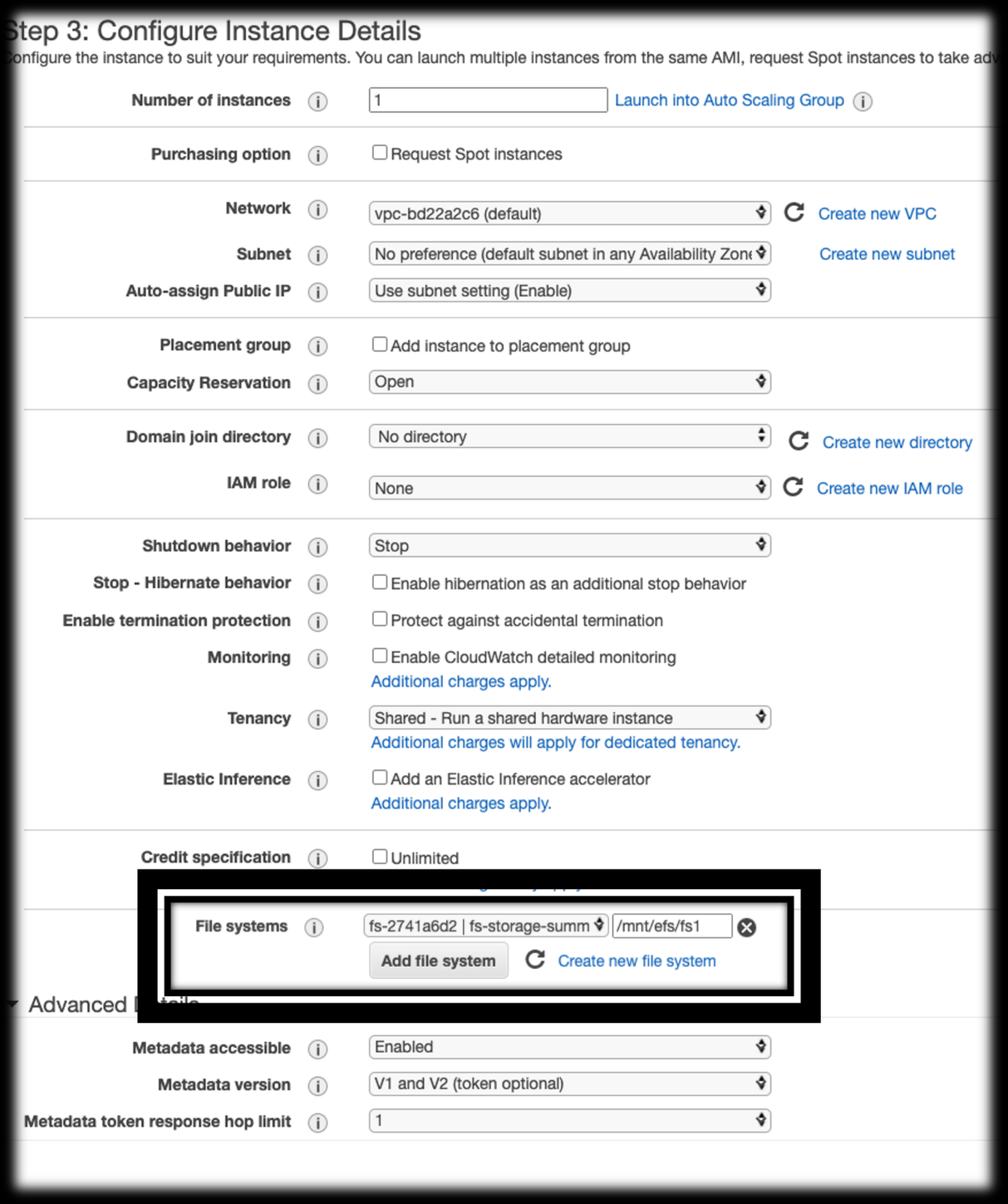
Add the newly created file system to the instance you are launching and it will get automatically mounted.

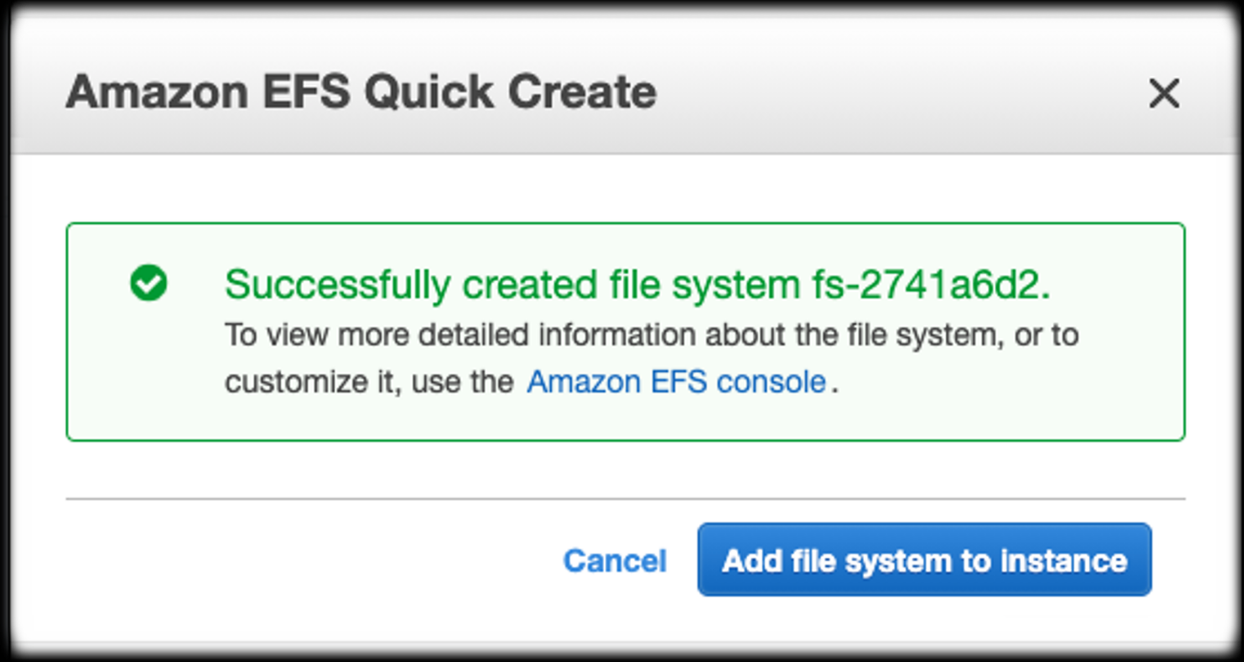
Skip manual Security Group configuration

The required Security Groups are automatically created allowing the file system to mount on the instance.

AWS integrations

Amazon EFS Quick Create from the Amazon EC2 Launch Instance Wizard





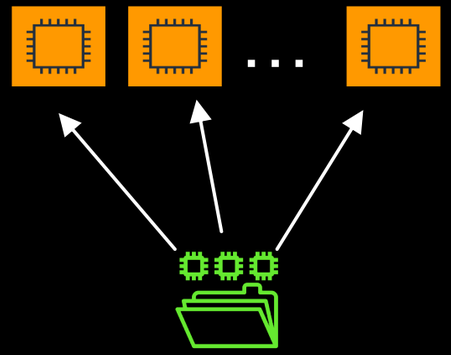
AWS integrations

Simplify Amazon EFS client management using AWS Systems Manager



Automate and maintain compliance

Automate the tasks required to install the latest version of EFS client. Maintain compliance and security by ensuring that the client is kept up to date.



Orchestrate file system mounts

Mount a file system to multiple EC2 instances using a single command.



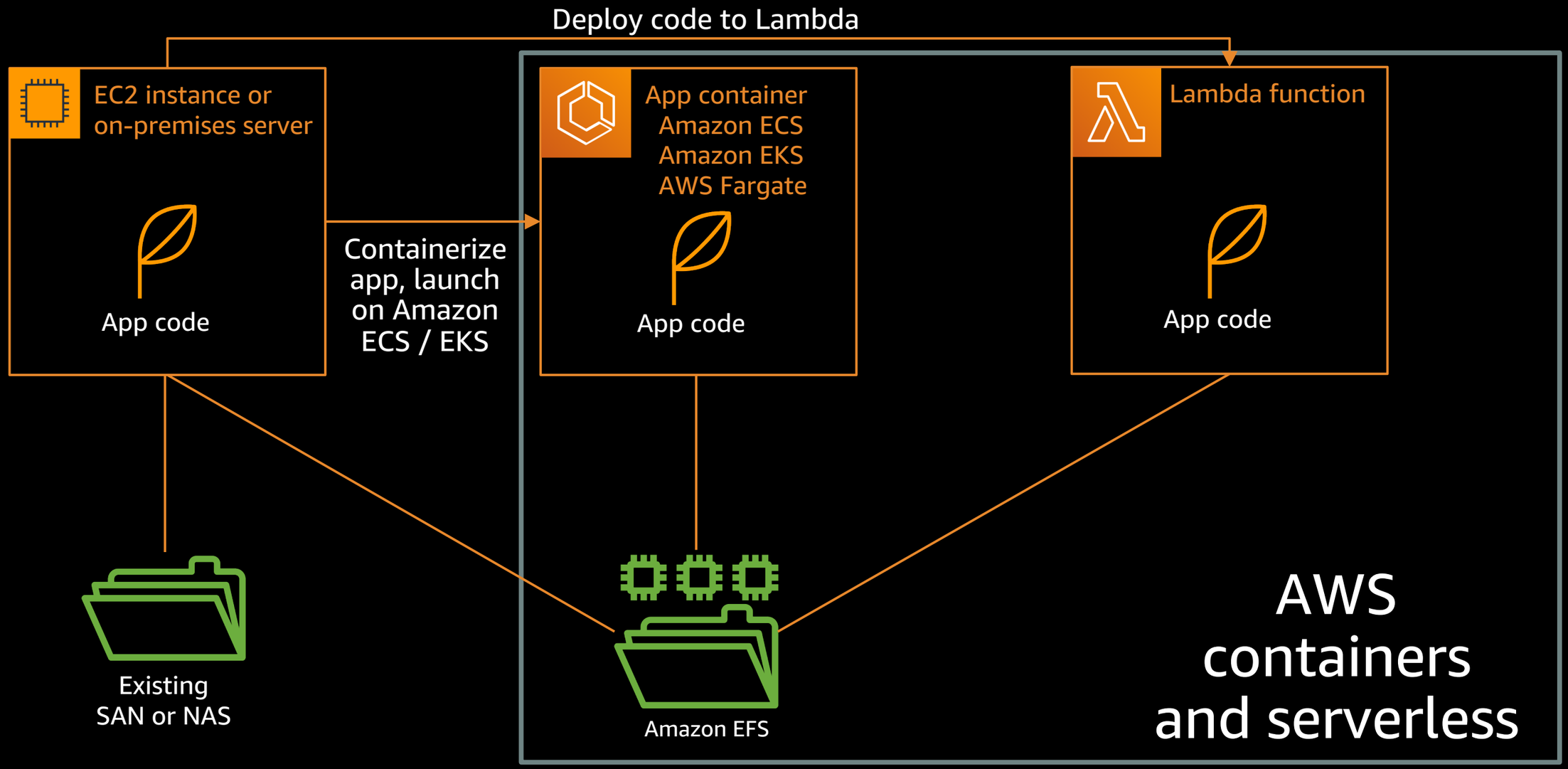
Improve visibility

Monitor file system mount status using CloudWatch logs.

AWS integrations

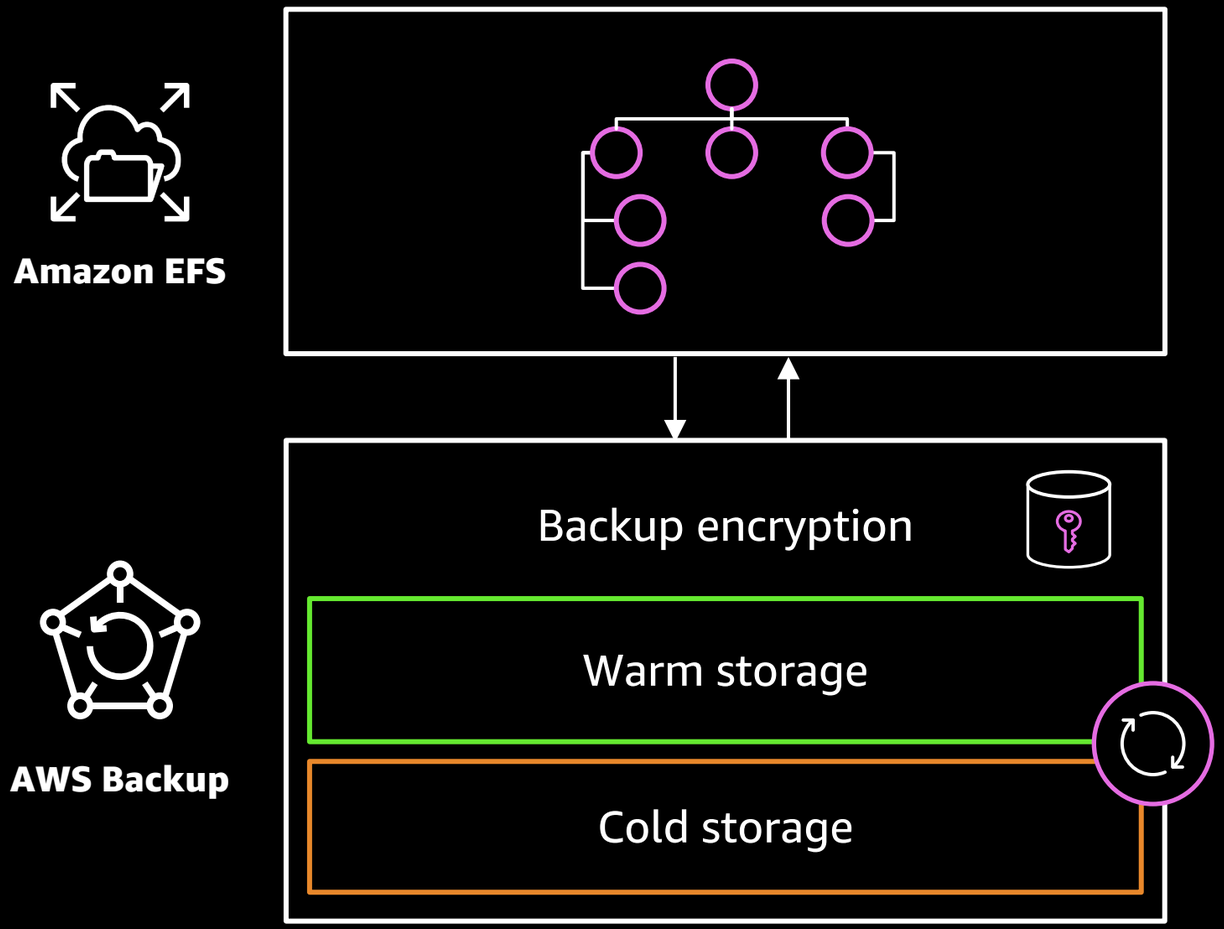
Serverless storage for your application modernization

To learn more:
STG310, STG312



AWS integrations

Automatic backup and item-level recovery



All **AWS Backup** generated backups of **Amazon EFS** file systems are replicated to 3 AZs, and are designed for 11 9s durability

Amazon EFS file systems can be backed up and restored using AWS Backup

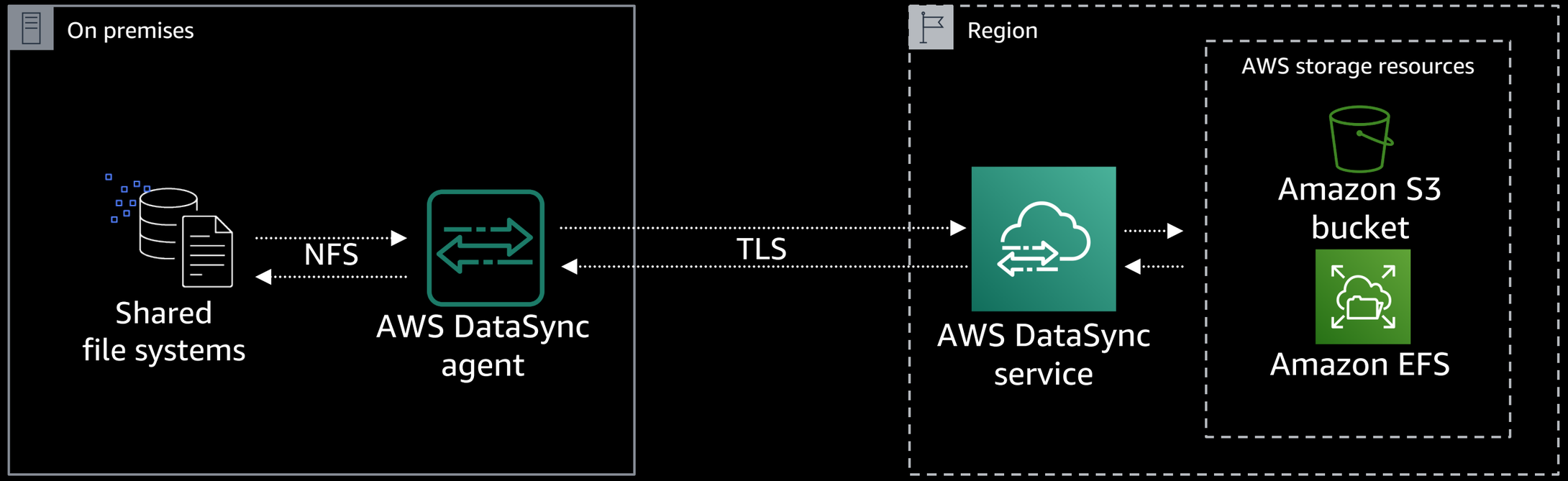
AWS Backup provides automated backup scheduling and retention per user defined policy

AWS Backup offers two classes of service backup storage with the ability to lifecycle to cold storage

Restore individual files and directories

AWS integrations

Migration to Amazon EFS using AWS Data Sync



AWS DataSync – online transfer service that simplifies, automates, and accelerates moving data between on-premises storage and AWS

Customer examples



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MicroStrategy uses AWS to deploy platform in minutes, not weeks

Challenge

MicroStrategy needed to meet customer demands for faster analytics by deploying the full MicroStrategy platform in less time

Company also needed easier way to scale its platform

Solution

MicroStrategy offers its full analytics and mobility platform on the AWS Cloud, taking advantage of services such as Amazon EFS, Amazon RDS, AWS CodeDeploy, and Amazon EC2

Benefits

Enables deployment in 30 minutes instead of weeks

Helps beverage company give sales people faster access to data

Enables pharmaceutical firm to deliver intelligence to 90% of field representatives

Helps online marketing company empower business leaders with real-time business KPI updates

> "By optimizing our full analytics and mobility platform on AWS, we are enabling deployment, installation, and configuration with only 3 clicks instead of 400."

Vijay Anand, Vice President for Product Marketing, MicroStrategy

MicroStrategy

Company: MicroStrategy

Industry: Big Data, Analytics, Batch Processing, and BI

Country: United States

Employees: 2,600

About MicroStrategy

MicroStrategy (Nasdaq: MSTR) is a leading worldwide provider of enterprise analytics and mobility software and services. The company's mission is to make every enterprise a more intelligent enterprise. MicroStrategy delivers modern analytics on an open, comprehensive enterprise platform.

Acquia modernizes web hosting with Amazon EKS & Amazon EFS

Challenge

Sought to further improve ability to elastically scale across compute and storage to improve their customers' digital experience.

Solution

Containerize hosting application, and run it on Amazon Elastic Kubernetes Service (Amazon EKS), using Amazon Elastic File System (Amazon EFS) for persistent storage.

Benefits

- Dynamic scaling of customer environments
- Lower TCO through improved storage and compute utilization
- Reduced administrative burden by leveraging fully managed services

> "By containerizing our hosting applications and running them on Amazon EKS and Amazon EFS, we have improved our customer experience, while considerably reducing our infrastructure and operational maintenance overhead."

– **Jake Farrell,** Senior Director of Engineering, Acquia

Company: Acquia
Industry: IT
Country: United States
Employees: 1k+

About Acquia

Acquia's software and services are built around Drupal to give enterprise companies the ability to build, operate, and optimize websites, apps, and other digital experiences.

To learn more:
STG312

Asurion builds on-demand ML using AWS Lambda & Amazon EFS

Challenge

Perform real-time analysis of customer experience during support calls using ML. Call recordings didn't fit in Lambda /tmp space.

Solution

Asurion uses Amazon Elastic File System (Amazon EFS) to give extended storage space to their ML functions running in AWS Lambda.

Benefits

- ML inference infrastructure scales elastically with call volume
- Reduced operational overhead compared to maintaining instances and auto-scaling

> "We really wanted to use AWS Lambda to make our ML inference elastic but thought we wouldn't be able to because of the size of data the process required. With Amazon EFS, we were easily able to give our function all of the storage space it needs."

– **Jeff Tougas,** Senior Principal Software Engineer, Asurion

asurion

Company: Asurion
Industry: Insurance Services
Country: United States
Employees: 10K+

About Asurion

Asurion helps people stay connected to their technology. Their experts can repair, replace, and resolve nearly any tech issue. They can be reached via call, chat, and in-person, at one of their uBreakiFix stores. They will also come directly to their customers, at their convenience.

To learn more:
STG310

What’s new



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What’s new with Amazon EFS?

To learn more:
STG213



Enterprise capabilities

99.99% Availability SLA

AWS IAM Authorization for NFS Clients

EFS Access Points

Additional cost-optimization via lifecycle management

AWS integrations

Container services (Amazon ECS, Amazon EKS, AWS Fargate)

AWS Lambda

EC2 Launch Instance Wizard Integration (EFS Quick Create)

Automatic backups and item-level recovery with AWS Backup

AWS Systems Manager Integration

Performance enhancements

5x read IOPS (up to 35K)

2x per client throughput (up to 500 MB/sec)

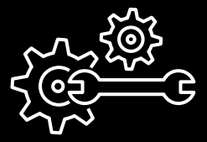
Best practices



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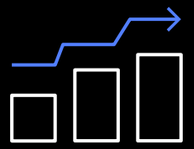
Amazon EFS | Developer best practices



Test in
General Purpose
performance mode



Start
with Bursting
Throughput mode



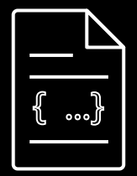
Consider Provisioned
Throughput mode for
loading >2.1 TB



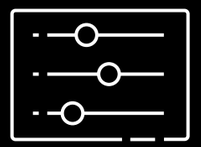
Linux kernel 4.3+



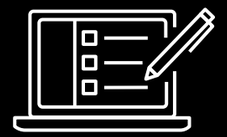
EFS mount helper
(NFSv4.1)



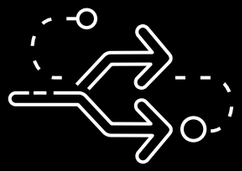
Large I/O size
(aggregate I/O)



Multiple
threads



Multiple
instances



Multiple
directories

Amazon EFS | Administrative best practices



Enable lifecycle management to automatically save up to 92%



Enable encryption at rest and in transit for sensitive workloads



Create a backup plan to further protect your data



Simplify EFS client management with AWS Systems Manager



Monitor throughput utilization, burst credits, and PercentIOLimit



Use AWS Budgets for cost management

Getting started with Amazon EFS



Sign up for an AWS account

Instantly get access to the AWS Free Tier



10-minute tutorial

Learn how to use Amazon EFS



Start building your cloud-native file system

Step-by-step walkthroughs

Get started: https://aws.amazon.com/efs/getting-started/

Tutorials: https://github.com/aws-samples/amazon-efs-tutorial

Migration: https://d1.awsstatic.com/whitepapers/aws-load-store-protect-linux.pdf

Amazon EFS Sessions

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STG313 Reduce TCO for your Linux file-based applications

STG314 Amazon EFS performance best practices for Linux workloads

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