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Get To Know Your Amazon Elastic File System (EFS)

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Agenda

- Introduction
- Deep dive on Amazon EFS
- What's new?
- Customer use cases
- Demo
- Summary

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How can you transform faster with file storage?

Infrastructure

Improve fundamentals: security, availability, performance, and cost

Architecture

Increase agility and ability to innovate

Business

Maximize your business results

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Accelerating your infrastructure transformation

Infrastructure

- Provide highly secure and reliable storage, always available and accessible
- Deliver price and performance to match your application needs at scale
- Enable native data protection, compliance, and backup

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Accelerating your architectural transformation

Architecture

- Capitalize on what the cloud offers by integrating natively with AWS services
- Secure data using native security methods, encryption, and IAM authorization
- Support latest compute models such as containers, microservices, and serverless

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Accelerating your business transformation

Business

- Reduce the cost and complexity of managing, maintaining, and operating infrastructure
- Generate opportunities to increase business value through analytics and machine learning
- Enable you to focus on innovation

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Using the right tool

Amazon Elastic File Service (EFS)

Linux-Based Workloads

Amazon FSx for Windows File Server

Windows-Based Workloads

Amazon FSx for Lustre

Compute-Intensive Workloads

FILE SYSTEMS FOR BUSINESS WORKLOADS

FILE SYSTEM FOR COMPUTE-INTENSIVE WORKLOADS

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Amazon EFS

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Amazon Elastic File System (Amazon EFS)

Amazon EFS
is a fully managed file system that is…

- **Cloud native**
- **Highly reliable**
- **Cost optimized**

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Use cases for Amazon EFS

Home directories

Container storage

Application test/dev

Lift and shift enterprise apps

Web serving

Content management

Database backups

Analytics

Media workflows

Metadata-intensive jobs

Scale-out jobs

Low latency and serial I/O

High throughput and parallel I/O

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Cloud native

Amazon EFS

Elastic

- Grow & shrink on demand
- No need to provision and manage infrastructure & capacity
- Pay as you go, pay only for what you use
- Simple to use, create a file system in seconds

Scalable

- Grow up to petabytes
- Performance modes for low latencies and maximum I/O
- Throughput that scales with storage
- Provisioned throughput available

Integrated

- Integrated with various AWS computing models
- Shared access from on-premises, inter region, and cloud-native applications
- Access concurrently from thousands of Amazon EC2 instances
- Attach to containers launched by both Amazon ECS (AWS Fargate) and Amazon EKS (AWS Fargate - coming soon)
- Use with Amazon SageMaker notebooks

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Highly reliable

Highly available, durable

- Stores data across three availability zones for high availability and durability
- Access your file system from multiple AZs
- Strong consistency for concurrent access

Secure

- Control network traffic
- Control file and directory access
- Control administrative (API) access with AWS IAM
- Encrypt data at rest and in transit
- Control NFS client access with AWS IAM
- Manage application access with EFS Access Points

Global footprint

- Amazon EFS is available in ALL regions
- Globally expanding regional service
- 90-day SLA for launch in new regions: Cape Town and Milan (5/13)

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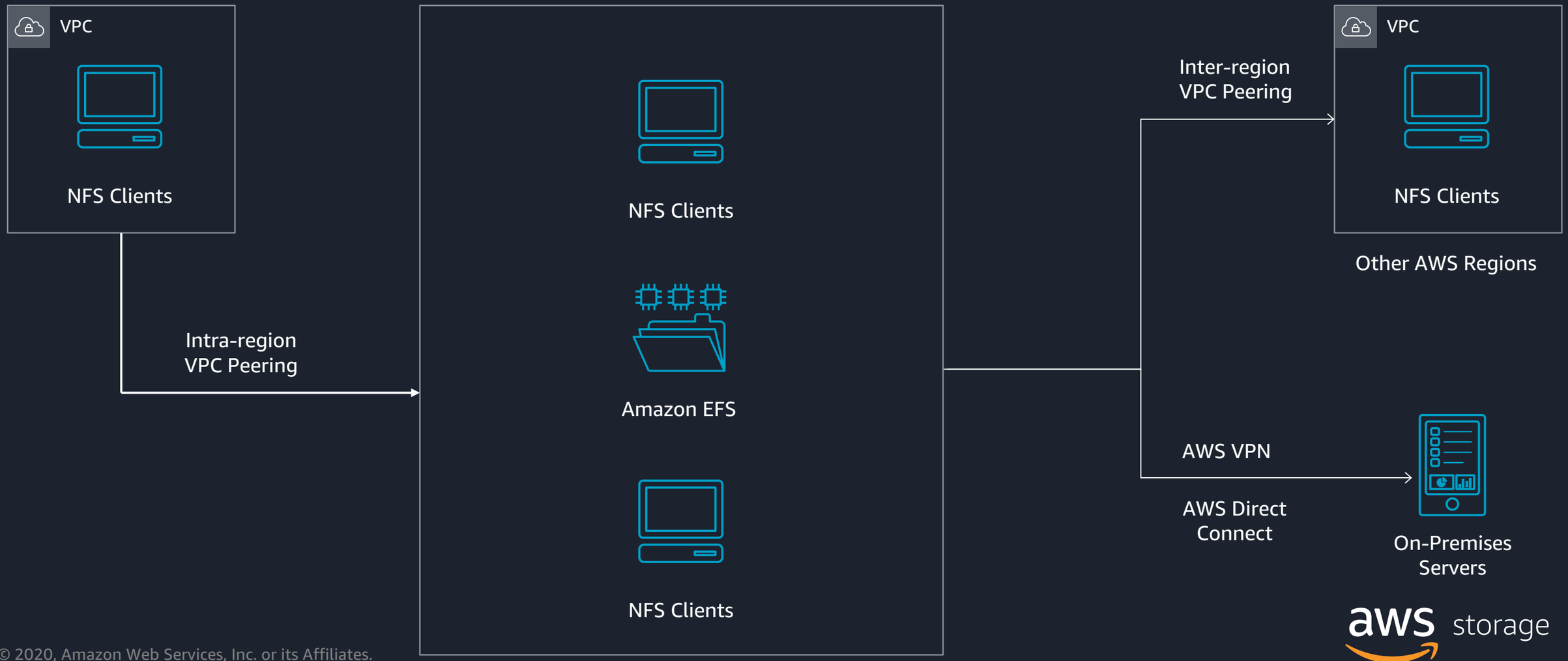
Highly reliable

Shared access



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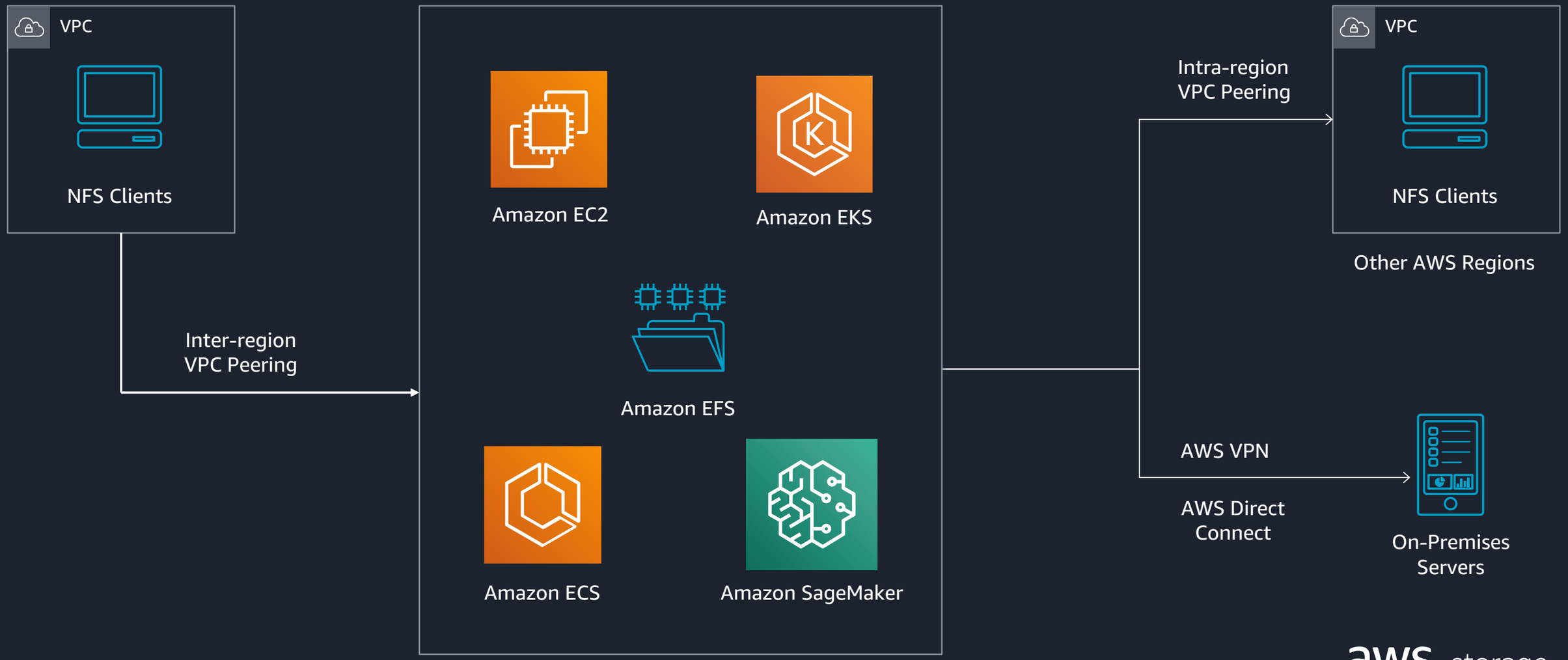
Cloud native

Highly integrated, shared access



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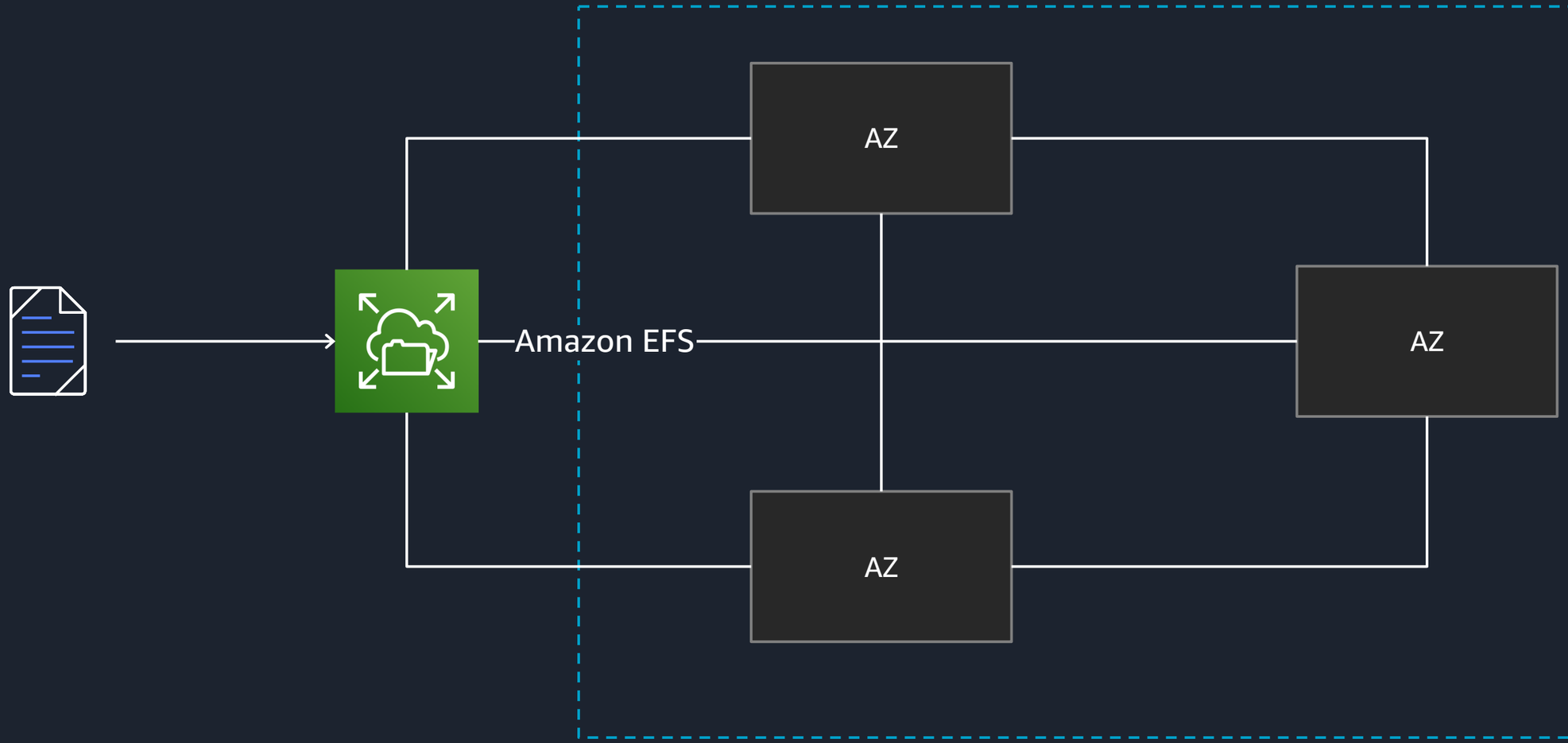
Highly reliable

Benefits of 3 independent AZs in each AWS Region



99.99% Availability SLA

Designed for 99.999999999% durability

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Cost optimized

Cost optimized | Amazon EFS

No minimum commitments or upfront fees

No need to provision storage

Use with Spot Instances

Automatic lifecycle management to lower cost storage

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Cost optimized

Amazon EFS

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

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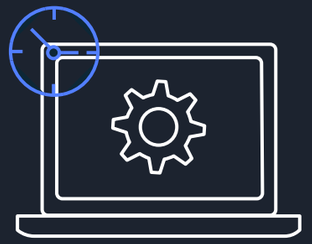
Amazon EFS Infrequent Access

Amazon EFS IA storage class for infrequently accessed files for $0.025/GB per month*

No changes to existing applications using Amazon EFS

Cost savings up to 92%



Automated lifecycle management

* Pricing in the US East (N. Virginia) region

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Enabling EFS Lifecycle Management

Lifecycle policies can be configured to 7,14, 30, 60, or 90 days since last access

All EFS features are supported with Amazon EFS IA

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Amazon EFS performance modes

General Purpose (default)

Recommended for the majority of workloads

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EFS performance modes

General Purpose (default)

Recommended for the majority of workloads

Max I/O

Recommended for scale-out workloads

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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 metadata operations

Virtually unlimited ability to scale out IOPS

Trade-offs

35k read ops/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

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EFS throughput modes

Bursting Throughput (default)

Recommended for the majority of workloads

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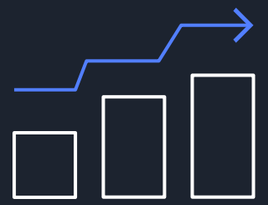
EFS throughput modes

Bursting Throughput (default)

Recommended for the majority of workloads



Provisioned Throughput

Recommended for higher throughput-to-storage ratio workloads

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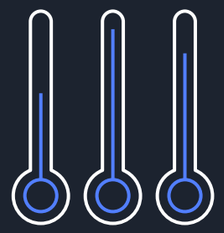
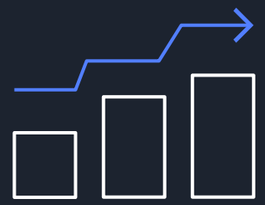
EFS throughput modes



Bursting Throughput (default)

Recommended for the majority of workloads

	Bursting Throughput (default)	Provisioned Throughput
What it's for	Varying throughput workloads	Increased, more consistent throughput workloads
Advantages	Auto-scaling throughput	User-defined throughput
Trade-offs	Fixed throughput-to-storage ratio	Separate throughput charge
When to use	Best choice for most workloads	Higher throughput-to-storage ratio Loading more than 2.1 TB



Provisioned Throughput

Recommended for higher throughput-to-storage ratio workloads

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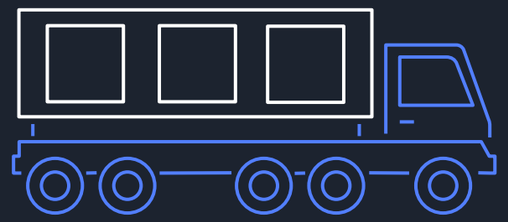
Provisioned Throughput

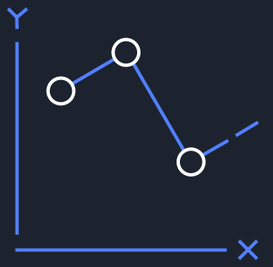


Independent throughput

Provision throughput independently of data stored

Increase

As often as you need



Switch or decrease

Once every 24+ hours

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Bursting Throughput pricing

Single pricing dimension

Storage price

$0.30/GB-month*

Includes 50 KiB/s throughput per GiB of storage

* Pricing in the US East (N. Virginia) region

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Provisioned Throughput pricing

Two pricing dimensions

Storage price

$0.30/GB-month*

Includes 50 KiB/s throughput per GiB of storage

* Pricing in the US East (N. Virginia) region

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Provisioned Throughput pricing

Two pricing dimensions

Storage price

$0.30/GB-month*

Includes 50 KiB/s throughput per GiB of storage

Throughput price

$6.00/MiBps-month*

Above 50 KiB/s throughput per GiB of storage

* Pricing in the US East (N. Virginia) region

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Security and compliance

Control network traffic

Using Amazon VPC security groups and network ACLs

Control file and directory access

Using POSIX permissions

control client identity/mount permissions with access points

Control administrative && application access

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

Manage application access with EFS Access Points

Encrypt data

At rest and in transit

Achieve compliance

HIPAA

GDPR

PCI-DSS

SOC

ISO

FedRAMP

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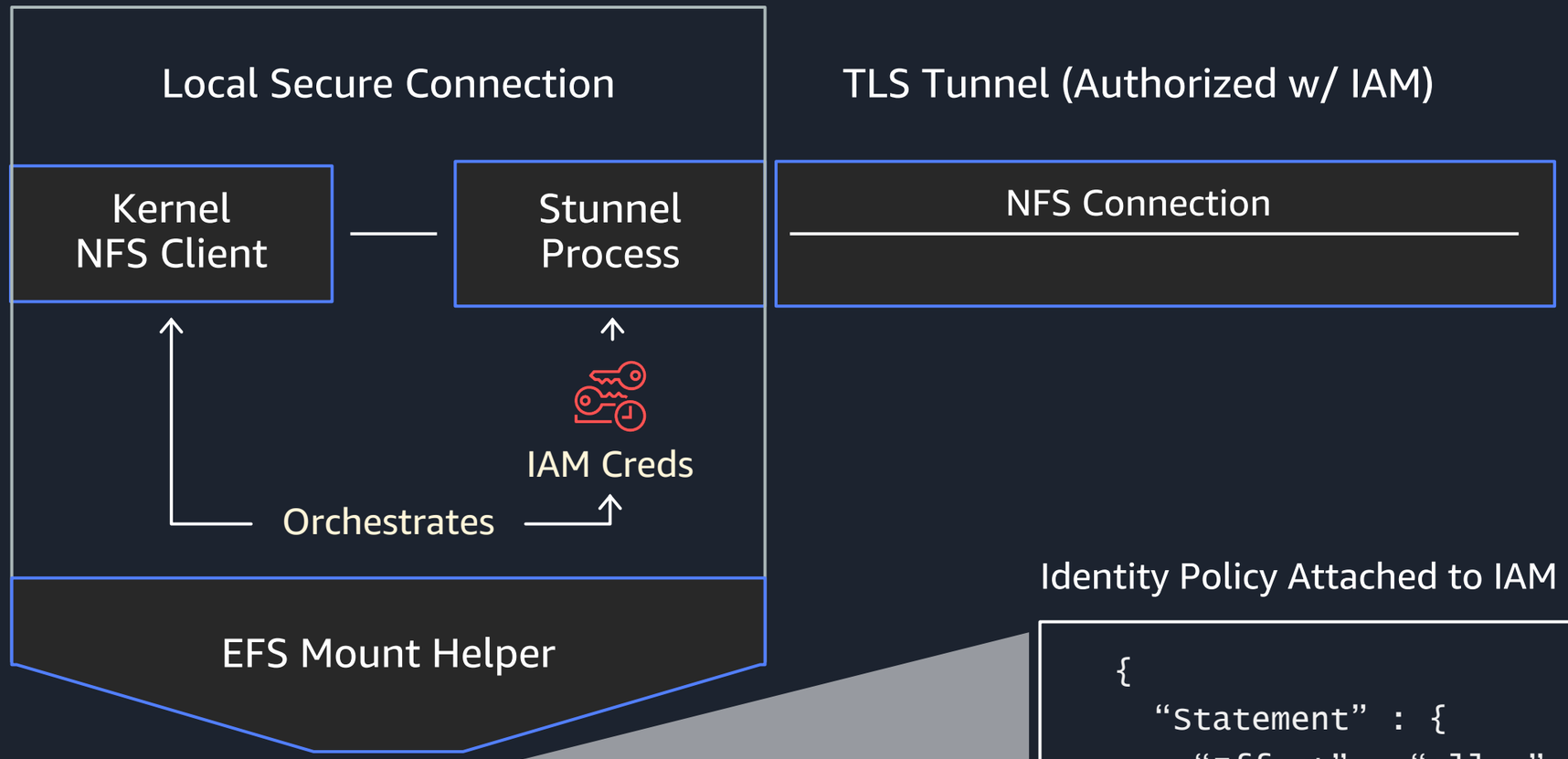
Amazon EFS | IAM authorization for NFS clients

Restricting EFS access using IAM Identity Policy



Identity Policy Attached to IAM Role

```
{
  “Statement” : {
    “Effect” : “allow”,
    “Action” : “elasticfilesystem:Client*”,
    "Resource": ”fs-deadbeef"
  }
}
```

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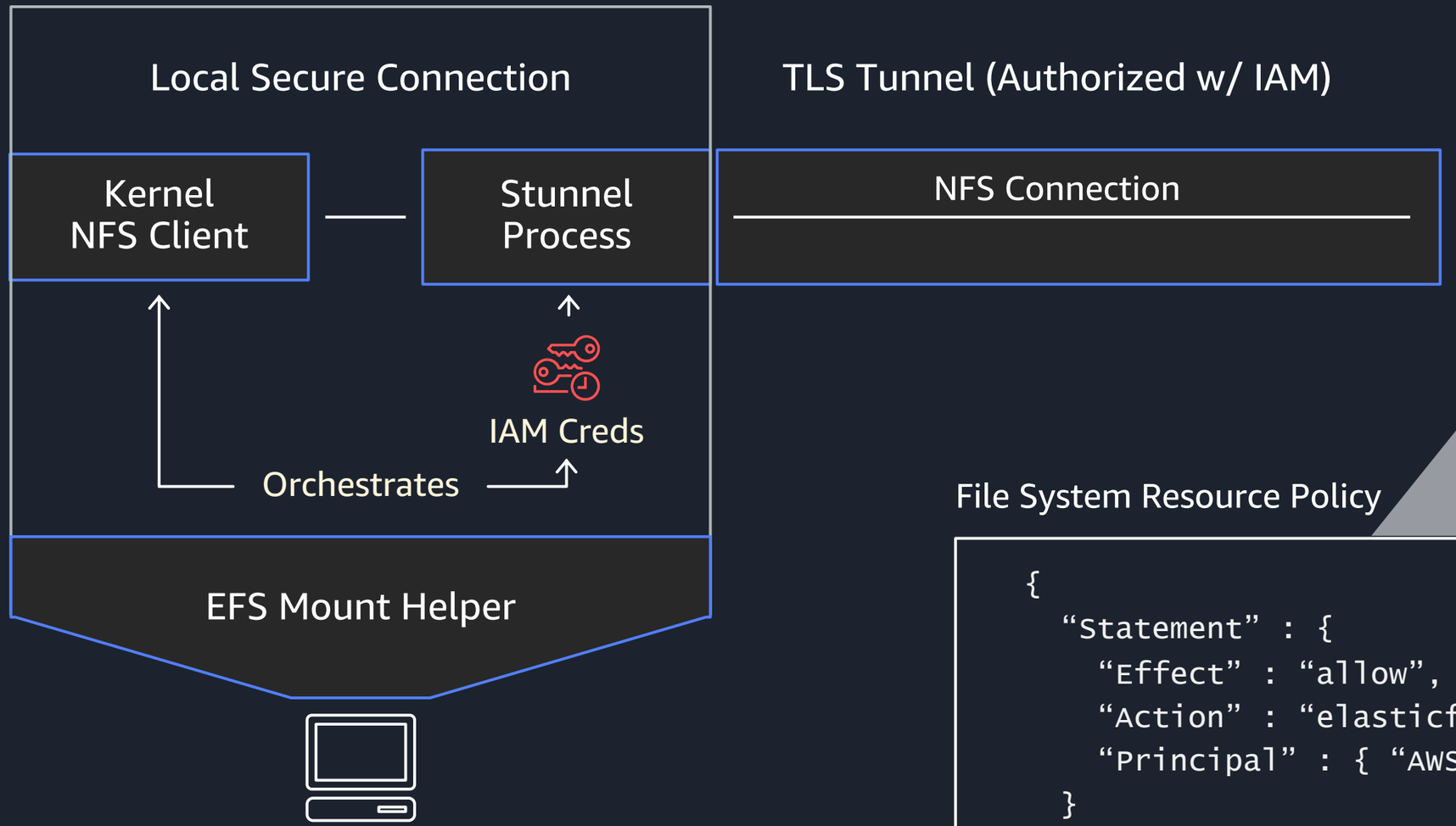
Amazon EFS | IAM authorization for NFS clients

Restricting EFS access using IAM Resource Policy



File System Resource Policy

```
{
  “Statement” : {
    “Effect” : “allow”,
    “Action” : “elasticfilesystem:Client*”,
    “Principal” : { “AWS”: “myrole” }
  }
}
```

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Application-specific Access with EFS Access Points

Creates App-specific Directory & Permissions

- No EC2 instance required!
- Apps only see data they need

Enforces File System Identity

- Root containers can’t escalate access
- Arbitrary users aren’t locked out

EFS Access Point

```
{
  “Name”: “MyApp”,
  "FileSystemId": "string",
  “PosixUser”: {
    “Uid”: 123
    “Gid”: 123,
    “SecondaryGids”: [100, 200, 300]
  },
  “RootDirectory”: {
    “Path”: “/apps/myapp”,
    “CreationInfo”: {
      “OwnerUid”: 123,
      “OwnerGid”: 123,
      “Permissions”: “0700”
    }
  }
}
```

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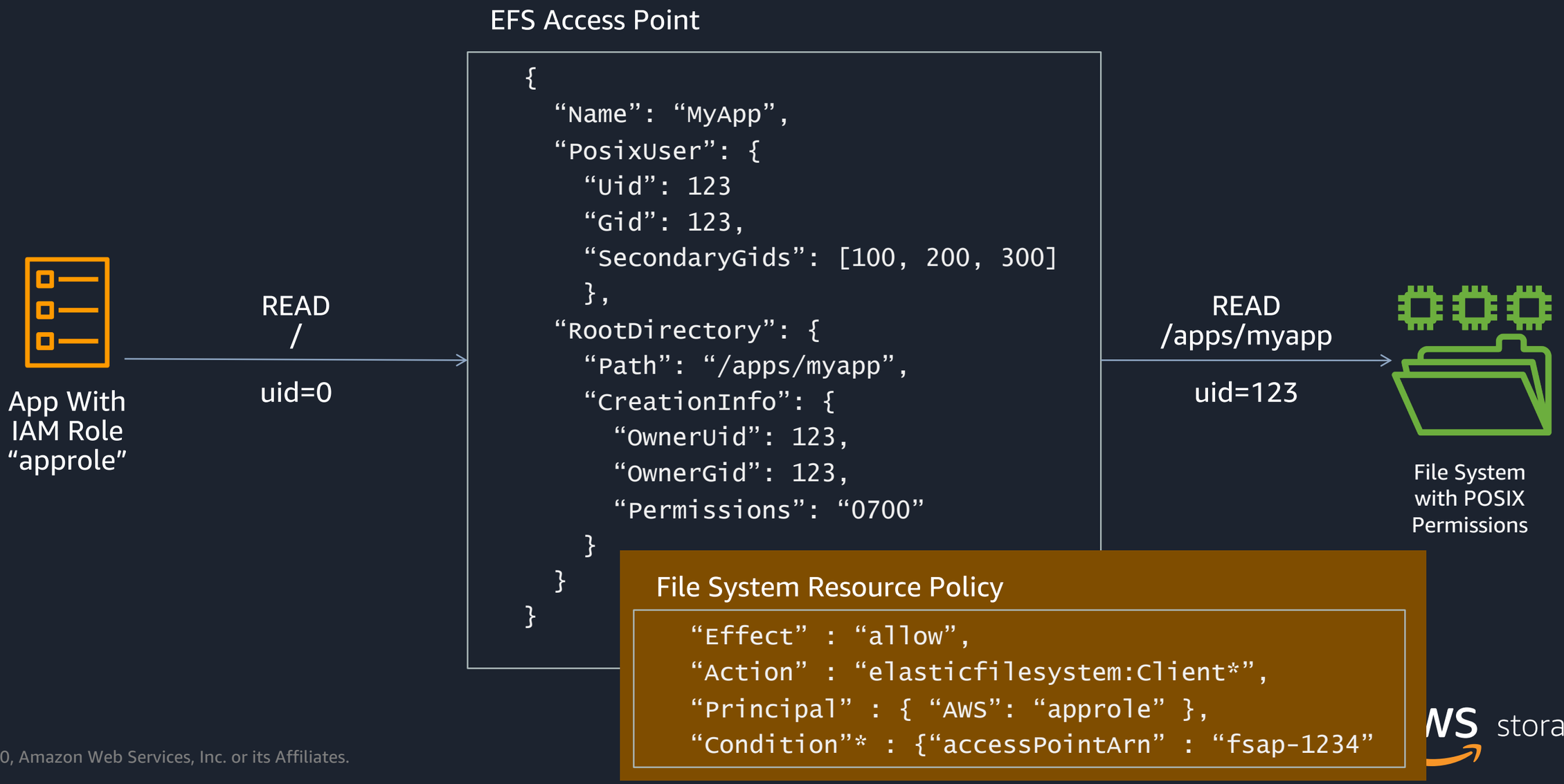
How EFS Access Points Work



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What’s new?

Since last summit, October 2019

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What's new | Since Oct' 2019

October 2019
- EC2 Launch Instance Wizard (LIW)
- AWS Private Link

November 2019
- EFS IA 7-day LM policy
- Middle East (Bahrain)
- EU (Stockholm)
- South America (Sao Paulo)
- Asia Pacific (Hong Kong)

December 2019
- Service-Linked Roles

January 2020
- AWS IAM Authorization for NFS Clients
- EFS Access Points
- Item-Level Recovery (using AWS Backup)
- China (Ningxia, Beijing)

February 2020
- GovCloud (US-East)
- EC2 LIW UX

March 2020
- AWS Budgets*

April 2020
- 400% Read IOPS increase (up to 35K)
- Integration with ECS and Fargate
- 99.99% SLA

May 2020
- CPT, MXP regions

Today

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* Not a new feature. We blogged to raise awareness.

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AWS integrations | Amazon EFS

Amazon EFS

Amazon VPC

AWS IAM

AWS KMS

Amazon CloudWatch

AWS CloudTrail

AWS CloudFormation

AWS Direct Connect

AWS VPN

AWS DataSync

AWS Backup

Amazon EC2

Amazon SageMaker

Amazon EKS

Amazon ECS

AWS Fargate

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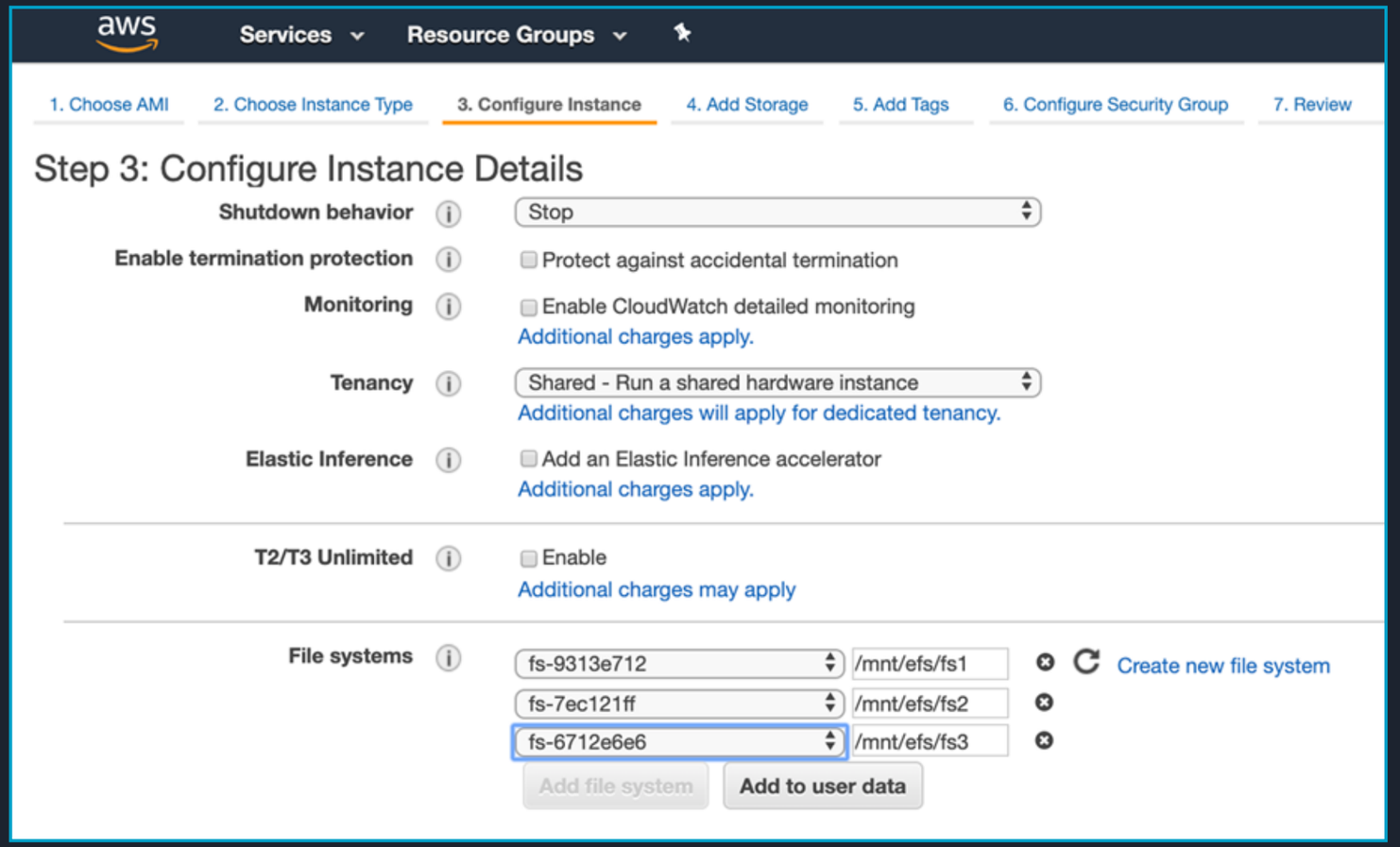
Amazon EC2 launch wizard | Amazon EFS

- Mount Amazon EFS file systems directly from the Amazon EC2 launch wizard
- Select an existing file system to mount or create a new file system



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New:
Amazon ECS and AWS Fargate Support for Amazon EFS

Simple: All EFS configuration is inside the ECS task definition, and connectivity is handled behind the scenes.

Serverless: AWS Fargate tasks can now leverage shared persistent storage.

Secure: Access to file systems can be authorized by IAM, and access to data controlled by EFS Access Points.

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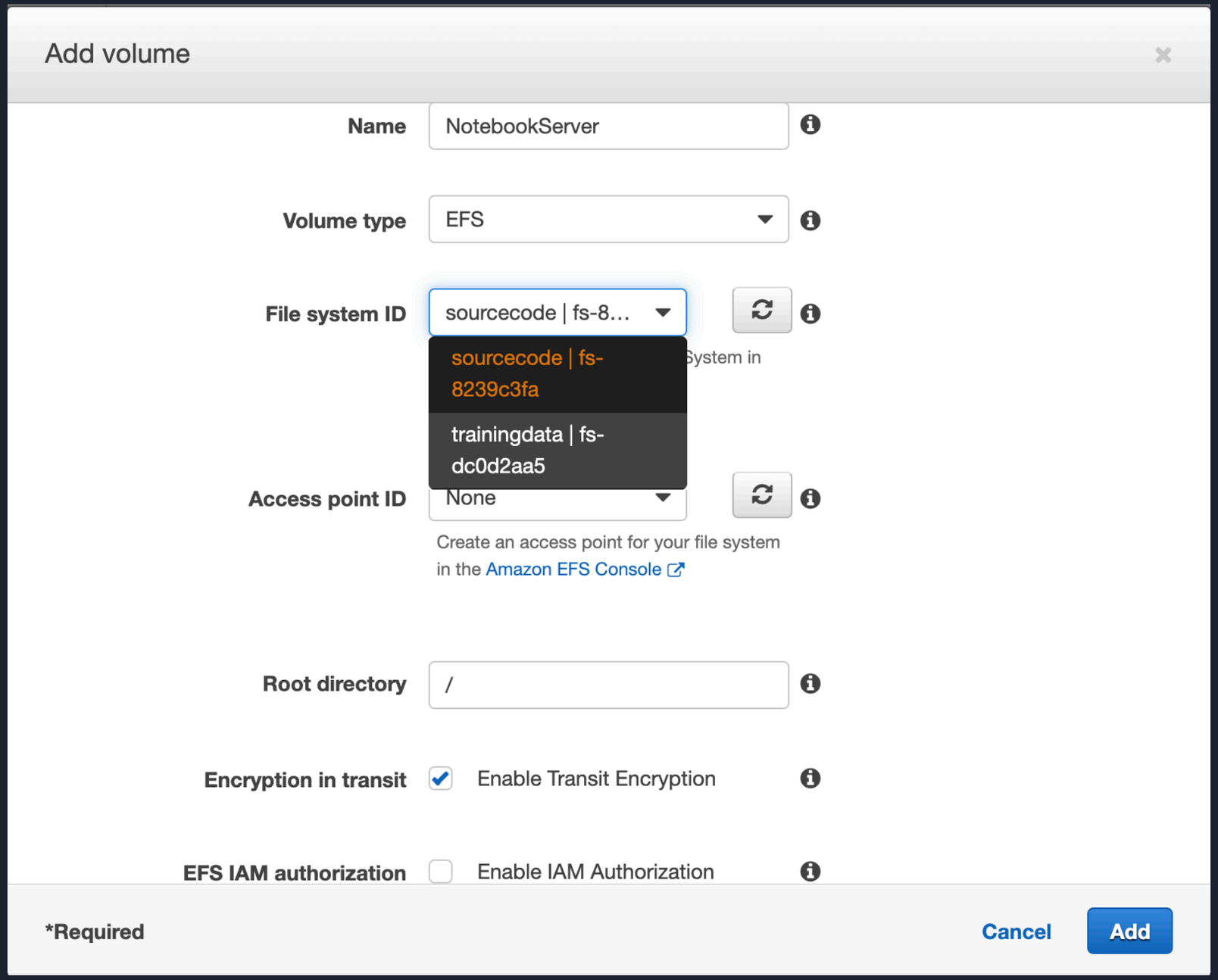

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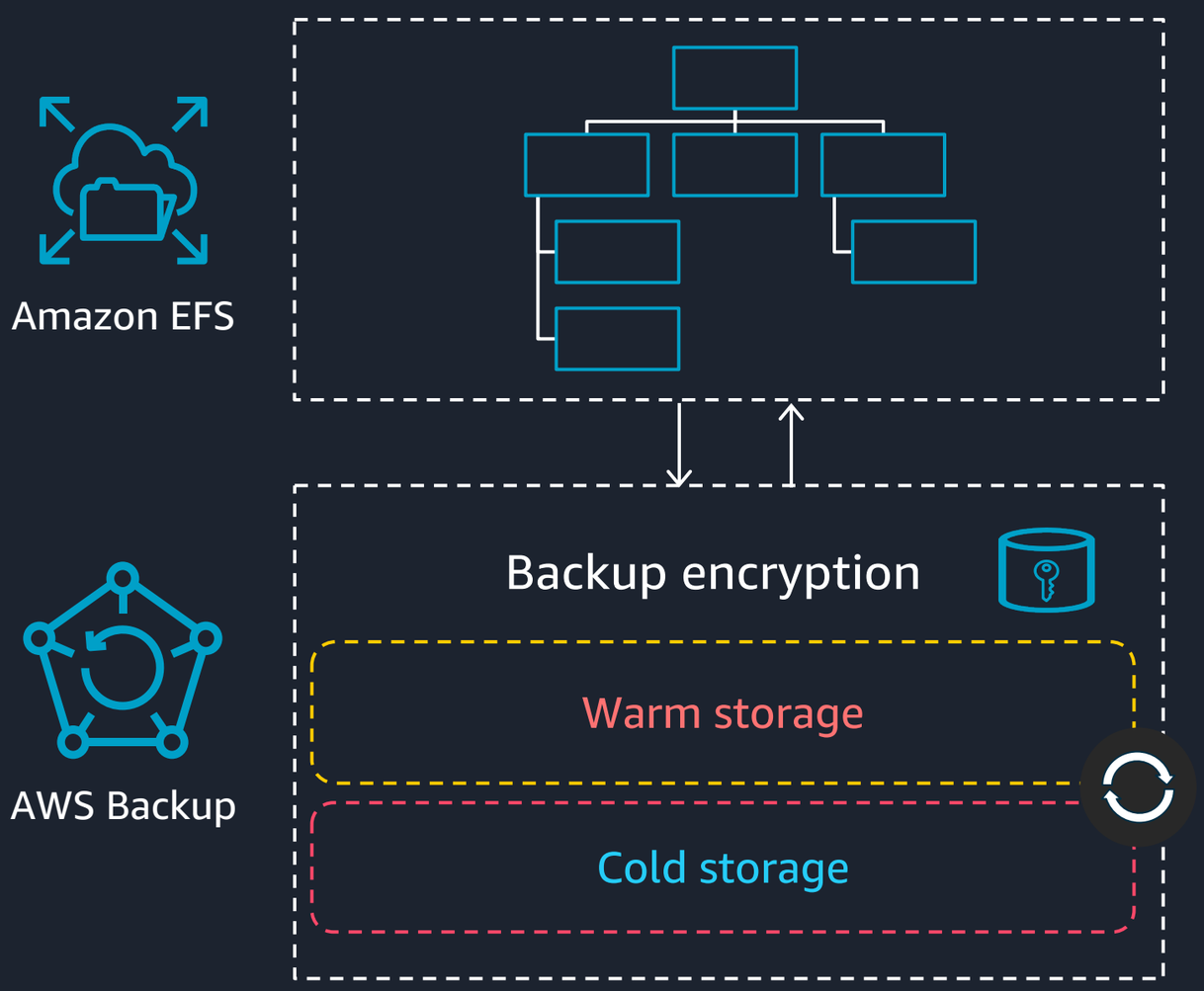
Backup for Amazon EFS



- 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

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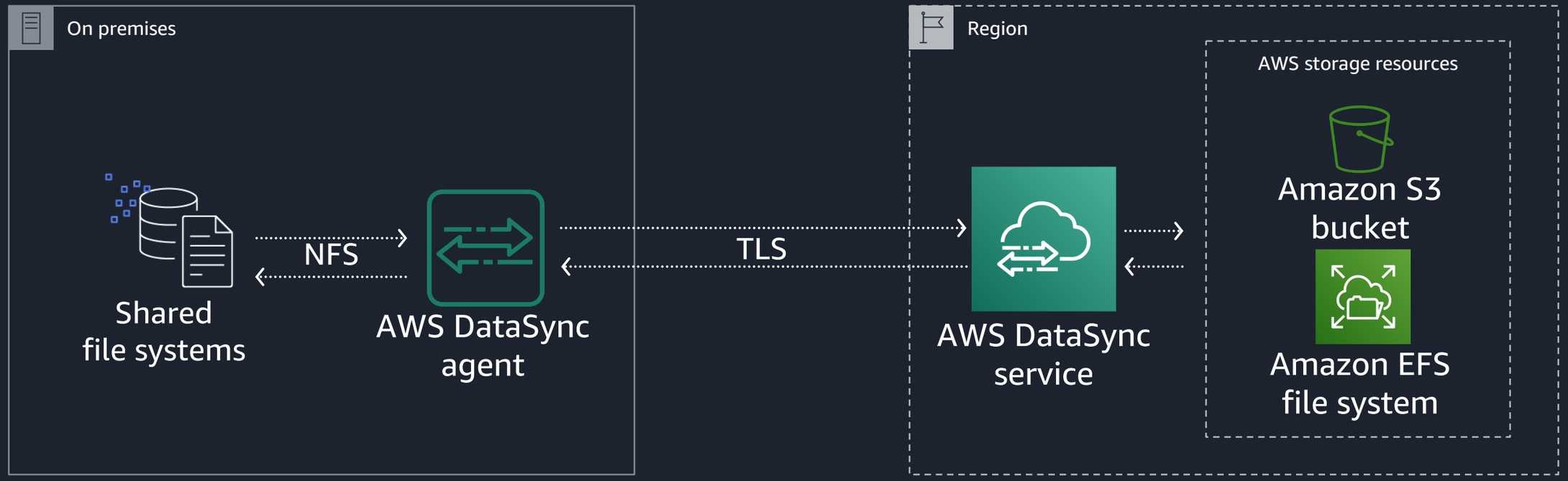
Migration to Amazon EFS



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

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Customer Use Cases

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Use cases for Amazon EFS

Home directories

Container storage

Application test/dev

Lift and shift enterprise apps

Web serving

Content management

Database backups

Analytics

Media workflows

Metadata-intensive jobs

Scale-out jobs

Low latency and serial I/O

High throughput and parallel I/O

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Demo

See the service in action!

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Amazon EFS | Best practices

Test in
General Purpose
performance mode

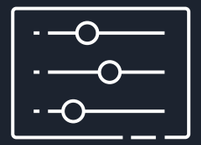
Start with
Bursting
Throughput mode

Consider Provisioned
Throughput mode for
loading >2.1 TB

Linux kernel 4.3+

EFS mount helper
(NFSv4.1)

Large IO size
(aggregate IO)



Multiple
threads

Multiple
instances

Multiple
directories

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Amazon EFS | 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

Monitor throughput
utilization, burst credits,
and PercentIOLimit

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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

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