Manage Secrets Like a Pro

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Customers want to . . .

- Manage secrets centrally
- Store secrets securely
- Control access to secrets
- Retrieve secrets at scale
- Centrally audit and monitor secrets usage
- Ensure compliance

What to expect in today's session

- Choosing the appropriate AWS service to secure a given type of secret
- When using AWS Secrets Manager:
  - What we do for you
  - What you need to take care of
  - What features we provide for each stage of the secret lifecycle
- Getting the most out of Secrets Manager

Secrets are of many types

IAM credentials

Database credentials

OAuth tokens

Encryption keys

SECRETS

Application credentials

SSH keys

Certificates (and private keys)

Application programming interface (API) keys

Modernization is an opportunity to select the easiest service

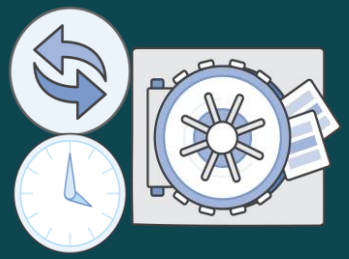
AWS credentials	AWS Identity & Access Management (IAM)
Encryption keys	AWS Key Management Service (KMS)
SSH keys	Amazon EC2 Instance Connect
Private keys + Certificates	AWS Certificate Manager
Database credentials	AWS Secrets Manager
Application credentials	
OAuth secrets	
Application programming interface (API) keys	

Manage secrets through their lifecycle

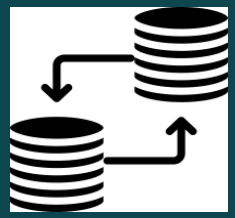
AWS Secrets Manager enables customers to create, rotate, manage, and retrieve database credentials, API keys, and other secrets while ensuring compliance

Secure by default

Fine-grained access control



Rotate



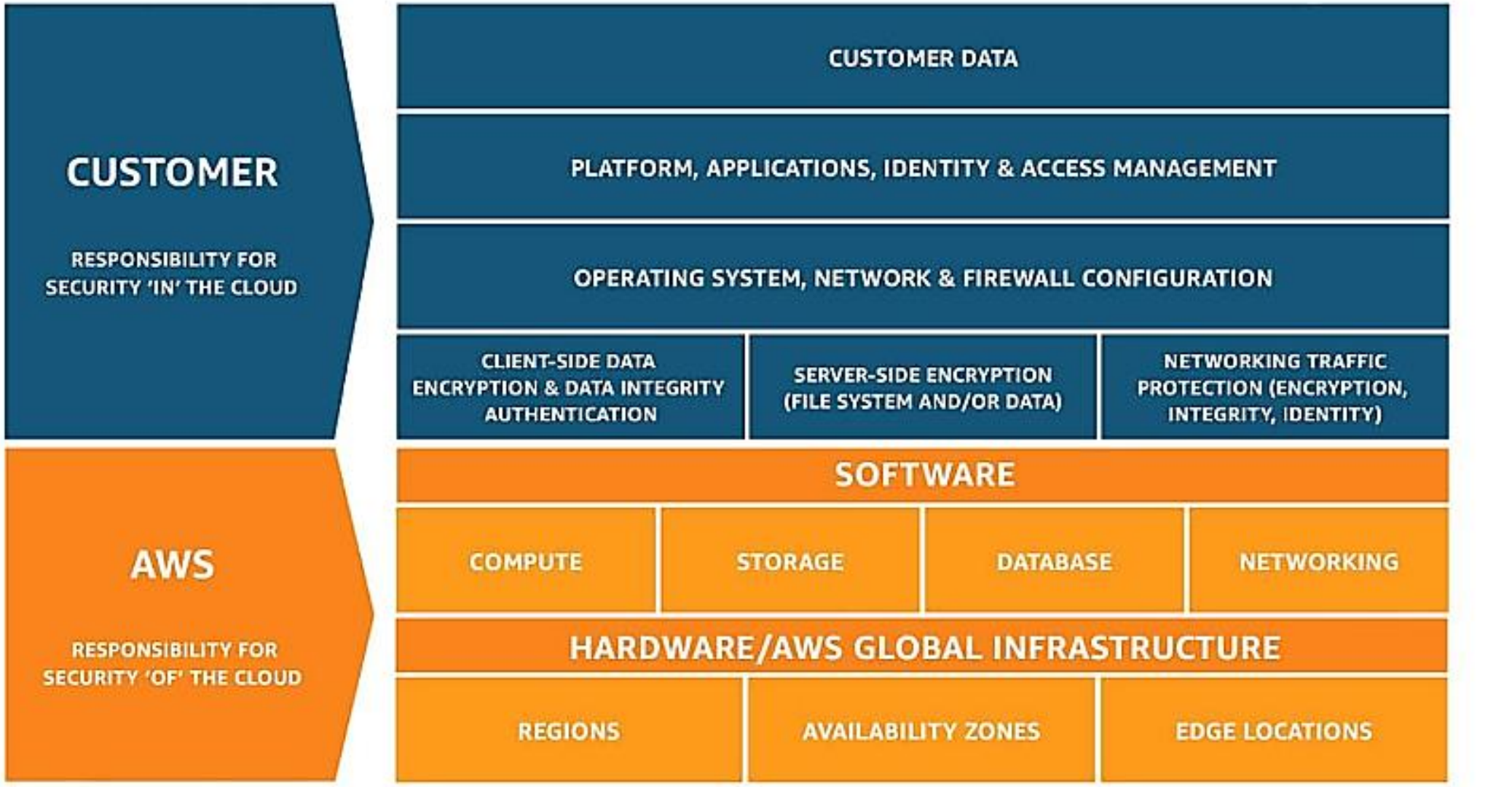
Replicate

Retrieve at scale

Monitor and audit

Meet compliance

AWS shared responsibility model (SRM)



SRM for Secrets Manager (examples)

Customer

Properly configure policies on secret and key that encrypts it

Use HA strategies and caching libraries to keep applications running while secrets rotate

Set monitors for non-compliant secrets

Be aware of service limits

Load test

AWS

Encrypt secrets by default

Enforce IAM and resource policies

Tools and guidance for safe rotation

Client-caching libraries

Integrations with AWS monitoring services

SLA

Create and use your secrets securely

Why does it matter?

- Secrets enable access to sensitive data
- Important to control access to secrets throughout the lifecycle:
  - At creation
  - During use
  - During updates

Pro tip #1: Automate provisioning of secrets through AWS CloudFormation

- Secret: Specify a value, or let Secrets Manger generate one for you

- Other supported resource types: ResourcePolicy, RotationSchedule, SecretTargetAttachment

Pro tip #2: Rotate secrets immediately after manual creation

Ensures any access to current secret value is controlled

- Via console: Rotation resources can be automatically provisioned, while creating a secret
- Via API/CLI: RotateSecret
- Ad-hoc: PutSecretValue + Resource update

Pro tip #3: Scope down to least privilege access

- Can be liberal with ListSecrets and DescribeSecret
- Applications need read-only permissions to GetSecretValue
- Use conditions to allow access to “Current” version of secret
- Verify which principals have access to secrets through an IAM policy using the IAM Policy Simulator (https://policysim.aws.amazon.com/)

Pro tip #4: Use AWS managed policies for elevated access

- SecretsManagerReadWrite
- IAMFullAccess
  - Trusted administrators only
  - Enforce multi-factor authentication (MFA)

Pro tip #5: Leverage ABAC

For convenient bulk-editing of permissions:

- Tag groups of related secrets
- Use Attribute-Based Access Control (ABAC) to simplify and automate permissions

Pro tip #6: Leverage KMS Keys for added control

- Admins can bulk-revoke application's access to secrets by revoking KMS key permissions
- Encrypt secrets with customer-managed keys to share them across accounts
- Note: You must use resource-based policies and customer-managed keys to share secrets across accounts

Pro tip #7: Use Secrets Manager to secure secrets across AWS services

Containers


Amazon ECS


Amazon EKS


AWS Fargate

Analytics


Amazon Redshift


Amazon EMR


AWS Glue


Amazon MSK

Internet of Things


AWS IoT Greengrass

Database


Amazon RDS


AWS DMS


Amazon DocumentDB

Developer Tools


AWS CodeBuild

Machine Learning


Amazon SageMaker


Amazon Kendra

Application Integration


Amazon AppFlow


Amazon EventBridge

Management & Governance


AWS OpsWorks

Pro tip #8: Scan regularly for unprotected secrets with CodeGuru Secrets Detector

- Detect secrets in source code or configuration files
  - Finds passwords, common API keys, SSH keys, and access tokens
  - In Java/Python code, configuration and documentation files
- Secure detected secrets with Secrets Manager

Retrieve secrets securely

Why does it matter?

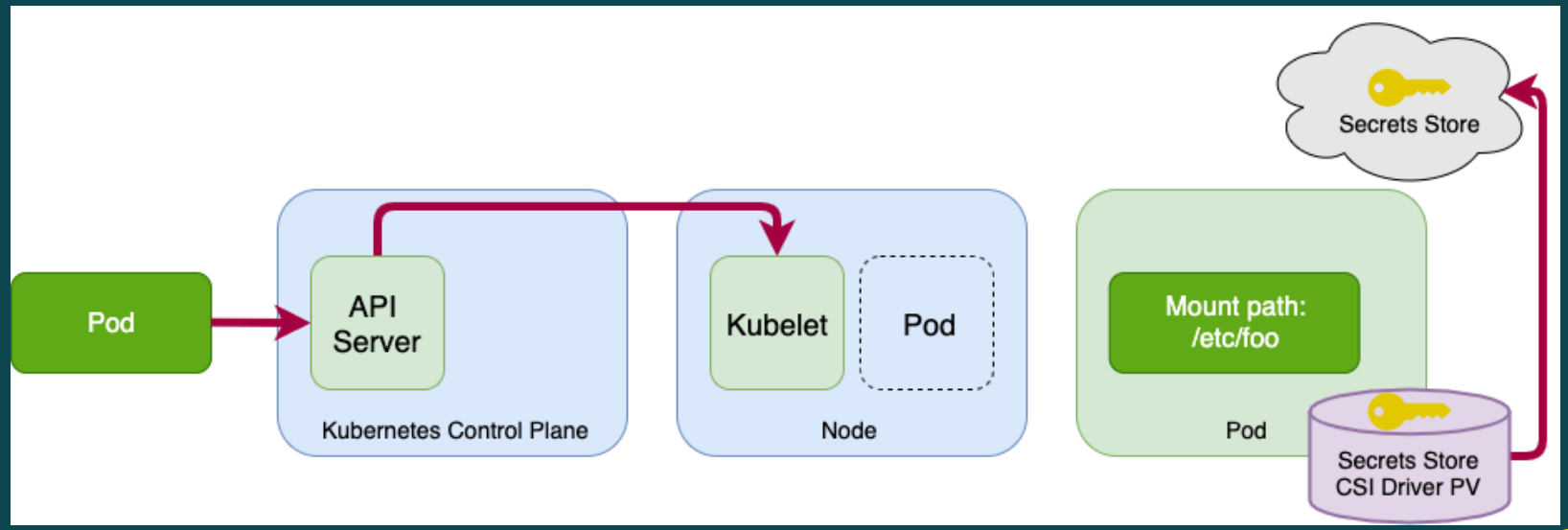
- Eliminate the need for developers to view or handle secrets
- Easily revoke access to secrets
- Update secrets without re-deploying code
- Reduce development time and operational risk

Pro tip #1: Use client-side caching libraries instead of directly calling GetSecretValue

- Reduce API bill
- Increase availability
- Reduce undifferentiated heavy lifting, esp. for retries and rotation
  - Java Database Connectivity (JDBC) driver automatically refreshes secret after it rotates
  - You can configure refresh interval for other client-side libraries (Java, Python, Go, .NET, Kubernetes)

Pro tip #2: Use the AWS secrets and config provider (ASCP) for Kubernetes workloads

- Easily mount secrets as environment variables via CSI driver plug-in
- Scope secrets to pods within clusters
- Rely on rotation reconciler to mount rotated secret values



Pro tip #3: Retrieve secrets as global variables in AWS Lambda

- Use global variables instead of retrieving secrets inside Lambda handler
- Prevents GetSecretValue API calls every time the Lambda executes
  - Reduces API cost
  - Prevents throttling
  - Improves performance

Pro tip #4: Schedule deletion of unused secrets

- Identify unused secrets using AWS Config

- Schedule deletion after 7–30 days to delete safely using --recovery-window-in-days
  - Secrets scheduled for deletion cannot be read
  - You can restore secrets during the recovery window

Pro tip #5: Refresh based on rotation settings

- Two secrets valid at a time: refresh at half-life
- One secret valid at a time:
  - Refresh aggressively, cache connections, or proactively broadcast update via rotation Lambda
  - Retries with exponential back-off and jitter

Rotate secrets

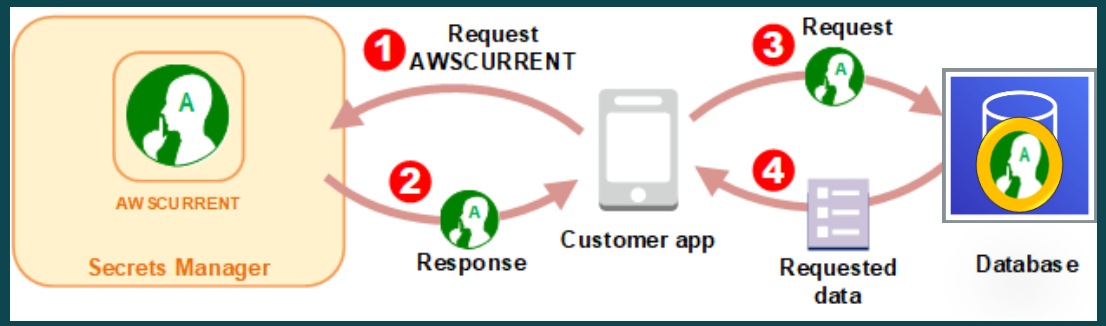
Why does it matter?

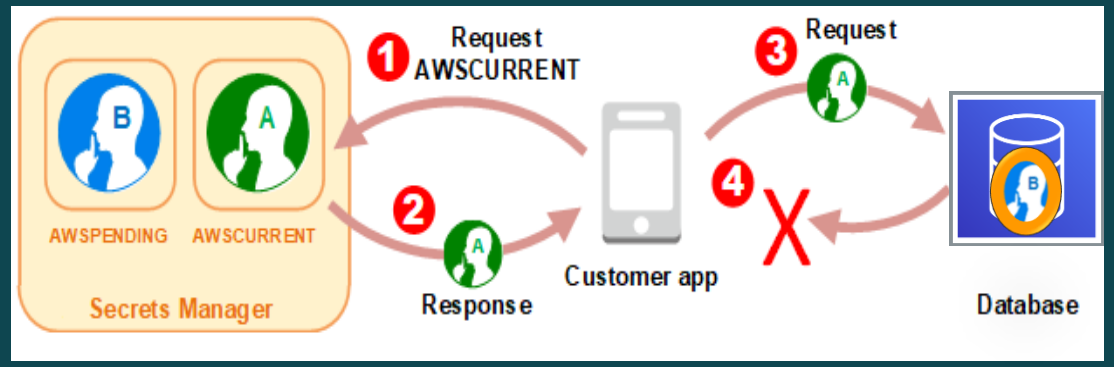
- Compliance
- Improved security: short-term secrets have lower blast radius than fixed secrets

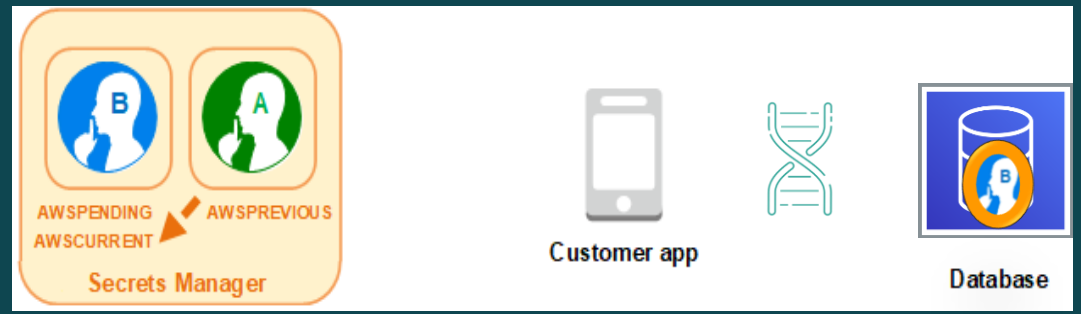
Pro tip #1: Alternate between two credentials for highly available applications

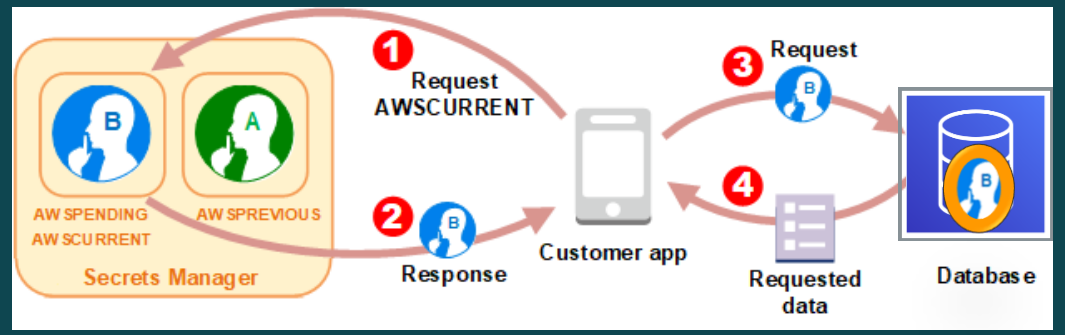
- Leverage concurrent credentials when resources permit this
- Alternate between equivalent accounts for databases
  - Secrets Manager provides multi-user rotation templates for Amazon-managed databases
  - You can customize your rotation Lambda for other resources
- If you must rotate a single credential:
  - Set high lockout limits, esp. for container and serverless workloads
  - Refresh aggressively, cache connections, or proactively broadcast update via rotation Lambda

Detour: Single credential rotation

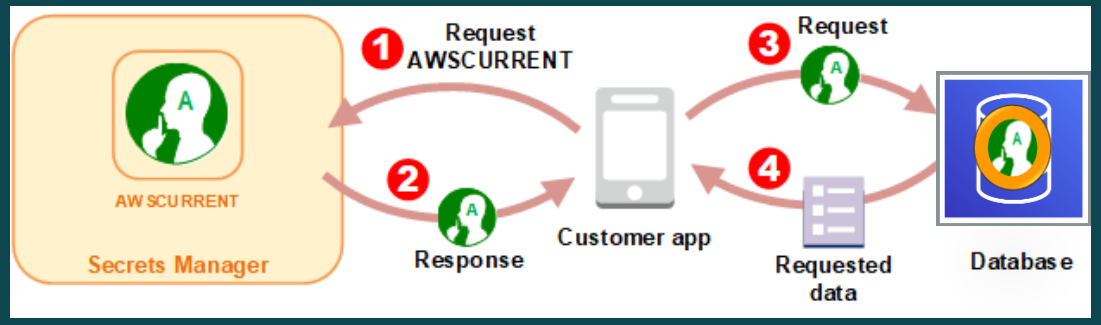


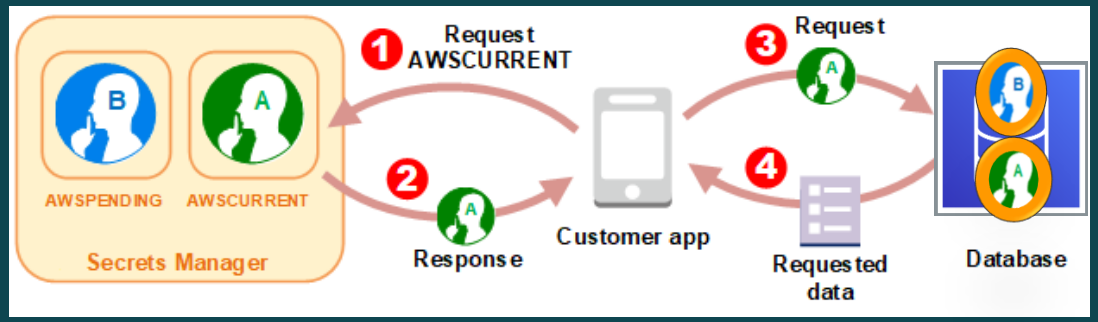


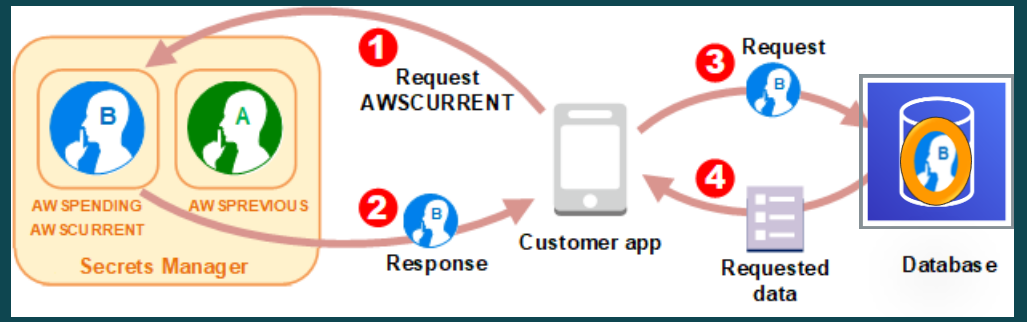




Detour: Dual credential rotation







Pro tip #2: Reuse rotation Lambdas for multiple secrets

- Easier to manage a small number of rotation Lambda functions
- Can still customize password generation to downstream application requirements

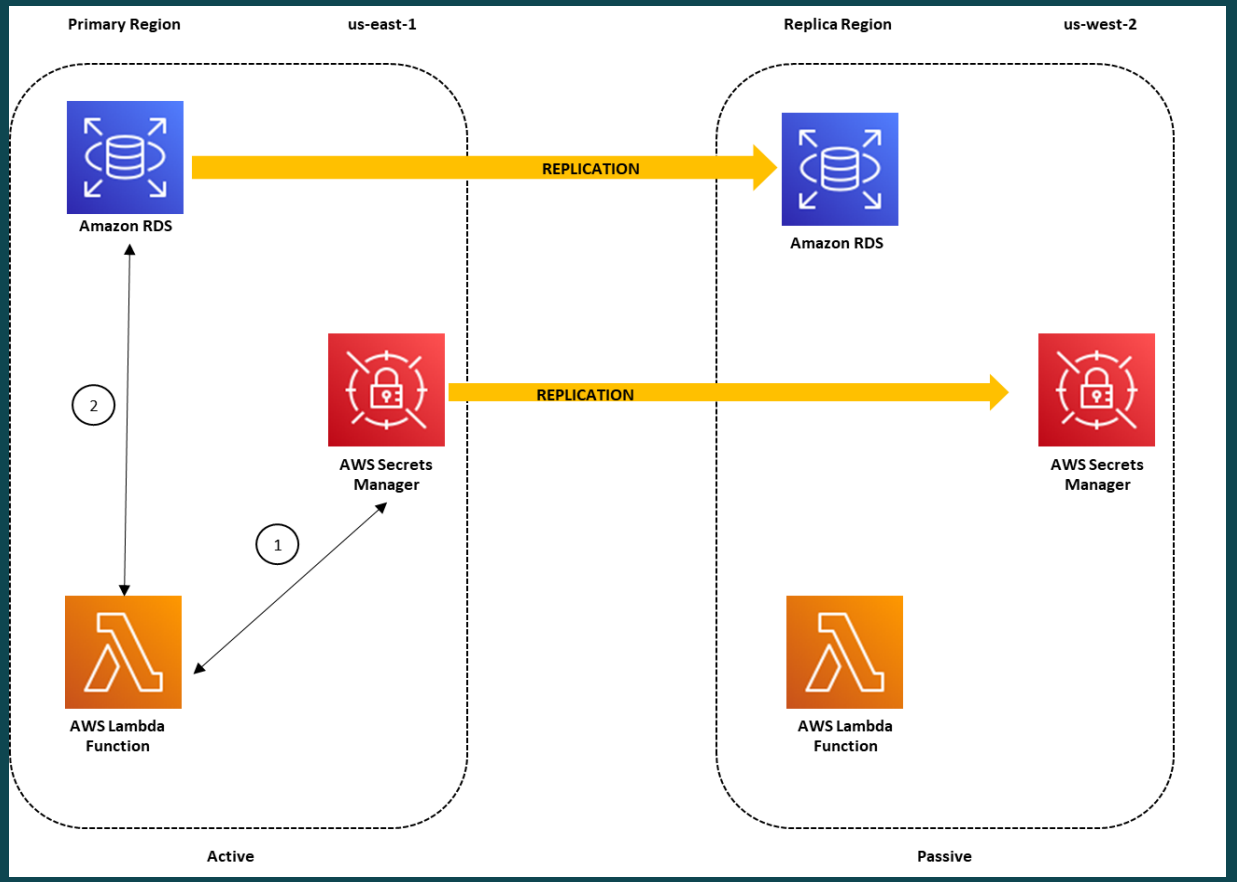
Pro tip #3: Align rotation schedule with maintenance windows

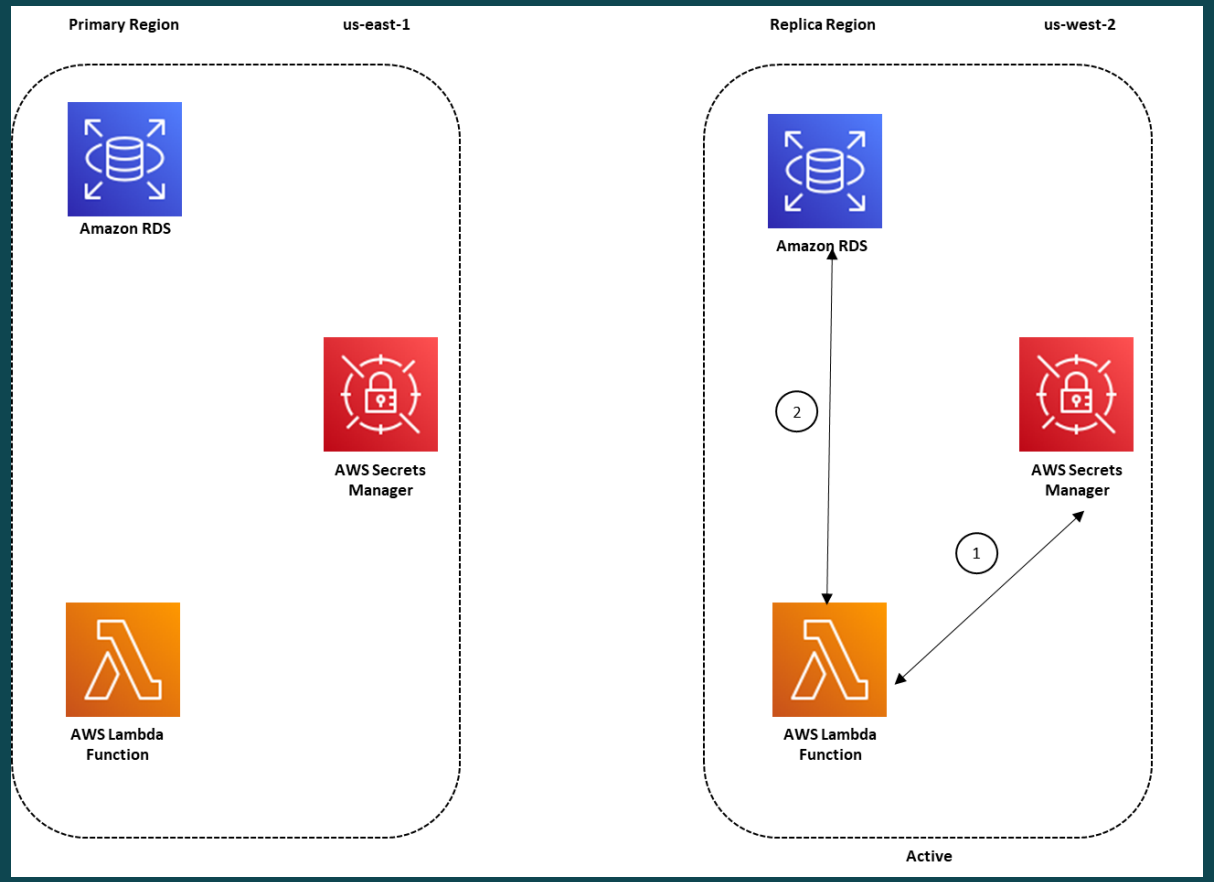
- By default, secrets rotate within a 24 hour timeframe every N days
- With scheduled windows, you can:
  - Limit rotation to certain hours of the day
  - Schedule rotation by day of week or month

Pro tip #4: Manage and monitor rotation

- By default, secrets rotate every 30 days. Set your rotation interval based on your compliance needs
- Configure AWS Config rules to watch for secrets that have not rotated as expected
- Leverage AWS CloudTrail events for rotation status

Pro tip #4: Use multi-region secrets for multi-region resources





Audit and monitor

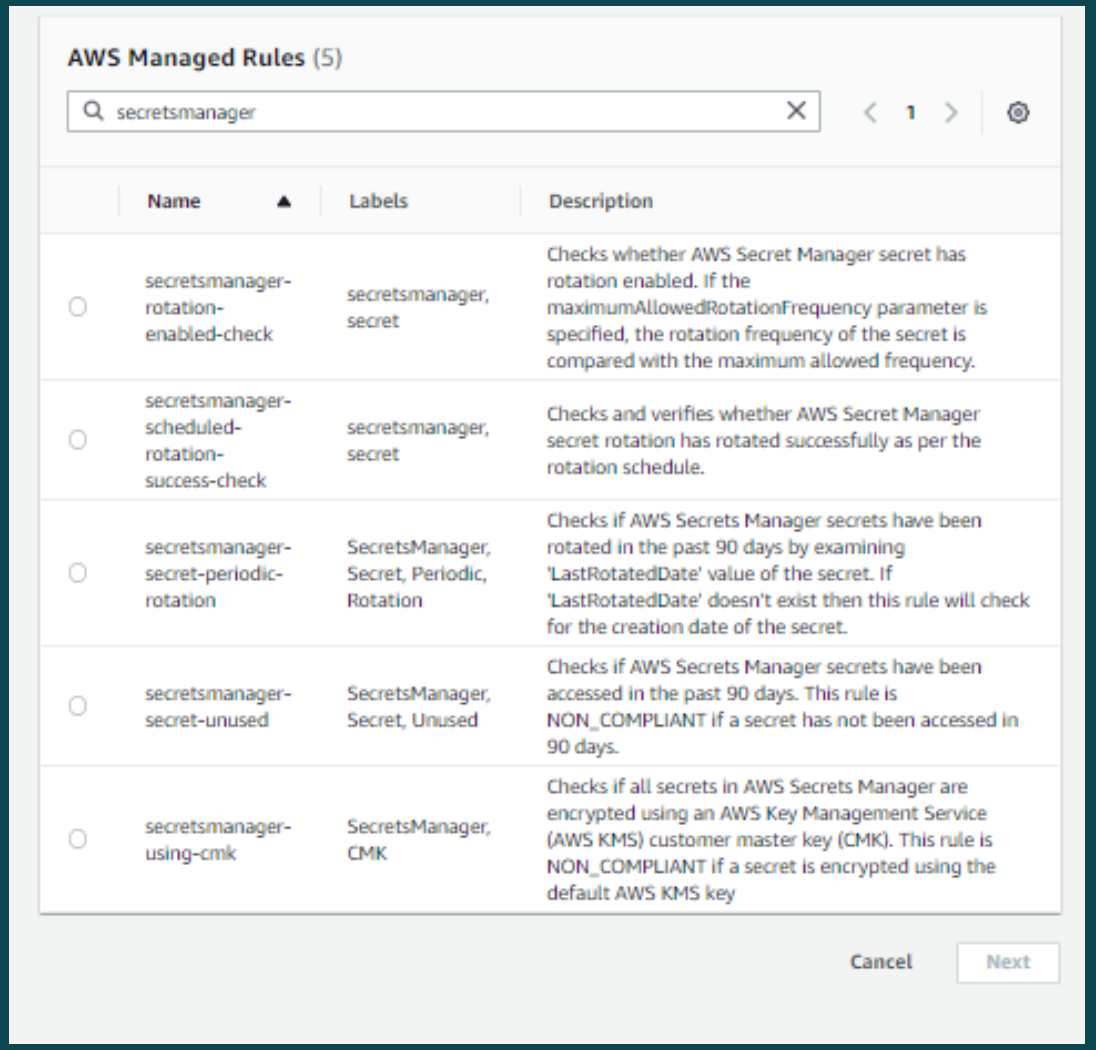
Why does it matter?

- Identify unexpected usage or changes, so you can investigate
- Identify unwanted changes, so they can be rolled back
- Compliance

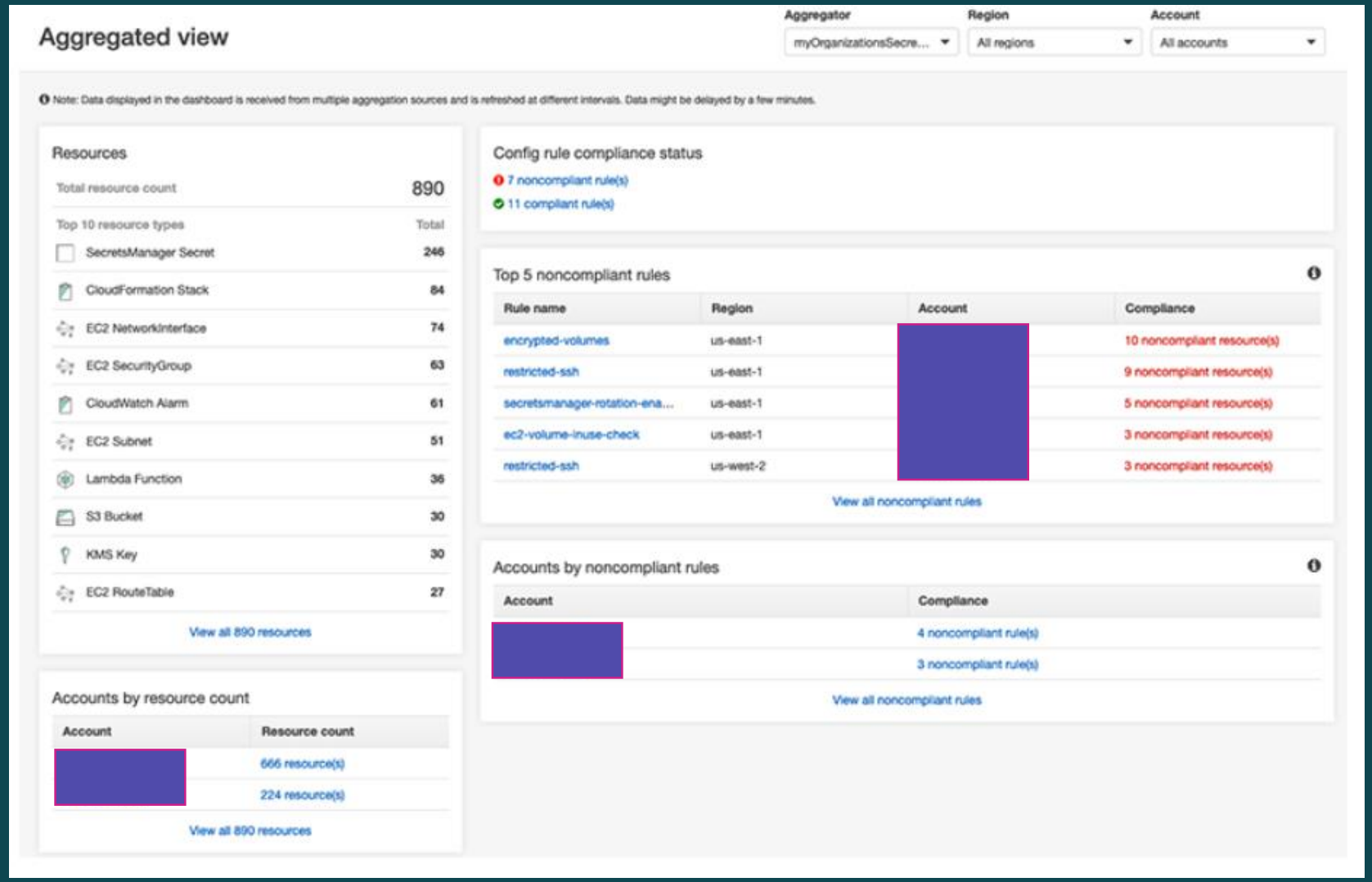
Pro tip #1: Leverage AWS services to monitor secrets

- IAM Access Analyzer to analyze permissions to secrets
- AWS CloudTrail logs to monitor use (including data plane)
- Amazon CloudWatch events to customize responses to changed secrets
- AWS Config to evaluate rules (e.g. rotation enabled & rotation succeeds)
- AWS Security Hub to easily evaluate compliance across organization
- AWS Config Aggregator for unified views across accounts

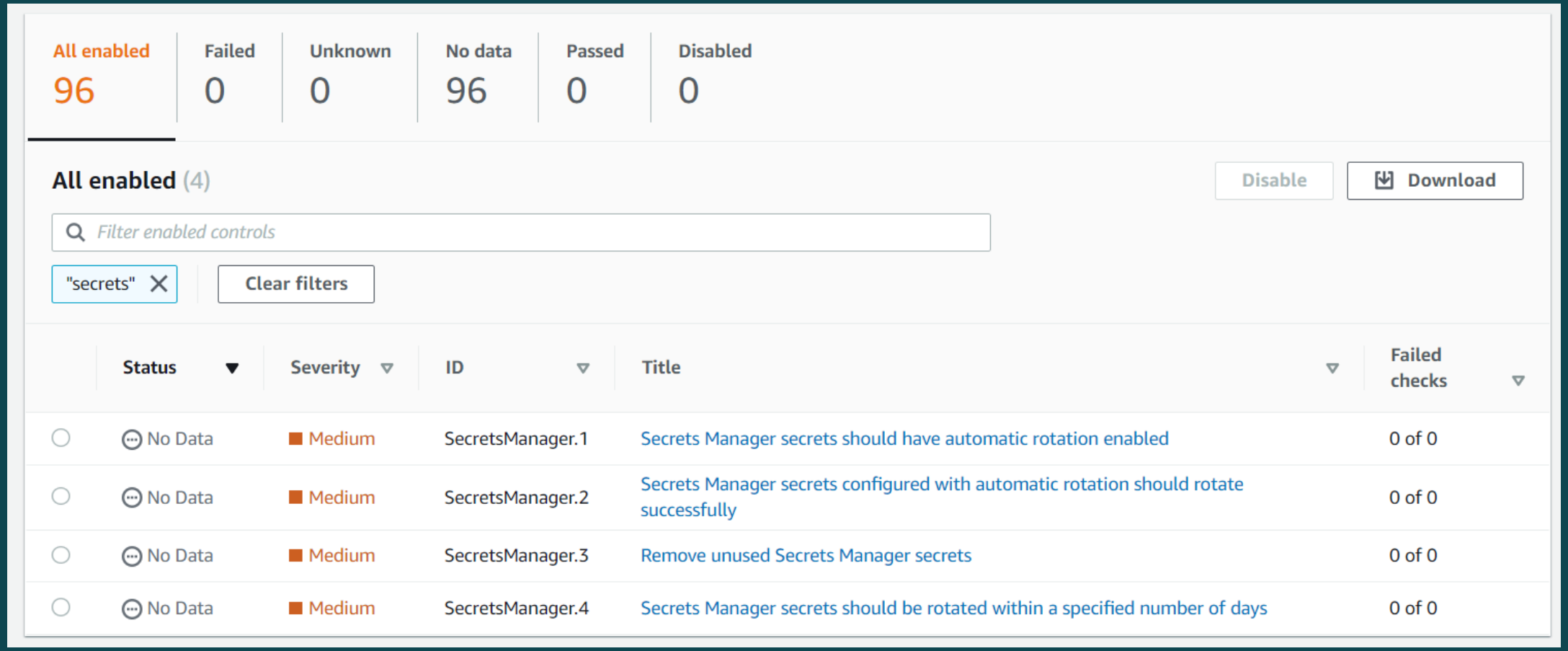
Account-level checks in AWS Config



Cross-account checks in AWS Config Aggregator



Organizational compliance with Security Hub



Decentralize secrets

Why does it matter?

- Quotas are at account-level
- Operational visibility is at account-level
- Monitoring tools are account-level and org-level

Pro tip #1: Create and store secrets in the accounts where they will be used

- Preserves velocity of development teams
- Reduces blast radius from compromised account credentials
- Prevents cross-application operational impact

Pro tip #2: Monitor secrets centrally

- Discussed in previous section
- Provides a balance between control and flexibility

Final Thoughts

Key Takeaways

- Minimize opportunities for secrets and humans to mix
- Plan ahead for access control and rotation
- Caching libraries reduce undifferentiated heavy lifting
- Centralized monitoring and decentralized secrets can co-exist

AWS manages our secrets with Secrets Manager – When you use Secrets Manager, you benefit from our mindset that “security is top priority”

Thank you for joining us!

- Questions?
- Please fill out the session survey!