ThreatModel for Amazon Simple Storage Service (Amazon S3)

Introduction

Read the blog: The last S3 security document that we’ll ever need.

Content

This publication includes:

- overall data flow diagram of Amazon S3

- overview of the Mitre ATT&CK matrix for Amazon S3

- prioritized list of all threat scenarios

- list of all the control activities and testing procedures

- control mappings to PCI DSS [other frameworks available]

- risk-based prioritized list of control implementation

License Agreement

Source

The latest version of this work is hosted on GitHub.

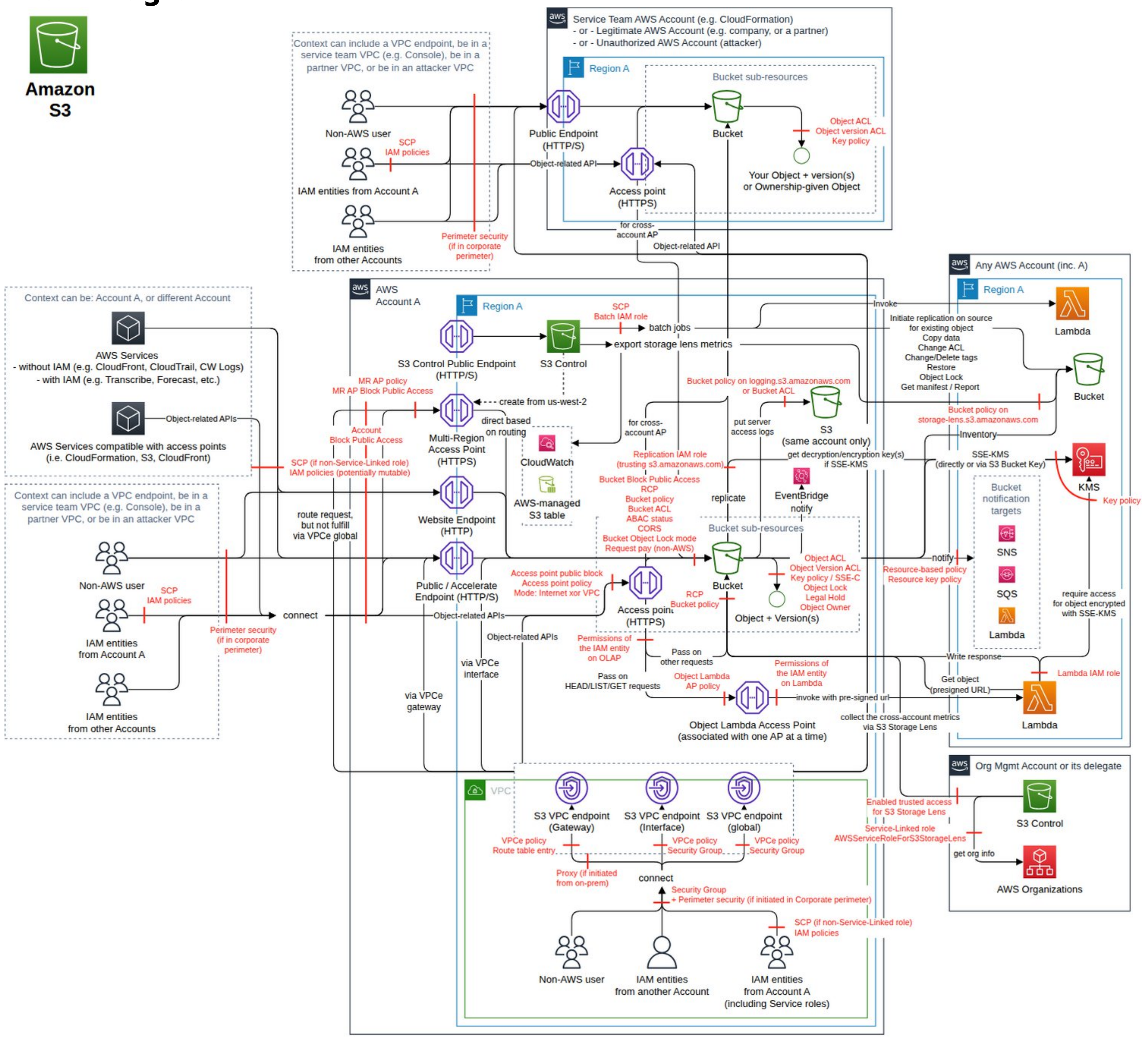
Contact

If you have any questions, please contact chatbot@trustoncloud.com.

Amazon Simple Storage Service (Amazon S3)

Data Flow Diagram

Amazon S3



Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
SCP
IAM policies
IAM entities from Account A
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTP/S)
Bucket
Object ACL
Object version ACL
Key policy
Object-related API
Access point (HTTPS)
Your Object + version(s) or Ownership-given Object
for cross-account AP
Object-related API
Context can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
Object-related APIs
AWS Services compatible with access points (i.e. CloudFormation, S3, CloudFront)
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
SCP
IAM policies
IAM entities from Account A
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
connect
AWS Account A
Region A
S3 Control Public Endpoint (HTTP/S)
S3 Control
SCP
Batch IAM role
batch jobs
export storage lens metrics
MR AP policy
MR AP Block Public Access
create from us-west-2
Account Block Public Access
Multi-Region Access Point (HTTPS)
direct based on routing
CloudWatch
AWS-managed S3 table
SCP (if non-Service-Linked role)
IAM policies (potentially mutable)
route request, but not fulfill via VPCe global
Website Endpoint (HTTP)
Public / Accelerate Endpoint (HTTP/S)
Object-related APIs
Object-related APIs
via VPCe interface
via VPCe gateway
Access point public block
Access point policy
Mode: Internet xor VPC
for cross-account AP
Bucket policy on logging.s3.amazonaws.com or Bucket ACL
put server access logs
S3 (same account only)
Replication IAM role (trusting s3.amazonaws.com)
get decryption/encryption key(s) if SSE-KMS
Bucket Block Public Access
RCP
Bucket policy
Bucket ACL
ABAC status
CORS
Bucket Object Lock mode
Request pay (non-AWS)
replicate
EventBridge
notify
Bucket sub-resources
Bucket
Object ACL
Object Version ACL
Key policy / SSE-C
Object Lock
Legal Hold
Object Owner
Object + Version(s)
Access point (HTTPS)
RCP
Bucket policy
Permissions of the IAM entity on OLAP
Pass on other requests
Pass on HEAD/LIST/GET requests
Object Lambda AP policy
Permissions of the IAM entity on Lambda
invoke with pre-signed url
Object Lambda Access Point (associated with one AP at a time)
Invoke
Initiate replication on source for existing object
Copy data
Change ACL
Change/Delete tags
Restore
Object Lock
Get manifest / Report
Bucket policy on storage-lens.s3.amazonaws.com
Inventory
SSE-KMS (directly or via S3 Bucket Key)
notify
Resource-based policy
Resource key policy
Write response
Get object (presigned URL)
collect the cross-account metrics via S3 Storage Lens
Any AWS Account (inc. A)
Region A
Lambda
Bucket
KMS
Key policy
Bucket notification targets
SNS
SQS
Lambda
require access for object encrypted with SSE-KMS
Lambda IAM role
Lambda
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
S3 VPC endpoint (global)
VPCe policy
Route table entry
VPCe policy
Security Group
VPCe policy
Security Group
Proxy (if initiated from on-prem)
connect
Security Group
+ Perimeter security (if initiated in Corporate perimeter)
SCP (if non-Service-Linked role)
IAM policies
Non-AWS user
IAM entities from another Account
IAM entities from Account A (including Service roles)
Org Mgmt Account or its delegate
S3 Control
Enabled trusted access for S3 Storage Lens
Service-Linked role AWSServiceRoleForS3StorageLens
get org info
AWS Organizations

Security Scorecard

Security in the Cloud	
Number of Actions*	194
Identity management	AWS IAM, bucket ACL, object ACL
Number of IAM permissions*	170
Resource-based policy	Bucket
Tag-based ABAC	Yes
CloudTrail Coverage for APIs	100.0%
Number of CloudTrail Event names*	161
CloudWatch Events	Events, via CloudTrail
VPC endpoint	Yes (Interface + Gateway)
VPC endpoint policy	Yes
Network filtering	No
Encryption-at-rest	Yes (SSE-KMS, SSE-S3, SSE-C)
Encryption-in-transit (inc. endpoint protocol)	Yes, but HTTP supported
CloudFormation	6

* See details in Appendixes

Mitre ATT&CK matrix for Amazon Simple Storage Service (Amazon S3)

Reconnaissance	Resource Development	Initial Access	Execution	Persistence	Privilege Escalation	Defense Evasion	Credential Access	Discovery	Lateral Movement	Collection	Command and Control	Exfiltration	Impact
Recon of AWS root account emails using the email ACL grantee feature [S3.T19]	Increase bill by creating incomplete multipart uploads [S3.T40]	Use a bucket to upload malware or modify an object to include malware [S3.T14]	Embed client-side script malware in a bucket website [S3.T15]	Uncontrolled change in IAM-managed policies [S3.T57]	Gain access by modifying or deleting important object tags [S3.T33]	Unauthorized modification of an object to become public or accessible in a private bucket you do not own by changing its object ACL [S3.T6]		Recon on the security boundaries and resource names through detailed access denial messages [S3.T62]		Bucket takeover to gather data [S3.T1]	Use of less secure or old S3 features [S3.T35]	Unauthorized access to data or loss of control of SSE-C encrypted data via bucket replication [S3.T2]	Grant unauthorized access to a private bucket by changing its bucket ACL [S3.T4]
Recon on valid AWS accounts or IAM principals [S3.T24]	Increase the bill by restoring a large amount of data [S3.T47]				Reduce bucket security by deleting the bucket policy [S3.T38]	Use CloudFront to access a private bucket [S3.T20]				Unauthorized upload of a private object to an accessible (e.g., public) bucket you do not own [S3.T5]		Exfiltrate your data hosted on an external bucket by using compromised IAM credentials accessed over the Internet [S3.T3]	Files encrypted for ransomware [S3.T16]
Recon on the AWS Region of a bucket [S3.T32]					Privilege escalation by enabling ABAC on general purpose buckets [S3.T64]	Exfiltrate data stored on S3 via AWS services [S3.T21]				Move prod data into a non-prod environment [S3.T11]		Exfiltrate data to an attacker bucket via a public endpoint [S3.T7]	Destroy or modify primary data [S3.T17]
						Object made public or accessible in a private bucket you own by changing its object ACL [S3.T36]				Intercept data in transit to an external bucket [S3.T12]		Exfiltrate data by using an S3 VPC endpoint to upload data to an attacker's bucket using an internal IAM entity [S3.T8]	Increase S3 costs by hotlinking or excessive downloading [S3.T22]
						Grant unauthorized access to a private bucket by changing its bucket policy [S3.T37]				Intercept data in transit on an S3 website endpoint [S3.T13]		Exfiltrate data by uploading it to an attacker bucket using a non-authenticated user or an unauthorized external IAM entity via one of your S3 VPC endpoints [S3.T9]	Delete objects by using lifecycle [S3.T25]
						Evade detection by disabling S3 access logs via a bucket ACL change [S3.T51]				Phishing using trademarks [S3.T23]		Exfiltrate data by using the public endpoint to upload data to an attacker's bucket, using external credentials [S3.T10]	Disrupt workflow by manipulating ETag [S3.T27]
						Reduce bucket security by modifying the bucket's Public Access Block [S3.T52]				Unauthorized collection of data by swapping access points [S3.T28]		Exfiltrate data by using tags [S3.T18]	Clickjacking on S3 website [S3.T29]
						Reduce bucket security by modifying the account's Public Access Block [S3.T53]				Use AWS services to access data in S3 [S3.T30]		Unauthorized object restored into an unauthorized bucket [S3.T26]	Loss of ownership of an object [S3.T43]
						Grant unauthorized access to a bucket by changing or deleting one of its access points' policies [S3.T54]				Intercept data in transit to an internal bucket [S3.T34]		Upload to an authorized external bucket but in an incorrect AWS account [S3.T31]	Exfiltrate, modify, or delete objects using Batch [S3.T44]
						Grant unauthorized access to buckets by changing the				Gain unauthorized access to buckets trusting all Multi-		Exfiltrate data by using compromised IAM credentials	Affect data protection by removing versioning

						Multi-Region Access Point policy [S3.T55]				Region Access Points [S3.T56]		from the Internet [S3.T39]	[S3.T48]
						Evade detection by disabling S3 access logs via bucket policy change or removal [S3.T58]						Exfiltrate data via event notification [S3.T41]	Affect data protection by removing replication [S3.T49]
						Evade detection by modifying S3 access logs [S3.T59]						Exfiltrate data via inventory [S3.T42]	DoS by blocking traffic using bucket ACL [S3.T50]
												Hijack a connection with an Object Lambda [S3.T46]	Increase costs and compliance risks by enabling S3 Object Lock in compliance mode [S3.T61]
												Create an exfiltration vector via cross-account access point [S3.T60]	Disrupting object writes by disabling customer-managed encryption on a bucket using SSE-C [S3.T63]
													Disrupting access by switching the object encryption type or its KMS key [S3.T65]

Feature Classes

Amazon Simple Storage Service (Amazon S3) has the following feature classes and subclasses (i.e. dependent on the usage of its class) that can be activated, restricted, or blocked using AWS Identity and Access Management.

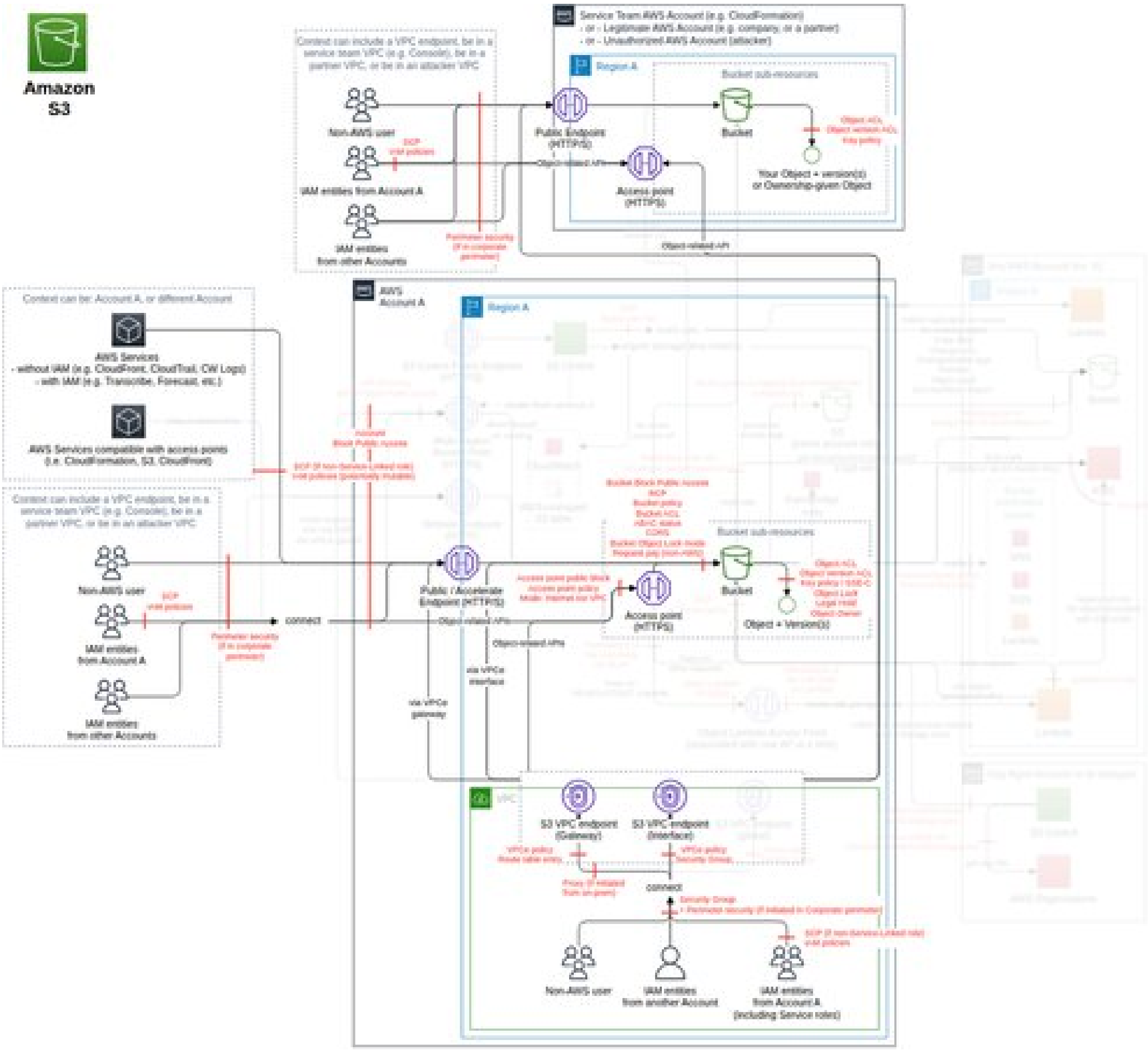
Feature	Relation	Description
Object operations (FC1)	class	You can upload, download, and delete virtually any number of objects to an external S3 bucket for which you are authorized.
Bucket (FC5)	subclass of Object operations	To upload your data into your AWS account, you must create an S3 bucket in one of the AWS Regions.
Bucket tag (FC7)	subclass of Bucket	You can tag buckets (ref).
Bucket ACL (FC8)	subclass of Bucket	Amazon S3 Access Control Lists (ACLs) enable you to manage access to buckets (ref).
Bucket policy (FC10)	subclass of Bucket	For your bucket, you can add a bucket policy to grant other AWS accounts or IAM users permissions for the bucket and the objects in it. Any object permissions apply only to the objects that the bucket owner creates.
S3 access logging (FC19)	subclass of Bucket ACL/Bucket policy	Server access logging provides detailed records of the requests made to a bucket.
Analytics (FC11)	subclass of Bucket	You can analyze storage access patterns to decide the storage class (ref).
Inventory (FC12)	subclass of Bucket	You can create a report on your storage, including object metadata or versions (ref).
Lifecycle (FC13)	subclass of Bucket	You can manage the lifecycle of your data to reduce storage costs (ref).
Metrics (FC14)	subclass of Bucket	You can configure metrics to get additional insights into your usage (ref).
Website (FC16)	subclass of Bucket	You can host a static website on Amazon S3. On a static website, individual web pages include static content. They might also contain client-side scripts (ref).
S3 Object Lock (FC17)	subclass of Bucket	You can use S3 Object Lock to store objects using a write-once-read-many (WORM) model (ref). Creating a bucket with S3 Object Lock will enable versioning even without permissions.
Legal hold (FC29)	subclass of S3 Object Lock	A legal hold provides the same protection as a retention period but has no expiration date. S3 Object Lock must be activated on the bucket.
Transfer Acceleration (FC18)	subclass of Bucket	You can use Transfer Acceleration to improve the performance of long-distance transfers (ref).
Notification (FC20)	subclass of Bucket	You can receive notifications when certain events happen in your bucket.
CORS (FC22)	subclass of Bucket	You can create a CORS configuration with rules that identify the origins you will allow to access your bucket, the operations (HTTP methods) supported for each origin, and other operation-specific information.
Bucket default encryption (FC23)	subclass of Bucket	You can set default encryption on a bucket so that all new objects are encrypted when stored in the bucket.
Public Access Block (bucket) (FC24)	subclass of Bucket	S3 Block Public Access (bucket) provides controls at the individual S3 bucket level to ensure objects never have public access.
Public Access Block (account) (FC25)	subclass of Bucket	S3 Block Public Access (account) provides controls across an entire AWS account to ensure objects never have public access.
Access point (FC26)	subclass of Bucket	Access points are named network endpoints that are attached to buckets, which you can use to perform S3 object operations.

S3 Object Lambda (FC32)	subclass of Access point	S3 Object Lambda enables users to apply their custom code to process the output of a standard S3 request by automatically invoking a Lambda function.
S3 Storage Lens (FC31)	subclass of Bucket	S3 Storage Lens provides a single view of object storage use and activity across your entire S3 storage.
Tagging (for Storage Lens group only) (FC34)	subclass of S3 Storage Lens	When you configure your Storage Lens group, you can optionally add AWS resource tags to the group.
Multi-Region Access Points (FC33)	subclass of Bucket	S3 Multi-Region Access Points provide a single global endpoint to access a dataset that spans multiple S3 buckets in different AWS Regions or in different AWS accounts.
FIS actions (FC35)	subclass of Bucket	In AWS Fault Injection Service, the action aws:s3:bucket-pause-replication can pause S3 replication from the experiment AWS Region to the destination AWS Region for the targeted buckets. Review FIS ThreatModel for more information.
S3 Object Ownership (FC30)	subclass of Bucket, used by Object operations	S3 Object Ownership enables bucket owners to automatically assume ownership of objects uploaded to their buckets by other AWS accounts.
Object tagging (FC2)	subclass of Object operations, used by Bucket	You can tag objects (ref).
Attribute-based access control (ABAC) for general purpose buckets (FC36)	subclass of Object tagging/Bucket	ABAC for general purpose buckets is an Amazon S3 feature that allows access decisions to be made based on matching attributes such as tags between IAM principals and S3 buckets.
Object versioning (FC3)	subclass of Object operations, used by Bucket	You can version your objects (ref).
Bucket versioning (FC6)	subclass of Object versioning/Bucket	Versioning is a means of keeping multiple variants of an object in the same bucket (ref).
Replication (FC15)	subclass of Bucket versioning	Replication enables the automatic and asynchronous copying of objects from one bucket to another bucket (ref).
ACL on versioned objects (FC9)	subclass of Object versioning/Bucket ACL	Amazon S3 Access Control Lists (ACLs) enable you to manage access to object versions (ref).
Tag on versioned objects (FC4)	subclass of Object tagging/Object versioning, used by Bucket	You can tag each version of an object (ref).
Torrent (FC21)	subclass of Object operations, used by Bucket	You can use the BitTorrent protocol to retrieve objects (ref).
Batch (FC27)	subclass of Object operations, used by Bucket	S3 Batch Operations performs large-scale Batch Operations on Amazon S3 objects.
Other uses (FC28)	class	Others can use their S3 service to impact you in some way.

Object operations *(class, FC1)*

You can upload, download, and delete virtually any number of objects to an external S3 bucket for which you are authorized. Amazon S3 Access Control Lists (ACLs) enable you to manage access to objects. Each object has an ACL attached to it as a sub-resource. It defines which AWS accounts or groups are granted access and the type of access. When a request is received against a resource, Amazon S3 checks the corresponding ACL to ensure the requester has the necessary access permissions (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

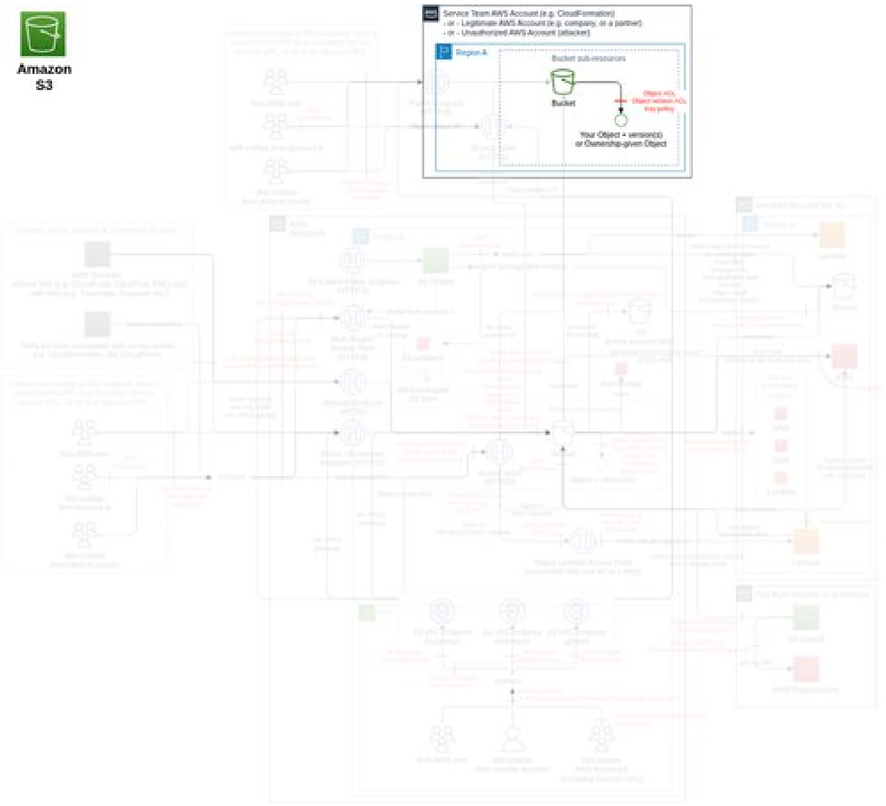
Action	IAM Permission
Deletes an object permanently (non-versioned bucket) or inserts a delete marker (versioned bucket).	s3:DeleteObject
Retrieves an object from Amazon S3.	s3:GetObject
Adds an object to a bucket.	s3:PutObject
Sets the Access Control List (ACL) permissions for an object. You must have WRITE_ACP permission to set the ACL of an object.	s3:PutObjectAcl

Threat List

Name	CVSS
Loss of ownership of an object	High (7.1)
Exfiltrate data by uploading it to an attacker bucket using a non-authenticated user or an unauthorized external IAM entity via one of your S3 VPC endpoints	Medium (6.2)
Destroy or modify primary data	Medium (6.1)
Exfiltrate data stored on S3 via AWS services	Medium (5.8)
Exfiltrate your data hosted on an external bucket by using compromised IAM credentials accessed over the Internet	Medium (5.7)
Exfiltrate data to an attacker bucket via a public endpoint	Medium (5.7)
Unauthorized upload of a private object to an accessible (e.g., public) bucket you do not own	Medium (5.7)
Exfiltrate data by using an S3 VPC endpoint to upload data to an attacker's bucket using an internal IAM entity	Medium (5.5)
Unauthorized modification of an object to become public or accessible in a private bucket you do not own by changing its object ACL	Medium (5.2)
Intercept data in transit to an external bucket	Medium (4.6)
Unauthorized object restored into an unauthorized bucket	Medium (4.3)
Upload to an authorized external bucket but in an incorrect AWS account	Medium (4.0)
Recon on the security boundaries and resource names through detailed access denial messages	Low (3.5)
Exfiltrate data by using tags	Low (3.3)
Use of less secure or old S3 features	Low (1.9)

Loss of ownership of an object

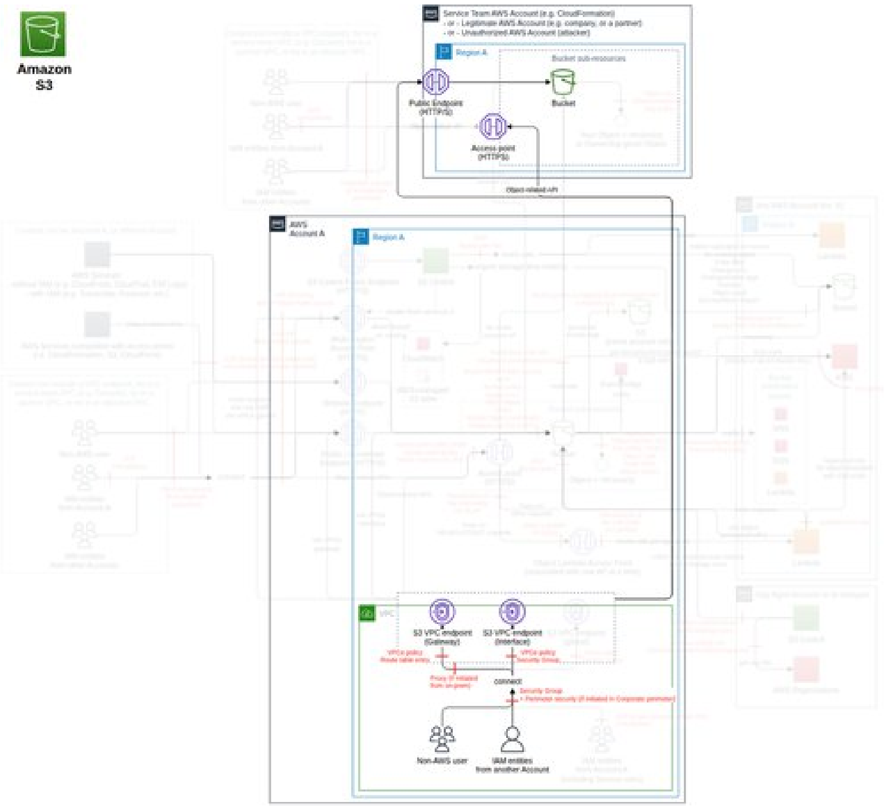
Threat Id	S3.T43
Name	Loss of ownership of an object
Description	S3 Object Ownership enables a bucket receiver to convert a bucket-owner-full-control ACL into an ownership transfer (for a new object); additionally, a bucket can convert all the objects to be owned by the bucket owner. An attacker can modify the receiver bucket to remove your object ACL control on an object and remove your access to this object.
Goal	Data manipulation
MITRE ATT&CK®	TA0040, T1531
CVSS	High (7.1)
IAM Access	{ "OPTIONAL": "s3:PutBucketOwnershipControls" }


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket
Object ACL
Object version ACL
Key policy
Your Object + version(s)
or Ownership-given Object

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO37 - Disabling ACLs for all buckets C152 - Ensure bucket ACLs and object ACLs are disabled on each bucket (enabled by default for all new buckets after April 2023). C153 - Prevent the creation of buckets with ACL enabled (e.g., by using an SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on StringNotEquals "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note that it does not block someone from enabling an ACL afterward via PutBucketOwnershipControls.	Very High	1	1	-
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C114 - For all external buckets with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover, block the PutObject with any ACL (e.g., using IAM or SCP and a deny on the condition "StringLike": {"s3:x-amz-acl": "*"}). It should be called via PutObjectAcl. C115 - For all external buckets with bucket-owner-full-control ACL requirements but without S3 Object Ownership handover, monitor that the PutObject operation does not include the ACL header.	Very High	1	1	1
CO12 - Enforce secure SDLC processes C113 - When transmitting an object to an external bucket with bucket-owner-full-control ACL requirements but without S3 Object Ownership handover, use 2 separate APIs (PutObject and PutObjectAcl) instead of the built-in object ACL operation in PutObject.	High	1	-	-

Exfiltrate data by uploading it to an attacker bucket using a non-authenticated user or an unauthorized external IAM entity via one of your S3 VPC endpoints

Threat Id	S3.T9
Name	Exfiltrate data by uploading it to an attacker bucket using a non-authenticated user or an unauthorized external IAM entity via one of your S3 VPC endpoints
Description	VPC endpoints for S3 allow any entity to connect from a VPC to any S3 bucket without an Internet Gateway. An attacker can exfiltrate data to an external S3 bucket via one of your VPC endpoints, using an unauthenticated user or their own external IAM entity. Note that some external IAM entities might be authorized if provided by one of your business partners.
Goal	Data theft
MITRE ATT&CK®	TA0010, T1537
CVSS	Medium (6.2)
IAM Access	{}


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTPS)
Bucket
Access point (HTTPS)
Object-related API
AWS Account A
Region A
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
VPCe policy
Route table entry
VPCe policy
Security Group
Proxy (if initiated from on-prem)
connect
Security Group
+ Perimeter security (if initiated in Corporate perimeter)
Non-AWS user
IAM entities from another Account

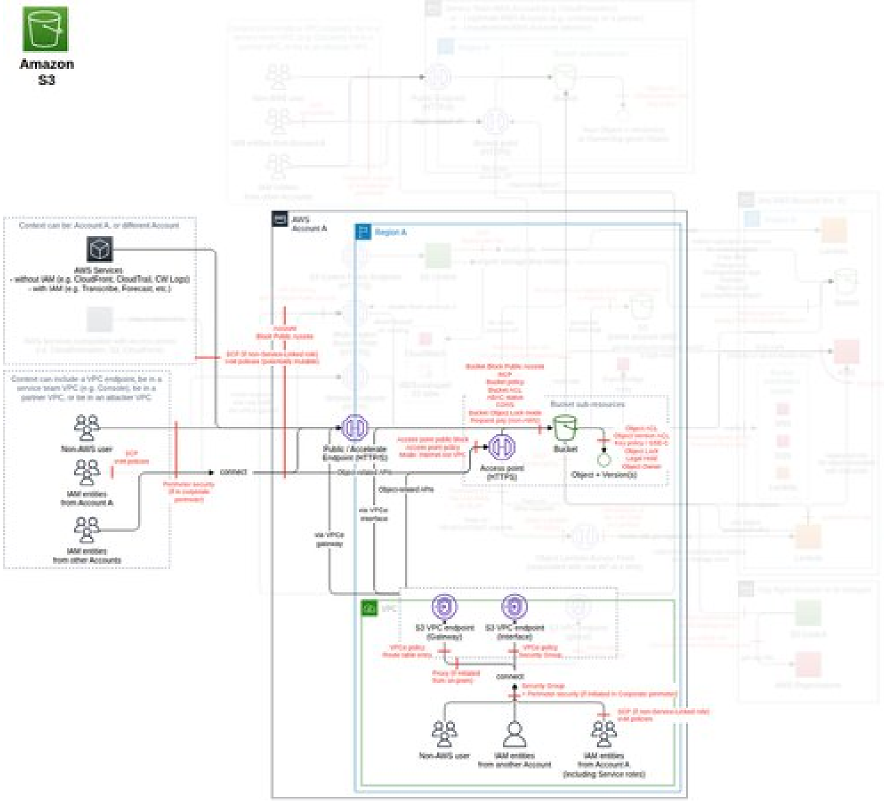
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO32 - Restrict access point access to VPCs when in use C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C105 - Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy.	Very High	1	1	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO7 - Limit and monitor access via S3 VPC endpoints C17 - For each VPC, maintain a list of AWS Organizations, OUs, and/or AWS accounts where IAM entities are authorized to access S3. C18 - For each VPC with an IAM entity allowed to use S3, secure them with the VPC ThreatModel (e.g., modification of VPC endpoints, VPC endpoint policy, routing table, Security Groups). C19 - Block any IAM entity not belonging to an authorized AWS Organization, OU, and/or AWS account from calling S3 from your VPCs by adding a deny statement in the S3 VPC endpoint policy for each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org IDs, as those are globally unique. C21 - Enable VPC DNS query logging in all VPCs. C22 - Maintain a list of authorized S3 and S3 access points (and their respective AWS accounts) to be accessed for each VPC. C23 - Limit the access to only authorized S3 bucket(s) or their AWS account(s) from each VPC (e.g., using the condition key "s3:ResourceAccount" on the VPC endpoint policy, alternatively use a specific resource-level statement for each bucket, or if the VPC endpoint policy size is beyond the limit and more granular control on VPC is required, use access points). C25 - Monitor VPC DNS query logs to ensure only authorized S3 buckets and S3 access points are being queried in each VPC (e.g., using VPC DNS query logging) and protect them using Route 53	Very High	5	2	1

ThreatModel. C124 - Ensure all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoint controls.				
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C15 - Request access via an S3 access point on a bucket you don't own, if compatible with your interaction with the bucket (e.g., not through an unsupported AWS service).	High	2	-	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Destroy or modify primary data

Threat Id	S3.T17
Name	Destroy or modify primary data
Description	S3 provides high durability by design (11 9s). However, data can still be deleted by the customer. An attacker (or someone by negligence) can use their access to destroy (or modify) primary data located on S3, affecting the ability of the business to operate (for example, Code Spaces).
Goal	Disruption of Service
MITRE ATT&CK®	TA0040, T1485
CVSS	Medium (6.1)

IAM Access	{
	"AND": [{
	"OR": ["s3:DeleteObject", "s3:PutObject"]
	}, {
	"OPTIONAL": {
	"OR": ["s3:DeleteObjectVersion", "s3:BypassGovernanceMode", "s3:PutObjectLegalHold"]
	}
	}]
	}

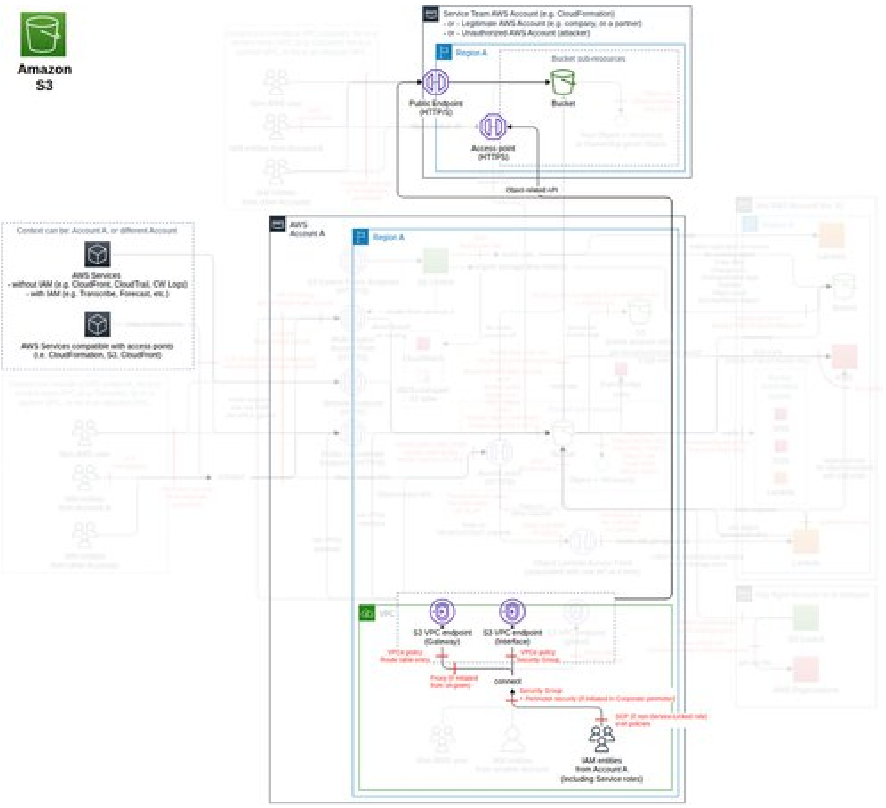

Amazon S3
AWS Services
Non-AWS user
IAM entities from Account A
IAM entities from other Accounts
connect
Public / Accelerate Endpoint (HTTPS)
Access point (HTTPS)
Bucket
Object + Version(s)
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
Non-AWS user
IAM entities from another Account
IAM entities from Account A (including Service roles)

Control Objectives	**Priority**	**# of associated Controls**		
		Directive	**Preventative**	**Detective**
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO29 - Limit access from only authorized VPCs C98 - For each S3 bucket, maintain a list of VPCs authorized to access it. C99 - Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).	Very High	1	1	-
CO16 - Enforce encryption at rest C61 - Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption (ref). C140 - Ensure all objects in S3 buckets are encrypted with an authorized KMS key. C63 - Use KMS ThreatModel to protect the KMS keys used for S3 (e.g., using encryptionContext on the policy of each KMS key). C64 - Implement an authorized default encryption key on each bucket; enable S3 Bucket Key if not using DSSE-KMS and if CloudTrail events are not required for KMS encrypt/decrypt (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings). C66 - Block PutObject requests with unauthorized KMS key on each bucket (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" exists and is not an authorized KMS key).	Very High	4	1	-
CO17 - Protect primary data against loss C69 - Enable versioning on buckets holding primary data. C71 - Back up primary data in a secure location under a different security authority (e.g., in an AWS data bunker account via replication, or using AWS Backup for Amazon S3).	Very High	2	-	-
CO20 - Protect data integrity using S3 Object Lock	Very High	-	2	-

C74 - Implement the authorized default S3 Object Lock on buckets requiring WORM (note: Amazon S3 evaluates and applies bucket policies before applying the bucket default S3 Object Lock settings). C76 - Block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock on buckets requiring WORM (e.g., using their bucket policy and centrally in an RCP applied to the OU or the AWS account with a deny statement on PutObject and PutObjectRetention if the condition "s3:object-lock-mode" exists and "s3:object-lock-remaining-retention-days" is not the defined S3 Object Lock configuration).				
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	High	2	-	-
CO12 - Enforce secure SDLC processes C44 - Ensure the integrity of stored objects (ref), using "x-amz-checksum" from the object metadata instead of ETag (e.g., using the compute checksum functionality in S3 Batch Operations). If ETag is used, make sure to properly account for its different definitions (ref).	Medium	1	-	-
CO19 - Have a process to apply legal holds C73 - Create a process to apply a legal hold to any S3 bucket whenever required. The condition "s3:object-lock-legal-hold" can be used to restrict who can remove such a lock.	Medium	1	-	-
CO18 - Encrypt or tokenize critical data C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Low	1	-	-

Exfiltrate data stored on S3 via AWS services

Threat Id	S3.T21
Name	Exfiltrate data stored on S3 via AWS services
Description	A number of AWS services use S3 for storage, including cross-account S3 buckets. Services with IAM roles (e.g., SageMaker) will give ownership to the target AWS account, removing ownership protection. An attacker can use those services to exfiltrate data.
Goal	Data theft
MITRE ATT&CK®	[TA0005](), [T1562]()
CVSS	[Medium (5.8)]()
IAM Access	{ "OPTIONAL": "s3:PutObjectAcl" }


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTPS)
Bucket
Access point (HTTPS)
Object-related API
Content can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
AWS Services compatible with access points (i.e. CloudFormation, S3, CloudFront)
AWS Account A
Region A
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
VPCe policy Route table entry
VPCe policy Security Group
Proxy (if initiated from on-prem)
connect
Security Group
+ Perimeter security (if initiated in Corporate perimeter)
SCP (if non Service-Linked role) IAM policies
IAM entities from Account A (including Service roles)

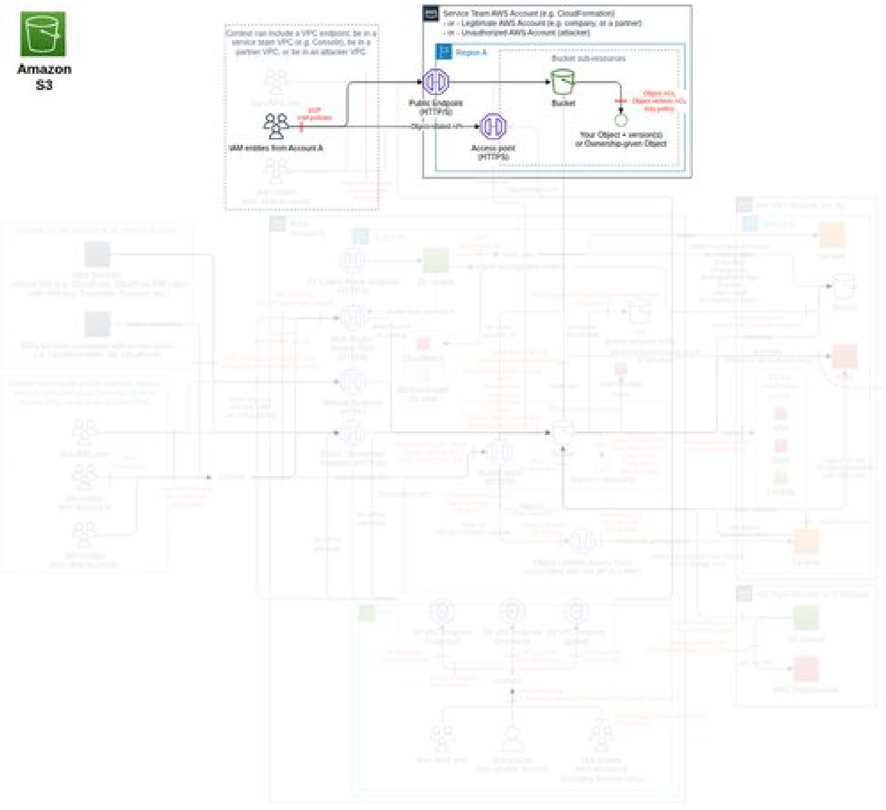
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like [FINRA herd]().	Very High	1	-	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C13 - Monitor that only authorized external buckets are used (e.g., via CloudTrail S3 data events in resources[].accountId and resources[].ARN). Both account ID and bucket name must be verified.	High	1	-	1
CO6 - Model the threats on all AWS services accessing S3 C16 - Analyze and protect all AWS services accessing S3 (e.g., via ThreatModel). Enforce use in VPC only, whenever possible.	High	1	-	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable [CloudTrail S3 data events]() in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the [IAM Access Advisor]() to	Medium	2	-	-

review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.				
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Exfiltrate your data hosted on an external bucket by using compromised IAM credentials accessed over the Internet

Threat Id	S3.T3
Name	Exfiltrate your data hosted on an external bucket by using compromised IAM credentials accessed over the Internet
Description	IAM credentials can be compromised. An attacker can use a compromised but authorized credential to download your object from an external bucket via the public endpoint or their VPC endpoint.
Goal	Data theft
MITRE ATT&CK®	TA0010, T1567
CVSS	Medium (5.7)

IAM Access	{
	"UNIQUE": "s3:GetObject"
	}

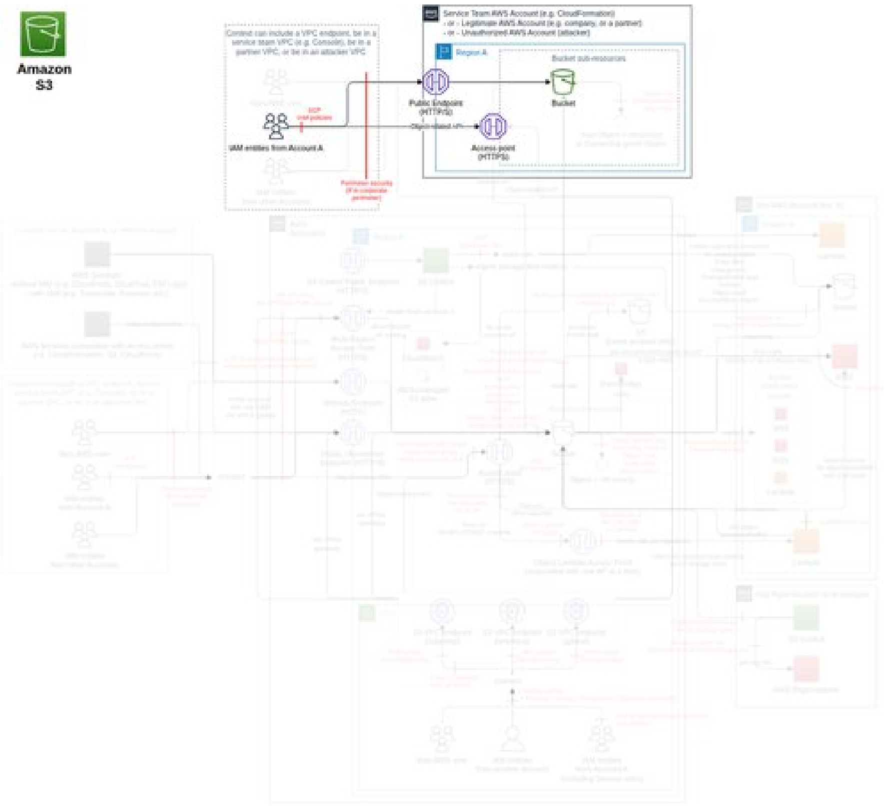

Amazon S3
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
SCP
IAM policies
IAM entities from Account A
Public Endpoint (HTTPS)
Object-related API
Access point (HTTPS)
Bucket
Object ACL
Object version ACL
Key policy
Your Object + version(s) or Ownership-given Object

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel).	High	1	-	-
CO12 - Enforce secure SDLC processes C46 - Ensure all S3 buckets interacted with are in the correct AWS account (e.g., using the condition in all compatible S3 requests: x-amz-expected-bucket-owner and x-amz-source-expected-bucket-owner).	Medium	1	-	-
CO4 - Monitor S3 with Amazon GuardDuty and Macie C10 - Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using the GuardDuty ThreatModel. Ensure findings are investigated (e.g., using Amazon Detective).	Low	1	-	-
CO18 - Encrypt or tokenize critical data C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Very Low	1	-	-

Exfiltrate data to an attacker bucket via a public endpoint

Threat Id	S3.T7
Name	Exfiltrate data to an attacker bucket via a public endpoint
Description	S3 allows IAM entities to upload data to a bucket in other AWS accounts if they have the necessary IAM permissions. An attacker can use one of your IAM entities to upload data to one of their buckets. If the attacker does not control the object ACL, they can use the names of objects (1 KB).
Goal	Data theft
MITRE ATT&CK®	TA0010, T1537
CVSS	Medium (5.7)

IAM Access	{
	"AND": ["s3:PutObject", {
	"OPTIONAL": "s3:PutObjectAcl"
	}]
	}



Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Region A
Bucket sub-resources
SCP IAM policies
IAM entities from Account A
Public Endpoint (HTTPS)
Bucket
Object-related APIs
Access point (HTTPS)
Perimeter security (if in corporate perimeter)

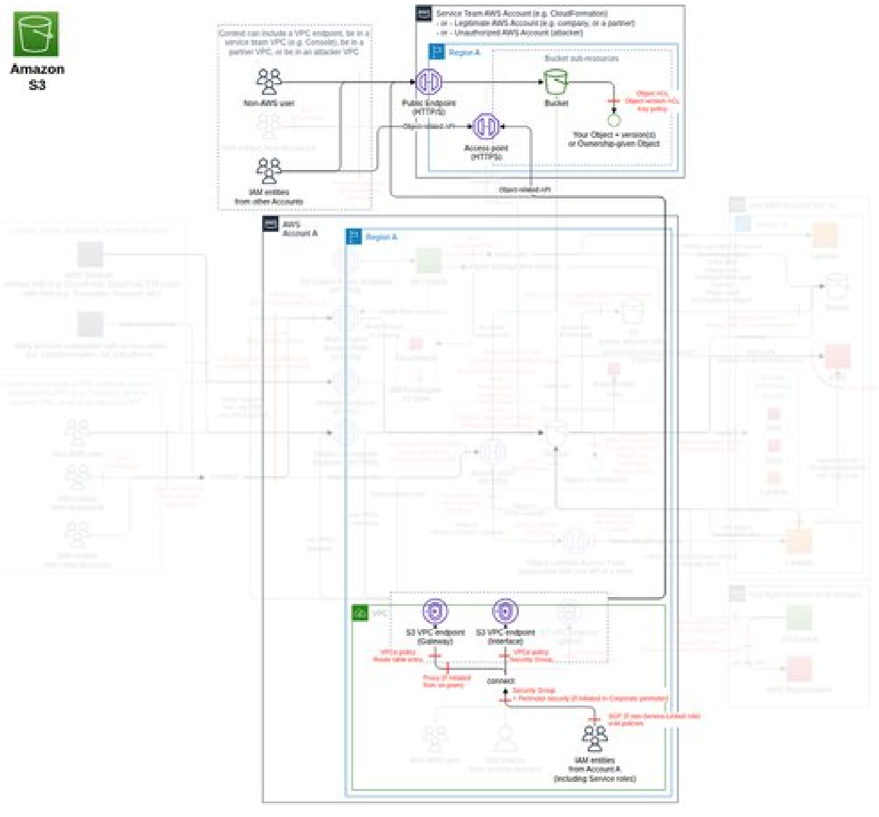
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO2 - Block S3 endpoints in your corporate perimeter security C8 - Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g., firewalls or a cloud interception proxy), including via Internet Gateway, to force the use of VPC endpoints. It will block data-plane transfer. Note: AWS Management Console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Very High	1	-	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO32 - Restrict access point access to VPCs when in use C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C105 - Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy. C106 - In bucket policies, or centrally in an RCP applied to the OU or AWS account, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn". C107 - Block the creation of non-VPC S3 access point "s3:CreateAccessPoint" (e.g., using IAM policies and SCPs with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}). C108 - Block all traffic from Internet-configured S3 access points (e.g., in their bucket policy, or centrally in an RCP applied to the OU or AWS account, using a deny statement with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}). C112 - Block any object-related operations access to S3 buckets not through an access point (i.e., IAM policy, SCP, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on the condition "ArnNotLike": {"s3:DataAccessPointArn": "arn:aws:s3:*Region*:*AccountId*:accesspoint/*"}).	Very High	1	5	-

CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C13 - Monitor that only authorized external buckets are used (e.g., via CloudTrail S3 data events in resources[].accountId and resources[].ARN). Both account ID and bucket name must be verified.	High	1	-	1
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO16 - Enforce encryption at rest C162 - Block requests not using DSSE-KMS when required (e.g., by using an SCP, IAM policies, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on required bucket names and "s3:x-amz-server-side-encryption" = "aws:kms:dsse"). C163 - Monitor requests not using DSSE-KMS when required (e.g., using CloudTrail log event name(s), CloudTrail S3 data events with field(s) requestParameter.bucketName, and "response.x-amz-server-side-encryption-aws").	Low	-	1	1
CO18 - Encrypt or tokenize critical data C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Low	1	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Unauthorized upload of a private object to an accessible (e.g., public) bucket you do not own

Threat Id	S3.T5
Name	Unauthorized upload of a private object to an accessible (e.g., public) bucket you do not own
Description	S3 buckets can be public for a legitimate reason. An attacker (or someone by negligence) can upload sensitive data to an accessible bucket (e.g., public) you do not own to make it accessible to exfiltrate data.
Goal	Data theft
MITRE ATT&CK®	TA0009, T1074
CVSS	Medium (5.7)

IAM Access	{
	"UNIQUE": "s3:PutObject"
	}



Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Region A
Bucket sub-resources
Non-AWS user
Public Endpoint (HTTPS)
Bucket
Object ACL
Object version ACL
Key policy
Object-related API
Access point (HTTPS)
Your Object + version(s) or Ownership-given Object
IAM entities from other Accounts
Object-related API
AWS Account A
Region A
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
VPCe policy
Route table entry
VPCe policy
Security Group
Proxy (if initiated from on-prem)
connect
Security Group
+ Perimeter security (if initiated in Corporate perimeter)
SCP (if non-Service-Linked role)
IAM policies
IAM entities from Account A (including Service roles)

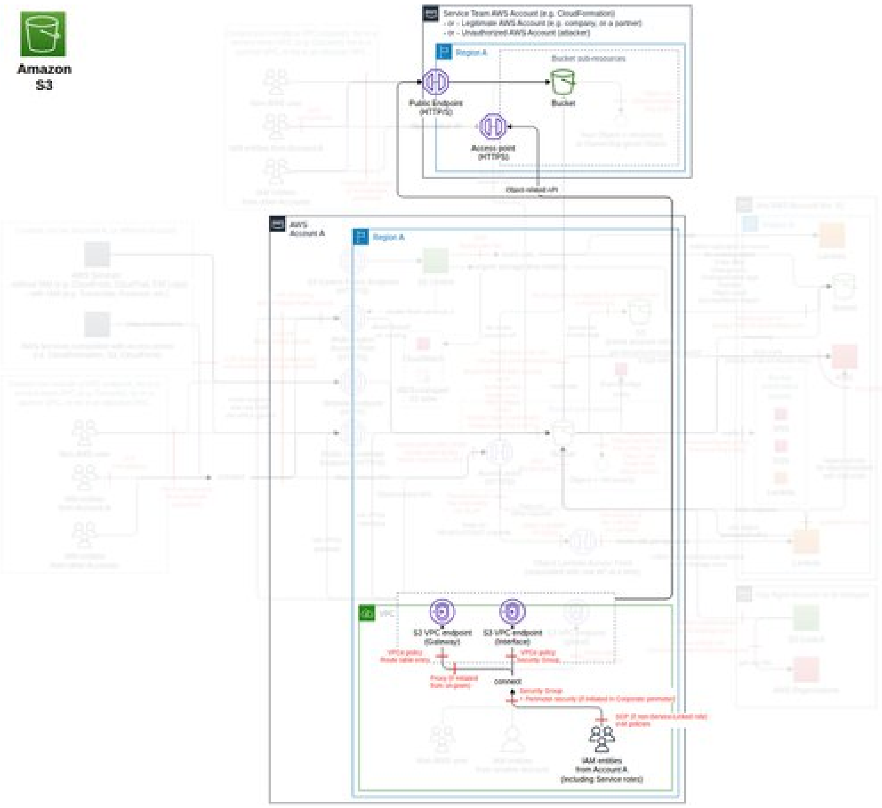
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C12 - Allow only authorized ACLs on objects for buckets you don't control (e.g., using IAM and VPC endpoint policy with the ACL conditions). C14 - Scan all data before uploading to an external bucket to ensure the classification of the data is aligned with the bucket classification (e.g., using Macie).	High	2	1	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

CO16 - Enforce encryption at rest C162 - Block requests not using DSSE-KMS when required (e.g., by using an SCP, IAM policies, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on required bucket names and "s3:x-amz-server-side-encryption" = "aws:kms:dsse"). C163 - Monitor requests not using DSSE-KMS when required (e.g., using CloudTrail log event name(s), CloudTrail S3 data events with field(s) requestParameter.bucketName, and "response.x-amz-server-side-encryption-aws").	Low	-	1	1
CO18 - Encrypt or tokenize critical data C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Low	1	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Exfiltrate data by using an S3 VPC endpoint to upload data to an attacker's bucket using an internal IAM entity

Threat Id	S3.T8
Name	Exfiltrate data by using an S3 VPC endpoint to upload data to an attacker's bucket using an internal IAM entity
Description	VPC endpoints for S3 allow IAM entities to connect from a VPC to any S3 bucket without an Internet Gateway. An attacker can exfiltrate pre-collected data to an external S3 bucket via a VPC endpoint, using an internal IAM entity they control. If the attacker does not control the object ACL, they can use the names of objects (1 KB).
Goal	Data theft
MITRE ATT&CK®	TA0010, T1537
CVSS	Medium (5.5)

IAM Access	{
	 "AND": ["s3:PutObject", {
	 "OPTIONAL": "s3:PutObjectAcl"
	 }]
	 }

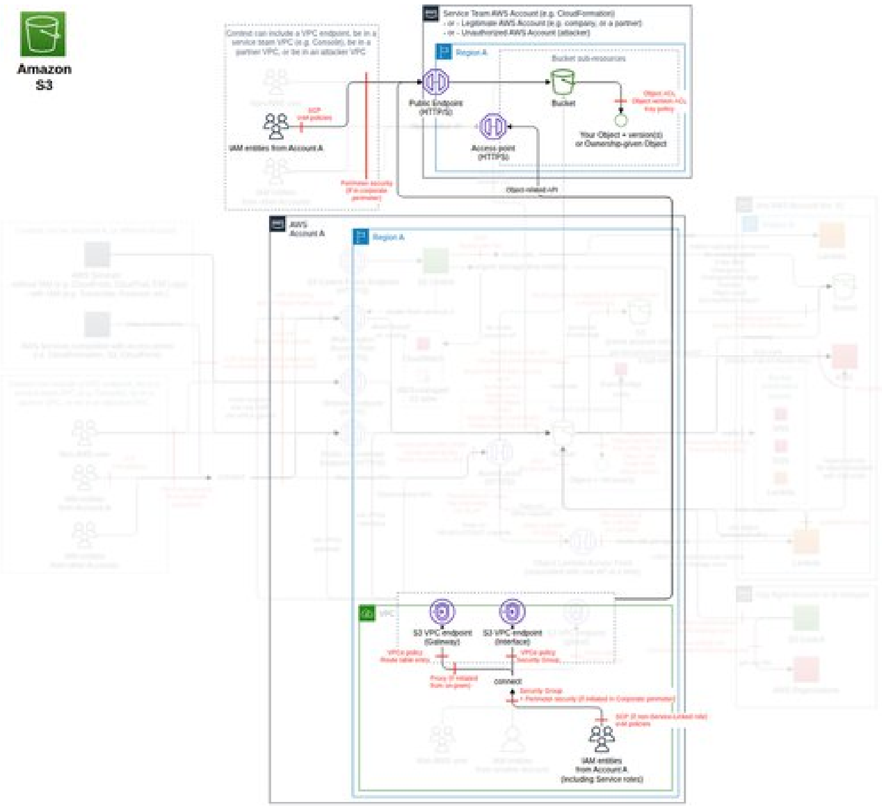

Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTPS)
Bucket
Access point (HTTPS)
Object-related API
AWS Account A
Region A
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
VPCe policy Route table entry
VPCe policy Security Group
Proxy (if initiated from on-prem)
connect
Security Group + Perimeter security (if initiated in Corporate perimeter)
SCP (if non-Service-Linked role) + IAM policies
IAM entities from Account A (including Service roles)

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO7 - Limit and monitor access via S3 VPC endpoints C21 - Enable VPC DNS query logging in all VPCs. C22 - Maintain a list of authorized S3 and S3 access points (and their respective AWS accounts) to be accessed for each VPC. C23 - Limit the access to only authorized S3 bucket(s) or their AWS account(s) from each VPC (e.g., using the condition key "s3:ResourceAccount" on the VPC endpoint policy, alternatively use a specific resource-level statement for each bucket, or if the VPC endpoint policy size is beyond the limit and more granular control on VPC is required, use access points). C25 - Monitor VPC DNS query logs to ensure only authorized S3 buckets and S3 access points are being queried in each VPC (e.g., using VPC DNS query logging) and protect them using Route 53 ThreatModel. C124 - Ensure all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoint controls.	Very High	3	1	1
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C15 - Request access via an S3 access point on a bucket you don't own, if compatible with your interaction with the bucket (e.g., not through an unsupported AWS service).	High	2	-	-

CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-
CO16 - Enforce encryption at rest C162 - Block requests not using DSSE-KMS when required (e.g., by using an SCP, IAM policies, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on required bucket names and "s3:x-amz-server-side-encryption" = "aws:kms:dsse"). C163 - Monitor requests not using DSSE-KMS when required (e.g., using CloudTrail log event name(s), CloudTrail S3 data events with field(s) requestParameter.bucketName, and "response.x-amz-server-side-encryption-aws").	Low	-	1	1

Unauthorized modification of an object to become public or accessible in a private bucket you do not own by changing its object ACL

Threat Id	S3.T6
Name	Unauthorized modification of an object to become public or accessible in a private bucket you do not own by changing its object ACL
Description	Bucket authority only prevails over object ACL when the object access is explicitly denied (ref). An attacker (or someone by negligence) can change the object ACL to make it public or accessible to themselves.
Goal	Data theft
MITRE ATT&CK®	TA0005, T1562
CVSS	Medium (5.2)
IAM Access	{ "OR": ["s3:PutObjectAcl", "s3:PutObjectVersionAcl"] }



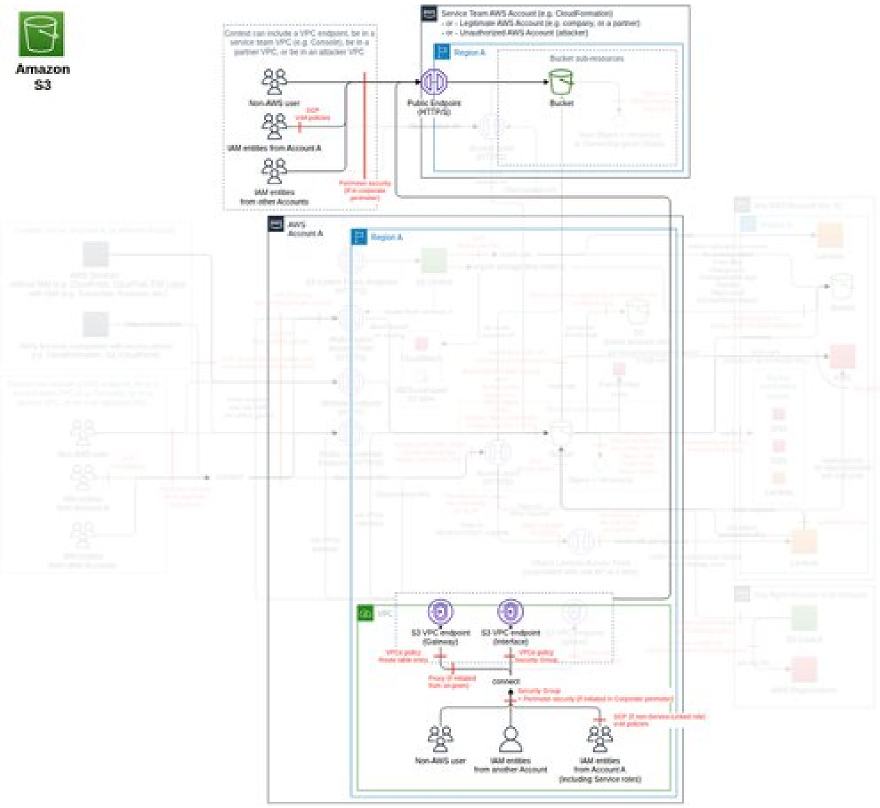
Amazon S3
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
SCP
IAM policies
IAM entities from Account A
Perimeter security (IP in corporate perimeter)
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTPS)
Bucket
Object ACL, Object version ACL, Key policy
Access point (HTTPS)
Your Object + version(s) or Ownership-given Object
Object-related API
AWS Account A
Region A
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
VPCe policy Route table entry
VPCe policy Security Group
Proxy (if initiated from on-prem)
connect
Security Group + Perimeter security (if initiated in Corporate perimeter)
SCP (if non Service-Linked role) IAM policies
IAM entities from Account A (including Service roles)

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO10 - Block changes to make an object public via object ACL C34 - Deny requests to change object ACL to public (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy with a deny statement on PutObjectAcl for "s3:x-amz-grant-read", "s3:x-amz-grant-read-acp", "s3:x-amz-grant-write-acp", "s3:x-amz-grant-full-control" on the following predefined groups "http://acs.amazonaws.com/groups/global/AllUsers" and "http://acs.amazonaws.com/groups/global/AuthenticatedUsers"). C35 - Monitor ObjectACL changes (or tentative changes) to public using CloudTrail S3 data events.	Very High	-	1	1
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO37 - Disabling ACLs for all buckets C152 - Ensure bucket ACLs and object ACLs are disabled on each bucket (enabled by default for all new buckets after April 2023). C153 - Prevent the creation of buckets with ACL enabled (e.g., by using an SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on StringNotEquals "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note that it does not block someone from enabling an ACL afterward via PutBucketOwnershipControls.	Very High	1	1	-
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C12 - Allow only authorized ACLs on objects for buckets you don't control (e.g., using IAM and VPC endpoint policy with the ACL conditions).	High	1	1	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-

CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Intercept data in transit to an external bucket

Threat Id	S3.T12
Name	Intercept data in transit to an external bucket
Description	S3 allows communication over HTTP. An attacker can intercept the traffic you send to an external bucket to read or modify the data.
Goal	Data theft
MITRE ATT&CK®	TA0009, T1557
CVSS	Medium (4.6)
IAM Access	{}


Amazon S3
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
SCP (r/d policies)
IAM entities from Account A
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTP(S))
Bucket
AWS Account A
Region A
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
VPCe policy Route table entry
VPCe policy Security Group
Proxy (if initiated from on-prem)
connect
Security Group + Perimeter security (if initiated in Corporate perimeter)
SCP (if non-Service-Linked role) r/d policies
Non-AWS user
IAM entities from another Account
IAM entities from Account A (including Service roles)

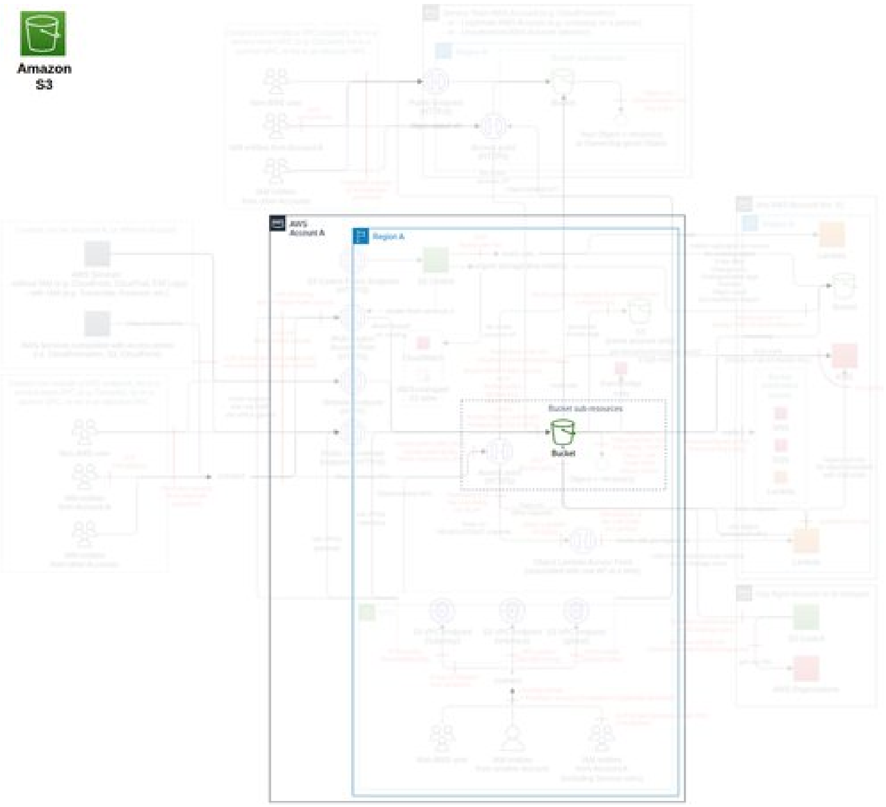
<table>
<tr><th rowspan="2">Control Objectives</th><th rowspan="2">Priority</th><th colspan="3"># of associated Controls</th></tr>
<tr><th>Directive</th><th>Preventative</th><th>Detective</th></tr>
<tr><td><b>CO1 - Enforce encryption in transit</b>
C1 - Block all unencrypted requests and unauthorized TLS version(s) from IAM entities you control (e.g., by denying all unencrypted requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != <i>authorized TLS version(s)</i>, using an SCP on your AWS Organization root node).
C3 - Block all unencrypted requests and unauthorized TLS version(s) from VPC endpoints you control (e.g., by denying all requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != <i>authorized TLS version(s)</i>, on the VPC endpoint policy).
C4 - Monitor and investigate all requests made with HTTP (e.g., via CloudTrail S3 data events with the lack of additionalEventData.CipherSuite).
C119 - Maintain a list of authorized version(s) of TLS/SSL per bucket (or per account/OU/Org) (e.g., considering quantum-resistant encryption).</td><td>Very High</td><td>1</td><td>2</td><td>1</td></tr>
<tr><td><b>CO15 - Identify and ensure the protection of all internal buckets hosting your objects</b>
C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.</td><td>Very High</td><td>1</td><td>-</td><td>-</td></tr>
<tr><td><b>CO18 - Encrypt or tokenize critical data</b>
C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.</td><td>Medium</td><td>1</td><td>-</td><td>-</td></tr>
<tr><td><b>CO3 - Enable S3 data events in AWS CloudTrail</b>
C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.</td><td>Medium</td><td>1</td><td>-</td><td>-</td></tr>
<tr><td><b>CO2 - Block S3 endpoints in your corporate perimeter security</b>
C8 - Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g., firewalls or a cloud interception proxy), including via Internet Gateway, to force the use of VPC endpoints. It will block data-plane transfer. Note: AWS Management Console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").</td><td>Low</td><td>1</td><td>-</td><td>-</td></tr>
<tr><td><b>CO39 - Enforce S3 server access logging on buckets</b></td><td>Low</td><td>1</td><td>-</td><td>-</td></tr>
</table>

C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.				

Unauthorized object restored into an unauthorized bucket

Threat Id	S3.T26
Name	Unauthorized object restored into an unauthorized bucket
Description	Objects can be stored in S3 Glacier. An attacker can restore an object to an unauthorized S3 bucket to collect or exfiltrate data.
Goal	Data theft
MITRE ATT&CK®	TA0010, T1020
CVSS	Medium (4.3)

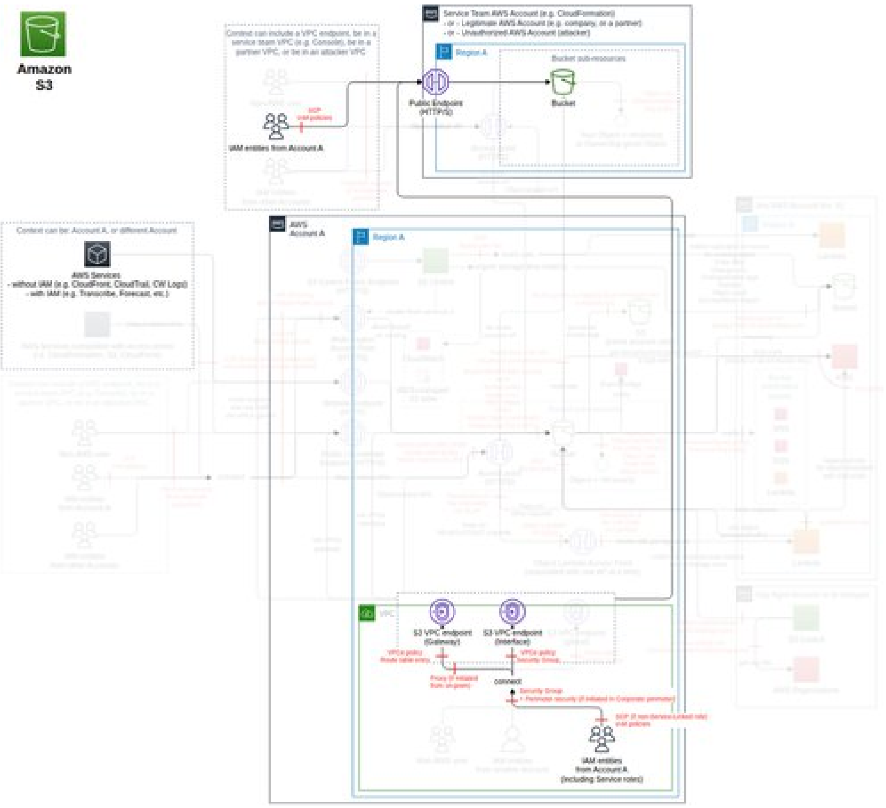
IAM Access	{
	"UNIQUE": "s3:RestoreObject"
	}



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Upload to an authorized external bucket but in an incorrect AWS account

Threat Id	S3.T31
Name	Upload to an authorized external bucket but in an incorrect AWS account
Description	Bucket names are globally unique. An attacker can take over a legitimate external bucket and deceive you into sending data to their bucket.
Goal	Data theft
MITRE ATT&CK®	[TA0010](), [T1537](), [T1567]()
CVSS	[Medium (4.0)]()
IAM Access	{ "UNIQUE": "s3:PutObject" }



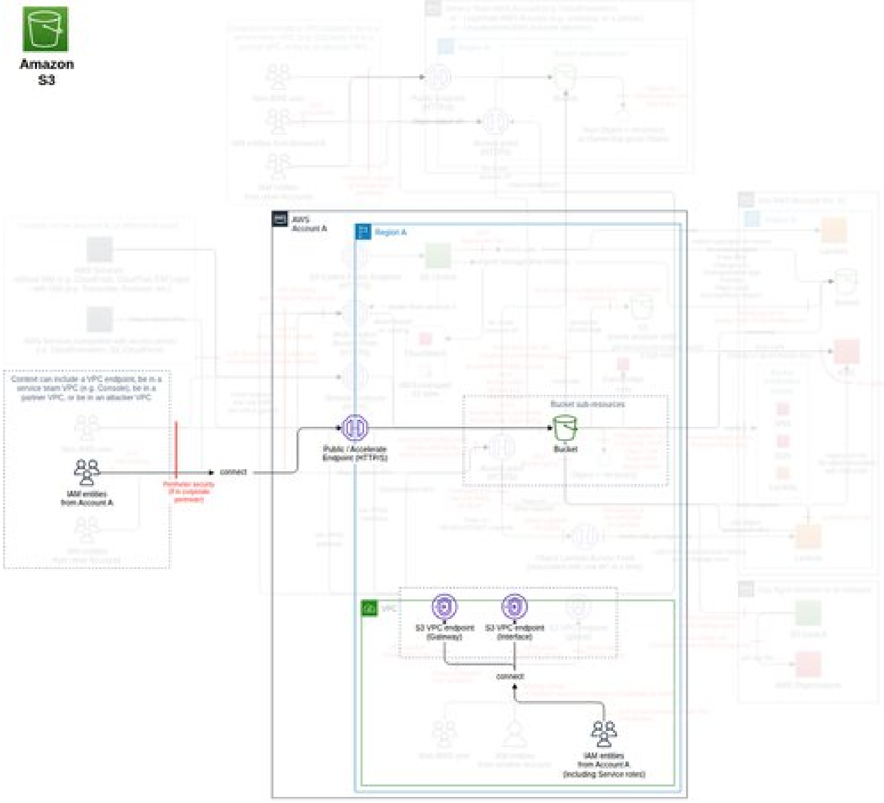
Amazon S3
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
SCP
IAM policies
IAM entities from Account A
Public Endpoint (HTTPS)
Bucket
Content can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
AWS Account A
Region A
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
VPCe policy
Route table entry
VPCe policy
Security Group
Proxy (if initiated from on-prem)
connect
Security Group
+ Perimeter security (if initiated in Corporate perimeter)
SCP (if non-Service-Linked role)
IAM policies
IAM entities from Account A (including Service roles)

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like [FINRA herd]().	Very High	1	-	-
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C13 - Monitor that only authorized external buckets are used (e.g., via CloudTrail S3 data events in resources[].accountId and resources[].ARN). Both account ID and bucket name must be verified. C15 - Request access via an S3 access point on a bucket you don't own, if compatible with your interaction with the bucket (e.g., not through an unsupported AWS service).	Very High	2	-	1
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable [CloudTrail S3 data events]() in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO16 - Enforce encryption at rest C162 - Block requests not using DSSE-KMS when required (e.g., by using an SCP, IAM policies, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on required bucket names and "s3:x-amz-server-side-encryption" = "aws:kms:dsse"). C163 - Monitor requests not using DSSE-KMS when required (e.g., using CloudTrail log event name(s), CloudTrail S3 data events with field(s) requestParameter.bucketName, and "response.x-amz-server-side-encryption-aws").	Low	-	1	1

CO18 - Encrypt or tokenize critical data C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Low	1	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Recon on the security boundaries and resource names through detailed access denial messages

Threat Id	S3.T62
Name	Recon on the security boundaries and resource names through detailed access denial messages
Description	Enhanced access-denied messages include detailed response fields about which condition or permission prevented access. They are available only within the same AWS account or within AWS Organizations. An attacker can repeatedly attempt to access buckets with different parameters or identities and gather specific reasons for denial or existing resource names (using the presence or absence of the enhanced access-denied messages), leading to the discovery of deployed security configurations and buckets in AWS Organizations.
Goal	Launch another attack
MITRE ATT&CK®	TA0007, T1518, T1580, T1619
CVSS	Low (3.5)
IAM Access	{ "UNIQUE": "any:any" }



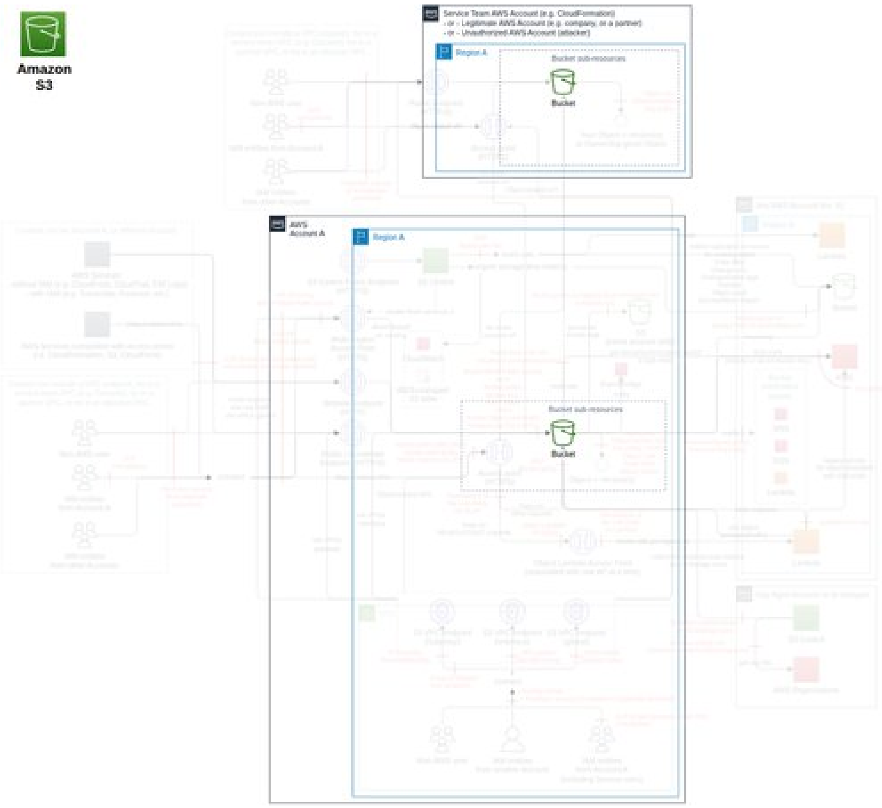
Amazon S3
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
IAM entities from Account A
Perimeter security (if in corporate premises)
connect
AWS Account A
Region A
Public / Accelerate Endpoint (HTTPS)
Bucket sub-resources
Bucket
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
connect
IAM entities from Account A (including Service roles)

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO7 - Limit and monitor access via S3 VPC endpoints C17 - For each VPC, maintain a list of AWS Organizations, OUs, and/or AWS accounts where IAM entities are authorized to access S3. C18 - For each VPC with an IAM entity allowed to use S3, secure them with the VPC ThreatModel (e.g., modification of VPC endpoints, VPC endpoint policy, routing table, Security Groups). C19 - Block any IAM entity not belonging to an authorized AWS Organization, OU, and/or AWS account from calling S3 from your VPCs by adding a deny statement in the S3 VPC endpoint policy for each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org IDs, as those are globally unique.	Very High	2	1	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Exfiltrate data by using tags

Threat Id	S3.T18
Name	Exfiltrate data by using tags
Description	Objects and buckets can have tags. An attacker can use these features to exfiltrate data.
Goal	Data theft
MITRE ATT&CK®	TA0010, T1020
CVSS	Low (3.3)

IAM Access	{
	"AND": [{
	"OR": ["s3:GetObjectTagging", "s3:GetObjectVersionTagging", "s3:PutBucketTagging"]
	}, {
	"OR": ["s3:PutObjectTagging", "s3:PutObjectVersionTagging", "s3:GetBucketTagging"]
	}]
	}

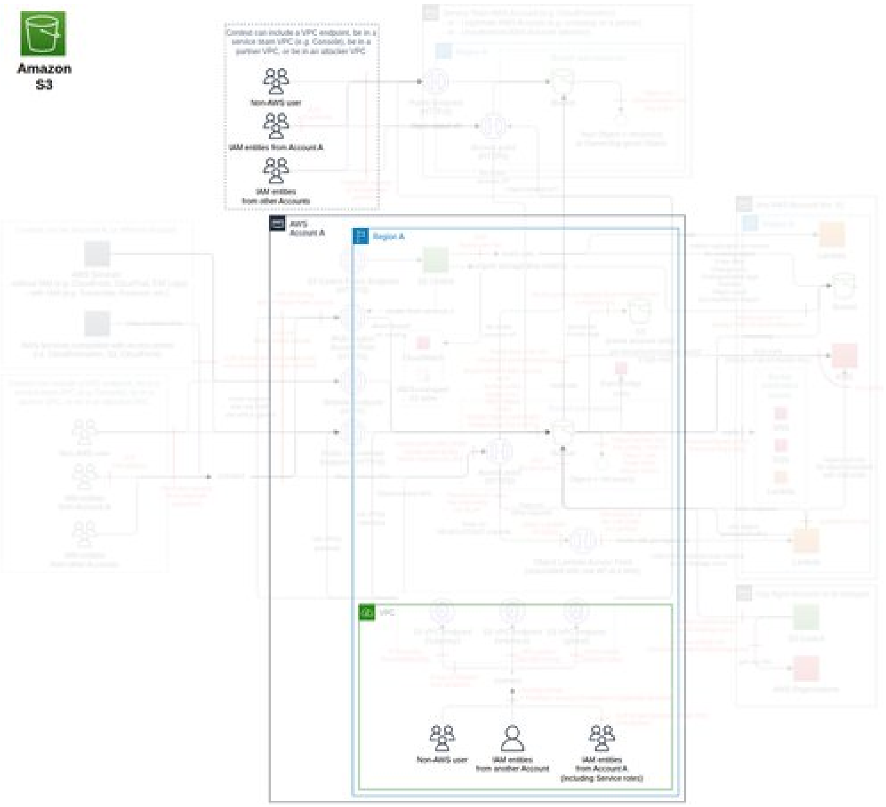

Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket
AWS Account A
Region A
Bucket sub-resources
Bucket

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO2 - Block S3 endpoints in your corporate perimeter security C8 - Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g., firewalls or a cloud interception proxy), including via Internet Gateway, to force the use of VPC endpoints. It will block data-plane transfer. Note: AWS Management Console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Use of less secure or old S3 features

Threat Id	S3.T35
Name	Use of less secure or old S3 features
Description	S3 was launched in 2006, and its features have evolved. An attacker can use older features that have been proven less secure by AWS (e.g., certain API configurations, SigV2, path-style model), but are still maintained for retro-compatibility.
Goal	Launch another attack
MITRE ATT&CK®	TA0011, T1102
CVSS	Low (1.9)

IAM Access	{
	"UNIQUE": "s3:deprecated"
	}


Amazon S3
Non-AWS user
IAM entities from Account A
IAM entities from other Accounts
AWS Account A
Region A
VPC
Non-AWS user
IAM entities from another Account
IAM entities from Account A (including Service roles)

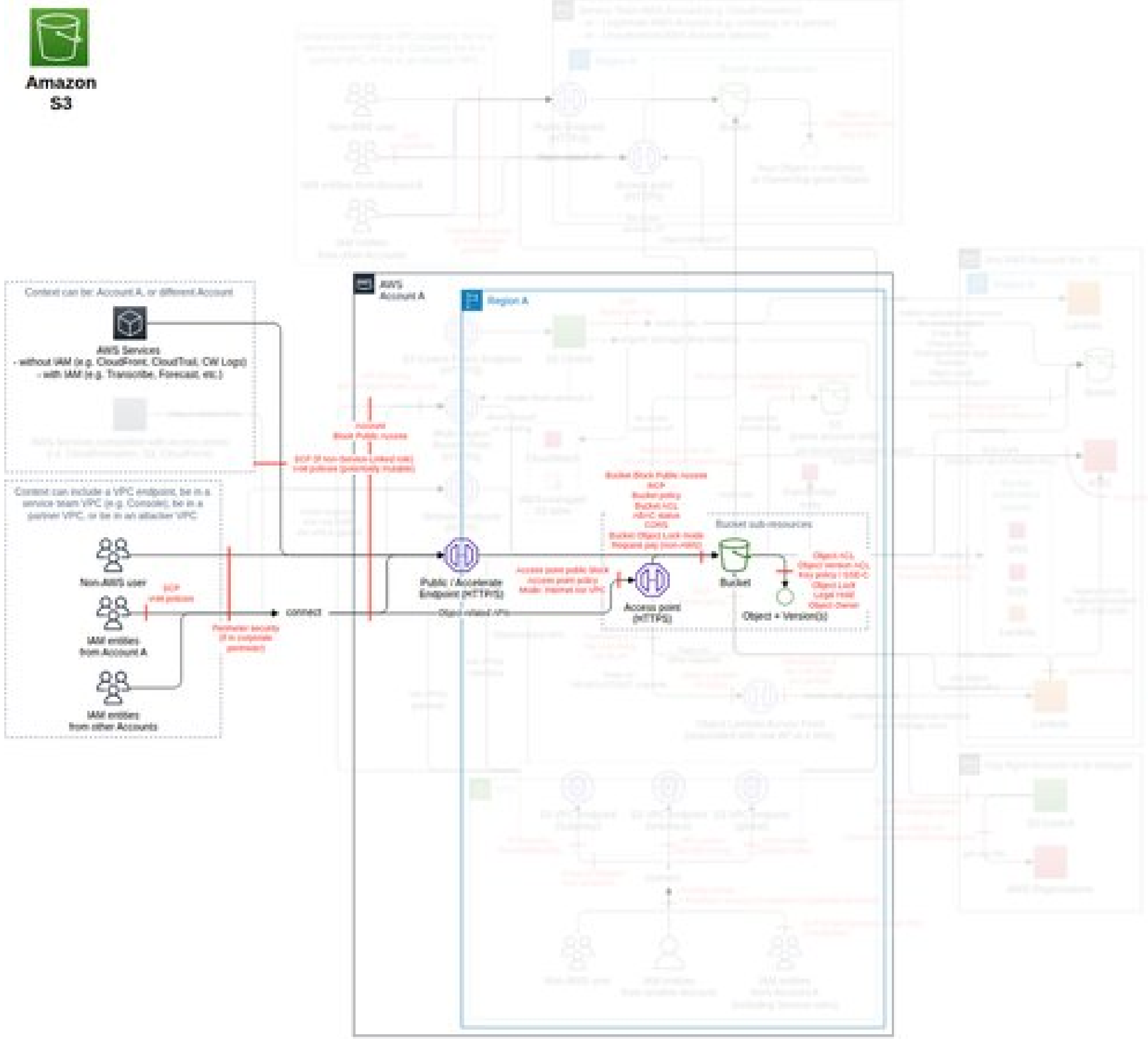
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO12 - Enforce secure SDLC processes C42 - When connecting to S3 endpoints, use the virtual-hosted model ("my-bucket-name.s3.amazonaws.com" or "my-bucket-name.my-s3-regional-endpoint.amazonaws.com") instead of the path-style model ("s3.amazonaws.com/my-bucket-name" or "my-s3-regional-endpoint.amazonaws.com/my-bucket-name") (see ref). All the latest SDKs make use of domain style by default. C43 - Monitor that all S3 connections are made with the virtual-hosted model (e.g., via CloudTrail S3 requestParameters.Host).	Very High	1	-	1
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO23 - Enforce SigV4 on all requests C81 - Block all requests not using SigV4 (e.g., using an SCP, bucket policies, or centrally in an RCP applied to the OU or AWS account on all buckets with deny on "StringNotEquals":{"s3:signatureversion": "AWS4-HMAC-SHA256"}). C82 - Monitor and investigate any requests not using SigV4 (e.g., via CloudTrail S3 when the additionalEventData.SignatureVersion is different from "SigV4"). C83 - Use SDK with SigV4 enabled (ref).	Very High	1	1	1
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	High	2	-	-
CO22 - Block deprecated actions C80 - Block deprecated S3 actions using IAM ThreatModel and the S3 actions list.	Medium	1	-	-

CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Bucket *(subclass of Object operations, FC5)*

To upload your data into your AWS account, you must create an S3 bucket in one of the AWS Regions.

Data Flow Diagram (DFD)



Amazon S3
Content can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
SCP
IAM policies
IAM entities from Account A
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
connect
AWS Account A
Region A
Account Block Public Access
SCP (if non-Service Linked role)
IAM policies (potentially multiple)
Public / Accelerate Endpoint (HTTPS)
Object related APIs
Access point public block
Access point policy
Mode: Internet (or VPC)
Access point (HTTPS)
Bucket Block Public Access
SCP
Bucket policy
Bucket ACL
ABAC status
CORS
Bucket Object Lock mode
Request pay (non-AWS)
Bucket sub-resources
Bucket
Object ACL
Object version ACL
Key policy / SSE-C
Object Lock
Legal Hold
Object Owner
Object + Version(s)

Actions and IAM Permissions to deny the feature

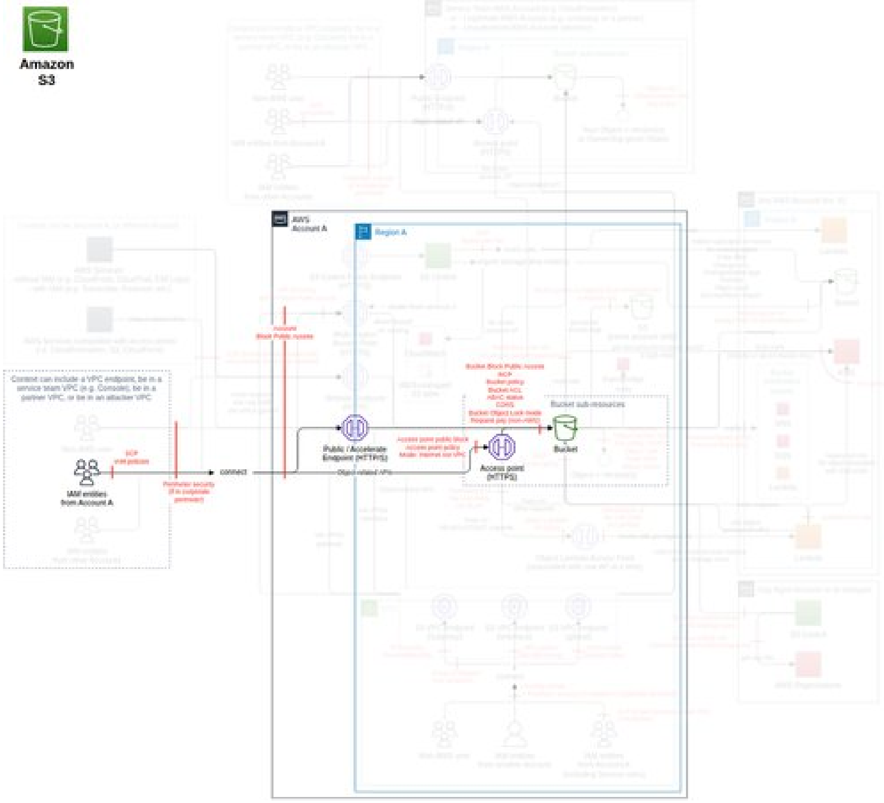
Action	IAM Permission
Creates a new bucket.	s3:CreateBucket

Threat List

Name	CVSS
Exfiltrate data by using compromised IAM credentials from the Internet	High (7.5)
Use a bucket to upload malware or modify an object to include malware	High (7.3)
Files encrypted for ransomware	Medium (6.3)
Object made public or accessible in a private bucket you own by changing its object ACL	Medium (5.9)
Increase S3 costs by hotlinking or excessive downloading	Medium (5.3)
Bucket takeover to gather data	Medium (5.2)
Intercept data in transit to an internal bucket	Medium (4.6)
Use AWS services to access data in S3	Medium (4.4)
Move prod data into a non-prod environment	Medium (4.4)
Increase the bill by restoring a large amount of data	Low (2.4)
Increase bill by creating incomplete multipart uploads	Low (2.3)
Disrupt workflow by manipulating ETag	Low (1.8)

Exfiltrate data by using compromised IAM credentials from the Internet

Threat Id	S3.T39
Name	Exfiltrate data by using compromised IAM credentials from the Internet
Description	IAM credentials can be compromised (directly or using presigned URL). An attacker can use a compromised but authorized IAM credential to download your object from an internal bucket via the public endpoint (using or not their own VPC endpoint).
Goal	Data theft
MITRE ATT&CK®	TA0010, T1567
CVSS	High (7.5)
IAM Access	{}


Amazon S3
AWS Account A
Region A
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
IAM entities from Account A
SCP
IAM policies
Perimeter security (if in corporate perimeter)
connect
Account Block Public Access
Public / Accelerate Endpoint (HTTPS)
Object-related APIs
Access point public block access point policy Model: Internet but VPC
Access point (HTTPS)
Bucket Block Public Access
RCP
Bucket policy
Bucket ACL
ABAC Model
CORS
Bucket Object Lock mode
Request pay (non-HAS)
Bucket sub-resources
Bucket

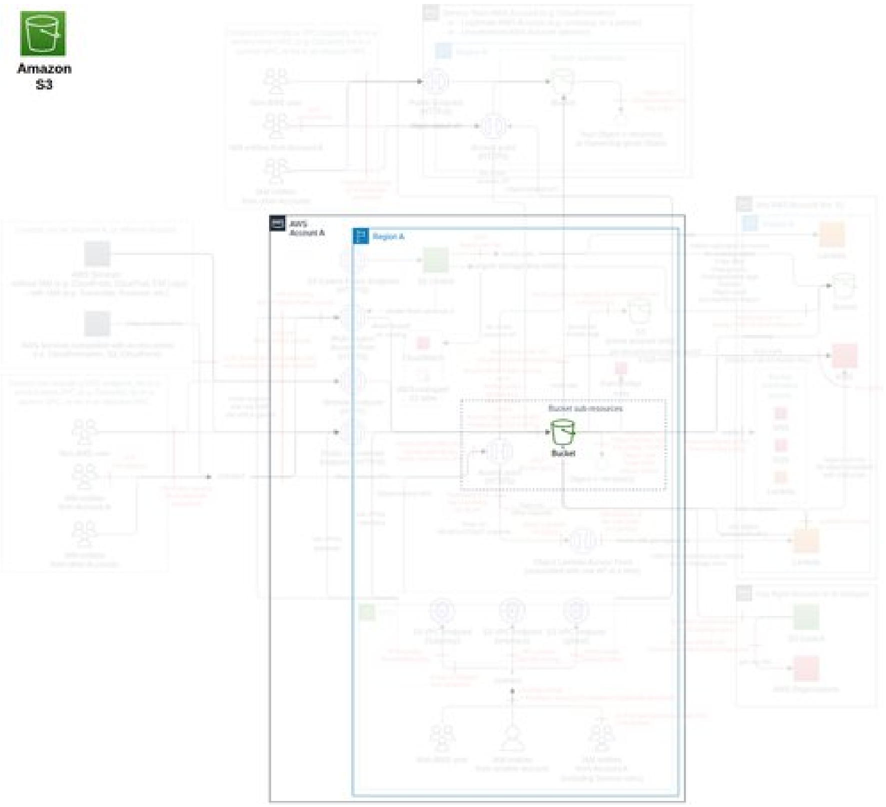
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO29 - Limit access from only authorized VPCs C98 - For each S3 bucket, maintain a list of VPCs authorized to access it. C99 - Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).	Very High	1	1	-
CO24 - Block all requests not using an HTTP authorization header, if not explicitly authorized C84 - Block all requests not using HTTP authorization header, i.e., presigned via query strings or POST (ref) (e.g., using an SCP, bucket policies, or centrally in an RCP applied to the OU or AWS account on all buckets with deny on "StringNotEquals":{"s3:authType": "REST-HEADER"}). Note that it blocks uploads via the console, as well. C85 - Monitor and investigate all requests that do not use the HTTP authorization header (e.g., via CloudTrail S3 events where the additionalEventData.AuthenticationMethod is different from "AuthHeader").	Medium	-	1	1
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Use a bucket to upload malware or modify an object to include malware

Threat Id	S3.T14
Name	Use a bucket to upload malware or modify an object to include malware
Description	S3 buckets are commonly used to distribute software. An attacker can upload malware to a bucket to better position it for later use or directly change an object to include malware (example).
Goal	Launch another attack
MITRE ATT&CK®	TA0001, T1195
CVSS	High (7.3)

IAM Access	{
	"UNIQUE": "s3:PutObject"
	}



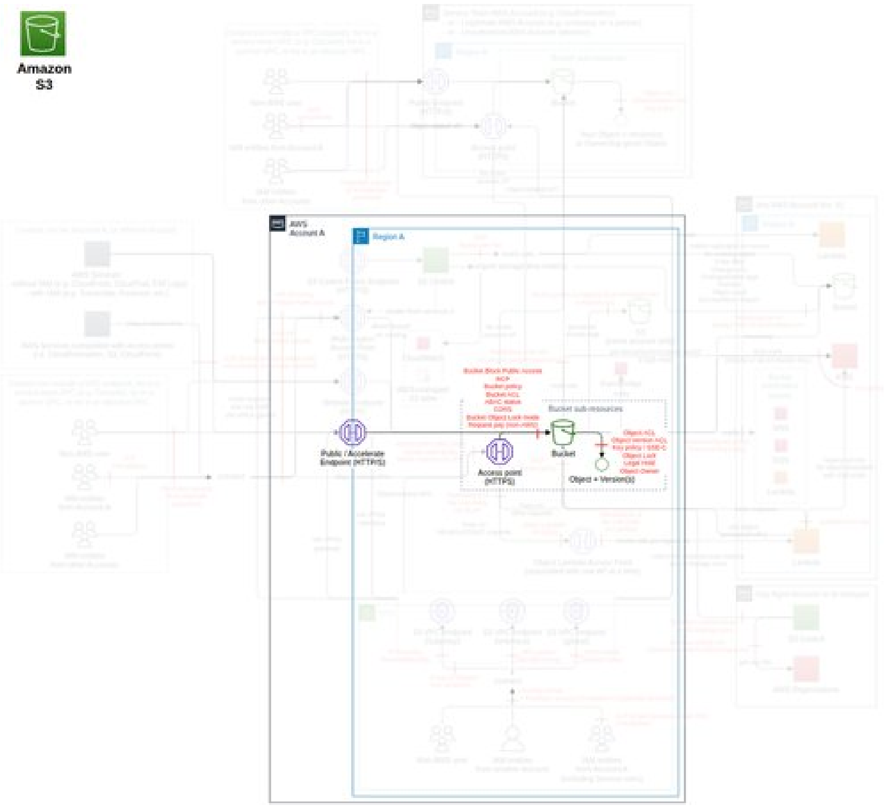
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO13 - Block direct public access C47 - Front buckets that are required to be public, using authenticated CDN (e.g., CloudFront) or API Gateway, protected with WAF (e.g., for hotlinking). C49 - Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. C51 - Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (enabled by default for all new buckets after April 2023). C53 - Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. C173 - Block public access to each S3 bucket at the organization root, OU, or account-level by enforcing S3 policies in AWS Organizations.	Very High	5	-	-
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO29 - Limit access from only authorized VPCs C98 - For each S3 bucket, maintain a list of VPCs authorized to access it. C99 - Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).	Very High	1	1	-
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C14 - Scan all data before uploading to an external bucket to ensure the classification of the data is aligned with the bucket classification (e.g., using Macie).	High	2	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to	High	2	-	-

review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.				
CO26 - Scan objects used for input/output of a workflow for malware C93 - If the bucket is used as an input or the output of a process, scan the objects for malware (e.g., using GuardDuty Malware Protection for S3, BucketAV, Cloud Storage Security, Trend Micro Cloud One, or your own scanning solution).	Medium	-	-	1

Files encrypted for ransomware

Threat Id	S3.T16
Name	Files encrypted for ransomware
Description	S3 provides several types of encryption where the key is not operated by AWS (e.g., SSE-KMS with Bring Your Own Key). An attacker can encrypt all the data stored in S3 to ransom the data owner for the decryption key (blogs: 1 and 2). Alternatively, an attacker can change the default encryption key, for a similar effect on any new data uploaded.
Goal	Direct Financial Gain
MITRE ATT&CK®	TA0040, T1486
CVSS	Medium (6.3)

IAM Access	{
	"OR": [{
	"AND": ["s3:GetObject", "s3:PutObject"]
	}, "s3:PutEncryptionConfiguration"]
	}

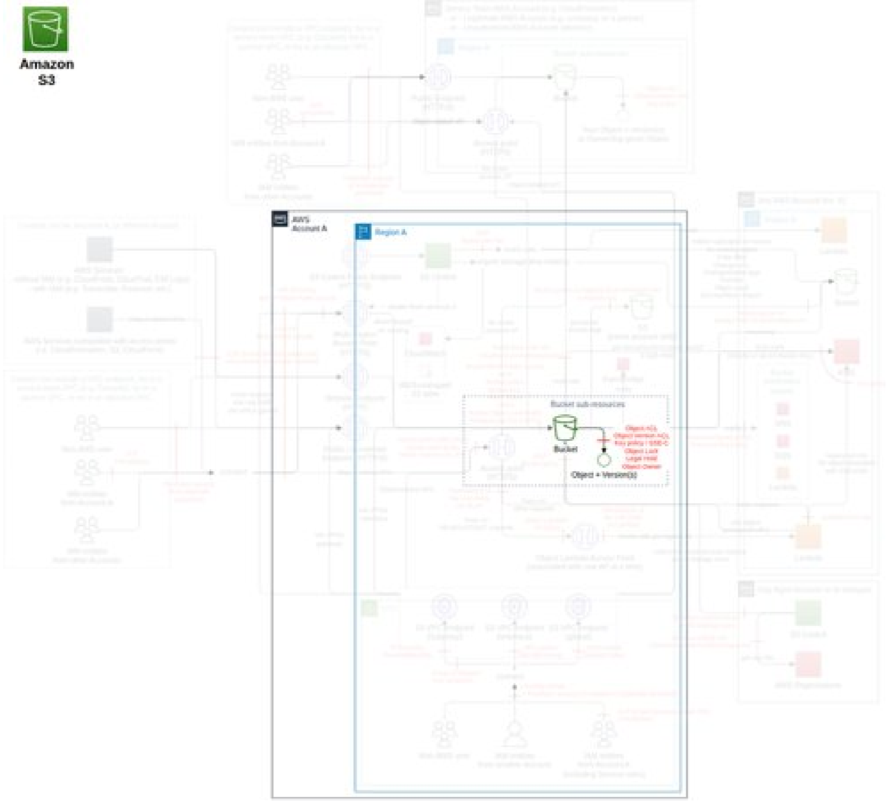


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO16 - Enforce encryption at rest C61 - Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption (ref). C140 - Ensure all objects in S3 buckets are encrypted with an authorized KMS key. C66 - Block PutObject requests with unauthorized KMS key on each bucket (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" exists and is not an authorized KMS key). C68 - Monitor that only authorized KMS keys are used for each bucket (using CloudTrail S3 data events in "requestParameters.bucketName" and "response.x-amz-server-side-encryption-aws-kms-key-id"). C145 - Maintain a list of buckets (or paths) required to be encrypted using server-side encryption with customer-provided keys (SSE-C). C146 - For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g., using bucket policies, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES256" is not present). C148 - For buckets (or paths) requiring SSE-C, monitor that only authorized encryption is used on each bucket or path (using CloudTrail S3 data events in requestParameters.bucketName and response.x-amz-server-side-encryption-customer-algorithm). C167 - Ensure SSE-C is blocked when not required for each bucket [default from April 2026].	Very High	4	2	2
CO17 - Protect primary data against loss C69 - Enable versioning on buckets holding primary data. C71 - Back up primary data in a secure location under a different security authority (e.g., in an AWS data bunker account via replication, or using AWS Backup for Amazon S3).	Very High	2	-	-
CO20 - Protect data integrity using S3 Object Lock C74 - Implement the authorized default S3 Object Lock on buckets requiring WORM (note: Amazon S3 evaluates and applies bucket policies before applying the bucket default S3 Object Lock	Very High	-	2	-

settings). C76 - Block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock on buckets requiring WORM (e.g., using their bucket policy and centrally in an RCP applied to the OU or the AWS account with a deny statement on PutObject and PutObjectRetention if the condition "s3:object-lock-mode" exists and "s3:object-lock-remaining-retention-days" is not the defined S3 Object Lock configuration).				
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
CO4 - Monitor S3 with Amazon GuardDuty and Macie C10 - Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using the GuardDuty ThreatModel. Ensure findings are investigated (e.g., using Amazon Detective).	Medium	1	-	-
CO19 - Have a process to apply legal holds C73 - Create a process to apply a legal hold to any S3 bucket whenever required. The condition "s3:object-lock-legal-hold" can be used to restrict who can remove such a lock.	Low	1	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Object made public or accessible in a private bucket you own by changing its object ACL

Threat Id	S3.T36
Name	Object made public or accessible in a private bucket you own by changing its object ACL
Description	Bucket authority only prevails over object ACL when the object access is explicitly denied by the bucket authority (ref). An attacker (or someone by negligence) can change the object ACL to make the object public or accessible to themselves to exfiltrate or modify the data.
Goal	Data theft
MITRE ATT&CK®	TA0005, T1562
CVSS	Medium (5.9)
IAM Access	{ "UNIQUE": "s3:PutObjectAcl" }

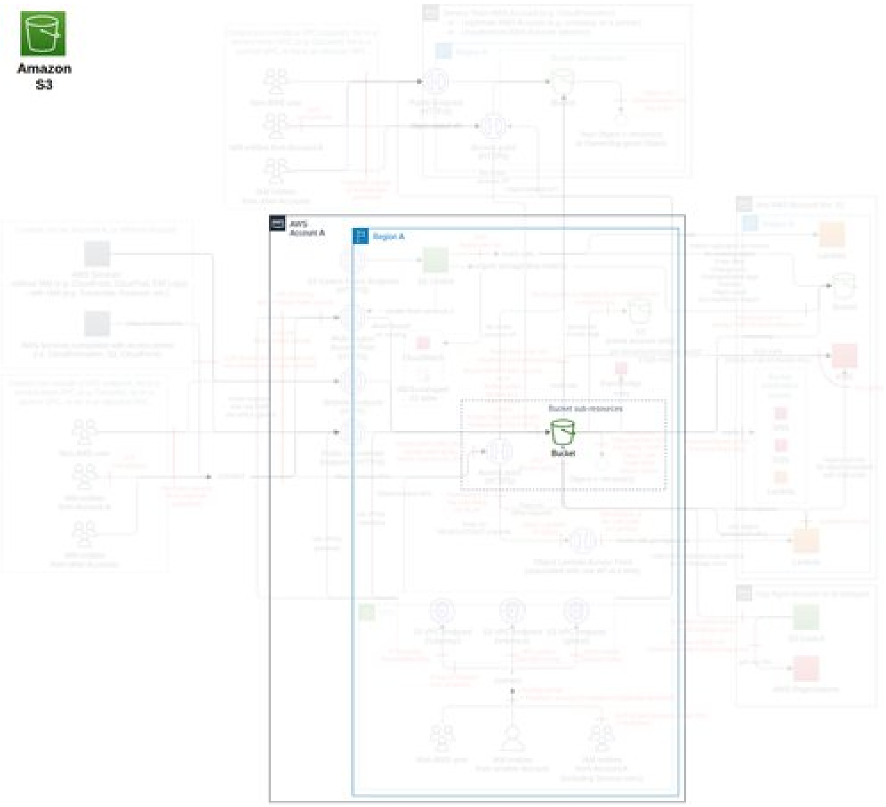


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO10 - Block changes to make an object public via object ACL C34 - Deny requests to change object ACL to public (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy with a deny statement on PutObjectAcl for "s3:x-amz-grant-read", "s3:x-amz-grant-read-acp", "s3:x-amz-grant-write-acp", "s3:x-amz-grant-full-control" on the following predefined groups "http://acs.amazonaws.com/groups/global/AllUsers" and "http://acs.amazonaws.com/groups/global/AuthenticatedUsers"). C35 - Monitor ObjectACL changes (or tentative changes) to public using CloudTrail S3 data events. C37 - Monitor and investigate anonymous requests to objects (e.g., using CloudTrail S3 data events with userIdentity.accountId=ANONYMOUS_PRINCIPAL).	Very High	-	1	2
CO13 - Block direct public access C49 - Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. C51 - Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (enabled by default for all new buckets after April 2023). C53 - Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. C173 - Block public access to each S3 bucket at the organization root, OU, or account-level by enforcing S3 policies in AWS Organizations.	Very High	4	-	-
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO16 - Enforce encryption at rest C61 - Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption (ref). C140 - Ensure all objects in S3 buckets are encrypted with an authorized KMS key. C63 - Use KMS ThreatModel to protect the KMS keys used for S3 (e.g., using encryptionContext on the policy of each KMS key). C64 - Implement an authorized default encryption key on each bucket; enable S3 Bucket Key if not using DSSE-KMS and if CloudTrail events are not required for KMS encrypt/decrypt (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings).	Very High	5	2	2

C66 - Block PutObject requests with unauthorized KMS key on each bucket (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" exists and is not an authorized KMS key). C68 - Monitor that only authorized KMS keys are used for each bucket (using CloudTrail S3 data events in "requestParameters.bucketName" and "response.x-amz-server-side-encryption-aws-kms-key-id"). C145 - Maintain a list of buckets (or paths) required to be encrypted using server-side encryption with customer-provided keys (SSE-C). C146 - For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g., using bucket policies, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES256" is not present). C148 - For buckets (or paths) requiring SSE-C, monitor that only authorized encryption is used on each bucket or path (using CloudTrail S3 data events in requestParameters.bucketName and response.x-amz-server-side-encryption-customer-algorithm).				
CO29 - Limit access from only authorized VPCs C98 - For each S3 bucket, maintain a list of VPCs authorized to access it. C99 - Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).	Very High	1	1	-
CO37 - Disabling ACLs for all buckets C152 - Ensure bucket ACLs and object ACLs are disabled on each bucket (enabled by default for all new buckets after April 2023). C153 - Prevent the creation of buckets with ACL enabled (e.g., by using an SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on StringNotEquals "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note that it does not block someone from enabling an ACL afterward via PutBucketOwnershipControls.	Very High	1	1	-
CO4 - Monitor S3 with Amazon GuardDuty and Macie C118 - Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect them using the Macie ThreatModel.	High	1	-	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Increase S3 costs by hotlinking or excessive downloading

Threat Id	S3.T22
Name	Increase S3 costs by hotlinking or excessive downloading
Description	S3 charges for hosting and data transfer out. An attacker can hotlink your content hosted on S3 on another page to avoid paying the S3 bills (ref) or download your public data excessively to increase your bills (especially doing partial downloads on large objects).
Goal	Financial Drain
MITRE ATT&CK®	TA0040, T1496
CVSS	Medium (5.3)
IAM Access	{}

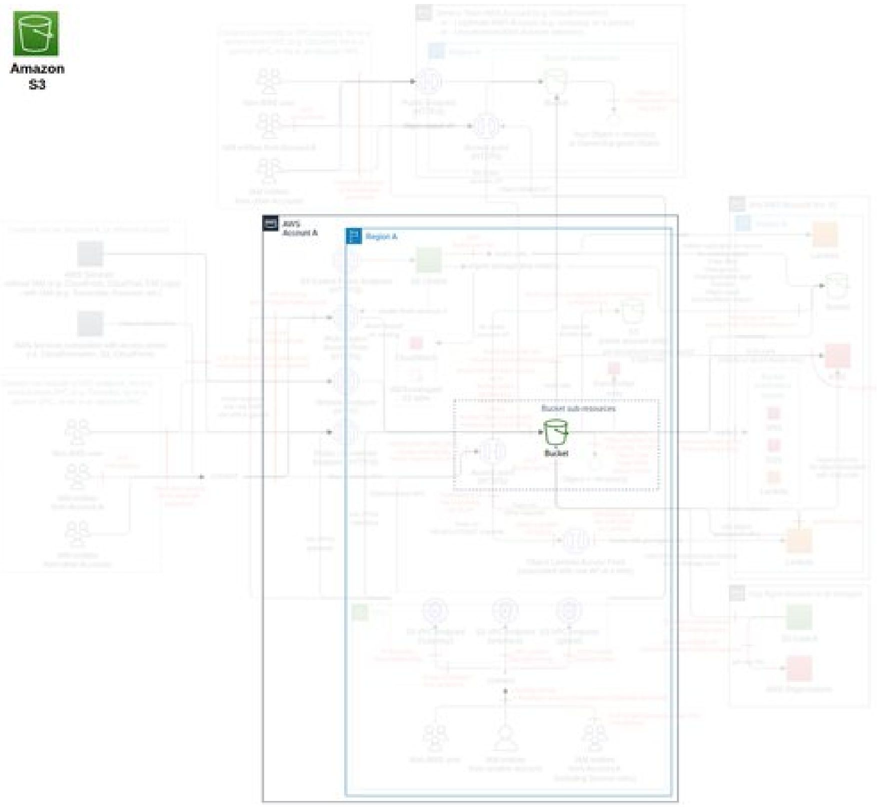


Control Objectives	**Priority**	**# of associated Controls**		
		Directive	**Preventative**	**Detective**
CO13 - Block direct public access C47 - Front buckets that are required to be public, using authenticated CDN (e.g., CloudFront) or API Gateway, protected with WAF (e.g., for hotlinking).	Very High	1	-	-
CO4 - Monitor S3 with Amazon GuardDuty and Macie C118 - Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect them using the Macie ThreatModel.	High	1	-	-

Bucket takeover to gather data

Threat Id	S3.T1
Name	Bucket takeover to gather data
Description	Bucket names are globally unique and can be recreated after 1 hour from deletion in another AWS account. An attacker can recreate the same bucket name of a deleted bucket you used to own to collect any new data uploaded by a non-updated party (ref), do a DNS takeover (using a non-deleted CNAME / CloudFront origin to the bucket), or use remaining permissions to exfiltrate data.
Goal	Data theft
MITRE ATT&CK®	TA0009, T1586
CVSS	Medium (5.2)

IAM Access	{
	"OPTIONAL": "s3:DeleteBucket"
	}

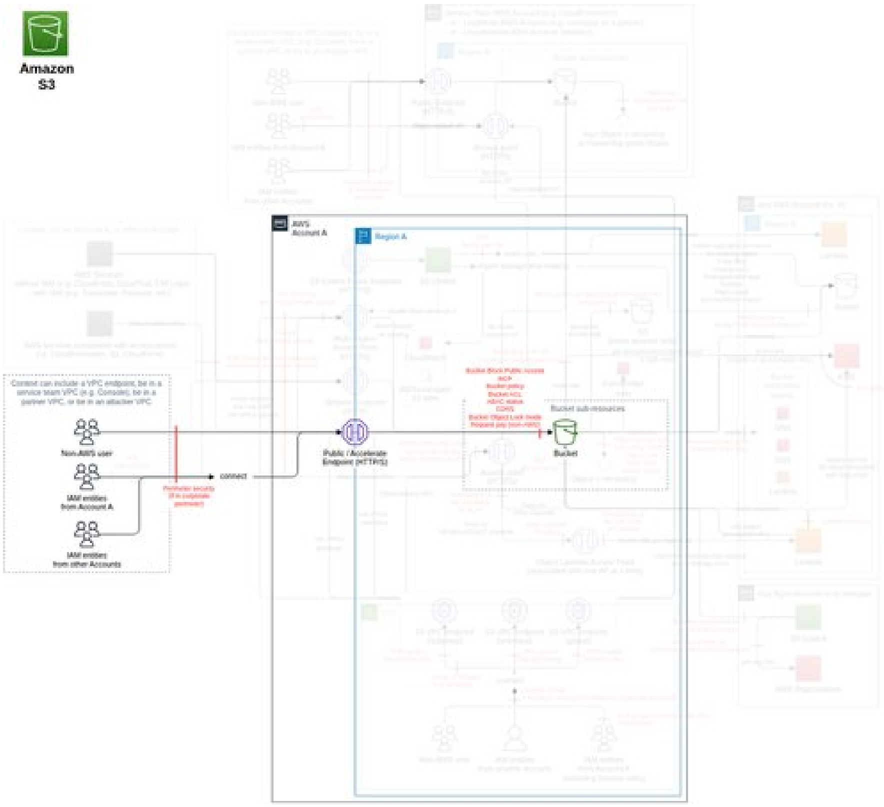


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO11 - Prevent deletion of buckets C38 - Block the action "s3:DeleteBucket" (e.g., via SCP or in an RCP applied to the OU or AWS account; exemption can be managed by authorizing a SuperAdmin to delete buckets with a certain tag, and with bucket owners able to tag buckets). C40 - Scan your CNAME records (e.g., in Amazon Route 53) and CloudFront origin for deleted buckets.	Very High	-	1	1
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C13 - Monitor that only authorized external buckets are used (e.g., via CloudTrail S3 data events in resources[].accountId and resources[].ARN). Both account ID and bucket name must be verified.	High	1	-	1
CO12 - Enforce secure SDLC processes C41 - Parameterize the S3 bucket name or S3 access point in your code (no hardcoding). C46 - Ensure all S3 buckets interacted with are in the correct AWS account (e.g., using the condition in all compatible S3 requests: x-amz-expected-bucket-owner and x-amz-source-expected-bucket-owner).	Medium	2	-	-

CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-
CO18 - Encrypt or tokenize critical data C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Very Low	1	-	-

Intercept data in transit to an internal bucket

Threat Id	S3.T34
Name	Intercept data in transit to an internal bucket
Description	S3 allows communication over HTTP. An attacker can intercept the traffic you send to an internal bucket in order to read or modify the data.
Goal	Data theft
MITRE ATT&CK®	TA0009, T1557
CVSS	Medium (4.6)
IAM Access	{}

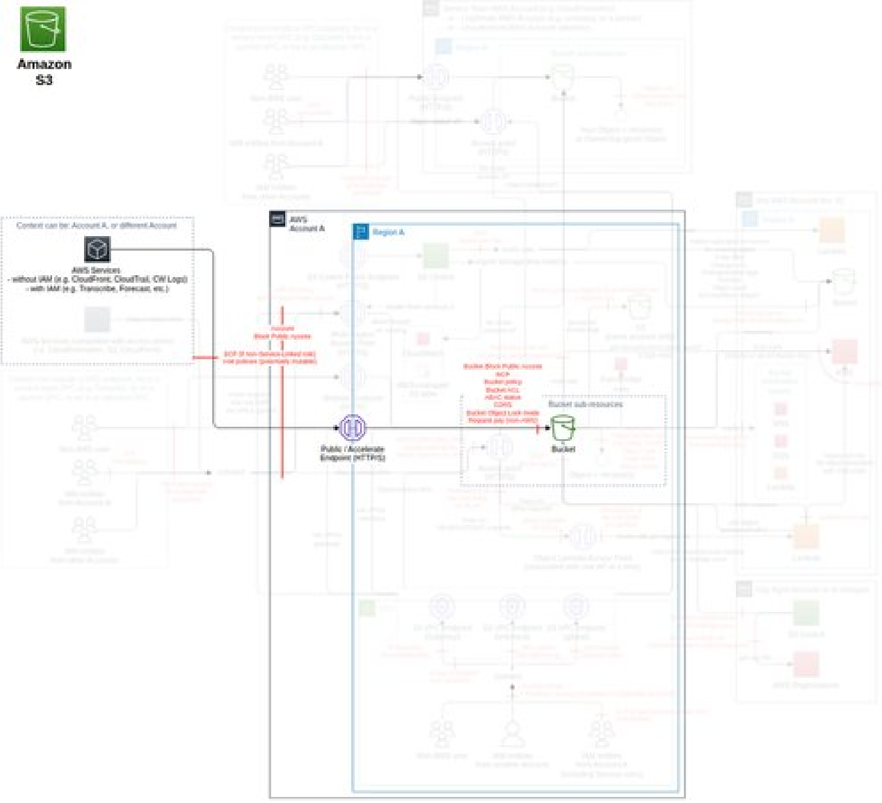

Amazon S3
AWS Account A
Region A
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
IAM entities from Account A
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
connect
Public / Accelerate Endpoint (HTTPS)
Bucket Block Public Access
SCP
Bucket policy
Bucket ACL
ABAC status
CORS
Bucket Object Lock mode
Request pay (non-AWS)
Bucket sub-resources
Bucket

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO1 - Enforce encryption in transit C1 - Block all unencrypted requests and unauthorized TLS version(s) from IAM entities you control (e.g., by denying all unencrypted requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != *authorized TLS version(s)*, using an SCP on your AWS Organization root node). C3 - Block all unencrypted requests and unauthorized TLS version(s) from VPC endpoints you control (e.g., by denying all requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != *authorized TLS version(s)*, on the VPC endpoint policy). C4 - Monitor and investigate all requests made with HTTP (e.g., via CloudTrail S3 data events with the lack of additionalEventData.CipherSuite). C6 - Block all unencrypted requests to the buckets you control (e.g., by denying all requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != *authorized TLS version(s)*, on their bucket policy or centrally in an RCP applied to the OU or AWS account). C119 - Maintain a list of authorized version(s) of TLS/SSL per bucket (or per account/OU/Org) (e.g., considering quantum-resistant encryption).	Very High	1	3	1
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO2 - Block S3 endpoints in your corporate perimeter security C8 - Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g., firewalls or a cloud interception proxy), including via Internet Gateway, to force the use of VPC endpoints. It will block data-plane transfer. Note: AWS Management Console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Very High	1	-	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Use AWS services to access data in S3

Threat Id	S3.T30
Name	Use AWS services to access data in S3
Description	A number of AWS services can access S3 to execute their functions. An attacker can use them to collect data using their service roles or service-linked roles.
Goal	Data theft
MITRE ATT&CK®	[TA0009](), [T1530](), [T1119]()
CVSS	[Medium (4.4)]()

IAM Access	{
	"UNIQUE": "iam:PassRole"
	}



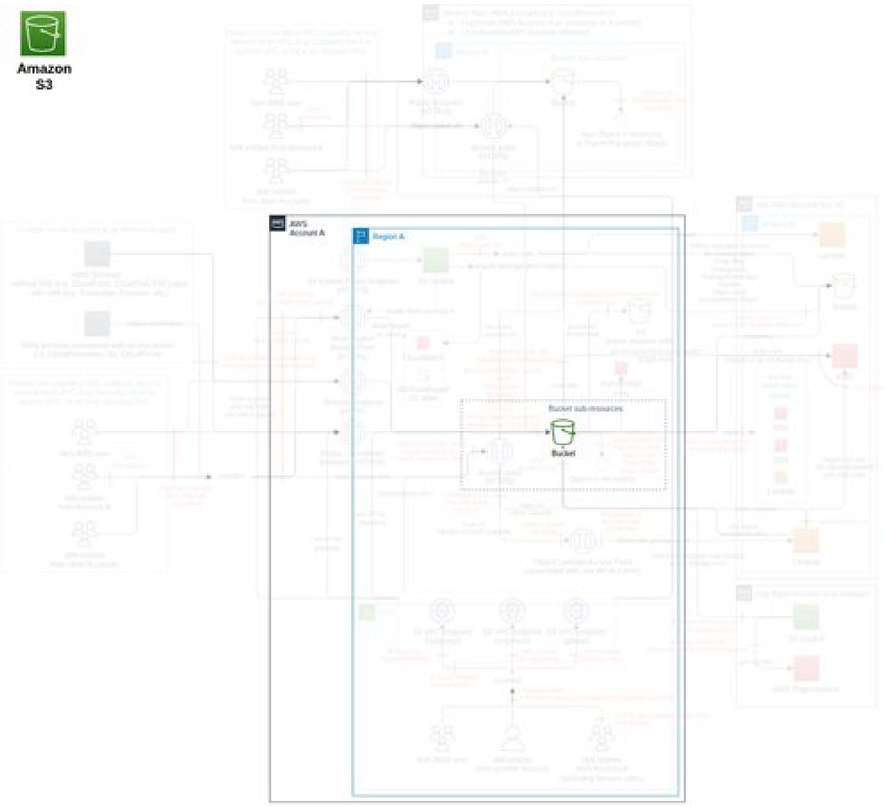
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like [FINRA herd]().	Very High	1	-	-
CO16 - Enforce encryption at rest C61 - Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption ([ref]()). C140 - Ensure all objects in S3 buckets are encrypted with an authorized KMS key. C66 - Block PutObject requests with unauthorized KMS key on each bucket (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" exists and is not an authorized KMS key). C68 - Monitor that only authorized KMS keys are used for each bucket (using CloudTrail S3 data events in "requestParameters.bucketName" and "response.x-amz-server-side-encryption-aws-kms-key-id"). C145 - Maintain a list of buckets (or paths) required to be encrypted using server-side encryption with customer-provided keys (SSE-C). C146 - For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g., using bucket policies, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES256" is not present). C148 - For buckets (or paths) requiring SSE-C, monitor that only authorized encryption is used on each bucket or path (using CloudTrail S3 data events in requestParameters.bucketName and response.x-amz-server-side-encryption-customer-algorithm).	Very High	3	2	2
CO29 - Limit access from only authorized VPCs C98 - For each S3 bucket, maintain a list of VPCs authorized to access it. C99 - Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).	Very High	1	1	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account.	Very High	1	1	1

C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").				
CO6 - Model the threats on all AWS services accessing S3 C16 - Analyze and protect all AWS services accessing S3 (e.g., via ThreatModel). Enforce use in VPC only, whenever possible.	High	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
CO18 - Encrypt or tokenize critical data C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Low	1	-	-

Move prod data into a non-prod environment

Threat Id	S3.T11
Name	Move prod data into a non-prod environment
Description	Multiple types of environments are usually operated in AWS. An attacker can move the data from a secure location (e.g., production) to a less secure location (e.g., dev).
Goal	Data theft
MITRE ATT&CK®	TA0009, T1074
CVSS	Medium (4.4)

IAM Access	{
	"UNIQUE": "s3:GetObject"
	}



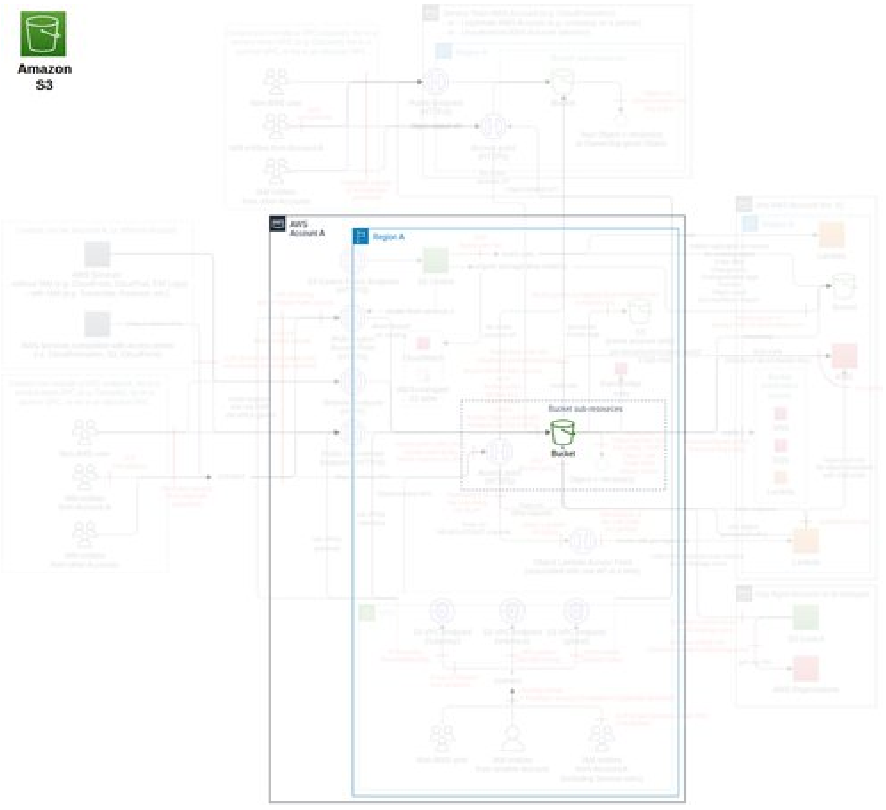
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd. C59 - Use a data discovery tool (e.g., Amazon Macie) to ensure no sensitive data is stored in an unauthorized bucket. C60 - Use a data discovery tool (e.g., Amazon Macie) to ensure the bucket names, object names, tags, and metadata do not contain sensitive data.	Very High	1	-	2
CO16 - Enforce encryption at rest C61 - Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption (ref). C140 - Ensure all objects in S3 buckets are encrypted with an authorized KMS key. C66 - Block PutObject requests with unauthorized KMS key on each bucket (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" exists and is not an authorized KMS key). C68 - Monitor that only authorized KMS keys are used for each bucket (using CloudTrail S3 data events in "requestParameters.bucketName" and "response.x-amz-server-side-encryption-aws-kms-key-id"). C145 - Maintain a list of buckets (or paths) required to be encrypted using server-side encryption with customer-provided keys (SSE-C). C146 - For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g., using bucket policies, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES256" is not present). C148 - For buckets (or paths) requiring SSE-C, monitor that only authorized encryption is used on each bucket or path (using CloudTrail S3 data events in requestParameters.bucketName and response.x-amz-server-side-encryption-customer-algorithm). C162 - Block requests not using DSSE-KMS when required (e.g., by using an SCP, IAM policies, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on required bucket names and "s3:x-amz-server-side-encryption" = "aws:kms:dsse"). C163 - Monitor requests not using DSSE-KMS when required (e.g., using CloudTrail log event name(s), CloudTrail S3 data events with field(s) requestParameter.bucketName, and "response.x-amz-server-side-encryption-aws").	Very High	3	3	3
CO29 - Limit access from only authorized VPCs	Very High	1	1	-

C98 - For each S3 bucket, maintain a list of VPCs authorized to access it. C99 - Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).				
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO32 - Restrict access point access to VPCs when in use C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C105 - Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy. C112 - Block any object-related operations access to S3 buckets not through an access point (i.e., IAM policy, SCP, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on the condition "ArnNotLike": {"s3:DataAccessPointArn": "arn:aws:s3:*Region*:*AccountId*:accesspoint/*"}).	Very High	1	2	-
CO7 - Limit and monitor access via S3 VPC endpoints C17 - For each VPC, maintain a list of AWS Organizations, OUs, and/or AWS accounts where IAM entities are authorized to access S3. C18 - For each VPC with an IAM entity allowed to use S3, secure them with the VPC ThreatModel (e.g., modification of VPC endpoints, VPC endpoint policy, routing table, Security Groups). C19 - Block any IAM entity not belonging to an authorized AWS Organization, OU, and/or AWS account from calling S3 from your VPCs by adding a deny statement in the S3 VPC endpoint policy for each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org IDs, as those are globally unique. C21 - Enable VPC DNS query logging in all VPCs. C22 - Maintain a list of authorized S3 and S3 access points (and their respective AWS accounts) to be accessed for each VPC. C23 - Limit the access to only authorized S3 bucket(s) or their AWS account(s) from each VPC (e.g., using the condition key "s3:ResourceAccount" on the VPC endpoint policy, alternatively use a specific resource-level statement for each bucket, or if the VPC endpoint policy size is beyond the limit and more granular control on VPC is required, use access points). C25 - Monitor VPC DNS query logs to ensure only authorized S3 buckets and S3 access points are being queried in each VPC (e.g., using VPC DNS query logging) and protect them using Route 53 ThreatModel.	Very High	4	2	1
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C13 - Monitor that only authorized external buckets are used (e.g., via CloudTrail S3 data events in resources[].accountId and resources[].ARN). Both account ID and bucket name must be verified.	High	1	-	1
CO18 - Encrypt or tokenize critical data C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Medium	1	-	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

Increase the bill by restoring a large amount of data

Threat Id	S3.T47
Name	Increase the bill by restoring a large amount of data
Description	Restore costs can be amplified by the size and the type (i.e., expedited). An attacker can restore lots of data to generate costs.
Goal	Financial Drain
MITRE ATT&CK®	TA0042, T1586
CVSS	Low (2.4)

IAM Access	{
	"UNIQUE": "s3:RestoreObject"
	}

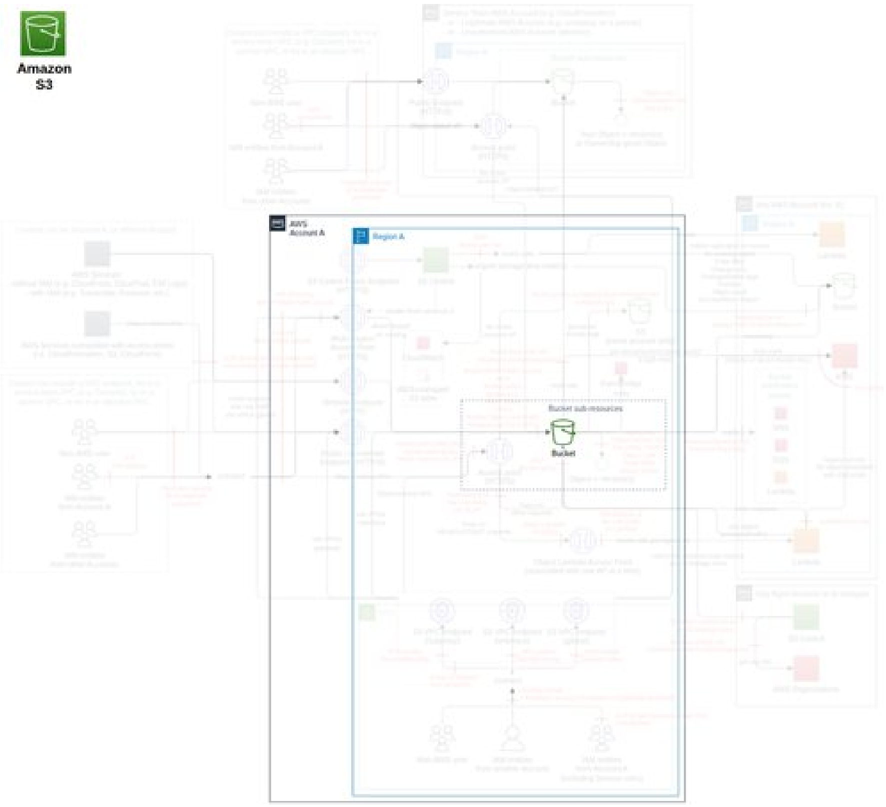


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Increase bill by creating incomplete multipart uploads

Threat Id	S3.T40
Name	Increase bill by creating incomplete multipart uploads
Description	By default, when a multipart upload is initiated but not completed, S3 will keep it (ref). An attacker can upload a large amount of data without completing it while being hard to detect.
Goal	Financial Drain
MITRE ATT&CK®	TA0042, T1586
CVSS	Low (2.3)

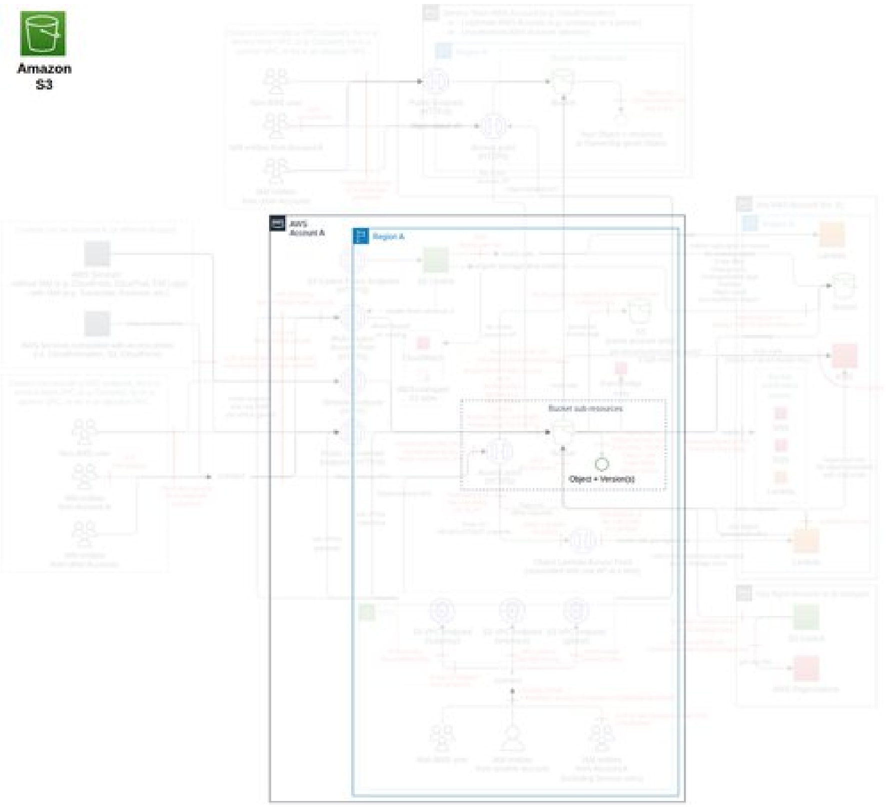
IAM Access	{
	"UNIQUE": "s3:PutObject"
	}



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO21 - Remove incomplete multipart uploads C78 - Reduce costs related to incomplete multipart uploads by creating a lifecycle policy to remove them after an agreed length of time (e.g., 7 days) (blog).	Very High	-	1	-

Disrupt workflow by manipulating ETag

Threat Id	S3.T27
Name	Disrupt workflow by manipulating ETag
Description	ETags include the MD5 of the file but not consistently and can be used by developers to verify the integrity of a file. An attacker can affect an upload function to change the ETag of a file to disrupt a workflow downstream.
Goal	Data manipulation
MITRE ATT&CK®	TA0040, T1565
CVSS	Low (1.8)
IAM Access	{}

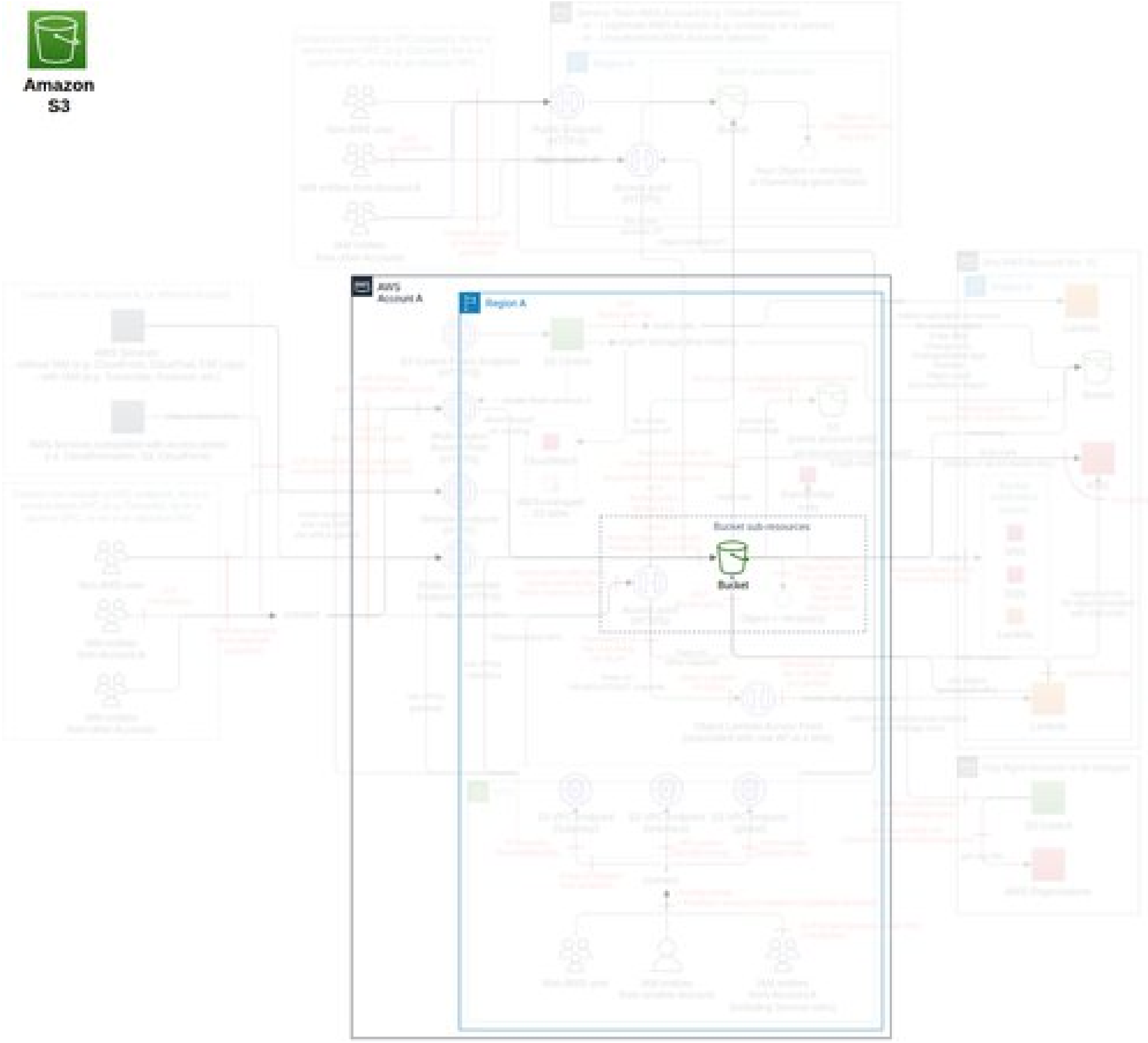


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO12 - Enforce secure SDLC processes C44 - Ensure the integrity of stored objects (ref), using "x-amz-checksum" from the object metadata instead of ETag (e.g., using the compute checksum functionality in S3 Batch Operations). If ETag is used, make sure to properly account for its different definitions (ref).	Very High	1	-	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1

Bucket tag *(subclass of Bucket, FC7)*

You can tag buckets ([ref](#)).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Adds a set of tags to an existing bucket.	s3:PutBucketTagging

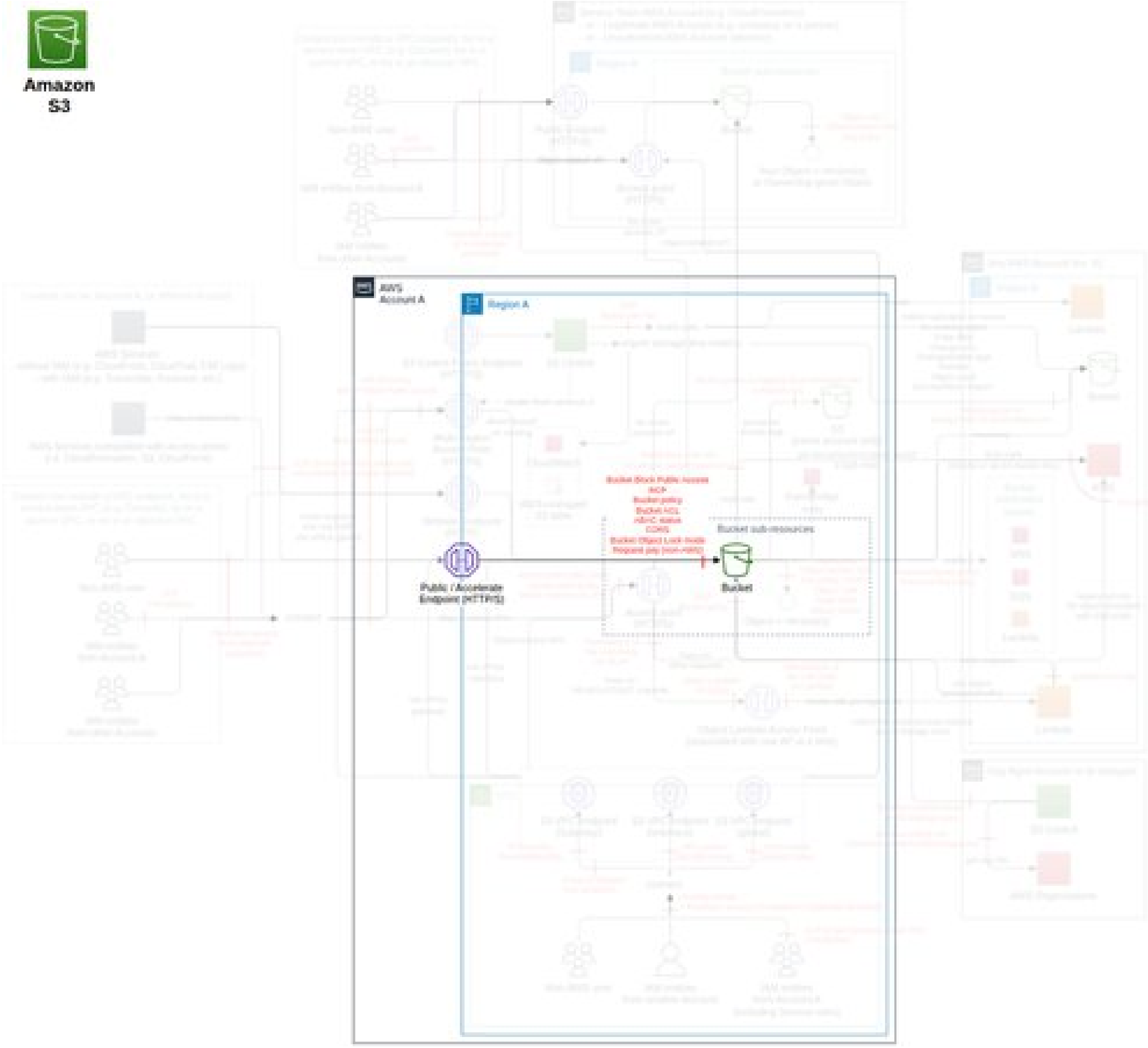
Threat List

Name	CVSS
None	None

Bucket ACL *(subclass of Bucket, FC8)*

***[NOT RECOMMENDED]** Amazon S3 Access Control Lists (ACLs) enable you to manage access to buckets. Each bucket has an ACL attached to it as a sub-resource. It defines which AWS accounts or groups are granted access and the type of access. When a request is received against a resource, Amazon S3 checks the corresponding ACL to ensure the requester has the necessary access permissions ([ref](#)).*

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Sets the permissions on an existing bucket using Access Control Lists (ACL).	s3:PutBucketAcl

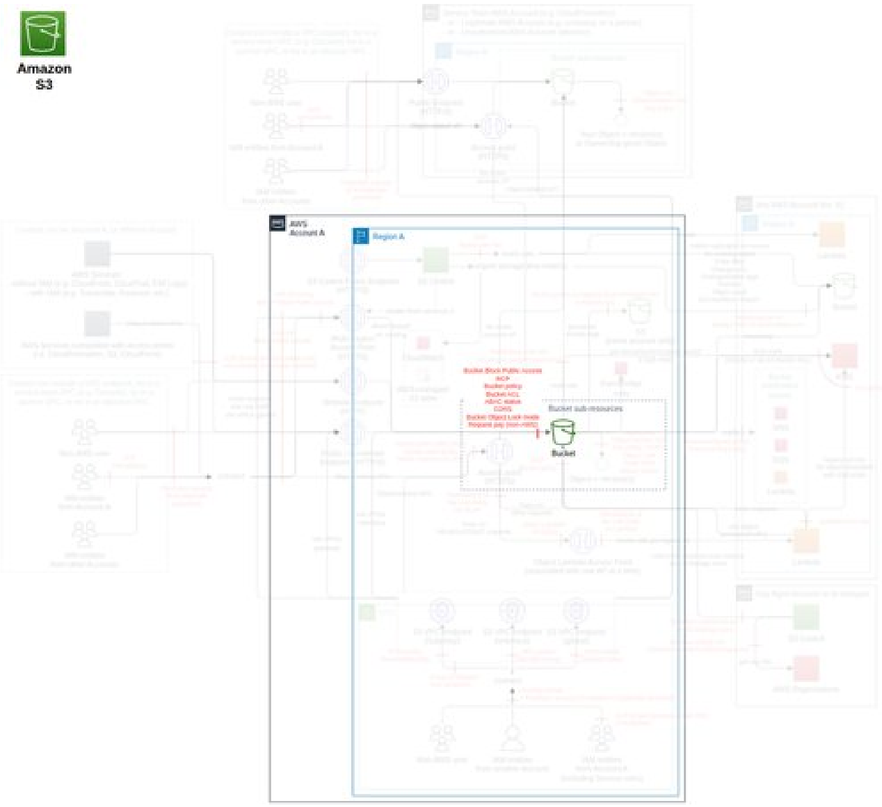
Threat List

Name	CVSS
Grant unauthorized access to a private bucket by changing its bucket ACL	[Medium (5.2)](#)
DoS by blocking traffic using bucket ACL	[Low (2.1)](#)

Grant unauthorized access to a private bucket by changing its bucket ACL

Threat Id	S3.T4
Name	Grant unauthorized access to a private bucket by changing its bucket ACL
Description	Bucket ACL can be used to give access to bucket information, list objects, and overwrite or delete objects. An attacker can change the bucket ACL to destroy or modify data, or exfiltrate data via the object name (1 KB).
Goal	Data manipulation
MITRE ATT&CK®	TA0040, T1486
CVSS	Medium (5.2)

IAM Access	{
	"UNIQUE": "s3:PutBucketAcl"
	}

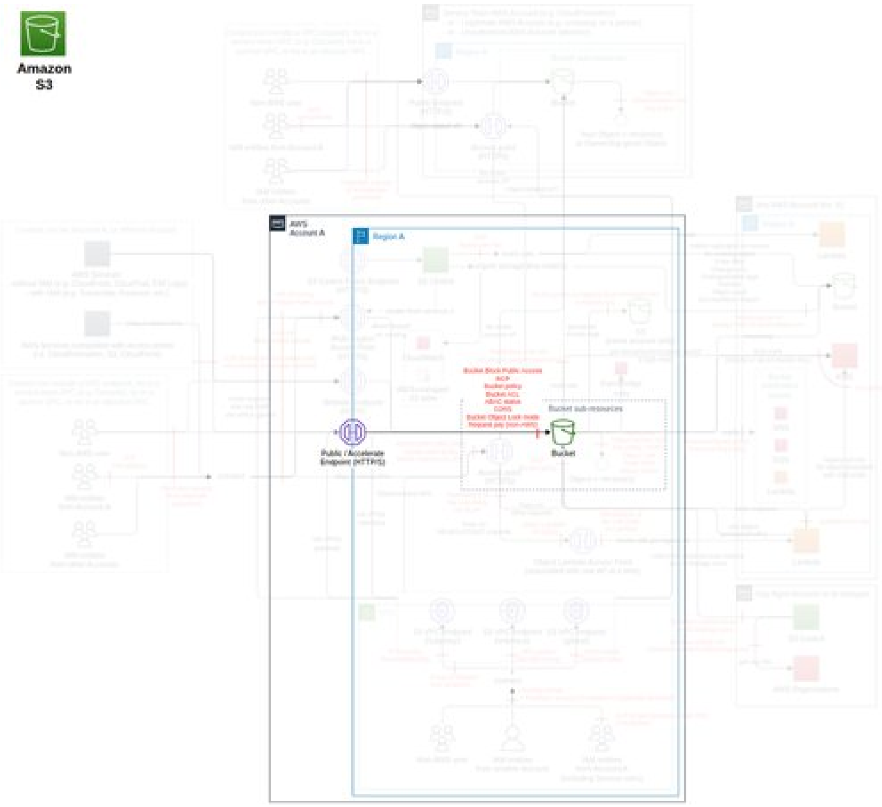


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO13 - Block direct public access C49 - Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. C51 - Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (enabled by default for all new buckets after April 2023). C173 - Block public access to each S3 bucket at the organization root, OU, or account-level by enforcing S3 policies in AWS Organizations.	Very High	3	-	-
CO14 - Block bucket ACL C55 - Deny requests to add an ACL on a bucket (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy, with a deny statement on "s3:PutBucketAcl"). C56 - Monitor changes to bucket ACLs to ensure they stay private (e.g., using the CloudTrail event PutBucketAcl and its field requestParameters.x-amz-acl, which should either be "private" or not exist).	Very High	-	1	1
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO37 - Disabling ACLs for all buckets C152 - Ensure bucket ACLs and object ACLs are disabled on each bucket (enabled by default for all new buckets after April 2023). C153 - Prevent the creation of buckets with ACL enabled (e.g., by using an SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on StringNotEquals "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note that it does not block someone from enabling an ACL afterward via PutBucketOwnershipControls.	Very High	1	1	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account).	Very High	1	1	1

C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").				
CO4 - Monitor S3 with Amazon GuardDuty and Macie C10 - Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using the GuardDuty ThreatModel. Ensure findings are investigated (e.g., using Amazon Detective). C118 - Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect them using the Macie ThreatModel.	High	2	-	-
CO3 - Enable S3 data events in AWS CloudTrail C9 - Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Medium	1	-	-
CO39 - Enforce S3 server access logging on buckets C166 - Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Low	1	-	-

DoS by blocking traffic using bucket ACL

Threat Id	S3.T50
Name	DoS by blocking traffic using bucket ACL
Description	Bucket ACL can allow access (e.g., for CloudFront access logs). An attacker can remove an existing permission to deny legitimate access to the bucket.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040, T1531
CVSS	Low (2.1)
IAM Access	{ "UNIQUE": "s3:PutBucketAcl" }

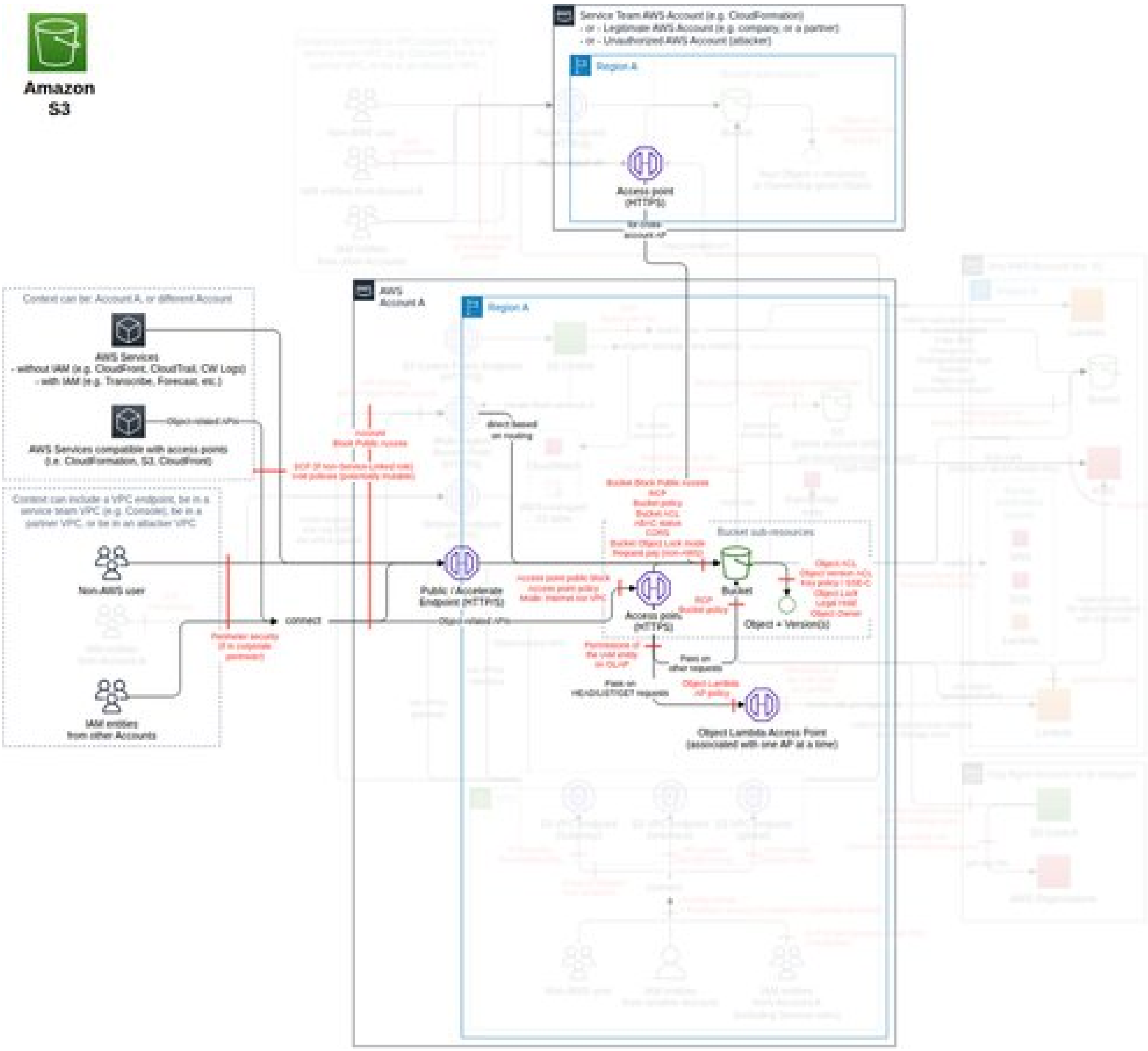


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Bucket policy *(subclass of Bucket, FC10)*

For your bucket, you can add a bucket policy to grant other AWS accounts or IAM users permissions for the bucket and the objects in it. Any object permissions apply only to the objects that the bucket owner creates.

Data Flow Diagram (DFD)



Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Access point (HTTPS)
for cross account AP
Content can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
Object-related APIs
AWS Services compatible with access points (i.e. CloudFormation, S3, CloudFront)
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
connect
Account Block Public Access
SCP (if non-Service-Linked role) Unit policies (potentially mutable)
AWS Account A
Region A
direct based on routing
Public / Accelerate Endpoint (HTTPS)
Object-related APIs
Bucket Block Public Access
SCP
Bucket policy
Bucket ACL
ABAC status
CORS
Bucket Object Lock mode
Request pay (non-ABC)
Bucket sub-resources
Access point public block
Access point policy
Mode: Internet (or VPC)
Access points (HTTPS)
Bucket
SCP
Bucket policy
Object ACL
Object version ACL
Key policy / SSE-C
Object Lock
Legal Hold
Object Owner
Object + Version(s)
Permissions of the user entity on OL-AP
Pass on other requests
Pass on HEAD/LIST/GET requests
Object Lambda AP policy
Object Lambda Access Point (associated with one AP at a time)

Actions and IAM Permissions to deny the feature

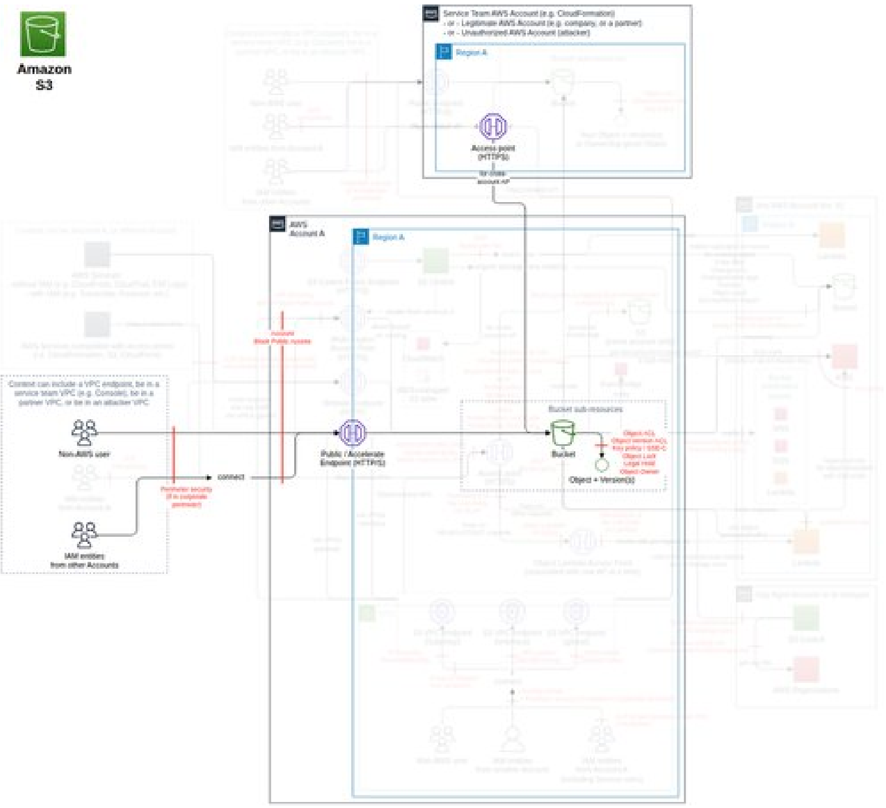
Action	IAM Permission
Adds to or replaces a policy on a bucket.	s3:PutBucketPolicy

Threat List

Name	CVSS
Grant unauthorized access to a private bucket by changing its bucket policy	Medium (6.9)
Reduce bucket security by deleting the bucket policy	Medium (6.4)
Use CloudFront to access a private bucket	Medium (5.5)

Grant unauthorized access to a private bucket by changing its bucket policy

Threat Id	S3.T37
Name	Grant unauthorized access to a private bucket by changing its bucket policy
Description	Bucket policies can enable access to objects owned by buckets. An attacker (or someone by negligence) can change a bucket policy to make the content of the bucket either accessible (via public endpoints, cross-account VPC endpoints, or cross-account access points) or to block all principals (leading to the need to use root to delete the policy) to impact the availability of any applications using the bucket.
Goal	Launch another attack
MITRE ATT&CK®	TA0005, T1562
CVSS	Medium (6.9)
IAM Access	{ "UNIQUE": "s3:PutBucketPolicy" }


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Access point (HTTPS)
for cross-account AP
AWS Account A
Region A
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
IAM entities from other Accounts
connect
Perimeter security (if in corporate perimeter)
Account Block Public Access
Public / Accelerate Endpoint (HTTPS)
Bucket sub-resources
Bucket
Object ACL
Object version ACL
Key policy / SSE-C
Object Lock
Legal Hold
Object Owner
Object + Version(s)

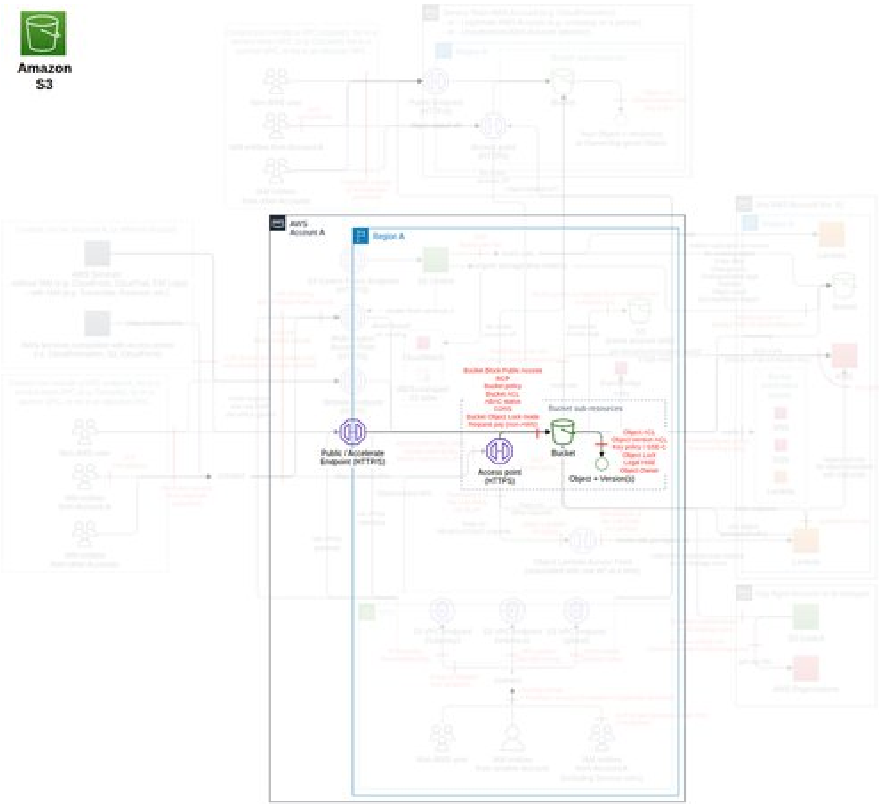
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO13 - Block direct public access C49 - Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. C51 - Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (enabled by default for all new buckets after April 2023). C53 - Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. C173 - Block public access to each S3 bucket at the organization root, OU, or account-level by enforcing S3 policies in AWS Organizations.	Very High	4	-	-
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO16 - Enforce encryption at rest C61 - Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption (ref). C140 - Ensure all objects in S3 buckets are encrypted with an authorized KMS key. C63 - Use KMS ThreatModel to protect the KMS keys used for S3 (e.g., using encryptionContext on the policy of each KMS key). C64 - Implement an authorized default encryption key on each bucket; enable S3 Bucket Key if not using DSSE-KMS and if CloudTrail events are not required for KMS encrypt/decrypt (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings). C66 - Block PutObject requests with unauthorized KMS key on each bucket (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" exists and is not an authorized KMS key). C145 - Maintain a list of buckets (or paths) required to be encrypted using server-side encryption with customer-provided keys (SSE-C). C146 - For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g., using bucket policies, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES256" is not present).	Very High	5	2	-
CO32 - Restrict access point access to VPCs when in use	Very High	1	1	-

C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C106 - In bucket policies, or centrally in an RCP applied to the OU or AWS account, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn".				
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account. C149 - For each bucket, maintain a list of authorized IAM principals allowed to access via the bucket policy. C150 - Ensure only authorized IAM principals allowed to access via bucket policy are configured (e.g., using IAM Access Analyzer for reconciliation).	Very High	4	-	-
CO4 - Monitor S3 with Amazon GuardDuty and Macie C118 - Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect them using the Macie ThreatModel.	High	1	-	-

Reduce bucket security by deleting the bucket policy

Threat Id	S3.T38
Name	Reduce bucket security by deleting the bucket policy
Description	Bucket policy can deny access to objects, as it supersedes the object's authority. An attacker (or someone by negligence) can delete the bucket policy and make the content less secure.
Goal	Launch another attack
MITRE ATT&CK®	TA0004, T1548
CVSS	Medium (6.4)

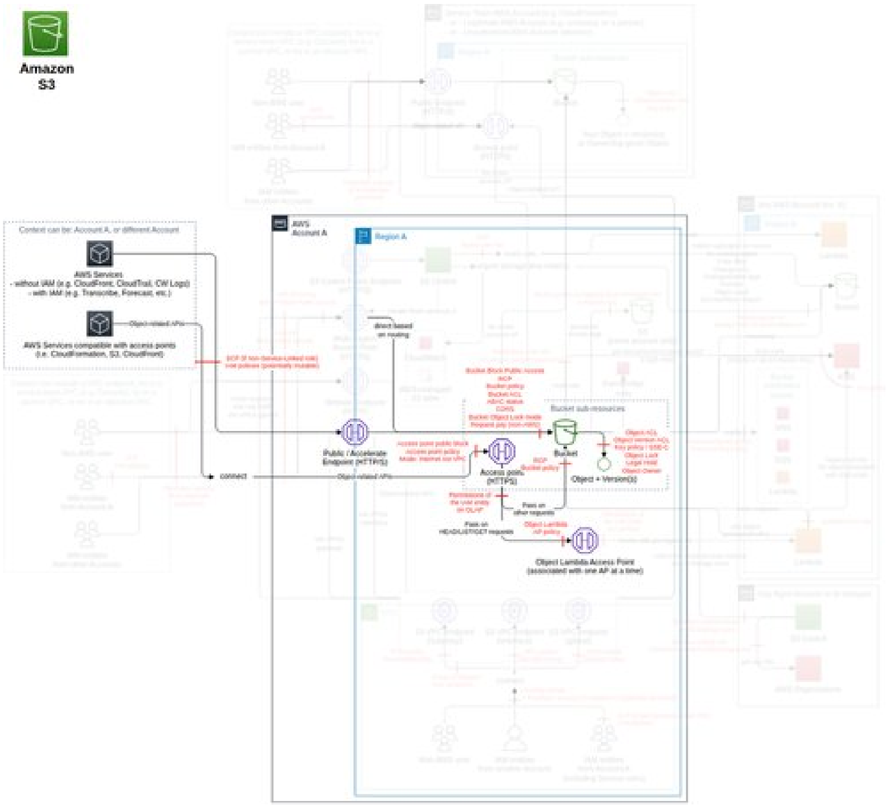
IAM Access	{
	"UNIQUE": "s3:DeleteBucketPolicy"
	}



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO29 - Limit access from only authorized VPCs C98 - For each S3 bucket, maintain a list of VPCs authorized to access it. C99 - Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).	Very High	1	1	-
CO13 - Block direct public access C49 - Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. C51 - Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (enabled by default for all new buckets after April 2023). C53 - Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. C173 - Block public access to each S3 bucket at the organization root, OU, or account-level by enforcing S3 policies in AWS Organizations.	High	4	-	-
CO4 - Monitor S3 with Amazon GuardDuty and Macie C118 - Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect them using the Macie ThreatModel.	High	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	High	2	-	-

Use CloudFront to access a private bucket

Threat Id	S3.T20
Name	Use CloudFront to access a private bucket
Description	CloudFront distributions can use S3 buckets or access points as their origin. An attacker can connect a CloudFront distribution to a private S3 bucket to gain access to it. Note: S3 resource policies can allow a "cloudfront.amazonaws.com" principal, which could allow any distribution if not restricted.
Goal	Data theft
MITRE ATT&CK®	TA0005, T1562
CVSS	Medium (5.5)
IAM Access	{ "OPTIONAL": { "OR": ["s3:PutBucketPolicy", "s3:PutAccessPointPolicy", "s3:PutAccessPointPolicyForObjectLambda"] } }



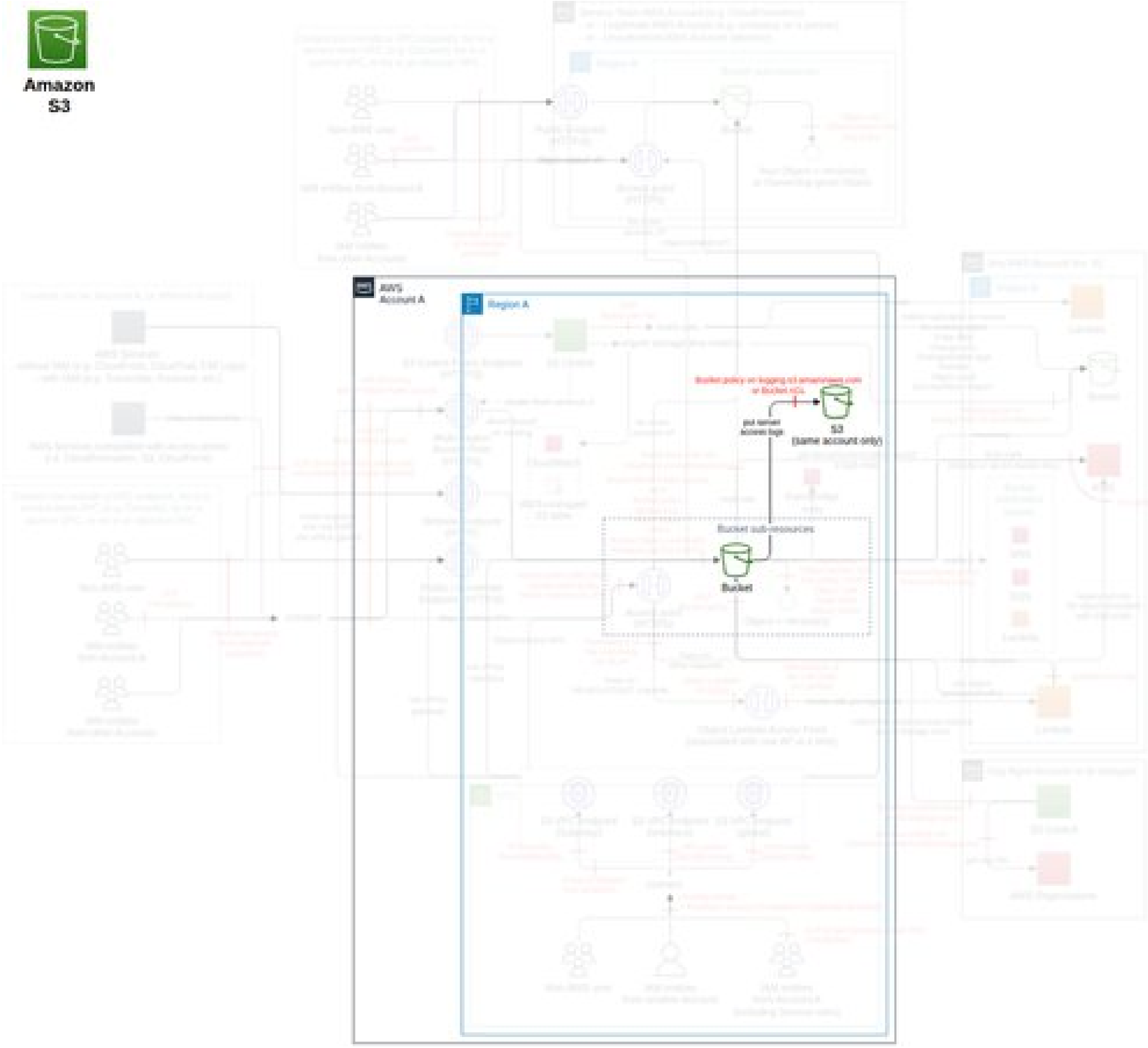
Amazon S3
Content can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
Object-related APIs
AWS Services compatible with access points (i.e. CloudFormation, S3, CloudFront)
SCP (if non Service-Linked role) (not policies (potentially mutable))
AWS Account A
Region A
direct based on routing
Bucket Block Public Access
RCP
Bucket policy
Bucket ACL
ABAC status
CORS
Bucket Object Lock mode
Prepared poly (non-HMG)
Bucket sub-resources
Public / Accelerate Endpoint (HTTPS)
Access point public block
Access point policy
Mode: Internet nor VPC
Access point (HTTPS)
RCP
Bucket policy
Bucket
Object ACL
Object version ACL
Key policy / SSE-C
Object Lock
Legal Hold
Object Owner
Object + Version(s)
connect
Object-related APIs
Permissions of the user entity on OLAP
Pass on other requests
Pass on HEAD/LIST/GET requests
Object Lambda AP policy
Object Lambda Access Point (associated with one AP at a time)

<table>
<tr><th rowspan="2">Control Objectives</th><th rowspan="2">Priority</th><th colspan="3"># of associated Controls</th></tr>
<tr><th>Directive</th><th>Preventative</th><th>Detective</th></tr>
<tr><td><b>CO15 - Identify and ensure the protection of all internal buckets hosting your objects</b>
C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.</td><td>Very High</td><td>1</td><td>-</td><td>-</td></tr>
<tr><td><b>CO16 - Enforce encryption at rest</b>
C61 - Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption (ref).
C140 - Ensure all objects in S3 buckets are encrypted with an authorized KMS key.
C64 - Implement an authorized default encryption key on each bucket; enable S3 Bucket Key if not using DSSE-KMS and if CloudTrail events are not required for KMS encrypt/decrypt (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings).
C66 - Block PutObject requests with unauthorized KMS key on each bucket (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" exists and is not an authorized KMS key).
C145 - Maintain a list of buckets (or paths) required to be encrypted using server-side encryption with customer-provided keys (SSE-C).
C146 - For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g., using bucket policies, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES256" is not present).</td><td>Very High</td><td>4</td><td>2</td><td>-</td></tr>
<tr><td><b>CO30 - Control CloudFront access</b>
C101 - Maintain a list of authorized CloudFront distributions (via Origin Access Control) and associated bucket, access point, and/or Object Lambda Access Point.
C137 - Ensure only authorized CloudFront distributions are associated with their authorized bucket, access point, and/or Object Lambda Access Point; and vice versa (e.g., using their bucket policy, centrally in an RCP applied to the OU or AWS account, with a deny statement, access point policy, resource policy for an Object Lambda Access Point, limiting the access to only the authorized distribution(s) in the SourceArn).</td><td>High</td><td>2</td><td>-</td><td>-</td></tr>
<tr><td><b>CO18 - Encrypt or tokenize critical data</b>
C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.</td><td>Low</td><td>1</td><td>-</td><td>-</td></tr>
</table>

S3 access logging *(subclass of Bucket ACL/Bucket policy, FC19)*

Server access logging provides detailed records for the requests made to a bucket. CloudTrail S3 data events are preferred due to the more reliable delivery timing, consistency, supporting KMS encryption, and S3 Object Lock ([full comparison](#)); however, the website endpoint is not recorded on S3 data events, some SIEM modules might be more feature-rich with S3 access logs, and access logging is free besides storage.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

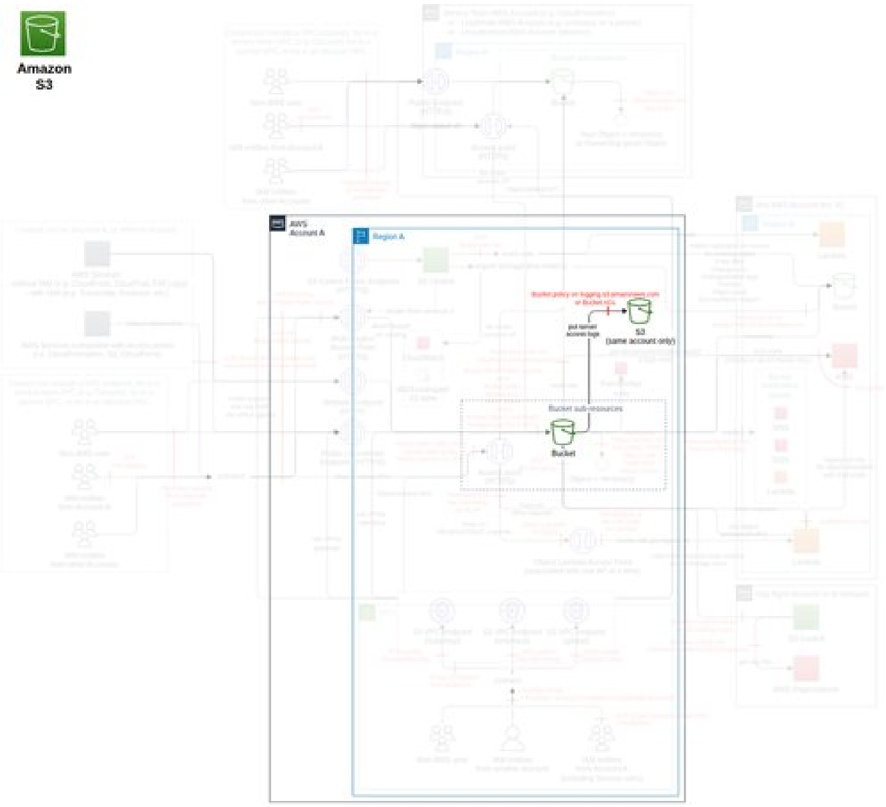
Action	IAM Permission
Sets the logging parameters for a bucket.	s3:PutBucketLogging

Threat List

Name	CVSS
Evade detection by disabling S3 access logs via a bucket ACL change	Low (2.4)
Evade detection by disabling S3 access logs via bucket policy change or removal	Low (2.4)
Evade detection by modifying S3 access logs	Low (2.4)

Evade detection by disabling S3 access logs via a bucket ACL change

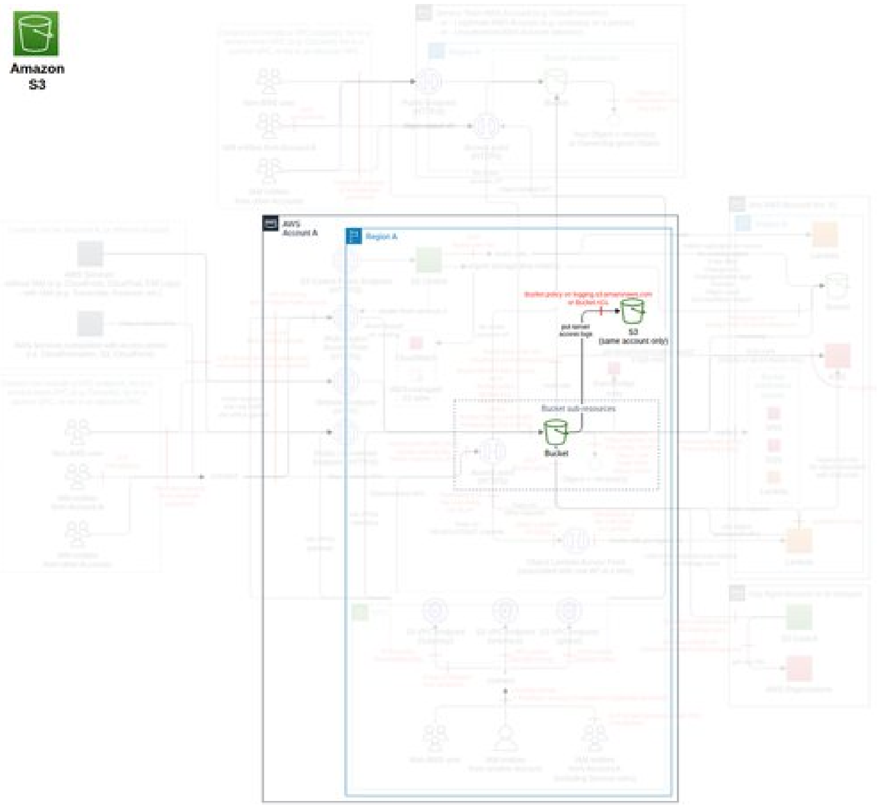
Threat Id	S3.T51
Name	Evade detection by disabling S3 access logs via a bucket ACL change
Description	S3 access logs can be used by SIEM to detect abnormal behaviors. An attacker can disable S3 access logs via bucket ACL changes on the logging destination bucket to evade detection.
Goal	Launch another attack
MITRE ATT&CK®	TA0005, T1564
CVSS	Low (2.4)
IAM Access	{ "UNIQUE": "s3:PutBucketAcl" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Evade detection by disabling S3 access logs via bucket policy change or removal

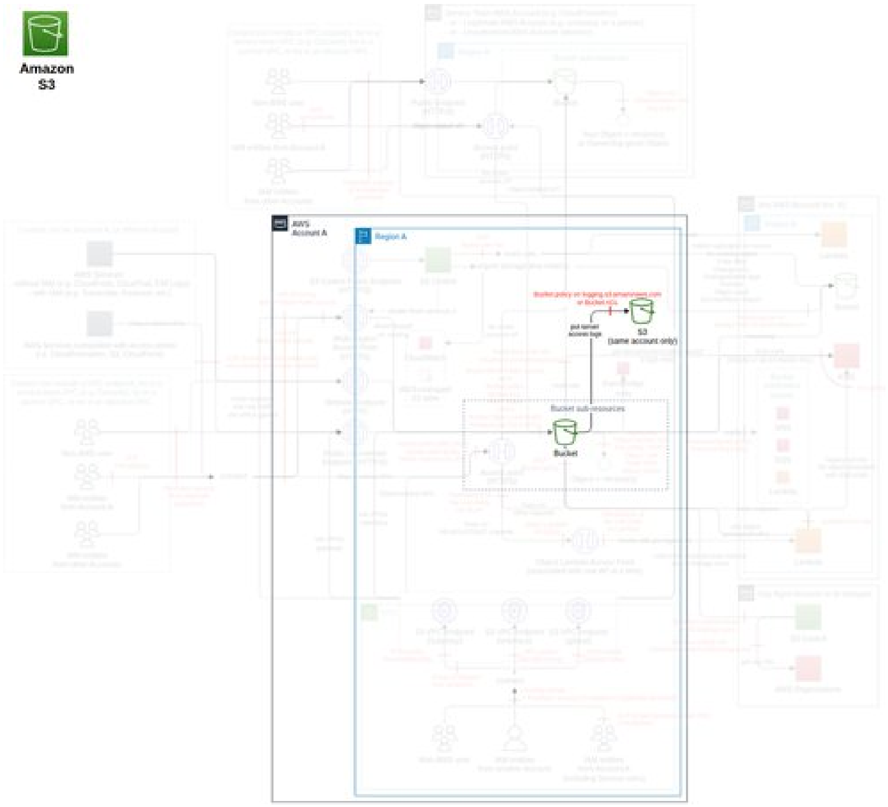
Threat Id	S3.T58
Name	Evade detection by disabling S3 access logs via bucket policy change or removal
Description	S3 access logs can be used by SIEM to detect abnormal behaviors. An attacker can disable S3 access logs via bucket policy changes on the logging destination bucket to evade detection.
Goal	Launch another attack
MITRE ATT&CK®	TA0005, T1564
CVSS	Low (2.4)
IAM Access	{ "OR": ["s3:PutBucketPolicy", "s3:DeleteBucketPolicy"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO14 - Block bucket ACL C55 - Deny requests to add an ACL on a bucket (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy, with a deny statement on "s3:PutBucketAcl"). C56 - Monitor changes to bucket ACLs to ensure they stay private (e.g., using the CloudTrail event PutBucketAcl and its field requestParameters.x-amz-acl, which should either be "private" or not exist).	Very High	-	1	1
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Evade detection by modifying S3 access logs

Threat Id	S3.T59
Name	Evade detection by modifying S3 access logs
Description	S3 access logs can be used by SIEM to detect abnormal behaviors. An attacker can modify or disable S3 access logs to evade detection.
Goal	Launch another attack
MITRE ATT&CK®	TA0005, T1564
CVSS	Low (2.4)
IAM Access	{ "UNIQUE": "s3:PutBucketLogging" }

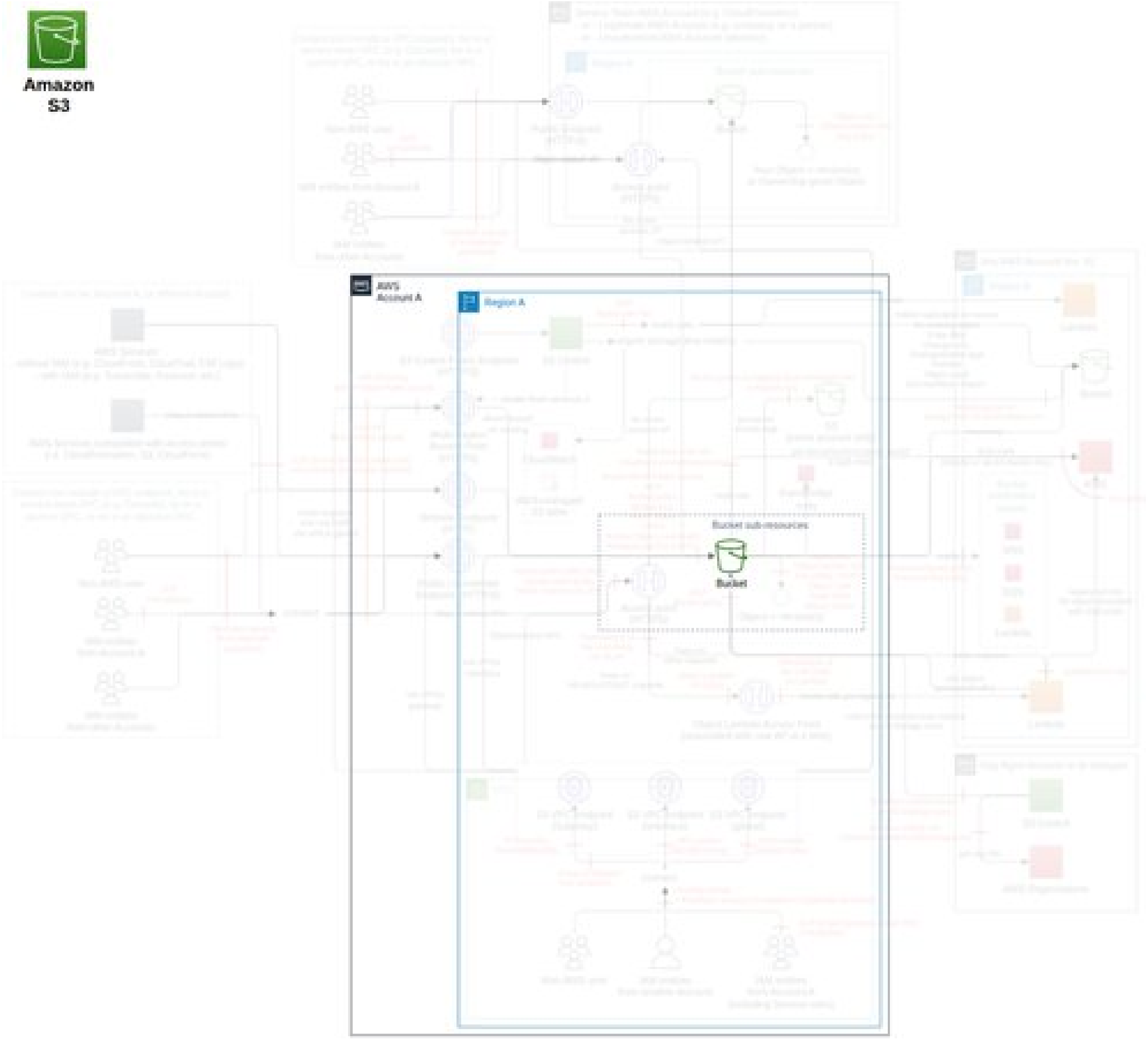


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO39 - Enforce S3 server access logging on buckets C157 - Monitor PutBucketLogging to detect bucket server access logging changes, including deactivation and bucket changes (i.e., using the CloudTrail event "PutBucketLogging" and the "requestParameters.BucketLoggingStatus" field to examine the lack of the "LoggingEnabled" key or an unauthorized bucket in "requestParameters.BucketLoggingStatus.LoggingEnabled.TargetBucket").	Medium	-	-	1
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Analytics *(subclass of Bucket, FC11)*

You can analyze storage access patterns to decide the storage class (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Adds an analytics configuration (identified by the analytics ID) to the bucket.	s3:PutAnalyticsConfiguration

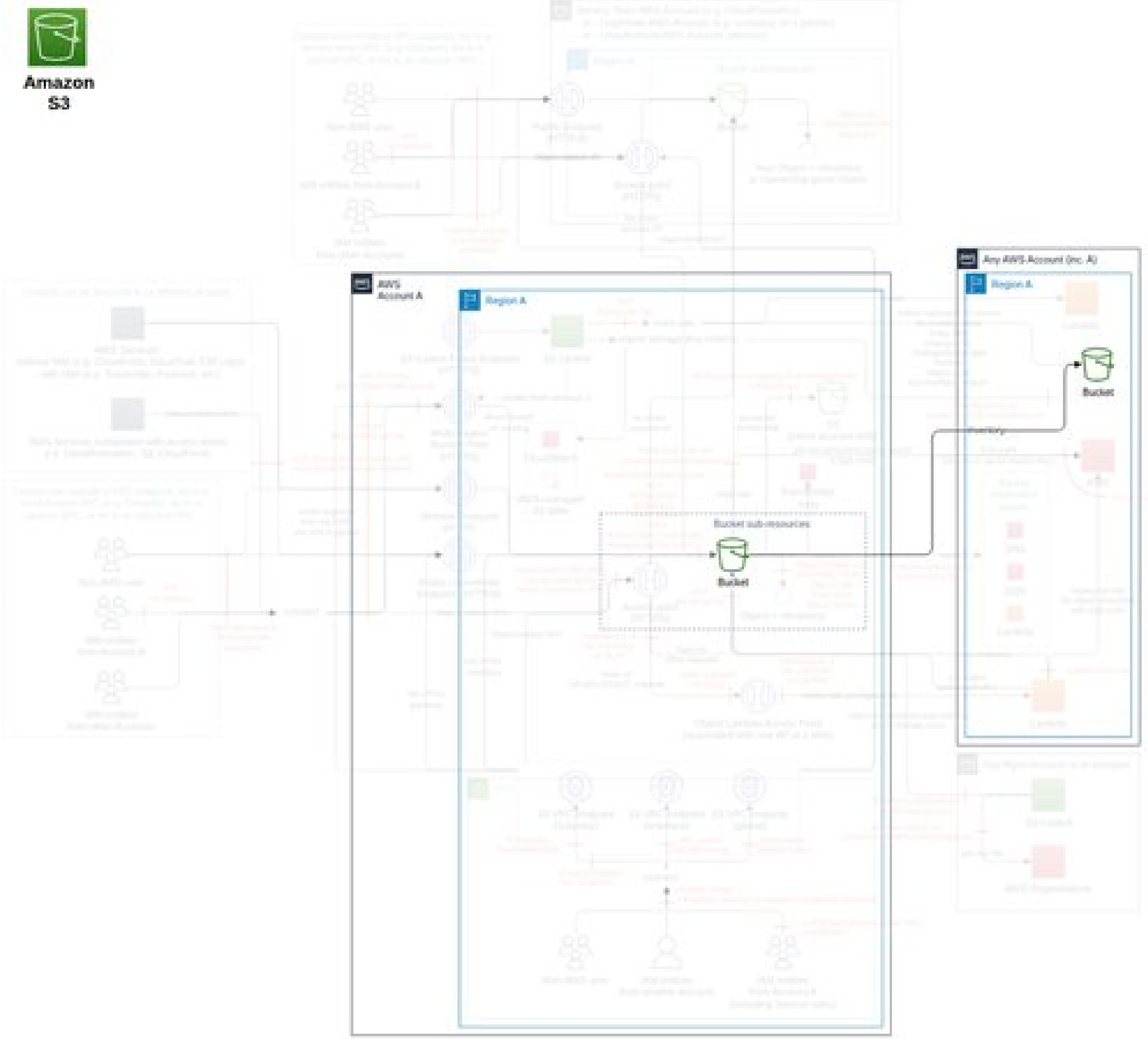
Threat List

Name	CVSS
None	None

Inventory *(subclass of Bucket, FC12)*

You can create a report on your storage, including object metadata or versions (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Adds an inventory configuration (identified by the inventory ID) to the bucket.	s3:PutInventoryConfiguration

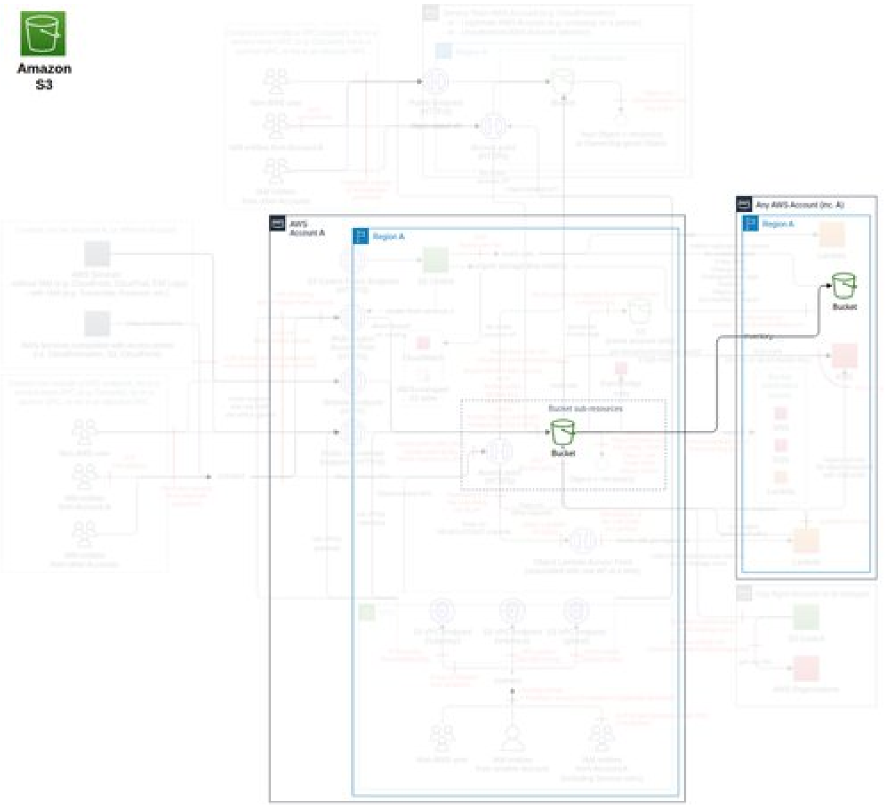
Threat List

Name	CVSS
Exfiltrate data via inventory	Low (2.4)

Exfiltrate data via inventory

Threat Id	S3.T42
Name	Exfiltrate data via inventory
Description	Inventory sends the object names (i.e., keys) to any configured S3 bucket or other metadata. An attacker can use the names of objects (1 KB) to exfiltrate data or use the metadata to conduct reconnaissance.
Goal	Data theft
MITRE ATT&CK®	TA0010, T1020
CVSS	Low (2.4)

IAM Access	{
	"UNIQUE": "s3:PutInventoryConfiguration"
	}



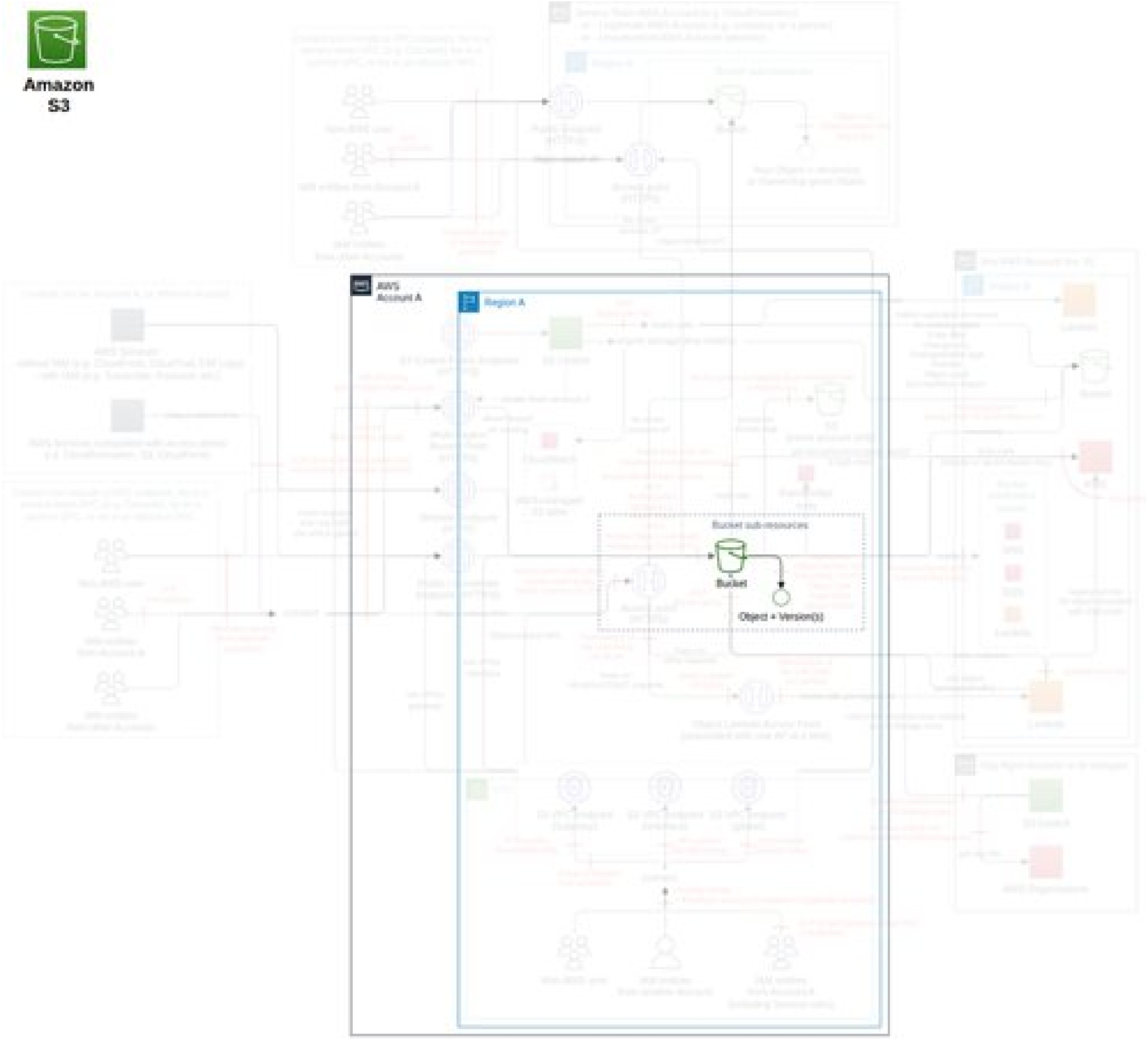
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO12 - Enforce secure SDLC processes C45 - Do not include sensitive data in bucket names, access point names, object names, object metadata, and tags.	Medium	1	-	-
CO28 - Control the data collected and the storage location of the inventory C96 - Maintain a list of authorized S3 buckets to receive the S3 Inventory of each bucket. C136 - Ensure only authorized S3 buckets are configured to receive S3 Inventory for each bucket. C164 - Maintain the list of authorized optional fields allowed to be accessed by each authorized IAM principal. C165 - Prevent the creation of inventories without authorized optional fields (e.g., by using an SCP and/or an IAM policy on "s3:PutInventoryConfiguration" with an allow statement on "s3:InventoryAccessibleOptionalFields" = authorized optional fields only).	Medium	3	1	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Lifecycle *(subclass of Bucket, FC13)*

You can manage the lifecycle of your data to reduce storage costs ([ref](#)).

Data Flow Diagram (DFD)

Amazon S3



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Creates a new lifecycle configuration for the bucket or replaces an existing lifecycle configuration.	s3:PutLifecycleConfiguration
Puts a S3 Intelligent-Tiering configuration to the specified bucket.	s3:PutIntelligentTieringConfiguration

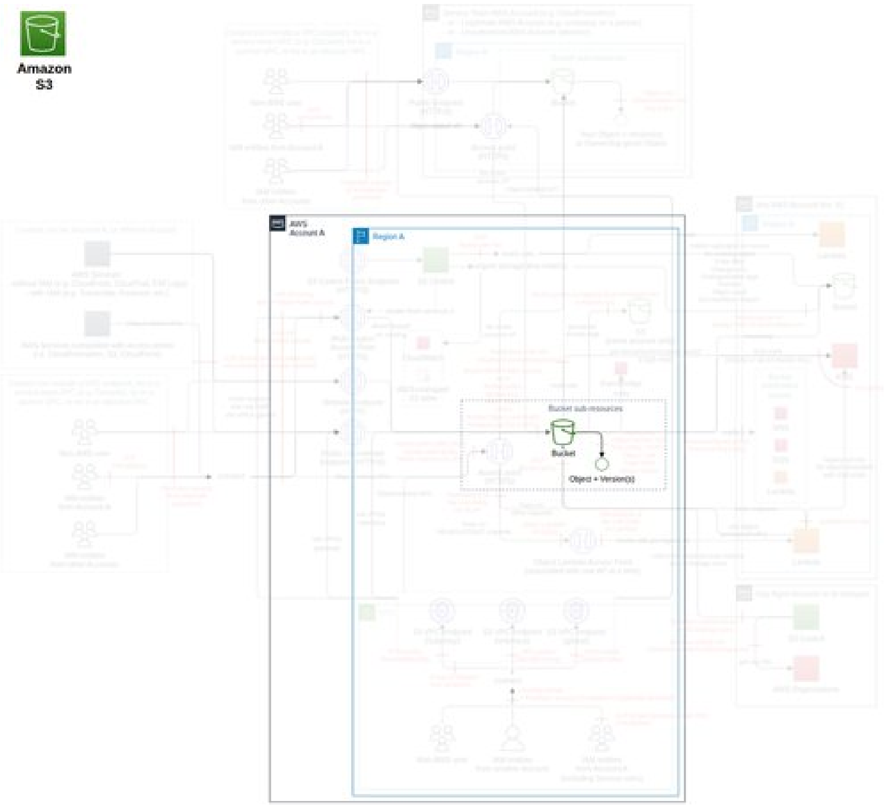
Threat List

Name	CVSS
Delete objects by using lifecycle	Medium (5.1)

Delete objects by using lifecycle

Threat Id	S3.T25
Name	Delete objects by using lifecycle
Description	Lifecycle allows you to delete objects after their configured expiry. An attacker can use a lifecycle configuration to destroy data.
Goal	Data manipulation
MITRE ATT&CK®	TA0040, T1485
CVSS	Medium (5.1)

IAM Access	{
	"UNIQUE": "s3:PutLifecycleConfiguration"
	}



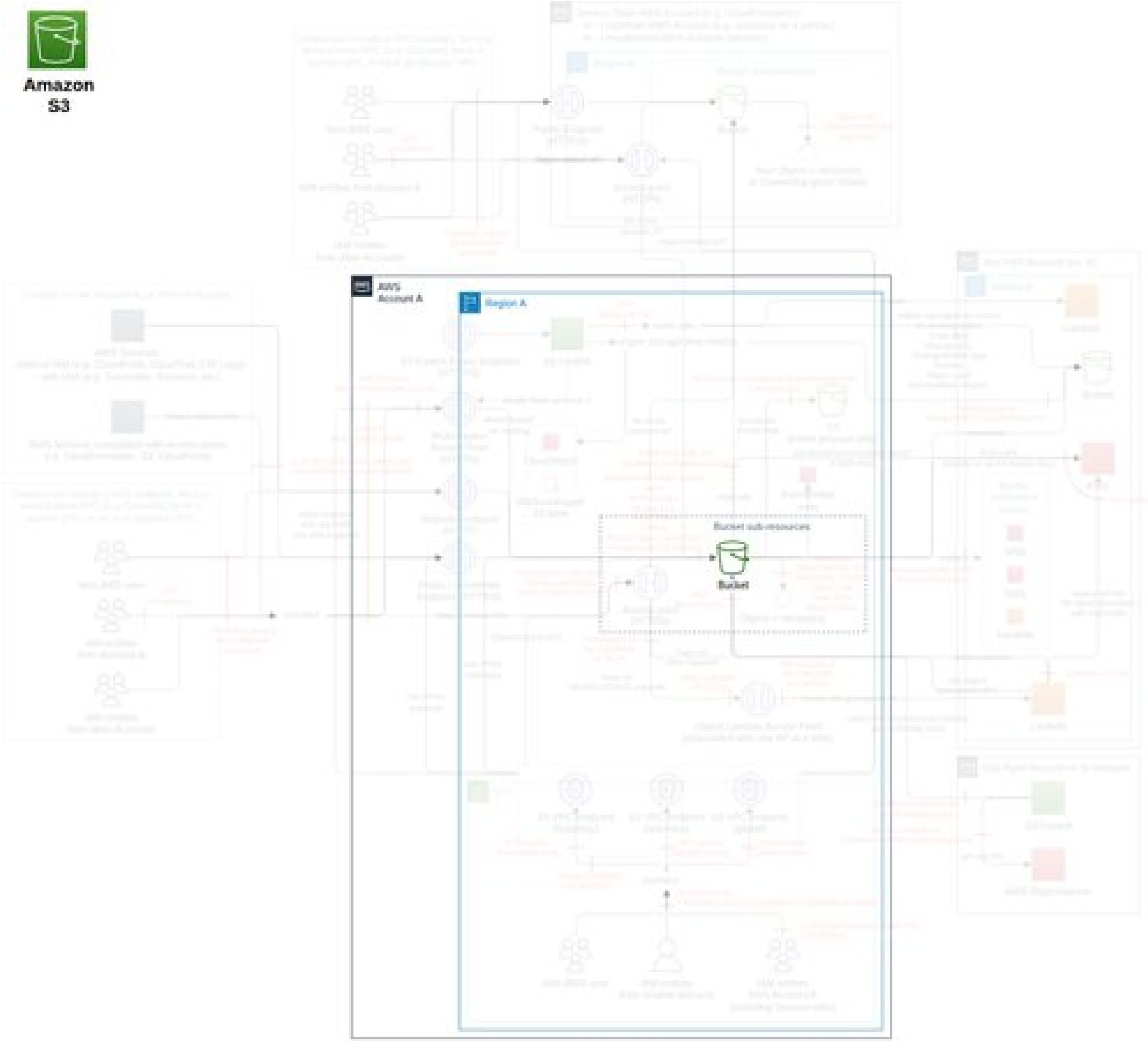
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO20 - Protect data integrity using S3 Object Lock C74 - Implement the authorized default S3 Object Lock on buckets requiring WORM (note: Amazon S3 evaluates and applies bucket policies before applying the bucket default S3 Object Lock settings).	Very High	-	1	-
CO17 - Protect primary data against loss C71 - Back up primary data in a secure location under a different security authority (e.g., in an AWS data bunker account via replication, or using AWS Backup for Amazon S3).	High	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Metrics *(subclass of Bucket, FC14)*

You can configure metrics to get additional insights into your usage (ref).

Data Flow Diagram (DFD)

Amazon S3



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Sets or updates a metrics configuration for the CloudWatch request metrics (specified by the metrics configuration ID) from the bucket.	s3:PutMetricsConfiguration

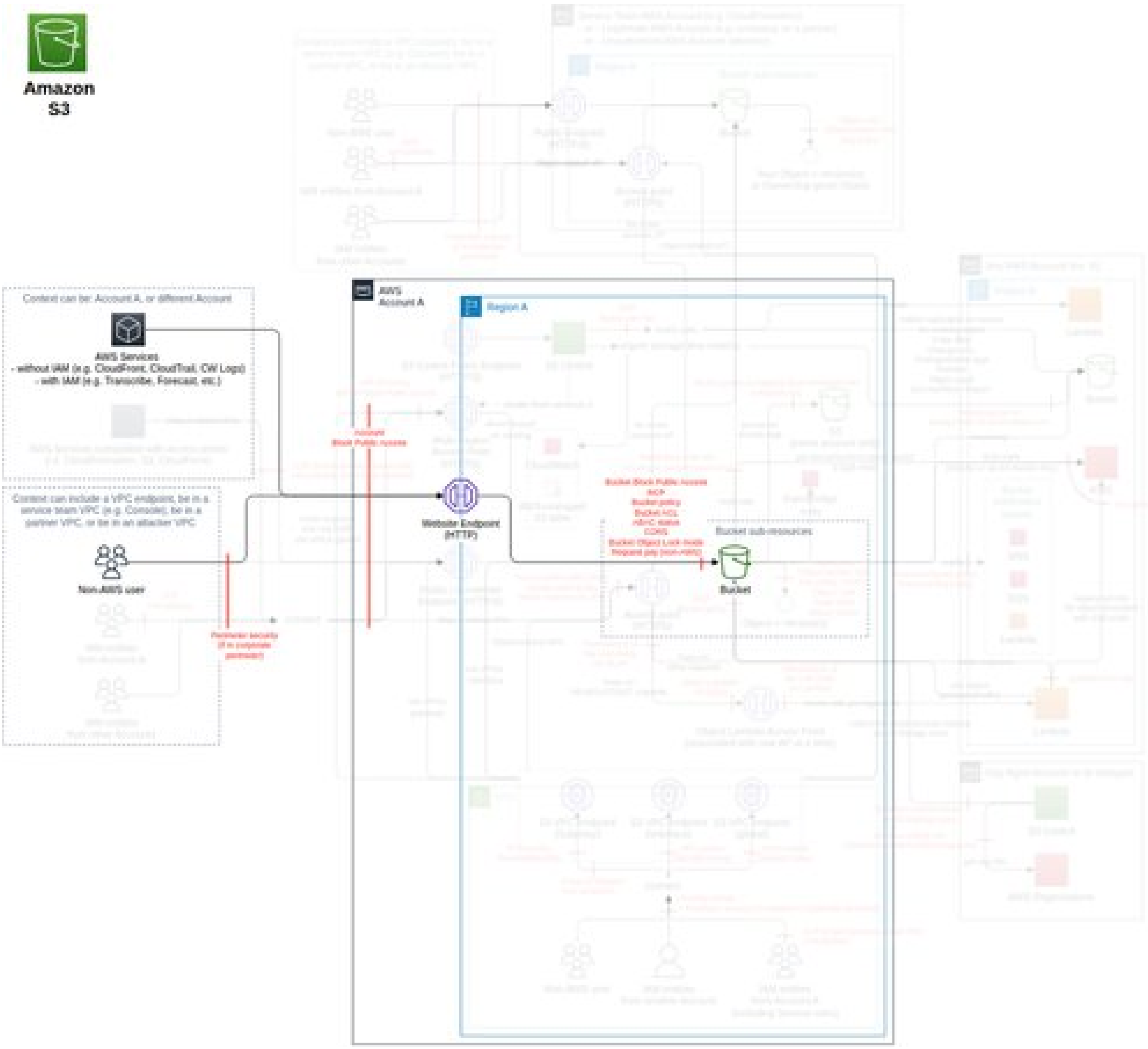
Threat List

Name	CVSS
None	None

Website *(subclass of Bucket, FC16)*

You can host a static website on Amazon S3. On a static website, individual web pages include static content. They might also contain client-side scripts ([ref](#)).

Data Flow Diagram (DFD)


Amazon S3
Context can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
Perimeter security (if in corporate perimeter)
AWS Account A
Region A
Account Block Public Access
Website Endpoint (HTTP)
Bucket Block Public Access
SCP
Bucket policy
Bucket ACL
ABAC status
CORS
Bucket Object Lock mode
Request pay (non-AWS)
Bucket sub-resources
Bucket

Actions and IAM Permissions to deny the feature

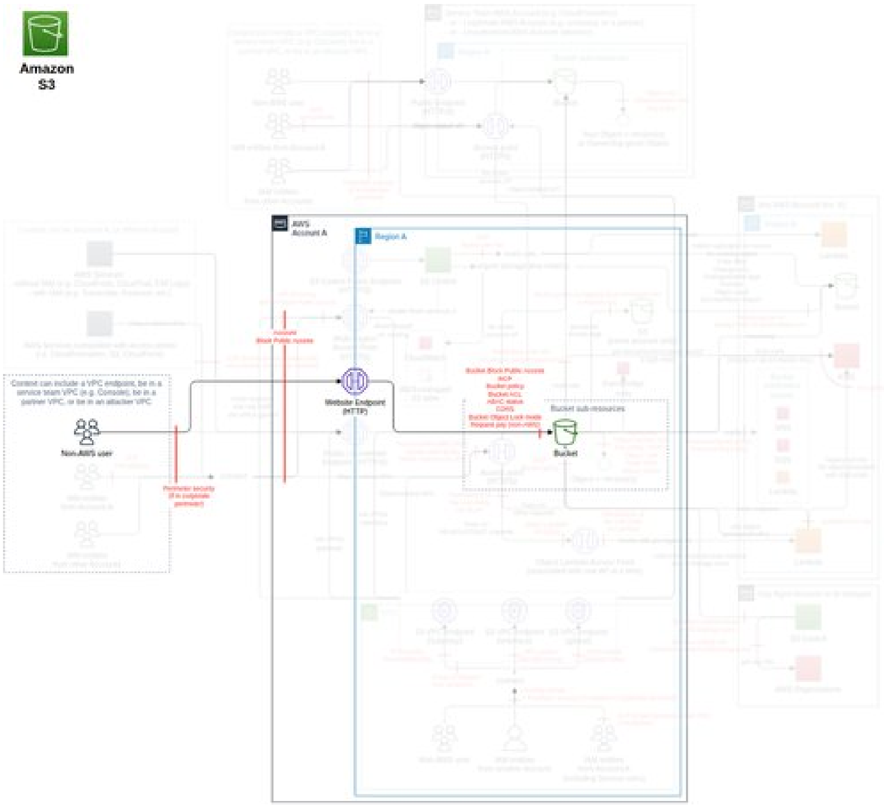
Action	IAM Permission
Sets the configuration of the website that is specified in the website subresource.	s3:PutBucketWebsite

Threat List

Name	CVSS
Embed client-side script malware in a bucket website	Medium (5.5)
Clickjacking on S3 website	Medium (4.2)
Intercept data in transit on an S3 website endpoint	Low (3.1)

Embed client-side script malware in a bucket website

Threat Id	S3.T15
Name	Embed client-side script malware in a bucket website
Description	S3 website enables users to be served client-side scripts (e.g., JavaScript). An attacker can upload a client-side script with malware (e.g., cryptomining) to the visitors.
Goal	Direct Financial Gain
MITRE ATT&CK®	TA0002, T1203
CVSS	Medium (5.5)
IAM Access	{ "UNIQUE": "s3:PutObject" }

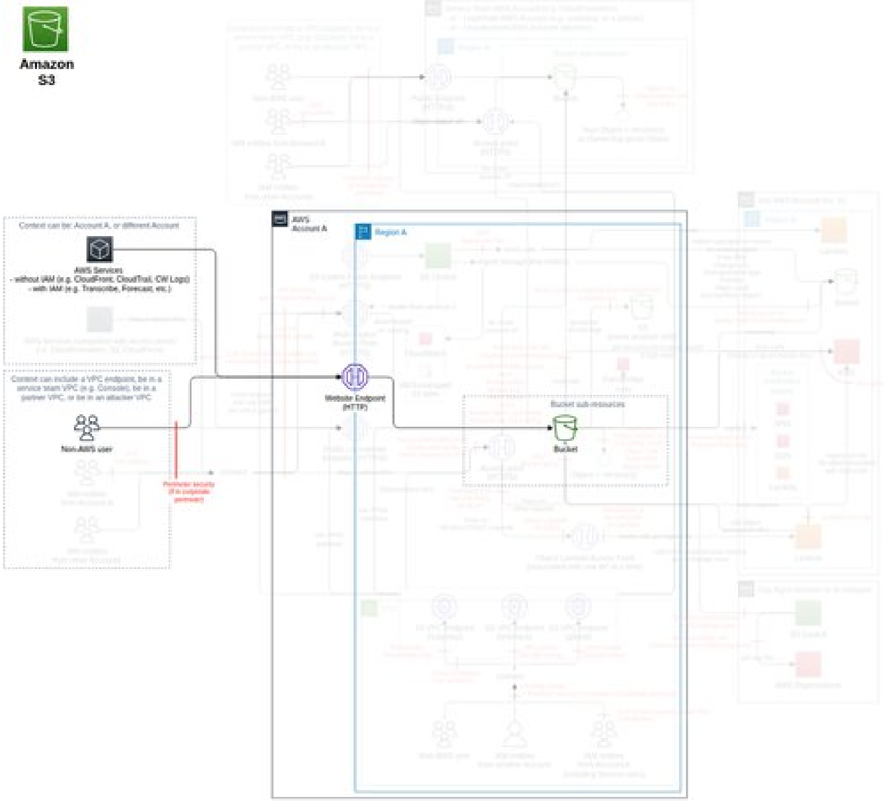


Amazon S3
AWS Account A
Region A
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
Perimeter security (if in corporate premises)
Account Block Public Access
Website Endpoint (HTTP)
Bucket Block Public Access
ACP
Bucket policy
Bucket ACL
ABAC status
CORS
Bucket Object Lock mode
Request pay (non-AWS)
Bucket sub-resources
Bucket

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO5 - Identify and ensure the protection of all external buckets hosting your objects C11 - Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel). C14 - Scan all data before uploading to an external bucket to ensure the classification of the data is aligned with the bucket classification (e.g., using Macie).	High	2	-	-
CO26 - Scan objects used for input/output of a workflow for malware C93 - If the bucket is used as an input or the output of a process, scan the objects for malware (e.g., using GuardDuty Malware Protection for S3, BucketAV, Cloud Storage Security, Trend Micro Cloud One, or your own scanning solution).	Low	-	-	1

Clickjacking on S3 website

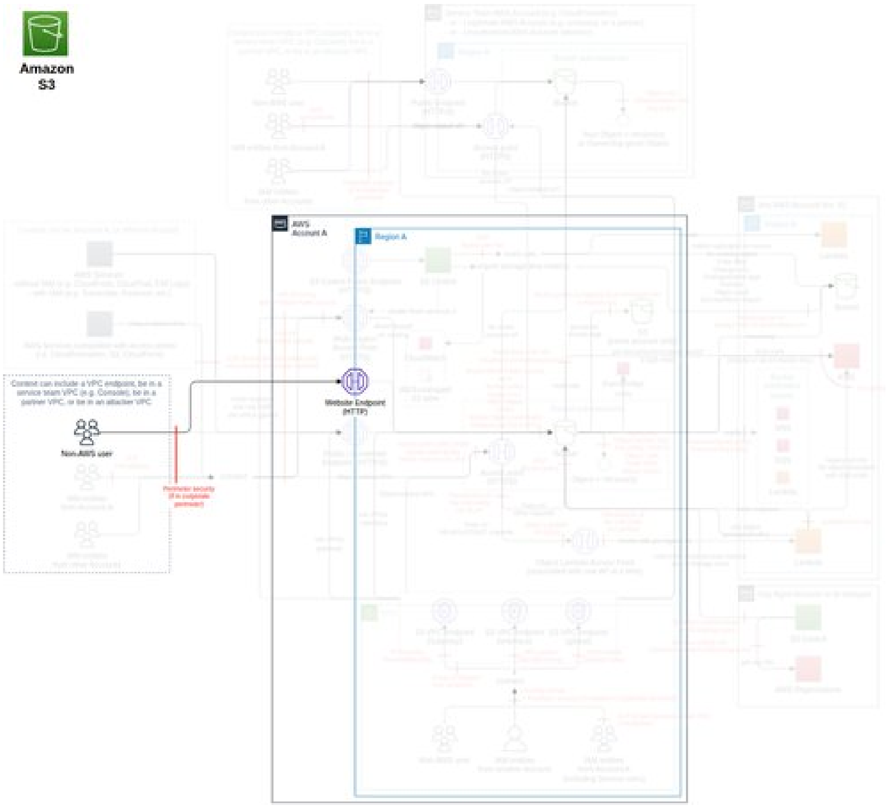
Threat Id	S3.T29
Name	Clickjacking on S3 website
Description	S3 does not enforce certain security headers by default. An attacker can use an iFrame on your website to trick users into interacting with their own scripts.
Goal	Launch another attack
MITRE ATT&CK®	TA0040, T1496
CVSS	Medium (4.2)
IAM Access	`{}`


Amazon S3
Content can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
Perimeter security (if in corporate perimeter)
AWS Account A
Region A
Website Endpoint (HTTP)
Bucket sub-resources
Bucket

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO35 - Deploy only authorized S3 websites and place them behind a CDN C141 - Maintain a list of authorized buckets to be configured as an S3 website endpoint. C142 - Ensure only authorized buckets are configured as an S3 website endpoint. C144 - Ensure S3 website endpoints are protected with HTTP headers (ref) using a CDN (e.g., CloudFront).	Very High	3	-	-

Intercept data in transit on an S3 website endpoint

Threat Id	S3.T13
Name	Intercept data in transit on an S3 website endpoint
Description	S3 website endpoint is serving HTTP only. An attacker can intercept the traffic you send to an external bucket to read the data.
Goal	Data theft
MITRE ATT&CK®	TA0009, T1557
CVSS	Low (3.1)
IAM Access	{}

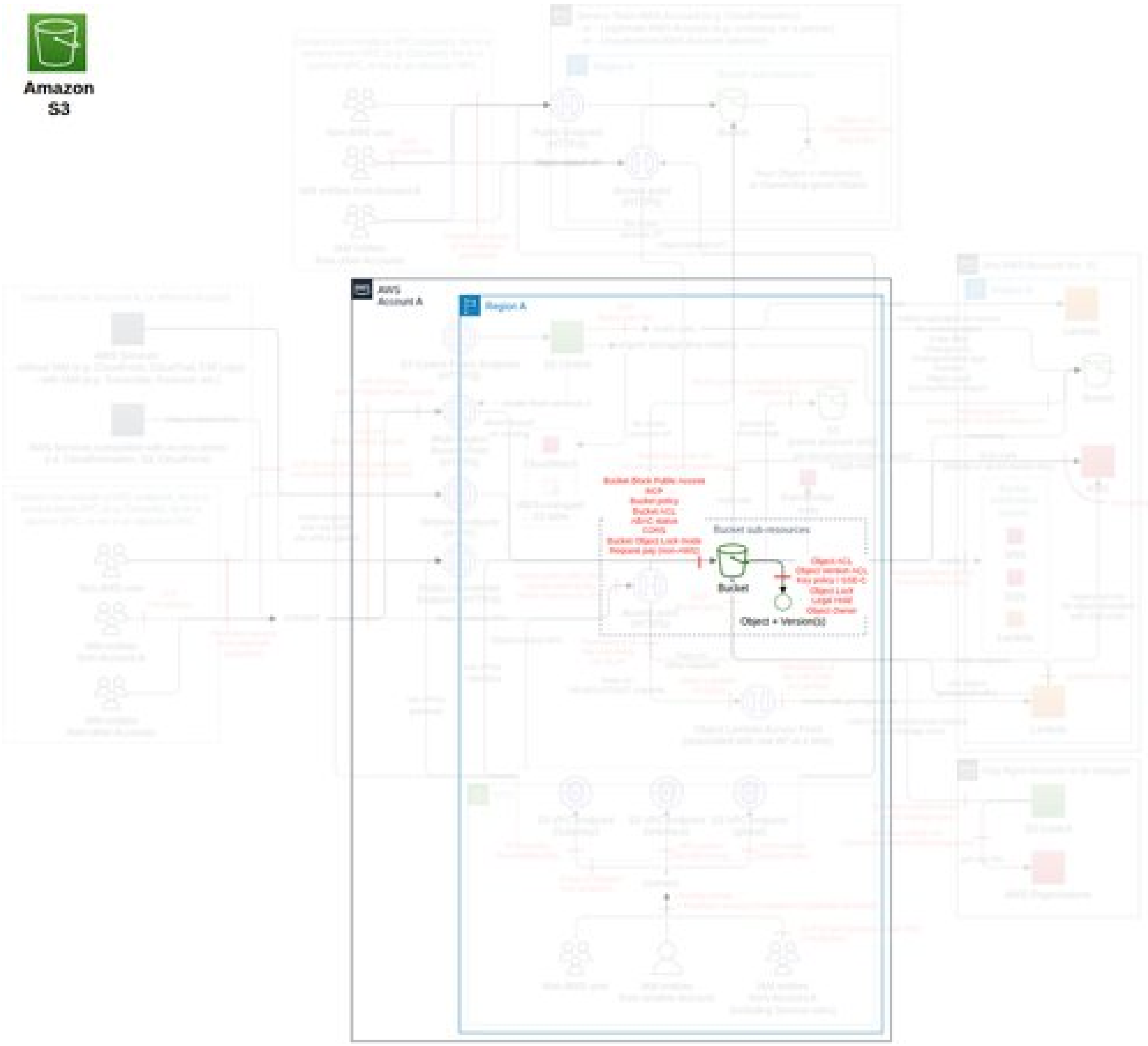

Amazon S3
AWS Account A
Region A
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
Perimeter security (if in corporate perimeter)
Website Endpoint (HTTP)

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO13 - Block direct public access C47 - Front buckets that are required to be public, using authenticated CDN (e.g., CloudFront) or API Gateway, protected with WAF (e.g., for hotlinking).	Very High	1	-	-
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO35 - Deploy only authorized S3 websites and place them behind a CDN C141 - Maintain a list of authorized buckets to be configured as an S3 website endpoint. C142 - Ensure only authorized buckets are configured as an S3 website endpoint. C144 - Ensure S3 website endpoints are protected with HTTP headers (ref) using a CDN (e.g., CloudFront).	Very High	3	-	-
CO18 - Encrypt or tokenize critical data C72 - Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Medium	1	-	-

S3 Object Lock *(subclass of Bucket, FC17)*

You can use S3 Object Lock to store objects using a write-once-read-many (WORM) model (ref). Creating a bucket with S3 Object Lock will enable versioning even without permissions.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

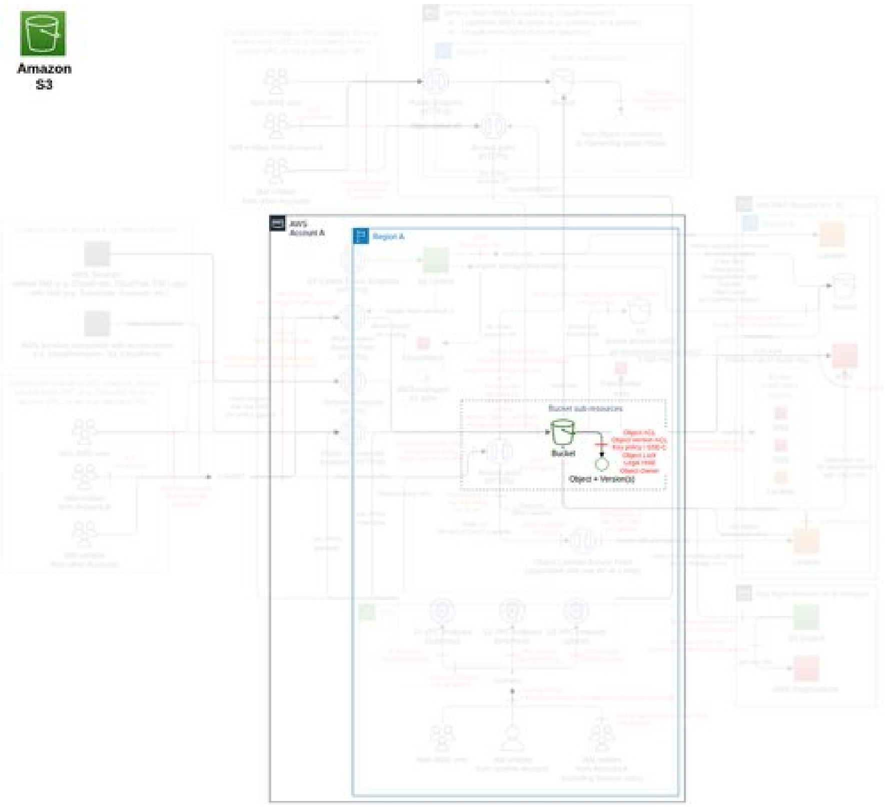
Action	IAM Permission
Grants permission to allow circumvention of governance-mode object retention settings (for DeleteObject, DeleteObjects and PutObjectRetention).	s3:BypassGovernanceRetention
Allows placing a default S3 Object Lock configuration at bucket creation (AWS Support needs to be contacted for existing buckets). It automatically enables versioning, even without permission.	s3:PutBucketObjectLockConfiguration
Puts object retention on a specific object.	s3:PutObjectRetention

Threat List

Name	CVSS
Increase costs and compliance risks by enabling S3 Object Lock in compliance mode	Medium (4.2)

Increase costs and compliance risks by enabling S3 Object Lock in compliance mode

Threat Id	S3.T61
Name	Increase costs and compliance risks by enabling S3 Object Lock in compliance mode
Description	Existing objects or buckets can be modified to have S3 Object Lock enabled. An attacker can enable it in compliance mode to lock any existing objects or new objects, increasing costs due to unnecessary data storage and potentially causing compliance risks if data is retained beyond its legally required period.
Goal	Financial Drain
MITRE ATT&CK®	TA0040, T1586
CVSS	Medium (4.2)
IAM Access	`{ "AND": [{ "OR": ["s3:PutBucketObjectLockConfiguration", "s3:PutObjectRetention"] }, { "OPTIONAL": "s3:PutObjectLegalHold" }] }`

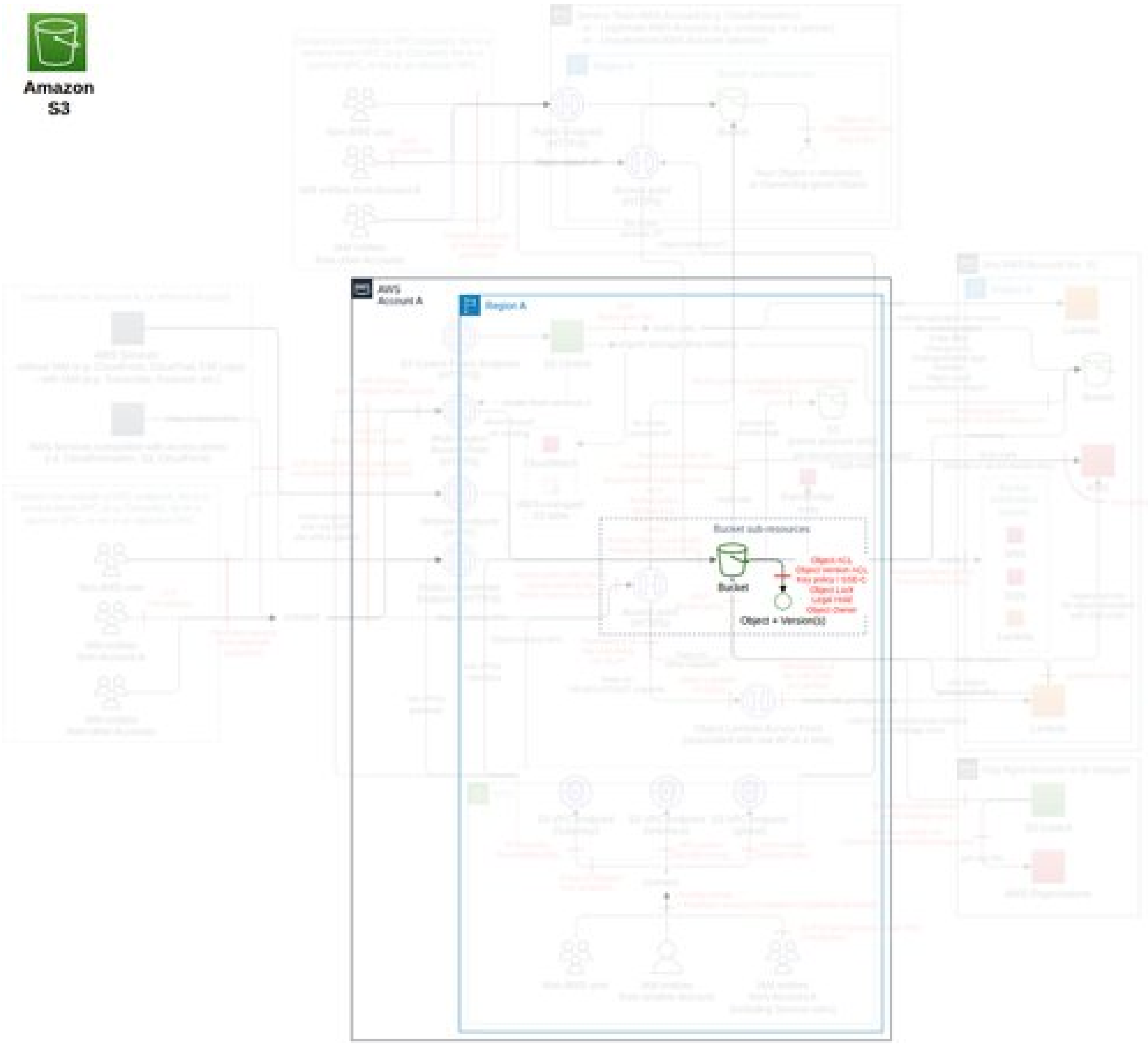


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO20 - Protect data integrity using S3 Object Lock C74 - Implement the authorized default S3 Object Lock on buckets requiring WORM (note: Amazon S3 evaluates and applies bucket policies before applying the bucket default S3 Object Lock settings). C76 - Block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock on buckets requiring WORM (e.g., using their bucket policy and centrally in an RCP applied to the OU or the AWS account with a deny statement on PutObject and PutObjectRetention if the condition "s3:object-lock-mode" exists and "s3:object-lock-remaining-retention-days" is not the defined S3 Object Lock configuration).	Very High	-	2	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Legal hold *(subclass of S3 Object Lock, FC29)*

A legal hold provides the same protection as a retention period, but it has no expiration date. Instead, a legal hold remains in place until you explicitly remove it. Legal holds are independent of retention periods.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Puts Object Lock legal hold on a specific object.	s3:PutObjectLegalHold

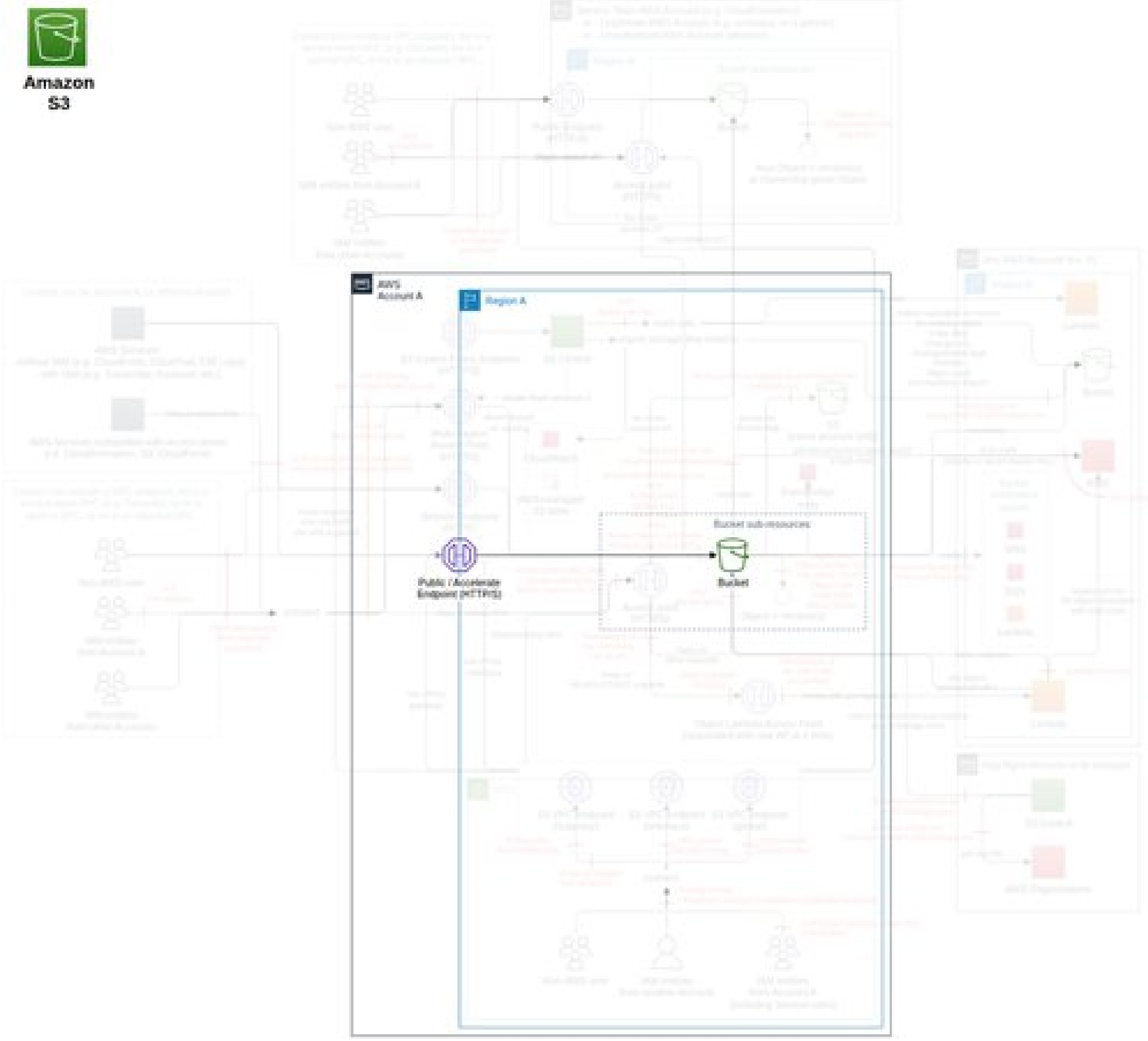
Threat List

Name	CVSS
None	None

Transfer Acceleration *(subclass of Bucket, FC18)*

You can use Transfer Acceleration to improve the performance of long-distance transfers (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Sets the Transfer Acceleration state of an existing bucket.	s3:PutAccelerateConfiguration

Threat List

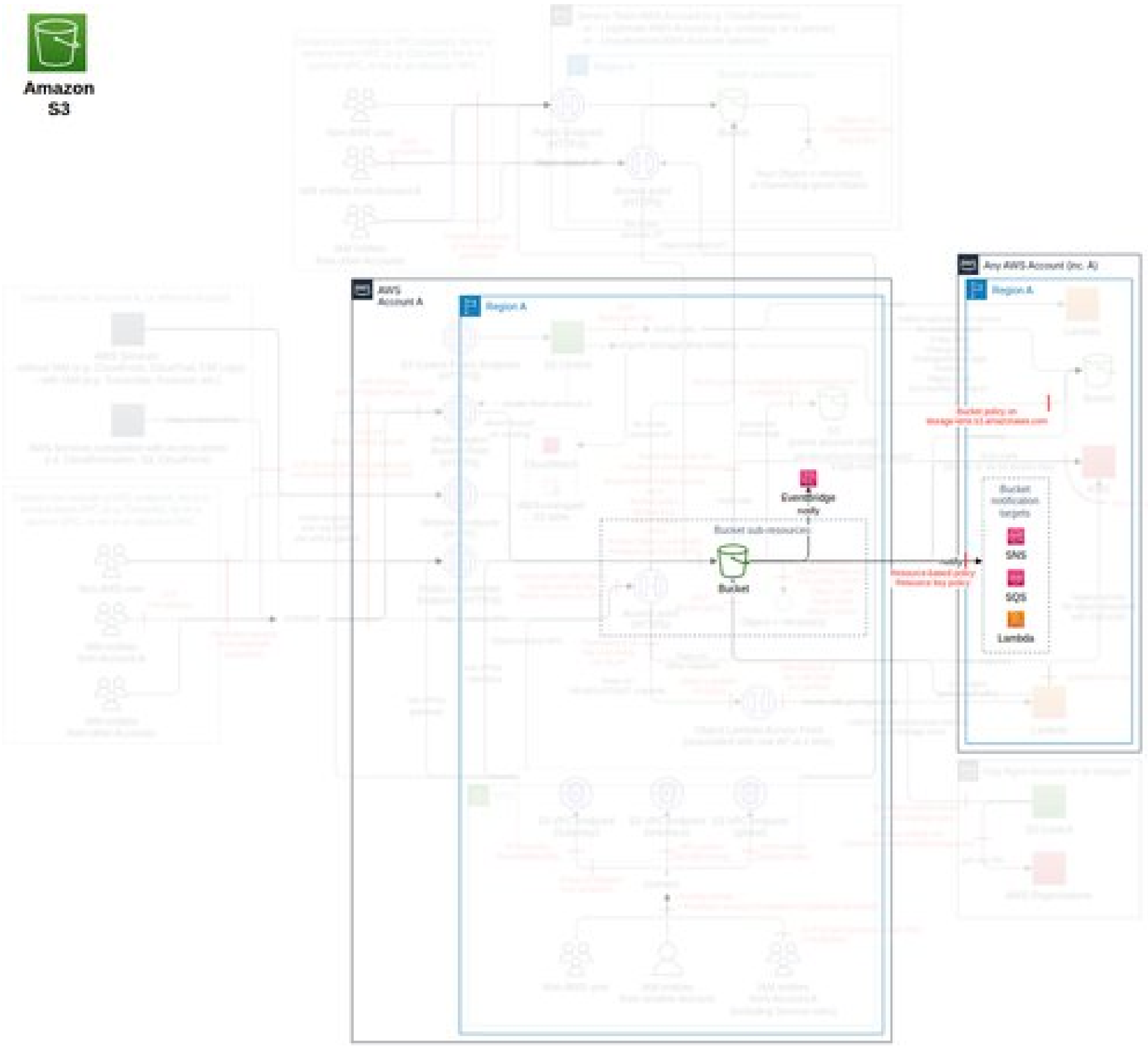
Name	CVSS
None	None

Notification *(subclass of Bucket, FC20)*

You can receive notifications when certain events happen in your bucket. Notifications can be sent cross-account (ref).

Data Flow Diagram (DFD)

Amazon S3



Actions and IAM Permissions to deny the feature

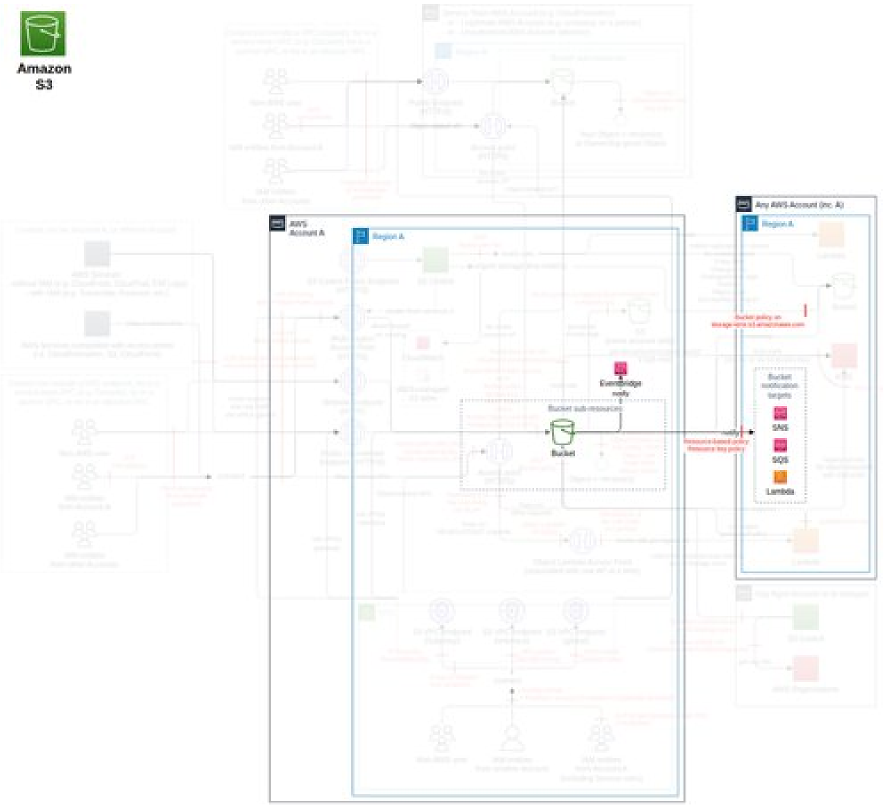
Action	IAM Permission
Enables you to receive notifications when certain events happen in your bucket.	s3:PutBucketNotification

Threat List

Name	CVSS
Exfiltrate data via event notification	Low (2.4)

Exfiltrate data via event notification

Threat Id	S3.T41
Name	Exfiltrate data via event notification
Description	Event notification sends the key to any configured SQS, SNS, or Lambda (cross-account), or EventBridge (same account). An attacker can use the name of objects (1 KB) to exfiltrate data.
Goal	Data theft
MITRE ATT&CK®	TA0010, T1537, T1020
CVSS	Low (2.4)
IAM Access	{ "UNIQUE": "s3:PutBucketNotification" }

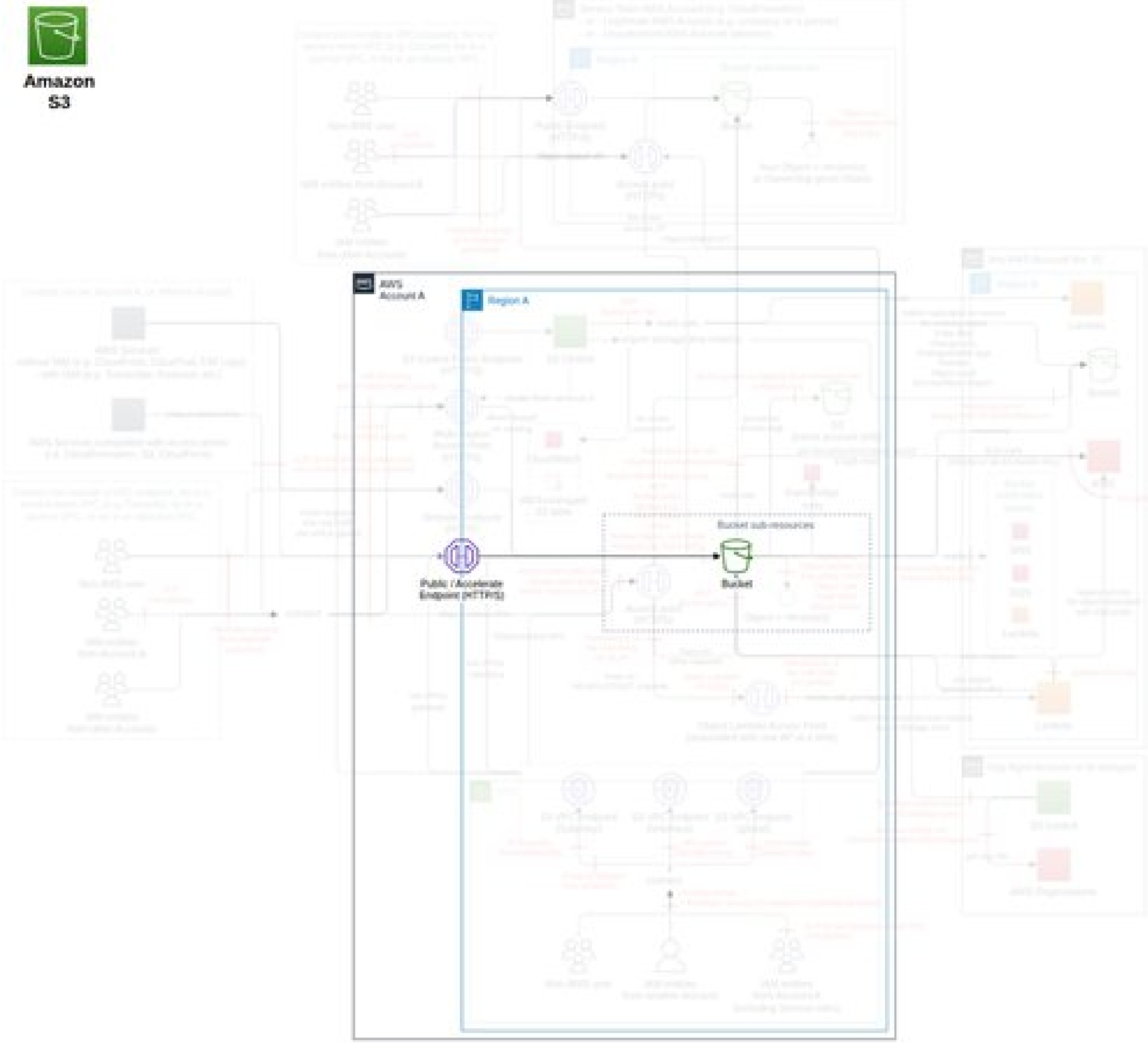


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO27 - Control event receivers C94 - Maintain a list of authorized notification receivers (e.g., SNS topic, Lambda) for each bucket. You might use a simpler approach by using authorized account IDs to ensure all your receivers are in authorized AWS accounts. C135 - Ensure only authorized notification receivers for each bucket are configured.	High	2	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
CO12 - Enforce secure SDLC processes C45 - Do not include sensitive data in bucket names, access point names, object names, object metadata, and tags.	Low	1	-	-

CORS *(subclass of Bucket, FC22)*

[NOT RECOMMENDED] *To configure your bucket to allow cross-origin requests, you create a CORS configuration, which is an XML document with rules that identify the origins that you will allow to access your bucket, the operations (HTTP methods) that will support for each origin, and other operation-specific information. This feature class is NOT RECOMMENDED to be activated since it is all HTTP. Prefer the use of CDN (e.g., CloudFront), API Gateway, and/or WAF fronting S3 buckets.*

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Sets the CORS configuration for your bucket.	s3:PutBucketCors

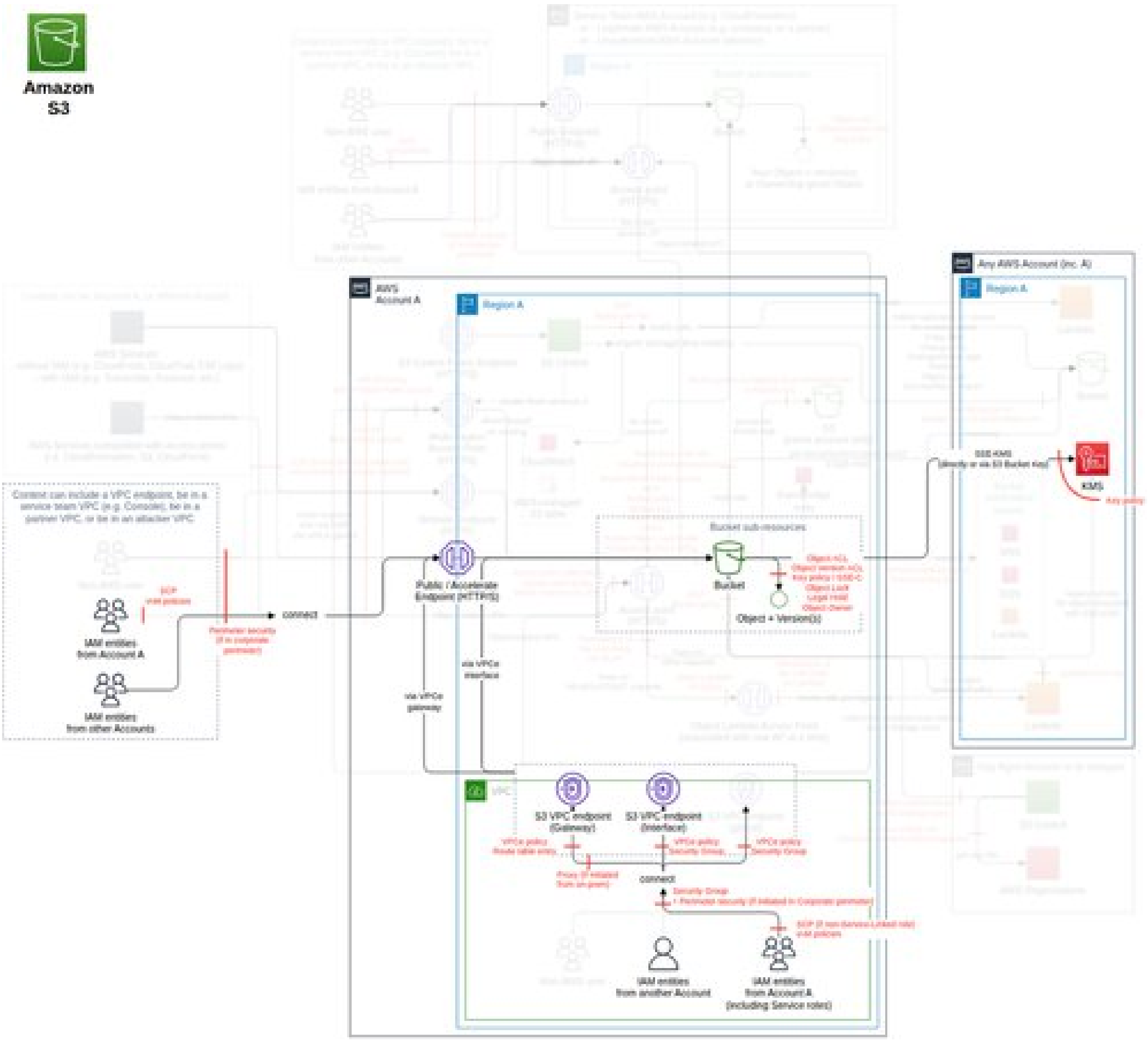
Threat List

Name	CVSS
None	None

Bucket default encryption *(subclass of Bucket, FC23)*

You can set default encryption on a bucket so that all new objects are encrypted when stored in the bucket.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Sets the default encryption configuration for the bucket.	s3:PutEncryptionConfiguration

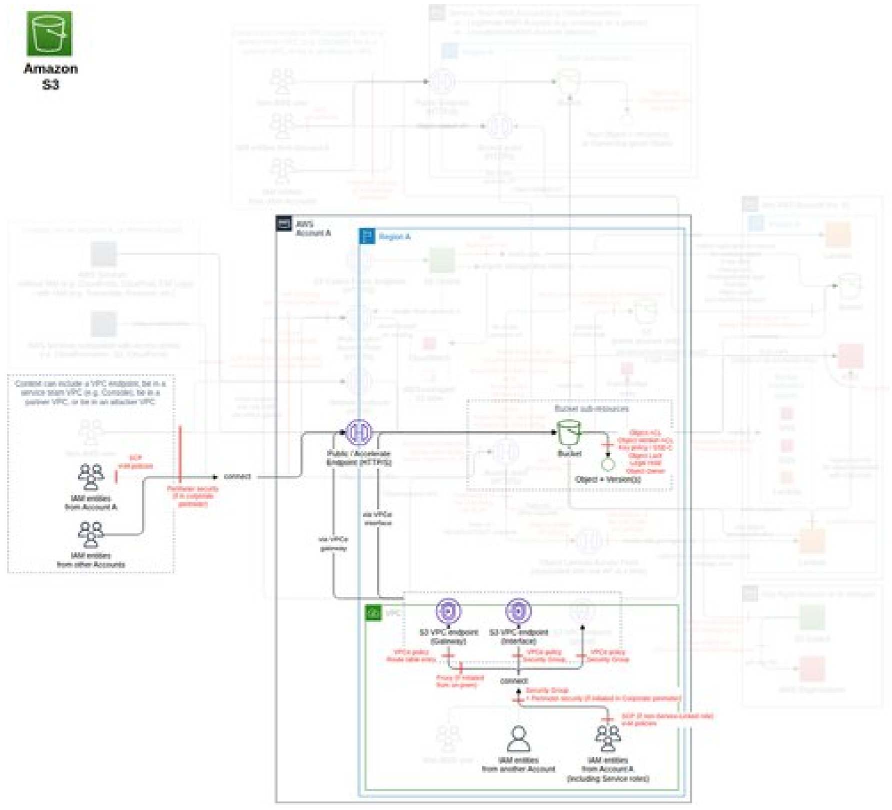
Threat List

Name	CVSS
Disrupting object writes by disabling customer-managed encryption on a bucket using SSE-C	Low (3.5)
Disrupting access by switching the object encryption type or its KMS key	Low (2.9)

Disrupting object writes by disabling customer-managed encryption on a bucket using SSE-C

Threat Id	S3.T63
Name	Disrupting object writes by disabling customer-managed encryption on a bucket using SSE-C
Description	Server-side encryption with customer-provided keys [SSE-C] can be blocked on individual general purpose buckets [will be the default from April 2026]. An attacker can change the encryption configuration to disable SSE-C on a bucket using it, resulting in objects failing to be written.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040, T1531
CVSS	Low (3.5)

IAM Access	{
	"UNIQUE": "s3:PutEncryptionConfiguration"
	}

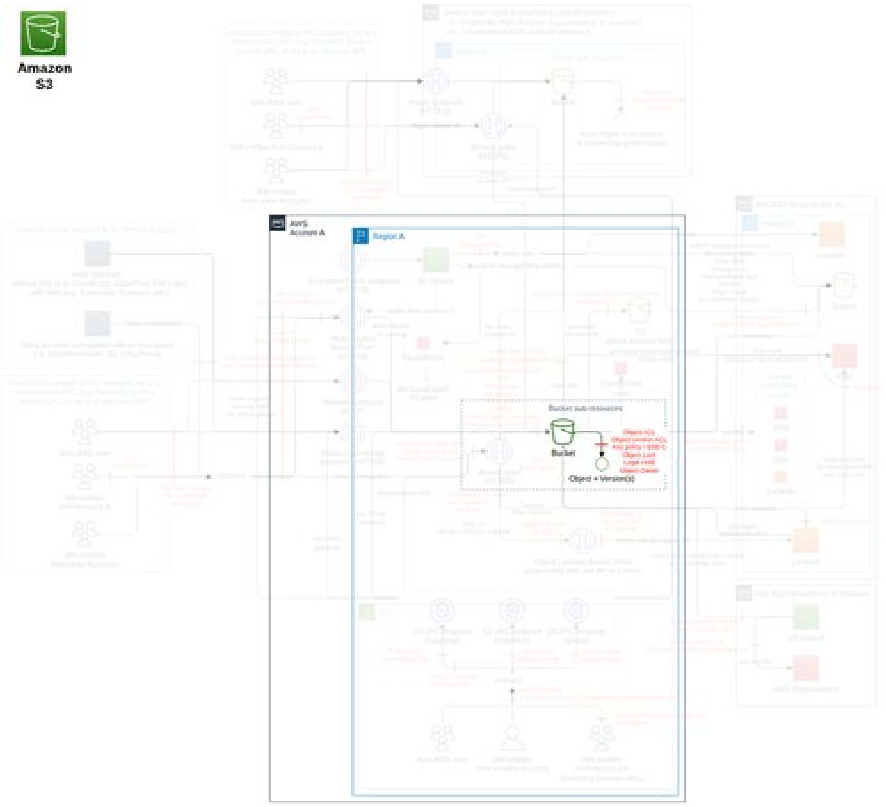

Amazon S3
AWS Account A
Region A
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
IAM entities from Account A
IAM entities from other Accounts
SCP
IAM policies
Perimeter security (if in corporate perimeter)
connect
Public / Accelerate Endpoint (HTTPS)
via VPCe interface
via VPCe gateway
Bucket sub-resources
Bucket
Object + Version(s)
Object ACL
Object version ACL
Key policy / SSE-C
Object Lock
Legal Hold
Object Owner
VPC
S3 VPC endpoint (Gateway)
S3 VPC endpoint (Interface)
VPCe policy
Route table entry
Security Group
Proxy (if initiated from on-prem)
Security Group
+ Perimeter security (if initiated in Corporate perimeter)
SCP (if non-Service-Linked role)
IAM policies
IAM entities from another Account
IAM entities from Account A (including Service roles)

Control Objectives	Priority	# of associated Controls		
		Directive	**Preventative**	**Detective**
CO16 - Enforce encryption at rest C145 - Maintain a list of buckets (or paths) required to be encrypted using server-side encryption with customer-provided keys (SSE-C). C167 - Ensure SSE-C is blocked when not required for each bucket [default from April 2026]. C169 - Monitor abnormal increases in the CloudWatch metric for HTTP 4xx client error status code requests (i.e., "4xxErrors").	Very High	2	-	1
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Disrupting access by switching the object encryption type or its KMS key

Threat Id	S3.T65
Name	Disrupting access by switching the object encryption type or its KMS key
Description	An object's encryption type can be changed in some conditions (SSE-S3 to SSE-KMS, or between different KMS keys). The KMS key must be in the same AWS account (via API), or the same AWS Organization (via AWS Support). An attacker can change the encryption type or the KMS key for an object, causing loss of access to the object for applications that do not have permissions to use the new KMS key.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040
CVSS	Low (2.9)

IAM Access	{
	"UNIQUE": "s3:UpdateObjectEncryption"
	}

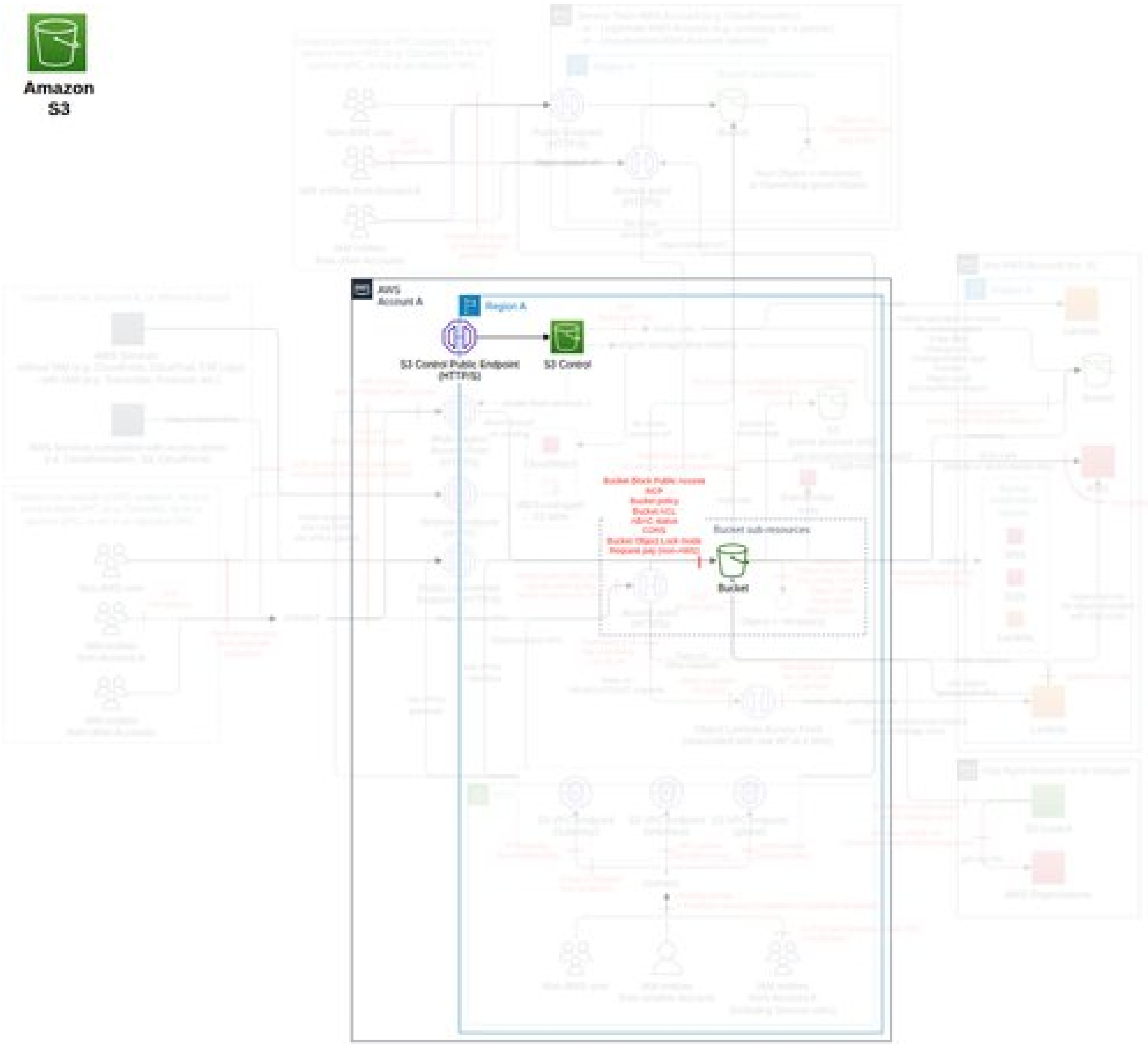


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO16 - Enforce encryption at rest C61 - Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption (ref). C140 - Ensure all objects in S3 buckets are encrypted with an authorized KMS key. C63 - Use KMS ThreatModel to protect the KMS keys used for S3 (e.g., using encryptionContext on the policy of each KMS key).	Very High	3	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Public Access Block (bucket) *(subclass of Bucket, FC24)*

S3 Block Public Access (bucket) provides controls at the individual S3 bucket level to ensure objects never have public access.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Creates or modifies the PublicAccessBlock configuration for an Amazon S3 bucket.	s3:PutBucketPublicAccessBlock

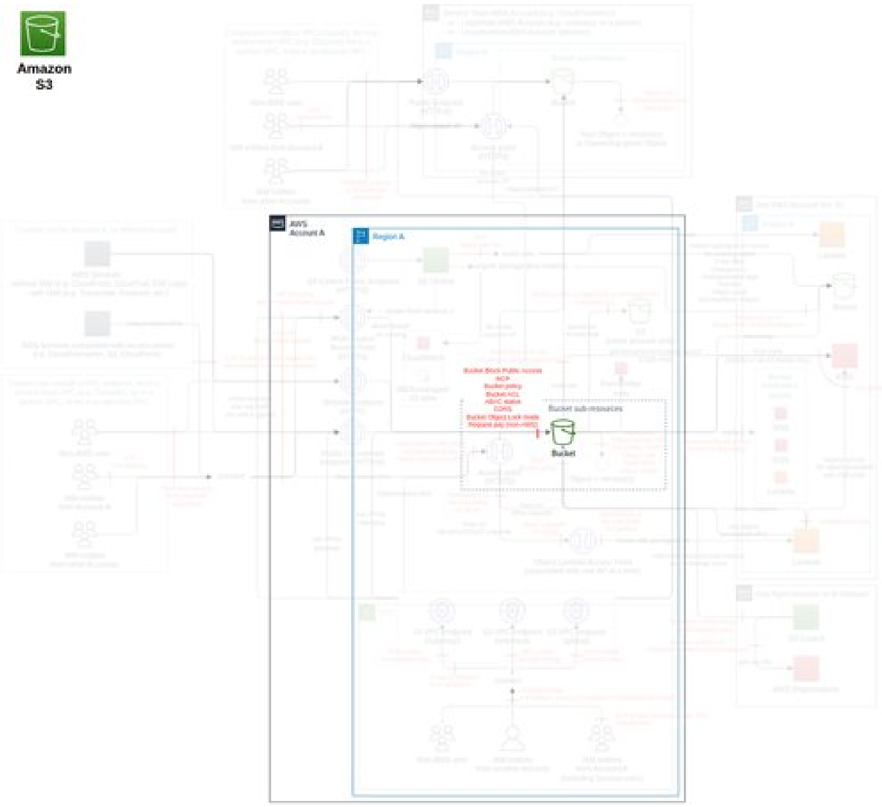
Threat List

Name	CVSS
Reduce bucket security by modifying the bucket's Public Access Block	Medium (4.5)

Reduce bucket security by modifying the bucket's Public Access Block

Threat Id	S3.T52
Name	Reduce bucket security by modifying the bucket's Public Access Block
Description	Bucket Public Access Block protects individual buckets from leakage (e.g., object ACL set to public). An attacker can remove this protection by modifying the bucket Public Access Block.
Goal	Launch another attack
MITRE ATT&CK®	TA0005, T1562
CVSS	Medium (4.5)

IAM Access	{
	"UNIQUE": "s3:PutBucketPublicAccessBlock"
	}



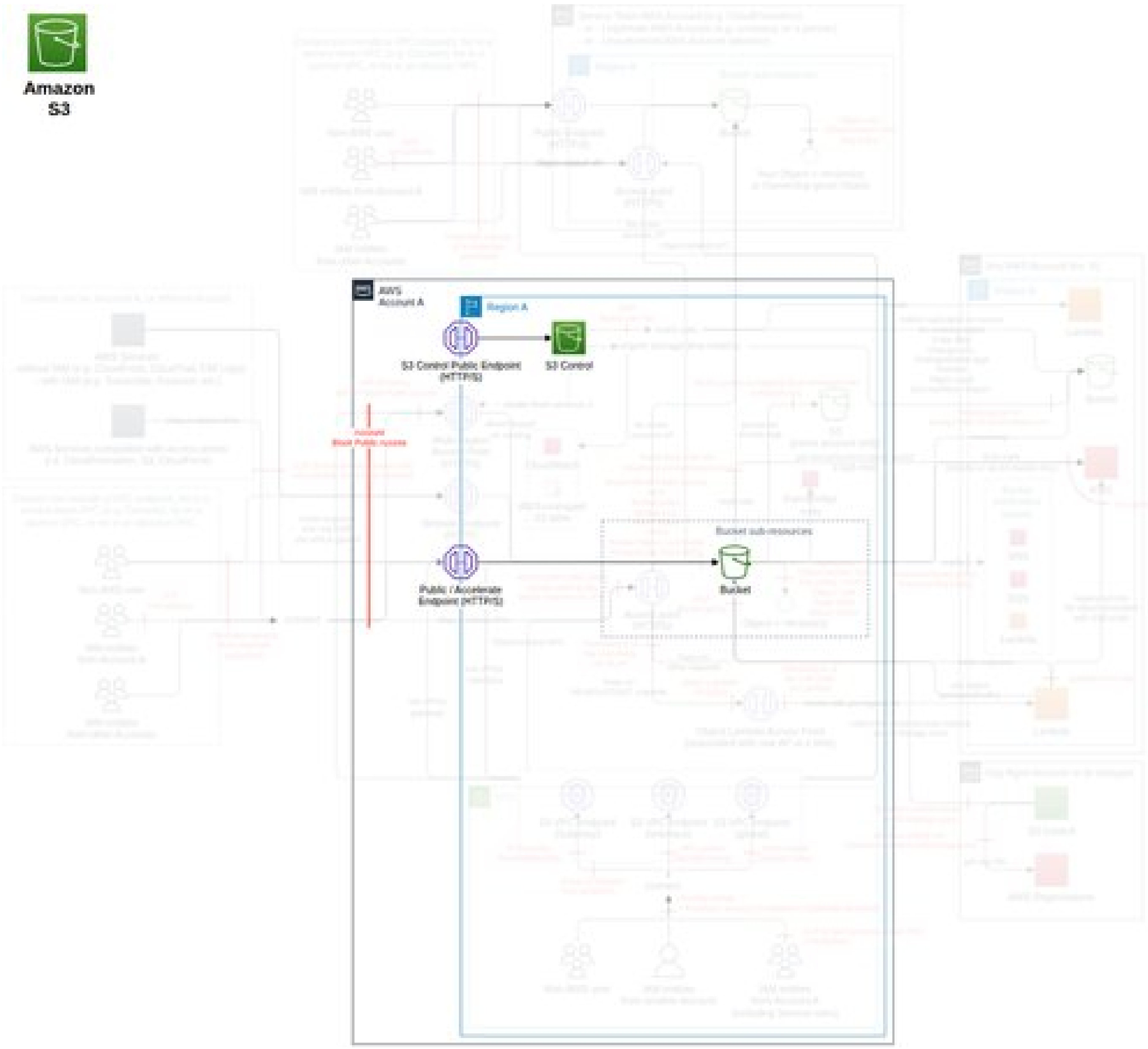
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO37 - Disabling ACLs for all buckets C152 - Ensure bucket ACLs and object ACLs are disabled on each bucket (enabled by default for all new buckets after April 2023). C153 - Prevent the creation of buckets with ACL enabled (e.g., by using an SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on StringNotEquals "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note that it does not block someone from enabling an ACL afterward via PutBucketOwnershipControls.	Very High	1	1	-
CO4 - Monitor S3 with Amazon GuardDuty and Macie C10 - Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using the GuardDuty ThreatModel. Ensure findings are investigated (e.g., using Amazon Detective).	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Public Access Block (account) *(subclass of Bucket, FC25)*

S3 Block Public Access (account) provides controls across an entire AWS account to ensure objects never have public access.

Data Flow Diagram (DFD)

Amazon S3


AWS Account A
Region A
S3 Control Public Endpoint (HTTP/S)
S3 Control
Account Block Public Access
Bucket sub-resources
Bucket
Public / Accelerate Endpoint (HTTP/S)

Actions and IAM Permissions to deny the feature

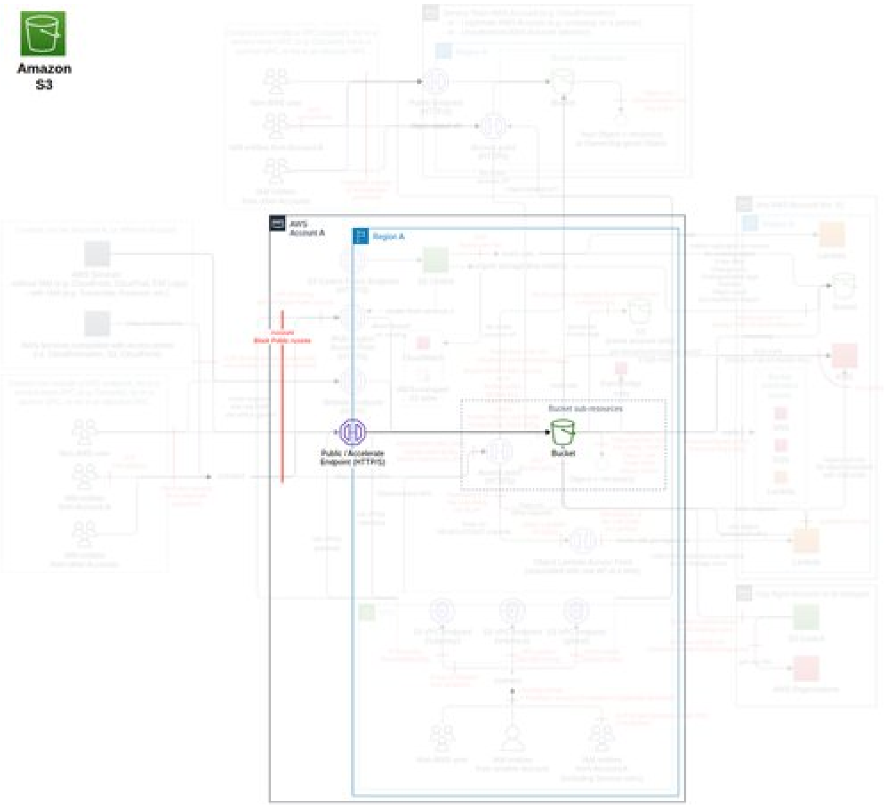
Action	IAM Permission
Creates or modifies the PublicAccessBlock configuration for an AWS account.	s3:PutAccountPublicAccessBlock

Threat List

Name	CVSS
Reduce bucket security by modifying the account's Public Access Block	Medium (4.5)

Reduce bucket security by modifying the account's Public Access Block

Threat Id	S3.T53
Name	Reduce bucket security by modifying the account's Public Access Block
Description	Account Public Access Block protects all buckets of an AWS account from leakage (e.g., object ACL set to public). An attacker can remove this protection by modifying the account's Public Access Block.
Goal	Launch another attack
MITRE ATT&CK®	TA0005, T1562
CVSS	Medium (4.5)
IAM Access	{ "UNIQUE": "s3:PutAccountPublicAccessBlock" }


Amazon S3
AWS Account A
Region A
Include Block Public Access
Public / Accelerate Endpoint (HTTPS)
Bucket sub-resources
Bucket

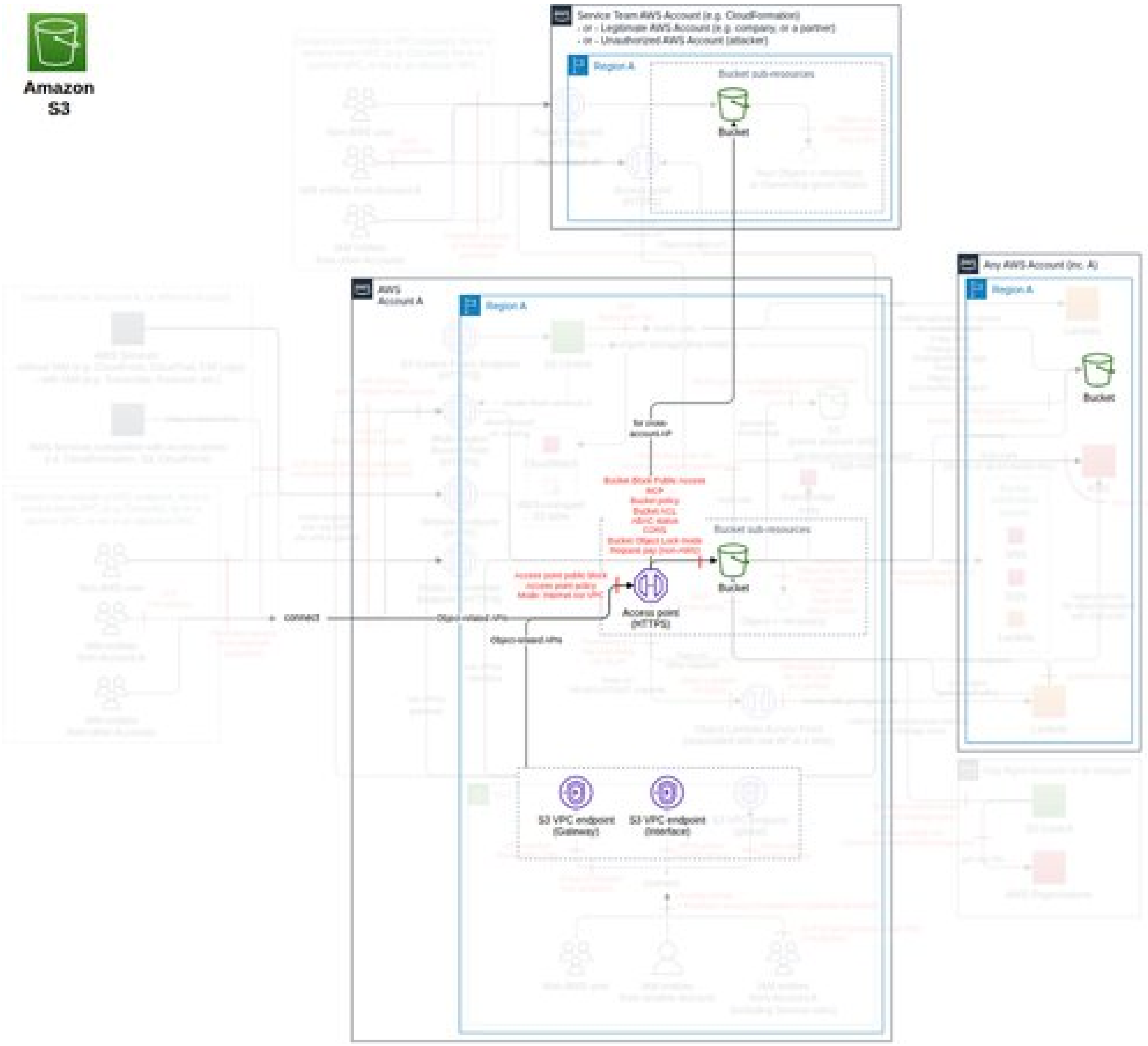
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO37 - Disabling ACLs for all buckets C152 - Ensure bucket ACLs and object ACLs are disabled on each bucket (enabled by default for all new buckets after April 2023). C153 - Prevent the creation of buckets with ACL enabled (e.g., by using an SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on StringNotEquals "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note that it does not block someone from enabling an ACL afterward via PutBucketOwnershipControls.	Very High	1	1	-
CO4 - Monitor S3 with Amazon GuardDuty and Macie C10 - Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using the GuardDuty ThreatModel. Ensure findings are investigated (e.g., using Amazon Detective).	Medium	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Access point *(subclass of Bucket, FC26)*

Access points are named network endpoints that are attached to buckets that you can use to perform S3 object operations. Only certain operations and AWS services are compatible (ref). S3 access points aren't currently compatible with Amazon CloudWatch metrics.

Data Flow Diagram (DFD)

Amazon S3



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Creates a new access point.	s3:CreateAccessPoint

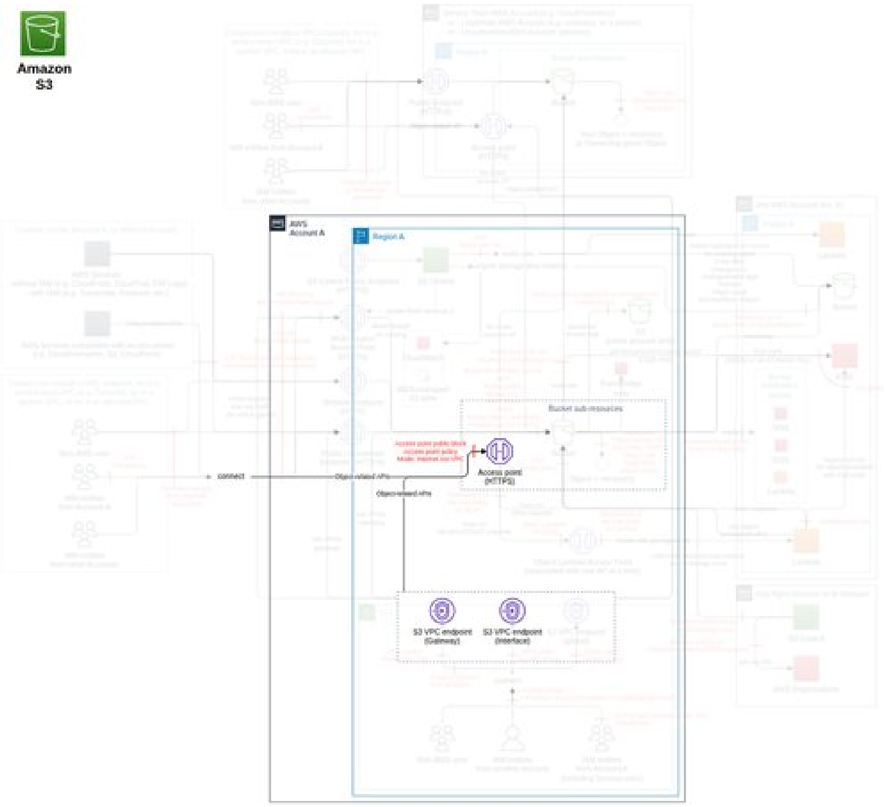
Threat List

Name	CVSS
Grant unauthorized access to a bucket by changing or deleting one of its access points' policies	Medium (6.2)
Unauthorized collection of data by swapping access points	Medium (4.6)
Create an exfiltration vector via cross-account access point	Medium (4.5)

Grant unauthorized access to a bucket by changing or deleting one of its access points' policies

Threat Id	S3.T54
Name	Grant unauthorized access to a bucket by changing or deleting one of its access points' policies
Description	Access point policies can enable access to objects owned by buckets. An attacker (or someone by negligence) can change the access point policy and make the content accessible.
Goal	Launch another attack
MITRE ATT&CK®	TA0005, T1562
CVSS	Medium (6.2)

IAM Access	{
	 "OR": ["s3:PutAccessPointPolicy", "s3:DeleteAccessPointPolicy", "s3:PutAccessPointPublicAccessBlock"]
	 }

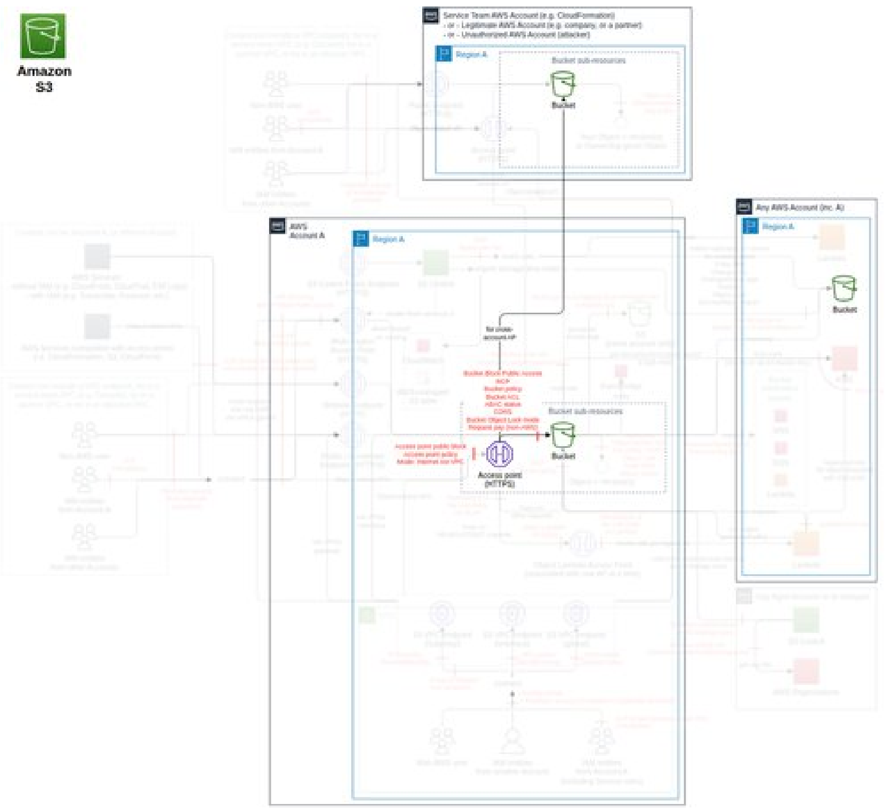


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO13 - Block direct public access C53 - Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Very High	1	-	-
CO32 - Restrict access point access to VPCs when in use C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C105 - Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy.	Very High	1	1	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Unauthorized collection of data by swapping access points

Threat Id	S3.T28
Name	Unauthorized collection of data by swapping access points
Description	Access points can be deleted and recreated with the same name, and therefore the same ARN. An attacker can delete an access point and recreate the same one on a bucket they control to collect/modify data, or make it accessible over the Internet.
Goal	Data theft
MITRE ATT&CK®	TA0009, T1056
CVSS	Medium (4.6)

IAM Access	{
	"AND": ["s3:CreateAccessPoint", "s3:DeleteAccessPoint"]
	}

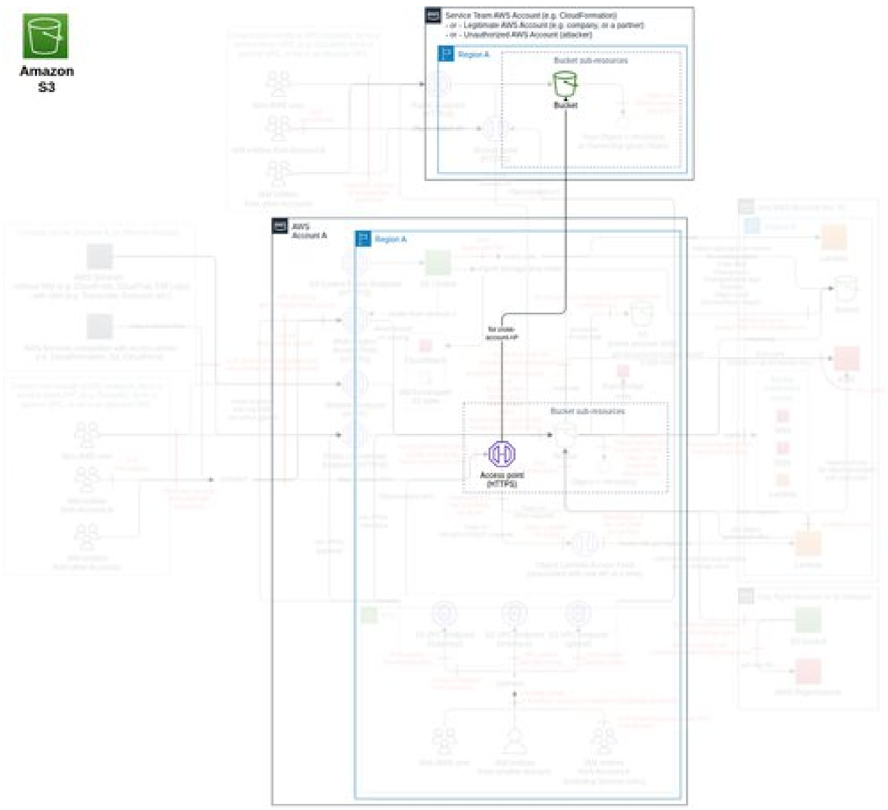


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO32 - Restrict access point access to VPCs when in use C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C106 - In bucket policies, or centrally in an RCP applied to the OU or AWS account, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn". C107 - Block the creation of non-VPC S3 access point "s3:CreateAccessPoint" (e.g., using IAM policies and SCPs with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}). C108 - Block all traffic from Internet-configured S3 access points (e.g., in their bucket policy, or centrally in an RCP applied to the OU or AWS account, using a deny statement with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}).	Very High	1	3	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Create an exfiltration vector via cross-account access point

Threat Id	S3.T60
Name	Create an exfiltration vector via cross-account access point
Description	Access points from a given AWS account can be connected to a cross-account bucket. An attacker can create an access point connected to a bucket they control to exfiltrate data.
Goal	Launch another attack
MITRE ATT&CK®	[TA0010](), [T1537]()
CVSS	[Medium (4.5)]()

IAM Access	{
	"UNIQUE": "s3:CreateAccessPoint"
	}

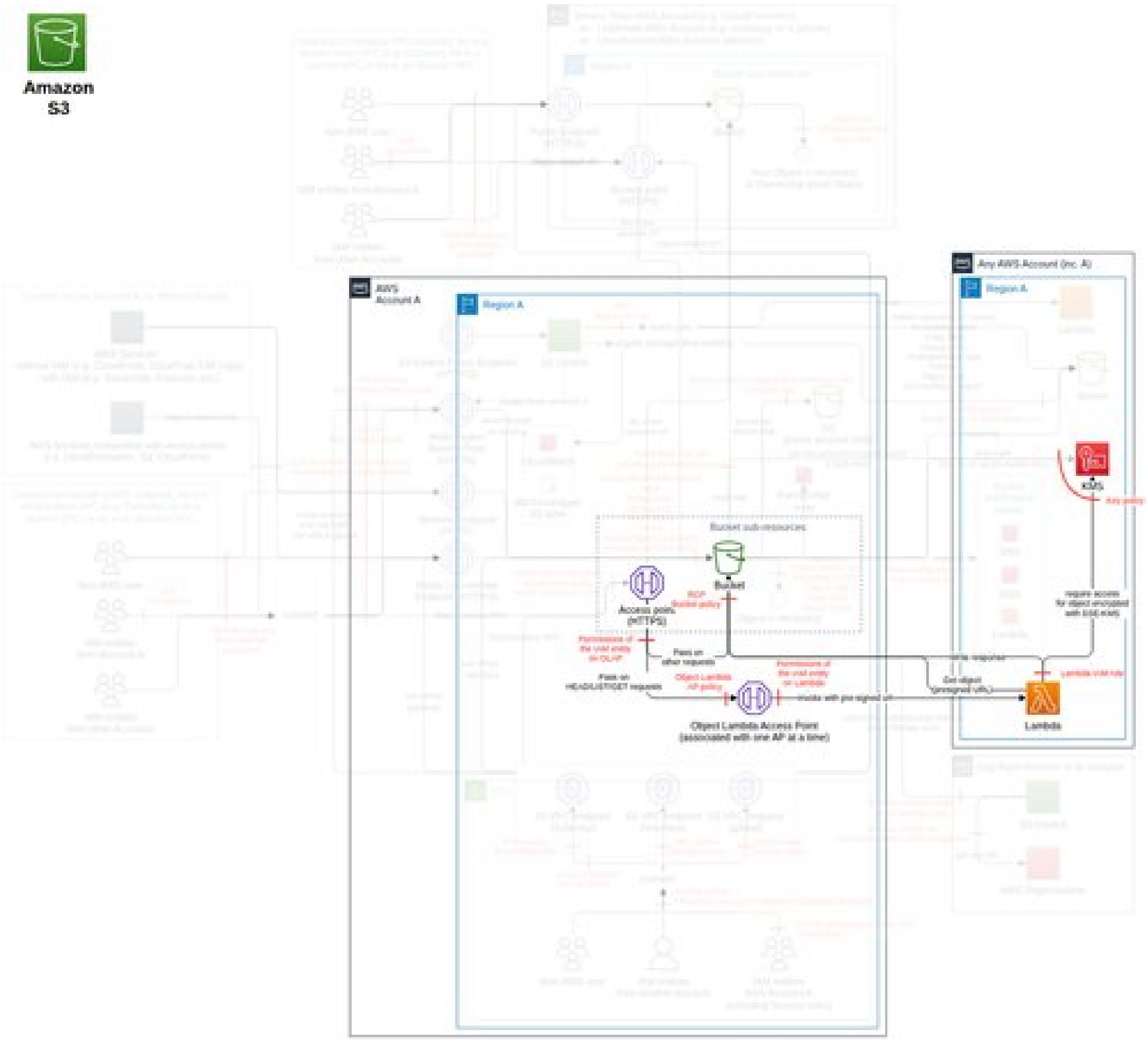

Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket
AWS Account A
Region A
for cross-account AP
Bucket sub-resources
Access point (HTTPS)

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO32 - Restrict access point access to VPCs when in use C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C106 - In bucket policies, or centrally in an RCP applied to the OU or AWS account, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn". C107 - Block the creation of non-VPC S3 access point "s3:CreateAccessPoint" (e.g., using IAM policies and SCPs with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}).	Very High	1	2	-
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account).	Very High	1	1	-
CO40 - Restrict access points to authorized AWS accounts C158 - Maintain a list of authorized S3 buckets and their AWS accounts for cross-account access points. C159 - Ensure only authorized S3 buckets and their AWS accounts for cross-account access points are configured. C160 - Monitor CreateAccessPoint to detect unauthorized buckets or AWS accounts (i.e., using CloudTrail event CreateAccessPoint and its fields "requestParameters.CreateAccessPointRequest.Bucket" and "requestParameters.CreateAccessPointRequest.BucketAccountId").	High	2	-	1
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the [IAM Access Advisor]() to review the use of non-object-related S3 actions.	Medium	1	-	-

S3 Object Lambda *(subclass of Access point, FC32)*

S3 Object Lambda enables users to apply their custom code to process the output of a standard S3 request by automatically invoking a Lambda function.

Data Flow Diagram (DFD)



Amazon S3
AWS Account A
Region A
Any AWS Account (inc. A)
Region A
KMS
Any policy
Bucket sub-resources
Bucket
RCP
Bucket policy
Access point (HTTPS)
Permissions of the IAM entity on OLAP
Pass on other requests
Pass on HEAD/LIST/GET requests
Object Lambda AP policy
Permissions of the IAM entity on Lambda
Invoke with pre-signed url
Object Lambda Access Point (associated with one AP at a time)
Get object (presigned URL)
Write response
require access for object encrypted with SSE-KMS
Lambda IAM role
Lambda

Actions and IAM Permissions to deny the feature

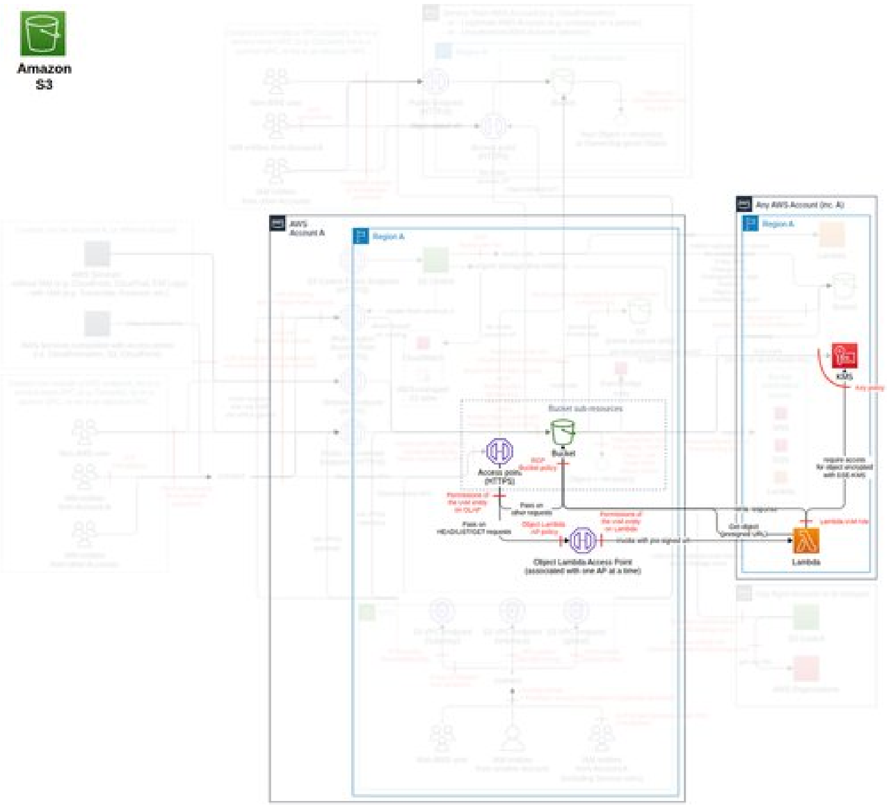
Action	IAM Permission
Creates an Object Lambda Access Point.	s3:CreateAccessPointForObjectLambda
Grants permission to retrieve objects from Amazon S3.	s3-object-lambda:GetObject
Grants permission to add an object to a bucket.	s3-object-lambda:PutObject

Threat List

Name	CVSS
Hijack a connection with an Object Lambda	Medium (5.7)

Hijack a connection with an Object Lambda

Threat Id	S3.T46
Name	Hijack a connection with an Object Lambda
Description	Object Lambda is invoked between the access point and the object. An attacker can configure a Lambda to modify, snoop, or exfiltrate data.
Goal	Data theft
MITRE ATT&CK®	TA0010, T1020
CVSS	Medium (5.7)
IAM Access	{ "OR": ["s3:CreateAccessPointForObjectLambda", "s3:PutAccessPointConfigurationForObjectLambda"] }

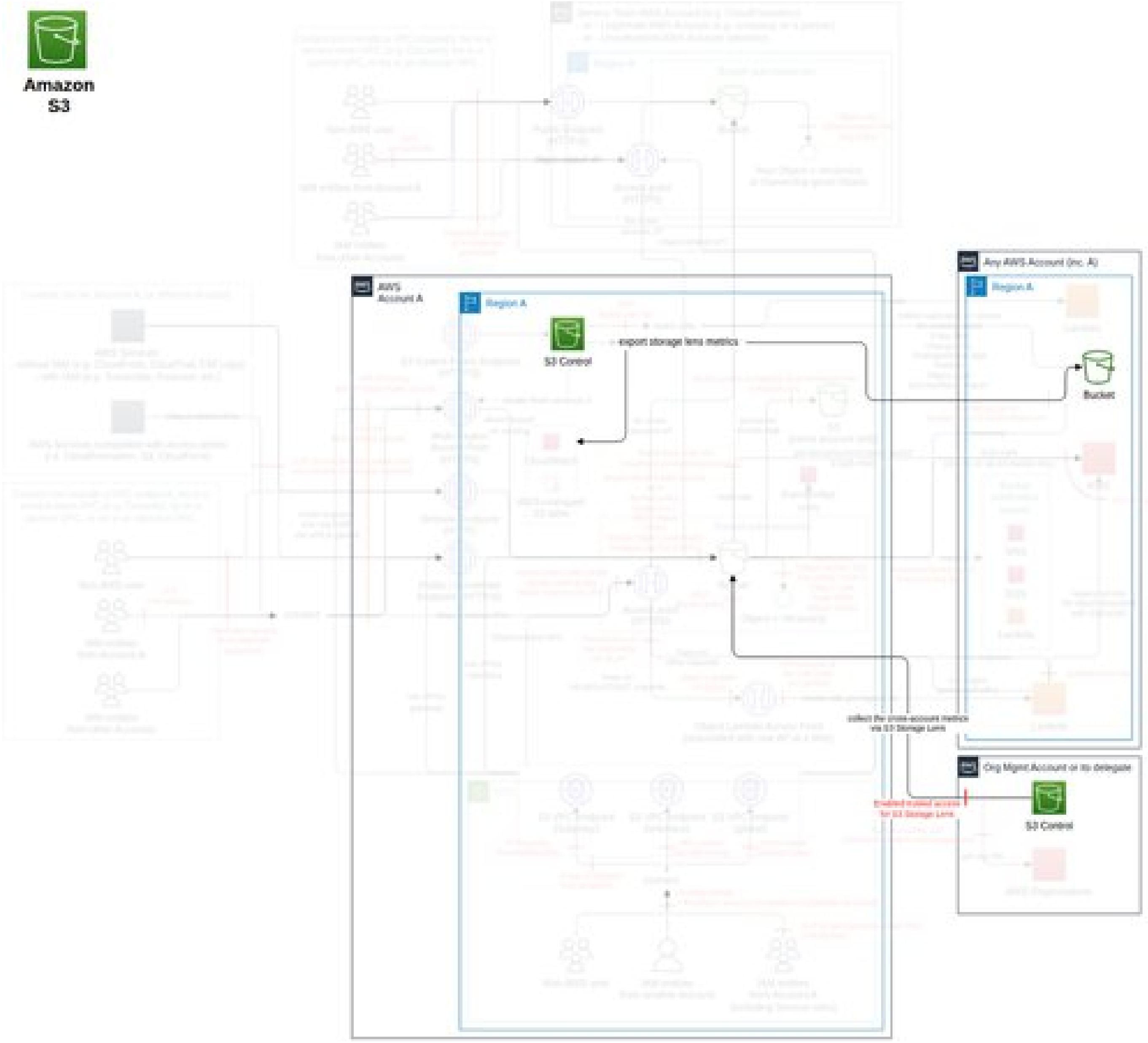

Amazon S3
AWS Account A
Region A
Any AWS Account (inc. A)
Region A
Bucket sub-resources
Bucket
Access point (HTTPS)
SCP Bucket policy
Permissions of the user entity on OLAP
Pass on other requests
Pass on HEAD/LIST/GET requests
Object Lambda AP policy
Permissions of the user entity on Lambda
Invoke with pre-signed url
Object Lambda Access Point (associated with one AP at a time)
Write response
Get object (presigned URL)
Lambda
KMS
Key policy
require access for object encrypted with SSE-KMS

<table>
<tr><th rowspan="2">Control Objectives</th><th rowspan="2">Priority</th><th colspan="3"># of associated Controls</th></tr>
<tr><th>Directive</th><th>Preventative</th><th>Detective</th></tr>
<tr><td><b>CO34 - Enforce only authorized Object Lambda Access Point and associated access</b>
C125 - Maintain a list of authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload.
C126 - Ensure only authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload are created.
C128 - Ensure Lambda functions configured on Object Lambda Access Point are secured using Lambda ThreatModel.
C129 - Maintain a list of cross-account access on each Object Lambda Access Point.
C130 - Ensure only authorized cross-account IAM entities are allowed in the Object Lambda Access Point policy.
C132 - Ensure CloudWatch is enabled for all Object Lambda Access Points.</td><td>Very High</td><td>6</td><td>-</td><td>-</td></tr>
<tr><td><b>CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks</b>
C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.
C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.</td><td>Medium</td><td>2</td><td>-</td><td>-</td></tr>
</table>

S3 Storage Lens *(subclass of Bucket, FC31)*

S3 Storage Lens provides a single view of object storage use and activity across your entire S3 storage.

Data Flow Diagram (DFD)


Amazon S3
AWS Account A
Region A
S3 Control
export storage lens metrics
Any AWS Account (inc. A)
Region A
Bucket
collect the cross-account metrics via S3 Storage Lens
Enabled trusted access for S3 Storage Lens
Org Mgmt Account or its delegate
S3 Control

Actions and IAM Permissions to deny the feature

Action	IAM Permission
Puts an Amazon S3 Storage Lens configuration.	s3:PutStorageLensConfiguration

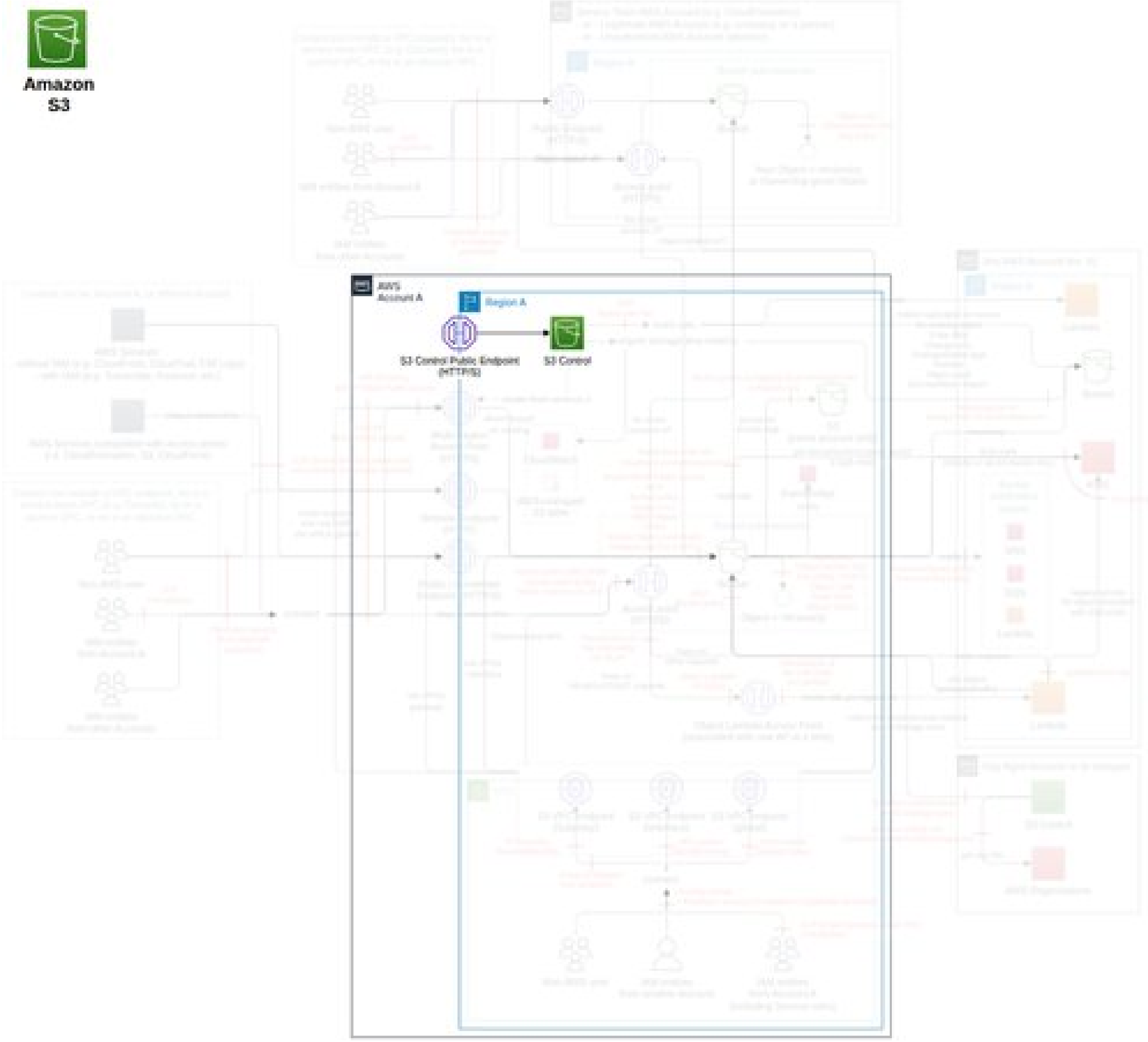
Threat List

Name	CVSS
None	None

Tagging (for Storage Lens group only) *(subclass of S3 Storage Lens, FC34)*

When you configure your Storage Lens group, you can optionally add AWS resource tags to the group.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Add tags to the specified resource.	s3:TagResource

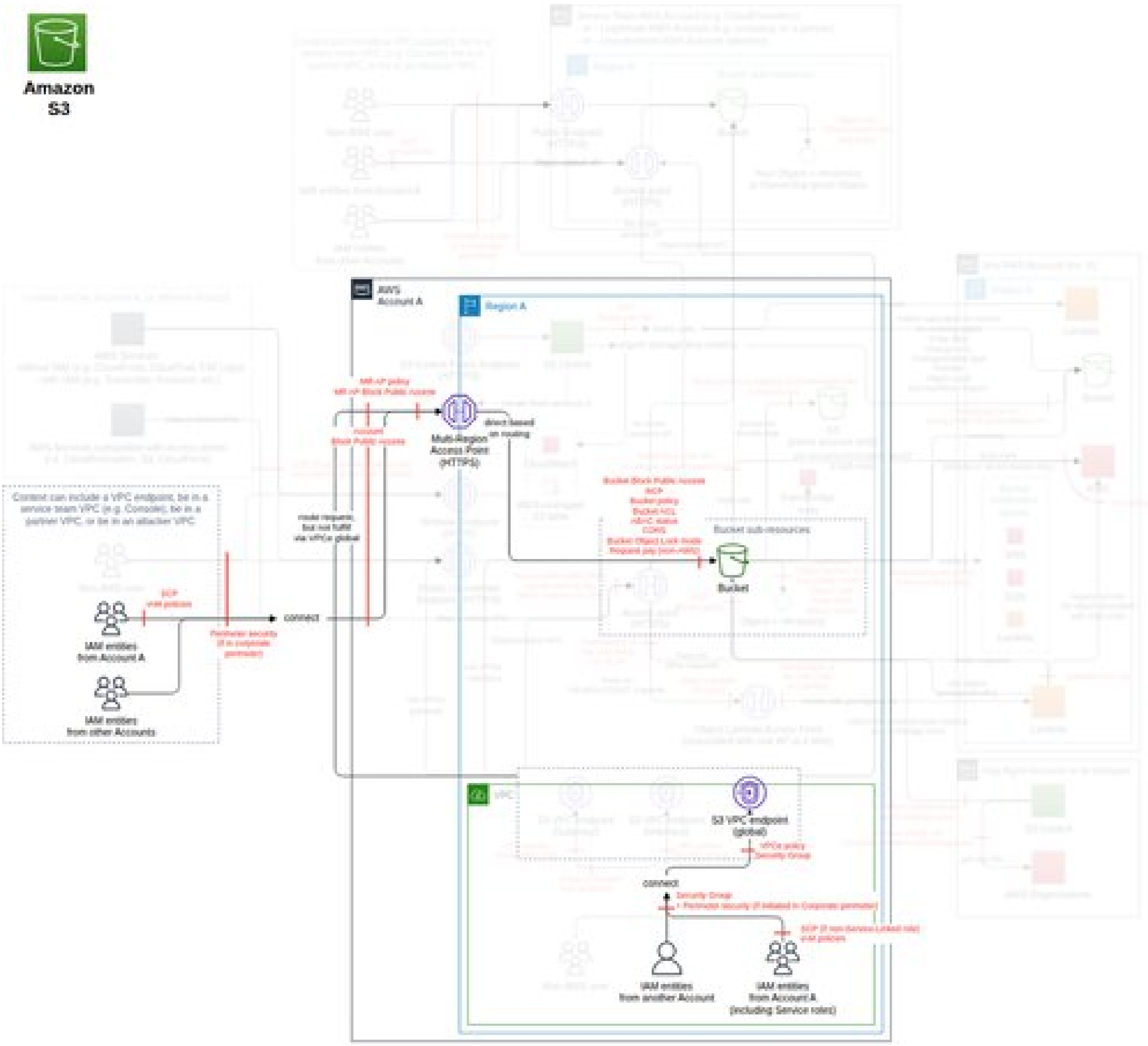
Threat List

Name	CVSS
None	None

Multi-Region Access Points *(subclass of Bucket, FC33)*

S3 Multi-Region Access Points provide a single global endpoint to access a dataset that spans multiple S3 buckets in different AWS Regions or in different AWS accounts.

Data Flow Diagram (DFD)


Amazon S3
AWS Account A
Region A
MR-AP policy
MR-AP Block Public Access
Account Block Public Access
Multi-Region Access Point (HTTPS)
direct based on routing
route requests but not fulfill via VPCe global
Bucket Block Public Access
ACP
Bucket policy
Bucket ACL
VPC-C status
CORS
Bucket Object Lock mode
Request pay (non-HAS)
Bucket sub-resources
Bucket
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
SCP
IAM policies
IAM entities from Account A
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
connect
VPC
S3 VPC endpoint (global)
VPCe policy
Security Group
connect
Security Group
+ Perimeter security (if initiated in Corporate perimeter)
SCP (if non Service Linked role)
IAM policies
IAM entities from another Account
IAM entities from Account A (including Service roles)

Actions and IAM Permissions to deny the feature

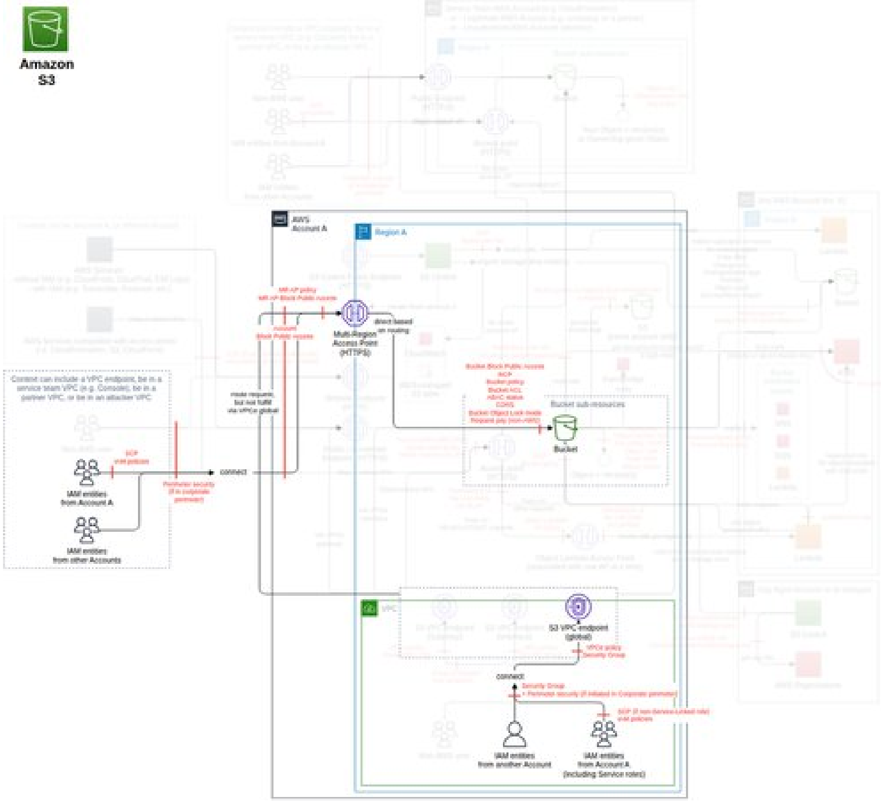
Action	IAM Permission
Creates a Multi-Region Access Point and associates it with the specified buckets.	s3:CreateMultiRegionAccessPoint
Submit a route configuration update for a Multi-Region Access Point.	s3:SubmitMultiRegionAccessPointRoutes

Threat List

Name	CVSS
Grant unauthorized access to buckets by changing the Multi-Region Access Point policy	Medium (6.2)
Gain unauthorized access to buckets trusting all Multi-Region Access Points	Medium (5.7)

Grant unauthorized access to buckets by changing the Multi-Region Access Point policy

Threat Id	S3.T55
Name	Grant unauthorized access to buckets by changing the Multi-Region Access Point policy
Description	Multi-Region Access Point policy can enable access to objects owned by the bucket. An attacker (or someone by negligence) can change the Multi-Region Access Point policy and make the content accessible.
Goal	Launch another attack
MITRE ATT&CK®	TA0005, T1562
CVSS	Medium (6.2)
IAM Access	{ "UNIQUE": "s3:PutMultiRegionAccessPointPolicy" }

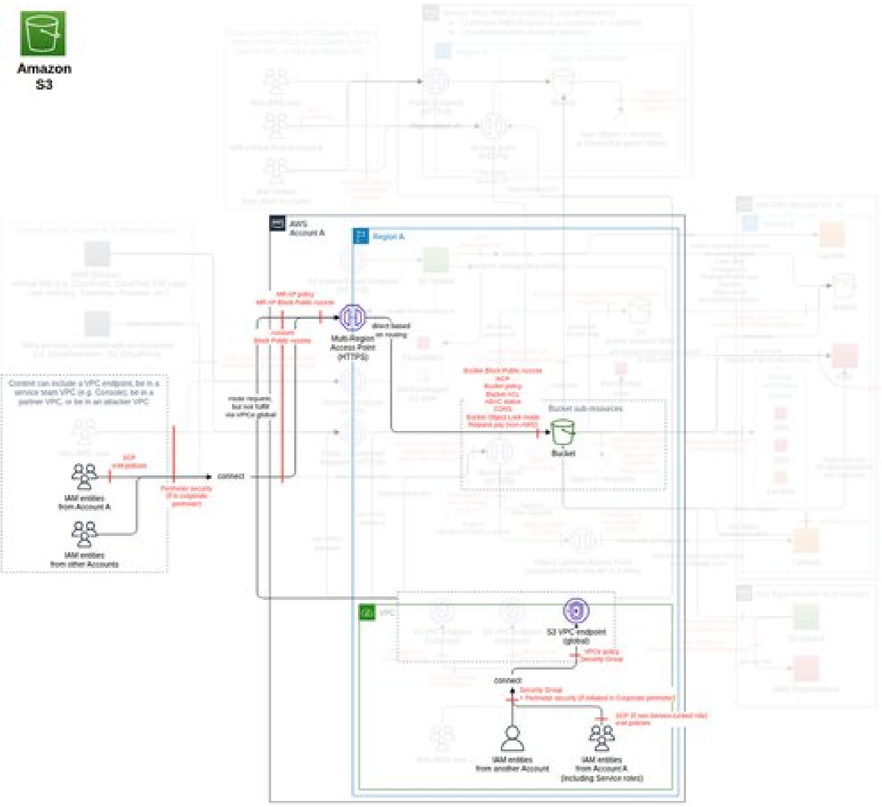

Amazon S3
AWS Account A
Region A
MR-AP policy
MR-AP Block Public Access
Account Block Public Access
Multi-Region Access Point (HTTPS)
direct based on routing
route request, but not fulfill via VPCe global
Bucket Block Public Access
SCP
Bucket policy
Bucket ACL
KMS key
CORS
Bucket Object Lock mode
Request pay (non-HIPS)
Bucket sub-resources
Bucket
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
SCP
IAM policies
IAM entities from Account A
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
connect
VPC
S3 VPC endpoint (global)
VPCe policy
Security Group
connect
Security Group
+ Perimeter security (if initiated in Corporate perimeter)
SCP (if non Service-Linked role)
IAM policies
IAM entities from another Account
IAM entities from Account A (including Service roles)

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO13 - Block direct public access C53 - Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Very High	1	-	-
CO32 - Restrict access point access to VPCs when in use C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C105 - Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy. C106 - In bucket policies, or centrally in an RCP applied to the OU or AWS account, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn".	Very High	1	2	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Gain unauthorized access to buckets trusting all Multi-Region Access Points

Threat Id	S3.T56
Name	Gain unauthorized access to buckets trusting all Multi-Region Access Points
Description	Buckets used by Multi-Region Access Points can be configured to delegate their access to any MRAP using the condition "s3:DataAccessPointAccount". An attacker can create an MRAP, add any misconfigured bucket, and gain access to it.
Goal	Launch another attack
MITRE ATT&CK®	TA0009, T1530
CVSS	Medium (5.7)

IAM Access	{
	"AND": ["s3:CreateMultiRegionAccessPoint", "s3:PutMultiRegionAccessPointPolicy"]
	}


Amazon S3
AWS Account A
Region A
MR-AP policy
MR-AP Block Public Access
Account Block Public Access
Multi-Region Access Point (HTTPS)
direct based on routing
Content can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
SCP
IAM policies
Perimeter security (if in corporate perimeter)
connect
IAM entities from Account A
IAM entities from other Accounts
route requests, but not fulfill via VPCe global
Bucket Block Public Access
SCP
Bucket policy
Bucket ACL
ACL
CORS
Bucket Object Lock mode
Request pay (non-HMAC)
Bucket sub-resources
Bucket
VPC
S3 VPC endpoint (global)
VPCe policy
Security Group
connect
Security Group
+ Perimeter security (if initiated in Corporate perimeter)
SCP (if non-Service-Linked role)
IAM policies
IAM entities from another Account
IAM entities from Account A (including Service roles)

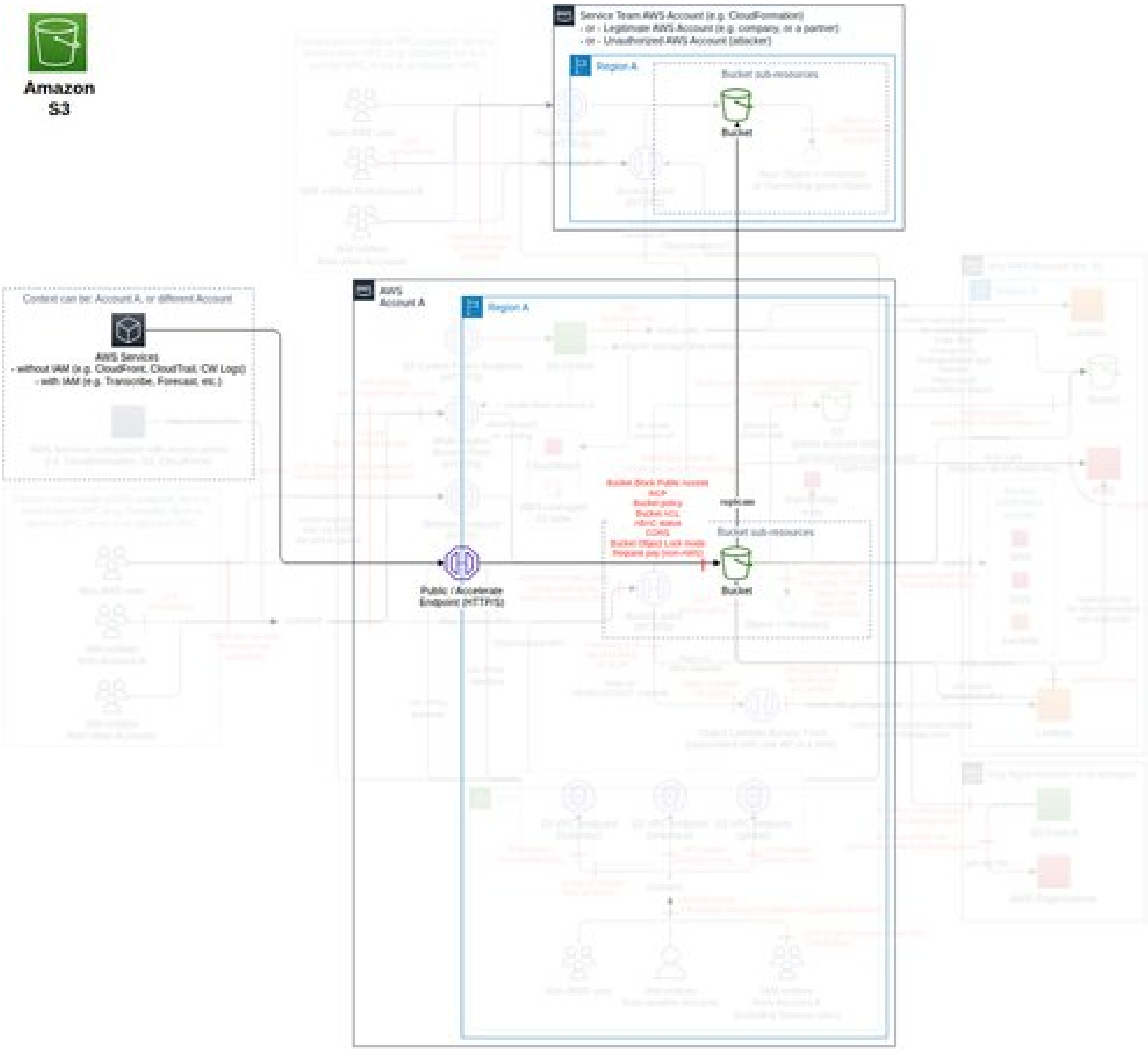
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO32 - Restrict access point access to VPCs when in use C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C106 - In bucket policies, or centrally in an RCP applied to the OU or AWS account, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn".	Very High	1	1	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

FIS actions *(subclass of Bucket, FC35)*

In AWS Fault Injection Service, the action aws:s3:bucket-pause-replication can pause S3 replication from the experiment AWS Region to the destination AWS Region for the targeted buckets. Review FIS ThreatModel for more information.

Data Flow Diagram (DFD)

Amazon S3



Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket
Content can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
AWS
Account A
Region A
Bucket Block Public Access
ACP
Bucket policy
Bucket ACL
ABAC status
CORS
Bucket Object Lock mode
Request pay (non-AWS)
replicate
Bucket sub-resources
Public / Accelerate
Endpoint (HTTPS)
Bucket

Actions and IAM Permissions to deny the feature

Action	IAM Permission
Pause S3 replication from target source buckets to destination buckets (used by AWS FIS only).	s3:PauseReplication

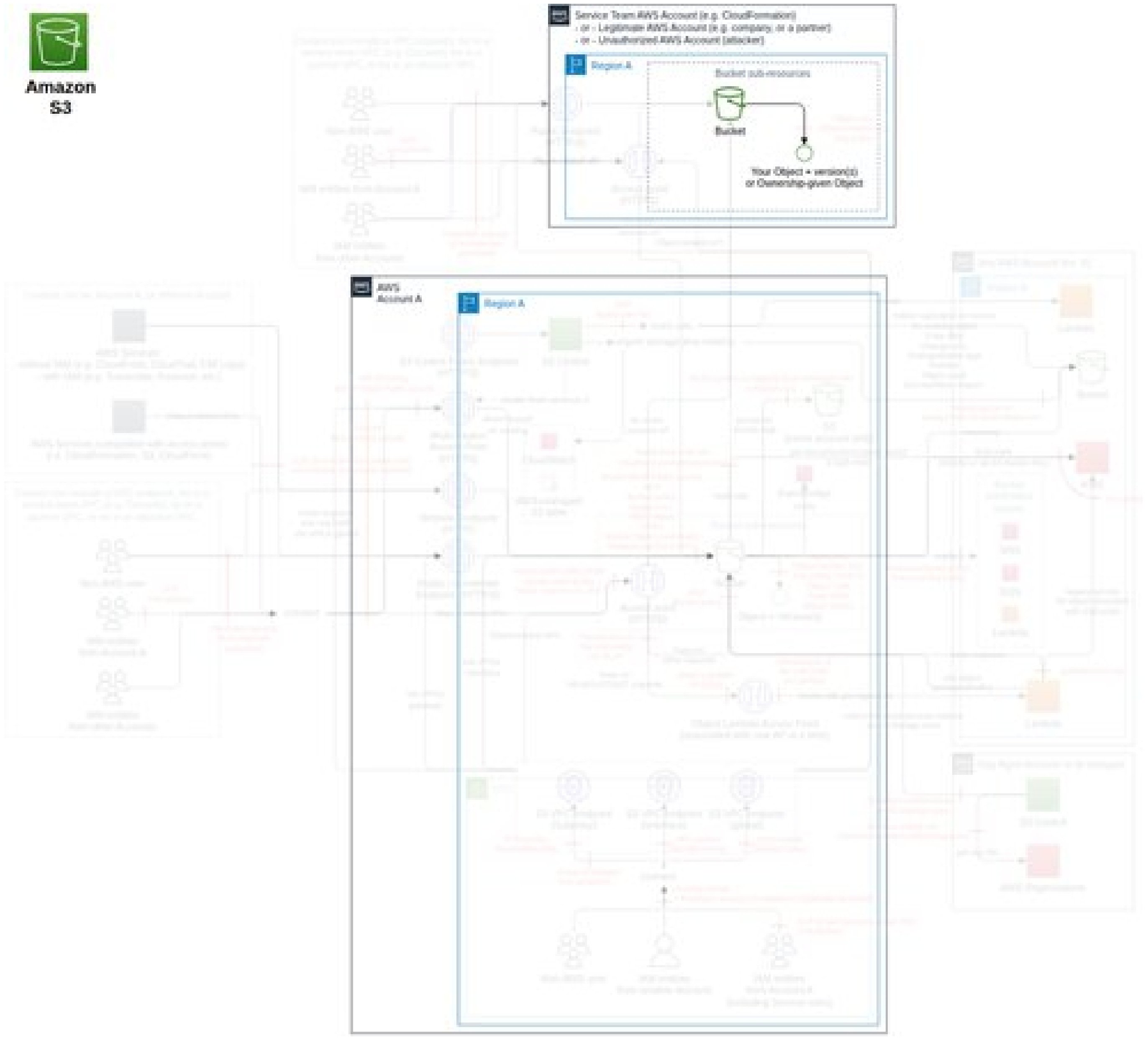
Threat List

Name	CVSS
None	None

S3 Object Ownership *(subclass of Bucket, used by Object operations, FC30)*

Enables bucket owners to automatically assume ownership of objects uploaded to their buckets by other AWS accounts. When an object is put with an ACL of "bucket-owner-full-control", the object will be fully owned by the target bucket owner. If the ACL is added later, ownership is retained by the object owner (ref).

Data Flow Diagram (DFD)


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket
Your Object + version(s)
or Ownership-given Object
AWS
Account A
Region A

Actions and IAM Permissions to deny the feature

Action	IAM Permission
Creates or modifies OwnershipControls for an Amazon S3 bucket.	s3:PutBucketOwnershipControls

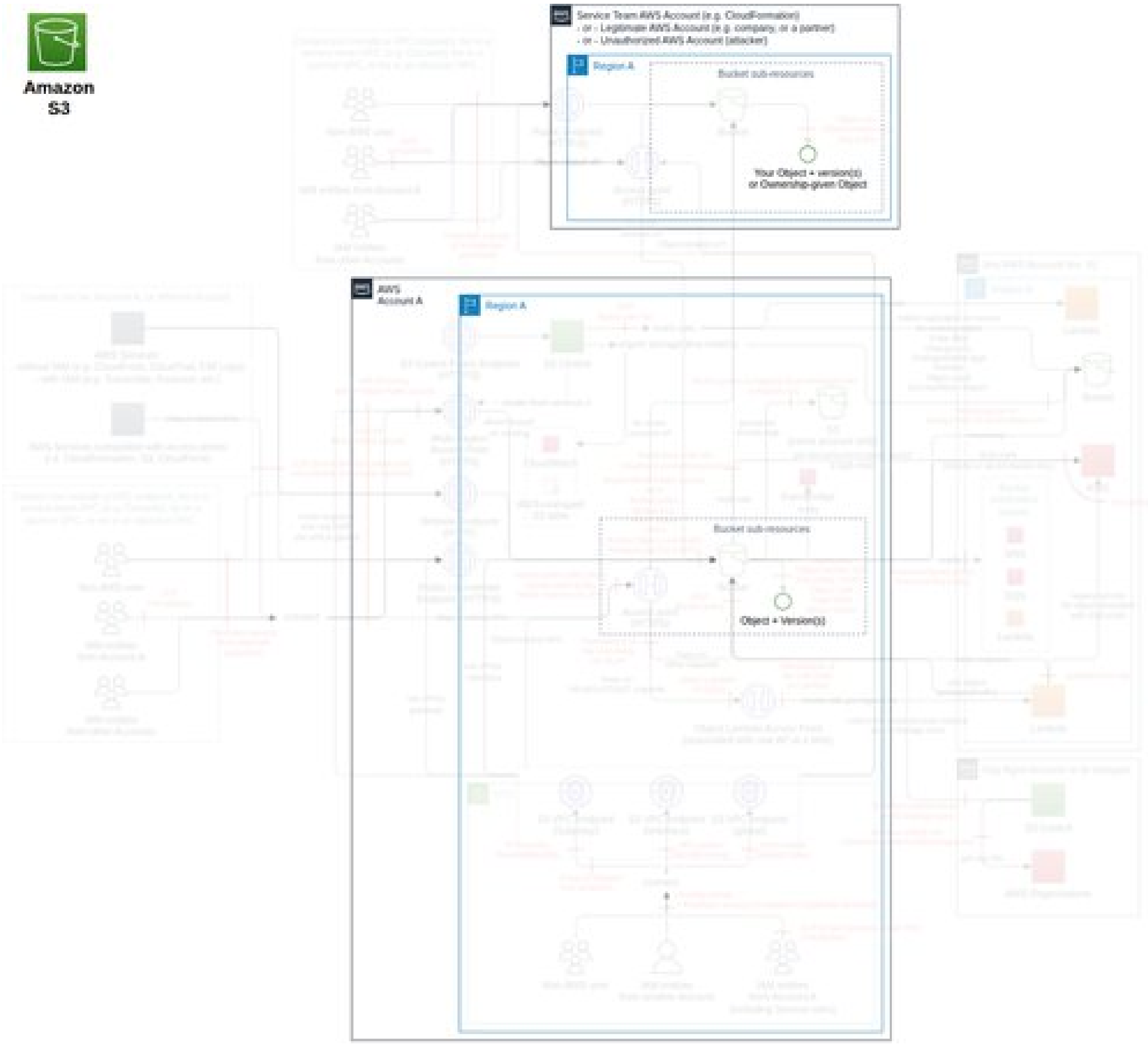
Threat List

Name	CVSS
None	None

Object tagging *(subclass of Object operations, used by Bucket, FC2)*

You can tag objects (ref).

Data Flow Diagram (DFD)


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Your Object + version(s)
or Ownership-given Object
AWS
Account A
Region A
Bucket sub-resources
Object + Version(s)

Actions and IAM Permissions to deny the feature

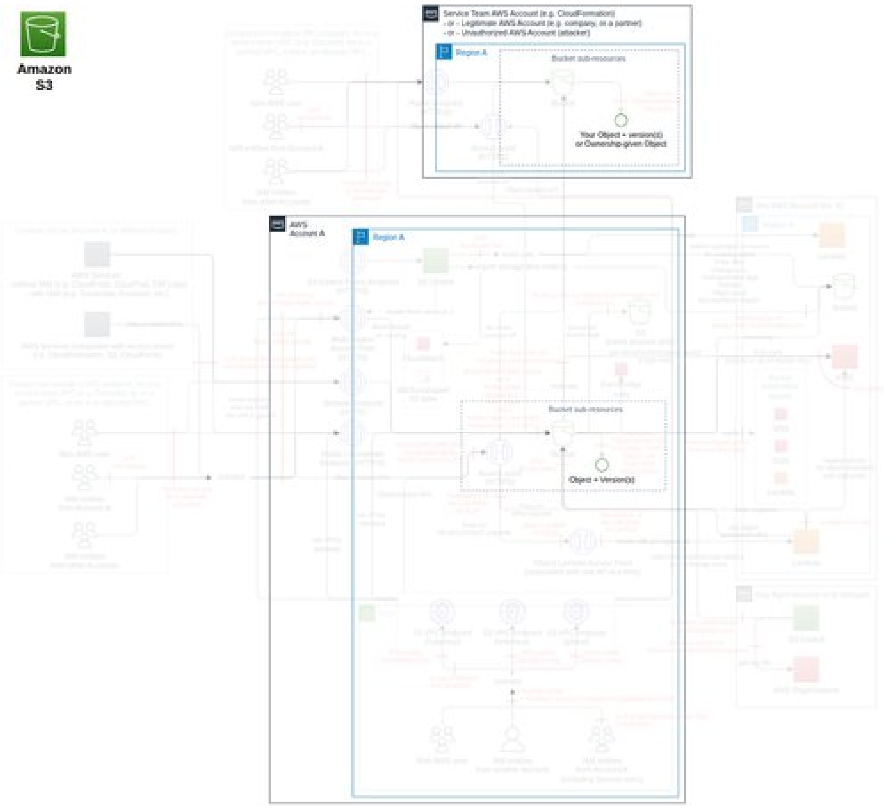
Action	IAM Permission
Adds a set of tags to an existing object.	s3:PutObjectTagging

Threat List

Name	CVSS
Gain access by modifying or deleting important object tags	Medium (4.4)

Gain access by modifying or deleting important object tags

Threat Id	S3.T33
Name	Gain access by modifying or deleting important object tags
Description	Tags can be used for various reasons, including security classification or access management (via ABAC). An attacker can change the tagging of an object to another value, enabling them to execute another attack.
Goal	Launch another attack
MITRE ATT&CK®	TA0004, T1548
CVSS	Medium (4.4)
IAM Access	{ "OR": ["s3:PutObjectTagging", "s3:DeleteObjectTagging"] }


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Your Object + version(s) or Ownership-given Object
AWS Account A
Region A
Bucket sub-resources
Object + Version(s)

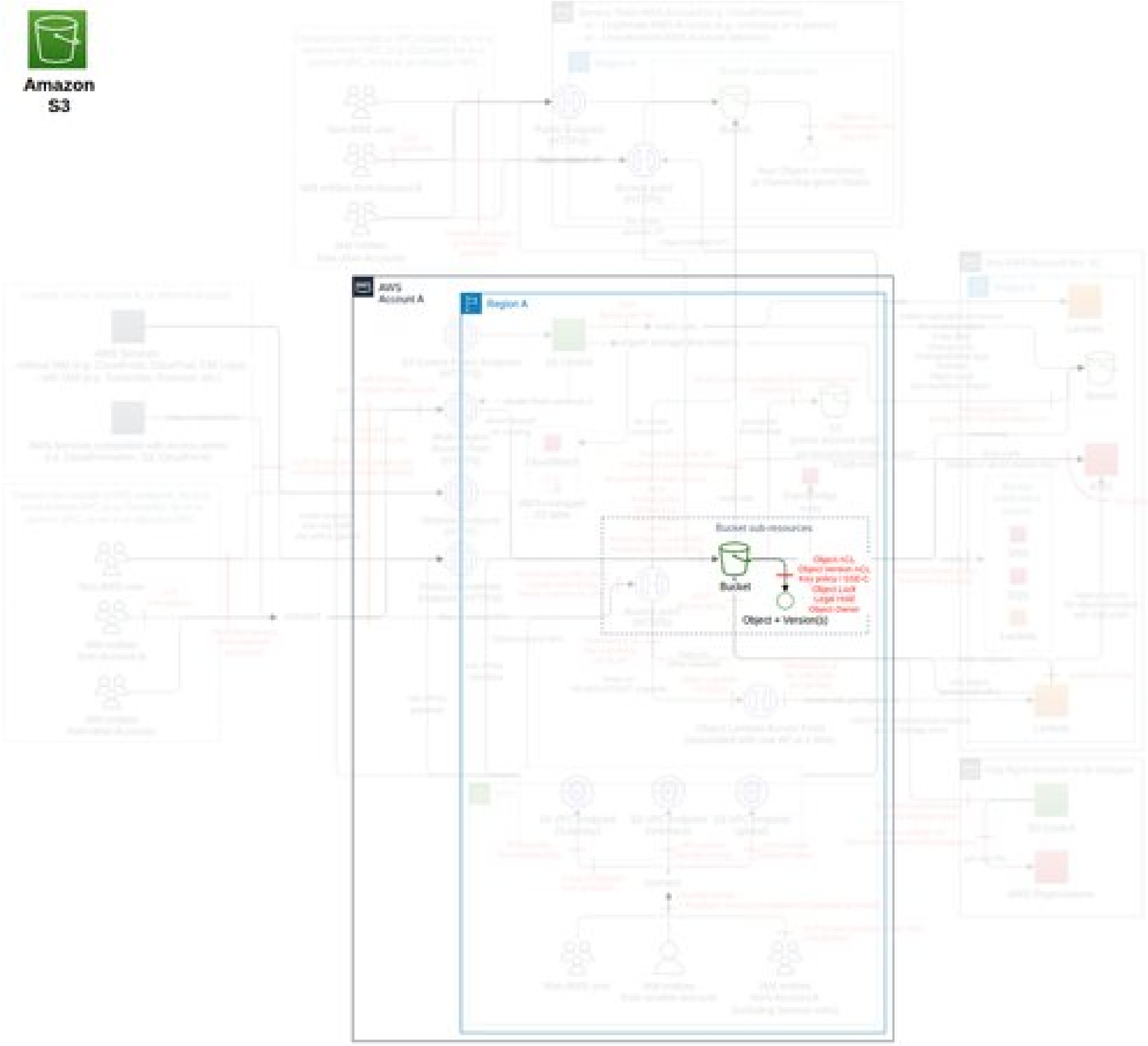
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Very High	1	-	-
CO29 - Limit access from only authorized VPCs C98 - For each S3 bucket, maintain a list of VPCs authorized to access it. C99 - Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).	Very High	1	1	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account. C170 - Integrate and limit the access to general purpose buckets via tags in the IAM Operating Model (including enforcing tagging of buckets and objects at creation using AWS:ResourceTag and s3:BucketTag).	High	3	-	-

Attribute-based access control (ABAC) for general purpose buckets *(subclass of Object tagging/Bucket, FC36)*

ABAC for general purpose buckets is an Amazon S3 feature that allows access decisions to be made based on matching attributes such as tags between IAM principals and S3 buckets.

Data Flow Diagram (DFD)

Amazon S3



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Set ABAC configuration for a general purpose bucket.	s3:PutBucketAbac

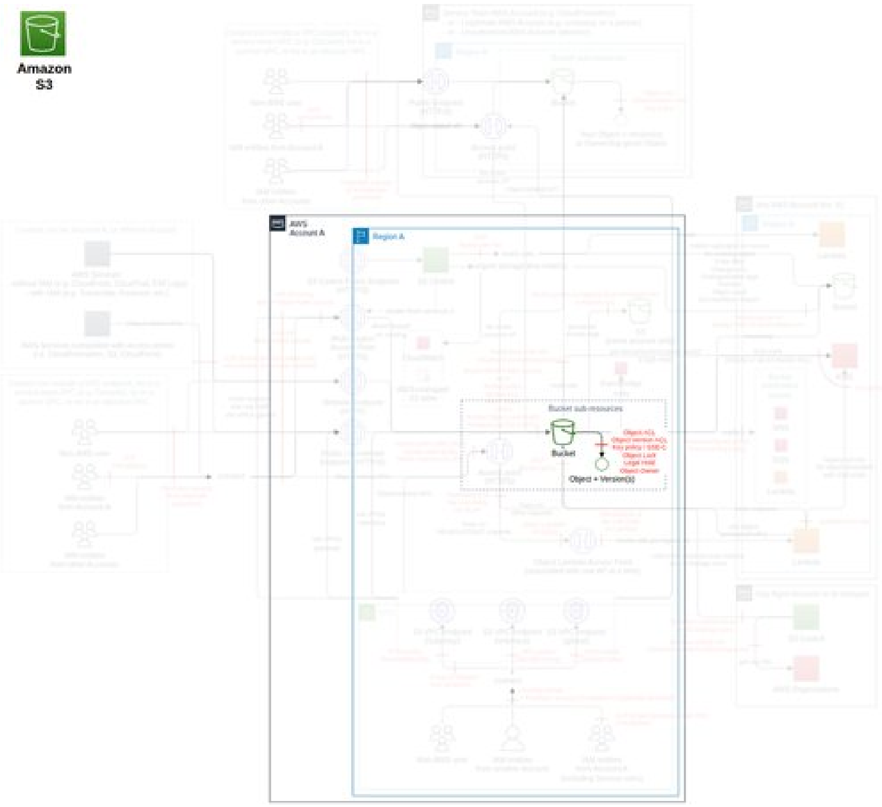
Threat List

Name	CVSS
Privilege escalation by enabling ABAC on general purpose buckets	Medium (5.9)

Privilege escalation by enabling ABAC on general purpose buckets

Threat Id	S3.T64
Name	Privilege escalation by enabling ABAC on general purpose buckets
Description	ABAC allows access to be managed by tags on general purpose buckets (disabled by default). An attacker can enable ABAC on a general purpose bucket that was previously not managed through it, allowing for some policy combinations to escalate privileges on the bucket and its objects.
Goal	Launch another attack
MITRE ATT&CK®	[TA0004](TA0004)
CVSS	Medium (5.9)

IAM Access	`{`
	`    "AND": ["s3:PutBucketAbac", {`
	`            "OPTIONAL": "s3:GetBucketAbac"`
	`        }]`
	`}`

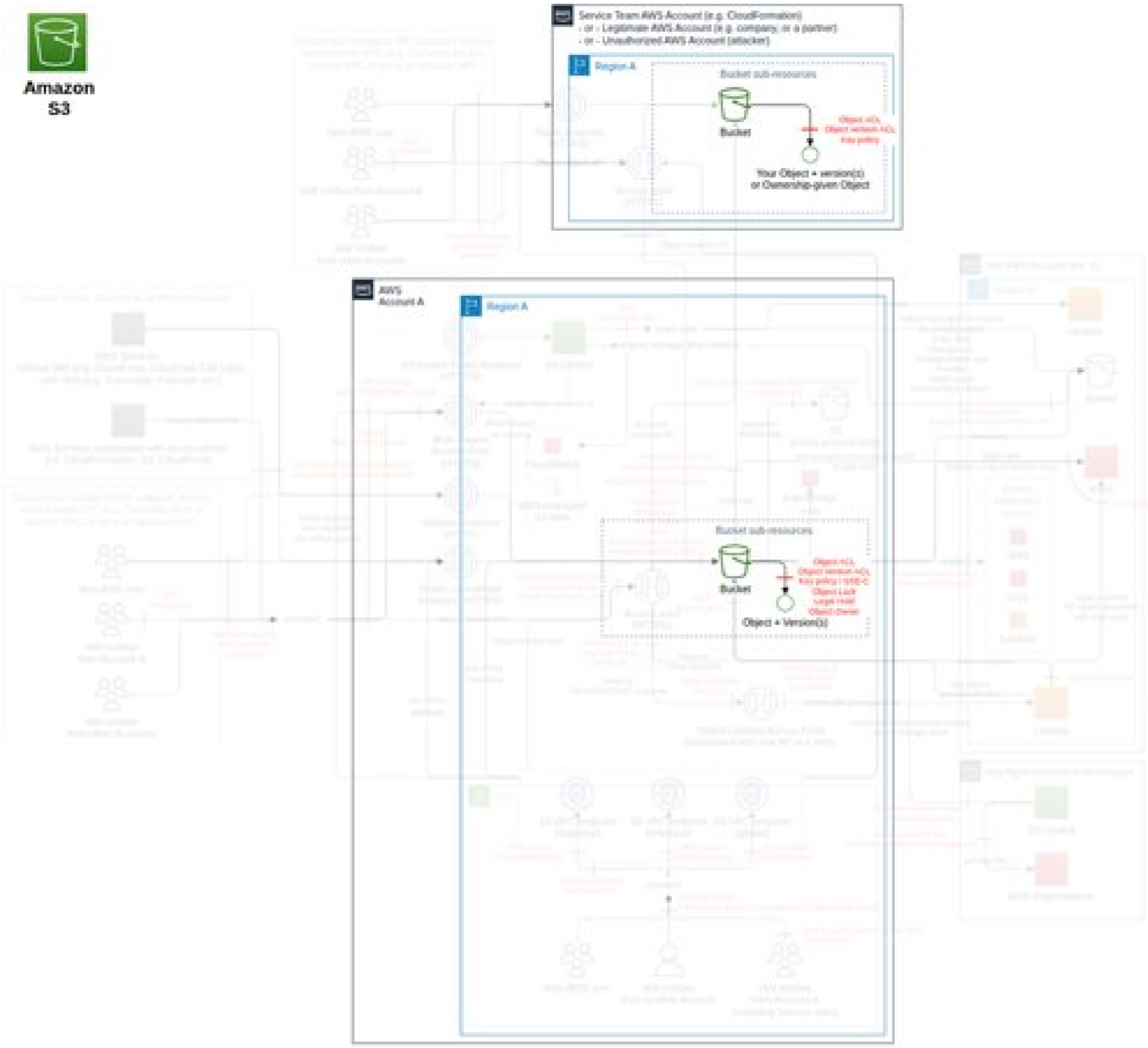


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO15 - Identify and ensure the protection of all internal buckets hosting your objects C58 - Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd. C171 - Ensure only the authorized ABAC configuration for each general purpose bucket is configured.	Very High	2	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Object versioning *(subclass of Object operations, used by Bucket, FC3)*

You can version your objects (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Retrieves an object version from Amazon S3.	s3:GetObjectVersion

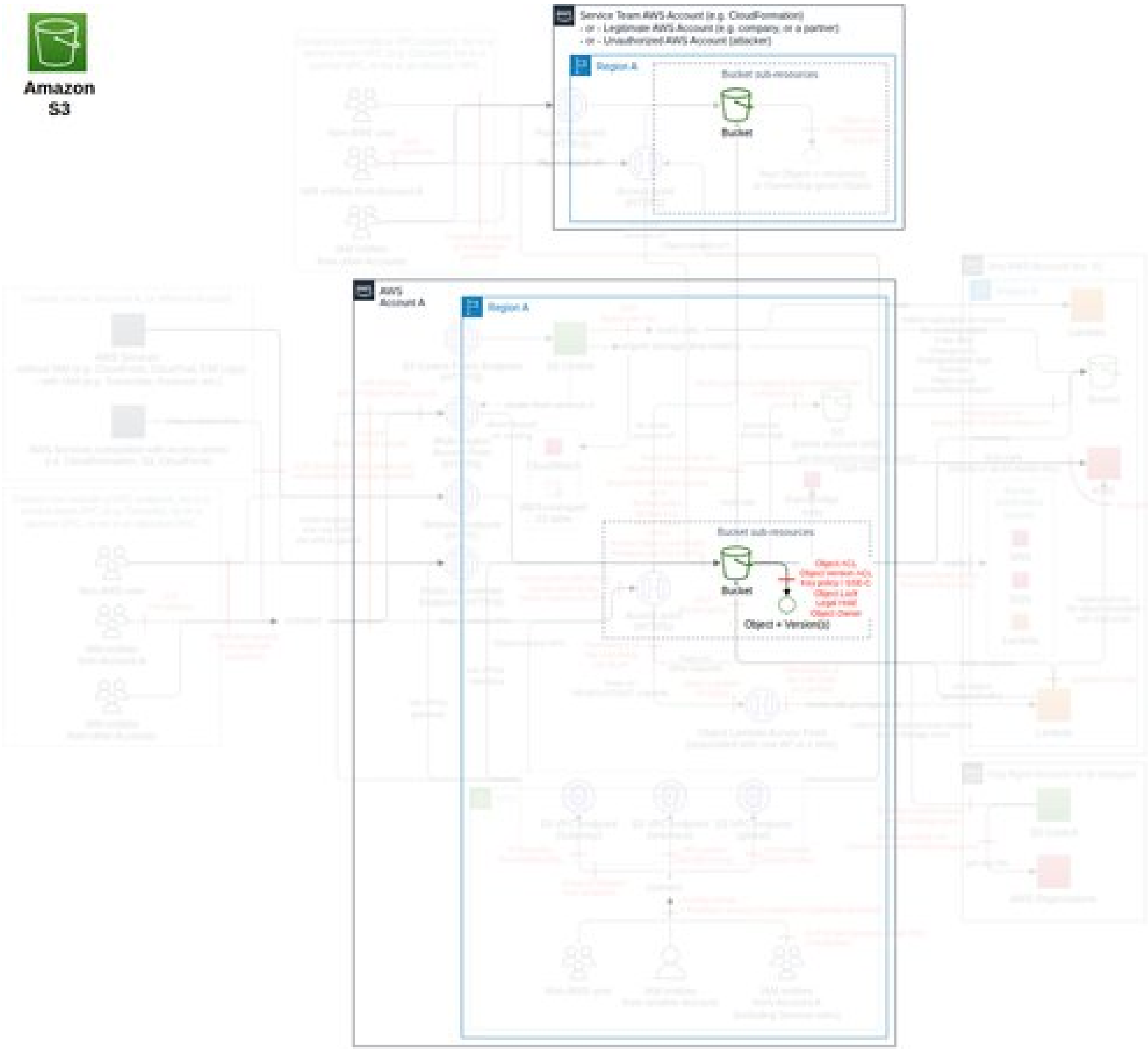
Threat List

Name	CVSS
None	None

Bucket versioning *(subclass of Object versioning/Bucket, FC6)*

Versioning is a means of keeping multiple variants of an object in the same bucket. You can use versioning to preserve, retrieve, and restore every version of every object stored in your Amazon S3 bucket. With versioning, you can easily recover from unintended user actions and application failures ([ref](#)).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Sets the versioning state of an existing bucket.	s3:PutBucketVersioning

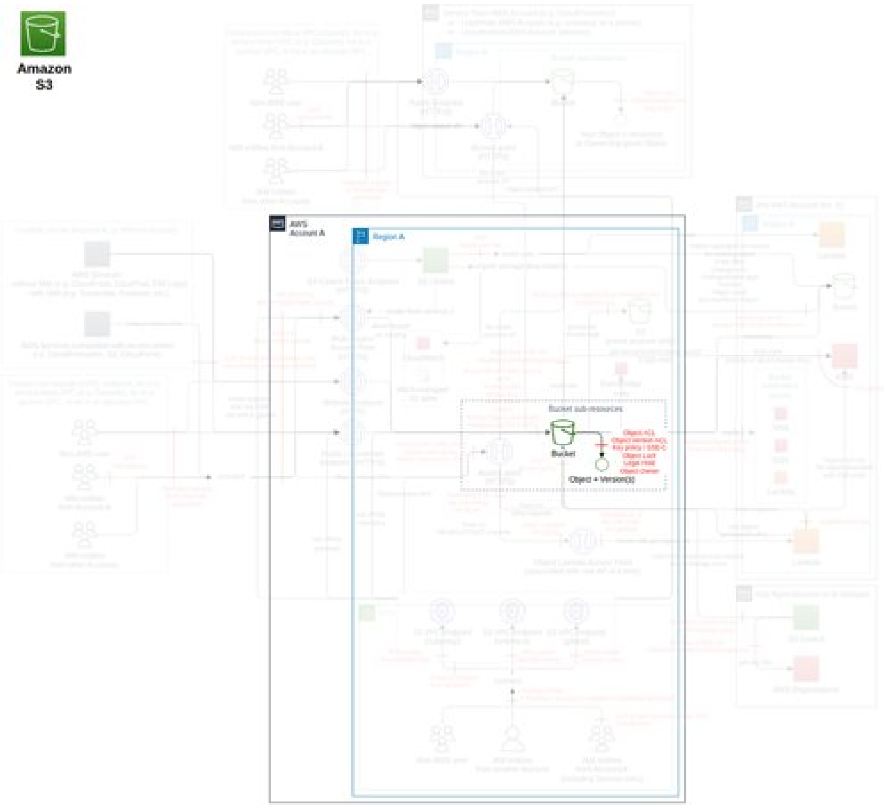
Threat List

Name	CVSS
Affect data protection by removing versioning	[Low (2.4)](#)

Affect data protection by removing versioning

Threat Id	S3.T48
Name	Affect data protection by removing versioning
Description	Versioning can be used as the first level of integrity protection. An attacker can suspend versioning to affect the data protection of a bucket.
Goal	Launch another attack
MITRE ATT&CK®	TA0040, T1490
CVSS	Low (2.4)

IAM Access	{
	"UNIQUE": "s3:PutBucketVersioning"
	}

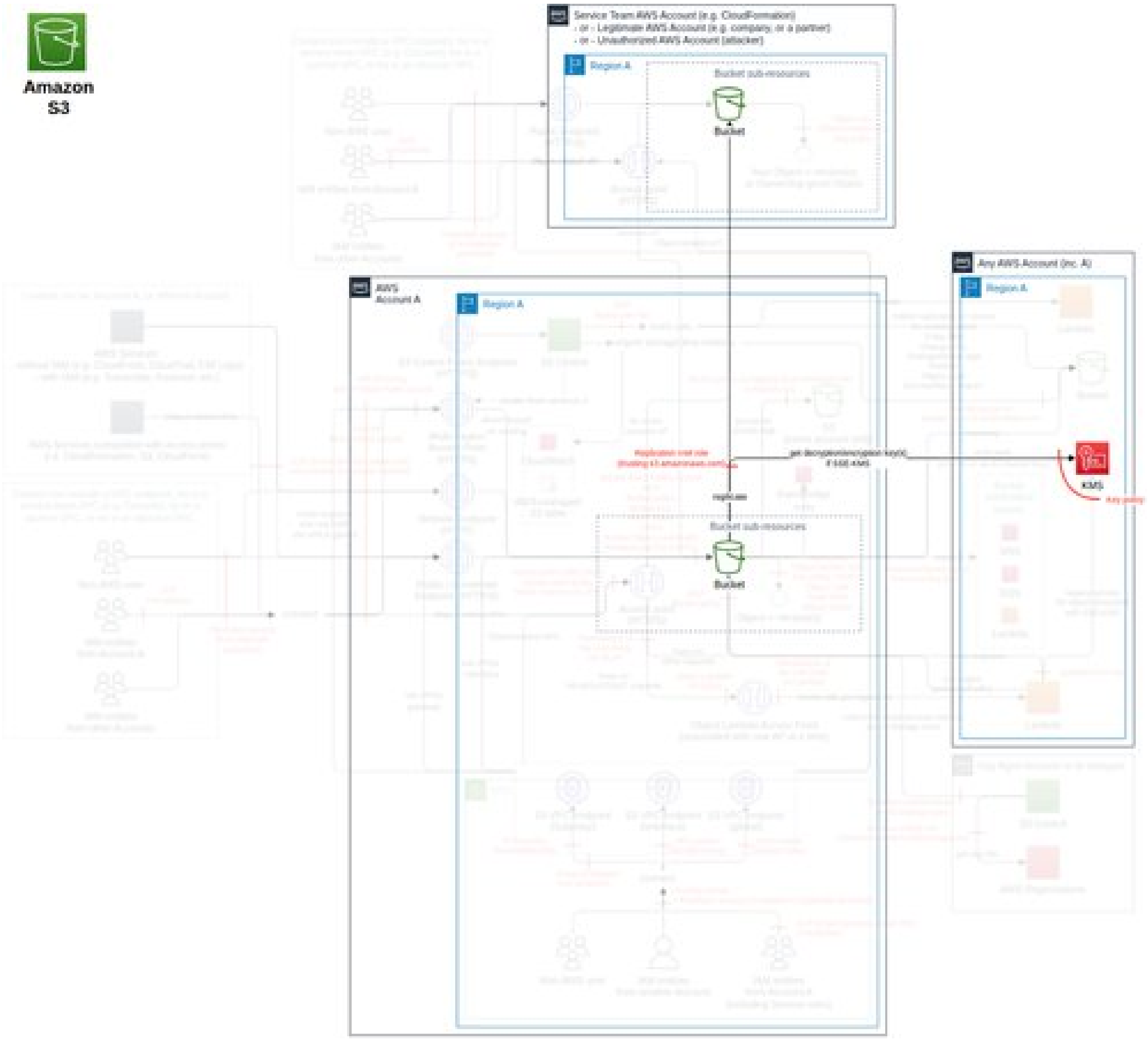


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

Replication *(subclass of Bucket versioning, FC15)*

Replication enables automatic and asynchronous copying of objects from one bucket to another. It can be cross-region or within the same region. Buckets configured for replication can be in the same AWS account or in different accounts. It is usually used for backing up S3 data, data centralization, or for multi-region applications.

Data Flow Diagram (DFD)


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket
AWS Account A
Region A
Any AWS Account (inc. A)
Region A
Replication IAM role
(trusting s3.amazonaws.com)
get decrypt/encryption key(s)
if SSE-KMS
KMS
Key policy
replicate
Bucket sub-resources
Bucket

Actions and IAM Permissions to deny the feature

Action	IAM Permission
Creates a new replication configuration (or replaces an existing one, if present).	s3:PutReplicationConfiguration

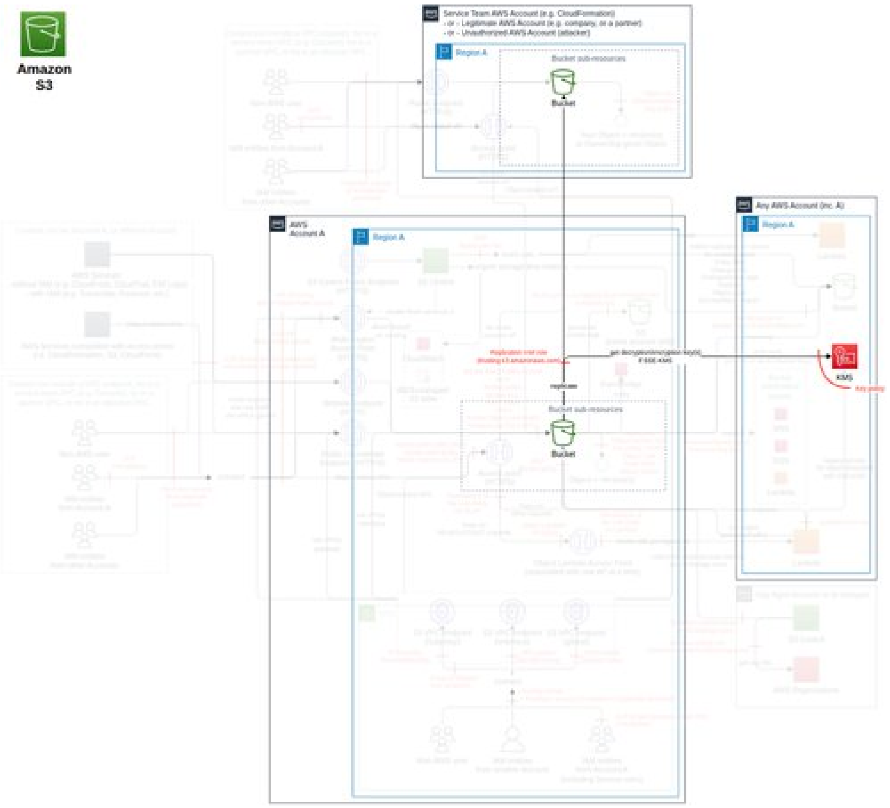
Threat List

Name	CVSS
Unauthorized access to data or loss of control of SSE-C encrypted data via bucket replication	Medium (4.5)
Affect data protection by removing replication	Low (2.4)

Unauthorized access to data or loss of control of SSE-C encrypted data via bucket replication

Threat Id	S3.T2
Name	Unauthorized access to data or loss of control of SSE-C encrypted data via bucket replication
Description	Replication allows you to replicate objects and their metadata and change ownership. The configuration only focuses on new objects (old objects replication requires S3 Batch Replication). An attacker can configure replication on a versioned bucket to replicate objects (or their metadata or tagging) in a bucket they control to exfiltrate data. As objects encrypted via SSE-C are also replicated without additional configuration or access requirements, an attacker can then decrypt them in their own bucket if they have the SSE-C key.
Goal	Data theft
MITRE ATT&CK®	[TA0010](), [T1048]()
CVSS	[Medium (4.5)]()

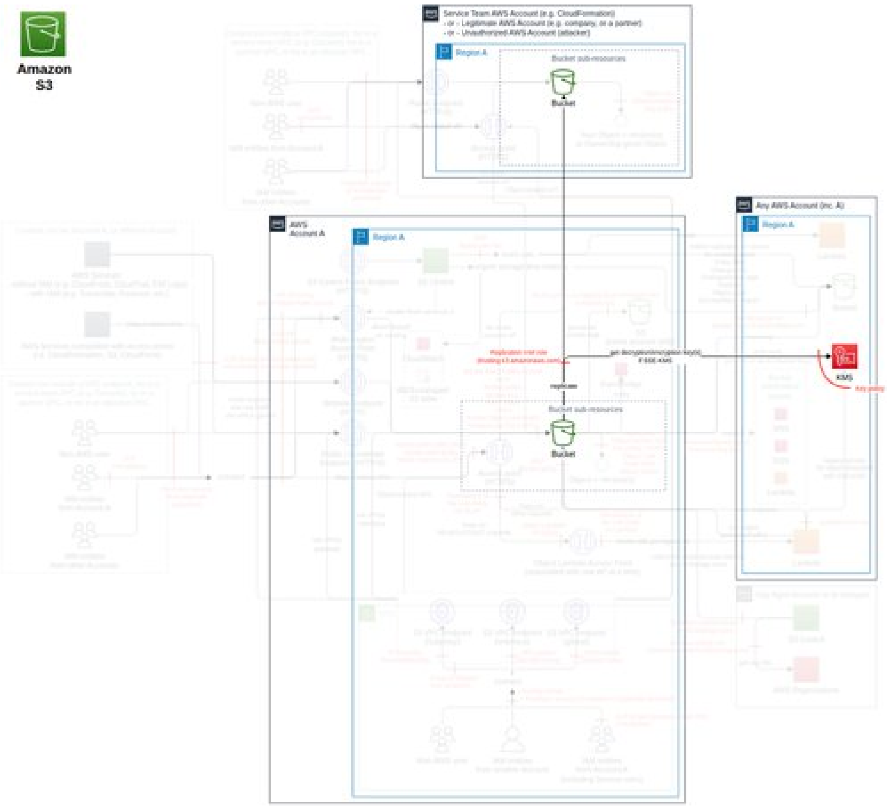
IAM Access	{
	"AND": ["s3:PutReplicationConfiguration", "iam:PassRole"]
	}


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket
AWS Account A
Region A
Replication IAM role
(trusting s3.amazonaws.com)
get decrypt/encrypt/gen key(s)
if SSE-KMS
replicate
Bucket sub-resources
Bucket
Any AWS Account (inc. A)
Region A
KMS
Key policy

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO9 - Block requests with KMS keys from unauthorized AWS accounts C31 - Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account. C32 - Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account). C33 - Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Very High	1	1	1
CO25 - Restrict bucket replication C86 - Maintain a list of authorized buckets to have replication enabled, their target bucket, and replication type (i.e., encryption type, ownership, RTC, etc.) ([ref]()). C134 - Ensure only authorized buckets have replication enabled and are configured correctly. C89 - Maintain a list of IAM roles used for replication, ideally dedicated (e.g., using change management process on infrastructure-as-code). C138 - Ensure only authorized IAM roles are attached for each replication, ideally dedicated. C90 - Limit S3 access to the source and destination buckets and the replication rights of each authorized IAM role configured for replication. C91 - Limit access to authorized IAM roles used for replication, using the IAM ThreatModel (e.g., trust policy, and "iam:PassRole"). C116 - Monitor abnormal behavior on replication CloudWatch metrics (i.e., "BytesPendingReplication", "OperationsPendingReplication", and "OperationsFailedReplication").	High	6	-	1
CO4 - Monitor S3 with Amazon GuardDuty and Macie C118 - Enable [S3 policy findings in Amazon Macie]() in all AWS accounts in all Regions, and protect them using the Macie ThreatModel.	High	1	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the [IAM Access Advisor]() to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Affect data protection by removing replication

Threat Id	S3.T49
Name	Affect data protection by removing replication
Description	Replication can be used as a level of integrity protection and backup. An attacker can remove replication to affect data protection.
Goal	Launch another attack
MITRE ATT&CK®	TA0040, T1490
CVSS	Low (2.4)
IAM Access	{ "UNIQUE": "s3:PutReplicationConfiguration" }



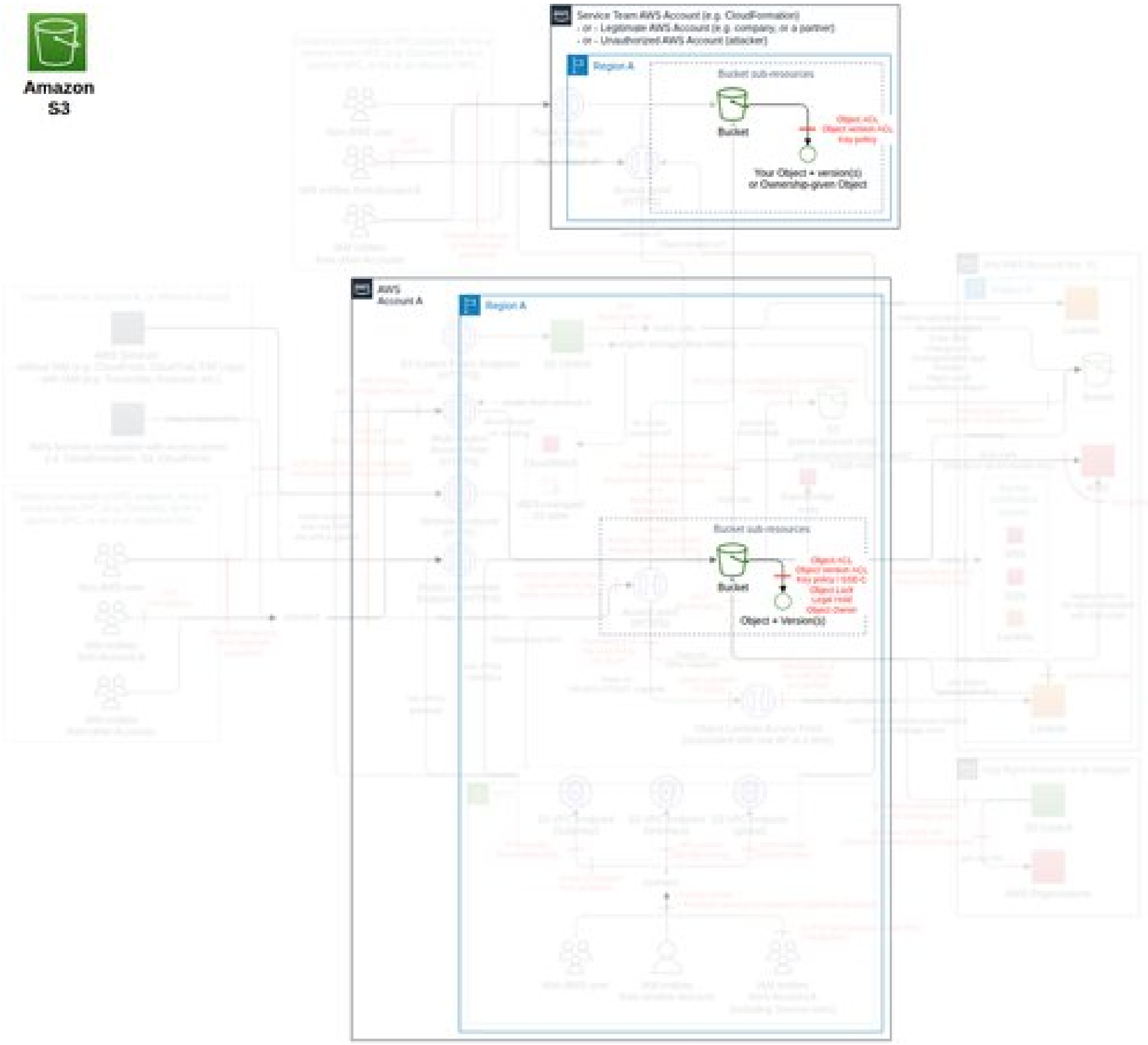
Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket
AWS Account A
Region A
Replication (not via Routing S3 amazonaws.com)
get decrypt/encryption key(s) if SSE-KMS
replicate
Bucket sub-resources
Bucket
Any AWS Account (inc. A)
Region A
KMS
Key policy

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO25 - Restrict bucket replication C116 - Monitor abnormal behavior on replication CloudWatch metrics (i.e., "BytesPendingReplication", "OperationsPendingReplication", and "OperationsFailedReplication").	Medium	-	-	1
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Medium	1	-	-

ACL on versioned objects *(subclass of Object versioning/Bucket ACL, FC9)*

Amazon S3 Access Control Lists (ACLs) enable you to manage access to object versions ([ref](ref)).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Sets the Access Control List (ACL) permissions for an object version. You must have WRITE_ACP permission to set the ACL of an object version.	s3:PutObjectVersionAcl

Threat List

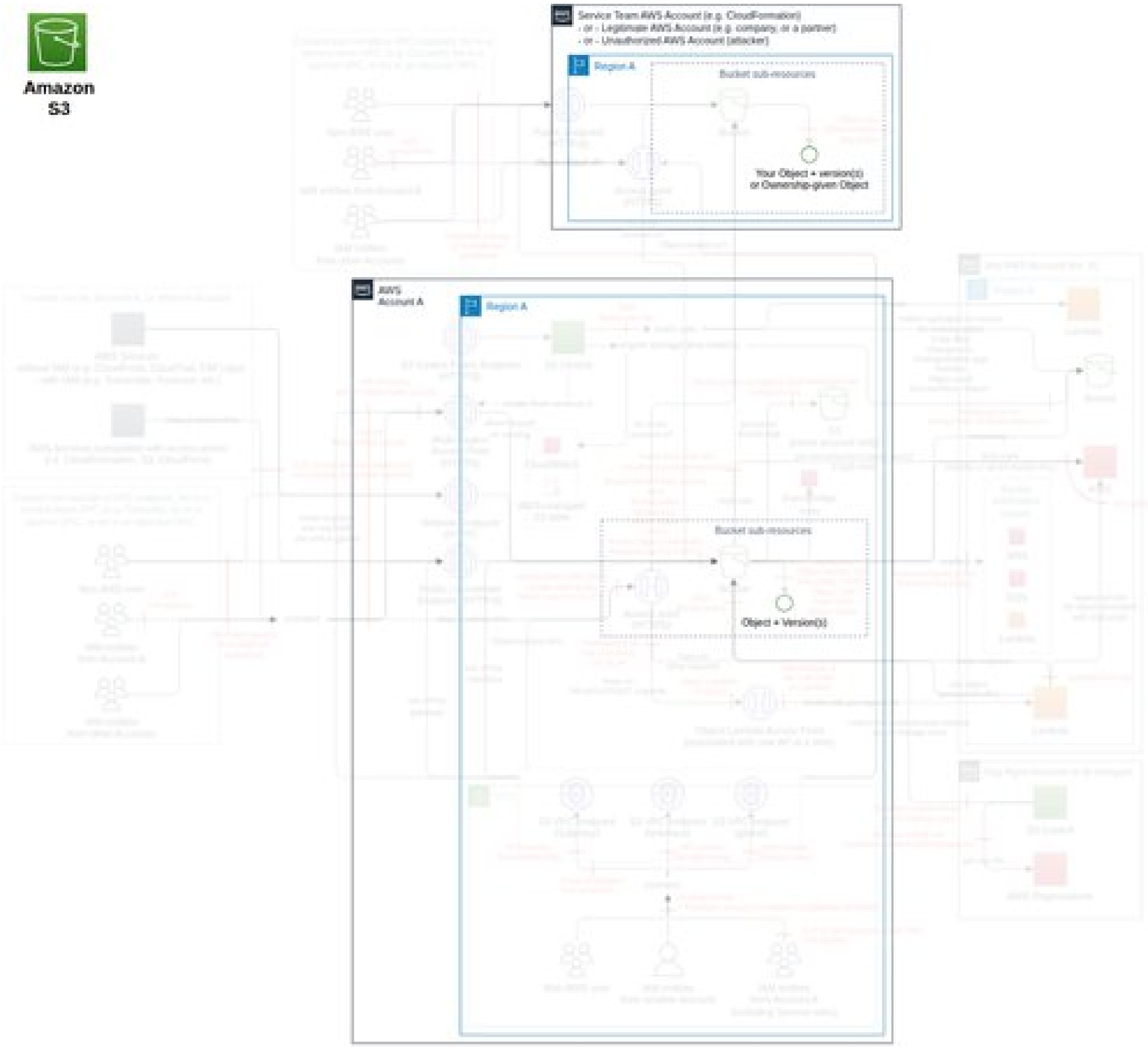
Name	CVSS
None	None

Tag on versioned objects *(subclass of Object tagging/Object versioning, used by Bucket, FC4)*

You can tag each version of an object (ref).

Data Flow Diagram (DFD)

Amazon S3



Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Your Object + version(s)
or Ownership-given Object
AWS
Account A
Region A
Bucket sub-resources
Object + Version(s)

Actions and IAM Permissions to deny the feature

Action	IAM Permission
Adds a set of tags to an existing object version.	s3:PutObjectVersionTagging

Threat List

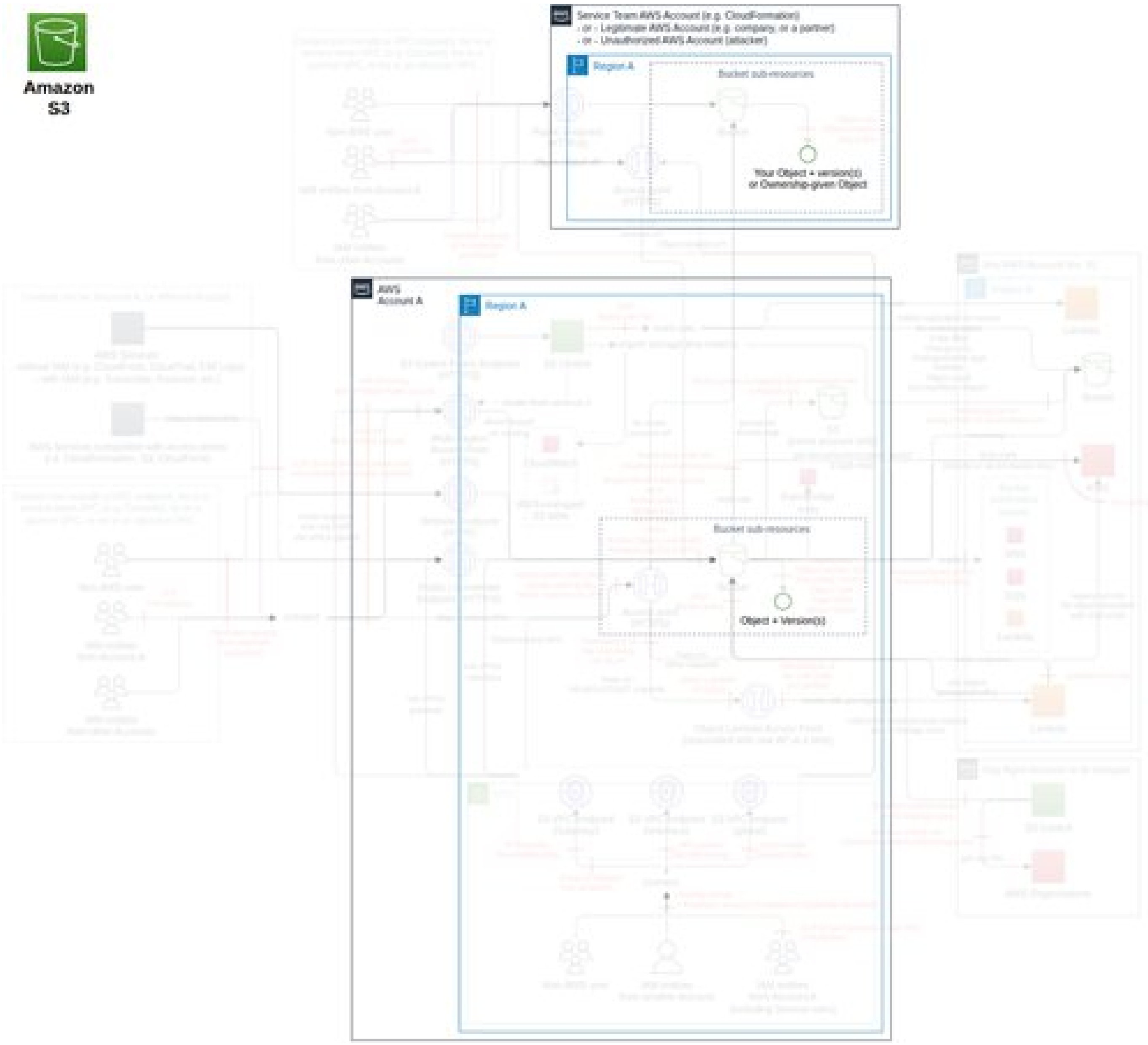
Name	CVSS
None	None

Torrent *(subclass of Object operations, used by Bucket, FC21)*

***[NOT RECOMMENDED]** You can use the BitTorrent protocol to retrieve objects ([ref](#)). It is only available in the AWS Regions launched before May 30, 2016. The seed rate is 100 KB. After April 29, 2022, BitTorrent clients will no longer connect to Amazon S3.*

Data Flow Diagram (DFD)

Amazon S3


Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Your Object + version(s)
or Ownership-given Object
AWS
Account A
Region A
Bucket sub-resources
Object + Version(s)

Actions and IAM Permissions to deny the feature

Action	IAM Permission
Returns torrent files from an object.	s3:GetObjectTorrent

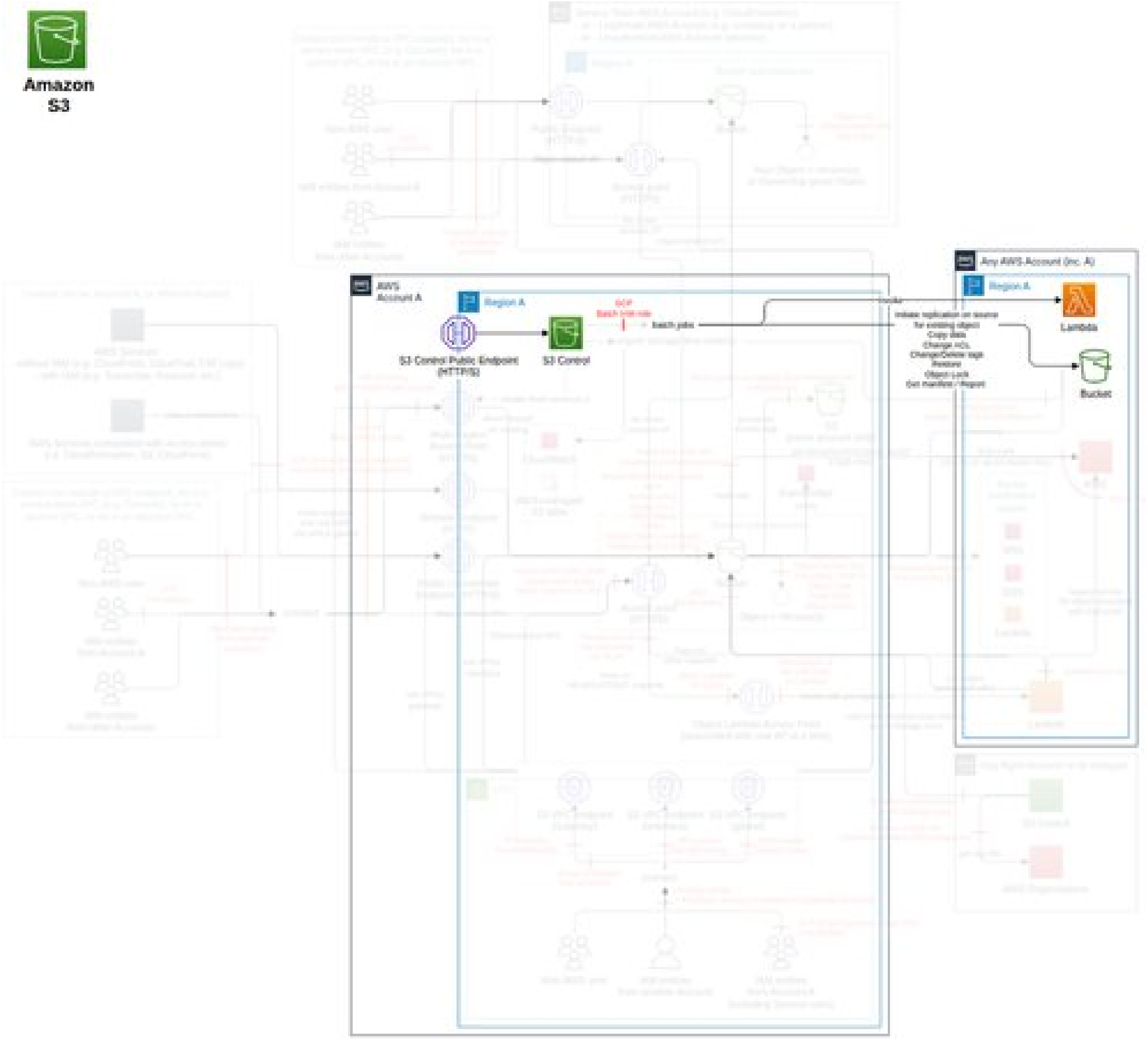
Threat List

Name	CVSS
None	None

Batch *(subclass of Object operations, used by Bucket, FC27)*

S3 Batch Operations performs large-scale Batch Operations on Amazon S3 objects.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

Action	IAM Permission
Creates a new Amazon S3 Batch Operations job.	s3:CreateJob

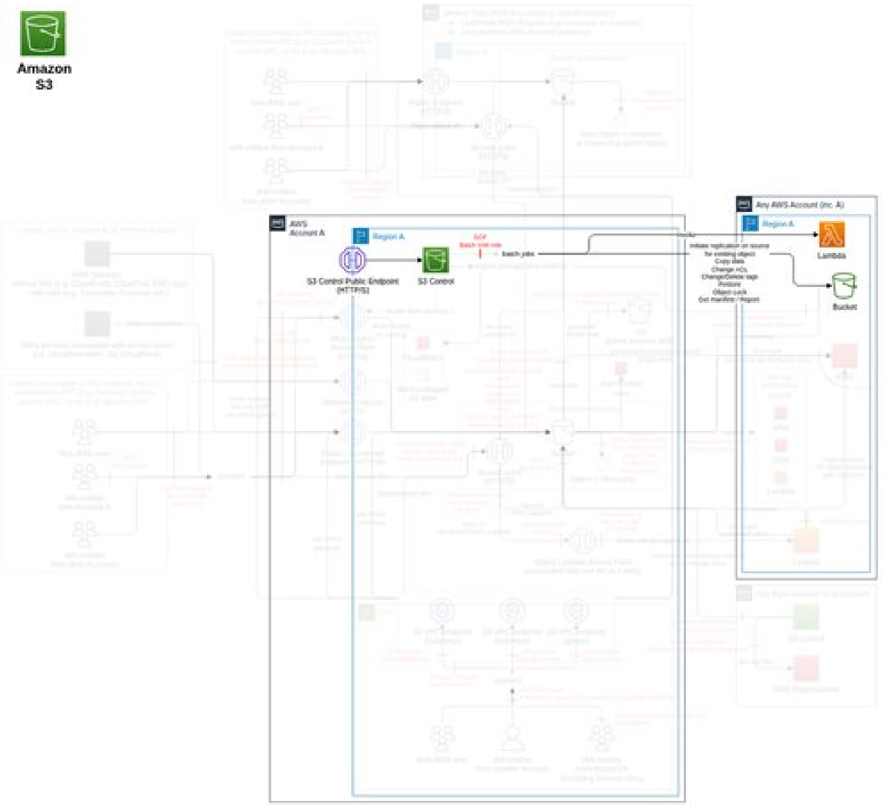
Threat List

Name	CVSS
Exfiltrate, modify, or delete objects using Batch	Medium (6.2)

Exfiltrate, modify, or delete objects using Batch

Threat Id	S3.T44
Name	Exfiltrate, modify, or delete objects using Batch
Description	S3 Batch Operations require an IAM role (with a proper trust policy), and can run operations including replicating existing objects, copying, or replacing/deleting object tags. An attacker can use Batch to copy or modify objects to exfiltrate or change the access management of an object (if relying on a tag).
Goal	Data manipulation
MITRE ATT&CK®	TA0040, T1565
CVSS	Medium (6.2)

IAM Access	{
	 "AND": ["s3:CreateJob", "iam:PassRole"]
	 }

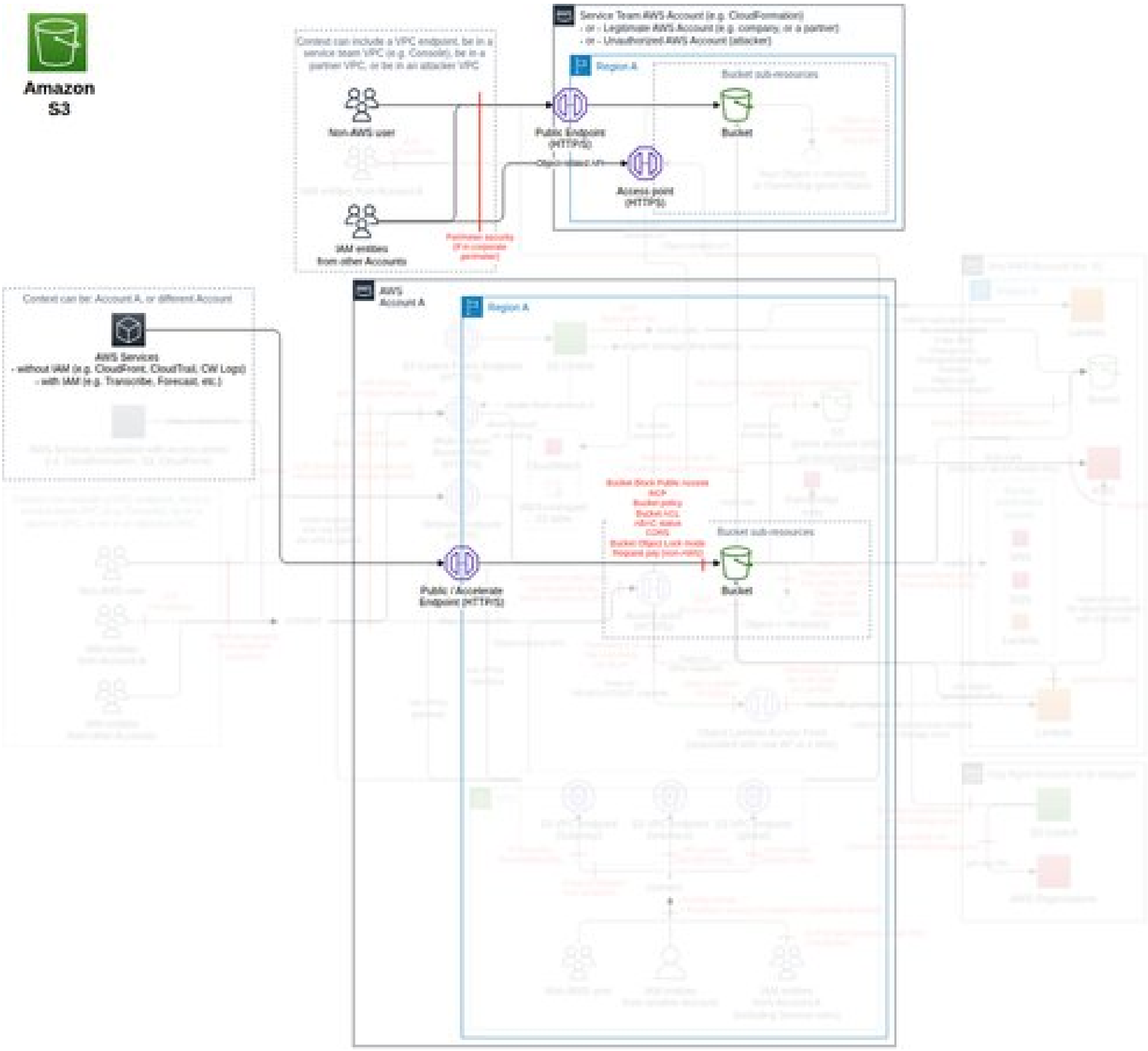


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO33 - Restrict Batch access using dedicated IAM roles C120 - Maintain a list of IAM roles used for Batch jobs, ideally dedicated (e.g., using change management process on infrastructure-as-code). C139 - Ensure only an authorized IAM role is attached to each Batch job. C121 - Limit access to only the required resources/permissions (e.g., source/destination buckets, Lambda functions) for each authorized IAM role configured for Batch jobs. C122 - Limit access to authorized IAM roles used for Batch jobs, using the IAM ThreatModel (e.g., trust policy, and "iam:PassRole").	Very High	4	-	-
CO8 - Limit the IAM entities allowed to use the IAM actions required to execute attacks C26 - Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions. C27 - In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Other uses *(class, FC28)*

Others can use their S3 service to impact you in some way.

Data Flow Diagram (DFD)


Amazon S3
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTPS)
Bucket
Object-related API
Access point (HTTPS)
Context can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
AWS Account A
Region A
Bucket Block Public Access
ACP
Bucket policy
Bucket ACL
ABAC status
CORS
Bucket Object Lock mode
Request pay (non-AWS)
Bucket sub-resources
Public / Accelerate Endpoint (HTTPS)
Bucket

Actions and IAM Permissions to deny the feature

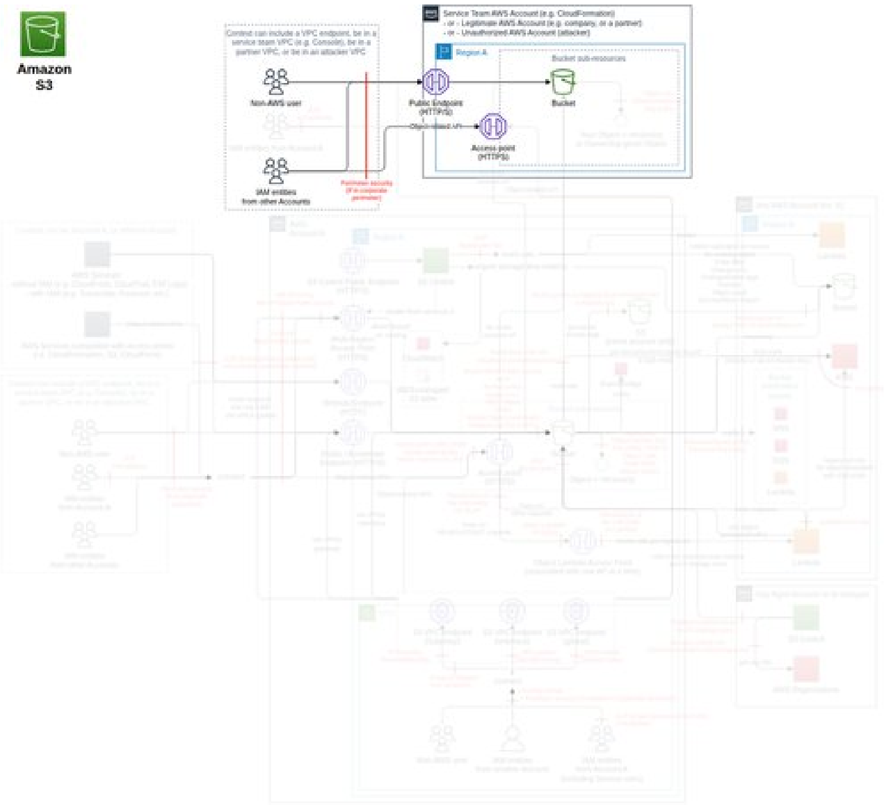
Action	IAM Permission
None	None

Threat List

Name	CVSS
Exfiltrate data by using the public endpoint to upload data to an attacker's bucket, using external credentials	Medium (6.2)
Recon on the AWS Region of a bucket	Medium (4.3)
Phishing using trademarks	Low (3.1)
Uncontrolled change in IAM-managed policies	Low (3.0)
Recon of AWS root account emails using the email ACL grantee feature	Low (2.0)
Recon on valid AWS accounts or IAM principals	Low (2.0)

Exfiltrate data by using the public endpoint to upload data to an attacker's bucket, using external credentials

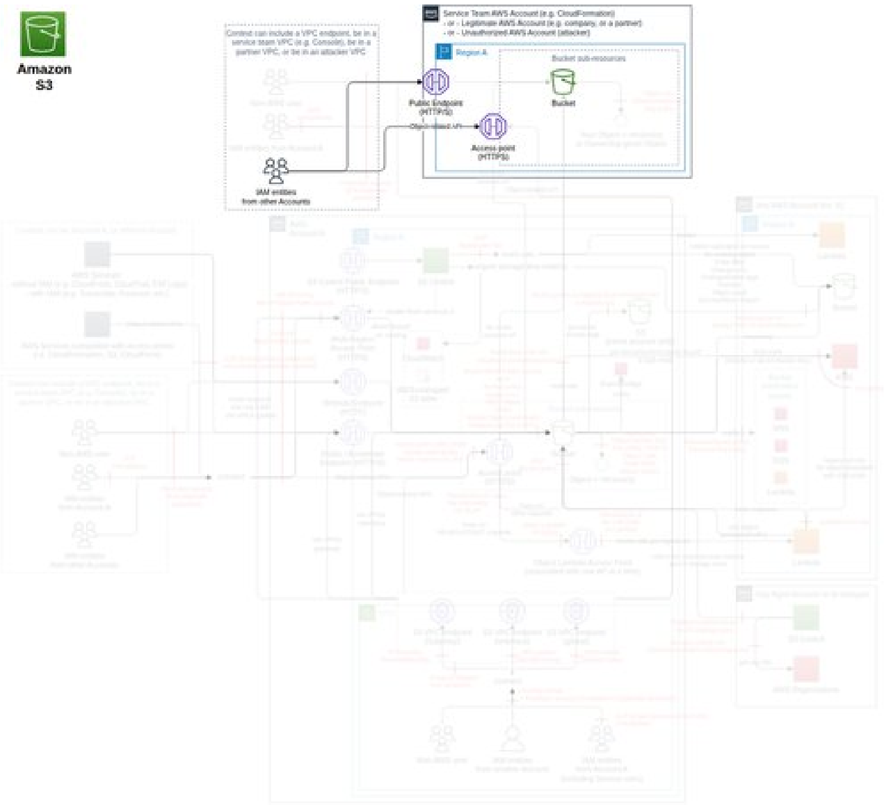
Threat Id	S3.T10
Name	Exfiltrate data by using the public endpoint to upload data to an attacker's bucket, using external credentials
Description	AWS authenticates per AWS account. An attacker can use their own credentials to exfiltrate data to external S3 buckets through the S3 public endpoint. It can be a non-authenticated user as well.
Goal	Data theft
MITRE ATT&CK®	TA0010, T1537
CVSS	Medium (6.2)
IAM Access	`{}`


Amazon S3
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Non-AWS user
IAM entities from other Accounts
Perimeter security (if in corporate perimeter)
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTPS)
Bucket
Object-related API
Access point (HTTPS)

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO2 - Block S3 endpoints in your corporate perimeter security C8 - Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g., firewalls or a cloud interception proxy), including via Internet Gateway, to force the use of VPC endpoints. It will block data-plane transfer. Note: AWS Management Console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Very High	1	-	-
CO32 - Restrict access point access to VPCs when in use C104 - Maintain a list of authorized access between VPCs, S3 access points, and S3. C105 - Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy. C108 - Block all traffic from Internet-configured S3 access points (e.g., in their bucket policy, or centrally in an RCP applied to the OU or AWS account, using a deny statement with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}).	Very High	1	2	-

Recon on the AWS Region of a bucket

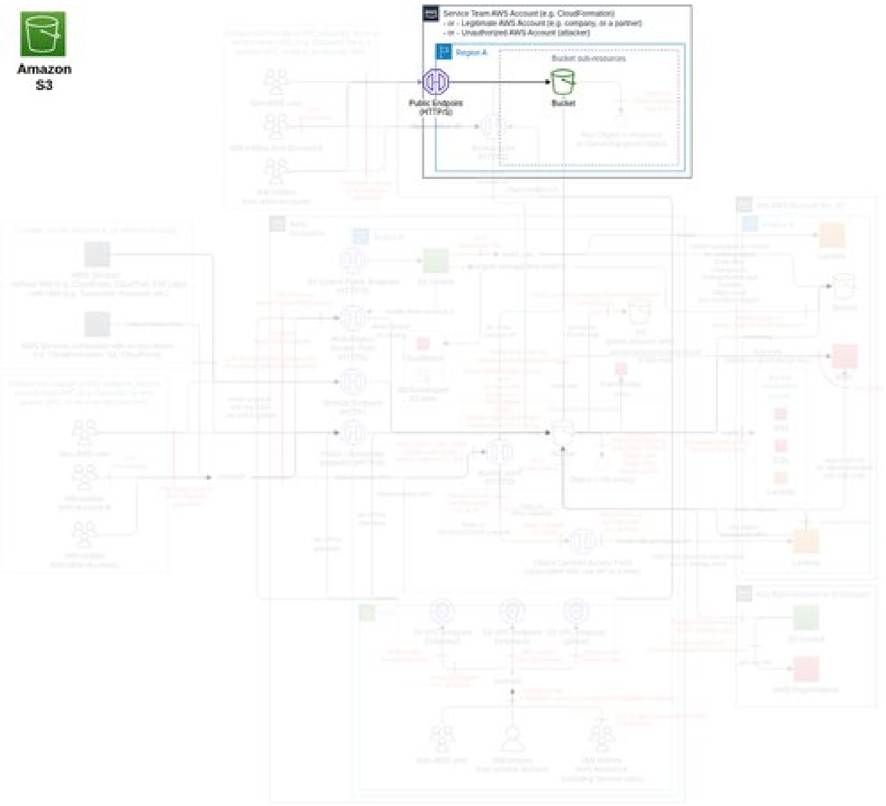
Threat Id	S3.T32
Name	Recon on the AWS Region of a bucket
Description	Error messages can give some information about specific buckets. An attacker who knows the bucket name can find its AWS Region. To find the AWS Region, use "aws s3 presign bucket-name/whatever", go to the presign link, and the error message will give you the region, if not in the right region.
Goal	Launch another attack
MITRE ATT&CK®	TA0043, T1590
CVSS	Medium (4.3)
IAM Access	`{}`


Amazon S3
Context can include a VPC endpoint, be in a service team VPC (e.g. Console), be in a partner VPC, or be in an attacker VPC
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTPS)
Bucket
Object-related API
Access point (HTTPS)
IAM entities from other Accounts

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
None				

Phishing using trademarks

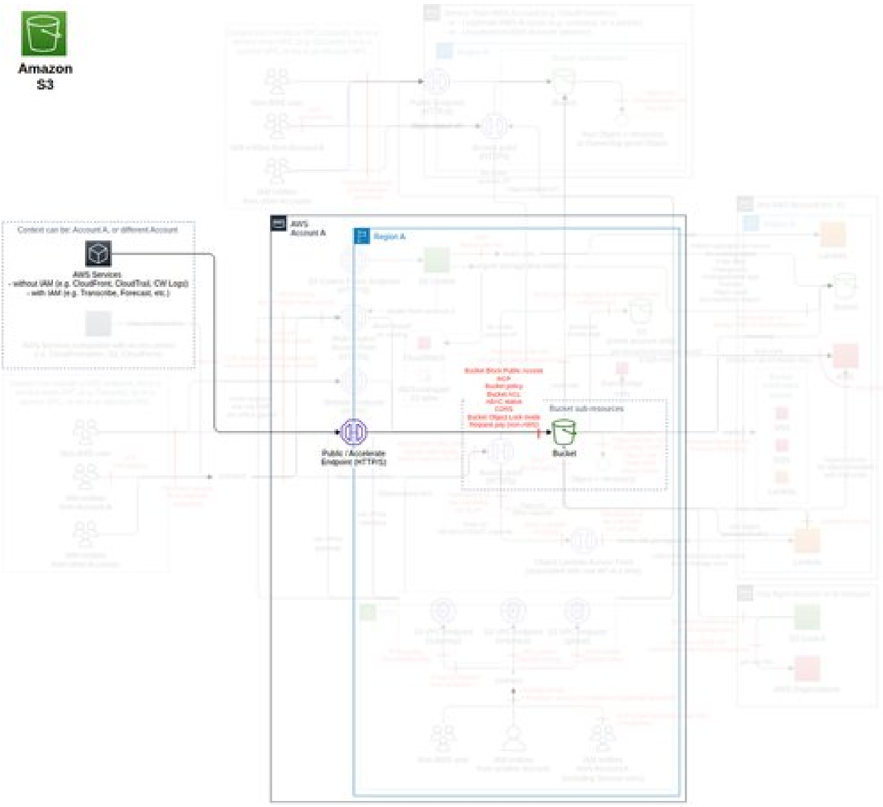
Threat Id	S3.T23
Name	Phishing using trademarks
Description	S3 provides URLs to buckets using the bucket name (i.e., "*mybucket.s3.amazonaws.com*"). An attacker can create a bucket with the name of your trademark to phish users.
Goal	Data theft
MITRE ATT&CK®	TA0009, T1056
CVSS	Low (3.1)
IAM Access	`{}`


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Public Endpoint (HTTPS)
Bucket

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO31 - Protect and/or claim your domains and trademarks/copyrights C103 - Protect and/or claim your domains and trademarks/copyrights (by creating your trademark buckets and using the copyright infringement process from AWS).	High	1	-	-

Uncontrolled change in IAM-managed policies

Threat Id	S3.T57
Name	Uncontrolled change in IAM-managed policies
Description	AWS managed policies can be attached to your IAM entities, but their permissions are managed by AWS. An attacker (including an AWS insider via a service-linked role) can use an overprivileged managed policy to execute an attack.
Goal	Launch another attack
MITRE ATT&CK®	TA0003, T1098
CVSS	Low (3.0)
IAM Access	`{}`

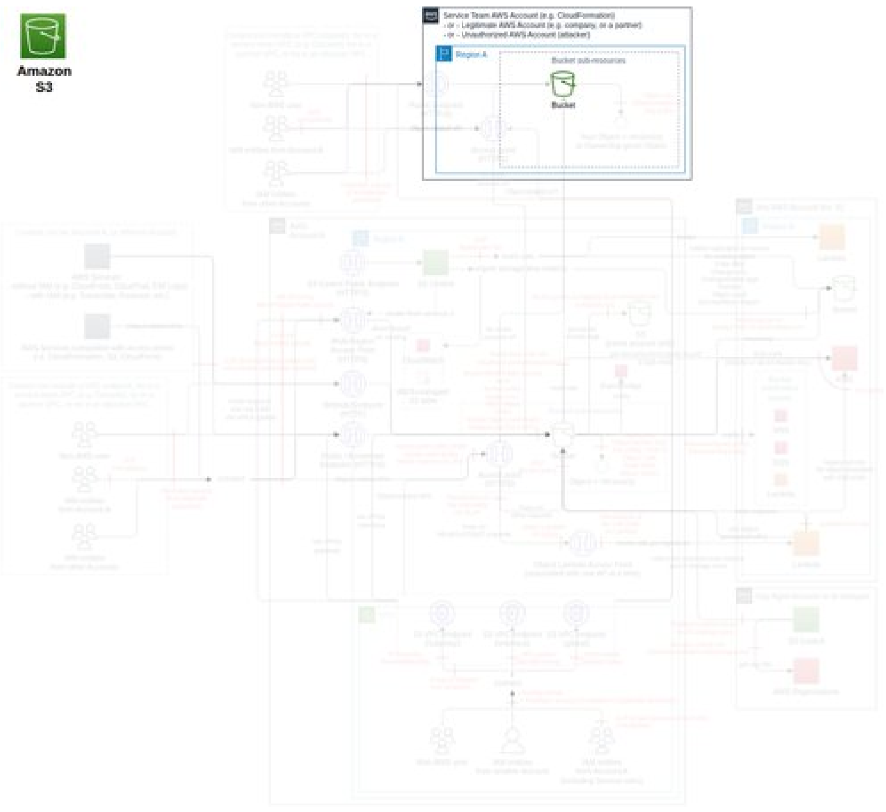


Amazon S3
Content can be: Account A, or different Account
AWS Services
- without IAM (e.g. CloudFront, CloudTrail, CW Logs)
- with IAM (e.g. Transcribe, Forecast, etc.)
AWS
Account A
Region A
Bucket Block Public Access
SCP
Bucket policy
Bucket ACL
KMS key policy
CORS
Bucket Object Lock mode
Request pay (non-AWS)
Bucket sub-resources
Public / Accelerate Endpoint (HTTPS)
Bucket

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO38 - Ensure all requests are blocked from unauthorized service roles C155 - Ensure all requests are blocked from AWS service roles that do not require access (e.g., by denying all requests with the principal "arn:aws:iam::*:*/AWSServiceRoleFor*" on S3 bucket policies).	Very High	1	-	-

Recon of AWS root account emails using the email ACL grantee feature

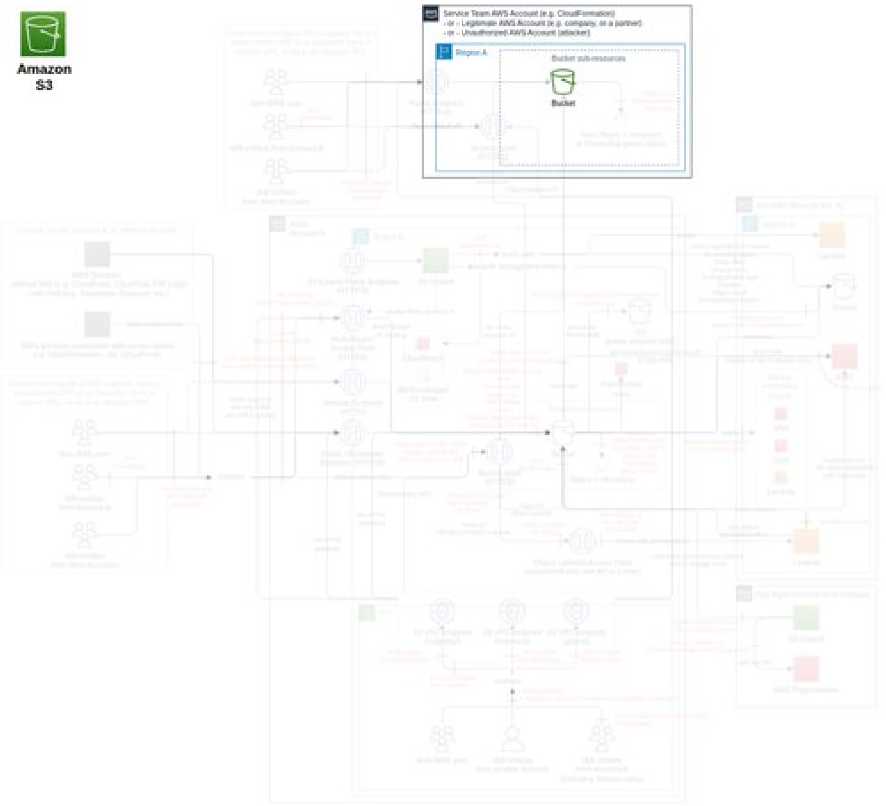
Threat Id	S3.T19
Name	Recon of AWS root account emails using the email ACL grantee feature
Description	S3 allows you to add root account emails to an ACL (ref, note that it will be discontinued on Oct 1st, 2025), and also resolve the given canonical ID into an AWS account ID (via a bucket policy, which automatically resolves a canonical ID into an ARN). An attacker can use trial-and-error to discover existing AWS root account emails and related AWS account IDs (even if you do not use the region where the feature is available), and use this information to launch another attack (e.g., phishing).
Goal	Launch another attack
MITRE ATT&CK®	TA0043, T1589
CVSS	Low (2.0)
IAM Access	`{}`


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO36 - Use an unguessable naming convention C29 - Use an unguessable naming convention for the email addresses of your AWS accounts (e.g., add a + sign and a random string to redirect the email to the same mailbox).	High	1	-	-

Recon on valid AWS accounts or IAM principals

Threat Id	S3.T24
Name	Recon on valid AWS accounts or IAM principals
Description	AWS provides error messages in AWS IAM or S3 bucket policy operations that can be used for basic recon. An attacker can discover whether an AWS account with a specific AWS account ID or IAM principal exists by modifying the policy of their own IAM resource or S3 bucket to grant some rights to that target AWS account or IAM principal (ref, ref2).
Goal	Launch another attack
MITRE ATT&CK®	TA0043, T1589
CVSS	Low (2.0)
IAM Access	{}


Amazon S3
Service Team AWS Account (e.g. CloudFormation)
- or - Legitimate AWS Account (e.g. company, or a partner)
- or - Unauthorized AWS Account (attacker)
Region A
Bucket sub-resources
Bucket

Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
CO36 - Use an unguessable naming convention C30 - Use an unguessable naming convention for your IAM users and IAM roles (e.g., add a random string).	High	1	-	-

Control Implementation

Enforce encryption in transit [S3.CO1]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Preventative (COSO) Protect (NIST CSF)	[S3.C1, depends on S3.C119, assured by S3.C2] Block all unencrypted requests and unauthorized TLS version(s) from IAM entities you control (e.g., by denying all unencrypted requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != *authorized TLS version(s)*, using an SCP on your AWS Organization root node).	Make an unencrypted S3 API call; it should be denied.	Low	S3.FC1 S3.FC5	S3.T12 (Very High) S3.T34 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C2] Verify the control blocking unencrypted requests and unauthorized TLS versions from IAM entities you control (e.g., an SCP on your AWS Organization's root node) is properly implemented.	Remove the control blocking unencrypted requests and unauthorized TLS version(s) (e.g., the SCP on your root node); it should be detected.	High	S3.FC1 S3.FC5	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C3, depends on S3.C119, assured by S3.C5] Block all unencrypted requests and unauthorized TLS version(s) from VPC endpoints you control (e.g., by denying all requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != *authorized TLS version(s)*, on the VPC endpoint policy).	Make an unencrypted AWS API call from one of your VPCs with a VPC endpoint; it should be denied.	Low	S3.FC1 S3.FC5	S3.T12 (Medium) S3.T34 (Medium)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C4] Monitor and investigate all requests made with HTTP (e.g., via CloudTrail S3 data events with the lack of additionalEventData.CipherSuite).	Make an unencrypted AWS API call from one of your VPCs with VPC endpoint; it should be detected.	Low	S3.FC1 S3.FC5	S3.T12 (Low) S3.T34 (Low)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C5] Verify a statement exists on all your VPC endpoint policies denying all requests with the condition "aws:SecureTransport" = False or using "s3:TlsVersion" != *authorized TLS version(s)*.	Create/remove the statement on a VPC endpoint policy denying 1) all unencrypted requests or 2) unauthorized TLS version(s); it should be detected.	High	S3.FC1 S3.FC5	-	Medium
Preventative (COSO) Protect (NIST CSF)	[S3.C6, depends on S3.C119, assured by S3.C7] Block all unencrypted requests to the buckets you control (e.g., by denying all requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != *authorized TLS version(s)*, on their bucket policy or centrally in an RCP applied to the OU or AWS account).	Make an unencrypted AWS API call to a bucket you control; it should be denied.	Low	S3.FC5	S3.T34 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C7] Verify all S3 bucket policies block unencrypted traffic (e.g., using the AWS Config rule: S3_BUCKET_SSL_REQUESTS_ONLY) and unauthorized versions of TLS.	Remove the statement on a bucket policy 1) denying all unencrypted requests and 2) denying unauthorized TLS versions; it should be detected.	Medium	S3.FC5	-	High
Directive (COSO) Identify (NIST CSF)	[S3.C119] Maintain a list of authorized version(s) of TLS/SSL per bucket (or per account/OU/Org) (e.g., considering quantum-resistant encryption).	Request the list of authorized version(s) of TLS/SSL per bucket (or per account/OU/Org), its review mechanism, and associated records.	Low	S3.FC1 S3.FC5	S3.T12 (Very Low) S3.T34 (Very Low)	High

Block S3 endpoints in your corporate perimeter security [S3.CO2]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C8] Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g., firewalls or a cloud interception proxy), including via Internet Gateway, to force the use of VPC endpoints. It will block data-plane transfer. Note: AWS Management Console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Request the evidence of the implementation of blocking S3 endpoints in your corporate perimeter security (e.g., firewalls) and tests of its effectiveness.	Low	S3.FC1 S3.FC5 S3.FC28	S3.T7 (High) S3.T10 (High) S3.T12 (Low) S3.T18 (Medium) S3.T34 (Very High)	High

Enable S3 data events in AWS CloudTrail [S3.CO3]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Detect (NIST CSF)	[S3.C9, depends on S3.C58] Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Request the CloudTrail ThreatModel and the evidence of its application for enabling and protecting S3 data events.	Very Low	S3.FC1 S3.FC5 S3.FC8	S3.T1 (Low) S3.T4 (Low) S3.T5 (Low) S3.T6 (Low) S3.T7 (Low) S3.T8 (Low) S3.T9 (Low) S3.T11 (Low) S3.T12 (Low) S3.T16 (Low) S3.T21 (Low) S3.T31 (Low) S3.T34 (Low) S3.T35 (Low) S3.T36 (Low) S3.T39 (Low)	Medium

Monitor S3 with Amazon GuardDuty and Macie [S3.CO4]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Detect (NIST CSF)	[S3.C10] Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using the GuardDuty ThreatModel. Ensure findings are investigated (e.g., using Amazon Detective).	Request the GuardDuty ThreatModel and the evidence of its application for enabling, monitoring, investigating, and protecting S3 use.	Low	S3.FC1 S3.FC5 S3.FC8 S3.FC24 S3.FC25	S3.T3 (Low) S3.T4 (Low) S3.T16 (Medium) S3.T52 (Medium) S3.T53 (Medium)	Medium
Directive (COSO) Detect (NIST CSF)	[S3.C118] Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect them using the Macie ThreatModel.	Request the Macie ThreatModel and the evidence of its application for enabling and protecting S3 policy findings.	Very Low	S3.FC5 S3.FC8 S3.FC10 S3.FC15	S3.T2 (Medium) S3.T4 (Medium) S3.T22 (Medium) S3.T36 (Medium) S3.T37 (Medium) S3.T38 (Medium)	Medium

Identify and ensure the protection of all external buckets hosting your objects [S3.CO5]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C11] Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel).	Request the list of all external buckets authorized to host your objects, their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), their data classification, and the mechanism used to ensure the security of those buckets.	Medium	S3.FC1 S3.FC5 S3.FC16	S3.T1 (Very Low) S3.T3 (High) S3.T5 (Very Low) S3.T6 (Low) S3.T7 (Very Low) S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Low) S3.T14 (Very Low) S3.T15 (Very Low) S3.T21 (Very Low) S3.T31 (High) S3.T43 (Very High)	Very High
Preventative (COSO) Protect (NIST CSF)	[S3.C12, depends on S3.C11] Allow only authorized ACLs on objects for buckets you don't control (e.g., using IAM and VPC endpoint policy with the ACL conditions).	Put an object with an unauthorized ACL; it should be denied.	Medium	S3.FC1	S3.T5 (Medium) S3.T6 (High)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C13, depends on S3.C11] Monitor that only authorized external buckets are used (e.g., via CloudTrail S3 data events in resources[].accountId and resources[].ARN). Both account ID and bucket name must be verified.	Make a call to an unauthorized bucket; it should be detected.	Low	S3.FC1 S3.FC5	S3.T1 (Low) S3.T7 (Low) S3.T11 (Low) S3.T21 (Low) S3.T31 (Medium)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C14, depends on S3.C11] Scan all data before uploading to an external bucket to ensure the classification of the data is aligned with the bucket classification (e.g., using Macie).	Request 1) the mechanism ensuring all data is scanned for proper data classification before upload to an external bucket, 2) its records of execution for all object upload flows, and 3) the plan to move any older object upload flows.	High	S3.FC1 S3.FC5 S3.FC16	S3.T5 (High) S3.T14 (High) S3.T15 (Medium)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C15] Request access via an S3 access point on a bucket you don't own, if compatible with your interaction with the bucket (e.g., not through an unsupported AWS service).	Request the documented reasons why the access point was not implemented in the use case.	Low	S3.FC1	S3.T8 (Medium) S3.T9 (Medium) S3.T31 (Very High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C114, depends on S3.C11] For all external buckets with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover, block the PutObject with any ACL (e.g., using IAM or SCP and a deny on the condition "StringLike": {"s3:x-amz-acl": "*"}). It should be called via PutObjectAcl.	Put an object in an external bucket with the bucket-owner-full-control ACL requirement but without the S3 Object Ownership handover requirement; it should be denied.	High	S3.FC1	S3.T43 (Very High)	High
Detective (COSO) Detect (NIST CSF)	[S3.C115, depends on S3.C11] For all external buckets with bucket-owner-full-control ACL requirements but without S3 Object Ownership handover, monitor that the PutObject operation does not include the ACL header.	Make a request to an external bucket with a bucket-owner-full-control ACL requirement but without an S3 Object Ownership handover requirement; it should be detected.	Low	S3.FC1	S3.T43 (Low)	Medium

Model the threats on all AWS services accessing S3 [S3.CO6]

Type	Control	Testing	Effort	Feature	Threat(s)	CVSS-weighted

				Class(es)	and Impact	Priority
Directive (COSO) Protect (NIST CSF)	[S3.C16] Analyze and protect all AWS services accessing S3 (e.g., via ThreatModel). Enforce use in VPC only, whenever possible.	Request the ThreatModels for all AWS services using S3.	High	S3.FC1 S3.FC5	S3.T21 (Very High) S3.T30 (Very High)	Medium

Limit and monitor access via S3 VPC endpoints [S3.CO7]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C17] For each VPC, maintain a list of AWS Organizations, OUs, and/or AWS accounts where IAM entities are authorized to access S3.	For each VPC, request the list of AWS Organizations, OU, and/or AWS account(s), where IAM entities are authorized to access S3, its review process, and its review records.	Medium	S3.FC1 S3.FC5	S3.T9 (Very Low) S3.T11 (Very Low) S3.T62 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C18, depends on S3.C17] For each VPC with an IAM entity allowed to use S3, secure them with the VPC ThreatModel (e.g., modification of VPC endpoints, VPC endpoint policy, routing table, Security Groups).	Request how the VPC ThreatModel for S3 is being applied.	High	S3.FC1 S3.FC5	S3.T9 (Medium) S3.T11 (Medium) S3.T62 (Medium)	Low
Preventative (COSO) Protect (NIST CSF)	[S3.C19, depends on S3.C17, assured by S3.C20] Block any IAM entity not belonging to an authorized AWS Organization, OU, and/or AWS account from calling S3 from your VPCs by adding a deny statement in the S3 VPC endpoint policy for each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org IDs, as those are globally unique.	For each VPC, make an API call with an IAM entity that is not part of its authorized AWS Organizations paths; it should be denied.	Low	S3.FC1 S3.FC5	S3.T9 (Very High) S3.T11 (Very High) S3.T62 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C20] Verify all S3 VPC endpoints are blocking any IAM entity not belonging to authorized AWS Organizations, OUs, and/or AWS accounts.	Remove the policy statement blocking any IAM entity not belonging to authorized AWS Organizations, OUs, and/or AWS accounts from the VPC endpoint; it should be detected.	High	S3.FC1 S3.FC5	-	High
Directive (COSO) Detect (NIST CSF)	[S3.C21] Enable VPC DNS query logging in all VPCs.	Request the mechanism to enable VPC DNS query logging in all VPCs.	Medium	S3.FC1 S3.FC5	S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Very Low)	Low
Directive (COSO) Identify (NIST CSF)	[S3.C22] Maintain a list of authorized S3 and S3 access points (and their respective AWS accounts) to be accessed for each VPC.	Request the list of authorized S3 buckets and S3 access points to be accessed for each VPC, its review process, and its review records.	Medium	S3.FC1 S3.FC5	S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Very Low)	Medium
Preventative (COSO) Protect (NIST CSF)	[S3.C23, depends on S3.C22, assured by S3.C24] Limit the access to only authorized S3 bucket(s) or their AWS account(s) from each VPC (e.g., using the condition key "s3:ResourceAccount" on the VPC endpoint policy, alternatively use a specific resource-level statement for each bucket, or if the VPC endpoint policy size is beyond the limit and more granular control on VPC is required, use access points).	Make a request to an unauthorized bucket from one of your VPCs; it should be denied.	Medium	S3.FC1 S3.FC5	S3.T8 (High) S3.T9 (High) S3.T11 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C24] Verify all VPCs are limited to accessing only authorized S3 bucket(s).	Remove the control limiting access to only authorized S3 bucket(s); it should be detected.	High	S3.FC1 S3.FC5	-	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C25, depends on S3.C21,S3.C22] Monitor VPC DNS query logs to ensure only authorized S3 buckets and S3 access points are being queried in each VPC (e.g., using VPC DNS query logging) and protect them using Route 53 ThreatModel.	Make a DNS query to an unauthorized 1) S3 bucket and 2) S3 access points; it should be detected.	Low	S3.FC1 S3.FC5	S3.T8 (Low) S3.T9 (Low) S3.T11 (Low)	Low

Directive (COSO) Protect (NIST CSF)	[S3.C124] Ensure all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoint controls.	Request 1) the mechanism ensuring all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoints controls, 2) its records of execution for all new VPC endpoints, and 3) the plan to move any older VPC endpoints.	Low	S3.FC1	S3.T8 (Very High) S3.T9 (Very High)	High

Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO8]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C26] Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Request the list of authorized IAM principals with the permissions required to execute the threat actions, its review process, and its review records.	High	S3.FC1 S3.FC2 S3.FC5 S3.FC6 S3.FC8 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC17 S3.FC19 S3.FC20 S3.FC23 S3.FC24 S3.FC25 S3.FC26 S3.FC27 S3.FC32 S3.FC33 S3.FC36	S3.T1 (High) S3.T2 (High) S3.T5 (Low) S3.T6 (Medium) S3.T7 (High) S3.T8 (High) S3.T11 (High) S3.T14 (Very High) S3.T16 (High) S3.T17 (Very High) S3.T18 (High) S3.T21 (Medium) S3.T25 (High) S3.T26 (High) S3.T28 (High) S3.T30 (High) S3.T33 (Very High) S3.T35 (Very High) S3.T36 (Medium) S3.T37 (Very High) S3.T38 (Very High) S3.T39 (High) S3.T41 (High) S3.T42 (High) S3.T44 (High) S3.T46 (High) S3.T47 (High) S3.T48 (High) S3.T49 (High) S3.T50 (High) S3.T51 (High) S3.T52 (High) S3.T53 (High) S3.T54 (High) S3.T55 (High) S3.T56 (High) S3.T58 (High) S3.T59 (High) S3.T60 (High) S3.T61 (High) S3.T62 (High) S3.T63 (High) S3.T64 (High)	High

					S3.T65 (High)	
Directive (COSO) Protect (NIST CSF)	[S3.C27, assured by S3.C28] In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Request all S3 bucket/access point/Object Lambda Access Point policy statements with "allow"; no principal from the same account should be authorized.	Low	S3.FC1 S3.FC2 S3.FC5 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC19 S3.FC20 S3.FC23 S3.FC26 S3.FC27 S3.FC32 S3.FC33	S3.T1 (Low) S3.T2 (Low) S3.T6 (Low) S3.T7 (Low) S3.T8 (Low) S3.T11 (Low) S3.T14 (Medium) S3.T16 (Low) S3.T17 (Medium) S3.T18 (Low) S3.T21 (Low) S3.T25 (Low) S3.T26 (Medium) S3.T30 (Low) S3.T33 (Medium) S3.T35 (Medium) S3.T36 (Low) S3.T37 (Medium) S3.T38 (Medium) S3.T39 (Low) S3.T41 (Low) S3.T42 (Low) S3.T44 (Low) S3.T46 (Medium) S3.T54 (Medium) S3.T55 (Medium) S3.T58 (Medium) S3.T59 (Medium) S3.T65 (Low)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C28] Verify all S3 bucket/access point/Object Lambda Access Point policies do not allow an IAM principal of the same AWS account (e.g., using the Config rule S3_BUCKET_POLICY_GRANTEE_CHECK for bucket policy).	Add an allow statement for an IAM principal of the same account in 1) a bucket policy, 2) an access point policy, and 3) an Object Lambda Access Point; it should be detected.	Medium	S3.FC1 S3.FC2 S3.FC5 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC19 S3.FC20 S3.FC23 S3.FC26 S3.FC27 S3.FC32 S3.FC33	-	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C149] For each bucket, maintain a list of authorized IAM principals allowed to access via the bucket policy.	Request the list of authorized IAM principals allowed to access via bucket policy, its review process, and its review records.	Medium	S3.FC10	S3.T37 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C150, depends on S3.C149, assured by S3.C151] Ensure only authorized IAM principals allowed to access via bucket policy are configured (e.g., using IAM Access Analyzer for reconciliation).	Request 1) the mechanism ensuring only authorized IAM principals are allowed to access buckets via bucket policy, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC10	S3.T37 (Very High)	High
Assurance (COSO)	[S3.C151]	Allow an unauthorized IAM principal on a bucket policy; it	Medium	S3.FC10	-	High

Detect (NIST CSF)	Verify only authorized IAM principals allowed to access via bucket policy are used (e.g., using the AWS Config rule S3_BUCKET_POLICY_GRANTEE_CHECK).	should be detected.				
Directive (COSO) Protect (NIST CSF)	[S3.C170, depends on S3.C58] Integrate and limit the access to general purpose buckets via tags in the IAM Operating Model (including enforcing tagging of buckets and objects at creation using AWS:ResourceTag and s3:BucketTag).	Request the IAM tag Operating Model for the general purpose buckets.	High	S3.FC2	S3.T33 (Very High)	Medium

Block requests with KMS keys from unauthorized AWS accounts [S3.CO9]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C31] Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account.	Request the list of AWS accounts authorized to provide KMS keys for S3 for each AWS account, its review process, and its review records.	Medium	S3.FC1 S3.FC5 S3.FC8 S3.FC15 S3.FC26	S3.T1 (Very Low) S3.T2 (Very Low) S3.T4 (Very Low) S3.T5 (Very Low) S3.T7 (Very Low) S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Very Low) S3.T16 (Very Low) S3.T21 (Very Low) S3.T27 (Very Low) S3.T28 (Very Low) S3.T30 (Very Low) S3.T31 (Very Low) S3.T60 (Very Low)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C32, depends on S3.C31] Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account).	Make a request encrypted with a KMS key from an unauthorized AWS account; it should be denied.	Low	S3.FC1 S3.FC5 S3.FC8 S3.FC15 S3.FC26	S3.T1 (High) S3.T2 (Medium) S3.T4 (High) S3.T5 (High) S3.T7 (High) S3.T8 (High) S3.T9 (High) S3.T11 (Medium) S3.T16 (High) S3.T21 (Medium) S3.T27 (Low) S3.T28 (High) S3.T30 (High) S3.T31 (High) S3.T60 (High)	High
Detective (COSO) Detect (NIST CSF)	[S3.C33, depends on S3.C31] Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Encrypt an object using an unauthorized key; it should be detected.	Low	S3.FC1 S3.FC5 S3.FC8 S3.FC15 S3.FC26	S3.T1 (Low) S3.T2 (Low) S3.T4 (Low) S3.T5 (Low) S3.T7 (Low) S3.T8 (Low) S3.T9 (Low) S3.T11 (Low)	Low

					S3.T16 (Low) S3.T21 (Low) S3.T27 (Very Low) S3.T28 (Low) S3.T30 (Low) S3.T31 (Low)	

Block changes to make an object public via object ACL [S3.CO10]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Preventative (COSO) Protect (NIST CSF)	[S3.C34, assured by S3.C36] Deny requests to change object ACL to public (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy with a deny statement on PutObjectAcl for "s3:x-amz-grant-read", "s3:x-amz-grant-read-acp", "s3:x-amz-grant-write-acp", "s3:x-amz-grant-full-control" on the following predefined groups "http://acs.amazonaws.com/groups/global/AllUsers" and "http://acs.amazonaws.com/groups/global/AuthenticatedUsers").	Make a call to create a public ObjectACL; it should be denied.	Medium	S3.FC1 S3.FC5	S3.T6 (Very High) S3.T36 (Very High)	High
Detective (COSO) Detect (NIST CSF)	[S3.C35] Monitor ObjectACL changes (or tentative changes) to public using CloudTrail S3 data events.	Make a call to create a public ObjectACL; it should be detected.	Low	S3.FC1 S3.FC5	S3.T6 (Low) S3.T36 (Low)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C36] Verify the control blocking change ObjectACL to public (e.g., an SCP and VPC endpoint policy) is properly implemented.	Remove the control blocking changes of ObjectACL to public; it should be detected.	High	S3.FC1 S3.FC5	-	High
Detective (COSO) Detect (NIST CSF)	[S3.C37] Monitor and investigate anonymous requests to objects (e.g., using CloudTrail S3 data events with userIdentity.accountId=ANONYMOUS_PRINCIPAL).	Make an anonymous call; it should be detected.	Low	S3.FC5	S3.T36 (Low)	Low

Prevent deletion of buckets [S3.CO11]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Preventative (COSO) Protect (NIST CSF)	[S3.C38, assured by S3.C39] Block the action "s3:DeleteBucket" (e.g., via SCP or in an RCP applied to the OU or AWS account; exemption can be managed by authorizing a SuperAdmin to delete buckets with a certain tag, and with bucket owners able to tag buckets).	Do a DeleteBucket; it should be denied.	Low	S3.FC5	S3.T1 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C39] Verify the control blocking the action "s3:DeleteBucket" is properly implemented.	Remove the control blocking the action "s3:DeleteBucket"; it should be detected.	High	S3.FC5	-	High
Detective (COSO) Detect (NIST CSF)	[S3.C40] Scan your CNAME records (e.g., in Amazon Route 53) and CloudFront origin for deleted buckets.	Create a CNAME record and CloudFront origin with an invalid bucket; it should be detected.	High	S3.FC5	S3.T1 (Very Low)	Very Low

Enforce secure SDLC processes [S3.CO12]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C41] Parameterize the S3 bucket name or S3 access point in your code (no hardcoding).	Request the process ensuring S3 bucket names or S3 access points are not hard-coded.	Medium	S3.FC5	S3.T1 (Low)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C42] When connecting to S3 endpoints, use the virtual-hosted model ("my-bucket-name.s3.amazonaws.com" or "my-bucket-name.my-s3-regional-endpoint.amazonaws.com") instead of the path-style model ("s3.amazonaws.com/my-bucket-name" or "my-s3-regional-endpoint.amazonaws.com/my-bucket-name") (see ref). All the latest SDKs make use of domain style by default.	Request the mechanism ensuring the use of domain style instead of path style.	Very Low	S3.FC1	S3.T35 (High)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C43] Monitor that all S3 connections are made with the virtual-hosted model (e.g., via CloudTrail S3 requestParameters.Host).	Make a path-style request to S3; it should be detected.	Medium	S3.FC1	S3.T35 (Low)	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C44] Ensure the integrity of stored objects (ref), using "x-amz-checksum" from the object metadata instead of ETag (e.g., using the compute checksum functionality in S3 Batch Operations). If ETag is used, make sure to properly account for its different definitions (ref).	Request 1) the mechanism ensuring the integrity of stored objects using checksums instead of ETag, and otherwise ensuring ETag's different definitions are properly accounted for, and 2) plan to move any older system using ETag to use the checksum metadata.	Low	S3.FC1 S3.FC5	S3.T17 (Medium) S3.T27 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C45] Do not include sensitive data in bucket names, access point names, object names, object metadata, and tags.	Request the process ensuring no sensitive data is included in bucket names, object names, object metadata, and tags.	Low	S3.FC12 S3.FC20	S3.T41 (Low) S3.T42 (Medium)	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C46] Ensure all S3 buckets interacted with are in the correct AWS account (e.g., using the condition in all compatible S3 requests: x-amz-expected-bucket-owner and x-amz-source-expected-bucket-owner).	Request the process ensuring that all S3 buckets interacted with are in the correct AWS account.	Medium	S3.FC1 S3.FC5	S3.T1 (Medium) S3.T3 (Medium)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C113, depends on S3.C11] When transmitting an object to an external bucket with bucket-owner-full-control ACL requirements but without S3 Object Ownership handover, use 2 separate APIs (PutObject and PutObjectAcl) instead of the built-in object ACL operation in PutObject.	Request the process for ensuring that PutObject requests on an external bucket with a bucket-owner-full-control ACL requirement, but without S3 Object Ownership handover, use 2 separate APIs.	Medium	S3.FC1	S3.T43 (High)	High

Block direct public access [S3.CO13]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C47, assured by S3.C48] Front buckets that are required to be public, using authenticated CDN (e.g., CloudFront) or API Gateway, protected with WAF (e.g., for hotlinking).	Request the process ensuring that buckets required to be public are fronted by an authenticated CDN or API Gateway, and are protected with a WAF.	Medium	S3.FC5 S3.FC16	S3.T13 (Very High) S3.T14 (Medium) S3.T22 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C48] Verify no bucket is available publicly for write or read (e.g., using the AWS Config rules: S3_BUCKET_PUBLIC_READ_PROHIBITED and S3_BUCKET_PUBLIC_WRITE_PROHIBITED).	Create a public S3 bucket; it should be detected.	Very Low	S3.FC5 S3.FC16	-	High

Directive (COSO) Protect (NIST CSF)	[S3.C49, assured by S3.C50] Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Request 1) the mechanism ensuring account-level S3 Block Public Access is enabled on all AWS accounts, 2) its records of execution for all new AWS accounts, and 3) the plan to move any older AWS accounts.	Very Low	S3.FC5 S3.FC8 S3.FC10	S3.T4 (High) S3.T14 (High) S3.T36 (Very High) S3.T37 (Very High) S3.T38 (Medium)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C50] Verify account-level S3 Block Public Access is enabled on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (e.g., using the AWS Config rule: S3_ACCOUNT_LEVEL_PUBLIC_ACCESS_BLOCKS).	Remove the account-level S3 Block Public Access of an AWS account; it should be detected.	Very Low	S3.FC5 S3.FC8 S3.FC10	-	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C51, assured by S3.C52] Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (enabled by default for all new buckets after April 2023).	Request 1) the mechanism ensuring S3 Block Public Access is enabled on each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC5 S3.FC8 S3.FC10	S3.T4 (High) S3.T14 (High) S3.T36 (Very High) S3.T37 (Very High) S3.T38 (Medium)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C52] Verify S3 Block Public Access is enabled on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (e.g., using the AWS Config rule: S3_BUCKET_LEVEL_PUBLIC_ACCESS_PROHIBITED).	Remove the S3 Block Public Access from an S3 bucket; it should be detected.	Very Low	S3.FC5 S3.FC8 S3.FC10	-	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C53, assured by S3.C54] Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Request 1) the mechanism ensuring S3 Block Public Access is enabled on each S3 access point, 2) its records of execution for all new S3 access points, and 3) the plan to move any older S3 access points.	Low	S3.FC5 S3.FC10 S3.FC26 S3.FC33	S3.T14 (High) S3.T36 (Medium) S3.T37 (Medium) S3.T38 (Medium) S3.T54 (High) S3.T55 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C54] Verify S3 Block Public Access is enabled on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Remove S3 Block Public Access of 1) an access point, and 2) a Multi-Region Access Point; it should be detected.	Medium	S3.FC5 S3.FC10 S3.FC26 S3.FC33	-	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C173] Block public access to each S3 bucket at the organization root, OU, or account-level by enforcing S3 policies in AWS Organizations.	Request the mechanism enforcing block of public access to each bucket at the organization root, OU, or account-level via S3 policies, its records of execution for all new AWS accounts, and the plan to move any older AWS accounts.	Low	S3.FC5 S3.FC8 S3.FC10	S3.T4 (High) S3.T14 (High) S3.T36 (Very High) S3.T37 (Very High) S3.T38 (Medium)	Very High

Block bucket ACL [S3.CO14]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Preventative (COSO) Protect (NIST CSF)	[S3.C55, assured by S3.C57] Deny requests to add an ACL on a bucket (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy, with a deny statement on "s3:PutBucketAcl").	Make a call to add an ACL on a bucket; it should be denied.	Medium	S3.FC8 S3.FC19	S3.T4 (Very High) S3.T58 (Very High)	High
Detective (COSO) Detect (NIST CSF)	[S3.C56] Monitor changes to bucket ACLs to ensure they stay private (e.g., using the CloudTrail event PutBucketAcl and its field requestParameters.x-amz-acl, which should either be	Make a call to have a bucket ACL other than private; it should be detected.	Medium	S3.FC8 S3.FC19	S3.T4 (Low) S3.T58 (Low)	Low

	"private" or not exist).					
Assurance (COSO) Detect (NIST CSF)	[S3.C57] Verify the control blocking bucket ACL changes is properly implemented.	Remove the control blocking bucket ACL changes; it should be detected.	High	S3.FC8 S3.FC19	-	High

Identify and ensure the protection of all internal buckets hosting your objects [S3.CO15]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C58] Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Request the list of all buckets you control and their related requirements, and the mechanism and records to ensure the accuracy of that metadata.	High	S3.FC1 S3.FC2 S3.FC5 S3.FC8 S3.FC10 S3.FC13 S3.FC16 S3.FC17 S3.FC19 S3.FC23 S3.FC36	S3.T1 (Very Low) S3.T3 (Very Low) S3.T4 (Very Low) S3.T5 (Very Low) S3.T6 (Very Low) S3.T7 (Very Low) S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (High) S3.T12 (Very Low) S3.T13 (Very Low) S3.T14 (Very Low) S3.T15 (Very Low) S3.T16 (Very Low) S3.T17 (Very High) S3.T20 (Very Low) S3.T21 (Very Low) S3.T25 (Low) S3.T30 (Very Low) S3.T31 (Very Low) S3.T33 (Very Low) S3.T34 (Very Low) S3.T35 (Very Low) S3.T36 (Very Low) S3.T37 (Very Low) S3.T39 (Very Low) S3.T59 (Very Low) S3.T61 (Very Low) S3.T64 (Very Low) S3.T65 (Very Low)	Very High
Detective (COSO) Detect (NIST CSF)	[S3.C59, depends on S3.C58] Use a data discovery tool (e.g., Amazon Macie) to ensure no sensitive data is stored in an unauthorized bucket.	Upload higher classification data in a bucket; it should be detected.	Medium	S3.FC5	S3.T11 (Medium)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C60] Use a data discovery tool (e.g., Amazon Macie) to ensure the bucket names, object names, tags, and metadata do not contain sensitive data.	Create a bucket name, object name, tags, or metadata of an object with sensitive data; it should be detected.	Very High	S3.FC5	S3.T11 (Very Low)	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C171, depends on S3.C58, assured by S3.C172] Ensure only the authorized ABAC configuration for each general purpose bucket is configured.	Request 1) the mechanism ensuring only the authorized ABAC configuration for each general purpose bucket is configured, 2) its records of execution for all new general purpose buckets, and 3) the plan to move any older general purpose buckets.	Medium	S3.FC36	S3.T64 (High)	Medium

Assurance (COSO) Detect (NIST CSF)	[S3.C172] Verify all general purpose buckets use their authorized ABAC configuration.	1) Enable ABAC on an unauthorized general purpose bucket, or 2) disable ABAC on an authorized general purpose bucket; it should be detected.	Medium	S3.FC36	-	Medium

Enforce encryption at rest [S3.CO16]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C61, depends on S3.C58] Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption (ref).	Request the list of authorized KMS key(s) for each bucket, its review process, and its review records.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC23	S3.T11 (Very Low) S3.T16 (Very Low) S3.T17 (Very Low) S3.T20 (Very Low) S3.T30 (Very Low) S3.T36 (Very Low) S3.T37 (Very Low) S3.T65 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C140, depends on S3.C61, assured by S3.C62] Ensure all objects in S3 buckets are encrypted with an authorized KMS key.	Request the mechanism (including training or utility) ensuring only authorized KMS keys are used for any objects stored in S3.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC23	S3.T11 (Medium) S3.T16 (Medium) S3.T17 (Medium) S3.T20 (Medium) S3.T30 (Medium) S3.T36 (Medium) S3.T37 (Medium) S3.T65 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C62] Verify all objects in S3 buckets are encrypted with an authorized KMS key (e.g., using S3 Inventory or S3 Batch Operations, see blog, or S3 Storage Lens, UnencryptedObjectCount and SSEKMSEnabledBucketCount).	Upload encrypted data 1) using an unauthorized KMS key, or 2) using SSE-S3; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC23	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C63, depends on S3.C61] Use KMS ThreatModel to protect the KMS keys used for S3 (e.g., using encryptionContext on the policy of each KMS key).	Request the KMS ThreatModel and the evidence of its application to protect S3.	High	S3.FC1 S3.FC5 S3.FC10 S3.FC23	S3.T17 (Medium) S3.T36 (Low) S3.T37 (Low) S3.T65 (Medium)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C64, depends on S3.C61, assured by S3.C65] Implement an authorized default encryption key on each bucket; enable S3 Bucket Key if not using DSSE-KMS and if CloudTrail events are not required for KMS encrypt/decrypt (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings).	Request 1) the mechanism implementing an authorized default encryption key on each bucket and enabling S3 Bucket Key, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC1 S3.FC5 S3.FC10	S3.T17 (Medium) S3.T20 (High) S3.T36 (High) S3.T37 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C65] Verify each bucket has an authorized default encryption key and has S3 Bucket Key enabled.	Create/modify a bucket 1) without default encryption, 2) with an incorrect default encryption key, or 3) with S3 Bucket Key disabled; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC10	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C66, depends on S3.C61, assured by S3.C67] Block PutObject requests with unauthorized KMS key on each bucket (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" exists and is not an authorized KMS key).	Make a request encrypted with an unauthorized KMS key; it should be denied.	Low	S3.FC1 S3.FC5 S3.FC10	S3.T11 (High) S3.T16 (High) S3.T17 (High) S3.T20 (Very High) S3.T30 (High) S3.T36 (High) S3.T37 (High)	High
Assurance (COSO)	[S3.C67]	Create a bucket not blocking PutObject requests with an	Medium	S3.FC1	-	High

Detect (NIST CSF)	Verify all buckets block PutObject requests with an unauthorized KMS key (e.g., using the Config rule: S3_BUCKET_POLICY_NOT_MORE_PERMISSIVE, note that a new rule needs to be deployed for each configuration, then the resource tracked by name or tag; alternatively, you might use S3_BUCKET_SERVER_SIDE_ENCRYPTION_ENABLED to ensure limited coverage).	unauthorized KMS key; it should be detected.		S3.FC5 S3.FC10		
Detective (COSO) Detect (NIST CSF)	[S3.C68, depends on S3.C61] Monitor that only authorized KMS keys are used for each bucket (using CloudTrail S3 data events in "requestParameters.bucketName" and "response.x-amz-server-side-encryption-aws-kms-key-id").	Make a request encrypted with an unauthorized KMS key; it should be detected.	Low	S3.FC5	S3.T11 (Very Low) S3.T16 (Low) S3.T30 (Very Low) S3.T36 (Low)	Low
Directive (COSO) Identify (NIST CSF)	[S3.C145] Maintain a list of buckets (or paths) required to be encrypted using server-side encryption with customer-provided keys (SSE-C).	Request the list of buckets (or paths) required to be encrypted with server-side encryption with customer-provided keys (SSE-C), its review process, and its review records.	Medium	S3.FC5 S3.FC10 S3.FC23	S3.T11 (Very Low) S3.T16 (Very Low) S3.T20 (Very Low) S3.T30 (Very Low) S3.T36 (Very Low) S3.T37 (Very Low) S3.T63 (Very Low)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C146, depends on S3.C145, assured by S3.C147] For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g., using bucket policies, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES256" is not present).	Make a request to a bucket (or path) requiring SSE-C without the proper encryption; it should be denied.	Low	S3.FC5 S3.FC10	S3.T11 (High) S3.T16 (High) S3.T20 (Very High) S3.T30 (High) S3.T36 (High) S3.T37 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C147] For buckets (or paths) requiring SSE-C, verify all buckets block PutObject requests with unauthorized encryption.	Create a bucket requiring SSE-C, not blocking PutObject requests with unauthorized encryption; it should be detected.	High	S3.FC5 S3.FC10	-	High
Detective (COSO) Detect (NIST CSF)	[S3.C148, depends on S3.C145] For buckets (or paths) requiring SSE-C, monitor that only authorized encryption is used on each bucket or path (using CloudTrail S3 data events in requestParameters.bucketName and response.x-amz-server-side-encryption-customer-algorithm).	Make a request to a bucket (or path) requiring SSE-C without the proper encryption; it should be detected.	Low	S3.FC5	S3.T11 (Very Low) S3.T16 (Low) S3.T30 (Very Low) S3.T36 (Low)	Low
Preventative (COSO) Protect (NIST CSF)	[S3.C162, depends on S3.C58] Block requests not using DSSE-KMS when required (e.g., by using an SCP, IAM policies, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on required bucket names and "s3:x-amz-server-side-encryption" = "aws:kms:dsse").	Make a request not using DSSE-KMS on a required S3 bucket; it should be denied.	Low	S3.FC1 S3.FC5	S3.T5 (Low) S3.T7 (Low) S3.T8 (Low) S3.T11 (Low) S3.T31 (Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C163, depends on S3.C58] Monitor requests not using DSSE-KMS when required (e.g., using CloudTrail log event name(s), CloudTrail S3 data events with field(s) requestParameter.bucketName, and "response.x-amz-server-side-encryption-aws").	Make a request not using DSSE-KMS on a required S3 bucket; it should be detected.	Low	S3.FC1 S3.FC5	S3.T5 (Very Low) S3.T7 (Very Low) S3.T8 (Very Low) S3.T11 (Very Low) S3.T31 (Very Low)	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C167, depends on S3.C145, assured by S3.C168] Ensure SSE-C is blocked when not required for each bucket [default from April 2026].	Request 1) the mechanism ensuring SSE-C is blocked when not required for each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC5 S3.FC23	S3.T16 (High) S3.T63 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C168] Verify SS3-C is blocked only when not required for each bucket.	1) Block SSE-C on a bucket requiring SSE-C, or 2) remove the block on SSE-C on a bucket not requiring SSE-C; it should be detected.	Low	S3.FC5 S3.FC23	-	High

Detective (COSO) Detect (NIST CSF)	[S3.C169] Monitor abnormal increases in the CloudWatch metric for HTTP 4xx client error status code requests (i.e., "4xxErrors").	Run HTTP 4xx client error status code requests abnormally; it should be detected.	High	S3.FC23	S3.T63 (Low)	Very Low

Protect primary data against loss [S3.CO17]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C69, depends on S3.C58, assured by S3.C70] Enable versioning on buckets holding primary data.	Request the mechanism used to ensure versioning on buckets holding primary data, and its records.	Very Low	S3.FC1 S3.FC5	S3.T16 (High) S3.T17 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C70] Verify buckets holding primary data are versioned (e.g., using S3_BUCKET_VERSIONING_ENABLED).	Remove versioning from a bucket holding primary data; it should be detected.	Low	S3.FC1 S3.FC5	-	High
Directive (COSO) Recover (NIST CSF)	[S3.C71, depends on S3.C58] Back up primary data in a secure location under a different security authority (e.g., in an AWS data bunker account via replication, or using AWS Backup for Amazon S3).	Request the mechanism used to back up primary data in a location that has a different security authority, its records of execution, and its records of restoration testing.	Medium	S3.FC1 S3.FC5 S3.FC13	S3.T16 (High) S3.T17 (High) S3.T25 (High)	Medium

Encrypt or tokenize critical data [S3.CO18]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C72] Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Request the governance and mechanism(s) used to protect data (e.g., encrypt or tokenize critical data on the client side).	Very High	S3.FC1 S3.FC5 S3.FC10 S3.FC16	S3.T1 (Medium) S3.T3 (Medium) S3.T5 (High) S3.T7 (High) S3.T11 (Very High) S3.T12 (Very High) S3.T13 (Very High) S3.T17 (High) S3.T20 (High) S3.T30 (High) S3.T31 (High)	Medium

Have a process to apply legal holds [S3.CO19]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C73] Create a process to apply a legal hold to any S3 bucket whenever required. The condition "s3:object-lock-legal-hold" can be used to restrict who can remove such a lock.	Request the process of applying legal hold, and its records.	Medium	S3.FC1 S3.FC5	S3.T16 (Low) S3.T17 (Medium)	Medium

Protect data integrity using S3 Object Lock [S3.CO20]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority

Preventative (COSO) Protect (NIST CSF)	[S3.C74, depends on S3.C58, assured by S3.C75] Implement the authorized default S3 Object Lock on buckets requiring WORM (note: Amazon S3 evaluates and applies bucket policies before applying the bucket default S3 Object Lock settings).	Upload an object without the appropriate S3 Object Lock; it should have the S3 Object Lock applied automatically.	Low	S3.FC1 S3.FC5 S3.FC13 S3.FC17	S3.T16 (High) S3.T17 (High) S3.T25 (High) S3.T61 (Medium)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C75] Verify all buckets requiring WORM have the correct default S3 Object Lock configuration.	Create a bucket requiring WORM 1) without S3 Object Lock or 2) with an incorrect default S3 Object Lock; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC13 S3.FC17	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C76, depends on S3.C58, assured by S3.C77] Block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock on buckets requiring WORM (e.g., using their bucket policy and centrally in an RCP applied to the OU or the AWS account with a deny statement on PutObject and PutObjectRetention if the condition "s3:object-lock-mode" exists and "s3:object-lock-remaining-retention-days" is not the defined S3 Object Lock configuration).	Make a request with an incorrect S3 Object Lock configuration on a bucket requiring WORM; it should be denied.	Low	S3.FC1 S3.FC5 S3.FC17	S3.T16 (High) S3.T17 (High) S3.T61 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C77] Verify all buckets requiring WORM block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock (e.g., using the Config rule: S3_BUCKET_POLICY_NOT_MORE_PERMISSIVE, note that a new rule needs to be deployed for each configuration, then the resource tracked by name or tag).	Create a bucket requiring WORM that does not block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC17	-	High

Remove incomplete multipart uploads [S3.CO21]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Preventative (COSO) Protect (NIST CSF)	[S3.C78, assured by S3.C79] Reduce costs related to incomplete multipart uploads by creating a lifecycle policy to remove them after an agreed length of time (e.g., 7 days) (blog).	Create an incomplete upload, and wait for the agreed time; it should be deleted automatically.	Low	S3.FC5	S3.T40 (High)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C79] Verify a lifecycle policy on incomplete multipart uploads is implemented on all buckets (e.g., using AWS Config rule: S3_LIFECYCLE_POLICY_CHECK).	Create a bucket without a lifecycle policy to remove incomplete multipart uploads; it should be detected.	Medium	S3.FC5	-	Low

Block deprecated actions [S3.CO22]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C80] Block deprecated S3 actions using IAM ThreatModel and the S3 actions list.	Request the controls blocking deprecated S3 actions.	Low	S3.FC1	S3.T35 (Medium)	Very Low

Enforce SigV4 on all requests [S3.CO23]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Preventative (COSO) Protect (NIST CSF)	[S3.C81] Block all requests not using SigV4 (e.g., using an SCP, bucket policies, or centrally in an RCP applied to the OU or AWS account on all buckets with deny on "StringNotEquals":{"s3:signatureversion": "AWS4-HMAC-SHA256"}).	Make a non-SigV4 AWS API call; it should be denied.	Low	S3.FC1	S3.T35 (High)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C82] Monitor and investigate any requests not using SigV4 (e.g., via CloudTrail S3 when the additionalEventData.SignatureVersion is different from "SigV4").	Make a non-SigV4 AWS API call; it should be detected.	Low	S3.FC1	S3.T35 (Low)	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C83] Use SDK with SigV4 enabled (ref).	Request the mechanism ensuring the use of SDK with SigV4 enabled.	Low	S3.FC1	S3.T35 (High)	Low

Block all requests not using an HTTP authorization header, if not explicitly authorized [S3.CO24]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Preventative (COSO) Protect (NIST CSF)	[S3.C84] Block all requests not using HTTP authorization header, i.e., presigned via query strings or POST (ref) (e.g., using an SCP, bucket policies, or centrally in an RCP applied to the OU or AWS account on all buckets with deny on "StringNotEquals":{"s3:authType": "REST-HEADER"}). Note that it blocks uploads via the console, as well.	Make a request without using the HTTP authorization header; it should be denied.	Low	S3.FC5	S3.T39 (Medium)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C85] Monitor and investigate all requests that do not use the HTTP authorization header (e.g., via CloudTrail S3 events where the additionalEventData.AuthenticationMethod is different from "AuthHeader").	Make 1) a presigned AWS API call and 2) a POST request without the HTTP authorization header; it should be detected.	Low	S3.FC5	S3.T39 (Very Low)	Low

Restrict bucket replication [S3.CO25]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C86] Maintain a list of authorized buckets to have replication enabled, their target bucket, and replication type (i.e., encryption type, ownership, RTC, etc.) (ref).	Request the list of authorized buckets to have replication enabled, their target bucket and replication rights, its review process, and its review records.	Medium	S3.FC15	S3.T2 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C134, depends on S3.C86, assured by S3.C87,S3.C88,S3.C117] Ensure only authorized buckets have replication enabled and are configured correctly.	Request 1) the mechanism ensuring only authorized buckets have replication enabled with their correct configuration, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC15	S3.T2 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C87] Verify only authorized buckets have replication enabled with their correct configuration (e.g., using S3 Storage Lens	Configure replication on a non-authorized bucket; it should be detected.	Medium	S3.FC15	-	Medium

	CrossAccountReplicationRuleCount).					
Assurance (COSO) Detect (NIST CSF)	[S3.C88] Verify authorized buckets have the correct replication configuration.	Modify the configuration of an authorized replication; it should be detected.	High	S3.FC15	-	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C89] Maintain a list of IAM roles used for replication, ideally dedicated (e.g., using change management process on infrastructure-as-code).	Request the list of all IAM roles configured for replication.	Medium	S3.FC15	S3.T2 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C138, depends on S3.C89, assured by S3.C92] Ensure only authorized IAM roles are attached for each replication, ideally dedicated.	Request the mechanism ensuring authorized IAM roles are attached for each replication, and the evidence of its execution for all replication configurations.	Medium	S3.FC15	S3.T2 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C90, depends on S3.C89] Limit S3 access to the source and destination buckets and the replication rights of each authorized IAM role configured for replication.	Request the S3 access for each replication role, and how they align with the replication requirements.	Medium	S3.FC15	S3.T2 (Medium)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C91, depends on S3.C89] Limit access to authorized IAM roles used for replication, using the IAM ThreatModel (e.g., trust policy, and "iam:PassRole").	Request the IAM ThreatModel and the evidence of its application to the IAM roles used for replication.	High	S3.FC15	S3.T2 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C92] Verify only the authorized IAM role is configured for each replication.	Create/modify a replication with an unauthorized IAM role; it should be detected.	High	S3.FC15	-	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C116] Monitor abnormal behavior on replication CloudWatch metrics (i.e., "BytesPendingReplication", "OperationsPendingReplication", and "OperationsFailedReplication").	Create an abnormal replication, or block a replication; it should be detected.	Low	S3.FC15	S3.T2 (Low) S3.T49 (Medium)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C117] Verify all replicated buckets have metrics enabled on each replication rule (included by default in S3 RTC).	Modify the replication metric of an authorized replication; it should be detected.	Medium	S3.FC15	-	Medium

Scan objects used for input/output of a workflow for malware [S3.CO26]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Detective (COSO) Detect (NIST CSF)	[S3.C93, depends on S3.C58] If the bucket is used as an input or the output of a process, scan the objects for malware (e.g., using GuardDuty Malware Protection for S3, BucketAV, Cloud Storage Security, Trend Micro Cloud One, or your own scanning solution).	Inject a malware test file; it should be detected.	Medium	S3.FC5 S3.FC16	S3.T14 (Medium) S3.T15 (Low)	Medium

Control event receivers [S3.CO27]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C94] Maintain a list of authorized notification receivers (e.g., SNS topic, Lambda) for each bucket. You might use a simpler approach by using authorized account IDs to ensure all your receivers are in authorized AWS accounts.	Request the list of authorized notification receivers for each bucket, its review process, and its review records.	Low	S3.FC20	S3.T41 (Very Low)	Low

Directive (COSO) Protect (NIST CSF)	[S3.C135, depends on S3.C94, assured by S3.C95] Ensure only authorized notification receivers for each bucket are configured.	Request 1) the mechanism ensuring only authorized notification receivers for each bucket are configured, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC20	S3.T41 (High)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C95] Verify only authorized notification receiver(s) are configured for buckets.	Create an unauthorized receiver; it should be detected.	High	S3.FC20	-	Low

Control the data collected and the storage location of the inventory [S3.CO28]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C96] Maintain a list of authorized S3 buckets to receive the S3 Inventory of each bucket.	Request the list of authorized bucket(s) to receive S3 Inventory of each bucket, its review process, and its review records.	Low	S3.FC12	S3.T42 (Very Low)	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C136, depends on S3.C96, assured by S3.C97] Ensure only authorized S3 buckets are configured to receive S3 Inventory for each bucket.	Request 1) the mechanism ensuring only authorized S3 buckets are configured to receive S3 Inventory for each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC12	S3.T42 (Medium)	Very Low
Assurance (COSO) Detect (NIST CSF)	[S3.C97] Verify only authorized buckets are configured to receive inventory.	Create an unauthorized bucket to receive inventory; it should be detected.	High	S3.FC12	-	Very Low
Directive (COSO) Identify (NIST CSF)	[S3.C164, depends on S3.C26] Maintain the list of authorized optional fields allowed to be accessed by each authorized IAM principal.	Request the list of authorized optional fields allowed to be accessed by each authorized IAM principal, its review process, and its review records.	High	S3.FC12	S3.T42 (Very Low)	Very Low
Preventative (COSO) Protect (NIST CSF)	[S3.C165, depends on S3.C164] Prevent the creation of inventories without authorized optional fields (e.g., by using an SCP and/or an IAM policy on "s3:PutInventoryConfiguration" with an allow statement on "s3:InventoryAccessibleOptionalFields" = authorized optional fields only).	Create an inventory with an unauthorized optional field; it should be denied.	Low	S3.FC12	S3.T42 (Medium)	Very Low

Limit access from only authorized VPCs [S3.CO29]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C98] For each S3 bucket, maintain a list of VPCs authorized to access it.	For each S3 bucket, request the list of authorized VPCs to access it, its review process, and its review records.	Low	S3.FC1 S3.FC2 S3.FC5 S3.FC10	S3.T11 (Very Low) S3.T14 (Very Low) S3.T17 (Very Low) S3.T30 (Very Low) S3.T33 (Very Low) S3.T36 (Very Low) S3.T38 (Very Low) S3.T39 (Very Low)	Very High
Preventative (COSO) Protect (NIST CSF)	[S3.C99, depends on S3.C98, assured by S3.C100] Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is	Make a request to the bucket outside an authorized VPC; it should be denied.	Very Low	S3.FC1 S3.FC2 S3.FC5 S3.FC10	S3.T11 (Medium) S3.T14 (Medium) S3.T17 (Medium) S3.T30 (High)	Very High

	beyond the limit, use this condition on the access point).				S3.T33 (High) S3.T36 (High) S3.T38 (High) S3.T39 (High)	
Assurance (COSO) Detect (NIST CSF)	[S3.C100] Verify all buckets include a control to limit access to only authorized VPCs (e.g., using the AWS Config rule S3_BUCKET_POLICY_GRANTEE_CHECK).	Remove the control limiting access to only authorized VPC(s); it should be detected.	Medium	S3.FC1 S3.FC2 S3.FC5 S3.FC10	-	Very High

Control CloudFront access [S3.CO30]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C101] Maintain a list of authorized CloudFront distributions (via Origin Access Control) and associated bucket, access point, and/or Object Lambda Access Point.	Request the list of all authorized CloudFront distributions and associated S3 buckets, access points, and/or Object Lambda Access Points.	Low	S3.FC10	S3.T20 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C137, depends on S3.C101, assured by S3.C102] Ensure only authorized CloudFront distributions are associated with their authorized bucket, access point, and/or Object Lambda Access Point; and vice versa (e.g., using their bucket policy, centrally in an RCP applied to the OU or AWS account, with a deny statement, access point policy, resource policy for an Object Lambda Access Point, limiting the access to only the authorized distribution(s) in the SourceArn).	Request 1) the mechanism ensuring only authorized CloudFront distributions are associated with their authorized bucket, access point, and/or Object Lambda Access Point; and vice versa, 2) its records of execution for all new CloudFront distributions, and 3) the plan to move any older CloudFront distributions.	Medium	S3.FC10	S3.T20 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C102] Verify all associations of CloudFront distributions with buckets, access points, and/or Object Lambda Access Points are authorized (e.g., using the Macie finding: "Policy:IAMUser/S3BucketSharedWithCloudFront").	Create a non-authorized distribution or association; it should be detected.	High	S3.FC10	-	Medium

Protect and/or claim your domains and trademarks/copyrights [S3.CO31]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C103] Protect and/or claim your domains and trademarks/copyrights (by creating your trademark buckets and using the copyright infringement process from AWS).	Request the process by protecting and/or claiming your domains and trademarks/copyrights.	Medium	S3.FC28	S3.T23 (High)	Low

Restrict access point access to VPCs when in use [S3.CO32]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C104] Maintain a list of authorized access between VPCs, S3 access points, and S3.	Request the list of authorized access between VPC, S3 access points, and S3.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC26	S3.T7 (Very Low) S3.T9 (Very Low) S3.T10 (Very Low) S3.T11 (Very Low)	High

				S3.FC28 S3.FC33	S3.T28 (Very Low) S3.T37 (Very Low) S3.T54 (Very Low) S3.T55 (Very Low) S3.T56 (Very Low) S3.T60 (Very Low)	
Preventative (COSO) Protect (NIST CSF)	[S3.C105, depends on S3.C104, assured by S3.C109] Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy.	Make a request on an unauthorized access point or bucket; it should be denied.	Medium	S3.FC1 S3.FC5 S3.FC26 S3.FC28 S3.FC33	S3.T7 (Medium) S3.T9 (Very High) S3.T10 (Very High) S3.T11 (Medium) S3.T54 (Medium) S3.T55 (Medium)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C106, depends on S3.C104, assured by S3.C110] In bucket policies, or centrally in an RCP applied to the OU or AWS account, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn".	Query the bucket outside the S3 access point; it should be denied.	Medium	S3.FC1 S3.FC10 S3.FC26 S3.FC33	S3.T7 (Medium) S3.T28 (High) S3.T37 (High) S3.T55 (Medium) S3.T56 (Very High) S3.T60 (High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C107] Block the creation of non-VPC S3 access point "s3:CreateAccessPoint" (e.g., using IAM policies and SCPs with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}).	Make a request to create an internet-based access point; it should be denied.	Low	S3.FC1 S3.FC26	S3.T7 (Medium) S3.T28 (Very High) S3.T60 (High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C108, assured by S3.C111] Block all traffic from Internet-configured S3 access points (e.g., in their bucket policy, or centrally in an RCP applied to the OU or AWS account, using a deny statement with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}).	Create an internet-facing access point and try to access a bucket; it should be denied.	Low	S3.FC1 S3.FC26 S3.FC28	S3.T7 (Medium) S3.T10 (Medium) S3.T28 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C109] Verify only access points are used in the resource-level statements in VPC endpoints.	Create a VPC endpoint giving access to an S3 bucket directly, rather than an access point; it should be detected.	High	S3.FC1 S3.FC5 S3.FC26 S3.FC28 S3.FC33	-	High
Assurance (COSO) Detect (NIST CSF)	[S3.C110] Verify S3 bucket policies deny unauthorized S3 access points.	Remove/modify the deny on the bucket policy; it should be detected.	High	S3.FC1 S3.FC10 S3.FC26 S3.FC33	-	High
Assurance (COSO) Detect (NIST CSF)	[S3.C111] Verify all S3 access points are VPC-attached.	Create an internet-based access point; it should be detected.	Low	S3.FC1 S3.FC26 S3.FC28	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C112, depends on S3.C104] Block any object-related operations access to S3 buckets not through an access point (i.e., IAM policy, SCP, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on the condition "ArnNotLike": {"s3:DataAccessPointArn": "arn:aws:s3:*Region*:*AccountId*:accesspoint/*"}).	Access any S3 bucket without using an access point; it should be denied.	Low	S3.FC1 S3.FC5	S3.T7 (Medium) S3.T11 (High)	High

Restrict Batch access using dedicated IAM roles [S3.CO33]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C120] Maintain a list of IAM roles used for Batch jobs, ideally dedicated (e.g., using change management process on infrastructure-as-code).	Request the list of all IAM roles configured for Batch jobs.	Medium	S3.FC27	S3.T44 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C139, depends on S3.C120, assured by S3.C123] Ensure only an authorized IAM role is attached to each Batch job.	Request the mechanism ensuring only an authorized IAM role is attached to each Batch job, and the evidence of its execution for all new {resource}.	Medium	S3.FC27	S3.T44 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C121, depends on S3.C120] Limit access to only the required resources/permissions (e.g., source/destination buckets, Lambda functions) for each authorized IAM role configured for Batch jobs.	Request access only to the required resources/permissions for each Batch IAM role, and request information on how they are aligned with the replication requirements.	Medium	S3.FC27	S3.T44 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C122, depends on S3.C120] Limit access to authorized IAM roles used for Batch jobs, using the IAM ThreatModel (e.g., trust policy, and "iam:PassRole").	Request the IAM ThreatModel and the evidence of its application to the IAM roles used for Batch jobs.	Medium	S3.FC27	S3.T44 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C123] Verify only the authorized IAM role is configured for each Batch job.	Create/modify a Batch job with an unauthorized IAM role; it should be detected.	High	S3.FC27	-	Medium

Enforce only authorized Object Lambda Access Point and associated access [S3.CO34]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C125] Maintain a list of authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload.	Request the list of authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload, its review process, and its review records.	Low	S3.FC32	S3.T46 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C126, depends on S3.C125, assured by S3.C127] Ensure only authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload are created.	Request the mechanism ensuring only authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload, and the evidence of its execution.	Medium	S3.FC32	S3.T46 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C127] Verify only the authorized Lambda functions are configured on each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload.	Attach 1) an unauthorized Lambda function to an Object Lambda Access Point, 2) an unauthorized Object Lambda Access Point to an access point, 3) an authorized Lambda function with an unauthorized HEAD/LIST/GET request to an Object Lambda Access Point, and 4) an authorized Lambda function with an unauthorized payload; it should be detected.	Medium	S3.FC32	-	High
Directive (COSO) Protect (NIST CSF)	[S3.C128] Ensure Lambda functions configured on Object Lambda Access Point are secured using Lambda ThreatModel.	Request the mechanism ensuring Lambda ThreatModel and its application for Lambda functions associated with Object Lambda Access Points, and its records of execution.	Medium	S3.FC32	S3.T46 (High)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C129] Maintain a list of cross-account access on each Object Lambda Access Point.	Request the list of authorized cross-account access for each Object Lambda Access Point, its review process, and its review records.	Very Low	S3.FC32	S3.T46 (Very Low)	Medium
Directive (COSO)	[S3.C130, depends on S3.C129, assured by S3.C131] Ensure only authorized cross-account IAM entities are allowed	Request the mechanism ensuring only cross-account IAM	Low	S3.FC32	S3.T46 (Medium)	Medium

Protect (NIST CSF)	in the Object Lambda Access Point policy.	entities are allowed in the Object Lambda Access Point policy, and the evidence of its execution.				
Assurance (COSO) Detect (NIST CSF)	[S3.C131] Verify only the authorized cross-account IAM entities are allowed in the Object Lambda Access Point policy.	Add an unauthorized cross-account IAM entity on an Object Lambda Access Point policy; it should be detected.	High	S3.FC32	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C132, assured by S3.C133] Ensure CloudWatch is enabled for all Object Lambda Access Points.	Request the mechanism ensuring CloudWatch is enabled for all Object Lambda Access Points, and its records of execution.	Low	S3.FC32	S3.T46 (Low)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C133] Verify CloudWatch is enabled for all Object Lambda Access Points.	Create an Object Lambda Access Point without CloudWatch enabled; it should be detected.	Low	S3.FC32	-	Low

Deploy only authorized S3 websites and place them behind a CDN [S3.CO35]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C141] Maintain a list of authorized buckets to be configured as an S3 website endpoint.	Request the list of authorized buckets to be configured as a website endpoint, its review process, and its review records.	Low	S3.FC16	S3.T13 (Very Low) S3.T29 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C142, depends on S3.C141, assured by S3.C143] Ensure only authorized buckets are configured as an S3 website endpoint.	Request 1) the mechanism ensuring only authorized buckets are configured as S3 website endpoints, 2) its records of execution for all new website-enabled buckets, and 3) the plan to move any older website-enabled buckets.	Medium	S3.FC16	S3.T13 (Medium) S3.T29 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C143] Verify only authorized buckets are configured as S3 website endpoints.	Enable static website hosting on an unauthorized bucket; it should be detected.	Medium	S3.FC16	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C144, depends on S3.C141] Ensure S3 website endpoints are protected with HTTP headers (ref) using a CDN (e.g., CloudFront).	Request the mechanism ensuring S3 website endpoints are protected with HTTP headers.	Medium	S3.FC16	S3.T13 (High) S3.T29 (Very High)	High

Use an unguessable naming convention [S3.CO36]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C29] Use an unguessable naming convention for the email addresses of your AWS accounts (e.g., add a + sign and a random string to redirect the email to the same mailbox).	Review the naming convention for root account email and its implementation.	Medium	S3.FC28	S3.T19 (High)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C30] Use an unguessable naming convention for your IAM users and IAM roles (e.g., add a random string).	Review the naming convention for IAM users/roles and their implementation.	Medium	S3.FC28	S3.T24 (High)	Low

Disabling ACLs for all buckets [S3.CO37]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C152, assured by S3.C154] Ensure bucket ACLs and object ACLs are disabled on each	Request 1) the mechanism ensuring bucket ACL and object ACL are disabled on each bucket, 2) its records of execution	Medium	S3.FC1 S3.FC5	S3.T4 (Very High) S3.T6 (Very High)	Very High

	bucket (enabled by default for all new buckets after April 2023).	for all new buckets, and 3) the plan to move any older buckets.		S3.FC8 S3.FC24 S3.FC25	S3.T36 (Very High) S3.T43 (Very High) S3.T52 (Very High) S3.T53 (Very High)	
Preventative (COSO) Protect (NIST CSF)	[S3.C153] Prevent the creation of buckets with ACL enabled (e.g., by using an SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on StringNotEquals "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note that it does not block someone from enabling an ACL afterward via PutBucketOwnershipControls.	Create a bucket with ACL enabled; it should be denied.	Low	S3.FC1 S3.FC5 S3.FC8 S3.FC24 S3.FC25	S3.T4 (High) S3.T6 (High) S3.T36 (High) S3.T43 (High) S3.T52 (High) S3.T53 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C154] Verify bucket ACL and object ACL are disabled on each bucket (e.g., using the AWS Config rule S3_BUCKET_ACL_PROHIBITED for bucket ACL, S3 Storage Lens ObjectOwnershipBucketOwnerEnforcedBucketCount, or S3 Inventory, which includes object ACL metadata).	Create/modify a bucket to enable ACL; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC8 S3.FC24 S3.FC25	-	Very High

Ensure all requests are blocked from unauthorized service roles [S3.CO38]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C155, assured by S3.C156] Ensure all requests are blocked from AWS service roles that do not require access (e.g., by denying all requests with the principal "arn:aws:iam::*:*/AWSServiceRoleFor*" on S3 bucket policies).	Request 1) the mechanism ensuring only authorized AWS service roles can access each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC28	S3.T57 (Very High)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C156] Verify all requests from unauthorized service roles are blocked.	Remove the statement on a bucket policy denying all unauthorized service roles; it should be detected.	Medium	S3.FC28	-	Low

Enforce S3 server access logging on buckets [S3.CO39]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Detect (NIST CSF)	[S3.C166, depends on S3.C58] Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Request 1) the mechanism ensuring server access logging is enabled in relevant buckets, 2) its records of execution for all new relevant buckets, and 3) the plan to move any older relevant buckets.	Low	S3.FC1 S3.FC5 S3.FC8	S3.T1 (Low) S3.T4 (Low) S3.T5 (Low) S3.T6 (Low) S3.T7 (Low) S3.T8 (Low) S3.T9 (Low) S3.T11 (Low) S3.T12 (Low) S3.T16 (Low) S3.T21 (Low) S3.T31 (Low) S3.T34 (Low) S3.T35 (Low) S3.T36 (Low)	Medium

					S3.T39 (Low)	
Detective (COSO) Detect (NIST CSF)	[S3.C157, depends on S3.C58] Monitor PutBucketLogging to detect bucket server access logging changes, including deactivation and bucket changes (i.e., using the CloudTrail event "PutBucketLogging" and the "requestParameters.BucketLoggingStatus" field to examine the lack of the "LoggingEnabled" key or an unauthorized bucket in "requestParameters.BucketLoggingStatus.LoggingEnabled.TargetBucket").	Make a call to 1) disable bucket logging, or 2) change to an unauthorized bucket; it should be detected.	Low	S3.FC19	S3.T59 (Medium)	Very Low

Restrict access points to authorized AWS accounts [S3.CO40]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C158] Maintain a list of authorized S3 buckets and their AWS accounts for cross-account access points.	Request the list of authorized S3 buckets and their AWS account for cross-account access points, its review process, and its review records.	Low	S3.FC26	S3.T60 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C159, depends on S3.C158, assured by S3.C161] Ensure only authorized S3 buckets and their AWS accounts for cross-account access points are configured.	Request 1) the mechanism ensuring only authorized S3 buckets and their AWS account for cross-account access points are configured, 2) its records of execution for all new S3 buckets and their AWS accounts for cross-account access points, and 3) the plan to move any older S3 buckets and their AWS accounts for cross-account access points.	Medium	S3.FC26	S3.T60 (High)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C160, depends on S3.C158] Monitor CreateAccessPoint to detect unauthorized buckets or AWS accounts (i.e., using CloudTrail event CreateAccessPoint and its fields "requestParameters.CreateAccessPointRequest.Bucket" and "requestParameters.CreateAccessPointRequest.BucketAccountId").	Call the API to create a cross-account access point with an unauthorized 1) bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.	Medium	S3.FC26	S3.T60 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C161] Verify only authorized S3 buckets and their AWS accounts for cross-account access points are used.	Deploy a cross-account access point with an unauthorized 1) bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.	Medium	S3.FC26	-	Medium

Compliance Mapping

PCI DSS v4

PCI DSS v4	Control Objectives	Controls				
		Very High	High	Medium	Low	Very Low
1.1	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO33] Restrict Batch access using dedicated IAM roles	-	S3.C8 S3.C120 S3.C122	S3.C16 S3.C121 S3.C123 S3.C139	-	-
1.2.1	[S3.CO27] Control event receivers [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	-	S3.C125 S3.C126 S3.C127	S3.C128 S3.C129 S3.C130 S3.C131	S3.C94 S3.C95 S3.C135 S3.C132 S3.C133 S3.C155 S3.C156	-
1.2.2	[S3.CO1] Enforce encryption in transit [S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO30] Control CloudFront access [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119 S3.C8 S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C3 S3.C5 S3.C22 S3.C23 S3.C24 S3.C101 S3.C102 S3.C137	S3.C4 S3.C18 S3.C21 S3.C25	-
1.2.3	[S3.CO2] Block S3 endpoints in your corporate perimeter security	-	S3.C8	-	-	-
1.2.4 1.2.5	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO24] Block all requests not using an HTTP authorization header, if not explicitly authorized [S3.CO33] Restrict Batch access using dedicated IAM roles	-	S3.C8 S3.C120 S3.C122	S3.C16 S3.C84 S3.C121 S3.C123 S3.C139	S3.C85	-
1.2.6	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO24] Block all requests not using an HTTP authorization header, if not explicitly authorized	-	S3.C8	S3.C84	S3.C85	-

1.2.7	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO27] Control event receivers [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	-	S3.C8 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C16 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131	S3.C94 S3.C95 S3.C135 S3.C132 S3.C133 S3.C155 S3.C156	-
1.2.8	[S3.CO2] Block S3 endpoints in your corporate perimeter security	-	S3.C8	-	-	-
1.2.10	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	-	S3.C8 S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131	S3.C18 S3.C21 S3.C25 S3.C132 S3.C133 S3.C155 S3.C156	-
1.3	[S3.CO2] Block S3 endpoints in your corporate perimeter security	-	S3.C8	-	-	-
1.3.1 1.3.2	[S3.CO1] Enforce encryption in transit [S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO30] Control CloudFront access [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119 S3.C8 S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C3 S3.C5 S3.C22 S3.C23 S3.C24 S3.C101 S3.C102 S3.C137	S3.C4 S3.C18 S3.C21 S3.C25	-
1.3.3	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO24] Block all requests not using an HTTP authorization header, if not explicitly authorized	-	S3.C8	S3.C84	S3.C85	-
1.4	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO24] Block all requests not using an HTTP authorization header, if not explicitly authorized	S3.C98 S3.C99 S3.C100	S3.C8 S3.C17 S3.C19	S3.C22 S3.C23 S3.C24	S3.C18 S3.C21 S3.C25	-

	[S3.CO29] Limit access from only authorized VPCs [S3.CO30] Control CloudFront access [S3.CO32] Restrict access point access to VPCs when in use		S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C84 S3.C101 S3.C102 S3.C137	S3.C85	
1.4.1	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO24] Block all requests not using an HTTP authorization header, if not explicitly authorized	-	S3.C8	S3.C84	S3.C85	-
1.4.2	[S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C10 S3.C118 S3.C22 S3.C23 S3.C24	S3.C18 S3.C21 S3.C25	-
1.4.3	[S3.CO13] Block direct public access [S3.CO30] Control CloudFront access	S3.C49 S3.C50 S3.C51 S3.C52 S3.C53 S3.C54 S3.C173	S3.C47 S3.C48	S3.C101 S3.C102 S3.C137	-	-
1.4.4	[S3.CO2] Block S3 endpoints in your corporate perimeter security	-	S3.C8	-	-	-
1.4.5	[S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO33] Restrict Batch access using dedicated IAM roles	-	S3.C120 S3.C122	S3.C16 S3.C121 S3.C123 S3.C139	-	-
1.5	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO24] Block all requests not using an HTTP authorization header, if not explicitly authorized [S3.CO33] Restrict Batch access using dedicated IAM roles	-	S3.C8 S3.C120 S3.C122	S3.C16 S3.C84 S3.C121 S3.C123 S3.C139	S3.C85	-
1.5.1	[S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO33] Restrict Batch access using dedicated IAM roles	-	S3.C120 S3.C122	S3.C16 S3.C121 S3.C123 S3.C139	-	-

2.2.1	[S3.CO5] Identify and ensure the protection of all external buckets hosting your objects	S3.C11	S3.C15 S3.C114	S3.C12 S3.C13 S3.C14 S3.C115	-	-
2.2.2	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO5] Identify and ensure the protection of all external buckets hosting your objects [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO24] Block all requests not using an HTTP authorization header, if not explicitly authorized	S3.C11	S3.C8 S3.C15 S3.C114	S3.C12 S3.C13 S3.C14 S3.C115 S3.C16 S3.C84	S3.C85	-
2.2.4	[S3.CO5] Identify and ensure the protection of all external buckets hosting your objects	S3.C11	S3.C15 S3.C114	S3.C12 S3.C13 S3.C14 S3.C115	-	-
2.2.5	[S3.CO1] Enforce encryption in transit [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO30] Control CloudFront access [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119 S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C3 S3.C5 S3.C22 S3.C23 S3.C24 S3.C101 S3.C102 S3.C137	S3.C4 S3.C18 S3.C21 S3.C25	-
2.3	[S3.CO1] Enforce encryption in transit	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119	S3.C3 S3.C5	S3.C4	-
2.3.1	[S3.CO1] Enforce encryption in transit [S3.CO9] Block requests with KMS keys from unauthorized AWS accounts [S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119 S3.C31 S3.C32 S3.C61 S3.C64 S3.C65 S3.C66 S3.C67	S3.C3 S3.C5 S3.C62 S3.C140 S3.C72	S3.C4 S3.C33 S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169

			S3.C145 S3.C146 S3.C147 S3.C167 S3.C168			
2.3.2	[S3.CO19] Have a process to apply legal holds [S3.CO20] Protect data integrity using S3 Object Lock	-	S3.C74 S3.C75 S3.C76 S3.C77	S3.C73	-	-
3.2.1	[S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data	-	S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168	S3.C62 S3.C140 S3.C72	S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169
3.3.2	[S3.CO5] Identify and ensure the protection of all external buckets hosting your objects [S3.CO15] Identify and ensure the protection of all internal buckets hosting your objects [S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data	S3.C11 S3.C58	S3.C15 S3.C114 S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168	S3.C12 S3.C13 S3.C14 S3.C115 S3.C59 S3.C171 S3.C172 S3.C62 S3.C140 S3.C72	S3.C63 S3.C68 S3.C148 S3.C162	S3.C60 S3.C163 S3.C169
3.5.1	[S3.CO9] Block requests with KMS keys from unauthorized AWS accounts [S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data	-	S3.C31 S3.C32 S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168	S3.C62 S3.C140 S3.C72	S3.C33 S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169
3.5.1.1	[S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data	-	S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145	S3.C62 S3.C140 S3.C72	S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169

			S3.C146 S3.C147 S3.C167 S3.C168			
3.5.1.2 3.5.1.3	[S3.CO9] Block requests with KMS keys from unauthorized AWS accounts [S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data	-	S3.C31 S3.C32 S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168	S3.C62 S3.C140 S3.C72	S3.C33 S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169
3.6.1 3.6.1.1 3.6.1.2 3.6.1.3 3.6.1.4 3.7.1 3.7.2 3.7.3 3.7.4	[S3.CO1] Enforce encryption in transit [S3.CO9] Block requests with KMS keys from unauthorized AWS accounts [S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119 S3.C31 S3.C32 S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168	S3.C3 S3.C5 S3.C62 S3.C140 S3.C72	S3.C4 S3.C33 S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169
3.7.5	[S3.CO9] Block requests with KMS keys from unauthorized AWS accounts [S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data	-	S3.C31 S3.C32 S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168	S3.C62 S3.C140 S3.C72	S3.C33 S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169
3.7.6 3.7.7 3.7.9	[S3.CO1] Enforce encryption in transit	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119	S3.C3 S3.C5	S3.C4	-

4.1 4.2.1	[S3.CO9] Block requests with KMS keys from unauthorized AWS accounts [S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data	-	S3.C31 S3.C32 S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168	S3.C62 S3.C140 S3.C72	S3.C33 S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169
4.2.1.1	[S3.CO1] Enforce encryption in transit	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119	S3.C3 S3.C5	S3.C4	-
4.2.1.2 4.2.2	[S3.CO26] Scan objects used for input/output of a workflow for malware	-	-	S3.C93	-	-
5.1.2 5.2.1 5.2.2 5.2.3 5.2.3.1 5.3.1 5.3.2 5.3.2.1 5.3.3 5.3.4 5.3.5	[S3.CO31] Protect and/or claim your domains and trademarks/copyrights	-	-	-	S3.C103	-
5.4.1	[S3.CO12] Enforce secure SDLC processes	-	S3.C113	S3.C44 S3.C46	S3.C41 S3.C42	S3.C43 S3.C45
6.2 6.2.1 6.2.2 6.2.3 6.2.3.1 6.2.4 6.3.1	[S3.CO25] Restrict bucket replication	-	-	S3.C86 S3.C87 S3.C88 S3.C89 S3.C90 S3.C91 S3.C92 S3.C117 S3.C134 S3.C138	S3.C116	-
6.3.2	[S3.CO12] Enforce secure SDLC processes	-	S3.C113	S3.C44 S3.C46	S3.C41 S3.C42	S3.C43 S3.C45
6.4.1 6.4.2	[S3.CO27] Control event receivers [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	-	S3.C125 S3.C126 S3.C127	S3.C128 S3.C129 S3.C130	S3.C94 S3.C95 S3.C135	-

				S3.C131	S3.C132 S3.C133 S3.C155 S3.C156	
6.5 6.5.1	[S3.CO5] Identify and ensure the protection of all external buckets hosting your objects [S3.CO27] Control event receivers [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	S3.C11	S3.C15 S3.C114 S3.C125 S3.C126 S3.C127	S3.C12 S3.C13 S3.C14 S3.C115 S3.C128 S3.C129 S3.C130 S3.C131	S3.C94 S3.C95 S3.C135 S3.C132 S3.C133 S3.C155 S3.C156	-
6.5.2	[S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO12] Enforce secure SDLC processes [S3.CO27] Control event receivers [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	-	S3.C113 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C16 S3.C44 S3.C46 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131	S3.C41 S3.C42 S3.C94 S3.C95 S3.C135 S3.C132 S3.C133 S3.C155 S3.C156	S3.C43 S3.C45
6.5.6	[S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO14] Block bucket ACL [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO37] Disabling ACLs for all buckets [S3.CO38] Ensure all requests are blocked from unauthorized service roles [S3.CO40] Restrict access points to authorized AWS accounts	S3.C152 S3.C153 S3.C154	S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C55 S3.C57 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131 S3.C158 S3.C159 S3.C160 S3.C161	S3.C18 S3.C21 S3.C25 S3.C56 S3.C132 S3.C133 S3.C155 S3.C156	-
7.1 7.2	[S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO10] Block changes to make an object public via object ACL [S3.CO14] Block bucket ACL [S3.CO20] Protect data integrity using S3 Object Lock [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO37] Disabling ACLs for all buckets [S3.CO38] Ensure all requests are blocked from unauthorized service roles [S3.CO40] Restrict access points to authorized AWS accounts	S3.C152 S3.C153 S3.C154	S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C34 S3.C36 S3.C55	S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129	S3.C18 S3.C21 S3.C25 S3.C35 S3.C37 S3.C56 S3.C132 S3.C133 S3.C155 S3.C156	-

			S3.C57 S3.C74 S3.C75 S3.C76 S3.C77 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C130 S3.C131 S3.C158 S3.C159 S3.C160 S3.C161		
7.2.1	[S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO10] Block changes to make an object public via object ACL [S3.CO20] Protect data integrity using S3 Object Lock [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	-	S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C34 S3.C36 S3.C74 S3.C75 S3.C76 S3.C77 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131	S3.C18 S3.C21 S3.C25 S3.C35 S3.C37 S3.C132 S3.C133 S3.C155 S3.C156	-
7.2.2	[S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	-	S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131	S3.C18 S3.C21 S3.C25 S3.C132 S3.C133 S3.C155 S3.C156	-
7.2.3	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks	-	S3.C26 S3.C149 S3.C150 S3.C151	S3.C27 S3.C28 S3.C170	-	-
7.2.4	[S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO10] Block changes to make an object public via object ACL [S3.CO20] Protect data integrity using S3 Object Lock	-	S3.C17 S3.C19 S3.C20 S3.C124	S3.C22 S3.C23 S3.C24 S3.C27	S3.C18 S3.C21 S3.C25 S3.C35	-

	[S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles		S3.C26 S3.C149 S3.C150 S3.C151 S3.C34 S3.C36 S3.C74 S3.C75 S3.C76 S3.C77 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C28 S3.C170 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131	S3.C37 S3.C132 S3.C133 S3.C155 S3.C156	
7.2.5	[S3.CO3] Enable S3 data events in AWS CloudTrail [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO10] Block changes to make an object public via object ACL [S3.CO17] Protect primary data against loss [S3.CO20] Protect data integrity using S3 Object Lock [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles [S3.CO39] Enforce S3 server access logging on buckets	-	S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C34 S3.C36 S3.C69 S3.C70 S3.C74 S3.C75 S3.C76 S3.C77 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C9 S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C71 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131 S3.C166	S3.C18 S3.C21 S3.C25 S3.C35 S3.C37 S3.C132 S3.C133 S3.C155 S3.C156	S3.C157
7.2.6	[S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO14] Block bucket ACL [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO37] Disabling ACLs for all buckets [S3.CO38] Ensure all requests are blocked from unauthorized service roles [S3.CO40] Restrict access points to authorized AWS accounts	S3.C152 S3.C153 S3.C154	S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C55 S3.C57 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131 S3.C158 S3.C159	S3.C18 S3.C21 S3.C25 S3.C56 S3.C132 S3.C133 S3.C155 S3.C156	-

				S3.C160 S3.C161		
7.3 7.3.1 7.3.2 7.3.3	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO14] Block bucket ACL [S3.CO37] Disabling ACLs for all buckets [S3.CO40] Restrict access points to authorized AWS accounts	S3.C152 S3.C153 S3.C154	S3.C26 S3.C149 S3.C150 S3.C151 S3.C55 S3.C57	S3.C27 S3.C28 S3.C170 S3.C158 S3.C159 S3.C160 S3.C161	S3.C56	-
8.1 8.2 8.2.2	[S3.CO40] Restrict access points to authorized AWS accounts	-	-	S3.C158 S3.C159 S3.C160 S3.C161	-	-
8.2.3	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks	-	S3.C26 S3.C149 S3.C150 S3.C151	S3.C27 S3.C28 S3.C170	-	-
8.2.4 8.2.6	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO14] Block bucket ACL [S3.CO37] Disabling ACLs for all buckets [S3.CO40] Restrict access points to authorized AWS accounts	S3.C152 S3.C153 S3.C154	S3.C26 S3.C149 S3.C150 S3.C151 S3.C55 S3.C57	S3.C27 S3.C28 S3.C170 S3.C158 S3.C159 S3.C160 S3.C161	S3.C56	-
8.3	[S3.CO1] Enforce encryption in transit [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO16] Enforce encryption at rest [S3.CO18] Encrypt or tokenize critical data [S3.CO33] Restrict Batch access using dedicated IAM roles	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119 S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168 S3.C120 S3.C122	S3.C3 S3.C5 S3.C16 S3.C62 S3.C140 S3.C72 S3.C121 S3.C123 S3.C139	S3.C4 S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169
8.3.2	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO14] Block bucket ACL [S3.CO37] Disabling ACLs for all buckets [S3.CO40] Restrict access points to authorized AWS accounts	S3.C152 S3.C153 S3.C154	S3.C26 S3.C149 S3.C150 S3.C151 S3.C55 S3.C57	S3.C27 S3.C28 S3.C170 S3.C158 S3.C159 S3.C160 S3.C161	S3.C56	-

8.3.3	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks	-	S3.C26 S3.C149 S3.C150 S3.C151	S3.C27 S3.C28 S3.C170	-	-
8.3.8	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO14] Block bucket ACL [S3.CO37] Disabling ACLs for all buckets [S3.CO40] Restrict access points to authorized AWS accounts	S3.C152 S3.C153 S3.C154	S3.C26 S3.C149 S3.C150 S3.C151 S3.C55 S3.C57	S3.C27 S3.C28 S3.C170 S3.C158 S3.C159 S3.C160 S3.C161	S3.C56	-
8.3.9	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks	-	S3.C26 S3.C149 S3.C150 S3.C151	S3.C27 S3.C28 S3.C170	-	-
8.3.10	[S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO33] Restrict Batch access using dedicated IAM roles	-	S3.C120 S3.C122	S3.C16 S3.C121 S3.C123 S3.C139	-	-
8.5	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO14] Block bucket ACL [S3.CO37] Disabling ACLs for all buckets [S3.CO40] Restrict access points to authorized AWS accounts	S3.C152 S3.C153 S3.C154	S3.C26 S3.C149 S3.C150 S3.C151 S3.C55 S3.C57	S3.C27 S3.C28 S3.C170 S3.C158 S3.C159 S3.C160 S3.C161	S3.C56	-
8.5.1	[S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO10] Block changes to make an object public via object ACL [S3.CO20] Protect data integrity using S3 Object Lock [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	-	S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C34 S3.C36 S3.C74 S3.C75 S3.C76 S3.C77 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131	S3.C18 S3.C21 S3.C25 S3.C35 S3.C37 S3.C132 S3.C133 S3.C155 S3.C156	-
8.6 8.6.1	[S3.CO5] Identify and ensure the protection of all external buckets hosting your objects [S3.CO15] Identify and ensure the protection of all internal buckets hosting your objects [S3.CO16] Enforce encryption at rest	S3.C11 S3.C58	S3.C15 S3.C114 S3.C61	S3.C12 S3.C13 S3.C14	S3.C63 S3.C68 S3.C148	S3.C60 S3.C163 S3.C169

	[S3.CO18] Encrypt or tokenize critical data		S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168	S3.C115 S3.C59 S3.C171 S3.C172 S3.C62 S3.C140 S3.C72	S3.C162	
9.4 9.4.1	[S3.CO11] Prevent deletion of buckets [S3.CO17] Protect primary data against loss	-	S3.C38 S3.C39 S3.C69 S3.C70	S3.C71	-	S3.C40
9.4.1.1 9.4.1.2	[S3.CO5] Identify and ensure the protection of all external buckets hosting your objects	S3.C11	S3.C15 S3.C114	S3.C12 S3.C13 S3.C14 S3.C115	-	-
9.4.2	[S3.CO19] Have a process to apply legal holds [S3.CO20] Protect data integrity using S3 Object Lock	-	S3.C74 S3.C75 S3.C76 S3.C77	S3.C73	-	-
9.4.6 9.4.7	[S3.CO25] Restrict bucket replication	-	-	S3.C86 S3.C87 S3.C88 S3.C89 S3.C90 S3.C91 S3.C92 S3.C117 S3.C134 S3.C138	S3.C116	-
9.5.1 9.5.1.1	[S3.CO21] Remove incomplete multipart uploads	-	-	-	S3.C78 S3.C79	-
9.5.1.2 9.5.1.2.1	[S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C10 S3.C118 S3.C22 S3.C23 S3.C24	S3.C18 S3.C21 S3.C25	-
10.1	[S3.CO3] Enable S3 data events in AWS CloudTrail	S3.C98	S3.C17	S3.C9	S3.C18	S3.C157

	[S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO17] Protect primary data against loss [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO39] Enforce S3 server access logging on buckets	S3.C99 S3.C100	S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C69 S3.C70 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112 S3.C120 S3.C122	S3.C10 S3.C118 S3.C16 S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C71 S3.C121 S3.C123 S3.C139 S3.C166	S3.C21 S3.C25	
10.2	[S3.CO3] Enable S3 data events in AWS CloudTrail [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO17] Protect primary data against loss [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO39] Enforce S3 server access logging on buckets	-	S3.C26 S3.C149 S3.C150 S3.C151 S3.C69 S3.C70 S3.C120 S3.C122	S3.C9 S3.C16 S3.C27 S3.C28 S3.C170 S3.C71 S3.C121 S3.C123 S3.C139 S3.C166	-	S3.C157
10.2.1 10.2.1.1	[S3.CO3] Enable S3 data events in AWS CloudTrail [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO17] Protect primary data against loss [S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles [S3.CO39] Enforce S3 server access logging on buckets	-	S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C69 S3.C70 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127	S3.C9 S3.C16 S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170 S3.C71 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131 S3.C166	S3.C18 S3.C21 S3.C25 S3.C132 S3.C133 S3.C155 S3.C156	S3.C157
10.2.1.2	[S3.CO3] Enable S3 data events in AWS CloudTrail [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO17] Protect primary data against loss	-	S3.C26 S3.C149 S3.C150 S3.C151	S3.C9 S3.C16 S3.C27 S3.C28	-	S3.C157

	[S3.CO33] Restrict Batch access using dedicated IAM roles [S3.CO39] Enforce S3 server access logging on buckets		S3.C69 S3.C70 S3.C120 S3.C122	S3.C170 S3.C71 S3.C121 S3.C123 S3.C139 S3.C166		
10.2.1.3 10.2.1.4 10.2.1.5 10.2.1.6 10.2.1.7 10.2.2	[S3.CO3] Enable S3 data events in AWS CloudTrail [S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO17] Protect primary data against loss [S3.CO39] Enforce S3 server access logging on buckets	-	S3.C69 S3.C70	S3.C9 S3.C10 S3.C118 S3.C71 S3.C166	-	S3.C157
10.3 10.3.1 10.3.2 10.3.3	[S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C10 S3.C118 S3.C22 S3.C23 S3.C24	S3.C18 S3.C21 S3.C25	-
10.3.4 10.4 10.4.1 10.4.1.1 10.4.2 10.4.2.1 10.4.3	[S3.CO19] Have a process to apply legal holds [S3.CO20] Protect data integrity using S3 Object Lock	-	S3.C74 S3.C75 S3.C76 S3.C77	S3.C73	-	-
10.5.1	[S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO33] Restrict Batch access using dedicated IAM roles	-	S3.C120 S3.C122	S3.C16 S3.C121 S3.C123 S3.C139	-	-
10.6 10.6.1 10.6.2 10.6.3	[S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use [S3.CO33] Restrict Batch access using dedicated IAM roles	S3.C98 S3.C99 S3.C100	S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C10 S3.C118 S3.C16 S3.C22 S3.C23 S3.C24 S3.C121 S3.C123 S3.C139	S3.C18 S3.C21 S3.C25	-

			S3.C120 S3.C122			
10.7 10.7.1 10.7.2 10.7.3	[S3.CO1] Enforce encryption in transit [S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO6] Model the threats on all AWS services accessing S3 [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO25] Restrict bucket replication [S3.CO29] Limit access from only authorized VPCs [S3.CO30] Control CloudFront access [S3.CO32] Restrict access point access to VPCs when in use [S3.CO33] Restrict Batch access using dedicated IAM roles	S3.C98 S3.C99 S3.C100	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119 S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112 S3.C120 S3.C122	S3.C3 S3.C5 S3.C10 S3.C118 S3.C16 S3.C22 S3.C23 S3.C24 S3.C86 S3.C87 S3.C88 S3.C89 S3.C90 S3.C91 S3.C92 S3.C117 S3.C134 S3.C138 S3.C101 S3.C102 S3.C137 S3.C121 S3.C123 S3.C139	S3.C4 S3.C18 S3.C21 S3.C25 S3.C116	-
11.2	[S3.CO1] Enforce encryption in transit [S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO30] Control CloudFront access [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119 S3.C8 S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C3 S3.C5 S3.C22 S3.C23 S3.C24 S3.C101 S3.C102 S3.C137	S3.C4 S3.C18 S3.C21 S3.C25	-
11.2.1	[S3.CO1] Enforce encryption in transit [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO25] Restrict bucket replication [S3.CO29] Limit access from only authorized VPCs [S3.CO30] Control CloudFront access [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119 S3.C17	S3.C3 S3.C5 S3.C22 S3.C23 S3.C24 S3.C86	S3.C4 S3.C18 S3.C21 S3.C25 S3.C116	-

			S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C87 S3.C88 S3.C89 S3.C90 S3.C91 S3.C92 S3.C117 S3.C134 S3.C138 S3.C101 S3.C102 S3.C137		
11.2.2	[S3.CO12] Enforce secure SDLC processes [S3.CO19] Have a process to apply legal holds [S3.CO20] Protect data integrity using S3 Object Lock	-	S3.C113 S3.C74 S3.C75 S3.C76 S3.C77	S3.C44 S3.C46 S3.C73	S3.C41 S3.C42	S3.C43 S3.C45
11.4.1	[S3.CO12] Enforce secure SDLC processes	-	S3.C113	S3.C44 S3.C46	S3.C41 S3.C42	S3.C43 S3.C45
11.4.4	[S3.CO2] Block S3 endpoints in your corporate perimeter security	-	S3.C8	-	-	-
11.4.5 11.4.6	[S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C10 S3.C118 S3.C22 S3.C23 S3.C24	S3.C18 S3.C21 S3.C25	-
11.5	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C8 S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C10 S3.C118 S3.C22 S3.C23 S3.C24	S3.C18 S3.C21 S3.C25	-
11.5.1	[S3.CO4] Monitor S3 with Amazon GuardDuty and Macie	S3.C98	S3.C17	S3.C10	S3.C18	-

	[S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use	S3.C99 S3.C100	S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C118 S3.C22 S3.C23 S3.C24	S3.C21 S3.C25	
11.5.1.1 11.5.2	[S3.CO6] Model the threats on all AWS services accessing S3	-	-	S3.C16	-	-
12.3 12.3.1 12.3.2	[S3.CO16] Enforce encryption at rest	-	S3.C61 S3.C64 S3.C65 S3.C66 S3.C67 S3.C145 S3.C146 S3.C147 S3.C167 S3.C168	S3.C62 S3.C140	S3.C63 S3.C68 S3.C148 S3.C162	S3.C163 S3.C169
12.3.3	[S3.CO19] Have a process to apply legal holds [S3.CO35] Deploy only authorized S3 websites and place them behind a CDN	-	S3.C141 S3.C144	S3.C73 S3.C142 S3.C143	-	-
12.4.2	[S3.CO12] Enforce secure SDLC processes	-	S3.C113	S3.C44 S3.C46	S3.C41 S3.C42	S3.C43 S3.C45
12.4.2.1	[S3.CO19] Have a process to apply legal holds	-	-	S3.C73	-	-
12.5 12.5.1	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO19] Have a process to apply legal holds	-	S3.C8	S3.C73	-	-
12.5.2	[S3.CO1] Enforce encryption in transit	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119	S3.C3 S3.C5	S3.C4	-
12.10.1 12.10.5	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks	-	S3.C26 S3.C149 S3.C150 S3.C151	S3.C27 S3.C28 S3.C170	-	-
15.1	[S3.CO2] Block S3 endpoints in your corporate perimeter security	-	S3.C8	-	-	-
A1.1.4	[S3.CO12] Enforce secure SDLC processes	-	S3.C113	S3.C44 S3.C46	S3.C41 S3.C42	S3.C43 S3.C45

A1.2.3	[S3.CO1] Enforce encryption in transit	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119	S3.C3 S3.C5	S3.C4	-
A2.1 A2.1.1 A2.1.2	[S3.CO19] Have a process to apply legal holds	-	-	S3.C73	-	-
A3.1 A3.1.1 A3.2	[S3.CO2] Block S3 endpoints in your corporate perimeter security [S3.CO19] Have a process to apply legal holds	-	S3.C8	S3.C73	-	-
A3.2.1	[S3.CO27] Control event receivers [S3.CO34] Enforce only authorized Object Lambda Access Point and associated access [S3.CO38] Ensure all requests are blocked from unauthorized service roles	-	S3.C125 S3.C126 S3.C127	S3.C128 S3.C129 S3.C130 S3.C131	S3.C94 S3.C95 S3.C135 S3.C132 S3.C133 S3.C155 S3.C156	-
A3.2.2.1	[S3.CO19] Have a process to apply legal holds	-	-	S3.C73	-	-
A3.2.3	[S3.CO2] Block S3 endpoints in your corporate perimeter security	-	S3.C8	-	-	-
A3.2.4	[S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C17 S3.C19 S3.C20 S3.C124 S3.C26 S3.C149 S3.C150 S3.C151 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109 S3.C110 S3.C111 S3.C112	S3.C10 S3.C118 S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C170	S3.C18 S3.C21 S3.C25	-
A3.2.6.1	[S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPCs when in use	S3.C98 S3.C99 S3.C100	S3.C17 S3.C19 S3.C20 S3.C124 S3.C104 S3.C105 S3.C106 S3.C107 S3.C108 S3.C109	S3.C10 S3.C118 S3.C22 S3.C23 S3.C24	S3.C18 S3.C21 S3.C25	-

			S3.C110 S3.C111 S3.C112			
A3.3.1	[S3.CO6] Model the threats on all AWS services accessing S3	-	-	S3.C16	-	-
A3.3.1.2	[S3.CO8] Limit the IAM entities allowed to use the IAM actions required to execute attacks	-	S3.C26 S3.C149 S3.C150 S3.C151	S3.C27 S3.C28 S3.C170	-	-

The Control Objectives are mapped to the Secure Controls Framework (SCF), provided under Attribution-NoDerivatives 4.0 International (CC BY-ND 4.0). Compliance mappings are not designed to fully ensure compliance with a specific governance or compliance standard. You are responsible for making your own assessment of whether your use of the Services meets applicable legal and regulatory requirements.

You can change the displayed Compliance mappings by contacting chatbot@trustoncloud.com.

Appendixes

Appendix 1 - Prioritized list for control implementation

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C11] Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel).	Request the list of all external buckets authorized to host your objects, their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), their data classification, and the mechanism used to ensure the security of those buckets.	Medium	S3.FC1 S3.FC5 S3.FC16	S3.T1 (Very Low) S3.T3 (High) S3.T5 (Very Low) S3.T6 (Low) S3.T7 (Very Low) S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Low) S3.T14 (Very Low) S3.T15 (Very Low) S3.T21 (Very Low) S3.T31 (High) S3.T43 (Very High)	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C49, assured by S3.C50] Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Request 1) the mechanism ensuring account-level S3 Block Public Access is enabled on all AWS accounts, 2) its records of execution for all new AWS accounts, and 3) the plan to move any older AWS accounts.	Very Low	S3.FC5 S3.FC8 S3.FC10	S3.T4 (High) S3.T14 (High) S3.T36 (Very High) S3.T37 (Very High) S3.T38 (Medium)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C50] Verify account-level S3 Block Public Access is enabled on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (e.g., using the AWS Config rule: S3_ACCOUNT_LEVEL_PUBLIC_ACCESS_BLOCKS).	Remove the account-level S3 Block Public Access of an AWS account; it should be detected.	Very Low	S3.FC5 S3.FC8 S3.FC10	-	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C51, assured by S3.C52] Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (enabled by default for all new buckets after April 2023).	Request 1) the mechanism ensuring S3 Block Public Access is enabled on each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC5 S3.FC8 S3.FC10	S3.T4 (High) S3.T14 (High) S3.T36 (Very High) S3.T37 (Very High) S3.T38 (Medium)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C52] Verify S3 Block Public Access is enabled on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (e.g., using the AWS Config rule: S3_BUCKET_LEVEL_PUBLIC_ACCESS_PROHIBITED).	Remove the S3 Block Public Access from an S3 bucket; it should be detected.	Very Low	S3.FC5 S3.FC8 S3.FC10	-	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C53, assured by S3.C54] Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Request 1) the mechanism ensuring S3 Block Public Access is enabled on each S3 access point, 2) its records of execution for all new S3 access points, and 3) the plan to move any older S3 access points.	Low	S3.FC5 S3.FC10 S3.FC26 S3.FC33	S3.T14 (High) S3.T36 (Medium) S3.T37 (Medium) S3.T38 (Medium) S3.T54 (High) S3.T55 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C54] Verify S3 Block Public Access is enabled on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and	Remove S3 Block Public Access of 1) an access point, and 2) a Multi-Region Access Point; it should be detected.	Medium	S3.FC5 S3.FC10 S3.FC26	-	Very High

	RestrictPublicBuckets set to true.			S3.FC33		
Directive (COSO) Protect (NIST CSF)	[S3.C173] Block public access to each S3 bucket at the organization root, OU, or account-level by enforcing S3 policies in AWS Organizations.	Request the mechanism enforcing block of public access to each bucket at the organization root, OU, or account-level via S3 policies, its records of execution for all new AWS accounts, and the plan to move any older AWS accounts.	Low	S3.FC5 S3.FC8 S3.FC10	S3.T4 (High) S3.T14 (High) S3.T36 (Very High) S3.T37 (Very High) S3.T38 (Medium)	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C58] Track all buckets you control, define their data classification and their access control (e.g., ABAC or not), identify whether the hosted data is primary (i.e., the source of truth, for example, logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g., file-processing, software package), their WORM requirements (e.g., SEC 17a-4, CTCC), whether they are production or non-production (preferably done at account-level), their storage class, their logging requirements (e.g., server access log, CloudTrail S3 data events), and their dual-layer server-side encryption requirement (e.g., for NSA CNSSP 15, or DAR CP). You may use tags, Infra-as-code, AWS Glue Data Catalog, or external management tools like FINRA herd.	Request the list of all buckets you control and their related requirements, and the mechanism and records to ensure the accuracy of that metadata.	High	S3.FC1 S3.FC2 S3.FC5 S3.FC8 S3.FC10 S3.FC13 S3.FC16 S3.FC17 S3.FC19 S3.FC23 S3.FC36	S3.T1 (Very Low) S3.T3 (Very Low) S3.T4 (Very Low) S3.T5 (Very Low) S3.T6 (Very Low) S3.T7 (Very Low) S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (High) S3.T12 (Very Low) S3.T13 (Very Low) S3.T14 (Very Low) S3.T15 (Very Low) S3.T16 (Very Low) S3.T17 (Very High) S3.T20 (Very Low) S3.T21 (Very Low) S3.T25 (Low) S3.T30 (Very Low) S3.T31 (Very Low) S3.T33 (Very Low) S3.T34 (Very Low) S3.T35 (Very Low) S3.T36 (Very Low) S3.T37 (Very Low) S3.T39 (Very Low) S3.T59 (Very Low) S3.T61 (Very Low) S3.T64 (Very Low) S3.T65 (Very Low)	Very High
Directive (COSO) Identify (NIST CSF)	[S3.C98] For each S3 bucket, maintain a list of VPCs authorized to access it.	For each S3 bucket, request the list of authorized VPCs to access it, its review process, and its review records.	Low	S3.FC1 S3.FC2 S3.FC5 S3.FC10	S3.T11 (Very Low) S3.T14 (Very Low) S3.T17 (Very Low) S3.T30 (Very Low) S3.T33 (Very Low) S3.T36 (Very Low) S3.T38 (Very Low) S3.T39 (Very Low)	Very High
Preventative (COSO) Protect (NIST CSF)	[S3.C99, depends on S3.C98, assured by S3.C100] Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).	Make a request to the bucket outside an authorized VPC; it should be denied.	Very Low	S3.FC1 S3.FC2 S3.FC5 S3.FC10	S3.T11 (Medium) S3.T14 (Medium) S3.T17 (Medium) S3.T30 (High) S3.T33 (High) S3.T36 (High) S3.T38 (High) S3.T39 (High)	Very High

Assurance (COSO) Detect (NIST CSF)	[S3.C100] Verify all buckets include a control to limit access to only authorized VPCs (e.g., using the AWS Config rule S3_BUCKET_POLICY_GRANTEE_CHECK).	Remove the control limiting access to only authorized VPC(s); it should be detected.	Medium	S3.FC1 S3.FC2 S3.FC5 S3.FC10	-	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C152, assured by S3.C154] Ensure bucket ACLs and object ACLs are disabled on each bucket (enabled by default for all new buckets after April 2023).	Request 1) the mechanism ensuring bucket ACL and object ACL are disabled on each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC1 S3.FC5 S3.FC8 S3.FC24 S3.FC25	S3.T4 (Very High) S3.T6 (Very High) S3.T36 (Very High) S3.T43 (Very High) S3.T52 (Very High) S3.T53 (Very High)	Very High
Preventative (COSO) Protect (NIST CSF)	[S3.C153] Prevent the creation of buckets with ACL enabled (e.g., by using an SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on StringNotEquals "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note that it does not block someone from enabling an ACL afterward via PutBucketOwnershipControls.	Create a bucket with ACL enabled; it should be denied.	Low	S3.FC1 S3.FC5 S3.FC8 S3.FC24 S3.FC25	S3.T4 (High) S3.T6 (High) S3.T36 (High) S3.T43 (High) S3.T52 (High) S3.T53 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C154] Verify bucket ACL and object ACL are disabled on each bucket (e.g., using the AWS Config rule S3_BUCKET_ACL_PROHIBITED for bucket ACL, S3 Storage Lens ObjectOwnershipBucketOwnerEnforcedBucketCount, or S3 Inventory, which includes object ACL metadata).	Create/modify a bucket to enable ACL; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC8 S3.FC24 S3.FC25	-	Very High
Preventative (COSO) Protect (NIST CSF)	[S3.C1, depends on S3.C119, assured by S3.C2] Block all unencrypted requests and unauthorized TLS version(s) from IAM entities you control (e.g., by denying all unencrypted requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != *authorized TLS version(s)*, using an SCP on your AWS Organization root node).	Make an unencrypted S3 API call; it should be denied.	Low	S3.FC1 S3.FC5	S3.T12 (Very High) S3.T34 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C2] Verify the control blocking unencrypted requests and unauthorized TLS versions from IAM entities you control (e.g., an SCP on your AWS Organization's root node) is properly implemented.	Remove the control blocking unencrypted requests and unauthorized TLS version(s) (e.g., the SCP on your root node); it should be detected.	High	S3.FC1 S3.FC5	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C6, depends on S3.C119, assured by S3.C7] Block all unencrypted requests to the buckets you control (e.g., by denying all requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != *authorized TLS version(s)*, on their bucket policy or centrally in an RCP applied to the OU or AWS account).	Make an unencrypted AWS API call to a bucket you control; it should be denied.	Low	S3.FC5	S3.T34 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C7] Verify all S3 bucket policies block unencrypted traffic (e.g., using the AWS Config rule: S3_BUCKET_SSL_REQUESTS_ONLY) and unauthorized versions of TLS.	Remove the statement on a bucket policy 1) denying all unencrypted requests and 2) denying unauthorized TLS versions; it should be detected.	Medium	S3.FC5	-	High
Directive (COSO) Identify (NIST CSF)	[S3.C119] Maintain a list of authorized version(s) of TLS/SSL per bucket (or per account/OU/Org) (e.g., considering quantum-resistant encryption).	Request the list of authorized version(s) of TLS/SSL per bucket (or per account/OU/Org), its review mechanism, and associated records.	Low	S3.FC1 S3.FC5	S3.T12 (Very Low) S3.T34 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C8] Block S3 endpoints (DNS and IP ranges) in your corporate	Request the evidence of the implementation of blocking S3 endpoints in your corporate perimeter security (e.g.,	Low	S3.FC1 S3.FC5	S3.T7 (High) S3.T10 (High)	High

	perimeter security to the Internet (e.g., firewalls or a cloud interception proxy), including via Internet Gateway, to force the use of VPC endpoints. It will block data-plane transfer. Note: AWS Management Console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	firewalls) and tests of its effectiveness.		S3.FC28	S3.T12 (Low) S3.T18 (Medium) S3.T34 (Very High)	
Directive (COSO) Protect (NIST CSF)	[S3.C15] Request access via an S3 access point on a bucket you don't own, if compatible with your interaction with the bucket (e.g., not through an unsupported AWS service).	Request the documented reasons why the access point was not implemented in the use case.	Low	S3.FC1	S3.T8 (Medium) S3.T9 (Medium) S3.T31 (Very High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C114, depends on S3.C11] For all external buckets with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover, block the PutObject with any ACL (e.g., using IAM or SCP and a deny on the condition "StringLike": {"s3:x-amz-acl": "*"}). It should be called via PutObjectAcl.	Put an object in an external bucket with the bucket-owner-full-control ACL requirement but without the S3 Object Ownership handover requirement; it should be denied.	High	S3.FC1	S3.T43 (Very High)	High
Directive (COSO) Identify (NIST CSF)	[S3.C17] For each VPC, maintain a list of AWS Organizations, OUs, and/or AWS accounts where IAM entities are authorized to access S3.	For each VPC, request the list of AWS Organizations, OU, and/or AWS account(s), where IAM entities are authorized to access S3, its review process, and its review records.	Medium	S3.FC1 S3.FC5	S3.T9 (Very Low) S3.T11 (Very Low) S3.T62 (Very Low)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C19, depends on S3.C17, assured by S3.C20] Block any IAM entity not belonging to an authorized AWS Organization, OU, and/or AWS account from calling S3 from your VPCs by adding a deny statement in the S3 VPC endpoint policy for each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org IDs, as those are globally unique.	For each VPC, make an API call with an IAM entity that is not part of its authorized AWS Organizations paths; it should be denied.	Low	S3.FC1 S3.FC5	S3.T9 (Very High) S3.T11 (Very High) S3.T62 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C20] Verify all S3 VPC endpoints are blocking any IAM entity not belonging to authorized AWS Organizations, OUs, and/or AWS accounts.	Remove the policy statement blocking any IAM entity not belonging to authorized AWS Organizations, OUs, and/or AWS accounts from the VPC endpoint; it should be detected.	High	S3.FC1 S3.FC5	-	High
Directive (COSO) Protect (NIST CSF)	[S3.C124] Ensure all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoint controls.	Request 1) the mechanism ensuring all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoints controls, 2) its records of execution for all new VPC endpoints, and 3) the plan to move any older VPC endpoints.	Low	S3.FC1	S3.T8 (Very High) S3.T9 (Very High)	High
Directive (COSO) Protect (NIST CSF)	[S3.C26] Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Request the list of authorized IAM principals with the permissions required to execute the threat actions, its review process, and its review records.	High	S3.FC1 S3.FC2 S3.FC5 S3.FC6 S3.FC8 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC17 S3.FC19 S3.FC20 S3.FC23 S3.FC24 S3.FC25 S3.FC26 S3.FC27 S3.FC32	S3.T1 (High) S3.T2 (High) S3.T5 (Low) S3.T6 (Medium) S3.T7 (High) S3.T8 (High) S3.T11 (High) S3.T14 (Very High) S3.T16 (High) S3.T17 (Very High) S3.T18 (High) S3.T21 (Medium) S3.T25 (High) S3.T26 (High) S3.T28 (High) S3.T30 (High) S3.T33 (Very High) S3.T35 (Very High)	High

				S3.FC33 S3.FC36	S3.T36 (Medium) S3.T37 (Very High) S3.T38 (Very High) S3.T39 (High) S3.T41 (High) S3.T42 (High) S3.T44 (High) S3.T46 (High) S3.T47 (High) S3.T48 (High) S3.T49 (High) S3.T50 (High) S3.T51 (High) S3.T52 (High) S3.T53 (High) S3.T54 (High) S3.T55 (High) S3.T56 (High) S3.T58 (High) S3.T59 (High) S3.T60 (High) S3.T61 (High) S3.T62 (High) S3.T63 (High) S3.T64 (High) S3.T65 (High)	
Directive (COSO) Identify (NIST CSF)	[S3.C149] For each bucket, maintain a list of authorized IAM principals allowed to access via the bucket policy.	Request the list of authorized IAM principals allowed to access via bucket policy, its review process, and its review records.	Medium	S3.FC10	S3.T37 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C150, depends on S3.C149, assured by S3.C151] Ensure only authorized IAM principals allowed to access via bucket policy are configured (e.g., using IAM Access Analyzer for reconciliation).	Request 1) the mechanism ensuring only authorized IAM principals are allowed to access buckets via bucket policy, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC10	S3.T37 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C151] Verify only authorized IAM principals allowed to access via bucket policy are used (e.g., using the AWS Config rule S3_BUCKET_POLICY_GRANTEE_CHECK).	Allow an unauthorized IAM principal on a bucket policy; it should be detected.	Medium	S3.FC10	-	High
Directive (COSO) Identify (NIST CSF)	[S3.C31] Maintain a list of AWS accounts authorized to provide KMS keys for S3 for each AWS account.	Request the list of AWS accounts authorized to provide KMS keys for S3 for each AWS account, its review process, and its review records.	Medium	S3.FC1 S3.FC5 S3.FC8 S3.FC15 S3.FC26	S3.T1 (Very Low) S3.T2 (Very Low) S3.T4 (Very Low) S3.T5 (Very Low) S3.T7 (Very Low) S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Very Low) S3.T16 (Very Low) S3.T21 (Very Low) S3.T27 (Very Low) S3.T28 (Very Low) S3.T30 (Very Low) S3.T31 (Very Low) S3.T60 (Very Low)	High

Preventative (COSO) Protect (NIST CSF)	[S3.C32, depends on S3.C31] Block requests with a KMS key from an unauthorized AWS account (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoints with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" is not a KMS key from an authorized AWS account).	Make a request encrypted with a KMS key from an unauthorized AWS account; it should be denied.	Low	S3.FC1 S3.FC5 S3.FC8 S3.FC15 S3.FC26	S3.T1 (High) S3.T2 (Medium) S3.T4 (High) S3.T5 (High) S3.T7 (High) S3.T8 (High) S3.T9 (High) S3.T11 (Medium) S3.T16 (High) S3.T21 (Medium) S3.T27 (Low) S3.T28 (High) S3.T30 (High) S3.T31 (High) S3.T60 (High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C34, assured by S3.C36] Deny requests to change object ACL to public (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy with a deny statement on PutObjectAcl for "s3:x-amz-grant-read", "s3:x-amz-grant-read-acp", "s3:x-amz-grant-write-acp", "s3:x-amz-grant-full-control" on the following predefined groups "http://acs.amazonaws.com/groups/global/AllUsers" and "http://acs.amazonaws.com/groups/global/AuthenticatedUsers").	Make a call to create a public ObjectACL; it should be denied.	Medium	S3.FC1 S3.FC5	S3.T6 (Very High) S3.T36 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C36] Verify the control blocking change ObjectACL to public (e.g., an SCP and VPC endpoint policy) is properly implemented.	Remove the control blocking changes of ObjectACL to public; it should be detected.	High	S3.FC1 S3.FC5	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C38, assured by S3.C39] Block the action "s3:DeleteBucket" (e.g., via SCP or in an RCP applied to the OU or AWS account; exemption can be managed by authorizing a SuperAdmin to delete buckets with a certain tag, and with bucket owners able to tag buckets).	Do a DeleteBucket; it should be denied.	Low	S3.FC5	S3.T1 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C39] Verify the control blocking the action "s3:DeleteBucket" is properly implemented.	Remove the control blocking the action "s3:DeleteBucket"; it should be detected.	High	S3.FC5	-	High
Directive (COSO) Protect (NIST CSF)	[S3.C113, depends on S3.C11] When transmitting an object to an external bucket with bucket-owner-full-control ACL requirements but without S3 Object Ownership handover, use 2 separate APIs (PutObject and PutObjectAcl) instead of the built-in object ACL operation in PutObject.	Request the process for ensuring that PutObject requests on an external bucket with a bucket-owner-full-control ACL requirement, but without S3 Object Ownership handover, use 2 separate APIs.	Medium	S3.FC1	S3.T43 (High)	High
Directive (COSO) Protect (NIST CSF)	[S3.C47, assured by S3.C48] Front buckets that are required to be public, using authenticated CDN (e.g., CloudFront) or API Gateway, protected with WAF (e.g., for hotlinking).	Request the process ensuring that buckets required to be public are fronted by an authenticated CDN or API Gateway, and are protected with a WAF.	Medium	S3.FC5 S3.FC16	S3.T13 (Very High) S3.T14 (Medium) S3.T22 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C48] Verify no bucket is available publicly for write or read (e.g., using the AWS Config rules: S3_BUCKET_PUBLIC_READ_PROHIBITED and S3_BUCKET_PUBLIC_WRITE_PROHIBITED).	Create a public S3 bucket; it should be detected.	Very Low	S3.FC5 S3.FC16	-	High
Preventative (COSO)	[S3.C55, assured by S3.C57]	Make a call to add an ACL on a bucket; it should be denied.	Medium	S3.FC8	S3.T4 (Very High)	High

Protect (NIST CSF)	Deny requests to add an ACL on a bucket (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy, with a deny statement on "s3:PutBucketAcl").			S3.FC19	S3.T58 (Very High)	
Assurance (COSO) Detect (NIST CSF)	[S3.C57] Verify the control blocking bucket ACL changes is properly implemented.	Remove the control blocking bucket ACL changes; it should be detected.	High	S3.FC8 S3.FC19	-	High
Directive (COSO) Identify (NIST CSF)	[S3.C61, depends on S3.C58] Maintain a list of authorized KMS keys for each bucket and its default encryption key. You might simplify by using only one key per bucket, ideally dedicated. Note that an S3 server access log bucket does not support KMS encryption (ref).	Request the list of authorized KMS key(s) for each bucket, its review process, and its review records.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC23	S3.T11 (Very Low) S3.T16 (Very Low) S3.T17 (Very Low) S3.T20 (Very Low) S3.T30 (Very Low) S3.T36 (Very Low) S3.T37 (Very Low) S3.T65 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C64, depends on S3.C61, assured by S3.C65] Implement an authorized default encryption key on each bucket; enable S3 Bucket Key if not using DSSE-KMS and if CloudTrail events are not required for KMS encrypt/decrypt (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings).	Request 1) the mechanism implementing an authorized default encryption key on each bucket and enabling S3 Bucket Key, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC1 S3.FC5 S3.FC10	S3.T17 (Medium) S3.T20 (High) S3.T36 (High) S3.T37 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C65] Verify each bucket has an authorized default encryption key and has S3 Bucket Key enabled.	Create/modify a bucket 1) without default encryption, 2) with an incorrect default encryption key, or 3) with S3 Bucket Key disabled; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC10	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C66, depends on S3.C61, assured by S3.C67] Block PutObject requests with unauthorized KMS key on each bucket (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-aws-kms-key-id" exists and is not an authorized KMS key).	Make a request encrypted with an unauthorized KMS key; it should be denied.	Low	S3.FC1 S3.FC5 S3.FC10	S3.T11 (High) S3.T16 (High) S3.T17 (High) S3.T20 (Very High) S3.T30 (High) S3.T36 (High) S3.T37 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C67] Verify all buckets block PutObject requests with an unauthorized KMS key (e.g., using the Config rule: S3_BUCKET_POLICY_NOT_MORE_PERMISSIVE, note that a new rule needs to be deployed for each configuration, then the resource tracked by name or tag; alternatively, you might use S3_BUCKET_SERVER_SIDE_ENCRYPTION_ENABLED to ensure limited coverage).	Create a bucket not blocking PutObject requests with an unauthorized KMS key; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC10	-	High
Directive (COSO) Identify (NIST CSF)	[S3.C145] Maintain a list of buckets (or paths) required to be encrypted using server-side encryption with customer-provided keys (SSE-C).	Request the list of buckets (or paths) required to be encrypted with server-side encryption with customer-provided keys (SSE-C), its review process, and its review records.	Medium	S3.FC5 S3.FC10 S3.FC23	S3.T11 (Very Low) S3.T16 (Very Low) S3.T20 (Very Low) S3.T30 (Very Low) S3.T36 (Very Low) S3.T37 (Very Low) S3.T63 (Very Low)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C146, depends on S3.C145, assured by S3.C147] For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g., using bucket policies, or centrally in an RCP applied to the OU or AWS account, with a deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-	Make a request to a bucket (or path) requiring SSE-C without the proper encryption; it should be denied.	Low	S3.FC5 S3.FC10	S3.T11 (High) S3.T16 (High) S3.T20 (Very High) S3.T30 (High) S3.T36 (High) S3.T37 (High)	High

	algorithm"="AES256" is not present).					
Assurance (COSO) Detect (NIST CSF)	[S3.C147] For buckets (or paths) requiring SSE-C, verify all buckets block PutObject requests with unauthorized encryption.	Create a bucket requiring SSE-C, not blocking PutObject requests with unauthorized encryption; it should be detected.	High	S3.FC5 S3.FC10	-	High
Directive (COSO) Protect (NIST CSF)	[S3.C167, depends on S3.C145, assured by S3.C168] Ensure SSE-C is blocked when not required for each bucket [default from April 2026].	Request 1) the mechanism ensuring SSE-C is blocked when not required for each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC5 S3.FC23	S3.T16 (High) S3.T63 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C168] Verify SS3-C is blocked only when not required for each bucket.	1) Block SSE-C on a bucket requiring SSE-C, or 2) remove the block on SSE-C on a bucket not requiring SSE-C; it should be detected.	Low	S3.FC5 S3.FC23	-	High
Directive (COSO) Protect (NIST CSF)	[S3.C69, depends on S3.C58, assured by S3.C70] Enable versioning on buckets holding primary data.	Request the mechanism used to ensure versioning on buckets holding primary data, and its records.	Very Low	S3.FC1 S3.FC5	S3.T16 (High) S3.T17 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C70] Verify buckets holding primary data are versioned (e.g., using S3_BUCKET_VERSIONING_ENABLED).	Remove versioning from a bucket holding primary data; it should be detected.	Low	S3.FC1 S3.FC5	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C74, depends on S3.C58, assured by S3.C75] Implement the authorized default S3 Object Lock on buckets requiring WORM (note: Amazon S3 evaluates and applies bucket policies before applying the bucket default S3 Object Lock settings).	Upload an object without the appropriate S3 Object Lock; it should have the S3 Object Lock applied automatically.	Low	S3.FC1 S3.FC5 S3.FC13 S3.FC17	S3.T16 (High) S3.T17 (High) S3.T25 (High) S3.T61 (Medium)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C75] Verify all buckets requiring WORM have the correct default S3 Object Lock configuration.	Create a bucket requiring WORM 1) without S3 Object Lock or 2) with an incorrect default S3 Object Lock; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC13 S3.FC17	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C76, depends on S3.C58, assured by S3.C77] Block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock on buckets requiring WORM (e.g., using their bucket policy and centrally in an RCP applied to the OU or the AWS account with a deny statement on PutObject and PutObjectRetention if the condition "s3:object-lock-mode" exists and "s3:object-lock-remaining-retention-days" is not the defined S3 Object Lock configuration).	Make a request with an incorrect S3 Object Lock configuration on a bucket requiring WORM; it should be denied.	Low	S3.FC1 S3.FC5 S3.FC17	S3.T16 (High) S3.T17 (High) S3.T61 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C77] Verify all buckets requiring WORM block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock (e.g., using the Config rule: S3_BUCKET_POLICY_NOT_MORE_PERMISSIVE, note that a new rule needs to be deployed for each configuration, then the resource tracked by name or tag).	Create a bucket requiring WORM that does not block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC17	-	High
Directive (COSO) Identify (NIST CSF)	[S3.C104] Maintain a list of authorized access between VPCs, S3 access points, and S3.	Request the list of authorized access between VPC, S3 access points, and S3.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC26 S3.FC28 S3.FC33	S3.T7 (Very Low) S3.T9 (Very Low) S3.T10 (Very Low) S3.T11 (Very Low) S3.T28 (Very Low) S3.T37 (Very Low) S3.T54 (Very Low) S3.T55 (Very Low) S3.T56 (Very Low) S3.T60 (Very Low)	High
Preventative (COSO)	[S3.C105, depends on S3.C104, assured by S3.C109]	Make a request on an unauthorized access point or bucket;	Medium	S3.FC1	S3.T7 (Medium)	High

Protect (NIST CSF)	Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy.	it should be denied.		S3.FC5 S3.FC26 S3.FC28 S3.FC33	S3.T9 (Very High) S3.T10 (Very High) S3.T11 (Medium) S3.T54 (Medium) S3.T55 (Medium)	
Preventative (COSO) Protect (NIST CSF)	[S3.C106, depends on S3.C104, assured by S3.C110] In bucket policies, or centrally in an RCP applied to the OU or AWS account, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn".	Query the bucket outside the S3 access point; it should be denied.	Medium	S3.FC1 S3.FC10 S3.FC26 S3.FC33	S3.T7 (Medium) S3.T28 (High) S3.T37 (High) S3.T55 (Medium) S3.T56 (Very High) S3.T60 (High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C107] Block the creation of non-VPC S3 access point "s3:CreateAccessPoint" (e.g., using IAM policies and SCPs with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}).	Make a request to create an internet-based access point; it should be denied.	Low	S3.FC1 S3.FC26	S3.T7 (Medium) S3.T28 (Very High) S3.T60 (High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C108, assured by S3.C111] Block all traffic from Internet-configured S3 access points (e.g., in their bucket policy, or centrally in an RCP applied to the OU or AWS account, using a deny statement with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}).	Create an internet-facing access point and try to access a bucket; it should be denied.	Low	S3.FC1 S3.FC26 S3.FC28	S3.T7 (Medium) S3.T10 (Medium) S3.T28 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C109] Verify only access points are used in the resource-level statements in VPC endpoints.	Create a VPC endpoint giving access to an S3 bucket directly, rather than an access point; it should be detected.	High	S3.FC1 S3.FC5 S3.FC26 S3.FC28 S3.FC33	-	High
Assurance (COSO) Detect (NIST CSF)	[S3.C110] Verify S3 bucket policies deny unauthorized S3 access points.	Remove/modify the deny on the bucket policy; it should be detected.	High	S3.FC1 S3.FC10 S3.FC26 S3.FC33	-	High
Assurance (COSO) Detect (NIST CSF)	[S3.C111] Verify all S3 access points are VPC-attached.	Create an internet-based access point; it should be detected.	Low	S3.FC1 S3.FC26 S3.FC28	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C112, depends on S3.C104] Block any object-related operations access to S3 buckets not through an access point (i.e., IAM policy, SCP, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on the condition "ArnNotLike": {"s3:DataAccessPointArn": "arn:aws:s3:*Region*:*AccountId*:accesspoint/*"}).	Access any S3 bucket without using an access point; it should be denied.	Low	S3.FC1 S3.FC5	S3.T7 (Medium) S3.T11 (High)	High
Directive (COSO) Identify (NIST CSF)	[S3.C120] Maintain a list of IAM roles used for Batch jobs, ideally dedicated (e.g., using change management process on infrastructure-as-code).	Request the list of all IAM roles configured for Batch jobs.	Medium	S3.FC27	S3.T44 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C122, depends on S3.C120] Limit access to authorized IAM roles used for Batch jobs, using the IAM ThreatModel (e.g., trust policy, and "iam:PassRole").	Request the IAM ThreatModel and the evidence of its application to the IAM roles used for Batch jobs.	Medium	S3.FC27	S3.T44 (Very High)	High
Directive (COSO)	[S3.C125]	Request the list of authorized Lambda functions for each	Low	S3.FC32	S3.T46 (Very Low)	High

Identify (NIST CSF)	Maintain a list of authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload.	Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload, its review process, and its review records.				
Directive (COSO) Protect (NIST CSF)	[S3.C126, depends on S3.C125, assured by S3.C127] Ensure only authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload are created.	Request the mechanism ensuring only authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload, and the evidence of its execution.	Medium	S3.FC32	S3.T46 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C127] Verify only the authorized Lambda functions are configured on each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload.	Attach 1) an unauthorized Lambda function to an Object Lambda Access Point, 2) an unauthorized Object Lambda Access Point to an access point, 3) an authorized Lambda function with an unauthorized HEAD/LIST/GET request to an Object Lambda Access Point, and 4) an authorized Lambda function with an unauthorized payload; it should be detected.	Medium	S3.FC32	-	High
Directive (COSO) Identify (NIST CSF)	[S3.C141] Maintain a list of authorized buckets to be configured as an S3 website endpoint.	Request the list of authorized buckets to be configured as a website endpoint, its review process, and its review records.	Low	S3.FC16	S3.T13 (Very Low) S3.T29 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C144, depends on S3.C141] Ensure S3 website endpoints are protected with HTTP headers (ref) using a CDN (e.g., CloudFront).	Request the mechanism ensuring S3 website endpoints are protected with HTTP headers.	Medium	S3.FC16	S3.T13 (High) S3.T29 (Very High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C3, depends on S3.C119, assured by S3.C5] Block all unencrypted requests and unauthorized TLS version(s) from VPC endpoints you control (e.g., by denying all requests with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" != *authorized TLS version(s)*, on the VPC endpoint policy).	Make an unencrypted AWS API call from one of your VPCs with a VPC endpoint; it should be denied.	Low	S3.FC1 S3.FC5	S3.T12 (Medium) S3.T34 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C5] Verify a statement exists on all your VPC endpoint policies denying all requests with the condition "aws:SecureTransport" = False or using "s3:TlsVersion" != *authorized TLS version(s)*.	Create/remove the statement on a VPC endpoint policy denying 1) all unencrypted requests or 2) unauthorized TLS version(s); it should be detected.	High	S3.FC1 S3.FC5	-	Medium
Directive (COSO) Detect (NIST CSF)	[S3.C9, depends on S3.C58] Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Request the CloudTrail ThreatModel and the evidence of its application for enabling and protecting S3 data events.	Very Low	S3.FC1 S3.FC5 S3.FC8	S3.T1 (Low) S3.T4 (Low) S3.T5 (Low) S3.T6 (Low) S3.T7 (Low) S3.T8 (Low) S3.T9 (Low) S3.T11 (Low) S3.T12 (Low) S3.T16 (Low) S3.T21 (Low) S3.T31 (Low) S3.T34 (Low) S3.T35 (Low) S3.T36 (Low) S3.T39 (Low)	Medium
Directive (COSO) Detect (NIST CSF)	[S3.C10] Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using the GuardDuty ThreatModel. Ensure findings are investigated (e.g., using Amazon Detective).	Request the GuardDuty ThreatModel and the evidence of its application for enabling, monitoring, investigating, and protecting S3 use.	Low	S3.FC1 S3.FC5 S3.FC8 S3.FC24	S3.T3 (Low) S3.T4 (Low) S3.T16 (Medium) S3.T52 (Medium)	Medium

				S3.FC25	S3.T53 (Medium)	
Directive (COSO) Detect (NIST CSF)	[S3.C118] Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect them using the Macie ThreatModel.	Request the Macie ThreatModel and the evidence of its application for enabling and protecting S3 policy findings.	Very Low	S3.FC5 S3.FC8 S3.FC10 S3.FC15	S3.T2 (Medium) S3.T4 (Medium) S3.T22 (Medium) S3.T36 (Medium) S3.T37 (Medium) S3.T38 (Medium)	Medium
Preventative (COSO) Protect (NIST CSF)	[S3.C12, depends on S3.C11] Allow only authorized ACLs on objects for buckets you don't control (e.g., using IAM and VPC endpoint policy with the ACL conditions).	Put an object with an unauthorized ACL; it should be denied.	Medium	S3.FC1	S3.T5 (Medium) S3.T6 (High)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C13, depends on S3.C11] Monitor that only authorized external buckets are used (e.g., via CloudTrail S3 data events in resources[].accountId and resources[].ARN). Both account ID and bucket name must be verified.	Make a call to an unauthorized bucket; it should be detected.	Low	S3.FC1 S3.FC5	S3.T1 (Low) S3.T7 (Low) S3.T11 (Low) S3.T21 (Low) S3.T31 (Medium)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C14, depends on S3.C11] Scan all data before uploading to an external bucket to ensure the classification of the data is aligned with the bucket classification (e.g., using Macie).	Request 1) the mechanism ensuring all data is scanned for proper data classification before upload to an external bucket, 2) its records of execution for all object upload flows, and 3) the plan to move any older object upload flows.	High	S3.FC1 S3.FC5 S3.FC16	S3.T5 (High) S3.T14 (High) S3.T15 (Medium)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C115, depends on S3.C11] For all external buckets with bucket-owner-full-control ACL requirements but without S3 Object Ownership handover, monitor that the PutObject operation does not include the ACL header.	Make a request to an external bucket with a bucket-owner-full-control ACL requirement but without an S3 Object Ownership handover requirement; it should be detected.	Low	S3.FC1	S3.T43 (Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C16] Analyze and protect all AWS services accessing S3 (e.g., via ThreatModel). Enforce use in VPC only, whenever possible.	Request the ThreatModels for all AWS services using S3.	High	S3.FC1 S3.FC5	S3.T21 (Very High) S3.T30 (Very High)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C22] Maintain a list of authorized S3 and S3 access points (and their respective AWS accounts) to be accessed for each VPC.	Request the list of authorized S3 buckets and S3 access points to be accessed for each VPC, its review process, and its review records.	Medium	S3.FC1 S3.FC5	S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Very Low)	Medium
Preventative (COSO) Protect (NIST CSF)	[S3.C23, depends on S3.C22, assured by S3.C24] Limit the access to only authorized S3 bucket(s) or their AWS account(s) from each VPC (e.g., using the condition key "s3:ResourceAccount" on the VPC endpoint policy, alternatively use a specific resource-level statement for each bucket, or if the VPC endpoint policy size is beyond the limit and more granular control on VPC is required, use access points).	Make a request to an unauthorized bucket from one of your VPCs; it should be denied.	Medium	S3.FC1 S3.FC5	S3.T8 (High) S3.T9 (High) S3.T11 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C24] Verify all VPCs are limited to accessing only authorized S3 bucket(s).	Remove the control limiting access to only authorized S3 bucket(s); it should be detected.	High	S3.FC1 S3.FC5	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C27, assured by S3.C28] In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Request all S3 bucket/access point/Object Lambda Access Point policy statements with "allow"; no principal from the same account should be authorized.	Low	S3.FC1 S3.FC2 S3.FC5 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC19 S3.FC20	S3.T1 (Low) S3.T2 (Low) S3.T6 (Low) S3.T7 (Low) S3.T8 (Low) S3.T11 (Low) S3.T14 (Medium) S3.T16 (Low) S3.T17 (Medium)	Medium

				S3.FC23 S3.FC26 S3.FC27 S3.FC32 S3.FC33	S3.T18 (Low) S3.T21 (Low) S3.T25 (Low) S3.T26 (Medium) S3.T30 (Low) S3.T33 (Medium) S3.T35 (Medium) S3.T36 (Low) S3.T37 (Medium) S3.T38 (Medium) S3.T39 (Low) S3.T41 (Low) S3.T42 (Low) S3.T44 (Low) S3.T46 (Medium) S3.T54 (Medium) S3.T55 (Medium) S3.T58 (Medium) S3.T59 (Medium) S3.T65 (Low)	
Assurance (COSO) Detect (NIST CSF)	[S3.C28] Verify all S3 bucket/access point/Object Lambda Access Point policies do not allow an IAM principal of the same AWS account (e.g., using the Config rule S3_BUCKET_POLICY_GRANTEE_CHECK for bucket policy).	Add an allow statement for an IAM principal of the same account in 1) a bucket policy, 2) an access point policy, and 3) an Object Lambda Access Point; it should be detected.	Medium	S3.FC1 S3.FC2 S3.FC5 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC19 S3.FC20 S3.FC23 S3.FC26 S3.FC27 S3.FC32 S3.FC33	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C170, depends on S3.C58] Integrate and limit the access to general purpose buckets via tags in the IAM Operating Model (including enforcing tagging of buckets and objects at creation using AWS:ResourceTag and s3:BucketTag).	Request the IAM tag Operating Model for the general purpose buckets.	High	S3.FC2	S3.T33 (Very High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C44] Ensure the integrity of stored objects (ref), using "x-amz-checksum" from the object metadata instead of ETag (e.g., using the compute checksum functionality in S3 Batch Operations). If ETag is used, make sure to properly account for its different definitions (ref).	Request 1) the mechanism ensuring the integrity of stored objects using checksums instead of ETag, and otherwise ensuring ETag's different definitions are properly accounted for, and 2) plan to move any older system using ETag to use the checksum metadata.	Low	S3.FC1 S3.FC5	S3.T17 (Medium) S3.T27 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C46] Ensure all S3 buckets interacted with are in the correct AWS account (e.g., using the condition in all compatible S3 requests: x-amz-expected-bucket-owner and x-amz-source-expected-bucket-owner).	Request the process ensuring that all S3 buckets interacted with are in the correct AWS account.	Medium	S3.FC1 S3.FC5	S3.T1 (Medium) S3.T3 (Medium)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C59, depends on S3.C58] Use a data discovery tool (e.g., Amazon Macie) to ensure no sensitive data is stored in an unauthorized bucket.	Upload higher classification data in a bucket; it should be detected.	Medium	S3.FC5	S3.T11 (Medium)	Medium

Directive (COSO) Protect (NIST CSF)	[S3.C171, depends on S3.C58, assured by S3.C172] Ensure only the authorized ABAC configuration for each general purpose bucket is configured.	Request 1) the mechanism ensuring only the authorized ABAC configuration for each general purpose bucket is configured, 2) its records of execution for all new general purpose buckets, and 3) the plan to move any older general purpose buckets.	Medium	S3.FC36	S3.T64 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C172] Verify all general purpose buckets use their authorized ABAC configuration.	1) Enable ABAC on an unauthorized general purpose bucket, or 2) disable ABAC on an authorized general purpose bucket; it should be detected.	Medium	S3.FC36	-	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C62] Verify all objects in S3 buckets are encrypted with an authorized KMS key (e.g., using S3 Inventory or S3 Batch Operations, see blog, or S3 Storage Lens, UnencryptedObjectCount and SSEKMSEnabledBucketCount).	Upload encrypted data 1) using an unauthorized KMS key, or 2) using SSE-S3; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC23	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C140, depends on S3.C61, assured by S3.C62] Ensure all objects in S3 buckets are encrypted with an authorized KMS key.	Request the mechanism (including training or utility) ensuring only authorized KMS keys are used for any objects stored in S3.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC23	S3.T11 (Medium) S3.T16 (Medium) S3.T17 (Medium) S3.T20 (Medium) S3.T30 (Medium) S3.T36 (Medium) S3.T37 (Medium) S3.T65 (High)	Medium
Directive (COSO) Recover (NIST CSF)	[S3.C71, depends on S3.C58] Back up primary data in a secure location under a different security authority (e.g., in an AWS data bunker account via replication, or using AWS Backup for Amazon S3).	Request the mechanism used to back up primary data in a location that has a different security authority, its records of execution, and its records of restoration testing.	Medium	S3.FC1 S3.FC5 S3.FC13	S3.T16 (High) S3.T17 (High) S3.T25 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C72] Aligned with your data governance, encrypt on the client side - or tokenize - the appropriate data.	Request the governance and mechanism(s) used to protect data (e.g., encrypt or tokenize critical data on the client side).	Very High	S3.FC1 S3.FC5 S3.FC10 S3.FC16	S3.T1 (Medium) S3.T3 (Medium) S3.T5 (High) S3.T7 (High) S3.T11 (Very High) S3.T12 (Very High) S3.T13 (Very High) S3.T17 (High) S3.T20 (High) S3.T30 (High) S3.T31 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C73] Create a process to apply a legal hold to any S3 bucket whenever required. The condition "s3:object-lock-legal-hold" can be used to restrict who can remove such a lock.	Request the process of applying legal hold, and its records.	Medium	S3.FC1 S3.FC5	S3.T16 (Low) S3.T17 (Medium)	Medium
Preventative (COSO) Protect (NIST CSF)	[S3.C84] Block all requests not using HTTP authorization header, i.e., presigned via query strings or POST (ref) (e.g., using an SCP, bucket policies, or centrally in an RCP applied to the OU or AWS account on all buckets with deny on "StringNotEquals":{"s3:authType": "REST-HEADER"}). Note that it blocks uploads via the console, as well.	Make a request without using the HTTP authorization header; it should be denied.	Low	S3.FC5	S3.T39 (Medium)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C86] Maintain a list of authorized buckets to have replication enabled, their target bucket, and replication type (i.e., encryption type, ownership, RTC, etc.) (ref).	Request the list of authorized buckets to have replication enabled, their target bucket and replication rights, its review process, and its review records.	Medium	S3.FC15	S3.T2 (Very Low)	Medium
Assurance (COSO)	[S3.C87]	Configure replication on a non-authorized bucket; it should	Medium	S3.FC15	-	Medium

Detect (NIST CSF)	Verify only authorized buckets have replication enabled with their correct configuration (e.g., using S3 Storage Lens CrossAccountReplicationRuleCount).	be detected.				
Assurance (COSO) Detect (NIST CSF)	[S3.C88] Verify authorized buckets have the correct replication configuration.	Modify the configuration of an authorized replication; it should be detected.	High	S3.FC15	-	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C89] Maintain a list of IAM roles used for replication, ideally dedicated (e.g., using change management process on infrastructure-as-code).	Request the list of all IAM roles configured for replication.	Medium	S3.FC15	S3.T2 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C90, depends on S3.C89] Limit S3 access to the source and destination buckets and the replication rights of each authorized IAM role configured for replication.	Request the S3 access for each replication role, and how they align with the replication requirements.	Medium	S3.FC15	S3.T2 (Medium)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C91, depends on S3.C89] Limit access to authorized IAM roles used for replication, using the IAM ThreatModel (e.g., trust policy, and "iam:PassRole").	Request the IAM ThreatModel and the evidence of its application to the IAM roles used for replication.	High	S3.FC15	S3.T2 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C92] Verify only the authorized IAM role is configured for each replication.	Create/modify a replication with an unauthorized IAM role; it should be detected.	High	S3.FC15	-	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C117] Verify all replicated buckets have metrics enabled on each replication rule (included by default in S3 RTC).	Modify the replication metric of an authorized replication; it should be detected.	Medium	S3.FC15	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C134, depends on S3.C86, assured by S3.C87,S3.C88,S3.C117] Ensure only authorized buckets have replication enabled and are configured correctly.	Request 1) the mechanism ensuring only authorized buckets have replication enabled with their correct configuration, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC15	S3.T2 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C138, depends on S3.C89, assured by S3.C92] Ensure only authorized IAM roles are attached for each replication, ideally dedicated.	Request the mechanism ensuring authorized IAM roles are attached for each replication, and the evidence of its execution for all replication configurations.	Medium	S3.FC15	S3.T2 (High)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C93, depends on S3.C58] If the bucket is used as an input or the output of a process, scan the objects for malware (e.g., using GuardDuty Malware Protection for S3, BucketAV, Cloud Storage Security, Trend Micro Cloud One, or your own scanning solution).	Inject a malware test file; it should be detected.	Medium	S3.FC5 S3.FC16	S3.T14 (Medium) S3.T15 (Low)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C101] Maintain a list of authorized CloudFront distributions (via Origin Access Control) and associated bucket, access point, and/or Object Lambda Access Point.	Request the list of all authorized CloudFront distributions and associated S3 buckets, access points, and/or Object Lambda Access Points.	Low	S3.FC10	S3.T20 (Very Low)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C102] Verify all associations of CloudFront distributions with buckets, access points, and/or Object Lambda Access Points are authorized (e.g., using the Macie finding: "Policy:IAMUser/S3BucketSharedWithCloudFront").	Create a non-authorized distribution or association; it should be detected.	High	S3.FC10	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C137, depends on S3.C101, assured by S3.C102] Ensure only authorized CloudFront distributions are associated with their authorized bucket, access point, and/or Object Lambda Access Point; and vice versa (e.g., using their bucket policy, centrally in an RCP applied to the OU or AWS account, with a deny statement, access point policy, resource policy for an Object Lambda Access Point, limiting	Request 1) the mechanism ensuring only authorized CloudFront distributions are associated with their authorized bucket, access point, and/or Object Lambda Access Point; and vice versa, 2) its records of execution for all new CloudFront distributions, and 3) the plan to move any older CloudFront distributions.	Medium	S3.FC10	S3.T20 (High)	Medium

	the access to only the authorized distribution(s) in the SourceArn).					
Directive (COSO) Protect (NIST CSF)	[S3.C121, depends on S3.C120] Limit access to only the required resources/permissions (e.g., source/destination buckets, Lambda functions) for each authorized IAM role configured for Batch jobs.	Request access only to the required resources/permissions for each Batch IAM role, and request information on how they are aligned with the replication requirements.	Medium	S3.FC27	S3.T44 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C123] Verify only the authorized IAM role is configured for each Batch job.	Create/modify a Batch job with an unauthorized IAM role; it should be detected.	High	S3.FC27	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C139, depends on S3.C120, assured by S3.C123] Ensure only an authorized IAM role is attached to each Batch job.	Request the mechanism ensuring only an authorized IAM role is attached to each Batch job, and the evidence of its execution for all new {resource}.	Medium	S3.FC27	S3.T44 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C128] Ensure Lambda functions configured on Object Lambda Access Point are secured using Lambda ThreatModel.	Request the mechanism ensuring Lambda ThreatModel and its application for Lambda functions associated with Object Lambda Access Points, and its records of execution.	Medium	S3.FC32	S3.T46 (High)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C129] Maintain a list of cross-account access on each Object Lambda Access Point.	Request the list of authorized cross-account access for each Object Lambda Access Point, its review process, and its review records.	Very Low	S3.FC32	S3.T46 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C130, depends on S3.C129, assured by S3.C131] Ensure only authorized cross-account IAM entities are allowed in the Object Lambda Access Point policy.	Request the mechanism ensuring only cross-account IAM entities are allowed in the Object Lambda Access Point policy, and the evidence of its execution.	Low	S3.FC32	S3.T46 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C131] Verify only the authorized cross-account IAM entities are allowed in the Object Lambda Access Point policy.	Add an unauthorized cross-account IAM entity on an Object Lambda Access Point policy; it should be detected.	High	S3.FC32	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C142, depends on S3.C141, assured by S3.C143] Ensure only authorized buckets are configured as an S3 website endpoint.	Request 1) the mechanism ensuring only authorized buckets are configured as S3 website endpoints, 2) its records of execution for all new website-enabled buckets, and 3) the plan to move any older website-enabled buckets.	Medium	S3.FC16	S3.T13 (Medium) S3.T29 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C143] Verify only authorized buckets are configured as S3 website endpoints.	Enable static website hosting on an unauthorized bucket; it should be detected.	Medium	S3.FC16	-	Medium
Directive (COSO) Detect (NIST CSF)	[S3.C166, depends on S3.C58] Enable server access logging in relevant buckets (e.g., production, with sensitive data). Make it available for security analysis.	Request 1) the mechanism ensuring server access logging is enabled in relevant buckets, 2) its records of execution for all new relevant buckets, and 3) the plan to move any older relevant buckets.	Low	S3.FC1 S3.FC5 S3.FC8	S3.T1 (Low) S3.T4 (Low) S3.T5 (Low) S3.T6 (Low) S3.T7 (Low) S3.T8 (Low) S3.T9 (Low) S3.T11 (Low) S3.T12 (Low) S3.T16 (Low) S3.T21 (Low) S3.T31 (Low) S3.T34 (Low) S3.T35 (Low) S3.T36 (Low) S3.T39 (Low)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C158] Maintain a list of authorized S3 buckets and their AWS accounts for cross-account access points.	Request the list of authorized S3 buckets and their AWS account for cross-account access points, its review process, and its review records.	Low	S3.FC26	S3.T60 (Very Low)	Medium

Directive (COSO) Protect (NIST CSF)	[S3.C159, depends on S3.C158, assured by S3.C161] Ensure only authorized S3 buckets and their AWS accounts for cross-account access points are configured.	Request 1) the mechanism ensuring only authorized S3 buckets and their AWS account for cross-account access points are configured, 2) its records of execution for all new S3 buckets and their AWS accounts for cross-account access points, and 3) the plan to move any older S3 buckets and their AWS accounts for cross-account access points.	Medium	S3.FC26	S3.T60 (High)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C160, depends on S3.C158] Monitor CreateAccessPoint to detect unauthorized buckets or AWS accounts (i.e., using CloudTrail event CreateAccessPoint and its fields "requestParameters.CreateAccessPointRequest.Bucket" and "requestParameters.CreateAccessPointRequest.BucketAccountId").	Call the API to create a cross-account access point with an unauthorized 1) bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.	Medium	S3.FC26	S3.T60 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C161] Verify only authorized S3 buckets and their AWS accounts for cross-account access points are used.	Deploy a cross-account access point with an unauthorized 1) bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.	Medium	S3.FC26	-	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C4] Monitor and investigate all requests made with HTTP (e.g., via CloudTrail S3 data events with the lack of additionalEventData.CipherSuite).	Make an unencrypted AWS API call from one of your VPCs with VPC endpoint; it should be detected.	Low	S3.FC1 S3.FC5	S3.T12 (Low) S3.T34 (Low)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C18, depends on S3.C17] For each VPC with an IAM entity allowed to use S3, secure them with the VPC ThreatModel (e.g., modification of VPC endpoints, VPC endpoint policy, routing table, Security Groups).	Request how the VPC ThreatModel for S3 is being applied.	High	S3.FC1 S3.FC5	S3.T9 (Medium) S3.T11 (Medium) S3.T62 (Medium)	Low
Directive (COSO) Detect (NIST CSF)	[S3.C21] Enable VPC DNS query logging in all VPCs.	Request the mechanism to enable VPC DNS query logging in all VPCs.	Medium	S3.FC1 S3.FC5	S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Very Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C25, depends on S3.C21,S3.C22] Monitor VPC DNS query logs to ensure only authorized S3 buckets and S3 access points are being queried in each VPC (e.g., using VPC DNS query logging) and protect them using Route 53 ThreatModel.	Make a DNS query to an unauthorized 1) S3 bucket and 2) S3 access points; it should be detected.	Low	S3.FC1 S3.FC5	S3.T8 (Low) S3.T9 (Low) S3.T11 (Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C33, depends on S3.C31] Monitor that only authorized AWS accounts provide KMS keys for each AWS account (using CloudTrail S3 data events in "response.x-amz-server-side-encryption-aws-kms-key-id").	Encrypt an object using an unauthorized key; it should be detected.	Low	S3.FC1 S3.FC5 S3.FC8 S3.FC15 S3.FC26	S3.T1 (Low) S3.T2 (Low) S3.T4 (Low) S3.T5 (Low) S3.T7 (Low) S3.T8 (Low) S3.T9 (Low) S3.T11 (Low) S3.T16 (Low) S3.T21 (Low) S3.T27 (Very Low) S3.T28 (Low) S3.T30 (Low) S3.T31 (Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C35] Monitor ObjectACL changes (or tentative changes) to public using CloudTrail S3 data events.	Make a call to create a public ObjectACL; it should be detected.	Low	S3.FC1 S3.FC5	S3.T6 (Low) S3.T36 (Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C37] Monitor and investigate anonymous requests to objects	Make an anonymous call; it should be detected.	Low	S3.FC5	S3.T36 (Low)	Low

	(e.g., using CloudTrail S3 data events with userIdentity.accountId=ANONYMOUS_PRINCIPAL).					
Directive (COSO) Protect (NIST CSF)	[S3.C41] Parameterize the S3 bucket name or S3 access point in your code (no hardcoding).	Request the process ensuring S3 bucket names or S3 access points are not hard-coded.	Medium	S3.FC5	S3.T1 (Low)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C42] When connecting to S3 endpoints, use the virtual-hosted model ("my-bucket-name.s3.amazonaws.com" or "my-bucket-name.my-s3-regional-endpoint.amazonaws.com") instead of the path-style model ("s3.amazonaws.com/my-bucket-name" or "my-s3-regional-endpoint.amazonaws.com/my-bucket-name") (see ref). All the latest SDKs make use of domain style by default.	Request the mechanism ensuring the use of domain style instead of path style.	Very Low	S3.FC1	S3.T35 (High)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C56] Monitor changes to bucket ACLs to ensure they stay private (e.g., using the CloudTrail event PutBucketAcl and its field requestParameters.x-amz-acl, which should either be "private" or not exist).	Make a call to have a bucket ACL other than private; it should be detected.	Medium	S3.FC8 S3.FC19	S3.T4 (Low) S3.T58 (Low)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C63, depends on S3.C61] Use KMS ThreatModel to protect the KMS keys used for S3 (e.g., using encryptionContext on the policy of each KMS key).	Request the KMS ThreatModel and the evidence of its application to protect S3.	High	S3.FC1 S3.FC5 S3.FC10 S3.FC23	S3.T17 (Medium) S3.T36 (Low) S3.T37 (Low) S3.T65 (Medium)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C68, depends on S3.C61] Monitor that only authorized KMS keys are used for each bucket (using CloudTrail S3 data events in "requestParameters.bucketName" and "response.x-amz-server-side-encryption-aws-kms-key-id").	Make a request encrypted with an unauthorized KMS key; it should be detected.	Low	S3.FC5	S3.T11 (Very Low) S3.T16 (Low) S3.T30 (Very Low) S3.T36 (Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C148, depends on S3.C145] For buckets (or paths) requiring SSE-C, monitor that only authorized encryption is used on each bucket or path (using CloudTrail S3 data events in requestParameters.bucketName and response.x-amz-server-side-encryption-customer-algorithm).	Make a request to a bucket (or path) requiring SSE-C without the proper encryption; it should be detected.	Low	S3.FC5	S3.T11 (Very Low) S3.T16 (Low) S3.T30 (Very Low) S3.T36 (Low)	Low
Preventative (COSO) Protect (NIST CSF)	[S3.C162, depends on S3.C58] Block requests not using DSSE-KMS when required (e.g., by using an SCP, IAM policies, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on required bucket names and "s3:x-amz-server-side-encryption" = "aws:kms:dsse").	Make a request not using DSSE-KMS on a required S3 bucket; it should be denied.	Low	S3.FC1 S3.FC5	S3.T5 (Low) S3.T7 (Low) S3.T8 (Low) S3.T11 (Low) S3.T31 (Low)	Low
Preventative (COSO) Protect (NIST CSF)	[S3.C78, assured by S3.C79] Reduce costs related to incomplete multipart uploads by creating a lifecycle policy to remove them after an agreed length of time (e.g., 7 days) (blog).	Create an incomplete upload, and wait for the agreed time; it should be deleted automatically.	Low	S3.FC5	S3.T40 (High)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C79] Verify a lifecycle policy on incomplete multipart uploads is implemented on all buckets (e.g., using AWS Config rule: S3_LIFECYCLE_POLICY_CHECK).	Create a bucket without a lifecycle policy to remove incomplete multipart uploads; it should be detected.	Medium	S3.FC5	-	Low
Preventative (COSO) Protect (NIST CSF)	[S3.C81] Block all requests not using SigV4 (e.g., using an SCP, bucket policies, or centrally in an RCP applied to the OU or AWS account on all buckets with deny on "StringNotEquals":{"s3:signatureversion": "AWS4-HMAC-SHA256"}).	Make a non-SigV4 AWS API call; it should be denied.	Low	S3.FC1	S3.T35 (High)	Low

Directive (COSO) Protect (NIST CSF)	[S3.C83] Use SDK with SigV4 enabled (ref).	Request the mechanism ensuring the use of SDK with SigV4 enabled.	Low	S3.FC1	S3.T35 (High)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C85] Monitor and investigate all requests that do not use the HTTP authorization header (e.g., via CloudTrail S3 events where the additionalEventData.AuthenticationMethod is different from "AuthHeader").	Make 1) a presigned AWS API call and 2) a POST request without the HTTP authorization header; it should be detected.	Low	S3.FC5	S3.T39 (Very Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C116] Monitor abnormal behavior on replication CloudWatch metrics (i.e., "BytesPendingReplication", "OperationsPendingReplication", and "OperationsFailedReplication").	Create an abnormal replication, or block a replication; it should be detected.	Low	S3.FC15	S3.T2 (Low) S3.T49 (Medium)	Low
Directive (COSO) Identify (NIST CSF)	[S3.C94] Maintain a list of authorized notification receivers (e.g., SNS topic, Lambda) for each bucket. You might use a simpler approach by using authorized account IDs to ensure all your receivers are in authorized AWS accounts.	Request the list of authorized notification receivers for each bucket, its review process, and its review records.	Low	S3.FC20	S3.T41 (Very Low)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C95] Verify only authorized notification receiver(s) are configured for buckets.	Create an unauthorized receiver; it should be detected.	High	S3.FC20	-	Low
Directive (COSO) Protect (NIST CSF)	[S3.C135, depends on S3.C94, assured by S3.C95] Ensure only authorized notification receivers for each bucket are configured.	Request 1) the mechanism ensuring only authorized notification receivers for each bucket are configured, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC20	S3.T41 (High)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C103] Protect and/or claim your domains and trademarks/copyrights (by creating your trademark buckets and using the copyright infringement process from AWS).	Request the process by protecting and/or claiming your domains and trademarks/copyrights.	Medium	S3.FC28	S3.T23 (High)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C132, assured by S3.C133] Ensure CloudWatch is enabled for all Object Lambda Access Points.	Request the mechanism ensuring CloudWatch is enabled for all Object Lambda Access Points, and its records of execution.	Low	S3.FC32	S3.T46 (Low)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C133] Verify CloudWatch is enabled for all Object Lambda Access Points.	Create an Object Lambda Access Point without CloudWatch enabled; it should be detected.	Low	S3.FC32	-	Low
Directive (COSO) Protect (NIST CSF)	[S3.C29] Use an unguessable naming convention for the email addresses of your AWS accounts (e.g., add a + sign and a random string to redirect the email to the same mailbox).	Review the naming convention for root account email and its implementation.	Medium	S3.FC28	S3.T19 (High)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C30] Use an unguessable naming convention for your IAM users and IAM roles (e.g., add a random string).	Review the naming convention for IAM users/roles and their implementation.	Medium	S3.FC28	S3.T24 (High)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C155, assured by S3.C156] Ensure all requests are blocked from AWS service roles that do not require access (e.g., by denying all requests with the principal "arn:aws:iam::*:*/AWSServiceRoleFor*" on S3 bucket policies).	Request 1) the mechanism ensuring only authorized AWS service roles can access each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC28	S3.T57 (Very High)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C156] Verify all requests from unauthorized service roles are blocked.	Remove the statement on a bucket policy denying all unauthorized service roles; it should be detected.	Medium	S3.FC28	-	Low
Detective (COSO) Detect (NIST CSF)	[S3.C40] Scan your CNAME records (e.g., in Amazon Route 53) and CloudFront origin for deleted buckets.	Create a CNAME record and CloudFront origin with an invalid bucket; it should be detected.	High	S3.FC5	S3.T1 (Very Low)	Very Low

Detective (COSO) Detect (NIST CSF)	[S3.C43] Monitor that all S3 connections are made with the virtual-hosted model (e.g., via CloudTrail S3 requestParameters.Host).	Make a path-style request to S3; it should be detected.	Medium	S3.FC1	S3.T35 (Low)	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C45] Do not include sensitive data in bucket names, access point names, object names, object metadata, and tags.	Request the process ensuring no sensitive data is included in bucket names, object names, object metadata, and tags.	Low	S3.FC12 S3.FC20	S3.T41 (Low) S3.T42 (Medium)	Very Low
Detective (COSO) Detect (NIST CSF)	[S3.C60] Use a data discovery tool (e.g., Amazon Macie) to ensure the bucket names, object names, tags, and metadata do not contain sensitive data.	Create a bucket name, object name, tags, or metadata of an object with sensitive data; it should be detected.	Very High	S3.FC5	S3.T11 (Very Low)	Very Low
Detective (COSO) Detect (NIST CSF)	[S3.C163, depends on S3.C58] Monitor requests not using DSSE-KMS when required (e.g., using CloudTrail log event name(s), CloudTrail S3 data events with field(s) requestParameter.bucketName, and "response.x-amz-server-side-encryption-aws").	Make a request not using DSSE-KMS on a required S3 bucket; it should be detected.	Low	S3.FC1 S3.FC5	S3.T5 (Very Low) S3.T7 (Very Low) S3.T8 (Very Low) S3.T11 (Very Low) S3.T31 (Very Low)	Very Low
Detective (COSO) Detect (NIST CSF)	[S3.C169] Monitor abnormal increases in the CloudWatch metric for HTTP 4xx client error status code requests (i.e., "4xxErrors").	Run HTTP 4xx client error status code requests abnormally; it should be detected.	High	S3.FC23	S3.T63 (Low)	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C80] Block deprecated S3 actions using IAM ThreatModel and the S3 actions list.	Request the controls blocking deprecated S3 actions.	Low	S3.FC1	S3.T35 (Medium)	Very Low
Detective (COSO) Detect (NIST CSF)	[S3.C82] Monitor and investigate any requests not using SigV4 (e.g., via CloudTrail S3 when the additionalEventData.SignatureVersion is different from "SigV4").	Make a non-SigV4 AWS API call; it should be detected.	Low	S3.FC1	S3.T35 (Low)	Very Low
Directive (COSO) Identify (NIST CSF)	[S3.C96] Maintain a list of authorized S3 buckets to receive the S3 Inventory of each bucket.	Request the list of authorized bucket(s) to receive S3 Inventory of each bucket, its review process, and its review records.	Low	S3.FC12	S3.T42 (Very Low)	Very Low
Assurance (COSO) Detect (NIST CSF)	[S3.C97] Verify only authorized buckets are configured to receive inventory.	Create an unauthorized bucket to receive inventory; it should be detected.	High	S3.FC12	-	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C136, depends on S3.C96, assured by S3.C97] Ensure only authorized S3 buckets are configured to receive S3 Inventory for each bucket.	Request 1) the mechanism ensuring only authorized S3 buckets are configured to receive S3 Inventory for each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC12	S3.T42 (Medium)	Very Low
Directive (COSO) Identify (NIST CSF)	[S3.C164, depends on S3.C26] Maintain the list of authorized optional fields allowed to be accessed by each authorized IAM principal.	Request the list of authorized optional fields allowed to be accessed by each authorized IAM principal, its review process, and its review records.	High	S3.FC12	S3.T42 (Very Low)	Very Low
Preventative (COSO) Protect (NIST CSF)	[S3.C165, depends on S3.C164] Prevent the creation of inventories without authorized optional fields (e.g., by using an SCP and/or an IAM policy on "s3:PutInventoryConfiguration" with an allow statement on "s3:InventoryAccessibleOptionalFields" = authorized optional fields only).	Create an inventory with an unauthorized optional field; it should be denied.	Low	S3.FC12	S3.T42 (Medium)	Very Low
Detective (COSO) Detect (NIST CSF)	[S3.C157, depends on S3.C58] Monitor PutBucketLogging to detect bucket server access logging changes, including deactivation and bucket changes (i.e., using the CloudTrail event "PutBucketLogging" and the "requestParameters.BucketLoggingStatus" field to examine	Make a call to 1) disable bucket logging, or 2) change to an unauthorized bucket; it should be detected.	Low	S3.FC19	S3.T59 (Medium)	Very Low

	the lack of the "LoggingEnabled" key or an unauthorized bucket in "requestParameters.BucketLoggingStatus.LoggingEnabled.TargetBucket").					

Appendix 2 - List of all Actions and their details

Id	Description	Feature Class ID	IAM Permission	Event	API
S3.A1	Aborts a multipart upload.	S3.FC1	s3:AbortMultipartUpload	Data-AWS::S3::Object-AbortMultipartUpload	AbortMultipartUpload
S3.A2	Grants permission to allow circumvention of governance-mode object retention settings (for DeleteObject, DeleteObjects and PutObjectRetention).	S3.FC17	s3:BypassGovernanceRetention	-	-
S3.A3	Completes a multipart upload by assembling previously uploaded parts.	S3.FC1	s3:PutObject	Data-AWS::S3::Object-CompleteMultipartUpload	CompleteMultipartUpload
S3.A4	Creates a copy of an object that is already stored in Amazon S3.	S3.FC1	s3:GetObject s3:PutObject	Data-AWS::S3::Object-CopyObject	CopyObject
S3.A5	Creates a new bucket.	S3.FC5	s3:CreateBucket	CreateBucket	CreateBucket
S3.A6	Initiates a multipart upload and returns an upload ID.	S3.FC1	s3:GetObject s3:PutObject	Data-AWS::S3::Object-CreateMultipartUpload	CreateMultipartUpload
S3.A7	Deletes the bucket. All objects (including all object versions and delete markers) in the bucket must be deleted before the bucket itself can be deleted.	S3.FC5	s3:DeleteBucket	DeleteBucket	DeleteBucket
S3.A8	Deletes an analytics configuration for the bucket.	S3.FC11	s3:PutAnalyticsConfiguration	DeleteBucketAnalyticsConfiguration	DeleteBucketAnalyticsConfiguration
S3.A9	Deletes the CORS configuration information set for the bucket.	S3.FC22	s3:PutBucketCors	DeleteBucketCors	DeleteBucketCors
S3.A10	Removes default encryption from the bucket.	S3.FC23	s3:PutEncryptionConfiguration	DeleteBucketEncryption	DeleteBucketEncryption
S3.A11	Deletes an inventory configuration from the bucket.	S3.FC12	s3:PutInventoryConfiguration	DeleteBucketInventoryConfiguration	DeleteBucketInventoryConfiguration
S3.A12	Deletes the lifecycle configuration from the bucket.	S3.FC13	s3:PutLifecycleConfiguration	DeleteBucketLifecycle	DeleteBucketLifecycle
S3.A13	Deletes a metrics configuration for the Amazon CloudWatch request metrics (specified by the metrics configuration ID) from the bucket. Note that this doesn't include the daily storage metrics.	S3.FC14	s3:PutMetricsConfiguration	DeleteBucketMetricsConfiguration	DeleteBucketMetricsConfiguration
S3.A14	Deletes the policy on a specified bucket.	S3.FC10	s3:DeleteBucketPolicy	DeleteBucketPolicy	DeleteBucketPolicy
S3.A15	Deletes the replication configuration from the bucket.	S3.FC15	s3:PutReplicationConfiguration	DeleteBucketReplication	DeleteBucketReplication
S3.A16	Deletes the tags from the bucket.	S3.FC7	s3:PutBucketTagging	DeleteBucketTagging	DeleteBucketTagging
S3.A17	Removes the website configuration for a bucket.	S3.FC16	s3:DeleteBucketWebsite	DeleteBucketWebsite	DeleteBucketWebsite
S3.A18	Deletes an object permanently (non-versioned bucket) or inserts a delete marker (versioned bucket).	S3.FC1	s3:DeleteObject	Data-AWS::S3::Object-DeleteObject	DeleteObject
S3.A19	Permanently deletes an object or a delete marker from a bucket.	S3.FC3	s3:DeleteObjectVersion	Data-AWS::S3::Object-DeleteObject	DeleteObject(VersionId=)
S3.A20	Deletes multiple objects permanently (non-versioned bucket) or inserts delete markers (versioned bucket).	S3.FC1	s3:DeleteObject	Data-AWS::S3::Object-DeleteObjects	DeleteObjects
S3.A21	Permanently deletes multiple objects or delete markers from a bucket.	S3.FC3	s3:DeleteObjectVersion	Data-AWS::S3::Object-DeleteObjects	DeleteObjects(VersionId=)
S3.A22	Removes the entire tag set from the specified object.	S3.FC2	s3:DeleteObjectTagging	Data-AWS::S3::Object-DeleteObjectTagging	DeleteObjectTagging
S3.A23	Removes the entire tag set from the specified object version.	S3.FC4	s3:DeleteObjectVersionTagging	Data-AWS::S3::Object-DeleteObjectTagging	DeleteObjectTagging(VersionId=)

S3.A24	Removes the PublicAccessBlock configuration for an Amazon S3 bucket.	S3.FC24	s3:PutBucketPublicAccessBlock	DeletePublicAccessBlock	DeletePublicAccessBlock
S3.A25	Returns the Transfer Acceleration state of a bucket, which is either "Enabled" or "Suspended".	S3.FC18	s3:GetAccelerateConfiguration	GetBucketAccelerateConfiguration	GetBucketAccelerateConfiguration
S3.A26	Returns the Access Control List (ACL) of a bucket.	S3.FC8	s3:GetBucketAcl	GetBucketAcl	GetBucketAcl
S3.A27	Returns an analytics configuration from the bucket.	S3.FC11	s3:GetAnalyticsConfiguration	GetBucketAnalyticsConfiguration	GetBucketAnalyticsConfiguration
S3.A28	Returns the CORS configuration information set for the bucket.	S3.FC22	s3:GetBucketCors	GetBucketCors	GetBucketCors
S3.A29	Returns the default encryption configuration for an Amazon S3 bucket.	S3.FC23	s3:GetEncryptionConfiguration	GetBucketEncryption	GetBucketEncryption
S3.A30	Returns an inventory configuration from the bucket.	S3.FC12	s3:GetInventoryConfiguration	GetBucketInventoryConfiguration	GetBucketInventoryConfiguration
S3.A31	(Deprecated) Returns the lifecycle configuration information set on the bucket.	S3.FC13	s3:GetLifecycleConfiguration	GetBucketLifecycle	GetBucketLifecycle
S3.A32	Returns the lifecycle configuration information set on the bucket.	S3.FC13	s3:GetLifecycleConfiguration	GetBucketLifecycleConfiguration	GetBucketLifecycleConfiguration
S3.A33	Returns a bucket's region.	S3.FC5	s3:GetBucketLocation	GetBucketLocation	GetBucketLocation
S3.A34	Returns the logging status of a bucket and the permissions users have to view and modify that status.	S3.FC19	s3:GetBucketLogging	GetBucketLogging	GetBucketLogging
S3.A35	Gets a metrics configuration from the bucket.	S3.FC14	s3:GetMetricsConfiguration	GetBucketMetricsConfiguration	GetBucketMetricsConfiguration
S3.A36	(Deprecated) Returns the notification configuration of a bucket.	S3.FC20	s3:GetBucketNotification	GetBucketNotification	GetBucketNotification
S3.A37	Returns the notification configuration of a bucket.	S3.FC20	s3:GetBucketNotification	GetBucketNotificationConfiguration	GetBucketNotificationConfiguration
S3.A38	Returns the policy of a specified bucket.	S3.FC10	s3:GetBucketPolicy	GetBucketPolicy	GetBucketPolicy
S3.A39	Retrieves the policy status for an Amazon S3 bucket, indicating whether the bucket is public.	S3.FC10	s3:GetBucketPolicyStatus	GetBucketPolicyStatus	GetBucketPolicyStatus
S3.A40	Returns the replication configuration of a bucket.	S3.FC15	s3:GetReplicationConfiguration	GetBucketReplication	GetBucketReplication
S3.A41	Returns the request payment configuration of a bucket.	S3.FC5	s3:GetBucketRequestPayment	GetBucketRequestPayment	GetBucketRequestPayment
S3.A42	Returns the tag set associated with the bucket.	S3.FC7	s3:GetBucketTagging	GetBucketTagging	GetBucketTagging
S3.A43	Returns the versioning state of a bucket.	S3.FC6	s3:GetBucketVersioning	GetBucketVersioning	GetBucketVersioning
S3.A44	Returns the website configuration for a bucket.	S3.FC16	s3:GetBucketWebsite	GetBucketWebsite	GetBucketWebsite
S3.A45	Retrieves an object from Amazon S3.	S3.FC1	s3:GetObject	Data-AWS::S3::Object-GetObject	GetObject
S3.A46	Retrieves an object version from Amazon S3.	S3.FC3	s3:GetObjectVersion	Data-AWS::S3::Object-GetObject	GetObject(VersionId=)
S3.A47	Returns ACL information about an object.	S3.FC1	s3:GetObjectAcl	Data-AWS::S3::Object-GetObjectAcl	GetObjectAcl
S3.A48	Returns ACL information about an object version, use the versionId subresource.	S3.FC9	s3:GetObjectVersionAcl	Data-AWS::S3::Object-GetObjectAcl	GetObjectAcl(VersionId=)
S3.A49	Gets Object Lock legal hold for a specific object.	S3.FC29	s3:GetObjectLegalHold	Data-AWS::S3::Object-GetObjectLockLegalHold	GetObjectLegalHold
S3.A50	Gets the default S3 Object Lock configuration for a bucket.	S3.FC17	s3:GetBucketObjectLockConfiguration	GetObjectLockConfiguration	GetObjectLockConfiguration
S3.A51	Retrieves an object's retention settings.	S3.FC17	s3:GetObjectRetention	Data-AWS::S3::Object-GetObjectLockRetention	GetObjectRetention
S3.A52	Returns the tag-set of an object.	S3.FC2	s3:GetObjectTagging	Data-AWS::S3::Object-GetObjectTagging	GetObjectTagging
S3.A53	Returns the tag-set of a specific version of an object.	S3.FC4	s3:GetObjectVersionTagging	Data-AWS::S3::Object-GetObjectTagging	GetObjectTagging(VersionId=)

S3.A54	Returns torrent files from an object.	S3.FC21	s3:GetObjectTorrent	Data-AWS::S3::Object-GetObjectTorrent	GetObjectTorrent
S3.A55	(Deprecated) No documented use of this action.	S3.FC21	s3:GetObjectVersionTorrent	-	-
S3.A56	Grants Amazon S3 the permission to replicate both unencrypted objects and objects encrypted with SSE-S3 or SSE-KMS.	S3.FC15	s3:GetObjectVersionForReplication	-	-
S3.A57	Retrieves the PublicAccessBlock configuration for an Amazon S3 bucket.	S3.FC24	s3:GetBucketPublicAccessBlock	GetPublicAccessBlock	GetPublicAccessBlock
S3.A58	Determines if a bucket exists and you have permission to access it.	S3.FC1	s3:HeadBucket	Data-AWS::S3::Object-HeadBucket	HeadBucket
S3.A59	Retrieves metadata from an object without returning the object itself.	S3.FC1	s3:GetObject	Data-AWS::S3::Object-HeadObject	HeadObject
S3.A60	Retrieves metadata from an object version without returning the object itself.	S3.FC3	s3:GetObjectVersion	Data-AWS::S3::Object-HeadObject	HeadObject(VersionId=)
S3.A61	Lists the analytics configurations for the bucket.	S3.FC11	s3:GetAnalyticsConfiguration	ListBucketAnalyticsConfigurations	ListBucketAnalyticsConfigurations
S3.A62	Returns a list of inventory configurations for the bucket.	S3.FC12	s3:GetInventoryConfiguration	ListBucketInventoryConfigurations	ListBucketInventoryConfigurations
S3.A63	Lists the metrics configurations for the bucket.	S3.FC14	s3:GetMetricsConfiguration	ListBucketMetricsConfigurations	ListBucketMetricsConfigurations
S3.A64	Returns a list of all buckets owned by the authenticated sender of the request.	S3.FC5	s3:ListAllMyBuckets	ListBuckets	ListBuckets
S3.A65	Lists in-progress multipart uploads.	S3.FC1	s3:ListBucketMultipartUploads	ListMultipartUploads	ListMultipartUploads
S3.A66	(Deprecated) Returns some or all (up to 1000) of the objects in a bucket.	S3.FC1	s3:ListBucket	Data-AWS::S3::Object-ListObjects	ListObjects
S3.A67	Returns some or all (up to 1000) of the objects in a bucket.	S3.FC1	s3:ListBucket	Data-AWS::S3::Object-ListObjects	ListObjectsV2
S3.A68	Lists metadata about all of the versions of objects in a bucket.	S3.FC3	s3:ListBucketVersions	Data-AWS::S3::Object-ListObjectVersions	ListObjectVersions
S3.A69	Lists the parts that have been uploaded for a specific multipart upload.	S3.FC1	s3:ListMultipartUploadParts	Data-AWS::S3::Object-ListParts	ListParts
S3.A70	Allows Amazon S3 to change the ownership of a replicated object.	S3.FC15	s3:ObjectOwnerOverrideToBucketOwner	-	-
S3.A71	Sets the Transfer Acceleration state of an existing bucket.	S3.FC18	s3:PutAccelerateConfiguration	PutBucketAccelerateConfiguration	PutBucketAccelerateConfiguration
S3.A72	Sets the permissions on an existing bucket using Access Control Lists (ACL).	S3.FC8	s3:PutBucketAcl	PutBucketAcl	PutBucketAcl
S3.A73	Adds an analytics configuration (identified by the analytics ID) to the bucket.	S3.FC11	s3:PutAnalyticsConfiguration	PutBucketAnalyticsConfiguration	PutBucketAnalyticsConfiguration
S3.A74	Sets the CORS configuration for your bucket.	S3.FC22	s3:PutBucketCors	PutBucketCors	PutBucketCors
S3.A75	Sets the default encryption configuration for the bucket.	S3.FC23	s3:PutEncryptionConfiguration	PutBucketEncryption	PutBucketEncryption
S3.A76	Adds an inventory configuration (identified by the inventory ID) to the bucket.	S3.FC12	s3:PutInventoryConfiguration	PutBucketInventoryConfiguration	PutBucketInventoryConfiguration
S3.A77	(Deprecated) Creates a new lifecycle configuration for the bucket or replaces an existing lifecycle configuration.	S3.FC13	s3:PutLifecycleConfiguration	PutBucketLifecycle	PutBucketLifecycle
S3.A78	Creates a new lifecycle configuration for the bucket or replaces an existing lifecycle configuration.	S3.FC13	s3:PutLifecycleConfiguration	PutBucketLifecycleConfiguration	PutBucketLifecycleConfiguration
S3.A79	Sets the logging parameters for a bucket.	S3.FC19	s3:PutBucketLogging	PutBucketLogging	PutBucketLogging
S3.A80	Sets or updates a metrics configuration for the CloudWatch request metrics (specified by the metrics configuration ID) from the bucket.	S3.FC14	s3:PutMetricsConfiguration	PutBucketMetricsConfiguration	PutBucketMetricsConfiguration
S3.A81	(Deprecated) Enables you to receive notifications when certain events happen in your bucket.	S3.FC20	s3:PutBucketNotification	PutBucketNotification	PutBucketNotification
S3.A82	Enables you to receive notifications when certain events happen in your	S3.FC20	s3:PutBucketNotification	PutBucketNotificationConfiguratio	PutBucketNotificationConfiguratio

	bucket.			n	n
S3.A83	Adds to or replaces a policy on a bucket.	S3.FC10	s3:PutBucketPolicy	PutBucketPolicy	PutBucketPolicy
S3.A84	Creates a new replication configuration (or replaces an existing one, if present).	S3.FC15	s3:PutReplicationConfiguration	PutBucketReplication	PutBucketReplication
S3.A85	Sets the request payment configuration of a bucket.	S3.FC5	s3:PutBucketRequestPayment	PutBucketRequestPayment	PutBucketRequestPayment
S3.A86	Adds a set of tags to an existing bucket.	S3.FC7	s3:PutBucketTagging	PutBucketTagging	PutBucketTagging
S3.A87	Sets the versioning state of an existing bucket.	S3.FC6	s3:PutBucketVersioning	PutBucketVersioning	PutBucketVersioning
S3.A88	Sets the configuration of the website that is specified in the website subresource.	S3.FC16	s3:PutBucketWebsite	PutBucketWebsite	PutBucketWebsite
S3.A89	Adds an object to a bucket.	S3.FC1	s3:PutObject	Data-AWS::S3::Object-PutObject	PutObject
S3.A90	Sets the Access Control List (ACL) permissions for an object. You must have WRITE_ACP permission to set the ACL of an object.	S3.FC1	s3:PutObjectAcl	Data-AWS::S3::Object-PutObjectAcl	PutObjectAcl
S3.A91	Sets the Access Control List (ACL) permissions for an object version. You must have WRITE_ACP permission to set the ACL of an object version.	S3.FC9	s3:PutObjectVersionAcl	Data-AWS::S3::Object-PutObjectAcl	PutObjectAcl(VersionId=)
S3.A92	Puts Object Lock legal hold on a specific object.	S3.FC29	s3:PutObjectLegalHold	Data-AWS::S3::Object-PutObjectLockLegalHold	PutObjectLegalHold
S3.A93	Allows placing a default S3 Object Lock configuration at bucket creation (AWS Support needs to be contacted for existing buckets). It automatically enables versioning, even without permission.	S3.FC17	s3:PutBucketObjectLockConfiguration	PutObjectLockConfiguration	PutObjectLockConfiguration
S3.A94	Puts object retention on a specific object.	S3.FC17	s3:PutObjectRetention	PutObjectRetention	PutObjectRetention
S3.A95	Adds a set of tags to an existing object.	S3.FC2	s3:PutObjectTagging	Data-AWS::S3::Object-PutObjectTagging	PutObjectTagging
S3.A96	Adds a set of tags to an existing object version.	S3.FC4	s3:PutObjectVersionTagging	Data-AWS::S3::Object-PutObjectTagging	PutObjectTagging(VersionId=)
S3.A97	Creates or modifies the PublicAccessBlock configuration for an Amazon S3 bucket.	S3.FC24	s3:PutBucketPublicAccessBlock	PutPublicAccessBlock	PutPublicAccessBlock
S3.A98	Allows Amazon S3 to replicate delete markers to the destination bucket.	S3.FC15	s3:ReplicateDelete	-	-
S3.A99	Allows Amazon S3 to replicate objects to the destination bucket, including tags.	S3.FC15	s3:ReplicateObject	-	-
S3.A100	Allows Amazon S3 to replicate object tags to the destination bucket.	S3.FC15	s3:ReplicateTags	-	-
S3.A101	Restores a temporary copy of an archived object.	S3.FC1	s3:RestoreObject	Data-AWS::S3::Object-RestoreObject	RestoreObject
S3.A102	Filters the contents of an Amazon S3 object based on a simple structured query language (SQL) statement.	S3.FC1	s3:GetObject	Data-AWS::S3::Object-SelectObjectContent	SelectObjectContent
S3.A103	Uploads a part in a multipart upload.	S3.FC1	s3:PutObject	Data-AWS::S3::Object-UploadPart	UploadPart
S3.A104	Uploads a part by copying data from an existing object as a data source.	S3.FC1	s3:PutObject s3:GetObject	Data-AWS::S3::Object-UploadPartCopy	UploadPartCopy
S3.A105	Creates a new access point.	S3.FC26	s3:CreateAccessPoint	CreateAccessPoint	CreateAccessPoint
S3.A106	Creates a new Amazon S3 Batch Operations job.	S3.FC27	s3:CreateJob	JobCreated	CreateJob
S3.A107	Deletes the specified access point.	S3.FC26	s3:DeleteAccessPoint	DeleteAccessPoint	DeleteAccessPoint
S3.A108	Deletes the policy on a specified access point.	S3.FC26	s3:DeleteAccessPointPolicy	DeleteAccessPointPolicy	DeleteAccessPointPolicy
S3.A109	Removes the PublicAccessBlock configuration for an AWS account.	S3.FC25	s3:PutAccountPublicAccessBlock	DeletePublicAccessBlock	DeletePublicAccessBlock
S3.A110	Retrieves the configuration parameters and status for a Batch Operations	S3.FC27	s3:DescribeJob	DescribeJob	DescribeJob

	job.				
S3.A111	Retrieves access point metadata.	S3.FC26	s3:GetAccessPoint	GetAccessPoint	GetAccessPoint
S3.A112	Returns the policy of a specified access point.	S3.FC26	s3:GetAccessPointPolicy	GetAccessPointPolicy	GetAccessPointPolicy
S3.A113	Retrieves the policy status for a specific access point's policy.	S3.FC26	s3:GetAccessPointPolicyStatus	GetAccessPointPolicyStatus	GetAccessPointPolicyStatus
S3.A114	Retrieves the PublicAccessBlock configuration for an AWS account.	S3.FC25	s3:GetAccountPublicAccessBlock	GetPublicAccessBlock	GetPublicAccessBlock
S3.A115	Returns a list of the access points currently associated with the specified bucket.	S3.FC26	s3:ListAccessPoints	ListAccessPoints	ListAccessPoints
S3.A116	Lists current jobs and jobs that have ended recently.	S3.FC27	s3:ListJobs	ListJobs	ListJobs
S3.A117	Adds to or replaces a data policy on an access point.	S3.FC26	s3:PutAccessPointPolicy	PutAccessPointPolicy	PutAccessPointPolicy
S3.A118	Creates or modifies the PublicAccessBlock configuration for an AWS account.	S3.FC25	s3:PutAccountPublicAccessBlock	PutPublicAccessBlock	PutPublicAccessBlock
S3.A119	Updates an existing job's priority.	S3.FC27	s3:UpdateJobPriority	UpdateJobPriority	UpdateJobPriority
S3.A120	Updates the status for the specified job.	S3.FC27	s3:UpdateJobStatus	JobStatusChanged	UpdateJobStatus
S3.A121	Removes OwnershipControls for an Amazon S3 bucket.	S3.FC30	s3:PutBucketOwnershipControls	DeleteBucketOwnershipControls	DeleteBucketOwnershipControls
S3.A122	Retrieves OwnershipControls for an Amazon S3 bucket.	S3.FC30	s3:GetBucketOwnershipControls	GetBucketOwnershipControls	GetBucketOwnershipControls
S3.A123	Creates or modifies OwnershipControls for an Amazon S3 bucket.	S3.FC30	s3:PutBucketOwnershipControls	PutBucketOwnershipControls	PutBucketOwnershipControls
S3.A124	Deletes the S3 Intelligent-Tiering configuration from the specified bucket.	S3.FC13	s3:DeleteIntelligentTieringConfiguration	DeleteBucketIntelligentTieringConfiguration	DeleteBucketIntelligentTieringConfiguration
S3.A125	Gets the S3 Intelligent-Tiering configuration from the specified bucket.	S3.FC13	s3:GetIntelligentTieringConfiguration	GetBucketIntelligentTieringConfiguration	GetBucketIntelligentTieringConfiguration
S3.A126	Lists the S3 Intelligent-Tiering configuration from the specified bucket.	S3.FC13	s3:ListIntelligentTieringConfigurations	ListBucketIntelligentTieringConfigurations	ListBucketIntelligentTieringConfigurations
S3.A127	Puts a S3 Intelligent-Tiering configuration to the specified bucket.	S3.FC13	s3:PutIntelligentTieringConfiguration	PutBucketIntelligentTieringConfiguration	PutBucketIntelligentTieringConfiguration
S3.A128	Deletes the Amazon S3 Storage Lens configuration.	S3.FC31	s3:DeleteStorageLensConfiguration	DeleteStorageLensConfiguration	DeleteStorageLensConfiguration
S3.A129	Deletes the Amazon S3 Storage Lens configuration tags.	S3.FC31	s3:DeleteStorageLensConfigurationTagging	DeleteStorageLensConfigurationTagging	DeleteStorageLensConfigurationTagging
S3.A130	Gets the Amazon S3 Storage Lens configuration.	S3.FC31	s3:GetStorageLensConfiguration	GetStorageLensConfiguration	GetStorageLensConfiguration
S3.A131	Gets the tags of Amazon S3 Storage Lens configuration.	S3.FC31	s3:GetStorageLensConfigurationTagging	GetStorageLensConfiguratioTagging	GetStorageLensConfiguratioTagging
S3.A132	Gets a list of Amazon S3 Storage Lens configurations.	S3.FC31	s3:ListStorageLensConfigurations	ListStorageLensConfigurations	ListStorageLensConfigurations
S3.A133	Puts an Amazon S3 Storage Lens configuration.	S3.FC31	s3:PutStorageLensConfiguration	PutStorageLensConfiguration	PutStorageLensConfiguration
S3.A134	Puts or replaces tags on an existing Amazon S3 Storage Lens configuration.	S3.FC31	s3:PutStorageLensConfigurationTagging	PutStorageLensConfigurationTagging	PutStorageLensConfigurationTagging
S3.A135	Creates an Object Lambda Access Point.	S3.FC32	s3:CreateAccessPointForObjectLambda	CreateAccessPointForObjectLambda	CreateAccessPointForObjectLambda
S3.A136	Deletes the specified Object Lambda Access Point.	S3.FC32	s3:DeleteAccessPointForObjectLambda	DeleteAccessPointForObjectLambda	DeleteAccessPointForObjectLambda
S3.A137	Removes the resource policy for an Object Lambda Access Point.	S3.FC32	s3:DeleteAccessPointPolicyForObjectLambda	DeleteAccessPointPolicyForObjectLambda	DeleteAccessPointPolicyForObjectLambda
S3.A138	Returns configuration for an Object Lambda Access Point.	S3.FC32	s3:GetAccessPointConfigurationForObjectLambda	GetAccessPointConfigurationForObjectLambda	GetAccessPointConfigurationForObjectLambda

S3.A139	Returns configuration information about the specified Object Lambda Access Point.	S3.FC32	s3:GetAccessPointForObjectLambda	GetAccessPointForObjectLambda	GetAccessPointForObjectLambda
S3.A140	Returns the resource policy for an Object Lambda Access Point.	S3.FC32	s3:GetAccessPointPolicyForObjectLambda	GetAccessPointPolicyForObjectLambda	GetAccessPointPolicyForObjectLambda
S3.A141	Returns the status of the resource policy associated with an Object Lambda Access Point.	S3.FC32	s3:GetAccessPointPolicyStatusForObjectLambda	GetAccessPointPolicyStatusForObjectLambda	GetAccessPointPolicyStatusForObjectLambda
S3.A142	Returns a list of the access points associated with the Object Lambda Access Point.	S3.FC32	s3:ListAccessPointsForObjectLambda	ListAccessPointsForObjectLambda	ListAccessPointsForObjectLambda
S3.A143	Replaces configuration for an Object Lambda Access Point.	S3.FC32	s3:PutAccessPointConfigurationForObjectLambda	PutAccessPointConfigurationForObjectLambda	PutAccessPointConfigurationForObjectLambda
S3.A144	Creates or replaces resource policy for an Object Lambda Access Point.	S3.FC32	s3:PutAccessPointPolicyForObjectLambda	PutAccessPointPolicyForObjectLambda	PutAccessPointPolicyForObjectLambda
S3.A145	Grants permission to abort a multipart upload.	S3.FC32	s3-object-lambda:AbortMultipartUpload	-	-
S3.A146	Grants permission to remove the null version of an object and insert a delete marker, which becomes the current version of the object.	S3.FC32	s3-object-lambda:DeleteObject	-	-
S3.A147	Grants permission to use the tagging subresource to remove the entire tag set from the specified object.	S3.FC32	s3-object-lambda:DeleteObjectTagging	-	-
S3.A148	Grants permission to retrieve objects from Amazon S3.	S3.FC32	s3-object-lambda:GetObject	-	-
S3.A149	Grants permission to return the Access Control List (ACL) of an object.	S3.FC32	s3-object-lambda:GetObjectAcl	-	-
S3.A150	Grants permission to get an object's current legal hold status.	S3.FC32	s3-object-lambda:GetObjectLegalHold	-	-
S3.A151	Grants permission to retrieve the retention settings for an object.	S3.FC32	s3-object-lambda:GetObjectRetention	-	-
S3.A152	Grants permission to return the tag set of an object.	S3.FC32	s3-object-lambda:GetObjectTagging	-	-
S3.A153	Grants permission to retrieve a specific version of an object.	S3.FC32	s3-object-lambda:GetObjectVersion	-	-
S3.A154	Grants permission to list some or all of the objects in an Amazon S3 bucket (up to 1000).	S3.FC32	s3-object-lambda:ListBucket	-	-
S3.A155	Grants permission to list the parts that have been uploaded for a specific multipart upload.	S3.FC32	s3-object-lambda:ListMultipartUploadParts	-	-
S3.A156	Grants permission to add an object to a bucket.	S3.FC32	s3-object-lambda:PutObject	-	-
S3.A157	Grants permission to set the Access Control List (ACL) permissions for new or existing objects in an S3 bucket.	S3.FC32	s3-object-lambda:PutObjectAcl	-	-
S3.A158	Grants permission to apply a legal hold configuration to the specified object.	S3.FC32	s3-object-lambda:PutObjectLegalHold	-	-
S3.A159	Grants permission to place an object retention configuration on an object.	S3.FC32	s3-object-lambda:PutObjectRetention	-	-
S3.A160	Grants permission to set the supplied tag-set to an object that already exists in a bucket.	S3.FC32	s3-object-lambda:PutObjectTagging	-	-
S3.A161	Grants permission to restore an archived copy of an object back into Amazon S3.	S3.FC32	s3-object-lambda:RestoreObject	-	-
S3.A162	Passes transformed objects to a GetObject operation when using Object Lambda Access Points.	S3.FC32	s3-object-lambda:WriteGetObjectResponse	WriteGetObjectResponse	WriteGetObjectResponse

S3.A163	Grants permission to remove a specific version of an object.	S3.FC32	s3-object-lambda:DeleteObjectVersion	-	-
S3.A164	Grants permission to remove the entire tag set for a specific version of the object.	S3.FC32	s3-object-lambda:DeleteObjectVersionTagging	-	-
S3.A165	Grants permission to return the Access Control List (ACL) of a specific object version.	S3.FC32	s3-object-lambda:GetObjectVersionAcl	-	-
S3.A166	Grants permission to return the tag set for a specific version of the object.	S3.FC32	s3-object-lambda:GetObjectVersionTagging	-	-
S3.A167	Grants permission to list in-progress multipart uploads.	S3.FC32	s3-object-lambda:ListBucketMultipartUploads	-	-
S3.A168	Grants permission to list metadata about all the versions of objects in an Amazon S3 bucket.	S3.FC32	s3-object-lambda:ListBucketVersions	-	-
S3.A169	Grants permission to use the ACL subresource to set the Access Control List (ACL) permissions for an object that already exists in a bucket.	S3.FC32	s3-object-lambda:PutObjectVersionAcl	-	-
S3.A170	Grants permission to set the supplied tag-set for a specific version of an object.	S3.FC32	s3-object-lambda:PutObjectVersionTagging	-	-
S3.A171	Returns configuration information about the specified Multi-Region Access Point.	S3.FC33	s3:GetMultiRegionAccessPoint	GetMultiRegionAccessPoint	GetMultiRegionAccessPoint
S3.A172	Indicates whether the specified Multi-Region Access Point has an access control policy that allows public access.	S3.FC33	s3:GetMultiRegionAccessPointPolicyStatus	GetMultiRegionAccessPointPolicy Status	GetMultiRegionAccessPointPolicy Status
S3.A173	Creates a Multi-Region Access Point and associates it with the specified buckets.	S3.FC33	s3:CreateMultiRegionAccessPoint	CreateMultiRegionAccessPoint	CreateMultiRegionAccessPoint
S3.A174	Retrieves the status of an asynchronous request to manage a Multi-Region Access Point.	S3.FC33	s3:DescribeMultiRegionAccessPointOperation	DescribeMultiRegionAccessPointOperation	DescribeMultiRegionAccessPointOperation
S3.A175	Deletes a Multi-Region Access Point. This action does not delete the buckets associated with the Multi-Region Access Point, only the Multi-Region Access Point itself.	S3.FC33	s3:DeleteMultiRegionAccessPoint	DeleteMultiRegionAccessPoint	DeleteMultiRegionAccessPoint
S3.A176	Returns a list of the Multi-Region Access Points currently associated with the specified AWS account.	S3.FC33	s3:ListMultiRegionAccessPoints	ListMultiRegionAccessPoints	ListMultiRegionAccessPoints
S3.A177	Returns the access control policy of the specified Multi-Region Access Point.	S3.FC33	s3:GetMultiRegionAccessPointPolicy	GetMultiRegionAccessPointPolicy	GetMultiRegionAccessPointPolicy
S3.A178	Associates an access control policy with the specified Multi-Region Access Point.	S3.FC33	s3:PutMultiRegionAccessPointPolicy	PutMultiRegionAccessPointPolicy	PutMultiRegionAccessPointPolicy
S3.A179	Remove tags from an existing Amazon S3 Batch Operations job.	S3.FC27	s3:DeleteJobTagging	DeleteJobTagging	DeleteJobTagging
S3.A180	Return the tag set of an existing Amazon S3 Batch Operations job.	S3.FC27	s3:GetJobTagging	GetJobTagging	GetJobTagging
S3.A181	Get an Amazon S3 Storage Lens dashboard.	S3.FC31	s3:GetStorageLensDashboard	GetStorageLensDashboardDataInternal	GetStorageLensDashboard
S3.A182	Replace tags on an existing Amazon S3 Batch Operations job.	S3.FC27	s3:PutJobTagging	PutJobTagging	PutJobTagging
S3.A183	Associate Public Access Block configurations with a specified access point, while creating a access point.	S3.FC26	s3:PutAccessPointPublicAccessBlock	PutAccessPointPublicAccessBlock	PutAccessPointPublicAccessBlock
S3.A184	Initiate the replication process by setting replication status of an object to pending.	S3.FC27	s3:InitiateReplication	-	-
S3.A185	Retrieves all the metadata from an object without returning the object itself.	S3.FC1	s3:GetObjectAttributes	Data-AWS::S3::Object-	GetObjectAttributes

	This action is useful if you're interested only in an object's metadata.		s3:GetObject	GetObjectAttributes	
S3.A186	Retrieves all the metadata from a versioned object without returning the object itself. This action is useful if you're interested only in an object's metadata.	S3.FC9	s3:GetObjectVersionAttributes s3:GetObjectVersion	Data-AWS::S3::Object-GetObjectAttributes	GetObjectAttributes(VersionId=)
S3.A187	Return the route configuration for a Multi-Region Access Point.	S3.FC33	s3:GetMultiRegionAccessPointRoutes	GetMultiRegionAccessPointRoutes	GetMultiRegionAccessPointRoutes
S3.A188	Submit a route configuration update for a Multi-Region Access Point.	S3.FC33	s3:SubmitMultiRegionAccessPoint Routes	SubmitMultiRegionAccessPointRoutes	SubmitMultiRegionAccessPointRoutes
S3.A189	Create an Amazon S3 Storage Lens group.	S3.FC31	s3:CreateStorageLensGroup	CreateStorageLensGroup	CreateStorageLensGroup
S3.A190	Delete an existing S3 Storage Lens group.	S3.FC31	s3:DeleteStorageLensGroup	DeleteStorageLensGroup	DeleteStorageLensGroup
S3.A191	Get an Amazon S3 Storage Lens group.	S3.FC31	s3:GetStorageLensGroup	GetStorageLensGroup	GetStorageLensGroup
S3.A192	List S3 Storage Lens groups.	S3.FC31	s3:ListStorageLensGroups	ListStorageLensGroups	ListStorageLensGroups
S3.A193	List the tags attached to the specified resource.	S3.FC34	s3:ListTagsForResource	ListTagsForResource	ListTagsForResource
S3.A194	Add tags to the specified resource.	S3.FC34	s3:TagResource	TagResource	TagResource
S3.A195	Remove tags from the specified resource.	S3.FC34	s3:UntagResource	UntagResource	UntagResource
S3.A196	Update an existing S3 Storage Lens group.	S3.FC31	s3:UpdateStorageLensGroup	UpdateStorageLensGroup	UpdateStorageLensGroup
S3.A197	Pause S3 replication from target source buckets to destination buckets (used by AWS FIS only).	S3.FC35	s3:PauseReplication	-	-
S3.A198	Retrieve ABAC configuration for a general purpose bucket.	S3.FC36	s3:GetBucketAbac	GetBucketAbac	GetBucketAbac
S3.A199	Set ABAC configuration for a general purpose bucket.	S3.FC36	s3:PutBucketAbac	PutBucketAbac	PutBucketAbac
S3.A200	Update the server-side encryption type of an existing object in a general purpose bucket (within same AWS Organizations).	S3.FC23	s3:UpdateObjectEncryption	Data-AWS::S3::Object-UpdateObjectEncryption	UpdateObjectEncryption

Appendix 3 - AWS Data Perimeter

Identity perimeter

[IP1] Only trusted identities can access my resources

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C152, assured by S3.C154] Ensure bucket ACLs and object ACLs are disabled on each bucket (enabled by default for all new buckets after April 2023).	Request 1) the mechanism ensuring bucket ACL and object ACL are disabled on each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC1 S3.FC5 S3.FC8 S3.FC24 S3.FC25	S3.T4 (Very High) S3.T6 (Very High) S3.T36 (Very High) S3.T43 (Very High) S3.T52 (Very High) S3.T53 (Very High)	Very High
Preventative (COSO) Protect (NIST CSF)	[S3.C153] Prevent the creation of buckets with ACL enabled (e.g., by using an SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on StringNotEquals "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note that it does not block someone from enabling an ACL afterward via PutBucketOwnershipControls.	Create a bucket with ACL enabled; it should be denied.	Low	S3.FC1 S3.FC5 S3.FC8 S3.FC24 S3.FC25	S3.T4 (High) S3.T6 (High) S3.T36 (High) S3.T43 (High) S3.T52 (High) S3.T53 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C154] Verify bucket ACL and object ACL are disabled on each bucket (e.g., using the AWS Config rule S3_BUCKET_ACL_PROHIBITED for bucket ACL, S3 Storage Lens ObjectOwnershipBucketOwnerEnforcedBucketCount, or S3 Inventory, which includes object ACL metadata).	Create/modify a bucket to enable ACL; it should be detected.	Medium	S3.FC1 S3.FC5 S3.FC8 S3.FC24 S3.FC25	-	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C26] Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the use of non-object-related S3 actions.	Request the list of authorized IAM principals with the permissions required to execute the threat actions, its review process, and its review records.	High	S3.FC1 S3.FC2 S3.FC5 S3.FC6 S3.FC8 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC17 S3.FC19 S3.FC20 S3.FC23 S3.FC24 S3.FC25 S3.FC26 S3.FC27 S3.FC32 S3.FC33 S3.FC36	S3.T1 (High) S3.T2 (High) S3.T5 (Low) S3.T6 (Medium) S3.T7 (High) S3.T8 (High) S3.T11 (High) S3.T14 (Very High) S3.T16 (High) S3.T17 (Very High) S3.T18 (High) S3.T21 (Medium) S3.T25 (High) S3.T26 (High) S3.T28 (High) S3.T30 (High) S3.T33 (Very High) S3.T35 (Very High) S3.T36 (Medium) S3.T37 (Very High) S3.T38 (Very High) S3.T39 (High) S3.T41 (High) S3.T42 (High) S3.T44 (High) S3.T46 (High)	High

					S3.T47 (High) S3.T48 (High) S3.T49 (High) S3.T50 (High) S3.T51 (High) S3.T52 (High) S3.T53 (High) S3.T54 (High) S3.T55 (High) S3.T56 (High) S3.T58 (High) S3.T59 (High) S3.T60 (High) S3.T61 (High) S3.T62 (High) S3.T63 (High) S3.T64 (High) S3.T65 (High)	
Directive (COSO) Identify (NIST CSF)	[S3.C149] For each bucket, maintain a list of authorized IAM principals allowed to access via the bucket policy.	Request the list of authorized IAM principals allowed to access via bucket policy, its review process, and its review records.	Medium	S3.FC10	S3.T37 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C150, depends on S3.C149, assured by S3.C151] Ensure only authorized IAM principals allowed to access via bucket policy are configured (e.g., using IAM Access Analyzer for reconciliation).	Request 1) the mechanism ensuring only authorized IAM principals are allowed to access buckets via bucket policy, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC10	S3.T37 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C151] Verify only authorized IAM principals allowed to access via bucket policy are used (e.g., using the AWS Config rule S3_BUCKET_POLICY_GRANTEE_CHECK).	Allow an unauthorized IAM principal on a bucket policy; it should be detected.	Medium	S3.FC10	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C34, assured by S3.C36] Deny requests to change object ACL to public (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy with a deny statement on PutObjectAcl for "s3:x-amz-grant-read", "s3:x-amz-grant-read-acp", "s3:x-amz-grant-write-acp", "s3:x-amz-grant-full-control" on the following predefined groups "http://acs.amazonaws.com/groups/global/AllUsers" and "http://acs.amazonaws.com/groups/global/AuthenticatedUsers").	Make a call to create a public ObjectACL; it should be denied.	Medium	S3.FC1 S3.FC5	S3.T6 (Very High) S3.T36 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C36] Verify the control blocking change ObjectACL to public (e.g., an SCP and VPC endpoint policy) is properly implemented.	Remove the control blocking changes of ObjectACL to public; it should be detected.	High	S3.FC1 S3.FC5	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C55, assured by S3.C57] Deny requests to add an ACL on a bucket (e.g., using an SCP, bucket policies, centrally in an RCP applied to the OU or AWS account, or VPC endpoint policy, with a deny statement on "s3:PutBucketAcl").	Make a call to add an ACL on a bucket; it should be denied.	Medium	S3.FC8 S3.FC19	S3.T4 (Very High) S3.T58 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C57] Verify the control blocking bucket ACL changes is properly implemented.	Remove the control blocking bucket ACL changes; it should be detected.	High	S3.FC8 S3.FC19	-	High
Directive (COSO) Detect (NIST CSF)	[S3.C9, depends on S3.C58] Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data).	Request the CloudTrail ThreatModel and the evidence of its application for enabling and protecting S3 data events.	Very Low	S3.FC1 S3.FC5	S3.T1 (Low) S3.T4 (Low)	Medium

	Make it available for security analysis, and protect it using CloudTrail ThreatModel.			S3.FC8	S3.T5 (Low) S3.T6 (Low) S3.T7 (Low) S3.T8 (Low) S3.T9 (Low) S3.T11 (Low) S3.T12 (Low) S3.T16 (Low) S3.T21 (Low) S3.T31 (Low) S3.T34 (Low) S3.T35 (Low) S3.T36 (Low) S3.T39 (Low)	
Directive (COSO) Protect (NIST CSF)	[S3.C27, assured by S3.C28] In the S3 bucket/access point/Object Lambda Access Point policy, do not allow IAM principals of the same AWS account. Only AWS IAM policies, and not resource policies such as S3 bucket/access point/Object Lambda Access Point policies, should be used to provide permissions to a principal of the same AWS account.	Request all S3 bucket/access point/Object Lambda Access Point policy statements with "allow"; no principal from the same account should be authorized.	Low	S3.FC1 S3.FC2 S3.FC5 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC19 S3.FC20 S3.FC23 S3.FC26 S3.FC27 S3.FC32 S3.FC33	S3.T1 (Low) S3.T2 (Low) S3.T6 (Low) S3.T7 (Low) S3.T8 (Low) S3.T11 (Low) S3.T14 (Medium) S3.T16 (Low) S3.T17 (Medium) S3.T18 (Low) S3.T21 (Low) S3.T25 (Low) S3.T26 (Medium) S3.T30 (Low) S3.T33 (Medium) S3.T35 (Medium) S3.T36 (Low) S3.T37 (Medium) S3.T38 (Medium) S3.T39 (Low) S3.T41 (Low) S3.T42 (Low) S3.T44 (Low) S3.T46 (Medium) S3.T54 (Medium) S3.T55 (Medium) S3.T58 (Medium) S3.T59 (Medium) S3.T65 (Low)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C28] Verify all S3 bucket/access point/Object Lambda Access Point policies do not allow an IAM principal of the same AWS account (e.g., using the Config rule S3_BUCKET_POLICY_GRANTEE_CHECK for bucket policy).	Add an allow statement for an IAM principal of the same account in 1) a bucket policy, 2) an access point policy, and 3) an Object Lambda Access Point; it should be detected.	Medium	S3.FC1 S3.FC2 S3.FC5 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC19 S3.FC20 S3.FC23	-	Medium

				S3.FC26 S3.FC27 S3.FC32 S3.FC33		
Directive (COSO) Protect (NIST CSF)	[S3.C170, depends on S3.C58] Integrate and limit the access to general purpose buckets via tags in the IAM Operating Model (including enforcing tagging of buckets and objects at creation using AWS:ResourceTag and s3:BucketTag).	Request the IAM tag Operating Model for the general purpose buckets.	High	S3.FC2	S3.T33 (Very High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C171, depends on S3.C58, assured by S3.C172] Ensure only the authorized ABAC configuration for each general purpose bucket is configured.	Request 1) the mechanism ensuring only the authorized ABAC configuration for each general purpose bucket is configured, 2) its records of execution for all new general purpose buckets, and 3) the plan to move any older general purpose buckets.	Medium	S3.FC36	S3.T64 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C172] Verify all general purpose buckets use their authorized ABAC configuration.	1) Enable ABAC on an unauthorized general purpose bucket, or 2) disable ABAC on an authorized general purpose bucket; it should be detected.	Medium	S3.FC36	-	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C129] Maintain a list of cross-account access on each Object Lambda Access Point.	Request the list of authorized cross-account access for each Object Lambda Access Point, its review process, and its review records.	Very Low	S3.FC32	S3.T46 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C130, depends on S3.C129, assured by S3.C131] Ensure only authorized cross-account IAM entities are allowed in the Object Lambda Access Point policy.	Request the mechanism ensuring only cross-account IAM entities are allowed in the Object Lambda Access Point policy, and the evidence of its execution.	Low	S3.FC32	S3.T46 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C131] Verify only the authorized cross-account IAM entities are allowed in the Object Lambda Access Point policy.	Add an unauthorized cross-account IAM entity on an Object Lambda Access Point policy; it should be detected.	High	S3.FC32	-	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C35] Monitor ObjectACL changes (or tentative changes) to public using CloudTrail S3 data events.	Make a call to create a public ObjectACL; it should be detected.	Low	S3.FC1 S3.FC5	S3.T6 (Low) S3.T36 (Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C56] Monitor changes to bucket ACLs to ensure they stay private (e.g., using the CloudTrail event PutBucketAcl and its field requestParameters.x-amz-acl, which should either be "private" or not exist).	Make a call to have a bucket ACL other than private; it should be detected.	Medium	S3.FC8 S3.FC19	S3.T4 (Low) S3.T58 (Low)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C155, assured by S3.C156] Ensure all requests are blocked from AWS service roles that do not require access (e.g., by denying all requests with the principal "arn:aws:iam::*:*/AWSServiceRoleFor*" on S3 bucket policies).	Request 1) the mechanism ensuring only authorized AWS service roles can access each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC28	S3.T57 (Very High)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C156] Verify all requests from unauthorized service roles are blocked.	Remove the statement on a bucket policy denying all unauthorized service roles; it should be detected.	Medium	S3.FC28	-	Low

[IP2] Only trusted identities are allowed from my network

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C124] Ensure all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoint controls.	Request 1) the mechanism ensuring all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoints controls, 2) its records of execution for all new VPC endpoints, and 3) the plan to move any older VPC endpoints.	Low	S3.FC1	S3.T8 (Very High) S3.T9 (Very High)	High

Resource perimeter

[RP1] My identities can access only trusted resources

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C11] Track all buckets you don't control that host your objects, define their data classification, identify their respective owners (and AWS account ID), determine their ObjectACL requirements (including S3 Object Ownership), and get assurance of their protection (e.g., through contractual agreement, verified by assurance programs, or using this ThreatModel).	Request the list of all external buckets authorized to host your objects, their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), their data classification, and the mechanism used to ensure the security of those buckets.	Medium	S3.FC1 S3.FC5 S3.FC16	S3.T1 (Very Low) S3.T3 (High) S3.T5 (Very Low) S3.T6 (Low) S3.T7 (Very Low) S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Low) S3.T14 (Very Low) S3.T15 (Very Low) S3.T21 (Very Low) S3.T31 (High) S3.T43 (Very High)	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C15] Request access via an S3 access point on a bucket you don't own, if compatible with your interaction with the bucket (e.g., not through an unsupported AWS service).	Request the documented reasons why the access point was not implemented in the use case.	Low	S3.FC1	S3.T8 (Medium) S3.T9 (Medium) S3.T31 (Very High)	High
Directive (COSO) Identify (NIST CSF)	[S3.C120] Maintain a list of IAM roles used for Batch jobs, ideally dedicated (e.g., using change management process on infrastructure-as-code).	Request the list of all IAM roles configured for Batch jobs.	Medium	S3.FC27	S3.T44 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C122, depends on S3.C120] Limit access to authorized IAM roles used for Batch jobs, using the IAM ThreatModel (e.g., trust policy, and "iam:PassRole").	Request the IAM ThreatModel and the evidence of its application to the IAM roles used for Batch jobs.	Medium	S3.FC27	S3.T44 (Very High)	High
Directive (COSO) Detect (NIST CSF)	[S3.C9, depends on S3.C58] Enable CloudTrail S3 data events in relevant AWS accounts, Regions, and buckets (e.g., production, with sensitive data). Make it available for security analysis, and protect it using CloudTrail ThreatModel.	Request the CloudTrail ThreatModel and the evidence of its application for enabling and protecting S3 data events.	Very Low	S3.FC1 S3.FC5 S3.FC8	S3.T1 (Low) S3.T4 (Low) S3.T5 (Low) S3.T6 (Low) S3.T7 (Low) S3.T8 (Low) S3.T9 (Low) S3.T11 (Low) S3.T12 (Low) S3.T16 (Low) S3.T21 (Low) S3.T31 (Low) S3.T34 (Low) S3.T35 (Low) S3.T36 (Low) S3.T39 (Low)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C13, depends on S3.C11] Monitor that only authorized external buckets are used (e.g., via CloudTrail S3 data events in resources[].accountId and resources[].ARN). Both account ID and bucket name must be verified.	Make a call to an unauthorized bucket; it should be detected.	Low	S3.FC1 S3.FC5	S3.T1 (Low) S3.T7 (Low) S3.T11 (Low) S3.T21 (Low) S3.T31 (Medium)	Medium
Directive (COSO)	[S3.C46]	Request the process ensuring that all S3 buckets interacted	Medium	S3.FC1	S3.T1 (Medium)	Medium

Protect (NIST CSF)	Ensure all S3 buckets interacted with are in the correct AWS account (e.g., using the condition in all compatible S3 requests: x-amz-expected-bucket-owner and x-amz-source-expected-bucket-owner).	with are in the correct AWS account.		S3.FC5	S3.T3 (Medium)	
Directive (COSO) Identify (NIST CSF)	[S3.C86] Maintain a list of authorized buckets to have replication enabled, their target bucket, and replication type (i.e., encryption type, ownership, RTC, etc.) (ref).	Request the list of authorized buckets to have replication enabled, their target bucket and replication rights, its review process, and its review records.	Medium	S3.FC15	S3.T2 (Very Low)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C89] Maintain a list of IAM roles used for replication, ideally dedicated (e.g., using change management process on infrastructure-as-code).	Request the list of all IAM roles configured for replication.	Medium	S3.FC15	S3.T2 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C90, depends on S3.C89] Limit S3 access to the source and destination buckets and the replication rights of each authorized IAM role configured for replication.	Request the S3 access for each replication role, and how they align with the replication requirements.	Medium	S3.FC15	S3.T2 (Medium)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C91, depends on S3.C89] Limit access to authorized IAM roles used for replication, using the IAM ThreatModel (e.g., trust policy, and "iam:PassRole").	Request the IAM ThreatModel and the evidence of its application to the IAM roles used for replication.	High	S3.FC15	S3.T2 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C134, depends on S3.C86, assured by S3.C87,S3.C88,S3.C117] Ensure only authorized buckets have replication enabled and are configured correctly.	Request 1) the mechanism ensuring only authorized buckets have replication enabled with their correct configuration, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC15	S3.T2 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C138, depends on S3.C89, assured by S3.C92] Ensure only authorized IAM roles are attached for each replication, ideally dedicated.	Request the mechanism ensuring authorized IAM roles are attached for each replication, and the evidence of its execution for all replication configurations.	Medium	S3.FC15	S3.T2 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C121, depends on S3.C120] Limit access to only the required resources/permissions (e.g., source/destination buckets, Lambda functions) for each authorized IAM role configured for Batch jobs.	Request access only to the required resources/permissions for each Batch IAM role, and request information on how they are aligned with the replication requirements.	Medium	S3.FC27	S3.T44 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C139, depends on S3.C120, assured by S3.C123] Ensure only an authorized IAM role is attached to each Batch job.	Request the mechanism ensuring only an authorized IAM role is attached to each Batch job, and the evidence of its execution for all new {resource}.	Medium	S3.FC27	S3.T44 (High)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C158] Maintain a list of authorized S3 buckets and their AWS accounts for cross-account access points.	Request the list of authorized S3 buckets and their AWS account for cross-account access points, its review process, and its review records.	Low	S3.FC26	S3.T60 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C159, depends on S3.C158, assured by S3.C161] Ensure only authorized S3 buckets and their AWS accounts for cross-account access points are configured.	Request 1) the mechanism ensuring only authorized S3 buckets and their AWS account for cross-account access points are configured, 2) its records of execution for all new S3 buckets and their AWS accounts for cross-account access points, and 3) the plan to move any older S3 buckets and their AWS accounts for cross-account access points.	Medium	S3.FC26	S3.T60 (High)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C160, depends on S3.C158] Monitor CreateAccessPoint to detect unauthorized buckets or AWS accounts (i.e., using CloudTrail event CreateAccessPoint and its fields "requestParameters.CreateAccessPointRequest.Bucket" and "requestParameters.CreateAccessPointRequest.BucketAccountId").	Call the API to create a cross-account access point with an unauthorized 1) bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.	Medium	S3.FC26	S3.T60 (Medium)	Medium
Assurance (COSO)	[S3.C161]	Deploy a cross-account access point with an unauthorized 1)	Medium	S3.FC26	-	Medium

Detect (NIST CSF)	Verify only authorized S3 buckets and their AWS accounts for cross-account access points are used.	bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.				
Directive (COSO) Identify (NIST CSF)	[S3.C94] Maintain a list of authorized notification receivers (e.g., SNS topic, Lambda) for each bucket. You might use a simpler approach by using authorized account IDs to ensure all your receivers are in authorized AWS accounts.	Request the list of authorized notification receivers for each bucket, its review process, and its review records.	Low	S3.FC20	S3.T41 (Very Low)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C95] Verify only authorized notification receiver(s) are configured for buckets.	Create an unauthorized receiver; it should be detected.	High	S3.FC20	-	Low
Directive (COSO) Protect (NIST CSF)	[S3.C135, depends on S3.C94, assured by S3.C95] Ensure only authorized notification receivers for each bucket are configured.	Request 1) the mechanism ensuring only authorized notification receivers for each bucket are configured, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC20	S3.T41 (High)	Low
Directive (COSO) Identify (NIST CSF)	[S3.C96] Maintain a list of authorized S3 buckets to receive the S3 Inventory of each bucket.	Request the list of authorized bucket(s) to receive S3 Inventory of each bucket, its review process, and its review records.	Low	S3.FC12	S3.T42 (Very Low)	Very Low
Assurance (COSO) Detect (NIST CSF)	[S3.C97] Verify only authorized buckets are configured to receive inventory.	Create an unauthorized bucket to receive inventory; it should be detected.	High	S3.FC12	-	Very Low
Directive (COSO) Protect (NIST CSF)	[S3.C136, depends on S3.C96, assured by S3.C97] Ensure only authorized S3 buckets are configured to receive S3 Inventory for each bucket.	Request 1) the mechanism ensuring only authorized S3 buckets are configured to receive S3 Inventory for each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC12	S3.T42 (Medium)	Very Low

[RP2] Only trusted resources can be accessed from my network

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C104] Maintain a list of authorized access between VPCs, S3 access points, and S3.	Request the list of authorized access between VPC, S3 access points, and S3.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC26 S3.FC28 S3.FC33	S3.T7 (Very Low) S3.T9 (Very Low) S3.T10 (Very Low) S3.T11 (Very Low) S3.T28 (Very Low) S3.T37 (Very Low) S3.T54 (Very Low) S3.T55 (Very Low) S3.T56 (Very Low) S3.T60 (Very Low)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C105, depends on S3.C104, assured by S3.C109] Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy.	Make a request on an unauthorized access point or bucket; it should be denied.	Medium	S3.FC1 S3.FC5 S3.FC26 S3.FC28 S3.FC33	S3.T7 (Medium) S3.T9 (Very High) S3.T10 (Very High) S3.T11 (Medium) S3.T54 (Medium) S3.T55 (Medium)	High
Directive (COSO) Identify (NIST CSF)	[S3.C125] Maintain a list of authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload.	Request the list of authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload, its review process, and its review records.	Low	S3.FC32	S3.T46 (Very Low)	High

Directive (COSO) Protect (NIST CSF)	[S3.C126, depends on S3.C125, assured by S3.C127] Ensure only authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload are created.	Request the mechanism ensuring only authorized Lambda functions for each Object Lambda Access Point, its associated access point, its associated HEAD/LIST/GET request(s), and payload, and the evidence of its execution.	Medium	S3.FC32	S3.T46 (Very High)	High
Directive (COSO) Identify (NIST CSF)	[S3.C22] Maintain a list of authorized S3 and S3 access points (and their respective AWS accounts) to be accessed for each VPC.	Request the list of authorized S3 buckets and S3 access points to be accessed for each VPC, its review process, and its review records.	Medium	S3.FC1 S3.FC5	S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Very Low)	Medium
Preventative (COSO) Protect (NIST CSF)	[S3.C23, depends on S3.C22, assured by S3.C24] Limit the access to only authorized S3 bucket(s) or their AWS account(s) from each VPC (e.g., using the condition key "s3:ResourceAccount" on the VPC endpoint policy, alternatively use a specific resource-level statement for each bucket, or if the VPC endpoint policy size is beyond the limit and more granular control on VPC is required, use access points).	Make a request to an unauthorized bucket from one of your VPCs; it should be denied.	Medium	S3.FC1 S3.FC5	S3.T8 (High) S3.T9 (High) S3.T11 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C24] Verify all VPCs are limited to accessing only authorized S3 bucket(s).	Remove the control limiting access to only authorized S3 bucket(s); it should be detected.	High	S3.FC1 S3.FC5	-	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C86] Maintain a list of authorized buckets to have replication enabled, their target bucket, and replication type (i.e., encryption type, ownership, RTC, etc.) (ref).	Request the list of authorized buckets to have replication enabled, their target bucket and replication rights, its review process, and its review records.	Medium	S3.FC15	S3.T2 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C134, depends on S3.C86, assured by S3.C87,S3.C88,S3.C117] Ensure only authorized buckets have replication enabled and are configured correctly.	Request 1) the mechanism ensuring only authorized buckets have replication enabled with their correct configuration, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC15	S3.T2 (High)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C158] Maintain a list of authorized S3 buckets and their AWS accounts for cross-account access points.	Request the list of authorized S3 buckets and their AWS account for cross-account access points, its review process, and its review records.	Low	S3.FC26	S3.T60 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C159, depends on S3.C158, assured by S3.C161] Ensure only authorized S3 buckets and their AWS accounts for cross-account access points are configured.	Request 1) the mechanism ensuring only authorized S3 buckets and their AWS account for cross-account access points are configured, 2) its records of execution for all new S3 buckets and their AWS accounts for cross-account access points, and 3) the plan to move any older S3 buckets and their AWS accounts for cross-account access points.	Medium	S3.FC26	S3.T60 (High)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C160, depends on S3.C158] Monitor CreateAccessPoint to detect unauthorized buckets or AWS accounts (i.e., using CloudTrail event CreateAccessPoint and its fields "requestParameters.CreateAccessPointRequest.Bucket" and "requestParameters.CreateAccessPointRequest.BucketAccountId").	Call the API to create a cross-account access point with an unauthorized 1) bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.	Medium	S3.FC26	S3.T60 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C161] Verify only authorized S3 buckets and their AWS accounts for cross-account access points are used.	Deploy a cross-account access point with an unauthorized 1) bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.	Medium	S3.FC26	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C18, depends on S3.C17] For each VPC with an IAM entity allowed to use S3, secure them with the VPC ThreatModel (e.g., modification of VPC endpoints, VPC endpoint policy, routing table, Security Groups).	Request how the VPC ThreatModel for S3 is being applied.	High	S3.FC1 S3.FC5	S3.T9 (Medium) S3.T11 (Medium) S3.T62 (Medium)	Low
Directive (COSO)	[S3.C21]	Request the mechanism to enable VPC DNS query logging in	Medium	S3.FC1	S3.T8 (Very Low)	Low

Detect (NIST CSF)	Enable VPC DNS query logging in all VPCs.	all VPCs.		S3.FC5	S3.T9 (Very Low) S3.T11 (Very Low)	
Detective (COSO) Detect (NIST CSF)	[S3.C25, depends on S3.C21,S3.C22] Monitor VPC DNS query logs to ensure only authorized S3 buckets and S3 access points are being queried in each VPC (e.g., using VPC DNS query logging) and protect them using Route 53 ThreatModel.	Make a DNS query to an unauthorized 1) S3 bucket and 2) S3 access points; it should be detected.	Low	S3.FC1 S3.FC5	S3.T8 (Low) S3.T9 (Low) S3.T11 (Low)	Low
Directive (COSO) Identify (NIST CSF)	[S3.C94] Maintain a list of authorized notification receivers (e.g., SNS topic, Lambda) for each bucket. You might use a simpler approach by using authorized account IDs to ensure all your receivers are in authorized AWS accounts.	Request the list of authorized notification receivers for each bucket, its review process, and its review records.	Low	S3.FC20	S3.T41 (Very Low)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C95] Verify only authorized notification receiver(s) are configured for buckets.	Create an unauthorized receiver; it should be detected.	High	S3.FC20	-	Low
Directive (COSO) Protect (NIST CSF)	[S3.C135, depends on S3.C94, assured by S3.C95] Ensure only authorized notification receivers for each bucket are configured.	Request 1) the mechanism ensuring only authorized notification receivers for each bucket are configured, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Medium	S3.FC20	S3.T41 (High)	Low

Network perimeter

[NP1] My identities can access resources only from expected networks

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C8] Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g., firewalls or a cloud interception proxy), including via Internet Gateway, to force the use of VPC endpoints. It will block data-plane transfer. Note: AWS Management Console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Request the evidence of the implementation of blocking S3 endpoints in your corporate perimeter security (e.g., firewalls) and tests of its effectiveness.	Low	S3.FC1 S3.FC5 S3.FC28	S3.T7 (High) S3.T10 (High) S3.T12 (Low) S3.T18 (Medium) S3.T34 (Very High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C12, depends on S3.C11] Allow only authorized ACLs on objects for buckets you don't control (e.g., using IAM and VPC endpoint policy with the ACL conditions).	Put an object with an unauthorized ACL; it should be denied.	Medium	S3.FC1	S3.T5 (Medium) S3.T6 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C16] Analyze and protect all AWS services accessing S3 (e.g., via ThreatModel). Enforce use in VPC only, whenever possible.	Request the ThreatModels for all AWS services using S3.	High	S3.FC1 S3.FC5	S3.T21 (Very High) S3.T30 (Very High)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C158] Maintain a list of authorized S3 buckets and their AWS accounts for cross-account access points.	Request the list of authorized S3 buckets and their AWS account for cross-account access points, its review process, and its review records.	Low	S3.FC26	S3.T60 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C159, depends on S3.C158, assured by S3.C161] Ensure only authorized S3 buckets and their AWS accounts for cross-account access points are configured.	Request 1) the mechanism ensuring only authorized S3 buckets and their AWS account for cross-account access points are configured, 2) its records of execution for all new S3 buckets and their AWS accounts for cross-account access points, and 3) the plan to move any older S3 buckets and their AWS accounts for cross-account access points.	Medium	S3.FC26	S3.T60 (High)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C160, depends on S3.C158] Monitor CreateAccessPoint to detect unauthorized buckets or AWS accounts (i.e., using CloudTrail event CreateAccessPoint and its fields "requestParameters.CreateAccessPointRequest.Bucket" and "requestParameters.CreateAccessPointRequest.BucketAccountId").	Call the API to create a cross-account access point with an unauthorized 1) bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.	Medium	S3.FC26	S3.T60 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C161] Verify only authorized S3 buckets and their AWS accounts for cross-account access points are used.	Deploy a cross-account access point with an unauthorized 1) bucket or 2) an authorized bucket in an unauthorized AWS account; it should be detected.	Medium	S3.FC26	-	Medium

[NP2] My resources can be accessed only from expected networks

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C49, assured by S3.C50] Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Request 1) the mechanism ensuring account-level S3 Block Public Access is enabled on all AWS accounts, 2) its records of execution for all new AWS accounts, and 3) the plan to move any older AWS accounts.	Very Low	S3.FC5 S3.FC8 S3.FC10	S3.T4 (High) S3.T14 (High) S3.T36 (Very High) S3.T37 (Very High) S3.T38 (Medium)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C50] Verify account-level S3 Block Public Access is enabled on all	Remove the account-level S3 Block Public Access of an AWS account; it should be detected.	Very Low	S3.FC5 S3.FC8	-	Very High

	AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (e.g., using the AWS Config rule: S3_ACCOUNT_LEVEL_PUBLIC_ACCESS_BLOCKS).			S3.FC10		
Directive (COSO) Protect (NIST CSF)	[S3.C51, assured by S3.C52] Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (enabled by default for all new buckets after April 2023).	Request 1) the mechanism ensuring S3 Block Public Access is enabled on each bucket, 2) its records of execution for all new buckets, and 3) the plan to move any older buckets.	Low	S3.FC5 S3.FC8 S3.FC10	S3.T4 (High) S3.T14 (High) S3.T36 (Very High) S3.T37 (Very High) S3.T38 (Medium)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C52] Verify S3 Block Public Access is enabled on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true (e.g., using the AWS Config rule: S3_BUCKET_LEVEL_PUBLIC_ACCESS_PROHIBITED).	Remove the S3 Block Public Access from an S3 bucket; it should be detected.	Very Low	S3.FC5 S3.FC8 S3.FC10	-	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C53, assured by S3.C54] Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Request 1) the mechanism ensuring S3 Block Public Access is enabled on each S3 access point, 2) its records of execution for all new S3 access points, and 3) the plan to move any older S3 access points.	Low	S3.FC5 S3.FC10 S3.FC26 S3.FC33	S3.T14 (High) S3.T36 (Medium) S3.T37 (Medium) S3.T38 (Medium) S3.T54 (High) S3.T55 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C54] Verify S3 Block Public Access is enabled on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Remove S3 Block Public Access of 1) an access point, and 2) a Multi-Region Access Point; it should be detected.	Medium	S3.FC5 S3.FC10 S3.FC26 S3.FC33	-	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C173] Block public access to each S3 bucket at the organization root, OU, or account-level by enforcing S3 policies in AWS Organizations.	Request the mechanism enforcing block of public access to each bucket at the organization root, OU, or account-level via S3 policies, its records of execution for all new AWS accounts, and the plan to move any older AWS accounts.	Low	S3.FC5 S3.FC8 S3.FC10	S3.T4 (High) S3.T14 (High) S3.T36 (Very High) S3.T37 (Very High) S3.T38 (Medium)	Very High
Directive (COSO) Identify (NIST CSF)	[S3.C98] For each S3 bucket, maintain a list of VPCs authorized to access it.	For each S3 bucket, request the list of authorized VPCs to access it, its review process, and its review records.	Low	S3.FC1 S3.FC2 S3.FC5 S3.FC10	S3.T11 (Very Low) S3.T14 (Very Low) S3.T17 (Very Low) S3.T30 (Very Low) S3.T33 (Very Low) S3.T36 (Very Low) S3.T38 (Very Low) S3.T39 (Very Low)	Very High
Preventative (COSO) Protect (NIST CSF)	[S3.C99, depends on S3.C98, assured by S3.C100] Limit access to only authorized VPCs (e.g., using their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement if the condition "aws:SourceVpce" is met, or if the bucket policy size is beyond the limit, use this condition on the access point).	Make a request to the bucket outside an authorized VPC; it should be denied.	Very Low	S3.FC1 S3.FC2 S3.FC5 S3.FC10	S3.T11 (Medium) S3.T14 (Medium) S3.T17 (Medium) S3.T30 (High) S3.T33 (High) S3.T36 (High) S3.T38 (High) S3.T39 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[S3.C100] Verify all buckets include a control to limit access to only authorized VPCs (e.g., using the AWS Config rule S3_BUCKET_POLICY_GRANTEE_CHECK).	Remove the control limiting access to only authorized VPC(s); it should be detected.	Medium	S3.FC1 S3.FC2 S3.FC5 S3.FC10	-	Very High

Directive (COSO) Identify (NIST CSF)	[S3.C17] For each VPC, maintain a list of AWS Organizations, OUs, and/or AWS accounts where IAM entities are authorized to access S3.	For each VPC, request the list of AWS Organizations, OU, and/or AWS account(s), where IAM entities are authorized to access S3, its review process, and its review records.	Medium	S3.FC1 S3.FC5	S3.T9 (Very Low) S3.T11 (Very Low) S3.T62 (Very Low)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C19, depends on S3.C17, assured by S3.C20] Block any IAM entity not belonging to an authorized AWS Organization, OU, and/or AWS account from calling S3 from your VPCs by adding a deny statement in the S3 VPC endpoint policy for each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org IDs, as those are globally unique.	For each VPC, make an API call with an IAM entity that is not part of its authorized AWS Organizations paths; it should be denied.	Low	S3.FC1 S3.FC5	S3.T9 (Very High) S3.T11 (Very High) S3.T62 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C20] Verify all S3 VPC endpoints are blocking any IAM entity not belonging to authorized AWS Organizations, OUs, and/or AWS accounts.	Remove the policy statement blocking any IAM entity not belonging to authorized AWS Organizations, OUs, and/or AWS accounts from the VPC endpoint; it should be detected.	High	S3.FC1 S3.FC5	-	High
Directive (COSO) Protect (NIST CSF)	[S3.C47, assured by S3.C48] Front buckets that are required to be public, using authenticated CDN (e.g., CloudFront) or API Gateway, protected with WAF (e.g., for hotlinking).	Request the process ensuring that buckets required to be public are fronted by an authenticated CDN or API Gateway, and are protected with a WAF.	Medium	S3.FC5 S3.FC16	S3.T13 (Very High) S3.T14 (Medium) S3.T22 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C48] Verify no bucket is available publicly for write or read (e.g., using the AWS Config rules: S3_BUCKET_PUBLIC_READ_PROHIBITED and S3_BUCKET_PUBLIC_WRITE_PROHIBITED).	Create a public S3 bucket; it should be detected.	Very Low	S3.FC5 S3.FC16	-	High
Directive (COSO) Identify (NIST CSF)	[S3.C104] Maintain a list of authorized access between VPCs, S3 access points, and S3.	Request the list of authorized access between VPC, S3 access points, and S3.	Medium	S3.FC1 S3.FC5 S3.FC10 S3.FC26 S3.FC28 S3.FC33	S3.T7 (Very Low) S3.T9 (Very Low) S3.T10 (Very Low) S3.T11 (Very Low) S3.T28 (Very Low) S3.T37 (Very Low) S3.T54 (Very Low) S3.T55 (Very Low) S3.T56 (Very Low) S3.T60 (Very Low)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C105, depends on S3.C104, assured by S3.C109] Limit access via the S3 access point by using a VPC endpoint, bucket policy, or centrally in an RCP applied to the OU or AWS account, with the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of the allowlist bucket name in the VPC endpoint/bucket policy.	Make a request on an unauthorized access point or bucket; it should be denied.	Medium	S3.FC1 S3.FC5 S3.FC26 S3.FC28 S3.FC33	S3.T7 (Medium) S3.T9 (Very High) S3.T10 (Very High) S3.T11 (Medium) S3.T54 (Medium) S3.T55 (Medium)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C106, depends on S3.C104, assured by S3.C110] In bucket policies, or centrally in an RCP applied to the OU or AWS account, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn".	Query the bucket outside the S3 access point; it should be denied.	Medium	S3.FC1 S3.FC10 S3.FC26 S3.FC33	S3.T7 (Medium) S3.T28 (High) S3.T37 (High) S3.T55 (Medium) S3.T56 (Very High) S3.T60 (High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C107] Block the creation of non-VPC S3 access point "s3:CreateAccessPoint" (e.g., using IAM policies and SCPs with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}).	Make a request to create an internet-based access point; it should be denied.	Low	S3.FC1 S3.FC26	S3.T7 (Medium) S3.T28 (Very High) S3.T60 (High)	High

Preventative (COSO) Protect (NIST CSF)	[S3.C108, assured by S3.C111] Block all traffic from Internet-configured S3 access points (e.g., in their bucket policy, or centrally in an RCP applied to the OU or AWS account, using a deny statement with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}).	Create an internet-facing access point and try to access a bucket; it should be denied.	Low	S3.FC1 S3.FC26 S3.FC28	S3.T7 (Medium) S3.T10 (Medium) S3.T28 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C109] Verify only access points are used in the resource-level statements in VPC endpoints.	Create a VPC endpoint giving access to an S3 bucket directly, rather than an access point; it should be detected.	High	S3.FC1 S3.FC5 S3.FC26 S3.FC28 S3.FC33	-	High
Assurance (COSO) Detect (NIST CSF)	[S3.C110] Verify S3 bucket policies deny unauthorized S3 access points.	Remove/modify the deny on the bucket policy; it should be detected.	High	S3.FC1 S3.FC10 S3.FC26 S3.FC33	-	High
Assurance (COSO) Detect (NIST CSF)	[S3.C111] Verify all S3 access points are VPC-attached.	Create an internet-based access point; it should be detected.	Low	S3.FC1 S3.FC26 S3.FC28	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C112, depends on S3.C104] Block any object-related operations access to S3 buckets not through an access point (i.e., IAM policy, SCP, their bucket policy, or centrally in an RCP applied to the OU or AWS account, with a deny statement on the condition "ArnNotLike": {"s3:DataAccessPointArn": "arn:aws:s3:*Region*:*AccountId*:accesspoint/*"}).	Access any S3 bucket without using an access point; it should be denied.	Low	S3.FC1 S3.FC5	S3.T7 (Medium) S3.T11 (High)	High
Directive (COSO) Identify (NIST CSF)	[S3.C141] Maintain a list of authorized buckets to be configured as an S3 website endpoint.	Request the list of authorized buckets to be configured as a website endpoint, its review process, and its review records.	Low	S3.FC16	S3.T13 (Very Low) S3.T29 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[S3.C144, depends on S3.C141] Ensure S3 website endpoints are protected with HTTP headers (ref) using a CDN (e.g., CloudFront).	Request the mechanism ensuring S3 website endpoints are protected with HTTP headers.	Medium	S3.FC16	S3.T13 (High) S3.T29 (Very High)	High
Directive (COSO) Identify (NIST CSF)	[S3.C101] Maintain a list of authorized CloudFront distributions (via Origin Access Control) and associated bucket, access point, and/or Object Lambda Access Point.	Request the list of all authorized CloudFront distributions and associated S3 buckets, access points, and/or Object Lambda Access Points.	Low	S3.FC10	S3.T20 (Very Low)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C102] Verify all associations of CloudFront distributions with buckets, access points, and/or Object Lambda Access Points are authorized (e.g., using the Macie finding: "Policy:IAMUser/S3BucketSharedWithCloudFront").	Create a non-authorized distribution or association; it should be detected.	High	S3.FC10	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C137, depends on S3.C101, assured by S3.C102] Ensure only authorized CloudFront distributions are associated with their authorized bucket, access point, and/or Object Lambda Access Point; and vice versa (e.g., using their bucket policy, centrally in an RCP applied to the OU or AWS account, with a deny statement, access point policy, resource policy for an Object Lambda Access Point, limiting the access to only the authorized distribution(s) in the SourceArn).	Request 1) the mechanism ensuring only authorized CloudFront distributions are associated with their authorized bucket, access point, and/or Object Lambda Access Point; and vice versa, 2) its records of execution for all new CloudFront distributions, and 3) the plan to move any older CloudFront distributions.	Medium	S3.FC10	S3.T20 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C142, depends on S3.C141, assured by S3.C143] Ensure only authorized buckets are configured as an S3 website endpoint.	Request 1) the mechanism ensuring only authorized buckets are configured as S3 website endpoints, 2) its records of execution for all new website-enabled buckets, and 3) the	Medium	S3.FC16	S3.T13 (Medium) S3.T29 (Medium)	Medium

		plan to move any older website-enabled buckets.				
Assurance (COSO) Detect (NIST CSF)	[S3.C143] Verify only authorized buckets are configured as S3 website endpoints.	Enable static website hosting on an unauthorized bucket; it should be detected.	Medium	S3.FC16	-	Medium