ThreatModel™ for Amazon Simple Storage Service (S3)

Extract from the blog: The last S3 security document that you'll ever need, and how to use it

TrustOnCloud helps customers make sense of the shared responsibility model, and accelerates secure adoption of each Cloud Service. We use threat modeling to ensure that **Security Architects, DevOps, and Security Governance teams are able to make good and bias-free security decisions**.

With 70+ ThreatModels published for our customers, we decided to release the ThreatModel for Amazon S3 to all, in order to **clearly define customer responsibilities** and **reduce security bad days for the AWS community, now and in the future**.

How to use the ThreatModel for Amazon S3

To get started, the document might feel overwhelming with its 170+ pages. With its 32 distinct features, Amazon S3, the Simple Storage Service, is no longer "Simple", but I digress. All pages of the ThreatModel are relevant for at least a use case; your use case might not need all the pages.

Common use cases we see from our customers are:

1. **Covering the "best practices" (e.g. best security/effort ratio)**
2. **Reviewing the service depending on your application(s), and implementing the controls based on your risk tolerance**
3. **Technology onboarding for large enterprises/agencies**
4. **Compliance mapping to demonstrate a risk-based approach and formulate an action plan**

For each use case, you will find below where to look, what to do, and for whom it typically makes sense.

1. **Covering the "best practices" (e.g. best security/effort ratio)**

Where to look in the ThreatModel: Go to page 142 [Appendix 1 - Prioritized list for control implementation]. You will have a list of all the controls ordered by priority. It is risk-based, without the hassle to go through all the risks. We built this priority using our list of threats, the impact of the controls on the threats, and the effort it takes to implement the controls.

What to do: review that you implemented the controls starting with the "Very High" priority (using the implementation column). Test your controls actually work (using the testing column). Note that some controls might not be relevant for your usage of the service, feel free to skip them.

Typically for: DevOps team, and/or not-too-sensitive workloads (or what I like to call it "if it gets owned, we will get a bad week, not a bad year")

2. **Reviewing the service depending on your application(s), and implementing the controls based on your risk tolerance (e.g. high security but ad hoc)**

Where to look in the ThreatModel: Go to page 6 [Feature Classes]. We call feature classes, the portion of the service you can enable (exposing you to risk on those APIs) while being able to disable the rest. You can then go deeper with each feature class page with its Data Flow Diagram, and its associated threats and controls.

What to do: Identify the feature classes you intend to use during a threat modeling session with the DevOps team. Review each threat (at least Medium and above) and their mitigating controls. Decide what controls (or levels of mitigation impact) is required for each threat to satisfy your risk tolerance.

Typically for: Security Architect, and/or for sensitive workloads (typically having reputational risks or regulatory risks)

3. **Technology onboarding for large enterprises/agencies (if you are required to dive deep – or enjoying – like as if it were the Mariana Trench)**

Where to look in the ThreatModel: Everywhere. Typically at this point, there is a decision from the enterprise/agency to use the service or not. We typically walk our customers through the relevant sections with our Cloud Threat Researchers.

What to do: Once the whole document is reviewed, some of our customers decided not to use a service for the highest application criticality or block certain features (looking at you Torrent S3 Object); or to take an exception-based approach. For other cases, the service can progress to their internal next steps. For example, building infrastructure-as-code templates that application owners must use, or defining the use cases to configure as IOC events and in your CSPM (e.g. Config Rules).

Typically for: Cloud Enterprise Security and GRC, for mass adoption of Cloud Services

4. **Compliance mapping to demonstrate a risk-based approach, gap analysis and formulating an action plan (where compliance comes in handy)**

Where to look in the ThreatModel: Go to page 135 [Compliance Mapping]. You will find a mapping from S3 controls to PCI DSS v3.2. The document supports over 100 Compliance frameworks and standards using the Secure Control Framework. Our mappings are based on compliance requirements mapped to security objectives and their underlying security activities. The activities are prioritized using our risk-based approach anchored in identifying threats on the service.

What to do: Review how you address the compliance requirements to which you are subject. Request evidence of the implementation and testing of the controls. Track the completion of any gaps.

Typically for: Compliance specialists, auditors, regulators

Document Structure

License Agreement and disclaimer

Source

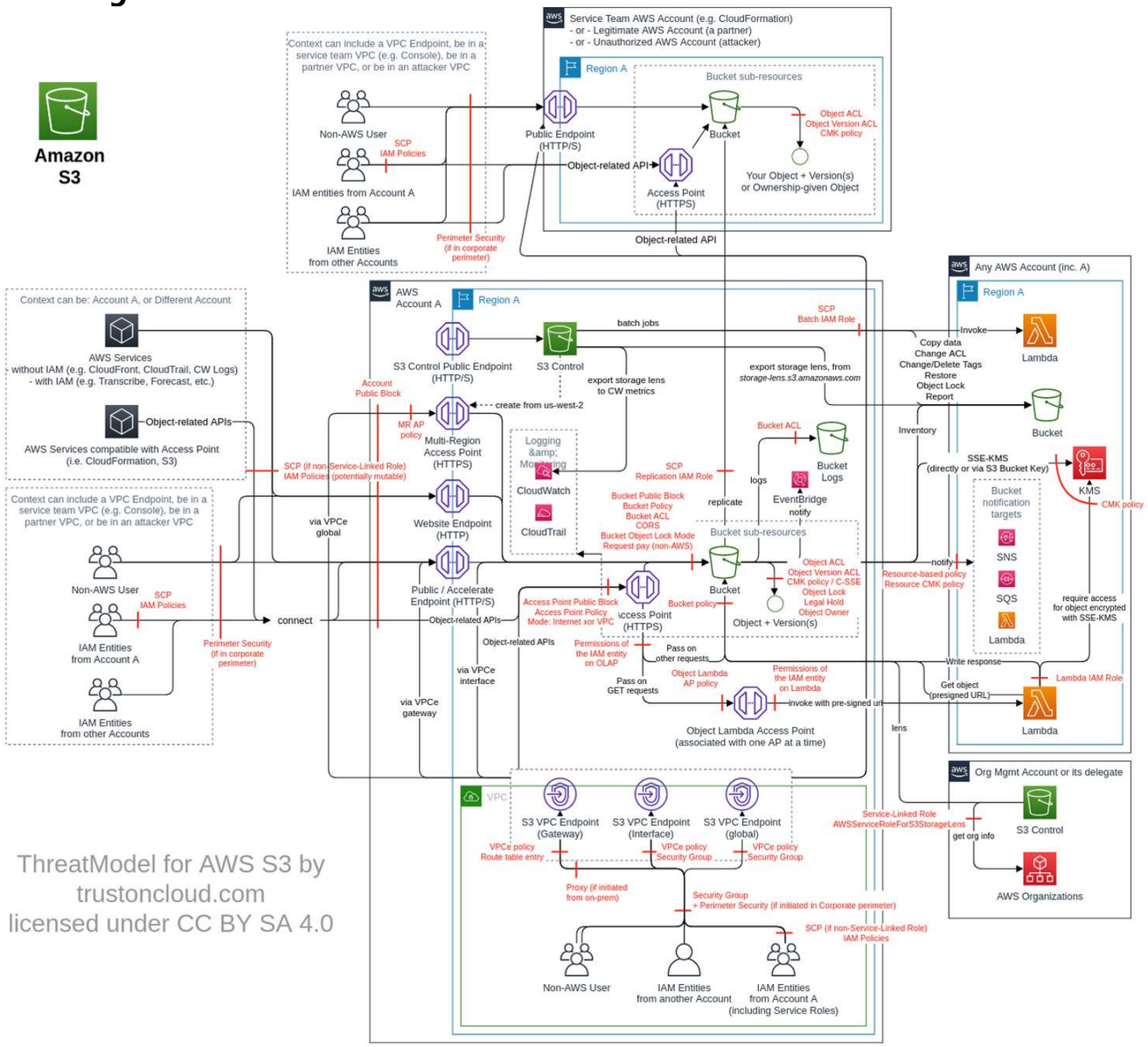
The latest version of this work is hosted on GitHub.

Contact

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

Amazon Simple Storage Service (S3)

Data Flow Diagram



Security Scorecard

Security of the Cloud	
Global Assurance Program Coverage (i.e. SOC, PCI, ISO)*	6 out of 6
Specific Assurance Program Coverage (e.g. FedRAMP, HIPAA BAA)*	16 out of 16

Security in the Cloud	
Number of Actions*	182
Identity management	AWS IAM, bucket ACL, object ACL
Number of IAM permissions*	153
Resource-level statement	Yes
Resource-based policy	Bucket
Tag-based ABAC	Yes
CloudTrail Coverage for APIs	99.3% (missing 1)
Number of CloudTrail Event Names*	150
CloudWatch 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 (S3)

Initial Access	Execution	Persistence	Privilege Escalation	Defense Evasion	Credential Access	Discovery	Lateral Movement	Collection	Exfiltration	Impact
			Gain access by modifying or deleting important object tags [S3.T33]	Exfiltrate data via ungoverned S3 endpoint [S3.T45]		Recon of AWS root account emails using email ACL grantee feature [S3.T19]	Reduce bucket security by modify the bucket public access block [S3.T52]	Move prod data in non-prod environment [S3.T11]	Bucket takeover to gather data [S3.T1]	Grant unauthorized access to a private bucket by changing bucket ACL [S3.T4]
			Reduce bucket security by deleting the bucket policy [S3.T38]	Evade detection by disabling S3 access logs [S3.T51]			Reduce bucket security by modify the account public access block [S3.T53]	Unauthorized collection of data by swapping access point [S3.T28]	Unauthorized access to data via bucket replication [S3.T2]	Use bucket to upload a malware or modify an object to include a malware [S3.T14]
							Grant unauthorized access to buckets by changing the Multi-Region Access Point policy [S3.T55]	Use AWS services to access data on S3 [S3.T30]	Exfiltrate your data hosted on an external bucket, by using of a compromised IAM access from Internet [S3.T3]	Embed client-side script malware in bucket website [S3.T15]
									Unauthorized upload of a private object in an accessible bucket (e.g. public) you do not own [S3.T5]	Files encrypted for ransomware [S3.T16]
									Unauthorized modification of an object to become public or accessible in a private bucket you do not own by changing object ACL [S3.T6]	Destroy or modify primary data [S3.T17]
									Exfiltrate data to an attacker bucket via public endpoint [S3.T7]	Hotlinking content from S3 bucket [S3.T22]
									Exfiltrate data by using a S3 VPC endpoint to upload data to an attacker bucket using an internal IAM entity [S3.T8]	Abuse MD5 etag [S3.T27]
									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]	Clickjacking on S3 website [S3.T29]
									Exfiltrate data by using the public endpoint to upload data in an attacker bucket, using external credentials [S3.T10]	Increase bill by creating incomplete uploads [S3.T40]
									Intercept data in transit to an external bucket [S3.T12]	Loss of ownership of an object [S3.T43]
									Intercept data in transit on the website endpoint [S3.T13]	Exfiltrate, modify or delete objects using Batch [S3.T44]
									Exfiltrate data by using tags [S3.T18]	Increase bill by restoring large amount of data [S3.T47]
									Use CloudFront to access private bucket [S3.T20]	Affect data protection by removing versioning [S3.T48]
									Exfiltrate data stored on S3 via AWS services [S3.T21]	Affect data protection by removing replication [S3.T49]
									Phishing using trademarks [S3.T23]	DoS by blocking traffic using bucket ACL [S3.T50]

									Recon on valid AWS account or IAM principals [S3.T24]	
									Delete objects by using lifecycle [S3.T25]	
									Unauthorized object restore into an unauthorized bucket [S3.T26]	
									Upload in an authorized external bucket, but in an incorrect AWS account [S3.T31]	
									Recon on information about a bucket [S3.T32]	
									Intercept data in transit to an internal bucket [S3.T34]	
									Use of less secure or old S3 features [S3.T35]	
									Object made public or accessible in a private bucket you own by changing object ACL [S3.T36]	
									Grant unauthorized access to a private bucket by changing bucket policy [S3.T37]	
									Exfiltrate data by using of a compromised IAM access from Internet [S3.T39]	
									Exfiltrate data via event notification [S3.T41]	
									Exfiltrate data via inventory [S3.T42]	
									Hijack connection with an Object Lambda [S3.T46]	
									Grant unauthorized access to a bucket by changing/deleting access point policy [S3.T54]	
									Gain unauthorized access to buckets trusting all Multi-Region Access Points [S3.T56]	

Feature Classes

Amazon Simple Storage Service (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.

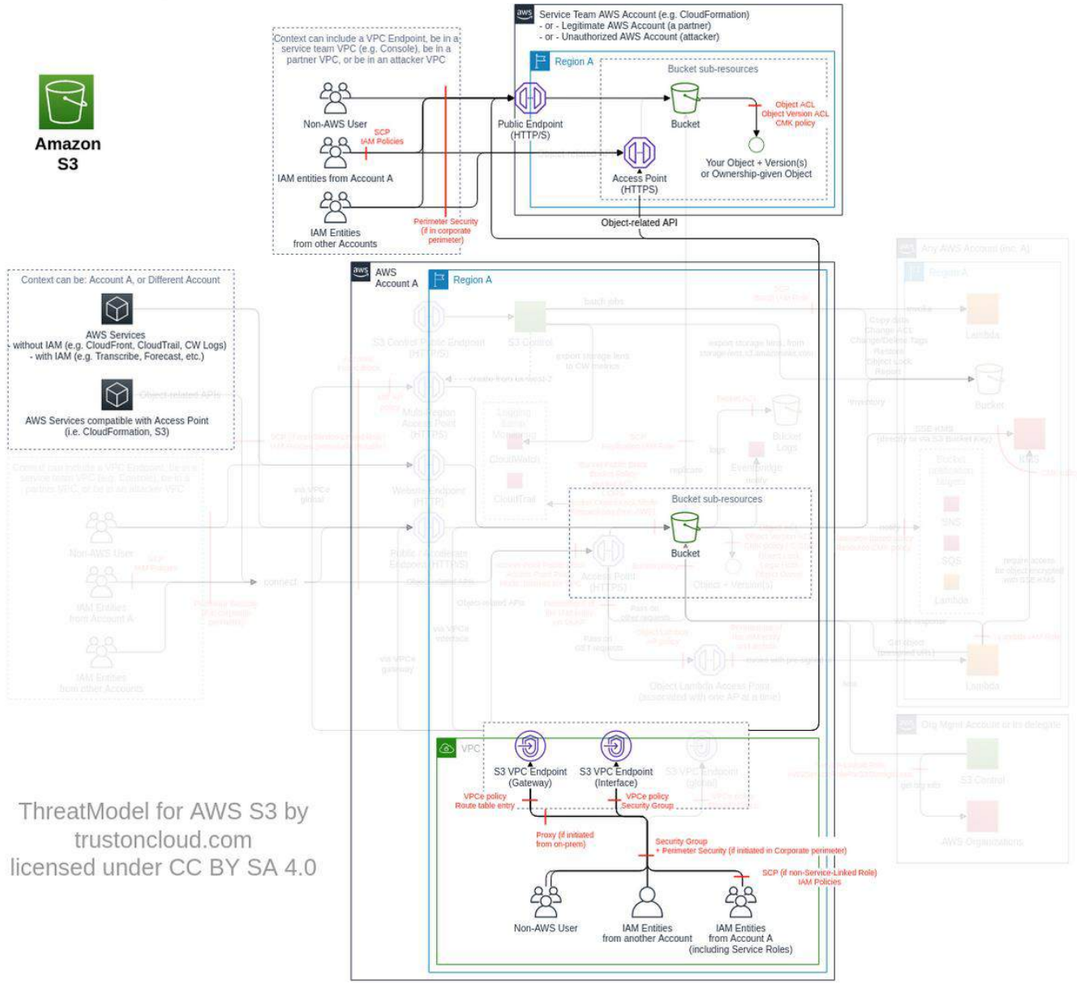
Feature	Relation	Description
Object upload/download	class	You can upload and download virtually any number of objects to an external S3 bucket you authorized to.
Bucket	subclass of Object upload/download	To upload your data into your AWS account, you must create an S3 bucket in one of the AWS Regions.
Object tagging	subclass of Object upload/download, used by Bucket	You can tag objects (ref).
Torrent	subclass of Object upload/download, used by Bucket	You can use the BitTorrent protocol to retrieve objects (ref).
Batch	subclass of Object upload/download, used by Bucket	S3 Batch Operations performs large-scale Batch Operations on Amazon S3 objects.
Object versioning	subclass of Object upload/download, used by Bucket	You can version your objects (ref).
Tag on versioned objects	subclass of Object tagging/Object versioning, used by Bucket	You can tag objects versions (ref).
ACL on versioned objects	subclass of Object versioning/ACL on versioned objects	Amazon S3 access control lists (ACLs) enable you to manage access to object versions (ref).
Bucket versioning	subclass of Object versioning/Bucket	Versioning is a means of keeping multiple variants of an object in the same bucket (ref).
Replication	subclass of Bucket versioning	Replication enables automatic and asynchronous copying of objects of a bucket into another bucket (ref).
Bucket tag	subclass of Bucket	You can tag buckets (ref).
Bucket ACL	subclass of Bucket	Amazon S3 access control lists (ACLs) enable you to manage access to buckets (ref).
S3 access logging	subclass of Bucket ACL	Server access logging provides detailed records for the requests that are made to a bucket.
Bucket policy	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.
Analytics	subclass of Bucket	You can analyse storage access patterns to decide on the storage class (ref).
Inventory	subclass of Bucket	You can create a report on your storage, including object metadata, or versions (ref).
Lifecycle	subclass of Bucket	You can lifecycle your data to reduce the cost of storage (ref).
Metrics	subclass of Bucket	You can configure metrics to get additional insights into your usage (ref).
S3 Storage Lens	subclass of Bucket	S3 Storage Lens provides a single view of object storage usage and activity across your entire S3 storage.
Website	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	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	subclass of S3 Object Lock	A legal hold provides the same protection as a retention period, but it has no expiration date. S3 Object Lock must be activated on the bucket.
Transfer Acceleration	subclass of Bucket	You can use Transfer Acceleration to improve the performance of long-distance transfers (ref).
Notification	subclass of Bucket	You can receive notifications when certain events happen in your bucket.
Access point	subclass of Bucket	Access points are named network endpoints that are attached to buckets that you can use to perform S3 object operations.
S3 Object Lambda	subclass of Access point	S3 Object Lambda enables users to apply their own custom code to process the output of a standard S3 request by automatically invoking a Lambda function.
Multi-Region Access Points	subclass of Bucket	S3 Multi-Region Access Points provide a single global endpoint to access a data set that spans multiple S3 buckets in different AWS Regions.
CORS	subclass of Bucket	You can create a CORS configuration with rules that identify the origins that you will allow to access your bucket and the operations (HTTP methods) that will support for each origin, and other operation-specific information.
Bucket default encryption	subclass of Bucket	You can set default encryption on a bucket so that all new objects are encrypted when they are stored in the bucket.
S3 Object Ownership	subclass of Bucket, used by Object upload/download	S3 Object Ownership enables bucket owners to automatically assume ownership of objects that are uploaded to their buckets by other AWS accounts.
Public Access Block (bucket)	subclass of Bucket	S3 Block Public Access (bucket) provides controls across at the individual S3 bucket level to ensure objects never have public access.
Public Access Block (account)	subclass of Bucket	S3 Block Public Access (account) provides controls across an entire AWS account to ensure objects never have public access.
Other uses	class	Others can use their own S3 service to impact you in some ways.

Object upload/download *(class, FC1)*

You can upload and download virtually any number of objects to an external S3 bucket you authorized to. 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 control that the requester has the necessary access permissions (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

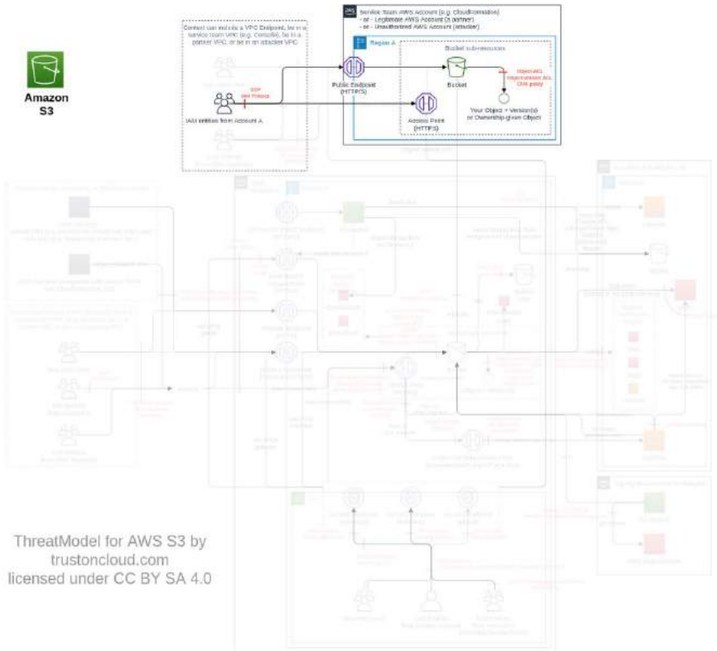
Action	IAM Permission
Retrieves an object from Amazon S3.	s3:GetObject
Adds an object to a bucket.	s3:PutObject
Sets the access control list (ACL) permissions for an object. You must have WRITE_ACP permission to set the ACL of an object.	s3:PutObjectAcl

Threat List

Name	CVSS
Exfiltrate your data hosted on an external bucket, by using of a compromised IAM access from Internet	Medium (6.7)
Loss of ownership of an object	Medium (6.3)
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)
Exfiltrate data stored on S3 via AWS services	Medium (5.8)
Exfiltrate data to an attacker bucket via public endpoint	Medium (5.7)
Unauthorized upload of a private object in an accessible bucket (e.g. public) you do not own	Medium (5.7)
Exfiltrate data by using a S3 VPC endpoint to upload data to an attacker 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 object ACL	Medium (5.2)
Intercept data in transit to an external bucket	Medium (4.6)
Unauthorized object restore into an unauthorized bucket	Medium (4.5)
Upload in an authorized external bucket, but in an incorrect AWS account	Medium (4.0)
Exfiltrate data via ungoverned S3 endpoint	Low (1.9)
Use of less secure or old S3 features	Low (1.9)

Exfiltrate your data hosted on an external bucket, by using of a compromised IAM access from Internet

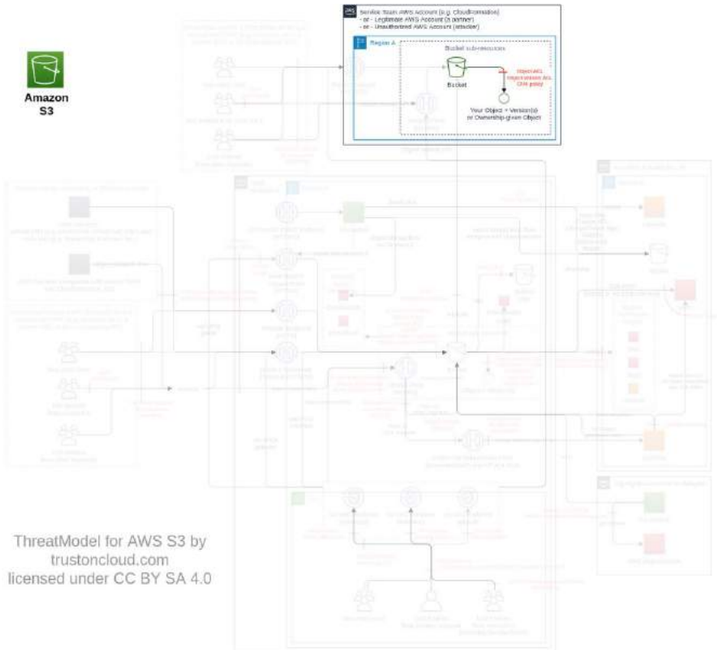
Threat Id	S3.T3
Name	Exfiltrate your data hosted on an external bucket, by using of a compromised IAM access from Internet
Description	IAM credentials can be compromised. An attacker can use a compromised but authorized credential to download your object from an external bucket via the public endpoint (using or not their own VPC endpoint).
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (6.7)
IAM Access	{ "UNIQUE": "s3:GetObject" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel).	High	1	-	-
Enforce good coding practice 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	-	-
Monitor S3 with Amazon GuardDuty and Macie Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using GuardDuty ThreatModel. Ensure findings are investigated (e.g. using Amazon Detective).	Low	1	-	-
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Very Low	1	-	-

Loss of ownership of an object

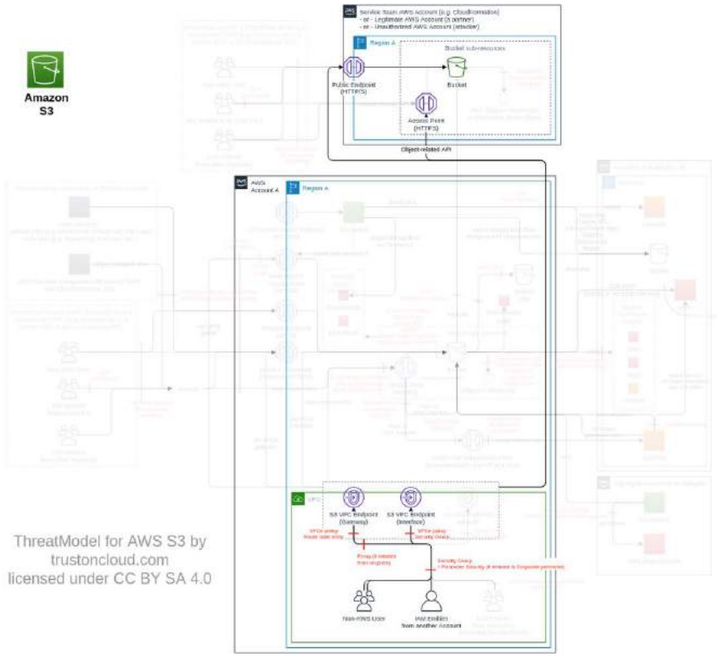
Threat Id	S3.T43
Name	Loss of ownership of an object
Description	S3 Object Ownership enables a bucket receiver to convert a bucket-owner-full-control ACL into an ownership transfer (for new object); additionally a bucket can convert all the objects to be owned by the bucket owner. An attacker can modify 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
CVSS	Medium (6.3)
IAM Access	{ "OPTIONAL": "s3:PutBucketOwnershipControls" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Disabling ACLs for all buckets Ensure bucket ACL and object ACL are disabled on each bucket Prevent the creation of buckets with ACL enabled (e.g. by using a SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note it does not block someone to enable ACL afterwards via PutPutBucketOwnershipControls.	Very High	1	1	-
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). For all external bucket 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. For all external bucket with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover, monitor that the PutObject do not include the ACL operation	Very High	1	1	1
Enforce good coding practice When transmitting an object to an external bucket with bucket-owner-full-control ACL requirement 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 Internet Gateway. An attacker can exfiltrate data to an external S3 bucket via one of your VPC endpoints, using a non-authenticated user or its 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
CVSS	Medium (6.2)
IAM Access	{}

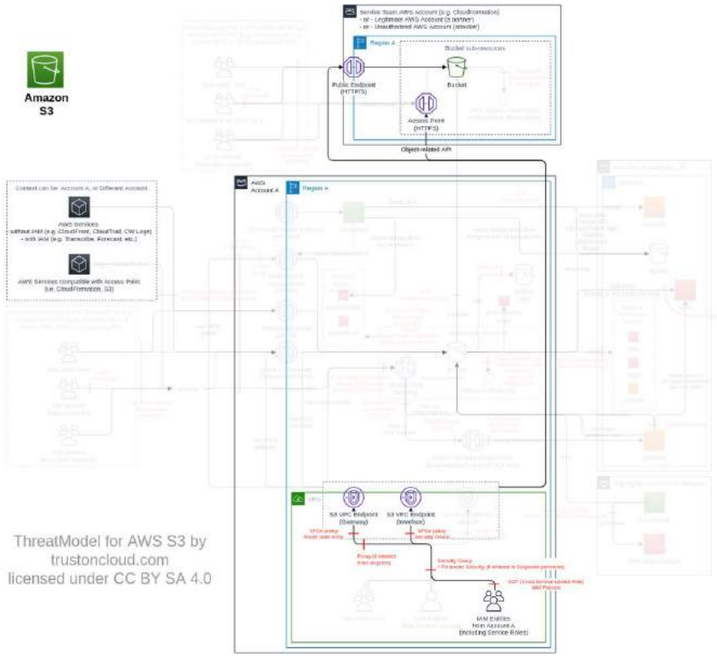


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Restrict access point access to VPC when in use Maintain a list of authorized access between VPC, S3 access point and S3. Limit access via the S3 access point by using in VPC endpoint and/or bucket policy the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of allowlist bucket name in VPC endpoint/bucket policy.	Very High	1	1	-
Limit and monitor access via S3 VPC endpoints For each VPC, maintain a list of AWS Organizations, OU and/or AWS account(s), where IAM entities are authorized to access S3 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) Block any IAM entity not belonging to an authorized AWS Organizations, OU and/or AWS account(s) to call S3 from your VPCs by adding a deny statement on S3 VPC endpoint policy of each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org ID, as those are globally unique. Enable VPC DNS query logging in all VPC Maintain a list of authorized S3 and S3 access point (and their respective AWS accounts) to be access for each VPC 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 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) Monitor VPC DNS query logs that only authorized S3 bucket and S3 access points are being queried in each VPC (e.g. using VPC DNS query logging), and protect it using Route53 ThreatModel	Very High	4	2	1
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Identify and ensure the protection all external buckets hosting your objects	High	2	-	-

Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). Request access via S3 access point on bucket you don't own, if compatible with your interaction with the bucket (e.g. not through not-compatible AWS service)				
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-

Exfiltrate data stored on S3 via AWS services

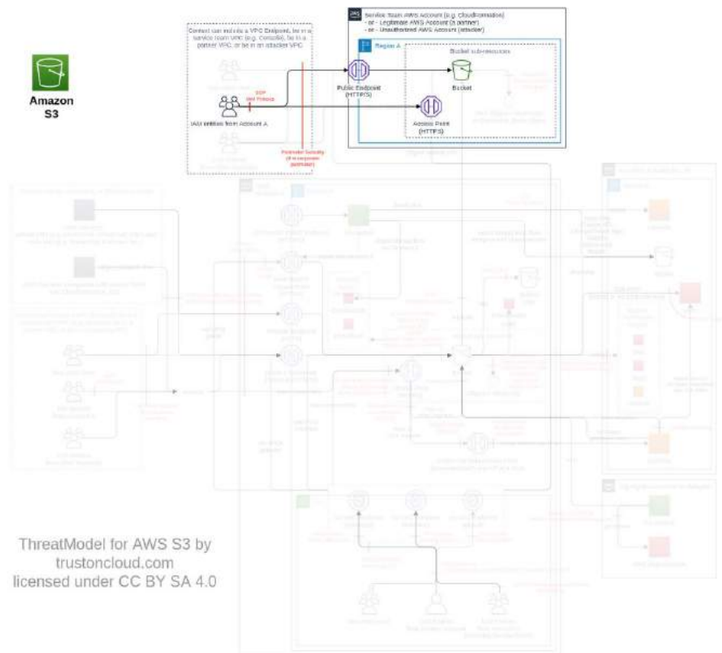
Threat Id	S3.T21
Name	Exfiltrate data stored on S3 via AWS services
Description	Number of AWS services are using S3 for storage, including storing in cross-account S3 buckets. Services with IAM roles (e.g. SageMaker) will give ownership to the target AWS account, hence removing the ownership protection. An attacker can use those services to exfiltrate data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.8)
IAM Access	{ "OPTIONAL": "s3:PutObjectAcl" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). 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
Model the threats on all AWS services accessing S3 Analyse and protect all AWS services accessing S3 (e.g. via ThreatModel). Enforce usage in VPC only, whenever possible.	High	1	-	-
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Low	2	-	-

Exfiltrate data to an attacker bucket via public endpoint

Threat Id	S3.T7
Name	Exfiltrate data to an attacker bucket via public endpoint
Description	S3 allows IAM entities to upload data in a bucket in other AWS accounts, if they have the 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 object ACL, it can use the name of objects (1KB).
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.7)
IAM Access	{ "AND": ["s3:PutObject", { "OPTIONAL": "s3:PutObjectAcl" }] }

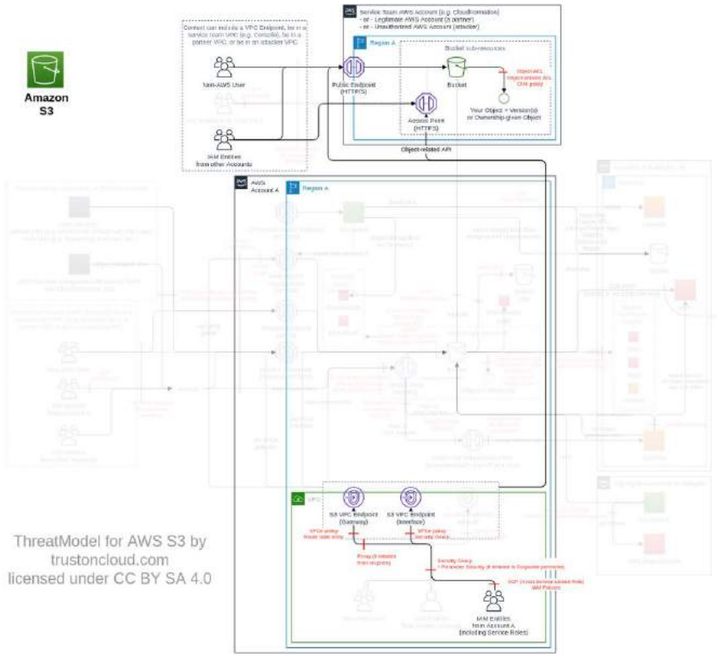


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block S3 endpoints in your corporate perimeter security Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g. firewalls, or cloud interception proxy like Kivera) including via Internet Gateway, to force usage of VPC endpoints. It will block data-plane transfer. Note: AWS console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Very High	1	-	-
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). 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
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Restrict access point access to VPC when in use Maintain a list of authorized access between VPC, S3 access point and S3. Limit access via the S3 access point by using in VPC endpoint and/or bucket policy the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of allowlist bucket name in VPC endpoint/bucket policy.	Medium	1	5	-

In S3 bucket policy, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" Block the creation "s3:CreateAccessPoint" of non-VPC S3 access point (e.g. using the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}) Block all traffic from Internet-configured S3 access point (e.g. on the bucket policy, using a deny statement with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}) Block any object-related operations access to S3 bucket not through access point (i.e. using a deny IAM policy statement with the condition "ArnNotLike" {"s3:DataAccessPointArn": "arn:aws:s3:*Region*:*AccountId*:accesspoint/*"})				
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Low	1	-	-

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

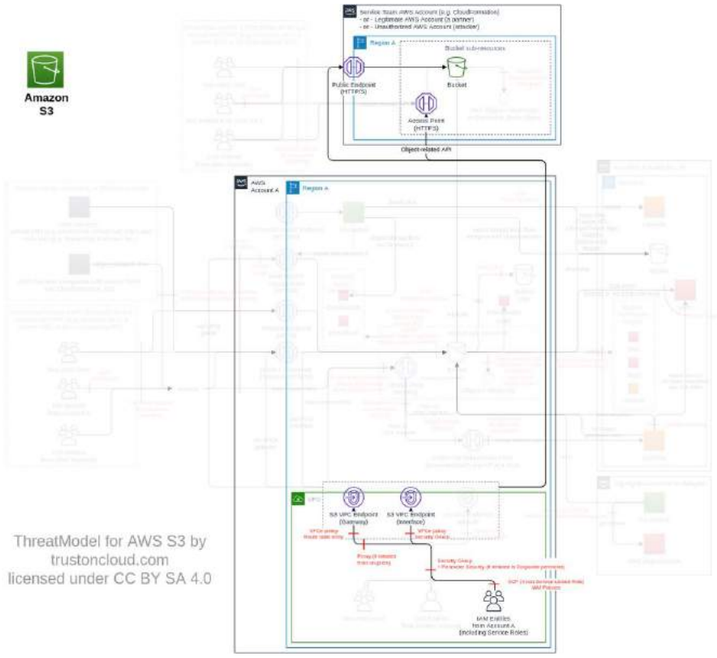
Threat Id	S3.T5
Name	Unauthorized upload of a private object in an accessible bucket (e.g. public) you do not own
Description	S3 buckets can be public for a legitimate reason. An attacker (or someone by negligence) can upload sensitive data in an accessible bucket (e.g. public) you do not own to make it accessible to exfiltrate it.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.7)
IAM Access	{ "UNIQUE": "s3:PutObject" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). Allow only authorized ACL on objects for bucket you don't control (e.g. using IAM and VPC endpoint policy with the ACL conditions) 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	-
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Low	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions.	Very Low	1	-	-

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

Threat Id	S3.T8
Name	Exfiltrate data by using a S3 VPC endpoint to upload data to an attacker bucket using an internal IAM entity
Description	VPC endpoints for S3 allow IAM entities to connect from a VPC to any S3 bucket without 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 object ACL, it can use the name of objects (1KB).
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.5)
IAM Access	{ "AND": ["s3:PutObject", { "OPTIONAL": "s3:PutObjectAcl" }] }

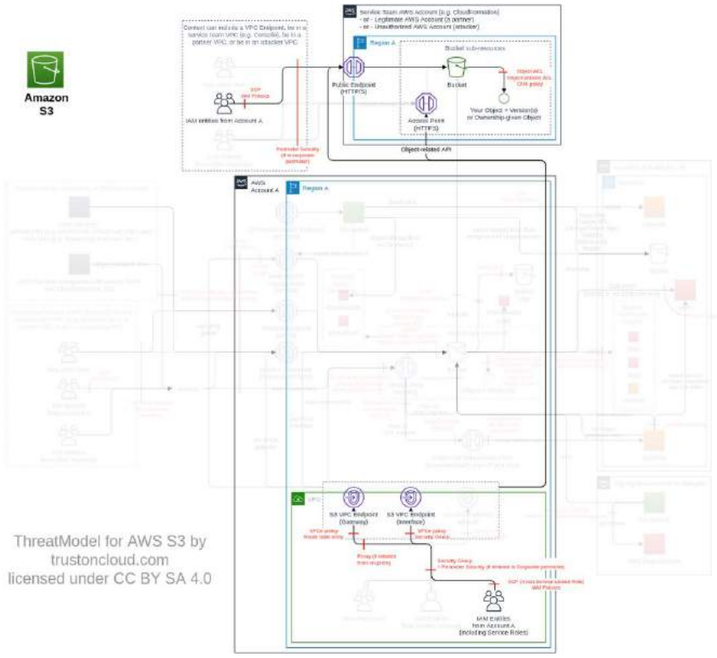


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). Request access via S3 access point on bucket you don't own, if compatible with your interaction with the bucket (e.g. not through not-compatible AWS service)	High	2	-	-
Limit and monitor access via S3 VPC endpoints Enable VPC DNS query logging in all VPC Maintain a list of authorized S3 and S3 access point (and their respective AWS accounts) to be access for each VPC 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 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) Monitor VPC DNS query logs that only authorized S3 bucket and S3 access points are being queried in each VPC (e.g. using VPC DNS query logging), and protect it using Route53 ThreatModel	High	2	1	1
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats	Medium	2	-	-

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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.				

Unauthorized modification of an object to become public or accessible in a private bucket you do not own by changing 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 object ACL
Description	Bucket authority only prevails on 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 for themselves.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.2)
IAM Access	{ "UNIQUE": "s3:PutObjectAcl" }

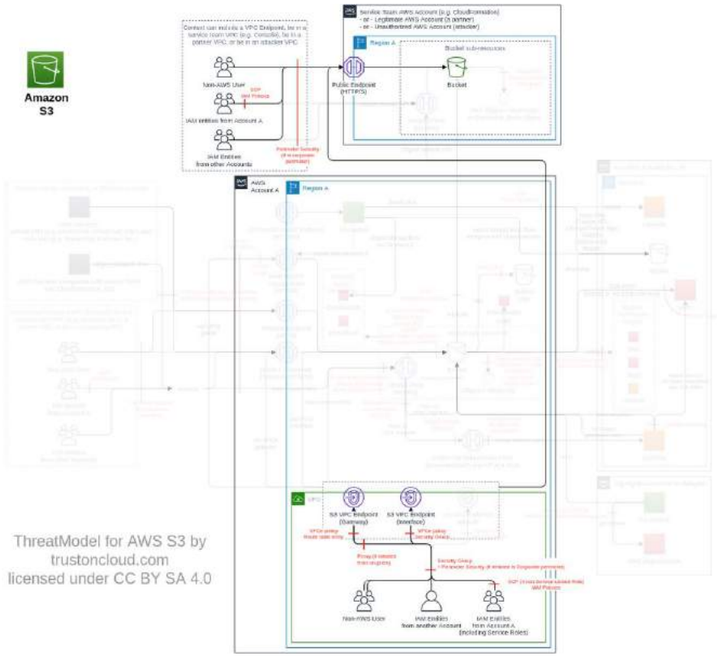


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block changes to make an object public via object ACL Deny requests to change object ACL to public (e.g. using an SCP, S3 bucket policy and VPC endpoint policy blocking PutObjectAcl for "s3:x-amz-grant-read", "s3:x-amz-grant-read-acp", "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") Monitor ObjectACL changed (or tentatively changed) to public using CloudTrail S3 data events	Very High	-	1	1
Disabling ACLs for all buckets Ensure bucket ACL and object ACL are disabled on each bucket Prevent the creation of buckets with ACL enabled (e.g. by using a SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note it does not block someone to enable ACL afterwards via PutPutBucketOwnershipControls.	Very High	1	1	-
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). Allow only authorized ACL on objects for bucket you don't control (e.g. using IAM and VPC endpoint policy with the ACL conditions)	High	1	1	-
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions.	Low	2	-	-

In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.				

Intercept data in transit to an external bucket

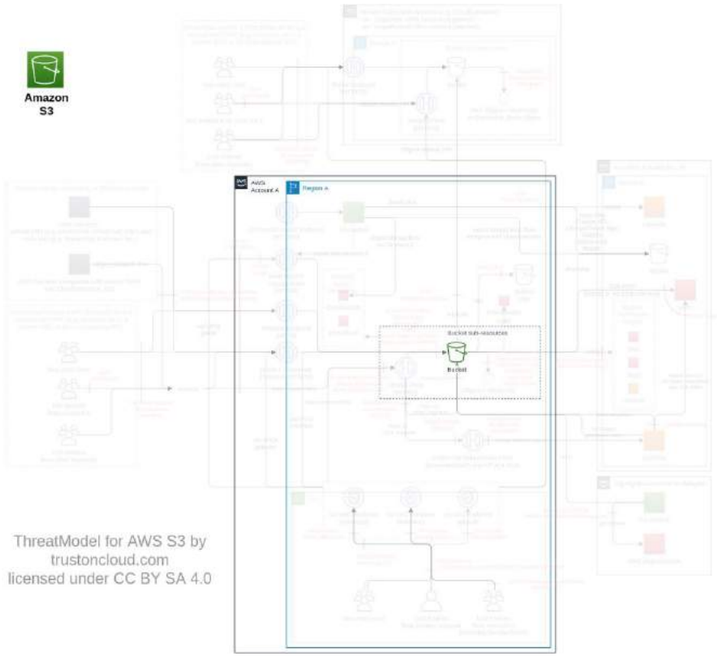
Threat Id	S3.T12
Name	Intercept data in transit to an external bucket
Description	S3 allows communication over HTTP. An attacker can intercept the traffic you send on an external bucket, in order to read or modify the data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (4.6)
IAM Access	{ "UNIQUE": "s3:any" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce encryption-in-transit Block all unencrypted requests and unauthorized TLS version(s) from IAM entities you control (e.g. by denying all unencrypted request with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" !=*authorized TLS version(s)*, using an SCP on your AWS Organization root node) 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) Monitor and investigate that all requests made with HTTP (e.g via CloudTrail S3 data events with the lack of additionalEventData.CipherSuite) Maintain a list of authorized version(s) of TLS/SSL per bucket (or per account/OU/Org)	Very High	1	2	1
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Medium	1	-	-
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Block S3 endpoints in your corporate perimeter security Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g. firewalls, or cloud interception proxy like Kivera) including via Internet Gateway, to force usage of VPC endpoints. It will block data-plane transfer. Note: AWS console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Low	1	-	-

Unauthorized object restore into an unauthorized bucket

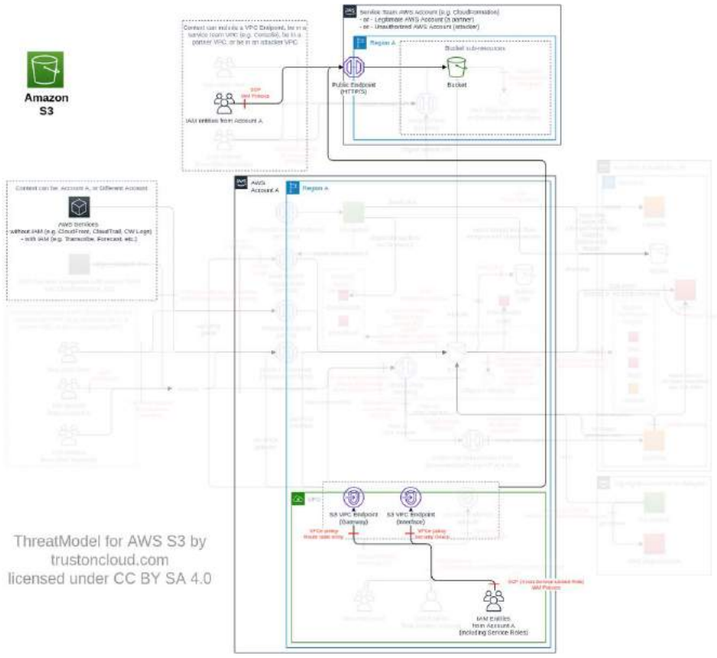
Threat Id	S3.T26
Name	Unauthorized object restore into an unauthorized bucket
Description	Objects can be stored in S3 Glacier. An attacker can restore an object to an unauthorized S3 bucket to collect or exfiltrate data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (4.5)
IAM Access	{ "UNIQUE": "s3:RestoreObject" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

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

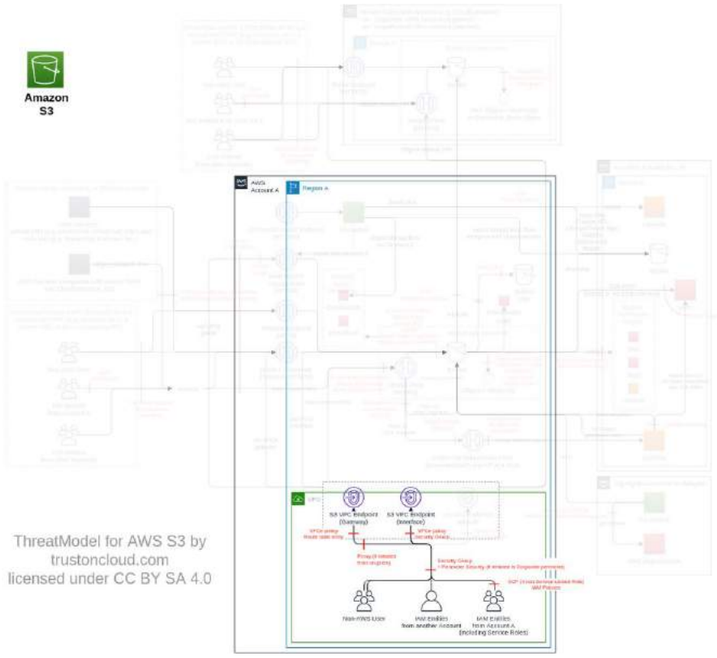
Threat Id	S3.T31
Name	Upload in an authorized external bucket, but in an incorrect AWS account
Description	Bucket names are globally unique. An attacker can take over a legitimate external bucket, and deceive you into sending it to their bucket.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (4.0)
IAM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



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). 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. Request access via S3 access point on bucket you don't own, if compatible with your interaction with the bucket (e.g. not through not-compatible AWS service)	Very High	2	-	1
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Low	1	-	-

Exfiltrate data via ungoverned S3 endpoint

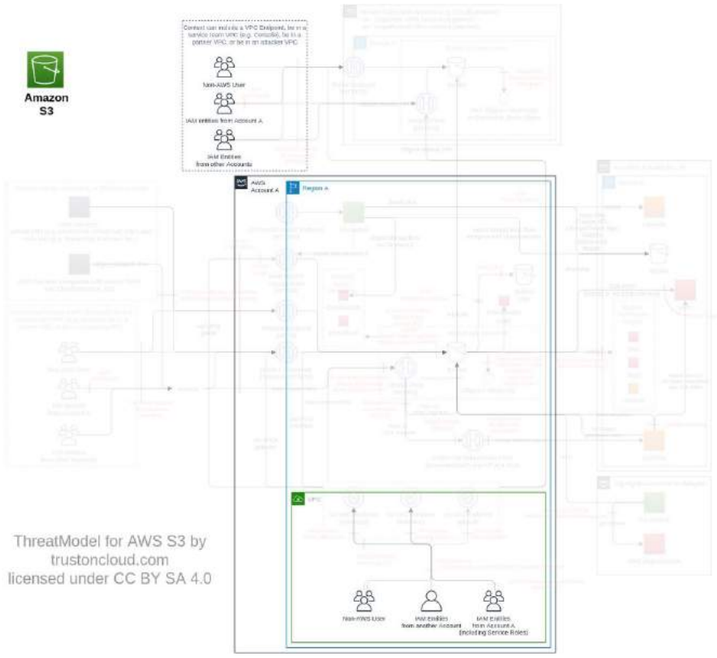
Threat Id	S3.T45
Name	Exfiltrate data via ungoverned S3 endpoint
Description	S3 VPC endpoints can be either Interface or Gateway. An attacker can create a second endpoint to create an ungoverned exfiltration vector.
Goal	Launch another attack
Mitre ATT&CK	TA0005
CVSS	Low (1.9)
IAM Access	{ "UNIQUE": "ec2:CreateVpcEndpoint" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit and monitor access via S3 VPC endpoints Ensure all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoints controls	Very High	1	-	-

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 configuration, SigV2, path-style model), but are still maintained for retro-compatibility.
Goal	Launch another attack
Mitre ATT&CK	TA0010
CVSS	Low (1.9)
IAM Access	{ "UNIQUE": "s3:deprecated" }



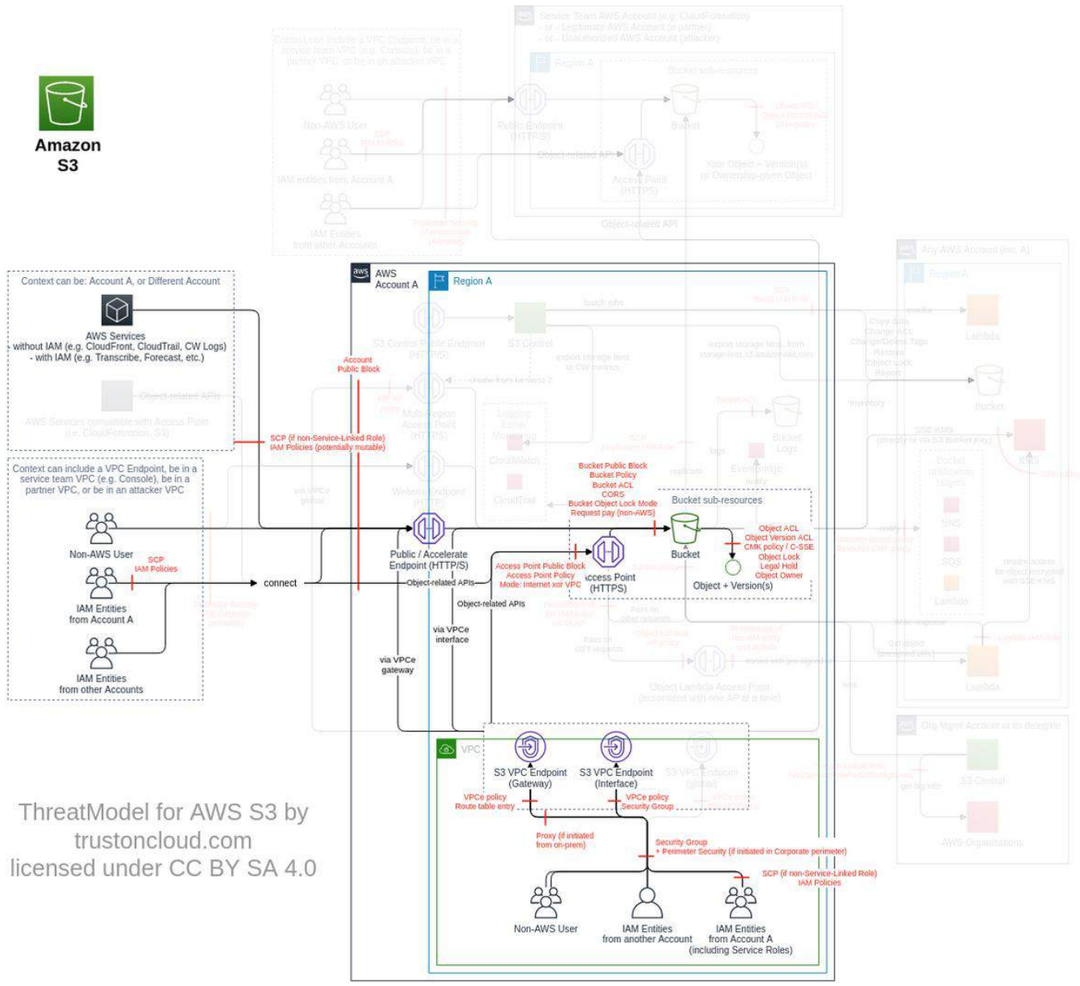
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce good coding practice When connecting to S3 endpoints, use virtual-hosted model ("my-bucket-name.s3.amazonaws.com" or "my-bucket-name.my-s3-regional-endpoint.amazonaws.com") instead of path-style model ("s3.amazonaws.com/my-bucket-name" or "my-s3-regional-endpoint.amazonaws.com/my-bucket-name") (see ref). All the latest SDK make use of domain style, by default. Monitor that all S3 connections are made with virtual-hosted model (e.g via CloudTrail S3 requestParameters.Host)	Very High	1	-	1
Block direct public access Use SDK with SigV4 enabled (ref)	Very High	1	-	-
Block all requests not using SigV4 Block all requests not using SigV4 (e.g. using an SCP and S3 policy on all buckets with deny on "StringNotEquals":{"s3:signatureversion": "AWS4-HMAC-SHA256"}) Monitor and investigate that all requests not using SigV4 (e.g via CloudTrail S3 with the additionalEventData.SignatureVersion different from "SigV4")	Very High	-	1	1
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	High	2	-	-
Block deprecated actions Block deprecated S3 actions, using IAM ThreatModel and the S3 actions list.	Medium	1	-	-
Enable CloudTrail S3 data events	Medium	1	-	-

Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel				

Bucket *(subclass of Object upload/download, 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)



Actions and IAM Permissions to deny the feature

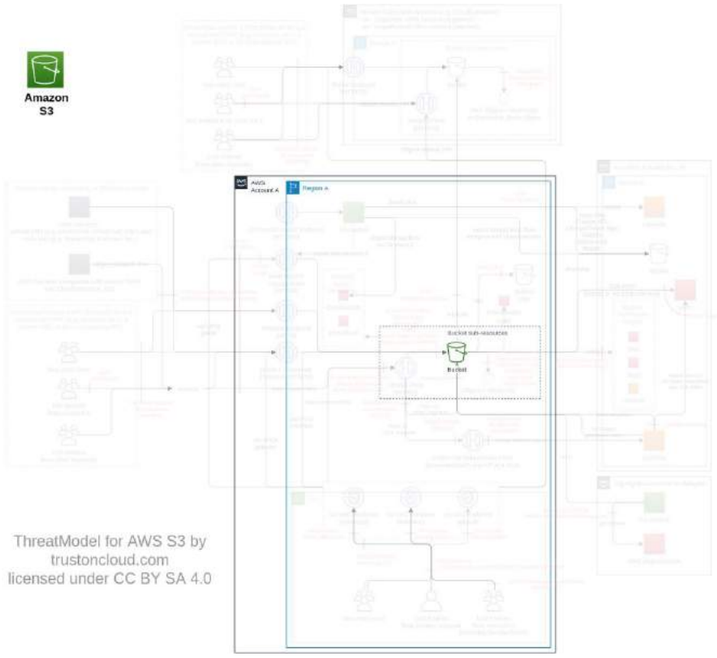
Action	IAM Permission
Creates a new bucket	s3:CreateBucket

Threat List

Name	CVSS
Use bucket to upload a malware or modify an object to include a malware	High (7.3)
Exfiltrate data by using of a compromised IAM access from Internet	Medium (6.5)
Files encrypted for ransomware	Medium (6.3)
Destroy or modify primary data	Medium (6.1)
Object made public or accessible in a private bucket you own by changing object ACL	Medium (5.9)
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 on S3	Medium (4.4)
Move prod data in non-prod environment	Medium (4.4)
Hotlinking content from S3 bucket	Low (3.5)
Increase bill by restoring large amount of data	Low (2.7)
Increase bill by creating incomplete uploads	Low (2.3)
Abuse MD5 etag	Low (1.8)

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

Threat Id	S3.T14
Name	Use bucket to upload a malware or modify an object to include a malware
Description	S3 buckets are commonly used to distribute software. An attacker can upload malware in a bucket to better position it for later use, or directly change an object to include a malware (example).
Goal	Launch another attack
Mitre ATT&CK	TA0040
CVSS	High (7.3)
IAM Access	{ "UNIQUE": "s3:PutObject" }

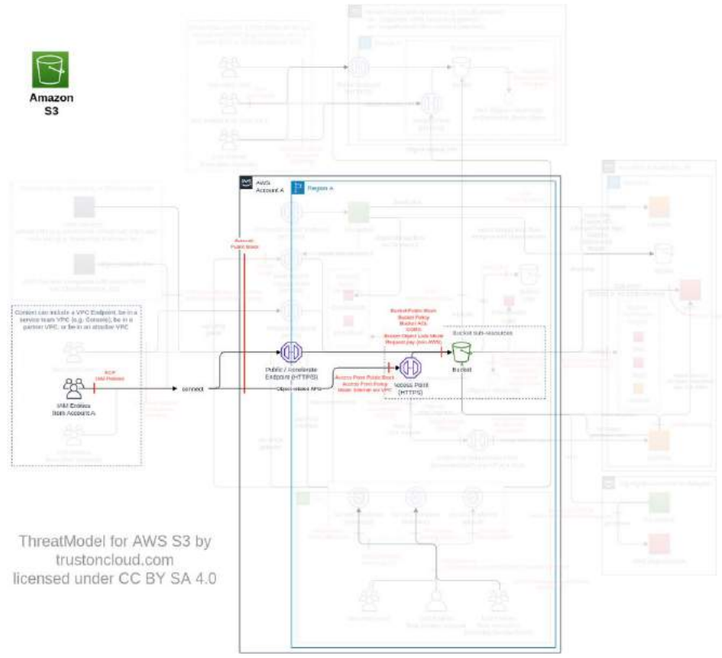


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block direct public access Front buckets required to be public, using authenticated CDN (e.g. CloudFront) or API Gateway, protected with WAF (e.g. for hotlinking) Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. 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	3	-
Limit access from only authorized VPCs For each S3 bucket, maintain a list of VPC(s), authorized to access it. Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the bucket policy size is beyond the limit, use this condition on access point)	High	1	1	-
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). 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	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	High	2	-	-
Scan input/output objects for malware	Medium	-	-	1

If the bucket is used as an input or the output of a process, scan the objects for malware (e.g. using VirusScan or Trend Micro Cloud One)				

Exfiltrate data by using of a compromised IAM access from Internet

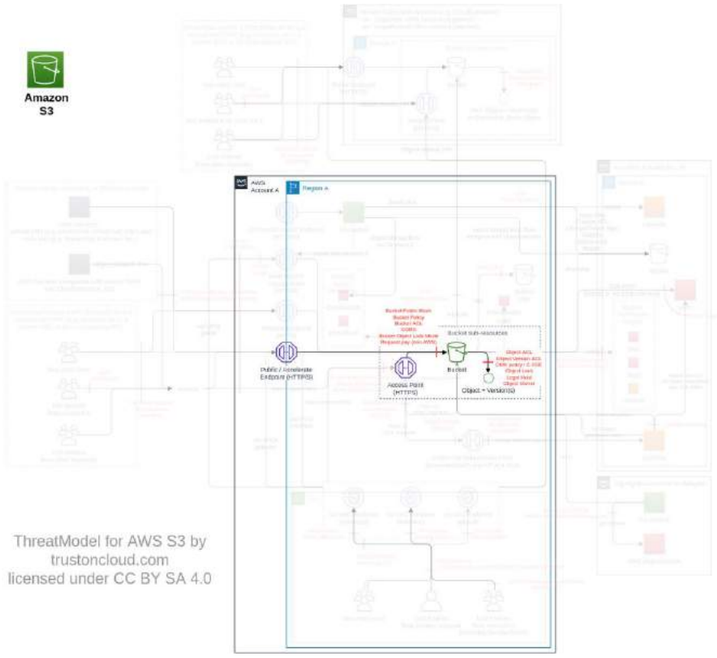
Threat Id	S3.T39
Name	Exfiltrate data by using of a compromised IAM access from Internet
Description	IAM credentials can be compromised (directly or using pre-signed URL). An attacker can use a compromised but authorized IAM credential to download your object from an internal bucket via the public endpoint (using or not their own VPC endpoint).
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (6.5)
IAM Access	{ "UNIQUE": "s3:GetObject" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit access from only authorized VPCs For each S3 bucket, maintain a list of VPC(s), authorized to access it. Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the bucket policy size is beyond the limit, use this condition on access point)	Very High	1	1	-
Block all requests not using HTTP authorization header, if not explicitly authorized Block all requests not using HTTP authorization header, i.e. presign via query strings or POST (ref) (e.g. using an SCP and S3 policy on all buckets with deny on "StringNotEquals":{"s3:authType": "REST-HEADER"}). Note it blocks uploads via the console, as well. Monitor and investigate that all requests not using HTTP authorization header (e.g via CloudTrail S3 with the additionalEventData.AuthenticationMethod different from "AuthHeader")	Medium	-	1	1
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

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 to get the decryption key (blog). 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
CVSS	Medium (6.3)
IAM Access	{ "AND": ["s3:GetObject", "s3:PutObject"] }

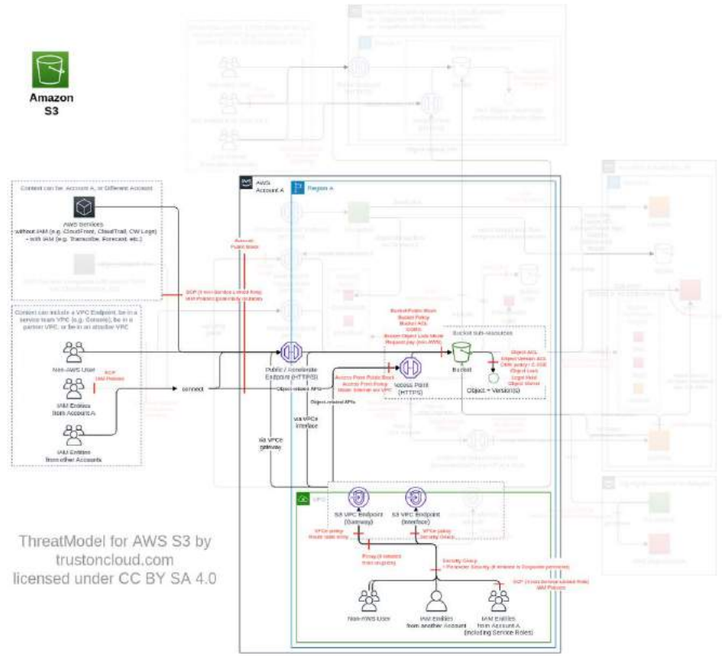


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce encryption-at-rest Maintain a list of authorized KMS key(s) for each bucket, and their default encryption key. You might simplify by using only 1 key per bucket, ideally dedicated. Note that S3 server access log bucket does not support KMS encryption (ref). Ensure all objects on S3 buckets are encrypted with an authorized KMS key Block PutObject requests with unauthorized KMS key on each bucket (e.g. using an S3 bucket policy deny statement on PutObject if the condition if exists "s3:x-amz-server-side-encryption-aws-kms-key-id" is not an authorized KMS key) Monitor that only authorized KMS key(s) are used on each bucket (using CloudTrail S3 data events in *requestParameter.bucketName* and *response.x-amz-server-side-encryption-aws-kms-key-id*) Maintain a list of buckets (or paths) required to be encrypted with server-side encryption with customer-provided keys (SSE-C) For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g. using an S3 bucket policy deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES265" is not present) 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 *requestParameter.bucketName* and *response.x-amz-server-side-encryption-customer-algorithm*)	Very High	3	2	2
Protect primary data against loss Enable versioning on buckets holding primary data Backup primary data in a secure location under a different security authority (e.g. in an AWS data bunker account via replication)	Very High	2	-	-
Use S3 Object Lock to protect data integrity Implement the authorized default S3 Object Lock on each bucket (note: Amazon S3 evaluates and applies bucket policies before applying bucket default S3 Object Lock settings) Block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock on each bucket (e.g. using an S3 bucket policy deny statement on PutObject and PutObjectRetention if the condition if exists "s3:object-lock-mode" and "s3:object-lock-remaining-retention-days" is not the defined S3 Object Lock configuration)	Very High	-	2	-
Block requests with KMS keys from unauthorized AWS account(s)	Very High	1	1	1

Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used for each AWS account (using CloudTrail S3 data events in *response.x-amz-server-side-encryption-aws-kms-key-id*)				
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Monitor S3 with Amazon GuardDuty and Macie Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using GuardDuty ThreatModel. Ensure findings are investigated (e.g. using Amazon Detective).	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
Have a process to apply legal hold Create a process to apply 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	-	-

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 its access to destroy (or modify) primary data located on S3, affecting the ability for the business to operate (for example, Code Spaces).
Goal	Disruption of Service
Mitre ATT&CK	TA0040
CVSS	Medium (6.1)
IAM Access	{ "AND": ["s3:DeleteObject", { "OPTIONAL": "S3:DeleteObjectVersion" }, { "OPTIONAL": "s3:BypassGovernanceMode" }] }

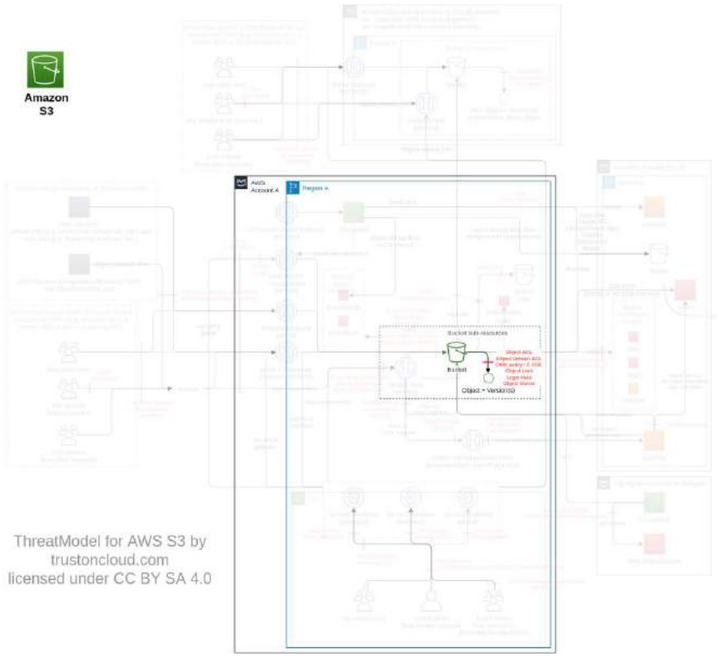


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Identify and ensure the protection all internal buckets hosting your objects Track all buckets you control, define their authorized data classification, identify whether the hosted data is primary (i.e. source of truth, for example logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g. file-processing, software package, etc.), their WORM requirements (e.g. SEC 17a-4, CTCC, etc.), if they are production/non-production (preferably done at account-level), their storage class. You may use tags, Infra-as-code, AWS Glue Data Catalog or external management tool like FINRA herd)	Very High	1	-	-
Enforce encryption-at-rest Maintain a list of authorized KMS key(s) for each bucket, and their default encryption key. You might simplify by using only 1 key per bucket, ideally dedicated. Note that S3 server access log bucket does not support KMS encryption (ref). Ensure all objects on S3 buckets are encrypted with an authorized KMS key Use KMS ThreatModel to protect the KMS keys used for S3 (e.g. using encryptionContext on the policy of each KMS key) Implement an authorized default encryption key on each bucket and enable S3 Bucket Key (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings) Block PutObject requests with unauthorized KMS key on each bucket (e.g. using an S3 bucket policy deny statement on PutObject if the condition if exists "s3:x-amz-server-side-encryption-aws-kms-key-id" is not an authorized KMS key)	Very High	4	1	-
Protect primary data against loss Enable versioning on buckets holding primary data Backup primary data in a secure location under a different security authority (e.g. in an AWS data bunker account via replication)	Very High	2	-	-
Use S3 Object Lock to protect data integrity Implement the authorized default S3 Object Lock on each bucket (note: Amazon S3 evaluates and applies bucket policies before applying bucket default S3 Object Lock settings) Block PutObject and PutObjectRetention requests with unauthorized S3 Object Lock on each bucket (e.g. using an S3 bucket policy deny statement on PutObject and PutObjectRetention if the condition if exists "s3:object-lock-mode" and "s3:object-lock-remaining-retention-days" is not the defined S3 Object Lock configuration)	Very High	-	2	-

Limit access from only authorized VPCs For each S3 bucket, maintain a list of VPC(s), authorized to access it. Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the bucket policy size is beyond the limit, use this condition on access point)	High	1	1	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	High	2	-	-
Have a process to apply legal hold Create a process to apply 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	-	-
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Low	1	-	-

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

Threat Id	S3.T36
Name	Object made public or accessible in a private bucket you own by changing object ACL
Description	Bucket authority only prevails on 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 it public or accessible for themselves (to exfiltrate or modify).
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.9)
IAM Access	{ "UNIQUE": "s3:PutObjectAcl" }

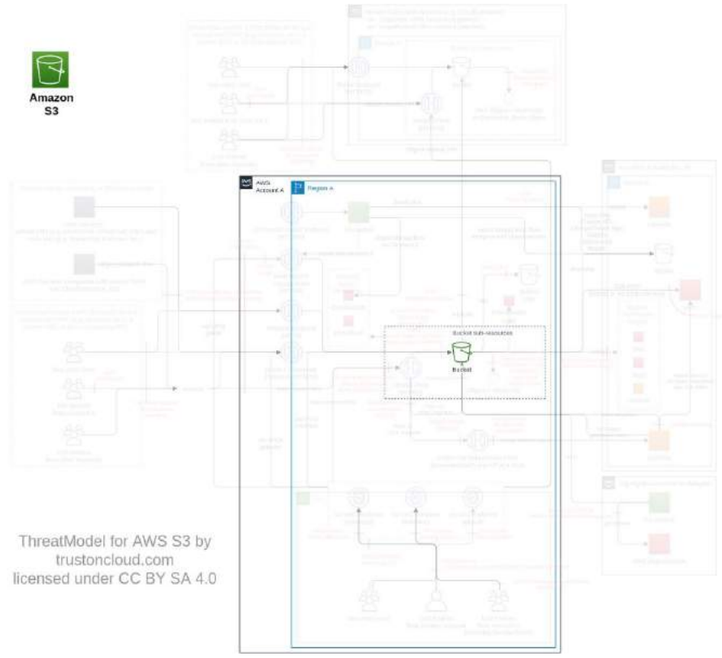


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block changes to make an object public via object ACL Deny requests to change object ACL to public (e.g. using an SCP, S3 bucket policy and VPC endpoint policy blocking PutObjectAcl for "s3:x-amz-grant-read", "s3:x-amz-grant-read-acp", "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") Monitor ObjectACL changed (or tentatively changed) to public using CloudTrail S3 data events Monitor and investigate anonymous requests to objects (e.g. using CloudTrail S3 data events with userIdentity.accountId=ANONYMOUS_PRINCIPAL)	Very High	-	1	2
Block direct public access Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Very High	-	3	-
Enforce encryption-at-rest Maintain a list of authorized KMS key(s) for each bucket, and their default encryption key. You might simplify by using only 1 key per bucket, ideally dedicated. Note that S3 server access log bucket does not support KMS encryption (ref). Ensure all objects on S3 buckets are encrypted with an authorized KMS key Use KMS ThreatModel to protect the KMS keys used for S3 (e.g. using encryptionContext on the policy of each KMS key) Implement an authorized default encryption key on each bucket and enable S3 Bucket Key (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings) Block PutObject requests with unauthorized KMS key on each bucket (e.g. using an S3 bucket policy deny statement on PutObject if the condition if exists "s3:x-amz-server-side-encryption-aws-kms-key-id" is not an authorized KMS key) Monitor that only authorized KMS key(s) are used on each bucket (using CloudTrail S3 data events in *requestParameter.bucketName* and *response.x-amz-server-side-encryption-aws-kms-key-id*) Maintain a list of buckets (or paths) required to be encrypted with server-side encryption with customer-provided keys (SSE-C) For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g. using an S3 bucket policy deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES265" is not present)	Very High	5	2	2

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 *requestParameter.bucketName* and *response.x-amz-server-side-encryption-customer-algorithm*)				
Limit access from only authorized VPCs For each S3 bucket, maintain a list of VPC(s), authorized to access it. Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the bucket policy size is beyond the limit, use this condition on access point)	Very High	1	1	-
Disabling ACLs for all buckets Ensure bucket ACL and object ACL are disabled on each bucket Prevent the creation of buckets with ACL enabled (e.g. by using a SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note it does not block someone to enable ACL afterwards via PutPutBucketOwnershipControls.	Very High	1	1	-
Monitor S3 with Amazon GuardDuty and Macie Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect it using Macie ThreatModel	High	1	-	-
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Low	2	-	-

Bucket takeover to gather data

Threat Id	S3.T1
Name	Bucket takeover to gather data
Description	Bucket names are globally unique. An attacker can recreate the same bucket name of a deleted bucket you used to own to collect any new data being uploaded by a non-updated party, do a DNS takeover (using a non-deleted CNAME / CloudFront origin to the bucket) or to use remaining permissions to exfiltrate data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.2)
IAM Access	{ "OPTIONAL": "s3:DeleteBucket" }

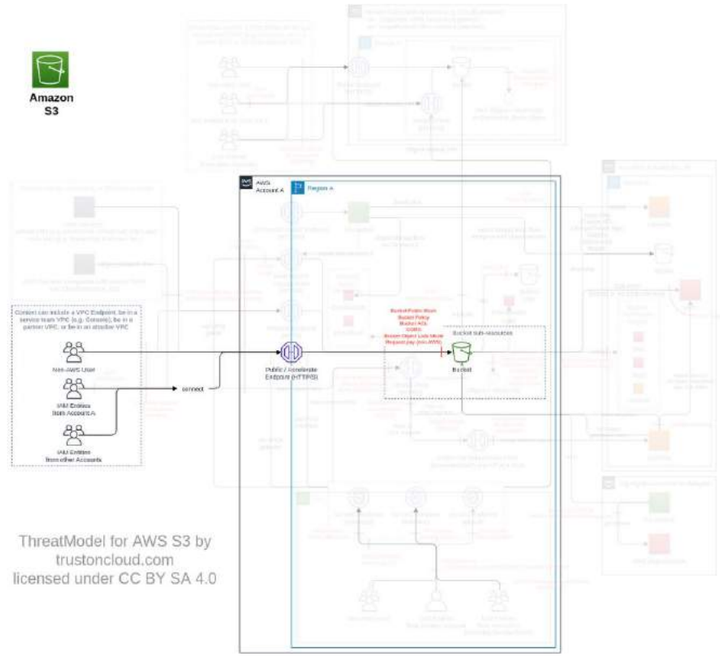


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Prevent deletion of buckets Block the action "s3:DeleteBucket" (e.g. via SCP, exemption can be managed by authorizing a SuperAdmin to delete buckets with a certain tag, and with bucket owners able to tag bucket) Scan your CNAME records (e.g. in Route53) and CloudFront origin for deleted buckets	Very High	-	1	1
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Enforce good coding practice Parameterize S3 bucket name or S3 access point in your code (no hardcoding) 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	-	-
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Identify and ensure the protection all external buckets hosting your objects 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.	Low	-	-	1
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Very Low	1	-	-

Intercept data in transit to an internal bucket

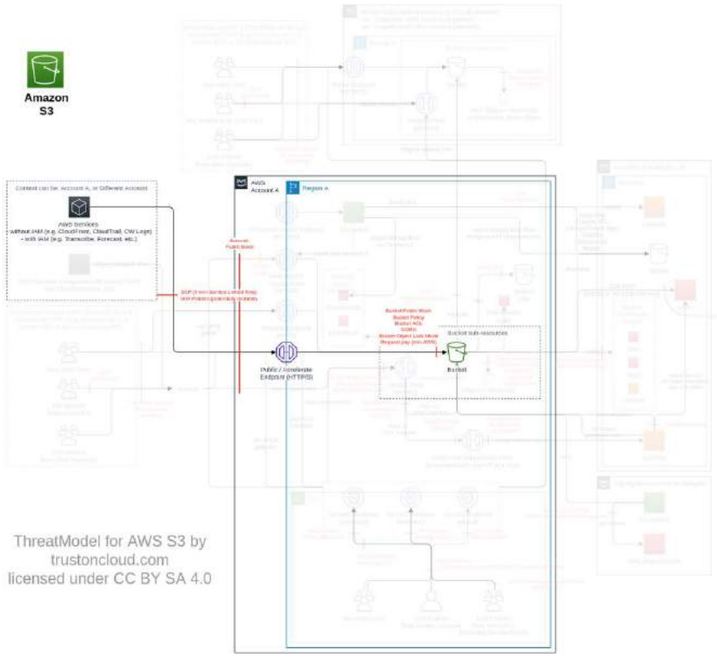
Threat Id	S3.T34
Name	Intercept data in transit to an internal bucket
Description	S3 allows communication over HTTP. An attacker can intercept the traffic you send on an internal bucket, in order to read or modify the data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (4.6)
IAM Access	{ "UNIQUE": "s3:any" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce encryption-in-transit Block all unencrypted requests and unauthorized TLS version(s) from IAM entities you control (e.g. by denying all unencrypted request with the condition "aws:SecureTransport" = False, or by using "s3:TlsVersion" !=*authorized TLS version(s)*, using an SCP on your AWS Organization root node) 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) Monitor and investigate that all requests made with HTTP (e.g via CloudTrail S3 data events with the lack of additionalEventData.CipherSuite) Block all unencrypted requests to S3 bucket 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 S3 bucket policy)	Very High	-	3	1
Block S3 endpoints in your corporate perimeter security Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g. firewalls, or cloud interception proxy like Kivera) including via Internet Gateway, to force usage of VPC endpoints. It will block data-plane transfer. Note: AWS console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Very High	1	-	-
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail	Medium	1	-	-

Use AWS services to access data on S3

Threat Id	S3.T30
Name	Use AWS services to access data on S3
Description	Number of AWS services can access S3 to execute their own functions. An attacker can use them to collect data, using their service role or service-linked roles.
Goal	Data theft
Mitre ATT&CK	TA0009
CVSS	Medium (4.4)
IAM Access	{ "UNIQUE": "iam:PassRole" }

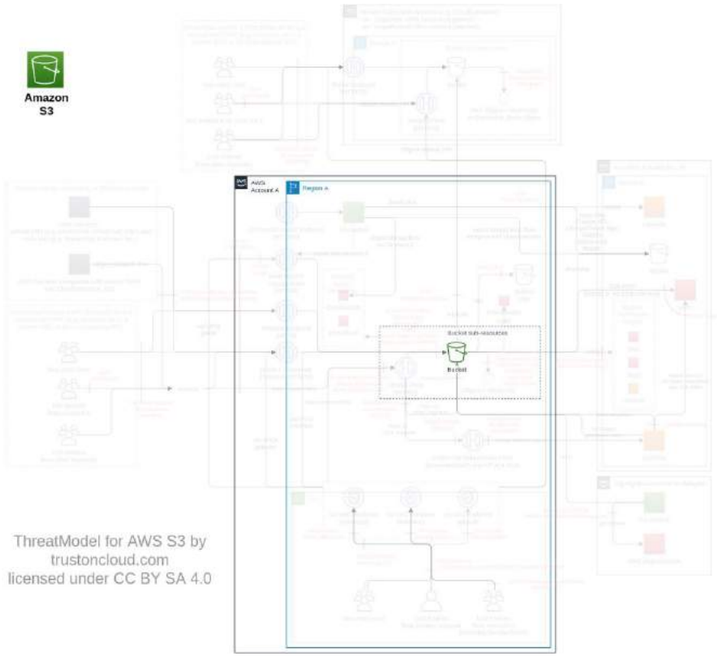


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce encryption-at-rest Maintain a list of authorized KMS key(s) for each bucket, and their default encryption key. You might simplify by using only 1 key per bucket, ideally dedicated. Note that S3 server access log bucket does not support KMS encryption (ref). Ensure all objects on S3 buckets are encrypted with an authorized KMS key Block PutObject requests with unauthorized KMS key on each bucket (e.g. using an S3 bucket policy deny statement on PutObject if the condition if exists "s3:x-amz-server-side-encryption-aws-kms-key-id" is not an authorized KMS key) Monitor that only authorized KMS key(s) are used on each bucket (using CloudTrail S3 data events in *requestParameter.bucketName* and *response.x-amz-server-side-encryption-aws-kms-key-id*) Maintain a list of buckets (or paths) required to be encrypted with server-side encryption with customer-provided keys (SSE-C) For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g. using an S3 bucket policy deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES265" is not present) 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 *requestParameter.bucketName* and *response.x-amz-server-side-encryption-customer-algorithm*)	Very High	3	2	2
Limit access from only authorized VPCs For each S3 bucket, maintain a list of VPC(s), authorized to access it. Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the bucket policy size is beyond the limit, use this condition on access point)	Very High	1	1	-
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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

Model the threats on all AWS services accessing S3 Analyse and protect all AWS services accessing S3 (e.g. via ThreatModel). Enforce usage in VPC only, whenever possible.	High	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Low	1	-	-

Move prod data in non-prod environment

Threat Id	S3.T11
Name	Move prod data in 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
CVSS	Medium (4.4)
IAM Access	{ "UNIQUE": "s3:GetObject" }

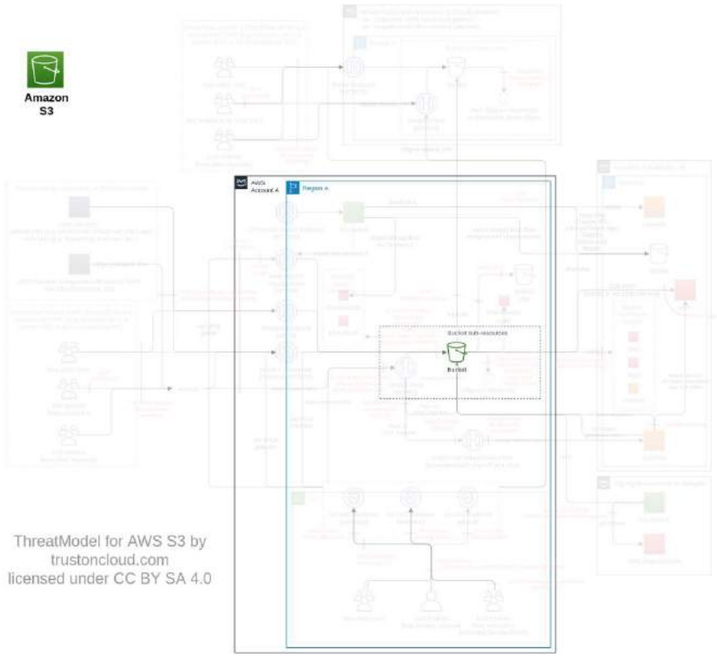


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Identify and ensure the protection all internal buckets hosting your objects Track all buckets you control, define their authorized data classification, identify whether the hosted data is primary (i.e. source of truth, for example logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g. file-processing, software package, etc.), their WORM requirements (e.g. SEC 17a-4, CTCC, etc.), if they are production/non-production (preferably done at account-level), their storage class. You may use tags, Infra-as-code, AWS Glue Data Catalog or external management tool like FINRA herd) Use a data discovery tool (e.g. Amazon Macie) to control that no sensitive data are stored in unauthorized bucket 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
Enforce encryption-at-rest Maintain a list of authorized KMS key(s) for each bucket, and their default encryption key. You might simplify by using only 1 key per bucket, ideally dedicated. Note that S3 server access log bucket does not support KMS encryption (ref). Ensure all objects on S3 buckets are encrypted with an authorized KMS key Block PutObject requests with unauthorized KMS key on each bucket (e.g. using an S3 bucket policy deny statement on PutObject if the condition if exists "s3:x-amz-server-side-encryption-aws-kms-key-id" is not an authorized KMS key) Monitor that only authorized KMS key(s) are used on each bucket (using CloudTrail S3 data events in *requestParameter.bucketName* and *response.x-amz-server-side-encryption-aws-kms-key-id*) Maintain a list of buckets (or paths) required to be encrypted with server-side encryption with customer-provided keys (SSE-C) For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g. using an S3 bucket policy deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES265" is not present) 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 *requestParameter.bucketName* and *response.x-amz-server-side-encryption-customer-algorithm*)	Very High	3	2	2
Restrict access point access to VPC when in use Maintain a list of authorized access between VPC, S3 access point and S3.	Very High	1	2	-

Limit access via the S3 access point by using in VPC endpoint and/or bucket policy the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of allowlist bucket name in VPC endpoint/bucket policy. Block any object-related operations access to S3 bucket not through access point (i.e. using a deny IAM policy statement with the condition "ArnNotLike" {"s3:DataAccessPointArn": "arn:aws:s3:*Region*:*AccountId*:accesspoint/*"})				
Limit and monitor access via S3 VPC endpoints For each VPC, maintain a list of AWS Organizations, OU and/or AWS account(s), where IAM entities are authorized to access S3 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) Block any IAM entity not belonging to an authorized AWS Organizations, OU and/or AWS account(s) to call S3 from your VPCs by adding a deny statement on S3 VPC endpoint policy of each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org ID, as those are globally unique. Enable VPC DNS query logging in all VPC Maintain a list of authorized S3 and S3 access point (and their respective AWS accounts) to be access for each VPC 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 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) Monitor VPC DNS query logs that only authorized S3 bucket and S3 access points are being queried in each VPC (e.g. using VPC DNS query logging), and protect it using Route53 ThreatModel	Very High	4	2	1
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Limit access from only authorized VPCs For each S3 bucket, maintain a list of VPC(s), authorized to access it. Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the bucket policy size is beyond the limit, use this condition on access point)	High	1	1	-
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). 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
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Medium	1	-	-
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Hotlinking content from S3 bucket

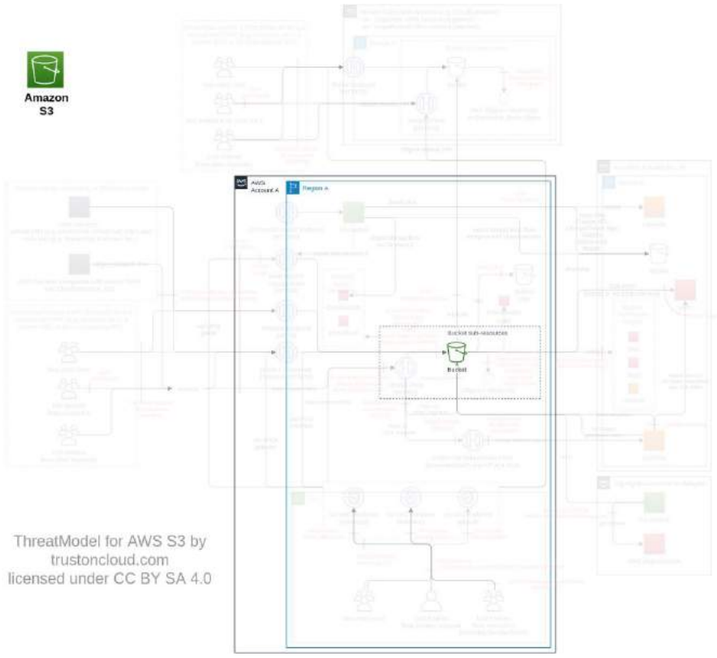
Threat Id	S3.T22
Name	Hotlinking content from S3 bucket
Description	S3 charges for hosting and data transfer out. An attacker can hotlink your content hosted on S3 on another page to avoid paying the S3 charges (ref).
Goal	Financial Drain
Mitre ATT&CK	TA0040
CVSS	Low (3.5)
IAM Access	{}



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

Increase bill by restoring large amount of data

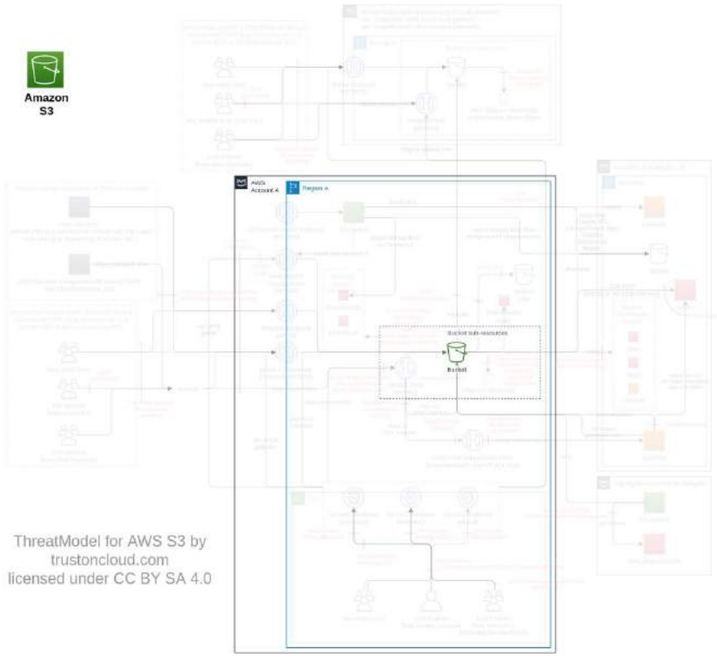
Threat Id	S3.T47
Name	Increase bill by restoring large amount of data
Description	Restore cost can be amplified by the size and the type (i.e. expedited). An attacker can restore lots of data to generate costs.
Goal	Financial Drain
Mitre ATT&CK	TA0040
CVSS	Low (2.7)
IAM Access	{ "UNIQUE": "s3:RestoreObject" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions.	Medium	1	-	-

Increase bill by creating incomplete uploads

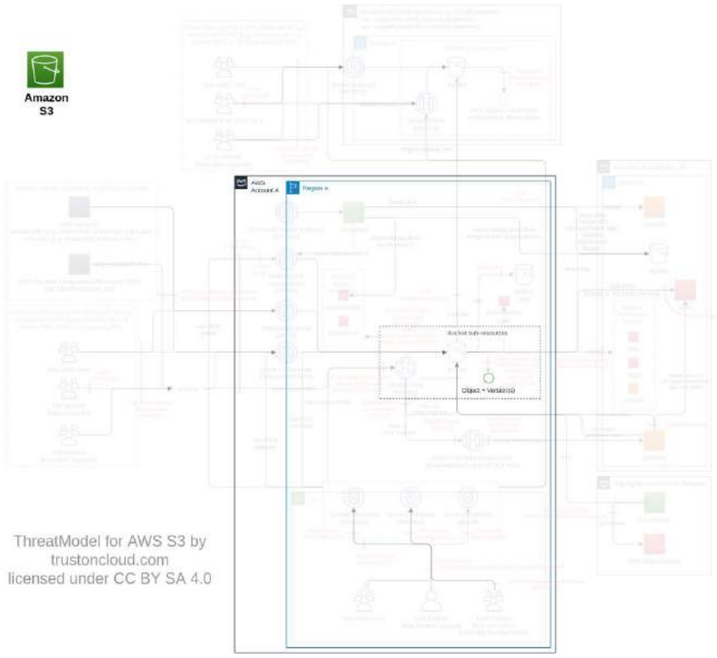
Threat Id	S3.T40
Name	Increase bill by creating incomplete uploads
Description	By default, when a multiple upload is initiated but not completed, S3 will keep it (ref). An attacker can upload a large amount of data without completing it, while being hard to detect.
Goal	Financial Drain
Mitre ATT&CK	TA0040
CVSS	Low (2.3)
IAM Access	{ "UNIQUE": "s3:PutObject" }



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

Abuse MD5 etag

Threat Id	S3.T27
Name	Abuse MD5 etag
Description	Etags includes 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, in order to disrupt a workflow downstream.
Goal	Data manipulation
Mitre ATT&CK	TA0040
CVSS	Low (1.8)
IAM Access	{}

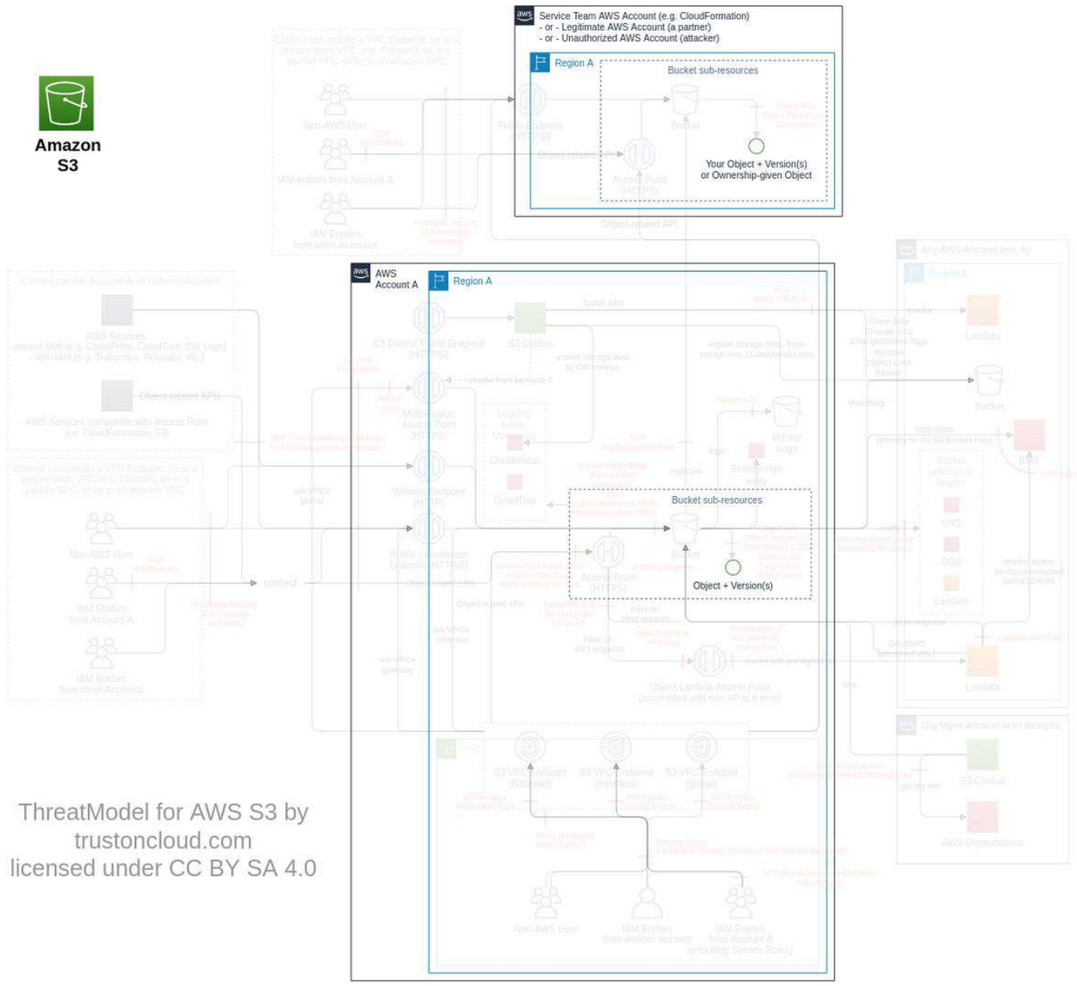


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce good coding practice If etag is used, make sure properly account for its different definitions (ref)	Very High	1	-	-
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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

Object tagging *(subclass of Object upload/download, used by Bucket, FC2)*

You can tag objects (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

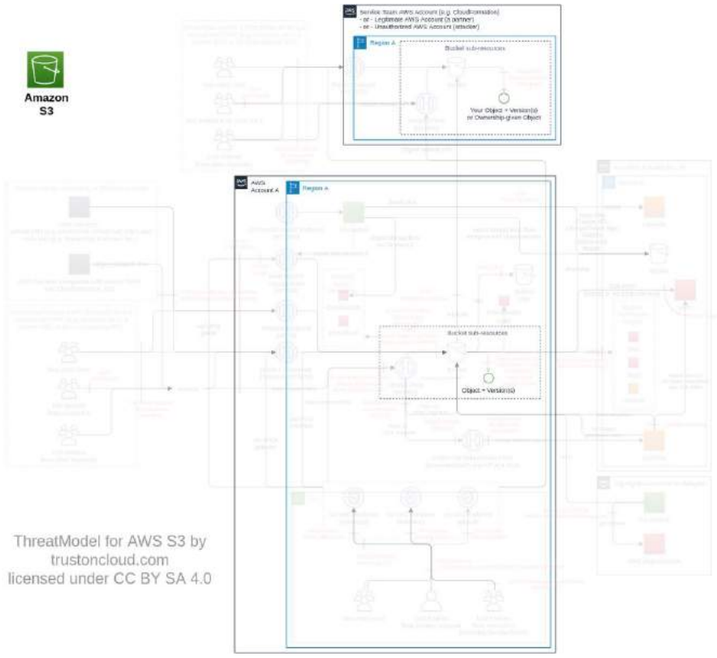
Action	IAM Permission
Adds a set of tags to an existing object.	s3:PutObjectTagging

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
CVSS	Medium (4.4)
IAM Access	{ "OR": ["s3:PutObjectTagging", "s3:DeleteObjectTagging"] }

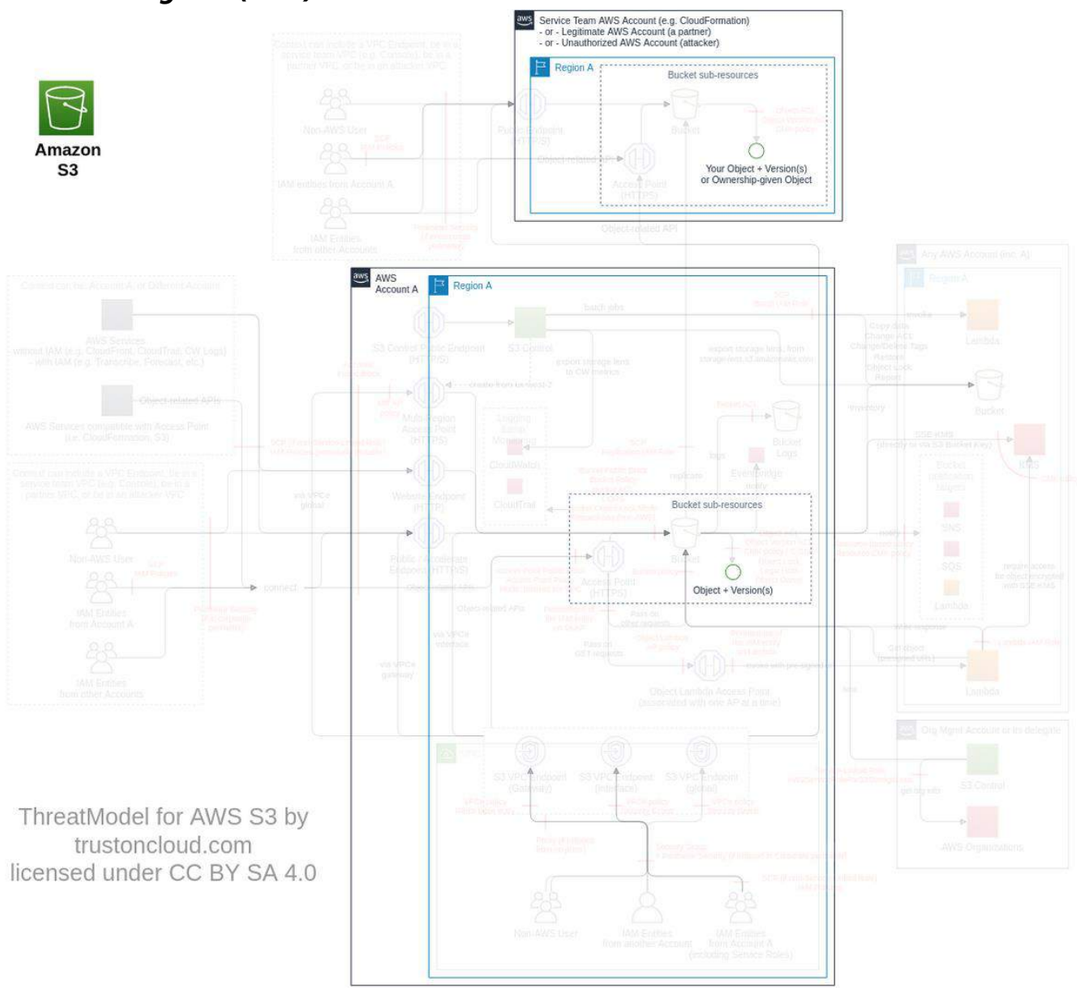


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit access from only authorized VPCs For each S3 bucket, maintain a list of VPC(s), authorized to access it. Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the bucket policy size is beyond the limit, use this condition on access point)	Very High	1	1	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	High	2	-	-

Torrent *(subclass of Object upload/download, used by Bucket, FC21)*

[NOT RECOMMENDED] *You can use the BitTorrent protocol to retrieve objects (ref). Only available in the AWS Regions launched before May 30, 2016. The seed rate is 100KB.*

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

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

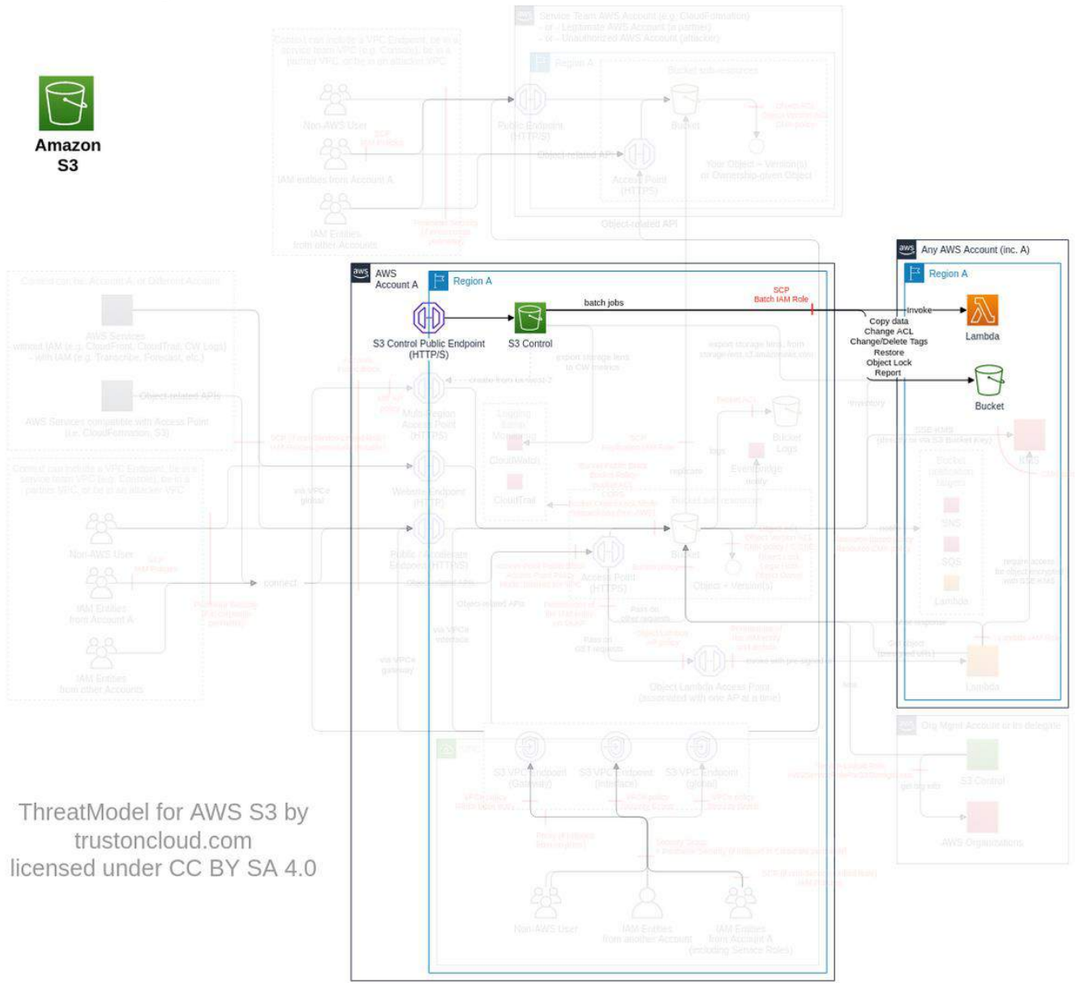
Threat List

Name	CVSS
None	None

Batch *(subclass of Object upload/download, 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

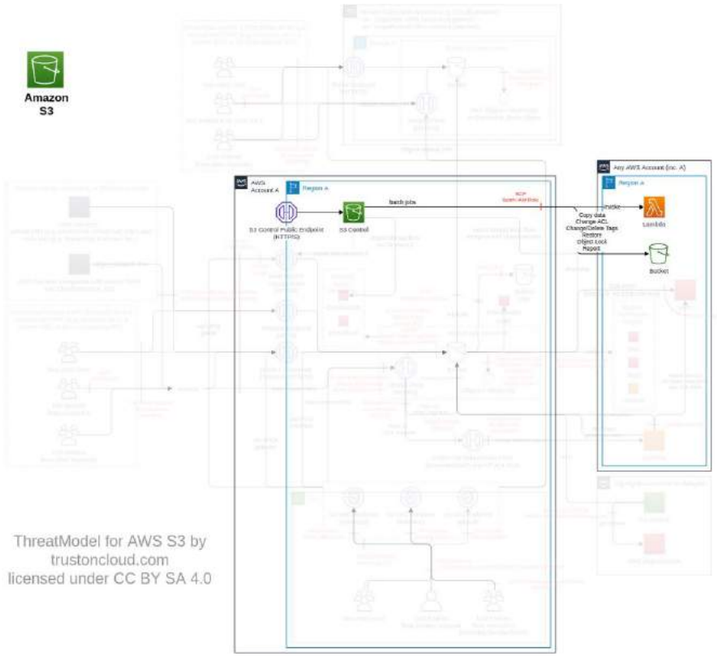
Action	IAM Permission
Creates a new Amazon S3 Batch Operations job.	s3:CreateJob

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 proper trust policy), then can run operations including copy, or replace/delete object tags. An attacker can use Batch copy or modify objects to exfiltrate or change the access management of an object (if relying on tag).
Goal	Data manipulation
Mitre ATT&CK	TA0040
CVSS	Medium (6.2)
IAM Access	{ "AND": ["s3:CreateJob", "iam:PassRole"] }

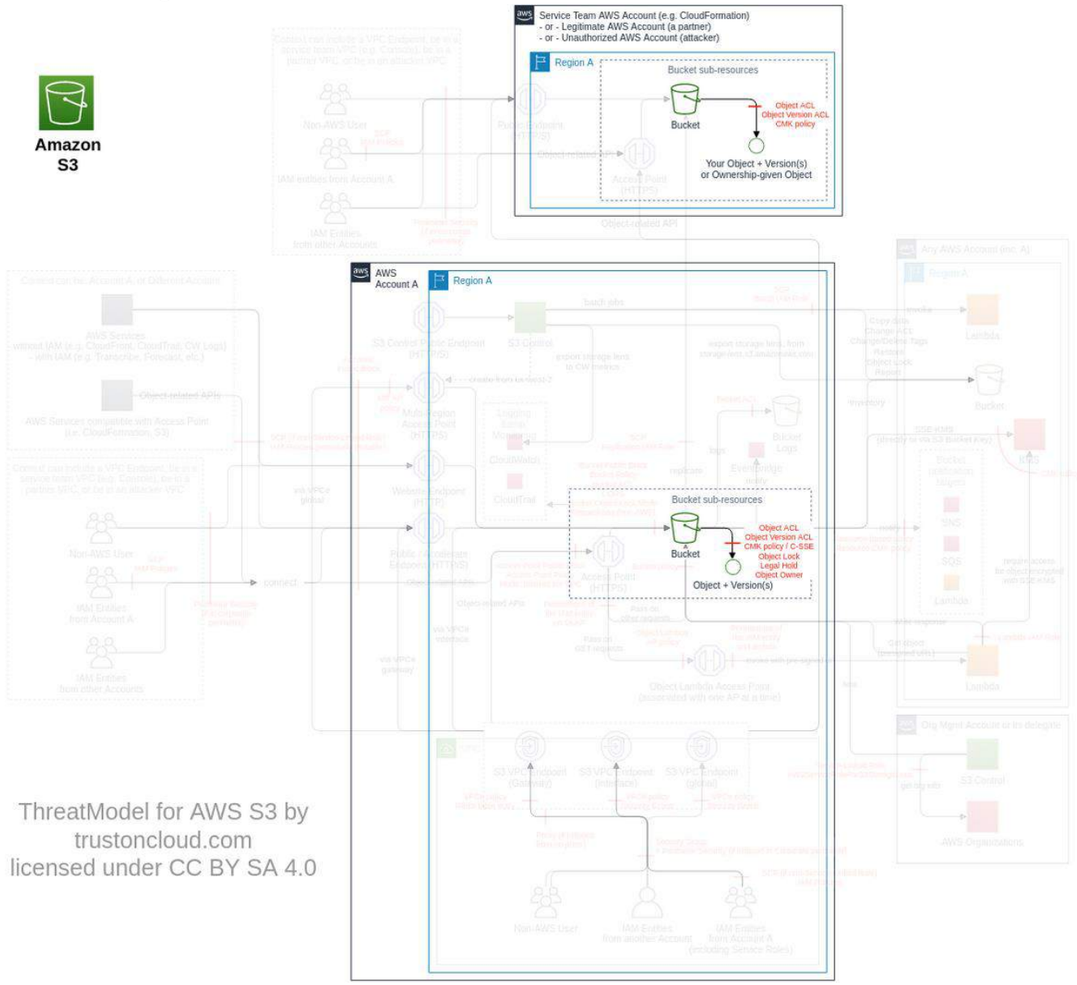


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Control IAM roles used for Batch Maintain a list of IAM roles used for Batch job, ideally dedicated (e.g. using change management process on infrastructure-as-code) Ensure only an authorized IAM role is attached on each Batch job Limit the access to only required resources/permissions (e.g. source/destination bucket, Lambda functions) of each authorized IAM role configured for Batch jobs Limit access to authorized IAM roles used for Batch job, using the IAM ThreatModel (e.g. trust policy, and "iam:PassRole")	Very High	4	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Object versioning *(subclass of Object upload/download, 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

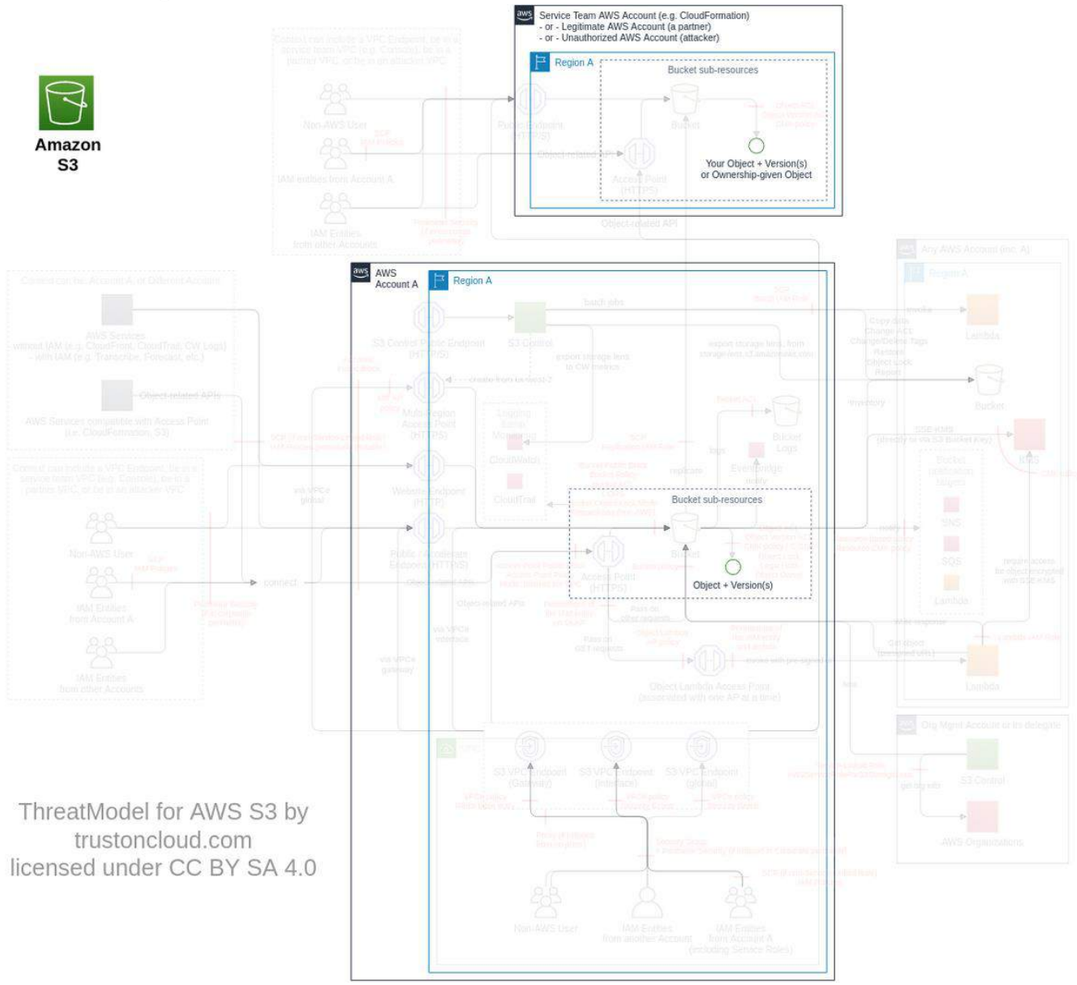
Threat List

Name	CVSS
None	None

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

You can tag objects versions (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

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

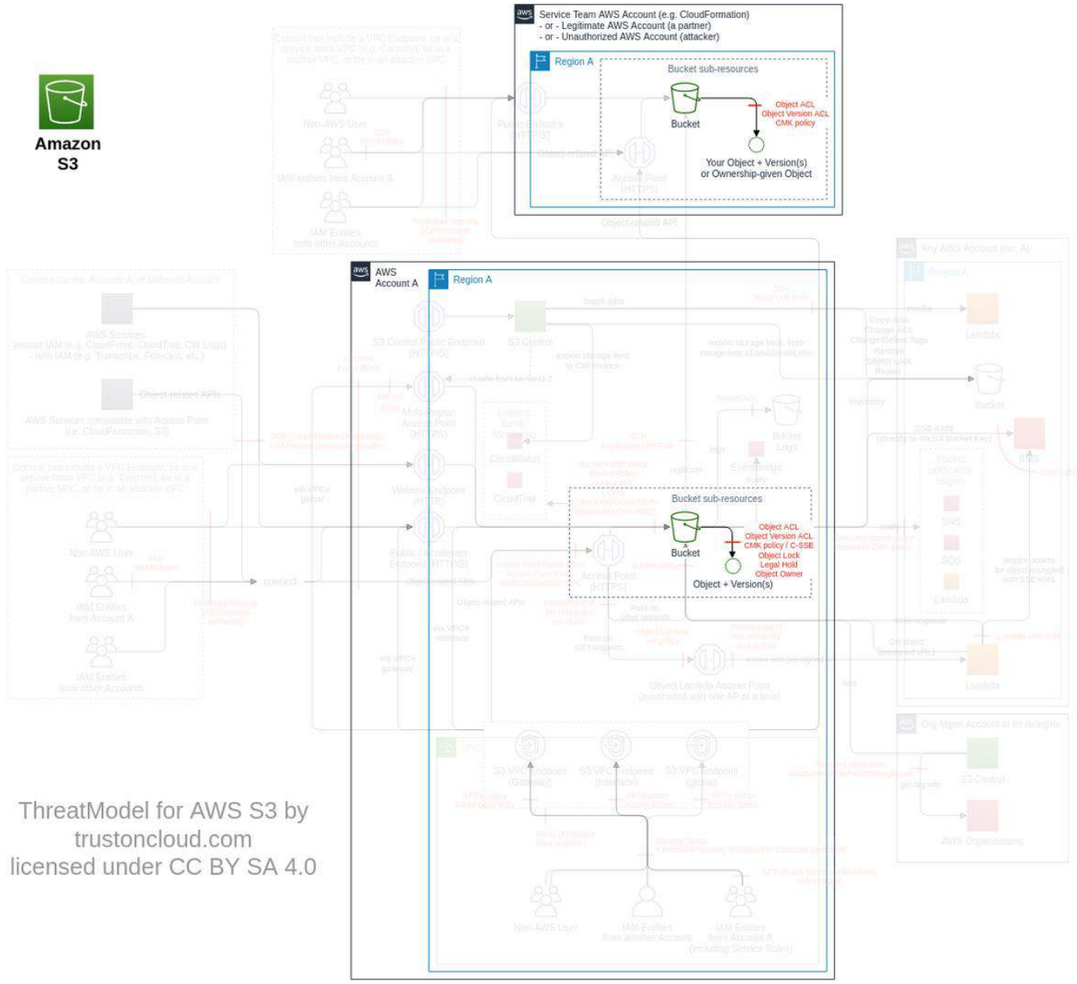
Threat List

Name	CVSS
None	None

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

Amazon S3 access control lists (ACLs) enable you to manage access to object versions (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

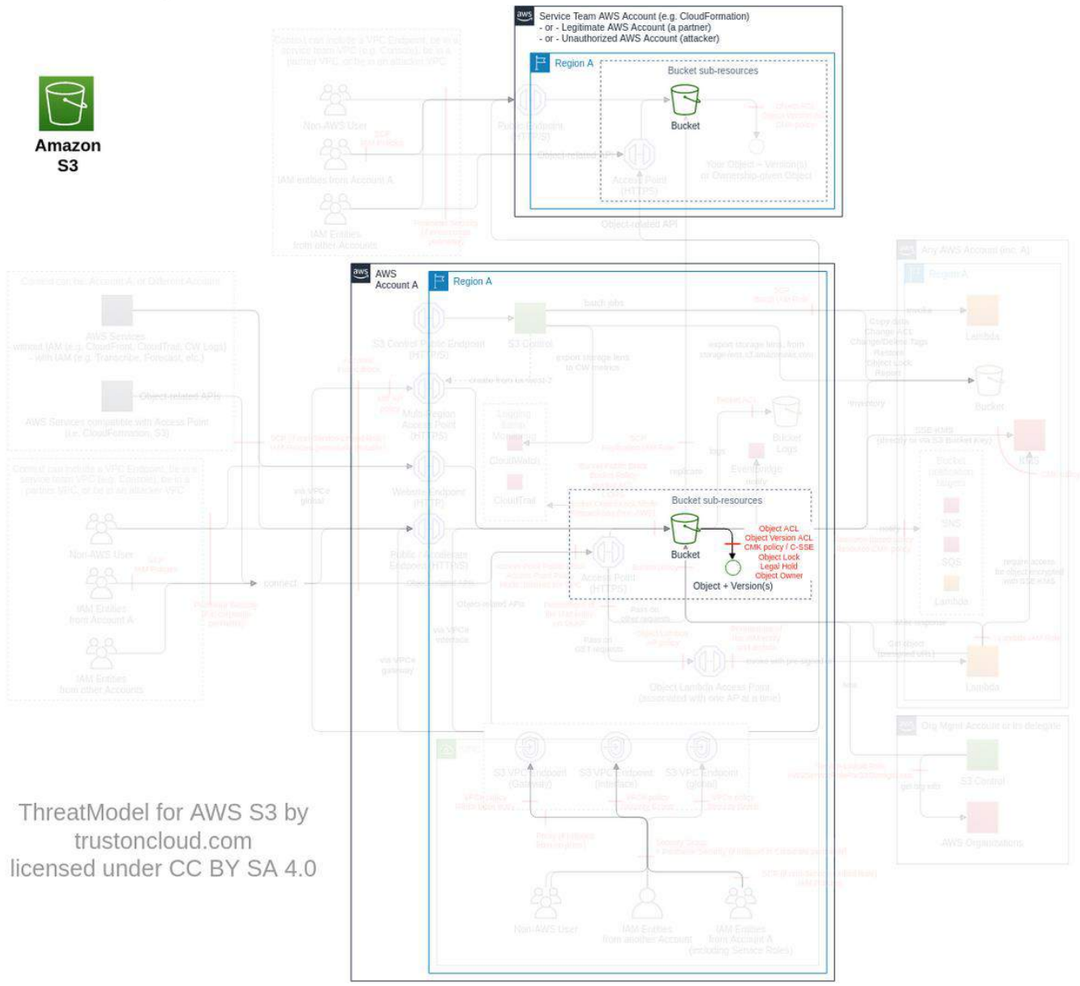
Threat List

Name	CVSS
None	None

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 both unintended user actions and application failures (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

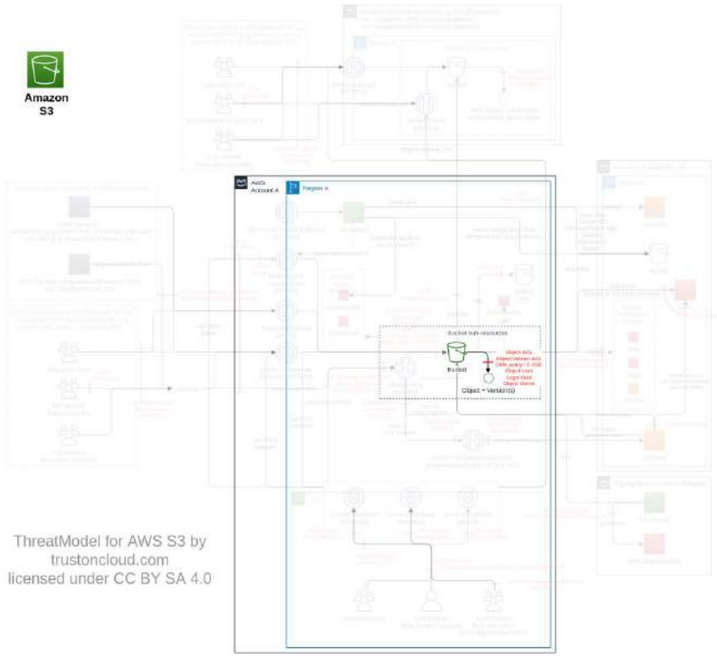
Action	IAM Permission
Sets the versioning state of an existing bucket.	s3:PutBucketVersioning

Threat List

Name	CVSS
Affect data protection by removing versioning	Low (2.7)

Affect data protection by removing versioning

Threat Id	S3.T48
Name	Affect data protection by removing versioning
Description	Versioning can be used as a first level of integrity protection. An attacker can suspend versioning to affect data protection of a bucket.
Goal	Data manipulation
Mitre ATT&CK	TA0040
CVSS	Low (2.7)
IAM Access	{ "UNIQUE": "s3:PutBucketVersioning" }

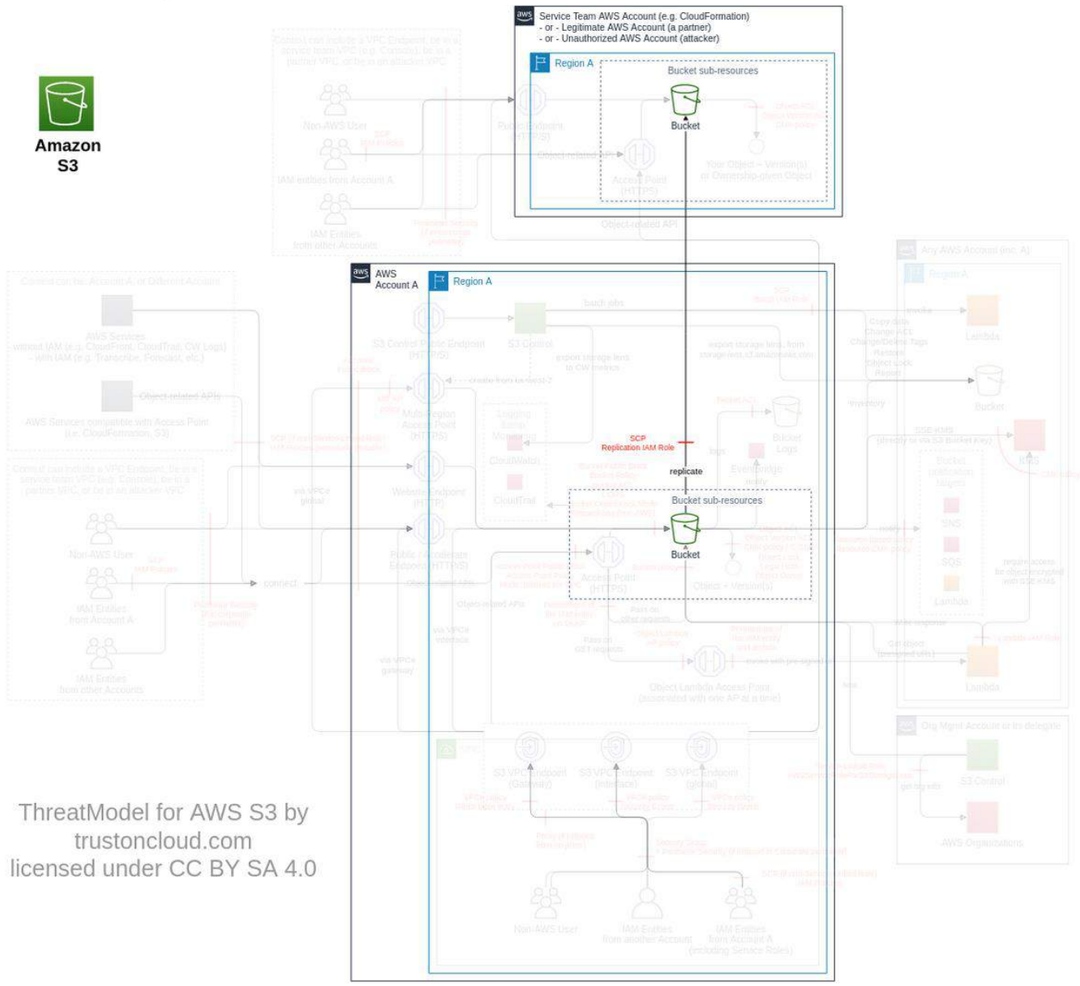


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit the access to the IAM actions required to execute the threats Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM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

Replication *(subclass of Bucket versioning, FC15)*

Replication enables automatic and asynchronous copying of objects of a bucket into another bucket. It can be cross-region or in the same region. Buckets configured for replication can be in the same AWS account or by different accounts. It is usually to backup S3 data, data centralization, or multi-region applications.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

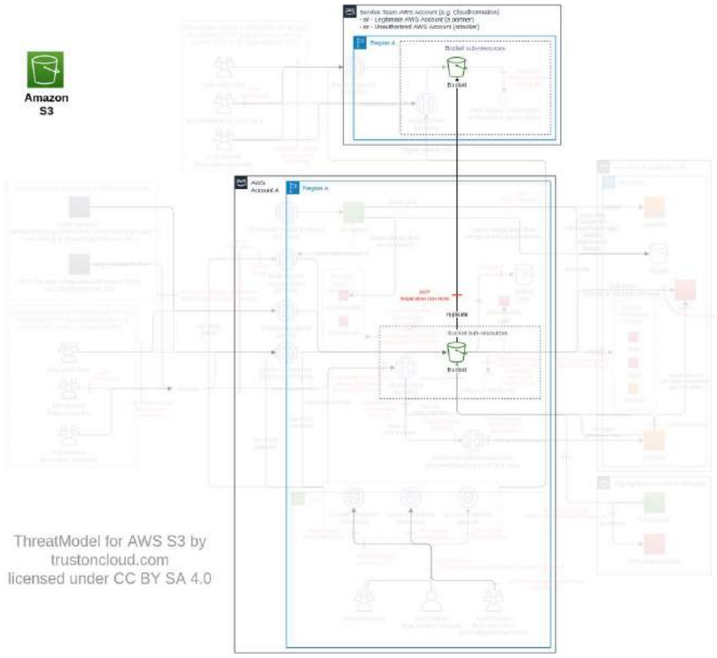
Action	IAM Permission
Creates a new replication configuration (or replaces an existing one, if present).	s3:PutReplicationConfiguration

Threat List

Name	CVSS
Unauthorized access to data via bucket replication	Medium (4.5)
Affect data protection by removing replication	Low (2.7)

Unauthorized access to data via bucket replication

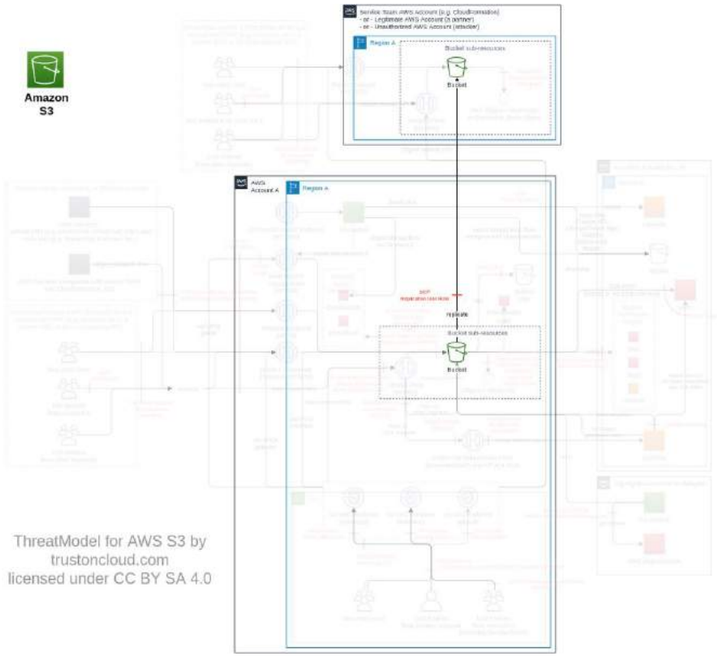
Threat Id	S3.T2
Name	Unauthorized access to data via bucket replication
Description	Replication allows you to replicate objects, their metadata and change ownership. The configuration focuses on new objects only (old objects replication requires a ticket to AWS Support). An attacker can configure replication on a bucket to replicate objects (or its metadata or tagging) in a bucket they control to exfiltrate data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (4.5)
IAM Access	{ "AND": ["s3:PutReplicationConfiguration", "iam:PassRole"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Restrict bucket replication Maintain a list of authorized buckets to have replication enabled, their target bucket and replication type (i.e. ownership, RTC, etc.) (ref). Ensure only authorized buckets have replication enabled and with correct configuration are configured Maintain a list of IAM roles used for replication, ideally dedicated (e.g. using change management process on infrastructure-as-code) Ensure only authorized IAM roles are attached for each replication, ideally dedicated Limit the S3 access to the source/destination bucket and replication rights of each authorized IAM role configured for replication Limit access to authorized IAM roles used for replication, using the IAM ThreatModel (e.g. trust policy, and "iam:PassRole") Monitor abnormal behaviour on replication CloudWatch metrics (i.e. *BytesPendingReplication* and *OperationsPendingReplication*)	High	6	-	1
Monitor S3 with Amazon GuardDuty and Macie Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect it using Macie ThreatModel	High	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM 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 the data protection.
Goal	Data manipulation
Mitre ATT&CK	TA0040
CVSS	Low (2.7)
IAM Access	{ "UNIQUE": "s3:PutReplicationConfiguration" }

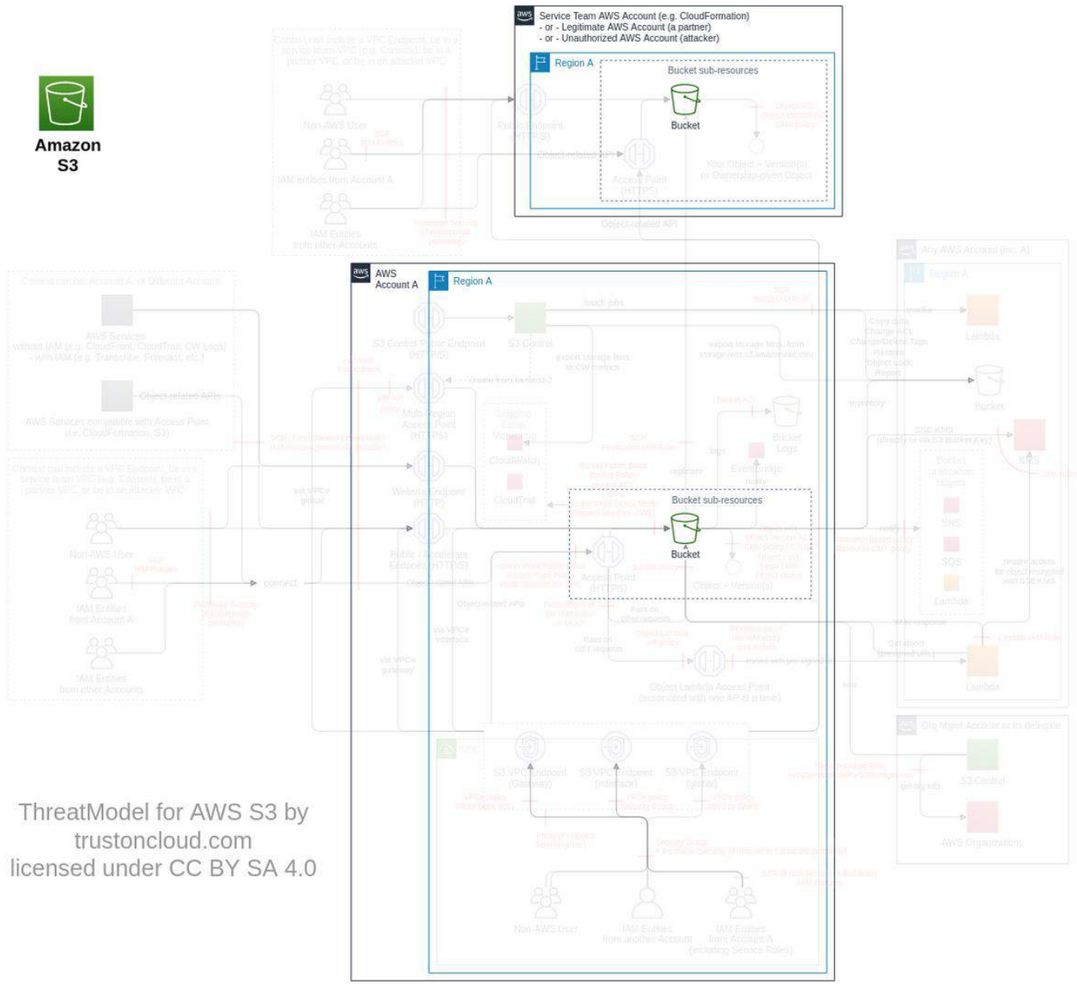


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit the access to the IAM actions required to execute the threats Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM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

Bucket tag *(subclass of Bucket, FC7)*

You can tag buckets (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

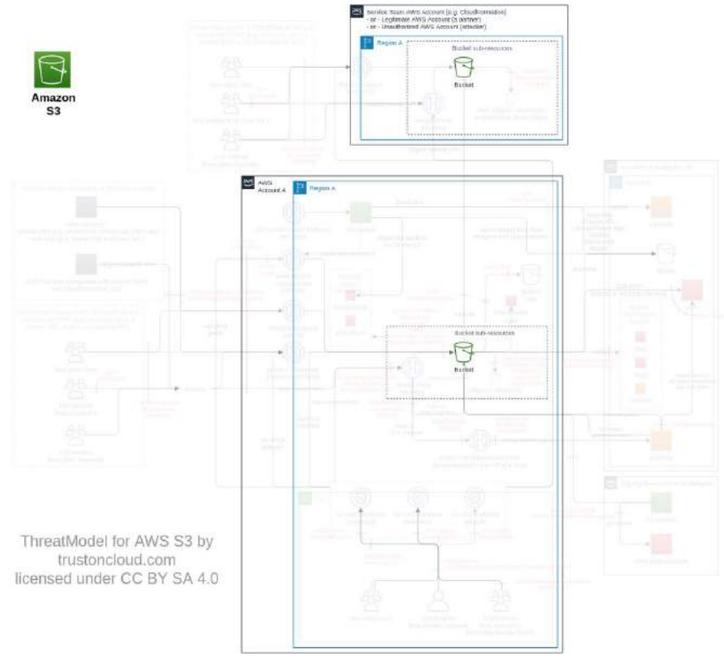
Action	IAM Permission
Adds a set of tags to an existing bucket.	s3:PutBucketTagging

Threat List

Name	CVSS
Exfiltrate data by using tags	Low (3.3)

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 those features to exfiltrate data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Low (3.3)
IAM Access	{ "AND": [{ "OR": ["GetObjectTagging", "s3:GetObjectVersionTagging"] }, { "OR": ["s3:PutObjectTagging", "s3:PutObjectVersionTagging"] }] }

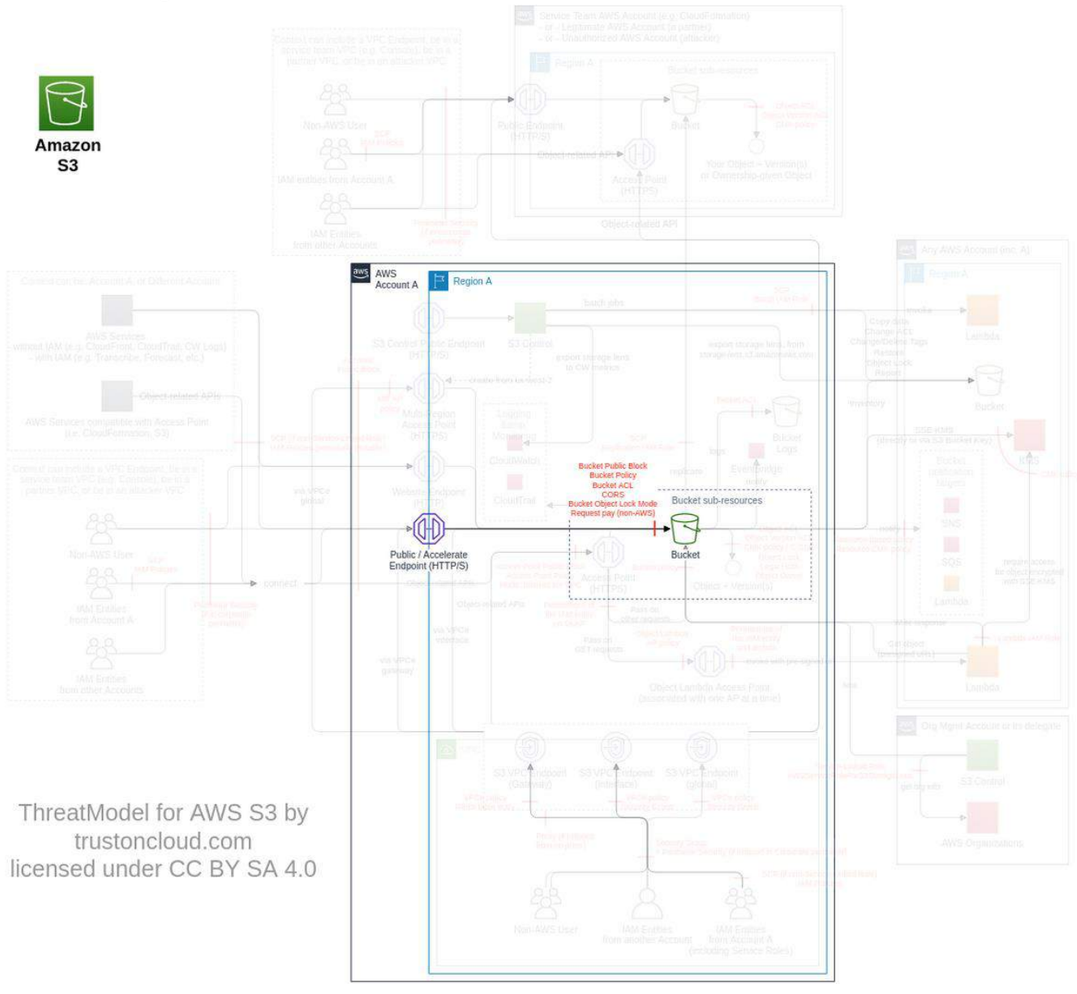


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block S3 endpoints in your corporate perimeter security Block S3 endpoints (DNS and IP ranges) in your corporate perimeter security to the Internet (e.g. firewalls, or cloud interception proxy like Kivera) including via Internet Gateway, to force usage of VPC endpoints. It will block data-plane transfer. Note: AWS console stays functional as it proxies non-data-plane requests (via "console.aws.amazon.com").	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

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 control that the requester has the necessary access permissions (ref).*

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

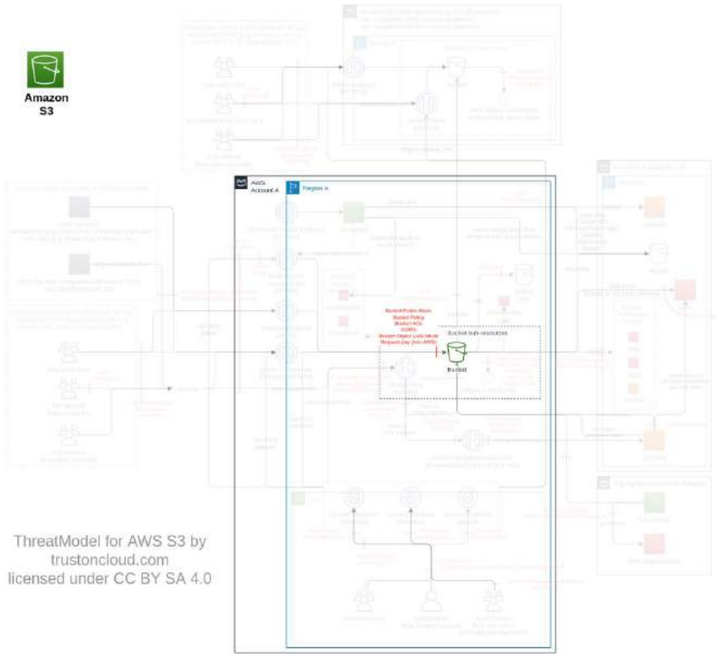
Action	IAM Permission
Sets the permissions on an existing bucket using access control lists (ACL).	s3:PutBucketAcl

Threat List

Name	CVSS
Grant unauthorized access to a private bucket by changing bucket ACL	Medium (5.2)
DoS by blocking traffic using bucket ACL	Low (2.4)

Grant unauthorized access to a private bucket by changing bucket ACL

Threat Id	S3.T4
Name	Grant unauthorized access to a private bucket by changing bucket ACL
Description	Bucket ACL can be used to give access to the bucket information, list the objects, and overwrite/delete objects. An attacker can change the bucket ACL to destroy or modify data, or exfiltrate data via the object name (1KB).
Goal	Data manipulation
Mitre ATT&CK	TA0040
CVSS	Medium (5.2)
IAM Access	{ "UNIQUE": "s3:PutBucketAcl" }

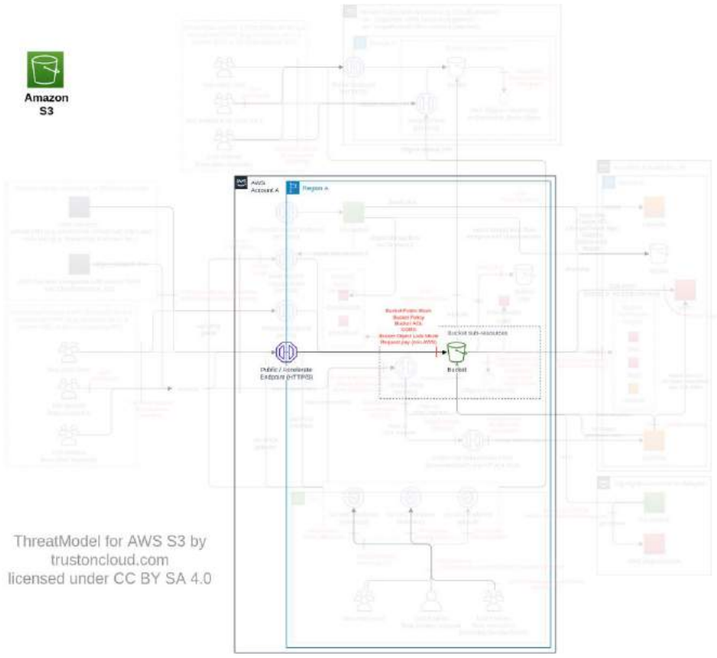


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block direct public access Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Very High	-	2	-
Block bucket ACL except for server access logging Deny requests to add bucket ACL other than for server access logging (e.g. using an SCP, bucket policy and VPC endpoint policy blocking PutBucketAcl for all but the following predefined group "http://acs.amazonaws.com/groups/s3/LogDelivery" using the IAM condition x-amz-acl: "log-delivery-write") Monitor changes on bucket ACL other than for server access logging (e.g. using CloudTrail, 1) if the CloudTrail PutBucketAcl log indicates requestParameters.AccessControlPolicy.AccessControlList.Grant[].Grantee.xsi:type: "Group", then the URI should be "http://acs.amazonaws.com/groups/s3/LogDelivery", and 2) if the requestParameters.AccessControlPolicy.AccessControlList.Grant[].Grantee.xsi:type: "CanonicalUser" then the ID should be the same than "AccessControlPolicy.Owner.ID", and 3) requestParameters.x-amz-acl should be either "private", "log-delivery-write" or not existing)	Very High	-	1	1
Disabling ACLs for all buckets Ensure bucket ACL and object ACL are disabled on each bucket Prevent the creation of buckets with ACL enabled (e.g. by using a SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note it does not block someone to enable ACL afterwards via PutPutBucketOwnershipControls.	Very High	1	1	-
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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

Monitor S3 with Amazon GuardDuty and Macie Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using GuardDuty ThreatModel. Ensure findings are investigated (e.g. using Amazon Detective). Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect it using Macie ThreatModel	High	2	-	-
Enable CloudTrail S3 data events Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). Make it available for security analysis, and protect it using CloudTrail ThreatModel	Medium	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 server access logging). An attacker can remove an existing permission to deny legitimate access to the bucket.
Goal	Disruption of Service
Mitre ATT&CK	TA0040
CVSS	Low (2.4)
IAM Access	{ "UNIQUE": "s3:PutBucketAcl" }

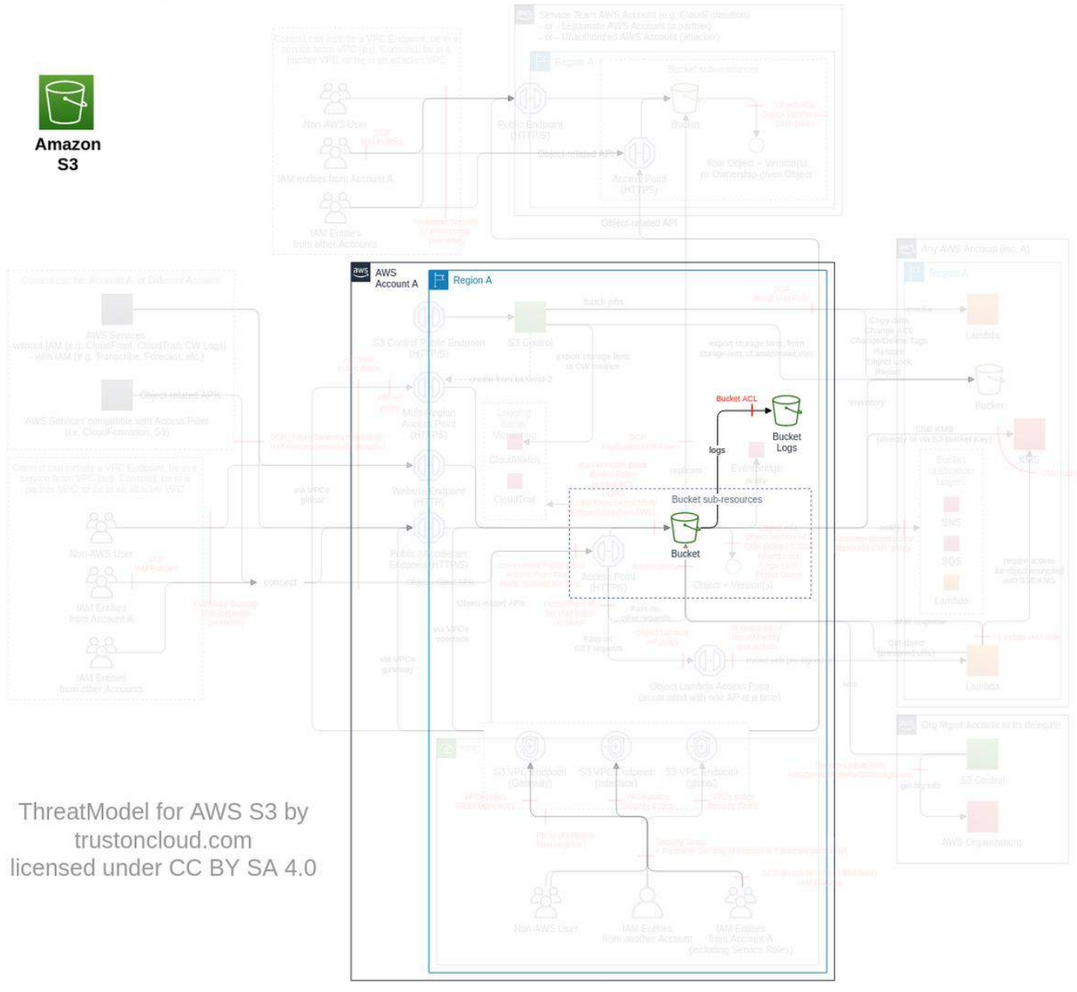


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit the access to the IAM actions required to execute the threats Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM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

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

Server access logging provides detailed records for the requests that are 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 website endpoint is not recorded on S3 data events, some SIEM modules might be more featured with S3 access logs, and access logging is free beside storage.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

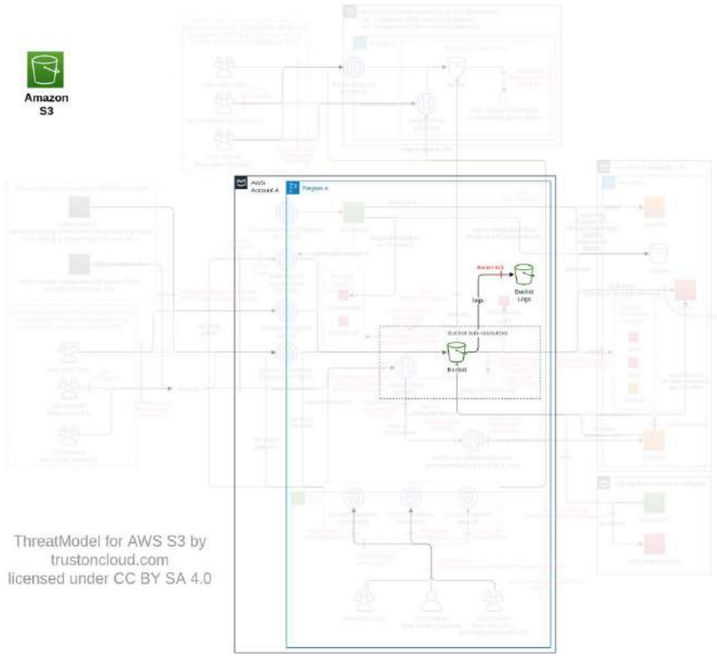
Action	IAM Permission
Sets the logging parameters for a bucket.	s3:PutBucketLogging

Threat List

Name	CVSS
Evade detection by disabling S3 access logs	Low (2.7)

Evade detection by disabling S3 access logs

Threat Id	S3.T51
Name	Evade detection by disabling S3 access logs
Description	S3 access logs can be used by SIEM to detect abnormal behaviors. An attacker can disable S3 access log on a bucket to evade detection.
Goal	Launch another attack
Mitre ATT&CK	TA0005
CVSS	Low (2.7)
IAM Access	{ "UNIQUE": "s3:PutBucketAcl" }

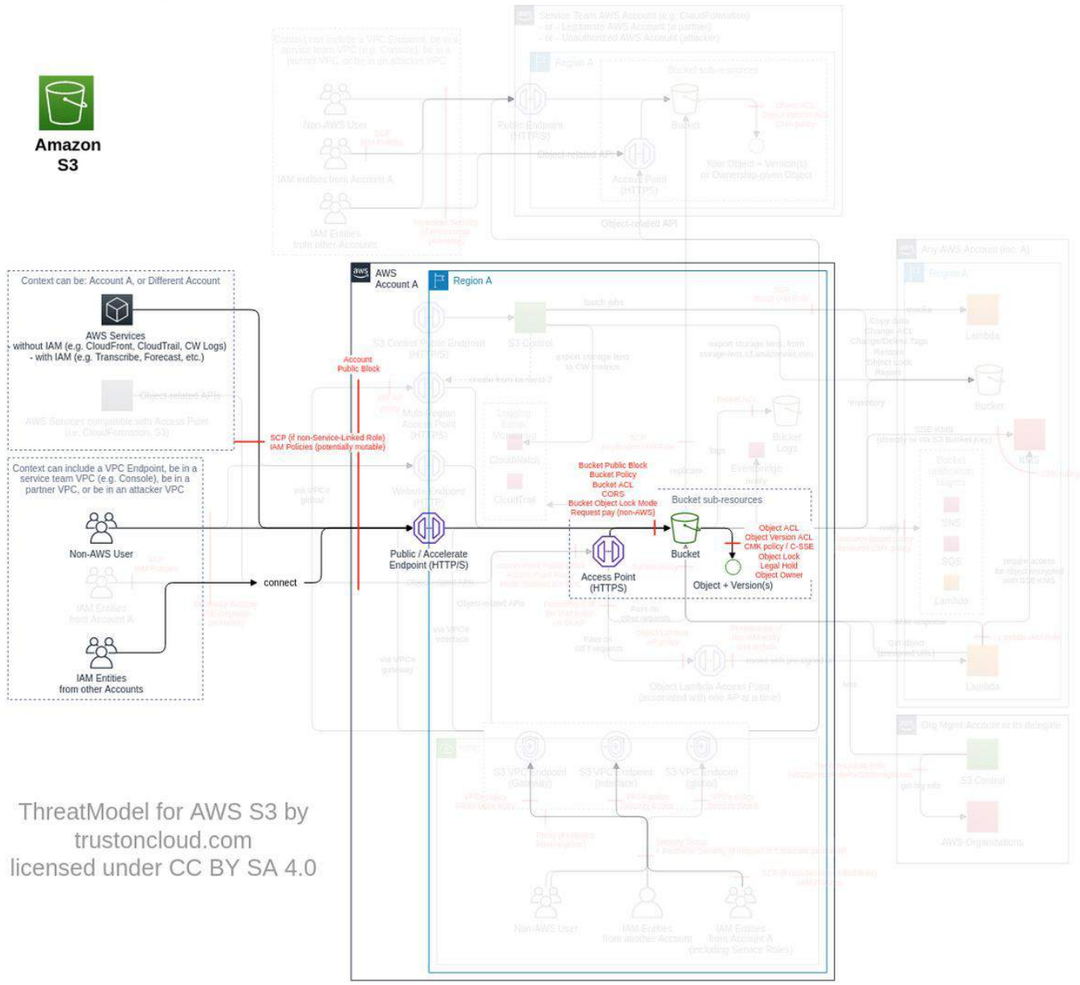


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit the access to the IAM actions required to execute the threats Limit the access to the IAM actions required to execute the threats using AWS IAM and/or SCP, following the IAM Operating Model and using the IAM ThreatModel. Use the IAM Access Advisor to review the usage 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)



Actions and IAM Permissions to deny the feature

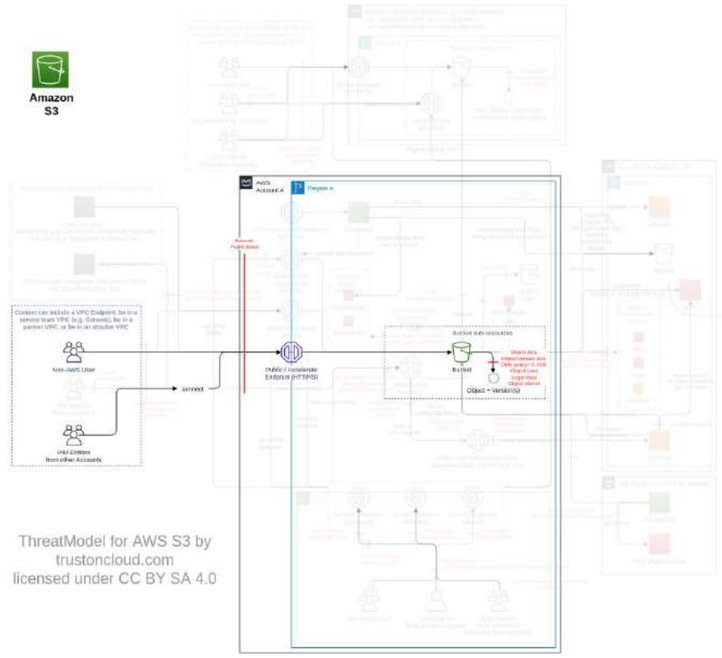
Action	IAM Permission
Adds to or replaces a policy on a bucket.	s3:PutBucketPolicy

Threat List

Name	CVSS
Grant unauthorized access to a private bucket by changing bucket policy	High (7.2)
Reduce bucket security by deleting the bucket policy	Medium (6.4)
Use CloudFront to access private bucket	Medium (5.5)

Grant unauthorized access to a private bucket by changing bucket policy

Threat Id	S3.T37
Name	Grant unauthorized access to a private bucket by changing bucket policy
Description	Bucket policy can enable access to objects owned by the bucket. An attacker (or someone by negligence) can change the bucket policy and make the content accessible.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	High (7.2)
IAM Access	{ "UNIQUE": "s3:PutBucketPolicy" }

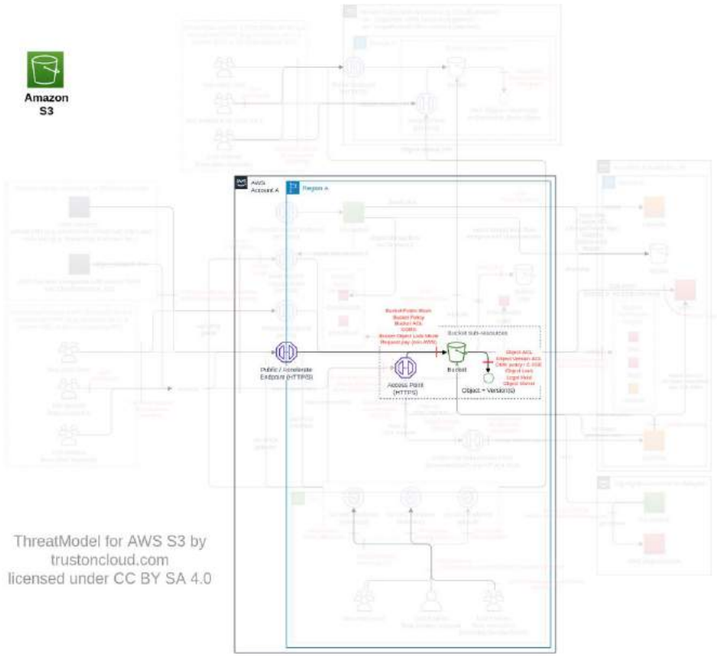


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block direct public access Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	Very High	-	3	-
Enforce encryption-at-rest Maintain a list of authorized KMS key(s) for each bucket, and their default encryption key. You might simplify by using only 1 key per bucket, ideally dedicated. Note that S3 server access log bucket does not support KMS encryption (ref). Ensure all objects on S3 buckets are encrypted with an authorized KMS key Use KMS ThreatModel to protect the KMS keys used for S3 (e.g. using encryptionContext on the policy of each KMS key) Implement an authorized default encryption key on each bucket and enable S3 Bucket Key (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings) Block PutObject requests with unauthorized KMS key on each bucket (e.g. using an S3 bucket policy deny statement on PutObject if the condition if exists "s3:x-amz-server-side-encryption-aws-kms-key-id" is not an authorized KMS key) Maintain a list of buckets (or paths) required to be encrypted with server-side encryption with customer-provided keys (SSE-C) For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g. using an S3 bucket policy deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES265" is not present)	Very High	5	2	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account. For each bucket, maintain a list of authorized IAM principals allowed to access via bucket policy	Very High	4	-	-

Ensure only authorized a list of authorized IAM principals allowed to access via bucket policy are configured (e.g. using IAM Access Analyzer for the reconciliation)				
Monitor S3 with Amazon GuardDuty and Macie Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect it using Macie ThreatModel	High	1	-	-

Reduce bucket security by deleting the bucket policy

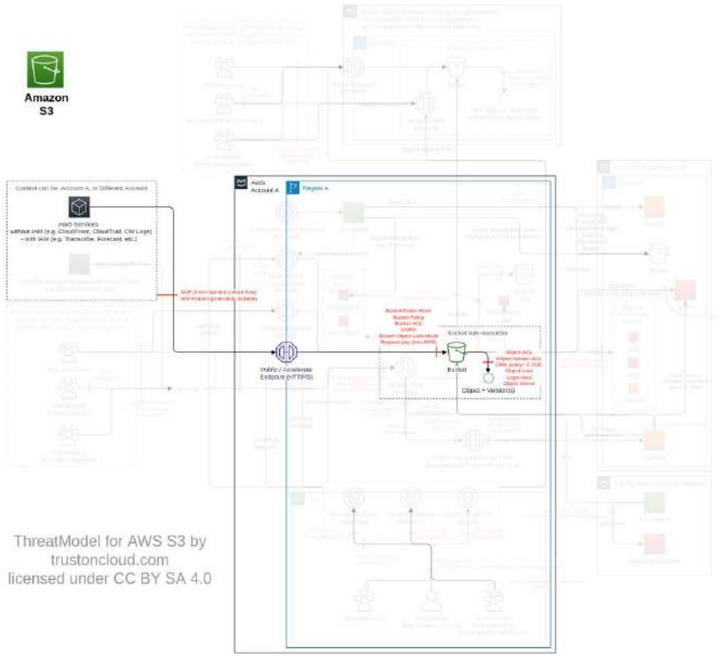
Threat Id	S3.T38
Name	Reduce bucket security by deleting the bucket policy
Description	Bucket policy can deny access to objects, as it supersedes the object authority. An attacker (or someone by negligence) can delete the bucket policy and make the content less secure.
Goal	Launch another attack
Mitre ATT&CK	TA0004
CVSS	Medium (6.4)
IAM Access	{ "UNIQUE": "s3:DeleteBucketPolicy" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit access from only authorized VPCs For each S3 bucket, maintain a list of VPC(s), authorized to access it. Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the bucket policy size is beyond the limit, use this condition on access point)	Very High	1	1	-
Block direct public access Enable account-level S3 Block Public Access on all AWS accounts, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. Enable S3 Block Public Access on all S3 buckets, with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true. Enable S3 Block Public Access on all S3 access points (including multi-region), with BlockPublicAcls, IgnorePublicAcls, BlockPublicPolicy, and RestrictPublicBuckets set to true.	High	-	3	-
Monitor S3 with Amazon GuardDuty and Macie Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect it using Macie ThreatModel	High	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	High	2	-	-

Use CloudFront to access private bucket

Threat Id	S3.T20
Name	Use CloudFront to access private bucket
Description	CloudFront distributions can use S3 as their origin. An attacker can connect a CloudFront distribution to a private S3 bucket to get access to it.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.5)
IAM Access	{ "UNIQUE": "s3:PutBucketPolicy" }

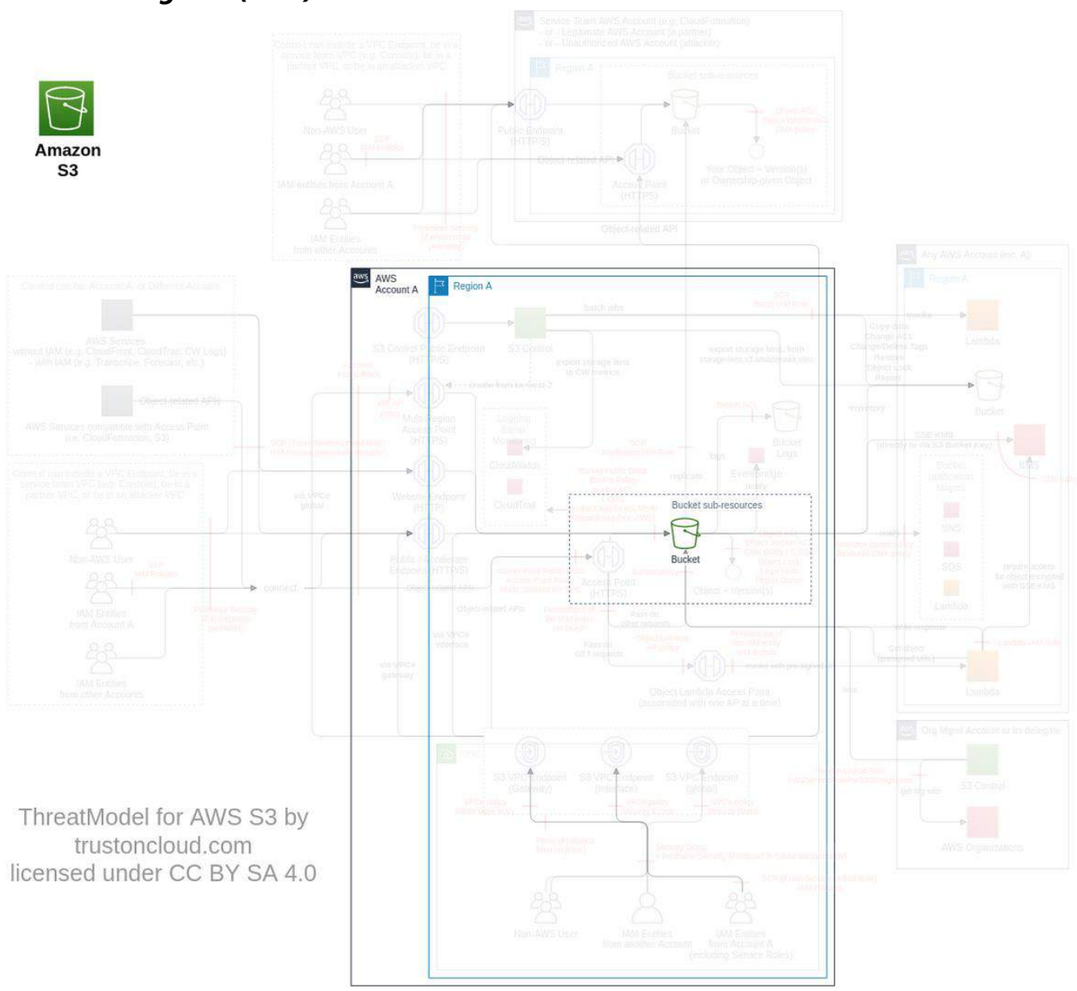


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce encryption-at-rest Maintain a list of authorized KMS key(s) for each bucket, and their default encryption key. You might simplify by using only 1 key per bucket, ideally dedicated. Note that S3 server access log bucket does not support KMS encryption (ref). Ensure all objects on S3 buckets are encrypted with an authorized KMS key Implement an authorized default encryption key on each bucket and enable S3 Bucket Key (note: Amazon S3 evaluates and applies bucket policies before applying bucket default encryption settings) Block PutObject requests with unauthorized KMS key on each bucket (e.g. using an S3 bucket policy deny statement on PutObject if the condition if exists "s3:x-amz-server-side-encryption-aws-kms-key-id" is not an authorized KMS key) Maintain a list of buckets (or paths) required to be encrypted with server-side encryption with customer-provided keys (SSE-C) For buckets (or paths) requiring SSE-C, block PutObject requests with unauthorized encryption (e.g. using an S3 bucket policy deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES265" is not present)	Very High	4	2	-
Control CloudFront access Maintain a list of authorized CloudFront distribution (via origin access identity) and associated bucket Ensure only authorized CloudFront distributions are associated with their authorized bucket, and vice versa.	High	2	-	-
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - appropriate data	Low	1	-	-

Analytics *(subclass of Bucket, FC11)*

You can analyse storage access patterns to decide on 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

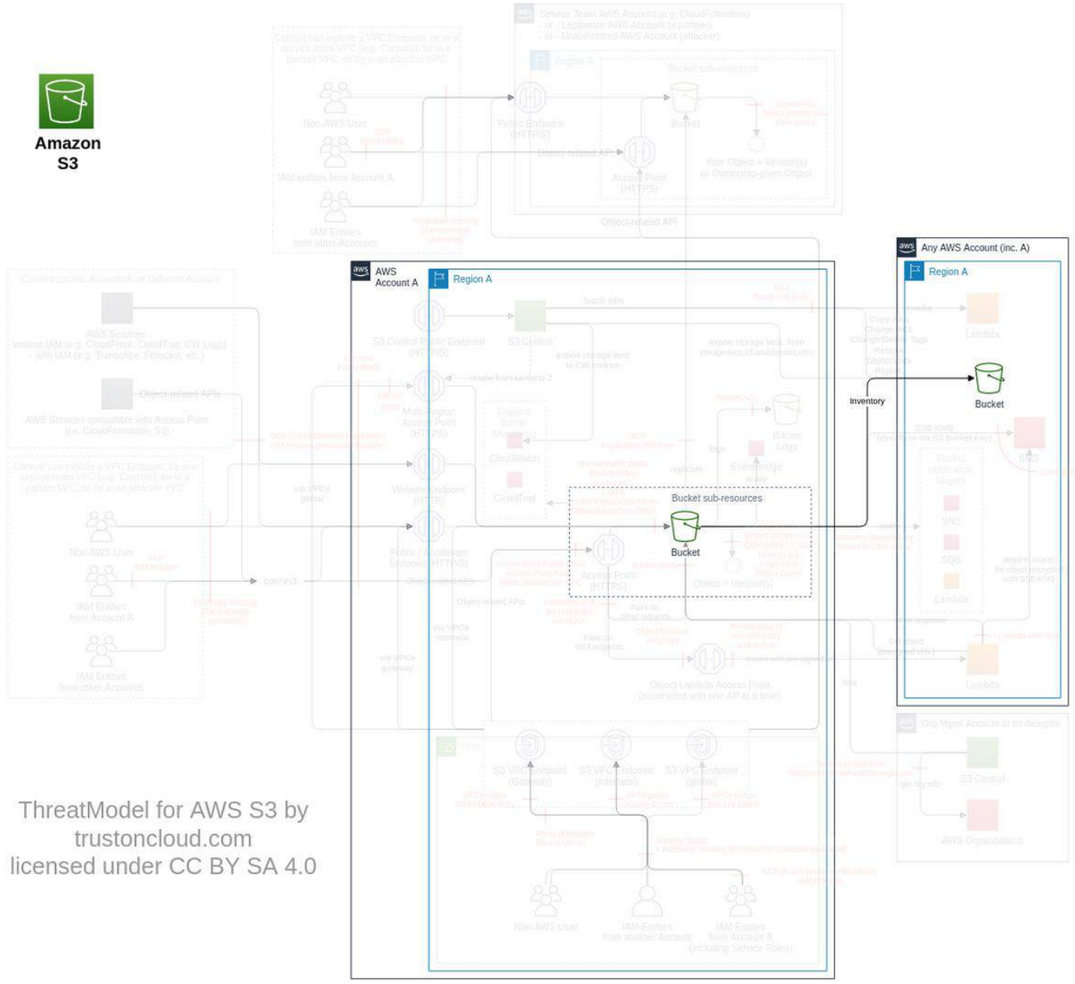
Threat List

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

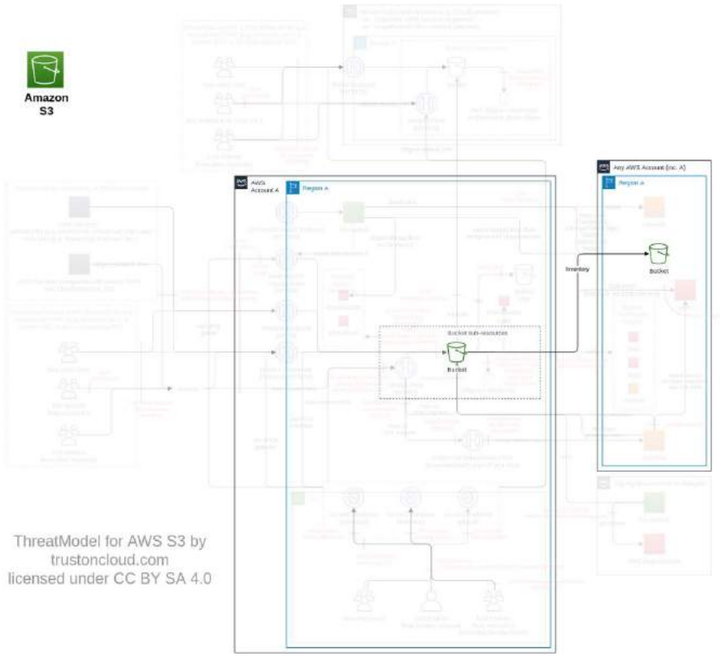
Action	IAM Permission
Adds an inventory configuration (identified by the inventory ID) to the bucket	s3:PutInventoryConfiguration

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. An attacker can use the name of objects (1KB) to exfiltrate data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Low (2.4)
IAM Access	{ "UNIQUE": "s3:PutBucketInventory" }

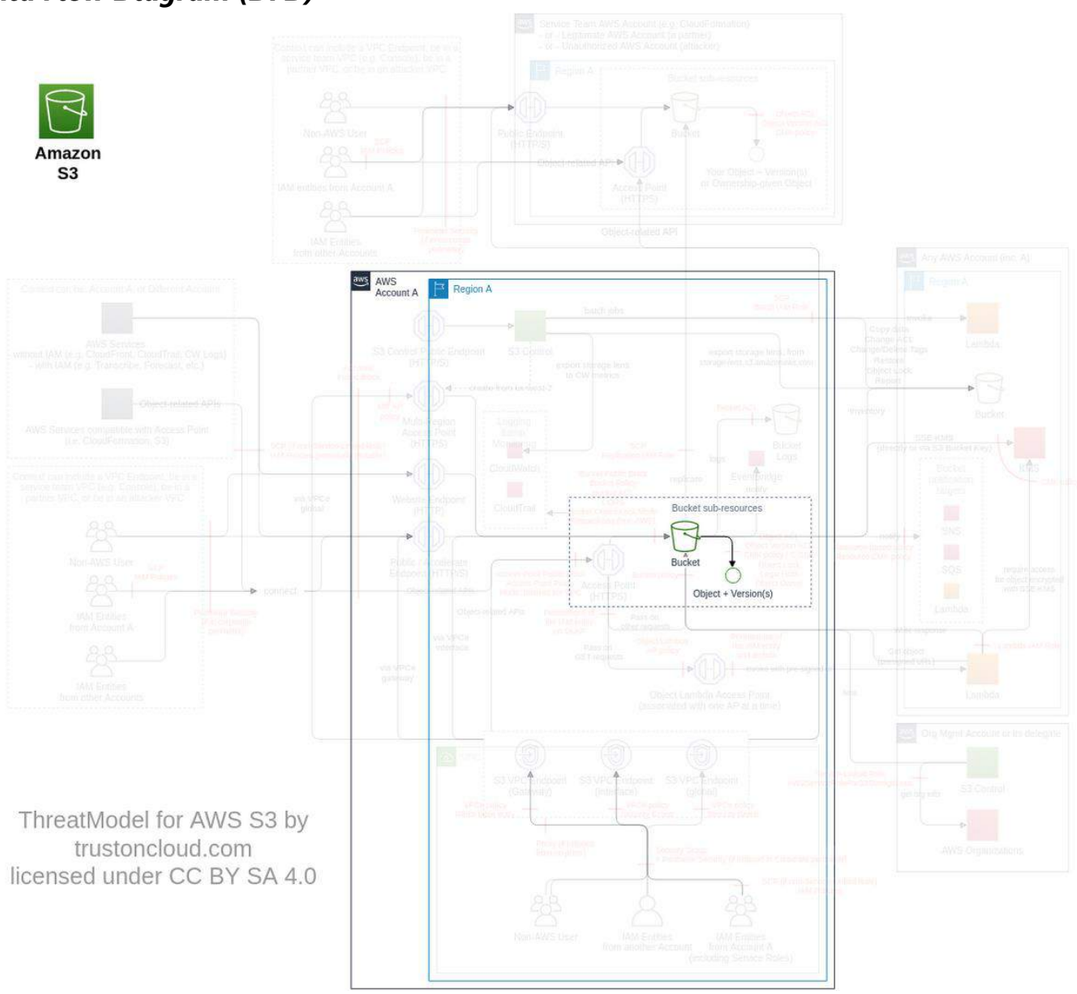


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce good coding practice Do not include sensitive data in bucket names, access point names, object names, object metadata and tags.	Medium	1	-	-
Control where the inventory is stored Maintain a list of authorized S3 buckets to receive S3 inventory of each bucket Ensure only authorized S3 buckets are configured to receive S3 inventory for each bucket	Medium	2	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Lifecycle *(subclass of Bucket, FC13)*

You can lifecycle your data to reduce the cost of storage (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

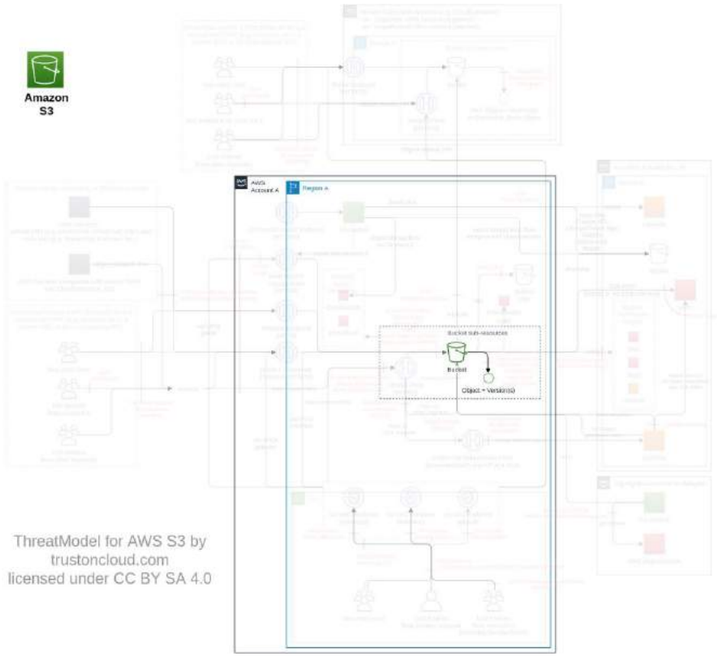
Action	IAM Permission
Creates a new lifecycle configuration for the bucket or replaces an existing lifecycle configuration.	s3:PutLifecycleConfiguration
Puts a S3 Intelligent-Tiering configuration to the specified bucket	s3:PutIntelligentTieringConfiguration

Threat List

Name	CVSS
Delete objects by using lifecycle	Medium (5.5)

Delete objects by using lifecycle

Threat Id	S3.T25
Name	Delete objects by using lifecycle
Description	Lifecycle allows you to delete objects after its configured expiry. An attacker can use a lifecycle configuration to destroy data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.5)
IAM Access	{ "UNIQUE": "s3:PutLifecycleConfiguration" }

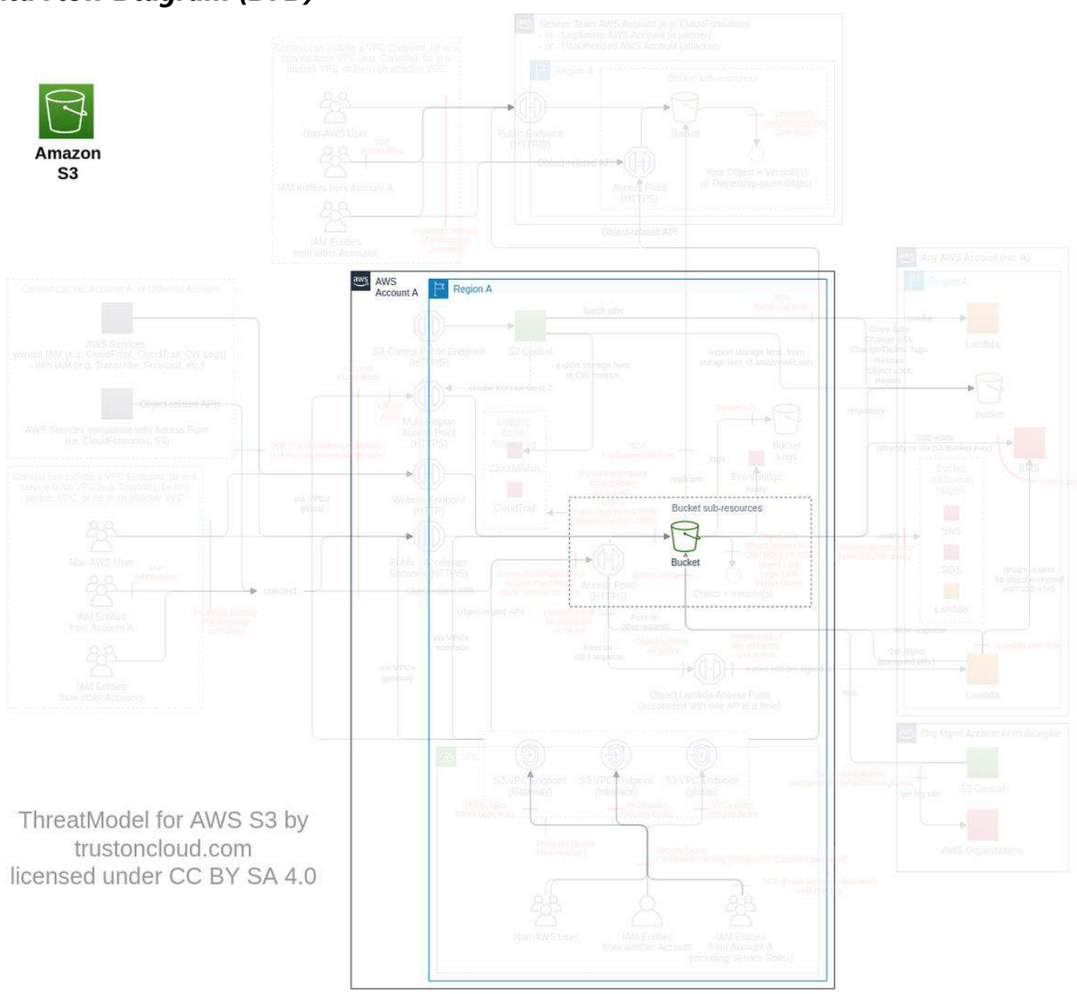


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Identify and ensure the protection all internal buckets hosting your objects Track all buckets you control, define their authorized data classification, identify whether the hosted data is primary (i.e. source of truth, for example logs, backups, forensic data, raw data, etc.) or an input/output of a process (e.g. file-processing, software package, etc.), their WORM requirements (e.g. SEC 17a-4, CTCC, etc.), if they are production/non-production (preferably done at account-level), their storage class. You may use tags, Infra-as-code, AWS Glue Data Catalog or external management tool like FINRA herd)	Very High	1	-	-
Use S3 Object Lock to protect data integrity Implement the authorized default S3 Object Lock on each bucket (note: Amazon S3 evaluates and applies bucket policies before applying bucket default S3 Object Lock settings)	Very High	-	1	-
Protect primary data against loss Backup primary data in a secure location under a different security authority (e.g. in an AWS data bunker account via replication)	High	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM 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)



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

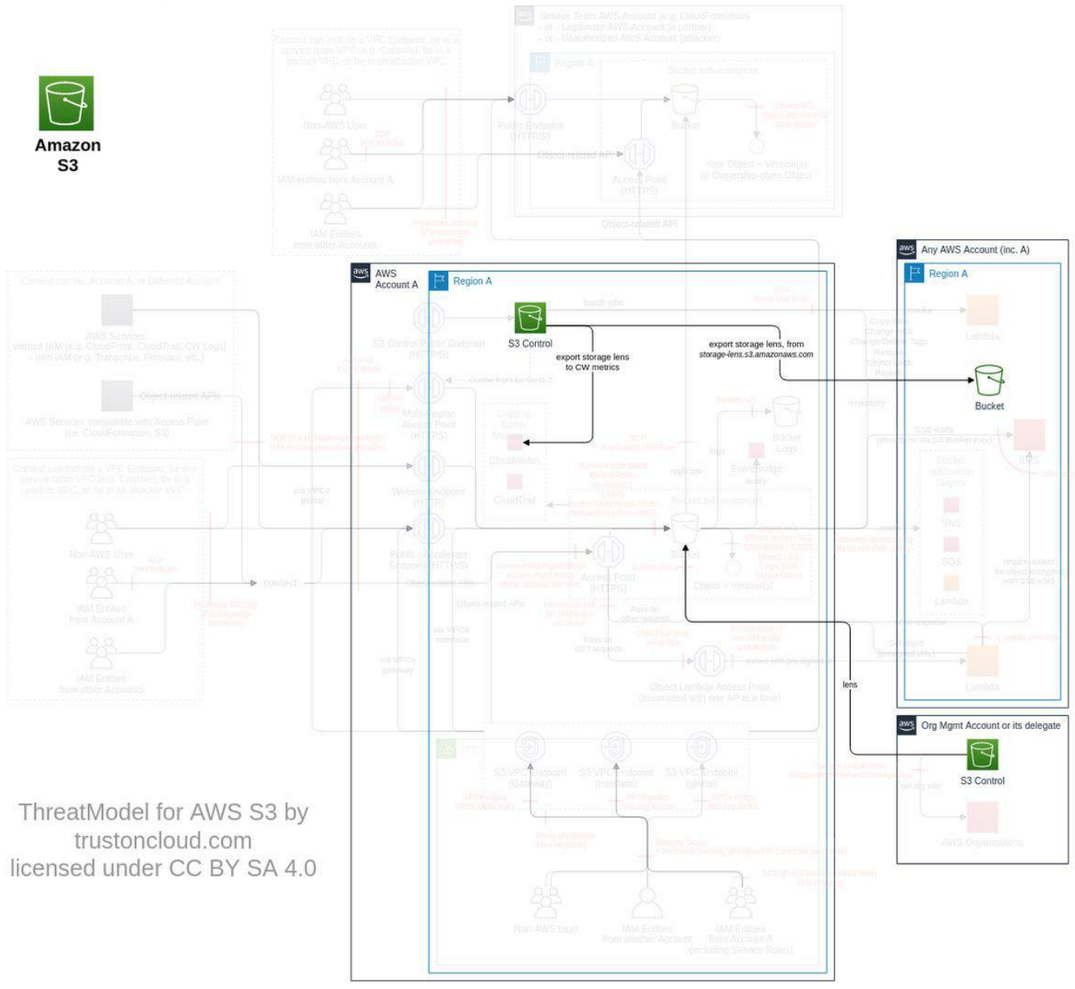
Threat List

Name	CVSS
None	None

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

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

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

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

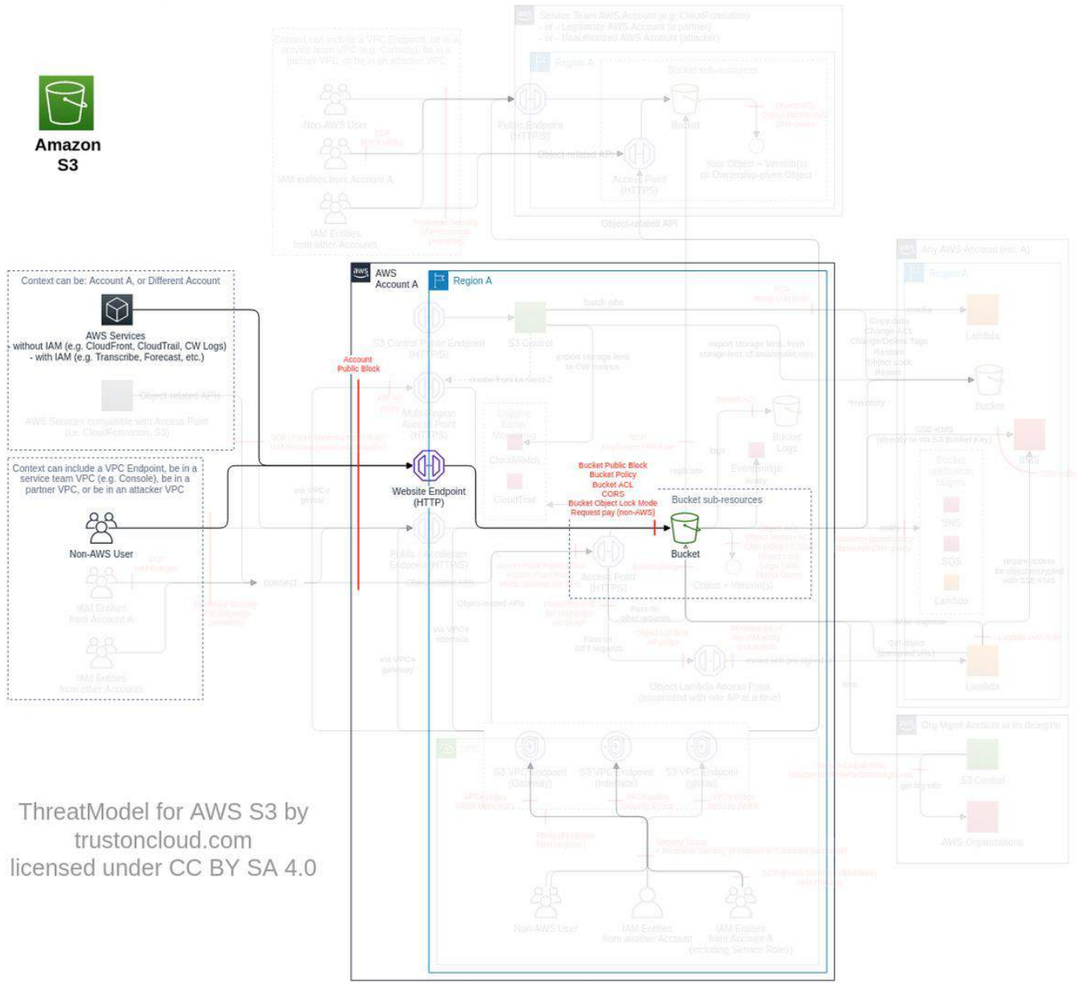
Threat List

Name	CVSS
None	None

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)



Actions and IAM Permissions to deny the feature

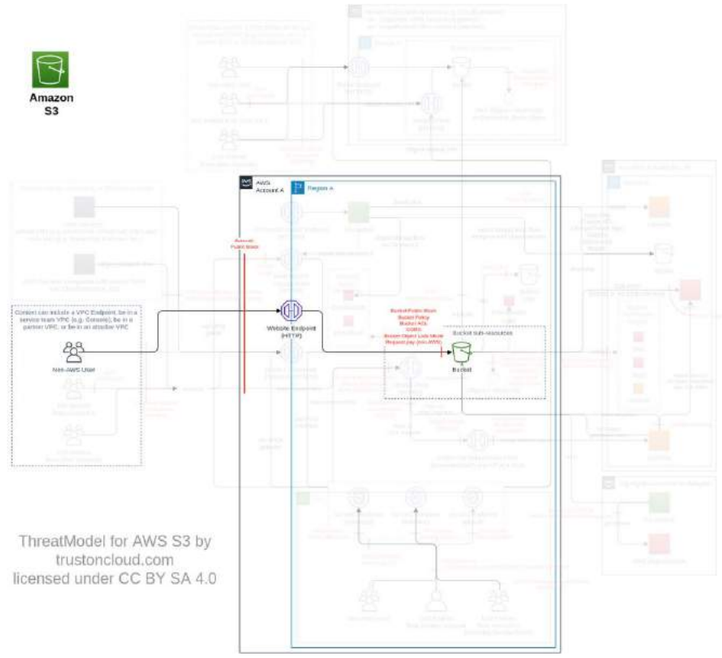
Action	IAM Permission
Sets the configuration of the website that is specified in the website subresource.	s3:PutBucketWebsite

Threat List

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

Embed client-side script malware in bucket website

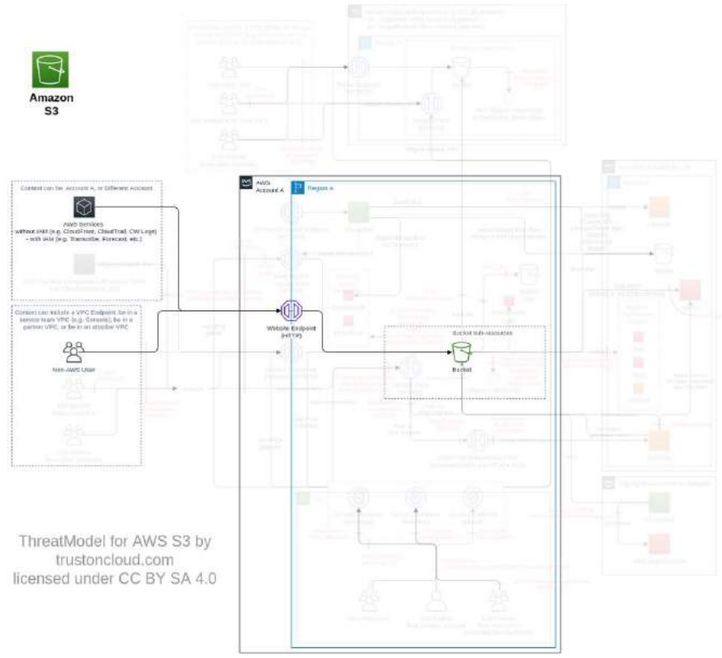
Threat Id	S3.T15
Name	Embed client-side script malware in bucket website
Description	S3 website enables users to be served client-side scripts (e.g. JavaScript). An attacker can upload a client-side script with a malware (e.g. cryptomining) on the visitor.
Goal	Direct Financial Gain
Mitre ATT&CK	TA0040
CVSS	Medium (5.5)
IAM Access	{ "UNIQUE": "s3:PutObject" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Identify and ensure the protection all external buckets hosting your objects Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel). 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	-	-
Scan input/output objects for malware If the bucket is used as an input or the output of a process, scan the objects for malware (e.g. using VirusScan or Trend Micro Cloud One)	Low	-	-	1

Clickjacking on S3 website

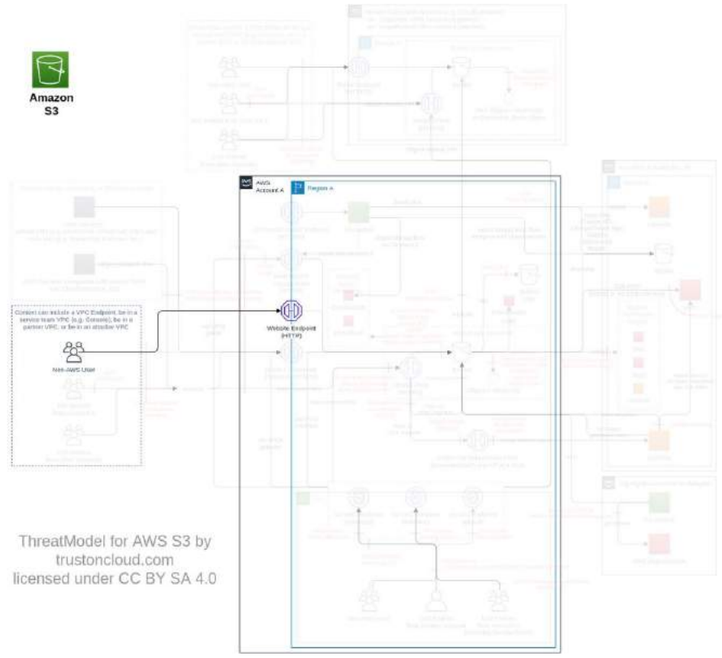
Threat Id	S3.T29
Name	Clickjacking on S3 website
Description	S3 does not enforce certain security headers by default. An attacker can use an iFrame on your website to trick users to interact with their own scripts.
Goal	Launch another attack
Mitre ATT&CK	TA0040
CVSS	Medium (4.2)
IAM Access	{}



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

Intercept data in transit on the website endpoint

Threat Id	S3.T13
Name	Intercept data in transit on the website endpoint
Description	S3 website endpoint is serving HTTP only. An attacker can intercept HTTP traffic to steal data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Low (3.1)
IAM Access	{}

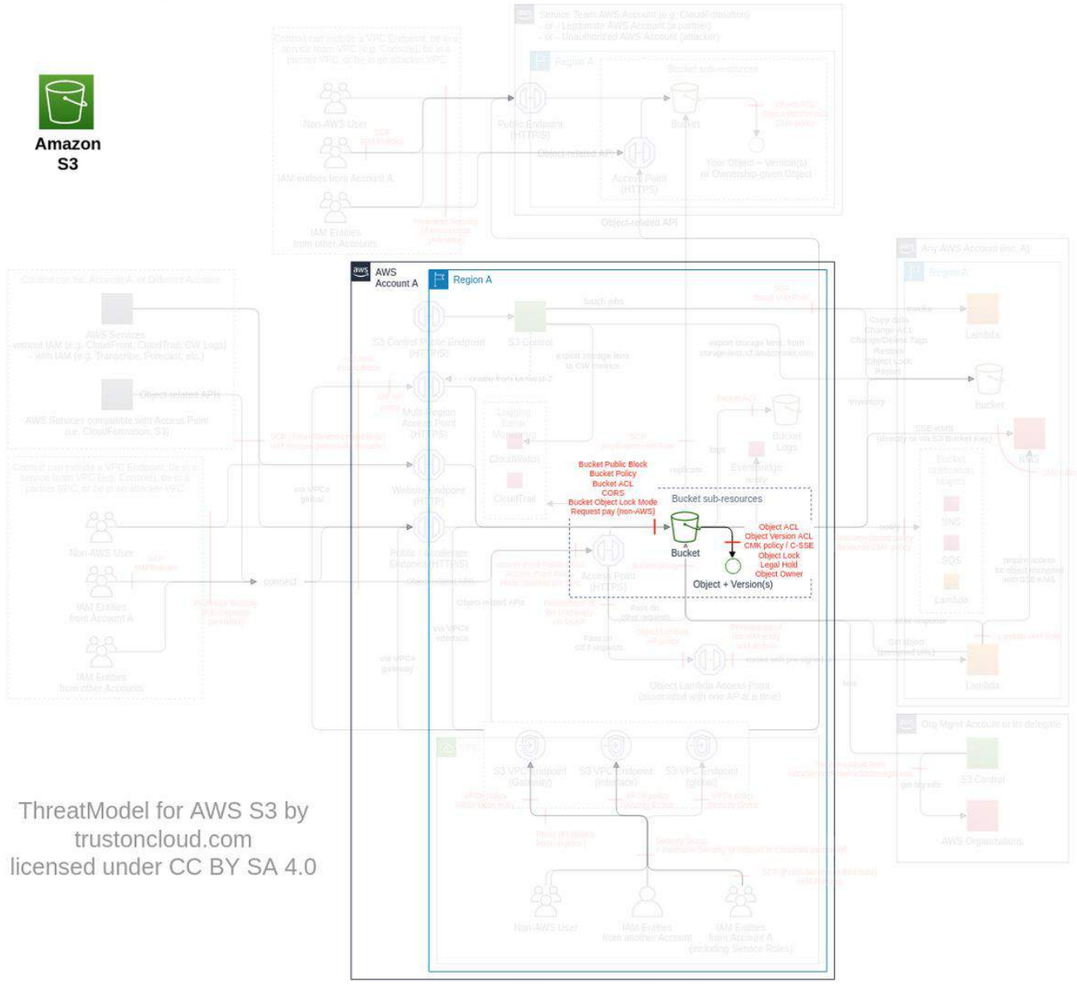


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block direct public access Front buckets required to be public, using authenticated CDN (e.g. CloudFront) or API Gateway, protected with WAF (e.g. for hotlinking)	Very High	1	-	-
Deploy only authorized S3 website and behind a CDN Maintain a list of authorized buckets to be configured as website Ensure only authorized buckets are configured as website Ensure S3 websites are protected with HTTP headers (ref) using a CDN (e.g. CloudFront)	High	3	-	-
Encrypt or tokenize critical data Aligned with your data governance, encrypt on the client side - or tokenize - 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 to place a default S3 Object Lock configuration at bucket creation (AWS Support needs to be contacted for existing buckets). It automatically enables versioning, even without the permission.	s3:PutObjectLockConfiguration
Puts object retention on a specific object	s3:PutObjectRetention

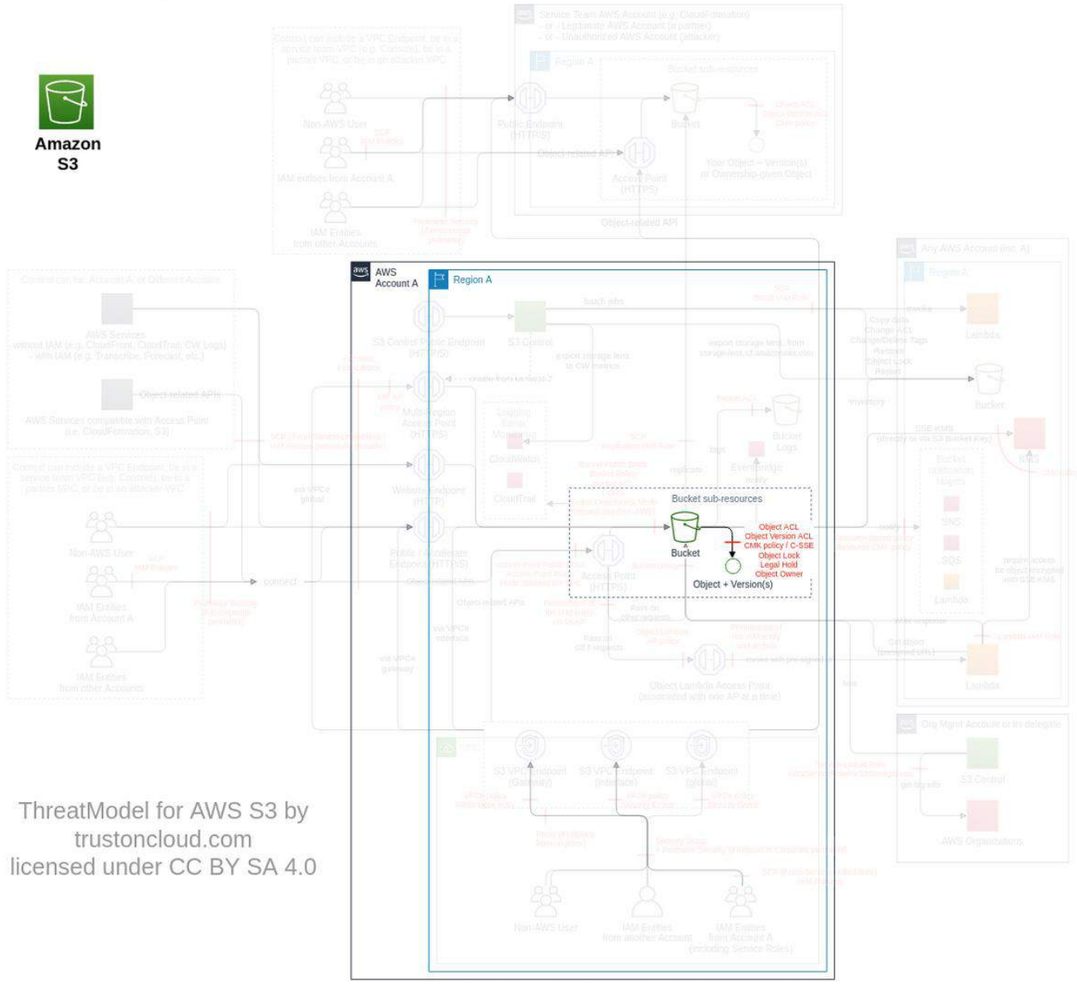
Threat List

Name	CVSS
None	None

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 from 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

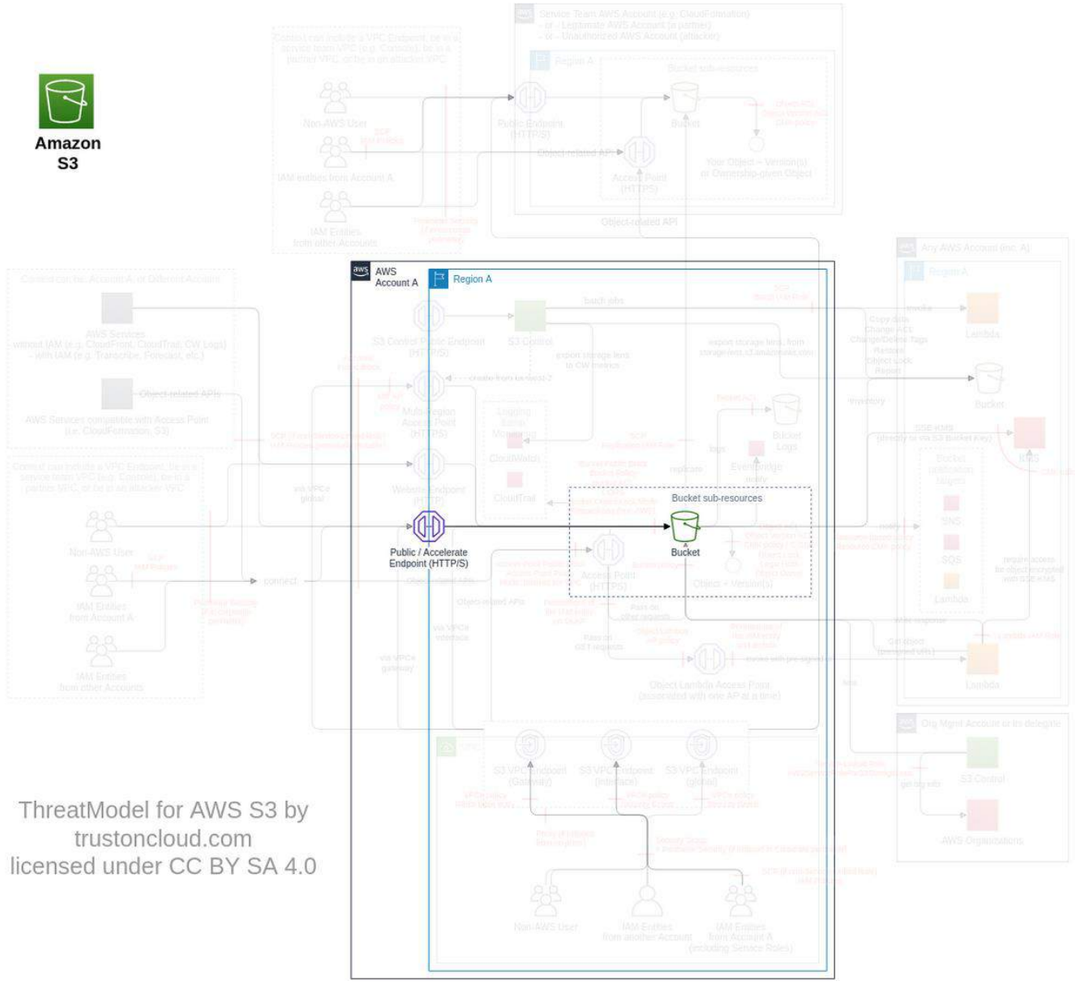
Threat List

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

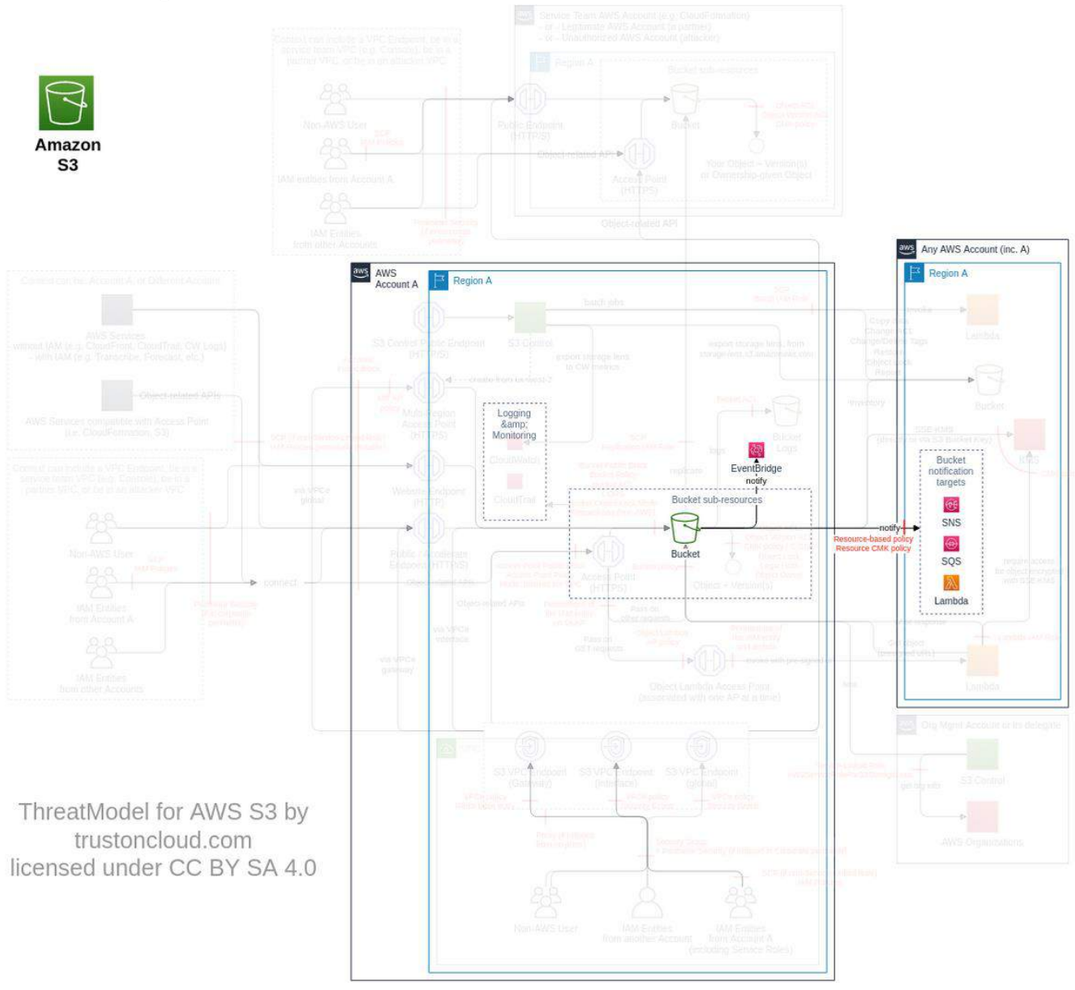
Threat List

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)



Actions and IAM Permissions to deny the feature

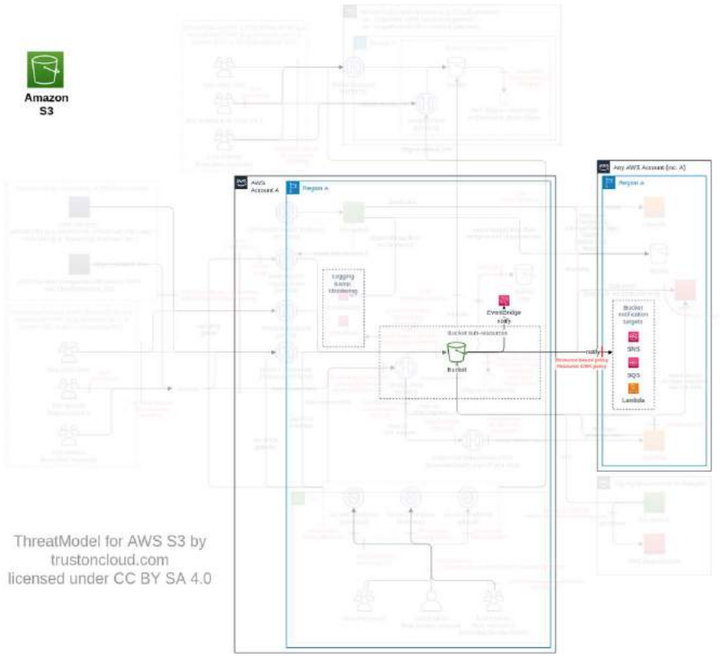
Action	IAM Permission
Enables you to receive notifications when certain events happen in your bucket.	s3:PutBucketNotification

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 (1KB) to exfiltrate data.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Low (2.4)
IAM Access	{ "UNIQUE": "s3:PutBucketNotification" }

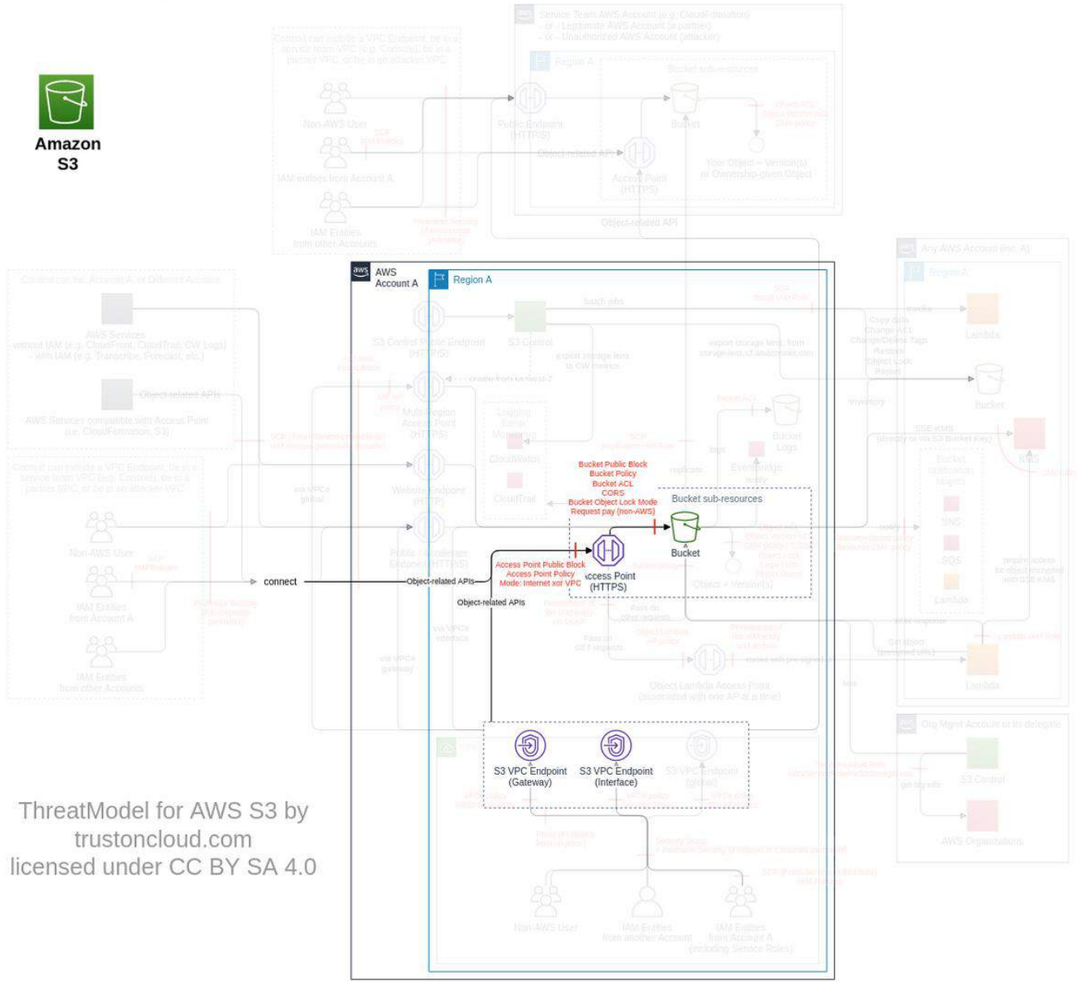


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Control event receivers Maintain a list of authorized notification receiver(s) (e.g. SNS Topic, Lambda, etc.) for each bucket. You might use a simpler approach by using authorized account ID(s) to ensure all your receivers are in authorized AWS account(s). Ensure only authorized notification receiver(s) (e.g. SNS Topic, Lambda, etc.) for each bucket are configured	High	2	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-
Enforce good coding practice Do not include sensitive data in bucket names, access point names, object names, object metadata and tags.	Low	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 (

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

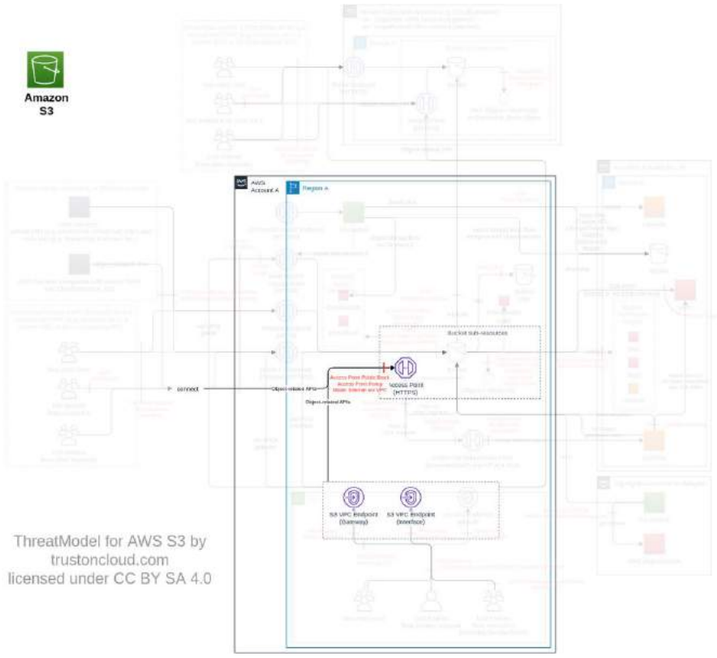
Action	IAM Permission
Creates a new access point.	s3:CreateAccessPoint

Threat List

Name	CVSS
Grant unauthorized access to a bucket by changing/deleting access point policy	Medium (6.8)
Unauthorized collection of data by swapping access point	Medium (4.6)

Grant unauthorized access to a bucket by changing/deleting access point policy

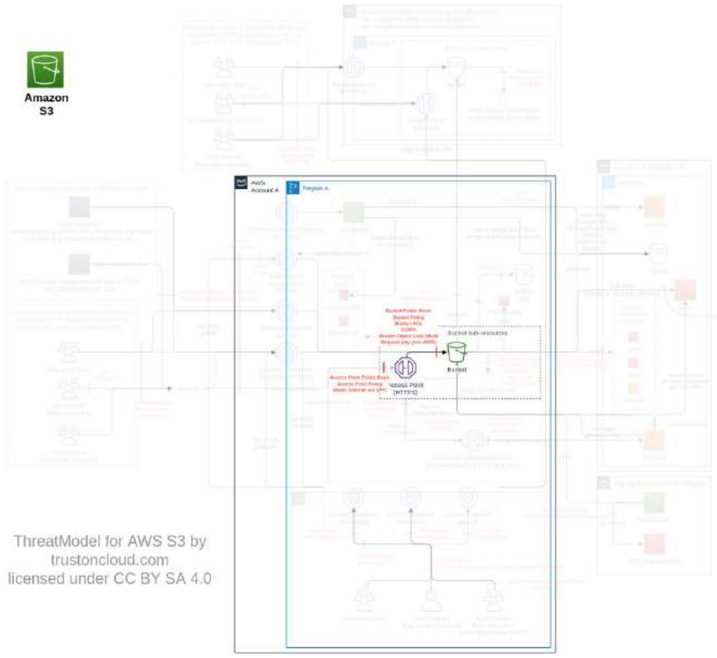
Threat Id	S3.T54
Name	Grant unauthorized access to a bucket by changing/deleting access point policy
Description	Access point policy can enable access to objects owned by the bucket. An attacker (or someone by negligence) can change the access point policy and make the content accessible.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (6.8)
IAM Access	{ "OR": ["s3:PutAccessPointPolicy", "s3:DeleteAccessPointPolicy"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block direct public access 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	-
Restrict access point access to VPC when in use Limit access via the S3 access point by using in VPC endpoint and/or bucket policy the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of allowlist bucket name in VPC endpoint/bucket policy.	Medium	-	1	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

Unauthorized collection of data by swapping access point

Threat Id	S3.T28
Name	Unauthorized collection of data by swapping access point
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, on a bucket (in the same account) it controls to collect/modify data; or making it accessible from the Internet.
Goal	Data theft
Mitre ATT&CK	TA0009
CVSS	Medium (4.6)
IAM Access	{ "AND": ["s3:CreateAccessPoint", "s3:DeleteAccessPoint"] }

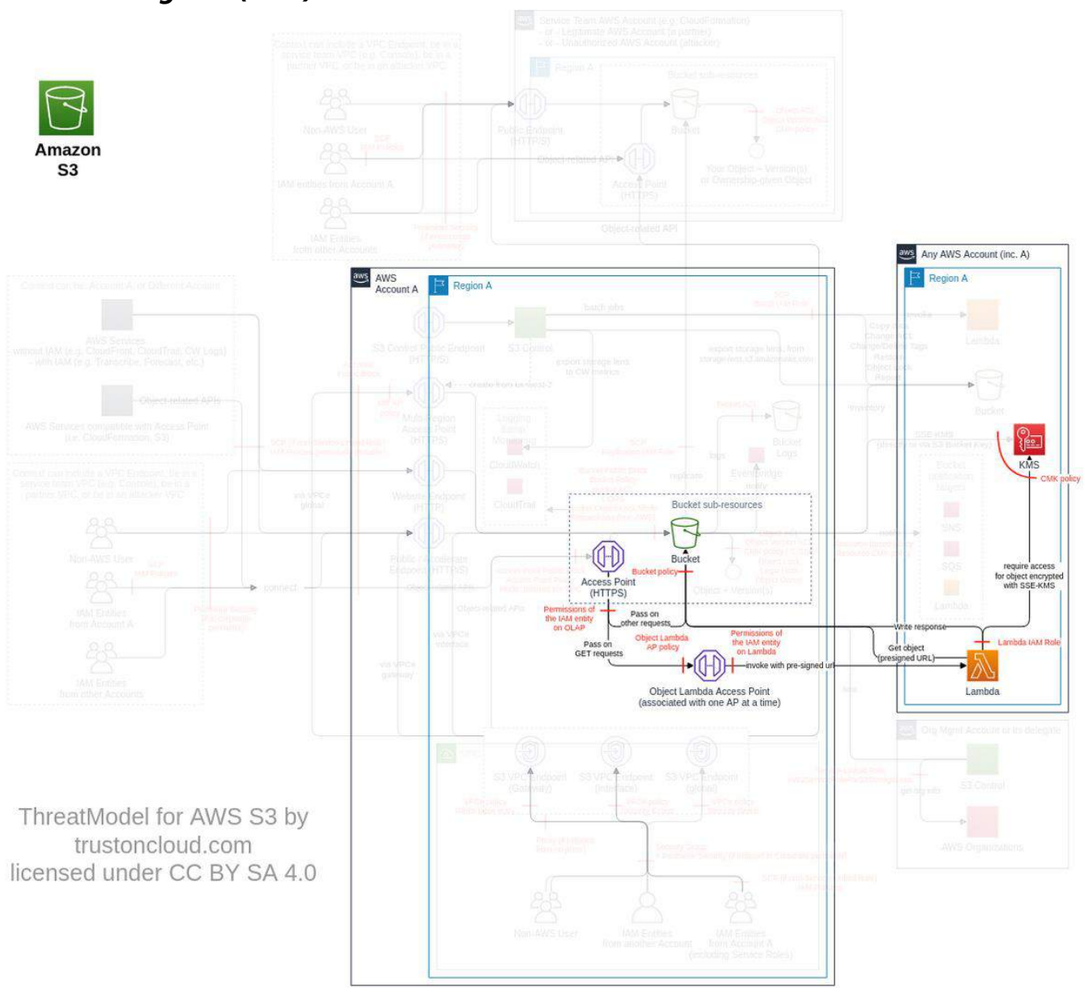


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Restrict access point access to VPC when in use Maintain a list of authorized access between VPC, S3 access point and S3. In S3 bucket policy, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" Block the creation "s3:CreateAccessPoint" of non-VPC S3 access point (e.g. using the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"}) Block all traffic from Internet-configured S3 access point (e.g. on the bucket policy, using a deny statement with the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"})	Very High	1	3	-
Block requests with KMS keys from unauthorized AWS account(s) Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts) Monitor that only authorized AWS accounts to provide KMS keys are used 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
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions.	Medium	1	-	-

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

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

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

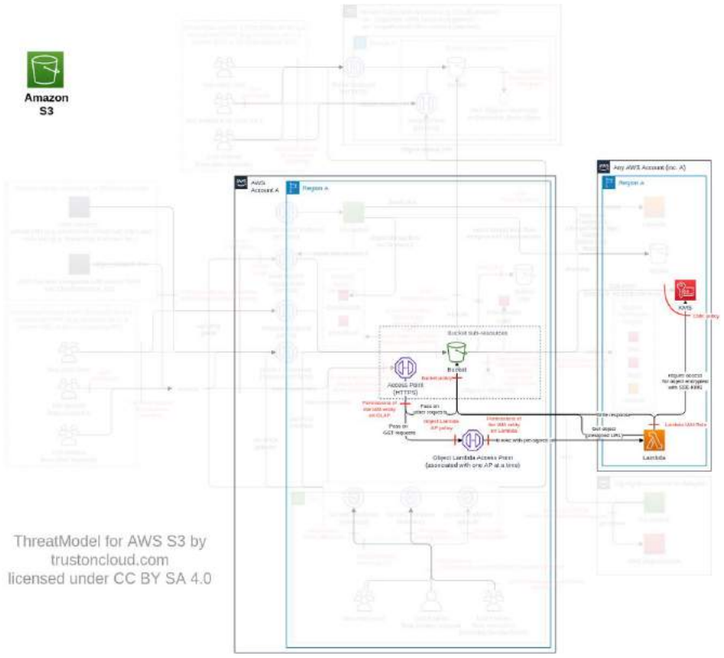
Action	IAM Permission
Creates an Object Lambda access point	s3:CreateAccessPointForObjectLambda
Grants permission to retrieve objects from Amazon S3	s3-object-lambda:GetObject
Grants permission to add an object to a bucket	s3-object-lambda:PutObject

Threat List

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

Hijack connection with an Object Lambda

Threat Id	S3.T46
Name	Hijack connection with an Object Lambda
Description	Object Lambda are 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
CVSS	Medium (5.7)
IAM Access	{ "OR": ["s3:CreateAccessPointForObjectLambda", "s3:PutAccessPointConfigurationForObjectLambda"] }

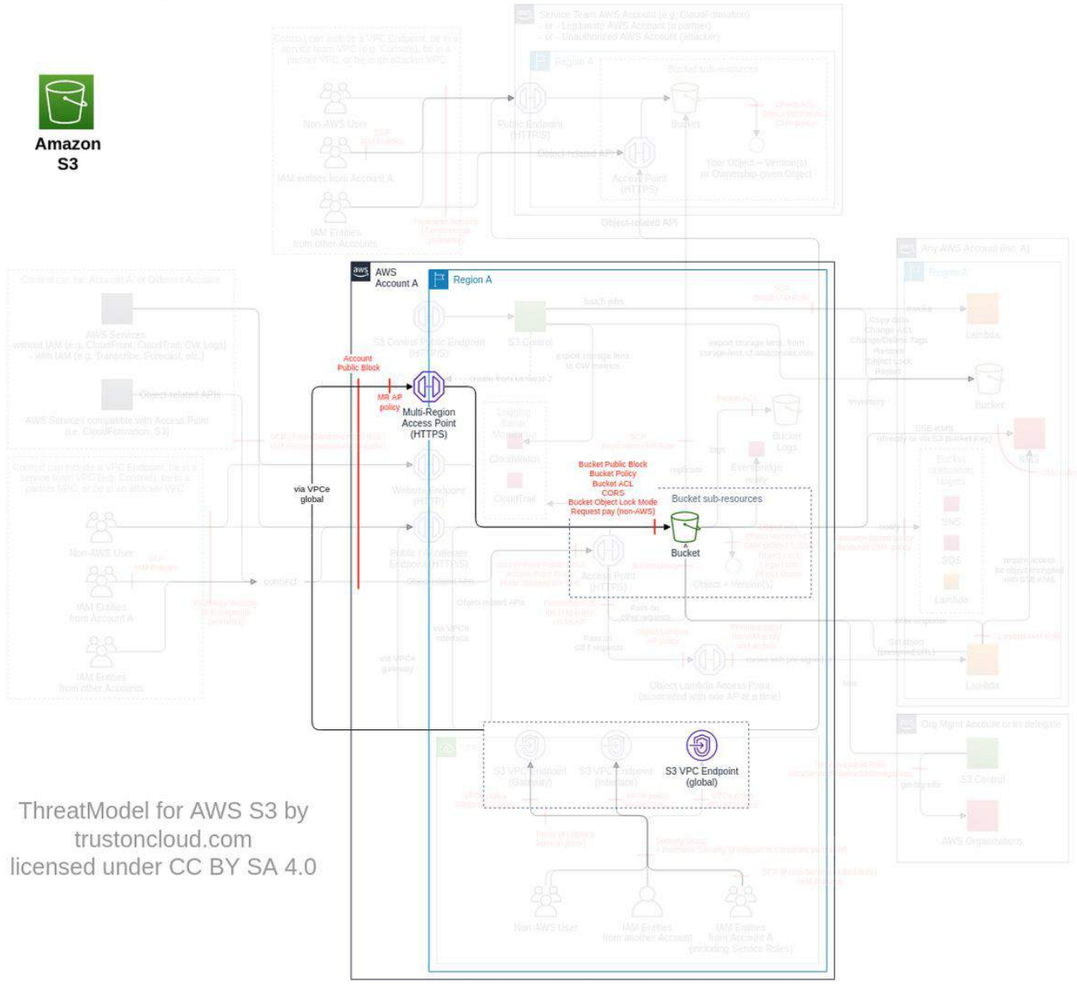


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce only authorized Object Lambda access point and associated access Maintain a list of authorized Lambda function for each Object Lambda access point, its associated access point, its associated GET request(s), and payload Ensure only authorized Lambda function for each Object Lambda access point, its associated access point, its associated GET request(s), and payload are created Ensure Lambda functions configured on Object Lambda access point are secured using Lambda ThreatModel Maintain a list of cross-account access on each Object Lambda access point Ensure only authorized cross-account IAM entities are allowed in the Object Lambda access point policy Ensure CloudWatch is enabled for all Object Lambda access points	Very High	6	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM should be used to provide permissions to a principal of the same AWS account.	Medium	2	-	-

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

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

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

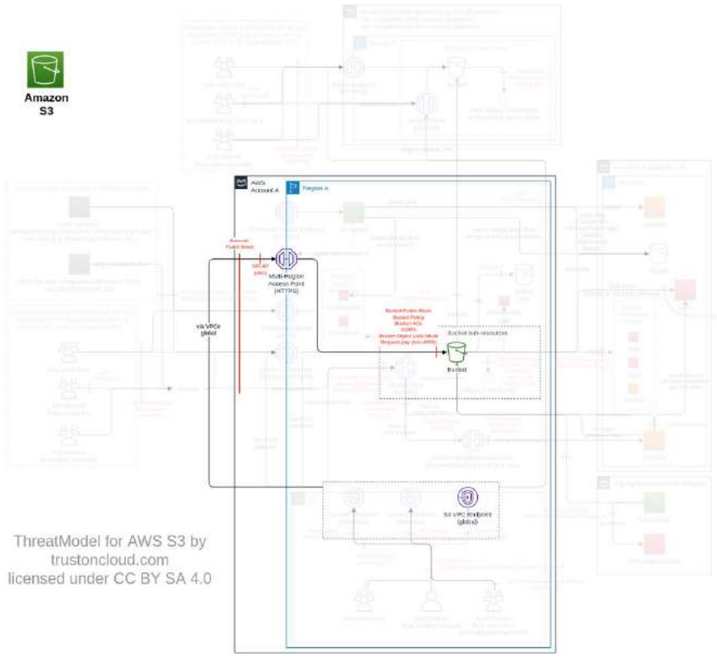
Action	IAM Permission
Creates a Multi-Region Access Point and associates it with the specified buckets.	s3:CreateMultiRegionAccessPoint

Threat List

Name	CVSS
Grant unauthorized access to buckets by changing the Multi-Region Access Point policy	Medium (6.8)
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

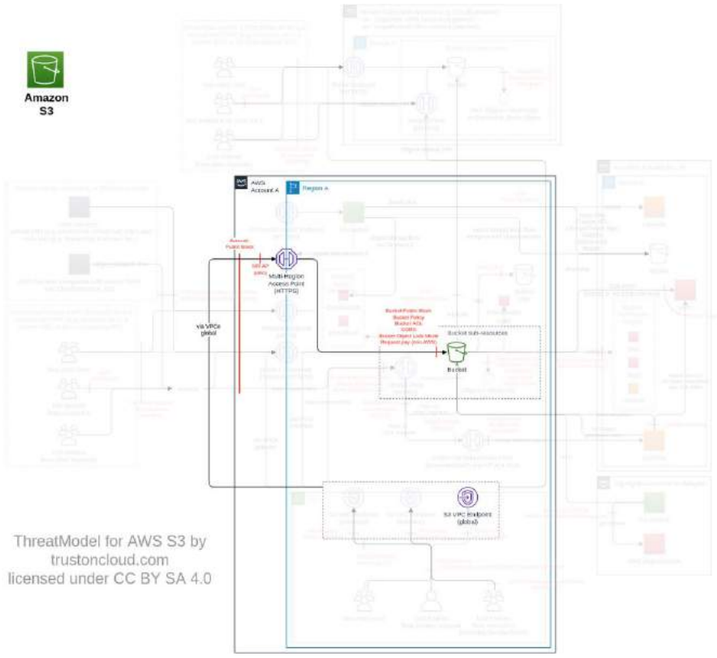
Threat Id	S3.T55
Name	Grant unauthorized access to buckets by changing the Multi-Region Access Point policy
Description	Multi-Region Access Point policy can enable access to objects owned by the bucket. An attacker (or someone by negligence) can change the Multi-Region Access Point policy and make the content accessible.
Goal	Launch another attack
Mitre ATT&CK	TA0008
CVSS	Medium (6.8)
IAM Access	{ "UNIQUE": "s3:PutMultiRegionAccessPointPolicy" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Block direct public access 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	-
Restrict access point access to VPC when in use Limit access via the S3 access point by using in VPC endpoint and/or bucket policy the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of allowlist bucket name in VPC endpoint/bucket policy. In S3 bucket policy, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn"	Medium	-	2	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions. In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM 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 a MRAP, add any misconfigured bucket and gain access to it.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Medium (5.7)
IAM Access	{ "AND": ["s3:CreateMultiRegionAccessPoint", "s3:PutMultiRegionAccessPointPolicy"] }

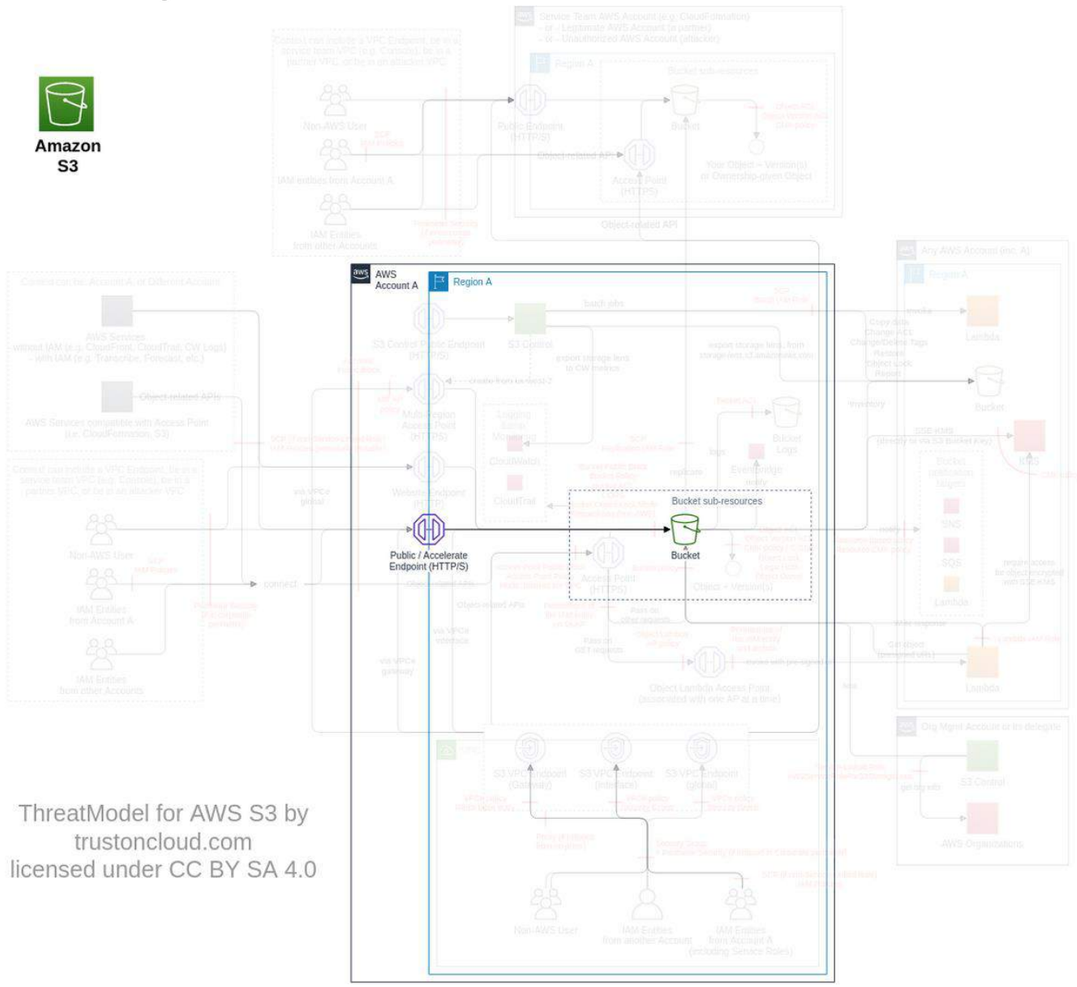


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Restrict access point access to VPC when in use In S3 bucket policy, deny all IAM principals not using an authorized S3 access point(s) using the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn"	Very High	-	1	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions.	Medium	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 usage 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

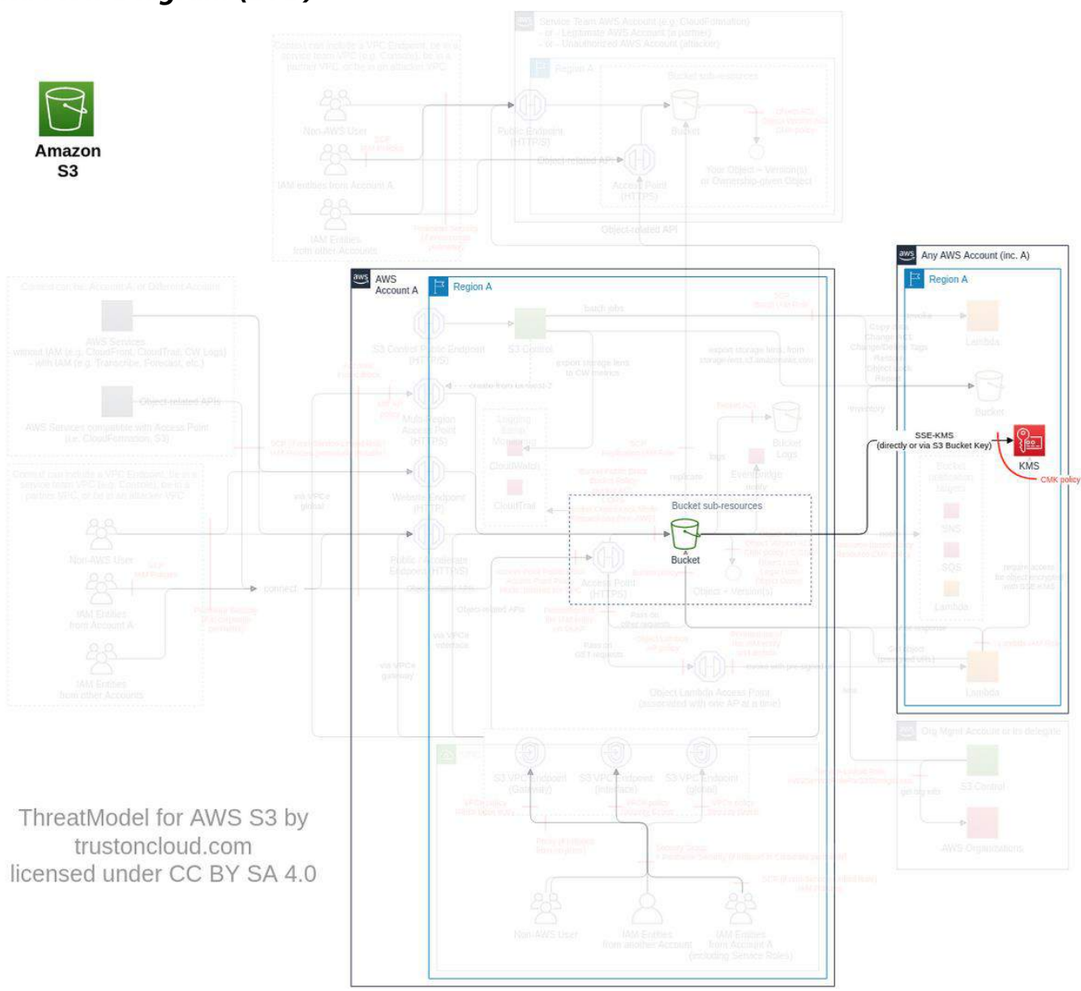
Threat List

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 they are 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

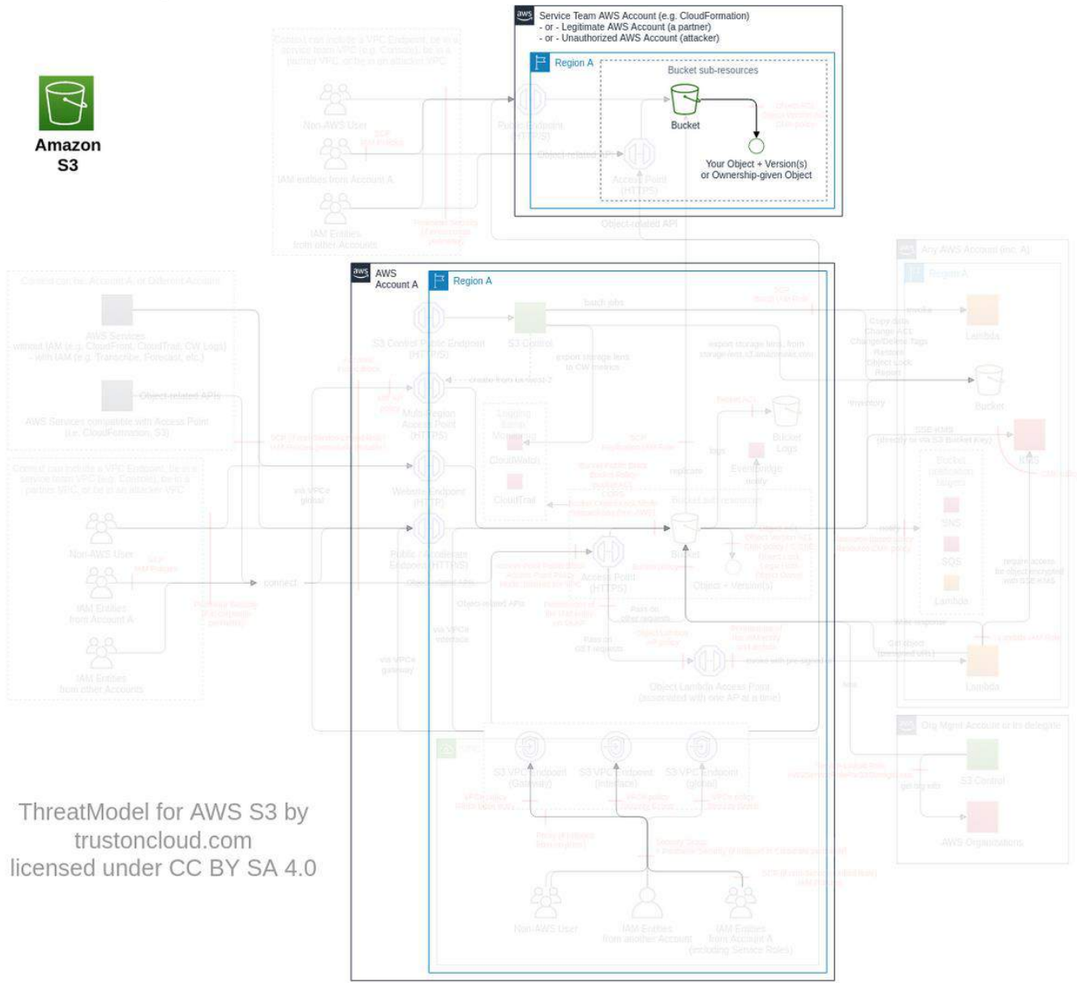
Threat List

Name	CVSS
None	None

S3 Object Ownership *(subclass of Bucket, used by Object upload/download, FC30)*

Enables bucket owners to automatically assume ownership of objects that are uploaded to their buckets by other AWS accounts. When the 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, the ownership is kept by object owner (ref).

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

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

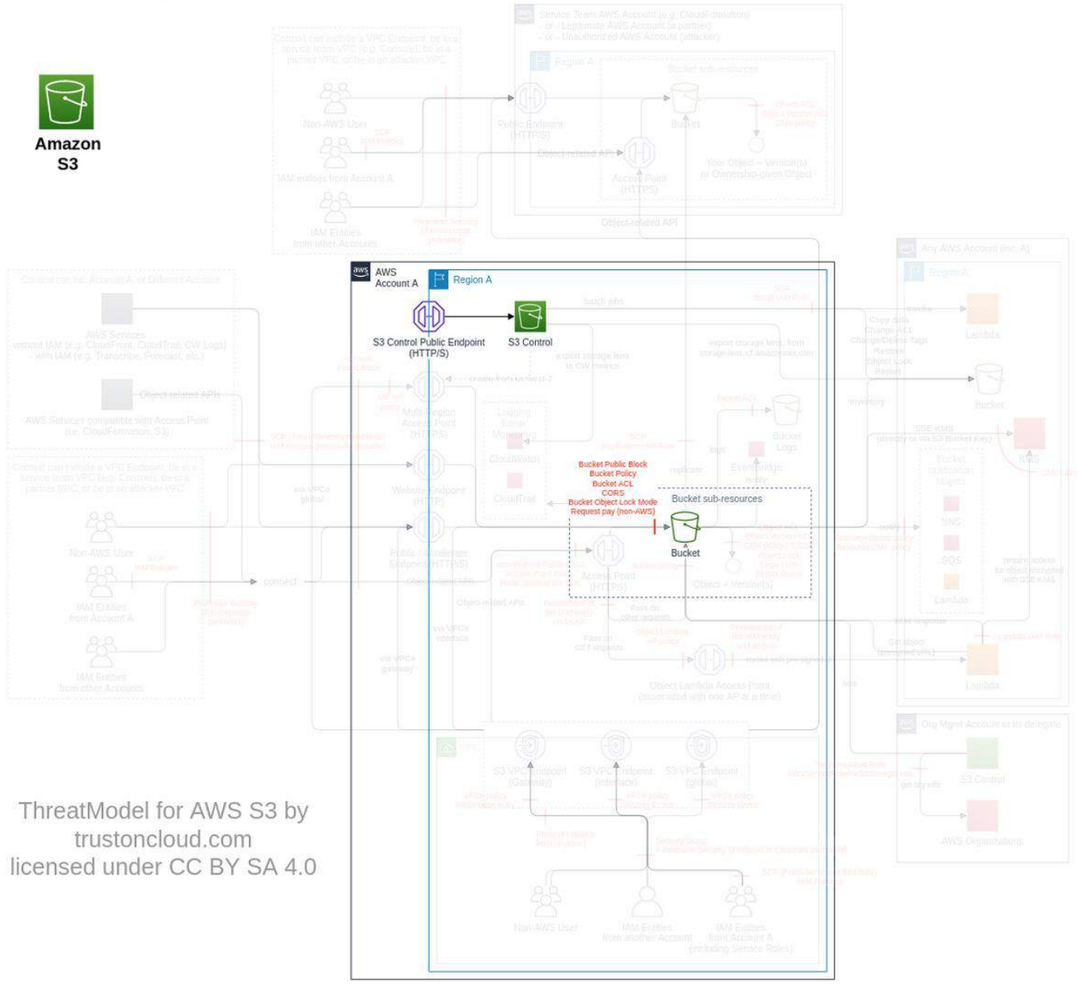
Threat List

Name	CVSS
None	None

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

S3 Block Public Access (bucket) provides controls across 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

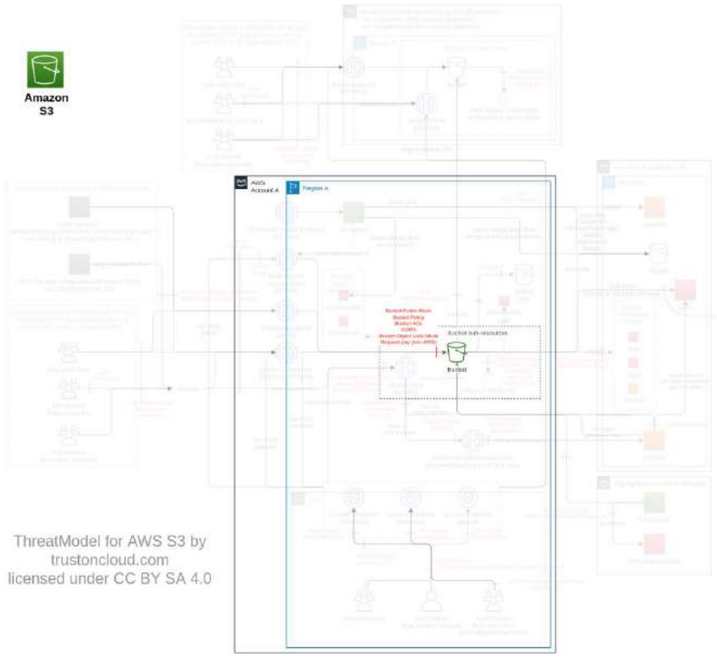
Action	IAM Permission
Creates or modifies the PublicAccessBlock configuration for an Amazon S3 bucket.	s3:PutBucketPublicAccessBlock

Threat List

Name	CVSS
Reduce bucket security by modify the bucket public access block	Medium (4.9)

Reduce bucket security by modify the bucket public access block

Threat Id	S3.T52
Name	Reduce bucket security by modify the bucket public access block
Description	Bucket public access block protect 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	TA0008
CVSS	Medium (4.9)
IAM Access	{ "UNIQUE": "s3:PutBucketPublicAccessBlock" }

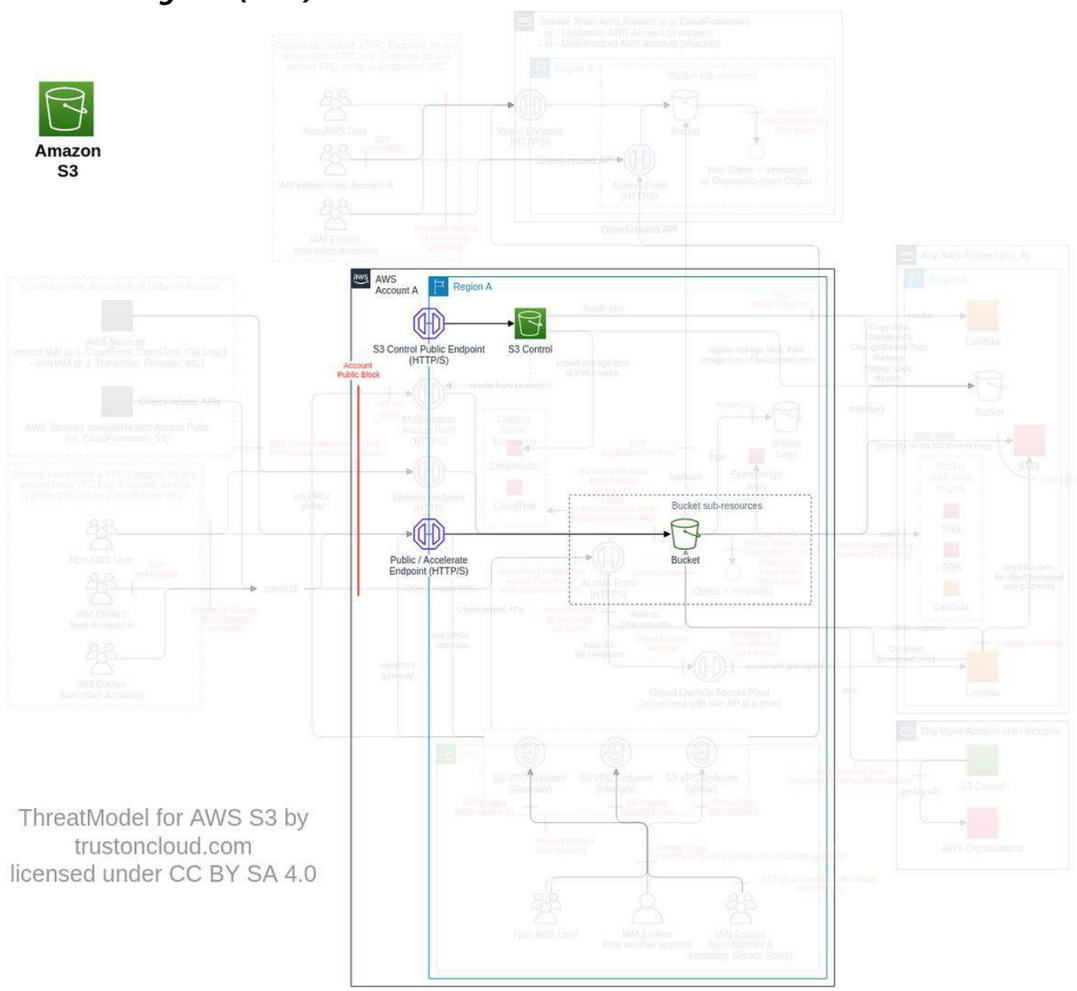


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Disabling ACLs for all buckets Ensure bucket ACL and object ACL are disabled on each bucket Prevent the creation of buckets with ACL enabled (e.g. by using a SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note it does not block someone to enable ACL afterwards via PutPutBucketOwnershipControls.	Very High	1	1	-
Monitor S3 with Amazon GuardDuty and Macie Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using GuardDuty ThreatModel. Ensure findings are investigated (e.g. using Amazon Detective).	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage 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)



Actions and IAM Permissions to deny the feature

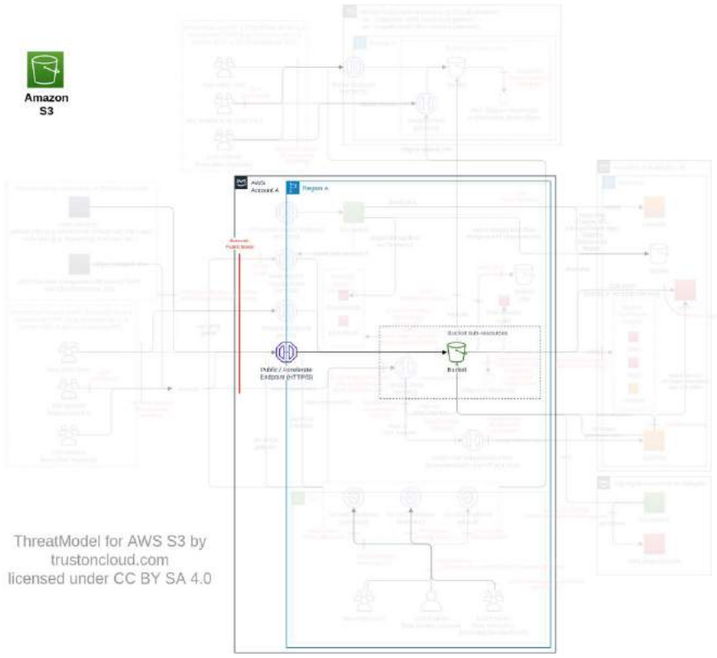
Action	IAM Permission
Creates or modifies the PublicAccessBlock configuration for an AWS account.	s3:PutAccountPublicAccessBlock

Threat List

Name	CVSS
Reduce bucket security by modify the account public access block	Medium (4.9)

Reduce bucket security by modify the account public access block

Threat Id	S3.T53
Name	Reduce bucket security by modify the account public access block
Description	Account public access block protect 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 public access block.
Goal	Launch another attack
Mitre ATT&CK	TA0008
CVSS	Medium (4.9)
IAM Access	{ "UNIQUE": "s3:PutAccountPublicAccessBlock" }

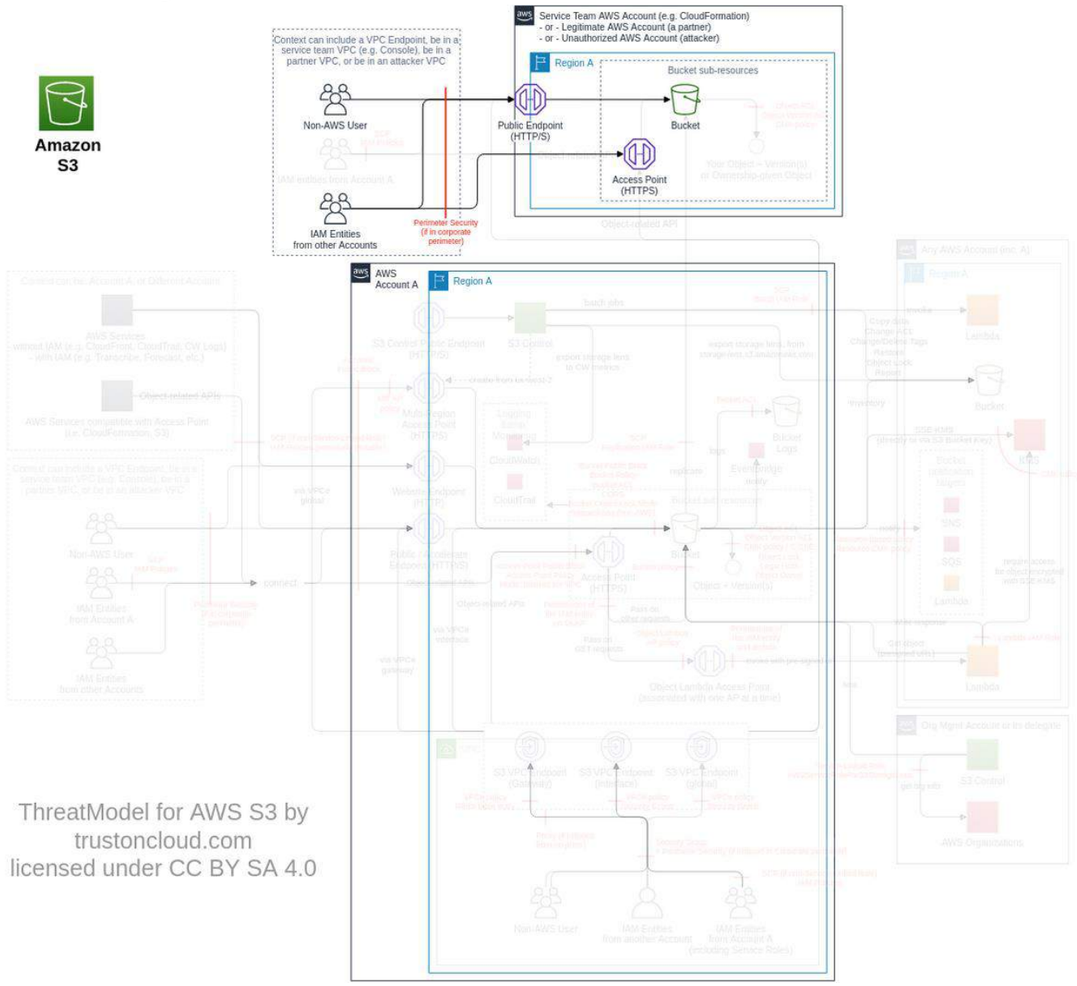


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Disabling ACLs for all buckets Ensure bucket ACL and object ACL are disabled on each bucket Prevent the creation of buckets with ACL enabled (e.g. by using a SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note it does not block someone to enable ACL afterwards via PutPutBucketOwnershipControls.	Very High	1	1	-
Monitor S3 with Amazon GuardDuty and Macie Enable and monitor S3 protection in Amazon GuardDuty in all AWS accounts in all Regions, and protect it using GuardDuty ThreatModel. Ensure findings are investigated (e.g. using Amazon Detective).	Medium	1	-	-
Limit the access to the IAM actions required to execute the threats 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 usage of non-object-related S3 actions.	Medium	1	-	-

Other uses *(class, FC28)*

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

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

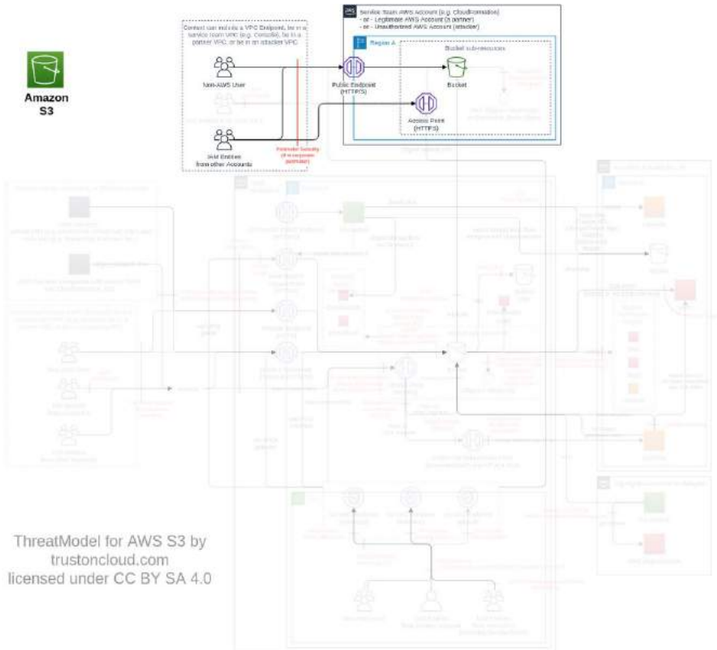
Action	IAM Permission
None	None

Threat List

Name	CVSS
Exfiltrate data by using the public endpoint to upload data in an attacker bucket, using external credentials	Medium (6.2)
Recon on information about a bucket	Medium (4.3)
Phishing using trademarks	Low (3.1)
Recon of AWS root account emails using email ACL grantee feature	Low (2.0)
Recon on valid AWS account or IAM principals	Low (2.0)

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

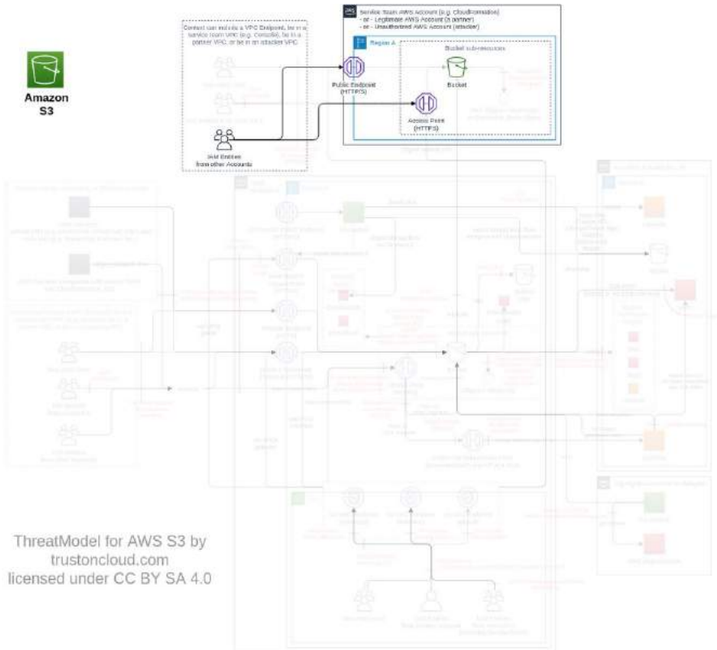
Threat Id	S3.T10
Name	Exfiltrate data by using the public endpoint to upload data in an attacker bucket, using external credentials
Description	AWS authenticates per AWS account. An attacker can bring its own credentials to exfiltrate data to external S3 buckets through the S3 public endpoint. It can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



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

Recon on information about a bucket

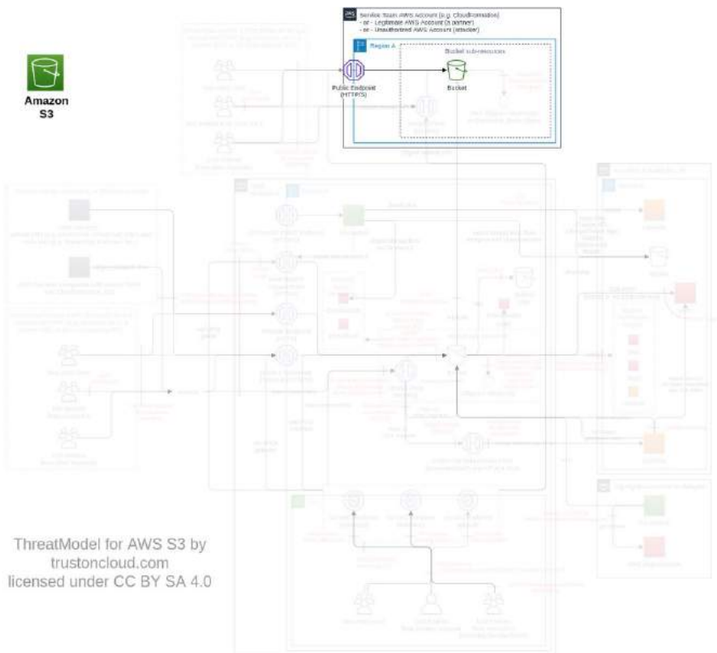
Threat Id	S3.T32
Name	Recon on information about a bucket
Description	Error messages can give some information about specific buckets. An attacker who knows the bucket name can find its AWS account and AWS Region. To find the AWS Region, use "aws s3 presign bucket-name/whatever" the error message will give you the region if not in the right region. To find the account, look at the call in CloudTrail (with S3 data enabled) under the resource section.
Goal	Launch another attack
Mitre ATT&CK	TA0010
CVSS	Medium (4.3)
IAM Access	{}



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
None				

Phishing using trademarks

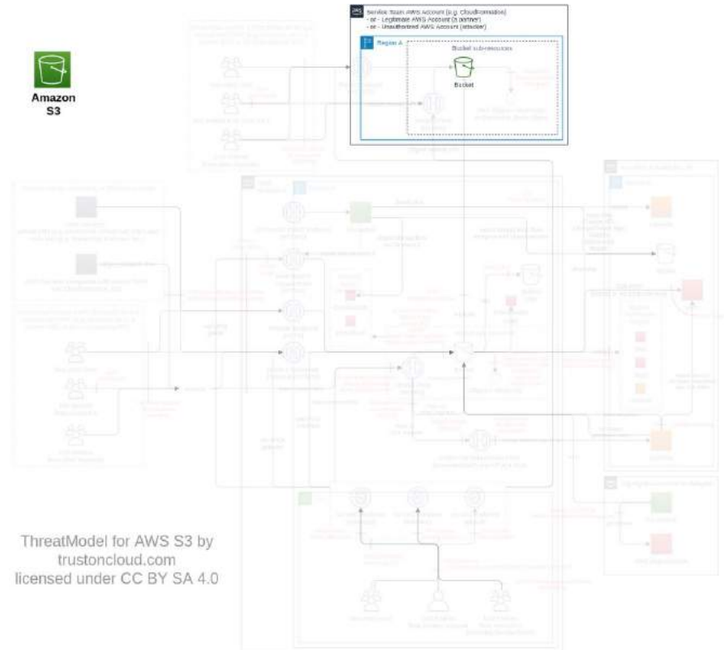
Threat Id	S3.T23
Name	Phishing using trademarks
Description	S3 provides URLs to buckets using the bucket name (i.e. "*mybucket*.s3.amazonaws.com"). An attacker can create a bucket with the name of your trademark to phish users.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Low (3.1)
IAM Access	{}



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

Recon of AWS root account emails using email ACL grantee feature

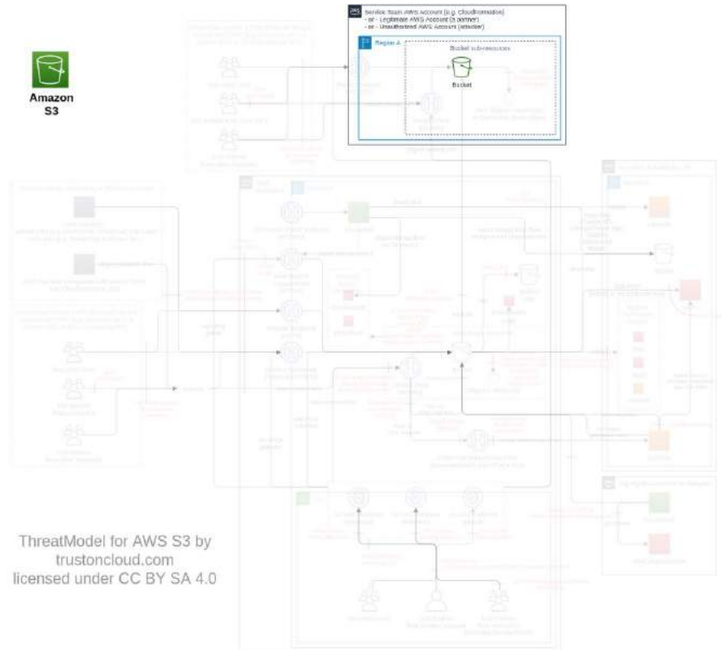
Threat Id	S3.T19
Name	Recon of AWS root account emails using email ACL grantee feature
Description	S3 allows you to add root account emails in ACL (ref), and as well resolve the given canonical ID into an AWS account ID (via a bucket policy, which automatically resolves a canonical ID into an ARN). An attacker can do trial-and-error to discover existing AWS root account emails and related AWS account ID (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	TA0007
CVSS	Low (2.0)
IAM Access	{}



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

Recon on valid AWS account or IAM principals

Threat Id	S3.T24
Name	Recon on valid AWS account or IAM principals
Description	AWS provides error messages in S3 bucket policy that can be used for basic recon. An attacker can discover whether an AWS account with a specific AWS account ID or AWS IAM principals exists, by modifying the S3 policy to grant some rights to the said AWS account/IAM principal.
Goal	Data theft
Mitre ATT&CK	TA0010
CVSS	Low (2.0)
IAM Access	{}



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

Control Implementation

Enforce encryption-in-transit

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 request 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 version(s) from IAM entities you control (e.g. an SCP on your AWS Organizations 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 VPC with 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 that 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 VPC 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 policy denying all requests with the condition "aws:SecureTransport" = False	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 S3 bucket 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 S3 bucket policy)	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 version(s) of TLS.	Remove the statement on a S3 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)	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.T12 (Very Low)	High

Block S3 endpoints in your corporate perimeter security

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 cloud interception proxy like Kivera) including via Internet Gateway, to force usage of VPC endpoints. It will block data-plane transfer. Note: AWS 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.FC28 S3.FC5 S3.FC7	S3.T7 (High) S3.T10 (High) S3.T12 (Low) S3.T18 (Medium) S3.T34 (Very High)	High

Enable CloudTrail S3 data events

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Detect (NIST CSF)	[S3.C9] Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). 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

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 GuardDuty ThreatModel. Ensure findings are investigated (e.g. using Amazon Detective).	Request the GuardDuty ThreatModel and the evidence of its application for enabling, monitoring, investigation and protecting S3 protection	Low	S3.FC1 S3.FC24 S3.FC25 S3.FC5 S3.FC8	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 it using Macie ThreatModel	Request the Macie ThreatModel and the evidence of its application for enabling and protecting S3 policy findings	Very Low	S3.FC10 S3.FC15 S3.FC5 S3.FC8	S3.T2 (Medium) S3.T4 (Medium) S3.T22 (Medium) S3.T36 (Medium) S3.T37 (Medium) S3.T38 (Medium)	High

Identify and ensure the protection all external buckets hosting your objects

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 hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel).	Request the list of all authorized 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.FC16 S3.FC5	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)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C12, depends on S3.C11] Allow only authorized ACL on objects for bucket 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 are scanned for proper data classification before upload to an external bucket are configured, 2) its records of execution for all object upload flows, and 3) plan to move any older object upload flows	High	S3.FC1 S3.FC16 S3.FC5	S3.T5 (High) S3.T14 (High) S3.T15 (Medium)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C15] Request access via S3 access point on bucket you don't own, if compatible with your interaction with the bucket (e.g. not through not-compatible AWS service)	Request the documented reason 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 bucket 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	Make a request to an external bucket with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover requirement, it should be denied.	High	S3.FC1	S3.T43 (Very High)	Medium

	on the condition "StringLike": {"s3:x-amz-acl": "*"}). It should be called via PutObjectAcl.					
Detective (COSO) Detect (NIST CSF)	[S3.C115, depends on S3.C11] For all external bucket with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover, monitor that the PutObject do not include the ACL operation	Make a request to an external bucket with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover requirement, it should be detected.	Low	S3.FC1	S3.T43 (Low)	Low

Model the threats on all AWS services accessing S3

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C16] Analyse and protect all AWS services accessing S3 (e.g. via ThreatModel). Enforce usage in VPC only, whenever possible.	Request the threat and mitigating controls 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

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, OU and/or AWS account(s), 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)	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 VPC ThreatModel for S3 is being applied.	High	S3.FC1 S3.FC5	S3.T9 (Medium) S3.T11 (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 Organizations, OU and/or AWS account(s) to call S3 from your VPCs by adding a deny statement on S3 VPC endpoint policy of each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org ID, as those are globally unique.	For each VPC, do an API call with an IAM entity which is not part of its authorized AWS Organizations path(s), it should be denied.	Low	S3.FC1 S3.FC5	S3.T9 (Very High) S3.T11 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C20] Verify all S3 VPC endpoint are blocking any IAM entity not belonging to an authorized AWS Organizations, OU and/or AWS account(s)	Remove the policy statement blocking any IAM entity not belonging to an authorized AWS Organizations, OU and/or AWS account(s) 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 VPC	Request the mechanism to enable VPC DNS query logging in all VPC	Medium	S3.FC1 S3.FC5	S3.T8 (Very Low) S3.T9 (Very Low) S3.T11 (Very Low)	Very Low
Directive (COSO) Identify (NIST CSF)	[S3.C22] Maintain a list of authorized S3 and S3 access point (and their respective AWS accounts) to be access for each VPC	Request the list of authorized S3 and S3 access point to be access 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 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 VPC, 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 VPC are limited to limit access to 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 that only authorized S3 bucket and S3 access points are being queried in each VPC (e.g. using VPC DNS query logging), and protect it using Route53 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 endpoints controls	Request the mechanism ensuring all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoints controls, and its records	Low	S3.FC1	S3.T45 (Very High)	Low

Limit the access to the IAM actions required to execute the threats

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 usage of non-object-related S3 actions.	Request the list of authorized IAM principals that have the permissions required to execute the threat actions, its review process, and its review records	High	S3.FC1 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC19 S3.FC2 S3.FC20 S3.FC24 S3.FC25 S3.FC26 S3.FC27 S3.FC32 S3.FC33 S3.FC5 S3.FC6 S3.FC7 S3.FC8	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)	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)	
Directive (COSO) Protect (NIST CSF)	[S3.C27, assured by S3.C28] In S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM 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.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC2 S3.FC20 S3.FC26 S3.FC27 S3.FC32 S3.FC33 S3.FC5 S3.FC7	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)	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) in an access point policy, and 3) in an Object Lambda access point, it should be detected.	Medium	S3.FC1 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC2	-	Medium

				S3.FC20 S3.FC26 S3.FC27 S3.FC32 S3.FC33 S3.FC5 S3.FC7		
Directive (COSO) Identify (NIST CSF)	[S3.C149] For each bucket, maintain a list of authorized IAM principals allowed to access via bucket policy	Request the list of authorized a 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)	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C150, depends on S3.C149, assured by S3.C151] Ensure only authorized a list of authorized IAM principals allowed to access via bucket policy are configured (e.g. using IAM Access Analyzer for the reconciliation)	Request 1) the mechanism ensuring only authorized IAM principals allowed to access via bucket policy are configured, 2) its records of execution for all new buckets, and 3) plan to move any older buckets	Medium	S3.FC10	S3.T37 (Very High)	Very 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	-	Very High

Block requests with KMS keys from unauthorized AWS account(s)

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 authorized AWS accounts to provide KMS keys for S3 for each AWS account	Request the list of authorized AWS accounts to provide KMS keys for S3 for each AWS account, its review process, and its review records	Medium	S3.FC1 S3.FC15 S3.FC26 S3.FC5 S3.FC8	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)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C32, depends on S3.C31] Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts)	Make a request encrypted with a KMS key from unauthorized AWS account, it should be denied	Low	S3.FC1 S3.FC15 S3.FC26 S3.FC5 S3.FC8	S3.T1 (High) S3.T2 (Medium) S3.T4 (High) S3.T5 (High) S3.T7 (High) S3.T8 (High) S3.T9 (High)	High

					S3.T11 (Medium) S3.T16 (High) S3.T21 (Medium) S3.T27 (Low) S3.T28 (High) S3.T30 (High) S3.T31 (High)	
Detective (COSO) Detect (NIST CSF)	[S3.C33, depends on S3.C31] Monitor that only authorized AWS accounts to provide KMS keys are used for each AWS account (using CloudTrail S3 data events in *response.x-amz-server-side-encryption-aws-kms-key-id*)	Make a call to an unauthorized bucket, it should be detected	Low	S3.FC1 S3.FC15 S3.FC26 S3.FC5 S3.FC8	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

Block changes to make an object public via object ACL

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, S3 bucket policy and VPC endpoint policy blocking 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 changed (or tentatively changed) 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

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, exemption can be managed by authorizing a SuperAdmin to delete buckets with a certain tag, and with bucket owners able to tag bucket)	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" (e.g. an SCP on your AWS Organizations root node) is properly implemented	Remove the control blocking the action "s3:DeleteBucket" (e.g. an SCP on your root node), it should be detected.	High	S3.FC5	-	High
Detective (COSO) Detect (NIST CSF)	[S3.C40] Scan your CNAME records (e.g. in Route53) 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 good coding practice

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[S3.C41] Parameterize S3 bucket name or S3 access point in your code (no hardcoding)	Request the process on ensuring S3 bucket name or S3 access point are not hard-coded	Medium	S3.FC5	S3.T1 (Low)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C42] When connecting to S3 endpoints, use virtual-hosted model ("my-bucket-name.s3.amazonaws.com" or "my-bucket-name.my-s3-regional-endpoint.amazonaws.com") instead of path-style model ("s3.amazonaws.com/my-bucket-name" or "my-s3-regional-endpoint.amazonaws.com/my-bucket-name") (see ref). All the latest SDK make use of domain style, by default.	Request the mechanism ensuring the usage 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 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] If etag is used, make sure properly account for its different definitions (ref)	Request the process ensuring etag different definitions are properly accounted for	Low	S3.FC5	S3.T27 (High)	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
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 on 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 requirement 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 on ensuring that PutObject requests on external bucket with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover use 2 separate APIs	Medium	S3.FC1	S3.T43 (High)	Medium

Block direct public access

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 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 front by authenticated CDN or API Gateway	Medium	S3.FC16 S3.FC5	S3.T13 (Very High) S3.T14 (Medium) S3.T22 (Very High)	Medium
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.FC16 S3.FC5	-	Medium
Preventative (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.	1) Create a public bucket and try to access one of its objects without proper authentication, or 2) change the ACL of an existing object to public, it should be denied.	Very Low	S3.FC10 S3.FC5 S3.FC8	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, it should be detected	Very Low	S3.FC10 S3.FC5 S3.FC8	-	Very High
Preventative (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.	1) Create a public bucket and try to access one of its objects without proper authentication, and 2) change the ACL of an existing object to public, it should be denied.	Low	S3.FC10 S3.FC5 S3.FC8	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 a S3 Block Public Access of an S3 bucket, it should be detected	Very Low	S3.FC10 S3.FC5 S3.FC8	-	Very High
Preventative (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.	1) Create a public bucket and try to access via access point one of its objects without proper authentication (ref), or 2) change the ACL of an existing object to public and try to access via access point one of its objects, it should be denied.	Low	S3.FC10 S3.FC26 S3.FC33 S3.FC5	S3.T14 (High) S3.T36 (Medium) S3.T37 (Medium) S3.T38 (Medium)	Very High

					S3.T54 (High) S3.T55 (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.FC10 S3.FC26 S3.FC33 S3.FC5	-	Very High
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 bucket ACL except for server access logging

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 bucket ACL other than for server access logging (e.g. using an SCP, bucket policy and VPC endpoint policy blocking PutBucketAcl for all but the following predefined group "http://acs.amazonaws.com/groups/s3/LogDelivery" using the IAM condition x-amz-acl: "log-delivery-write")	Make a call to create a bucket ACL other than server access logging, it should be denied.	Medium	S3.FC8	S3.T4 (Very High)	High
Detective (COSO) Detect (NIST CSF)	[S3.C56] Monitor changes on bucket ACL other than for server access logging (e.g. using CloudTrail, 1) if the CloudTrail PutBucketAcl log indicates requestParameters.AccessControlPolicy.AccessControlList.Grant[].Grantee.xsi:type: "Group", then the URI should be "http://acs.amazonaws.com/groups/s3/LogDelivery", and 2) if the requestParameters.AccessControlPolicy.AccessControlList.Grant[].Grantee.xsi:type: "CanonicalUser" then the ID should be the same than "AccessControlPolicy.Owner.ID", and 3) requestParameters.x-amz-acl should be either "private", "log-delivery-write" or not existing)	Make a call to create a bucket ACL other than server access logging, it should be detected.	Medium	S3.FC8	S3.T4 (Low)	Low
Assurance (COSO) Detect (NIST CSF)	[S3.C57] Verify the control blocking bucket ACL changes other than for server access logging (e.g. an SCP, a bucket policy and VPC endpoint policy) is properly implemented	Remove the control blocking bucket ACL changes other than for server access logging, it should be detected.	High	S3.FC8	-	High

Identify and ensure the protection all internal buckets hosting your objects

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 authorized data classification, identify whether the hosted data is primary (i.e. 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, etc.), their WORM requirements (e.g. SEC 17a-4, CTCC, etc.), if they are production/non-production (preferably done at account-level), their storage class. You may use tags, Infra-as-code, AWS Glue Data Catalog or external management tool like FINRA herd)	Request the list of all buckets you control, define their authorized data classification, identify whether the data is primary and the mechanism and records to ensure the accuracy of those metadata	High	S3.FC13 S3.FC5	S3.T11 (High) S3.T17 (Very High) S3.T25 (Low)	High
Detective (COSO) Detect (NIST CSF)	[S3.C59, depends on S3.C58] Use a data discovery tool (e.g. Amazon Macie) to control that no sensitive data are stored in unauthorized bucket	Upload a 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 a metadata of an object with sensitive data, it should be detected.	Very High	S3.FC5	S3.T11 (Very Low)	Very Low

Enforce encryption-at-rest

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[S3.C61] Maintain a list of authorized KMS key(s) for each bucket, and their default encryption key. You might simplify by using only 1 key per bucket, ideally dedicated. Note that 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.FC10 S3.FC5	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)	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C140, assured by S3.C62] Ensure all objects on S3 buckets are encrypted with an authorized KMS key	Request the mechanism (including training, or utility) ensuring only authorized KMS key are used for any objects stored in S3	Medium	S3.FC10 S3.FC5	S3.T11 (Medium) S3.T16 (Medium) S3.T17 (Medium) S3.T20 (Medium) S3.T30 (Medium) S3.T36 (Medium) S3.T37 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C62] Verify all objects on S3 buckets are encrypted with an authorized KMS key (e.g. using S3 inventory, see blog, or S3 Storage Lens)	Upload an encrypted data using an unauthorized KMS key, it should be detected.	Medium	S3.FC10 S3.FC5	-	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.FC10 S3.FC5	S3.T17 (Medium) S3.T36 (Low) S3.T37 (Low)	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 and enable S3 Bucket Key (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) plan to move any older buckets	Low	S3.FC10 S3.FC5	S3.T17 (Medium) S3.T20 (High) S3.T36 (High) S3.T37 (High)	Very 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 a wrong default encryption key or 3) without S3 Bucket Key disabled, it should be detected.	Medium	S3.FC10 S3.FC5	-	Very 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 an S3 bucket policy deny statement on PutObject if the condition if exists "s3:x-amz-server-side-encryption-aws-kms-key-id" is not an authorized KMS key)	Make a request encrypted with an unauthorized KMS key, it should be denied	Low	S3.FC10 S3.FC5	S3.T11 (High) S3.T16 (High) S3.T17 (High) S3.T20 (Very High) S3.T30 (High) S3.T36 (High) S3.T37 (High)	Very 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 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 a limited coverage)	Create a bucket not blocking PutObject requests with an unauthorized KMS key, it should be detected.	Medium	S3.FC10 S3.FC5	-	Very High
Detective (COSO) Detect (NIST CSF)	[S3.C68, depends on S3.C61] Monitor that only authorized KMS key(s) are used on each bucket (using CloudTrail S3 data events in *requestParameter.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 with 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.FC10 S3.FC5	S3.T11 (Very Low) S3.T16 (Very Low) S3.T20 (Very Low) S3.T30 (Very Low) S3.T36 (Very Low) S3.T37 (Very Low)	Very 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 an S3 bucket policy deny statement on PutObject if the condition "s3:x-amz-server-side-encryption-customer-algorithm"="AES265" is not present)	Make a request to a bucket (or path) requiring SSE-C without the proper encryption, it should be denied	Low	S3.FC10 S3.FC5	S3.T11 (High) S3.T16 (High) S3.T20 (Very High) S3.T30 (High) S3.T36 (High) S3.T37 (High)	Very 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.FC10 S3.FC5	-	Very 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	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)	Low

	CloudTrail S3 data events in *requestParameter.bucketName* and *response.x-amz-server-side-encryption-customer-algorithm*)				S3.T36 (Low)	

Protect primary data against loss

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.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.FC5	-	High
Directive (COSO) Recover (NIST CSF)	[S3.C71, depends on S3.C58] Backup primary data in a secure location under a different security authority (e.g. in an AWS data bunker account via replication)	Request the mechanism used to backup primary data in a location which have different security authority, its records of execution, and records of restoration testing	Medium	S3.FC13 S3.FC5	S3.T16 (High) S3.T17 (High) S3.T25 (High)	Medium

Encrypt or tokenize critical data

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 - 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.FC10 S3.FC16 S3.FC5	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 hold

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 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.FC5	S3.T16 (Low) S3.T17 (Medium)	Medium

Use S3 Object Lock to protect data integrity

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 each bucket (note: Amazon S3 evaluates and applies bucket policies before applying bucket default S3 Object Lock settings)	Upload an object without appropriate S3 Object Lock, it should have the S3 Object Lock automatically.	Low	S3.FC13 S3.FC5	S3.T16 (High) S3.T17 (High) S3.T25 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C75] Verify all buckets have the correct default S3 Object Lock configuration	Create a bucket 1) without S3 Object Lock or 2) with an incorrect default S3 Object Lock, it should be detected.	Medium	S3.FC13 S3.FC5	-	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 each bucket (e.g. using an S3 bucket policy deny statement on PutObject and PutObjectRetention if the condition if exists "s3:object-lock-mode" 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, it should be denied	Low	S3.FC5	S3.T16 (High) S3.T17 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C77] Verify all buckets blocks 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 be deployed for each configuration, then the resource tracked by name or tag)	Create a bucket not blocking PutObject and PutObjectRetention requests with unauthorized S3 Object Lock, it should be detected.	Medium	S3.FC5	-	High

Remove incomplete multipart uploads

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 upload 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	Create a bucket without a lifecycle policy to remove incomplete multipart upload, it should be detected	Medium	S3.FC5	-	Low

Block deprecated actions

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

Block all requests not using SigV4

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 and S3 policy 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 that all requests not using SigV4 (e.g via CloudTrail S3 with the additionalEventData.SignatureVersion different from "SigV4")	Make a non-SigV4 AWS API call, it should be detected.	Low	S3.FC1	S3.T35 (Low)	Very Low

Block all requests not using HTTP authorization header, if not explicitly authorized

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. presign via query strings or POST (ref) (e.g. using an SCP and S3 policy on all buckets with deny on "StringNotEquals":{"s3:authType": "REST-HEADER"}). Note it blocks uploads via the console, as well.	Make a request with a non-HTTP authorization header, it should be denied	Low	S3.FC5	S3.T39 (Medium)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C85] Monitor and investigate that all requests not using HTTP authorization header (e.g via CloudTrail S3 with the additionalEventData.AuthenticationMethod different from "AuthHeader")	Make 1) a presigned AWS API call and 2) a POST request, it should be detected.	Low	S3.FC5	S3.T39 (Very Low)	Very Low

Restrict bucket replication

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. 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 with correct configuration are configured	Request 1) the mechanism ensuring only authorized buckets have replication enabled and with correct configuration are configured, 2) its records of execution for all new buckets, and 3) 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 and with correct configuration	Configure replication on a non-authorized bucket, it should be detected	Medium	S3.FC15	-	Medium
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 configuration	Medium	S3.FC15	S3.T2 (High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C90, depends on S3.C89] Limit the S3 access to the source/destination bucket and replication rights of each authorized IAM role configured for replication	Request the S3 access of replication role, and how they aligned to 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 behaviour on replication CloudWatch metrics (i.e. *BytesPendingReplication* and *OperationsPendingReplication*)	Create an abnormal replication, it should be detected	Low	S3.FC15	S3.T2 (Low)	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 input/output objects for malware

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 VirusScan or Trend Micro Cloud One)	Inject a malware test file, it should be detected.	Medium	S3.FC16 S3.FC5	S3.T14 (Medium) S3.T15 (Low)	Medium

Control event receivers

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 receiver(s) (e.g. SNS Topic, Lambda, etc.) for each bucket. You might use a simpler approach by using authorized account ID(s) to ensure all your receivers are in authorized AWS account(s).	Request the list of authorized notification receiver (e.g. SNS Topic, Lambda, etc.) 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 receiver(s) (e.g. SNS Topic, Lambda, etc.) for each bucket are configured	Request 1) the mechanism ensuring only authorized notification receiver(s) (e.g. SNS Topic, Lambda, etc.) for each bucket are configured, 2) its records of execution for all new buckets, and 3) 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 where the inventory is stored

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 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) 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

Limit access from only authorized VPCs

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 VPC(s), authorized to access it.	For each S3 bucket, request the list of authorized VPC to access it, its review process, and its review records	Low	S3.FC10 S3.FC2 S3.FC5	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)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C99, depends on S3.C98, assured by S3.C100] Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the	Make a request to the bucket outside an authorized VPC, it should be denied	Very Low	S3.FC10 S3.FC2 S3.FC5	S3.T11 (Medium) S3.T14 (Medium) S3.T17 (Medium)	High

	bucket policy size is beyond the limit, use this condition on access point)				S3.T30 (High) 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 VPC(s) (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.FC10 S3.FC2 S3.FC5	-	High

Control CloudFront access

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 distribution (via origin access identity) and associated bucket	Request the list of all authorized CloudFront distribution and associated S3 buckets	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, and vice versa.	Request 1) the mechanism ensuring only authorized only authorized CloudFront distribution are associated with their authorized bucket, and vice versa, 2) its records of execution for all new CloudFront distribution, and 3) plan to move any older CloudFront distribution	Medium	S3.FC10	S3.T20 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C102] Verify all associations of CloudFront distributions with buckets are authorized	Create a non-authorized distribution or association, it should be detected.	High	S3.FC10	-	Medium

Protect and/or claim your domains and trademarks/copyrights

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 VPC when in use

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 VPC, S3 access point and S3.	Request the list of authorized access between VPC and S3 access points	Medium	S3.FC1 S3.FC26 S3.FC28	S3.T7 (Very Low) S3.T9 (Very Low) S3.T10 (Very Low)	Medium

				S3.FC5	S3.T11 (Very Low) S3.T28 (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 in VPC endpoint and/or bucket policy the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of allowlist bucket name in VPC endpoint/bucket policy.	Do a request on an unauthorized access point or bucket, it should be denied.	Medium	S3.FC1 S3.FC26 S3.FC28 S3.FC33 S3.FC5	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, assured by S3.C110] In S3 bucket policy, 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 S3 access point, it should be denied.	Medium	S3.FC1 S3.FC26 S3.FC33	S3.T7 (Medium) S3.T28 (High) S3.T55 (Medium) S3.T56 (Very High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C107] Block the creation "s3:CreateAccessPoint" of non-VPC S3 access point (e.g. using the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"})	Do 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)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C108, assured by S3.C111] Block all traffic from Internet-configured S3 access point (e.g. on the bucket policy, 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 statement in VPC endpoints	Create a VPC endpoint giving access to an S3 bucket, it should be detected.	High	S3.FC1 S3.FC26 S3.FC28 S3.FC33 S3.FC5	-	High
Assurance (COSO) Detect (NIST CSF)	[S3.C110] Verify S3 bucket policies deny non-authorized S3 access points	Remove/modify the deny on the bucket policy, it should be detected.	High	S3.FC1 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 bucket not through access point (i.e. using a deny IAM policy statement with the condition "ArnNotLike" {"s3:DataAccessPointArn": "arn:aws:s3:*Region*:*AccountId*:accesspoint/*"})	Access any S3 bucket using the S3 public endpoint, it should be denied.	Low	S3.FC1 S3.FC5	S3.T7 (Medium) S3.T11 (High)	High

Control IAM roles used for Batch

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO)	[S3.C120]	Request the list of all IAM roles configured for Batch job	Medium	S3.FC27	S3.T44 (Very Low)	High

Identify (NIST CSF)	Maintain a list of IAM roles used for Batch job, ideally dedicated (e.g. using change management process on infrastructure-as-code)					
Directive (COSO) Protect (NIST CSF)	[S3.C139, depends on S3.C120, assured by S3.C123] Ensure only an authorized IAM role is attached on each Batch job	Request the mechanism ensuring only an authorized IAM role is attached on 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 the access to only required resources/permissions (e.g. source/destination bucket, Lambda functions) of each authorized IAM role configured for Batch jobs	Request the access to only required resources/permissions for each Batch IAM role, and how they aligned to 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 job, 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 job	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

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 function for each Object Lambda access point, its associated access point, its associated GET request(s), and payload	Request the list of authorized Lambda function for each Object Lambda access point, its associated access point, its associated 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 function for each Object Lambda access point, its associated access point, its associated GET request(s), and payload are created	Request the mechanism ensuring only authorized Lambda function for each Object Lambda access point, its associated access point, its associated 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 function are configured on each Object Lambda access point, its associated access point, its associated GET request(s), and payload	Attach 1) an unauthorized Lambda function on an Object Lambda access point, 2) an unauthorized Object Lambda access point to an access point, 3) an authorized Lambda function with an unauthorized GET request on 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 to Object Lambda access point, 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 1) 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 website and behind a CDN

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 website	Request the list of authorized buckets to be configured as website, its review process, and its review records	Low	S3.FC16	S3.T13 (Very Low) S3.T29 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C142, depends on S3.C141, assured by S3.C143] Ensure only authorized buckets are configured as website	Request 1) the mechanism ensuring only authorized buckets are configured as website, 2) its records of execution for all new website-enabled buckets, and 3) 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 website	Enable website configuration 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 websites are protected with HTTP headers (ref) using a CDN (e.g. CloudFront)	Request the mechanism ensuring S3 websites are protected with HTTP headers	Medium	S3.FC16	S3.T13 (High) S3.T29 (Very High)	High

Use unguessable naming convention

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

Disabling ACLs for all buckets

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 ACL and object ACL are disabled on each bucket	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) plan to move any older buckets	Medium	S3.FC1 S3.FC24 S3.FC25 S3.FC5 S3.FC8	S3.T4 (Very High) S3.T6 (Very High) S3.T36 (Very High) S3.T43 (Very High) S3.T52 (Very High) S3.T53 (Very High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C153] Prevent the creation of buckets with ACL enabled (e.g. by using a SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note it does not block someone to enable ACL afterwards via PutPutBucketOwnershipControls.	Create a bucket to enable ACL, it should be denied.	Low	S3.FC1 S3.FC24 S3.FC25 S3.FC5 S3.FC8	S3.T4 (High) S3.T6 (High) S3.T36 (High) S3.T43 (High) S3.T52 (High) S3.T53 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C154] Verify bucket ACL and object ACL are disabled on each bucket	Create/modify a bucket to enable ACL, it should be detected.	Medium	S3.FC1 S3.FC24 S3.FC25 S3.FC5 S3.FC8	-	High

Compliance Mapping

PCI DSS v3.2

PCI DSS v3.2	Control Objectives	Controls				
		Very High	High	Medium	Low	Very Low
1.1 1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7 1.2 1.2.1 1.2.2 1.2.3 1.3	[S3.CO13] Block direct public access [S3.CO30] Control CloudFront access	S3.C49 S3.C50 S3.C51 S3.C52 S3.C53 S3.C54	-	S3.C47 S3.C48 S3.C101 S3.C102 S3.C137	S3.C83	-
1.3.1 1.3.2	[S3.CO13] Block direct public access	S3.C49 S3.C50 S3.C51 S3.C52 S3.C53 S3.C54	-	S3.C47 S3.C48	S3.C83	-
1.3.3	[S3.CO13] Block direct public access [S3.CO30] Control CloudFront access	S3.C49 S3.C50 S3.C51 S3.C52 S3.C53 S3.C54	-	S3.C47 S3.C48 S3.C101 S3.C102 S3.C137	S3.C83	-
1.3.4	[S3.CO13] Block direct public access	S3.C49 S3.C50 S3.C51 S3.C52 S3.C53 S3.C54	-	S3.C47 S3.C48	S3.C83	-
1.3.5 1.3.6 1.3.7	[S3.CO5] Identify and ensure the protection all external buckets hosting your objects [S3.CO15] Identify and ensure the protection all internal buckets hosting your objects	-	S3.C11 S3.C15 S3.C58	S3.C12 S3.C13 S3.C14	S3.C115	S3.C60

				S3.C114 S3.C59		
2.1 2.1.1	[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.C146 S3.C147	-	S3.C62 S3.C140 S3.C72	S3.C63 S3.C68 S3.C148	-
2.2.3	[S3.CO9] Block requests with KMS keys from unauthorized AWS account(s) [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.C31 S3.C32	S3.C62 S3.C140 S3.C72	S3.C33 S3.C63 S3.C68 S3.C148	-
3.5 3.5.1 3.5.2 3.5.3 3.5.4 3.6 3.6.1 3.6.2 3.6.3 3.6.4 3.6.5 3.6.6 3.6.7 3.6.8	[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.C62 S3.C140 S3.C72	S3.C63 S3.C68 S3.C148	-
4.1	[S3.CO26] Scan input/output objects for malware	-	-	S3.C93	-	-
5.1 5.1.1 5.1.2 5.2 5.3 5.4	[S3.CO27] Control event receivers [S3.CO28] Control where the inventory is stored	-	-	-	S3.C94 S3.C95 S3.C135	S3.C96 S3.C97 S3.C136
6.4 6.4.1 6.4.2	[S3.CO12] Enforce good coding practice	-	-	S3.C46 S3.C113	S3.C41 S3.C42 S3.C44	S3.C43 S3.C45

6.4.3 6.4.4 6.4.5 6.4.5.1 6.4.5.2 6.4.5.3 6.4.5.4 6.4.6						
6.6	[S3.CO8] Limit the access to the IAM actions required to execute the threats [S3.CO10] Block changes to make an object public via object ACL [S3.CO13] Block direct public access [S3.CO33] Control IAM roles used for Batch [S3.CO34] Enforce only authorized Object Lambda access point and associated access [S3.CO35] Deploy only authorized S3 website and behind a CDN [S3.CO37] Disabling ACLs for all buckets	S3.C149 S3.C150 S3.C151 S3.C49 S3.C50 S3.C51 S3.C52 S3.C53 S3.C54	S3.C26 S3.C34 S3.C36 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127 S3.C144 S3.C152 S3.C153 S3.C154	S3.C27 S3.C28 S3.C47 S3.C48 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131 S3.C141 S3.C142 S3.C143	S3.C35 S3.C37 S3.C83 S3.C132 S3.C133	-
7.1 7.1.1 7.1.2 7.1.3 7.1.4 7.2 7.2.1	[S3.CO13] Block direct public access	S3.C49 S3.C50 S3.C51 S3.C52 S3.C53 S3.C54	-	S3.C47 S3.C48	S3.C83	-
7.2.2	[S3.CO8] Limit the access to the IAM actions required to execute the threats [S3.CO10] Block changes to make an object public via object ACL [S3.CO13] Block direct public access [S3.CO33] Control IAM roles used for Batch [S3.CO34] Enforce only authorized Object Lambda access point and associated access [S3.CO35] Deploy only authorized S3 website and behind a CDN [S3.CO37] Disabling ACLs for all buckets	S3.C149 S3.C150 S3.C151 S3.C49 S3.C50 S3.C51 S3.C52 S3.C53 S3.C54	S3.C26 S3.C34 S3.C36 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127 S3.C144 S3.C152 S3.C153 S3.C154	S3.C27 S3.C28 S3.C47 S3.C48 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131 S3.C141 S3.C142 S3.C143	S3.C35 S3.C37 S3.C83 S3.C132 S3.C133	-

7.2.3	[S3.CO5] Identify and ensure the protection all external buckets hosting your objects [S3.CO15] Identify and ensure the protection all internal buckets hosting your objects	-	S3.C11 S3.C15 S3.C58	S3.C12 S3.C13 S3.C14 S3.C114 S3.C59	S3.C115	S3.C60
8.1.2	[S3.CO1] Enforce encryption-in-transit	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119	S3.C3 S3.C5	S3.C4	-
8.1.5	[S3.CO5] Identify and ensure the protection all external buckets hosting your objects [S3.CO15] Identify and ensure the protection all internal buckets hosting your objects	-	S3.C11 S3.C15 S3.C58	S3.C12 S3.C13 S3.C14 S3.C114 S3.C59	S3.C115	S3.C60
8.2 8.2.1 8.2.2 8.2.3 8.2.4 8.2.5 8.2.6 8.3	[S3.CO8] Limit the access to the IAM actions required to execute the threats [S3.CO10] Block changes to make an object public via object ACL [S3.CO13] Block direct public access [S3.CO33] Control IAM roles used for Batch [S3.CO34] Enforce only authorized Object Lambda access point and associated access [S3.CO35] Deploy only authorized S3 website and behind a CDN [S3.CO37] Disabling ACLs for all buckets	S3.C149 S3.C150 S3.C151 S3.C49 S3.C50 S3.C51 S3.C52 S3.C53 S3.C54	S3.C26 S3.C34 S3.C36 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127 S3.C144 S3.C152 S3.C153 S3.C154	S3.C27 S3.C28 S3.C47 S3.C48 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131 S3.C141 S3.C142 S3.C143	S3.C35 S3.C37 S3.C83 S3.C132 S3.C133	-
8.7	[S3.CO7] Limit and monitor access via S3 VPC endpoints [S3.CO8] Limit the access to the IAM actions required to execute the threats [S3.CO11] Prevent deletion of buckets [S3.CO14] Block bucket ACL except for server access logging [S3.CO22] Block deprecated actions [S3.CO23] Block all requests not using SigV4 [S3.CO24] Block all requests not using HTTP authorization header, if not explicitly authorized [S3.CO25] Restrict bucket replication [S3.CO29] Limit access from only authorized VPCs [S3.CO32] Restrict access point access to VPC when in use [S3.CO33] Control IAM roles used for Batch [S3.CO34] Enforce only authorized Object Lambda access point and associated access [S3.CO35] Deploy only authorized S3 website and behind a CDN [S3.CO37] Disabling ACLs for all buckets	S3.C149 S3.C150 S3.C151	S3.C17 S3.C19 S3.C20 S3.C26 S3.C38 S3.C39 S3.C55 S3.C57 S3.C98 S3.C99 S3.C100 S3.C105 S3.C106 S3.C107	S3.C22 S3.C23 S3.C24 S3.C27 S3.C28 S3.C84 S3.C86 S3.C87 S3.C88 S3.C89 S3.C90 S3.C91 S3.C92 S3.C117	S3.C18 S3.C25 S3.C124 S3.C56 S3.C81 S3.C116 S3.C132 S3.C133	S3.C21 S3.C40 S3.C80 S3.C82 S3.C85

			S3.C108 S3.C109 S3.C110 S3.C111 S3.C112 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127 S3.C144 S3.C152 S3.C153 S3.C154	S3.C134 S3.C138 S3.C104 S3.C121 S3.C123 S3.C139 S3.C128 S3.C129 S3.C130 S3.C131 S3.C141 S3.C142 S3.C143		
8.18.4	[S3.CO3] Enable CloudTrail S3 data events [S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO17] Protect primary data against loss [S3.CO25] Restrict bucket replication	-	S3.C118 S3.C69 S3.C70	S3.C9 S3.C10 S3.C71 S3.C86 S3.C87 S3.C88 S3.C89 S3.C90 S3.C91 S3.C92 S3.C117 S3.C134 S3.C138	S3.C116	-
10.1	[S3.CO3] Enable CloudTrail S3 data events [S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO8] Limit the access to the IAM actions required to execute the threats [S3.CO17] Protect primary data against loss [S3.CO25] Restrict bucket replication [S3.CO29] Limit access from only authorized VPCs [S3.CO33] Control IAM roles used for Batch [S3.CO34] Enforce only authorized Object Lambda access point and associated access [S3.CO35] Deploy only authorized S3 website and behind a CDN	S3.C149 S3.C150 S3.C151	S3.C118 S3.C26 S3.C69 S3.C70 S3.C98 S3.C99 S3.C100 S3.C120 S3.C122 S3.C125 S3.C126 S3.C127 S3.C144	S3.C9 S3.C10 S3.C27 S3.C28 S3.C71 S3.C86 S3.C87 S3.C88 S3.C89 S3.C90 S3.C91 S3.C92 S3.C117 S3.C134 S3.C138 S3.C121 S3.C123 S3.C139	S3.C116 S3.C132 S3.C133	-

				S3.C128 S3.C129 S3.C130 S3.C131 S3.C141 S3.C142 S3.C143		
10.2 10.2.1 10.2.2 10.2.3 10.2.4 10.2.5 10.2.6 10.2.7	[S3.CO3] Enable CloudTrail S3 data events [S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO17] Protect primary data against loss [S3.CO25] Restrict bucket replication	-	S3.C118 S3.C69 S3.C70	S3.C9 S3.C10 S3.C71 S3.C86 S3.C87 S3.C88 S3.C89 S3.C90 S3.C91 S3.C92 S3.C117 S3.C134 S3.C138	S3.C116	-
10.3 10.3.1 10.3.2 10.3.3 10.3.4 10.3.5 10.3.6	[S3.CO3] Enable CloudTrail S3 data events [S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO8] Limit the access to the IAM actions required to execute the threats [S3.CO11] Prevent deletion of buckets [S3.CO17] Protect primary data against loss [S3.CO25] Restrict bucket replication [S3.CO33] Control IAM roles used for Batch	S3.C149 S3.C150 S3.C151	S3.C118 S3.C26 S3.C38 S3.C39 S3.C69 S3.C70 S3.C120 S3.C122	S3.C9 S3.C10 S3.C27 S3.C28 S3.C71 S3.C86 S3.C87 S3.C88 S3.C89 S3.C90 S3.C91 S3.C92 S3.C117 S3.C134 S3.C138 S3.C121 S3.C123 S3.C139	S3.C116	S3.C40
10.5 10.5.1 10.5.2 10.5.3 10.5.4 10.5.5	[S3.CO3] Enable CloudTrail S3 data events [S3.CO4] Monitor S3 with Amazon GuardDuty and Macie [S3.CO25] Restrict bucket replication	-	S3.C118	S3.C9 S3.C10 S3.C86 S3.C87 S3.C88 S3.C89	S3.C116	-

				S3.C90 S3.C91 S3.C92 S3.C117 S3.C134 S3.C138		
10.6 10.6.1 10.6.2 10.6.3 10.8 10.8.1 11.1 11.5 11.5.1	[S3.CO1] Enforce encryption-in-transit	-	S3.C1 S3.C2 S3.C6 S3.C7 S3.C119	S3.C3 S3.C5	S3.C4	-
12.3.8 12.3.9	[S3.CO6] Model the threats on all AWS services accessing S3	-	-	S3.C16	-	-

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) Identify (NIST CSF)	[S3.C149] For each bucket, maintain a list of authorized IAM principals allowed to access via bucket policy	Request the list of authorized a 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)	Very High
Directive (COSO) Protect (NIST CSF)	[S3.C150, depends on S3.C149, assured by S3.C151] Ensure only authorized a list of authorized IAM principals allowed to access via bucket policy are configured (e.g. using IAM Access Analyzer for the reconciliation)	Request 1) the mechanism ensuring only authorized IAM principals allowed to access via bucket policy are configured, 2) its records of execution for all new buckets, and 3) plan to move any older buckets	Medium	S3.FC10	S3.T37 (Very High)	Very 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	-	Very High
Preventative (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.	1) Create a public bucket and try to access one of its objects without proper authentication, or 2) change the ACL of an existing object to public, it should be denied.	Very Low	S3.FC10 S3.FC5 S3.FC8	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, it should be detected	Very Low	S3.FC10 S3.FC5 S3.FC8	-	Very High
Preventative (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.	1) Create a public bucket and try to access one of its objects without proper authentication, and 2) change the ACL of an existing object to public, it should be denied.	Low	S3.FC10 S3.FC5 S3.FC8	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 a S3 Block Public Access of an S3 bucket, it should be detected	Very Low	S3.FC10 S3.FC5 S3.FC8	-	Very High
Preventative (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.	1) Create a public bucket and try to access via access point one of its objects without proper authentication (ref), or 2) change the ACL of an existing object to public and try to access via access point one of its objects, it should be denied.	Low	S3.FC10 S3.FC26 S3.FC33 S3.FC5	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.FC10 S3.FC26 S3.FC33 S3.FC5	-	Very High
Directive (COSO) Identify (NIST CSF)	[S3.C61] Maintain a list of authorized KMS key(s) for each bucket, and their default encryption key. You might simplify by using only 1 key per bucket, ideally dedicated. Note that 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.FC10 S3.FC5	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)	Very 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 and enable S3 Bucket Key (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) plan to move any older buckets	Low	S3.FC10 S3.FC5	S3.T17 (Medium) S3.T20 (High) S3.T36 (High) S3.T37 (High)	Very 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 a wrong default encryption key or 3) without S3 Bucket Key disabled, it should be detected.	Medium	S3.FC10 S3.FC5	-	Very 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 an S3 bucket policy deny statement on PutObject if the condition if exists "s3:x-amz-server-side-encryption-aws-kms-key-id" is not an authorized KMS key)	Make a request encrypted with an unauthorized KMS key, it should be denied	Low	S3.FC10 S3.FC5	S3.T11 (High) S3.T16 (High) S3.T17 (High) S3.T20 (Very High) S3.T30 (High) S3.T36 (High) S3.T37 (High)	Very 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 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 a limited coverage)	Create a bucket not blocking PutObject requests with an unauthorized KMS key, it should be detected.	Medium	S3.FC10 S3.FC5	-	Very High
Directive (COSO) Identify (NIST CSF)	[S3.C145] Maintain a list of buckets (or paths) required to be encrypted with 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.FC10 S3.FC5	S3.T11 (Very Low) S3.T16 (Very Low) S3.T20 (Very Low) S3.T30 (Very Low) S3.T36 (Very Low) S3.T37 (Very Low)	Very 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 an S3 bucket policy deny statement on PutObject if the condition "s3:x-amz-	Make a request to a bucket (or path) requiring SSE-C without the proper encryption, it should be denied	Low	S3.FC10 S3.FC5	S3.T11 (High) S3.T16 (High) S3.T20 (Very High) S3.T30 (High) S3.T36 (High)	Very High

	server-side-encryption-customer-algorithm"="AES265" is not present)				S3.T37 (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.FC10 S3.FC5	-	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 request 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 version(s) from IAM entities you control (e.g. an SCP on your AWS Organizations 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 S3 bucket 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 S3 bucket policy)	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 version(s) of TLS.	Remove the statement on a S3 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)	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.T12 (Very Low)	High
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 cloud interception proxy like Kivera) including via Internet Gateway, to force usage of VPC endpoints. It will block data-plane transfer. Note: AWS 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.FC28 S3.FC5 S3.FC7	S3.T7 (High) S3.T10 (High) S3.T12 (Low) S3.T18 (Medium) S3.T34 (Very High)	High
Directive (COSO) Detect (NIST CSF)	[S3.C118] Enable S3 policy findings in Amazon Macie in all AWS accounts in all Regions, and protect it using Macie ThreatModel	Request the Macie ThreatModel and the evidence of its application for enabling and protecting S3 policy findings	Very Low	S3.FC10 S3.FC15 S3.FC5 S3.FC8	S3.T2 (Medium) S3.T4 (Medium) S3.T22 (Medium) S3.T36 (Medium) S3.T37 (Medium) S3.T38 (Medium)	High
Directive (COSO) Protect (NIST CSF)	[S3.C11] Track all buckets you don't control hosting your objects, define their authorized data classification, identify their respective owners (and AWS account ID), their ObjectACL requirements (including S3 Object Ownership), and get assured for the	Request the list of all authorized 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.FC16 S3.FC5	S3.T3 (High) S3.T5 (Very Low) S3.T6 (Low) S3.T7 (Very Low) S3.T8 (Very Low)	High

	protection (e.g. through contractual agreement, verified by assurance programs, or using this ThreatModel).				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)	
Directive (COSO) Protect (NIST CSF)	[S3.C15] Request access via S3 access point on bucket you don't own, if compatible with your interaction with the bucket (e.g. not through not-compatible AWS service)	Request the documented reason 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.C17] For each VPC, maintain a list of AWS Organizations, OU and/or AWS account(s), 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)	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 Organizations, OU and/or AWS account(s) to call S3 from your VPCs by adding a deny statement on S3 VPC endpoint policy of each VPC, with the condition using "aws:PrincipalOrgPaths" (ref) including the full Org ID, as those are globally unique.	For each VPC, do an API call with an IAM entity which is not part of its authorized AWS Organizations path(s), it should be denied.	Low	S3.FC1 S3.FC5	S3.T9 (Very High) S3.T11 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C20] Verify all S3 VPC endpoint are blocking any IAM entity not belonging to an authorized AWS Organizations, OU and/or AWS account(s)	Remove the policy statement blocking any IAM entity not belonging to an authorized AWS Organizations, OU and/or AWS account(s) from the VPC endpoint, it should be detected.	High	S3.FC1 S3.FC5	-	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 usage of non-object-related S3 actions.	Request the list of authorized IAM principals that have the permissions required to execute the threat actions, its review process, and its review records	High	S3.FC1 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC19 S3.FC2 S3.FC20 S3.FC24 S3.FC25 S3.FC26 S3.FC27 S3.FC32 S3.FC33 S3.FC5 S3.FC6 S3.FC7 S3.FC8	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)	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)	
Directive (COSO) Identify (NIST CSF)	[S3.C31] Maintain a list of authorized AWS accounts to provide KMS keys for S3 for each AWS account	Request the list of authorized AWS accounts to provide KMS keys for S3 for each AWS account, its review process, and its review records	Medium	S3.FC1 S3.FC15 S3.FC26 S3.FC5 S3.FC8	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)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C32, depends on S3.C31] Block requests with unauthorized AWS account providing the KMS key (e.g. using an SCP, bucket policy and VPC endpoint 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 accounts)	Make a request encrypted with a KMS key from unauthorized AWS account, it should be denied	Low	S3.FC1 S3.FC15 S3.FC26 S3.FC5 S3.FC8	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)	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, S3 bucket policy and VPC endpoint policy blocking PutObjectAcl for "s3:x-amz-grant-read", "s3:x-amz-grant-read-	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

	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")					
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, exemption can be managed by authorizing a SuperAdmin to delete buckets with a certain tag, and with bucket owners able to tag bucket)	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" (e.g. an SCP on your AWS Organizations root node) is properly implemented	Remove the control blocking the action "s3:DeleteBucket" (e.g. an SCP on your root node), it should be detected.	High	S3.FC5	-	High
Preventative (COSO) Protect (NIST CSF)	[S3.C55, assured by S3.C57] Deny requests to add bucket ACL other than for server access logging (e.g. using an SCP, bucket policy and VPC endpoint policy blocking PutBucketAcl for all but the following predefined group "http://acs.amazonaws.com/groups/s3/LogDelivery" using the IAM condition x-amz-acl: "log-delivery-write")	Make a call to create a bucket ACL other than server access logging, it should be denied.	Medium	S3.FC8	S3.T4 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C57] Verify the control blocking bucket ACL changes other than for server access logging (e.g. an SCP, a bucket policy and VPC endpoint policy) is properly implemented	Remove the control blocking bucket ACL changes other than for server access logging, it should be detected.	High	S3.FC8	-	High
Directive (COSO) Protect (NIST CSF)	[S3.C58] Track all buckets you control, define their authorized data classification, identify whether the hosted data is primary (i.e. 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, etc.), their WORM requirements (e.g. SEC 17a-4, CTCC, etc.), if they are production/non-production (preferably done at account-level), their storage class. You may use tags, Infra-as-code, AWS Glue Data Catalog or external management tool like FINRA herd)	Request the list of all buckets you control, define their authorized data classification, identify whether the data is primary and the mechanism and records to ensure the accuracy of those metadata	High	S3.FC13 S3.FC5	S3.T11 (High) S3.T17 (Very High) S3.T25 (Low)	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.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.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 each bucket (note: Amazon S3 evaluates and applies bucket policies before applying bucket default S3 Object Lock settings)	Upload an object without appropriate S3 Object Lock, it should have the S3 Object Lock automatically.	Low	S3.FC13 S3.FC5	S3.T16 (High) S3.T17 (High) S3.T25 (High)	High

Assurance (COSO) Detect (NIST CSF)	[S3.C75] Verify all buckets have the correct default S3 Object Lock configuration	Create a bucket 1) without S3 Object Lock or 2) with an incorrect default S3 Object Lock, it should be detected.	Medium	S3.FC13 S3.FC5	-	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 each bucket (e.g. using an S3 bucket policy deny statement on PutObject and PutObjectRetention if the condition if exists "s3:object-lock-mode" 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, it should be denied	Low	S3.FC5	S3.T16 (High) S3.T17 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C77] Verify all buckets blocks 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 be deployed for each configuration, then the resource tracked by name or tag)	Create a bucket not blocking PutObject and PutObjectRetention requests with unauthorized S3 Object Lock, it should be detected.	Medium	S3.FC5	-	High
Directive (COSO) Identify (NIST CSF)	[S3.C98] For each S3 bucket, maintain a list of VPC(s), authorized to access it.	For each S3 bucket, request the list of authorized VPC to access it, its review process, and its review records	Low	S3.FC10 S3.FC2 S3.FC5	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)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C99, depends on S3.C98, assured by S3.C100] Limit the access to only those VPC(s) (e.g. using S3 bucket statement, deny if the condition "aws:SourceVpce", or if the bucket policy size is beyond the limit, use this condition on access point)	Make a request to the bucket outside an authorized VPC, it should be denied	Very Low	S3.FC10 S3.FC2 S3.FC5	S3.T11 (Medium) S3.T14 (Medium) S3.T17 (Medium) S3.T30 (High) S3.T33 (High) S3.T36 (High) S3.T38 (High) S3.T39 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C100] Verify all buckets include a control to limit access to only authorized VPC(s) (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.FC10 S3.FC2 S3.FC5	-	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 in VPC endpoint and/or bucket policy the condition "s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn" in an allow statement to reduce the length of allowlist bucket name in VPC endpoint/bucket policy.	Do a request on an unauthorized access point or bucket, it should be denied.	Medium	S3.FC1 S3.FC26 S3.FC28 S3.FC33 S3.FC5	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, assured by S3.C110] In S3 bucket policy, deny all IAM principals not using an authorized S3 access point(s) using the condition	Query the bucket outside S3 access point, it should be denied.	Medium	S3.FC1 S3.FC26 S3.FC33	S3.T7 (Medium) S3.T28 (High) S3.T55 (Medium) S3.T56 (Very High)	High

	"s3:DataAccessPointAccount" or preferably "s3:DataAccessPointArn"					
Preventative (COSO) Protect (NIST CSF)	[S3.C107] Block the creation "s3:CreateAccessPoint" of non-VPC S3 access point (e.g. using the condition "StringNotEquals": {"s3:AccessPointNetworkOrigin": "VPC"})	Do 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)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C108, assured by S3.C111] Block all traffic from Internet-configured S3 access point (e.g. on the bucket policy, 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 statement in VPC endpoints	Create a VPC endpoint giving access to an S3 bucket, it should be detected.	High	S3.FC1 S3.FC26 S3.FC28 S3.FC33 S3.FC5	-	High
Assurance (COSO) Detect (NIST CSF)	[S3.C110] Verify S3 bucket policies deny non-authorized S3 access points	Remove/modify the deny on the bucket policy, it should be detected.	High	S3.FC1 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 bucket not through access point (i.e. using a deny IAM policy statement with the condition "ArnNotLike" {"s3:DataAccessPointArn": "arn:aws:s3:*Region*:*AccountId*:accesspoint/*"})	Access any S3 bucket using the S3 public endpoint, 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 job, ideally dedicated (e.g. using change management process on infrastructure-as-code)	Request the list of all IAM roles configured for Batch job	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 job, 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 job	Medium	S3.FC27	S3.T44 (Very High)	High
Directive (COSO) Identify (NIST CSF)	[S3.C125] Maintain a list of authorized Lambda function for each Object Lambda access point, its associated access point, its associated GET request(s), and payload	Request the list of authorized Lambda function for each Object Lambda access point, its associated access point, its associated 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 function for each Object Lambda access point, its associated access point, its associated GET request(s), and payload are created	Request the mechanism ensuring only authorized Lambda function for each Object Lambda access point, its associated access point, its associated 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]	Attach 1) an unauthorized Lambda function on an Object Lambda access point, 2) an unauthorized Object Lambda access point to an access point, 3) an authorized Lambda function	Medium	S3.FC32	-	High

	Verify only the authorized Lambda function are configured on each Object Lambda access point, its associated access point, its associated GET request(s), and payload	with an unauthorized GET request on an Object Lambda access point, and 4) an authorized Lambda function with an unauthorized payload, it should be detected.				
Directive (COSO) Protect (NIST CSF)	[S3.C144, depends on S3.C141] Ensure S3 websites are protected with HTTP headers (ref) using a CDN (e.g. CloudFront)	Request the mechanism ensuring S3 websites are protected with HTTP headers	Medium	S3.FC16	S3.T13 (High) S3.T29 (Very High)	High
Directive (COSO) Protect (NIST CSF)	[S3.C152, assured by S3.C154] Ensure bucket ACL and object ACL are disabled on each bucket	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) plan to move any older buckets	Medium	S3.FC1 S3.FC24 S3.FC25 S3.FC5 S3.FC8	S3.T4 (Very High) S3.T6 (Very High) S3.T36 (Very High) S3.T43 (Very High) S3.T52 (Very High) S3.T53 (Very High)	High
Preventative (COSO) Protect (NIST CSF)	[S3.C153] Prevent the creation of buckets with ACL enabled (e.g. by using a SCP and/or an IAM policy on "s3:CreateBucket" with a deny statement on "s3:x-amz-object-ownership":"BucketOwnerEnforced"). Note it does not block someone to enable ACL afterwards via PutPutBucketOwnershipControls.	Create a bucket to enable ACL, it should be denied.	Low	S3.FC1 S3.FC24 S3.FC25 S3.FC5 S3.FC8	S3.T4 (High) S3.T6 (High) S3.T36 (High) S3.T43 (High) S3.T52 (High) S3.T53 (High)	High
Assurance (COSO) Detect (NIST CSF)	[S3.C154] Verify bucket ACL and object ACL are disabled on each bucket	Create/modify a bucket to enable ACL, it should be detected.	Medium	S3.FC1 S3.FC24 S3.FC25 S3.FC5 S3.FC8	-	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 VPC with 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 policy denying all requests with the condition "aws:SecureTransport" = False	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] Enable CloudTrail S3 data events in relevant AWS accounts, Regions and buckets (e.g. production, with sensitive data, etc.). 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)	Medium

					S3.T34 (Low) S3.T35 (Low) S3.T36 (Low) S3.T39 (Low)	
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 GuardDuty ThreatModel. Ensure findings are investigated (e.g. using Amazon Detective).	Request the GuardDuty ThreatModel and the evidence of its application for enabling, monitoring, investigation and protecting S3 protection	Low	S3.FC1 S3.FC24 S3.FC25 S3.FC5 S3.FC8	S3.T3 (Low) S3.T4 (Low) S3.T16 (Medium) S3.T52 (Medium) S3.T53 (Medium)	Medium
Preventative (COSO) Protect (NIST CSF)	[S3.C12, depends on S3.C11] Allow only authorized ACL on objects for bucket 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 are scanned for proper data classification before upload to an external bucket are configured, 2) its records of execution for all object upload flows, and 3) plan to move any older object upload flows	High	S3.FC1 S3.FC16 S3.FC5	S3.T5 (High) S3.T14 (High) S3.T15 (Medium)	Medium
Preventative (COSO) Protect (NIST CSF)	[S3.C114, depends on S3.C11] For all external bucket 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.	Make a request to an external bucket with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover requirement, it should be denied.	High	S3.FC1	S3.T43 (Very High)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C16] Analyse and protect all AWS services accessing S3 (e.g. via ThreatModel). Enforce usage in VPC only, whenever possible.	Request the threat and mitigating controls 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 point (and their respective AWS accounts) to be access for each VPC	Request the list of authorized S3 and S3 access point to be access 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 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 VPC, 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 VPC are limited to limit access to 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 S3 bucket/access point/Object Lambda access point policy, do not allow IAM principals of the same AWS account. Only AWS IAM 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.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC2 S3.FC20 S3.FC26 S3.FC27 S3.FC32 S3.FC33 S3.FC5 S3.FC7	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)	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) in an access point policy, and 3) in an Object Lambda access point, it should be detected.	Medium	S3.FC1 S3.FC10 S3.FC12 S3.FC13 S3.FC15 S3.FC2 S3.FC20 S3.FC26 S3.FC27 S3.FC32 S3.FC33 S3.FC5 S3.FC7	-	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 on 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]	Request the process on ensuring that PutObject requests on external bucket with bucket-owner-full-control ACL	Medium	S3.FC1	S3.T43 (High)	Medium

	When transmitting an object to an external bucket with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover, use 2 separate APIs (PutObject and PutObjectAcl), instead of the built-in object ACL operation in PutObject.	requirement but without S3 Object Ownership handover use 2 separate APIs				
Directive (COSO) Protect (NIST CSF)	[S3.C47, assured by S3.C48] Front buckets 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 front by authenticated CDN or API Gateway	Medium	S3.FC16 S3.FC5	S3.T13 (Very High) S3.T14 (Medium) S3.T22 (Very High)	Medium
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.FC16 S3.FC5	-	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C59, depends on S3.C58] Use a data discovery tool (e.g. Amazon Macie) to control that no sensitive data are stored in unauthorized bucket	Upload a higher classification data in a bucket, it should be detected.	Medium	S3.FC5	S3.T11 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C62] Verify all objects on S3 buckets are encrypted with an authorized KMS key (e.g. using S3 inventory, see blog, or S3 Storage Lens)	Upload an encrypted data using an unauthorized KMS key, it should be detected.	Medium	S3.FC10 S3.FC5	-	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C140, assured by S3.C62] Ensure all objects on S3 buckets are encrypted with an authorized KMS key	Request the mechanism (including training, or utility) ensuring only authorized KMS key are used for any objects stored in S3	Medium	S3.FC10 S3.FC5	S3.T11 (Medium) S3.T16 (Medium) S3.T17 (Medium) S3.T20 (Medium) S3.T30 (Medium) S3.T36 (Medium) S3.T37 (Medium)	Medium
Directive (COSO) Recover (NIST CSF)	[S3.C71, depends on S3.C58] Backup primary data in a secure location under a different security authority (e.g. in an AWS data bunker account via replication)	Request the mechanism used to backup primary data in a location which have different security authority, its records of execution, and records of restoration testing	Medium	S3.FC13 S3.FC5	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 - 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.FC10 S3.FC16 S3.FC5	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]	Request the process of applying legal hold, and its records	Medium	S3.FC5	S3.T16 (Low) S3.T17 (Medium)	Medium

	Create a process to apply 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.					
Preventative (COSO) Protect (NIST CSF)	[S3.C84] Block all requests not using HTTP authorization header, i.e. presign via query strings or POST (ref) (e.g. using an SCP and S3 policy on all buckets with deny on "StringNotEquals":{"s3:authType": "REST-HEADER"}). Note it blocks uploads via the console, as well.	Make a request with a non-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. 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) Detect (NIST CSF)	[S3.C87] Verify only authorized buckets have replication enabled and with correct configuration	Configure replication on a non-authorized bucket, it should be detected	Medium	S3.FC15	-	Medium
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 the S3 access to the source/destination bucket and replication rights of each authorized IAM role configured for replication	Request the S3 access of replication role, and how they aligned to 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 with correct configuration are configured	Request 1) the mechanism ensuring only authorized buckets have replication enabled and with correct configuration are configured, 2) its records of execution for all new buckets, and 3) 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 configuration	Medium	S3.FC15	S3.T2 (High)	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C93, depends on S3.C58]	Inject a malware test file, it should be detected.	Medium	S3.FC16 S3.FC5	S3.T14 (Medium) S3.T15 (Low)	Medium

	If the bucket is used as an input or the output of a process, scan the objects for malware (e.g. using VirusScan or Trend Micro Cloud One)					
Directive (COSO) Identify (NIST CSF)	[S3.C101] Maintain a list of authorized CloudFront distribution (via origin access identity) and associated bucket	Request the list of all authorized CloudFront distribution and associated S3 buckets	Low	S3.FC10	S3.T20 (Very Low)	Medium
Assurance (COSO) Detect (NIST CSF)	[S3.C102] Verify all associations of CloudFront distributions with buckets are authorized	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, and vice versa.	Request 1) the mechanism ensuring only authorized only authorized CloudFront distribution are associated with their authorized bucket, and vice versa, 2) its records of execution for all new CloudFront distribution, and 3) plan to move any older CloudFront distribution	Medium	S3.FC10	S3.T20 (High)	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C104] Maintain a list of authorized access between VPC, S3 access point and S3.	Request the list of authorized access between VPC and S3 access points	Medium	S3.FC1 S3.FC26 S3.FC28 S3.FC5	S3.T7 (Very Low) S3.T9 (Very Low) S3.T10 (Very Low) S3.T11 (Very Low) S3.T28 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[S3.C121, depends on S3.C120] Limit the access to only required resources/permissions (e.g. source/destination bucket, Lambda functions) of each authorized IAM role configured for Batch jobs	Request the access to only required resources/permissions for each Batch IAM role, and how they aligned to 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 on each Batch job	Request the mechanism ensuring only an authorized IAM role is attached on 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 to Object Lambda access point, 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 1) an unauthorized cross-account IAM entity on an Object Lambda access point policy, it should be detected.	High	S3.FC32	-	Medium
Directive (COSO) Identify (NIST CSF)	[S3.C141] Maintain a list of authorized buckets to be configured as website	Request the list of authorized buckets to be configured as website, its review process, and its review records	Low	S3.FC16	S3.T13 (Very Low) S3.T29 (Very Low)	Medium

Directive (COSO) Protect (NIST CSF)	[S3.C142, depends on S3.C141, assured by S3.C143] Ensure only authorized buckets are configured as website	Request 1) the mechanism ensuring only authorized buckets are configured as website, 2) its records of execution for all new website-enabled buckets, and 3) 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 website	Enable website configuration on an unauthorized bucket, it should be detected.	Medium	S3.FC16	-	Medium
Detective (COSO) Detect (NIST CSF)	[S3.C4] Monitor and investigate that 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 VPC with VPC endpoint, it should be detected.	Low	S3.FC1 S3.FC5	S3.T12 (Low) S3.T34 (Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C115, depends on S3.C11] For all external bucket with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover, monitor that the PutObject do not include the ACL operation	Make a request to an external bucket with bucket-owner-full-control ACL requirement but without S3 Object Ownership handover requirement, it should be detected.	Low	S3.FC1	S3.T43 (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 VPC ThreatModel for S3 is being applied.	High	S3.FC1 S3.FC5	S3.T9 (Medium) S3.T11 (Medium)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C25, depends on S3.C21,S3.C22] Monitor VPC DNS query logs that only authorized S3 bucket and S3 access points are being queried in each VPC (e.g. using VPC DNS query logging), and protect it using Route53 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 endpoints controls	Request the mechanism ensuring all S3 VPC endpoints (Interface and Gateway) are covered by the VPC endpoints controls, and its records	Low	S3.FC1	S3.T45 (Very High)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C33, depends on S3.C31] Monitor that only authorized AWS accounts to provide KMS keys are used for each AWS account (using CloudTrail S3 data events in *response.x-amz-server-side-encryption-aws-kms-key-id*)	Make a call to an unauthorized bucket, it should be detected	Low	S3.FC1 S3.FC15 S3.FC26 S3.FC5 S3.FC8	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 changed (or tentatively changed) 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]	Make an anonymous call, it should be detected.	Low	S3.FC5	S3.T36 (Low)	Low

	Monitor and investigate anonymous requests to objects (e.g. using CloudTrail S3 data events with userIdentity.accountId=ANONYMOUS_PRINCIPAL)					
Directive (COSO) Protect (NIST CSF)	[S3.C41] Parameterize S3 bucket name or S3 access point in your code (no hardcoding)	Request the process on ensuring S3 bucket name or S3 access point are not hard-coded	Medium	S3.FC5	S3.T1 (Low)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C42] When connecting to S3 endpoints, use virtual-hosted model ("my-bucket-name.s3.amazonaws.com" or "my-bucket-name.my-s3-regional-endpoint.amazonaws.com") instead of path-style model ("s3.amazonaws.com/my-bucket-name" or "my-s3-regional-endpoint.amazonaws.com/my-bucket-name") (see ref). All the latest SDK make use of domain style, by default.	Request the mechanism ensuring the usage of domain style instead of path style.	Very Low	S3.FC1	S3.T35 (High)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C44] If etag is used, make sure properly account for its different definitions (ref)	Request the process ensuring etag different definitions are properly accounted for	Low	S3.FC5	S3.T27 (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.C56] Monitor changes on bucket ACL other than for server access logging (e.g. using CloudTrail, 1) if the CloudTrail PutBucketAcl log indicates requestParameters.AccessControlPolicy.AccessControlList.Grant[].Grantee.xsi:type: "Group", then the URI should be "http://acs.amazonaws.com/groups/s3/LogDelivery", and 2) if the requestParameters.AccessControlPolicy.AccessControlList.Grant[].Grantee.xsi:type: "CanonicalUser" then the ID should be the same than "AccessControlPolicy.Owner.ID", and 3) requestParameters.x-amz-acl should be either "private", "log-delivery-write" or not existing)	Make a call to create a bucket ACL other than server access logging, it should be detected.	Medium	S3.FC8	S3.T4 (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.FC10 S3.FC5	S3.T17 (Medium) S3.T36 (Low) S3.T37 (Low)	Low
Detective (COSO) Detect (NIST CSF)	[S3.C68, depends on S3.C61] Monitor that only authorized KMS key(s) are used on each bucket (using CloudTrail S3 data events in *requestParameter.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 *requestParameter.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.C78, assured by S3.C79] Reduce costs related to incomplete multipart upload 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	Create a bucket without a lifecycle policy to remove incomplete multipart upload, 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 and S3 policy 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.C116] Monitor abnormal behaviour on replication CloudWatch metrics (i.e. *BytesPendingReplication* and *OperationsPendingReplication*)	Create an abnormal replication, it should be detected	Low	S3.FC15	S3.T2 (Low)	Low
Directive (COSO) Identify (NIST CSF)	[S3.C94] Maintain a list of authorized notification receiver(s) (e.g. SNS Topic, Lambda, etc.) for each bucket. You might use a simpler approach by using authorized account ID(s) to ensure all your receivers are in authorized AWS account(s).	Request the list of authorized notification receiver (e.g. SNS Topic, Lambda, etc.) 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 receiver(s) (e.g. SNS Topic, Lambda, etc.) for each bucket are configured	Request 1) the mechanism ensuring only authorized notification receiver(s) (e.g. SNS Topic, Lambda, etc.) for each bucket are configured, 2) its records of execution for all new buckets, and 3) 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 unguessable naming convention for the email addresses of your AWS accounts (e.g. add a + sign and a random string to redirect the email in the same mailbox)	Review naming convention for root account email and their implementation	Medium	S3.FC28	S3.T19 (High)	Low
Directive (COSO) Protect (NIST CSF)	[S3.C30] Use unguessable naming convention for your IAM users and IAM roles (e.g. add a random string)	Review naming convention for IAM users/role and their implementation	Medium	S3.FC28	S3.T24 (High)	Low
Directive (COSO) Detect (NIST CSF)	[S3.C21] Enable VPC DNS query logging in all VPC	Request the mechanism to enable VPC DNS query logging in all VPC	Medium	S3.FC1 S3.FC5	S3.T8 (Very Low) S3.T9 (Very Low)	Very Low

					S3.T11 (Very Low)	
Detective (COSO) Detect (NIST CSF)	[S3.C40] Scan your CNAME records (e.g. in Route53) 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 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 a 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.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 that all requests not using SigV4 (e.g via CloudTrail S3 with the additionalEventData.SignatureVersion different from "SigV4")	Make a non-SigV4 AWS API call, it should be detected.	Low	S3.FC1	S3.T35 (Low)	Very Low
Detective (COSO) Detect (NIST CSF)	[S3.C85] Monitor and investigate that all requests not using HTTP authorization header (e.g via CloudTrail S3 with the additionalEventData.AuthenticationMethod different from "AuthHeader")	Make 1) a presigned AWS API call and 2) a POST request, it should be detected.	Low	S3.FC5	S3.T39 (Very Low)	Very Low
Directive (COSO) Identify (NIST CSF)	[S3.C96] Maintain a list of authorized S3 buckets to receive 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) plan to move any older buckets	Medium	S3.FC12	S3.T42 (Medium)	Very Low

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	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	CompleteMultipartUpload	CompleteMultipartUpload
S3.A4	Creates a copy of an object that is already stored in Amazon S3	S3.FC1	s3:GetObject s3:PutObject	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	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	DeleteObject	DeleteObject
S3.A19	Permanently deletes an object or a delete marker from a bucket	S3.FC3	s3:DeleteObjectVersion	DeleteObject	DeleteObject(VersionId=)
S3.A20	Deletes multiple objects permanently (non-versioned bucket) or inserts delete markers (versioned bucket)	S3.FC1	s3:DeleteObject	DeleteObjects	DeleteObjects
S3.A21	Permanently deletes multiple objects or delete markers from a bucket	S3.FC3	s3:DeleteObjectVersion	DeleteObjects	DeleteObjects(VersionId=)
S3.A22	Removes the entire tag set from the specified object.	S3.FC2	s3:DeleteObjectTagging	DeleteObjectTagging	DeleteObjectTagging
S3.A23	Removes the entire tag set from the specified object version.	S3.FC4	s3:DeleteObjectVersionTagging	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	GetObject	GetObject
S3.A46	Retrieves an object version from Amazon S3.	S3.FC3	s3:GetObjectVersion	GetObject	GetObject(VersionId=)
S3.A47	Returns ACL information about an object	S3.FC1	s3:GetObjectAcl	GetObjectAcl	GetObjectAcl
S3.A48	Returns ACL information about an object version, use the versionId subresource.	S3.FC9	s3:GetObjectVersionAcl	GetObjectAcl	GetObjectAcl(VersionId=)
S3.A49	Gets Object Lock legal hold for a specific object	S3.FC29	s3:GetObjectLegalHold	GetObjectLegalHold	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	GetObjectRetention	GetObjectRetention
S3.A52	Returns the tag-set of an object.	S3.FC2	s3:GetObjectTagging	GetObjectTagging	GetObjectTagging
S3.A53	Returns the tag-set of a specific version of an object.	S3.FC4	s3:GetObjectVersionTagging	GetObjectTagging	GetObjectTagging(VersionId=)
S3.A54	Returns torrent files from an object.	S3.FC21	s3:GetObjectTorrent	GetObjectTorrent	GetObjectTorrent
S3.A55	(Deprecated) No documented usage 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	HeadBucket	HeadBucket
S3.A59	Retrieves metadata from an object without returning the object itself.	S3.FC1	s3:GetObject	HeadObject	HeadObject
S3.A60	Retrieves metadata from an object version without returning the object itself.	S3.FC3	s3:GetObjectVersion	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	ListObjects	ListObjects
S3.A67	Returns some or all (up to 1000) of the objects in a bucket.	S3.FC1	s3:ListBucket	ListObjectsV2	ListObjectsV2
S3.A68	Lists metadata about all of the versions of objects in a bucket.	S3.FC3	s3:ListBucketVersions	ListObjectVersions	ListObjectVersions
S3.A69	Lists the parts that have been uploaded for a specific multipart upload.	S3.FC1	s3:ListMultipartUploadParts	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 bucket.	S3.FC20	s3:PutBucketNotification	PutBucketNotificationConfiguration	PutBucketNotificationConfiguration
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	PutObject,PostObject	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	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	PutObjectAcl	PutObjectAcl(VersionId=)
S3.A92	Puts Object Lock legal hold on a specific object	S3.FC29	s3:PutObjectLegalHold	PutObjectLegalHold	PutObjectLegalHold
S3.A93	Allows to place a default S3 Object Lock configuration at bucket creation (AWS Support needs to be contacted for existing buckets). It automatically enables versioning, even without the permission.	S3.FC17	s3:PutObjectLockConfiguration	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	PutObjectTagging	PutObjectTagging
S3.A96	Adds a set of tags to an existing object version	S3.FC4	s3:PutObjectVersionTagging	PutObjectVersionTagging	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	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	SelectObjectContent	SelectObjectContent
S3.A103	Uploads a part in a multipart upload.	S3.FC1	s3:PutObject	UploadPart	UploadPart
S3.A104	Uploads a part by copying data from an existing object as a data source.	S3.FC1	s3:PutObject s3:GetObject	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 job.	S3.FC27	s3:DescribeJob	DescribeJob	DescribeJob
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
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	GetStorageLensConfiguratioTaggi ng	GetStorageLensConfiguratioTaggi ng
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	PutStorageLensConfigurationTaggi ng	PutStorageLensConfigurationTaggi ng
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	DeleteAccessPointPolicyForObject Lambda	DeleteAccessPointPolicyForObject Lambda
S3.A138	Returns configuration for an Object Lambda access point	S3.FC32	s3:GetAccessPointConfigurationForObjectLambda	GetAccessPointConfigurationForO bjectLambda	GetAccessPointConfigurationForO bjectLambda
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	GetMultiRegionAccessPointPolicyStatus	GetMultiRegionAccessPointPolicyStatus
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

Appendix 3 - List of the Service availability in AWS Regions

Region Name	Region Id	**Amazon Simple Storage Service (S3)** (s3)	**AWS S3 Control** (s3-control)
Africa (Cape Town)	af-south-1	**Yes**	**No**
Asia Pacific (Hong Kong)	ap-east-1	**Yes**	**No**
Asia Pacific (Tokyo)	ap-northeast-1	**Yes**	**Yes**
Asia Pacific (Seoul)	ap-northeast-2	**Yes**	**Yes**
Asia Pacific (Osaka)	ap-northeast-3	**Yes**	**Yes**
Asia Pacific (Mumbai)	ap-south-1	**Yes**	**Yes**
Asia Pacific (Singapore)	ap-southeast-1	**Yes**	**Yes**
Asia Pacific (Sydney)	ap-southeast-2	**Yes**	**Yes**
Canada (Central)	ca-central-1	**Yes**	**Yes**
China (Beijing)	cn-north-1	**Yes**	**Yes**
China (Ningxia)	cn-northwest-1	**Yes**	**Yes**
Europe (Frankfurt)	eu-central-1	**Yes**	**Yes**
Europe (Stockholm)	eu-north-1	**Yes**	**Yes**
Europe (Milan)	eu-south-1	**Yes**	**No**
Europe (Ireland)	eu-west-1	**Yes**	**Yes**
Europe (London)	eu-west-2	**Yes**	**Yes**
Europe (Paris)	eu-west-3	**Yes**	**Yes**
Middle East (Bahrain)	me-south-1	**Yes**	**No**
South America (São Paulo)	sa-east-1	**Yes**	**Yes**
US East (N. Virginia)	us-east-1	**Yes**	**Yes**
US East (Ohio)	us-east-2	**Yes**	**Yes**
AWS GovCloud (US-East)	us-gov-east-1	**Yes**	**Yes**
AWS GovCloud (US-West)	us-gov-west-1	**Yes**	**Yes**
US ISO East	us-iso-east-1	**Yes**	**No**
US ISO WEST	us-iso-west-1	**Yes**	**No**
US ISOB East (Ohio)	us-isob-east-1	**Yes**	**No**
US West (N. California)	us-west-1	**Yes**	**Yes**
US West (Oregon)	us-west-2	**Yes**	**Yes**