Configuration Manual

MSc Research Project
MSc Cybersecurity

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MSc Project Submission Sheet

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Configuration Manual

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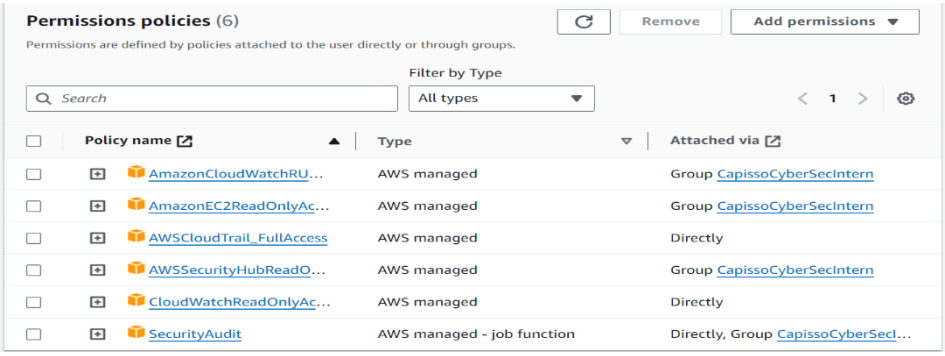
1. Introduction

This guide gives an organization step by step guide on how to configure AWS services in a way to meet GDPR compliance and related CIS Controls. Every category contains particular settings, illustrations, commands, and Web addresses for more information.

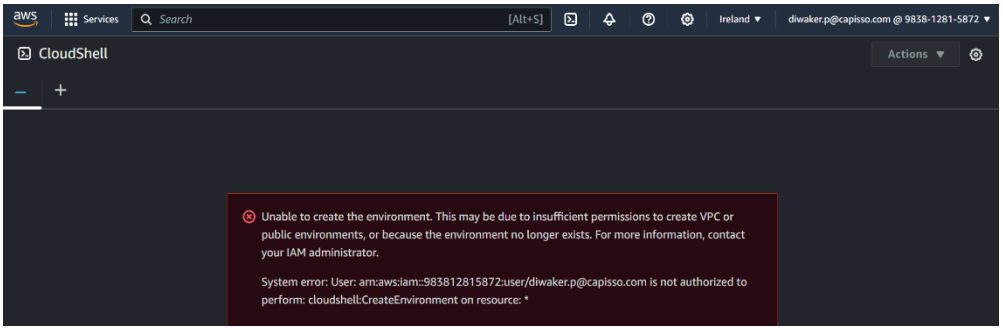
2. Prerequisites

Before starting the configuration, ensure you have:

- **AWS Account:** Getting a standard user admin level access to the AWS account.
- **IAM Permissions:** Make certain that you have the necessary rights to set up IAM, S3, RDS and such.



- **AWS CLI:** AWS CLI is a service from AWS used for accomplishing command-line operations, and for it to operate it has to be installed, and the configuration put in place. Otherwise, it can be installed by using Command Line Interface from Amazon and the source can be accessed through [1].



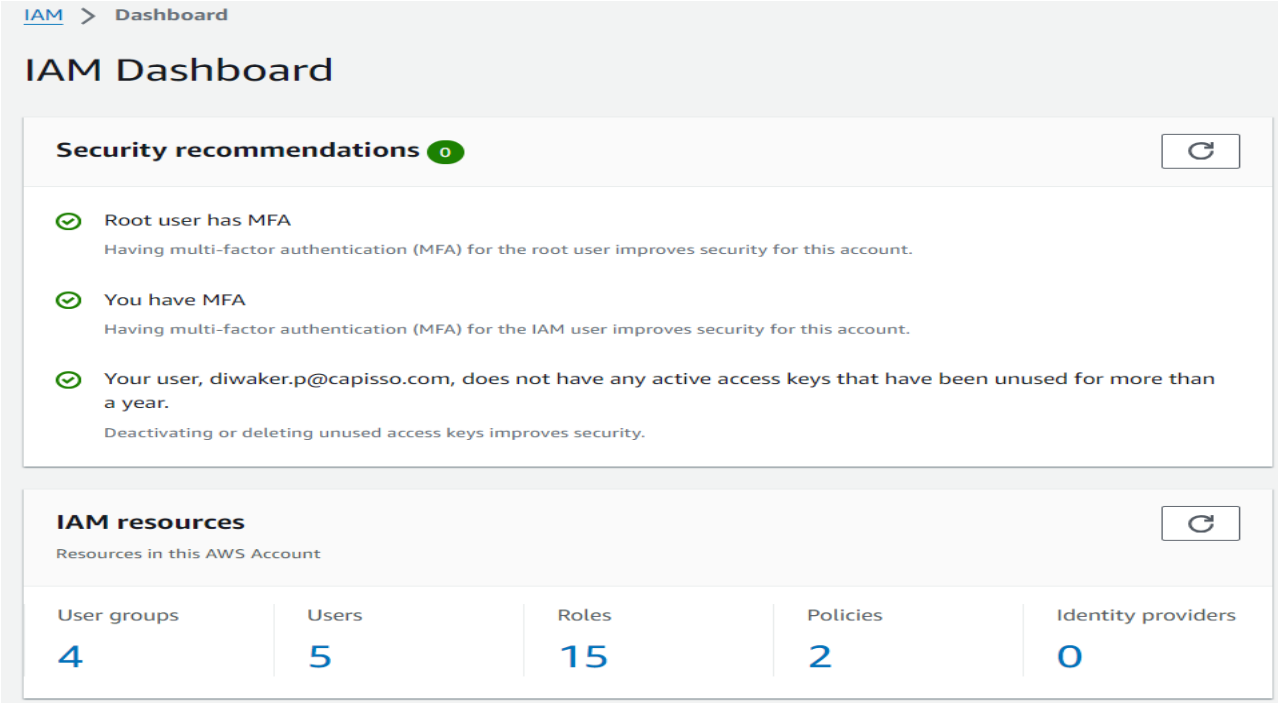
2. Identity and Access Management (IAM)

2.1. Enable Multi-Factor Authentication (MFA) for the Root Account

- **Objective:** Secure root account further more with an additional layer of security [1].
  Steps:
  1. Navigate to the AWS cloud and sign into the console with the help of root credential.
  2. Clicking on the 'IAM' button brings you to the IAM Dashboard which is further reached by searching the AWS Console for 'IAM'.
  3. On the IAM Dashboard go to Security Status and then Manage MFA.
  4. It is also important to do what the screen tells you to do so as to enable the MFA. Select the preferred virtual second factor (like Google Authenticator) and tap on the QR code that the application affords.
  5. The final step is to enter the authentication codes shown on your MFA device.

6. More importantly, keep the codes which were given during the setup of the application safely stored.

- **Compliance References:**
  - **GDPR Compliance:** Ensuring the security of the data personal is one of the provision of the regulation and is highlighted under Article 32 of the regulation.
  - **CIS Control:** Control 16 (Account Monitoring and Control), IG1



2.2. Create IAM Users and Groups with Specific Permissions

- **Objective:** Limit user rights to the barest minimum; grant roles based on the operations or assignments of an employee[2].

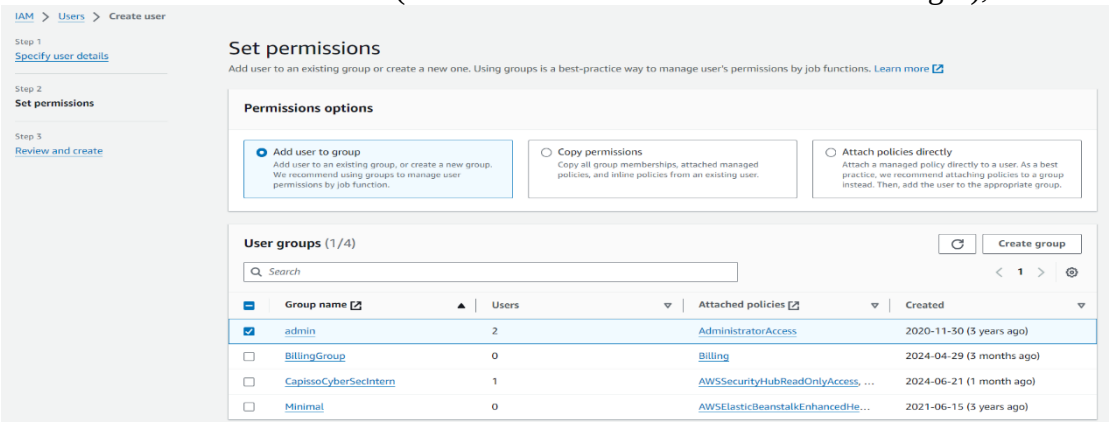
Steps:

1. In IAM Dashboard navigate to Users and then click on Add User.
2. Input a username, then choose Programmatic access if the user needs an API, you also can also grant AWS Management Console access.
3. Click Next: Permissions and select what kind of permission assignment method you will take.
4. Set up the existing ones to be attached directly and the format is a selection of a number of predefined policies available.
5. Linked with traditional user management, the new specific actions are the following:
6. This will then become your actual custom policy (for advanced usage).
7. Check the settings of the user and then click on Create User to generate the user.
8. Save the login details and make sure that they are shared with the user in a secure way.

Compliance References:

- **GDPR Compliance:** Article 25 (Data Protection by Design and by Default)

- **CIS Control:** Control 4 (Controlled Use of Administrative Privileges), IG1



2.3. Enforce MFA for All IAM Users

- **Objective:** Ensure all the user accounts have implement of MFA to avoid anybody gaining access to the system [3].

  Steps:
  1. From the IAM Dashboard, click on Users.
  2. Select a user and navigate to the Security credentials tab.
  3. Under Assigned MFA device, click on Manage.
  4. Select Activate MFA and follow the on-screen instructions to set up the MFA device.
  5. Repeat these steps for each user account.

- **Compliance References:**
  - **GDPR Compliance:** Article 32 (Security of Processing of Personal Data)
  - **CIS Control:** Control 16 (Account Monitoring and Control), IG2

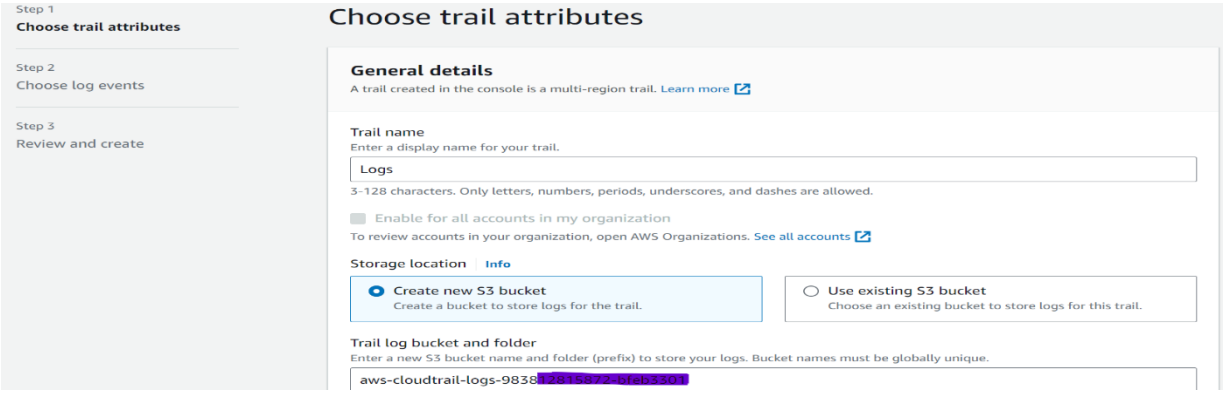
3. Logging and Monitoring

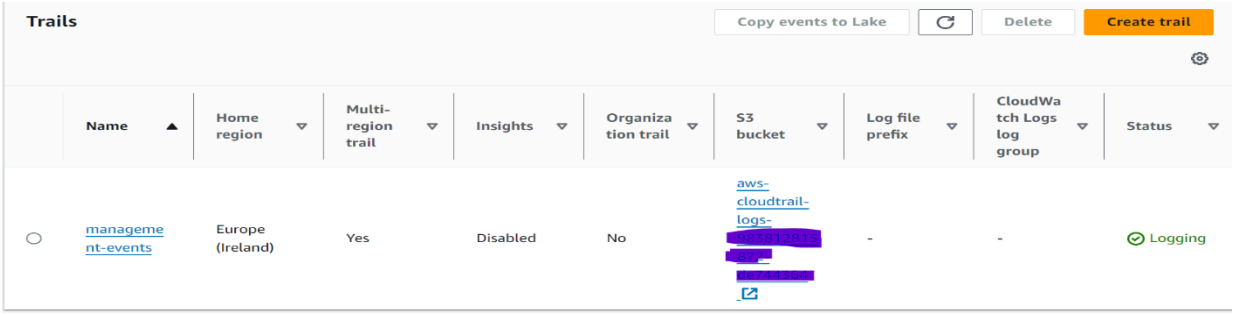
3.1. Enable AWS CloudTrail in All Regions

- **Objective:** With the track of API, monitor usage across all AWS services and their activities to protect and quantify the events performed [4].

  Steps:
  1. Go to the CloudTrail Console.
  2. Go to the menu on the left and click on Trails and then Trails again and select Create trail.
  3. Under Who do you want to apply this trail? Name your trail and check the 'All' selection.
  4. Choose the S3 Bucket to use for the logs (if necessary create a new one).
  5. Allow validation of the log file and the possibility of encrypting it with AWS KMS to secure the logs.
  6. Click on the 'Create' button.

- **Compliance References:**
  - **GDPR Compliance:** Article 30 (Records of Processing Activities)
  - **CIS Control:** Control 6 (Maintenance, Monitoring, and Analysis of Audit Logs), IG1

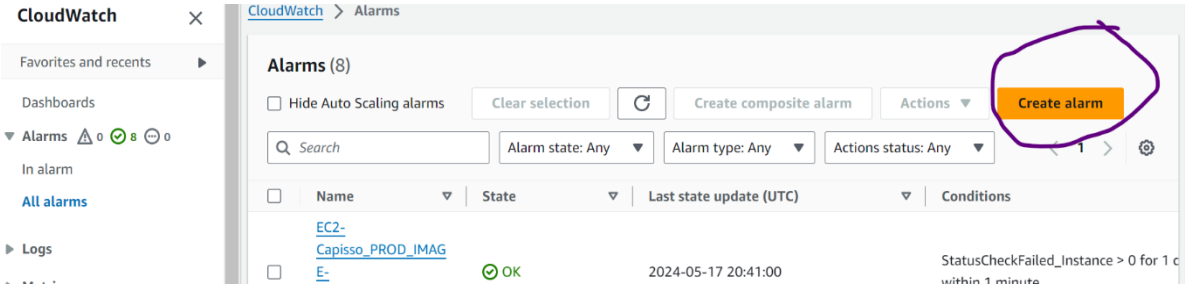




3.2. Set Up Amazon CloudWatch Alarms for Monitoring

- **Objective:** Monitor AWS resources and trigger alarms based on specified metrics to respond quickly to potential issues.

  Steps:
  1. Navigate to the CloudWatch Console.
  2. Click on **Alarms** in the left-hand menu, then click **Create alarm**.
  3. Choose a metric to monitor, such as CPU utilization, error rates, or request latency.
  4. Set conditions for the alarm (e.g., trigger if CPU > 80% for 5 minutes).
  5. Define the action to take when the alarm is triggered, such as sending an email notification via SNS.
  6. Review the settings and click **Create Alarm**.
- **Compliance References:**
  - **GDPR Compliance:** Article 32 (Security of Processing)
  - **CIS Control:** Control 8 (Audit Log Management), IG2

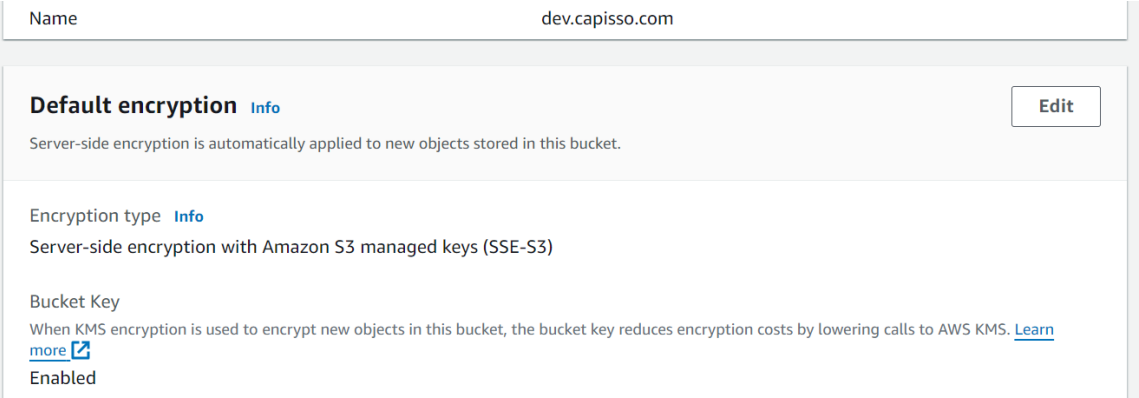


4. Data Encryption

4.1. Enable Server-Side Encryption for S3 Buckets

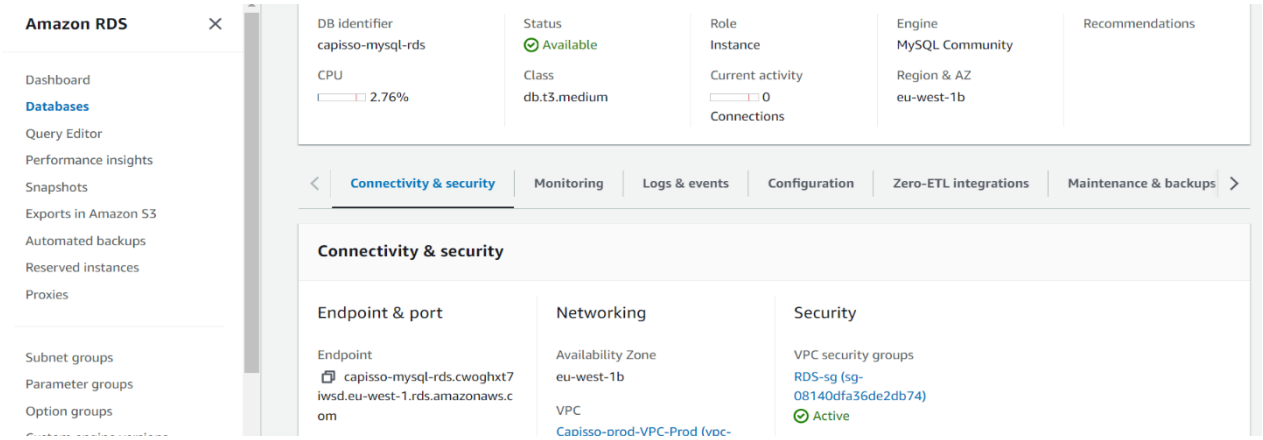
- **Objective:** Secure data at-rest through the use of AWS owned keys or through customers' keys where necessary [5].

  Steps:
  1. Go to the S3 Console.
  2. Go to the object list, choose the bucket you would like to encrypt and click on the Properties option.
  3. Down scroll to Default encryption and click on 'Edit' section.
  4. Select between AES-256 (AWS encrypted with AWS master keys) or AWS-KMS (Customer master keys).
  5. If utilising the KMS namespace, choose from one of the keys available or create one using one of the methods provided.
  6. If you have made changes then click on OK to apply the changes and enable encryption for the bucket.
- **Compliance References:**
  - **GDPR Compliance:** Article 32 (Security of Processing)
  - **CIS Control:** Control 13 (Data Protection), IG1



4.2. Enable Encryption in Transit for RDS Databases

- **Objective:** Secure data during transmission between your application and RDS [6].
  Steps:
  1. Navigate to the RDS Console.
  2. Select your database instance.
  3. Under the "Connectivity & security" section, verify that "Use SSL connection" is enabled.
  4. Download the appropriate SSL/TLS certificate from the AWS Documentation.
  5. Configure your application to use this certificate for encrypted connections.
- **Compliance References:**
  - **GDPR Compliance:** Article 32 (Security of Processing)
  - **CIS Control:** Control 13 (Data Protection), IG2



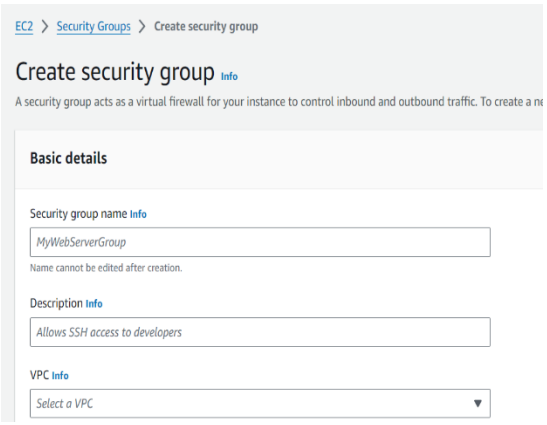
5. Networking

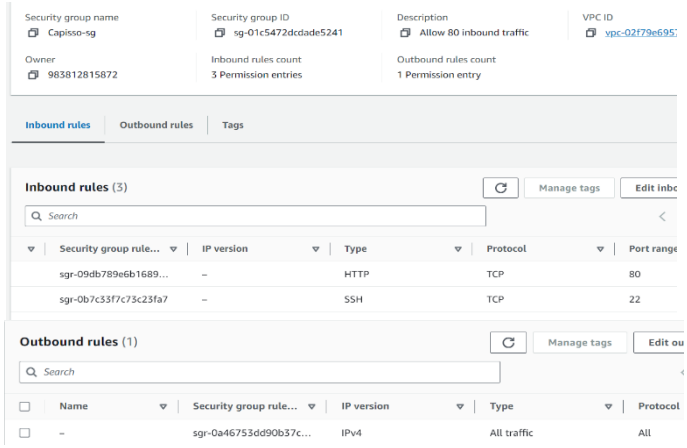
5.1. Configure Security Groups to Restrict Access

- **Objective:** Security groups can help to regulate incoming and outgoing communications to resources in AWS [7].
  Steps:
  1. Navigate to the VPC Console and under services find Security Groups on the left side of the Window.
  2. Go to create new security group and as the security group name and security group description.
  3. In case of Inbound rules, one need to add rules to permit specific traffic only (e.g. permit SSH from particular IP addresses only).
  4. Under Outbound rules define allowed outbound traffic for instance, all outbound traffic to other TCP ports are prohibited apart from ports 80 and 443 for HTTPs connection.
  5. Attach the security group to your EC2 instances or other resources.

- **Compliance References:**
  - **GDPR Compliance:** Article 32 (Security of Processing)

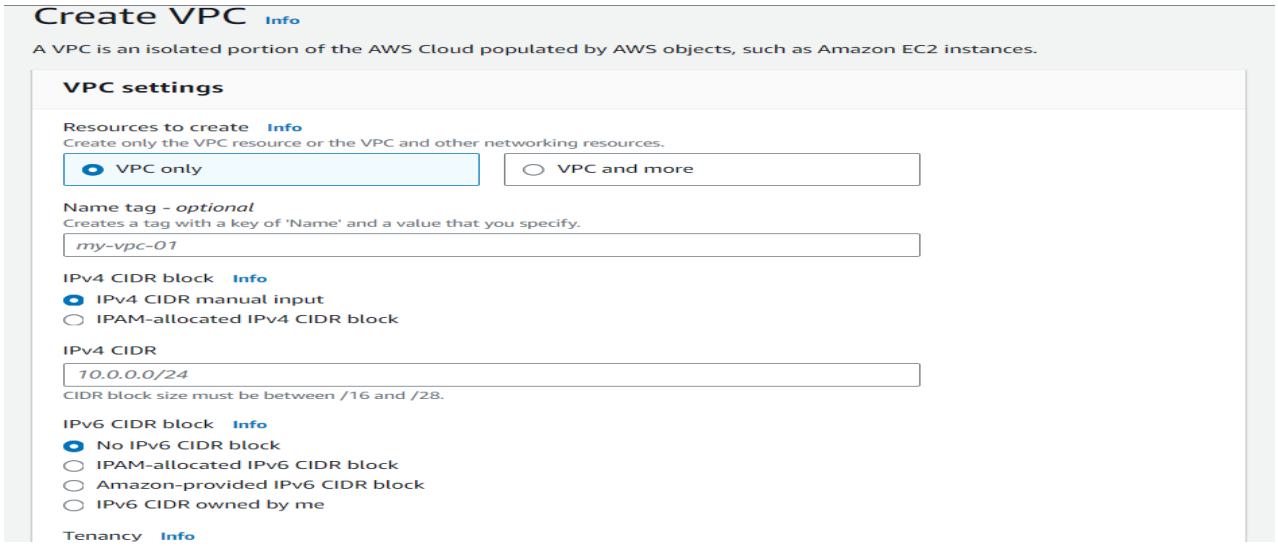
- **CIS Control:** Control 9(Limitation and Control of Network Ports, Protocols, and Services), IG1





5.2. Set Up VPC Flow Logs for Network Traffic Monitoring

- **Objective:** Capture and monitor network traffic within your VPC [8].
  Steps:
  1. Navigate to the VPC Console.
  2. Select your VPC, then click "Create Flow Log".
  3. Choose the traffic to capture (All, Accept, or Reject).
  4. Specify the destination (CloudWatch Logs or S3).
  5. Create the flow log and monitor it through the chosen destination.
- **Compliance References:**
  - **GDPR Compliance:** Article 32 (Security of Processing)
  - **CIS Control:** Control 9 (Limitation and Control of Network Ports, Protocols, and Services), IG2



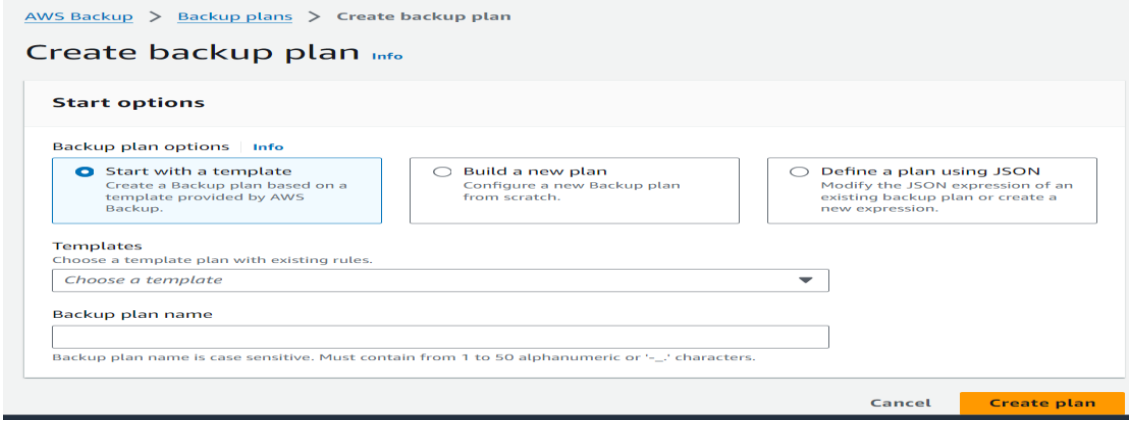
6. Data Backup and Recovery

6.1. Automate Backups for RDS Databases

- **Objective:** Always plan for the disaster recovery and makes sure you are backing up data frequently [9].
  Steps:
  1. Go to the RDS Console.
  2. Choose the database instance that you'd like to resize, and then click on 'Modify'.
  3. Under the **Backup** section, set the backup retention period (e.g., 7 days).
  4. Enable **Automated backups** and specify the backup window.
  5. Hit Continue then Apply immediately to make a current change.

- **Compliance References:**

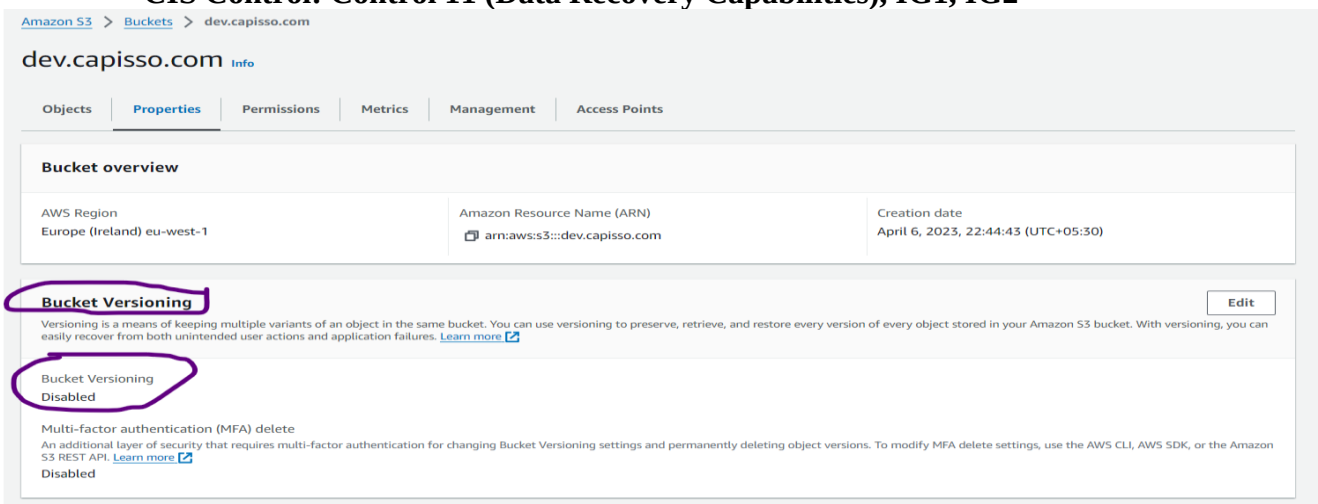
- **GDPR Compliance:** Article 32 (Security of Processing)
- **CIS Control:** Control 11 (Data Recovery Capabilities), IG1



6.2. Enable S3 Bucket Versioning for Data Redundancy

- **Objective:** Protect against accidental deletions by keeping previous versions of objects [10].
  Steps:
  1. Navigate to the S3 Console.
  2. Select your bucket and click on the "Properties" tab.
  3. Scroll to "Bucket Versioning" and click "Enable Versioning".
  4. Confirm the changes.

- **Compliance Reference:**
  - **GDPR Compliance: Article 32 (Security of Processing)**
  - **CIS Control: Control 11 (Data Recovery Capabilities), IG1, IG2**



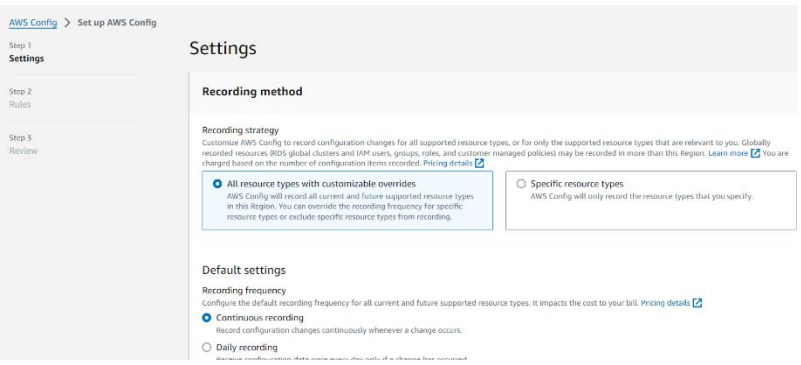
7. Incident Response

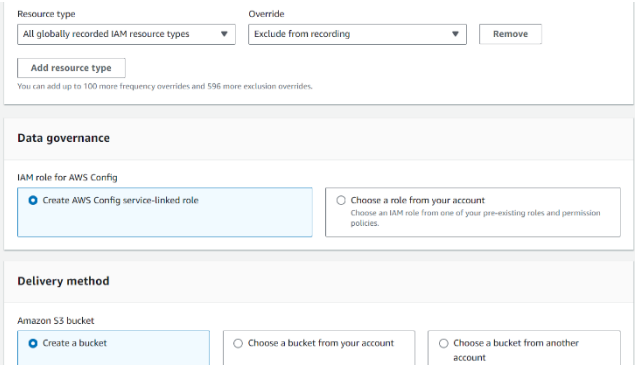
7.1. Set Up AWS Config Rules for Continuous Compliance

- **Objective:** Automatically check and enforce compliance with security policies [11].
  Steps:
  1. Go to the AWS Config Console.
  2. Click **Rules** in the left-hand menu, then **Add Rule**.
  3. Select a predefined rule (e.g., **s3-bucket-encrypted**) or create a custom rule.
  4. Define the scope and parameters for the rule (e.g., check all S3 buckets for encryption).
  5. Set up notifications for rule violations using SNS.
  6. Click **Save** to enable the rule.

- **Compliance References:**
  - **GDPR Compliance:** Article 32 (Security of Processing)

- **CIS Control:** Control 4 (Continuous Vulnerability Management), IG2

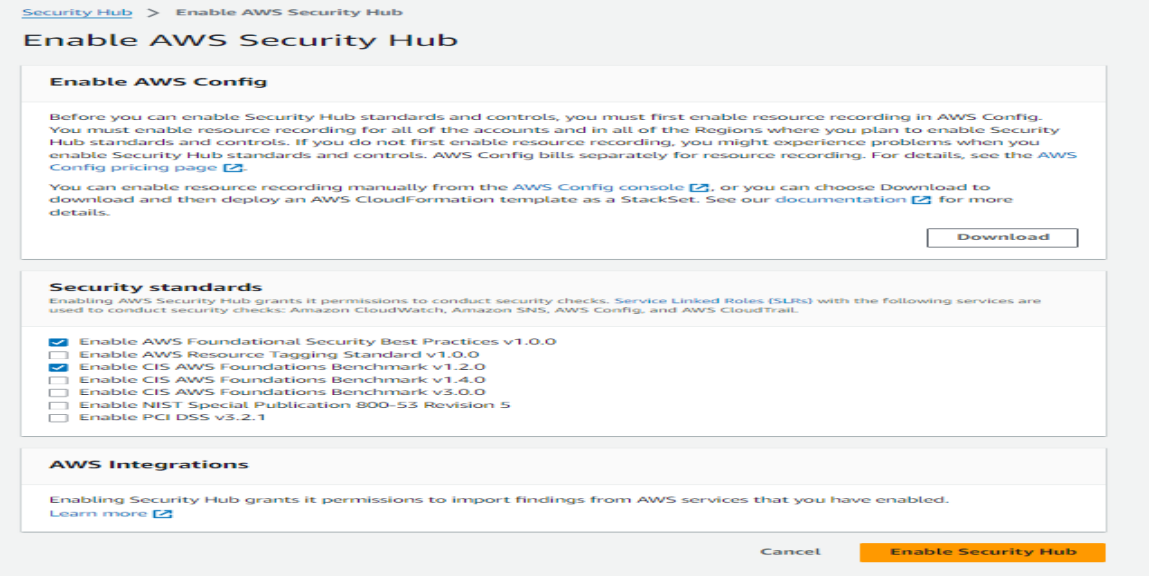




7.2. Enable AWS Security Hub for Centralized Security Monitoring

- **Objective:** Collect and rank security issues for all of your AWS accounts [12].
  Steps:
  1. Go to Security Hub Console.
  2. Go to the configure tab and click 'Get started', then enable Security Hub.
  3. Select the compliance framework for you wish to meet (for example CIS AWS Foundations).
  4. Classification and prioritization of security findings from Security Hub dashboard.

- **Compliance Reference:**
  - **GDPR Compliance:** Article 24 (Responsibility of the Controller)
  - **CIS Control:** Control 19 (Incident Response and Management), IG1



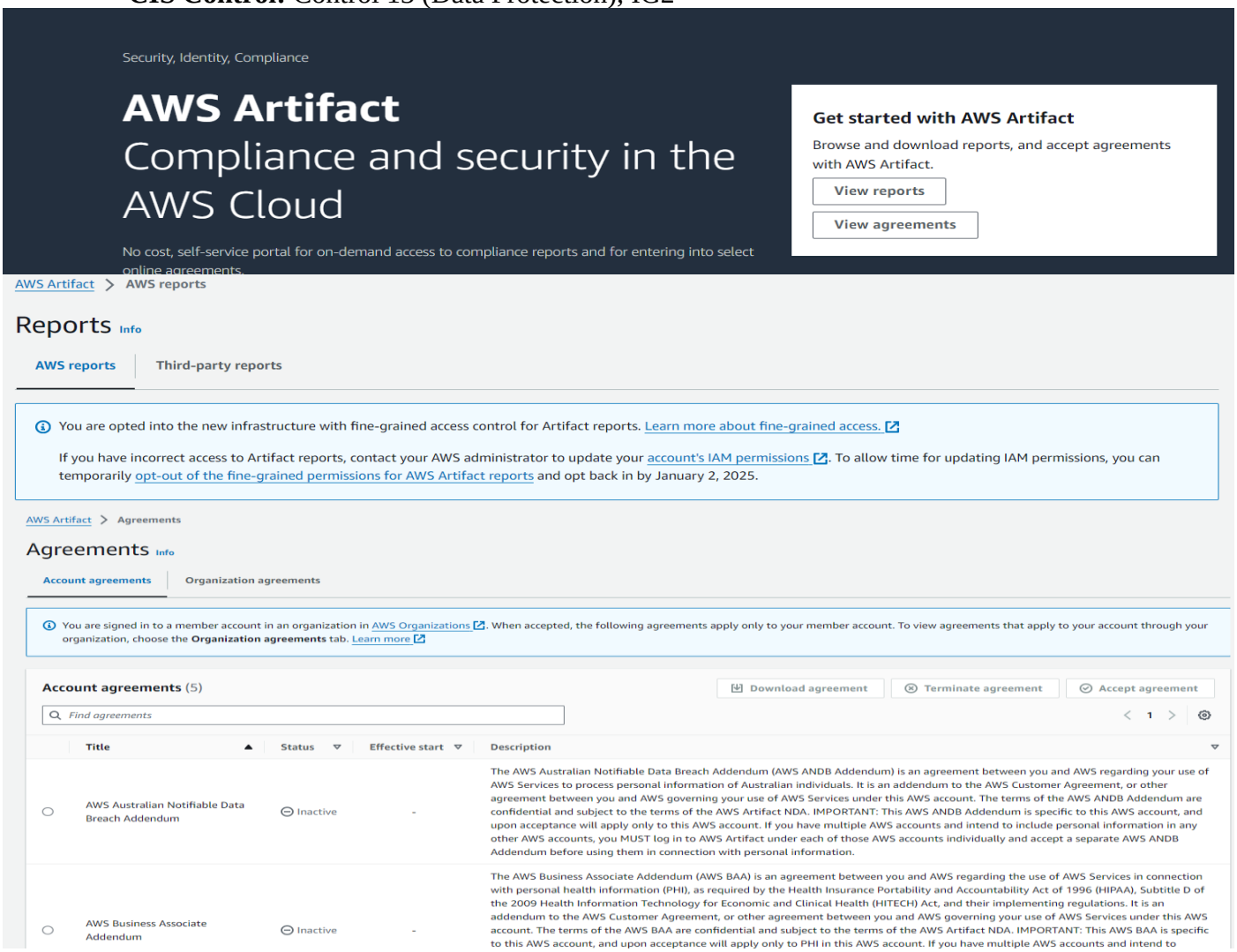
8. Broader GDPR Compliance Considerations

8.1. Data Processing Agreements (DPAs)

- **Objective:** Ensure all data processors must have DPAs in their companies that meet the requirement of GDPR [13].
  Steps:
  1. Please find a list of all Third-party processors in your AWS environment under AWS Artifact View Reports.
  2. Download DPA templates from AWS Artifact to ensure they are GDPR-compliant.
  3. Look at the existing DPAs to fit the GDPR requirements and when necessary, redesign the DPAs to meet the indicated GDPR specifications for your organisation.

4. All DPAs are to be documented in AWS Artifact.

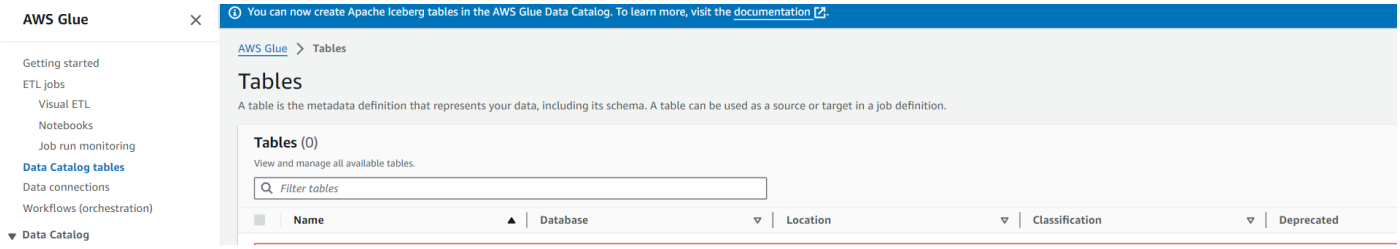
- **Compliance Reference:**
  - **GDPR Compliance:** Article 28 (Processor)
  - **CIS Control:** Control 13 (Data Protection), IG2



8.2. Data Inventory and Mapping

- **Objective:** Ensure that record is kept of all categories of personal data processed [14].
  Steps:
  1. Go to the AWS Glue Console and start a data catalog to document data sources.
  2. Identify where and how personal data is stored, processed, and transferred within your AWS infrastructure using AWS Glue Data Catalogs.
  3. Data could be categorized also using Amazon Macie for mapping sensitive data.
  4. Another subtle, yet important piece of advice: do not forget to update the data inventory periodically.

- **Compliance Reference:**
  - **GDPR Compliance:** Article 30 (Records of Processing Activities)
  - **CIS Control:** Control 3 (Data Protection), IG2



References:

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