data.all - User Guide

v2.6.0

None

None

Table of contents

1. Introduction

This section defines what is data.all, what is the challenge that it is trying to overcome and the value that it can bring to your teams.

1.1 What is data.all?

A modern data workspace that makes collaboration among diverse users (like business, analysts and engineers) easier, increasing efficiency and agility in data projects ✨

1.2 Why did we built data.all?

Data teams can be diverse: analysts, scientists, engineers, business users. Diverse people, with diverse tools and skillsets — diverse "DNAs". All leading to chaos and resulting in titanic efforts spent in **Collaboration Overhead**.

Using data.all, any line of business within an organization can create their own isolated data lake, produce, consume and share data within and across business units, worldwide. By simplifying data discovery, data access management while letting more builders use AWS vast portfolio of data and analytics services, data.all helps more data teams discover relevant data and let them use the power of the AWS cloud to create data driven applications faster.

1.3 How can data.all help data teams?

Teams can easily DISCOVER AND UNDERSTAND data 💫

data.all makes all your datasets easily discoverable! No more Slack messages saying "Where's that dataset?" or long email threads for approvals. With data.all, you can simply browse the data catalog.

Key Capabilities: Discovery and Search, Data Preview & Worksheets and Notebooks

Teams can easily SHARE AND COLLABORATE with data 🤝

Data practitioners spend 30-50% of their time finding and understanding data. data.all cuts that time by 95%. Your data team will be shipping 2-3 times more projects in no time.

Key Capabilities: Data Profiling & Data Sharing and Subscriptions

Teams don't have to worry about SECURING their data 🛡️

Don't lose sleep trying to figure out if your sensitive data is secure. Build ecosystems of trust, make your team happy, and let data.all manage governance and security behind the scenes.

Key Capabilities: Granular Access Control

2. Main components

This section introduces the main components of data.all which are divided in 3 groups. This is an overview, for more details please refer to their specific sections.

- **Administrate**: used by team and data lake administrators to organise and manage teams and users inside data.all
- **Discover**: used by all users to contribute with data, search for data and share data.
- **Play**: once data is in data.all, all users can use these tools to work with data.

2.1 Administrate

2.1.1 Organizations

Organizations are high level constructs where business units can collaborate across different AWS accounts at once. An organization includes environments (see below). Organizations are abstractions, they **don't** contain AWS resources, consequently there is no CloudFormation stack associated with them.

Organizations usually correspond to whole organizations, organization divisions or a separated geographical region within an organization.

2.1.2 Environments

An environment is a workplace where a team can bring, process, analyze data and build data driven applications. This workspace is mapped to an AWS account in one region. It is possible to have more than one environment in the same AWS Account, however we recommend to stick to one environment - one account.

An environment usually corresponds to a business unit or a department. Inside an environment we add teams and assign them different levels of permissions.

2.1.3 Teams

A team corresponds to an IdP group that has been onboarded to data.all. A special case for the administration of data.all is the **Tenant**, an IdP group with high level application (tenant) permissions. As with IdP groups, users can belong to multiple teams.

Teams corresponds to real teams.

> **but really, what are teams?**
>
> Data in data.all is isolated at team level, meaning that all members of a team can access all team's datasets. Thus, a team is any group of users that can access the team's datasets. We can have bigger teams with generic data and project-based teams owning data that requires more restrictive access to only members of the project.

2.2 Discover

2.2.1 Datasets

A dataset is a representation of multiple AWS resources that helps users store data. When data owners create a dataset on data.all the following resources are created:

- Amazon S3 Bucket to store the data on AWS.
- AWS KMS key to encrypt the data on AWS.
- AWS IAM role that gives access to the data on Amazon S3.
- AWS Glue database that is the representation of the structured data on AWS.

Inside the dataset we can store structured data as tables or unstructured data in folders.

2.2.2 Catalog

data.all centralized Catalog is an inventory of datasets, tables, folders and dashboards. It contains metadata for each of the mentioned data assets and thanks to its search capabilities, users can filter based on type of data, type of asset, tags, region and on glossary terms.

We use the Catalog to search and discover data

2.2.3 Glossaries

A Glossary is a list of terms, organized in a way to help users understand the context of their datasets. For example, terms like "cost", "revenue", etc, can be used to group and search all financial datasets.

Glossaries are used to add meaning to data assets metadata facilitating and enhancing Catalog searching

2.2.4 Shares

A Share is an access request to a data asset. Users search and discover data in the catalog and for those data assets that belong to other teams, users can create a Share on behalf of a team (remember, data access: at team level!!). Then, the owners of the asset can accept or reject the share.

We use Shares to collaborate and share data with other teams.

2.3 Play

2.3.1 Worksheets

Worksheets are AWS Athena sessions that allow us to query our datasets as if we were in the AWS Athena Query editor console.

2.3.2 Notebooks

Data practitioners can experiment machine learning algorithms spinning up Jupyter notebook with access to all your datasets. data.all leverages Amazon SageMaker instance to access Jupyter notebooks.

2.3.3 ML Studio

With ML Studio Notebooks we can add users to our SageMaker domain and open Amazon SageMaker Studio

2.3.4 Pipelines

In order to distribute data processing, data.all introduces data.all pipelines where: - data.all takes care of CI/CD infrastructure - data.all offers flexible pipeline blueprints to deploy AWS resources and a Step Function

2.3.5 Dashboards

In the Dashboard window we can start Quicksight sessions, create visual analysis and dashboards.

3. Administrate

3.1 Tenant and Organizations

data.all manages teams' permissions at four levels:

1. Tenant team
2. Organization
3. Environment (next section)
4. Teams (next section)

3.1.1 Tenant

data.all has a super user's team which is a group from your IdP that has the right to manage high level application (tenant) permissions for all IdP groups integrated with data.all.

This super user's team maps to a group from your IdP that's by default named "***DAAdministrators***", any user member of this group will be able to:

- create organizations
- manage tenant permissions on onboarded teams (IdP groups) as shown below.

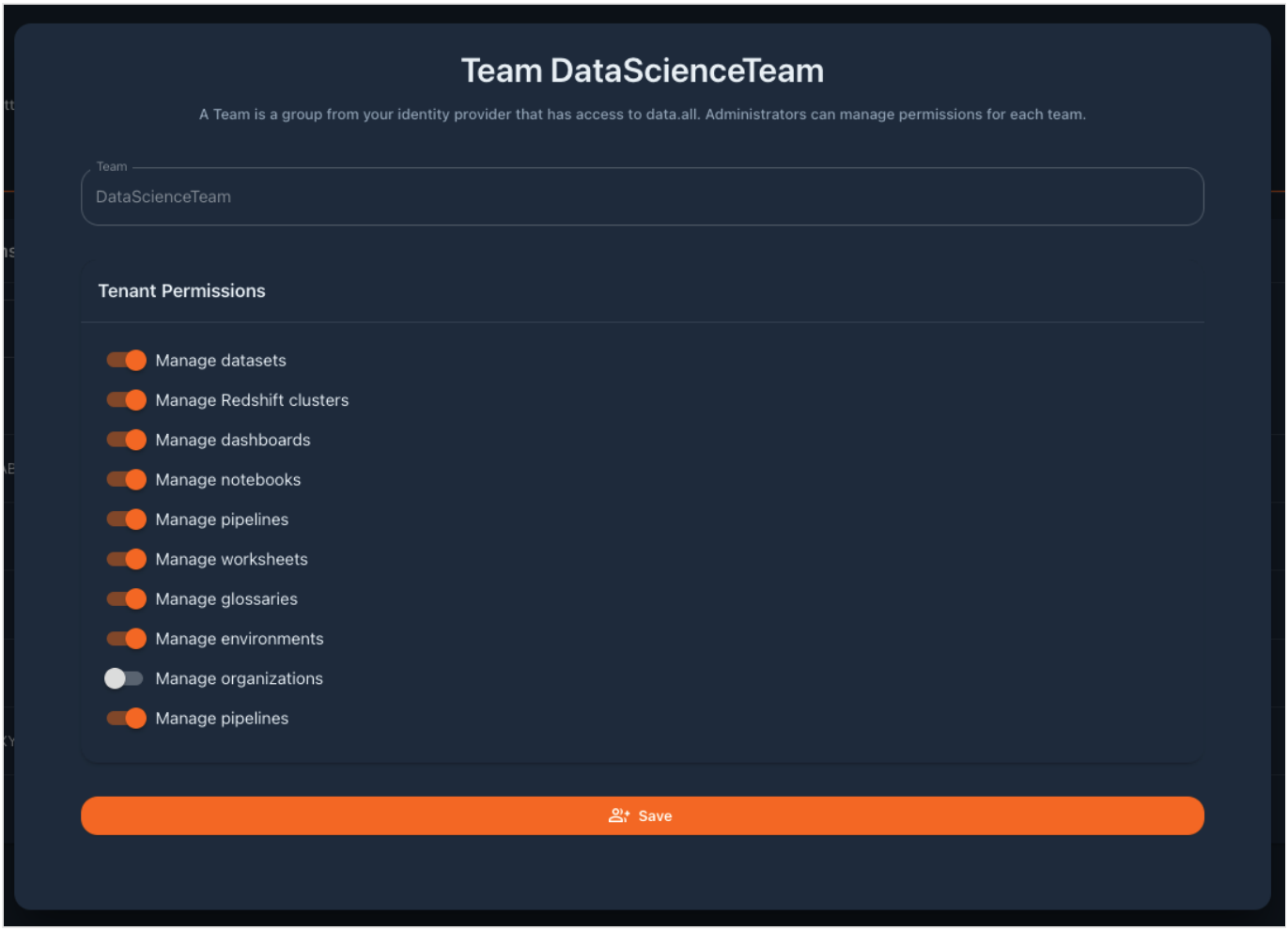
Manage tenant permissions

As a user part of "***DAAdministrators***" on your IdP you can access the settings menu from the profile icon.

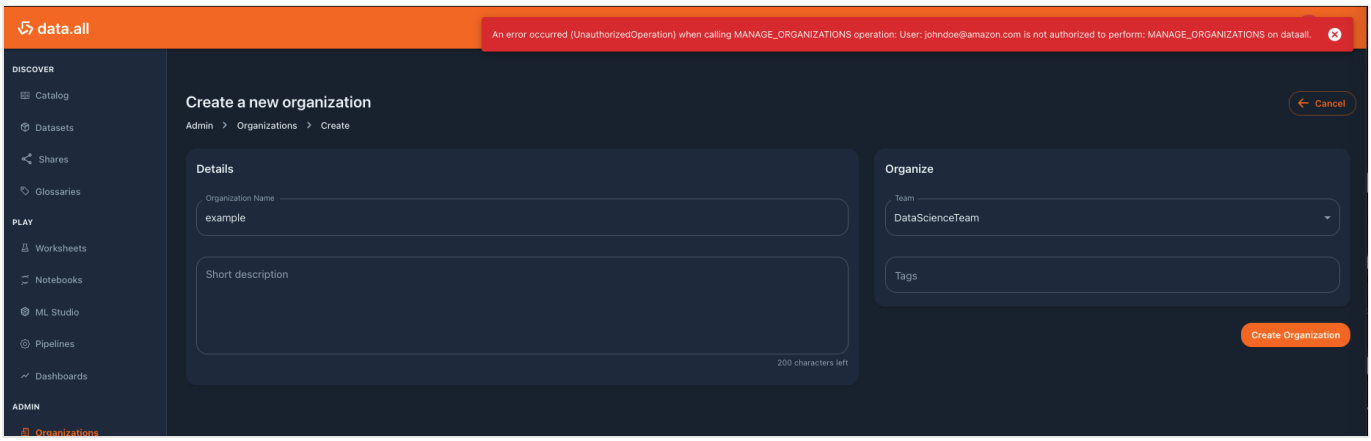
For example, Maria Garcia is not part of "***DAAdministrators***", therefore she sees nothing

On the other hand, Tenant user is part of this group and can navigate to **Admin settings**

In *Admin Settings*, the Tenant user can manage tenant permissions. In the following picture, the user is NOT granting the *DataScienceTeam* that John belongs to permissions to create an organization.



If the tenant revokes the permission of a team to manage an object, that team won't be able to perform any action on that particular object. For the given example, assuming that John only belongs to the *DataScienceTeam*, he is not able to create organizations:



3.1.2 **Organizations**

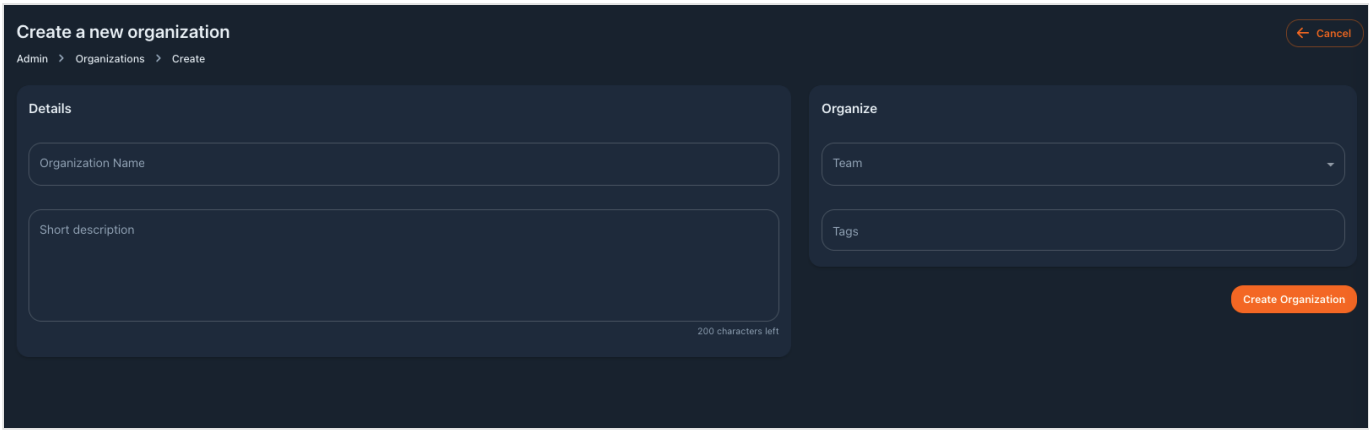
Organizations are high level constructs where business units can collaborate across many different AWS accounts at once. An organization includes environments and teams (see next section). Organizations are abstractions, they **don't** contain AWS resources, consequently there is no CloudFormation stack associated with them.

Organizations usually correspond to whole organizations, organization divisions or a separated geographical region within an organization.

Create an organization

> **Organization permissions**
>
> Any user can create an organization as long as he or she belongs to a group with tenant permission "Manage Organizations" (see previous chapter, "Manage tenant permissions").

To create an organization, on the left pane select **Organization**, click **Create** and complete the following form.



Field	Description	Required	Editable	Example
Organization name	Name of the organization	Yes	Yes	AnyCompany EMEA
Short description	Short description about the organization	No	Yes	AnyCompany EMEA region
Team	Name of the team managing the organization	Yes	No	EMEAAdmin
Tags	List of tags	No	Yes	fin,rnd,mark,sales

The next step to onboard your IdP groups is to link an environment and add teams, check Link an environment and Add a team to an environment

Edit and update an organization

On the organisation window we can check the organization metadata, as well as the environments and teams that belong to this organisation (we will come back to this in Environments and teams).

To edit the metadata of the organisation, click in **Edit** and update the information. Name, description and tags are editable, however the organisation team cannot be updated.

Delete an organization

> **Warning**
>
> Make sure that you delete the organisation environments before deleting the organisation. Otherwise, orphan environments might run into conflicts.

To archive an organisation, click on the **Archive** button next to the Edit button. A window with the previous warning will appear. If you want to go ahead and delete the organization, type *permantly archive* in the box and submit.

3.2 Environments and Teams

An environment is a **workplace** where a team can bring, process, analyze data and build data driven applications. Environments comprise AWS resources, thus when we create an environment, we deploy a CDK/CloudFormation stack to an AWS account and region. In other words, **an environment is mapped to an AWS account in one region, where users store data and work with data.**

> **One AWS account, One environment**
>
> To ensure correct data access and AWS resources isolation, onboard one environment in each AWS account. **We strongly discourage users to use the same AWS account for multiple environments**.

3.2.1 AWS account Pre-requisites

data.all does not create AWS accounts. You need to provide an AWS account and complete the following bootstraping steps. Only the first step, CDK bootstrap, is mandatory; the rest are needed depending on your deployment configuration or on the features enabled in the environment.

1. CDK Bootstrap

data.all uses AWS CDK to deploy and manage resources on your AWS account. AWS CDK requires some resources to exist on the AWS account, and provides a command called `bootstrap` to deploy these specific resources in a particular AWS region.

In this step we establish a trust relationship between the data.all infrastructure account and the accounts to be linked as environments. data.all codebase and CI/CD resources are in the data.all **tooling account**, and all the application resources used by the platform are located in a **infrastructure account**. From the infrastructure account we will deploy environments and other resources inside each of our business accounts. We are granting permissions to the infrastructure account by setting the `--trust` parameter in the cdk bootstrap command.

To boostrap the AWS account using AWS CDK, you need the following (which are already fulfilled if you open AWS CloudShell from the environment account).

1. to have AWS credentials configured in ~/.aws/credentials or as environment variables.
2. to install cdk: `npm install -g aws-cdk`

Then, you can copy/paste the following command from the UI and run from your local machine or CloudShell:

```
cdk bootstrap --trust DATA.ALL_AWS_ACCOUNT_NUMBER  -c @aws-cdk/core:newStyleStackSynthesis=true --cloudformation-execution-policies arn:aws:iam::aws:policy/
AdministratorAccess aws://YOUR_ENVIRONMENT_AWS_ACCOUNT_NUMBER/ENVIRONMENT_REGION
```

> **Which account should I put in the command?**
>
> Let's check with an example: the **tooling account** is 111111111111 and data.all was deployed to the **infrastructure account** = 222222222222. Now we want to onboard a **business account** = 333333333333 in region eu-west-1. Then the cdk bootstrap command will look like: `bash`
> `cdk bootstrap --trust 222222222222  -c @aws-cdk/core:newStyleStackSynthesis=true --cloudformation-execution-policies`
> `arn:aws:iam::aws:policy/AdministratorAccess aws://333333333333/eu-west-1`

RESTRICTED CDK EXECUTION ROLE

In the above command we define the `--cloudformation-execution-policies` to use the AdministratorAccess policy `arn:aws:iam::aws:policy/AdministratorAccess`. This is the default policy that CDK uses to deploy resources, nevertheless it is possible to restrict it to any IAM policy created in the account.

A more restricted policy named `DataAllCustomCDKPolicyREGION` is provided and directly downloadable from the UI. This more restrictive policy can be optionally passed in to the parameter `--cloudformation-execution-policies` instead of `arn:aws:iam::aws:policy/AdministratorAccess` for the CDK Execution role.

```
aws cloudformation --region REGION create-stack --stack-name DataAllCustomCDKExecPolicyStack --template-body file://cdkExecPolicy.yaml --parameters
ParameterKey=EnvironmentResourcePrefix,ParameterValue=dataall --capabilities CAPABILITY_NAMED_IAM && aws cloudformation wait stack-create-complete --stack-name
DataAllCustomCDKExecPolicyStack --region REGION && cdk bootstrap --trust 225091619433 -c @aws-cdk/core:newStyleStackSynthesis=true --cloudformation-execution-
policies arn:aws:iam::ACCOUNT_ID:policy/DataAllCustomCDKPolicyREGION aws://ACCOUNT_ID/REGION
```

ENVIRONMENTS IN MULTIPLE REGIONS

v2.4.0 allows the creation of multiple environments in the same AWS account and in multiple regions. We need to bootstrap every region that will host an environment.

> **Regional CDK Execution Policy**
>
> Every CDK execution role requires its own `DataAllCustomCDKPolicyREGION` IAM policy. If you are using restricted CDK execution roles you need a different `DataAllCustomCDKExecPolicyStack` for each region used.

2. (For manual) Pivot role

data.all assumes a certain IAM role to be able to call AWS SDK APIs on your account. The Pivot Role is a super role in the environment account and thus, it is protected to be assumed only by the data.all central account using an external Id.

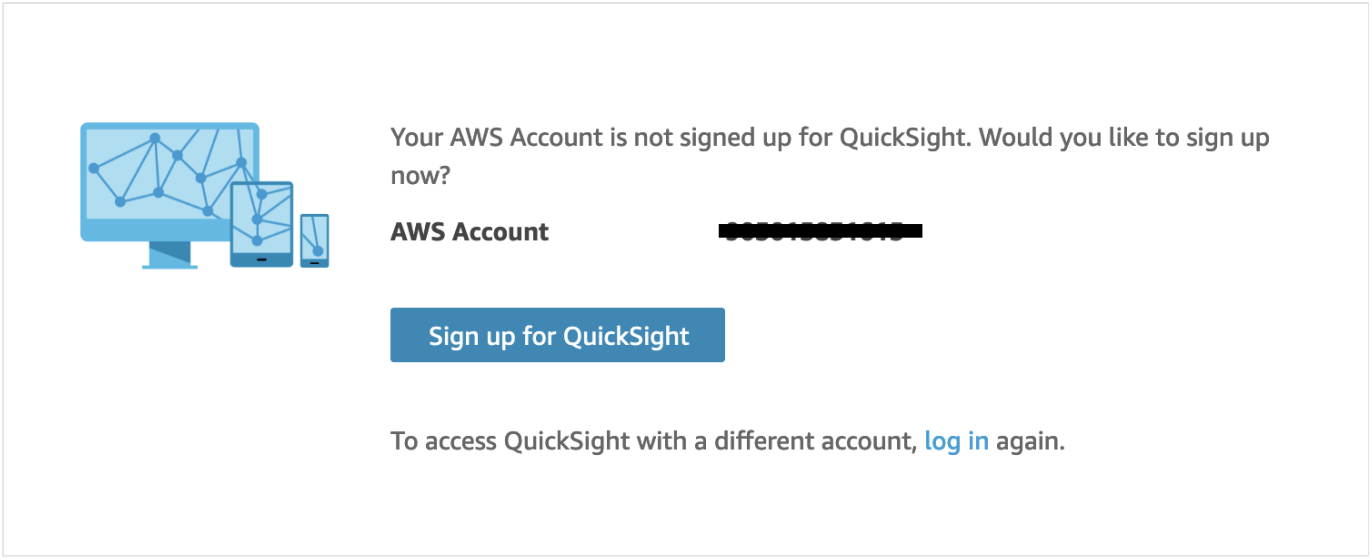
Since release V1.5.0, the Pivot Role can be created as part of the environment CDK stack, given that the trust between data.all and the environment account is already explicitly granted in the bootstraping of the account. To enable the creation of Pivot Roles as part of the environment stack, the `cdk.json` parameter `enable_pivot_role_auto_create` needs to be set to `true`. When an environment is linked to data.all a nested stack creates a role called **dataallPivotRole-cdk**.

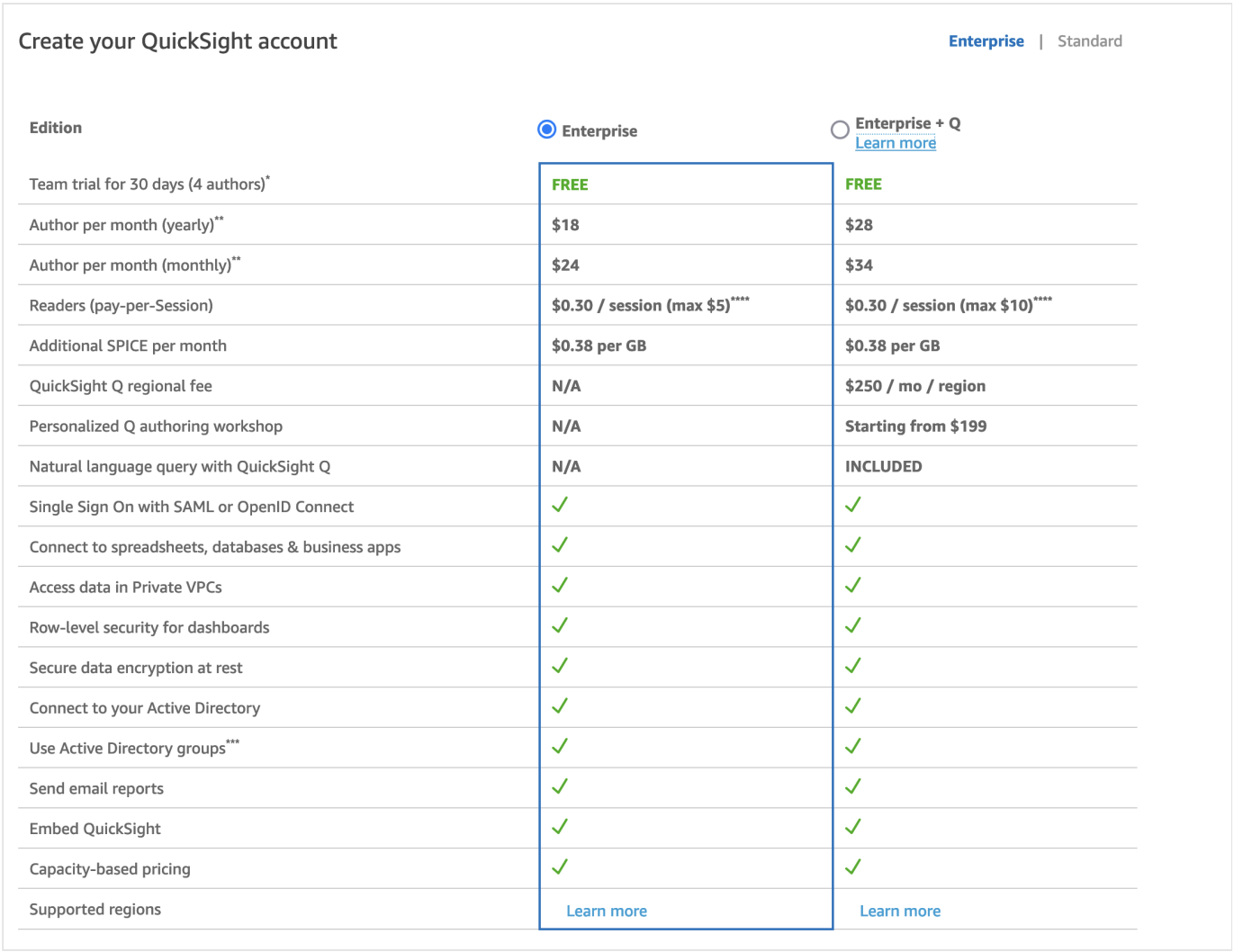
For versions prior to V1.5.0 or if `enable_pivot_role_auto_create` is `false` the Pivot Role needs to be created manually. In this case, the AWS CloudFormation stack of the role can be downloaded from *data.all* environment creation form. (Navigate to an organization and click on link an environment to see this form). Fill the CloudFormation stack with the parameters available in data.all UI to create the role named **dataallPivotRole**.

> **Upgrading from manual to cdk-created Pivot Role**
>
> If you have existing environments that were linked to data.all using a manually created Pivot Role you can still benefit from V1.5.0 `enable_pivot_role_auto_create` feature. You just need to update that parameter in the `cdk.json` configuration of your deployment. Once the CICD pipeline has completed: new linked environments will contain the nested cdk-pivotRole stack (no actions needed) and existing environments can be updated by:
> a) manually, by clicking on "update stack" in the environment --> stack tab
> b) automatically, wait for the `stack-updater` ECS task that runs daily overnight
> c) automatically, set the added `enable_update_dataall_stacks_in_cicd_pipeline` parameter to `true` in the `cdk.json` config file. The `stack-updater` ECS task will be triggered from the CICD pipeline

3. (For Dashboards) Subscribe to Amazon Quicksight

This is an optional step. To link environments with ***Dashboards enabled*** , you will also need a running Amazon QuickSight subscription on the bootstraped account. If you have not subscribed to Quicksight before, go to your AWS account and choose the Enterprise option as show below:





Create your QuickSight account

Enterprise | Standard

Edition	Enterprise	Enterprise + Q Learn more
Team trial for 30 days (4 authors)*	FREE	FREE
Author per month (yearly)**	$18	$28
Author per month (monthly)**	$24	$34
Readers (pay-per-Session)	$0.30 / session (max $5)****	$0.30 / session (max $10)****
Additional SPICE per month	$0.38 per GB	$0.38 per GB
QuickSight Q regional fee	N/A	$250 / mo / region
Personalized Q authoring workshop	N/A	Starting from $199
Natural language query with QuickSight Q	N/A	INCLUDED
Single Sign On with SAML or OpenID Connect	✓	✓
Connect to spreadsheets, databases & business apps	✓	✓
Access data in Private VPCs	✓	✓
Row-level security for dashboards	✓	✓
Secure data encryption at rest	✓	✓
Connect to your Active Directory	✓	✓
Use Active Directory groups***	✓	✓
Send email reports	✓	✓
Embed QuickSight	✓	✓
Capacity-based pricing	✓	✓
Supported regions	Learn more	Learn more

4. (For ML Studio) Specifying a VPC or using default

If ML Studio is enabled, data.all will create a new SageMaker Studio domain in your AWS Account and use the domain later on to create ML Studio profiles.

Prior to V1.5.0 data.all always used the default VPC to create a new SageMaker domain. The default VPC had then to be customized to fulfill the networking requirements specified in the Sagemaker documentation for VPCOnly domains.

In V1.5.0 we introduce the creation of a suitable VPC for SageMaker as part of the environment stack. However, it is not possible to edit the VPC used by a SageMaker Studio domain, it requires deletion and re-creation. To allow backwards compatibility and not delete the pre-existing domains, in V1.5.0 the default behavior is still to use the default VPC.

In V2.2.0, we introduced the ability to select your own VPC ID and Subnet IDs to deploy the VPC-Only Sagemaker Studio domain to.

Data.all will follow the following rules to establish which VPC to use for Sagemaker Studio domain creation:

- If MLStudio enabled with VPC and subnet IDs specified
- Use the specified VPC and subnet IDs
- If MLStudio enabled with no VPC/subnet IDs specified
- default VPC exists --> Uses default VPC and all subnets available
- default VPC does not exist --> Creates a new VPC and uses with private subnets

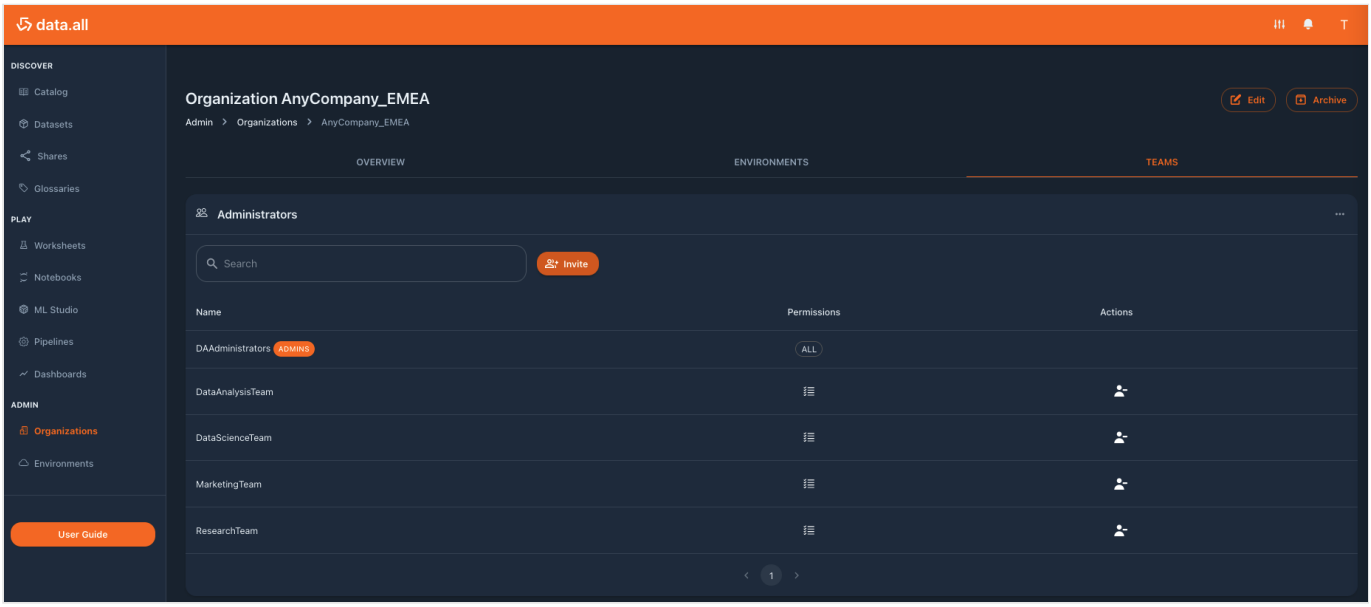
Pre-existing environments from older versions of data.all will have their Sagemaker Studio domain remain unchanged if already enabled. Users can get a better understanding of what VPC configuration is being used by navigating to the environment --> MLStudio Tab in the data.all UI once the environment stack is created.

3.2.2 NEW Link an environment

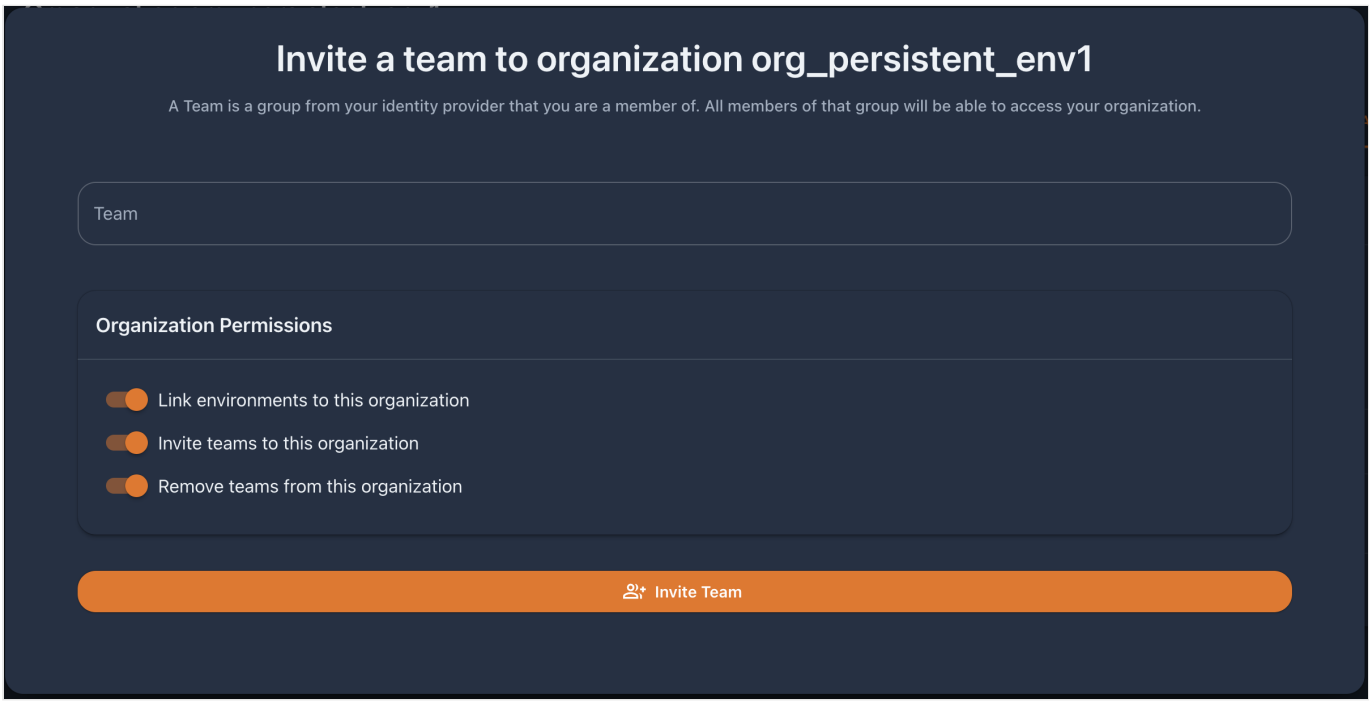
Necessary permissions

> **Environment permissions**
>
> Only organization Administrator teams can link environments to the Organization. The Organization creator team is the by default Organization Administrator team, but users of this group can now invite other teams and grant them permission to manage organization teams, and link environment to the organization.

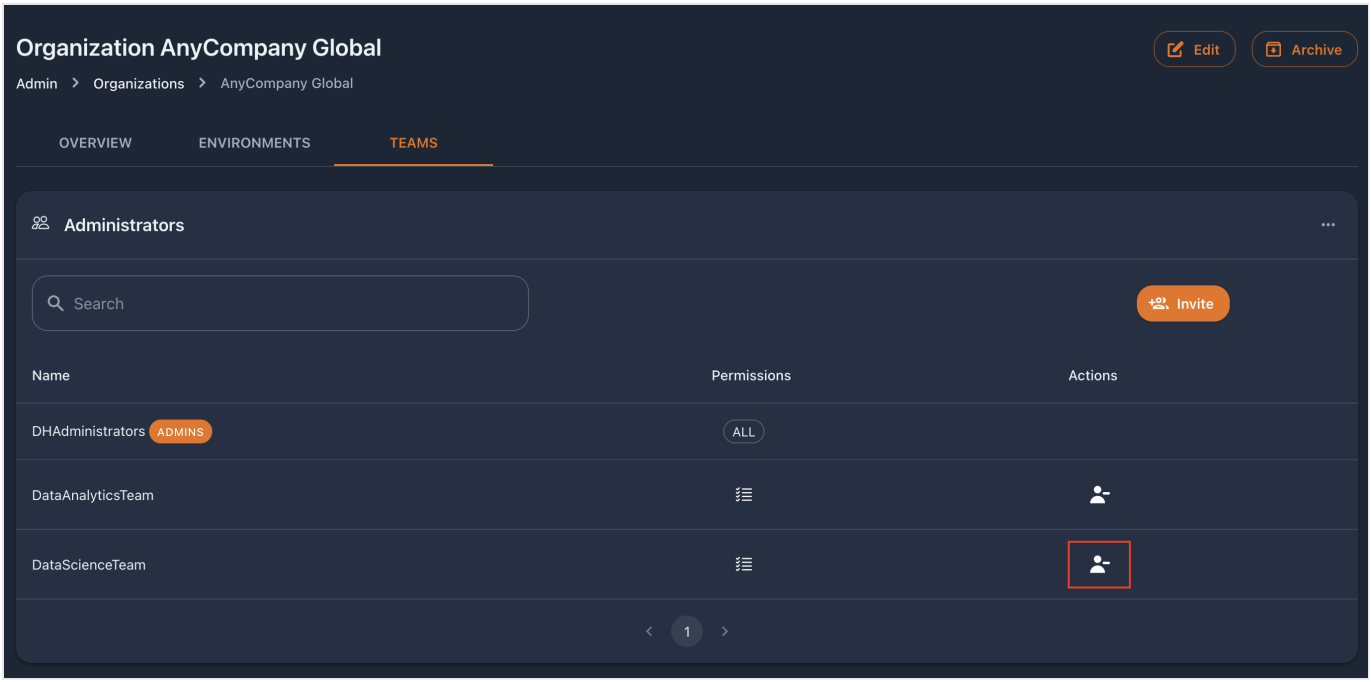
Managing organization teams can be done through the UI or APIs. From the UI, navigate to your organizations and click on the **Teams** tab.



Invite button opens a dialog that gives the organization creators the possibility to invite one of the IdP groups they belong to, which will appear in a dropdown when we click on **Teams**. They can also invite an IdP group that they don't belong to, as long as they type the exact group name (**case sensitive**):

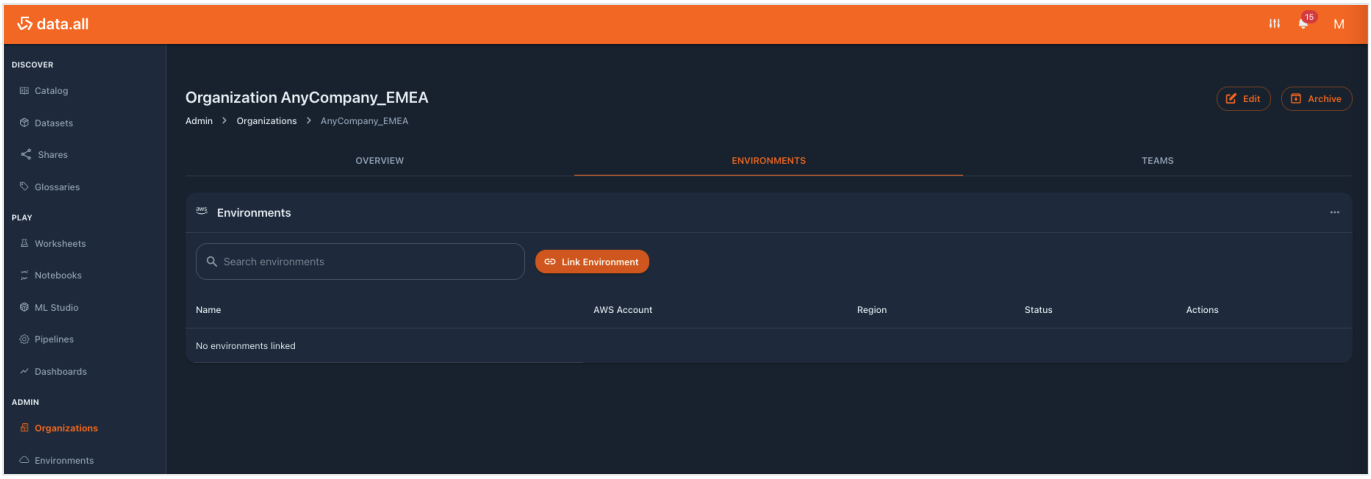


You can check the Organization administrators teams in the Organization's **Teams** tabs and remove a team if necessary on the icon in the Actions column.



Link environment

Once the AWS account/region is bootstraped and we have permission to link an environment to an organization, let's go! Navigate to your organization, click on the **Link Environment** button, and fill the environment creation form:



Field	Description	Required	Editable	Example
Environment name	Name of the environment	Yes	Yes	Finance
Short description	Short description about the environment	No	Yes	Finance department teams
Account number	AWS bootstraped account maped to the environment	Yes	No	111111111111
Region	AWS region	Yes	No	Europe (Ireland)
IAM Role ARN	Alternative name of the environment IAM role	No	No	anotherRoleName
Resources prefix	Prefix for all AWS resources created in this environment. Only (^[a-z-]*$)	Yes	Yes	fin
Team	Name of the group initially assigned to this environment	Yes	No	FinancesAdmin
Tags	Tags that can later be used in the Catalog	Yes	Yes	finance, test
ML Studio VPC ID	VPC to host the environment sagemaker studio domain (if mlstudio is enabled) instead than the default VPC or the VPC created by *data.all*	No	No	vpc-.....
ML Studio Subnet ID(s)	Subnet(s) to host the environment sagemaker studio domain (if mlstudio is enabled) instead than the default subnets or the subnets created by *data.all*	No	No	subnet-....

Features Management

An environment is defined as a workspace and in this workspace we can flexibly activate or deactivate different features, adapting the workspace to the teams' needs. If you want to use Dashboards, you need to complete the optional third step explained in the previous chapter "Bootstrap your AWS account".

> **This is not set in stone!**
>
> Don't worry if you change your mind, features are editable. You can always update the environment to enable or disable a feature.

Click on Save, the new Environment should be displayed in the Environments section of the left side pane.

3.2.3 Manage your Environment

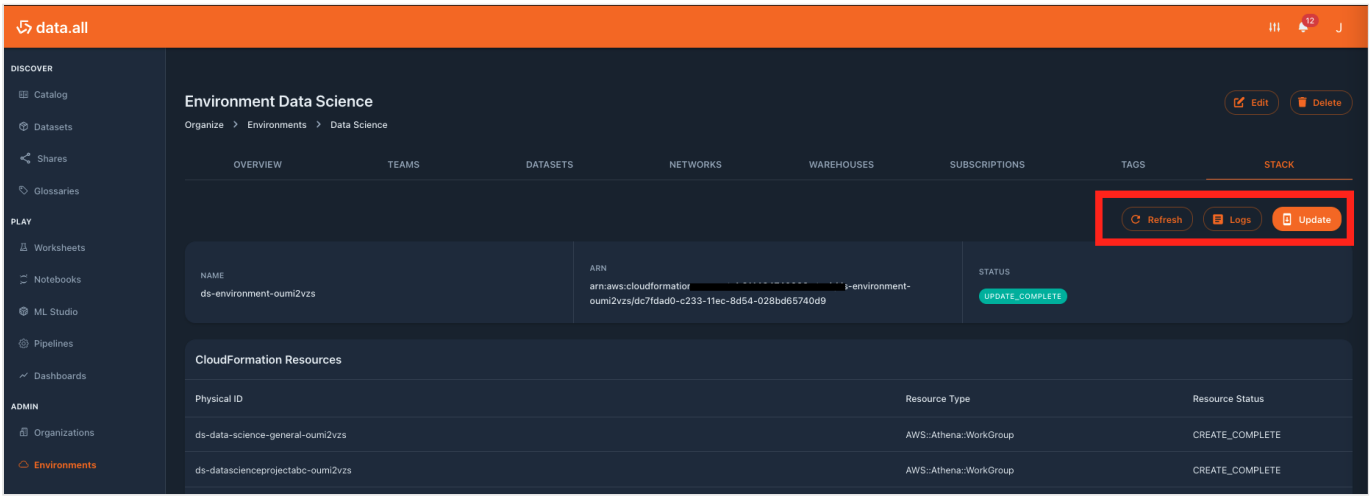
Go to the environment you want to check. You can find your environment in the Environments list clicking on the left side pane or by navigating to the environment organization. There are several tabs just below the environment name:

- Overview: summary of environment information and AWS console and credential access.
- Teams: list of all teams onboarded to this environment.
- Datasets: list of all datasets owned and shared with for this environment
- MLStudio: summary of Sagemaker Studio domain configuration (if enabled)
- Networks: VPCs created and owned by the environment
- Subscriptions: SNS topic subscriptions enabled or disabled in the environment
- Tags: editable key-value tags
- Stack: CloudFormation stack details and logs

> **Environment access**
>
> If **none** of the teams you belong to (IdP groups) has been onboarded to the environment, you won't be able to see the environment in the environments menu or in the organization environments list. **Check the "Manage teams" section**

Check CloudFormation stack

After linking an environment we can check the deployment of AWS resources in CloudFormation, click on the environment and then on the **Stack** tab. Right after linking an environment you should find something like the below picture.



After some minutes its status should go from "PENDING" to "CREATE_COMPLETE" and we will be able to look up the AWS resources created as part of the environment CloudFormation stack. Moreover, we can manually trigger the update in case of change sets of the CloudFormation stack with the **Update** button.

> **Pro Tip**
>
> If something in the creation or update of an environment fails, we can directly check the logs by clicking the logs button. No need to navigate to the AWS console to find your logs!

After being processed (not in `PENDING`), the status of the CloudFormation stack is directly read from CloudFormation.

Edit and update an environment

Find your environment in the Environments list or by navigating to the corresponding organization. Once in your selected environment, click on **Edit** in the top-right corner of the window and make all the changes you want.

Finally, click on **Save** at the bottom-right side of the page to update the environment.

> **Automatically updates the CloudFormation stack**
>
> Clicking on Save will update the environment metadata as well as the CloudFormation stack on the AWS account

Delete an environment

In the chosen environment, next to the Edit button, click on the **Delete** button.

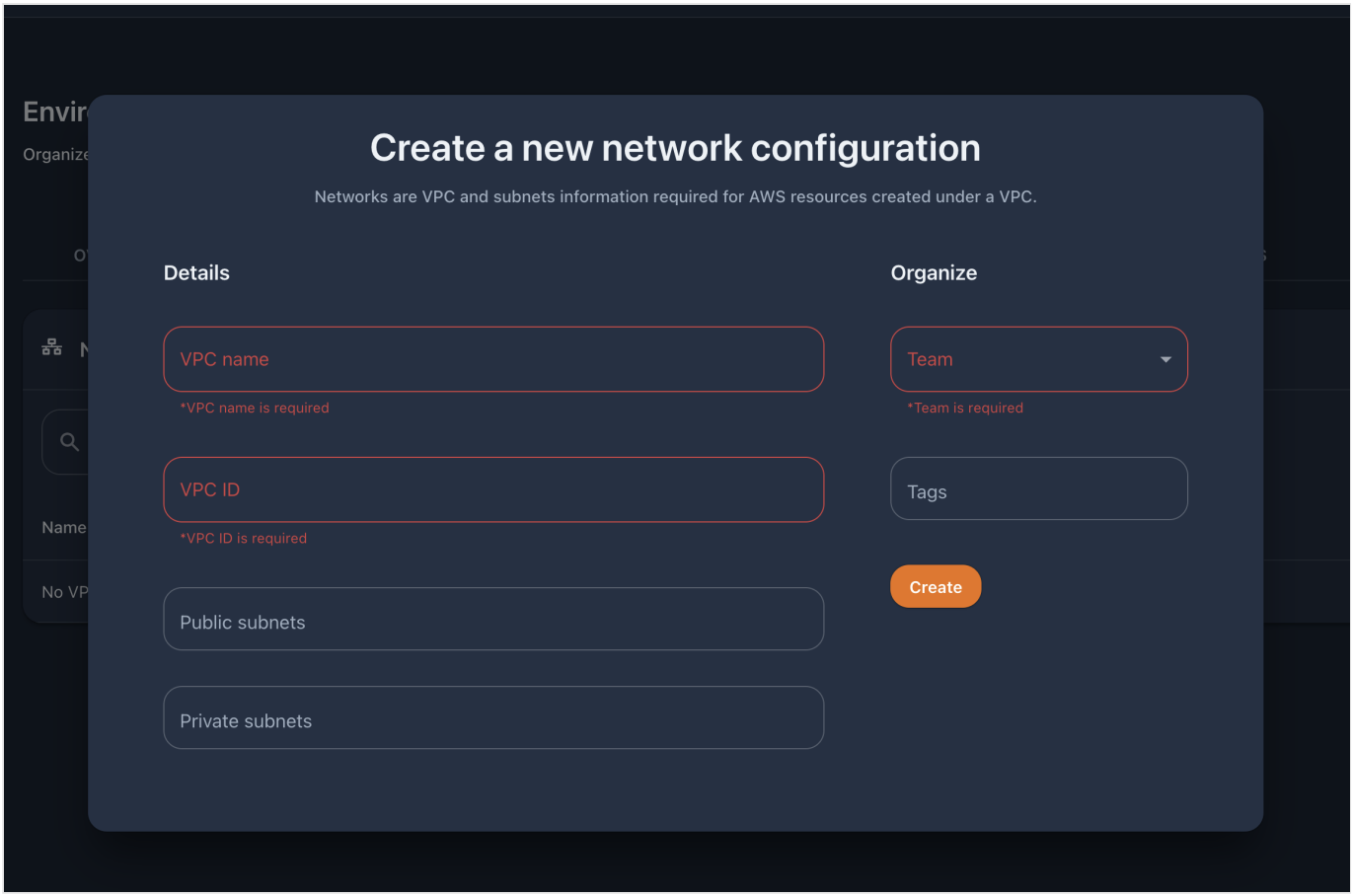
> **orphan *data.all* resources**
>
> A message like this one: *"Remove all environment related objects before proceeding with the deletion!"* appears in the delete display. Don't ignore it! Before deleting an environment, clean it up: delete its datasets and other resources.

Note that we can keep the environment CloudFormation stack. What is this for? This is useful in case you want to keep using the environment resources (IAM roles, etc) created by *data.all* but outside of *data.all*

Create networks

Networks are pre-existing VPCs that are onboarded to *data.all* and belonging to an environment and team. To create a network, click in the **Networks** tab in the environment window, then click on **Add** and finally fill the following form.

> **Using Networks**
>
> After onboarding your network(s) in *data.all*, users can easily select the VPC and Subnet information of that network to seamlessly deploy new resources in data.all that require VPC configurations, such as data.all Notebooks. For example, if a User wants to create a notebook in their environment after onboarding a network, the VPC and Subnet ID fields in the create notebook form on data.all will auto-populate with the VPC and subnet information for the user to easily to select (rather than navigating to and from the AWS Console)!

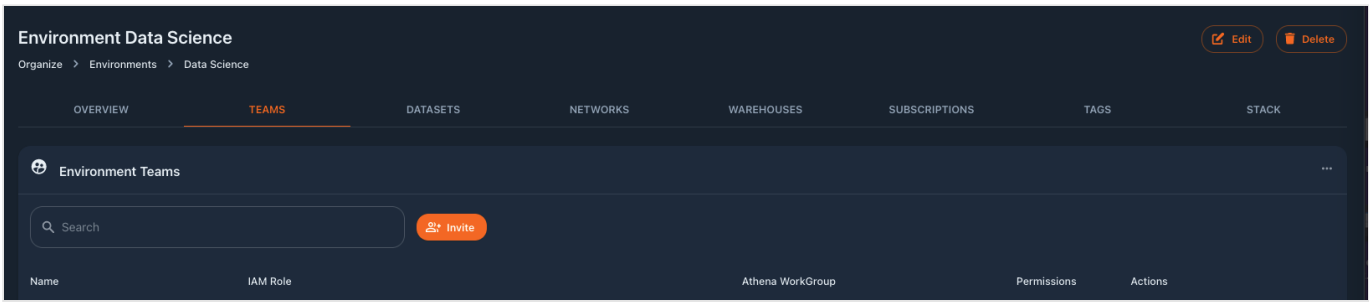


Create Key-value tags

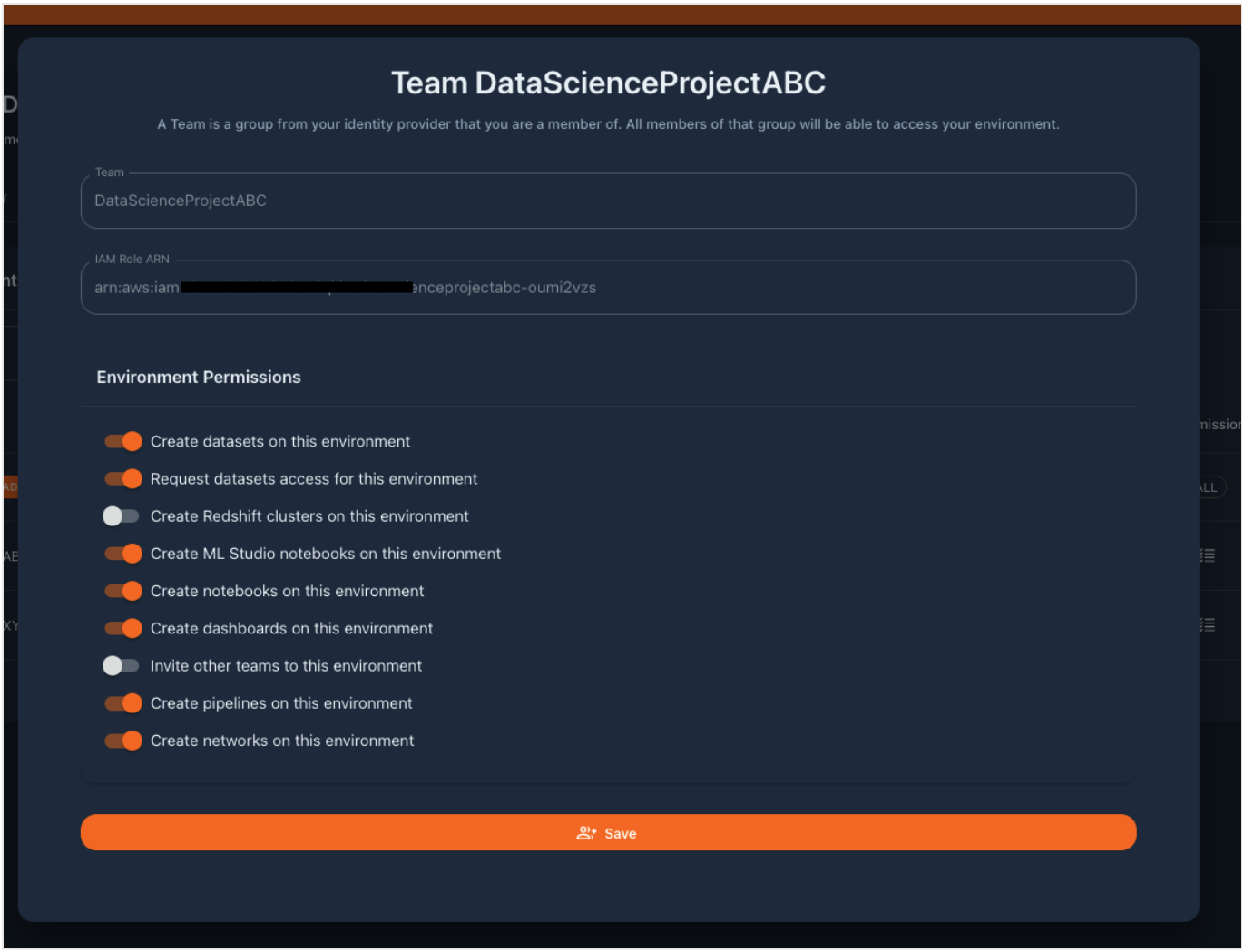
In the **Tags** tab of the environment window, we can create key-value tags. These tags are not *data.all* tags that are used to tag datasets and find them in the catalog. In this case we are creating AWS tags as part of the environment CloudFormation stack. There are multiple tagging strategies as explained in the documentation.

3.2.4 Manage Teams

Environment creators have all permissions on the environment, and can invite other teams to the onboarded environment. To add an IdP group to an environment, navigate to the **Teams** tab of the environment and click on the **Invite** button.



A display will allow you to customize the AWS permissions that the onboarded group will have, adapting to different types of users (data scientists, data engineers, data analysts, management). The customizable permissions can be enabled or disabled as appears in the following picture.

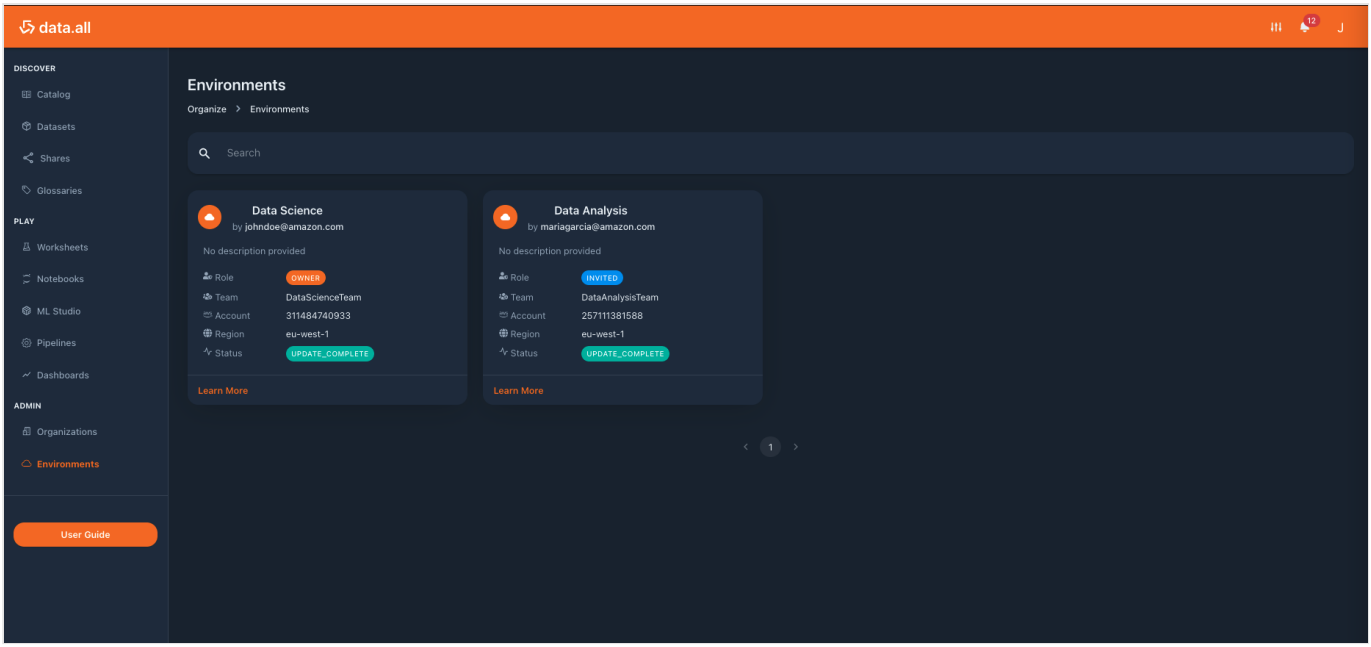


When the invitation is saved, the environment CloudFormation stack gets automatically updated and creates a new IAM role for the new team. The IAM role policies are mapped to the permissions and are granted to the invited team (e.g., a team invited without "Create ML Studio" permission will not have Sagemaker permissions on the associated IAM role).To remove a group, in the *Actions* column select the minus icon.

> **Automated permission assignment**
>
> Groups retrieved from the IdP are automatically granted all application high level permissions by default to accelerate the onboarding process.

Users will only be able to see the environments where a team that they belong to has been onboarded (either as creator of the environment or invited to the environment). In the following picture, John belongs to the *DataScienceTeam* that owns the *Data Science* environment, but on top of that he can access the *Data Analysis* environment because her team has been invited by Maria.

> **Pro tip!**
>
> You know whether you are `OWNER` or `INVITED` in an environment by checking **your Role** in that environment. This information appears in the picture in each environment box in the field "Role".

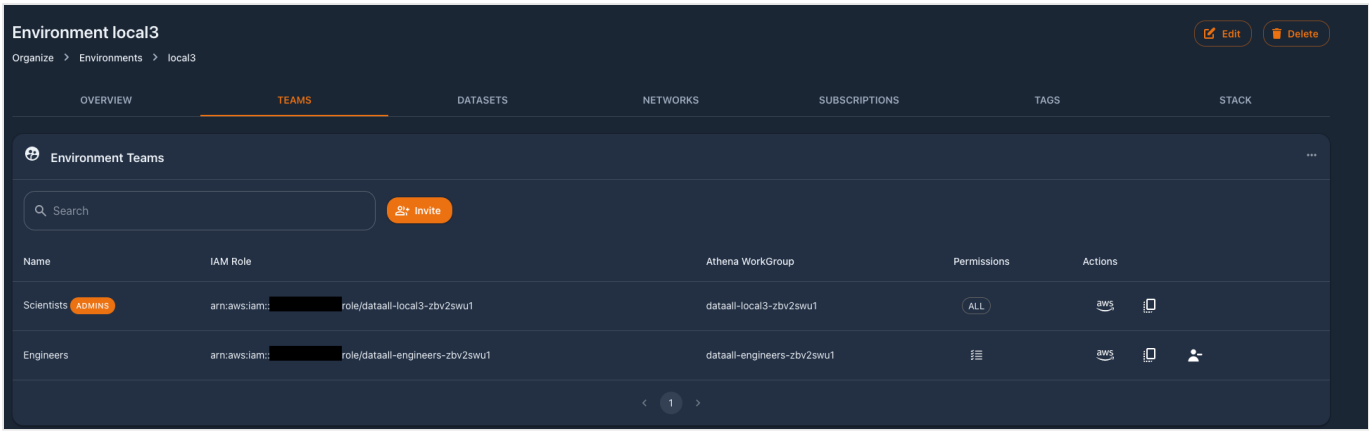


Difference between invited and owner

A team that has been invited to an environment has slight limitations, because well, it is not their environment! Invited teams cannot access the **Stack** tab of the environment because they should not be handling the resources of the environment. Same applies for **Tags** and **Subscriptions**. Other limitations come from the permissions that have been assigned to the team.

AWS access - Environment IAM roles

For the environment admin team and for each team invited to the environment *data.all* creates an IAM role. From the **Teams** tab of the environment we can assume our team's IAM role to get access to the AWS Console or copy the credentials to the clipboard. Both options are under the "Actions" column in the Teams table (these options are only available if `core.features.env_aws_actions` is set to `True` in the `config.json` used for deployment of data.all).



Usage

- Assumed by Team members from *data.all* UI to explore and work with data
- Credentials can be copied in *data.all* UI to explore and work with data
- Assumed by *data.all* Worksheets to query data using Athena
- Credentials can be copied in *data.all* Pipelines to develop the pipeline

IAM Permissions

Default permissions

- read permissions to profiling/code folder in the Environment S3 Bucket
- Athena permissions to use the Team's workgroup
- CloudFormation permissions to resources tagged with Team tag and prefixed with environment `resource_prefix`
- SSM Parameter Store permissions to resources tagged with team tag and prefixed with environment `resource_prefix`
- Secrets Manager permissions to resources tagged with team tag and prefixed with environment `resource_prefix`
- read permissions on Logs and IAM
- PassRole permissions for itself to Glue, Lambda, SageMaker, StepFunctions and DataBrew

Data permissions

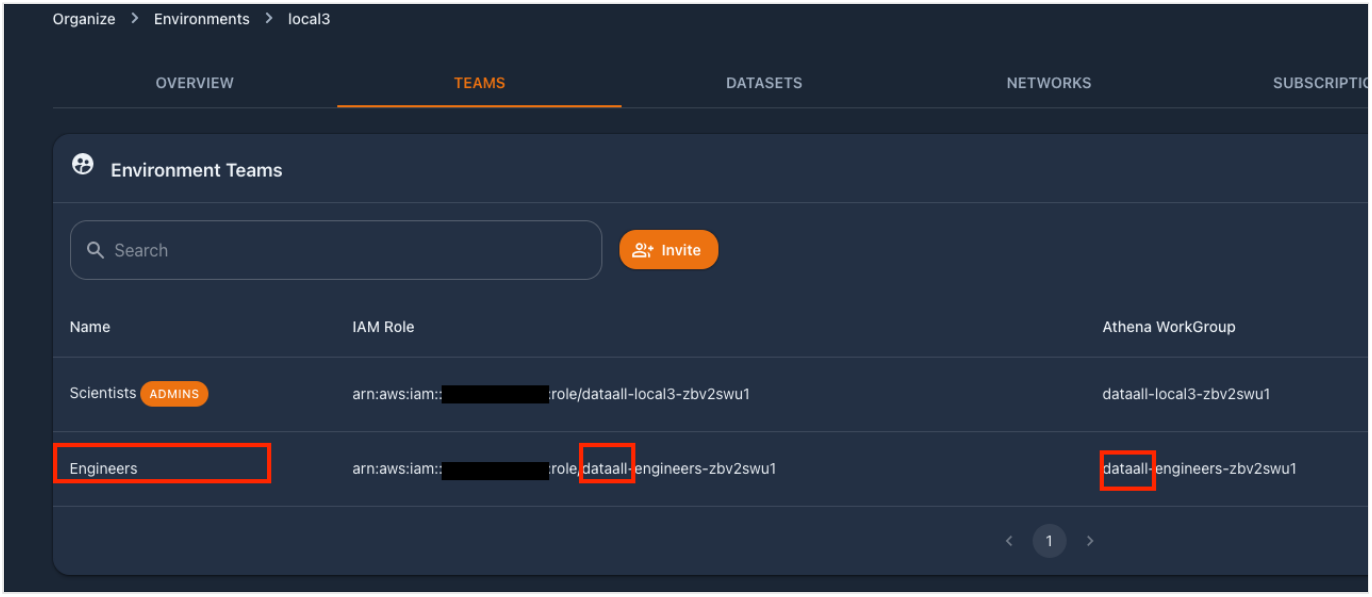
- read and write permissions to the Team-owned Dataset S3 Buckets
- encrypt/decrypt data with the Team-owned Dataset KMS keys
- read and write permissions Dataset Glue databases - governed with Lake Formation

Feature permissions

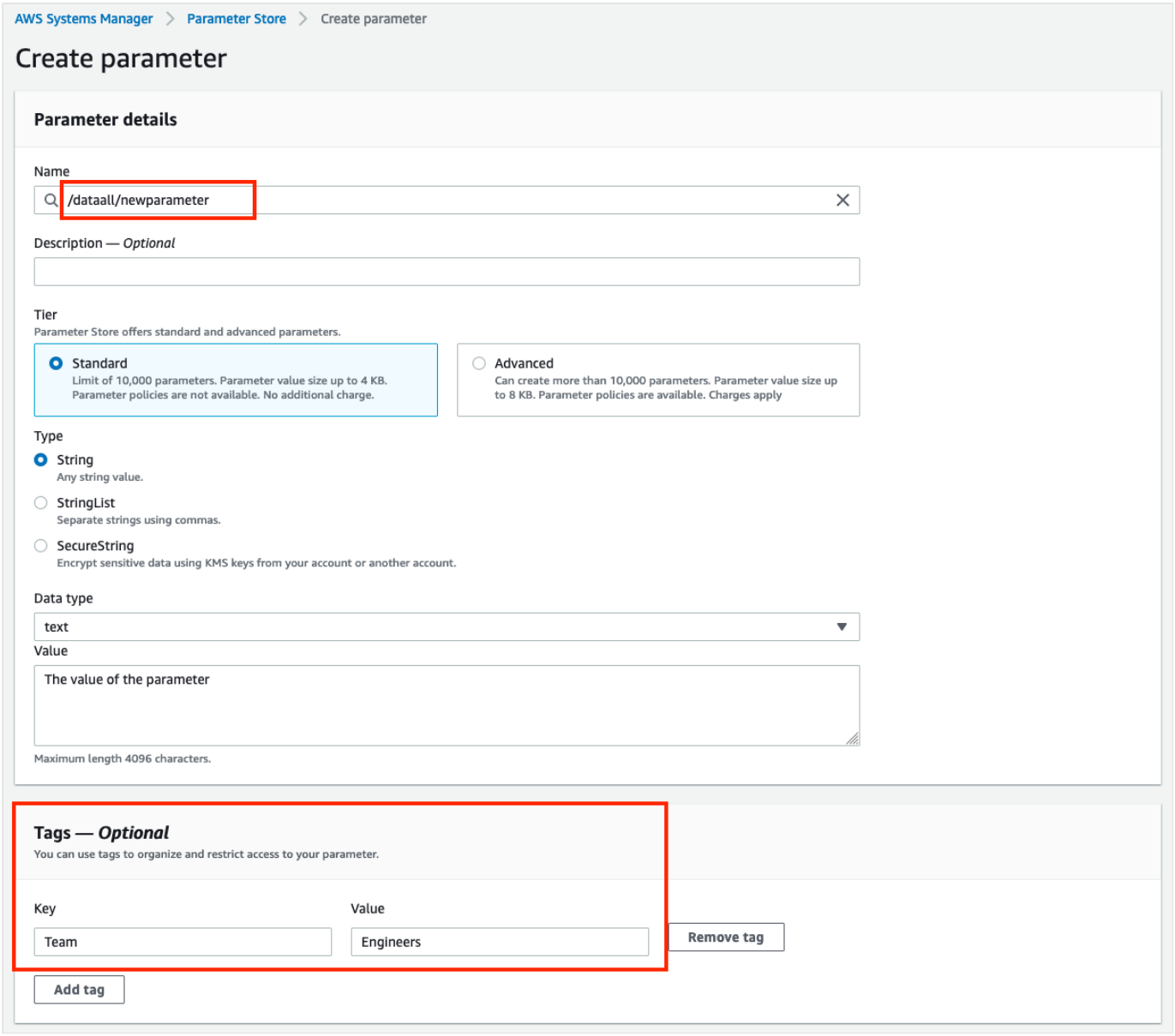
Depending on the features enabled in the environment and granted to the Team, additional AWS permissions are given to the role. Permissions for any AWS service need to be defined to allow access onlt to resources tagged with team tag and prefixed with environment `resource_prefix`

> **Access denied? You need to tag resources when you create them**
>
> Since permissions to AWS services are restricted to team-tagged resources, you need to tag any new resource that you create at creation time.

Let's say you are using the "Engineers" IAM role in an environment that prefixes all resources with the `resource_prefix` = "dataall" as in the following picture.



Assuming the IAM role you will be able to create parameters prefixed by "dataall" and tagged with a tag Team=Engineers, otherwise you will get AccessDenied errors.



All the resources created in the environment stack are tagged with the tag `Team=EnvAdminTeam`, which means that environment admins can access and manage the environment baseline AWS resources.

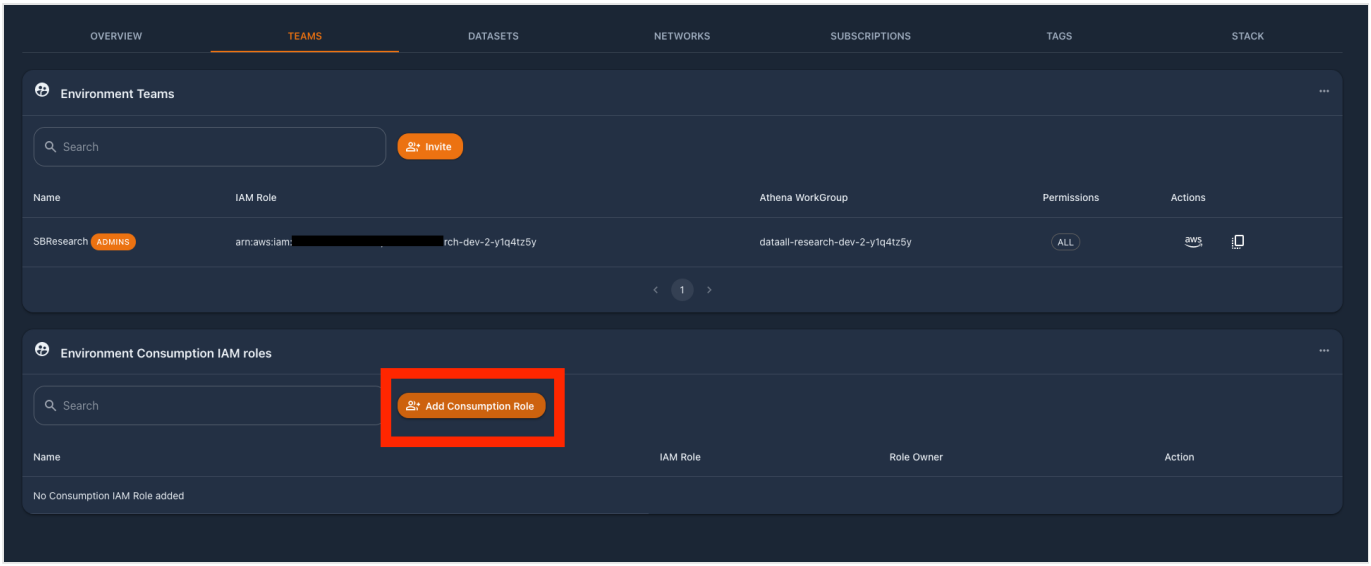
Data Governance with Lake Formation

We use AWS Lake Formation to govern Glue databases and tables. Using Lake Formation, we grant permissions to the Environment teams IAM roles to read and write the Glue databases and tables that the Team owns. In other words, each environment team IAM role can only access the Glue databases and tables of the Datasets that the team owns.

3.2.5 Manage Consumption Roles

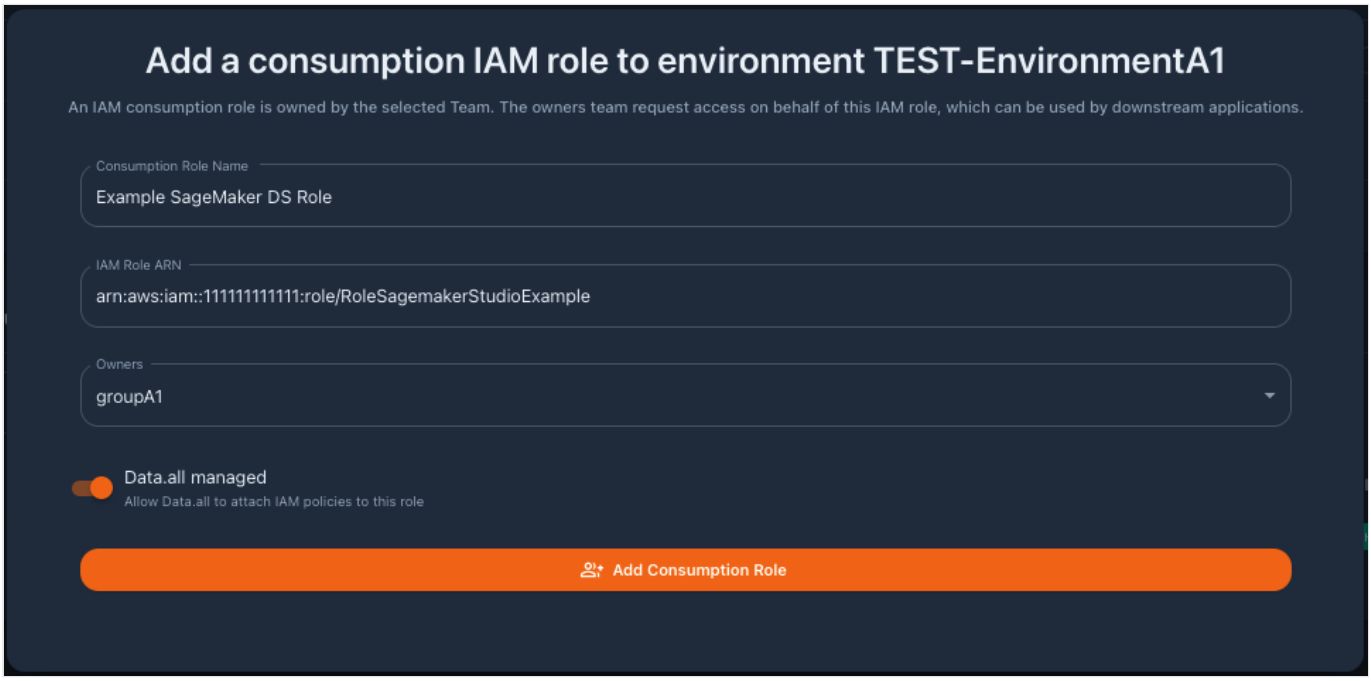
data.all creates or imports one IAM role per Cognito/IdP group that we invite to the environment. With these IAM roles data producers and consumers can ingest and consume data, but sometimes we want to consume data from an application that already has an execution role. To increase the flexibility in the data consumption patterns, data.all introduces Consumption Roles.

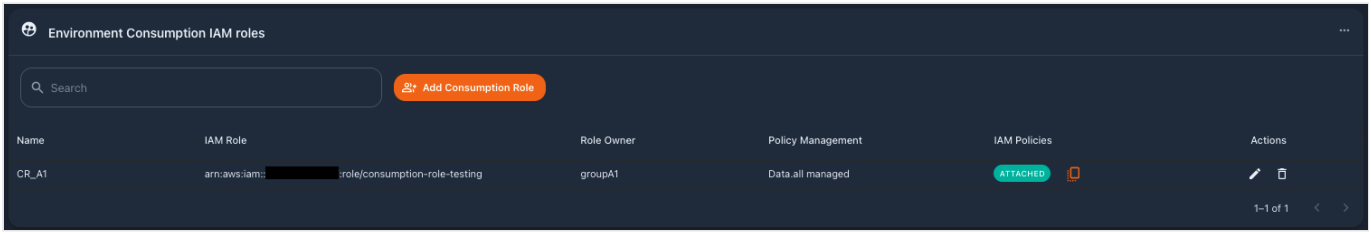
Any IAM role that exists in the Environment AWS Account can be added to *data.all*. In the **Teams** tab click on *Add Consumption Role*



A window like the following will appear for you to introduce a name for the consumption role in data.all, the arn of the IAM role, the Team that owns the consumption role and whether data.all should manage the consumption role. Enabling "data.all managed" on the consumption role allows data.all to attach IAM policies to the role used for data.all related activities, such as sharing data, rather than having a user manually add those policies to the role.

Only members of this team and tenants of *data.all* can edit or remove the consumption role.





Existing roles only

data.all checks whether that IAM role exists in the AWS account of the environment before adding it as a consumption role.

Data Access

- By default, a new consumption role does NOT have access to any data in *data.all*.
- The team that owns the consumption role needs to open a share request for the consumption role as discussed more in the Discover --> Shares section.

3.3 Maintenance Window

When deploying new releases, patch updates, etc there may arise a situation in which a user may be performing an action,
and, at the same time some AWS resources might be getting updated. This can put data.all created components (Environments, Datasets, Dataset Shares) into broken state. Also, there might be a need to debug (or patch update few things in data.all) when the data.all administrators may want to restrict actions taken by users in data.all. In order to protect such a deployment and create a safe environment for deployment / patch updates, data.all can be put into maintenance mode.

In order to enable use of maintenance mode into your deployment of data.all, modify the config.json and add this to the modules section

```
"maintenance": {
    "active": true
}
```

Note: Only data.all administrators can start the maintenance mode. Maintenance window is available in the `Admin Settings` section. Data.all currently supports two maintenance modes.

Read-only : In this mode, a user can visit data.all and navigate through data.all but won't be able to update/modify any data.all related components. No-Access : In this mode, a user is shown a blank page after the user logs into data.all. In this mode, all user actions are blocked.

Note - During both the maintenance modes, data.all admins can perform all data.all actions (i.e. an admin can login and modify data.all related components where they have access)

The following happens when a maintenance mode / window is started in data.all

1. All Scheduled ECS tasks (such as Catalog-Indexer, Share Verifier, etc) are disabled
2. If there is any running ECS task at the time of starting maintenance window, the status of that ECS task is polled and only when all the ECS tasks have completed , the maintenance mode status is changed to ACTIVE - indicating that it is safe to deploy or carry out any maintenance activities.
3. GraphQL calls are blocked depending on the maintenance mode. If the maintenance mode is Read-Only, then only mutation graphql calls are blocked. In case of No-Access maintenance mode, both mutation and query graphql calls are blocked for the user.

3.3.1 Enable / Disable Maintenance mode

In order to enable maintenance mode, goto `Admin Settings` page - which is only accessible to data.all adminstrators - and navigate to the `Maintenance` tab. Once you are on the maintenance tab, select the mode and click on `Start Maintenance`.

Please wait for the maintenance window status to change from PENDING to ACTIVE before taking actions.

You can disable maintenance mode the same way it was enabled by clicking on `End Maintenance`.

4. Discover

4.1 Datasets

4.1.1 Datasets

In *data.all*, a Dataset is a representation of multiple AWS resources that helps users store data and establish the basis to make this data discoverable and shareable with other teams.

When data owners create a dataset the following resources are deployed on the selected environment and its linked AWS account:

1. Amazon S3 Bucket to store the data on AWS.
2. AWS KMS key to encrypt the data on AWS.
3. AWS IAM role that gives access to the data on Amazon S3 (Dataset IAM role, see below)
4. AWS Glue database that is the representation of the structured data on AWS.

Dataset IAM role

Usage

- Assumed by Dataset owners from *data.all* UI to quickly ingest or access Dataset data
- Assumed by Dataset Glue crawler
- Assumed by the Dataset Glue profiling job

IAM Permissions

- read and write permissions to the Dataset S3 Bucket (ONLY this bucket)
- encrypt/decrypt data with the Dataset KMS key (ONLY this key)
- read and write permissions to the Dataset Glue database and tables (ONLY this database)
- read permissions to profiling/code folder in the Environment S3 Bucket (ONLY this folder)
- read and write permissions to profiling/results/datasetUri folder in the Environment S3 Bucket (ONLY this folder)
- put logs permissions to log crawler and profiling jobs results

Data Governance with Lake Formation

In addition to restricting the access via IAM policies, Dataset Glue database and tables are protected using AWS Lake Formation. With Lake Formation, the Dataset IAM role gets granted access to the Dataset Glue database only.

Tables and Folders

Inside a dataset we can store structured data in tables and unstructured data in folders.

- Tables are the representation of **AWS Glue Catalog** tables that are created on the dataset's Glue database on AWS.
- Folders are the representation of an **Amazon S3 prefix** where data owners can organize their data. For example, when data is loaded, it can go to a folder named “raw” then after it's processed the data moves to a folder called “silver” and so on.

Dataset ownership

Dataset ownership refers to the ability to access, modify or remove data from a dataset, but also to the responsibility of assigning these privileges to others.

- **Owners**: When you create a dataset and associate it with a team, the dataset business ownership belongs to the associated team.
- **Stewards**: You can delegate the stewardship of a dataset to a team of stewards. You can type a name of an IdP group or choose one of the teams of your environment to be the dataset stewards.

> **Note**
>
> Dataset owners team is a required, non-editable field, while stewards are optional and can be added post the dataset has been created. If no other stewards team is designated, the dataset owner team will be the only responsible in managing access to the dataset.

Dataset access

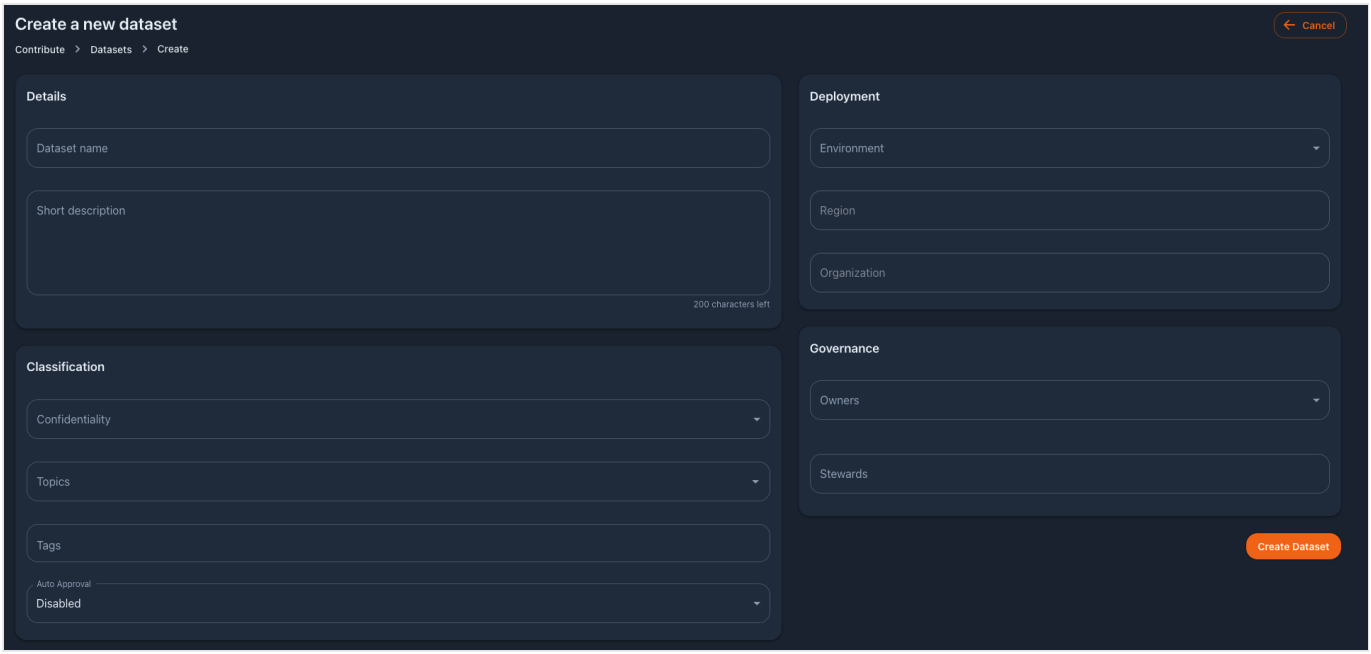
In this case we are referring to the ability to access, modify or remove data from a dataset. Who can access the dataset content? users belonging to...

- the dataset owner team
- a dataset steward team
- teams with a share request approved to dataset content

> **Note**
>
> Dataset metadata is available for all users in the centralized data catalog.

4.1.2 NEW Create a dataset

On left pane choose **Datasets**, then click on the **Create** button. Fill the dataset form.



Field	Description	Required	Editable	Example
Dataset name	Name of the dataset	Yes	Yes	AnyDataset
Short description	Short description about the dataset	No	Yes	For AnyProject predictive model
Environment	Environment (mapped to an AWS account)	Yes	No	DataScience
Region (auto-filled)	AWS region of the environment	Yes	No	Europe (Ireland)
Organization (auto-filled)	Organization of the environment	Yes	No	AnyCompany EMEA
Owners	Team that owns the dataset	Yes	No	DataScienceTeam
Stewards	Team that can manage share requests on behalf of owners	No	Yes	FinanceBITeam, FinanceMgmtTeam
Confidentiality	Level of confidentiality: Unclassified, Oficial or Secret	Yes	Yes	Secret
Topics	Topics that can later be used in the Catalog	Yes, at least 1	Yes	Finance
Tags	Tags that can later be used in the Catalog	Yes, at least 1	Yes	deleteme, ds
Auto Approval	Whether shares for this dataset need approval from dataset owners/ stewards	Yes (default `Disabled`)	Yes	Disabled, Enabled

4.1.3 Import a dataset

If you already have data stored on Amazon S3 buckets in your data.all environment, data.all has got you covered with the import feature. In addition to the fields of a newly created dataset you have to specify the S3 bucket and optionally a Glue database and a KMS key Alias. If the Glue database is left empty, data.all will create a Glue database pointing at the S3 Bucket. As for the KMS key Alias, data.all assumes that if nothing is specified the S3 Bucket is encrypted with SSE-S3 encryption. Data.all performs a validation check to ensure the KMS Key Alias provided (if any) is the one that encrypts the S3 Bucket specified.

Imported KMS key and S3 Bucket policies requirements

Data.all pivot role will handle data sharing on the imported Bucket and KMS key (if imported). Make sure that the resource policies allow the pivot role to manage them. For the KMS key policy, explicit permissions are needed. See an example below.

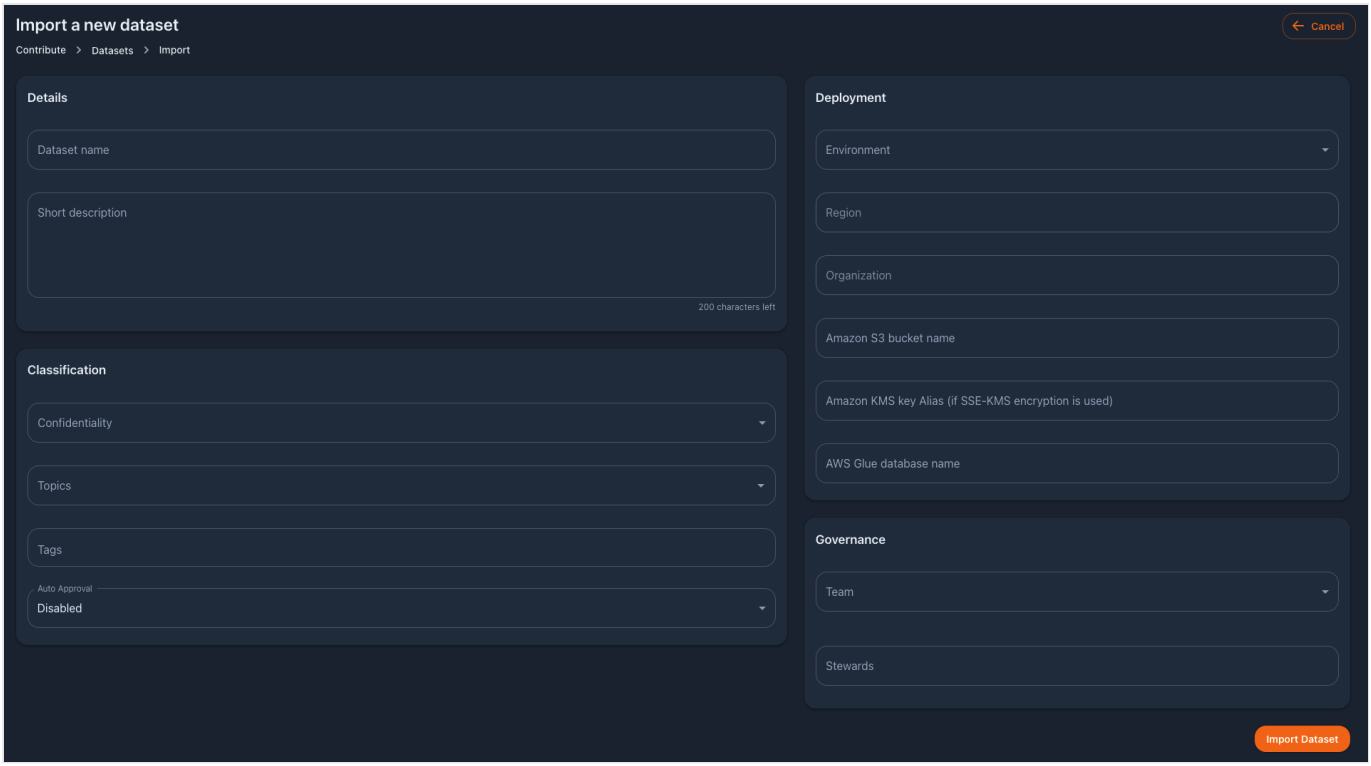
KMS key policy

In the KMS key policy we need to grant explicit permission to the pivot role. At a minimum the following permissions are needed for the pivotRole:

```
{
  "Sid": "Enable Pivot Role Permissions",
  "Effect": "Allow",
  "Principal": {
    "AWS": "arn:aws:iam::111122223333:role/dataallPivotRole-cdk"
   },
  "Action": [
    "kms:Decrypt",
    "kms:Encrypt",
    "kms:GenerateDataKey*",
    "kms:PutKeyPolicy",
    "kms:GetKeyPolicy",
    "kms:ReEncrypt*",
    "kms:TagResource",
    "kms:UntagResource"
    'kms:DescribeKey'
   ],
  "Resource": "*"
}
```

Update imported Datasets

Imported keys is an addition of V1.6.0 release. Any previously imported bucket will have a KMS Key Alias set to `Undefined`. If that is the case and you want to update the Dataset and import a KMS key Alias, data.all let's you edit the Dataset on the **Edit** window.



Field	Description	Required	Editable	Example
Amazon S3 bucket name	Name of the S3 bucket you want to import	Yes	No	DOC-EXAMPLE-BUCKET
Amazon KMS key Alias	Alias of the KMS key used to encrypt the S3 Bucket (do not include alias/, just)	No	No	somealias
AWS Glue database name	Name of the Glue database tht you want to import	No	No	anyDatabase

(Going Further) Support for Datasets with Externally-Managed Glue Catalog

If the dataset you are trying to import relates to Glue Database that is managed in a separate account, data.all's import dataset feature can also handle importing and sharing these type of datasets in data.all. Assuming the following pre-requisites are copmlete:

- There exists an AWS Account (i.e. the Catalog Account) which is:
- Onboarded as a data.all environment (e.g. Env A)
- Contains the Glue Database with Location URI (as S3 Path from Dataset Producer Account) AND Tables
- Glue Database has a resource tag `owner_account_id=<PRODUCER_ACCOUNT_ID>`
- Data Lake Location registered in LakeFormation with the role used to register having permissions to the S3 Bucket from Dataset Producer Account
- Resource Link created on the Glue Database to grant permission for the Dataset Producer Account on the Database and Tables
- There exists another AWS Account (i.e. the Dataset Producer Account) which is:
- Onboarded as a data.all environment (e.g. Env B)
- Contains the S3 Bucket that contains the data (used as S3 Path in Catalog Account)

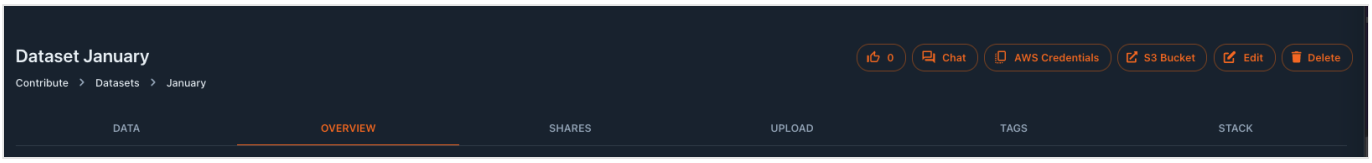
The data.all producer, a member of EnvB Team(s), would import the dataset specifying the S3 bucket as the bucket name that exists in the Dataset Producer Account and specifying the Glue database name as the Glue DB resource link name in the Dataset Producer Account.

This dataset will then be properly imported and can be discovered and shared the same way as any other dataset in data.all.

4.1.4 Navigate dataset tabs

When we belong to the dataset owner team

After creating or importing a dataset it will appear in the datasets list (click on Datasets on the left side pane). In this window, it will only ve visible for those users belonging to the dataset owner team. If we select one of our datasets we will see the following dataset window:



When we DON'T belong to the dataset owner team

How do we access a dataset if we don't have access to it? IN THE CATALOG! on the left pane click on Catalog, find the dataset you are interested in, click on it and if you don't have access to it, you should see only some of the tabs in comparison with the previous pic, something like:

4.1.5 Edit and update a dataset

Data owners can edit the dataset by clicking on the **edit** button, editing the editable fields and saving the changes.

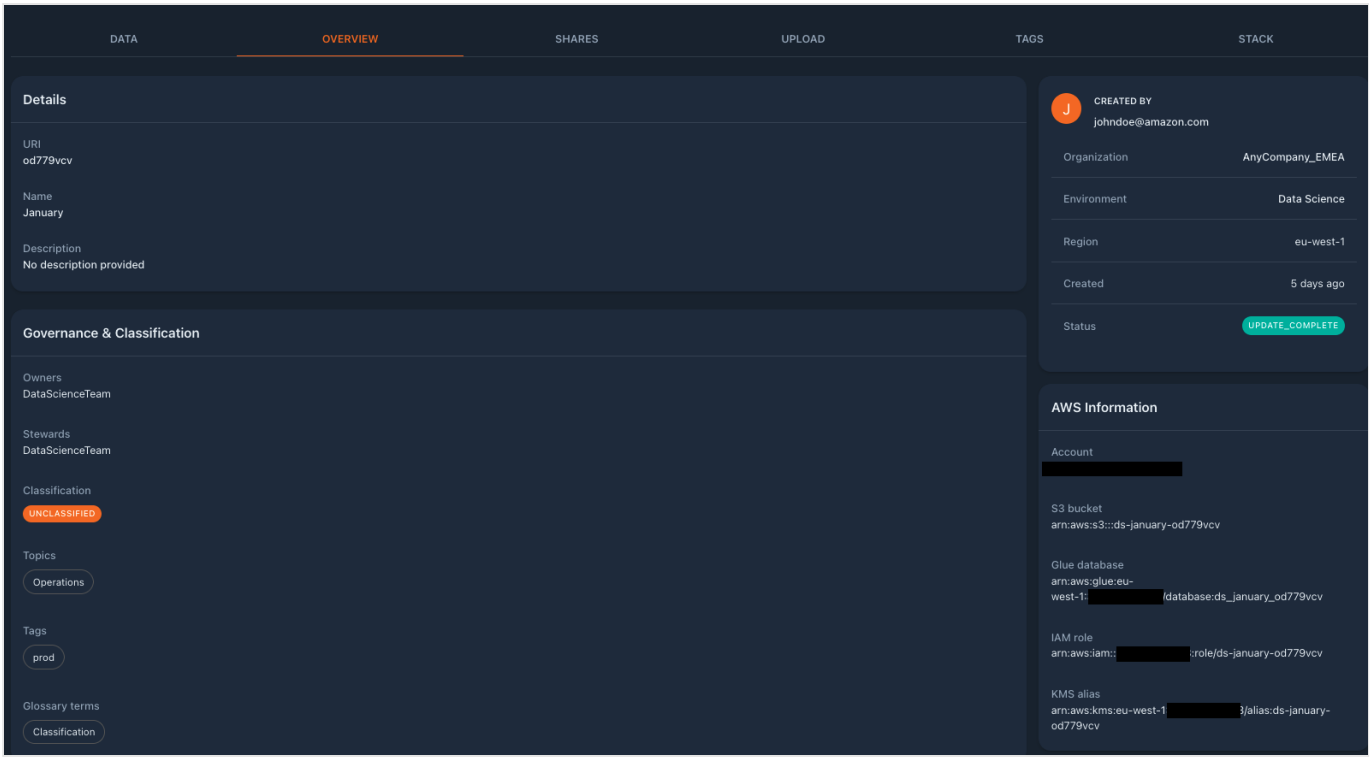
4.1.6 Delete a dataset

To delete a dataset, in the selected dataset window click on the **delete** button in the top-right corner. As with environments, it is possible to keep the AWS CloudFormation stack to keep working with the data and resources created but outside of data.all.

4.1.7 Check dataset info and access AWS

The **Overview** tab of the dataset window contains dataset metadata, including governance and creation details. Moreover, AWS information related to the resources created by the dataset CloudFormation stack can be consulted here: AWS Account, Dataset S3 bucket, Glue database, IAM role and KMS Alias.

You can also assume this IAM role to access the S3 bucket in the AWS console by clicking on the **S3 bucket** button. Alternatively, click on **AWS Credentials** to obtain programmatic access to the S3 bucket (only available if `modules.dataset.features.aws_actions` is set to `True` in the `config.json` used for deployment of data.all).



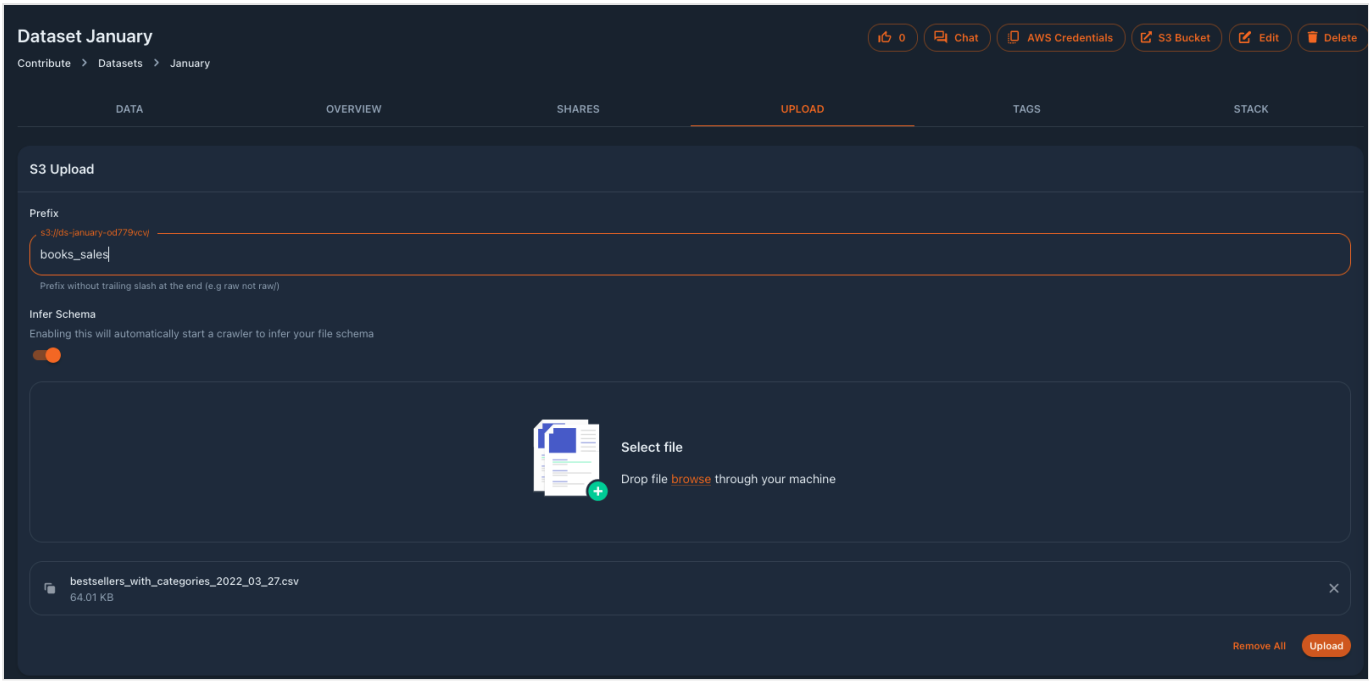
4.1.8 Fill the dataset with data

Tables

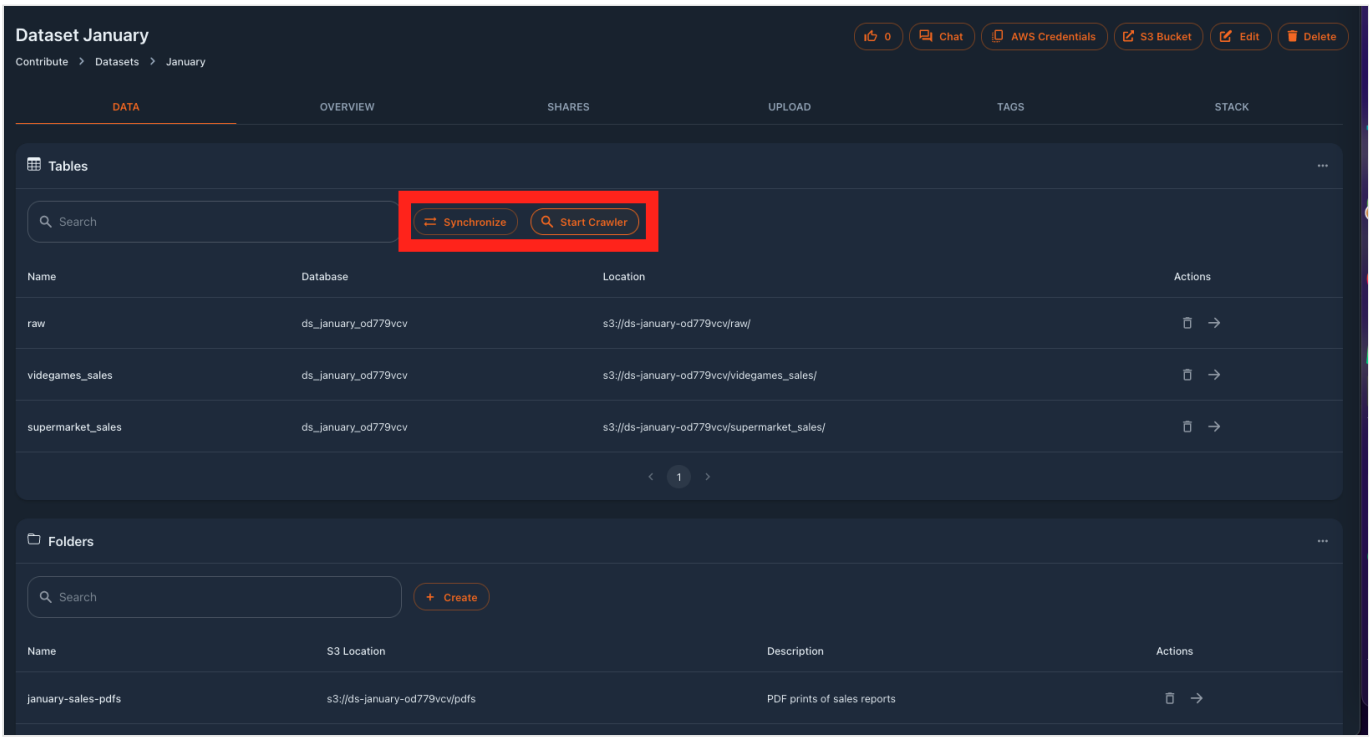
Quickly upload a file for data exploration

Users may want to experiment with a small set of data (e.g. a csv file). To create tables from a file, we first upload the file, then run the crawler to infer its schema, and finally, we read the schema by synchronizing the table. Upload & Crawl & Sync

1. Upload data: Go to the **Upload** tab of the dataset and browse or drop your sample file. It will be uploaded to the dataset S3 bucket in the prefix specified. By default, a Glue crawler will be triggered by the upload of a file, however this feature can be disabled as appears in the picture.



1. Crawl data: the file has been uploaded but the table and its schema have not been registered in the dataset Glue Catalog database. If you have disabled the crawler in the upload, click on the **Start Crawler** button in the Data tab. If you just want to crawl one prefix, you can specify it in the Start Crawler feature.



1. Synchronize tables: Once crawled and registered in the Glue database, you can synchronize tables from your dataset's AWS Glue database by using **Synchronize** tables feature in the Data tab. In any case, data.all will synchronize automatically the tables for you at a frequency of **15 minutes**.

You can preview your small set of data right away from data.all, check Tables.

Ingest data

If you need to ingest larger quantities of data, manage bigger files, or simply you cannot work with local files that can be uploaded; this is your section!

There are multiple ways of filling our datasets with data and actually, the steps don't differ much from the upload-crawl-sync example.

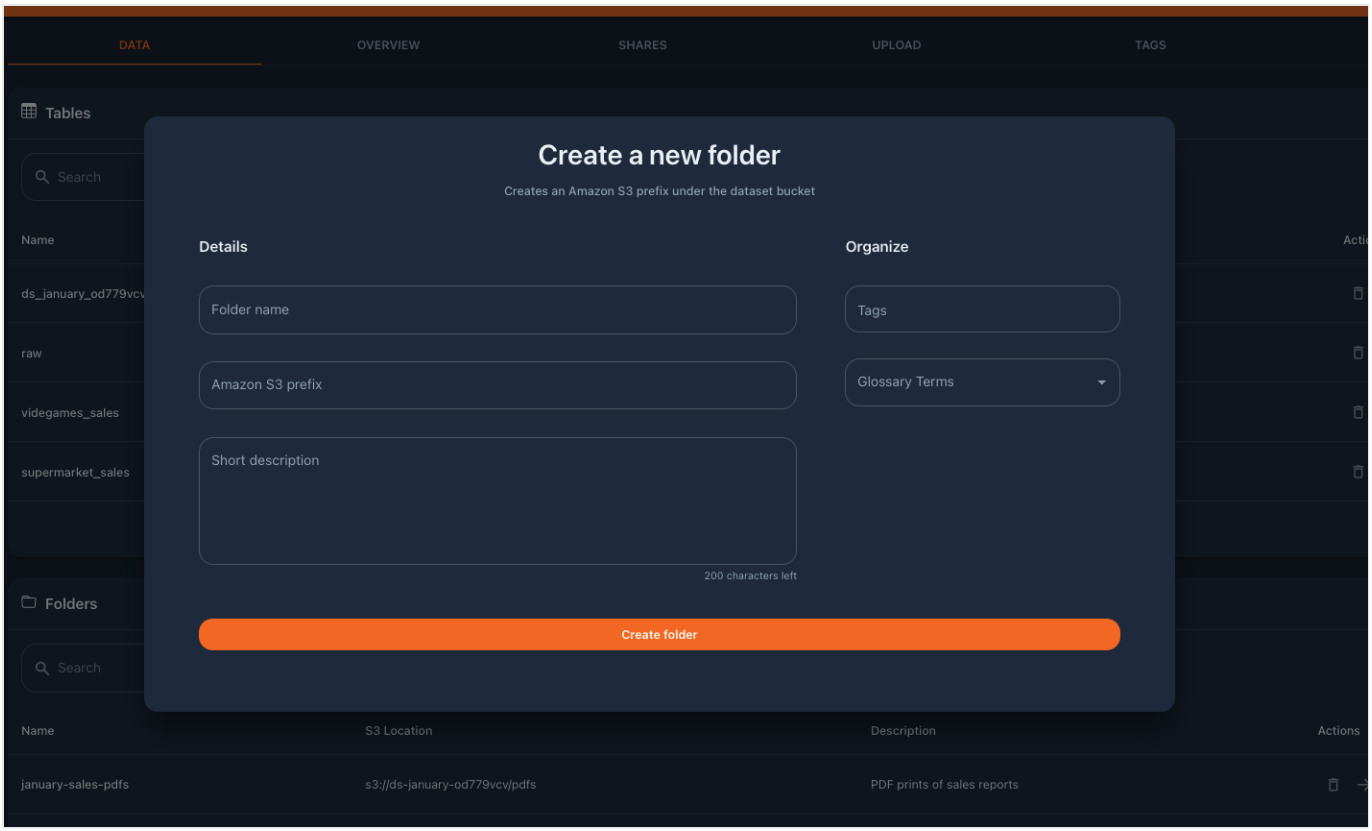
- Crawl & Sync option: we can drop the data from the source to our dataset S3 bucket. Then, we will crawl and synchronize data as we did in the previous steps 2 and 3.
- Register & Sync option: we drop the data from the source to our dataset S3 bucket. However, if we want to have more control over our tables and its schema, instead of starting the crawler we can **register the tables** in the Glue Catalog and then click on Synchronize as we did in step 3.

How do we register Glue tables? There are numerous ways:

- manually from the AWS Glue console in your environment account
- Using AWS Glue API, `CreateTable`.
- In a Glue Job leveraging Glue PySpark DynamicFrame class
- With boto3
- Or with AWS Data Wrangler, Pandas on AWS.
- Also, you can deploy Glue resources using CloudFormation
- Or directly, migrating from Hive Metastore.
- there are more for sure :)

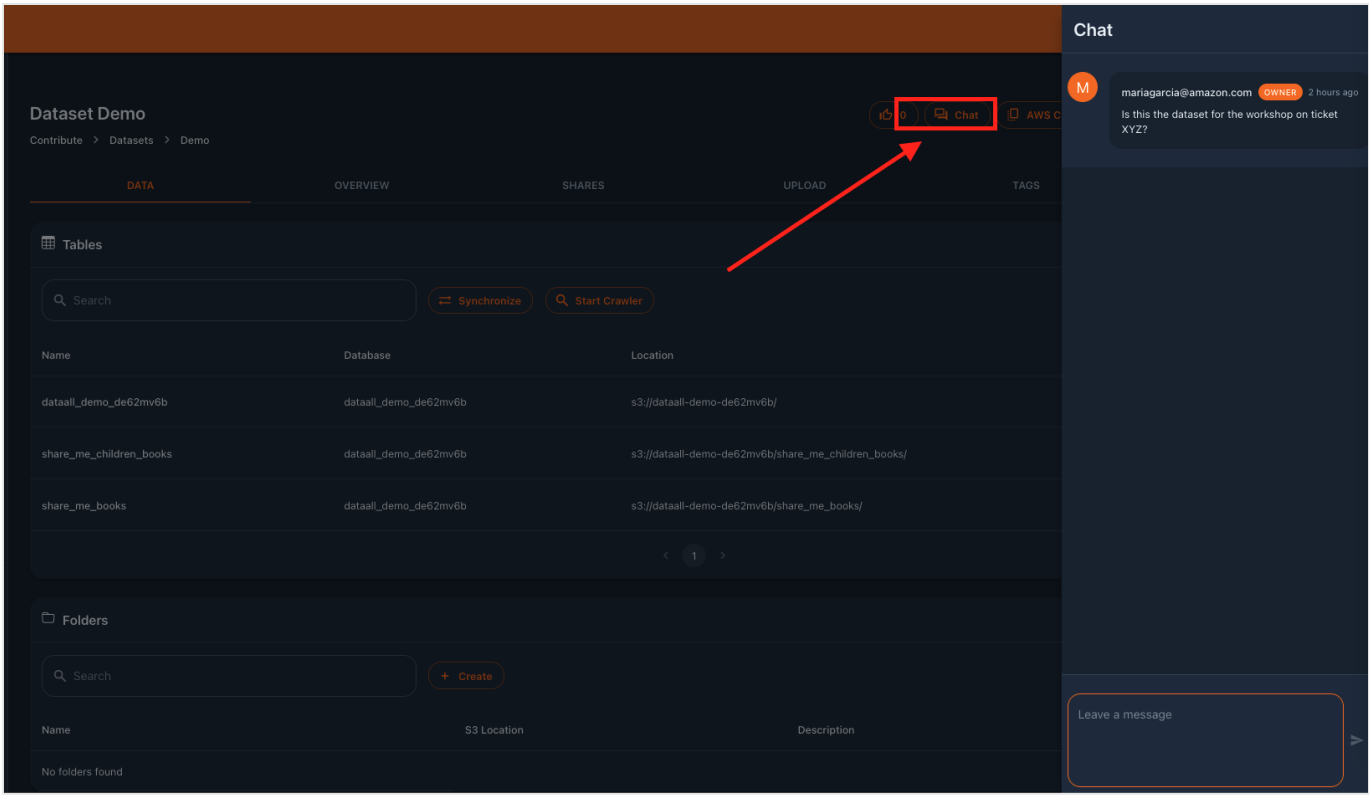
Folders

As previously defined, folders are prefixes inside our dataset S3 bucket. To create a folder, go to the **Data** tab and on the folders section, click on Create. The following form will appear. We will dive deeper in how to use folders in the folders section.



4.1.9 Leave a message in Chat

In the **Chats** button users can interact and leave their comments and questions on the Dataset Chat.



4.1.10 Create key-value tags

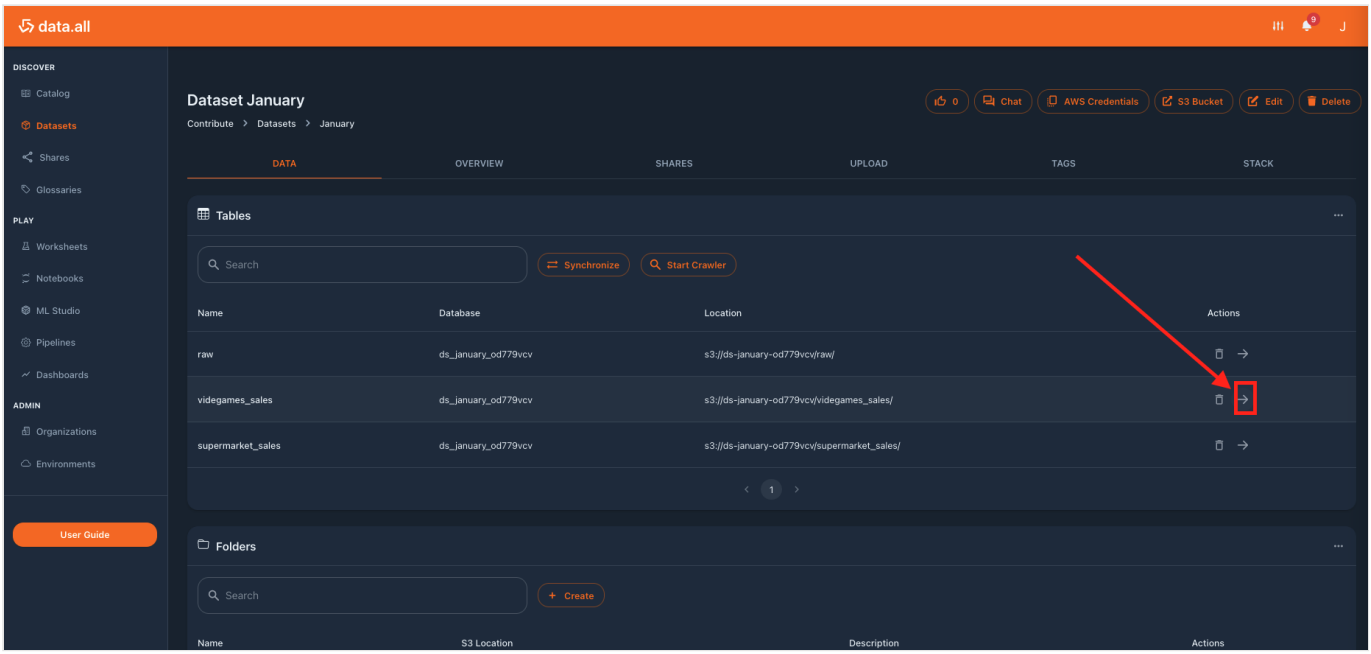
Same as in environments. In the **Tags** tab of the dataset window, we can create key-value tags. These tags are not data.all tags that are used to tag the dataset and find it in the catalog. In this case we are creating AWS tags as part of the dataset CloudFormation stack. There are multiple tagging strategies as explained in the documentation.

4.2 Tables and Folders

4.2.1 **Tables**

In this section we will go through the different tabs in the Table window. We can reach this view:

1. by selecting a table from the data Catalog
2. or in the dataset view, in the **Tables** tab clicking on the arrow in the *Actions* column for the chosen table.



Check table metadata

Also in the table window, go to the **Overview** tab where you will find the following information:

- URI: unique table identifier
- Name: name of the registered table in the Glue Catalog
- Tags
- Glossary terms
- Description
- Organization, Environment, Region, Team: inherited from the dataset
- Created: creation time of the table
- Status: `INSYNC`

> **Description, Tags and Glossary terms are not inherited!**
>
> If a dataset is tagged with Tags and Glossary terms, the child tables do not inherit these tags and terms. In the Overview tab, by clicking on **Edit** is where you can add them. Same applies for the description. Adding tags and terms to your tables will make them more discoverable in the Catalog.

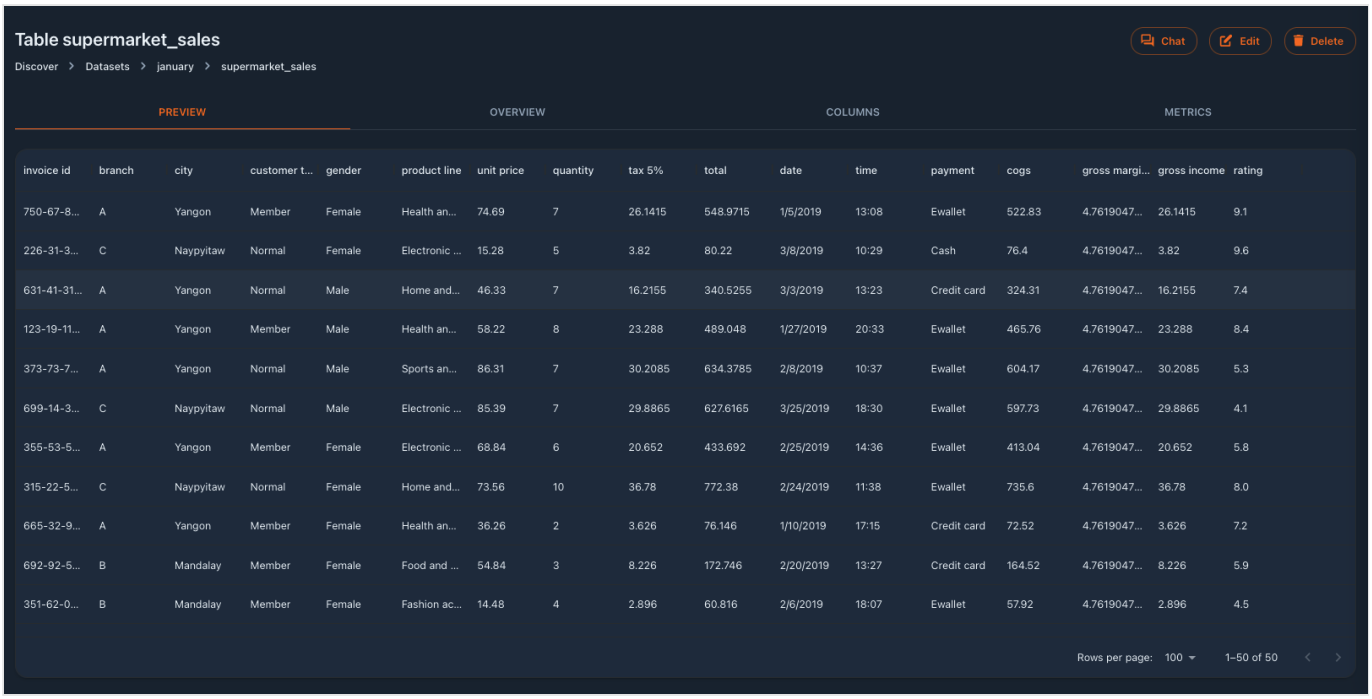
Add or edit table metadata

Edit your table metadata by clicking on the **Edit** button.

Preview data

Data preview gives you the ability to preview a subset of the data available on data.all. Preview feature is available for data you own or data that's shared with you.

Just select a table and in the **Preview** tab you will find the results of an SQL select subset of the table.



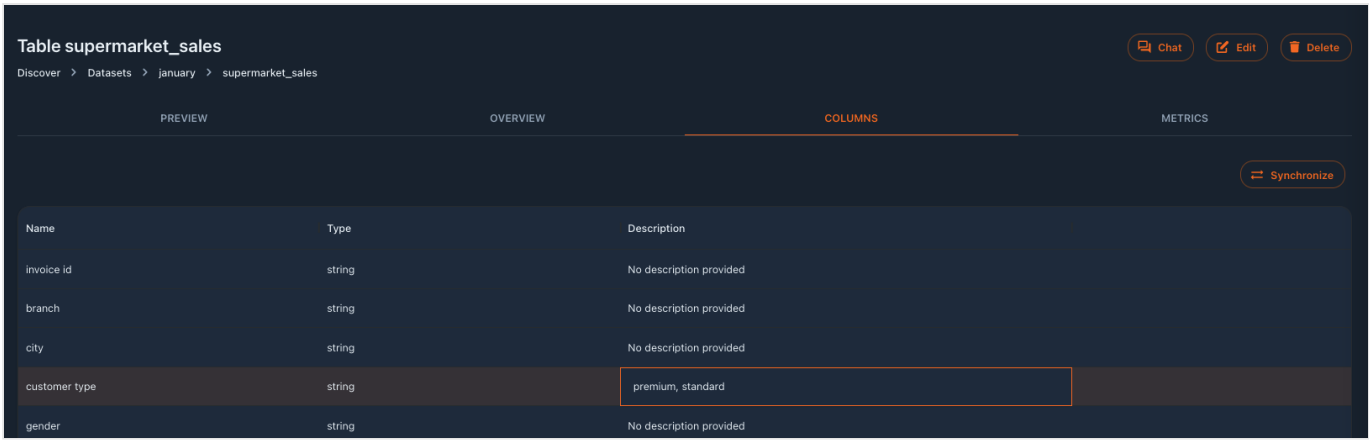
Leave a message in Chat

As with datasets, in the **Chats** button users can interact and leave their comments and questions on the Table Chat.

Add column description

Metadata makes more sense when columns description fields are not empty. With data.all you can add columns description and avoid the pain of figuring out fields purpose.

Select one table and in the **Columns** tab, directly type the description in the Description column as shown in the picture.



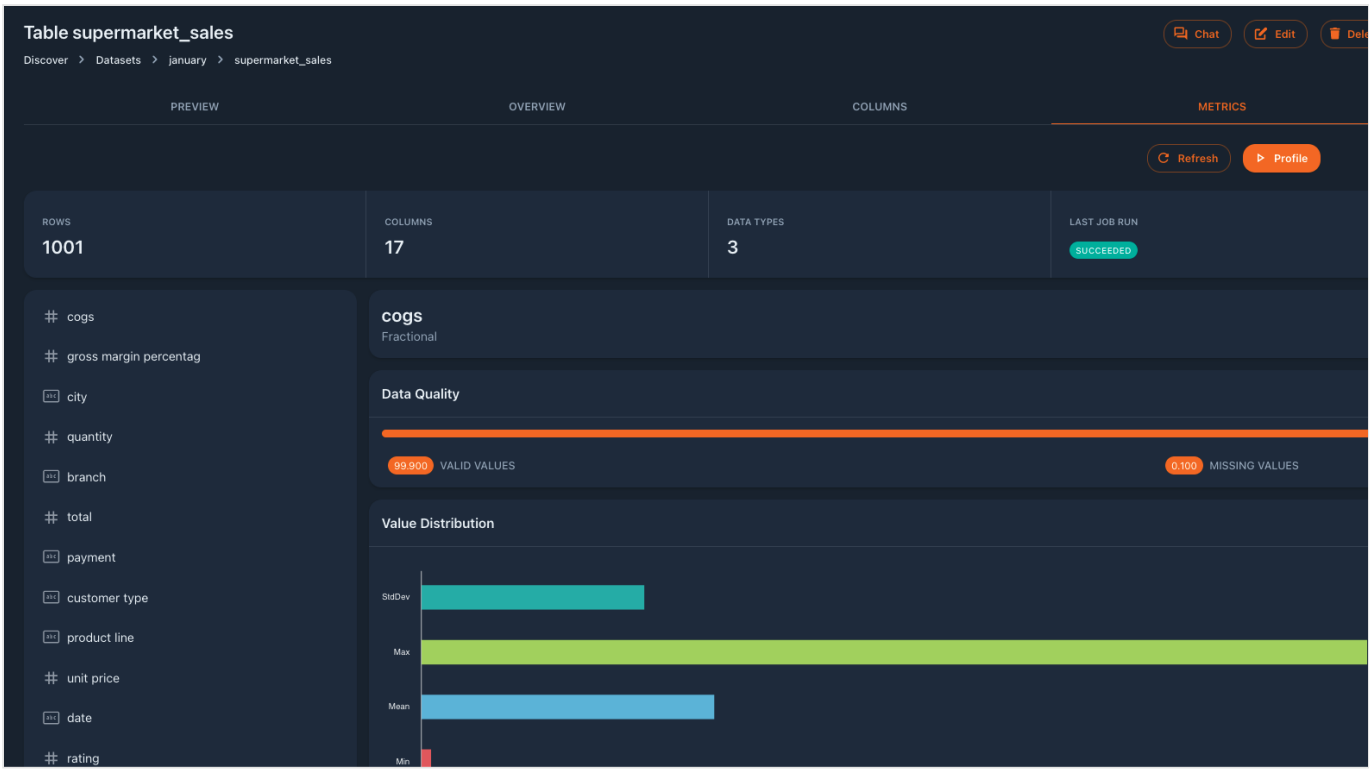
Profile data

Data profiling refers to the process of examining, analyzing, and reviewing the data available in the source by collecting statistical information about the data set's quality and hygiene. This process is called also data archaeology, data assessment, data discovery, or data quality analysis. Data profiling helps in determining the accuracy, completeness, structure, and quality of your data.

Data profiling in data.all involves:

- Collecting descriptive statistics like minimum, maximum, mean, median, and standard deviation.
- Collecting data types, along with the minimum and maximum length.
- Determining the percentages of distinct or missing data.
- Identifying frequency distributions and significant values.

By selecting the **Metrics** tab of your data table you can run a profiling job (click in the **Profile** button) , or view the latest generated data profiling metrics:

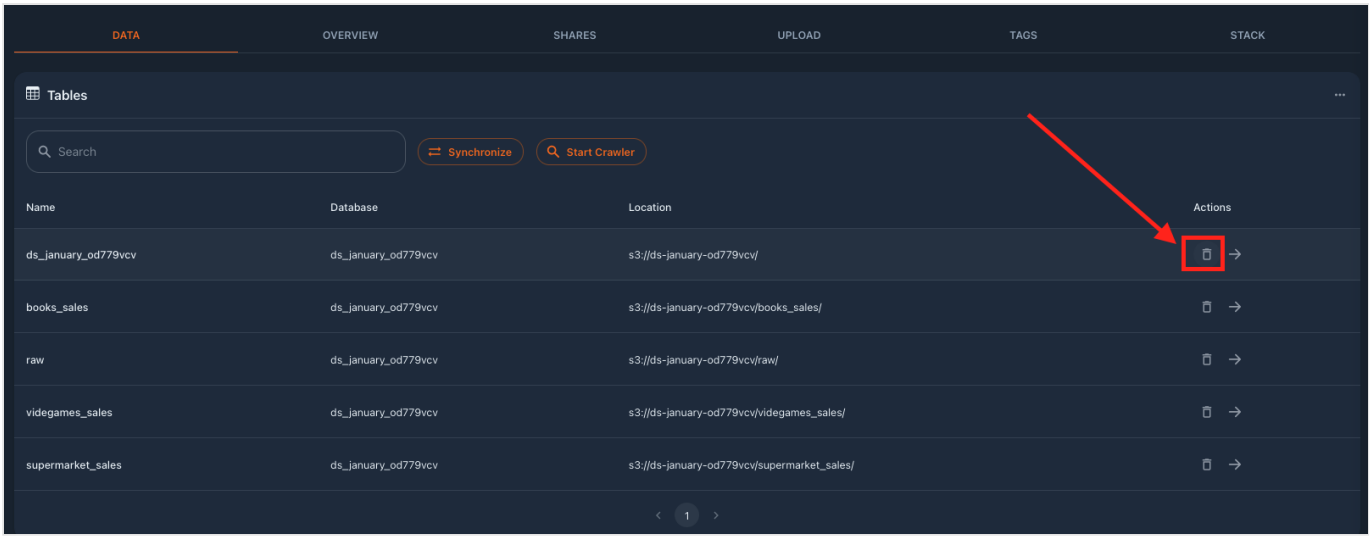


> **Profiling Job Prerequisite**
>
> Before running the profiling job you will need to ensure that the **default** Glue Database exists in the AWS Account where the data exists (by default this database exists for new accounts). This is required to enable the Glue profiling job to use the metadata stored in the Glue Catalog.

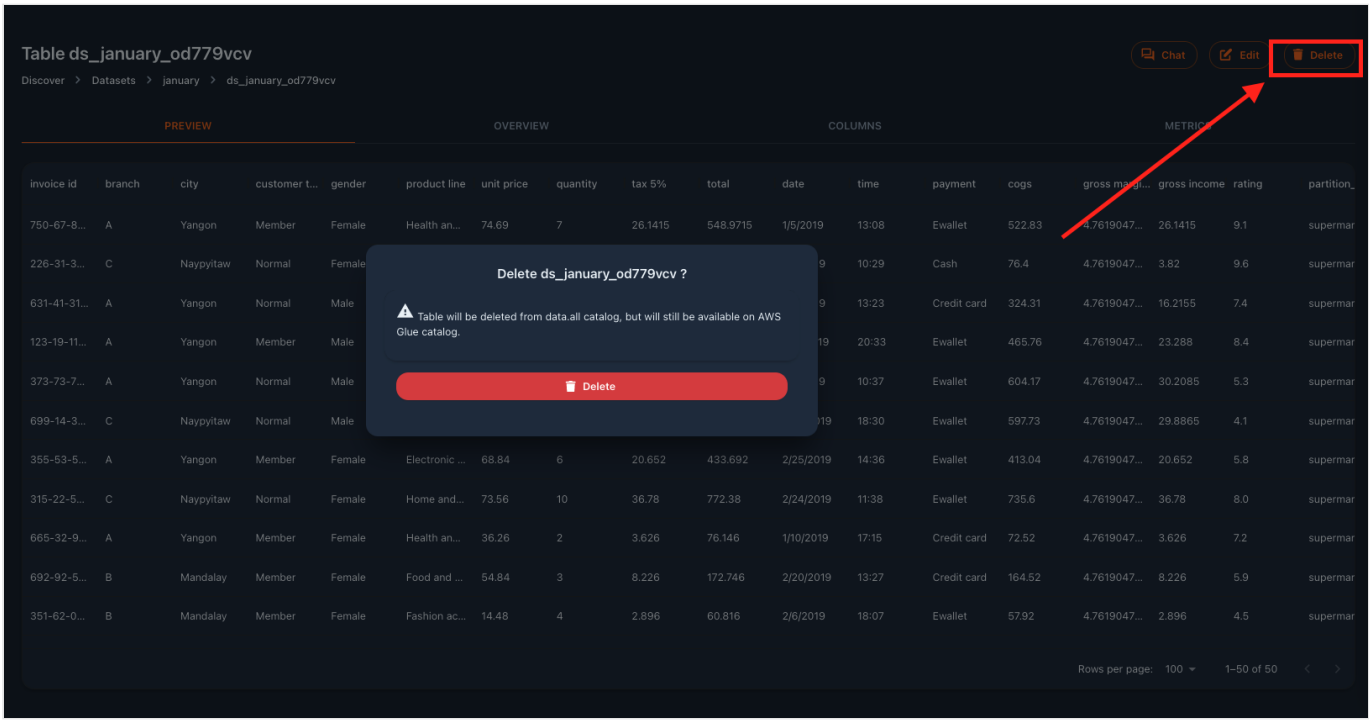
Delete a table

Deleting a table means deleting it from the data.all Catalog, but it will be still available on the AWS Glue Catalog. Moreover, when data owners delete a table, they are **not** deleting its data from the dataset S3 bucket. Teams with shared access to the dataset cannot delete tables or folders, even if they are shared.

It is possible to delete a table from the dataset **Tables** tab with the trash can icon next to each of the tables in the *Actions* column.



Another option is to go to the specific table (on the above picture click on the arrow icon next to the trash can icon). Click on the **Delete** button in the top right corner and confirm the deletion.

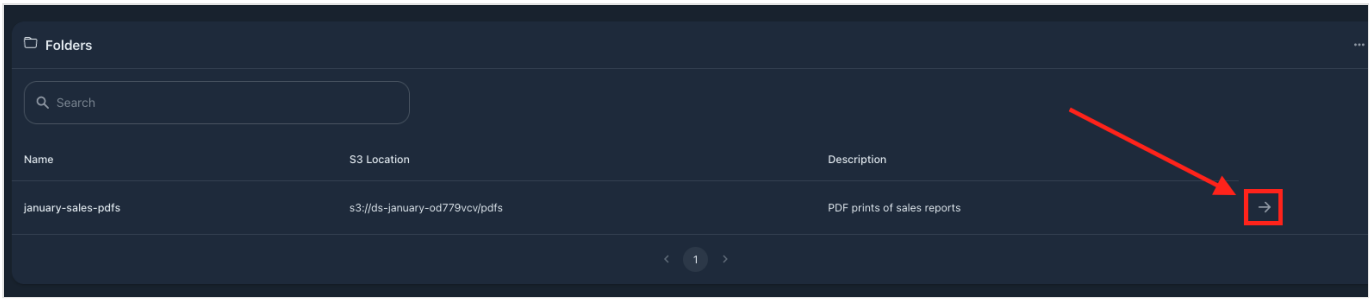


An error occurred (ResourceShared) when calling DELETE_DATASET_TABLE operation: Revoke all table shares before deletion

To protect data consumers, if the table is shared you cannot delete it. The share requests to the table need to be revoked before deleting the table. Check the Shares section to learn how to grant and revoke access.

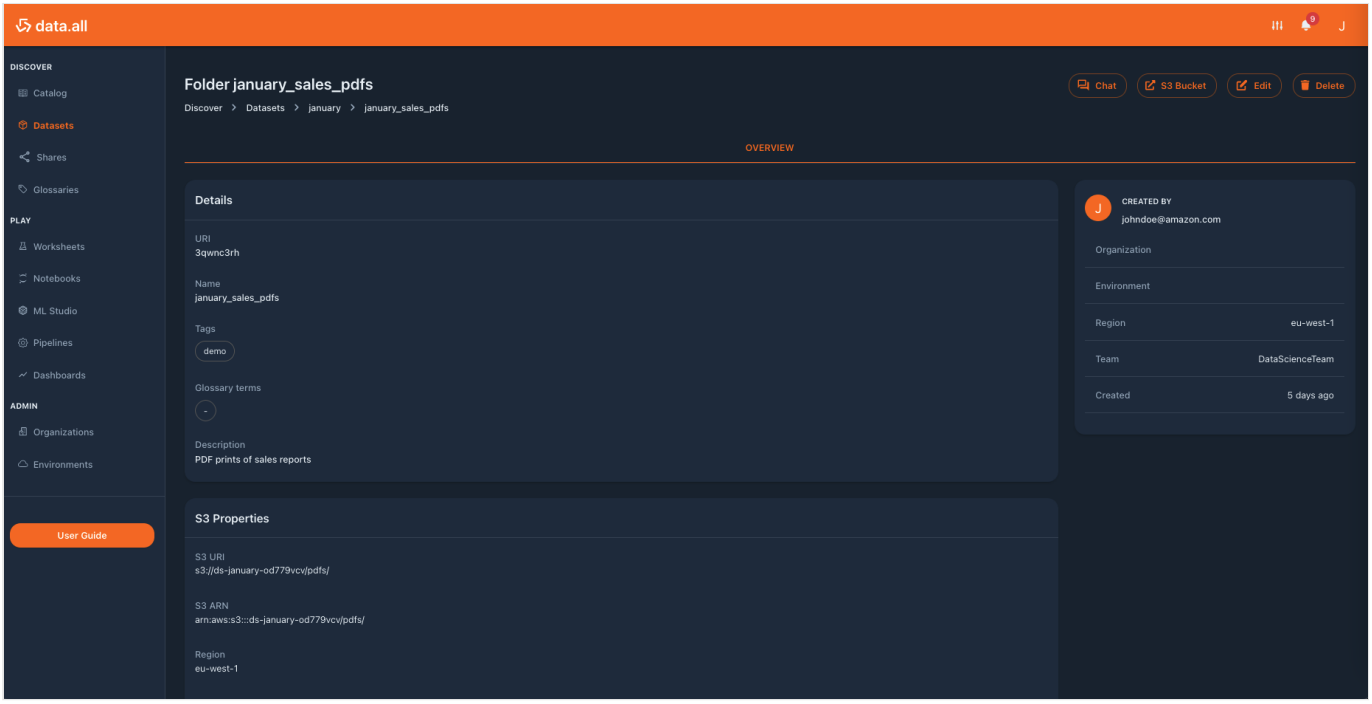
4.2.2 Folders

To open the Folder window you can either find your chosen folder in the Catalog or navigate to the dataset and then in the **Folders** tab click on the arrow in the *Actions* column of your folder:



Check folder and S3 metadata

The **Overview** tab of the folder contains folder metadata: - URI: unique folder identifier - Name: name of the folder, it is made out of the dataset name concatenated with the S3 prefix - Tags - Glossary terms - Description - Organization, Environment, Region, Team: inherited from the dataset - Created: creation time of the table



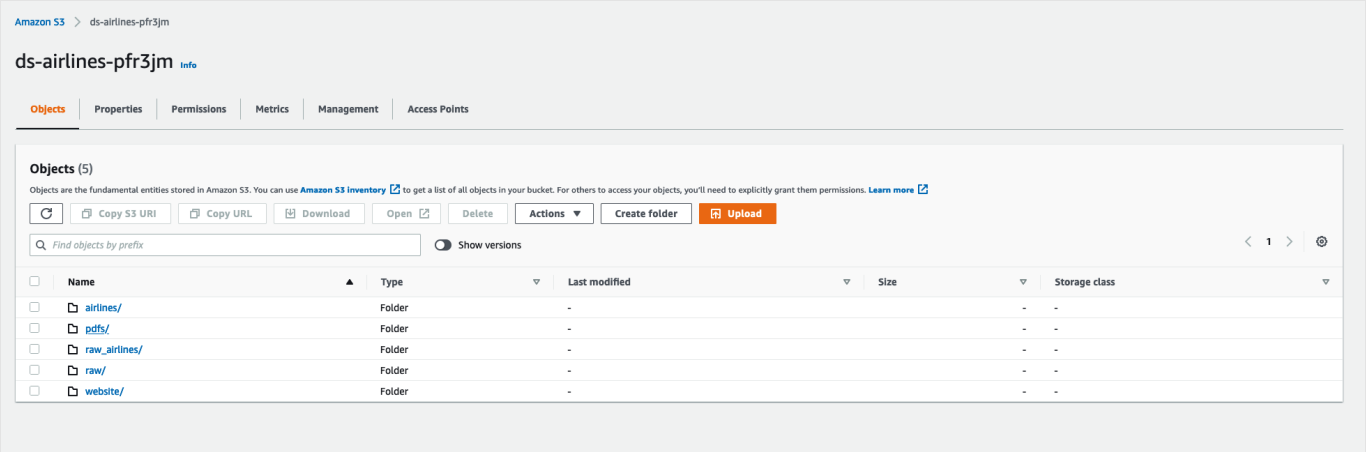
Add or edit table metadata

Edit your folder metadata by clicking on the **Edit** button.

> **Description, Tags and Glossary terms are not inherited**
>
> Careful, those 3 fields are not synced with their dataset metadata. Just click on the **Edit** button of the folder to complete any missing information. This is especially useful to improve Catalog search of your folders.

Check the content of your folder

To check what kind of files does our prefix content, we can access the AWS S3 console on the **S3 Bucket** button of the Folder **Overview** tab.



Leave a message in Chat

Exactly the same as with tables. Allow your teams to discuss directly on the Folder Chat.

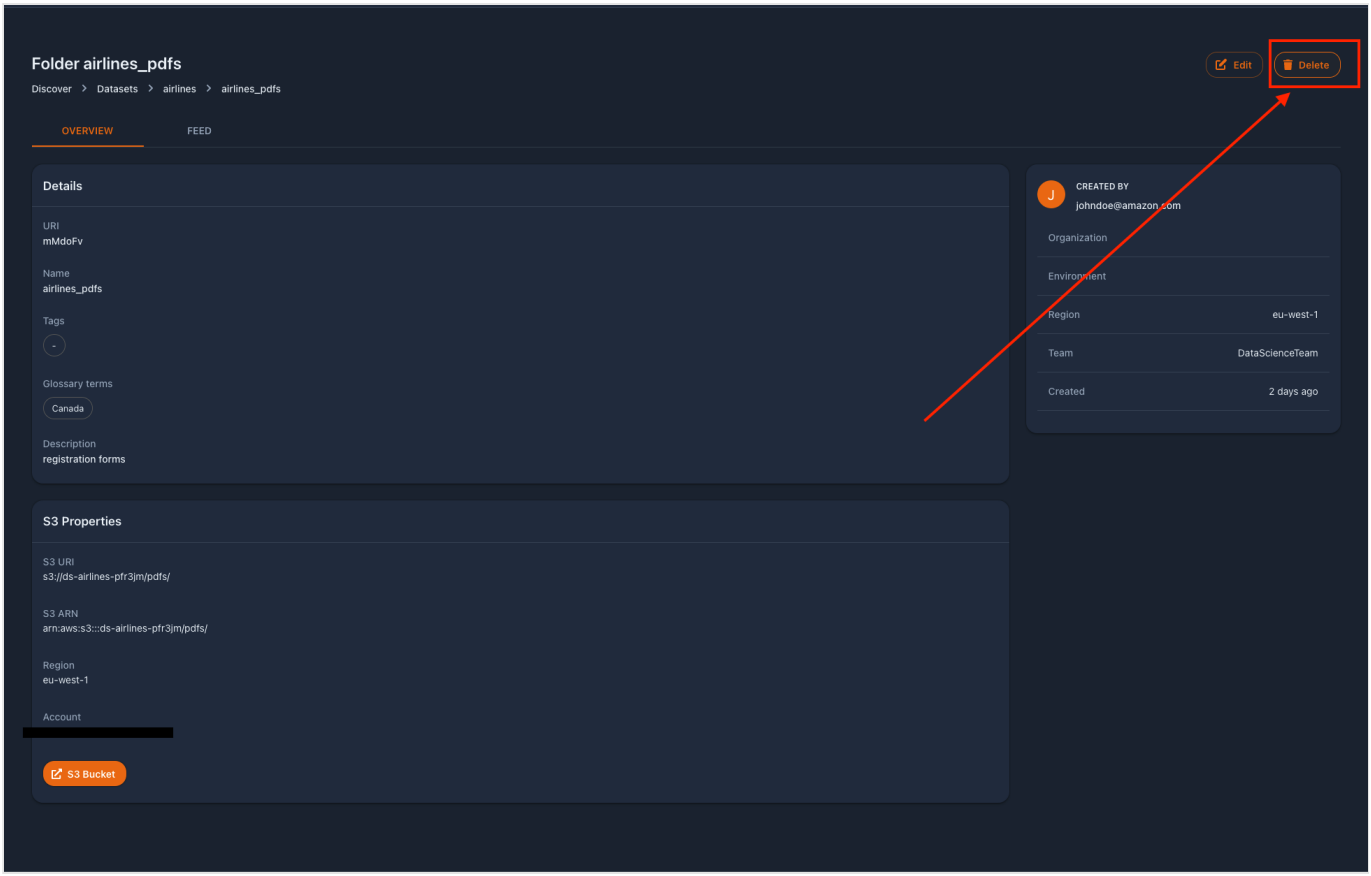
Delete a folder

Deleting folders is analogous to deleting tables. Deletion means deletion from the data.all Catalog and the content of the S3 prefix remains in the dataset S3 bucket. Only dataset owners can delete dataset folders.

The steps to delete a folder are exactly the same as with tables. You can either go to the dataset and in the **Folders** tab click on the can trash icon on the *Actions* column of the selected folder; or you can navigate to the Folder and click on the **Delete** button.

An error occurred (ResourceShared) when calling DELETE_DATASET_FOLDER operation: Revoke all folder shares before deletion

To protect data consumers, if the table is shared you cannot delete it. The share requests to the table need to be revoked before deleting the table. Check the Shares section to learn how to grant and revoke access.


Folder airlines_pdfs
Discover > Datasets > airlines > airlines_pdfs
Edit
Delete
OVERVIEW
FEED
Details
URI
mMdoFv
Name
airlines_pdfs
Tags
-
Glossary terms
Canada
Description
registration forms
CREATED BY
johndoe@amazon.com
Organization
Environment
Region
eu-west-1
Team
DataScienceTeam
Created
2 days ago
S3 Properties
S3 URI
s3://ds-airlines-pfr3jm/pdfs/
S3 ARN
arn:aws:s3:::ds-airlines-pfr3jm/pdfs/
Region
eu-west-1
Account
S3 Bucket

4.3 Centralized Catalog and glossaries

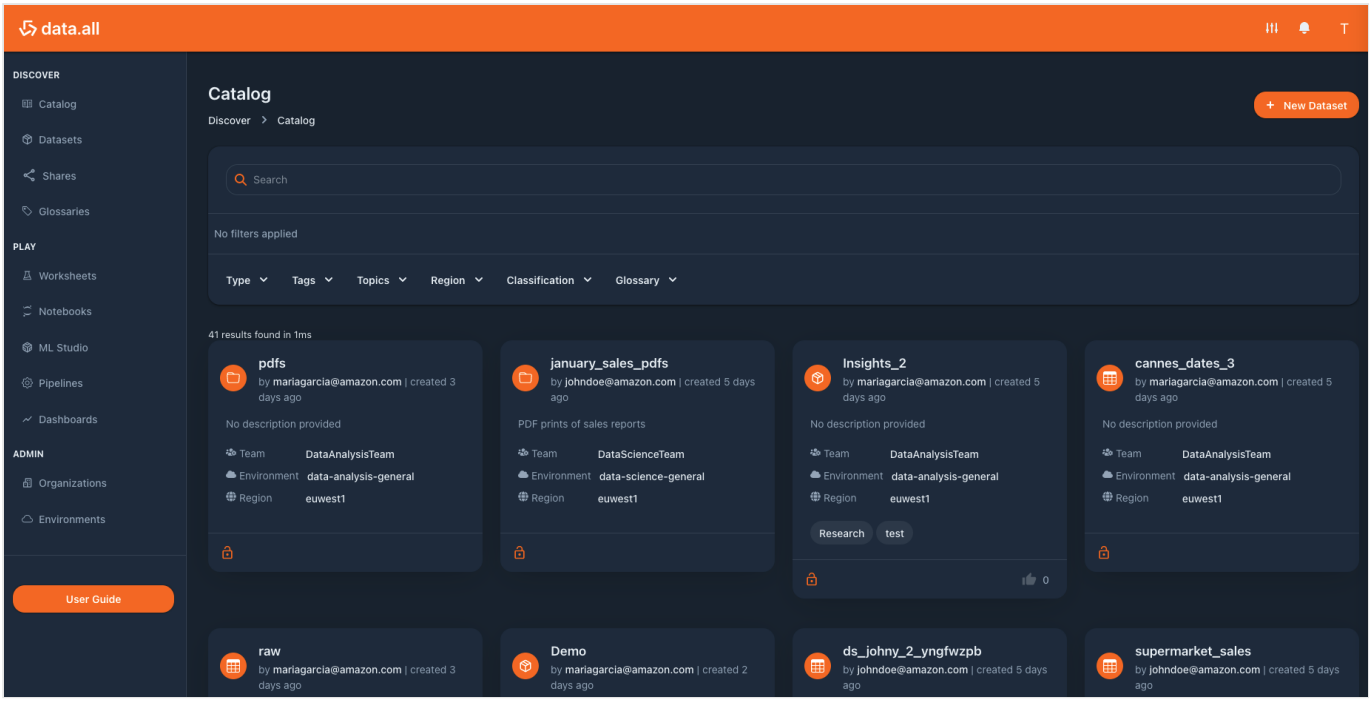
4.3.1 **Catalog**

In the Catalog we have a record with metadata for each dataset, table, folder and dashboard in data.all. Users come to this centralized Catalog to search and find data owned by other teams. Once users find a data asset they are interested in, they will create a Share request.

How do users find the data that they need?

Data needs to be discoverable, for this reason data.all Catalog offers a variety of filters that use business context to improve your search:

- **Type of data**: `dataset`, `table`, `folder` and/or `dashboard`
- **Tags**: tags of the data asset.
- **Topics**: filter by general topics created by the user.
- **Region**: AWS region where the data asset is located.
- **Classification**: `unclassified`, `official` and/or `secret`
- **Glossary**: filter datasets by the glossary terms created by users. This helps in two ways: It lets you narrow down results quickly using granular glossary terms like "sales", "profit", etc. Traditionally, a data glossary is just used to organize data. However, data.all uses it to power its search. This further encourages users to enrich and maintain the glossary regularly.



4.3.2 **Glossaries**

A Glossary is a list of terms, organized in a way to help users understand the context of their datasets. For example, terms like "cost", "revenue", etc, can be used to group and search all financial datasets.

The use of familiar terminology helps in quickly understanding the data and its background. It is a crucial element of data governance as it helps in bringing the business understanding closer to an organization's data initiatives.

On data.all, glossary terms can be attached to any dataset and can be leveraged to power quick and ease data discovery in the Catalog.

> **Spotlight**
>
> Glossaries are built hierarchically. They are made of categories and terms. This structure allows for glossaries from multiple domains to co-exist.

Term:

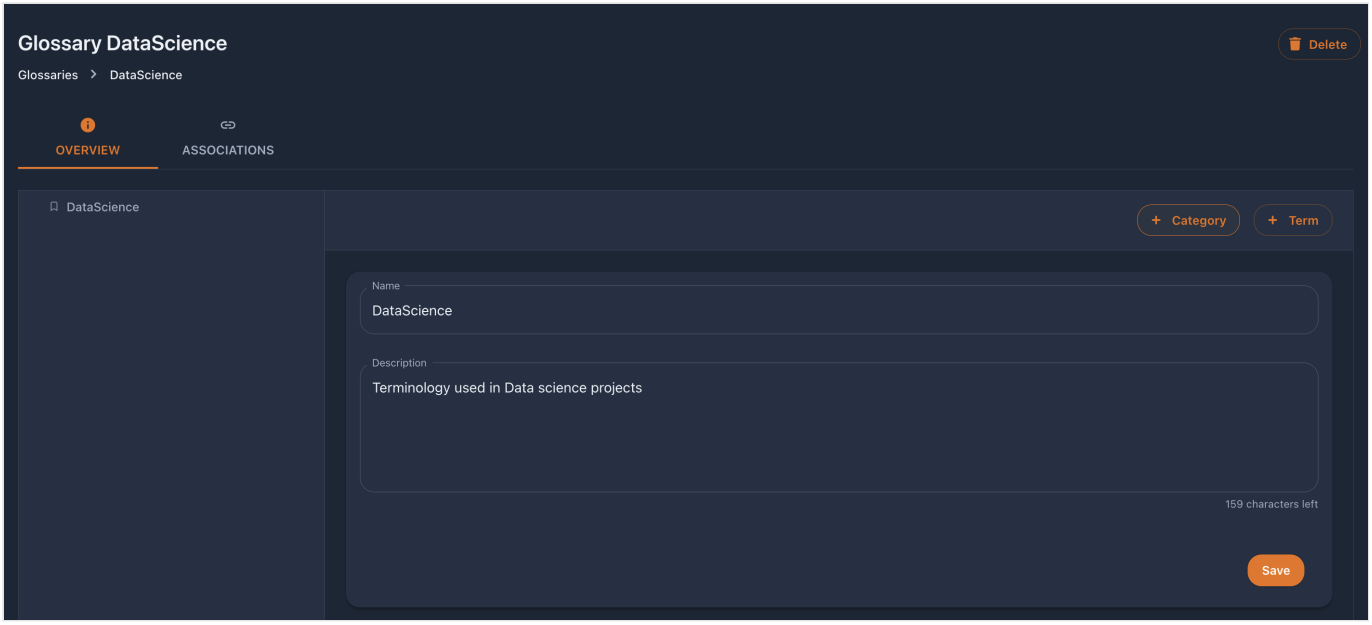
- A term is the lowest unit which is unique inside each glossary.
- It describes the content of the data assets in the most useful and precise way.
- It can exist independently, without belonging to any particular category or sub-category.

Category:

A category is used to group the terms of a similar context together. it is just a way of organizing terms.

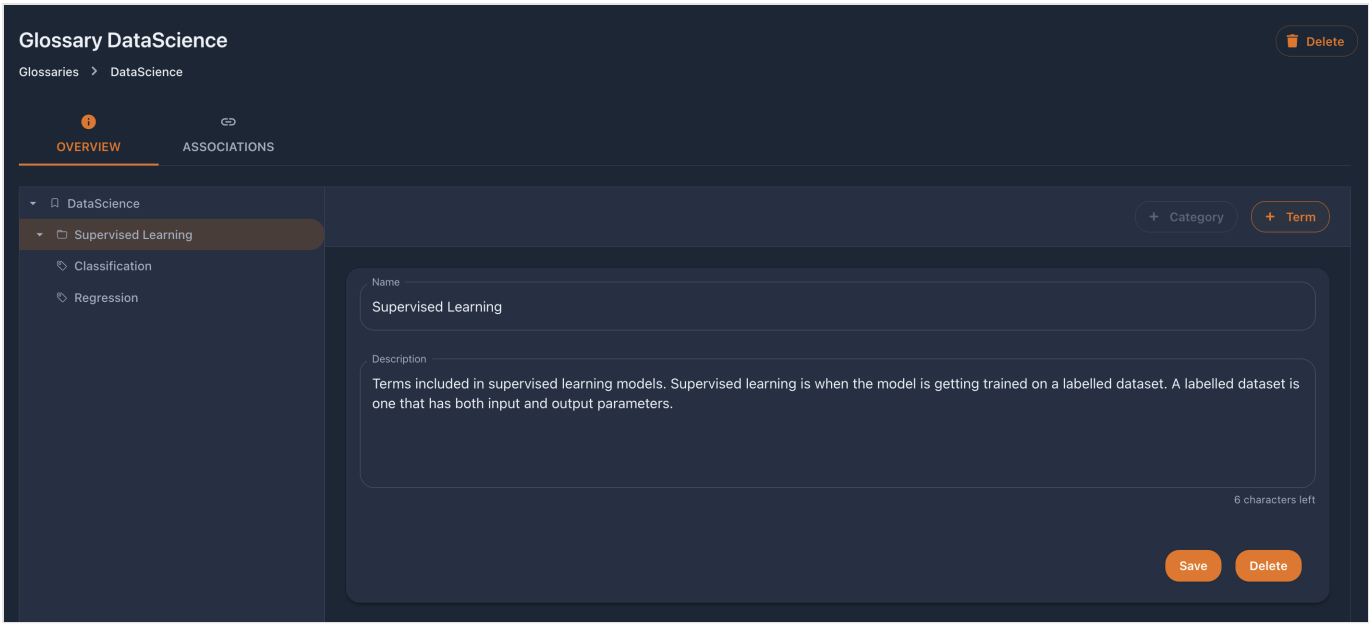
Create a new glossary

1. Go to **Glossaries** menu on the elft side pane.
2. Click on **Create**.
3. Fill the form and add a new glossary.



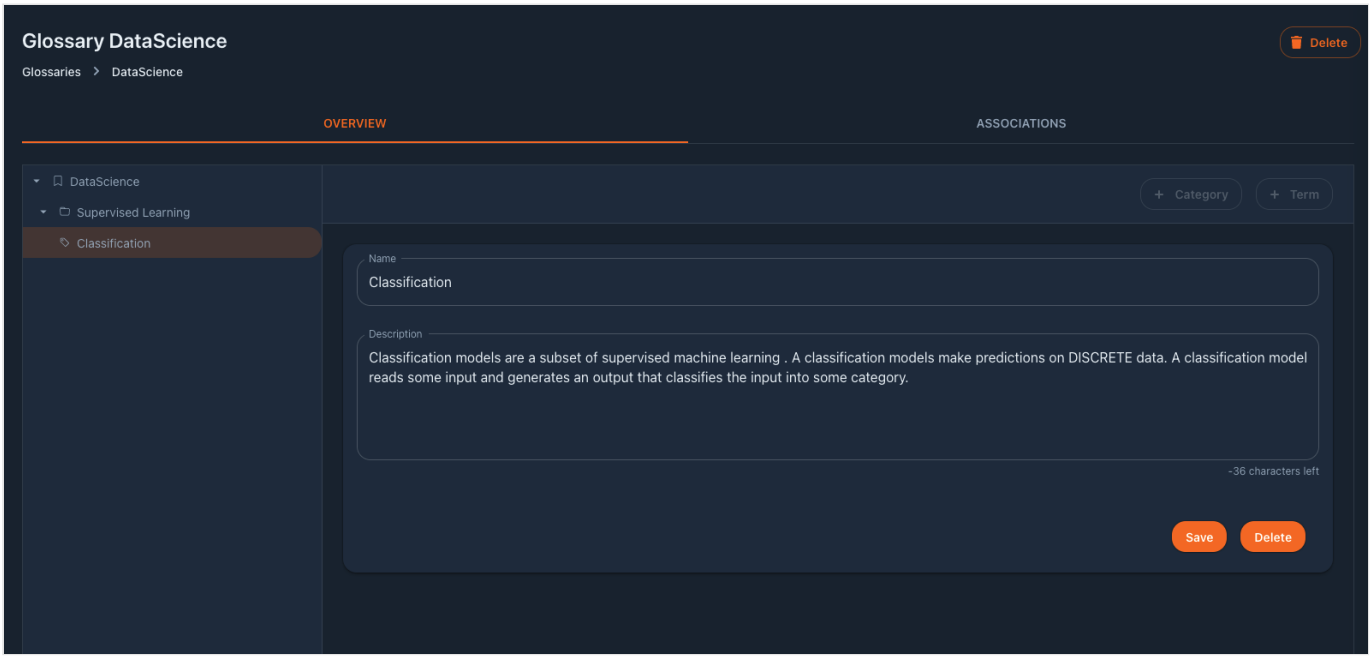
Add a category inside a Glossary

1. Click on the button "Add category" to add a new category.
2. Add a name and description to your category for better understanding.



Add terms to a category

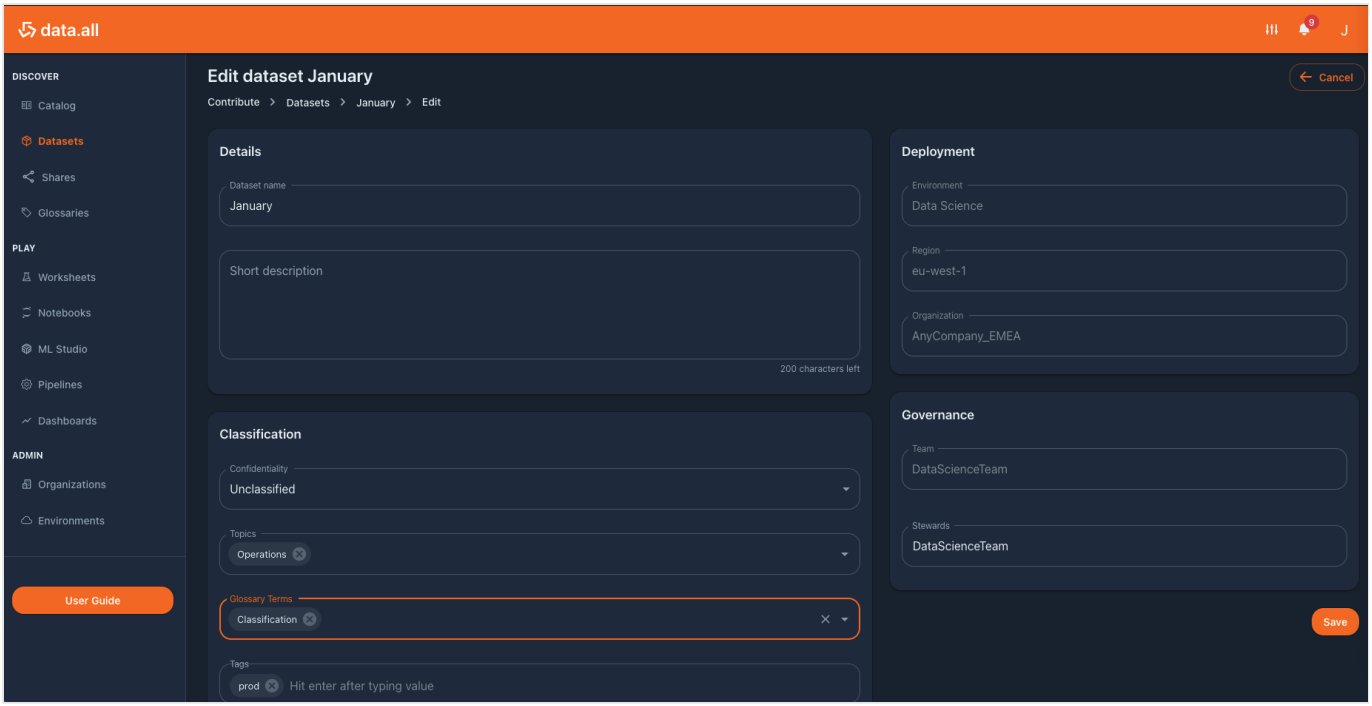
1. Click on the button "Add term" to add a new term to the category.
2. Give it an appropriate name and description.



> **Remember!**
>
> The term will be used to recognize and filter the datasets. Hence, keep it short and precise.

Link your data with appropriate glossary terms

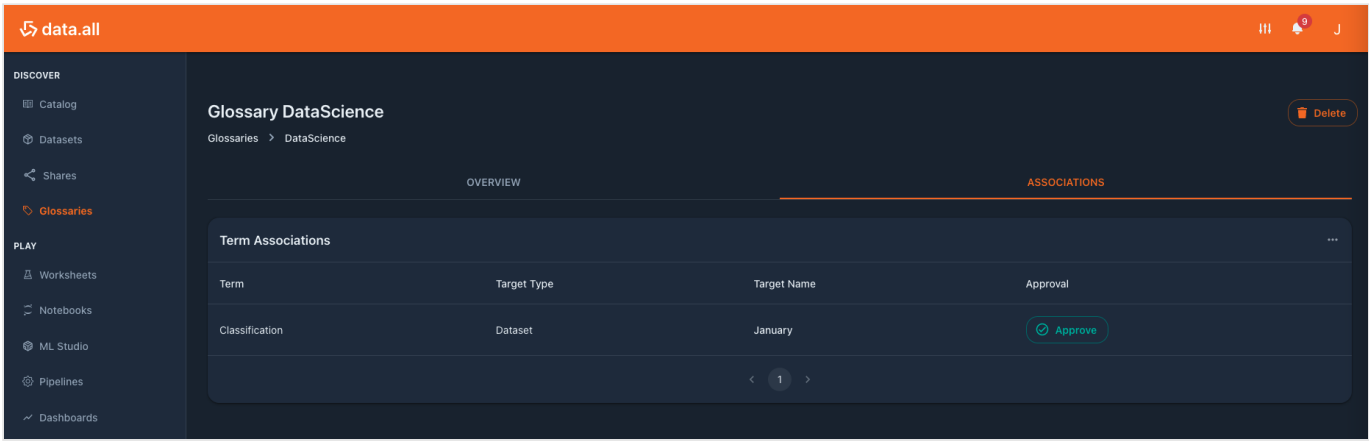
You can associate a glossary term to a dataset or a table. Go to a dataset click on "edit" and update the glossary terms field as shown below



Approve and Check all data related to a glossary

To see a list of all datasets and tables that have been linked with terms of a specific glossary, go to Glossaries and select the glossary. In the **Associations** tab it is possible to check the related data assets (target name), their types (e.g. dataset) and the specific term that they have used.

Important: Glossary owners need to approve the association. If it is not approved it won't be used as filter in the catalog.



4.4 Shares

Teams can browse data.all catalog and request access for data assets. data.all shares data between teams securely within and environment and across environments without any data movement.

Datasets can contain tables and folders. Tables are Glue Tables registered in Glue Catalog. data.all uses (and automates) Lake Formation sharing feature to create access permissions to tables, meaning that no data is copied between AWS accounts.

Under-the-hood, folders are prefixes inside the dataset S3 bucket. To create sharing of folders in data.all, we create an S3 access point per requester group to handle its access to specific prefixes in the dataset.

data.all also supports the sharing of the entire S3 Bucket to requestors using IAM permissions and S3/KMS policies if desired.

Concepts

- Share request or Share Object: one for each dataset and requester team.
- Share Item refers to the individual tables and folders or S3 Bucket that are added to the Share request.

Sharing workflow

Requesters create a share request and add items to it. Both requesters and approvers can work on this `DRAFT` of the request and add and delete items to the request Draft. Items that are added go to the `PENDINGAPPROVAL` status.

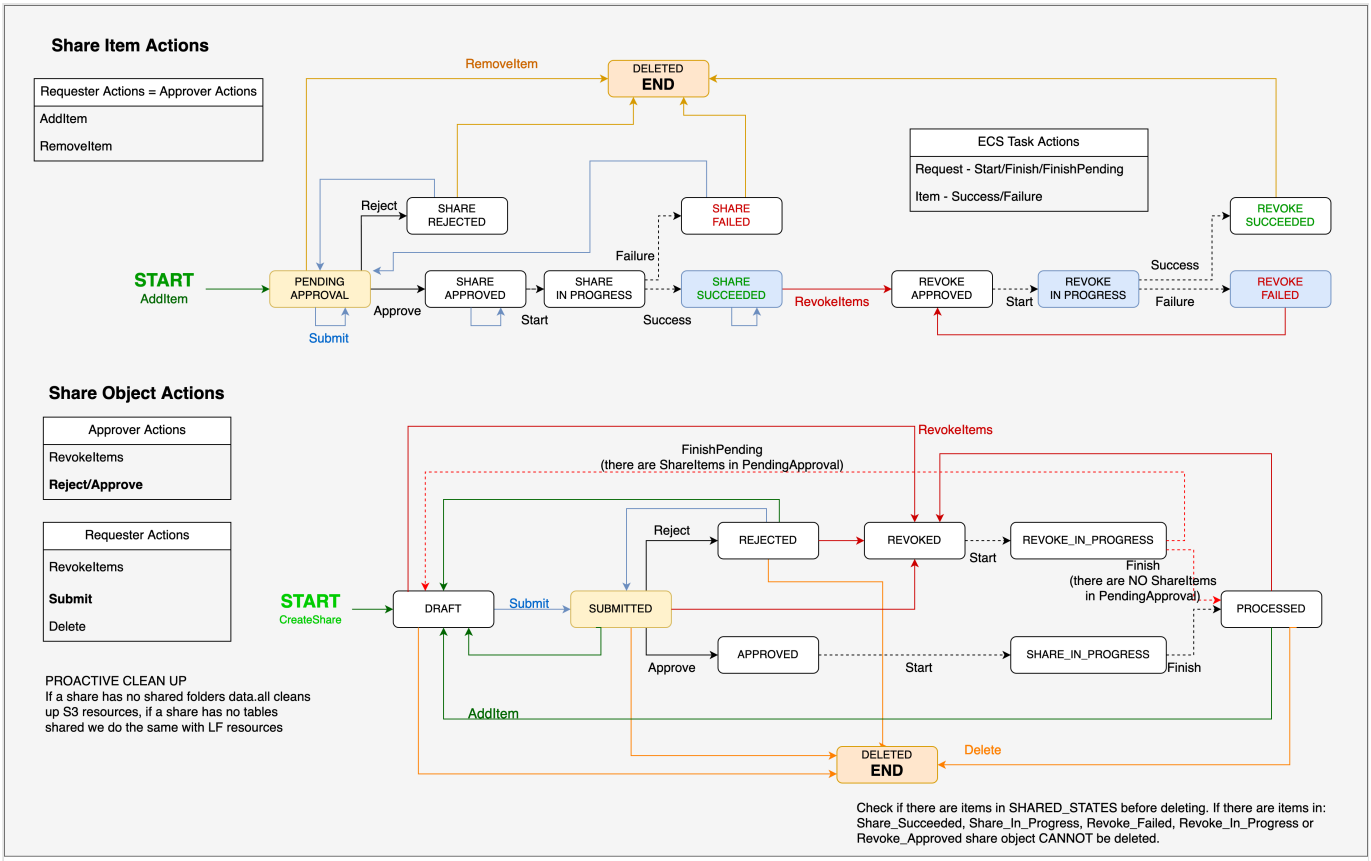
Once the draft is ready, requesters **submit** the request, which moves to the `SUBMITTED` status. Then, approvers **approve** or **reject** the request which will go to `APPROVED` or `REJECTED` status and its items to `SHARE_APPROVED` or `SHARE_REJECTED` correspondingly.

When the sharing task starts in the backend, both items and the share object move to `SHARE_IN_PROGRESS`. Once all items have been processed, the Share object is `PROCESSED` and each of the items is in either `SHARE_SUCCEEDED` or `SHARE_FAILED`. New items can be added to the share requests, the request will go back to `DRAFT` to be re-processed.

Both approvers and requesters can revoke access to shared items. They open the revoke items window and select which items should be revoked from the share request. The items move to `REVOKE_APPROVED` while the share is in `REVOKED` status.

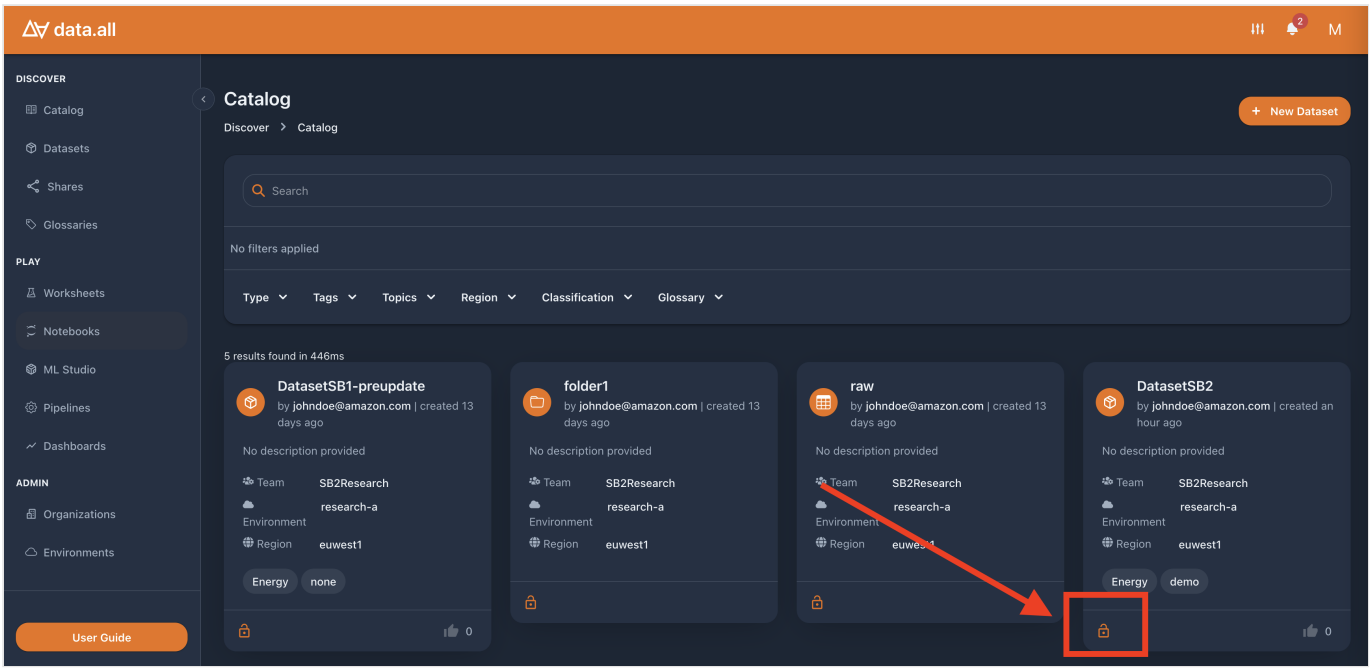
While the revoking task is executing, the items and the request remain in `REVOKE_IN_PROGRESS` until the revoke is complete and items go to `REVOKE_FAILED` or `SUCCEEDED`. If there are share items in `PENDINGAPPROVAL` in the share request, it will go back to `DRAFT`. Otherwise, it will go to `PROCESSED`.

Requesters can delete the share request with the **delete** button. However, the request cannot contain any shared items. Users must revoke all shared items before deletion.

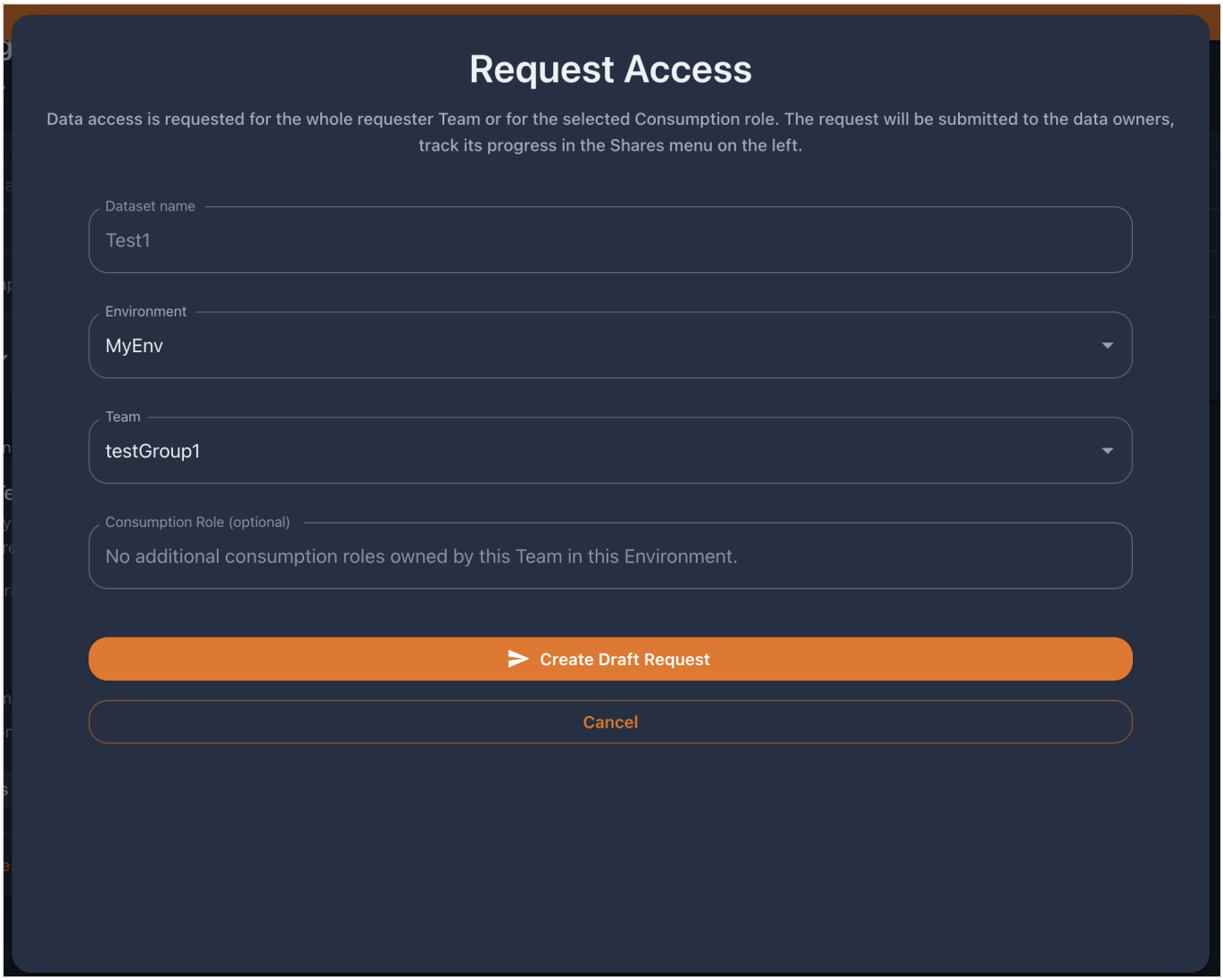


Create a share request (requester)

On left pane choose **Catalog** then **Search** for the table you want to access. Click on the lock icon of the selected data asset.

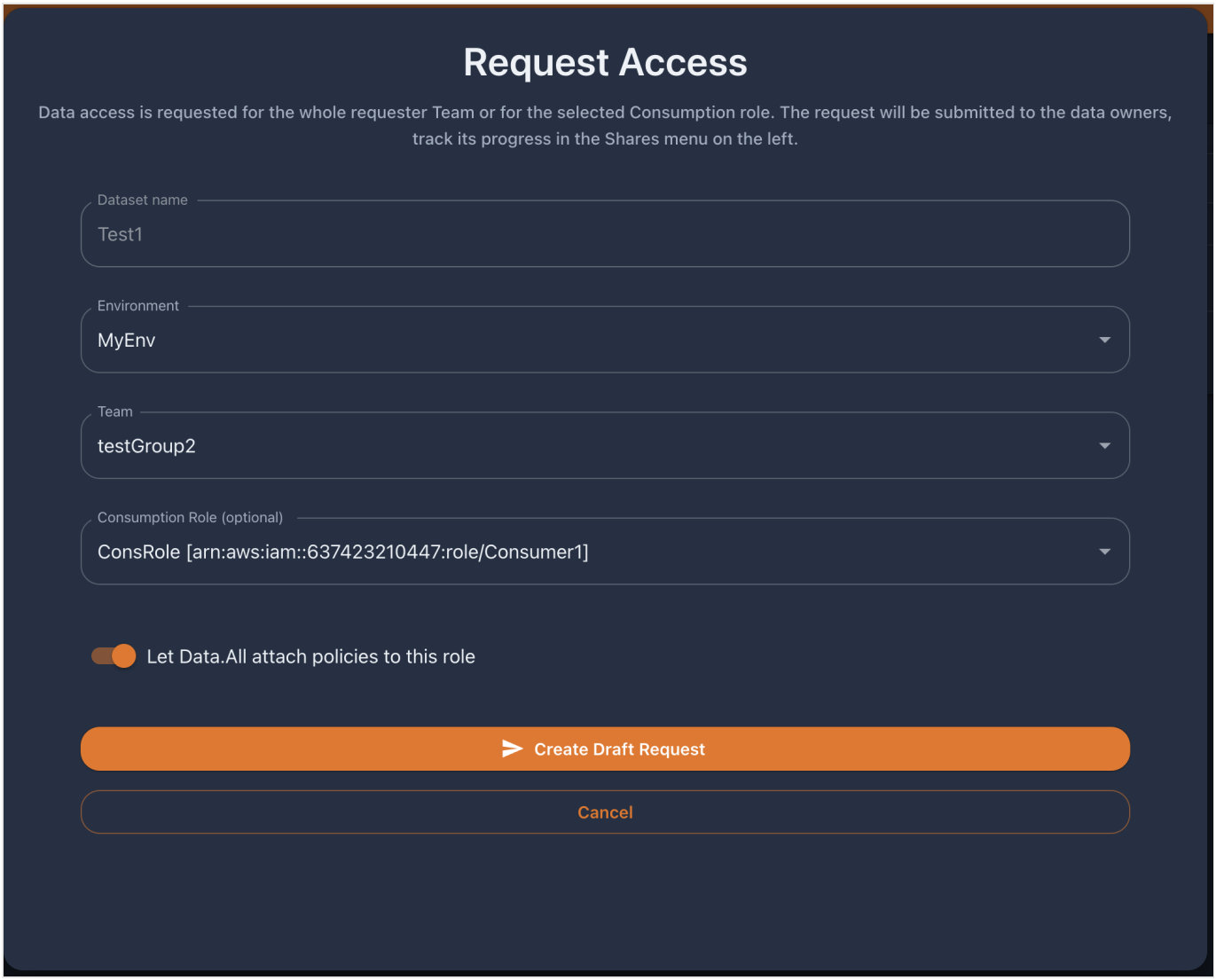


The following window will open. Choose your target environment and team.

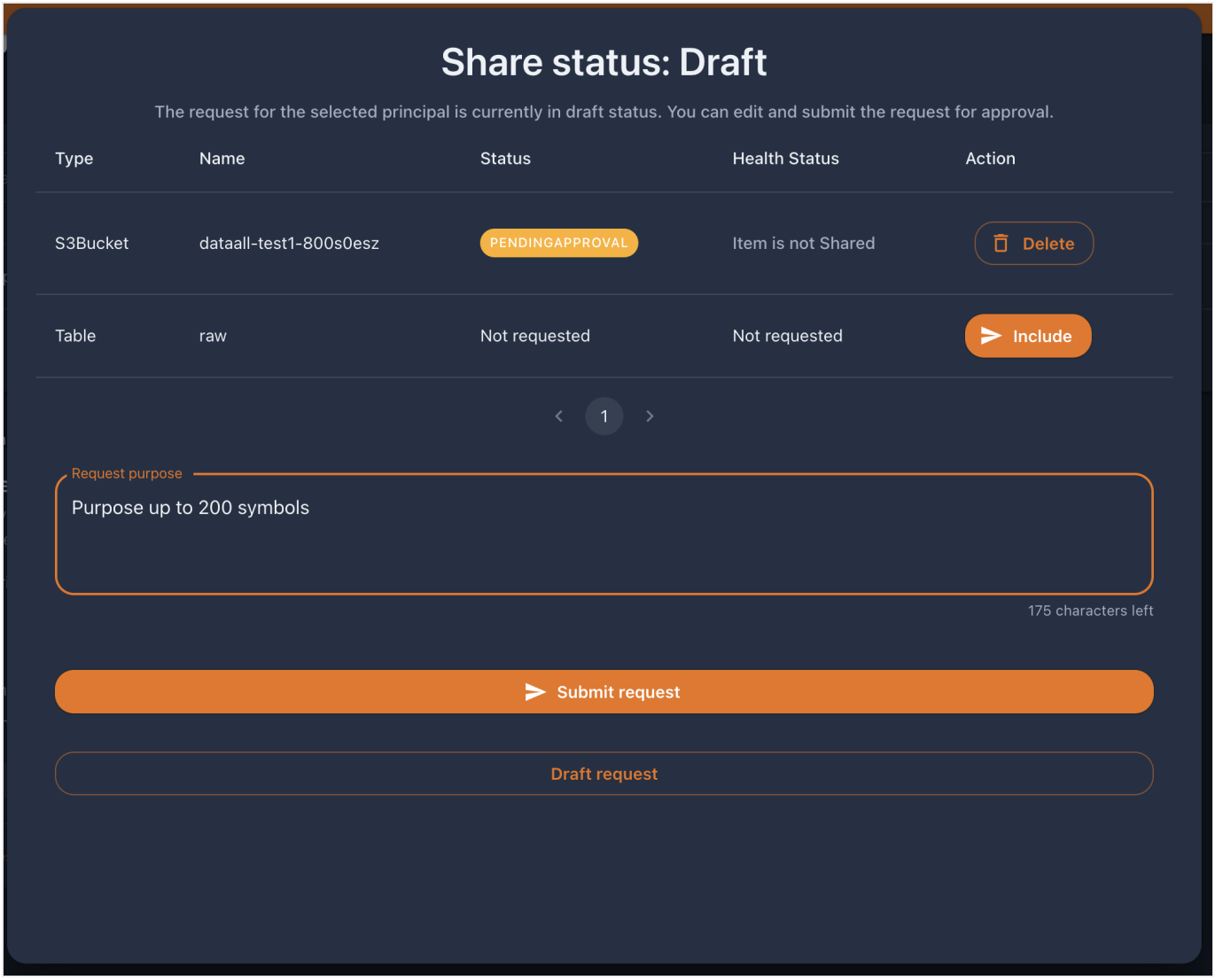


If instead of to a team, you want to request access for a Consumption role, add it to the request as in the picture below.

NOTE: If the consumption role selected is not data.all managed - you will have the option to allow data.all to attach the share policies to the consumption role for this particular share object (if not enabled here you will have to manually attach the share policies to be given access to data).


Request Access
Data access is requested for the whole requester Team or for the selected Consumption role. The request will be submitted to the data owners, track its progress in the Shares menu on the left.
Dataset name
Test1
Environment
MyEnv
Team
testGroup2
Consumption Role (optional)
ConsRole [arn:aws:iam::637423210447:role/Consumer1]
Let Data.All attach policies to this role
Create Draft Request
Cancel

Finally, click on **Create Draft Request**. This will create a share request or object for the corresponding dataset and if you have requested a table or folder it will add those items to the request. After that the modal window will switch to share edit form.



Here you can edit the list of items you want to request access to. Note that the request is in `DRAFT` status and that the items that we add are in `PENDINGAPPROVAL`. They are not shared until the request is submitted and processed. The share can not be submitted if the list of items is empty.

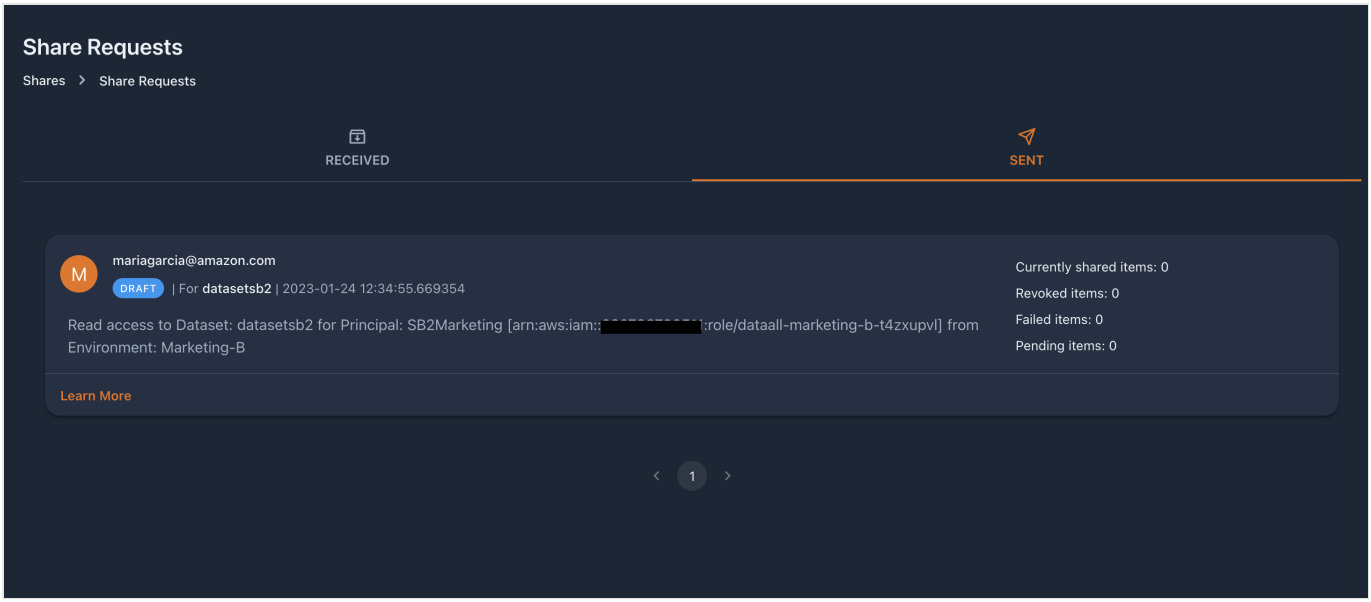
`Request purpose` is optional field, recommended length is up to 200 symbols.

When you are happy with the share request form, click **Submit Request** or click **Draft Request** if you want to return to this form later.

The share needs to be submitted for the request to be sent to the approvers.

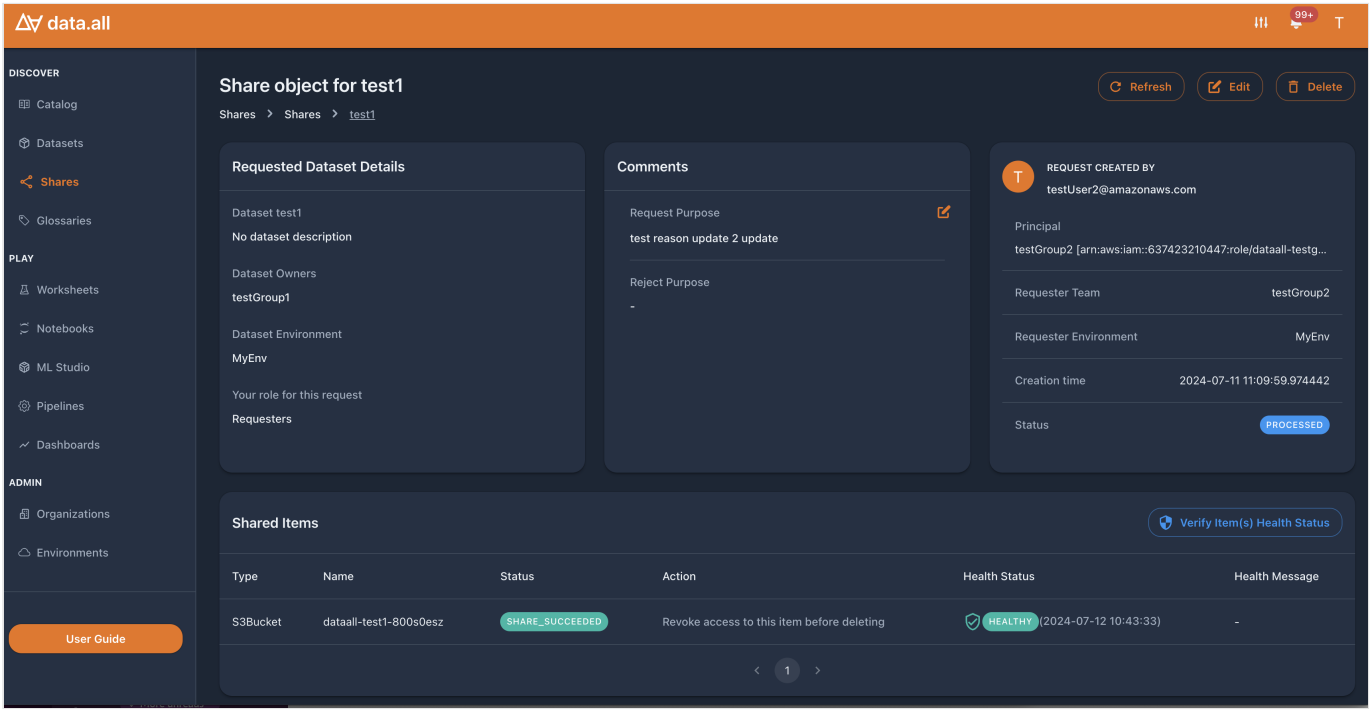
4.4.1 Check your sent/received share requests

Anyone can go to the Shares menu on the left side pane and look up the share requests that they have received and that they have sent. Click on **Learn More** in the request that you are interested in to start working on your request.



4.4.2 **Add/delete items**

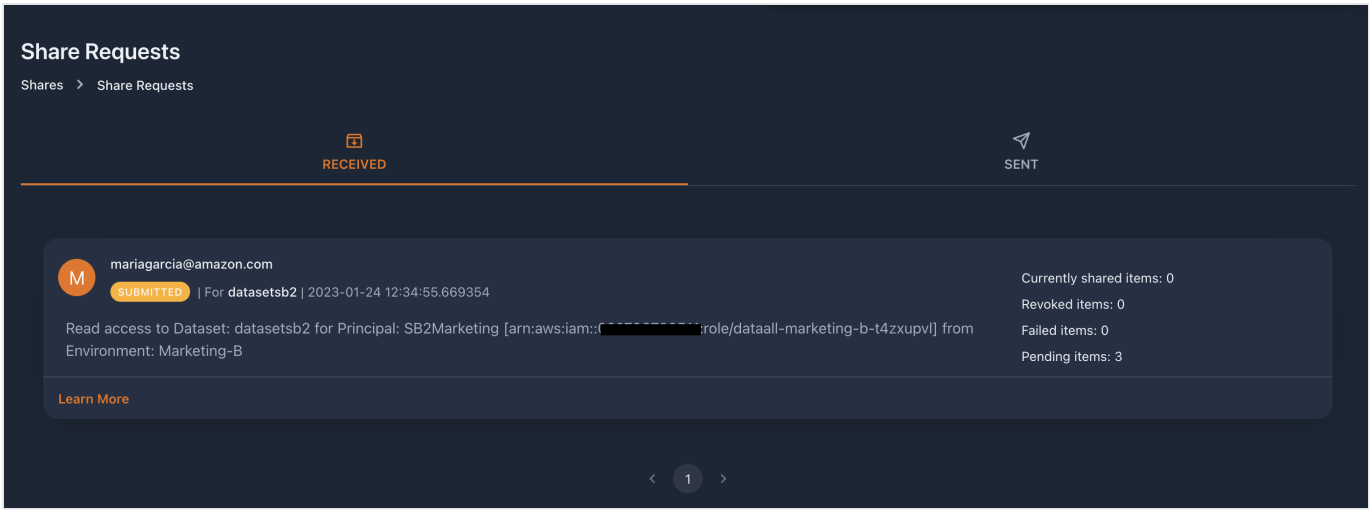
If the request is not being processed, it can be edited by clicking the **Edit** button on top of the page.



Edit button opens the modal window with the Share Edit Form, same as upon creating the share. Here you can edit list of shared items and request purpose. To remove an item from the request click on the **Delete** button with the trash icon next to it. We can only delete items that have not been shared. Items that are shared must be revoked, which is explained below.

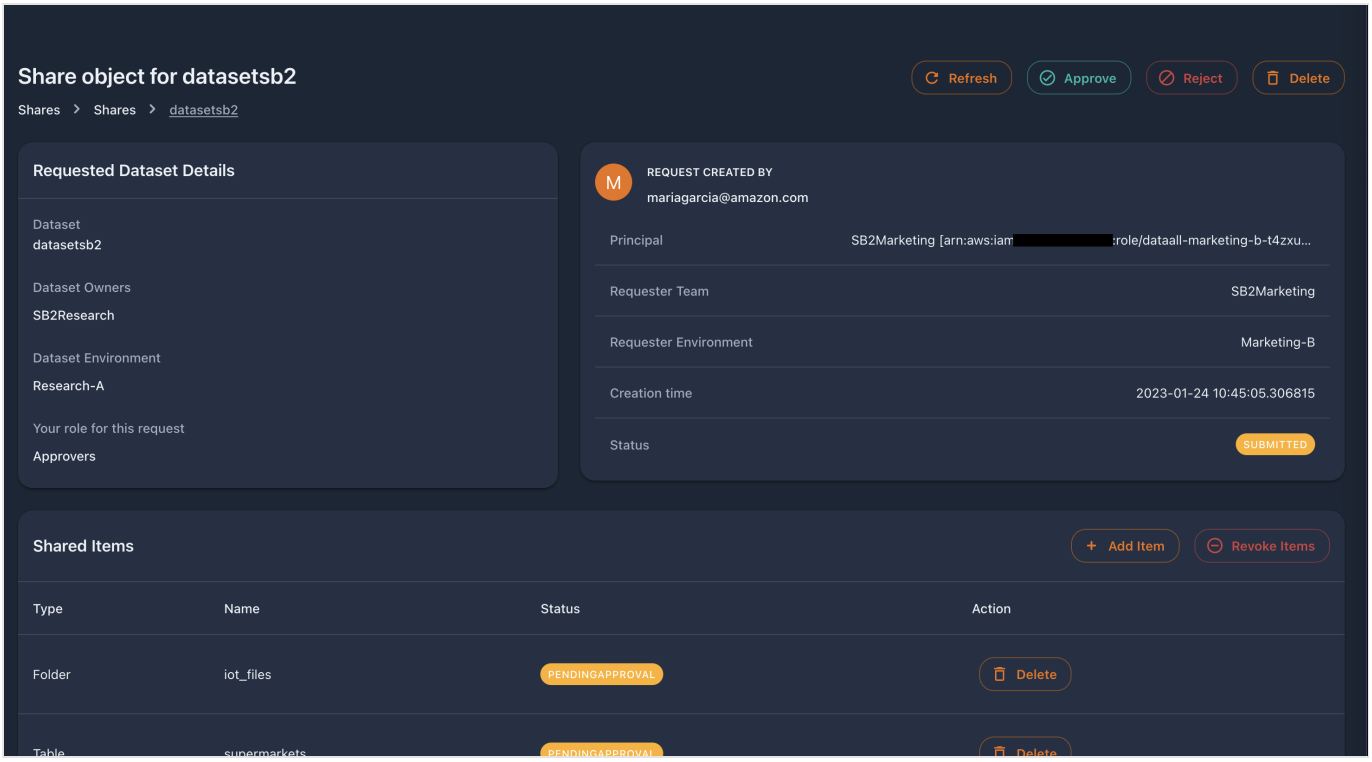
4.4.3 **Submit a share request (requester)**

Once the draft is ready, the requesters need to click on the **submit** button. The request should be now in the `SUBMITTED` state. Approvers can see the request in their received share requests, alongside the current shared items, revoked items, failed items and pending items.

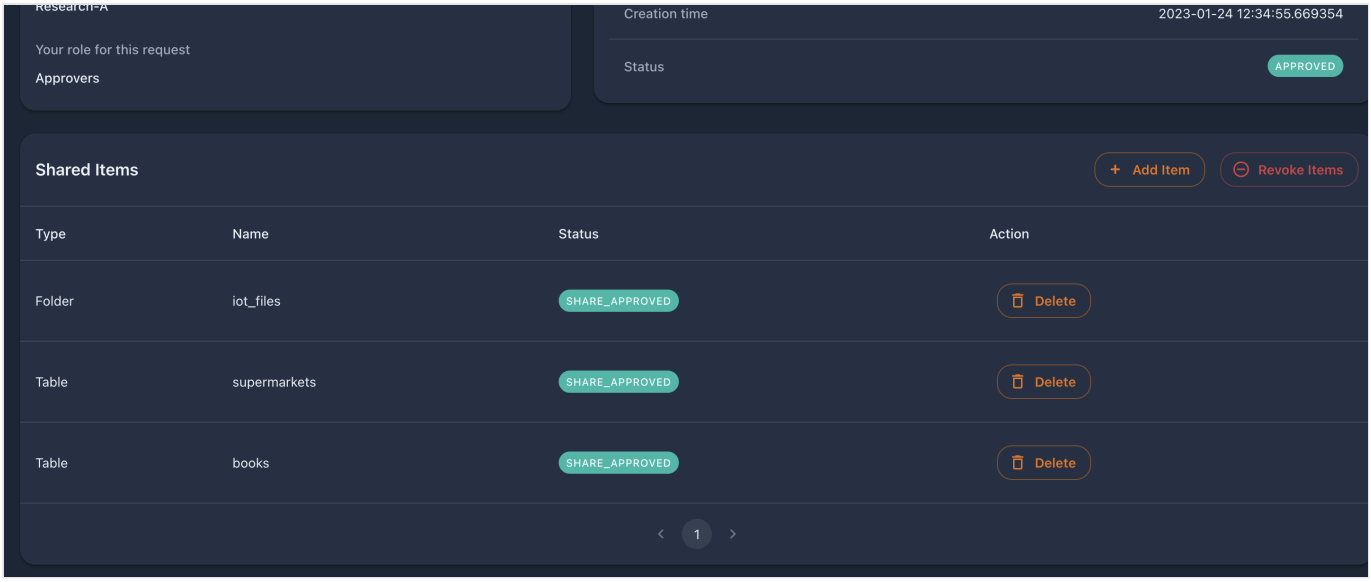


4.4.4 **Approve/Reject a share request (approver)**

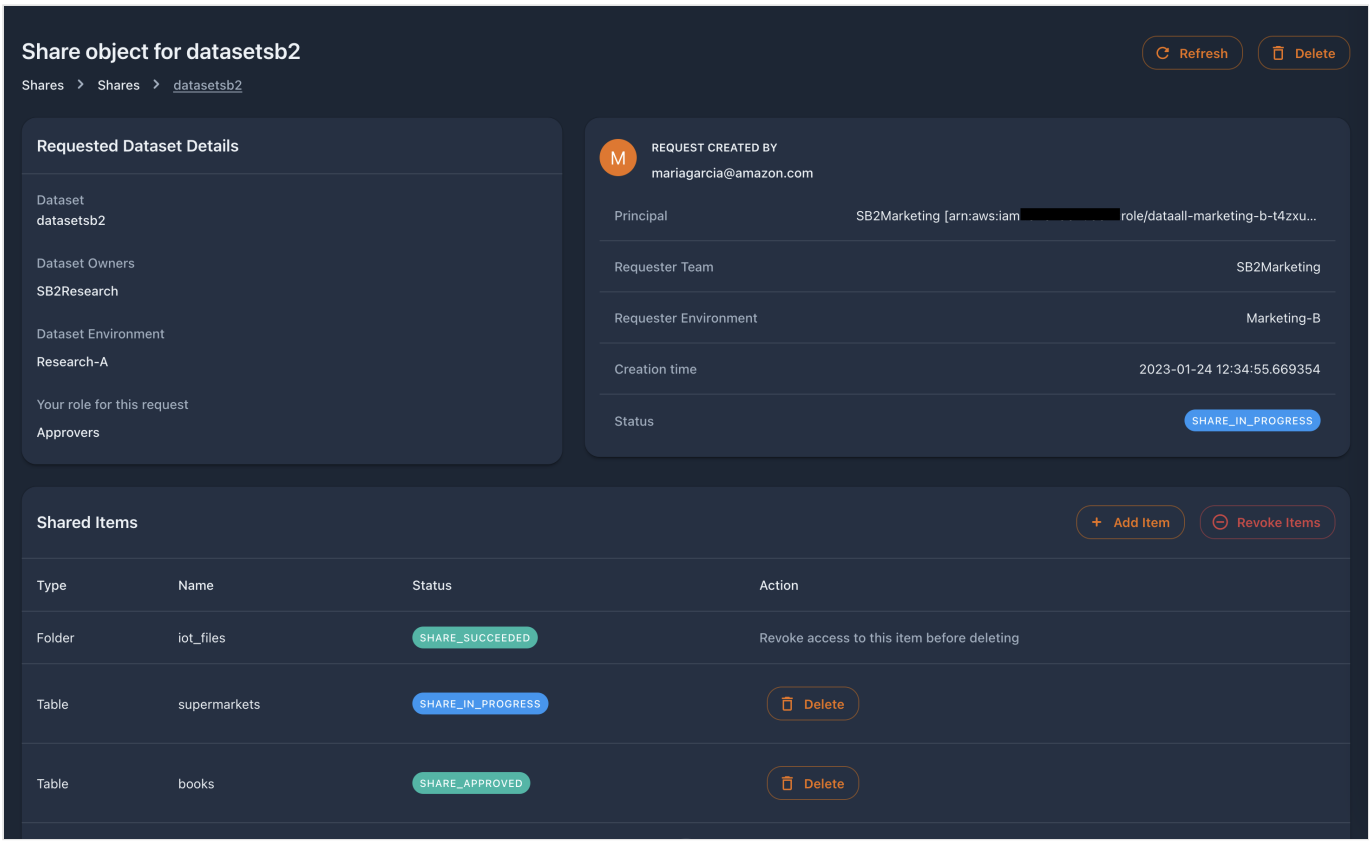
As an approver, click on **Learn more** in the `SUBMITTED` request and in the share view you can check the tables and folders added in the request. This is the view that approvers see, it now contains buttons to approve or reject the request.



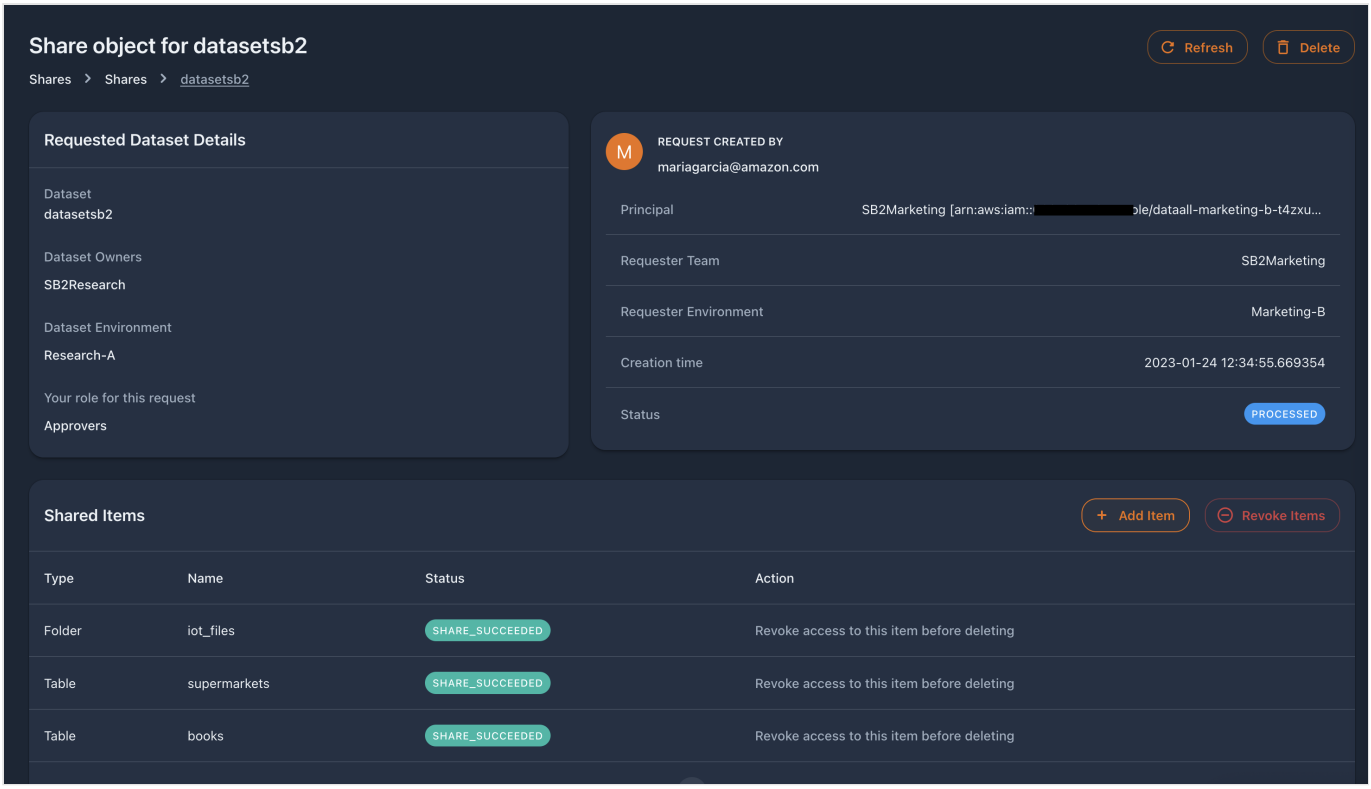
If the approvers **approve** the request, it moves to the `APPROVED` status. Share items IN `PENDINGAPPROVAL` will go to `SHARE_APPROVED`.



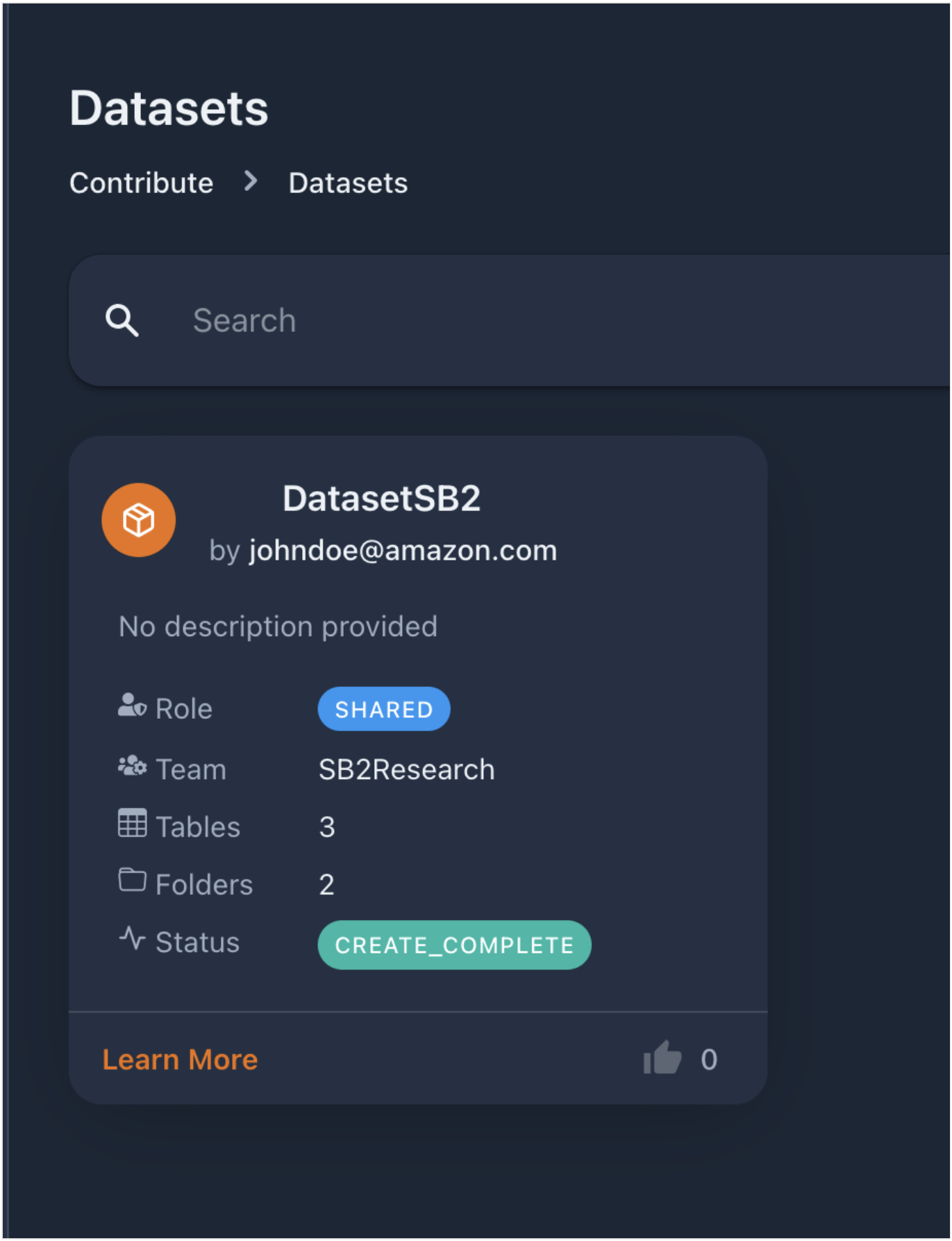
Data.all backend starts a sharing task, during which, items and the request are in `SHARE_IN_PROGRESS` state.



When the task is completed, the items go to `SHARE_SUCCEEDED` or `SHARE_FAILED` and the request is `PROCESSED`.

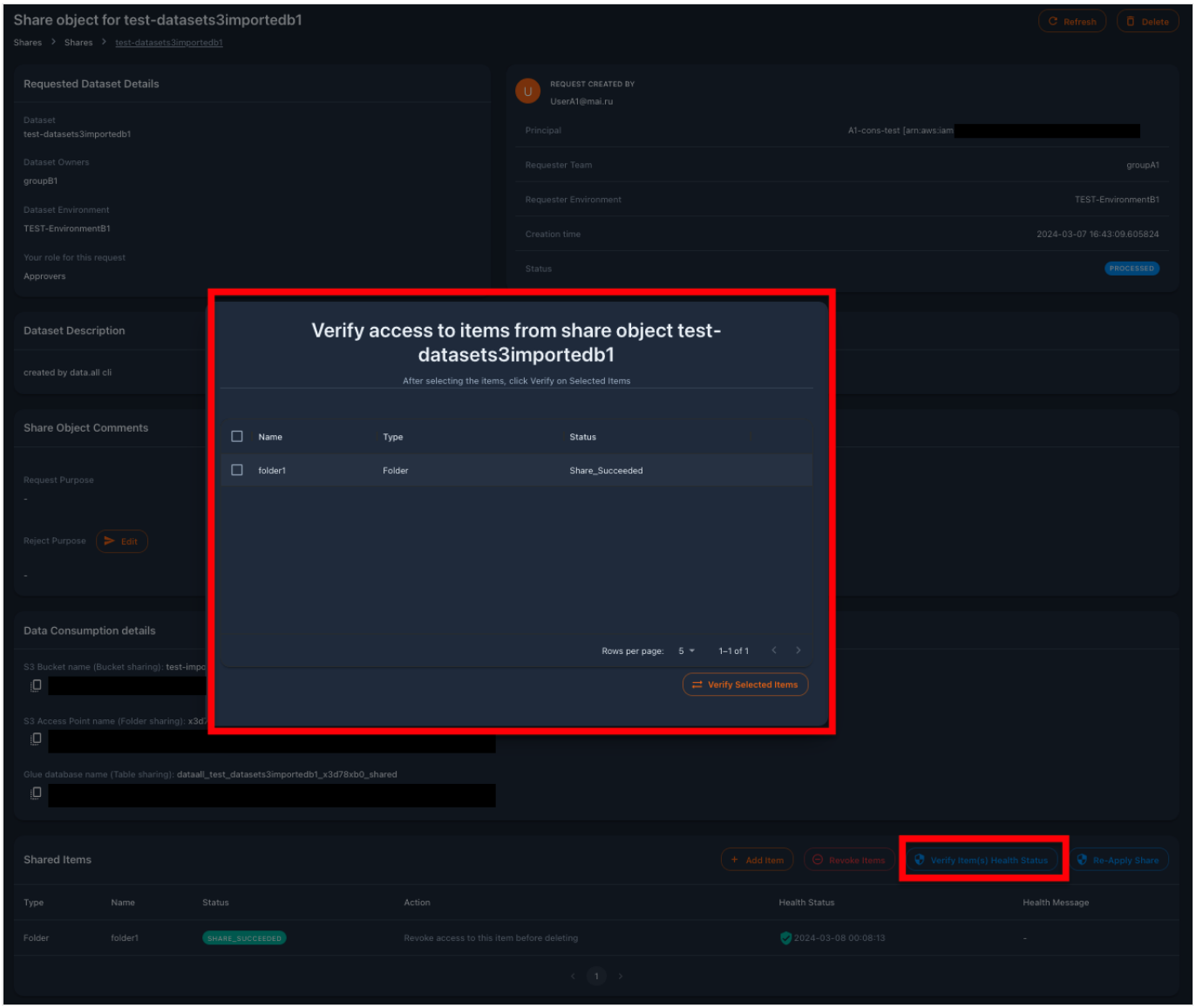


If a dataset is shared, requesters should see the dataset on their screens. Their role with regards to the dataset is `SHARED`.


Datasets
Contribute
Datasets
Search
DatasetSB2
by johndoe@amazon.com
No description provided
Role
SHARED
Team
SB2Research
Tables
3
Folders
2
Status
CREATE_COMPLETE
Learn More
0

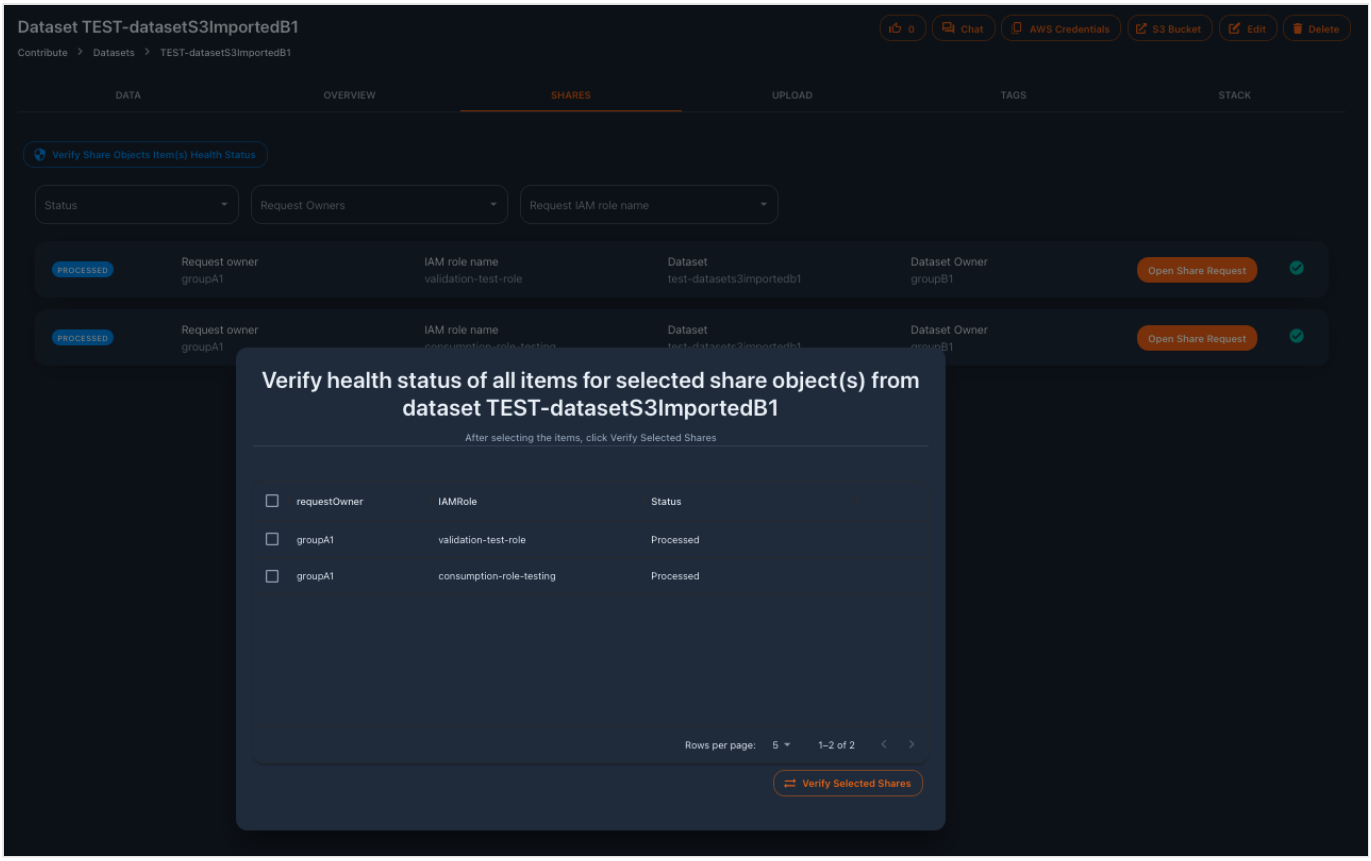
4.4.5 **Verify (and Re-apply) Items**

As of V2.3 of data.all - share requestors or approvers are able to verify the health status of the share items within their share request from the data.all UI. Any set of share items that are in a shared state (i.e. `SHARE_SUCCEEDED` or `REVOKE_FAILED` state) will be able to be selected to start a verify share process.



Upon completion of the verify share process, each share item's healthStatus will be updated with an updated healthStatus (i.e. `Healthy` or `Unhealthy`) as well as a timestamp representing the last verification time. If the share item is in an `Unhealthy` health status, there will also be included a health message detailing what part of the share is in an unhealthy state.

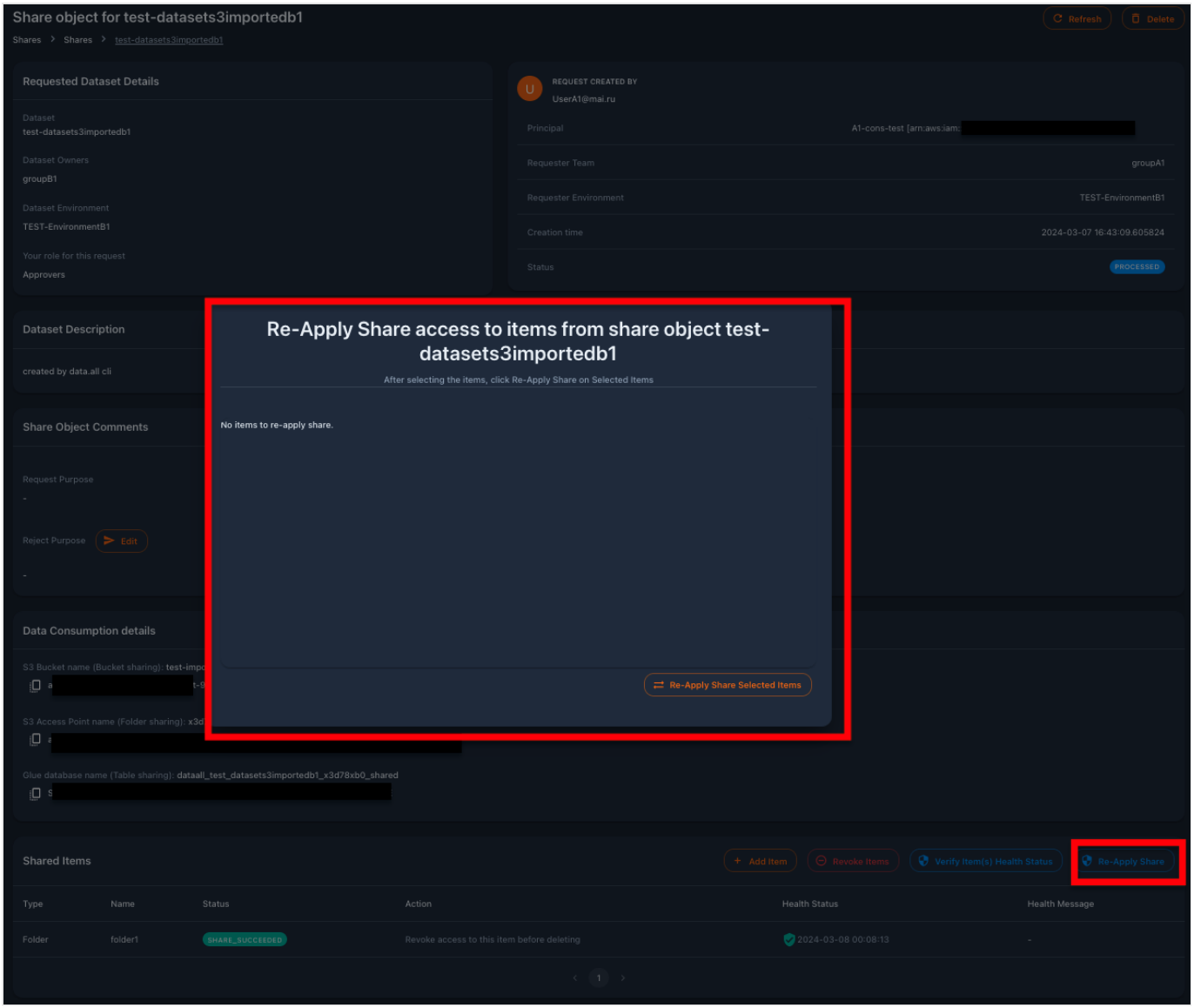
In addition to running a verify share process on particular items, dataset owners can run the verify share process on multiple share objects associated with a particular dataset. Navigating to the Dataset --> Shares Tab, dataset owners can start a verify process on multiple share objects. For each share object selected, the share items that are in a shared state for the associated share object will verified and updated with a new health status and so on.



Scheduled Share Verify Task

The share verifier process is run against all share object items that are in a shared state every 7 days by default as a scheduled task which runs in the background of data.all.

If any share items do end up in an `Unhealthy` status, the data.all approver will have the option to re-apply the share for the selected items that are in an unhealthy state.

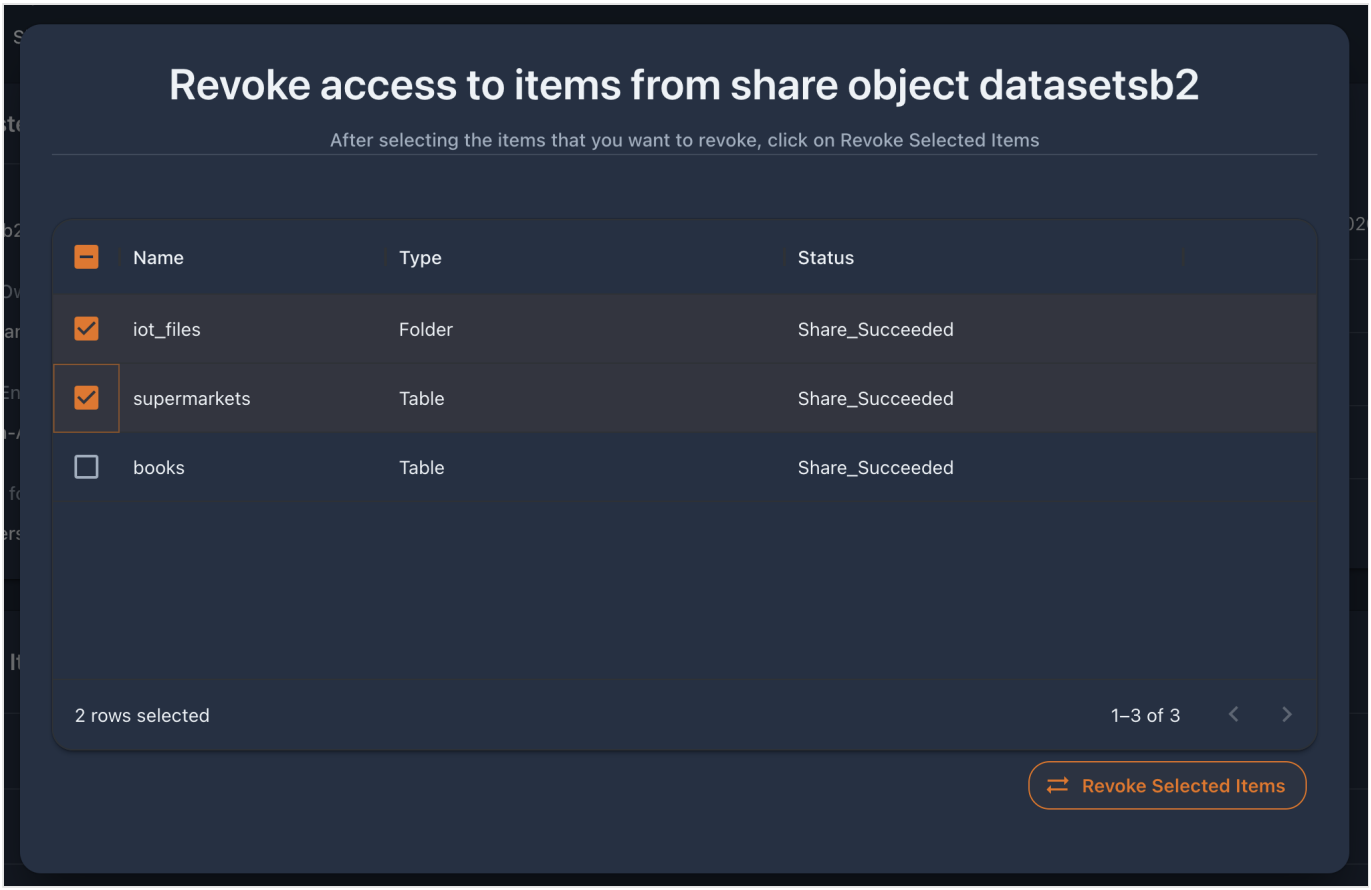


Upon successful re-apply process, the share items health status will revert back to a `Healthy` status with an updated timestamp.

4.4.6 **Revoke Items**

Both approvers and requesters can click on the button **Revoke items** to remove the share grant from chosen items.

It will open a window where multiple items can be selected for revoke. Once the button "revoke selected items" is pressed the consequent revoke task will be triggered.

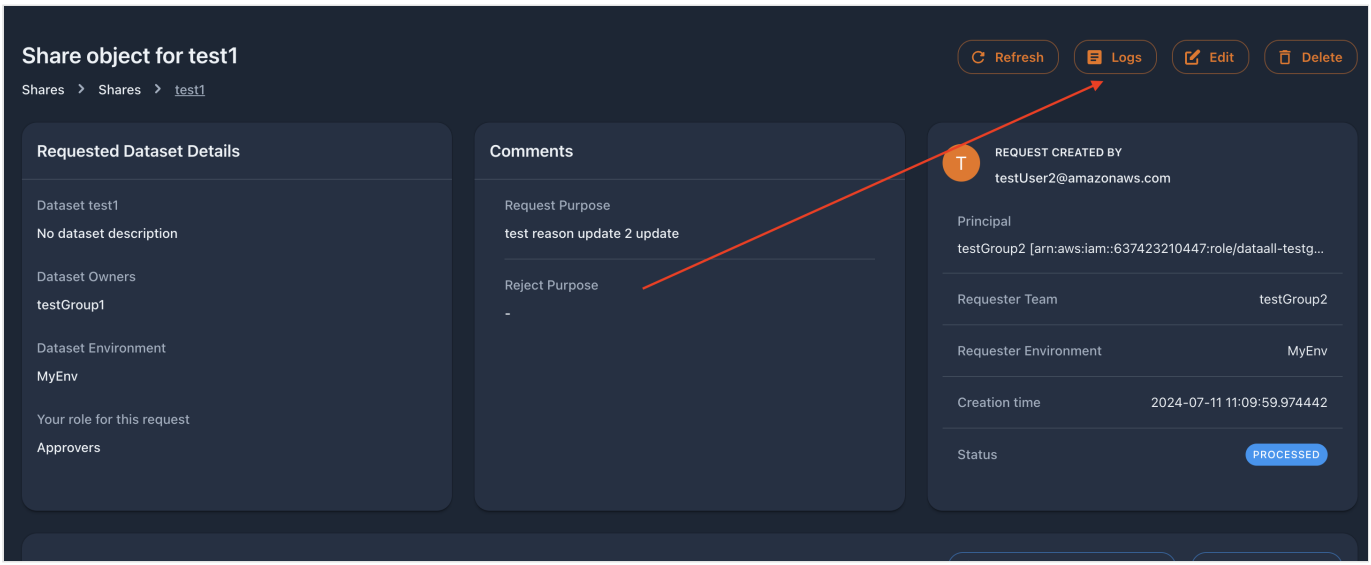


Proactive clean-up

In every revoke task, data.all checks if there are no more shared folders or tables in a share request. In such case, data.all automatically cleans up any unnecessary S3 access point or Lake Formation permission.

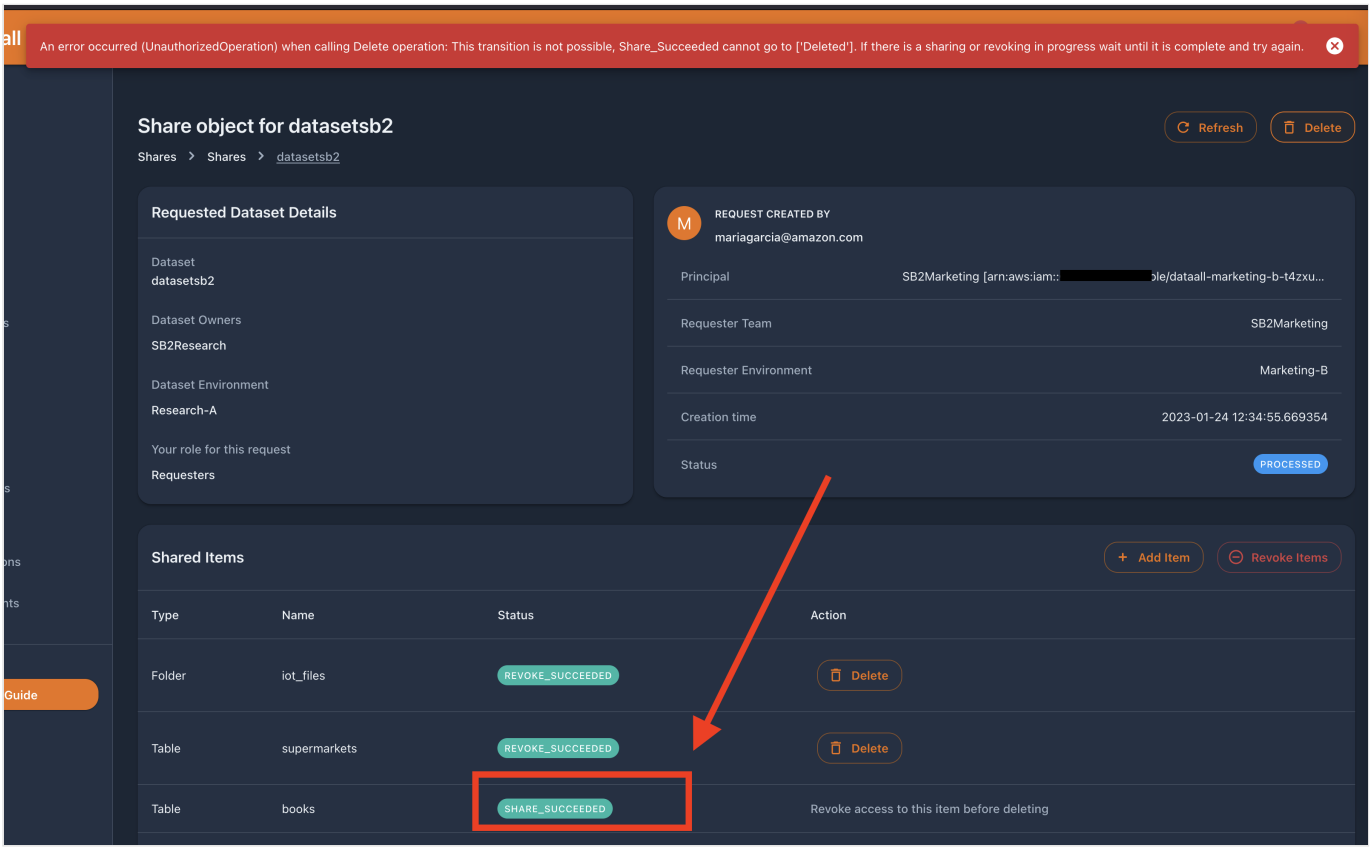
4.4.7 View Share Logs

For the share Approvers the logs of share processor are available via Data.all UI. To view logs of the latest share processor run, click **Logs** button in right upper conner of the Share View page.



4.4.8 **Delete share request**

To delete a share request, it needs to be empty from shared items. For example, the following request has some items in `SHARE_SUCCEEDED` state, therefore we receive an error. Once we have revoked access to all items we can delete the request.



4.4.9 **Consume shared data**

Data.all tables are Glue tables shared using AWS Lake Formation, therefore any service that reads Glue tables and integrates with Lake Formation is able to consume the data. Permissions are granted to the team role or the consumption role that has been specified in the request.

For the case of folders, the underlying sharing mechanism used is S3 Access Points. You can read data inside a prefix using the IAM role of the requester (same as with tables) and executing get calls to the S3 access point.

For example:

```
aws s3 ls arn:aws:s3:<SOURCE_REGION>:<SOURCE_AWSACCOUNTID>:accesspoint/<DATASETURI>-<REQUESTER-TEAM>/folder2/
```

For S3 bucket sharing, IAM policies, S3 bucket policies, and KMS Key policies (if applicable) are updated to enable sharing of the S3 Bucket resource.

For example, access to the bucket would be similar to:

```
aws s3 ls s3://<BUCKET_NAME>
```

4.4.10 **Email Notification on share requests**

In data.all, you can enable email notification to send emails to requesters and approvers of a share request. Email notifications are triggered during all share workflows - Share Submitted, Approved, Rejected, Revoked.

The content sent in email notification is similar to the UI based notification.

For example the email body will look like,

```
User <USERNAME> <SHARE_ACTION> share request for dataset <DATASET_NAME>

where <SHARE_ACTION> corresponds to "submitted", "approved", "revoked", "rejected"
```

Note - In order to enable email notification, you need to configure it in `config.json` and setup the AWS services needed for during the deployment phase. Please review steps for setting up email notification on data.all webpage in the `Deploy to AWS` section

5. Play

5.1 Worksheets

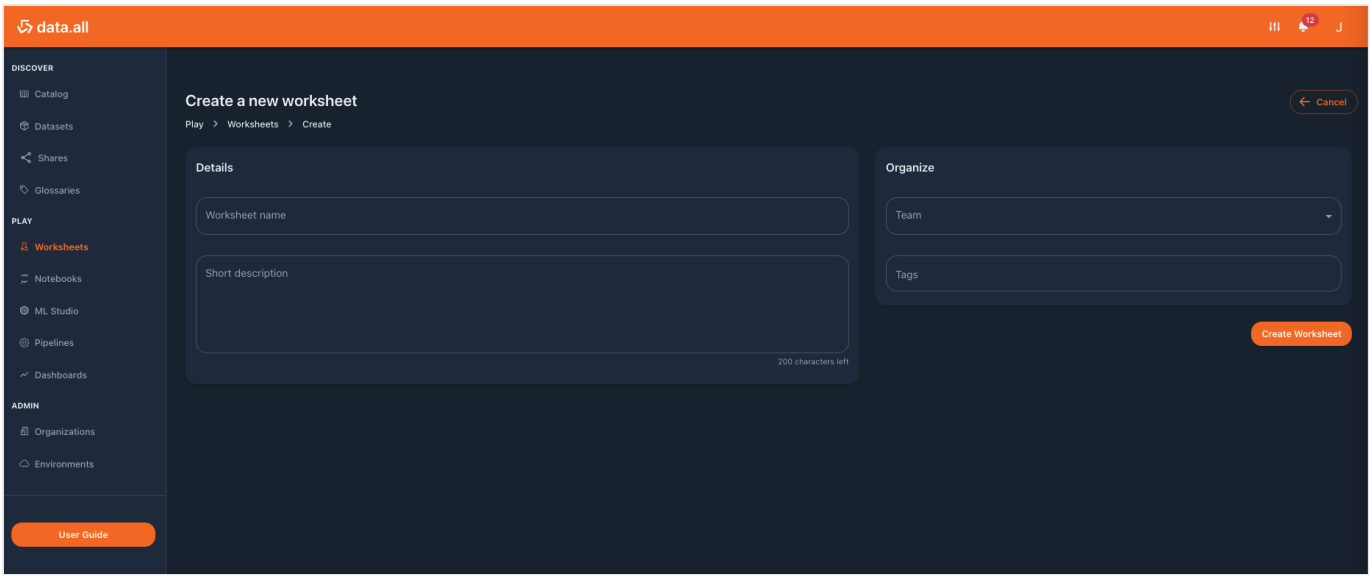
data.all offers a rich editor to write SQL queries and explore data. It is Athena on the backend that runs our queries on environments where our teams have been onboarded.

5.1.1 NEW Create a Worksheet

On the left pane under **Play** click on **Worksheets** to go to the Worksheet menu. Here you will find all Worksheets owned by your teams.

> **Shared queries = Seamless Collaboration**
>
> Check, learn from and collaborate with other members of your team to improve your analyses and get insights from your data, directly from data.all worksheets. No need to send queries by email, no need to create views :)

To create a new worksheet click on the **Create** button in the top right corner and fill the Worksheet form:



Field	Description	Required	Editable	Example
Worksheet name	Name of the worksheet	Yes	Yes	PalmDor
Short description	Short description about the worksheet	No	Yes	Query used to retrieve Palm D'or winners
Team	Team that owns the worksheet	Yes	No	DataScienceTeam
Tags	Tags	No	Yes	adhoc

> **No AWS resources**
>
> When we are creating a worksheet we are NOT deploying AWS resources. We don't provision clusters, we are not creating tables or views. We simply store the query in data.all database and we run it serverlessly on AWS Athena.

5.1.2 Edit worksheet metadata

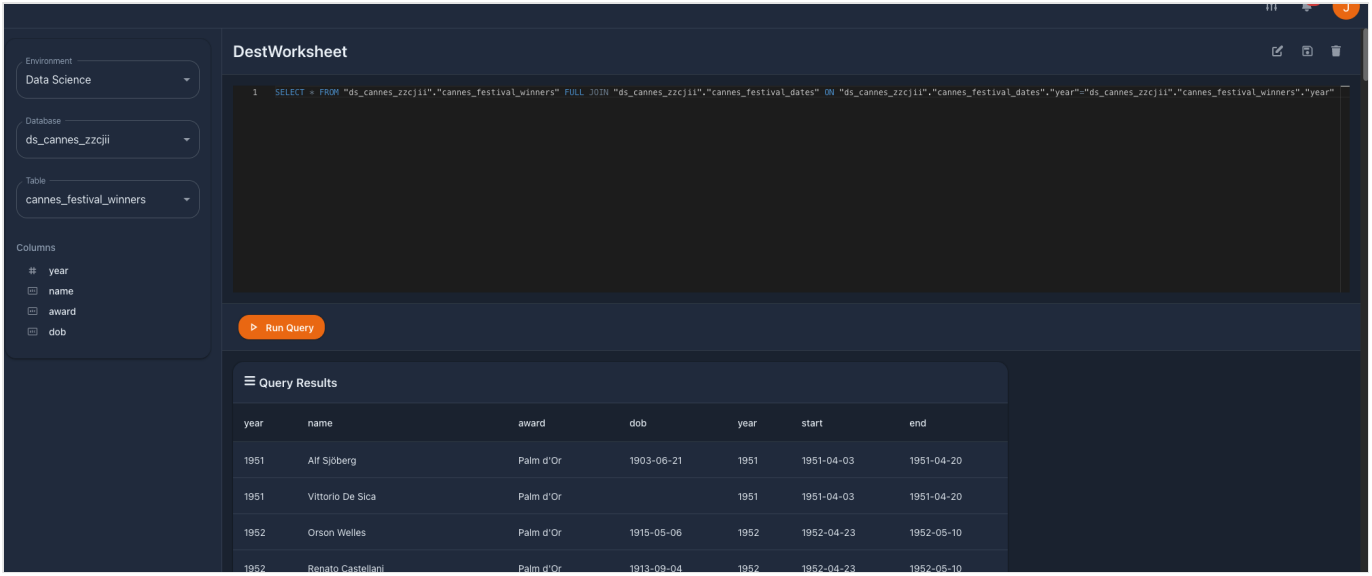
Select a worksheet and click on the pencil icon to edit the metadata of the worksheet. This includes worksheet name, description and tags. The ownership of the worksheet, its team, is not editable.

5.1.3 Delete a worksheet

Next to the edit button, there are 2 other buttons. To delete a worksheet click on the trash icon one. Worksheets are not AWS resources, they are a data.all construct whose information is stored in the data.all database. Thus, when we delete a worksheet we are not deleting AWS resources or CloudFormation stacks.

5.1.4 Write and save your queries

Select your worksheet and choose any of the environments, datasets and tables of your team to list column information. In the query editor write your SQL statements and click on **Run Query** to get your query results. Error messages coming from Athena will pop-up automatically.



If you want to save the current query for later or for other users, click on the **save** icon (between the edit and the delete buttons).

> **More than just SELECT**
>
> Worksheets can be used for data exploration, for quick ad-hoc queries and for more complicated queries that require joins. As far as you have access to the joined datasets you can combine information from multiple tables or datasets. Check the docs for more information on AWS Athena SQL syntax.

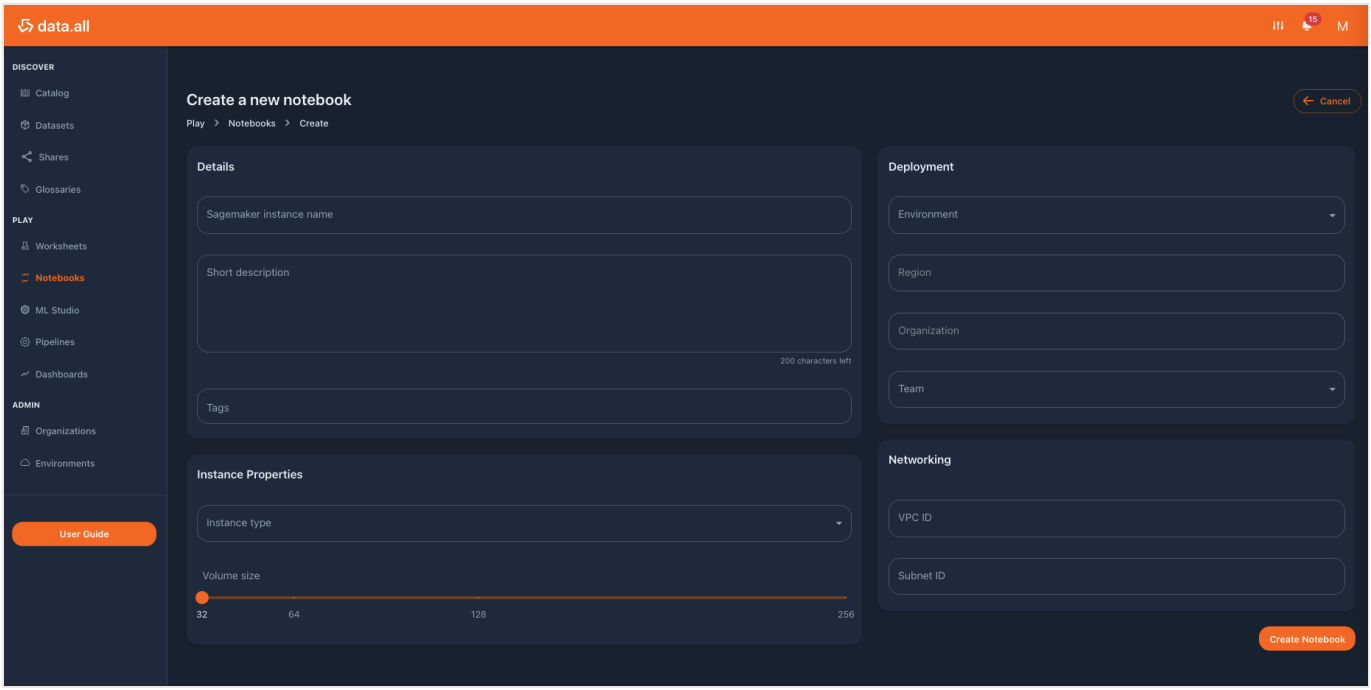
5.2 Notebooks

Data practitioners can experiment machine learning algorithms spinning up Jupyter notebook with access to all your datasets. data.all leverages Amazon SageMaker instance to access Jupyter notebooks.

5.2.1 NEW Create a Notebook

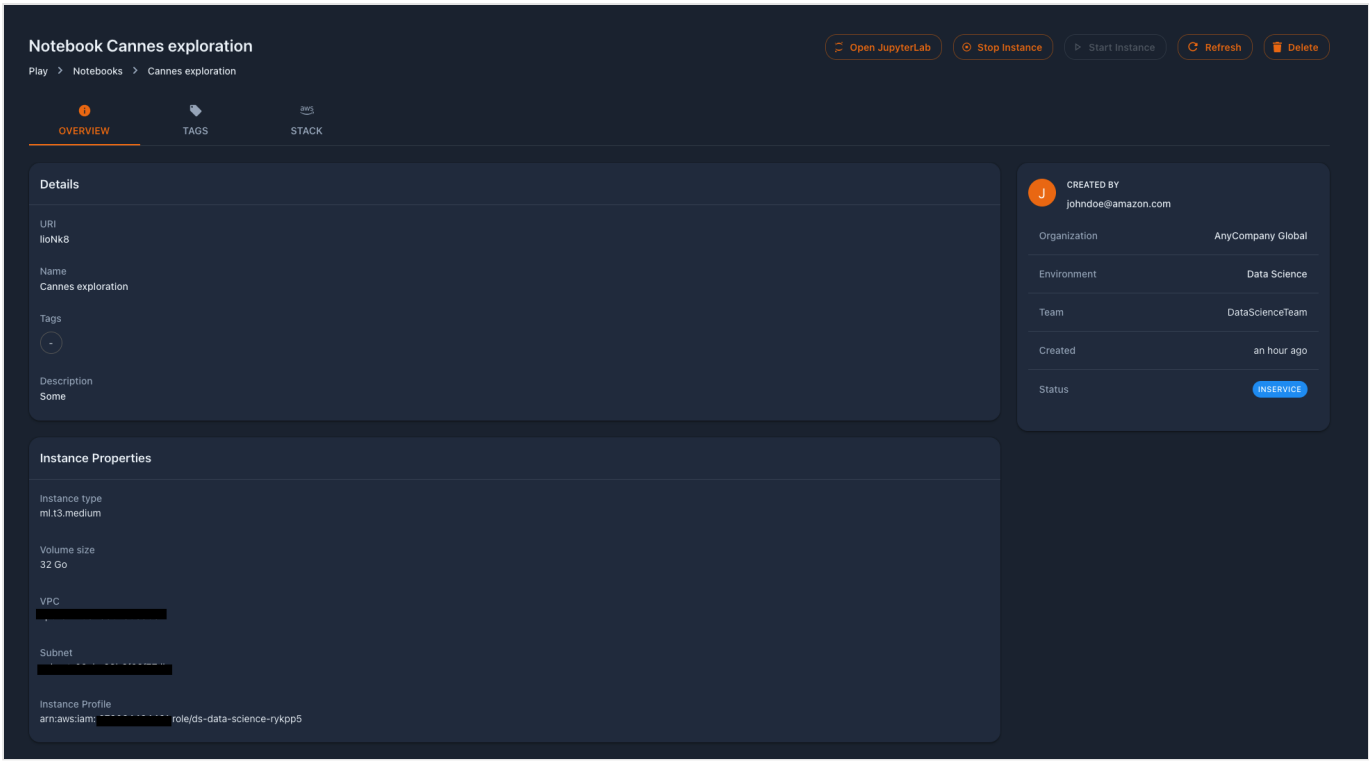
> **Pre-requisites**
>
> To use Notebooks you need to introduce your own VPC ID or create a Sagemaker Studio domain inside a VPC (read the docs). Provisioning the notebook instances inside a VPC enables the notebook to access VPC-only resources such as EFS file systems.

To create a Notebook, go to Notebooks on the left pane and click on the **Create** button. Then fill in the following form:



Field	Description	Required	Editable	Example
Sagemaker instance name	Name of the notebook	Yes	No	Cannes Project
Short description	Short description about the notebook	No	No	Notebook for Cannes exploration
Tags	Tags	No	No	deleteme
Environment	Environment (and mapped AWS account)	Yes	No	Data Science
Region (auto-filled)	AWS region	Yes	No	Europe (Ireland)
Organization (auto-filled)	Organization of the environment	Yes	No	AnyCompany EMEA
Team	Team that owns the notebook	Yes	No	DataScienceTeam
VPC Identifier	VPC provided to host the notebook	No	No	vpc-.....
Subnets	Subnets provided to host the notebook	No	No	subnet-....
Instance type	[ml.t3.medium, ml.t3.large, ml.m5.xlarge]	Yes	No	ml.t3.medium
Volume size	[32, 64, 128, 256]	Yes	No	32

If successfully created we can check its metadata in the **Overview** tab. Unlike other data.all resources, Notebooks are non-editable.



5.2.2 Check CloudFormation stack

In the **Stack** tab of the Notebook, is where we check the AWS resources provisioned by data.all as well as its status. As part of the Notebook CloudFormation stack deployed using CDK, data.all will deploy:

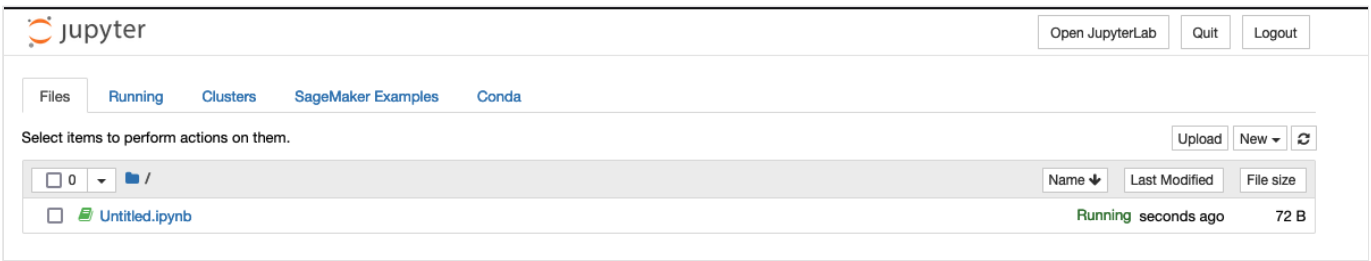
1. AWS EC2 Security Group
2. AWS SageMaker Notebook Instance
3. AWS KMS Key and Alias

5.2.3 Delete a Notebook

To delete a Notebook, simply select it and click on the **Delete** button in the top right corner. It is possible to keep the CloudFormation stack associated with the Notebook by selecting this option in the confirmation delete window that appears after clicking on delete.

5.2.4 Open JupyterLab

Click on the **Open JupyterLab** button of the Notebook window to start writing code on Jupyter Notebooks.



5.2.5 Stop/Start instance

As we briefly commented, data.all uses AWS SageMaker instances to access Jupyter notebooks. Be frugal and stop your instances when you are not developing. To do that, close the Jupyter window and click on **Stop Instance** in the Notebook buttons. It takes a couple of minutes, just refresh and check the Notebook Status in the overview tab. It should end up in `STOPPED`.

> **Save money, stop your instances**
>
> This feature allows users to easily manage their instances directly from data.all UI.

Same when you are coming back to work on your Notebook, click on **Start instance** to start the SageMaker instance. In this case the Status of the notebook should first be `PENDING` and once the instance is ready, `INSERVICE`.

5.2.6 Create Key-value tags

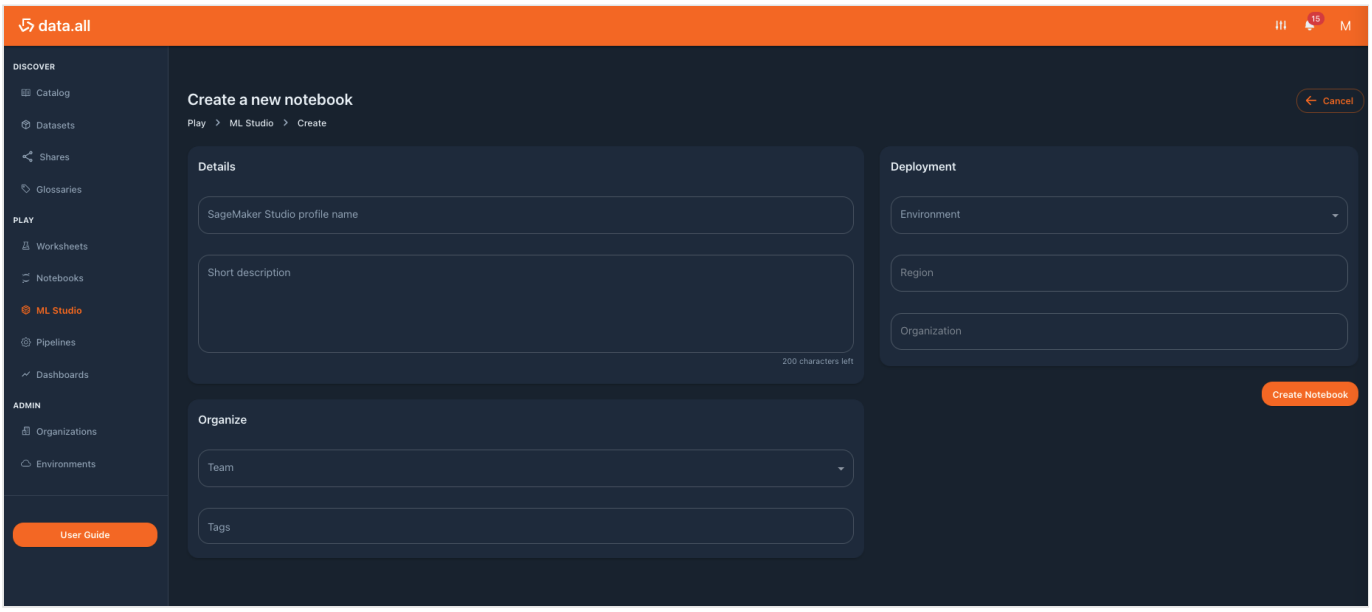
In the **Tags** tab of the notebook window, we can create key-value tags. These tags are not *data.all* tags that are used to tag datasets and find them in the catalog. In this case we are creating AWS tags as part of the notebook CloudFormation stack. There are multiple tagging strategies as explained in the documentation.

5.3 ML Studio

With ML Studio Profiles we can add users to our SageMaker domain and open Amazon SageMaker Studio. The SageMaker Studio domain is created as part of the environment stack.

5.3.1 NEW Create an ML Studio profile

To create a new ML Studio profile, go to ML Studio on the left side pane and click on Create. Then fill in the creation form with its corresponding information.



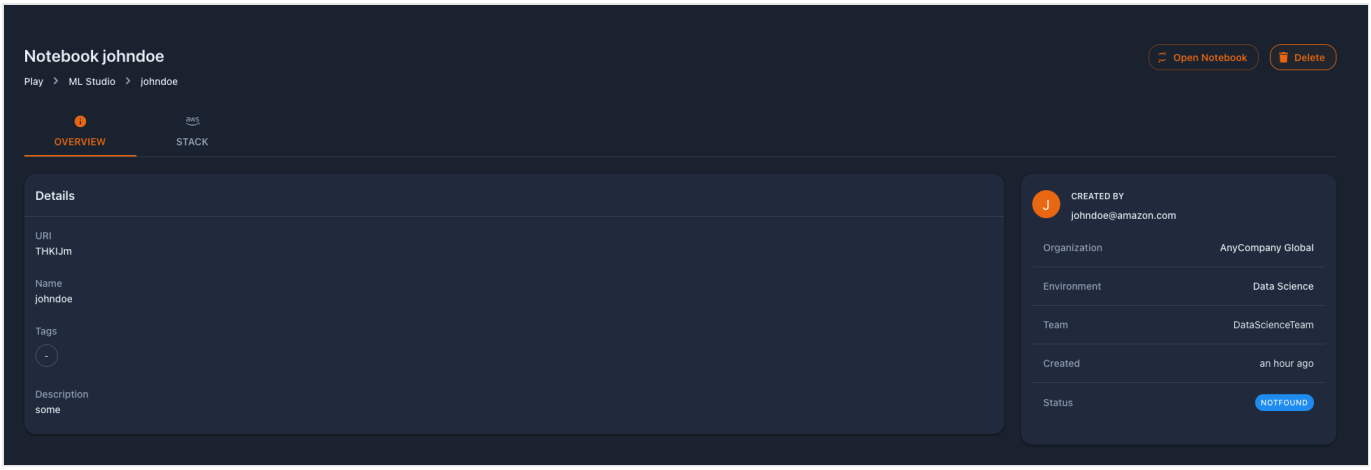
Field	Description	Required	Editable	Example
Sagemaker Studio profile name	Name of the user to add to SageMaker domain	Yes	No	johndoe
Short description	Short description about the user profile	No	No	Notebook for Cannes exploration
Tags	Tags	No	No	deleteme
Environment	Environment (and mapped AWS account)	Yes	No	Data Science
Region (auto-filled)	AWS region	Yes	No	Europe (Ireland)
Organization (auto-filled)	Organization of the environment	Yes	No	AnyCompany EMEA
Team	Team that owns the notebook	Yes	No	DataScienceTeam

5.3.2 Check CloudFormation stack

In the **Stack** tab of the ML Studio Profile, is where we check the AWS resources provisioned by data.all as well as its status. As part of the CloudFormation stack deployed using CDK, data.all will deploy some CDK metadata and a SageMaker User Profile.

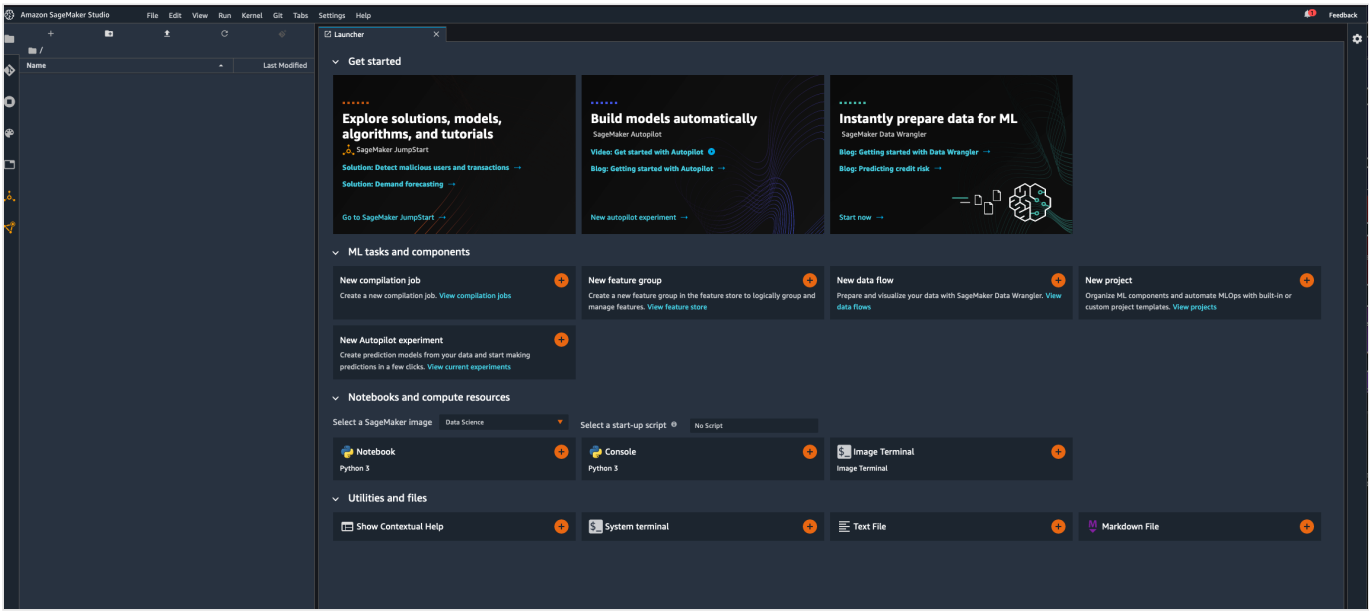
5.3.3 Delete an ML Studio user

To delete a SageMaker user, simply select it and click on the **Delete** button in the top right corner. It is possible to keep the CloudFormation stack associated with the User by selecting this option in the confirmation delete window that appears after clicking on delete.



5.3.4 Open Amazon SageMaker Studio

Click on the **Open ML Studio** button of the ML Studio notebook window to open Amazon SageMaker Studio.



5.4 Pipelines

Different business units might have their own data lake and ingest and process the data with very different tools: Scikit Learn, Spark, SparkML, AWS SageMaker, AmazonAthena… The diversity of tools and use-cases result in a wide variety of CICD standards which discourages development collaboration.

In order to distribute data ingestion and processing, data.all introduces data.all pipelines:

- data.all takes care of CICD infrastructure
- data.all integrates with AWS DDK, a tool to help you build data workflows in AWS
- data.all allows you to define development environments directly from the UI and deploys data pipelines to those AWS accounts

> **Focus on value-added code**
>
> data.all takes care of the CICD and multi-environment configuration and DDK provides reusable assets and data constructs that accelerate the deployment of AWS data workflows, so you can focus on writing the actual transformation code and generating value from your data!

5.4.1 Multi-environment Pipelines

In some cases, enterprises decide to separate CICD resources from data application resources, which at the same time, need to be deployed to multiple accounts. Data.all allows users to easily define their CICD environment and other infrastructure environments in a flexible, robust way.

Let's see it with an example. In your enterprise, the Research team has 3 AWS accounts: Research-CICD, Research-DEV and Research-PROD. They want to ingest data with a data pipeline that is written in Infrastructure as Code (IaC) in the Research-CICD account. The actual data pipeline is deployed in 2 data accounts. First, in Research-DEV for development and testing and once it is ready it is deployed to Research-PROD.

Pre-requisites

As a pre-requisite, Research-DEV and Research-PROD accounts need to be bootstrapped using AWS CDK, trusting the CICD account (`--trust` parameter). Assuming 111111111111 = CICD account the commands are as follows:

- In Research-CICD (111111111111): `cdk bootstrap`
- In Research-DEV (222222222222): `cdk bootstrap --trust 111111111111`
- In Research-PROD (333333333333): `cdk bootstrap --trust 111111111111`

In data.all we need to link the AWS accounts to the platform by creating 3 data.all Environments: Research-CICD Environment, Research-DEV Environment and Research-PROD Environment.

NOTE: In practice, the cdk bootstrap command would already be run once when linking an environment. For example, if bootstrapping an environment with the default AdministratorAccess CDK execution policy, the command run before linking a new environment would look similar to:

```
cdk bootstrap --trust DATA.ALL_AWS_ACCOUNT_NUMBER  -c @aws-cdk/core:newStyleStackSynthesis=true --cloudformation-execution-policies arn:aws:iam::aws:policy/
AdministratorAccess aws://YOUR_ENVIRONMENT_AWS_ACCOUNT_NUMBER/ENVIRONMENT_REGION
```

In order for the DEV and PROD accounts to also trust the CICD account without impacting the initial bootstrap requirements, the Research-DEV and Research-PROD accounts need to edit the aforementioned bootstrap command similar to the following:

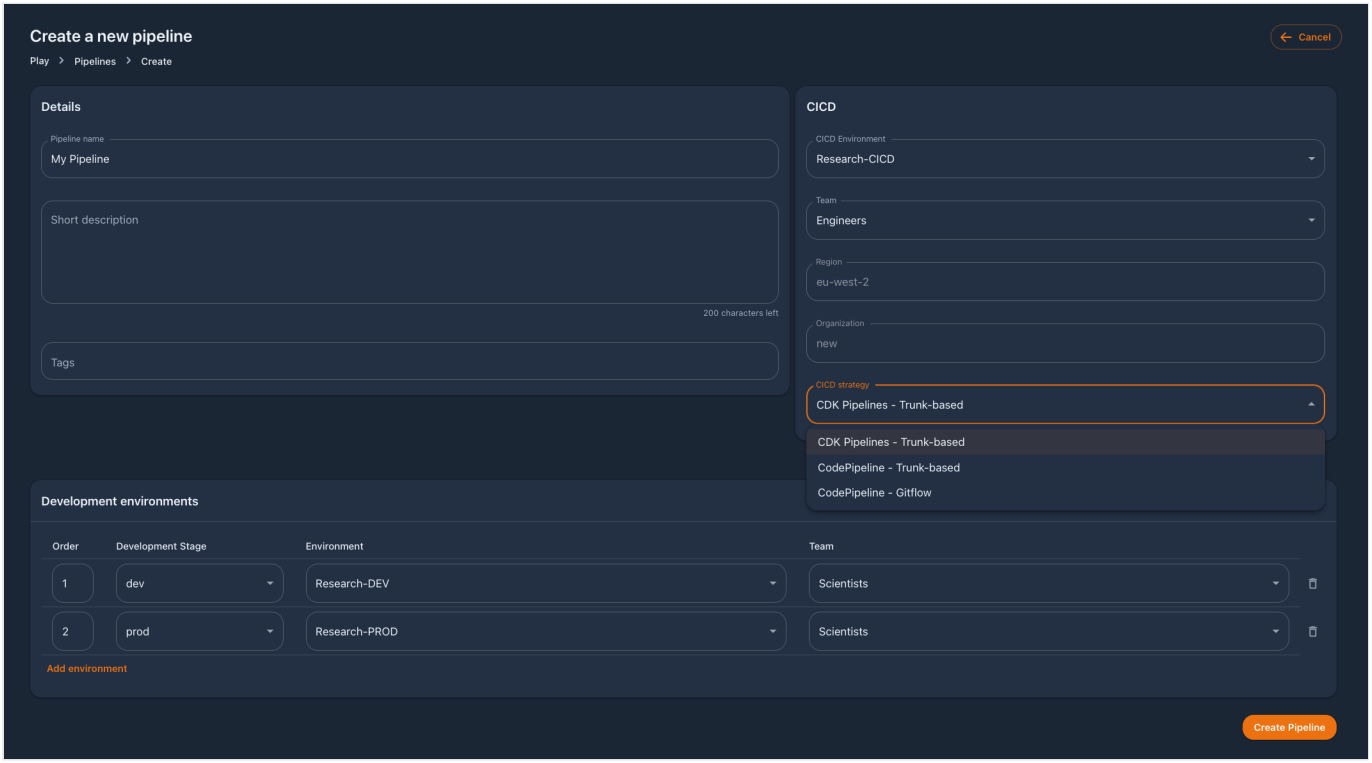
```
cdk bootstrap --trust DATA.ALL_AWS_ACCOUNT_NUMBER --trust Research-CICD_AWS_ACCOUNT_NUMBER -c @aws-cdk/core:newStyleStackSynthesis=true --cloudformation-
execution-policies arn:aws:iam::aws:policy/AdministratorAccess aws://YOUR_ENVIRONMENT_AWS_ACCOUNT_NUMBER/ENVIRONMENT_REGION
```

Creating a pipeline

data.all pipelines are created from the UI, under Pipelines. We need to fill the creation form with the following information:

- Name, Description and tags
- CICD Environment: AWS account and region where the CICD resources will be deployed.
- Team, this is the Admin team of the pipeline. It belongs to the specified CICD Environment where the pipeline is defined as IaC
- CICD strategy: This is the development strategy that determines the type of CICD Pipeline that is created by data.all. Currently the following 4 types are supported depending on your use case:
  a. **CDK Pipelines - Trunk-based** : A CICD pipeline based on CDK Pipelines library. It defines a DDK Core construct which deploys Continuous Integration and Delivery for your app. Specifically, it provisions a stack containing a self-mutating CDK code pipeline to deploy one or more copies of your CDK applications using CloudFormation with a minimal amount of effort on your part.
  b. **CodePipeline - Trunk-based** : A CICD pipeline similar to CDK Pipelines and with a trunk-based approach but is not self-mutating.
  c. **CodePipeline - Gitflow**: A Gitflow branching strategy where each branch of the source repository has a corresponding CICD Pipeline that deploys resources for that branches environment.

Finally, we need to add **Development environments**. These are the AWS accounts and regions where the infrastructure defined in the CICD pipeline is deployed.



CDK Pipelines Overview

CODECOMMIT REPOSITORY

When a pipeline is created, an AWS CodeCommit repository with the code of an AWS DDK application is created in the CICD environment AWS account. It contains an set up for a multi-account deployment, as explained in its documentation.

In the deployed repository, data.all pushes a `ddk.json` file with the details of the selected development environments:

```
{
    "tags": {
        "dataall": "true",
        "Target": "PIPELINE_NAME"
    },
    "environments": {
        "cicd": {
```

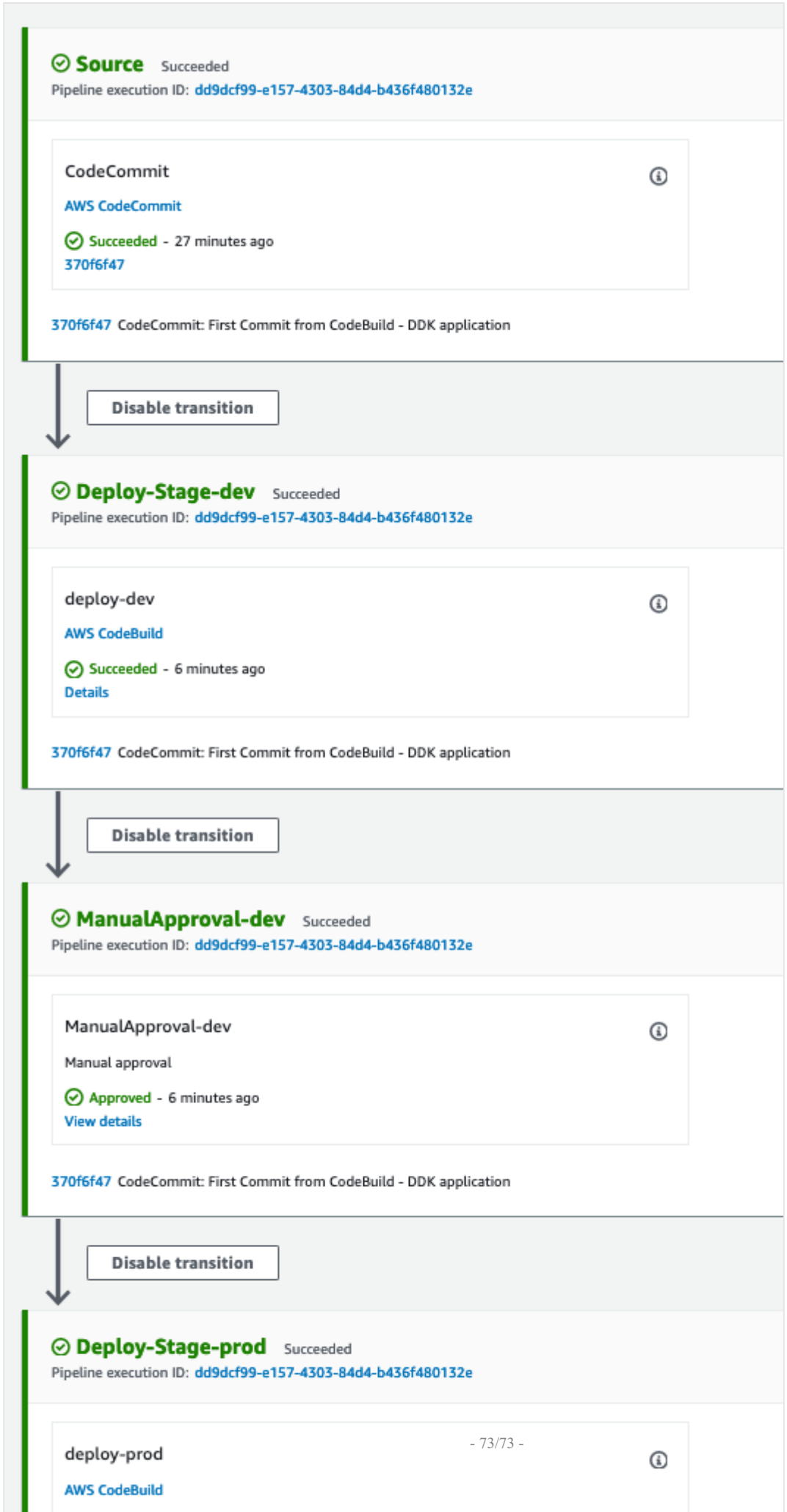
```
            "account": "111111111111",
            "region": "eu-west-1"
        },
        "dev": {
            "account": "222222222222",
            "region": "eu-west-1",
            "tags": {
                "Team": "DATAALL_GROUP"
            }
        },
        "prod": {
            "account": "333333333333",
            "region": "eu-west-1",
            "tags": {
                "Team": "DATAALL_GROUP"
            }
        }
    }
}
```

In addition, the `app.py` file is also written accordingly to the development environments selected in data.all UI. It will look similar to the following:

```
# !/usr/bin/env python3

import aws_cdk as cdk
import aws_ddk_core as ddk
from dataall_pipeline_app.dataall_pipeline_app_stack import DataallPipelineStack

app = cdk.App()

class ApplicationStage(cdk.Stage):
    def __init__(
            self,
            scope,
            environment_id: str,
            **kwargs,
    ) -> None:
        super().__init__(scope, f"dataall-{environment_id.title()}", **kwargs)
        DDKApplicationStack(self, "DataPipeline-PIPELINENAME-PIPELINEURI", environment_id)

id = f"dataall-cdkpipeline-PIPELINEURI"
cicd_pipeline = (
    ddk.CICDPipelineStack(
        app,
        id="dataall-pipeline-PIPELINENAME-PIPELINEURI",
        environment_id="cicd",
        pipeline_name="PIPELINENAME",
        cdk_language="python",
        env=ddk.Configurator.get_environment(
            config_path="./ddk.json", environment_id="cicd"
        ),
    )
        .add_source_action(repository_name="dataall-PIPELINENAME-PIPELINEURI")
        .add_synth_action()
        .build_pipeline()
        .add_stage(
          stage_id="dev",
          stage=ApplicationStage(
            app,
            "dev",
            env=ddk.Configurator.get_environment(config_path="./ddk.json", environment_id="dev")
          )
        )
        .add_stage(
          stage_id="prod",
          stage=ApplicationStage(
            app,
            "prod",
            env=ddk.Configurator.get_environment(config_path="./ddk.json", environment_id="prod")
          )
        )
        .synth()
)

app.synth()
```

CICD DEPLOYMENT

data.all backend performs the first deployment of the CICD stack defined in the CodeCommit repository. The result is a CloudFormation template deploying a CICD pipeline having the aforementioned CodeCommit repository as source. This CodePipeline pipeline is based on the CDK Pipelines library.


Source Succeeded
Pipeline execution ID: dd9dcf99-e157-4303-84d4-b436f480132e
CodeCommit
AWS CodeCommit
Succeeded - 27 minutes ago
370f6f47
370f6f47 CodeCommit: First Commit from CodeBuild - DDK application
Disable transition
Deploy-Stage-dev Succeeded
Pipeline execution ID: dd9dcf99-e157-4303-84d4-b436f480132e
deploy-dev
AWS CodeBuild
Succeeded - 6 minutes ago
Details
370f6f47 CodeCommit: First Commit from CodeBuild - DDK application
Disable transition
ManualApproval-dev Succeeded
Pipeline execution ID: dd9dcf99-e157-4303-84d4-b436f480132e
ManualApproval-dev
Manual approval
Approved - 6 minutes ago
View details
370f6f47 CodeCommit: First Commit from CodeBuild - DDK application
Disable transition
Deploy-Stage-prod Succeeded
Pipeline execution ID: dd9dcf99-e157-4303-84d4-b436f480132e
deploy-prod
AWS CodeBuild