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Prisma Cloud Field Guide

How to deploy Prisma Cloud from Code to Cloud

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Overview

This document is intended to provide customers and partners with the best practices implementations within Prisma Cloud.

Document Structure

The basic structure of this document follows the cloud application's lifecycle phases and additional information for Prisma Cloud operation.

1. Code/Build
2. Deploy
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4. Additional Information

Code & Build

Cloud Code Security Onboarding

There are three main types of environments that Code Security can onboard, each supporting several platforms:

- **Integrated Development Environment (IDE)**
  - VSCode
  - IntelliJ
- **Version Control System (VCS)**
  - Azure Repos
  - BitBucket
  - BitBucket Server
  - GitHub
  - GitHub Server
  - GitLab
  - GitLab Self-Managed
- **CI/CD pipelines**
  - AWS Code Build
  - Azure Pipelines
  - Checkov
  - CircleCI
  - GitHub Actions
  - GitLab Runner
  - Jenkins
  - Terraform Cloud (Sentinel)
  - Terraform Cloud (Run Tasks)
  - Terraform Enterprise (Sentinel)

Onboarding documentation

The Code Security capacities support a wide range of Cloud DevSecOps and Integrated Repositories, Development Environments (IDEs), and CI/CD pipelines that you use to build and deploy code and infrastructure for your organization.

Supported IaC types and frameworks

What are the scannable IaC file types?

Currently, followings are supported, Here is the reference link:

- Terraform
- Terraform plan
- Cloudformation
- AWS SAM
- Kubernetes
- Dockerfile
- Serverless framework
- Bicep
- ARM
- Argo Workflows
- Bitbucket Pipelines
- Circle CI Pipelines
- GitHub Actions
- GitLab CI

Master/Main and branch scanning

Recap on Git branching process

Currently VCS scan is on master/main PR and Branch scanning in CI/CD only.

Palo Alto Networks is currently working on adding the ability to select a set to scan a few ~5 (but not all) branches in the daily periodic scans. Note that if you are doing a fix on an existing PR scan, it will not open a new PR, but rather commit back to that same branch.

CDK Scanning (CI/CD)

Support for CDKTF for Terraform is provided through Chekov integration.

The main problem for using CDKs is that there is no traceability back to the original CDK code, so PRs or anything bot related are not usable with CDKs.

More info here:
Tutorial: Scanning AWS CDK-generated templates at build-time with Bridgecrew

CdkGoat - Vulnerable AWS CDK Infrastructure

Terraform Plan Scanning (CI/CD)

Checkov can be used to evaluate terraform plan expressed in a json file. Plan evaluation provides Checkov additional dependencies and context that can result in a more complete scan result.

```
terraform show -json tfplan.binary | jq '.' > tfplan.json
checkov -f tfplan.json
```

Scanning Third-Party and Private Terraform Modules (CI/CD)

Terraform modules abstract the terraform configuration away from a regular Checkov scan on the current directory.

To ensure coverage of objects within these modules, you can instruct Checkov to **scan the .terraform directory**, after a terraform init, which will have retrieved the third-party modules and any associated .tf files:

```
terraform init
checkov -d . # Your TF files.
checkov -d .terraform # Module TF files.
```

It is worth noting however, that when scanning the .terraform directory, Checkov cannot differentiate between third-party and internally written modules. That said, you will benefit from scanning coverage across all of them.

In case third-party modules are stored in a private repository or a private Terraform Cloud registry, **you can provide access tokens as environment variables for checkov to attempt to clone those modules.**

Variable Name	Description
GITHUB_PAT	Github personal access token with read access to the private repository
BITBUCKET_TOKEN	Bitbucket personal access token with read access to the private repository
TFC_TOKEN	Terraform Cloud token which can access the private registry
BITBUCKET_USERNAME	Bitbucket username (can only be used with a BITBUCKET_APP_PASSWORD

BITBUCKET_APP_PASSWORD Bitbucket app password (can only be used with a BITBUCKET_USERNAME)

For self-hosted VCS repositories, use the following environment variables:

Variable Name	Description
VCS_BASE_URL	Base URL of the self-hosted VCS: https://example.com
VCS_USERNAME	Username for basic authentication
VCS_TOKEN	Password for basic authentication

For more info see - Terraform Plan and External Terraform Module Scanning

Connect VCS (Version Control System) Code Repositories

By integrating your VCS repos you will put an automatic security guardrail in place, **forcing all/selected repos to be scanned just by doing the Prisma Cloud integration**.

This provides a single interface to administer repos security scans from the Prisma Cloud CCS console. VCS scanning is (as of August 2922) supported for master/main branch oly.

However, there are some limitations to this approach. As an alternative, integrating CI/CD pipelines with Code Security scans allows you to customize your code security scanning process during the build time.

Please Note: **New repositories created in your VCS are not automatically added** (except Bitbucket Server) to Code Security configuration after the VCS integration is configured.

It is **your responsibility to create a process for onboarding new code repositories** after Code Security integration with your chosen VCS. This might involve updating all aspects of the existing Code Security configurations for your new repository. Such as creating/updating new/editing existing RBAC Roles, setting up correct notification channels, and new automation workflows.

Navigate to **Settings > Repositories > Add Repository** and select your VCS system.
For testing purposes, you can onboard some sample Git repositories:

- TerraGoat - Vulnerable by design Terraform Infrastructure
- Cfngoat - Vulnerable by design Cloudformation Template
- CdkGoat - Vulnerable by design AWS CDK Infrastructure
- BicepGoat - Vulnerable by design Bicep and ARM Infrastructure
- KubernetesGoat - Vulnerable by design Kubernetes Cluster
- KustomizeGoat - Vulnerable by design Kustomize deployment
- SupplyGoat - Vulnerable by design SCA

Checkov

Integrating Prisma Cloud with Checkov makes it possible for Prisma Cloud Code Security to scan your infrastructure as code files (Terraform and CloudFormation), display Incidents on the Console and, optionally, cause a build to fail. For more details, see Checkov.

The following are reasons why you would want to use CI/CD scanning over VCS scans:

- CI/CD scanning allows users to scan right at deployment time
- Scan TF plan files that contain "data" values imported from the cloud environment
- Block deployments on failed scan

Checkov CLI specific Use Cases

- Use CLI to check against a specific policy for a job in the pipeline
- Use CLI to scan private terraform modules (Prisma Cloud support is coming)
- Use CLI to download policies
  use the --list argument. It will show each policy and each resource type per policy (some policies apply to multiple resource types)
  use the --output-bc-ids option to show which policies exist in the platform, and which are checkov-only:
  checkov --list --output-bc-ids
  To just get a list of unique policy IDs, without metadata:
  checkov --output-bc-ids -l | cut -d '|' -f 3 | sort | uniq
  To download policies in CSV:
  echo 'Provider,Benchmarks,Policy ID,Title,Severity,Category' > policies.csv; curl 'https://www.bridgecrew.cloud/api/v1/policies/table' -H "Authorization: $BC_API_KEY"+ (.value|join(",","))) | join("; ")), .id, .title, .severity, .category] | @csv' >> policies.csv

Navigate to **Settings > Repositories > Add Repository** and select your CI/CD system.

Also see this Bridgecrew blog post

IDE Integration

Navigate to **Settings > Repositories > Add Repository** and select your IDE.

The IDE integration supports Microsoft Visual Studio Code and Jetbrains IntelliJ:

- Checkov Extension for Visual Studio Code
  - Also see this Bridgecrew blog post
- Checkov Plugin for Jetbrains IDEA

Also see this Bridgecrew blog post.

Drift Detection

Prisma Cloud Code Security supports Drift Detection for your VCS. Drifts are inconsistencies in the configuration that occur when resources are modified directly or manually using the CLI or console, and these modifications from the code are not recorded or tracked.

The inconsistencies in code can either be an addition or deletion of values from the template in the source code.

Code Security periodically scans your repositories to identify Drifts that may occur between the build and deploy phase and enables you with corrective resolutions to handle traceable configuration changes.

Drift detection is currently available only for resources that are deployed using Terraform and CloudFormation on AWS and Azure.

Support for resources deployed on **Google Cloud Platform (GCP)** is being released at the end of TBC.

Support for TF state, Kubernetes, and Unmanaged resource detection is being released after this.

Please check the Release Notes for up-to-date information.
https://docs.paloaltonetworks.com/prisma/prisma-cloud/prisma-cloud-release-notes/prisma-cloud-code-security-release-information

Setup and Manage Drift Detection

Enforcement (Scan configurations)

Once your code repositories are integrated, you can modify your configuration to specify how Prisma Cloud scans your code.

Periodic scans are performed every 12 hours at 8am/8pm EST and can last up to 60 minutes. You can also perform on-demand scan by pressing the “Scan Now” button in the project repository view.

On the Prisma Cloud console there are default parameters, based on best practices, for each code category scanned in your repositories.

Using enforcement, you can configure these default parameters and receive violation notifications only for critical issues, helping you reduce unnecessary noise and optimizing secure productivity.

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Enforcement Categories

Open Source (SCA)

Critical - Hard Fail

Where Prisma Cloud scans any SCA vulnerabilities and license issues found on open source dependencies.

Supply chain graph is a real-time auto-discovery of potentially misconfigured infrastructure and application files.

The graph identifies infrastructure, image, open-source, and secrets and combines that data to identify risk chains

Open source Supported packages (Aug 2022)

- Java (Gradle), Java (Maven)
- Python (pip)
- JavaScript + typescript (NPM)
- Go
- Yarn (TypeScript, JavaScript)
- Groovy (Ruby)
- Nugget, Packet (.NET)
- Indirect dependency tree & remediation
- Open source License Compliance
- Package reputation and operational risk
- Malicious package detection

Not supported:
Languages: C, C++, Swift, Objective C, Rust., Scala, Haskell

Vulnerability of open source packages will replace CWP's repository vulnerability scanning that will be deprecated.

Infrastructure as Code (IaC)

Where you provision and manage your infrastructure through code. Prisma Cloud scans Infrastructure as code files for misconfiguration issues.

Secrets in Code Security scans

You can use Code Security to detect and block secrets in IaC files stored in your IDEs, Git-based VCS, and CI/CD pipelines.

A secret is a programmatic access key that provides systems with access to information, services or assets. Developers use secrets such as API keys, encryption keys, OAuth tokens, certificates, PEM files, passwords, and passphrases to enable their application to securely communicate with other cloud services.

For identifying secrets, Prisma Cloud provides default policies that use domain-specific and

generic syntax to match on specific signatures and patterns to validate the likelihood or entropy of a string being a secret. You can view the scan results directly on Code Security > Projects, on the CLI if using Checkov, or in the IDE such as VSCode.

We scan for hard coded secrets in code pre-commit or exposed secrets in running workloads and cloud resources, using a number of intelligent pattern searches. A secret is one instance of one of the ~20 listed below types of **secrets we detect in IaC files**. (Scan any file, scan git-history, custom policies are coming in Q1FY'23).

As of today, Checkov comes out of the box with the following regular expression based secrets finders:

- Artifactory credentials
- AWS access keys
- Azure storage account access keys
- Basic auth credentials
- Cloudant credentials
- IBM Cloud IAM keys
- IBM COS HMAC credentials
- JSON web tokens
- MailChimp access keys
- NPM tokens
- Slack tokens
- SoftLayer credentials
- Square OAuth secrets
- Stripe access keys
- Twilio API keys

Please read this article:
https://bridgecrew.io/blog/checkov-secrets-scanning-find-exposed-credentials-in-iac/

Each unique secret value is counted once per file, so if the same password or whatever appears multiple times in a file, it's counted once, but if it appears in another file, it's counted again.

There is nothing that can be configured for Secrets scans.

The following file types or extensions are scanned for secrets:

- .yml, .yaml
- .tf
- .json
- .bicep
- build.gradle
- build.gradle.kts
- Dockerfile
- gradle.properties
- go.mod
- go.sum
- gemfile
- pipfile.lock
- requirements.txt
- pom.xml
- package.json

- package-lock.json
- yarn
- yarn.lock

The secrets scan is using Yelp - detect-secrets https://github.com/Yelp/detect-secrets

Container Images (CI/CD)

Critical - Hard Fail

Where your repositories packages and binaries in a selected container image are scanned for SCA vulnerabilities and license issues by Prisma Cloud.

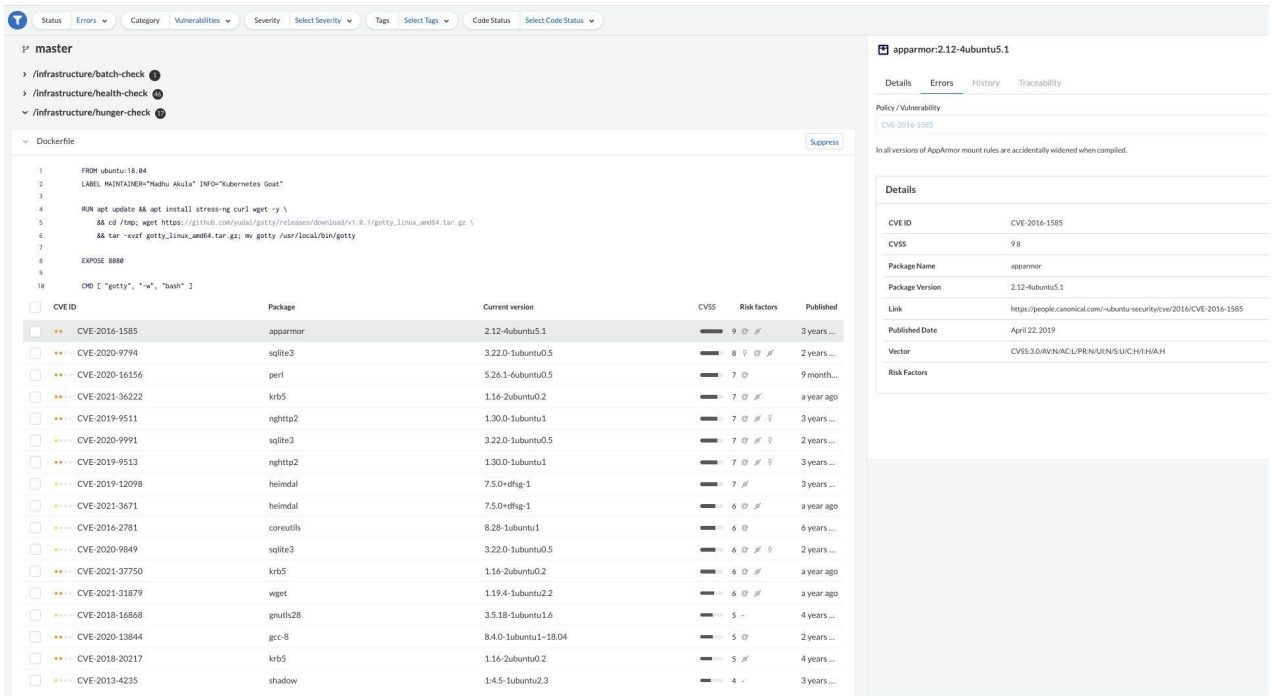
This will automatically scan repositories for container vulnerabilities leveraging Prisma Cloud's twistcli, the CLI tool acquired from Twistlock, helping you identify and remediate vulnerabilities in container images with high accuracy and a low false-positive rate.

Please see here for more information Introducing Container Image Scanning: Identify vulnerabilities with Bridgecrew

With container image scanning, Bridgecrew will identify any Dockerfile in your repository and scan it for misconfigurations and vulnerabilities found in any dependencies.

Dockerfile analysis is a special use case (before image is created) with SCA packages vulnerabilities + dockerfile config rules, if you add a new Dockerfile with dependencies such as operating system packages and Python, NodeJS, Java, or Go libraries, Bridgecrew will identify any vulnerabilities and misconfigurations in those packages.

Here is an example:



Example of the checkov Dockerfile scan:

```
checkov --dockerfile-path Dockerfile --docker-image nginx:latest --repo-id tkishel/twisty
```

Example: https://www.checkov.io/7.Scan%20Examples/Dockerfile.html

Dockerfile policies: https://www.checkov.io/5.Policy%20Index/dockerfile.html

If checkov is using a Bridgecrew-managed Prisma Cloud Compute Console, then **using twistcli in Compute directly (compared to checkov) would allow the customer to leverage their own CI Vulnerability (and Exceptions) and Compliance Rules.**

Build Integrity (VCS Config)

When Prisma Cloud scans your CI/CD pipelines and VCS that are integrated on the console for misconfiguration issues found in branch or pipeline configuration files.

Securing cloud infrastructure early in the development lifecycle is crucial, but even the most secure code can be compromised if the very place we store the code, the VCS, is exposed. If not adequately protected, a bad actor can inject a backdoor into our code that will make it into production without us knowing.

That's why securing your version control system (VCS) is critical for a secure and reliable supply chain. The right protections ensure that code in your repositories is not modified or deleted—either mistakenly or maliciously.

VCS checks (misconfigs related to branch protection on the VCS config settings) are supported for scanning GitHub, GitLab, and Bitbucket.

Examples of these are:

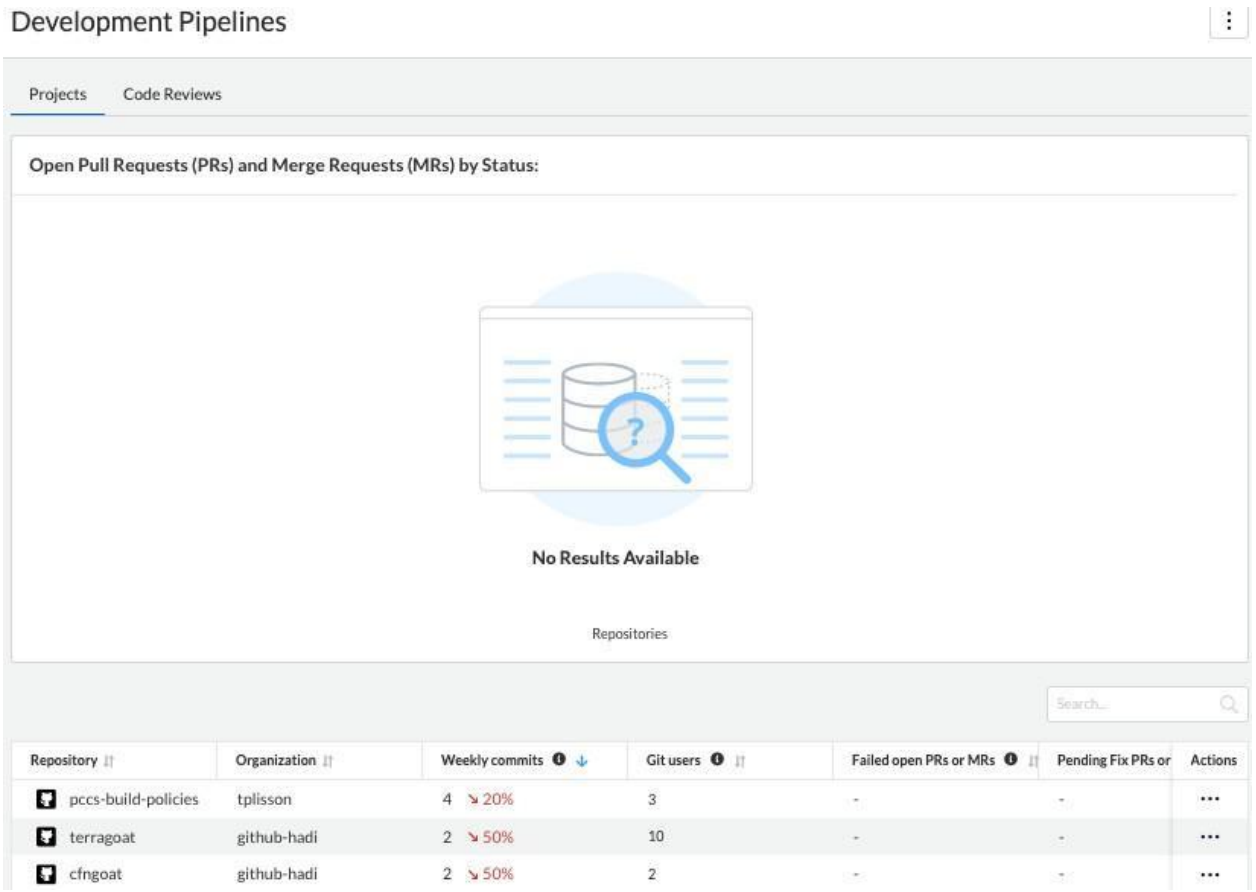
- Enforce 2FA
- Turn on SSO
- Enforce signed commits branch protection rules on critical branches
- Require approvals on code review

Please read this for more information - [Keep your software supply chain secure with these new VCS policies]

Review failed scans/suggestions results on VCS

For every failed scan result you can view the latest Pull Request (PR) of your repository within the Prisma Cloud console.

Currently, the ability to review violation fix suggestions and view the Pull Request (PR) scans that failed are **only supported for GitHub repositories**. From the Prisma Cloud console, you can directly access your repositories in GitHub and remediate solutions through a Pull Request (PR).



Policies Management

Out-of-the-Box Policies

Prisma Cloud Code Security default policies are being updated once a month, policies deleted, new ones created and existing policies are updated. Please check the release information for up to date information:
https://docs.paloaltonetworks.com/prisma/prisma-cloud/prisma-cloud-release-notes/prisma-cloud-code-security-release-information

Prisma Cloud includes out-of-the-box policies that enable you to detect misconfigurations and provide automated fixes for security issues seen across your integrated code repositories and pipelines. You can review this list of Configuration policies with a filter for subtype **Build** on the Prisma Cloud administrative console **Policies**.

Please note: It is currently (August 2022) not possible to select the Policies view filter to show build only policies. FYI - all build policies are of type - Config.

To view the Custom created policies choose the policies created by your Prisma Cloud users listed in the “Last modified by” column. All Prisma Cloud default policies are modified by “Prisma Cloud System Admin”. It might be easier to use the API to do this, more info on this later.

Code Security offers thousands of out-of-the-Box policies for scanning various types of resources. You can find more about supported policies here:

- AWS Policy Index
- Azure Policy Index
- GCP Policy Index
- Secrets Policy Index
- Kubernetes Policy Index
- Docker Policy Index
- Alibaba Policy Index
- GitHub Policy Index
- GitLab Policy Index

Bridgecrew default policies are listed on github here:
https://github.com/bridgecrewio/checkov/tree/master/docs/5.Policy%20Index
Checkov Policy Index:
https://www.checkov.io/5.Policy%20Index/all.html

Import Bridgecrew custom policies into Prisma Cloud

If you are an existing Bridgecrew user and have created custom policies then it will be possible to import Bridgecrew custom policies into the Prisma Cloud Code Security module. Please use the following script to do this:

https://github.com/PaloAltoNetworks/prisma_channel_resources/blob/main/prisma_bash_to

olbox-main/export_bridgecrew_custom_yaml_policies_and_load_into_ccs.sh

Custom Policy for Build-Time Checks

The following document provides good details on the custom policy definition - Custom Policy definition

This document gives good examples of custom policies - Examples - YAML-Based Custom Policies

For example: Can a user create a custom policy that could prevent the usage of certain resources as a cost saving feature?

```
metadata:

name: "don't create s3 buckets"
guidelines: "save some monies"
category: "general"
severity: "critical"
scope:
provider: "aws"

definition:
cond_type: "attribute"
resource_types:
- "aws_s3_bucket"
attribute: "bucket" # pick any required attribute
operator: "exists"
```

How to add custom policies for build time.

It is recommended to utilize Labels for your custom build policies - for example Code-Security-Build-AWS/GCP/Azure-AppX-01. Creating a Policy Label standard for your organisation and the appropriate labels assignment to your custom policies will enable you to filter the policies list to your specific build policy set on the Prisma Cloud portal and will significantly simplify your custom policy operational management.

Using APIs to manage policies

You can use the CSPM Policy API to create and manage Code Security build policies.

The following Code Security API calls are also available to manage build policies in Prisma Cloud Code Security:

- `POST /code/api/v1/policies/definition/{queryId}`
- `POST /code/api/v1/policies`
- `GET /code/api/v1/policies/table/data`
- `POST /code/api/v1/policies/{policyId}`
- `DELETE /code/api/v1/policies/{policyId}`
- `POST /code/api/v1/policies/preview`
- `POST /code/api/v1/policies/clone/{policyId}`
- `POST /code/api/v1/remediations/buildtime`
- `GET /code/api/v1/remediations/buildtime/{fixId}`
- `GET /code/api/v1/remediations/buildtime/baseFile/{filename}`

PolicyId is auto-generated.

Here is a sample custom policy definition in JSON

```
{
 "cloudType": "aws",
 "name": "Sample API build policy",
 "policyType": "config",
 "rule": {
    "name": "Sample API build policy",
    "parameters": {
      "withIac": "true",
      "savedSearch": "false"
    },
    "type": "Config",
    "children": [
      {
        "criteria":
"{\"category\":\"General\",\"resourceTypes\":[\"aws_s3_bucket\"],\"conditionQuery\":{\
"
attribute\":\"bucket\",\"operator\":\"equals\",\"value\":\"abc\",\"cond_type\":\"attri
b  ute\"}}",
        "type": "build",
        "recommendation": "Get good"
      }
    ]
 },
 "severity": "low"
}
```

It *might* be technically possible to send more complex policy definitions in the Prisma API payload, allowing you to create more complex policies than can be expressed in the visual editor. This will result in the policy being visible on the Prisma policies page, but it will not be fully viewable or editable, because the definition cannot be rendered in the visual editor. This is officially not supported,

More info on Code Security API usage here: https://prisma.pan.dev/api/cloud/code/

Instructions on how to setup the Postman Collections and Environments relating to Prisma Cloud (including Compute Console) API requests - https://github.com/PaloAltoNetworks/pcs-postman

You can use the following API call to retrieve all build policies in JSON format

`https://{{api-endpoint}}/code/api/v1/policies`

Not all policies are YAML policies. YAML policies are the only OOTB policies that have definitions that are visible and editable (via cloning) in the platform. Python policies in the platform are sort of "black box" policies and do not have visible definitions (but the definitions are visible in Checkov).

Please read this article to find out how to convert JSON to YAML format using jq/yq. This is useful if you want to use the YAML Policy Code Editor to be able to create new custom policies with the Policy Code Editor using the existing policies as a template.

https://stackoverflow.com/questions/53315791/how-to-convert-a-json-response-into-yaml-in-b ash

Custom Compliance Standard

Prisma Cloud includes an extensive list of out-of-the-box compliance standards..

You can also create your own Compliance standards and assign the chosen default policies and/or your custom policies for compliance checks for this custom compliance standard.

Create one from scratch or use “clone existing standard” as a framework for your new custom

compliance standard. Please note that you will need to edit your policies in order to assign them to a specific compliance standard.

CI Scan for Container Images

You can integrate Prisma cloud scanning in the pipelines for these technologies:

- Azure DevOps
- Gitlab CI/CD
- Jenkins
- Any other pipeline that we don't integrate into (Twistcli)

CI plugin documentation

Best Practices for “Other” Pipeline Integration

For CI/CD pipeline tools that we do not natively support an integration with, TwistCLI can be used instead and should be embedded in the pipeline at a stage that is before the container/image is deployed. This allows for the container/image to be scanned for vulnerabilities and blocked as needed per the CI rules in Prisma Cloud Compute.

The following Code Block below was pulled from a Gitlab pipeline task and demonstrates how to pull down and configure TwistCLI on the pipeline job runner agent, run the image scans using credentials and URL pertinent to the customer's tenant, and publish the results both in the pipeline output and to the console.

```
prisma-cloud-compute-scan:
  stage: build
  variables:
    prisma_cloud_compute_url: ""
    prisma_cloud_compute_username: ""
    prisma_cloud_compute_password: ""
    prisma_cloud_scan_image: node:lts-alpine
  before_script:
    - apk update && apk add --no-cache docker-cli
    - docker version
    - apk --no-cache add curl
    - apk add --no-cache --upgrade bash
    - |
      if ! /tmp/twistcli --version 2> /dev/null; then
        echo "Download twistcli binary file ..." curl
        -k -u
${prisma_cloud_compute_username}:${prisma_cloud_compute_password} \
          --output /tmp/twistcli
${prisma_cloud_compute_url}/api/v1/util/twistcli
        chmod +x /tmp/twistcli
      fi
      /tmp/twistcli --version
```

```
    - |
      echo "Create image scan helper script image_scan.sh ..."
      cat > ./image_scan.sh << EOF
      #!/bin/bash
      set +e
      /tmp/twistcli images scan --details --address \$prisma_cloud_compute_url
\
        --user=\$prisma_cloud_compute_username
--password=\$prisma_cloud_compute_password \
        --output-file twistcli.json \$prisma_cloud_scan_image
      rc=\$?
      if [ -f twistcli.json ]; then
        mkdir -p report/image_scan
        touch report/image_scan/results.xml
        docker run --rm \
          -v \$PWD/twistcli.json:/tmp/twistcli.json \
          -v \$PWD/report/image_scan/results.xml:/tmp/results.xml \
          redlock/pcs-sl-scanner pcs_compute_junit_report
      fi
      exit \$rc
      EOF
      chmod +x ./image_scan.sh
  script:
    # if script is defined in extended job, make sure below command is added
    -     bash
  ./image_scan.sh
  artifacts:
    when : always
    paths:
      - report/image_scan/results.xml
    reports:
      junit:
        - report/image_scan/results.xml
  tag
    - shell
```

[Additional CI platform integrations sample code]

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Deploy

Defender Deployment Strategy

Automated Defender Agents are possible with these technologies

- Everything (serveless, server, host..)
- Openshift
- K8's
  Terraform and Kubernetes:
  - Depending on your use case you can couple that daemonset deployment in Terraform with this API call:
    - https://registry.terraform.io/providers/hashicorp/kubernetes/latest/docs/resourc es/daemonset
    - https://pan.dev/compute/api/post-defenders-daemonset-yaml

- Defender baked in AMI
  - Adding curl command into EC2 Image Builder to install a defender in the AMI (checking EC2 Image Builder API also) (example: curl -sSL -k --header "authorization: Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VyIjoiYXZraW5nX3BhbG9hbHRvbmV0d29ya3NfY29tIiwicm9sZSI6ImFkbWluIiwiZ3JvdXBzIjpbImFkbWlucyIsImRldm9wcyJdLCJyb2xlUGVybXMiOltbMjU1LDI1NSwyNTUsMjU1LDI1NSwxMjcsMV0sWzI1NSwyNTUsMjU1LDI1NSwyNTUsMTI3LDFdXSwicGVybWlzc2lvbnMiOlt7InByb2plY3QiOiJDZW50cmFsIENvbnNvbGUifV0sInNlc3Npb25UaW1lb3V0U2VjIjo4NjQwMCwiZXhwIjoxNjQ1MTMzMjIzLCJpc3MiOiJ0d2lzdGxvY2sifQ.86IPNZwEHmIvGenl8SZR1wyIi85g1xa1ZAbjVvfbsbc" -X POST https://127.0.0.1:8083/api/v1/scripts/defender.sh | sudo bash -s -- -c "127.0.0.1" -d "none" -m)
- Fargate
  - https://pan.dev/compute/api/post-defenders-fargate-json/

- Detailed doc / github for twistcli for deployment of images
  - Code Repo - github (reference links)
    - https://github.com/PaloAltoNetworks/prisma-cloud-compute-operator
    - https://github.com/PaloAltoNetworks/terraform-provider-prismacloudcompute
    - https://github.com/twistlock/sample-code/tree/master/automated-deployments

- https://docs.paloaltonetworks.com/prisma/prisma-cloud/prisma-cloud-admin-compute/vulnerability_management/code_repo_scanning.html

Upgrade/Redeploy the defenders

After the console upgrade, either SaaS or Self-hosted, the defenders need to be upgraded by the customer.

It is recommended to automate the defender deployment process. With automation, the defender upgrade will be much smoother in a large-scale environment.

If the customer has an automation process for the container deployment, the customer should integrate the defender deployment process into the existing pipeline process. Defender deployment can be automated with API calls (defender yaml, helm chart, or fargate defender) as referenced.

To upgrade the container defenders manually, you will need to generate and download the yaml file or helm chart from the upgraded console. You will need to update the current yaml or helm chart and apply the new version to upgrade the defenders on your cluster.

If you are using the installation script from the console, we recommend using the uninstall script to remove defenders first. Then you can run the install script copied from the console on the cluster.

Here is the detailed steps for upgrade:

- Host Defenders:
https://docs.paloaltonetworks.com/prisma/prisma-cloud/prisma-cloud-admin-compute/upgrade/upgrade_process_saas#:~:text=Defender%20and%20Prisma%20Cloud%20components%20upgrade%20process
- Kubernetes Defenders:
https://docs.paloaltonetworks.com/prisma/prisma-cloud/prisma-cloud-admin-compute/upgrade/upgrade_defender_daemonset

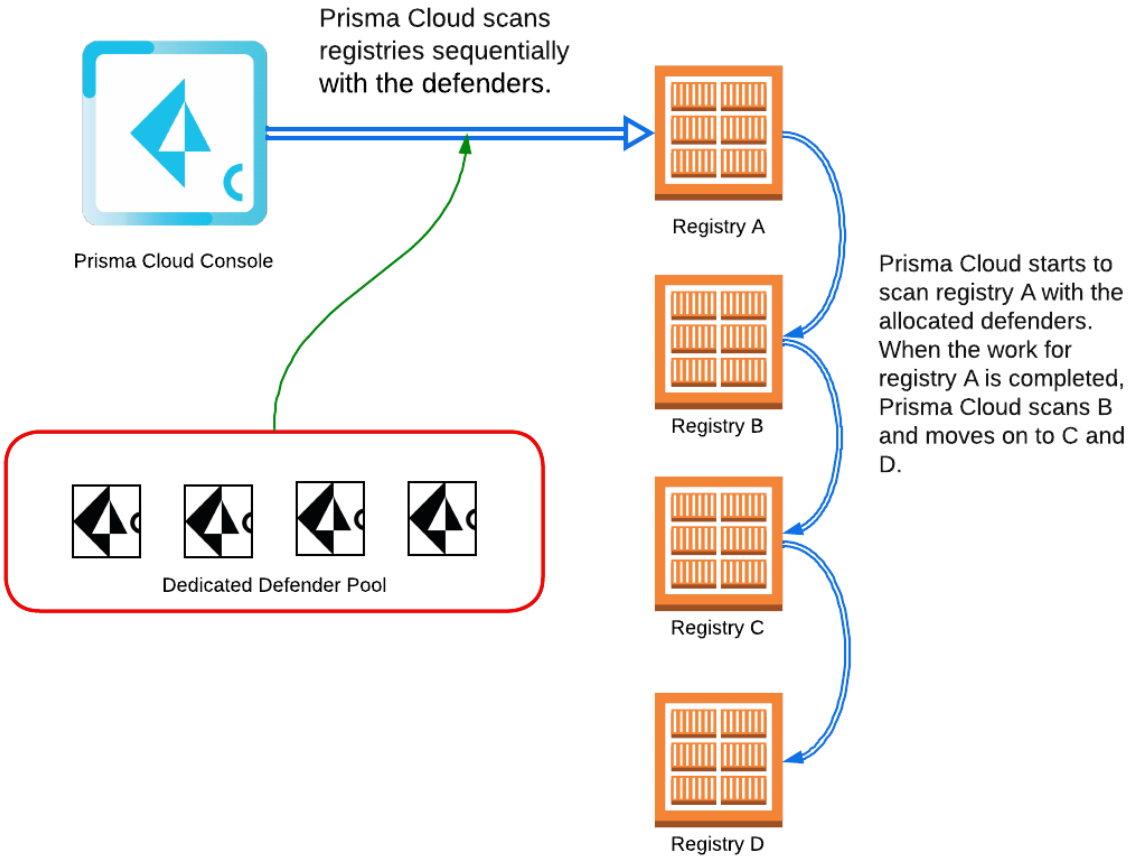
App-Embedded Defenders and serverless defenders need to be upgraded manually. These defenders are also recommended to integrate to the pipeline of task deployment or serveless script deployment process.

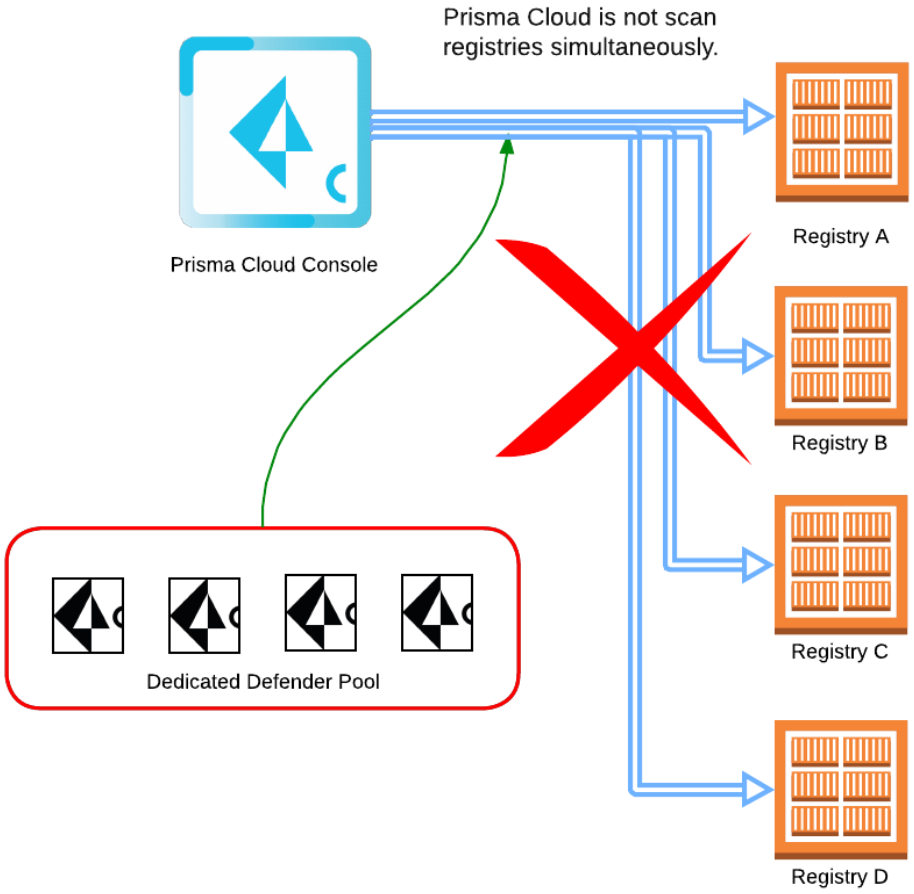
Registry Scanning

Prisma Cloud can scan container images in public and private repositories on public and private registries. When you configure Prisma Cloud to scan a registry, you can select the scope of defenders that will be used for performing the scan job.

Registry Scan Behavior

Prisma Console controls the registry scan with assigned defenders. Console scans one registry at a time. If multiple registries are configured to scan, Prisma Cloud console will scan one registry. Once completed the first registry scanning, then move to the following registry. This registry scanning behavior is not configurable.


Prisma Cloud scans registries sequentially with the defenders.
Prisma Cloud Console
Registry A
Registry B
Registry C
Registry D
Prisma Cloud starts to scan registry A with the allocated defenders. When the work for registry A is completed, Prisma Cloud scans B and moves on to C and D.
Dedicated Defender Pool

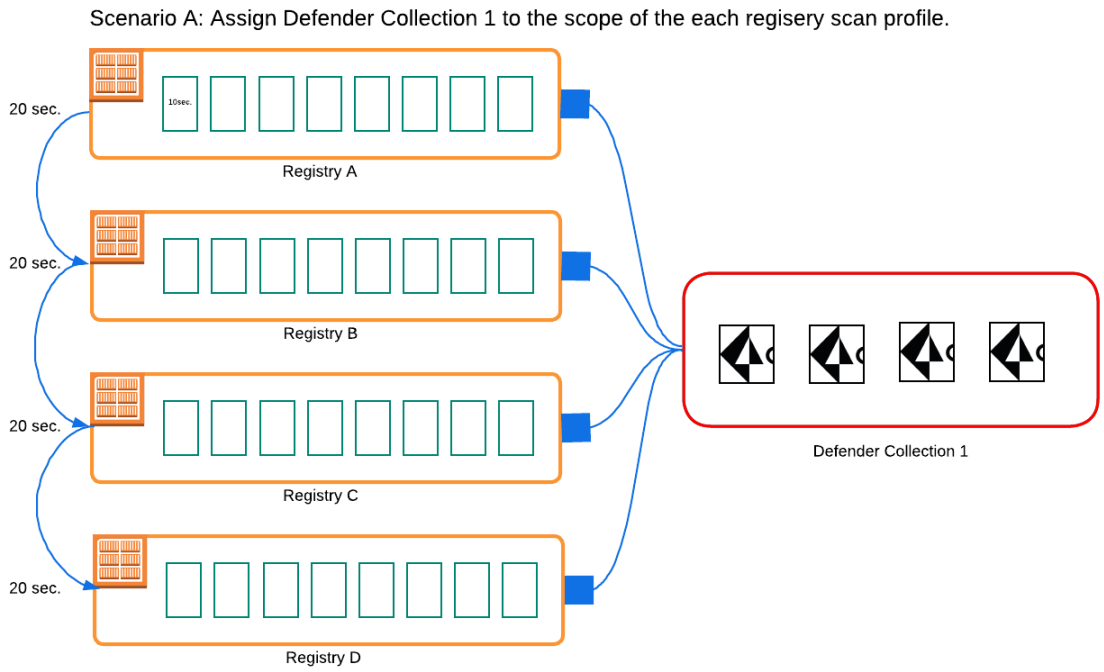


For example, here are three scenarios to configure multiple registries scan with Prisma Cloud. Depending on the configuration, you can compare the total scanning time. Let's assume the following conditions:

- There are four registries to scan.
- Each registry has eight images.
- It takes 10 seconds to scan the image.

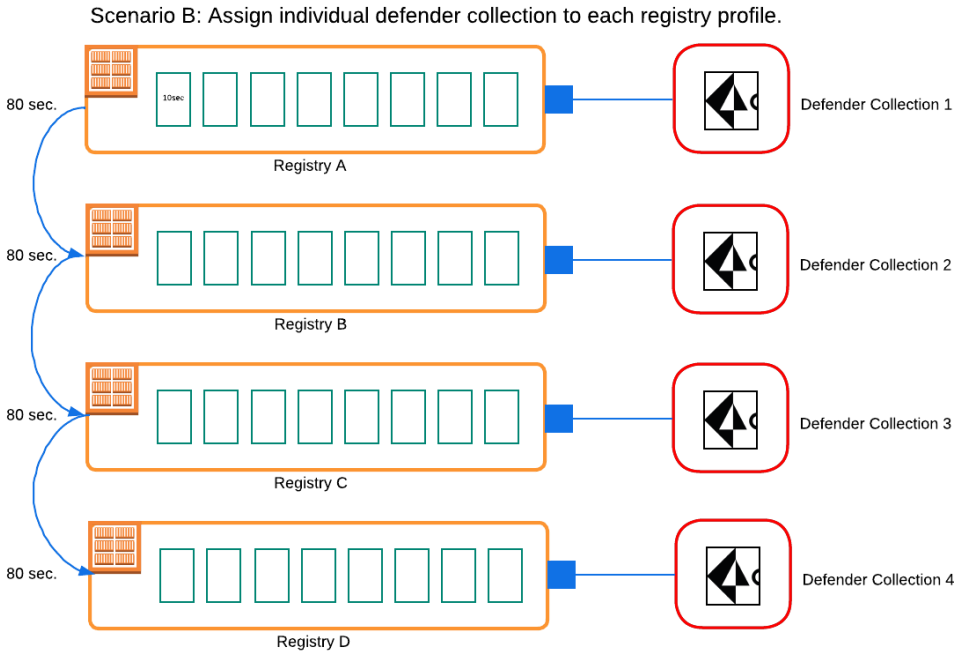
Scenario A:

Build a defender collection for registry scan and assign four defenders. The configures all registry scan profiles with this defender collection. With this scenario, all four defenders scan the images in the registry in parallel. Prisma cloud would then pick registry A and scan it first. It will take 20 seconds to complete. When the work for registry A is done, Prisma Cloud scans B and moves to C and D. The total time to finish the four registry scans is 80 seconds.



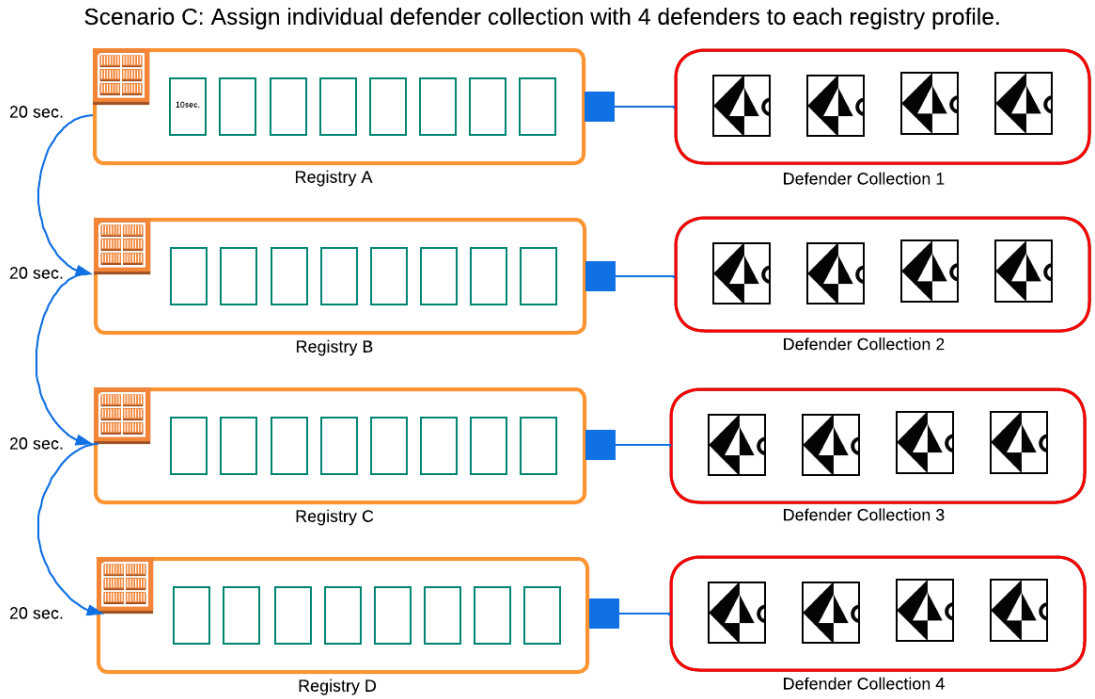
Scenario B:

Build 4 defender collections with a member of the defender. Configure each registry scan with a specific defender collection. One defender will scan the assigned registry. Prisma cloud picks the registry A to scan with the defender collection 1. It will take 80 sec to complete the scan. Then Prisma cloud scans B and moves to C and D. The total time for the scan is 320 seconds.



Scenario C:

Build 4 defender collections with four defenders. Configure each registry scan with a specific defender collection. First, Prisma cloud picks registry A to scan with defender collection 1. It will take 20 sec to complete the scan with four defenders. Then, Prisma cloud scans B and moves to C and D. The total time for the scan will be 80 seconds, which is the same as scenario A. However, because Prisma cloud scans registry sequentially, while defender collection 1 is scanning registry A, the other 12 defenders in collections 2, 3, and 4 are running but scanning.



In the above example, scenario A is the most efficient method. It is best to deploy a dedicated defender pool for scanner purposes and create a dedicated scanner collection. For multiple large registries, it's recommended to assign the defender collection to all registries and increase the number of defenders in the collection to improve throughput and reduce scan time. The console will not scan registries simultaneously, but sequentially, so creating multiple dedicated defender pools is not recommended.

Trusted Images

As organizations get more familiar with their images and environment, they typically leverage our Trusted Images feature to control developer access to a specific registry or even specific images or layers. Trusted Images ensure that developers are using verified or approved sources for their images, as well as provide a straightforward way to implement the best practices for container security.

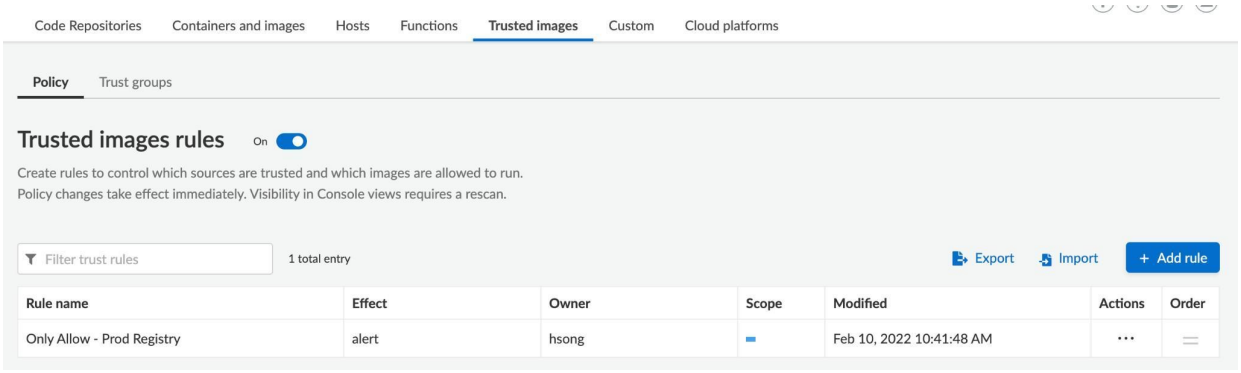
The trusted image function lets you explicitly define which images are permitted to run in your environment. If an untrusted image runs, Prisma Cloud emits an audit, raises an alert, and optionally blocks the container from running.
It is recommended to specify the images it trusts. Declare trust using objects called Trust Groups. Trust Groups collect related registries, repositories, and images in a single entity.

Then, for writing policy rules. It's recommended to use registries or repositories for the trusted groups if they are an organizations' standard golden images.

As a best practice, the default rule, Default - alert all should be maintained, and it should be the last rule in your policy as a catchall rule. The default rule matches all clusters and hosts (*). It will alert the images that aren't captured by any other rule in your policy.

Assuming the default rule is in place, the policy is evaluated as follows:

- A rule is matched: The rule is evaluated.
- A rule is matched, but no trust group is matched: The image is considered untrusted. Prisma Cloud takes the same action as if it were explicitly denied.
- No rule match is found: The default rule is evaluated, and an alert is raised for the image that was started. The default rule is always matched because the cluster and hostname are set to a wildcard



Trusted Image Policy

Base Images

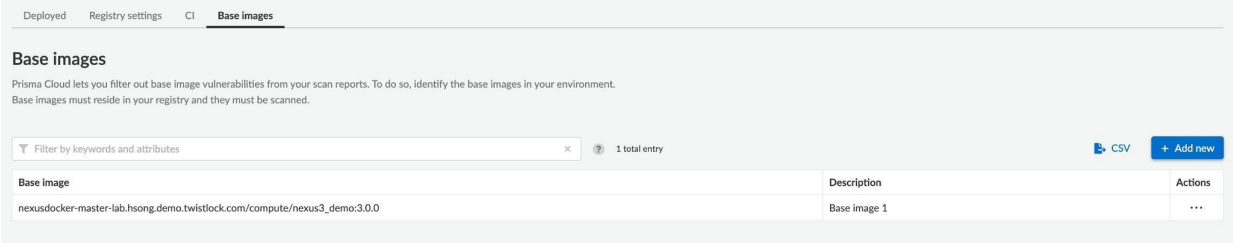
Filtering out vulnerabilities whose source is the base image can help your teams focus on the vulnerabilities relevant for them to fix. For Prisma Cloud to be able to exclude base image vulnerabilities, first identify the base images in your environment.

The base image should be specified in the following format: registry/repo:tag. You can use wildcards for the tag's definition. Excluding base image vulnerabilities is currently not supported on Windows images.

It is recommended to select base Images for the most commonly used throughout the different projects/applications and add them to the Base Images.

Once the base images are identified, they can be filtered out from the reports by using the 'Exclude base images vulns' filter.

The maximum number of base images that can be in scope is 50, where each base image is represented by a digest. If there are 50 base images in scope, and the scanner discovers a new base image, the oldest is purged and replaced with the newest.



Base Images

Compute Compliance

The Center for Internet Security (CIS) publishes recommendations or best practices that should be adhered to when setting up machine images, servers, containers, etc. In addition to these CIS compliance standards the twistlock team has added best practices. As an example, to be HIPAA compliant you may be required to implement certain CIS standards. Computers can fail or block builds to adhere to compliance standards but there is no remediation in place.

Example CIS Kubernetes Compliance Benchmark:

- Ensure admin.conf file permissions are 644 or more restrictive
- Audit: run the stat command to display the permissions
- Remediation: run chmod to set the appropriate permissions

Prisma Compute automates the audit steps checking for misconfigurations in various environments and exposes each benchmark check as a discrete configuration item in a compliance rule allowing for individual lower level checks to be enforced in an environment.

- Critical and high severity alerts only -- medium and low are ignored by default
- Rule creation compliance standard are in the top right corner of creating an alert
- Compliance checks are set by PANW not CIS, customer needs to verify compliance checks based on need
- Anything the customer can script out to run as a compliance check can be integrated as a compliance check (powershell or bash) to be run against each image
- Checks can be organization specific or standard hardening guidelines
- Checks are safely executed against new container instance in a sandbox environment

Trusted Images:

- Allow for specific images, registries, or image base layers to be deemed as trusted
- Allows for choice of which image can be trusted

- Rules can be setup so that the use of untrusted images trigger an alert or the image is blocked by being prevented from launching
- Feature allows organizations to protect against the deployment of arbitrary and potentially malicious images from the internet such as from Docker Hub
- 'Not a get out of jail free card'
    - Even if image is trusted it can still fail at run time based on compliance checks and rules

Cloud Platform Discovery and Compliance

- Check and scan resources based on customer cloud provider credentials
    - Checks if there is a scan in the CSP that coordinates with a Prisma Cloud Scan
        - Scans:
            - Managed Kubernetes
            - Image Registries
            - Serverless Functions
        - Runs set of Twistlock Lab created checks against a cloud environment

Cloud Compliance is defense in depth:

1. Scan vulnerabilities (check critical or high CVEs)
2. Compliance checks for unpublished CVEs
    a. Available dashboard in UI -- Defend Compliance -- Rule matching is the same (top to bottom)
        i. Checks high and critical severity -- can create alert, turns off, blocks image spin up, or fails -- checks that nothing is set to block

Manage – Cloud Accounts:

- Used for onboarding cloud providers
- Initially scans for resources to show if there is a protection or not

Compliance Tab:

- Compliance Explorer: shows all non-compliance critical and high alerts
- Clicking on compliance check will show resources that are not compliant
- Container level view shows each container in environment -- name, image, host, cluster, compliance heat map
    - Open up to see best practice within compliance -- make sure to check version number for compliance
    - Check compliance standard vendor with description in Prisma Compliance Container View
    - Compliance vendors will show audits, remediation, etc.
    - Our Audits in Prisma are written in Go so they are not available to see in UI
- Image Level view -- container compliance is different from image level compliance
    - Can be custom, twistlock, CIS (most CIS are written at the container level)

    - Every image scan for vulnerability follows compliance at the same time following the compliance rules
    - Typically, vulnerabilities are scanned first, the written into rules or policies for compliance
- Function Level View
- Trusted Images: list of images with trust status
- Cloud discovery: Scans all cloud workloads, picks out environments' resources (AWS: EC2, registries, lambda functions, EKS, ECS) count in each region and how many are scanned by twistlock or compute

Vulnerability Policy - Alerting To Blocking Strategy

Having clear visibility into which vulnerabilities to focus on is crucial to identify four items: 1.) the criticality of the alarm, 2.) the owners of an image resource, 3.) the actual image resource that is triggering the vulnerability alarm and 4.) if there is a fix for the vulnerability. In order to facilitate visibility, the GO code to pull the images and sort the images by owner tag and image can be found here.

Without measurability, it is impossible to manage in a proper manner. In addition, scanning images in the CI/CD pipeline is crucial in preventing further vulnerabilities from polluting the environment. Once the report is generated by the GO, it will be clear who the maintainers are, and the images they own. The report will also show the vulnerabilities and their severity levels. When initially generating a report for a customer who has a non-existent vulnerability management policy, their vulnerabilities with critical and high severity levels can be over 1 million alerts. The GO code is flexible enough to filter out only specific vulnerability levels and fix dates. When filtered, to simply critical, the list is much more manageable. Also the report will show that across multiple images, the same package is triggering alarms. Therefore updating one package across multiple images could reduce the vulnerabilities significantly.

Owners

It is vital to know who the owners are for resources. Many customers have no visibility into these cloud resources because they do not have an enforcement of tags in their environment. If ownership is not clear, it will be a huge challenge to manage the environment. Also, the tags can be utilized in defining scopes in Prisma Cloud to block vulnerabilities from polluting the environment.

Socialization

It is important to socialize the project of converting from alerting to blocking. Having key stakeholders onboard with the objective of the project is important. To that end, having a regular cadence call multiple times a week is critical to review which images and which packages are triggering alarms. In these meetings, the package updates can be measured to ensure readiness of blocking. If alarms are still not being addressed, during the meeting

those issues can be discussed and determined if the blocking for that image is a go or no go for specific business issues.

Change Control

As with any good business process, it is important to have a good documentation system to know what changes affect end consumers of an application. With a change control, it also outlines a backout plan if an outage occurs.

Scope

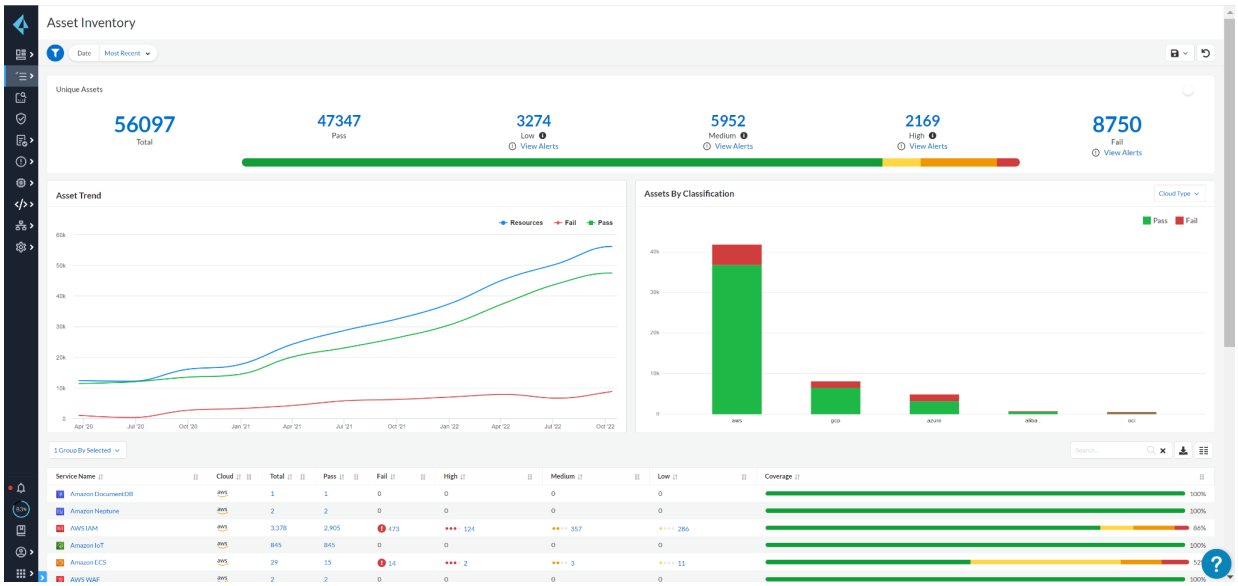
Defining scopes that you can place the images in to block is important. Having one for alerting only and one for blocking is very important. When converting images to blocking mode causes an outage, move the image back to the scope of alerting and triage the situation later. Once the image has been moved to blocking mode, the CI pipeline scanning is critical in keeping the environment unpolluted.

Run

Onboarding Best Practices

Onboarding a cloud account at the top hierarchical level is recommended as it saves you time and helps smoothly onboard cloud accounts within the hierarchy (i.e. AWS Organization, Azure Tenant, GCP Organization). Any individual cloud accounts that were onboarded prior to the hierarchy but are within it, will be automatically structured without needing to specify additional information. You have the ability to onboard individual units under the hierarchy, such as eight out of ten Organizational Units (OU) in an AWS Organization. If there are OUs that you would like to exclude, it can be done at the time of onboarding.

At the last step of onboarding, there is a status check that will let you know if Configuration, Cloudtrail, VPC Flow Logs, and the Organization are connecting properly. Validating the statuses to ensure there are no issues (validated by a green check mark) will allow you to ingest data properly from your cloud account or hierarchy. After onboarding is complete, you can navigate to Prisma Cloud's Asset Inventory to review the resources that are being ingested and specific details such as the number of specific resources/assets, configuration details, audit trails, network connectivity, and more.



AWS Onboarding

Individual Account Onboarding

An individual AWS cloud account can be set up/added to Prisma Cloud manually as well as in an automated method. There are a total 4 major required steps in adding an AWS account to Prisma Cloud. When you choose the automated method it only completes three of the four required steps. There is one step that has to be completed manually when choosing the automated method. More details about the steps and permissions and cloudFormation template can be found here

It is **recommended** that you **use the automated method to onboard an AWS cloud account** into Prisma Cloud as it is quick and easy to use and it also reduces any chance of misconfigurations in your setup.

When setting up an AWS account, there are 4 required steps that need to be completed:

1. Create custom role for Prisma Cloud service (Automated or Manual)
2. Enable CloudTrail (Automated or Manual)
3. Setup CloudWatch and Enable VPC flow log (Manual)
4. Add AWS account to Prisma Cloud console (Automated or Manual)

The first 3 steps are done in the AWS console and the 4th step is done in the Prisma console.

Step 1: Create a custom Role for AWS Resource Configuration data
The first step is to create a custom role within the AWS account to allow Prisma Cloud to make the required API calls to your AWS cloud account for collecting the metadata for your cloud resources. Here are some of the sample AWS APIs ingested by Prisma Cloud . This is required to ingest the configuration data from your cloud account for the deployed resources into Prisma Cloud. This step is taken in your AWS cloud account. This can be done manually or by using a CloudFormation template from your AWS console.

Step 2: Enable CloudTrail for Event data
CloudTrail is usually enabled by default for all cloud regions within AWS but if you have disabled CloudTrail, you will need to re-enable it for on boarding your AWS account into Prisma Cloud. CloudTrail is needed for ingesting user and event data from your AWS cloud account. This step is taken in your AWS cloud account.

Step 3: Set up cloudwatch and Enable VPC Flow logs
This is a manual step which is required to ingest the network level traffic data from your cloud account onto Prisma Cloud. For this, you must set up a CloudWatch log group and also enable VPC flow logs to get the network traffic data into Prisma Cloud. This step is taken in your AWS cloud account. Please note that this step is required even if you use the CloudFormation template (CFT) for configuring the other settings.

Step 4: Add an AWS account to Prisma Cloud
You must add your AWS account using the Prisma Cloud console. This step is taken within the Prisma console.

Prerequisites for adding an AWS account to Prisma Cloud:

1. The **Amazon Resource Name (ARN)** for the role that was created. This is a role that you create in AWS for Prisma Cloud.

Recommendations for when on-boarding an AWS account Manually:

1. Make sure you choose the appropriate cloud account type
2. Make sure you choose the Security Capabilities and Permissions that you want to enable.
3. Make sure that the Role is configured correctly for the Prisma Cloud in your AWS console in the same region as your AWS account in order to establish a proper trust relationship. More details on the permissions and roles can be found here
4. Ensure that you have the VPC flow logs enabled to send logs to cloudwatch and have the proper permissions for it

Note: If you would like Prisma Cloud to ingest data and logs from other integrations like AWS guardDuty, AWS S3 or AWS inspector make sure to enable these from AWS console as these are disabled by default.

If you plan to enable "Data security" within Prisma Cloud to scan to prevent data leaks and to protect your cloud storage data then make sure to enable Data Security under "Security Capabilities and Permissions". Data protection policies on Prism Cloud do not support automatic remediation. If by any chance you choose the "Data Security" option with Remediation option enabled you will have to manually fix the issues to address alerts generated by data policies. More details can be found here.

AWS Organizations

You can on-board your master or root AWS account on Prisma Cloud. When you enable AWS organizations on the AWS management console and add the master account that has the payer role, all member accounts within the master or root account are added in a streamlined manner onto Prisma Cloud. This helps in bulk onboarding of AWS accounts into Prisma Cloud.

The flow to on board an organization or master account is that you first deploy the CloudFormation template in the master account to create the Prisma Cloud role to monitor or monitor and protect your resources deployed in the master account and then you use the CloudFormation stacksets to create the Prisma Cloud role to access each member account within the master account. This automated process will basically on board any new member account that you add to your master account automatically on Prisma Cloud within a few hours.

You can also choose to exclude a few OUs (organizational units) by manually disabling individual member accounts on Prisma Cloud once they are on boarded or you could also on board a subset of accounts and exclude the OUs you don't want while deploying the stackset so that Prisma Cloud role is only created in the desired OU you want to onboard.

It is recommended that you have a predefined list of OUs you want to have included/excluded while on boarding for better experience and to save time later to modify existing setup.

Note: After you have onboarded an account as an AWS organization, you cannot roll back.

There are 2 different scenarios that you can come across while on boarding and AWS org account:

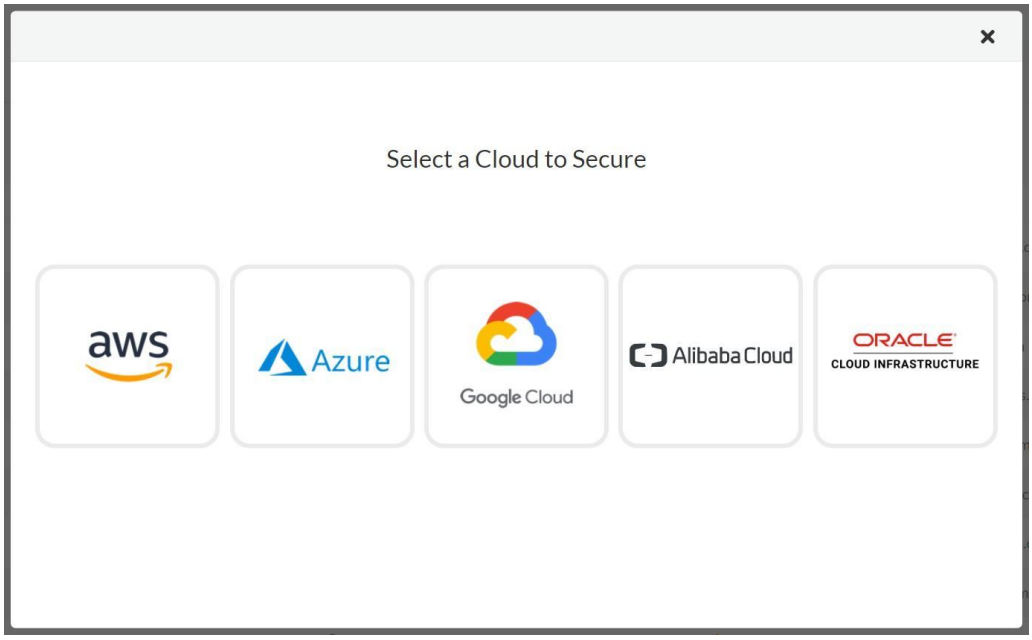
1. Add a new AWS organization account to Prisma Cloud
2. Update an onboarded AWS organization

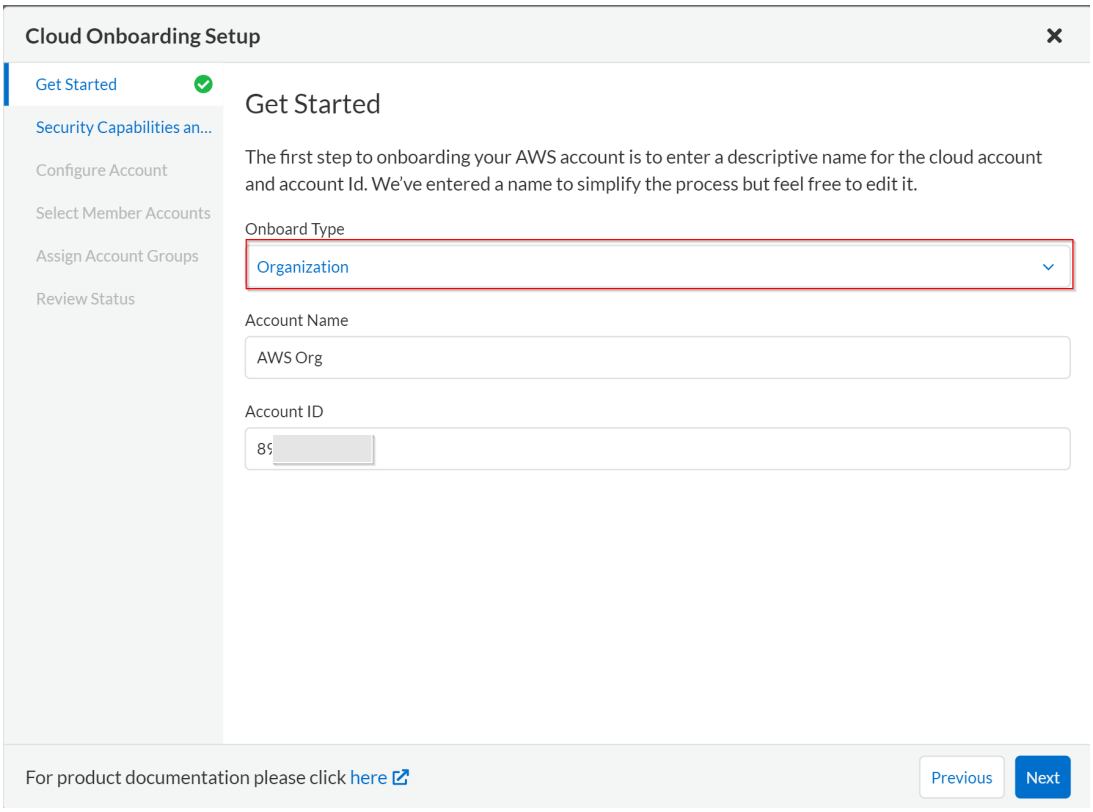
To **add a new AWS organization account to Prisma Cloud** here are some of the basic steps required on the Prisma Cloud side:

Step 1: Access your Prisma Cloud console and select Settings> Cloud Accounts> Add Cloud Account.

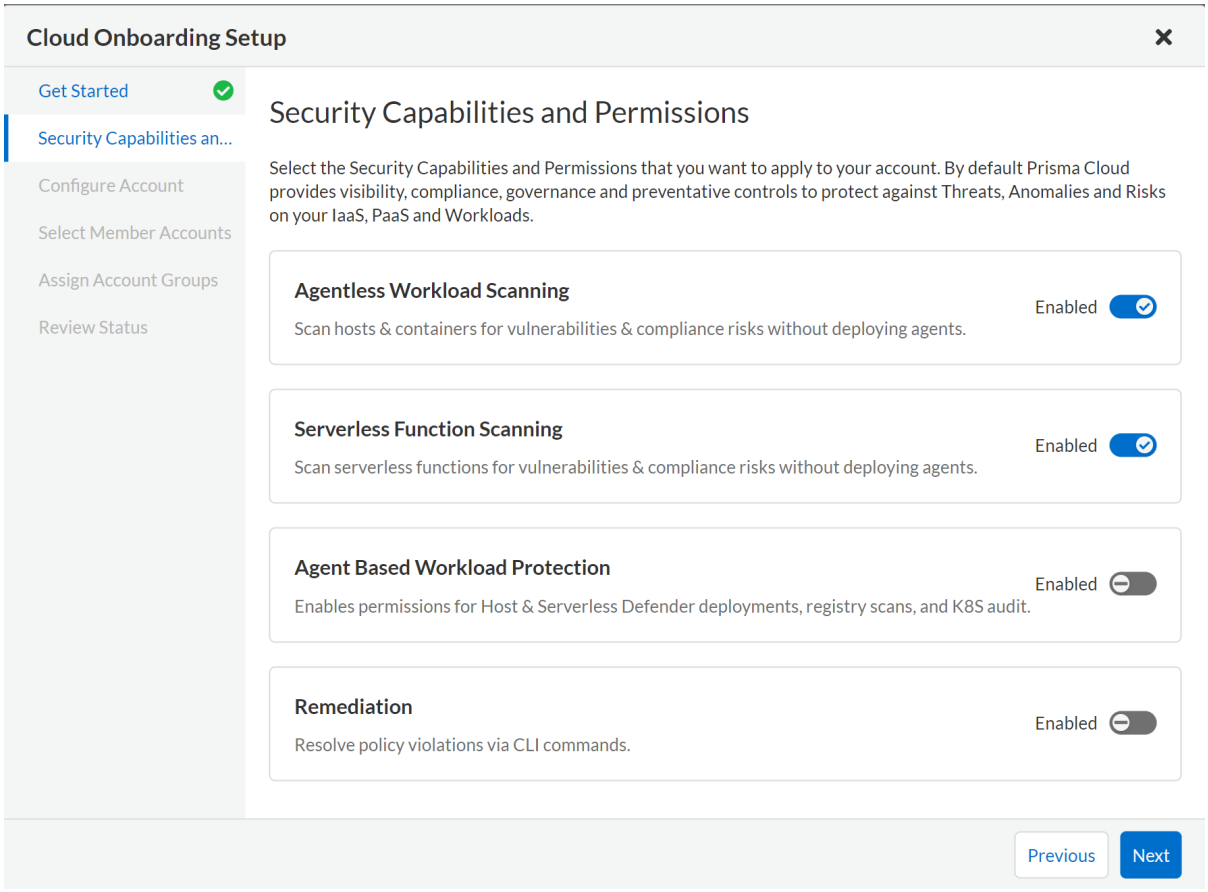
Step 2: Select AWS as the cloud provider

Step 3: Select onboard as “Organization” and enter a Cloud Account Name and Account ID (Management Account ID). Please note that a cloud account name will be auto populated for you but you can replace it with a cloud account name that uniquely identifies your AWS Organization on Prisma Cloud.





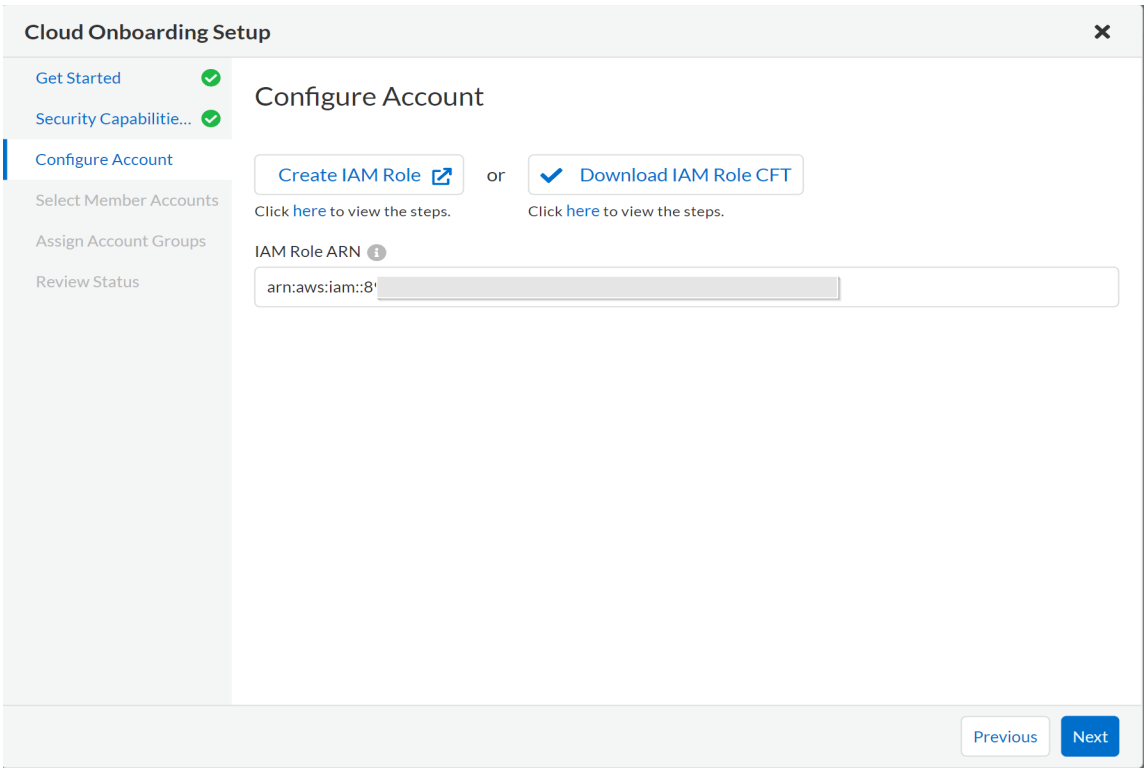
Step 4: Select the Security Capabilities and Permissions that you want to enable. Your selection will determine which cloud formation template to be used to automate the process of creating the custom role required for Prisma Cloud.



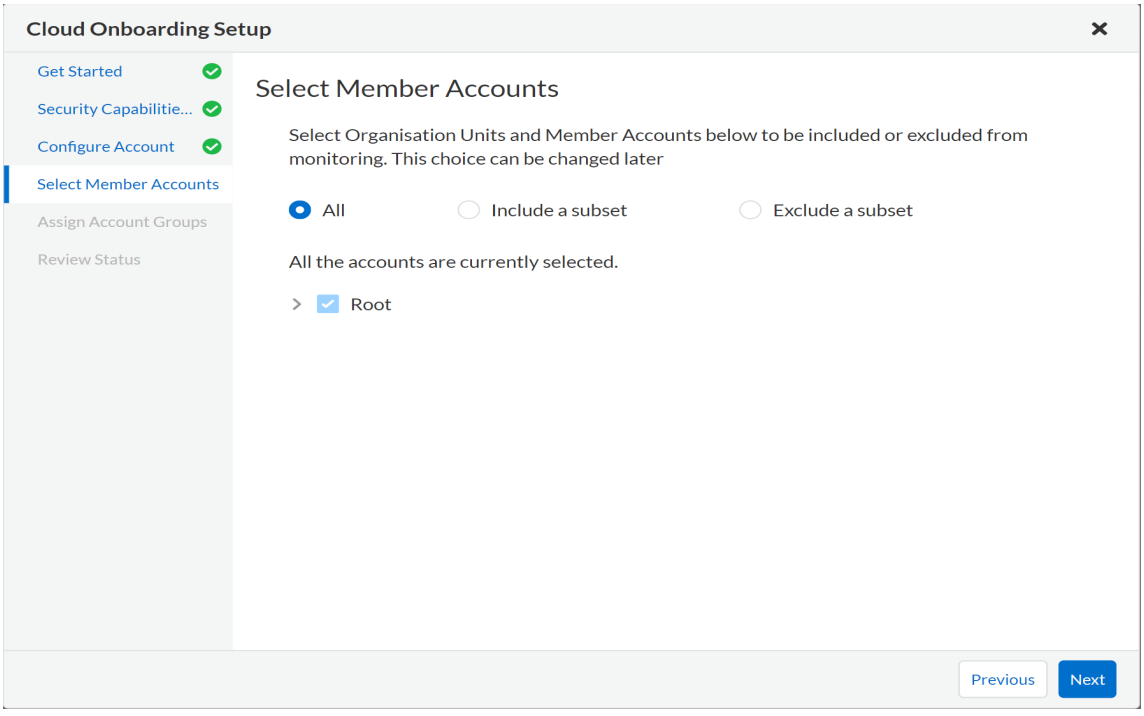
Step 5: Set up Prisma Cloud role on the AWS master account. This step can be automated using a cloud formation template.

Step 6: Log in to your AWS account and go to Services > CloudFormation > Stack. Click on Create Stack and Select With new resources. Choose Upload a template file and upload the IAM Role CFT file, click Next and provide a Stack name of your choice. Provide the OrganizationalUnitIds and click Next. Select I acknowledge that AWS CloudFormation might create IAM resources with custom names, and click Create stack.

Once the stack is created, you will need the PrismaCloudARN value which you can find from the “outputs” tab from your stack screen (from AWS console) which you can paste in the Prisma Cloud console screen under “IAM Role ARN” section.

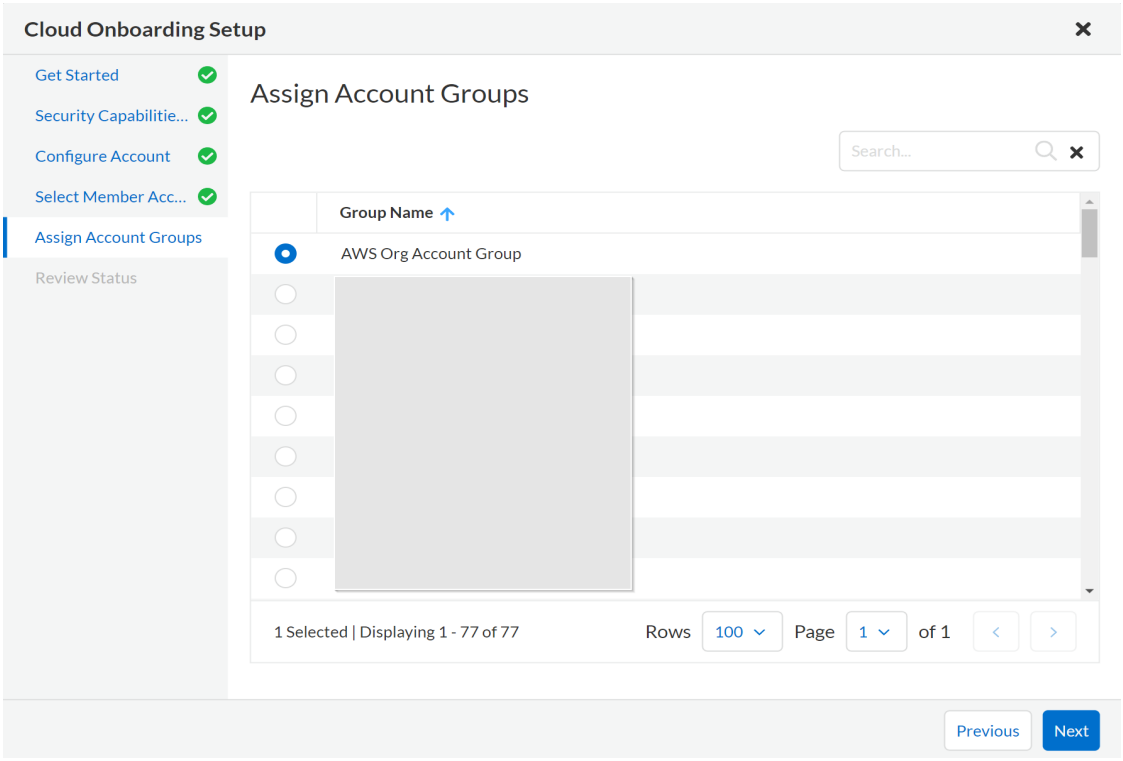


Step 7: Select Member Accounts. You have the option to include or exclude member accounts from monitoring.

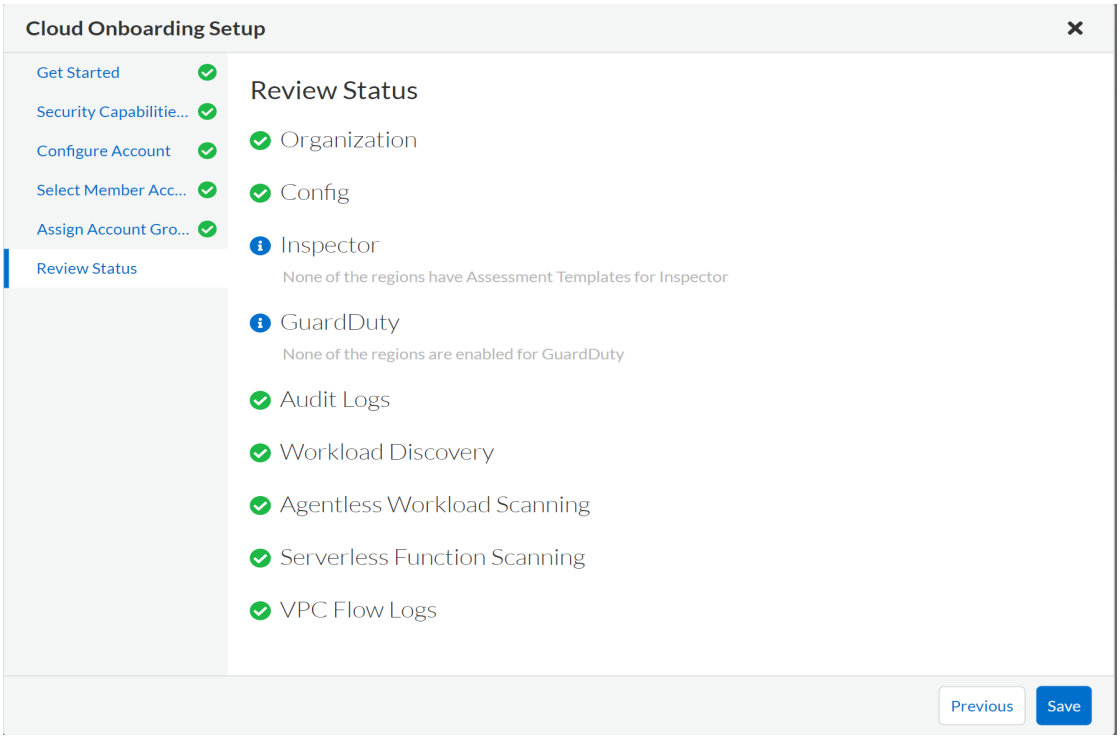


Step 8: You must ensure to select an account group. You must assign all the member accounts of the AWS org to an account group for better ease of use and also so that you can create an alert rule for checks to associate with that account group so that alerts are generated when a policy violation occurs within those accounts.

Note: you can also modify the cloud account settings if you would like to selectively assign AWS member accounts to different account groups on Prisma Cloud.



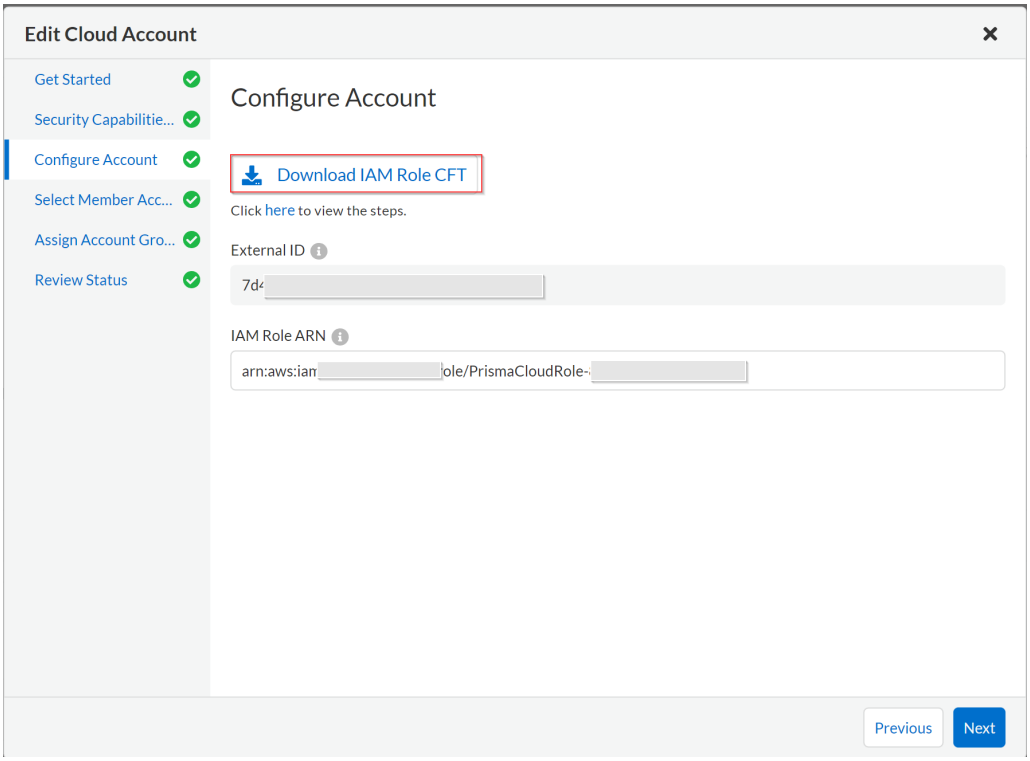
Step 9: Verify the status of your configuration/onboarding, and click **Save**.



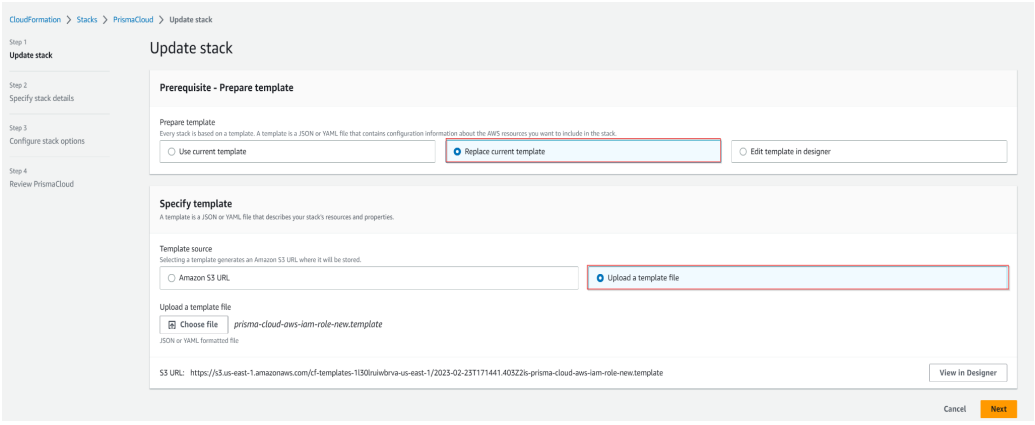
To **Update an onboarded AWS organization** , the steps are similar to how we onboard an AWS org onto Prisma Cloud but some of the differences are as listed below:

In addition to updating the CFT stack for enabling permissions for new services, you can also use this workflow to update the account groups that are secured with Prisma Cloud, update the remediation, and redeploy Prisma Cloud role in member accounts etc.

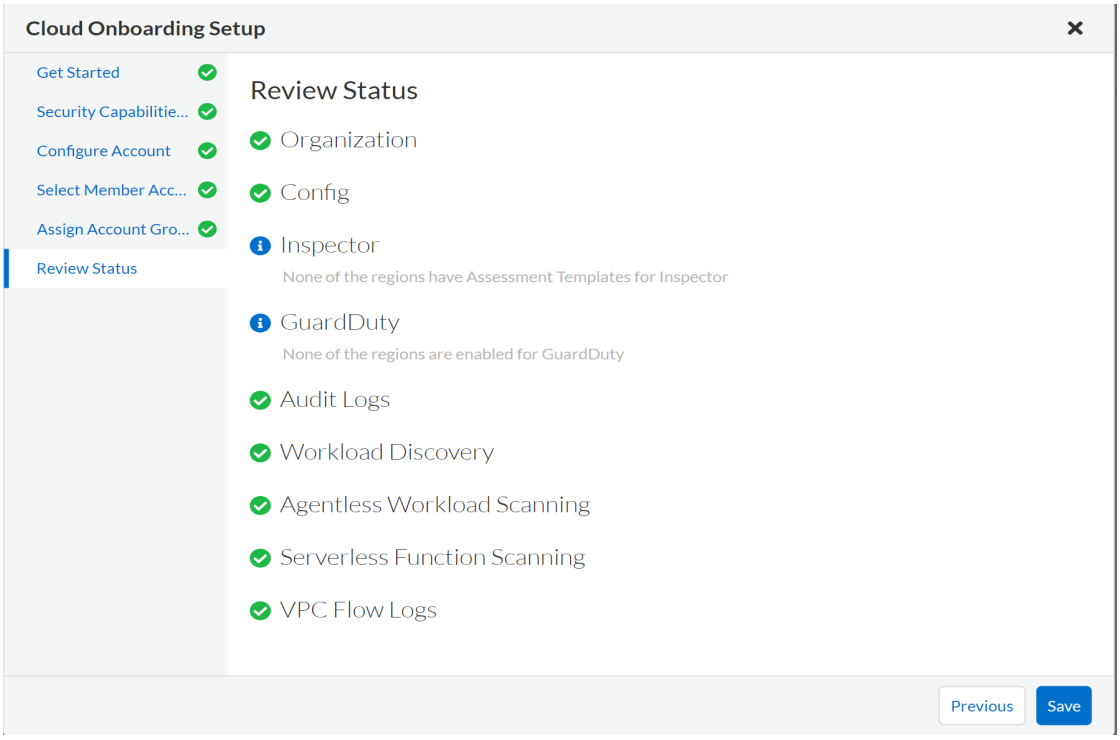
Step1: Download the latest CloudFormation Template from Prisma Cloud Console. Login to Prisma Cloud Console, Select **Settings** > **Cloud Accounts** and click the **Edit** icon for the AWS Org, navigate to **Configure Account** and Download the IAM Role CFT.



Step 2: Log in to your AWS console, navigate to **Services> cloudformation>stacks**, Select PrismaCloud Stack and click **Update Stack.** Replace the existing template with the template you downloaded in Step 1. Click Next to review the configuration. Select I acknowledge that AWS CloudFormation might create IAM resources with custom names, and **submit**.



Step 3: Review the onboarding status of your AWS Organization on Prisma Cloud. You can select the member accounts to include or exclude from Prisma Cloud monitoring, and you can assign member accounts to different account groups on Prisma Cloud.



Azure Onboarding

Overview

Prisma Cloud CSPM Onboarding allows customers to add their Cloud Account by Subscription or by Tenant when it relates to Azure.

Before You Begin

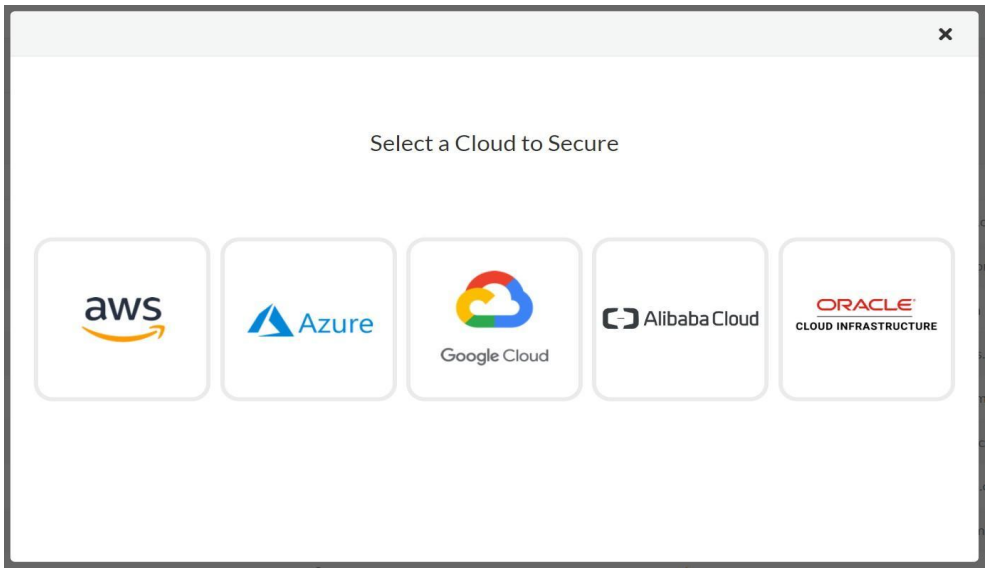
To accomplish this, you will:

- Need to have access to Management Groups
- Need to have access to the Tenant Root Group

Procedure 1: Onboard Azure Tenant

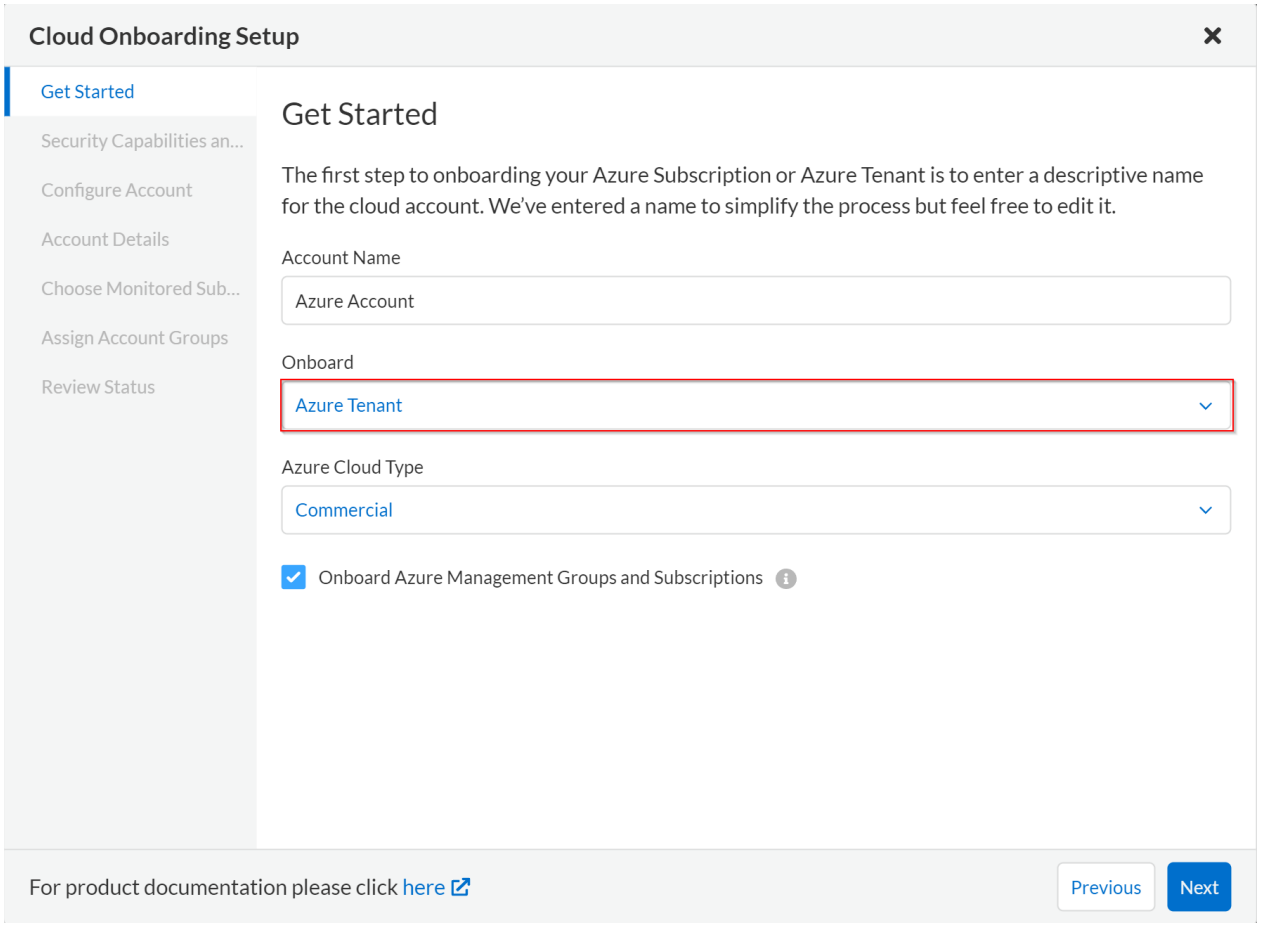
Step 1 Login to Prisma Cloud

Go to Settings > Cloud Account > Add Cloud Account > Select Azure

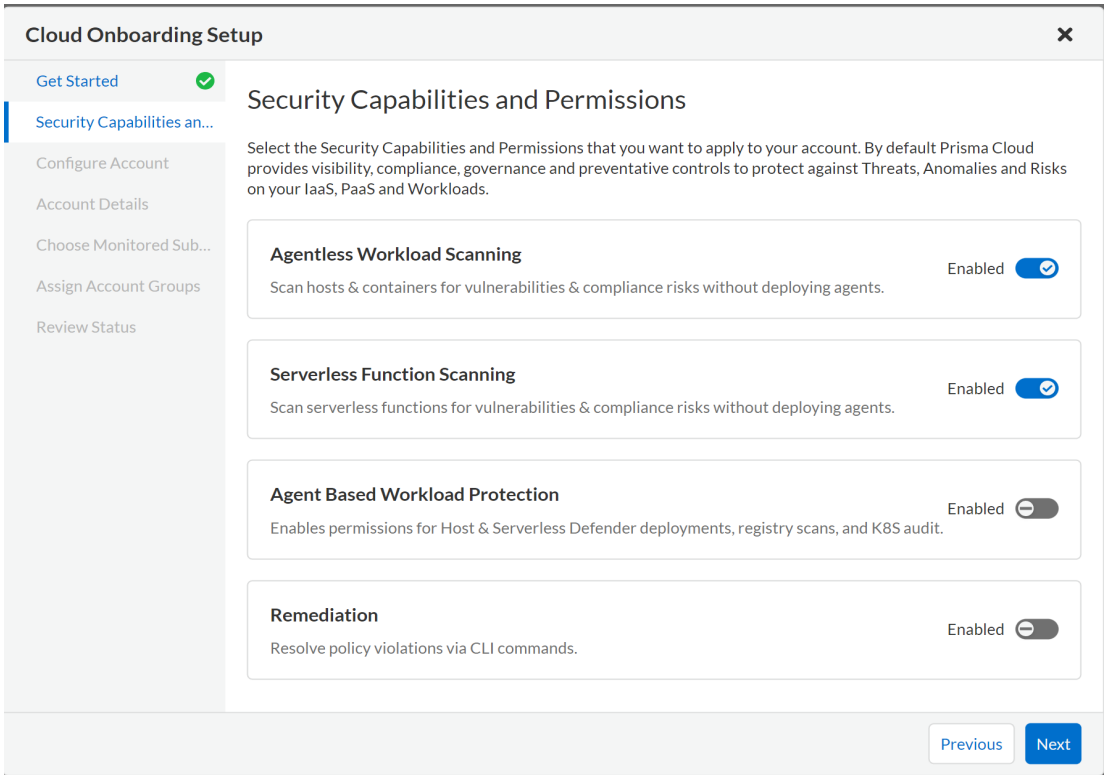


Step 2 Select Onboard as Azure Tenant

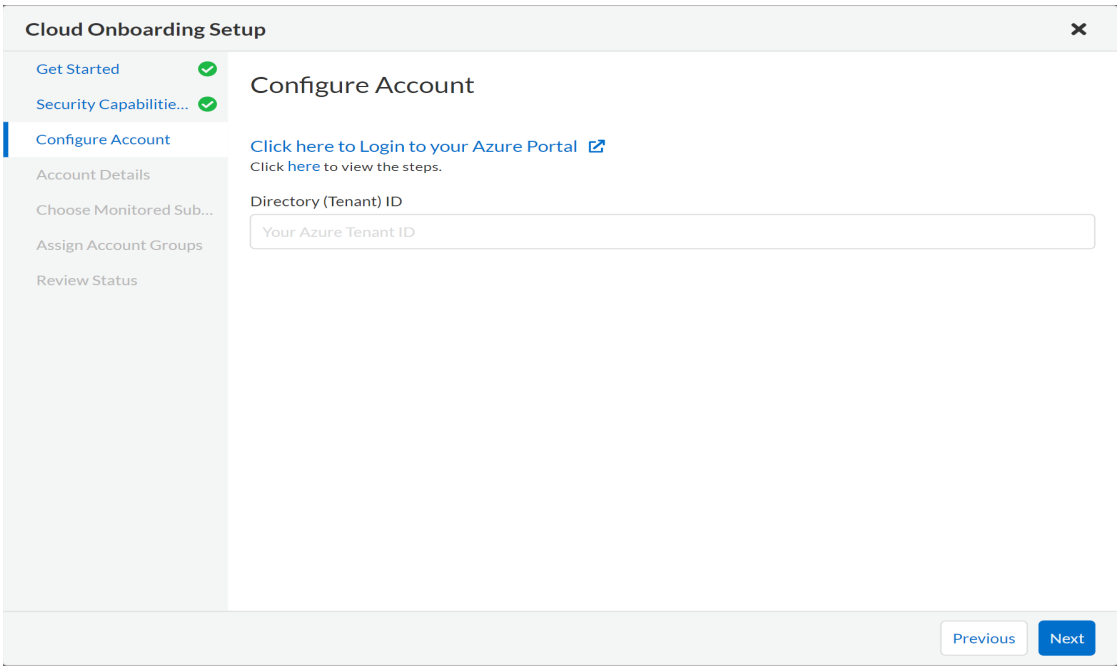
Select > Onboard Azure Management Groups and Subscriptions



Step 3 Enable the permissions for additional capabilities. Based on your selection, Prisma Cloud dynamically generates a Terraform template that includes the associated permissions for the Prisma Cloud role.



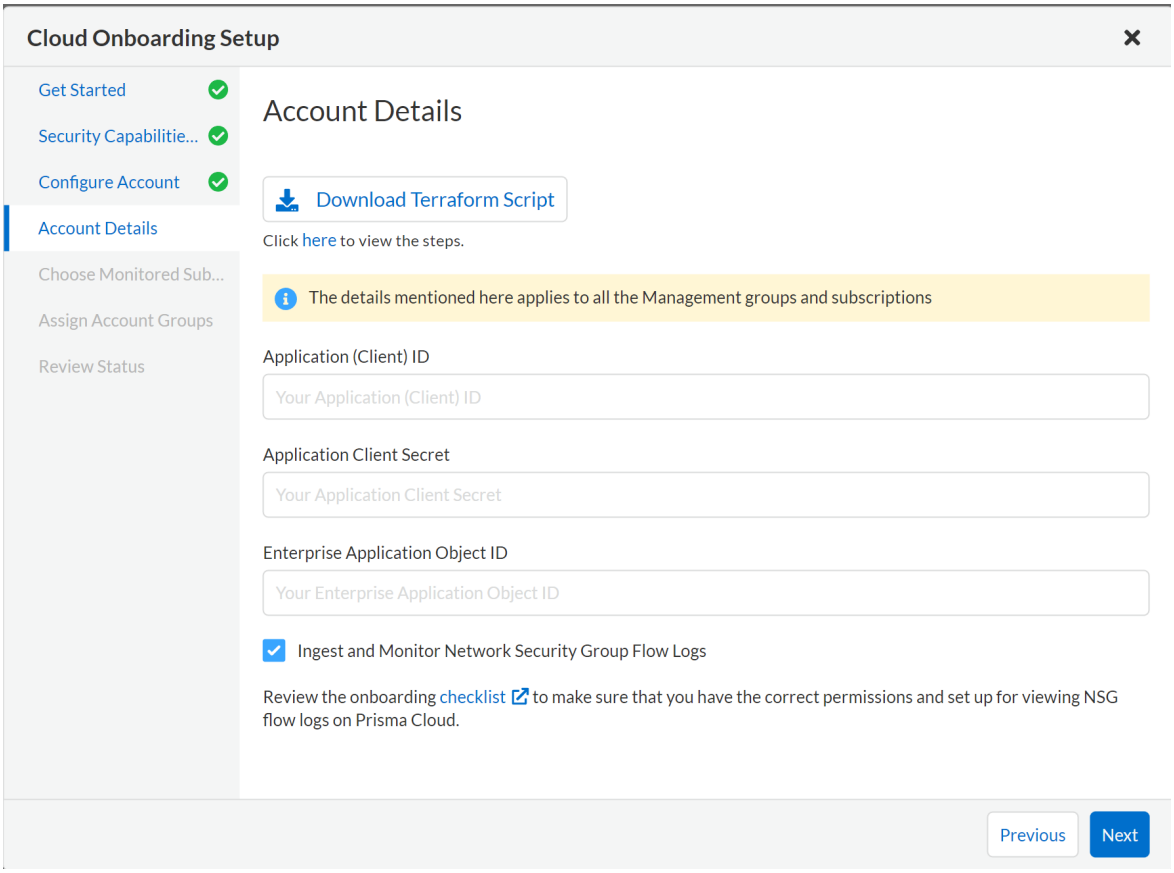
Step 4 Add your Tenant ID



Step 5 Configure Account Details

Get the following details from your account running the Terraform Script or by doing manually using the following link
Register an App on Azure Active Directory

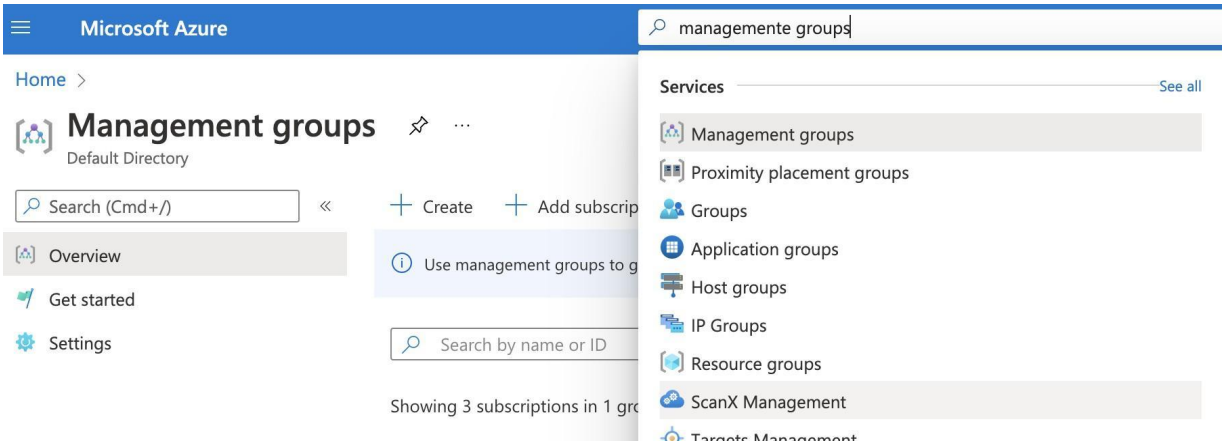
- Application (Client ID)
- Application Client Secret
- Enterprise Application Object ID



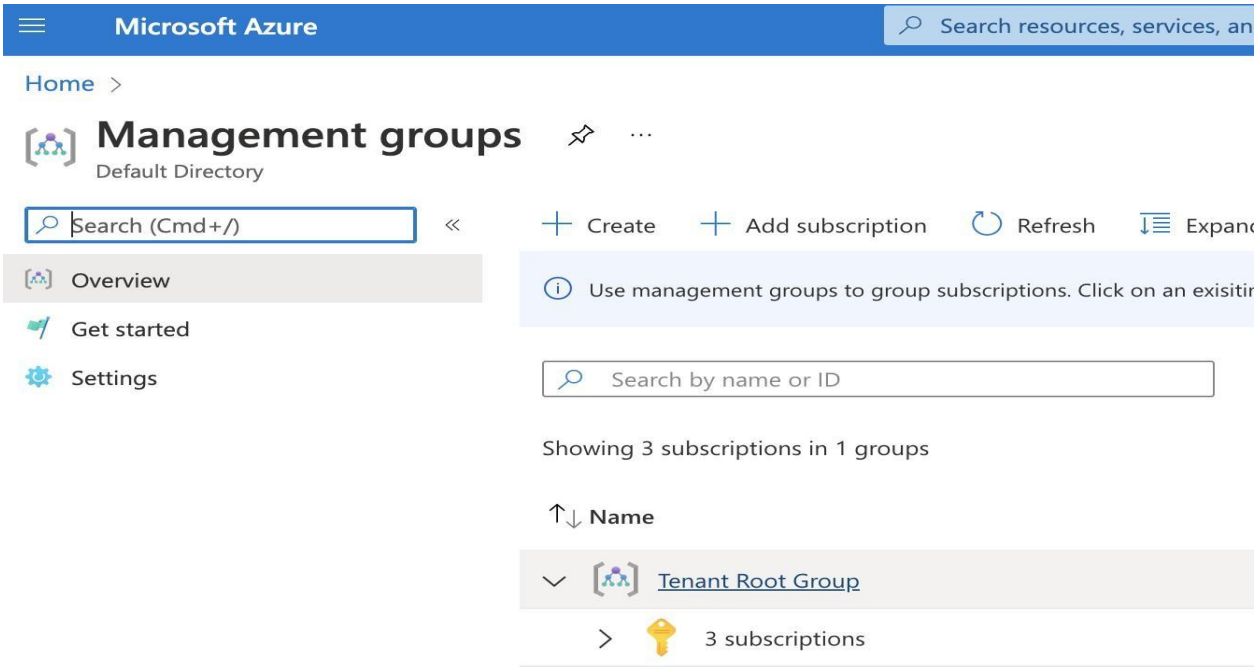
Procedure 2: Add Roles to the Root Group

Step 1 Validate you have access to the Tenant Root Group

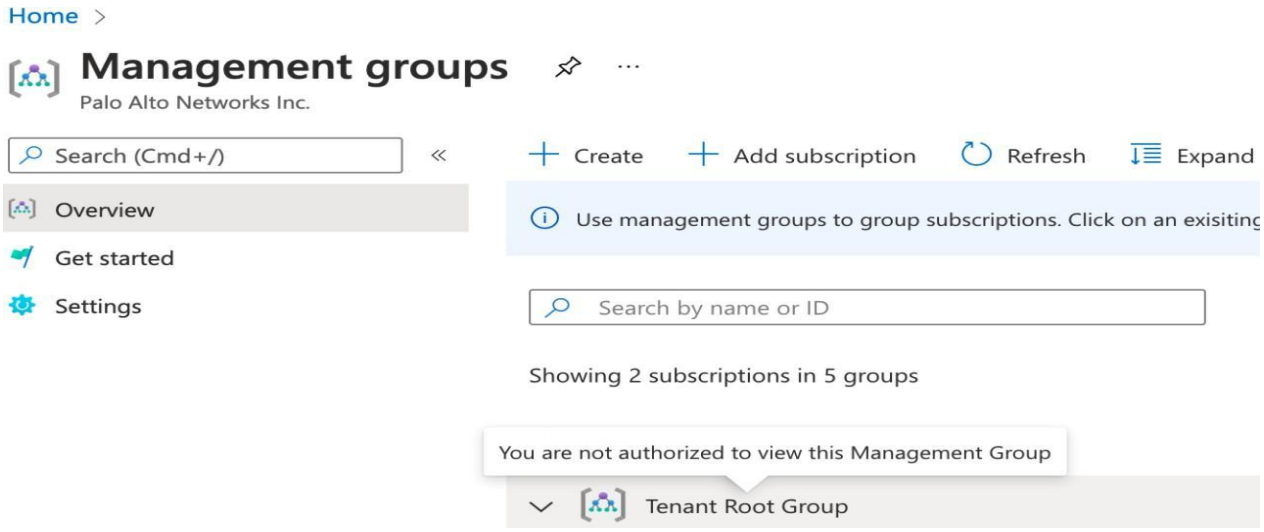
Go to your Azure Portal and search Management Groups



Step 2 Click on top of Tenant Root Group then Go to IAM

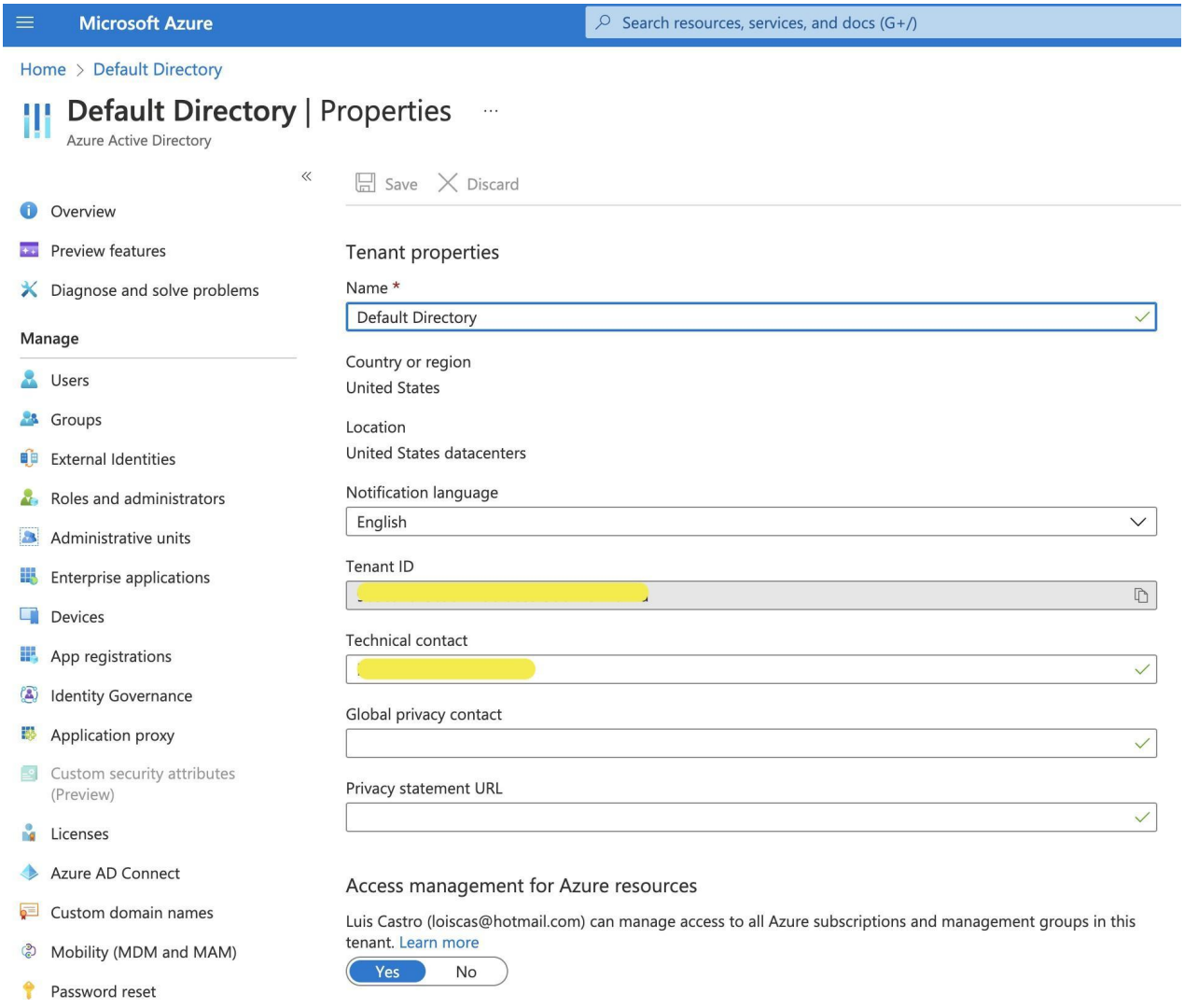


If Tenant Root Group is not clickable, it means your user does not have access to the Root Group



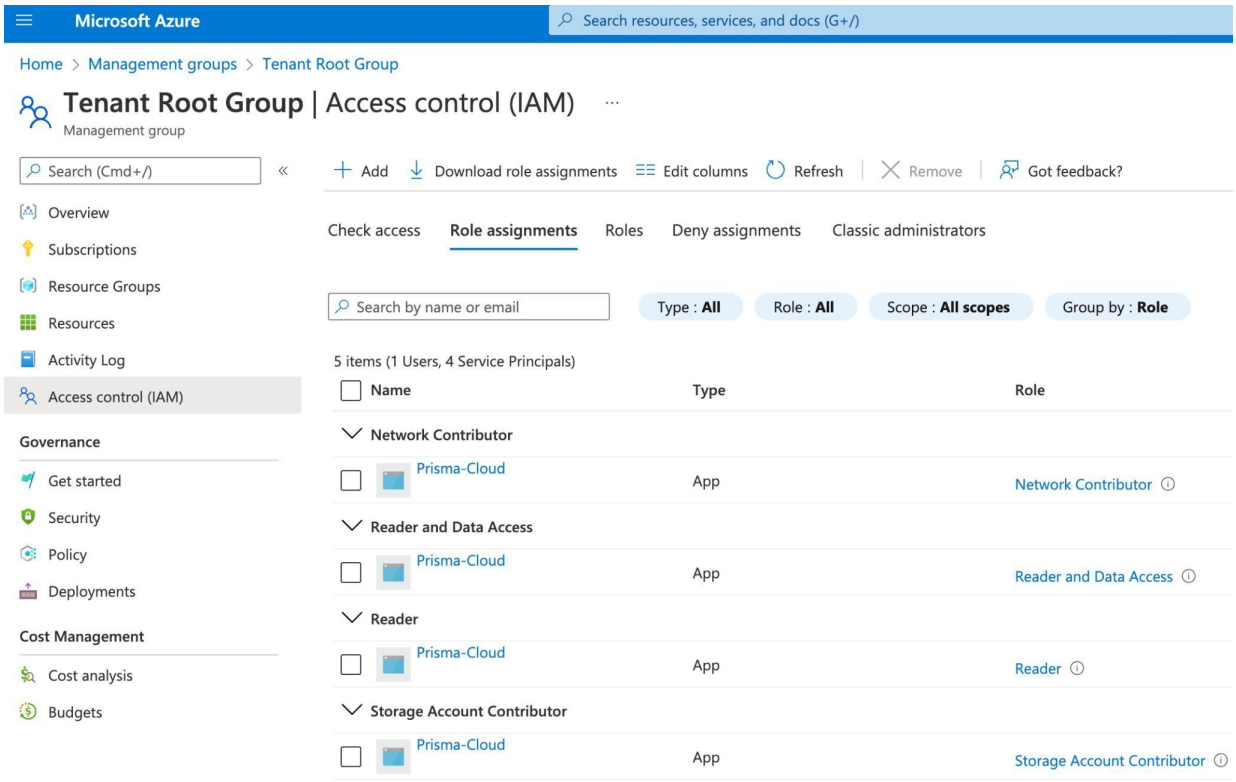
To gain access to Tenant Root Group follow the next steps:
Go to Azure Active Directory > Properties > Access management for Azure resources > Select Yes

Note: This requires a high level of permission inside the Azure Tenant which might require approval from the Tenant Administrator



Step 3 Inside Tenant Root Group IAM go to Role Assignment and add the following roles to your Application Prisma Cloud

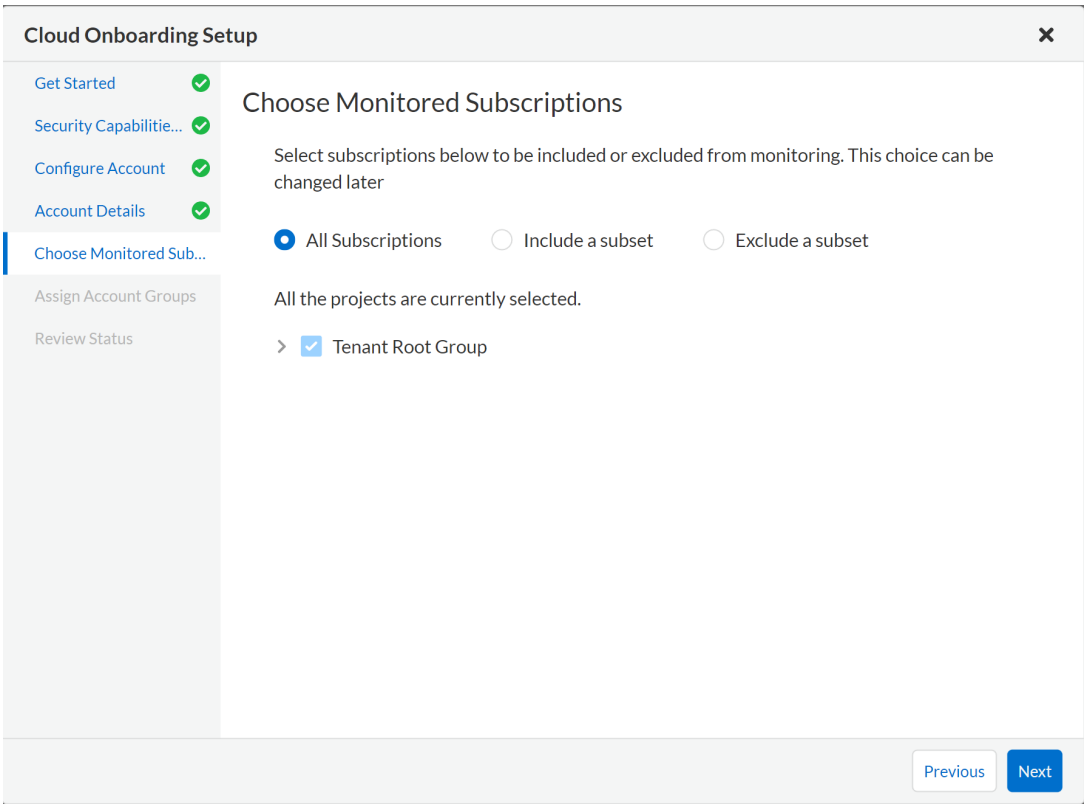
- Reader
- Reader and Data Access
- Network Contributor
- Storage Account Contributor



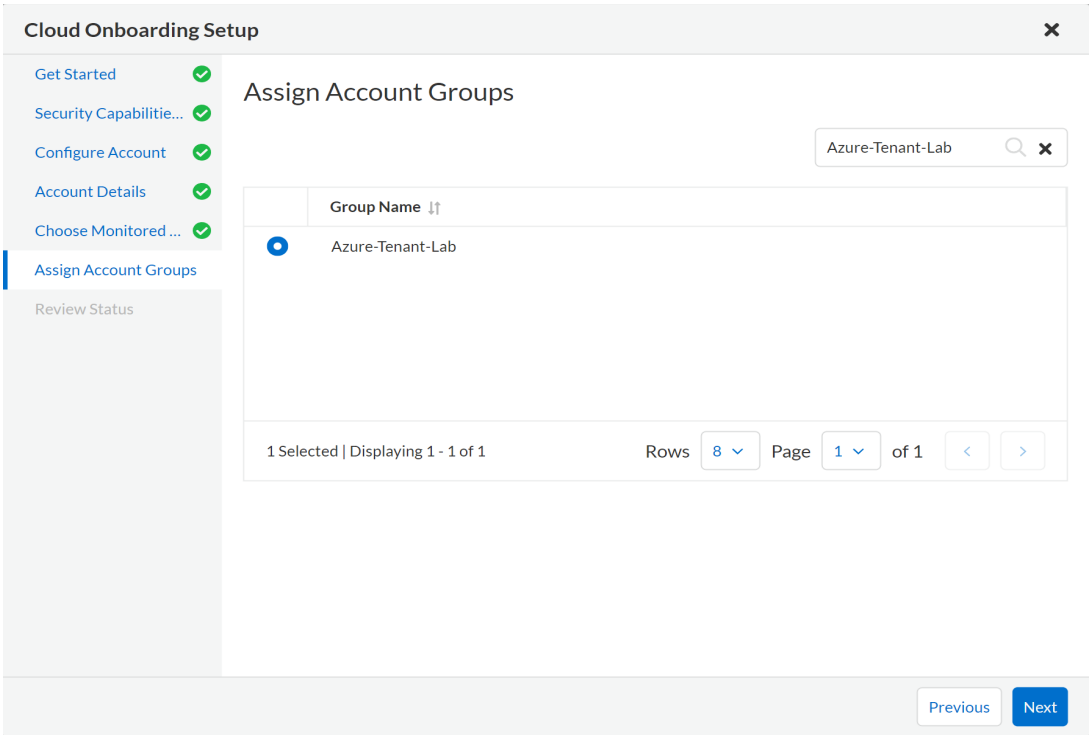
Procedure 3: Select your desired subscriptions

Step 1 You can choose the following:

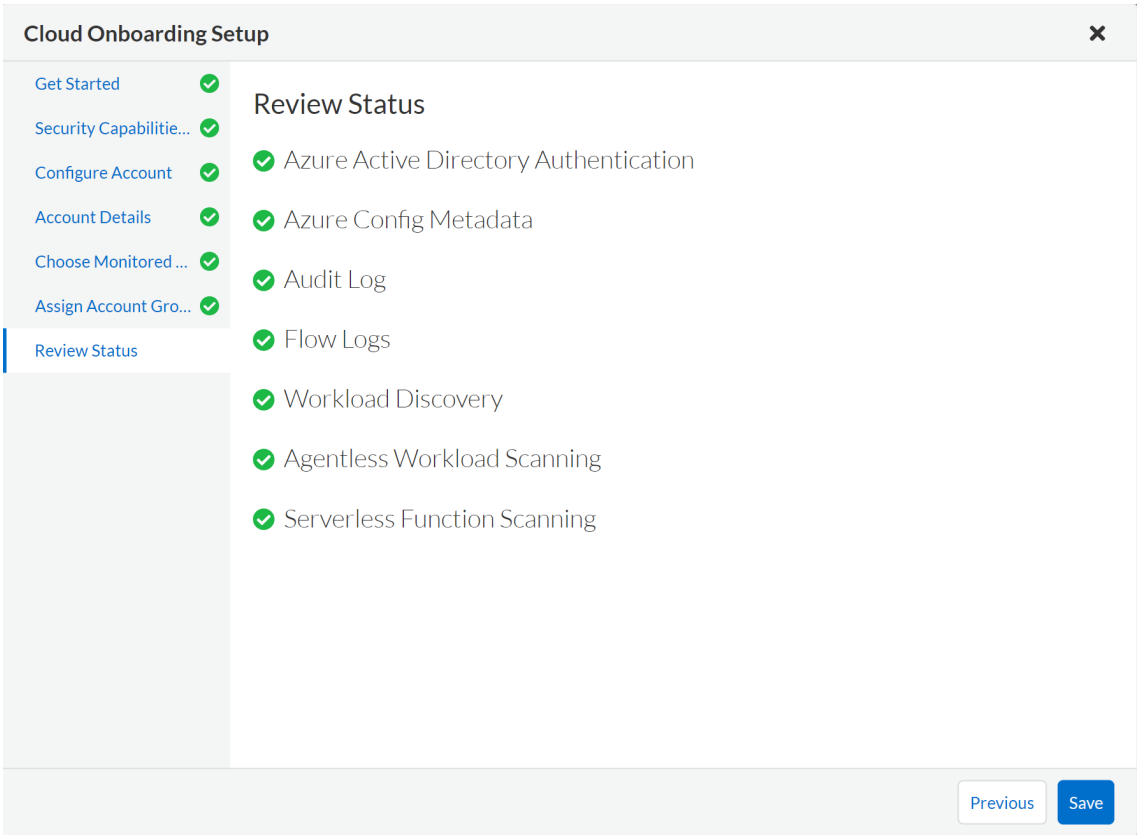
- All Subscriptions
- Include a subset
- Exclude a subset



Step 2 Select your Default Account Group



Step 3 Finalize configuration - Check for the status of the configuration, if ok all should be in green.If Flow Logs are not enabled you will see that it's disabled.



Google Cloud Platform (GCP) Onboarding

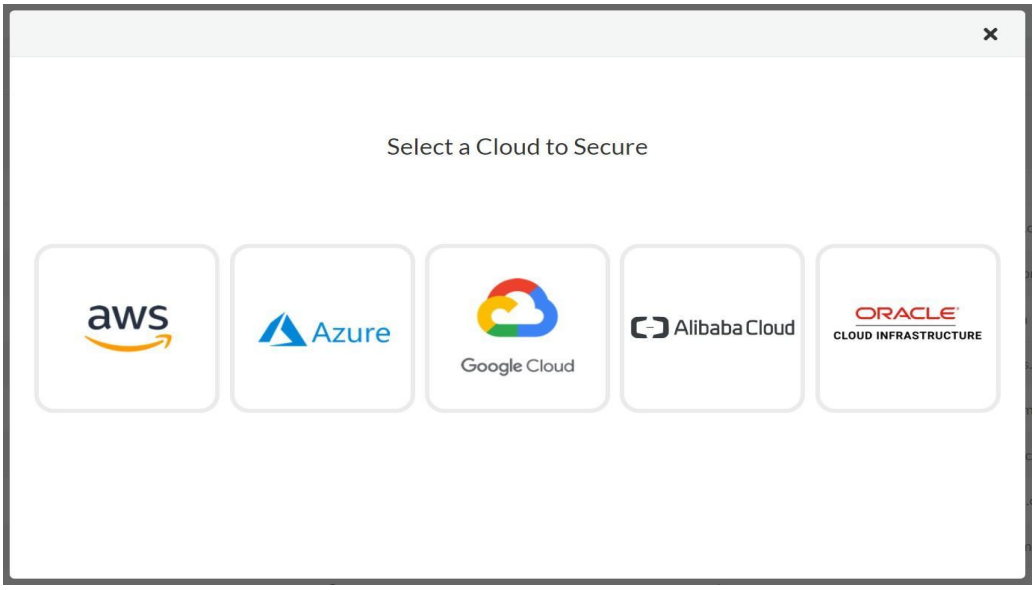
To enable Prisma Cloud to retrieve data on your Google Cloud Platform (GCP) resources and identify potential security risks and compliance issues, you must connect your GCP projects to Prisma Cloud. This document will explain how to onboard GCP folder and GCP projects within (GCP current and future projects) onto Prisma Cloud.

GCP supports flexible resource hierarchy and more details can be found here. In the GCP resource hierarchy, Folders are an additional grouping mechanism on top of projects which customers often use to group a set of GCP projects that belong to a business unit.
If a customer is using G-suite appscripts, then whenever an AppsScript project is created a corresponding GCP project is also created automatically in the background. Why because the G-suite appscripts use the GCP to manage authorization, Advanced services, and other details. In many cases, this leads to a large number of GCP projects [sometimes in 10000+] being created in GCP organization without ANY real IaaS cloud resources within.
In such cases, you may want to exclude the following parent folders for Prisma cloud

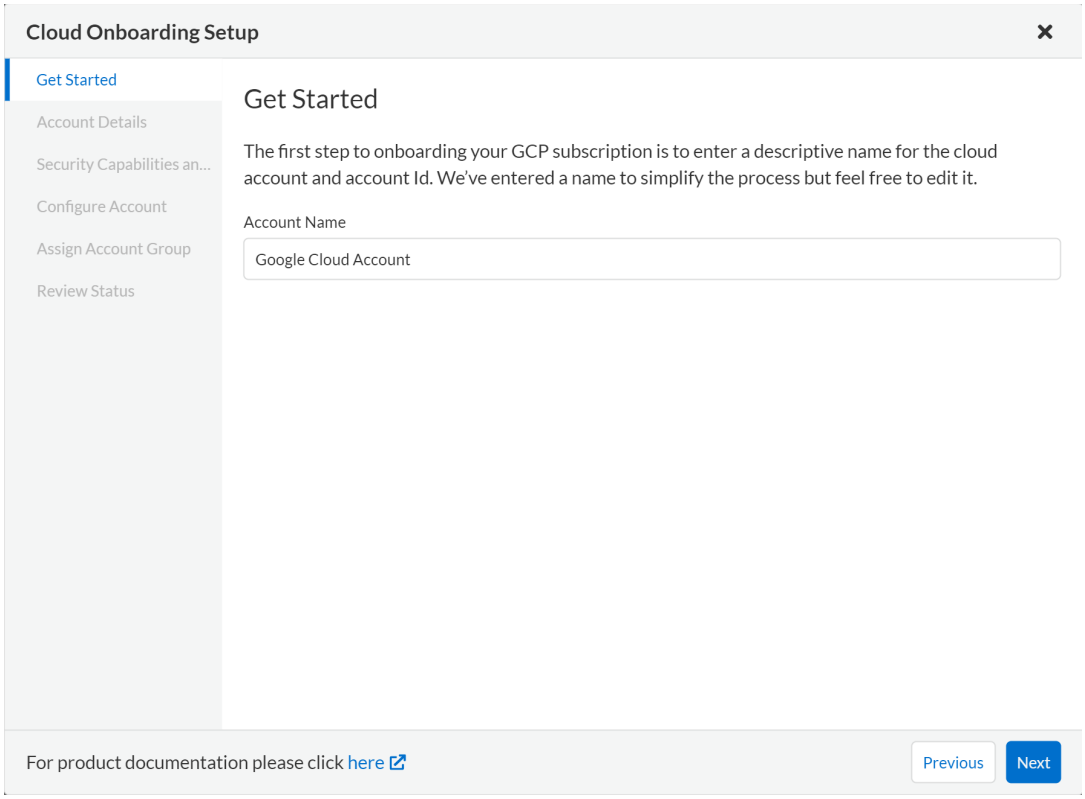
onboarding.
Organization root > system-gsuite > apps-script | Organization root > system-gsuite

Steps for GCP folder level onboarding
In order to analyze and monitor your Google Cloud Platform (GCP) project, Prisma Cloud requires access to specific APIs and a service account which is an authorized identity that enables authentication between Prisma Cloud and GCP. A combination of custom, predefined and primitive roles grant the service account the permissions it needs to complete specific actions on the resources in your GCP project.

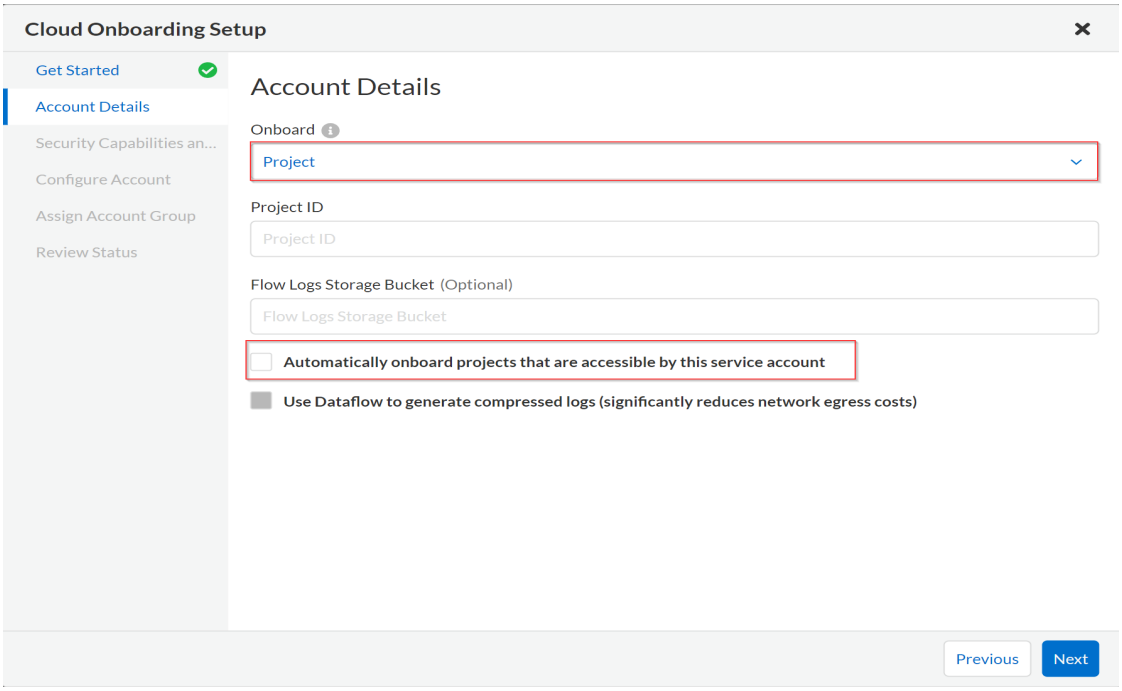
1. Access your Prisma Cloud console and select Settings> Cloud Accounts> Add Cloud Account.
2. Select Google Cloud as the cloud provider.



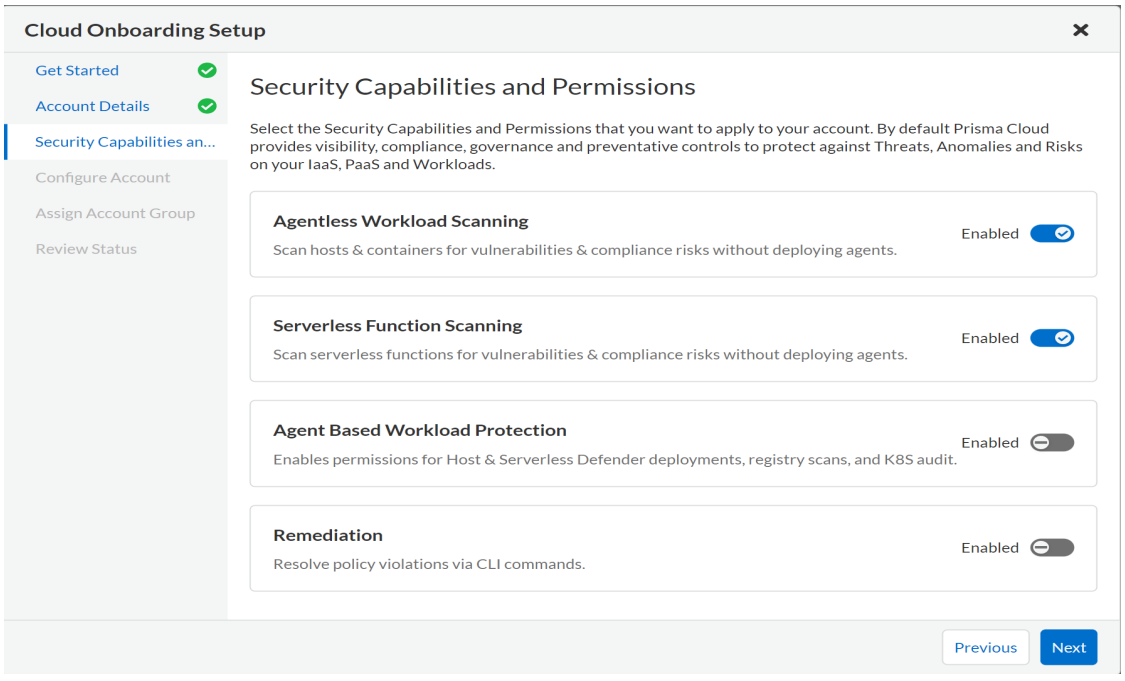
3. Enter a Cloud Account Name. Please note that a cloud account name will be auto populated for you but you can replace it with a cloud account name that uniquely identifies your GCP Project on Prisma Cloud.


Cloud Onboarding Setup
Get Started
Account Details
Security Capabilities an...
Configure Account
Assign Account Group
Review Status
Get Started
The first step to onboarding your GCP subscription is to enter a descriptive name for the cloud account and account Id. We've entered a name to simplify the process but feel free to edit it.
Account Name
Google Cloud Account
For product documentation please click here
Previous
Next

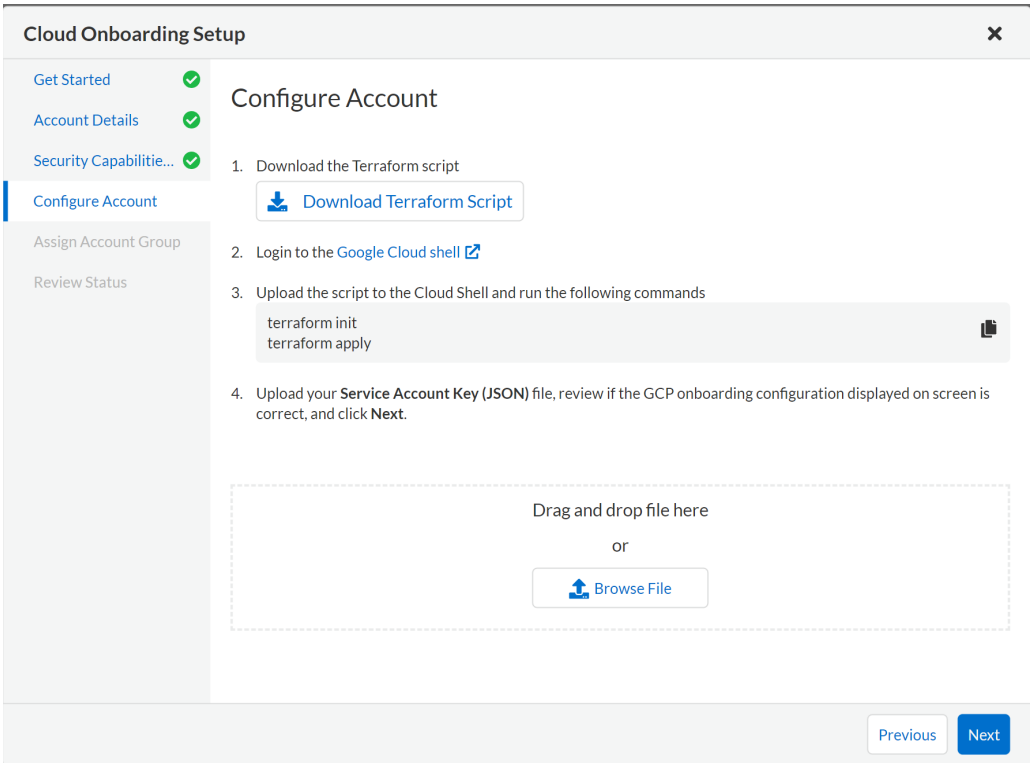
4. Select onboard as “Project” and provide the GCP project ID and the name of the Flow Log Storage Bucket in the account details page. Make sure to select ‘Automatically onboard projects that are accessible by this service account’. Dataflow compression and Flog logs are optional here.



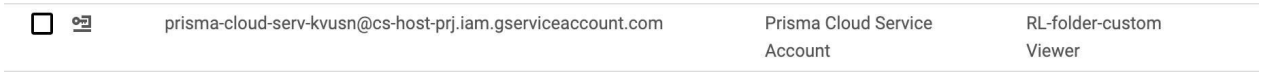
5. Select the Security Capabilities and Permissions that you want to enable.



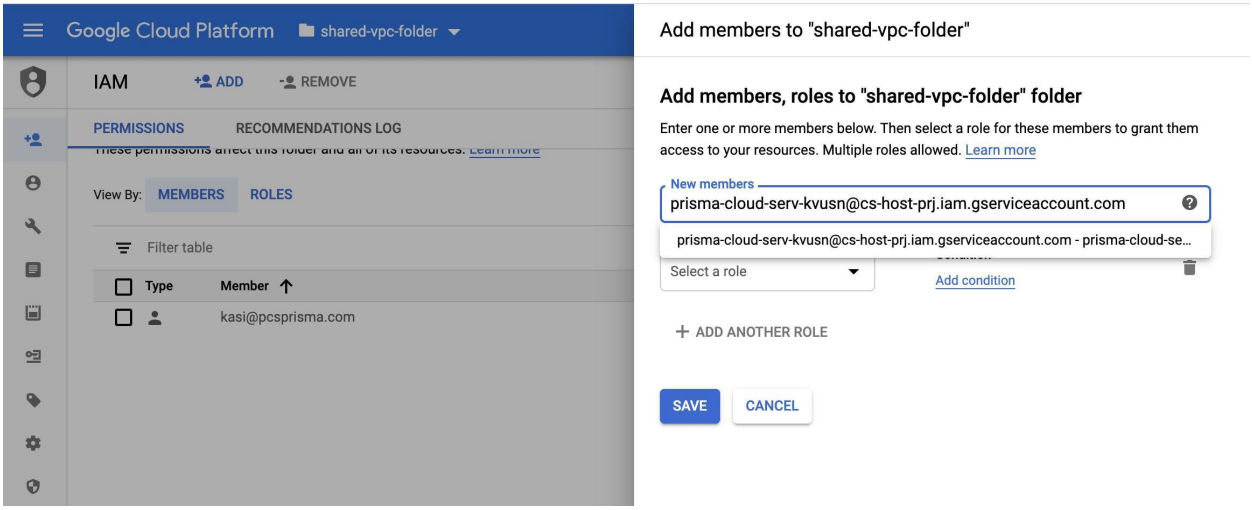
6. Download the Terraform template and run in the 'specified' GCP project (from the previous step). Capture the output and create a .JSON file of the GCP IAM service account credential.



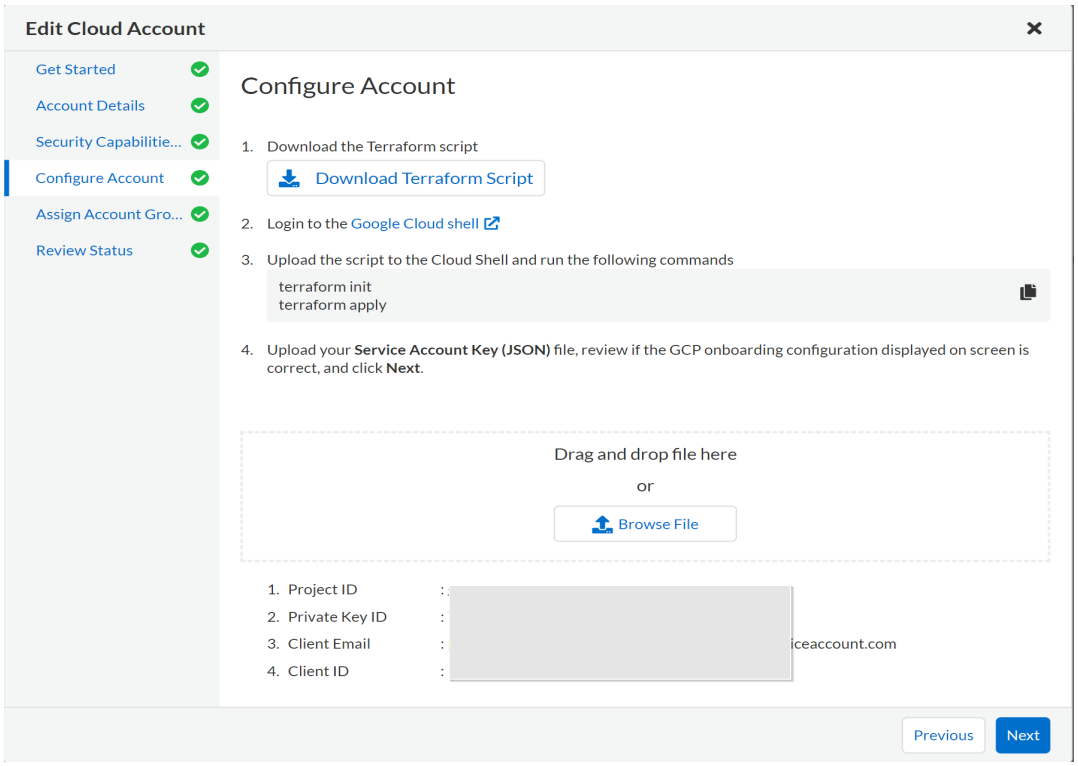
7. In the GCP console, go to the 'specified' GCP project and look for the service-account created and copy the service-account member name. It will be something like 'prisma-cloud-serv-<randome-value>@<gcp-project-name>.iam.gserviceaccount.com' , example below:



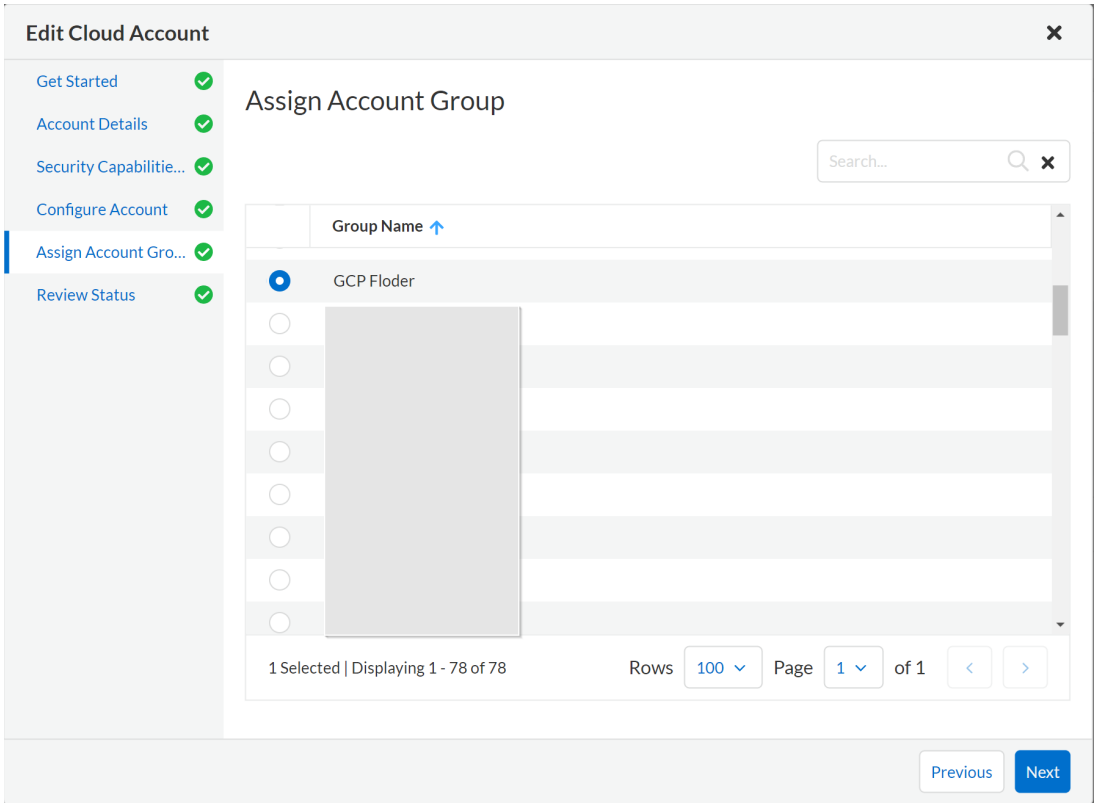
8. Now, go to the GCP folder(s) that you wish you onboard to Prisma Cloud and add this service-account in there and grant one additional permission 'folder viewer' pre-defined role.



9. Now, go back to the Prisma Cloud onboarding page and supply the service-account JSON credential file to complete the folder level onboarding process.



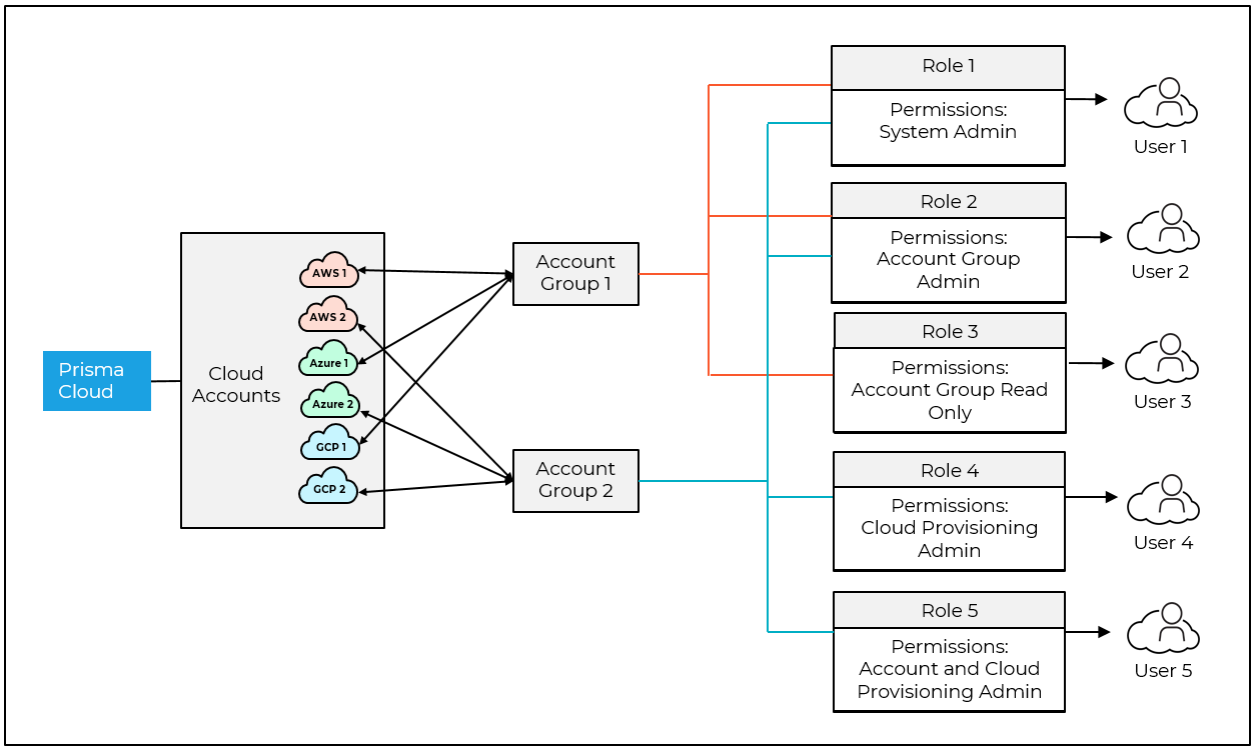
10. Select the Account Group to associate with your project.



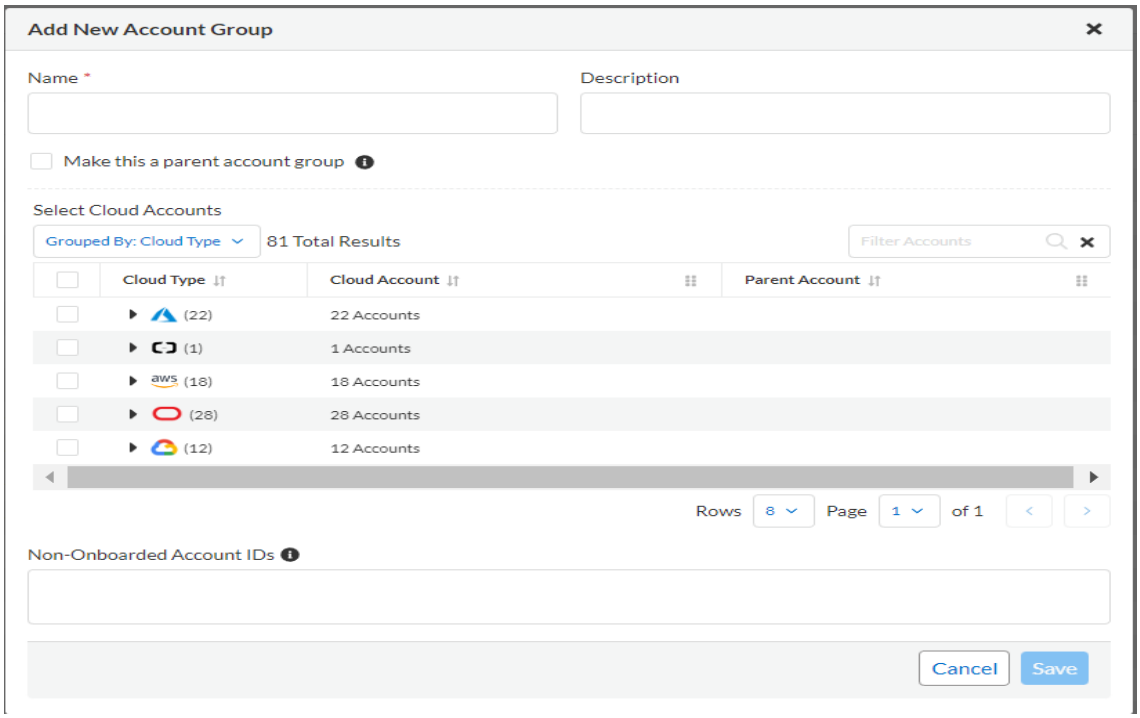
11. Review the onboarding status of the GCP folder to Prisma Cloud and click Save..

Account Groups

During onboarding, you will also choose the Account Group that you would like the account/hierarchy to belong to. Account Group creation is important to map to your organization's business and security needs. Prisma Cloud by default comes with a "Default Account Group" that contains all of your cloud accounts. It is tied to the "Default Alert Rule", alert only on the recommended OOTB policies (policies with Prisma_Cloud label) for all of my cloud accounts. Designating certain accounts into Account Groups such as "AWS Development Accounts", "Compliance Team Accounts", "Production Accounts", etc. will allow you to create meaningful roles with least privilege access, create specific Alert Rules based on Account Groups, Investigate, and filter dashboards/views based on those Account Groups. After specific account groups are created and utilized, the "Default Account Group" may be disabled to reduce noise and incorporate granularity and management of accounts/alerts.



To Add an Account Group
Select Settings > Account Groups > Add Account Group



Alert Rules

Prisma Cloud comes with a “Default Alert Rule” as mentioned previously, where the target is the “Default Account Group” and the alerts are for only the Prisma Cloud Recommended OOTB policies (policies with Prisma_Cloud label) within your tenant. Best practice calls for creating specific custom account groups. Creating specific custom Alert Rules allows you to manage your alerts better. Setup Alert Rules based on organization/security use cases and personas as a starting point. More details about creating alert rules can be found here.

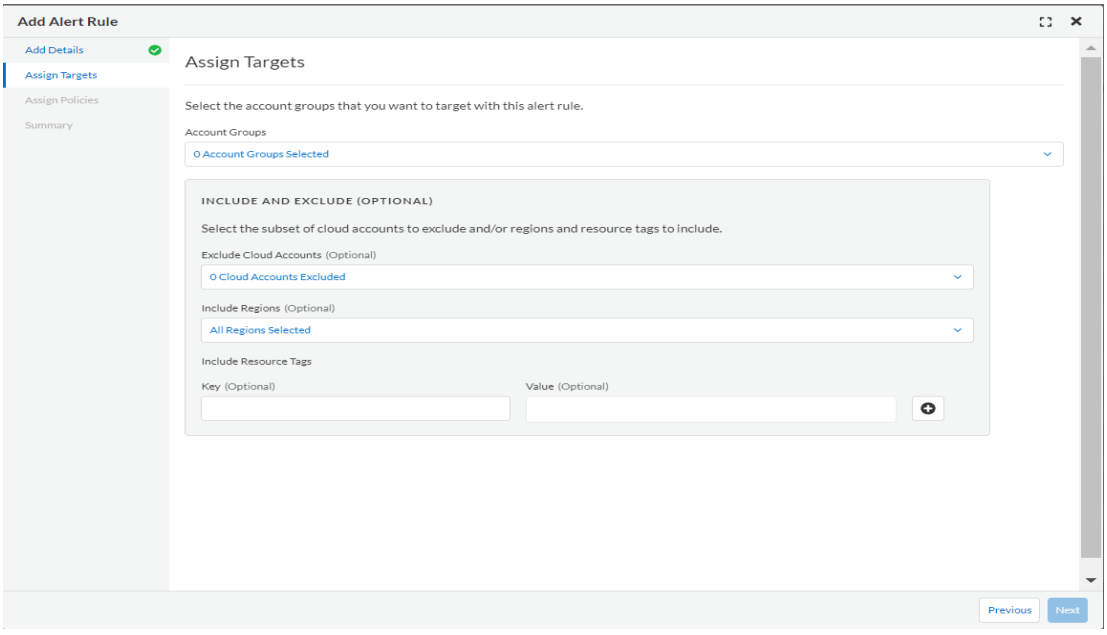
High Level Steps to Enabling Alerts after Onboarding:

1. Enable Alerts by adding the cloud account to an account group during the onboarding process
2. Create an alert rule for run-time checks that correlates with the account group, selecting the policies you’d like to receive alerts on
3. Verify the alert rule is creating alert notifications in the Alert Overview page

The last step in the Alert Rule window is the Notification. If you don’t select a Notification method but still configure the rule, you will see the alerts in the console. If you’d like to receive it via email or send alerts to a third-party tool, you can select it at this stage.

Examples of custom/specific Alert Rules:

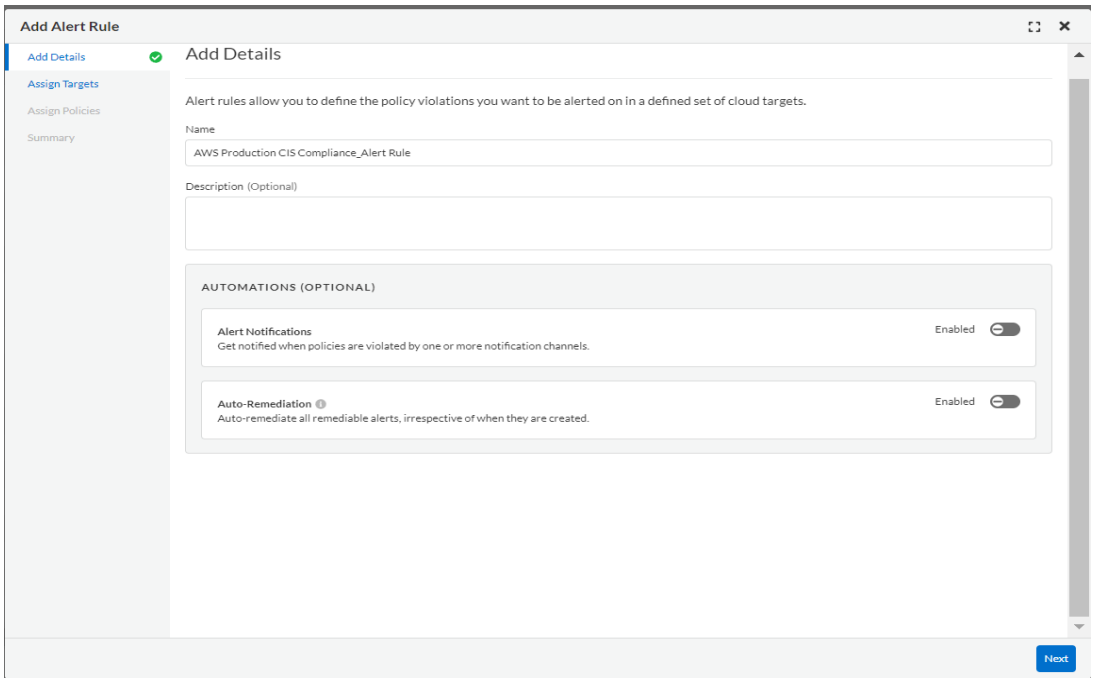
- Tagged resources/alerts - IAM Alerts, Security Groups, etc.
- Teams - DevOps (monitoring build policies and IaC), Compliance (monitoring production or critical accounts that are audited)
- Type of account - Production, Testing, Sandbox, Critical.



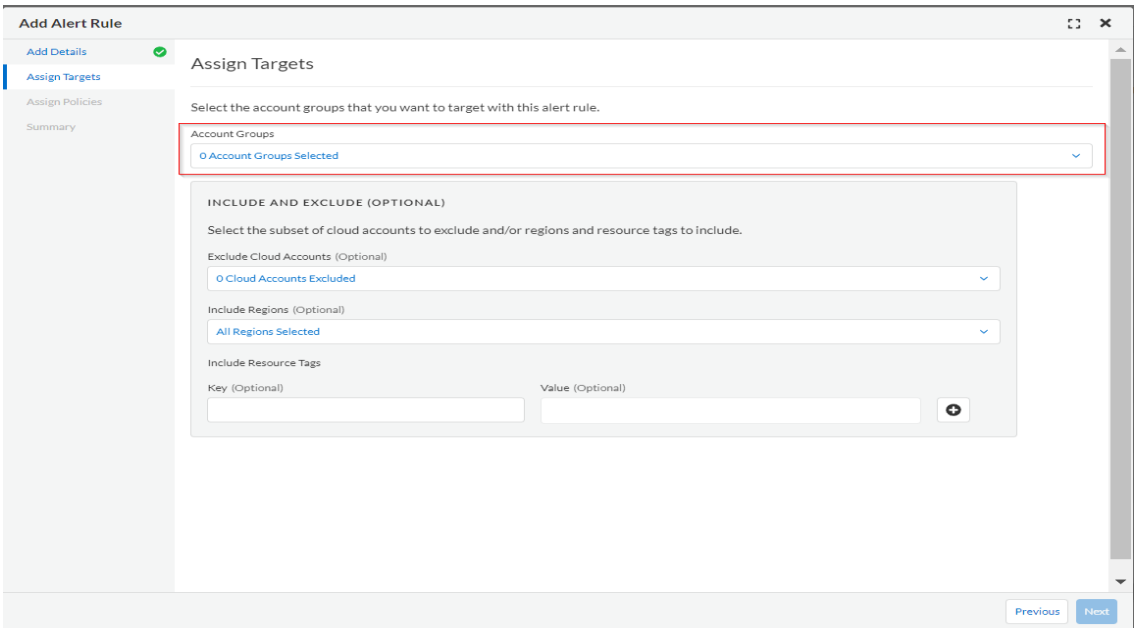
You can filter your Alerts Overview with Alert Rules, allowing you to focus on a specific set at a time. For example, if you have an “AWS Production CIS Compliance” alert rule, you can focus on solely your AWS Production accounts (assuming you’ve created that Account Group) and be alerted on the CIS compliance-related policies within Prisma Cloud.

There are four steps in an Alert Rule configuration:

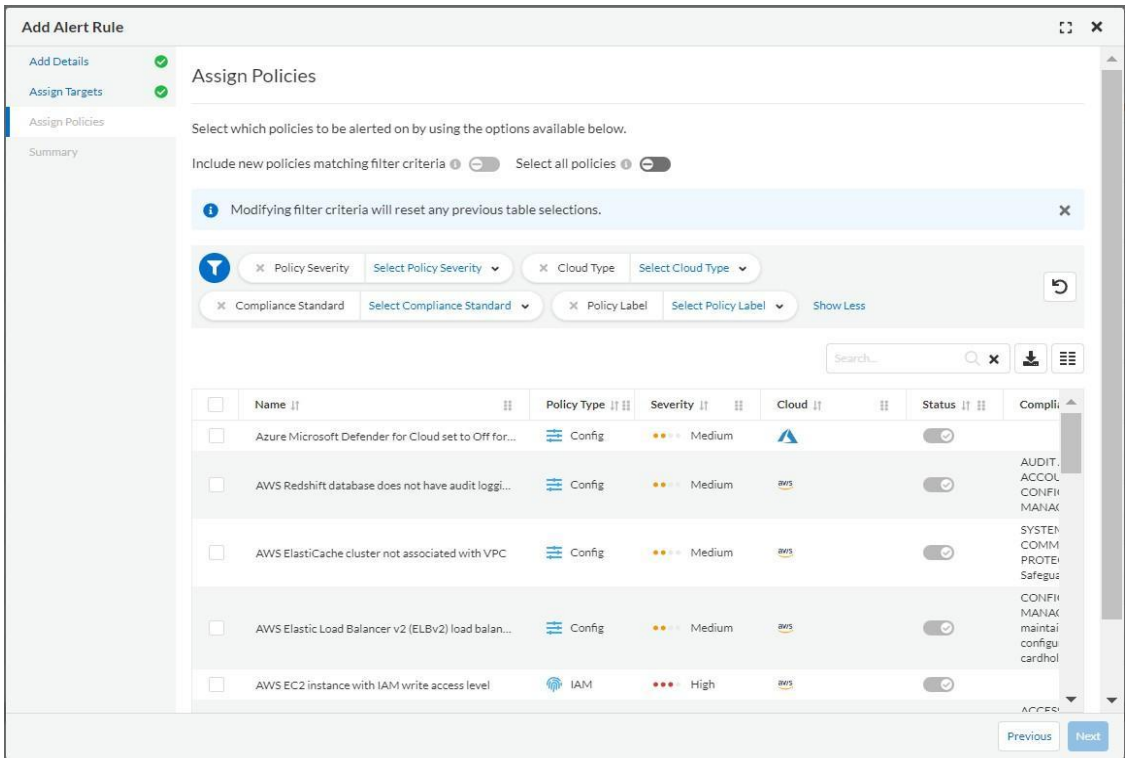
1. Details where you create the name and description. Also you have the option to enable Alert Notifications and Auto-remediation. If you enable Alert Notifications, the Configure Notifications step is displayed.



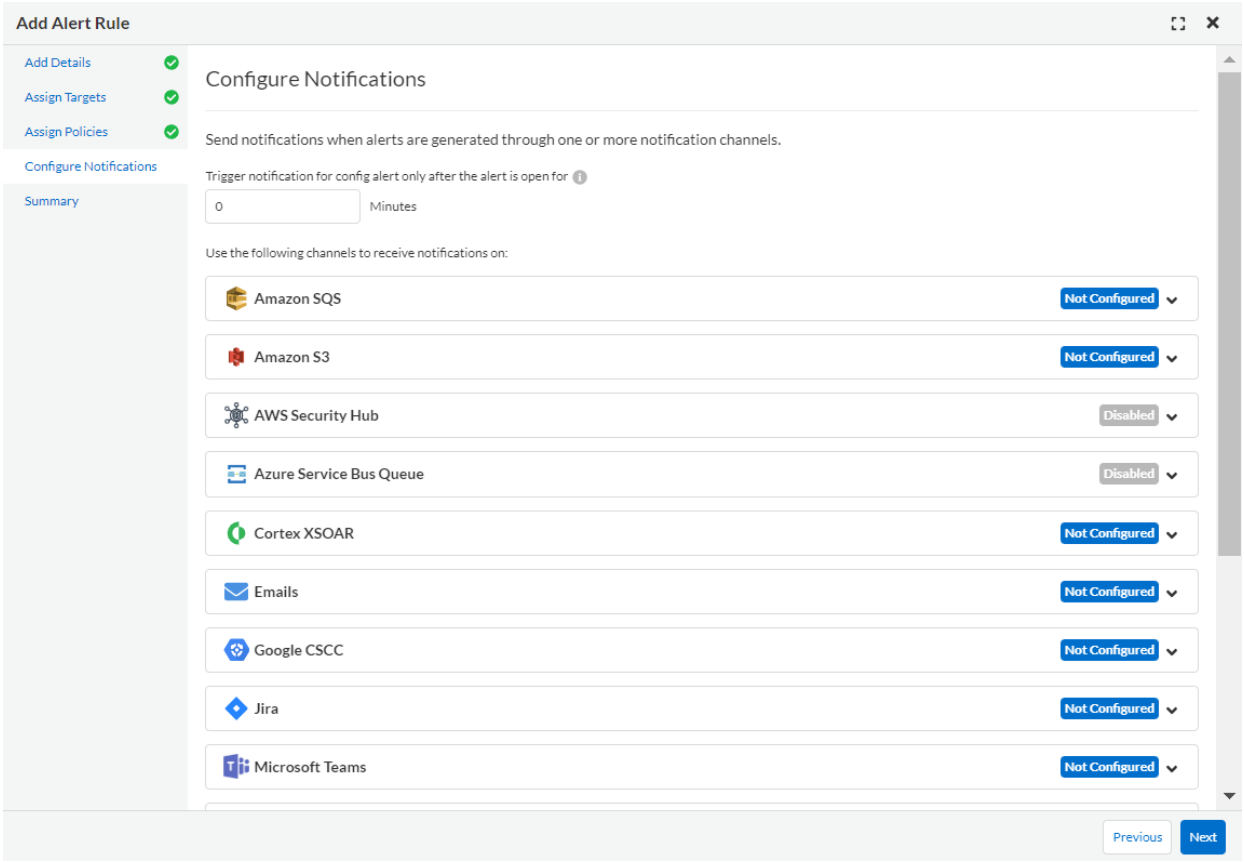
2. Target where you choose the designated Cloud Account Group or individual cloud accounts (utilizing the Advanced Settings to exclude), regions, and resource tags.



3. Select Policies where you can filter and choose specific policies to be alerted on, or choose “Select all policies” if you’d like to be alerted on all of them (increases alerts and noise).



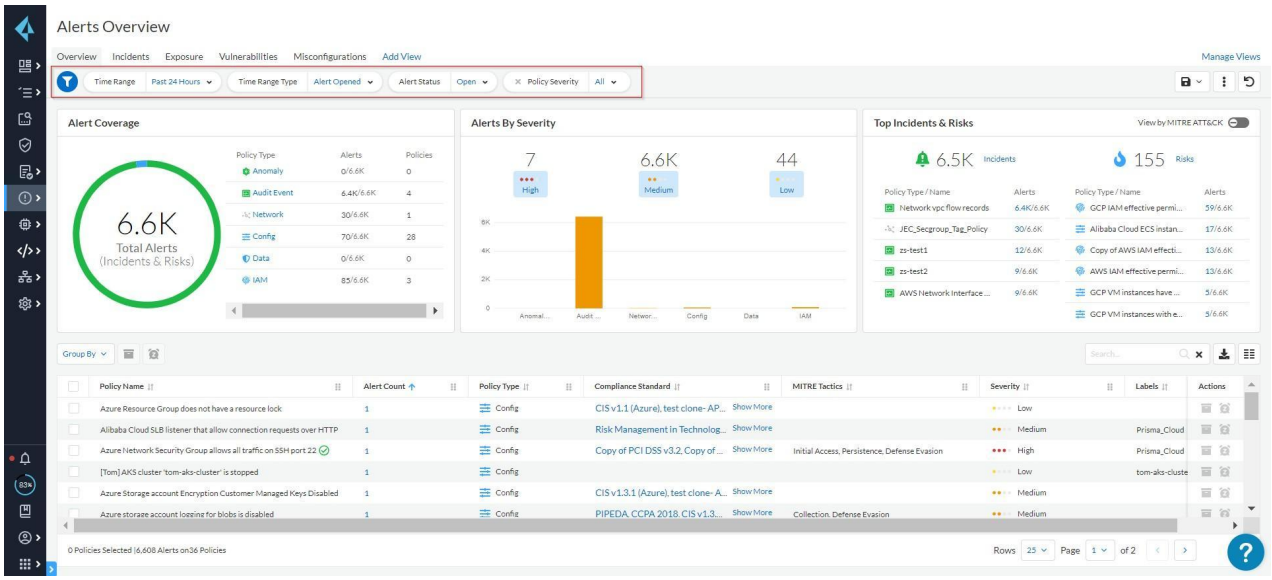
4. Alert Notification where you specify how you'd like to be notified on the alerts in this specific Alert Rule. You have the option of third-party integrations, email, or if you do not choose a specific "channel", it will be an Alert Rule contained just in the console which is still helpful to filter when viewing Alerts and data. Note: New accounts must be updated manually in Alert Rules.



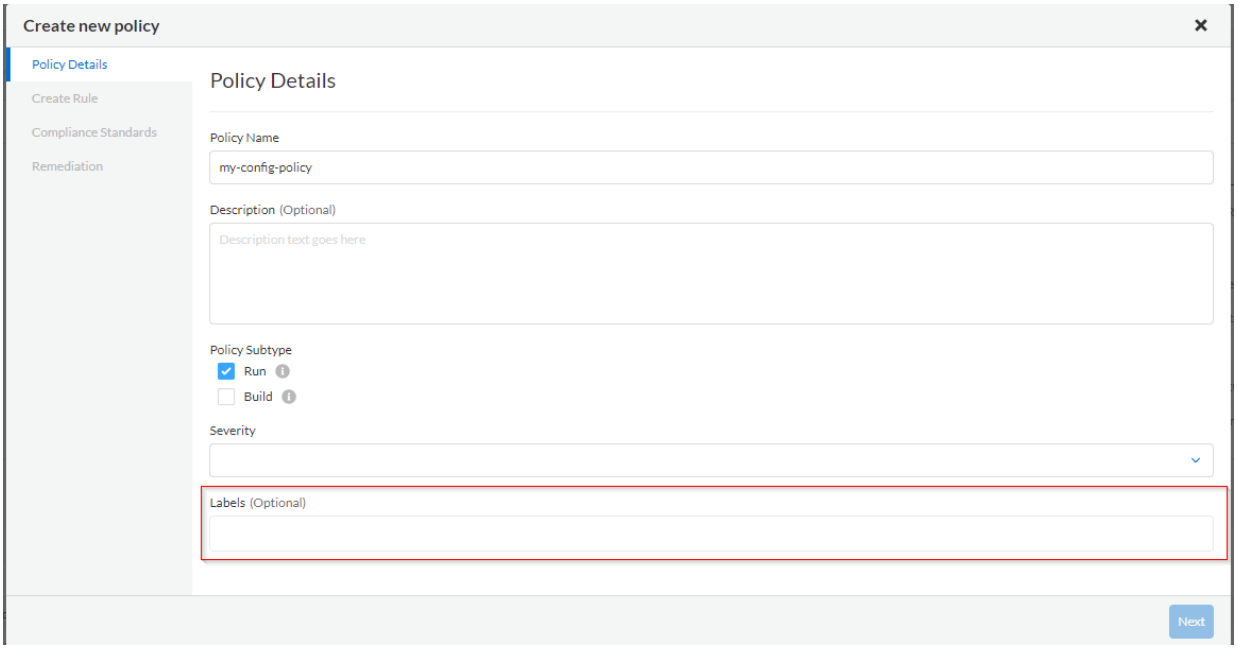
Additional Onboarding Information

Utilize Filters in *Prisma Cloud Asset Inventory, Policies, Alerts, and Compliance*.

There is typically a lot of data ingested into Prisma Cloud and being able to filter will help you have a more granular view and focus on the relevant information at the time. Understand the use of filters in Policies and Alerts. It helps view more granular/detailed information rather than a flood of Policies and Alerts



Creating meaningful labels for OOTB and custom policies facilitate reviewing data, alerts, and security needs. You will see this option in the first part of a policy, whether it's a default OOTB or a custom one. See the screenshot below.



Config Policy Walkthrough

Your Prisma Cloud tenant will come with some default out-of-the-box policies already enabled. To view your Prisma Cloud policies, go to your left navigation bar, click on the fourth option which will open your policies. There are hundreds of default policies that apply across multiple cloud providers as well as some that are cloud agnostic. Review the enabled policies as well as the disabled ones to determine if they should be enabled or disabled for your organization. Utilize the filter options mentioned earlier in the Setup/Configuration section of the document to filter by different options such as Cloud Type, Compliance Standard, Severity, and more. There is also a list of recommended policies to enable that are aligned to the CIS Benchmarks for each major cloud provider. See below tables for recommended policies.

Category	AWS Policy	Azure Policy	GCP Policy
Identity Management			
	AWS IAM deprecated managed policies in use by User		GCP IAM Service account has admin privileges
	AWS IAM Groups with Administrator Access Permissions		GCP IAM user have overly permissive Cloud KMS roles
	AWS IAM has expired SSL/TLS certificates		GCP IAM user with service account privileges
	AWS IAM password policy allows password reuse		
	AWS IAM password policy does not have a minimum of 14 characters		
	AWS IAM password policy does not have password expiration period		
	AWS IAM Password policy is unsecure		
	AWS IAM policy allows assume role permission across all services		
	AWS IAM policy allows full administrative privileges		
	AWS IAM Roles with Administrator Access Permissions		
	AWS MFA is not enabled on Root account		
	AWS MFA not enabled for IAM users		
	AWS root account configured with Virtual MFA		

Category	AWS Policy	Azure Policy	GCP Policy
Access Management			
	AWS access keys are not rotated for 90 days	Azure Active Directory Guest users found	GCP User managed service account keys are not rotated for 90 days
	AWS Certificate Manager (ACM) has expired certificates	Azure Custom Role Administering Resource Locks not assigned	GCP VM instance configured with default service account
	AWS Customer Master Key (CMK) rotation is not enabled	Azure subscriptions with custom roles are overly permissive	GCP VM instance using a default service account with full access to all Cloud APIs
	AWS KMS customer managed external key expiring in 30 days or less	SQL servers which do not have Azure Active Directory admin configured	
	AWS KMS Key policy overly permissive	Azure Active Directory Security Defaults is disabled	
	AWS KMS Key scheduled for deletion		
	AWS S3 bucket having policy overly permissive to VPC endpoints		
	AWS SQS queue access policy is overly permissive		
	AWS SNS topic policy overly permissive for publishing		
	AWS SNS topic policy overly permissive for subscription		
	AWS EC2 instance not configured with Instance Metadata Service v2 (IMDSv2)		
	AWS IAM policy is overly permissive to all traffic via condition clause		

Category	AWS Policy	Azure Policy	GCP Policy
Data Protection - Encryption at rest			
	AWS EBS snapshot is not encrypted	Azure Key Vault is not recoverable	GCP GCE Disk snapshot not encrypted with CSEK
	AWS EBS volume region with encryption is disabled	Azure SQL Server advanced data security is disabled	GCP KMS encryption key not rotating in every 90 days
	AWS Elastic File System (EFS) with encryption for data at rest is disabled	SQL databases has encryption disabled	
	AWS RDS DB cluster encryption is disabled		
	AWS RDS DB snapshot is not encrypted		
	AWS RDS instance is not encrypted		
	AWS S3 buckets do not have server side encryption		
	AWS SNS topic with server-side encryption disabled		
	AWS SQS server side encryption not enabled		

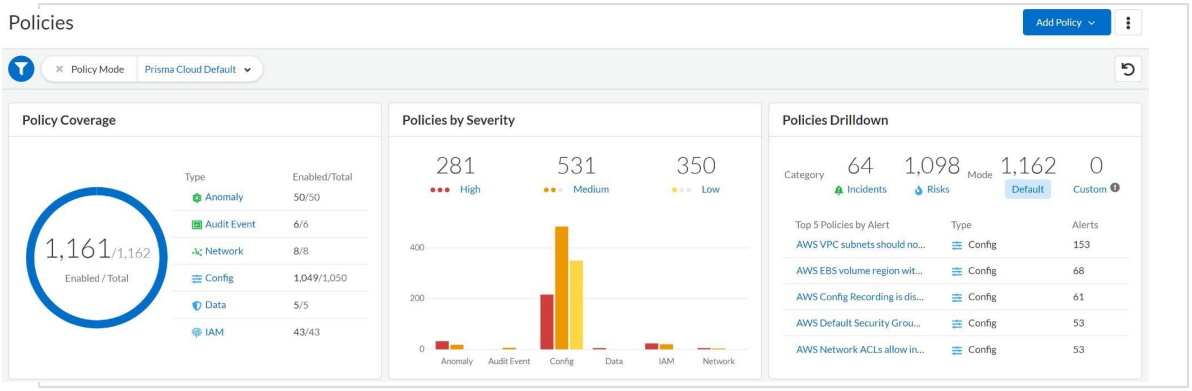
Category	AWS Policy	Azure Policy	GCP Policy
Data Protection - Encryption in transit			
	AWS Application Load Balancer (ALB) is not using the latest predefined security policy	Azure ACR HTTPS not enabled for webhook	GCP HTTPS Load balancer is configured with SSL policy having TLS version 1.1 or lower
	AWS CloudFront distribution is using insecure SSL protocols for HTTPS communication	Azure App Service Web app doesn't redirect HTTP to HTTPS	
	AWS CloudFront origin protocol policy does not enforce HTTPS-only	Azure App Service Web app doesn't use latest TLS version	
	AWS CloudFront viewer protocol policy is not configured with HTTPS	Azure Application Gateway allows TLSv1.1 or lower	
	AWS CloudTrail logs are not encrypted using Customer Master Keys (CMKs)	Azure Application gateways listener that allow connection requests over HTTP	
	AWS Elastic Load Balancer (Classic) SSL negotiation policy configured with insecure ciphers	Azure CDN Endpoint Custom domains is not configured with HTTPS	
	AWS Elastic Load Balancer (Classic) SSL negotiation policy configured with vulnerable SSL protocol	Azure CDN Endpoint Custom domains using insecure TLS version	
	AWS Elastic Load Balancer v2 (ELBv2) listener that allow connection requests over HTTP	Azure MySQL Database Server SSL connection is disabled	
	AWS Elastic Load Balancer v2 (ELBv2) SSL negotiation policy configured with weak ciphers	Azure PostgreSQL database server with SSL connection disabled	
	AWS Elastic Load Balancer v2 (ELBv2) with listener TLS/SSL is not configured	Storage Accounts without Secure transfer enabled	
	AWS Elastic Load Balancer with listener TLS/SSL is not configured		
	AWS Network Load Balancer (NLB) is not using the latest predefined security policy		
	AWS S3 bucket not configured with secure data transport policy		
	AWS SNS subscription is not configured with HTTPS		
	AWS SNS topic not configured with secure data transport policy		

Category	AWS Policy	Azure Policy	GCP Policy
Public Exposure			
	AWS Amazon Machine Image (AMI) is publicly accessible	Azure Container registries Public access to All networks is enabled	GCP BigQuery dataset is publicly accessible
	AWS Classic Load Balancer is in use for internet-facing applications		GCP SQL database is assigned with public IP
	AWS CloudTrail bucket is publicly accessible		GCP Storage buckets are publicly accessible to all authenticated users
	AWS EBS Snapshot with access for unmonitored cloud accounts		GCP Storage buckets are publicly accessible to all users
	AWS EBS snapshots are accessible to public		Storage Buckets with publicly accessible Stackdriver logs
	AWS EC2 instance allowing public IP in subnets		
	AWS EC2 instances with Public IP and associated with Security Groups have Internet Access		
	AWS RDS database instance is publicly accessible		
	AWS RDS instance not in private subnet		
	AWS RDS snapshots are accessible to public		
	AWS S3 Bucket Policy allows public access to CloudTrail logs		
	AWS S3 bucket publicly readable		
	AWS S3 bucket publicly writable		
	AWS S3 buckets are accessible to any authenticated user		
	AWS S3 buckets are accessible to public		
	AWS S3 Buckets Block public access setting disabled		
	AWS VPC subnets should not allow automatic public IP assignment		
	AWS SNS topic is exposed to unauthorized access		

Category	AWS Policy	Azure Policy	GCP Policy
Network configuration			
	AWS CloudFront web distribution with AWS Web Application Firewall (AWS WAF) service disabled	Azure Cosmos DB IP range filter not configured	GCP Firewall rule allows all traffic on RDP port (3389)
	AWS Default Security Group does not restrict all traffic	Azure Network Security Group allows all traffic on RDP Port 3389	GCP Firewall rule allows all traffic on SSH port (22)
	AWS NAT Gateways are not being utilized for the default route	Azure Network Security Group allows all traffic on SSH port 22	GCP Firewall with Inbound rule overly permissive to All Traffic
	AWS Security Group allows all traffic on RDP port (3389)	Azure Network Security Group having Inbound rule overly permissive to all traffic on any protocol	GCP project is configured with legacy network
	AWS Security Group allows all traffic on SSH port (22)	Azure Network Security Group having Inbound rule overly permissive to all traffic on TCP protocol	GCP VM instances have IP Forwarding enabled
	AWS Security Group Inbound rule overly permissive to all traffic on all protocols (-1)	Azure Network Security Group having Inbound rule overly permissive to all traffic on UDP protocol	GCP VPC Network subnets have Private Google access disabled
	AWS Security Group overly permissive to all traffic	Azure Network Security Group with overly permissive outbound rule	
	AWS VPC allows unauthorized peering	Azure PostgreSQL Database Server 'Allow access to Azure services' enabled	
	Instances exposed to network traffic from the internet	Azure PostgreSQL Database Server Firewall rule allow access to all IPV4 address	
	AWS Application Load Balancer (ALB) not configured with AWS Web Application Firewall v2 (AWS WAFv2)	Azure SQL Servers Firewall rule allow access to all IPV4 address	
		Azure Storage Account default network access is set to 'Allow'	
		Azure storage account has a blob container with public access	
		Azure Virtual Network subnet is not configured with a Network Security Group	
		SQL Server Firewall rules allow access to any Azure internal resources	

Category	AWS Policy	Azure Policy	GCP Policy
Logging			
	AWS Access logging not enabled on S3 buckets	Azure Monitoring log profile is not configured to export activity logs	GCP Project audit logging is not configured properly across all services and all users in a project
	AWS Certificate Manager (ACM) has certificates with Certificate Transparency Logging disabled	Azure Network Watcher Network Security Group (NSG) flow logs retention is less than 90 days	GCP VPC Flow logs for the subnet is set to Off
	AWS CloudFront distribution with access logging disabled	Azure storage account logging for blobs is disabled	
	AWS CloudTrail is not enabled in all regions	Azure storage account logging for queues is disabled	
	AWS CloudTrail logging is disabled	Azure storage account logging for tables is disabled	
	AWS VPC has flow logs disabled		

Category	AWS Policy	Azure Policy	GCP Policy
Others			
	AWS Amazon Machine Image (AMI) infected with mining malware	Azure App Service Web app authentication is off	GCP GCR Container Vulnerability Scanning is disabled
		Azure App Services FTP deployment is All allowed	GCP MySQL instance with local_infile database flag is not disabled
		Azure Application Gateway does not have the Web application firewall (WAF) enabled	GCP SQL database instance is not configured with automated backups
		Azure Security Center Defender set to Off for App Service	GCP VM instance with Shielded VM features disabled
		Azure Security Center Defender set to Off for Azure SQL database servers	VM instances have serial port access enabled
		Azure Security Center Defender set to Off for Key Vault	
		Azure Security Center Defender set to Off for Kubernetes	
		Azure Security Center Defender set to Off for Servers	
		Azure Security Center Defender set to Off for Storage	
		Azure SQL Server ADS Vulnerability Assessment is disabled	
		Threat Detection on SQL databases is set to Off	
		Threat Detection types on SQL databases is misconfigured	

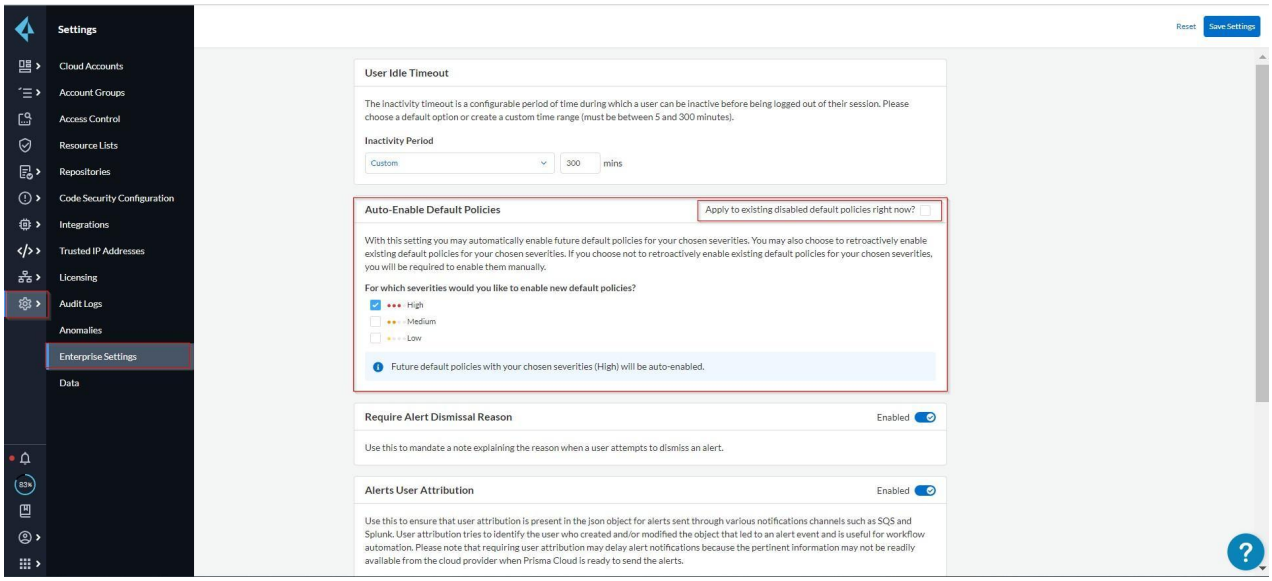


CIS is a Good baseline compliance standards define cloud-specific technical controls and we develop policies per the standard. Other compliance standards map existing policies to high-level requirements.

Policy Types and Classifications

CATEGORY	CLASS	TYPE	SUBTYPE
Incident	Behavioral	Anomaly	UEBA
	Behavioral	Anomaly	Network
	Privileged Activity Monitoring	Audit Event	Audit
	Network Protection	Network	Network Event
Risk	Misconfiguration	Config	Run
	Misconfiguration	Config	Build
	Misconfiguration	Data	Data Classification
	Vulnerability	Data	Malware

In Enterprise Settings (last option in navigation bar, Settings → Enterprise Settings), you can select the option for new default policies to be enabled when they are released with Prisma Cloud updates. You can select the severity of the policies to be enabled, for example, if you'd only like new default high severity policies to be enabled, you can select only the "high" option. You can also choose to retroactively enable existing default policies for your chosen severities.



Compliance and Reporting

Setting up custom compliance standards can help users to logically group their RQL policies to fit the scope of what they are trying to achieve. An example of a use case could be to have a compliance standard that is generally used for a specific business unit of a customer environment

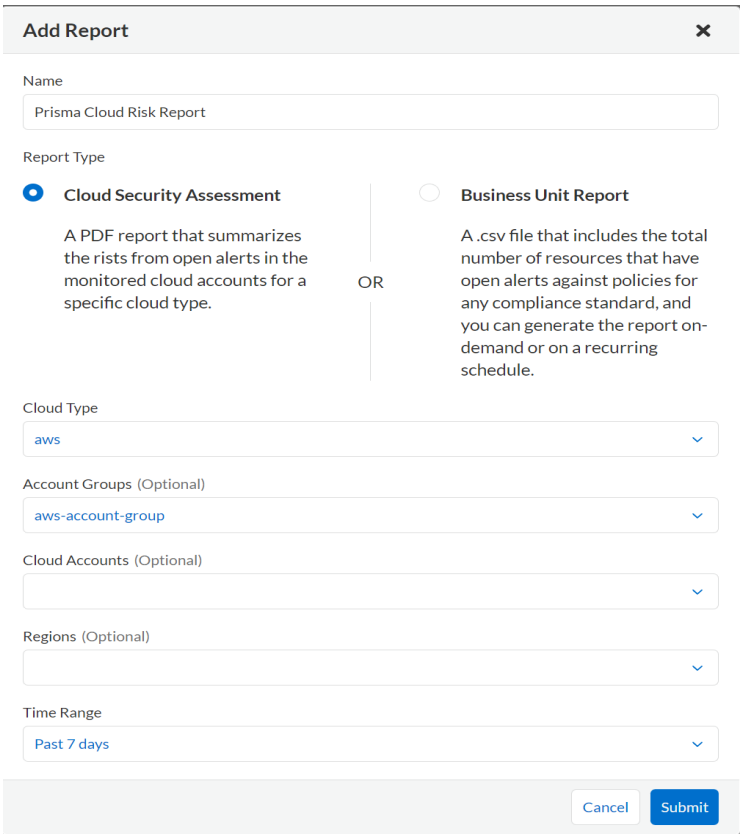
There are three different formal reports you can configure from Prisma Cloud; two Alert Reports and one Compliance Report. The two Alert Reports consist of a Cloud Security Assessment Report and a Business Unit Report.

The Cloud Security Assessment report is a PDF report that summarizes the risks from open alerts in the monitored cloud accounts for a specific cloud type. The report includes an executive summary and a list of policy violations, including a page with details for each policy that includes the description and the compliance standards that are associated with it, the number of resources that passed and failed the check within the specified time period. This report can be useful to share with management, outside third party organizations for assessment purposes, or just a quick review.

The Business Unit report is a .csv file that includes the total number of resources that have open alerts against policies for any compliance standard, and you can generate the report on-demand or on a recurring schedule. This .csv file allows you to open the report in Microsoft Excel to be able to filter, sort, or utilize any Excel features or you can upload this into a third party tool such as a SIEM tool. You can opt to create an overview report which shows you how you're doing across all your business units, or get a little more granular about each of the

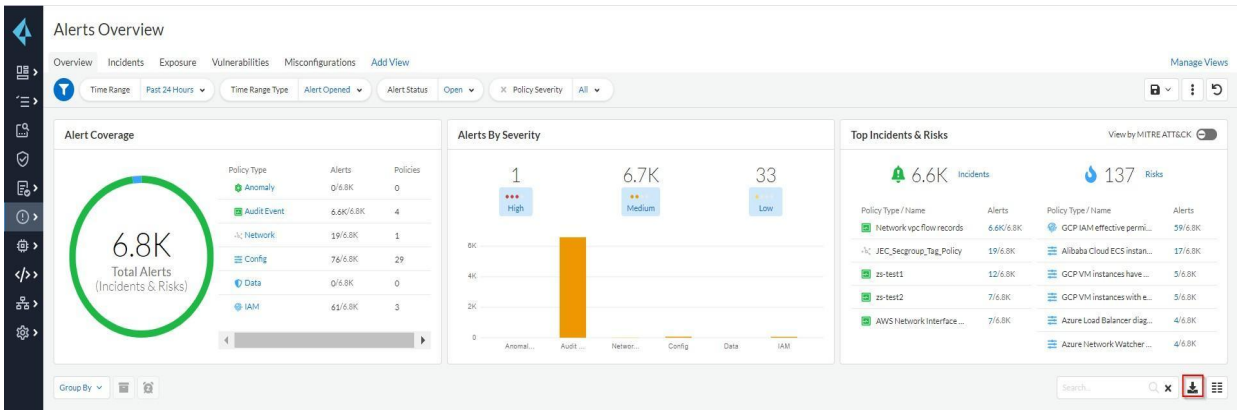
cloud accounts you want to monitor. You can also generate the Business Unit report to review policy violations that are associated with specific compliance standards.

To create an Alert Report, navigate to Alerts → Reports → Add Alert Report



Compliance Report: The third type of report that you can generate with Prisma Cloud is a Compliance Report. Prisma Cloud natively includes multiple industry known Compliance Standards such as NIST, CIS, PCI-DSS, HIPAA, and others. You can create compliance reports based on a cloud compliance standard for immediate online viewing or download, or schedule recurring reports so you can monitor compliance to the standard over time.

From a single report, you have a consolidated view of how well all of your cloud accounts are adhering to the selected standard. Each report details how many resources and accounts are being monitored against the standard, and, of those, how many of the resources passed or failed the compliance check. This report can be useful for dedicated Compliance teams, management, or to assist during a security assessment or audit.



Note: You can also download information by clicking on the download option in multiple different views where you see tables of information. Examples include the Asset Inventory page, Alerts Overview, Policies, etc.

IAM Security

The IAM Security Module provides net-effective permissions to cloud infrastructure resources based on policies that are configured out of the box. This allows Prisma Cloud administrators the ability to rightsize these permissions quickly, which reduces the risk of compromise from identity credentials.

The IAM Security module is enabled on the Subscriptions tab in the Prisma Cloud console (click on Learn Mode, and Activate to enable). Once IAM Security has been activated, you will be able to run RQL queries. Verify this on the Investigate tab.

Be sure to save searches that you have created to save time the next time you need to run the query again. If you need to analyze permissions offline you can download the results of a query in CSV format.

Integrate IAM Security with your IdP to calculate permissions for your SSO provider (e.g. Okta, Azure AD).

Manually remediate IAM security alerts by going to:

1. Alerts > Overview
2. Select the violating policy
3. Policies that can be remediated are indicated by a icon.
4. Under the Options column, click the Remediate button.
5. Prisma Cloud will make recommendations for CLI commands to run in your CSP.

Create an Alert Rule for Run-Time Checks and follow the instructions for configuring a custom python script on AWS or Azure; this will allow you to manage auto-remediation for IAM alert rules using the messaging queuing service on the respective CSP.

Some best practice guidelines to consider for IAM Security

- Which users have access to resource X?
- What accounts, services and resources does the user name@domain.com have access to?
- What are the cross account permissions between my accounts?
- Can any users outside of group C access resources in region D?
- What roles are not configured according to best practices?
- What resources can be effectively assessed by the public?
- Which compute workloads have permissions that are not actually being used?
- Resolve all over-permissive policies and enforce least-privilege from now on

Data Security

Data security is both the practice and the technology of protecting valuable and sensitive company and customer data, such as personal or financial information. Data security is a company's protective measures put in place to keep any unauthorized access out of their databases, websites, applications, and computers.

- Create meaningful roles with Permissions to Account Groups.
- Create meaningful labels for OOB policies and custom policies. Use labels in alert rules and report generation.
- If you are using AWS or GCP Orgs, use Prisma Cloud Org support to automatically on-board all the member accounts, folders, projects (Azure mgmt groups - BETA).
- Use API for all bulk operations, such as cloud onboarding, account group management, custom dashboards etc. Review and use Prisma Cloud Terraform provider or Python scripts for leveraging the Prisma Cloud API.
- Create and manage access keys
- Create custom Alert Rules to send alerts only to cloud-account owners.
- Set up integrations with Splunk, ServiceNow, other SIEM/SOAR tools.
- Review cloud accounts in orange/red status to ensure permissions and settings are correct. Goal is for accounts to be in green status.
- Use tags to group your cloud resources, accounts etc.
- Use filters to focus only on specific cloud accounts, alert types, cloud types etc.
- Consider setting up integrations sooner rather than later as some integrations only get net-new alerts and thus older alerts won't be sent to the integration if you wait to set them up further down the onboarding path.

- When adding new cloud account groups, make sure to include them in alert rules (not automatic)

New Updates and Feature Releases

- Permissions/new APIs being added, edit Prisma Cloud policy in AWS for example to fix config issues
- Prisma Cloud New Features

Runtime protections

Configure, enable, and customize Prisma Cloud policies. Familiarize yourself with and customize compliance requirements.

Runtime Models

One key goal is minimizing the amount of work you're required to do to manage runtime defense. Leverage the models that Prisma Cloud can automatically create and manage. Because behavioral learning for model creation is mature technology for Prisma Cloud, in most cases, you won't need to create auxiliary rules to augment model behavior. There will be some exceptions. For example, a long-running container that changes its behavior throughout its lifecycle might need some manually created rules to fully capture all valid behaviors. This is atypical for most environments, however, as containers that need to be upgraded are typically destroyed and reprovisioned with new images.

If you do need to create runtime rules, here are some best practices for doing so:

Minimize the number of rules — Creating static rules requires time and effort to build and maintain; only create rules where necessary and allow the autonomous models to provide most of the the protection.

Precisely target rules — Be cautious of creating rules that apply to broad sets of images or containers. Providing wide ranging runtime exceptions can lower your overall security by making rules too permissive. Instead, target only the specific containers and images necessary. Don't use wildcard (*) in the whitelist or blacklist because it can interrupt the execution of legitimate services.

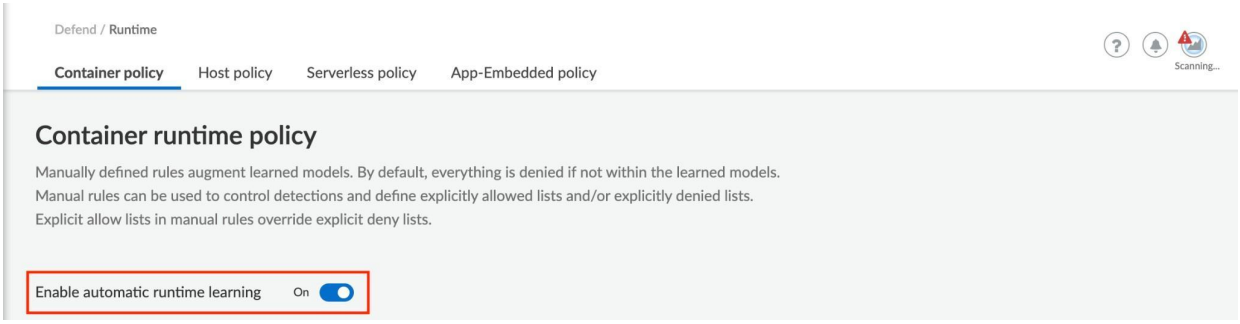
Name rules consistently — Because rule names are used in audit events, choose consistent, descriptive names for any rules you create. This simplifies incident response and investigation. Also, consider using Prisma Cloud's alert profile feature to alert specific teams to specific types of events that are detected.

Rules in alert action — It is recommended to start configuring the runtime rules in alert action and after you are comfortable with the outputs you can change the action to prevent or block.

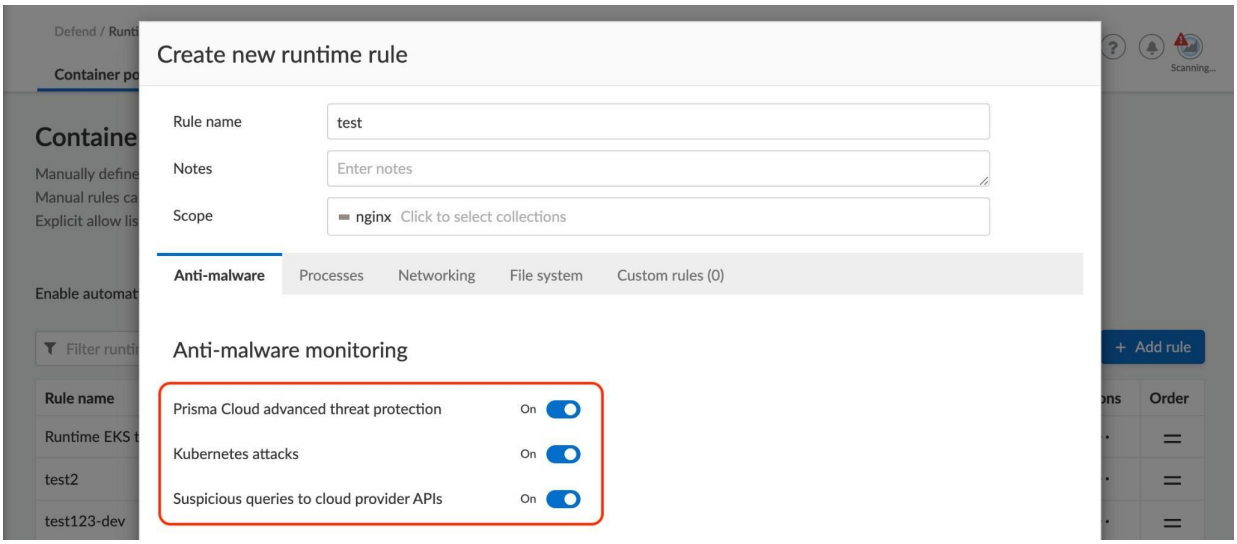
Rules testing — In case the customer wants to implement a runtime policy with block or prevent actions. It is recommended to test this policy behavior in a test environment before pushing it to production. For example, testing Kubernetes cluster or test namespace.

Runtime Policy Configuration

- Enable the use of ML models in case of container policy by enabling the automatic runtime learning option.



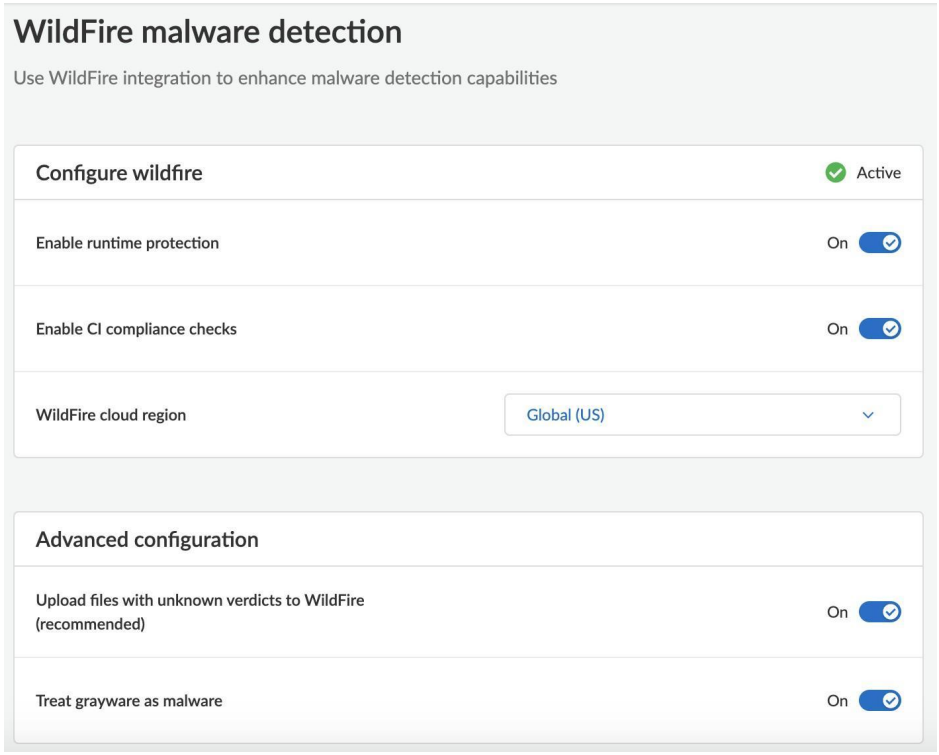
- Provide a descriptive rule name.
- Avoid using a wide scope based on a cluster name for example and make it more specific by providing a namespace name and image or container value.
- Use **Prisma Cloud Advanced Threat Protection** intelligence feed, to apply malware prevention techniques across processes, networking and filesystem.
- In case the container is running inside a Kubernetes cluster it is better to enable the **Kubernetes attack** option to monitor attempts to directly access Kubernetes infrastructure from within a running container. In case a container is developed for some use case to communicate with Kubernetes API, it needs to be excluded from the selected scope to avoid false positive alarms.
- **Suspicious queries to cloud provider APIs** can be enabled to monitor access to cloud provider metadata API from within a running container. In case a container is developed for some use case to communicate with a cloud provider API, it needs to be excluded from the selected scope to avoid false positive alarms.



- Use **Advanced Malware Analysis** based on Wildfire malware analysis engine, to detect malware. Currently Prisma Cloud Compute uses WildFire for file verdicts only in the following scenarios for Container runtime / CI:
    - ELF files written to a linux container file system in runtime.
    - Shared objects are not examined via WildFire.
    - File must be smaller than 100MB (WildFire limit).
    - You can submit up to 5000 files per day, and get up to 50,000 verdicts on your submissions to the WildFire service.
    - Wildfire is supported on Linux only. Windows containers and hosts aren't currently supported.

WildFire malware detection

- **Use WildFire for runtime protection** — Enable WildFire malware scanning in runtime for containers and hosts.
- **Use WildFire for CI compliance checks** — Enable WildFire malware scanning for containers CI checks.
- Choose the closest WildFire cloud region
- **Upload files with unknown verdicts to WildFire** — Determines whether files with unknown verdict will be sent to WildFire for full analysis. When off, WildFire will only provide verdict for files that have been uploaded to WildFire via a different client.
- **Treat grayware as malware** — Use a more restrictive approach and treat files with grayware verdict as malware.

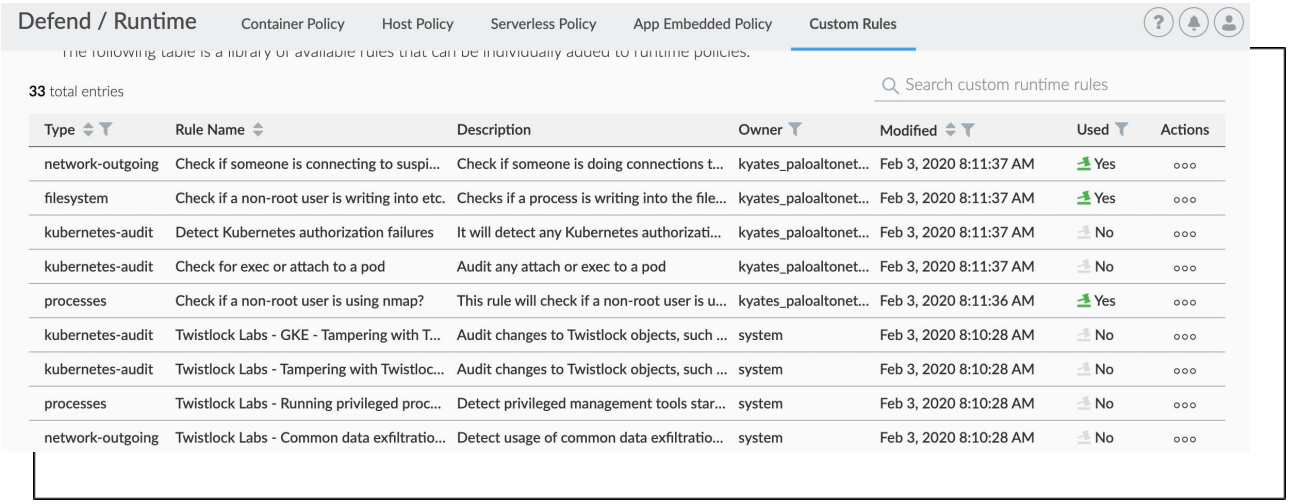


- Processes:
  - Review the learned processes in the container model and whitelist or blacklist the process in the rule based on the business need.
  - Configure the Anti-malware and exploit prevention option on alert mode for testing and then change to prevent or block mode.
- Networking:
  - Review the learned networking ports and domains in the container model and whitelist or blacklist it in the rule based on the business need.
  - Configure the Anti-malware and exploit prevention option on alert mode for testing and then change to prevent or block mode
- File System:
  - Review the learned file system paths in the container model and whitelist or blacklist it in the rule based on the business need.
  - Configure the Anti-malware and exploit prevention option on alert mode for testing and then change to prevent or block mode

Custom Runtime Rules

- Precise way to describe and detect specific runtime behaviors.

- Can help fill in a lot of gaps on hosts since our model is more focused on services
  - Example: Preventing writes to a particular file system on a host.
- Make sure to test specific use cases before telling customers what you can and can't do.
- Sample built-in runtime rules are usually good enough in POC.



Type	Rule Name	Description	Owner	Modified	Used	Actions
network-outgoing	Check if someone is connecting to suspi...	Check if someone is doing connections t...	kyates_paloaltonet...	Feb 3, 2020 8:11:37 AM	Yes	ooo
filesystem	Check if a non-root user is writing into etc.	Checks if a process is writing into the file...	kyates_paloaltonet...	Feb 3, 2020 8:11:37 AM	Yes	ooo
kubernetes-audit	Detect Kubernetes authorization failures	It will detect any Kubernetes authorizati...	kyates_paloaltonet...	Feb 3, 2020 8:11:37 AM	No	ooo
kubernetes-audit	Check for exec or attach to a pod	Audit any attach or exec to a pod	kyates_paloaltonet...	Feb 3, 2020 8:11:37 AM	No	ooo
processes	Check if a non-root user is using nmap?	This rule will check if a non-root user is u...	kyates_paloaltonet...	Feb 3, 2020 8:11:36 AM	Yes	ooo
kubernetes-audit	Twistlock Labs - GKE - Tampering with T...	Audit changes to Twistlock objects, such ...	system	Feb 3, 2020 8:10:28 AM	No	ooo
kubernetes-audit	Twistlock Labs - Tampering with Twistloc...	Audit changes to Twistlock objects, such ...	system	Feb 3, 2020 8:10:28 AM	No	ooo
processes	Twistlock Labs - Running privileged proc...	Detect privileged management tools star...	system	Feb 3, 2020 8:10:28 AM	No	ooo
network-outgoing	Twistlock Labs - Common data exfiltratio...	Detect usage of common data exfiltratio...	system	Feb 3, 2020 8:10:28 AM	No	ooo

Web-Application and API Security (WAAS)

App Definition

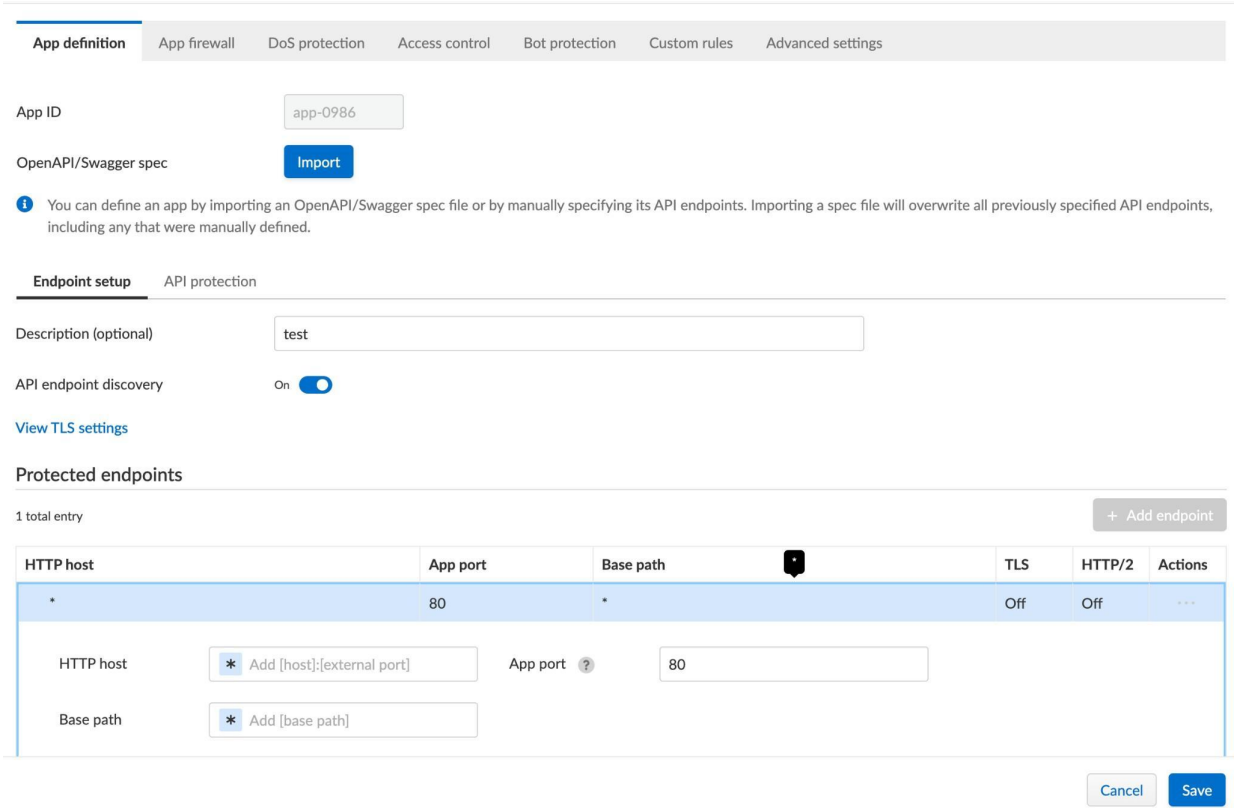
Utilizing Open API / Swagger documents to create the General App Setup and API protection is highly recommended. Not only do Open API and Swagger documents make it easy and consistent to deploy application definitions, they also support the following DevOps philosophy:

1.) Open API / Swagger is a good form of documentation on Restful APIs for any given developer group and organization
2.) Support automated updating as API and infrastructure changes.
3.) Allow for automation of deployment in a consistent manner.
4.) Allow versioning for documentation and rollback of configuration if there is a problem with the deployment.

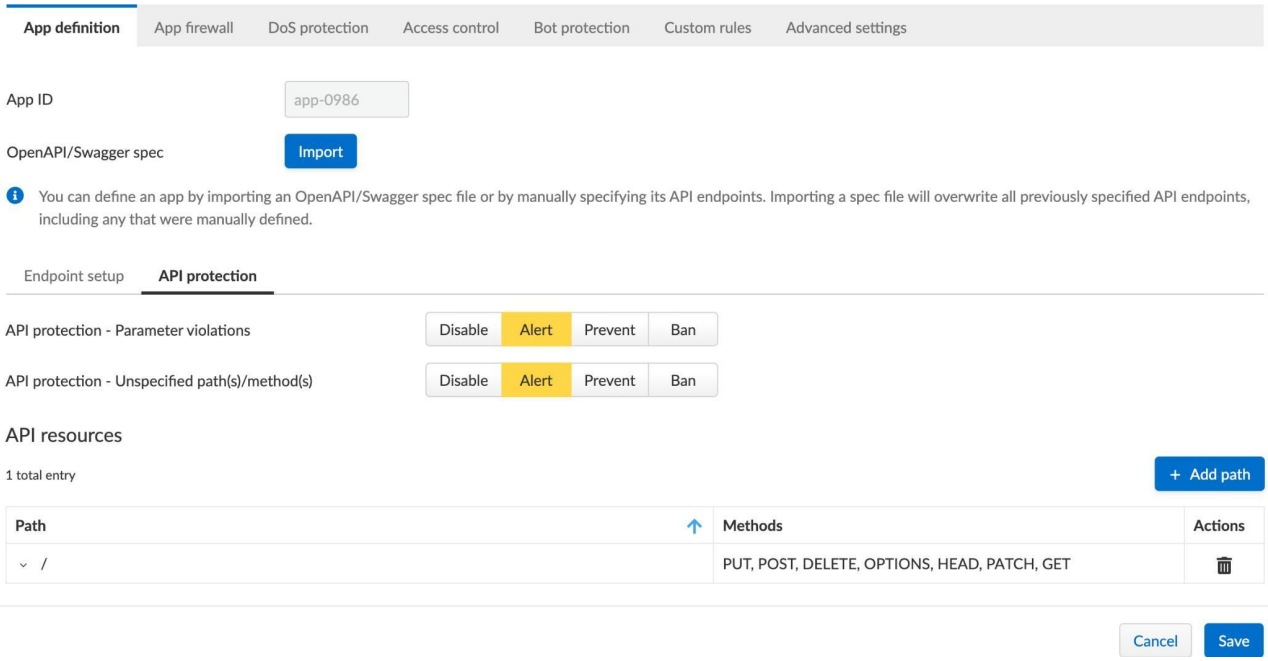
If Open API / Swagger documentation is not available, define the API functions manually. To enable API protection, define the base path and the App port. The App port is the port that the application is listening on rather than the external port that the calling application will use. The more specific to describe your application, there is a better chance of protecting

your application. Rather than defining a host, use the scoping mechanism to clearly identify the application to protect.

With the base path, the standard path for RestAPI is “/api/v1”.



Specify your APIs by defining the signature of your endpoint as far as what is an acceptable input parameter.

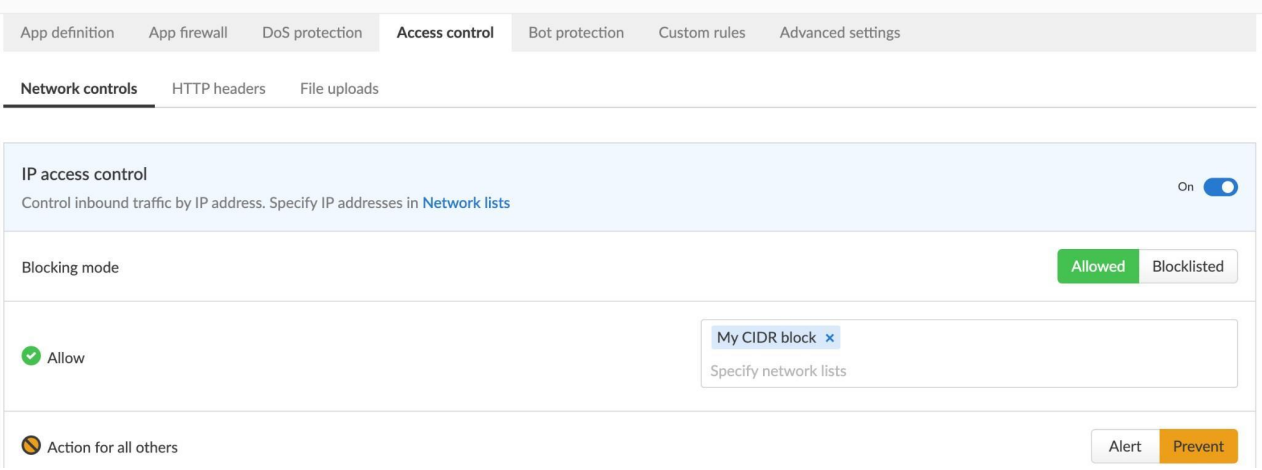


Define Rule and Scope

To properly profile your application, clearly defining a scope is very important. Think broad enough to encompass the application yet specific enough to define the application. When you build a collection for WAAS rules, you have to specify an image minimum to assign to the scope of the WAAS rules. Prisma Cloud will use the collection to identify the application to apply the WAAS rules. If you need behavior to be different based on labels, or a cluster where the container will be running, create a separate collection and apply the given WAAS rule to that collection. More details about WAAS rule resource and application scope can be found here.

Network Controls

Allowing only sources that need access to the application reduces the attack radius of a given application. In order to do this, define a CIDR block that is allowed to access the application, and allow only that CIDR block. Prevent for all other CIDR blocks by setting the “Prevent” action for all others.



HTTP Headers

With http header inspection, it is looking for a key value pair to inspect for every single http call to the application. The header name is case insensitive and the value could be either allow or deny. For the values, they can be either explicit or a wildcard character (*) can be used for the following three use cases:

- Begins With
  - E.g., “Mozilla/5.0*”
- Contains
  - E.g., “*(X11; Linux x86_64)*”
- Ends With
  - E.g., “*Safari/537.36”

Application Profiling

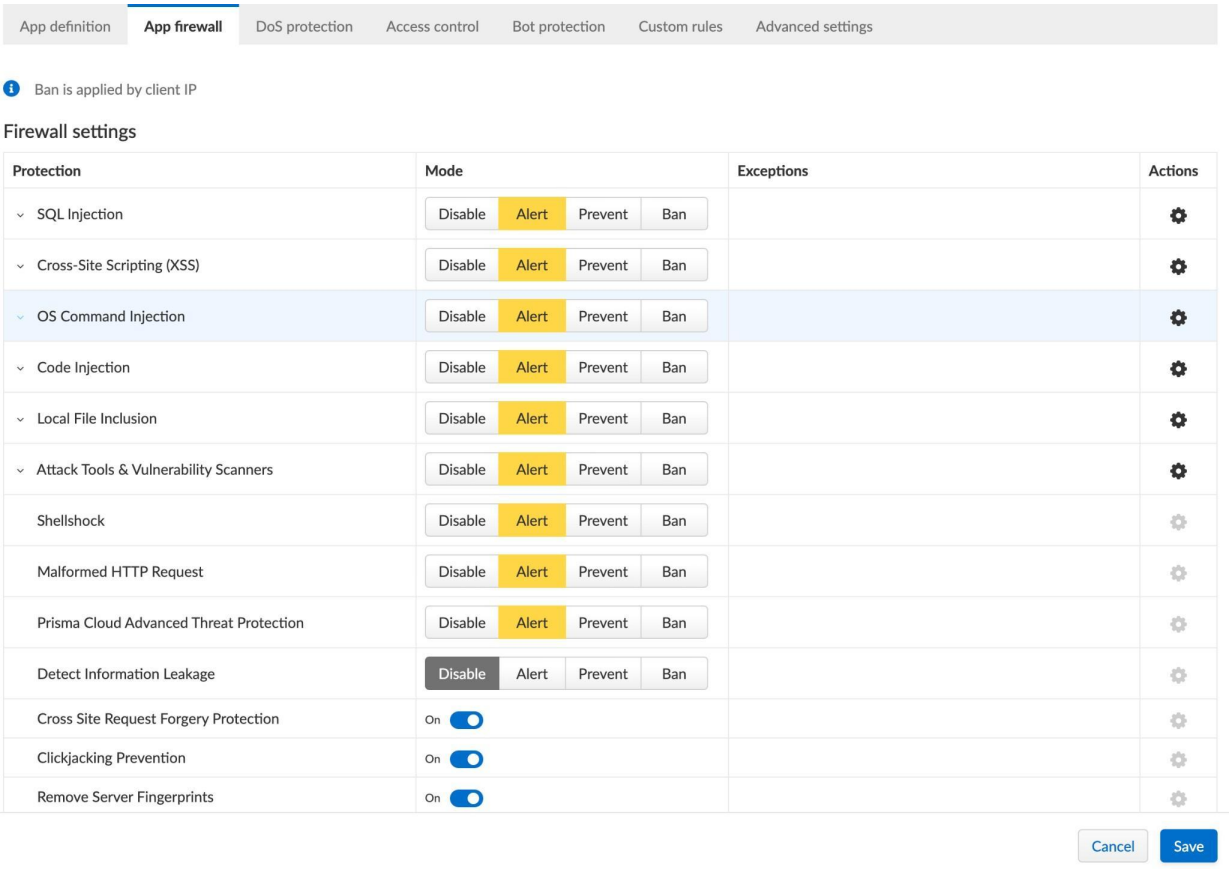
The best way to protect an application is to be as specific in the application profiling. For example, if you are looking for a person at an airport and you have never met this person before, the more accurate detail that describes the person will clearly identify the person with the least amount of false positives. Likewise with an application, the greater detail the WAAS component has to profile the application, the better it will be in blocking attacks. To enforce specific headers such as a specific token type to retrieve data, you inspect the header for a specific token format by means of a regular expression. For example, if in any given request to an application you wanted the following:

- Specific headers with specific values
  - The headers can be inspected with the exact values
- An application token in the header with specific format (e.g., “s.34x7797bxe3p118923”)
  - The header value can be inspected with a regular expression such as the following would match the above token:

        - /^s\.[0-9a-zA-Z]+/g
    - Utilizing an online regex tool such as the following link will assist in creating an application profile that accurately describes your application.
- Body content
    - The body content can look for specific values using regular expressions to block malicious intent
    - Regular expression can be used to inspect body content to ensure it is a valid web request and reject it if it is not.
    - The body content can look for payload that is only valid
    - The body content can be inspected in combination with an action. For example the payload will only be inspected if the http request action is a POST or PUT and will not be examined if the action is a GET or DELETE.

Scoping

Rules are basic building blocks to enforce a specific action but scopes are used to bind a rule to a specific application. Building proper scopes



Load Balancers

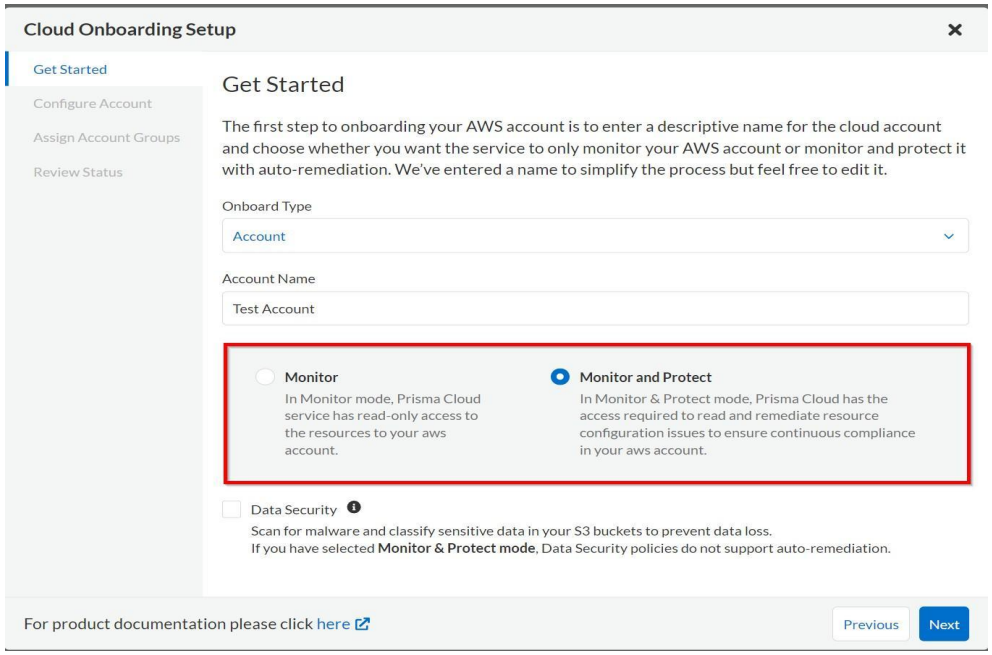
Configuration for load balancers need to have the HTTP Header X-Forwarded-For in each

request for WAAS to be able to determine if the HTTP call needs to be blocked based on source country origin. Most load balancers have that header enabled but without that header country origin blocking will not work.

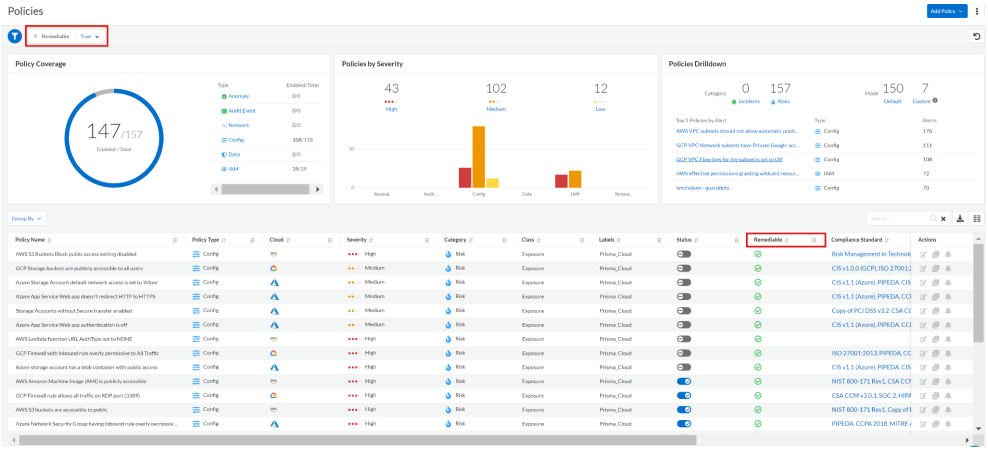
Autoremediation

Remediate policies - from Prisma Cloud console can be done manually or by auto-remediation

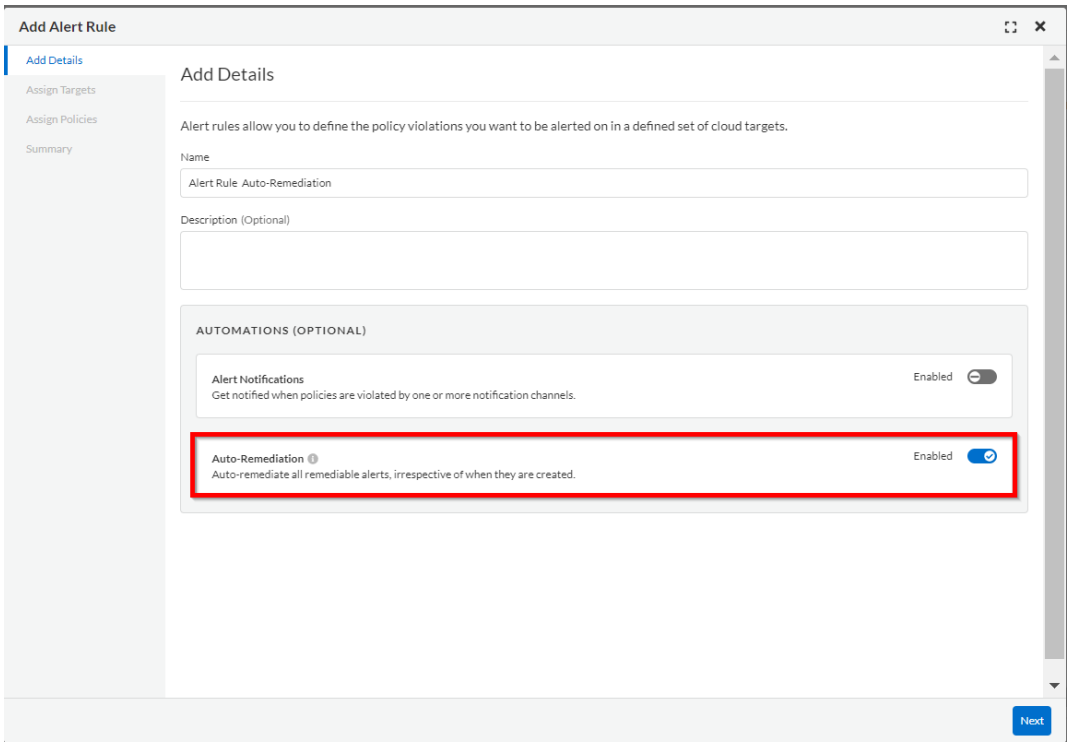
1. Auto-Remediation requires:
    a. Monitor and Protect (Read-Write) mode so cloud accounts/hierarchies might need to be updated in terms of onboarding and permissions (reviewadditional permissions required for Read-Write most).



    b. Policies (default or custom config policies only) are configured with auto-remediation. You can view all of the remediable policies by navigating to Policies and adding the filter “Remediable” and setting it to “True”.



c. Alert Rule (a new rule or modify an existing one) with auto-remediation enabled.



2. Understand how auto-remediation works since it pushes CLI commands automatically once an alert is detected and could possibly create unwanted changes.
3. Prisma Cloud Automatically runs the remediation CLI to resolve the policy violations for all open alerts regardless of when they are generated.
4. If you are modifying an existing alert rule (enable auto-remediation) that includes non-remediable policies, those policies will no longer be included in the alert rule.
5. It's helpful to test out auto-remediation in sandbox environments.
6. It's helpful to start with auto-remediation by configuring a new alert rule with auto-remediation enabled, limiting it to an account group, and assigning some policies to it. You can add more account groups and policies to the alert rule after that.

The following lists recommend starting policies for Auto Remediation within the three major cloud providers.

AWS

Typically when first starting out with auto-remediation, you will want to focus on low hanging fruit configurations. Down below are 5 AWS policies which we recommend getting started with:

Policy	Description
AWS Security Group allows all traffic on RDP port (3389)	Used as the remote access port for Microsoft Windows, it is advised to keep this port open to only trusted IP addresses. This policy checks the configuration of your security groups and ensures that this port is not allowed from any IP address (0.0.0.0/0).
AWS Security Group allows all traffic on SSH port (22)	Most commonly used as the SSH port for Linux, it is highly recommended to lock down access to only trusted IP address ranges. Leaving this port open to 0.0.0.0/0 can expose your instance to brute-force type attacks.
AWS Amazon Machine Image (AMI) is publicly accessible	Unless for very specific use-cases, AMIs should not be made public as they may contain sensitive information. Having a public facing AMI would allow anyone with an AWS account the ability to launch your AMI image.
AWS EBS snapshots are accessible to the public	EBS snapshots are typically used for backups or for security tools. From an EBS snapshot, a volume can be created which can then be attached to an instance, allowing access to the contents of that volume.
AWS CloudTrail logging is disabled	AWS CloudTrail is a service that enables governance, compliance, operational & risk auditing of the AWS account. It is a compliance and security best practice to turn on logging for CloudTrail across different regions to get a complete audit trail of activities across various services.

Azure

Policy	Description
Azure Network Security Group allows all traffic on SSH port 22	As a best practice, restrict SSH solely to known static IP addresses. Limit the access list to include known hosts, services, or specific employees only. This policy will remove the entry for port 22 which allows access from anywhere from your NSG.
Azure Network Security Group allows all traffic on RDP Port 3389	As a best practice, restrict RDP solely to known static IP addresses. Limit the access list to include known hosts, services, or specific employees only. This policy will remove the entry for port 3389 which allows access from anywhere from your NSG.
SQL databases have encryption disabled	Transparent data encryption protects Azure database against malicious activity. It performs real-time encryption and decryption of the database, related reinforcements, and exchange log records without requiring any changes to the application. This policy will automatically enable encryption on the databases which have this disabled.
Azure Key Vault is not recoverable	The key vault contains object keys, secrets and certificates. Accidental unavailability of a key vault can cause immediate data loss or loss of security functions (authentication, validation, verification, non-repudiation, etc.) supported by the key vault objects.

Google Cloud Platform

Policy	Description
GCP Firewall rule allows all traffic on SSH port (22)	Allowing access from arbitrary IP addresses to this port increases the attack surface of your network. It is recommended that the SSH port (22) should be allowed to specific IP addresses. This policy can remove the entry exposing port 22 to 0.0.0.0/0 from your firewall rules.
GCP Firewall rule allows all traffic on RDP port (3389)	Allowing access from arbitrary IP addresses to this port increases the attack surface of your network. It is recommended that the RDP port (3389) should be allowed to specific IP addresses. This policy can remove the entry exposing port 3389 to 0.0.0.0/0 from your firewall rules.
GCP Firewall rule allows all traffic on SMTP port (25)	This policy identifies GCP Firewall rules which allow all inbound traffic on SMTP port (25). Allowing access from arbitrary IP addresses to this port increases the attack surface of your network. This policy can remove the entry exposing port 25 to 0.0.0.0/0 from your firewall rules.
GCP Firewall rule logging disabled	This policy identifies GCP firewall rules that are not configured with firewall rule logging. Firewall Rules Logging lets you audit, verify, and analyze the effects of your firewall rules. When you enable logging for a firewall rule, Google Cloud creates an entry called a connection record each time the rule allows or denies traffic. This policy can automatically enable this functionality on the firewall rules.
GCP Storage log buckets have object versioning disabled	This policy identifies Storage log buckets which have object versioning disabled. Enabling object versioning on storage log buckets will protect your cloud storage data from being overwritten or accidentally deleted. This policy can enable object versioning features on all storage buckets where sinks are configured.

Some best practices to keep in mind here:

1. Create custom compliance frameworks if needed for specific organizational needs
2. Enable disposition of new default policies that are added with Prisma Cloud product updates by reviewing Enterprise Setting option
3. Setup Trusted IPs and Prisma Cloud Login IPs to reduce false positive alerts
4. Create and manage access keys as needed for certain cloud tools and third party integrations
5. Policies
    a. What policies are recommended to start with for remediating for customers -
        i. Steps on Alert Burndown
            1. Understand what alert burndown means - bringing down the number of alerts so it's manageable (important alerts being looked at and resolved regularly)
            2. Create a plan
                a. Focus on what's important to the organization (high volume alerts or high severity alerts)
            3. Understand alert actions
                a. Dismiss, snooze, remediate, investigate
            4. Effort vs. result
                a. Low effort in lowering many alerts (ex. Audit events)
                b. High volume alerts (think of severity, impact from remediation, complexity of remediation)
                    i. Ex policies:
                        1. Config : AWS Security groups allow internet traffic
                        2. Audit Event : IAM configuration updates
                        3. Anomaly : Unusual user activity
                        4. Network : Internet exposed instances

Additional Information

Enabling Cloud Code Security

The activation process is very simple and once activated, the CCS module is free during the initial 30-day trial.

Navigate to **Profile > Subscription> Code Security** to **Subscribe**.

Before you begin adding your development environments and pipelines for scanning, you must first generate access keys to allow permissions for specific users.

If you control outbound Internet connectivity from your cloud workloads and IDE users, make sure to add the Prisma Cloud IP addresses and hostnames for your Prisma Cloud SaaS instance to your Cloud or on-prem FWs allow lists, please see allow access to the Prisma Cloud Console.

If you are using Prisma Cloud Trusted IP Login IP Addresses Lists, make sure the IPs that need access to the portal and APIs are also included there.

Code Security Supported Environments

1. Code Repositories - Version Control Systems (VCS)
2. CI/CD systems
3. IDEs.

For up to date list please see the following documentation
https://docs.paloaltonetworks.com/prisma/prisma-cloud/prisma-cloud-admin-code-security/get-started/connect-your-repositories

License information

Prisma Cloud Code Security is currently only available as a module within the Prisma Cloud SaaS (Enterprise) service.

On-prem Prisma Cloud version can only support OSS License Compliance checks (currently GitHub only) as part of the CI repositories compliance checks.

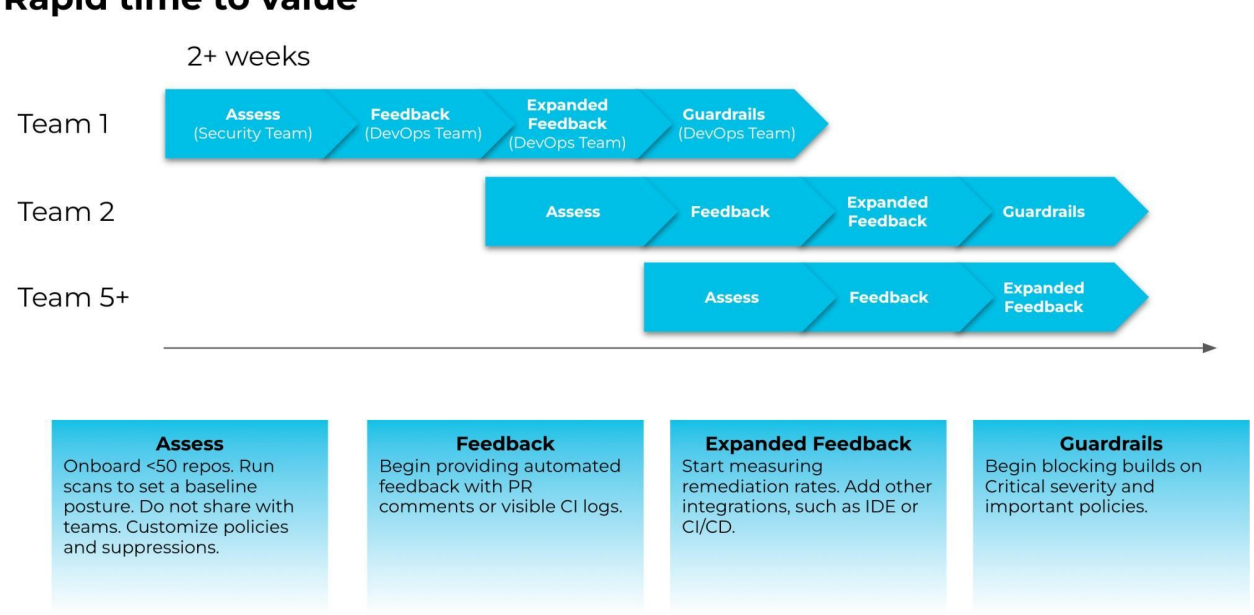
Per 3 scanned IaC resource blocks, secrets identified, or Dockerfiles scanned = 1 Unit of credit

In Terraform and CloudFormation a resource block describes one or more infrastructure objects, such as virtual networks, compute instances, or higher-level components such as DNS records.

Cloud Code Security Deployment Process

The diagram below shows a typical Code Security deployment process. This consist of four phases:

1. Access (Setup)
2. Feedback
3. Expanded Feedback
4. Guardrails

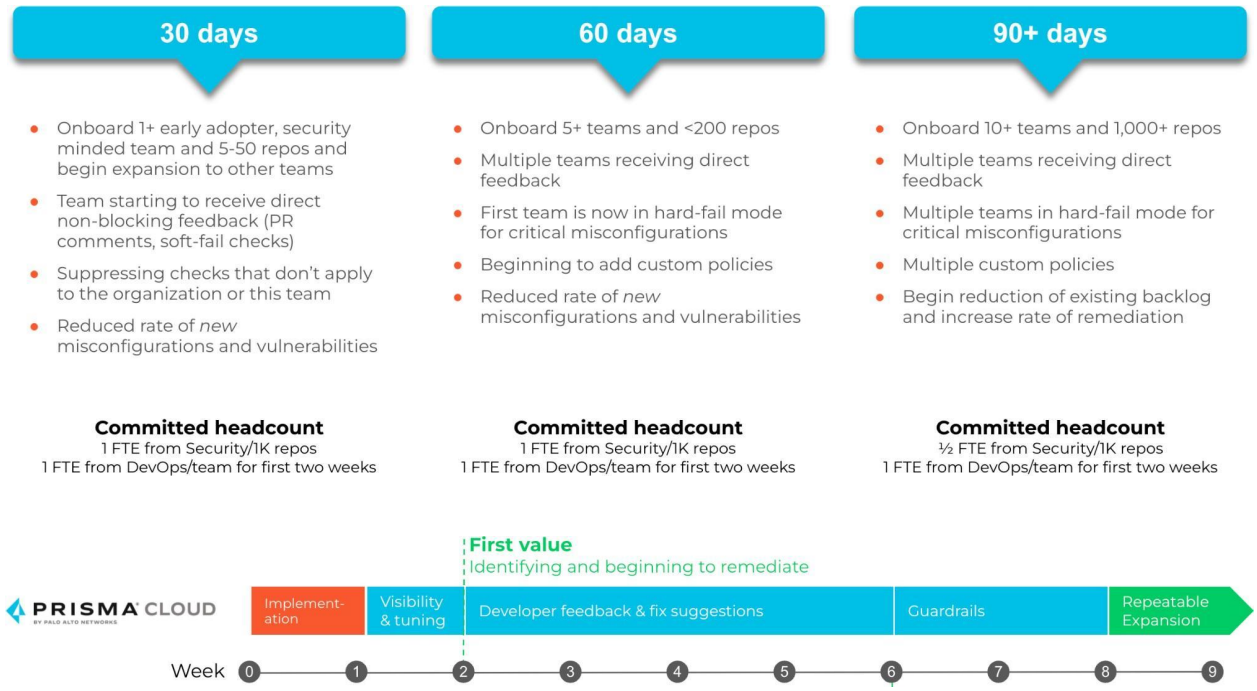


The overall process to deploy Code Security into operation within the client environment will typically involve the following:

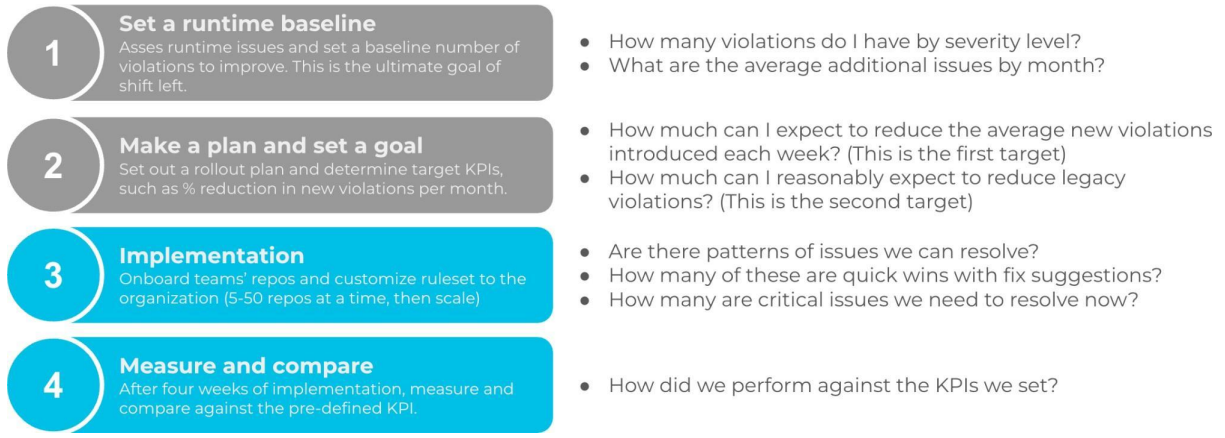
1. Review and understand Prisma Cloud Code Security capabilities
2. Setup RBAC access for Developers, Repositories editors, and Prisma Cloud Code Security configurations (including API Access keys management)
3. Onboard VCS repositories for scanning
4. Embed Security Code scanning in CI/CD pipelines with the specific client requirements
5. Configure default and per-repository (if required) scan enforcement settings (Hard/Soft Fail, Bot comments) and repositories/paths exclusions
6. Establish a process for the VCS Scan results review, PRs and Suppress process, Software Supply Chain review, Exposed Secrets resolution, Drift detection for each repository
    a. After initial scan
    b. New scan results

7. Create Code Security deployment goals for Developers and SecOps and scan resolutions KPIs
8. Setup Prisma Cloud Alert notifications integration and configure notifications for each code repository/category scan results
9. Setup a process to manage out-of-the-box tags and custom tags and tag rules for all resources with the assigned repositories integrated on Prisma Cloud
10. Review out-of-the-box policies and create custom build policies (if required) to match custom security guardrails and rules/standards used by the client.
11. Review Code Security automation options and create an automated deployment model for Application environment Code Security onboarding, custom policies management, alerting and scan results review.

The diagrams below shows the target timelines for an average rollout of the Cloud Code Security



The diagram below shows a typical approach to setting up the CSS deployment goals:



Code Security Administrator Access Management

Administrator access is the same process as for CSPM. You create roles, users and access keys via the PCEE interface. When creating roles, it is important to note which Permission Groups are relevant to the CCS module. For instance, only the SYS ADMIN and the ACCOUNT AND CLOUD PROVISIONING ADMIN permissions allow to add, update or delete repositories, while the DEVELOPER role provides the least privilege permissions.

Navigate to **Settings > Access Control** and select **Add > Role**.
Navigate to **Settings > Access Control** and select **Add > User**.
Navigate to **Settings > Access Control** and select **Add > Access Key**.

Administrators can also access the CCS module using any Single Sign-On (SSO) provider defined in CPEE. No extra configuration is required.

Set Up Administrator Access for Code Security

You need to enable administrative access for all the DevSecOps and Security teams who need to add code repositories or pipelines, create policies and review scan results on Prisma Cloud. To know more see - add Prisma Cloud Administrators and role permissions. You can also see: - add administrative users.

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Prisma Cloud Roles and Code Security Permissions:

The following table provides a Code Security filtered list of the access privileges associated with each role for the different parts of the Prisma Cloud administrative console. Please note the main differences highlighted in **bold**.

https://docs.paloaltonetworks.com/prisma/prisma-cloud/prisma-cloud-admin/manage-prisma-cloud-administrators/prisma-cloud-admin-permissions

Prisma Cloud Standard Role	System Admin	Account and Cloud Provisioning Admin	DEVELOPER	ACCOUNT GROUP READ ONLY
Code Security View View Scan Results in Projects, Development Pipelines, and Supply Chain Graph	All repositories	Designated repositories	Designated repositories	Designated repositories
Code Security Repositories Add/Edit/Del	All repositories	Designated repositories	**No**	No
Policies View	Yes	**Yes**	**No**	No
Policies Add/Edit/Del	Yes	**Yes**	No	No
Alerts View/Edit	Yes	**Yes**	**No**	No
Edit /Update Code Security Configuration	**Yes**	No	No	No
Suppress and Submit Changes to repositories	All repositories	**Designated repositories**	**No**	No
Fix and Submit Changes to repositories	All repositories	Designated repositories	**Designated repositories**	**No**
View/Edit Filters	All repositories	Designated repositories	Designated Repositories	Designated Repositories
View Resource	All	Designated	Designated	Designated

Details and Resource History	repositories	repositories	Repositories	Repositories
View Open in Git	All repositories	Designated repositories	Designated Repositories	Designated Repositories
View Merge PR	All repositories	Designated repositories	Designated Repositories	Designated Repositories

The following are the available options for creating Users with access to the Code Security module:

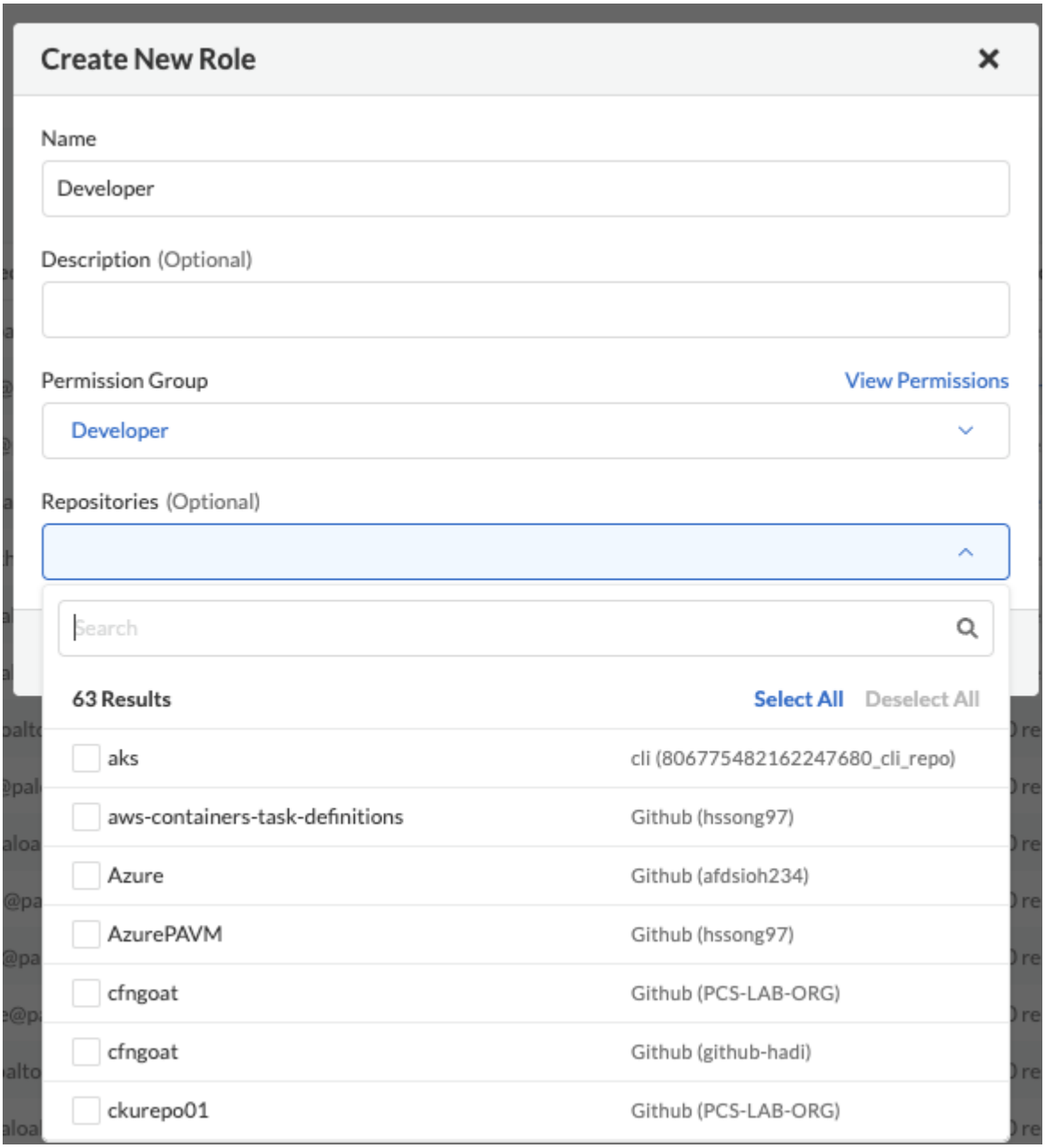
1. Use the existing System Admin Role for full access to the Code Security features.
2. Set up Developer role for Developers with view access to the relevant repositories and access to issue Fix and Submit changes to the relevant repositories.

For CI/CD scanning add the relevant Developer Service account with the relevant Developer and repository access.

3. Create Account and Cloud Provisioning Admin role to allow repositories edit access to the relevant repositories (Alternative is to using the existing SysteAdmin roles for this)
4. Create New Code Security specific or update existing Account Group Read Only role to allow view access to relevant repositories (if required)

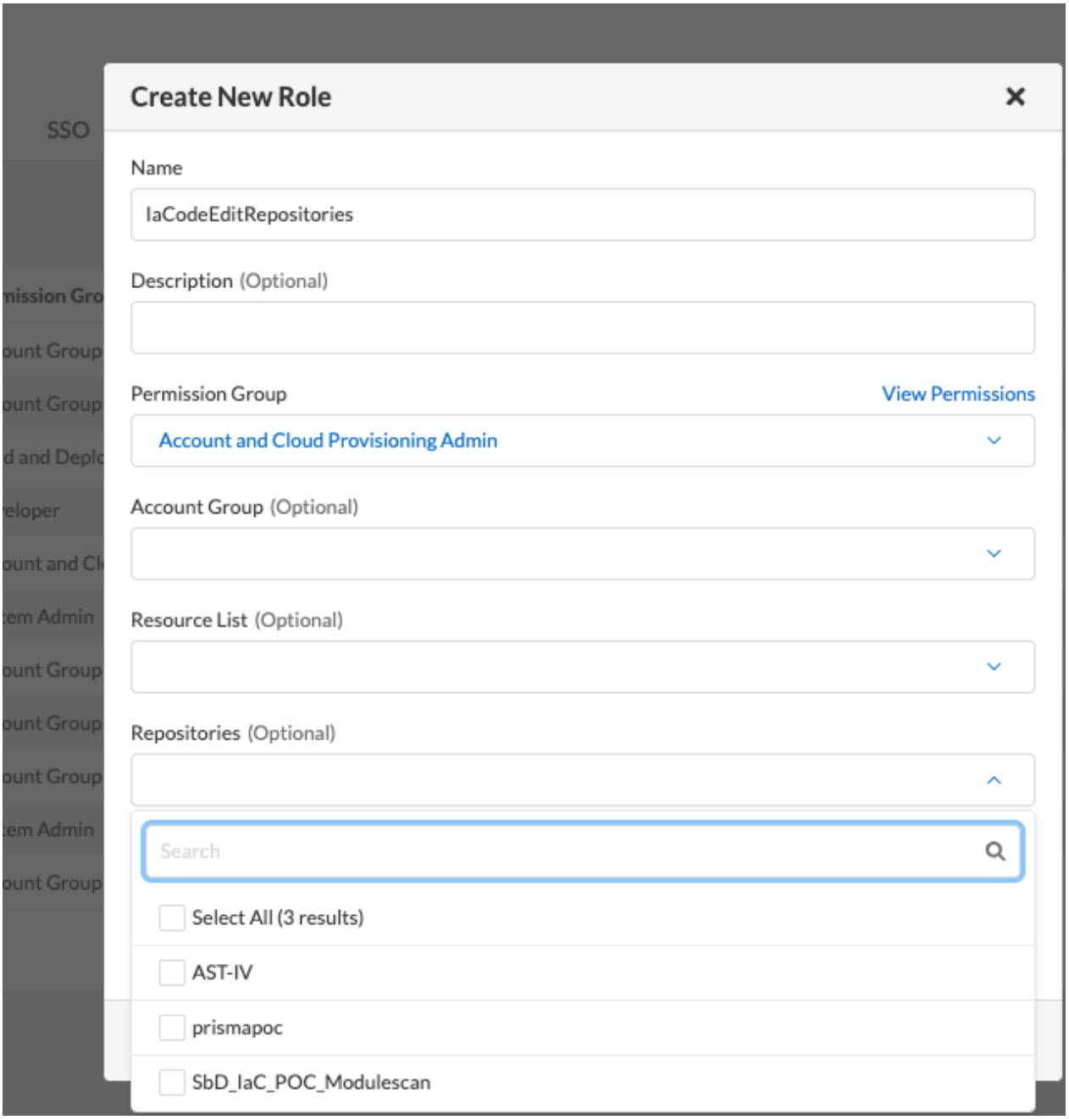
Code Security Roles Configuration

1. Create **Developer** role for Developers and Service Accounts with view/submit fix access to the relevant repositories.

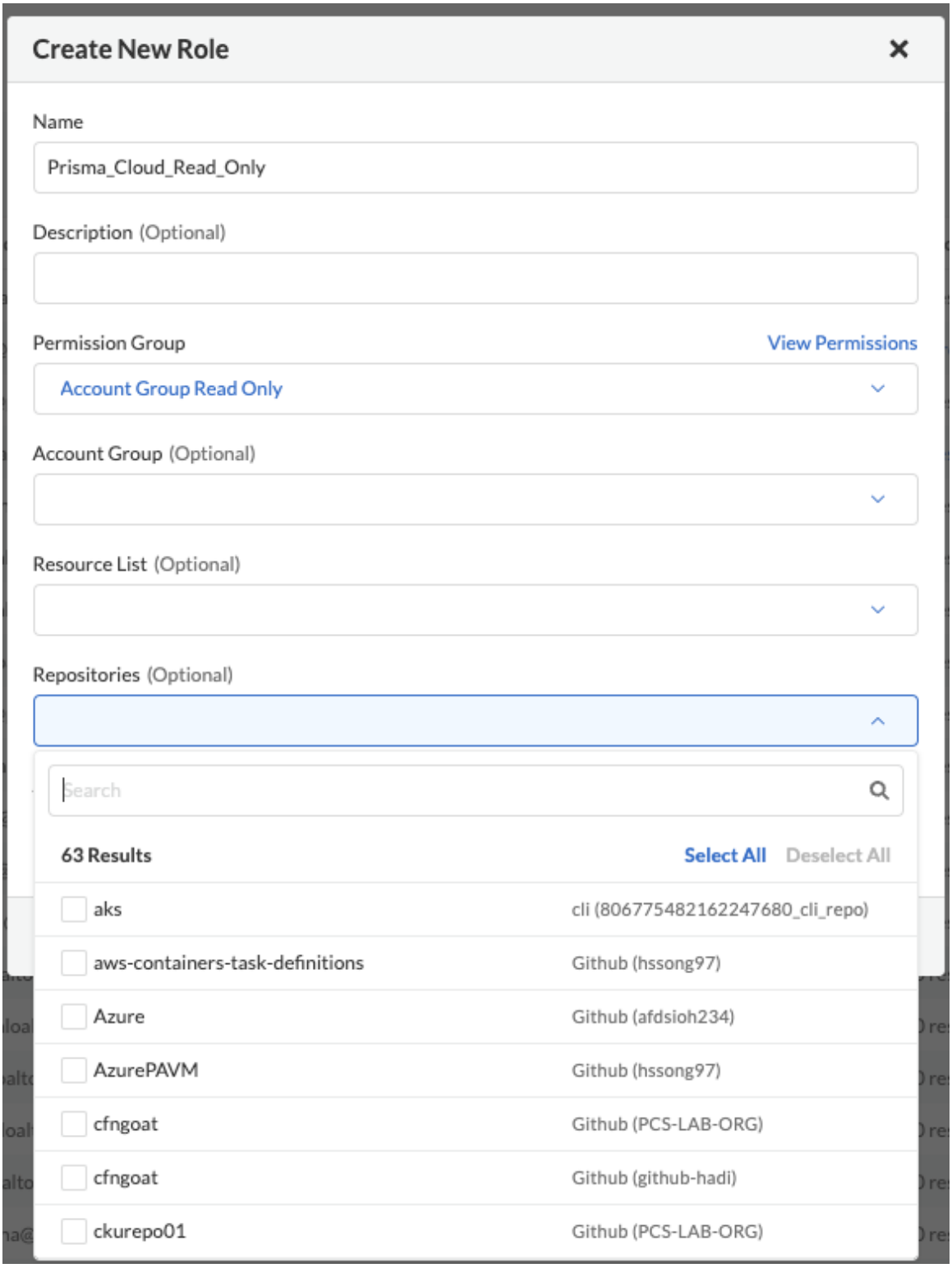


2. Create **Account and Cloud Provisioning Admin** role with permissions to edit a specific repository.

   Example to create a new IaCodeEditRepositories role with the "Account and Cloud Provisioning Admin" permission group and assign it to the relevant users.
   This role permissions can be enabled for all onboarded repositories and/or filtered to specific repositories:



3. Create New Code Security specific or update existing **Account Group Read Only** permissions role to allow view access to relevant repositories (if required)


Create New Role
Name
Prisma_Cloud_Read_Only
Description (Optional)
Permission Group
View Permissions
Account Group Read Only
Account Group (Optional)
Resource List (Optional)
Repositories (Optional)
Search
63 Results
Select All
Deselect All
aks
cli (806775482162247680_cli_repo)
aws-containers-task-definitions
Github (hssong97)
Azure
Github (afdsioh234)
AzurePAVM
Github (hssong97)
cfngoat
Github (PCS-LAB-ORG)
cfngoat
Github (github-hadi)
ckurepo01
Github (PCS-LAB-ORG)

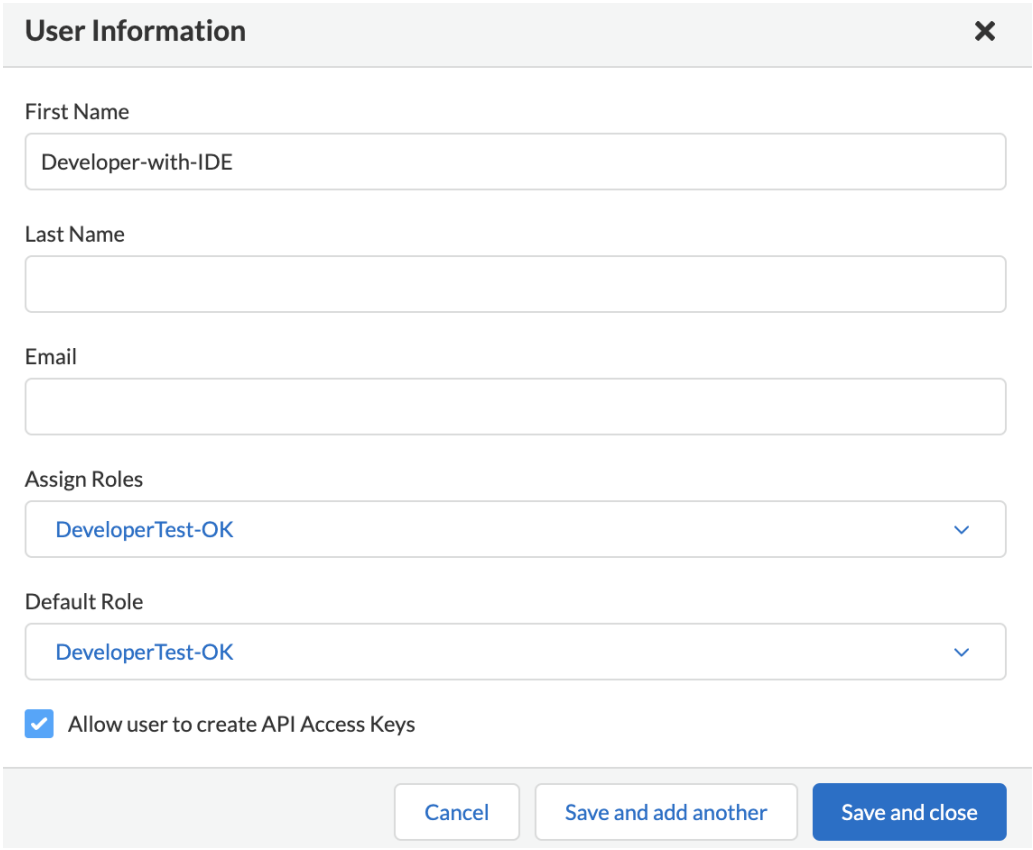
Generate API Access Key for Developers (IDE)

Prisma Cloud uses Access Keys to integrate with the environments where you host your templates, source code, or pipelines.

For CI/CD integration and API use, it recommended to use Service Account keys (No User Access Account keys). Please see the next section. Service accounts do not provide access to the Prisma Cloud portal.

There should be no Code Security users API Access Keys present unless you are using IDE integration.

The User must have the “Allow user to create API Access Keys” ticked.

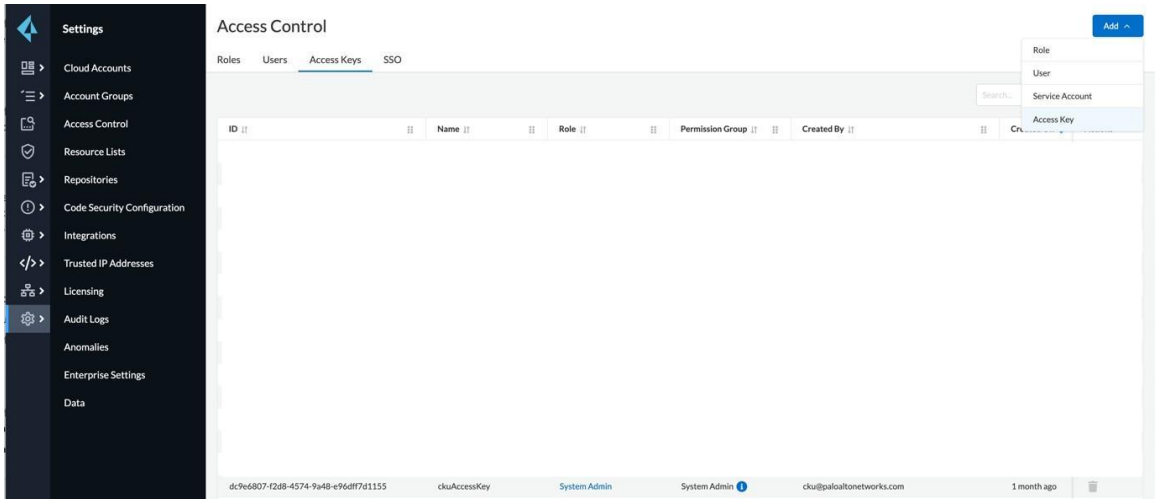


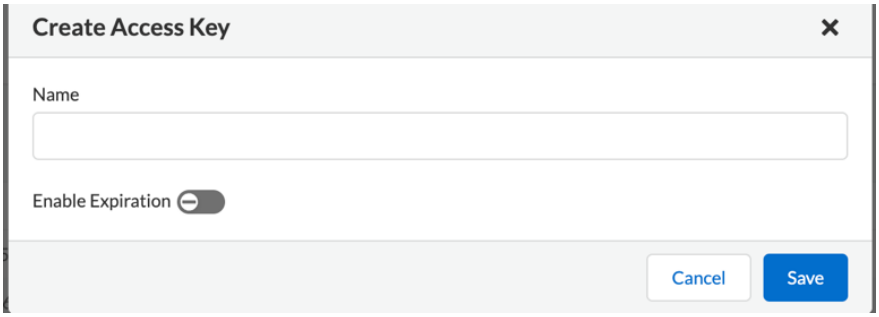
Access keys are specific to a user and they enforce the role and permissions assigned to the specified user. Use key expiry date for each key (you can have up to 2).

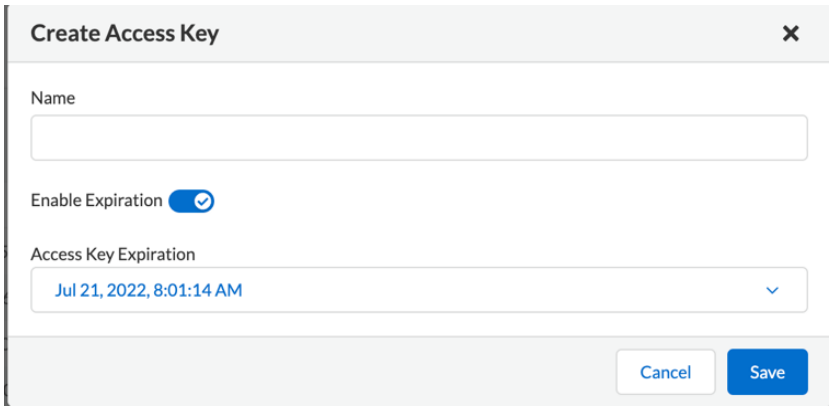
A user can have more than one Prisma Cloud Role assigned to them. The default Role (assigned when the user is created or updated later) will be used when accessing Prisma Cloud with the user API Access Key.

Note: When you are prompted to add an API Token on any plugin, make sure to provide the relevant User/Service account Prisma Cloud access key ID and secret as the input.

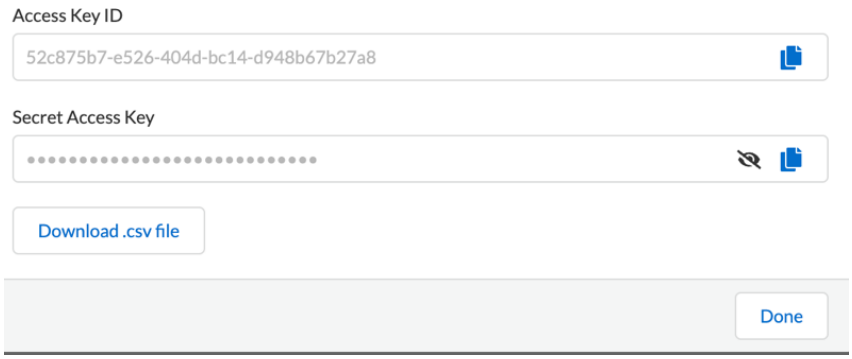
1. Select Settings > Access Control > Access Keys Tab > Add Access Key.


Settings
Cloud Accounts
Account Groups
Access Control
Resource Lists
Repositories
Code Security Configuration
Integrations
Trusted IP Addresses
Licensing
Audit Logs
Anomalies
Enterprise Settings
Data
Access Control
Add
Role
User
Service Account
Access Key
Roles
Users
Access Keys
SSO
ID
Name
Role
Permission Group
Created By
dc9e6807-f2d8-4574-9a48-e96dff7d1155
ckuAccessKey
System Admin
System Admin
cku@paloaltonetworks.com
1 month ago


Create Access Key
Name
Enable Expiration
Cancel
Save



4. Copy and save your new **Access Key ID** and **Secret Key** in a secure location.



You can select **Download .csv file** to download this information.
Save your secret key once it is generated, as **you cannot view it again on Prima Cloud**.

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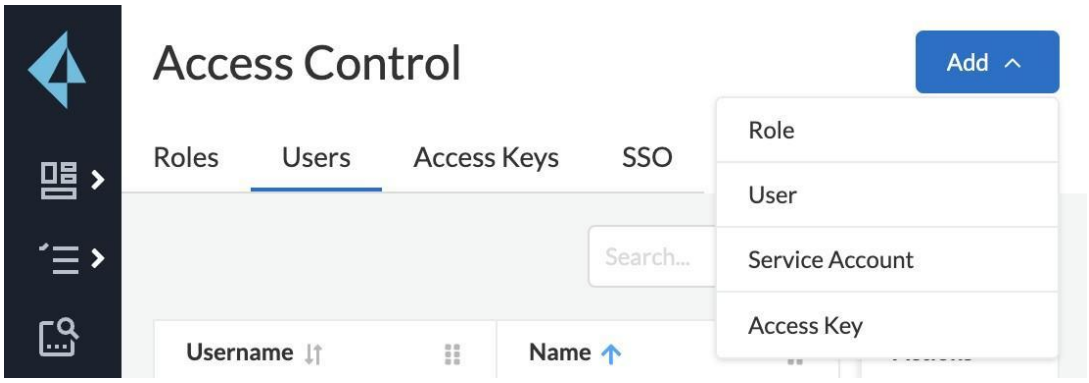
Generate API Access Key for Code Security service account

Prisma Cloud uses Access Keys to **integrate with CI/CD pipelines or API usage.**

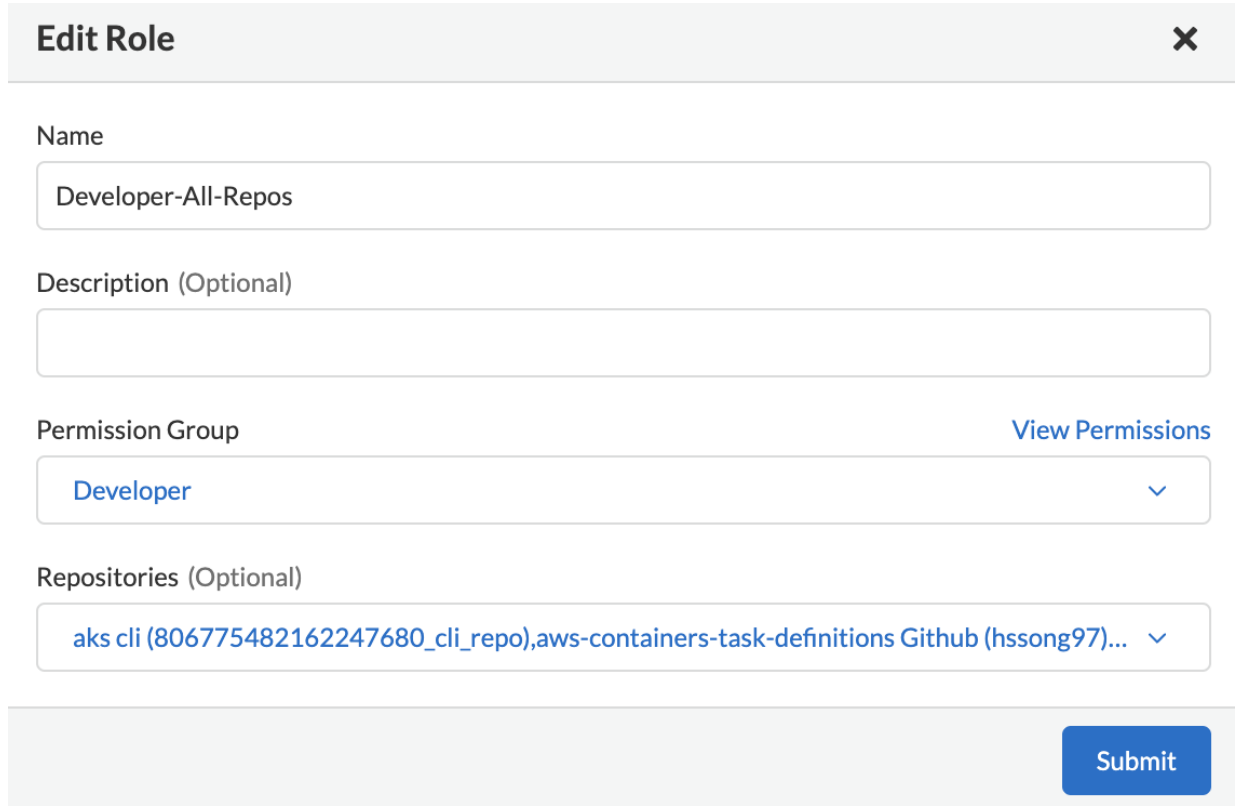
It is recommended to set up a service account with API Access key access only for CI/CD onboarding and API use.

It is also best practice to use dedicated service account/API keys for each CI/CD tool or software deployment pipeline and use key expiry date for each key (you can have up to 2)
And don't forget to test and document API key rotation process.

1. Select Settings > Access Control > Users > Add > Service account.

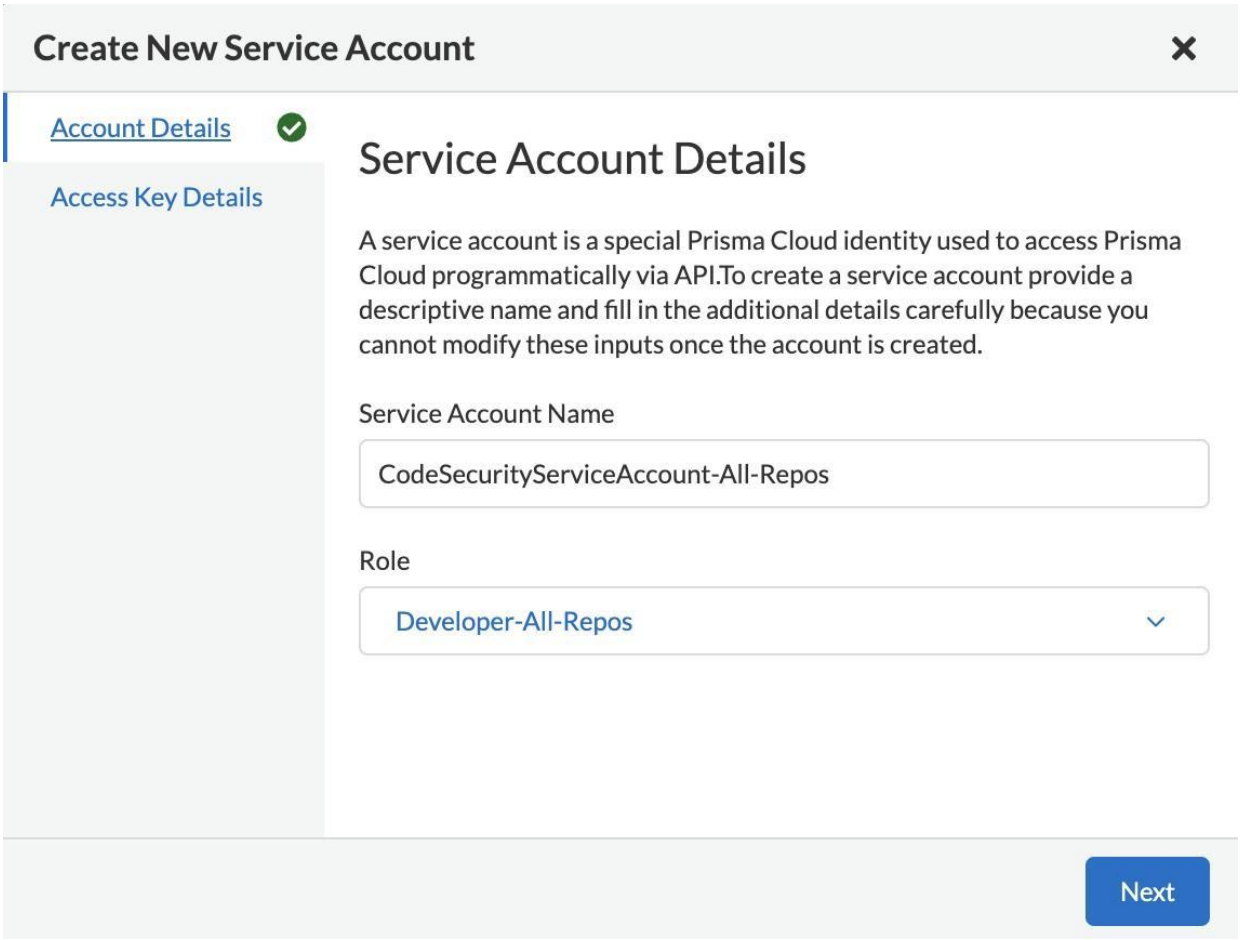


We will be using the **Developer** role created previously with access to all repositories (please note: it is recommended to create a dedicated role for access to each security domain with access to dedicated IaC repositories), here are the details

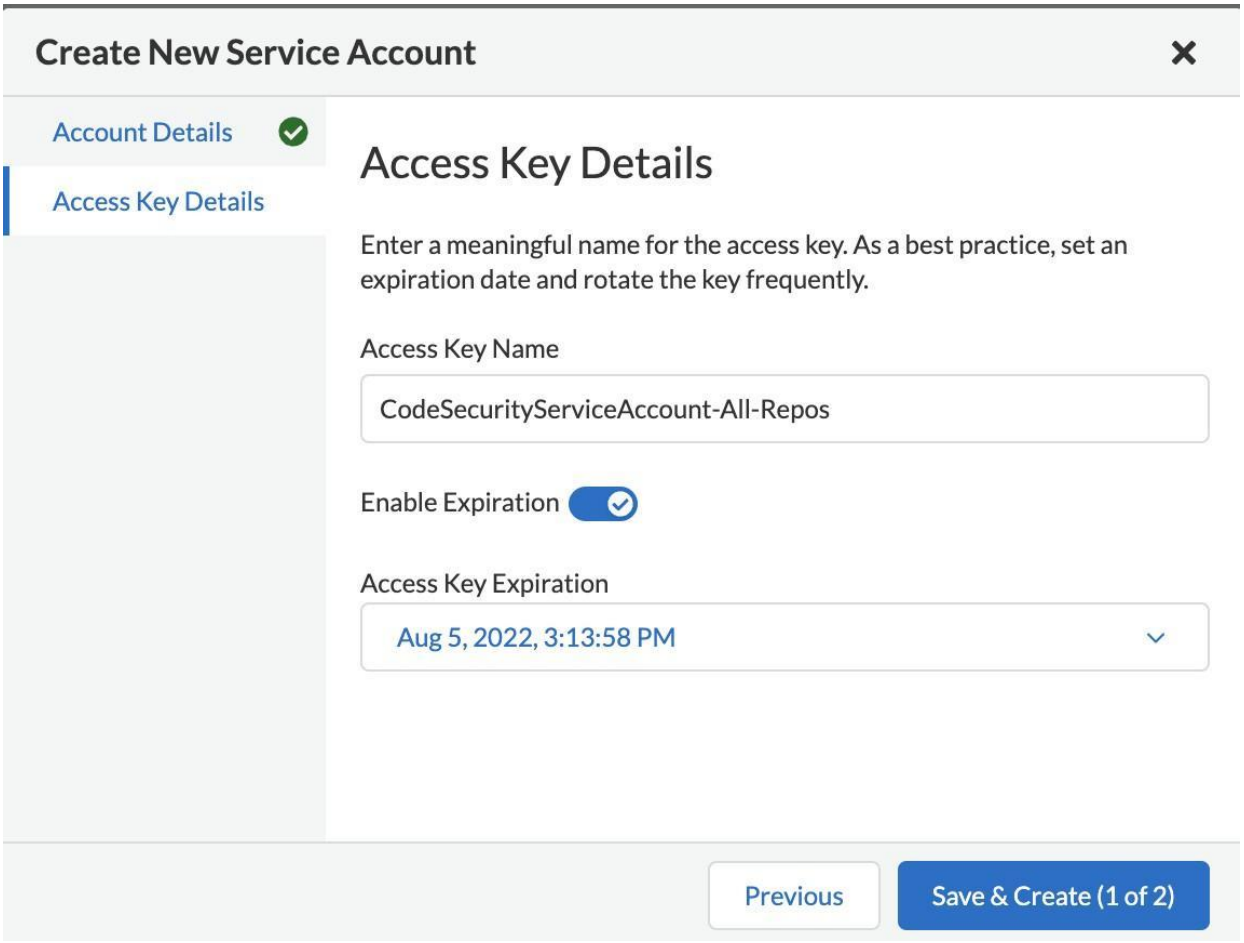


see role created previously for this use above^

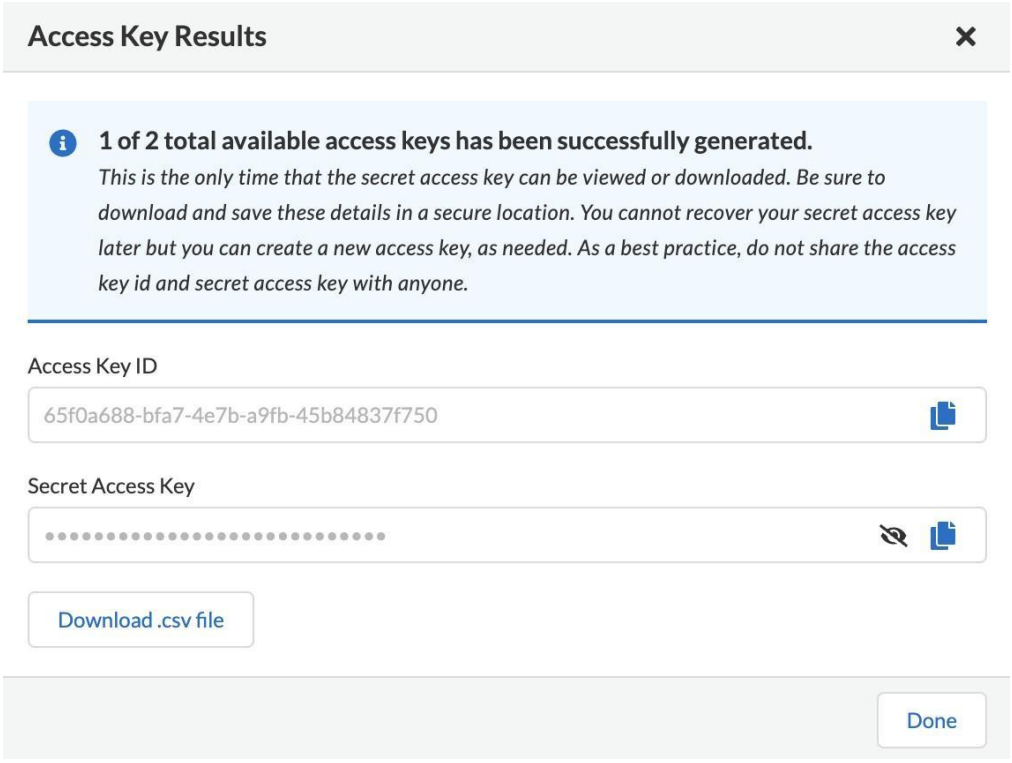
2. Name your service account and select the role that you created in the previous step. This will provide this access key with API access to the role that was created. This means that the API key will have access to the same data that the role provides access to if a user was provisioned with this role.



3. Define a name for the access key to be provisioned as well as a date for the access key to expire. Is is best practice to name the key with something that references that this is a service account key and if possible what it has access to. Since all keys will fall under the Access Keys section of access control, this will enable the user with a quick glance to identify which keys are used for service accounts (API access only) and which keys belong to a user.



4. The API key will be created and will state how many keys can be created. Note only 2 access keys can be generated per service account.



Download API key credentials and store it in a safe place like Vault where you can retrieve it securely as part of your CI/CD pipeline run.

Save your secret key once it is generated, as **you cannot view it again on Prima Cloud**. This is the key that will be used for CI/CD scans onboarding.

Using CSPM API to manage API Access Keys

It is possible to use API endpoints to create and update API access keys at scale:

https://prisma.pan.dev/api/cloud/cspm/access-keys

Here is an example on how to use the endpoints to write a script to rotate users and service account keys:

https://github.com/PaloAltoNetworks/prismacloud-api-python/blob/main/scripts/pcs_rotate_service_account_access_key.py

The Prisma Cloud Python API library also includes methods for the other endpoints:

https://github.com/PaloAltoNetworks/prismacloud-api-python/blob/main/prismacloud/api/cspm/_endpoints.py

APIs for Code Security

Prisma Cloud Code Security API

The Prisma™ Cloud Code Security API enables you to check your Infrastructure-as-Code resources against Prisma Cloud out-of-the-box and custom security policies programmatically. The Code Security API enables you to:

- Initiate Code Security scans of repositories you've added to Prisma Cloud
- View the repositories you've connected to Code Security
- Manage Code Security suppression rules
- Fix or suppress Code Security policy violations

See Prisma Cloud Code Security API documentation for more information.

Prisma Cloud CSPM API

- keys CSPM Policy API

Terraform Provider

Terraform Bridgecrew provider

Within the Code Security Module (PCEE), can we leverage Bridgecrew terraform provider in order to create Build policies?. Please note that this is currently not fully supported.
The current limitation (Aug 2022):
You can use the BC provider to create policies in PCCS, and you will get the policies in your scan results. However, the policies will not show up on the policies page.

Self-Hosted Console

Deploy the console

The Console must be deployed first. The initiation of the Console will ensure that only the Defenders that a Console deploys will only be controlled by the Console. Automation (e.g. ansible, Operators, etc.) can be used to deploy Compute. The Console must be running and

licensed before any further configuration can be implemented (e.g. deploy Defenders). The most common methods of deployment are:

- Onebox - simple single docker host deployment. The twistlock.sh (*$ twistlock.sh -sy onebox*) bash script that is included within the release tar will deploy a Console and Defender on the node. Note: Onebox will only deploy the Console on a RHEL node running podman.
- Kubernetes - Most favors of K8s are supported. Every release is tested on several versions of K8s and they are listed here.
- OpenShift - basically it is Kubernetes but there are some slight nuances (e.g. external router, OpenShift internal registry, <=v3.11 - docker, >=v4.0 - cri-o)

Upgrade the console

You should have kept good notes when initially installing Prisma Cloud. The configuration options set in twistlock.cfg and the parameters passed to twistcli in the initial install are used to generate working configurations for the upgrade.

Prerequisites: Document and save all options set in twistcli.cfg and parameters passed to twistcli during the install.

The console upgrade is the one way to upgrade the higher version, meaning you cannot downgrade to the current version. Due to the restore only support to the same version, it's strongly recommended to test the upgrade with the dev or secondary console first and validate the all utilized functionality.

To safely upgrade the console, it is required to keep the "Default - ignore Twistlock components", in the vulnerability to defend the policy. If this rule is disabled or deleted, there is a chance that an upgrade will fail.

Backup and Restore

Prisma Cloud automatically backs up all data and configuration files periodically. You can view all backups, make new backups, and restore specific backups from the Console UI. You can also restore specific backups using the twistcli command line utility. You can also manually backup any point of the time from the console.

Prisma Cloud is implemented with containers that cleanly separate the application from its state and configuration data. To back up a Prisma Cloud installation, only the files in the data directory need to be archived. Because Prisma Cloud containers read their state from the files in the data directory, Prisma Cloud containers do not need to be backed up, and they can be installed and restarted from scratch.

You can only restore Console from a backup file whose version exactly matches the current running version of Console. If the console is unresponsive, you can use twistcli to restore the console.

Supported life cycle for connected components

Any supported version of Defender, twistcli, and the Jenkins plugin can connect to Console. Prisma Cloud supports the latest release and the previous two releases (n, n-1, and n-2).

There are some exceptions to this policy as we roll out this new capability.

For Defenders:

- 21.08 supports n and n-1 (21.04) only.
- Starting with the next release (Joule), there will be full support for n, n-1, and n-2. For twistcli and the Jenkins plugin:
- 21.08 supports itself (n) only.
- In the next release (Joule), Console will support n and n-1.
    - In release after Joule (Kepler), Console will support n, n-1, n-2.

Compute Radar Utilization

Cloud Radar View

Allows user to view geographic locations of onboarded cloud accounts as well as filter these geographic locations by CSP region, CSPs, resources that are protected within each cloud account including (functions, clusters, registries, app embedded and hosts), and individual cloud accounts

Upon selecting a specific location's resources the user can view the compliance posture of the resources within that location with options to protect the resources if available should they not be compliant. Users can select a resource through the list of available resources to view the resource details including (name, version, runtime, ARN, and protected status), as well as the option to view listed compliance violations with detailed descriptions of each violation upon individual selection of the unprotected resource. The view of non-compliant resources includes the resource's onboarded cloud credential, ID, severity, result, title and associated collection

Host Radar View

Allows users to view available hosts that Prisma has access to. There is an option to color code the hosts by vulnerability severity, runtime behavior compliance, and overall compliance. Users can filter by specific collections, clusters, CSP regions, CSP hosts, only connected hosts, and overall severity level

Container Radar View

Allows user to view individual clusters of containers with available egress/ingress connections

Upon selecting a cluster, individual nodes can be viewed in detail. The console provides a view into the risk summary, environment, and networking information

Risk Summary:

Provides view of vulnerabilities, runtime, compliance, and WAAS for individual container selected with a link to that part of the console within Compute

Shows Image, Image ID, Cluster, Namespace, and Service Account

Environment:

Shows containers and hosts of selected cluster's selected node

Networking Information:

Shows the connected inbound and outbound ports and protocols to the node as well as the outbound IP addresses

Serverless Radar View

Allows user to view connected Serverless functions within cloud environments

Upon selection of a node representing a serverless function, the user can view the services that the function has permission to as well as general info including the function's CSP, region, and runtime name.

Upon selection of permitted services associated with the serverless function the user can view the resource association (AWS ARN or equivalent) within the service as well as the associated permissions that the function can perform within the associated services

There is also an option, if applicable, to see the scanning levels that are not natively associated with the serverless function within Prisma Cloud Compute. As an example, if the serverless function is not scanned by vulnerabilities or associated with a compliance standard, there will be an option to protect the function with the natively available infrastructure not yet associated within PCC

Settings

Provides the user with the options to toggle container netCwork monitoring and host network monitoring

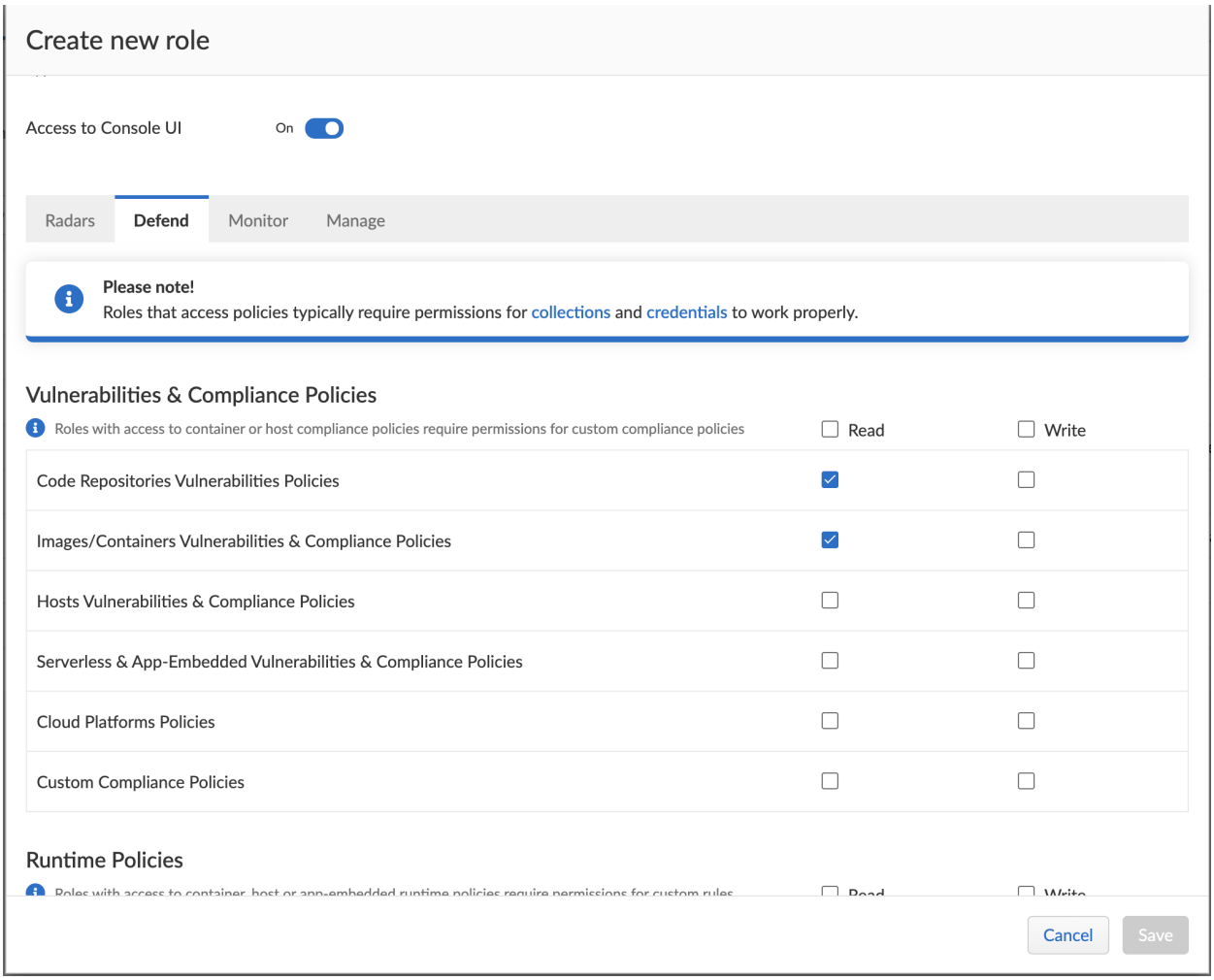
Allows the user to configure network objects by adding subnets to scan that include the network object name and the CIDR block of the associated subnet

Compute Collections

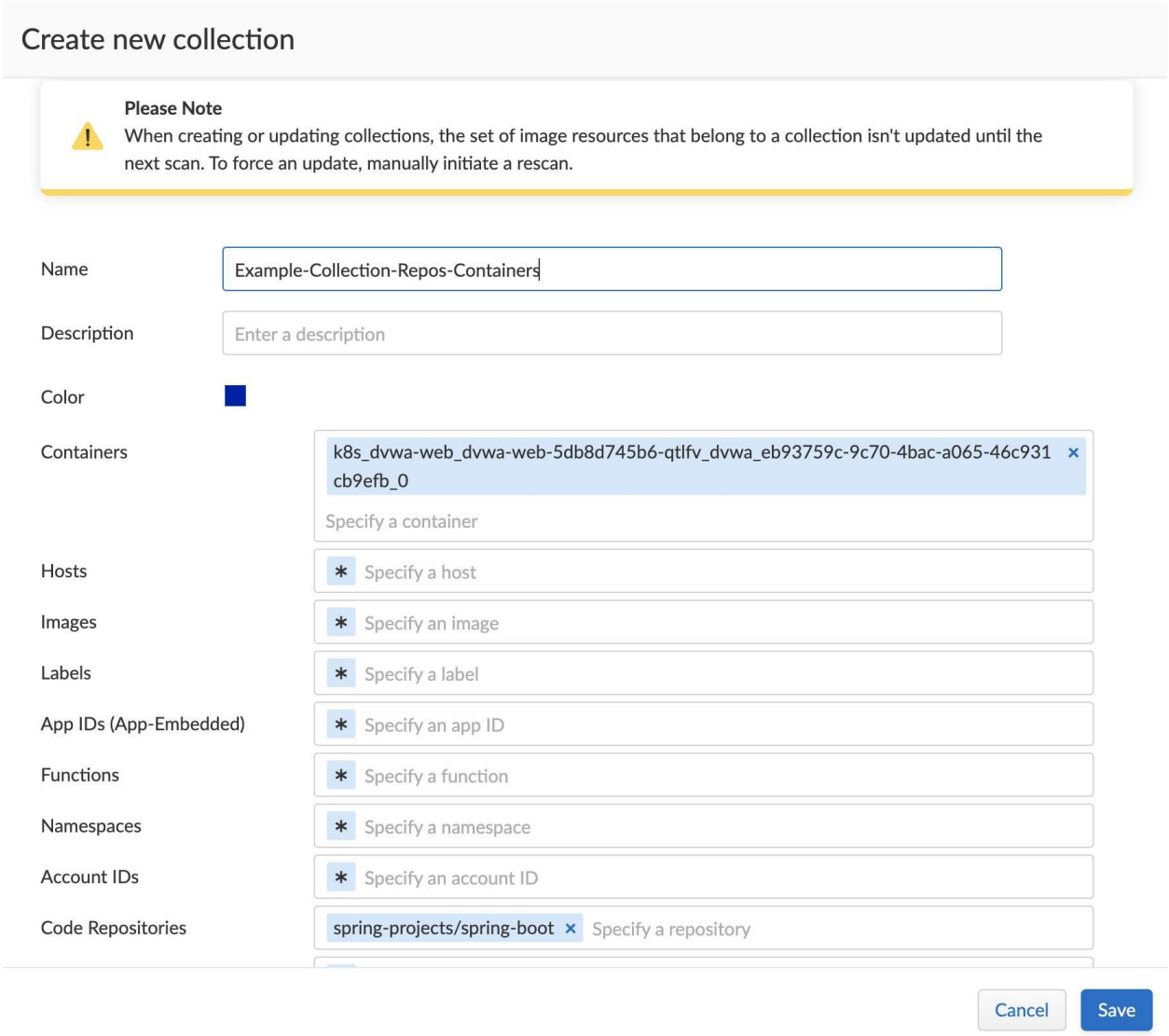
You will need access to an existing SaaS or self-hosted tenant that has the compute capabilities enabled. This means that a user correlated to a role that has sufficient permissions has been assigned to you and you have the ability to authenticate with the console.

Collection Functionality Overview in Compute

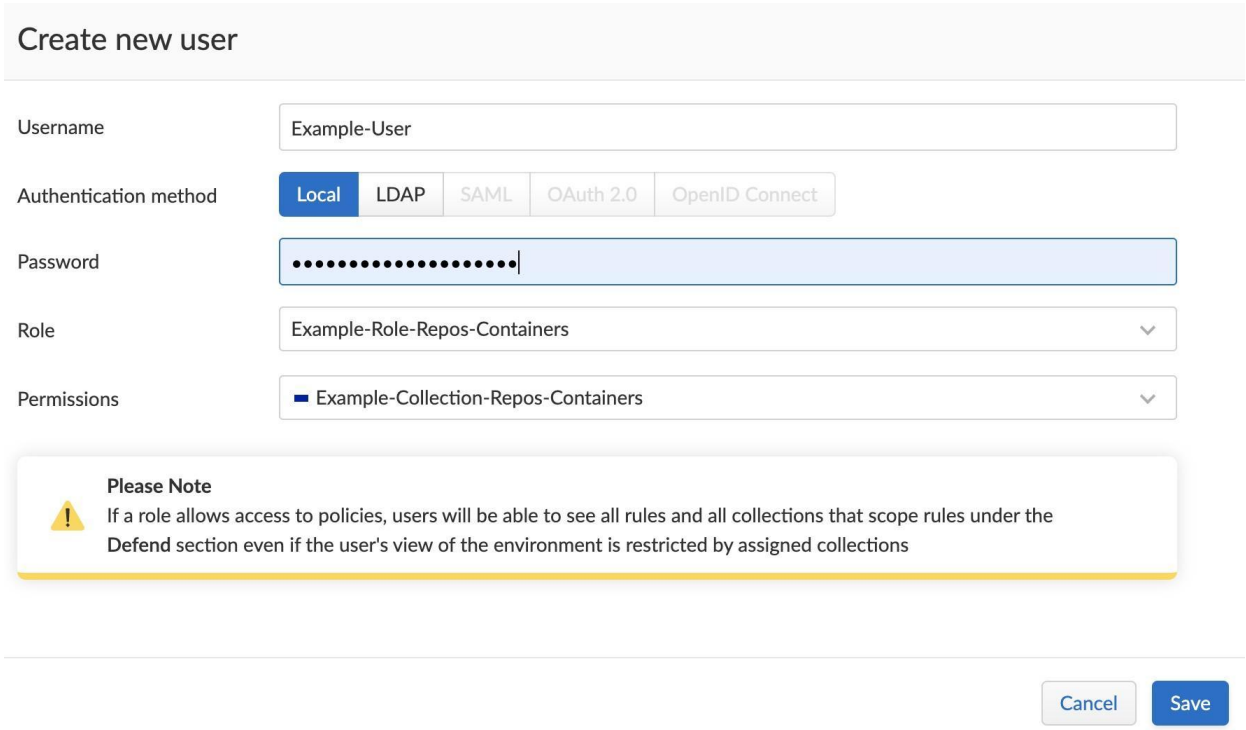
In terms of collection scoping within the console, the first step will be to create a role that limits user access to the specific modules that they need. In this example, access has been limited to the Defend. Vulnerabilities and Compliance modules through the role that were created:



Next a collection was created to associate with the users that would be encompassed by this role, and only included a code repository and an image:

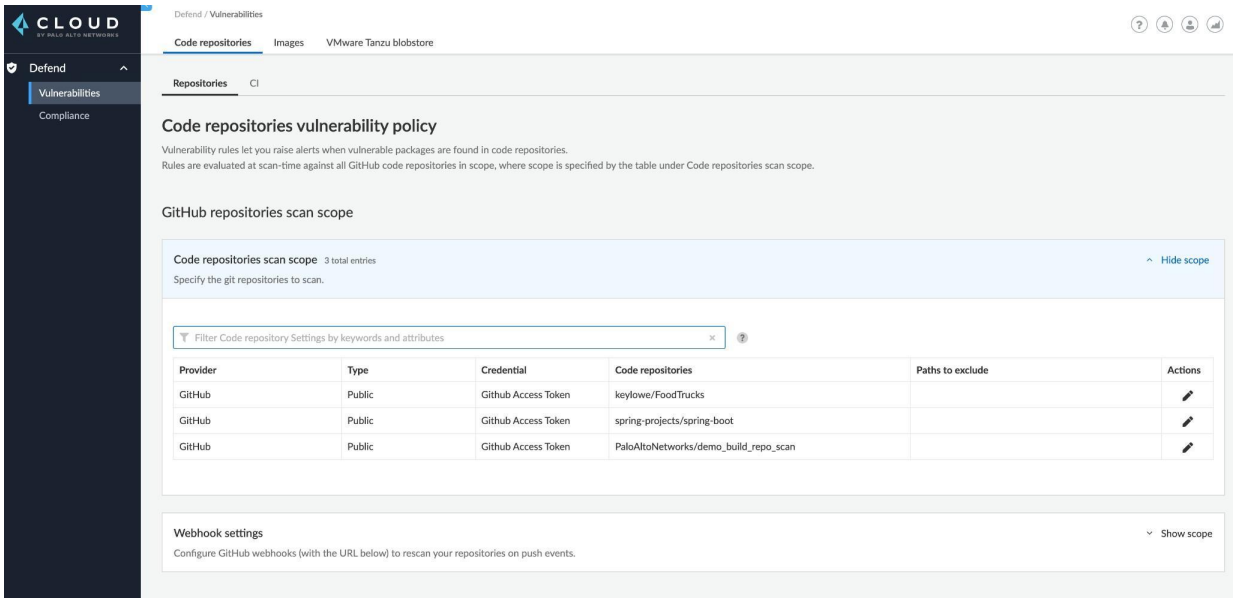


Then the collection and the role were created with a new user:

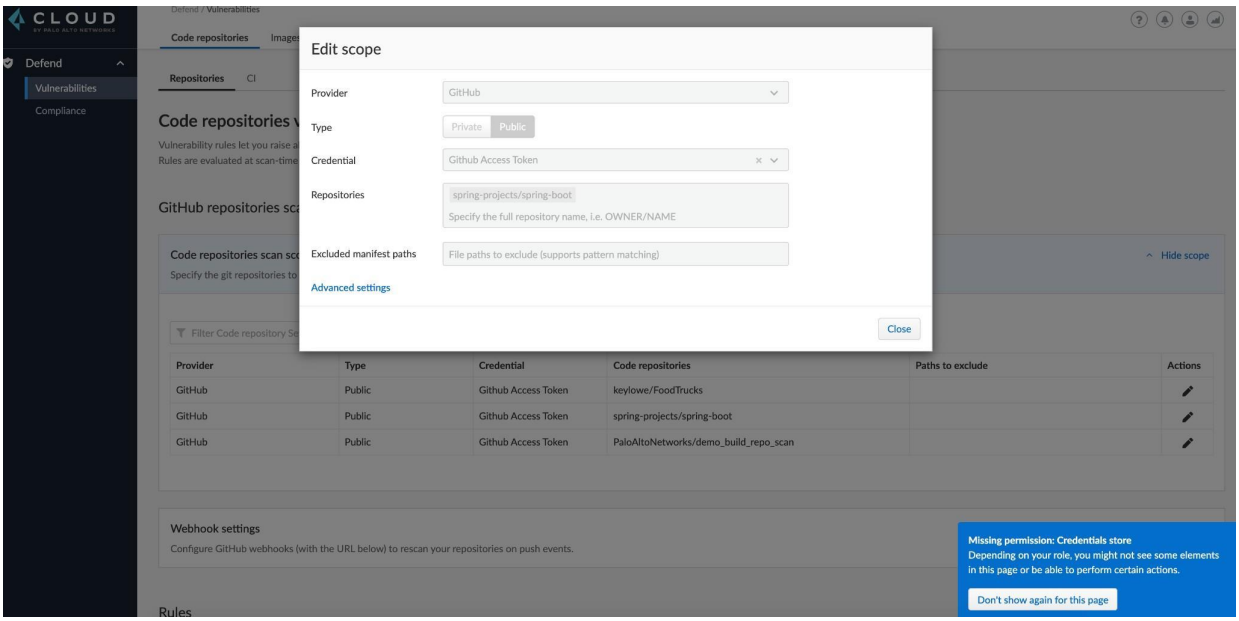


As you can see by the warning sign, in the Defend module of the console where rules are set, one limitation of the console is that specifically within this module users are able to view all rules regardless of assigned collections. This is only within this module and will be shown in a subsequent step. The other modules are completely filtered by the collections that are assigned to a user.

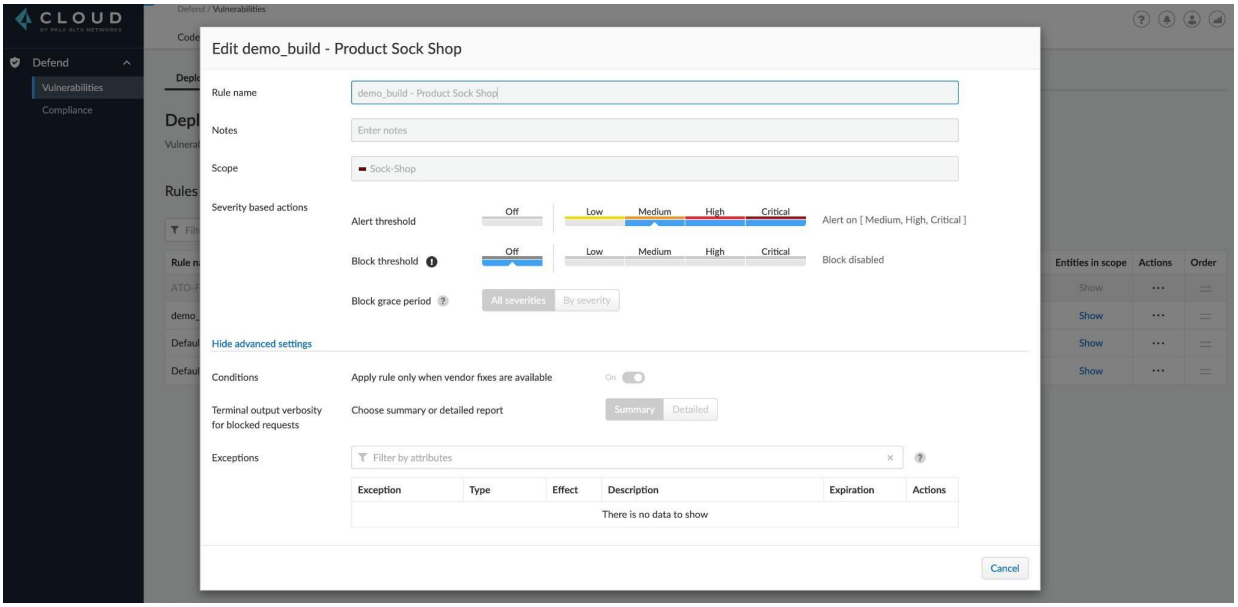
One thing to note is that this will allow console users to see all rules with associated infrastructure in terms of the associated views within the Defend module. For the Radar and Monitor modules, the views are filtered by the individual collections assigned to a user. Once this role was assigned with a collection, the user got the following view of the console when logged in with the new user:



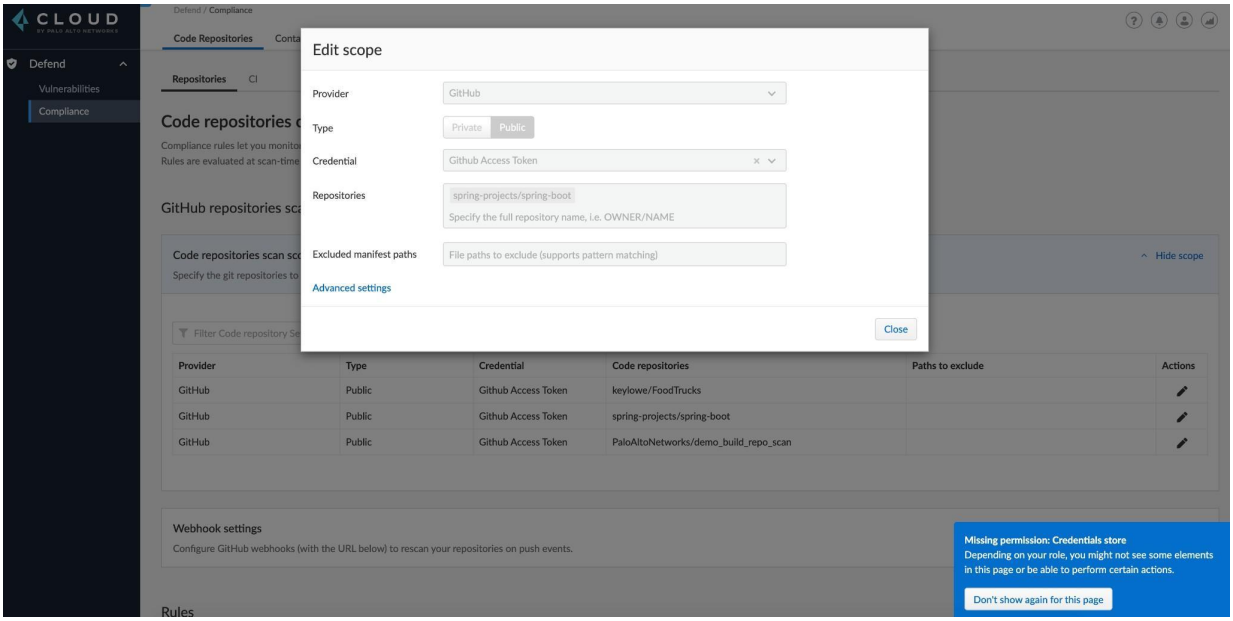
As previously mentioned, in this specific module users, when assigned to have access to this module via role, can see all of the rules regardless of the collection that they are assigned to. In the console's current design the Defend module is meant to be managed and reviewed by vulnerability management teams or managers. Only read access was granted to this module. When we click into editing a scope, we get a non-editable view as can be seen below:

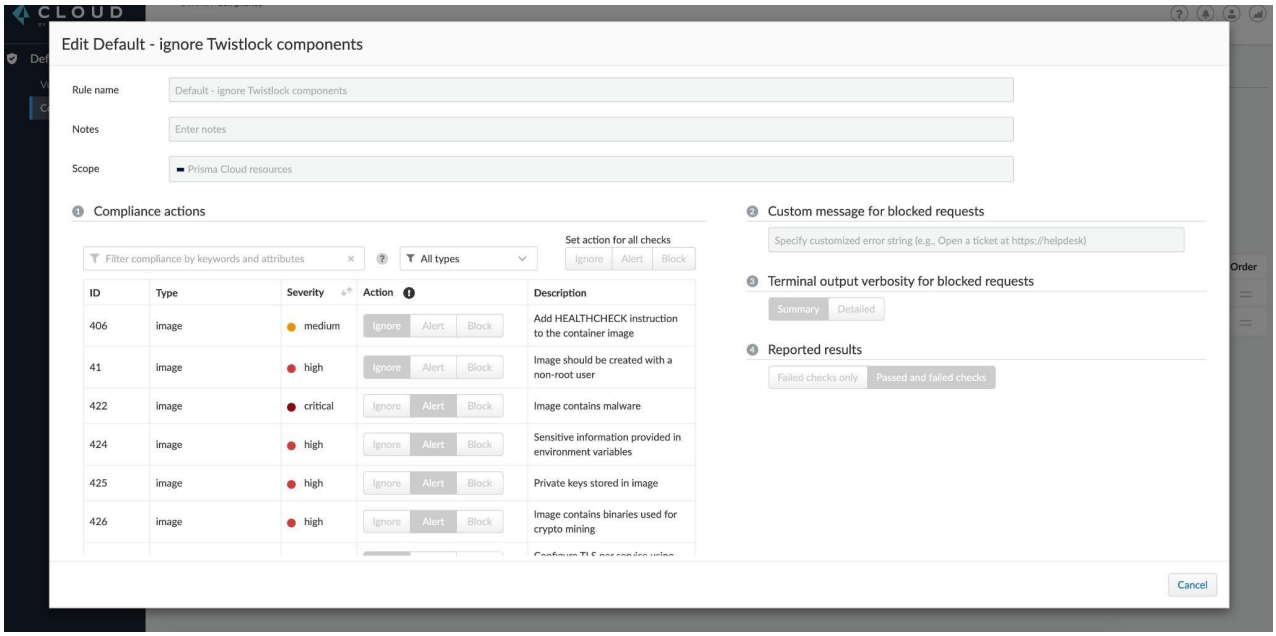


BY pivoting into the Images tab within the Defend module, we can see the rules associated with images but, again, since this role has read-only access to this module, the fields are not editable:

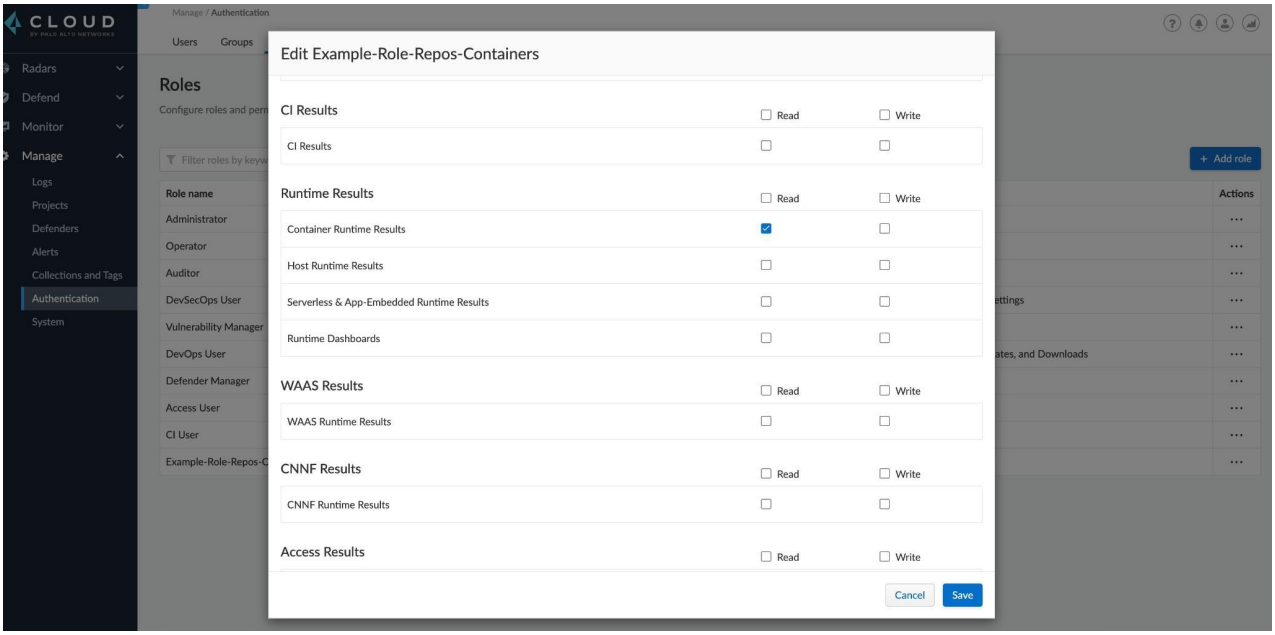


This behavior is also mirrored within the Compliance view of the Defend module for code repositories as well as containers:

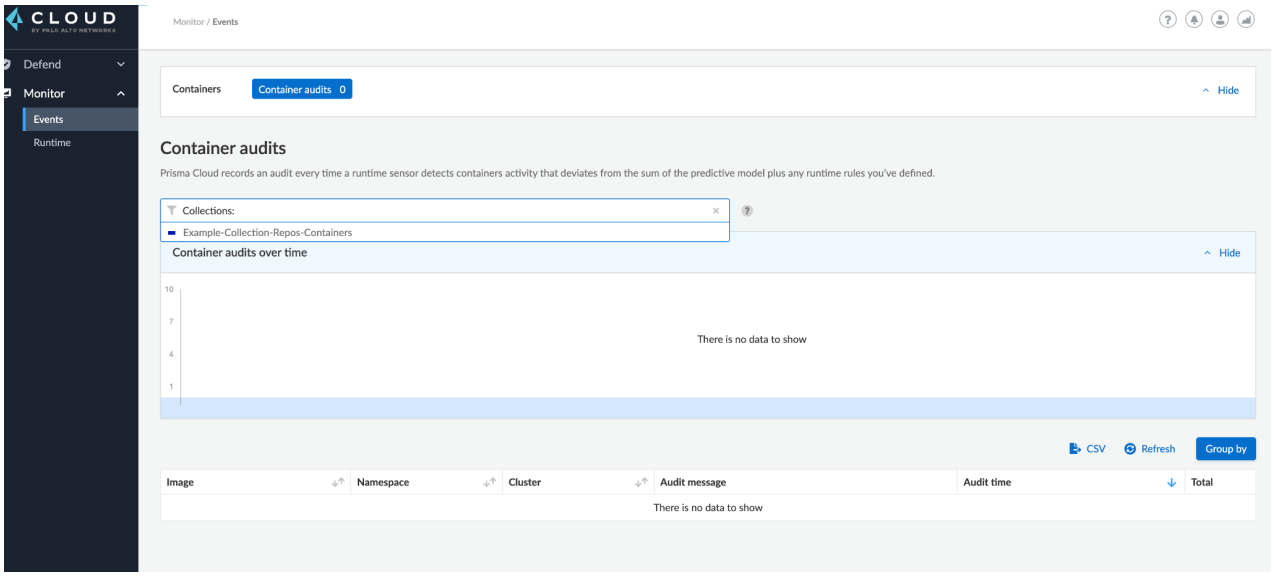




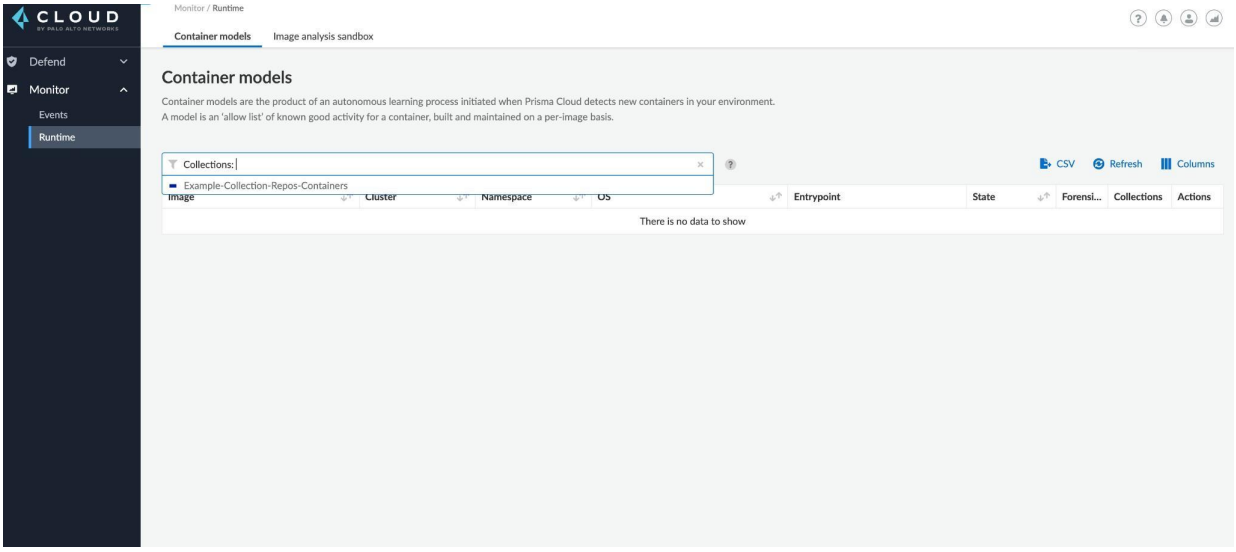
Next, to show how the Monitor module filters by collection, read access was assigned to the image runtime behavior view of the Monitor module for the user's role that was used to log in..



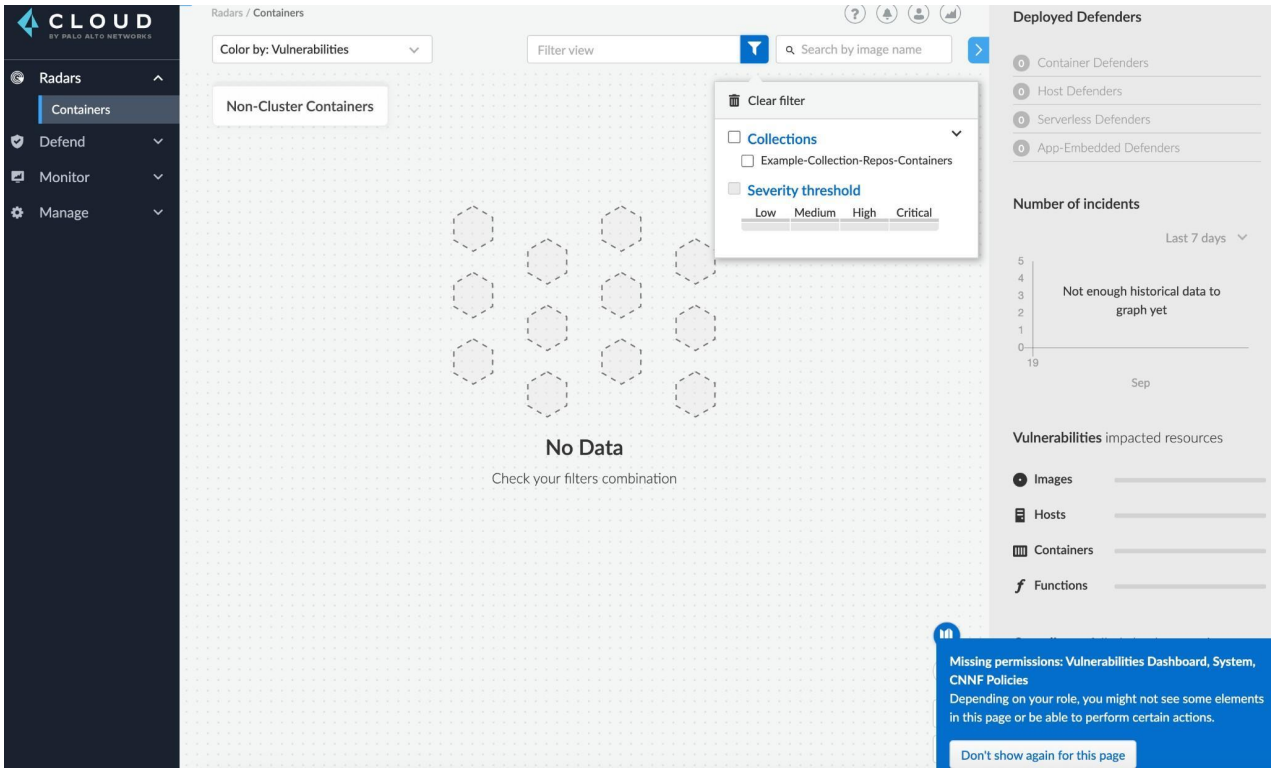
After logging back in with the new user's account, we can see that the Monitor module and the runtime view have been added to the new user's view of the console:



You can also see that the only collection that is available within this view is the collection assigned to the user. This shows how module access can be limited by the scope of the collections that a user is assigned to. In addition to the events view this collection scope has also limited the runtime view within the Monitor module.



As an additional example the Radar module was added, and the container view within this module to the new user's role. When logging back into the console using the new user's credentials, the radar module was limited in functionality to the collection that was assigned to the user.



To summarize, assigned collections combined with roles can limit the scope of what users are able to view within the console. The limitation of the scope of this filtering is the Defend module which, in the present state of the console, is meant to be only assigned to security managers and vulnerability management teams who set the threshold of the risk appetites of environments through severity thresholds.

Hopefully this information helps with your use cases. In terms of newly defended resources, they will be assigned to the OOTB “All” collection that is accessible by system administrators and can be further assigned to the collection associated with a user, team, or environment by system administrators or roles that are granted write access to the collections view of the System module.

In the console defenders are the primary point of ingesting data from the cloud resources on which they are deployed. They push updates via port 8084 to the console and the results of what are pushed are compared to the console’s threat intelligence stream in addition to the various vulnerability threshold rules, runtime rules, and WAAS rules associated with how the defender is scoped into collections. Defenders are the base level of information ingestion into the console, with typically a one-to-one mapping to various resources deployed in a customer cloud environment, such as containers, hosts, registries, and serverless functions.

The information ingested into the console from defenders is made available on a need to know basis through the role associated with the user that is viewing the console as well as the collection that the infrastructure has the defender is deployed to. The role associated with the user can grant read or write permissions to individual modules of the console, as well as individual views within each module. The collection associated with the infrastructure can further limit the information that each user is privy to within the console. All defenders scan their respective infrastructure that they are deployed to but not all of that information is available to each user.

When a user is associated with a role, collections can be associated with either the role that the user is assigned to or with an individual user. As an example, in a DevOps environment there could be a development, QA/testing, and production environment with different business units interacting with each environment. A role could be created for the development team that is associated only with collections that encompass infrastructure in the development environment. As an additional example, there could be a use case of an audit, where an auditing team would need access to the production environment. In this use case a role could be created with full read access to every collection associated with the production environment. Through creating the scope of what defender streams are able to be viewed in the console through collections console administrators can limit the information available to each business unit's use case.

Defenders are built so that the information ingested to the console is tailored to the type of infrastructure on which the defender is deployed. Associating a collection with a single defender would necessitate that each resource in the collection would have to be the same (i.e. all hosts, containers, registries, or serverless functions). Collections allow for the information ingested by defenders to be available regardless of the resource type. However, in the use case of a defender being associated with a collection, the ability for the collection to encompass multiple types of defended infrastructure would be limited by how the defenders are configured for different types of resources. The granular, one-to-one mapping of defenders with individual cloud resources in customer infrastructure allows for, in the present state of the console. the information ingested by the defenders to be grouped on a need to know basis via collections or roles associated with specific collections.

General Best Practices When Implementing Collections

- Naming conventions (code words, hashes, etc.)
- Designing scope with information streams (upstream and downstream) as well as levels of scope in mind (business unit, team, application, environment)
- Looking at available options with the API
- Creating collections for specific incidents/events

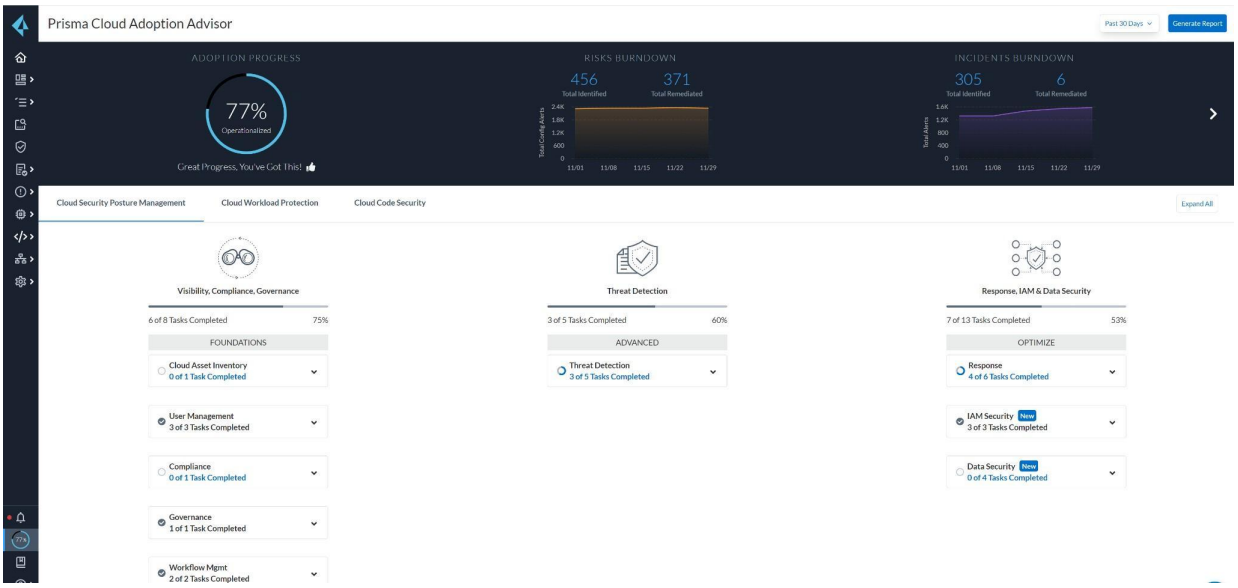
Prisma Cloud Enterprise Setup

First steps are to inventory cloud accounts to start ingesting platform logs to begin the process of analysis by Prisma Cloud. Administrators need access to the platform based on their role and responsibilities. Enabling the Adoption Advisor is highly recommended, as it allows customers to view progress in configuring initial critical configuration tasks, to get the most out of the platform and its various modules. The Prisma Cloud FAQs page will answer common questions and provide insight to different areas in the tool.

Detailed Initial Configuration for CSPM

Adoption Advisor

Prisma Cloud's Adoption Advisor (AA) is a tool that helps you see how far you've explored the tool's capabilities. It allows you to view the various tasks to perform in order to adopt Prisma Cloud – providing you visibility into security areas that you have not discovered yet. Adoption Advisor is available for the CSPM, CWPP, and CCS. It groups the tasks into three categories – Foundations, Advanced, and Optimize. There's a percentage that's associated with how much you've adopted Prisma Cloud so far, and completing tasks under the three categories will further increase the percentage shown. You will see AA in the bottom left of your screen with the percentage showing. Your team should utilize AA to get the most of the Prisma Cloud tool and discover/learn capabilities that you may have not configured yet but are beneficial to have within your organization. Complete the different actions where you'll see a task, description, summary, and then clicking into it will have the tool walk you through how to complete that specific task.

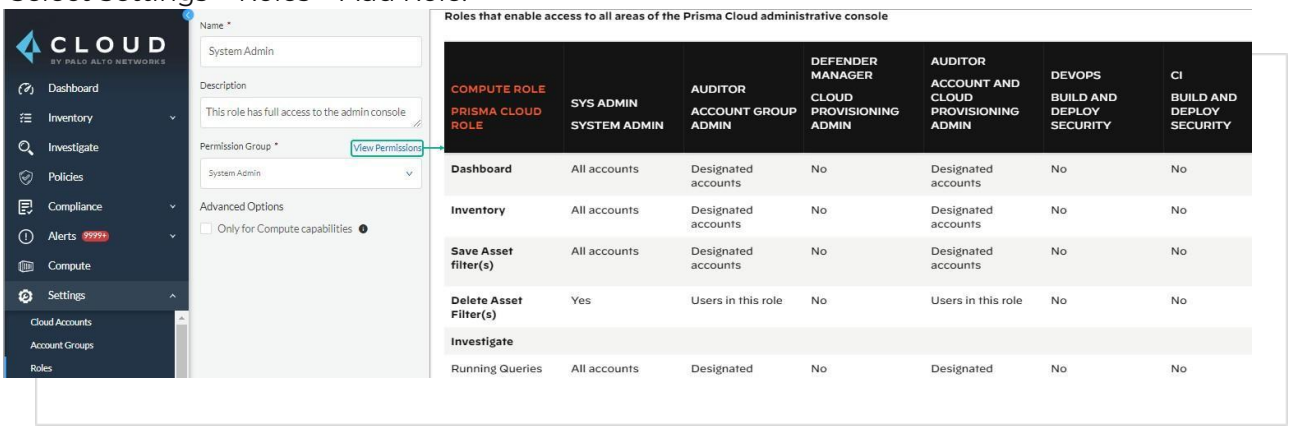


Configuring and spending time in the initial onboarding process will help in the long run when it comes to other Prisma Cloud configuration tasks, such as Alert Rules, RBAC, alert monitoring, and more.

Managing Prisma Cloud Administrators

Review Prisma Cloud role permissions, create organization-specific Roles tied to the appropriate Permission Groups (System Admin, Account Group Read-Only, Cloud Provisioning Admin, etc.). It is best practice to not make every user a System Administrator and to tie the least amount of access needed to each user/team. A common role used across organizations is an Account Group Administrator or Account and Cloud Provisioning Administrator. These two roles allow a user to utilize the Prisma Cloud tool but only access the Account Group(s) they're responsible for.

Select Settings → Roles → Add Role.



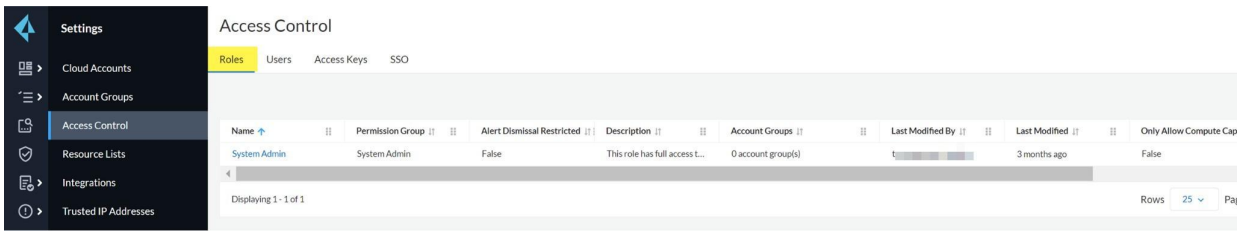
Roles that enable access to all areas of the Prisma Cloud administrative console

COMPUTE ROLE / PRISMA CLOUD ROLE	SYS ADMIN / SYSTEM ADMIN	AUDITOR / ACCOUNT GROUP ADMIN	DEFENDER MANAGER / CLOUD PROVISIONING ADMIN	AUDITOR / ACCOUNT AND CLOUD PROVISIONING ADMIN	DEVOPS / BUILD AND DEPLOY SECURITY	CI / BUILD AND DEPLOY SECURITY
Dashboard	All accounts	Designated accounts	No	Designated accounts	No	No
Inventory	All accounts	Designated accounts	No	Designated accounts	No	No
Save Asset filter(s)	All accounts	Designated accounts	No	Designated accounts	No	No
Delete Asset Filter(s)	Yes	Users in this role	No	Users in this role	No	No
Investigate						
Running Queries	All accounts	Designated	No	Designated	No	No

Here are some key concepts to consider:

- What is the function of the user?
- Does the user need to access the Prisma Cloud Portal, or will automation/integration provide what they need?
- If the user does not require access to the Prisma Cloud Portal, will an emailed report be sufficient enough?
- Does the user need to do more than just consume asset/security data?
- Is there asset/security data the user should NOT have access to?
- Is there a capability the user needs to access that cannot be done with a read-only role?

See the below screen capture showing Access Control settings. Here, you can access "Roles", "Users", "Access Keys", and "SSO" configurations.



Single Sign On

In setting up authentication management, SSO integration is recommended as best practice. You can enable SSO using the Identity Provider (IdP) your organization utilizes, as long as it supports SAML.

Examples include Okta, Microsoft Active Directory Federation Services (AD FS), Azure Active Directory, Google, or OneLogin. Note, you can only configure a single IdP across the cloud accounts that Prisma monitors. Organizations can add administrative users on Prisma Cloud to create their local account when SSO is enabled or utilize Just-In-Time (JIT) provisioning on the SSO configuration if you'd like to have the accounts created locally.

Note: It is important to provide at least two admin users who can bypass the third-party SSO - a setting under the SSO settings/configuration. This is needed in the event there are SSO issues, such as a SSL certificate expiration or an IdP problem.

Some Examples of SSO Roles

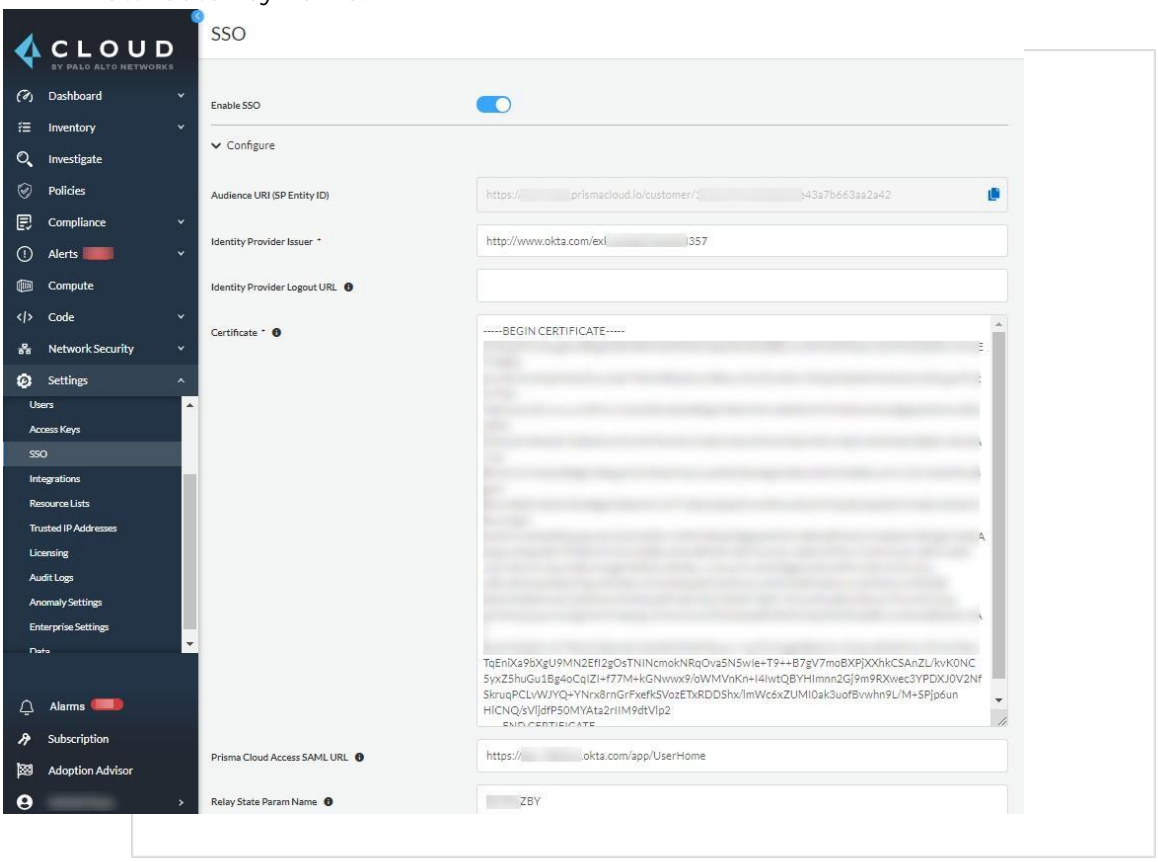
- Create roles based on user personas (DevOps, SecOps, SOC/IR, Compliance, App Developers)
- Attach roles to different account groups based on cloud account ownership

If you are facing issues with user authentication and SSO configuration, you can find a list of the last five SAML login failures by navigating to the bottom of the SSO configuration page.

SAML Troubleshooting common errors

1. Mandatory Fields: Check to ensure that mandatory fields are filled out correctly. IdP Issuer and Certificate are the two required fields. If you're using HIT, the additional fields must also be filled correctly.
2. SSO Not Enabled: Enable SSO under the main Prisma Cloud settings.
3. Authentication Failed Errors: If a user experiences an authentication failure when they try to log in, you can investigate the issue using a SAML browser plugin to capture the assertion that's being sent to the user's browser. SAML Assertion is the XML document that the IdP sends to the service provider that contains the user authorization. It is important to remember that the URL or certificate information in the asset may not match the Prisma Cloud configuration.

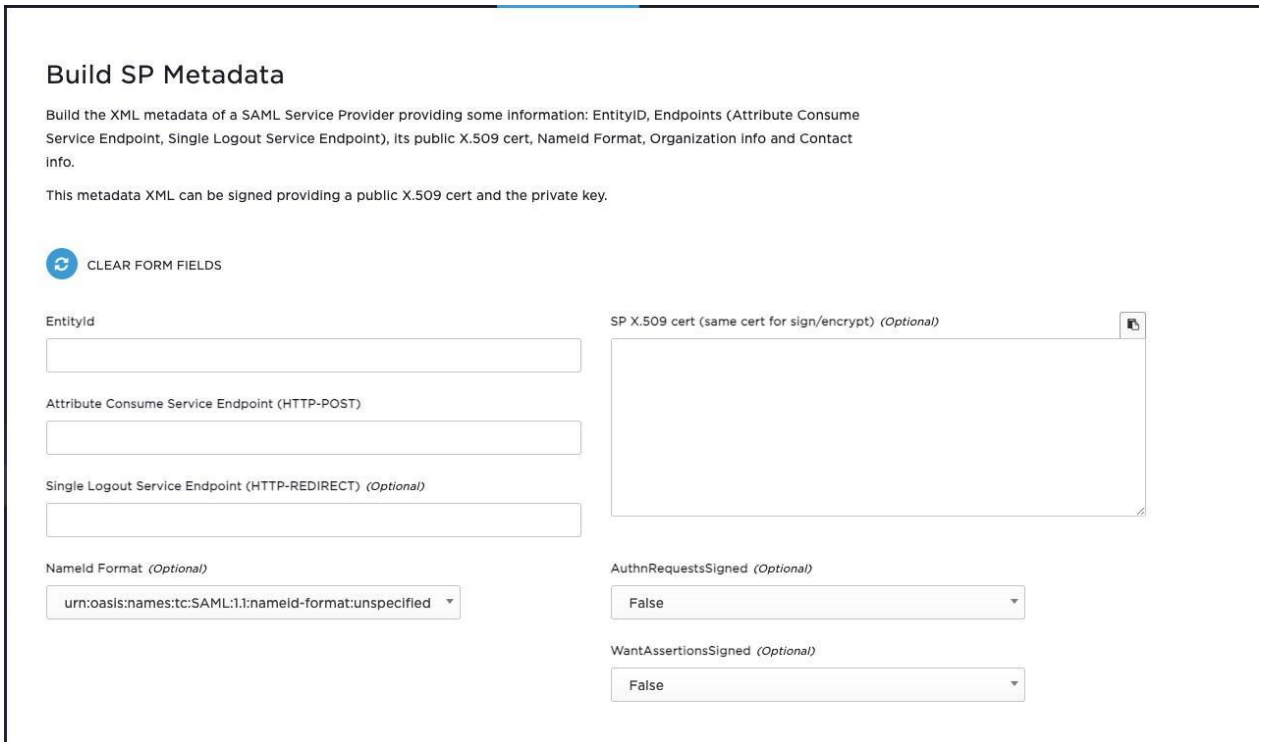
4. JIT Authentication Failed Errors: The URL, certificate, or JIT user parameters may not be correct and can be analyzed from the Assertion XML document. There may be missing attribute values in that the Prisma Cloud SSO config may have an incorrect attribute key name.



Generate a SAML SP Metadata file

By default, CSPM can't generate a metadata file which means that we need to generate it using a third party tool like https://www.samltool.com or create it manually.

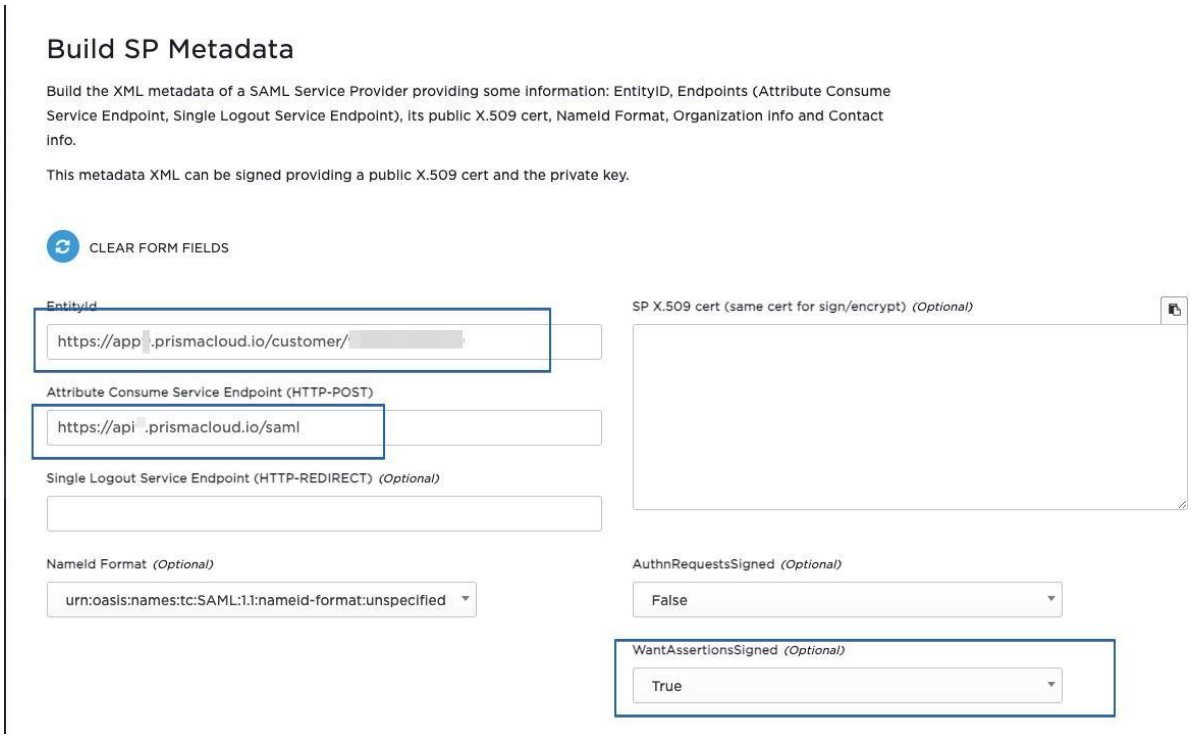
1. Go to https://www.samltool.com



2. Identify the following values on your Prisma Cloud Tenant:

EntityId → *Audience URI (SP Entity ID)* →
https://app**<TENANTNUMBER>**.prismacloud.io/customer/**<CUST_ID_HERE>** *Attribute Consume Service Endpoint (HTTP-POST)* →
https://api**<TENANTNUMBER>**.prismacloud.io/saml
WantAssertionsSigned → True

3. Fill out the above data on https://www.samltool.com and click on “Build SP METADATA”



SP Metadata Output example:

```
<?xml version="1.0"?>
<md:EntityDescriptor xmlns:md="urn:oasis:names:tc:SAML:2.0:metadata"
                     validUntil="2022-10-20T16:32:31Z"
                     cacheDuration="PT604800S"

entityID="https://app<TENANTNUMBER>.prismacloud.io/customer/<CUST_ID_HERE>">
    <md:SPSSODescriptor AuthnRequestsSigned="false" WantAssertionsSigned="true"
protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol">

<md:NameIDFormat>urn:oasis:names:tc:SAML:1.1:nameid-format:unspecified</md:Name
IDFormat>
        <md:AssertionConsumerService
Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"

Location="https://api<TENANTNUMBER>.prismacloud.io/saml"
                                     index="1" />

    </md:SPSSODescriptor>
</md:EntityDescriptor>
```

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Investigate with RQL

Investigating in Prisma Cloud allows you to see further into security and operational information within your cloud environment(s). Each Prisma Cloud Run policy is built/structured around RQL, or Resource Query Language. RQL is similar to the widely-known SQL and it performs configuration searches into how your cloud resources are deployed. The visibility you gain here saves you time rather than going into your individual cloud provider portal.

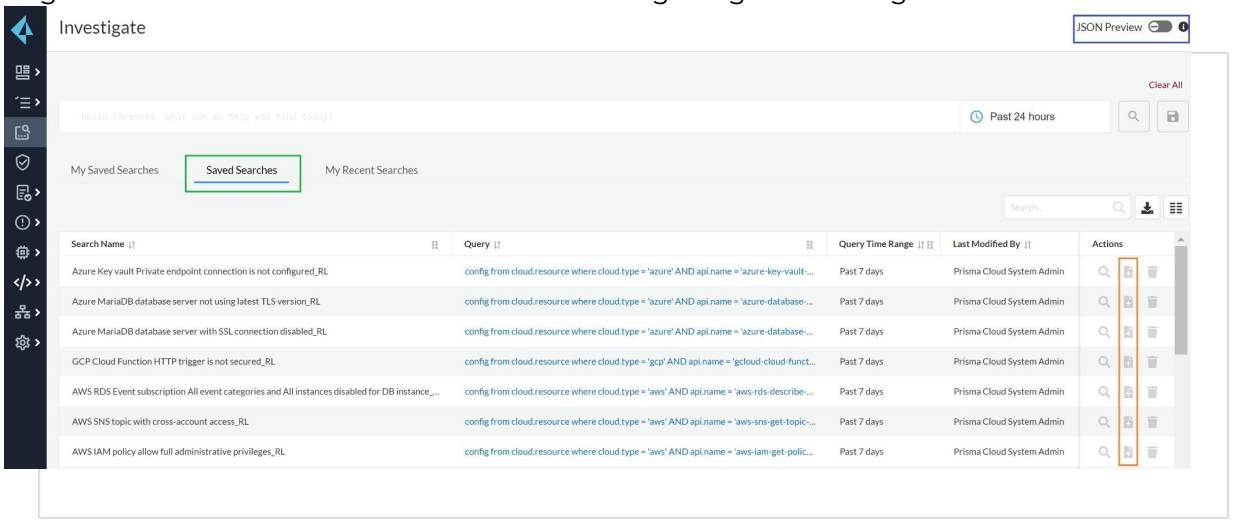
There are multiple types of RQL queries:

1. Config: Config Query to search for the configuration of the cloud resources.
2. Event: Use Event Query to search and audit all the console and API access events in your cloud environment.
3. IAM: Use IAM Query to gain visibility into the permissions of your cloud resources.
4. Network: Use Network Query to search real-time network events in your environment.

Some questions that might come to mind when securing your cloud environment are:

- Do I have any critical S3 buckets that are publicly accessible?
- Are there cloud resources in my environment that are missing critical patches from vulnerabilities?
- What activities has a root user performed that may not have been necessary?

You can create custom RQL queries as well as search into ones that are already structured, such as within a default policy or if you navigate to Investigate → Saved Searches, you will find hundreds of saved searches from not just users within your organization, but also ones that are saved by default within the product that customers and users can find helpful to their organization. See Saved Searches in the following image below in green.

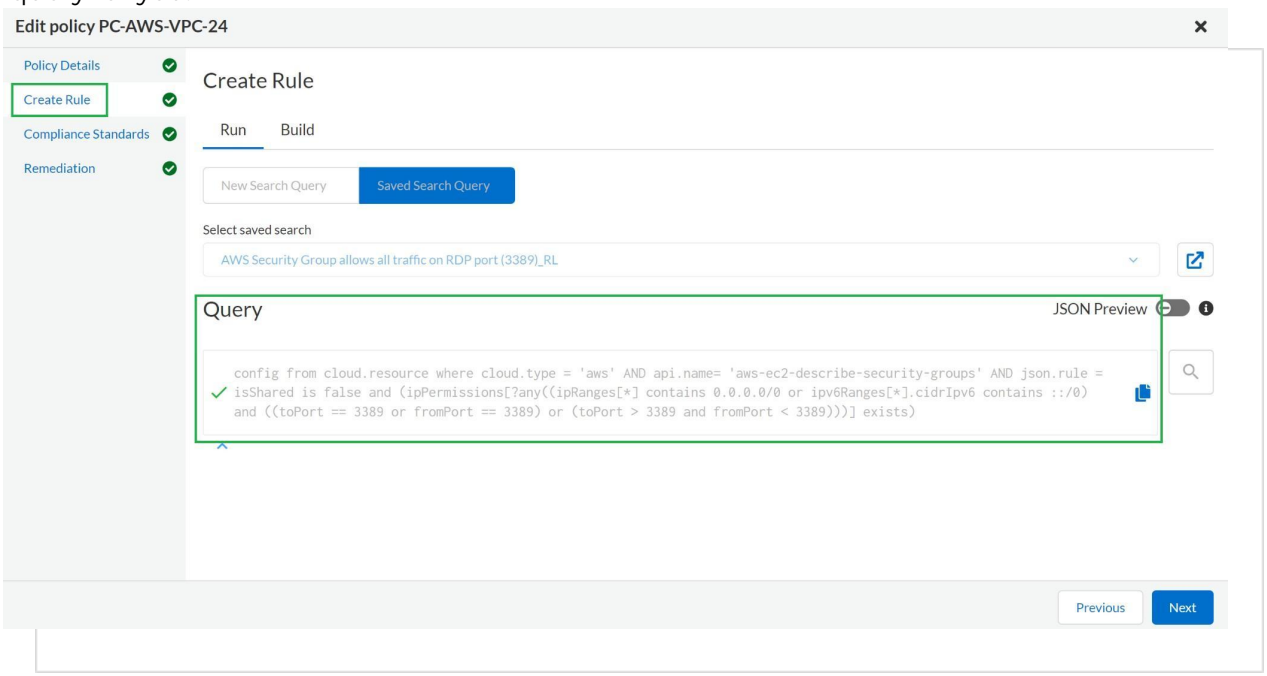


Any helpful Saved Searches can be instantly turned into a policy by selecting the document icon shown in the previous screenshot in orange. RQL queries can be created and start with

clicking into the search bar where you're provided drop-down options to build out your query. Selecting the "JSON Preview" option in the top right corner (shown in blue) will show you the drop down menu in the actual .json configuration file view to easily select what object you're looking for. Taking a pre-existing query and modifying it with different objects, operators, and other parameters will allow you to customize your search to exactly what you're looking for.

A query must include an API and you can view if you've built it out correctly when a green checkmark shows at the beginning of your query. A red X signifies that your query is either incomplete or there is a syntax error such as a quotation mark or parentheses missing.

To view the RQL query behind a default policy, navigate to Policies and search for the specific policy you're wanting to look into further. In this example, we'll be looking at "AWS Security Group allows all traffic on RDP port (3389)". Once you find the policy within the policy page, click on the edit icon (indicated by the pencil icon on the far right of the policy). You will see the RQL in the second option of the "Edit Policy" popup, and you can copy the query and go to investigate to search or more easily, just select the blue arrow on the right of the policy/saved search name to open a new window that opens Investigate and populates the query for you.



Examples of Common RQL Searches

Policy Description	RQL
AWS: List EC2 instances with a public IP address	config from cloud.resource where api.name = 'aws-ec2-describe-instances' and json.rule =

	publicIpAddress exists
Find workloads with vulnerability 'CVE-2015-5600'	network from vpc.flow_record where dest.resource IN (resource where finding.type IN ('Host Vulnerability') AND finding.name = 'CVE-2015-5600') and bytes > 0
Azure SQL instances that allow any IP address to connect to it	config from cloud.resource where cloud.service = 'Azure SQL' AND api.name = 'azure-sql-server-list' AND json.rule = firewallRules[*] contains "0.0.0.0"
List Azure Storage accounts (can be used for Azure flow log checks)	config from cloud.resource where cloud.type = 'azure' AND api.name = 'azure-storage-account-list' addcolumn location
List VPCs that do not have Flow Logs enabled	config from cloud.resource where api.name = 'aws-ec2-describe-vpcs' as X; config from cloud.resource where api.name = 'aws-ec2-describe-flow-logs' as Y; filter ' not ($.Y.resourceId equals $.X.vpcId)'; show X;

Useful Documentation for RQL:

- Review the RQL Reference Guide
- Review the RQL Example Library for useful queries to run and utilize. It allows you to modify easily since you can edit the existing RQLs
- Review the RQL Operators document to understand the different capabilities within RQL searches
- Review the APIs that are ingested for reference to build out custom investigate searches and policies
    - Alibaba APIs Ingested by Prisma Cloud
    - AWS APIs Ingested by Prisma Cloud
    - GCP APIs Ingested by Prisma Cloud
    - Microsoft Azure APIs Ingested by Prisma Cloud
    - OCI APIs Ingested by Prisma Cloud
- Visit the RQL FAQs for additional help and information

Third Party Integration

Prisma Cloud Enterprise Integration

Configure integrations with third party security tools and SOC workflow tools. Configure alert workflows for notifications and remediation. Organizations already have multiple processes in place when it comes to managing security in the cloud, whether that's a SIEM tool, logging tool, or ticketing system such as ServiceNow.

1. Setup integrations - helps to monitor alerts and send alert notifications to security processes that already exist in an organization or a new process can be created to manage large amounts of alerts/data. Integrations help with the process of keeping Prisma Cloud alerts manageable.

   a. 3rd party integrations (ex. w/Splunk, ServiceNow, other native integrations
   b. Webhooks (non-native integrations such as a SIEM tool)
   c. Discuss Alert Payload info sent to third-party integration - helpful for customers to understand the importance and beneficial to alert remediation/management
2. Create Alert Rules
   a. This is used to generate specific Alerts - specify the target accounts/account groups, the specific policies (or all), as well the notification channel if one is needed

3. Set up alert profiles and integrations to test alert notification functionality with different types of policies that generates alerts

   a. This helps to create a parallel to a DevOps pipeline with alert workflows so that instead of having to test how the alert generates information on the channel that will be used, users can test sending alert information in a standardized way through alert profiles and integrations that mirror the configuration of the production level information streams

Compute Integration

Prisma Cloud Compute supports the following Third Party tool integrations out of the box:

- Email
- JIRA
- Slack
- Splunk
- PagerDuty
- Webhooks
- Google Cloud Security Command Center - Only available for onboarded PC accounts.
- AWS Security Hub - Only available for onboarded PC accounts.
- ServiceNow - Only Incident Response

Best practice is to first determine if a customer is using any of the above tools as a SOC tool that can ingest Prisma Cloud alert data. If there is no available out-of-the-box integration for your customer's tool, try to figure out if their tool supports Webhooks ingestion. If Webhooks ingestion is not a probability, there is a possibility that Professional Services can help set up a custom integration with their tool using our APIs.

Related Links:
prisma-cloud-docs/compute/admin_guide at master · PaloAltoNetworks/prisma-cloud-docs (github.com)
https://github.com/PaloAltoNetworks/prisma-cloud-docs/tree/master/compute/admin_guide/alerts

Code Security Notification

You can enable notifications to the external integrations you have configured in Prisma Cloud Enterprise.. JIRA, ServiceNow, Microsoft Teams, Slack, Splunk and Webhook are supported. Notifications are disabled by default.. See Configure External Integrations on Prisma Cloud to set up an integration. Then configure Code Security Notifications.

General Resources and References:

- Prisma Cloud: Customer Corner Monthly Videos
- Prisma Cloud Live Community
- Prisma Cloud Official Documentations