Threagile
Agile Threat Modeling

Threat Model Report

Argo CD

13 November 2022

Argoproj Maintainers

Table of Contents

Risks by Technical Asset

Data Breach Probabilities by Data Asset

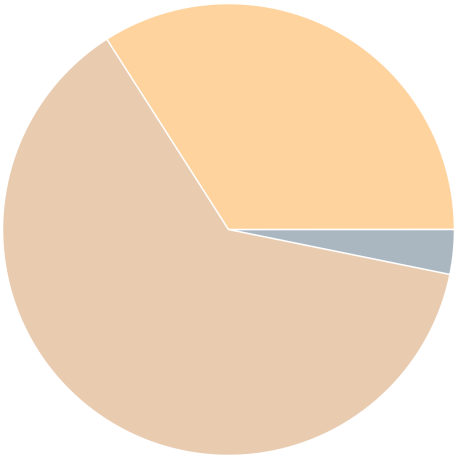
Management Summary

Threagile toolkit was used to model the architecture of "Argo CD" and derive risks by analyzing the components and data flows. The risks identified during this analysis are shown in the following chapters. Identified risks during threat modeling do not necessarily mean that the vulnerability associated with this risk actually exists: it is more to be seen as a list of potential risks and threats, which should be individually reviewed and reduced by removing false positives. For the remaining risks it should be checked in the design and implementation of "Argo CD" whether the mitigation advices have been applied or not.

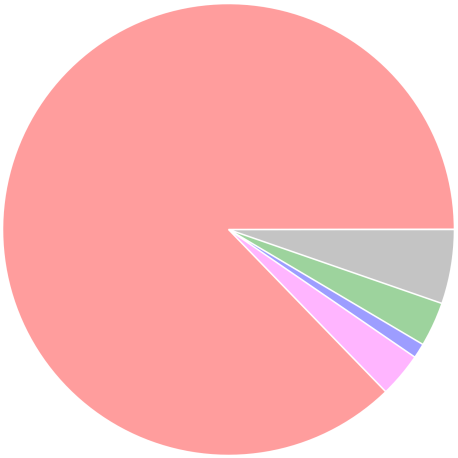
Each risk finding references a chapter of the OWASP ASVS (Application Security Verification Standard) audit checklist. The OWASP ASVS checklist should be considered as an inspiration by architects and developers to further harden the application in a Defense-in-Depth approach. Additionally, for each risk finding a link towards a matching OWASP Cheat Sheet or similar with technical details about how to implement a mitigation is given.

In total **94 initial risks** in **22 categories** have been identified during the threat modeling process:

0 critical risk
0 high risk
32 elevated risk
59 medium risk
3 low risk



82 unchecked
0 in discussion
3 accepted
1 in progress
3 *mitigated*
5 *false positive*



Just some **more** custom summary possible here...

Impact Analysis of 94 Initial Risks in 22 Categories

The most prevalent impacts of the **94 initial risks** (distributed over **22 risk categories**) are (taking the severity ratings into account and using the highest for each category):
Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated: **Cross-Site Request Forgery (CSRF)**: 4 Initial Risks - Exploitation likelihood is *Very Likely* with *Medium* impact.
If this risk remains unmitigated, attackers might be able to trick logged-in victim users into unwanted actions within the web application by visiting an attacker controlled web site.

Elevated: **Cross-Site Scripting (XSS)**: 3 Initial Risks - Exploitation likelihood is *Likely* with *High* impact.
If this risk remains unmitigated, attackers might be able to access individual victim sessions and steal or modify user data.

Elevated: **Missing Authentication**: 10 Initial Risks - Exploitation likelihood is *Likely* with *High* impact.
If this risk is unmitigated, attackers might be able to access or modify sensitive data in an unauthenticated way.

Elevated: **Missing Cloud Hardening**: 3 Initial Risks - Exploitation likelihood is *Unlikely* with *Very High* impact.
If this risk is unmitigated, attackers might access cloud components in an unintended way.

Elevated: **Missing File Validation**: 1 Initial Risk - Exploitation likelihood is *Very Likely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to provide malicious files to the application.

Elevated: **Missing Hardening**: 4 Initial Risks - Exploitation likelihood is *Likely* with *Medium* impact.
If this risk remains unmitigated, attackers might be able to easier attack high-value targets.

Elevated: **Missing Identity Provider Isolation**: 1 Initial Risk - Exploitation likelihood is *Unlikely* with *Very High* impact.
If this risk is unmitigated, attackers successfully attacking other components of the system might have an easy path towards highly sensitive identity provider assets and their identity datastores, as they are not separated by network segmentation.

Elevated: **Path-Traversal**: 1 Initial Risk - Exploitation likelihood is *Likely* with *High* impact.
If this risk is unmitigated, attackers might be able to read sensitive files (configuration data, key/credential files, deployment files, business data files, etc.) from the filesystem of affected components.

Elevated: **Server-Side Request Forgery (SSRF)**: 29 Initial Risks - Exploitation likelihood is *Likely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to access sensitive services or files of network-reachable components by modifying outgoing calls of affected components.

Elevated: **Unguarded Access From Internet**: 3 Initial Risks - Exploitation likelihood is *Very Likely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to directly attack sensitive systems without any hardening components in-between due to them being directly exposed on the internet.

Medium: **Accidental Secret Leak**: 3 Initial Risks - Exploitation likelihood is *Unlikely* with *High* impact.
If this risk is unmitigated, attackers which have access to affected sourcecode repositories or artifact registries might find secrets accidentally checked-in.

Medium: **Code Backdooring**: 4 Initial Risks - Exploitation likelihood is *Unlikely* with *High* impact.
If this risk remains unmitigated, attackers might be able to execute code on and completely takeover production environments.

Medium: **Container Base Image Backdooring**: 9 Initial Risks - Exploitation likelihood is *Unlikely* with *High* impact.
If this risk is unmitigated, attackers might be able to deeply persist in the target system by executing code in deployed containers.

Medium: **Missing Build Infrastructure**: 1 Initial Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to exploit risks unseen in this threat model due to critical build infrastructure components missing in the model.

Medium: **Missing Identity Store**: 1 Initial Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to exploit risks unseen in this threat model in the identity provider/store that is currently missing in the model.

Medium: **Missing Network Segmentation**: 3 Initial Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers successfully attacking other components of the system might have an easy path towards more valuable targets, as they are not separated by network segmentation.

Medium: **Missing Two-Factor Authentication (2FA)**: 3 Initial Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to access or modify highly sensitive data without strong authentication.

Medium: **Missing Vault (Secret Storage)**: 1 Initial Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to easier steal config secrets (like credentials, private keys, client certificates, etc.) once a vulnerability to access files is present and exploited.

Medium: **Missing Web Application Firewall (WAF)**: 3 Initial Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to apply standard attack pattern tests at great speed without any filtering.

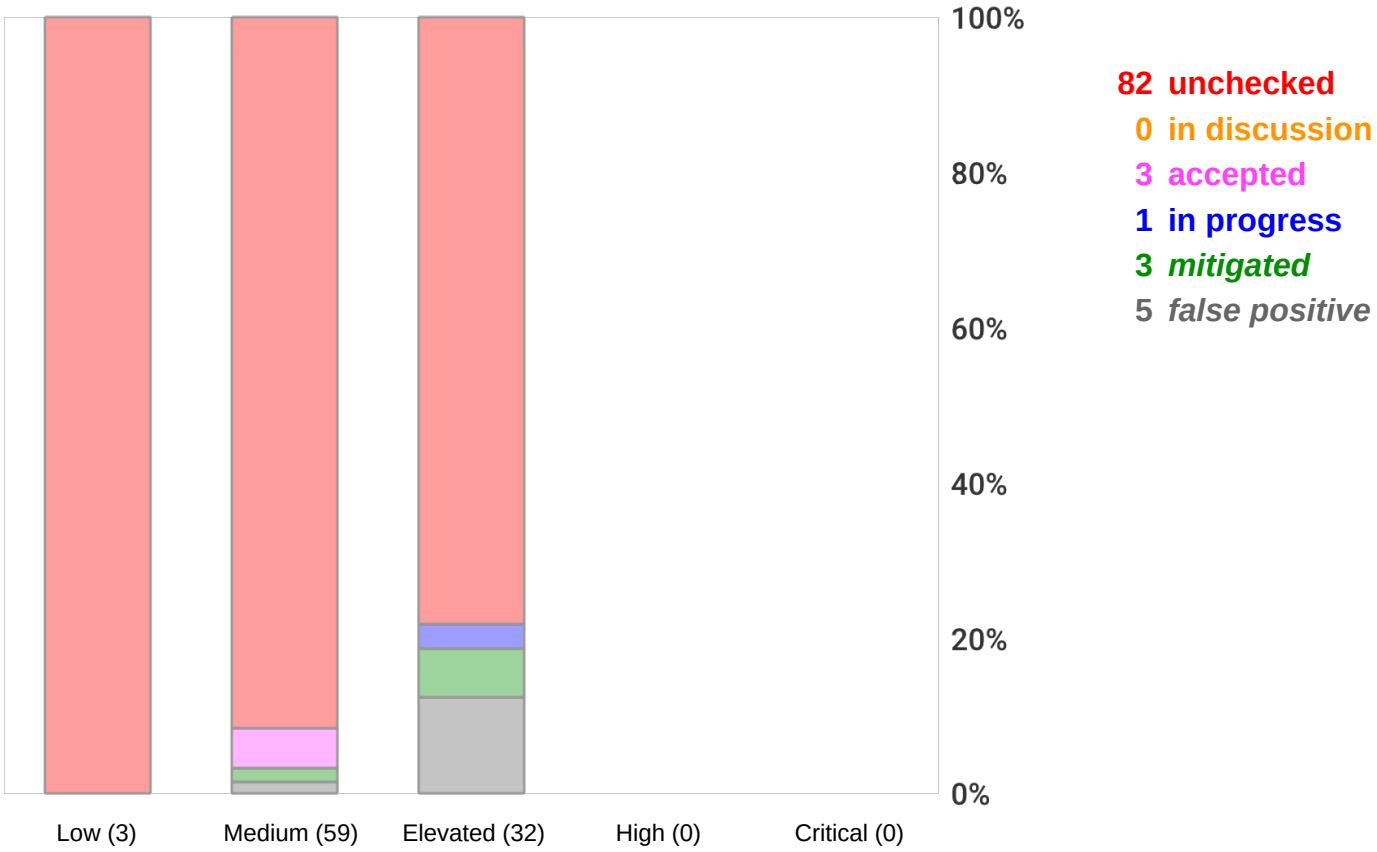
Medium: **Unchecked Deployment**: 4 Initial Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk remains unmitigated, vulnerabilities in custom-developed software or their dependencies might not be identified during continuous deployment cycles.

Medium: **Unencrypted Technical Assets**: 1 Initial Risk - Exploitation likelihood is *Unlikely* with *High* impact.
If this risk is unmitigated, attackers might be able to access unencrypted data when successfully compromising sensitive components.

Medium: **Unnecessary Data Transfer**: 2 Initial Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to target unnecessarily transferred data.

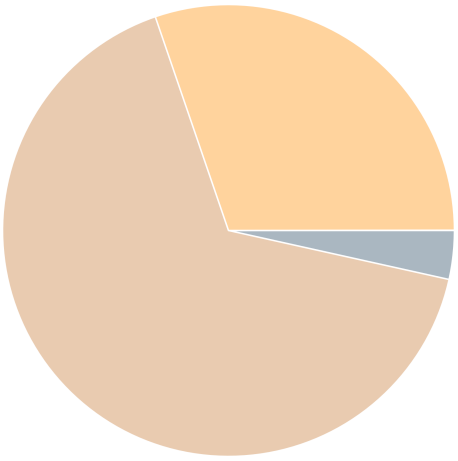
Risk Mitigation

The following chart gives a high-level overview of the risk tracking status (including mitigated risks):

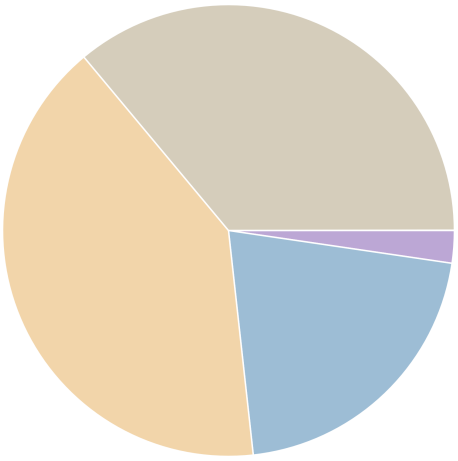


After removal of risks with status *mitigated* and *false positive* the following **86 remain unmitigated**:

0 unmitigated critical risk
0 unmitigated high risk
26 unmitigated elevated risk
57 unmitigated medium risk
3 unmitigated low risk



2 business side related
18 architecture related
35 development related
31 operations related



Impact Analysis of 86 Remaining Risks in 20 Categories

The most prevalent impacts of the **86 remaining risks** (distributed over **20 risk categories**) are (taking the severity ratings into account and using the highest for each category):
Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated: **Cross-Site Request Forgery (CSRF)**: 4 Remaining Risks - Exploitation likelihood is *Very Likely* with *Medium* impact.
If this risk remains unmitigated, attackers might be able to trick logged-in victim users into unwanted actions within the web application by visiting an attacker controlled web site.

Elevated: **Cross-Site Scripting (XSS)**: 3 Remaining Risks - Exploitation likelihood is *Likely* with *High* impact.
If this risk remains unmitigated, attackers might be able to access individual victim sessions and steal or modify user data.

Elevated: **Missing Authentication**: 6 Remaining Risks - Exploitation likelihood is *Likely* with *High* impact.
If this risk is unmitigated, attackers might be able to access or modify sensitive data in an unauthenticated way.

Elevated: **Missing Cloud Hardening**: 3 Remaining Risks - Exploitation likelihood is *Unlikely* with *Very High* impact.
If this risk is unmitigated, attackers might access cloud components in an unintended way.

Elevated: **Missing Hardening**: 4 Remaining Risks - Exploitation likelihood is *Likely* with *Medium* impact.
If this risk remains unmitigated, attackers might be able to easier attack high-value targets.

Elevated: **Missing Identity Provider Isolation**: 1 Remaining Risk - Exploitation likelihood is *Unlikely* with *Very High* impact.
If this risk is unmitigated, attackers successfully attacking other components of the system might have an easy path towards highly sensitive identity provider assets and their identity datastores, as they are not separated by network segmentation.

Elevated: **Server-Side Request Forgery (SSRF)**: 28 Remaining Risks - Exploitation likelihood is *Likely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to access sensitive services or files of network-reachable components by modifying outgoing calls of affected components.

Elevated: **Unguarded Access From Internet**: 3 Remaining Risks - Exploitation likelihood is *Very Likely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to directly attack sensitive systems without any hardening components in-between due to them being directly exposed on the internet.

Medium: **Accidental Secret Leak**: 3 Remaining Risks - Exploitation likelihood is *Unlikely* with *High* impact.
If this risk is unmitigated, attackers which have access to affected sourcecode repositories or artifact registries might find secrets accidentally checked-in.

Medium: **Code Backdooring**: 4 Remaining Risks - Exploitation likelihood is *Unlikely* with *High* impact.
If this risk remains unmitigated, attackers might be able to execute code on and completely takeover production environments.

Medium: **Container Base Image Backdooring**: 9 Remaining Risks - Exploitation likelihood is *Unlikely* with *High* impact.
If this risk is unmitigated, attackers might be able to deeply persist in the target system by executing code in deployed containers.

Medium: **Missing Build Infrastructure**: 1 Remaining Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to exploit risks unseen in this threat model due to critical build infrastructure components missing in the model.

Medium: **Missing Identity Store**: 1 Remaining Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to exploit risks unseen in this threat model in the identity provider/store that is currently missing in the model.

Medium: **Missing Network Segmentation**: 3 Remaining Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers successfully attacking other components of the system might have an easy path towards more valuable targets, as they are not separated by network segmentation.

Medium: **Missing Two-Factor Authentication (2FA)**: 2 Remaining Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to access or modify highly sensitive data without strong authentication.

Medium: **Missing Vault (Secret Storage)**: 1 Remaining Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to easier steal config secrets (like credentials, private keys, client certificates, etc.) once a vulnerability to access files is present and exploited.

Medium: **Missing Web Application Firewall (WAF)**: 3 Remaining Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to apply standard attack pattern tests at great speed without any filtering.

Medium: **Unchecked Deployment**: 4 Remaining Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk remains unmitigated, vulnerabilities in custom-developed software or their dependencies might not be identified during continuous deployment cycles.

Medium: **Unencrypted Technical Assets**: 1 Remaining Risk - Exploitation likelihood is *Unlikely* with *High* impact.
If this risk is unmitigated, attackers might be able to access unencrypted data when successfully compromising sensitive components.

Medium: **Unnecessary Data Transfer**: 2 Remaining Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
If this risk is unmitigated, attackers might be able to target unnecessarily transferred data.

Application Overview

Business Criticality

The overall business criticality of "Argo CD" was rated as:

(archive | operational | **IMPORTANT** | critical | mission-critical)

Business Overview

Some more *demo text* here and even images...

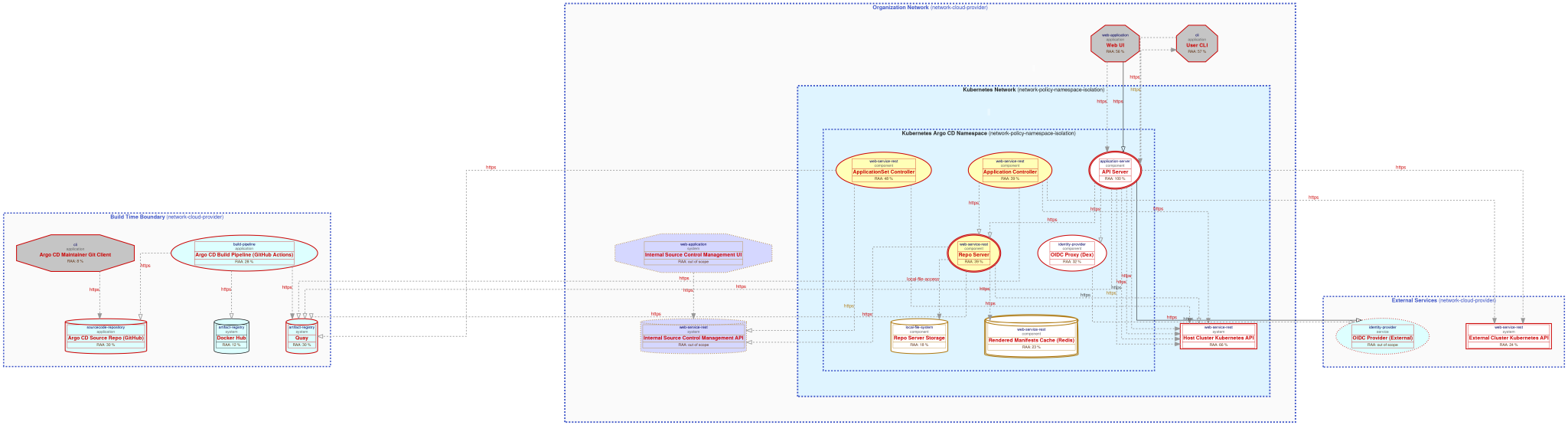
Technical Overview

Some more *demo text* here and even images...

Data-Flow Diagram

The following diagram was generated by Threagile based on the model input and gives a high-level overview of the data-flow between technical assets. The RAA value is the calculated *Relative Attacker Attractiveness* in percent. For a full high-resolution version of this diagram please refer to the PNG image file alongside this report.

Data-Flow Diagram - Argo CD



Security Requirements

This chapter lists the custom security requirements which have been defined for the modeled target.

Encryption During Transit
Data must be transported through parts of the system encrypted to prevent Malicious-In-The-Middle Attack.

Encryption at Rest
If sensitive data is stored within the Argo CD system, then this must be encrypted to prevent an attacker retrieving this data during breach.

Input Validation
Strict input validation is required to reduce the overall attack surface.

Users are restricted by RBAC
RBAC rules defined by an Argo CD operator are actually enforced for API access.

This list is not complete and regulatory or law relevant security requirements have to be taken into account as well. Also custom individual security requirements might exist for the project.

Abuse Cases

This chapter lists the custom abuse cases which have been defined for the modeled target.

Argo CD Server Compromise
As a attacker I want to compromise the integrity of an Argo CD server in order to find information on users to perform attacks

CPU Cycle Theft / Deploying Crypto-Miner
As an attacker, I want to compromise an Argo CD instance, in order to deploy a crypto-miner, to seek financial gains through stealing resources.

Code Repository Compromise
As a attacker I want to infiltrate the codebase of an Argo CD user to affect their continuous delivery.

Cross-Site Scripting Attacks
As a attacker I want to execute Cross-Site Scripting (XSS) and similar attacks in order to takeover victim sessions and cause reputational damage.

Database Compromise
As a attacker I want to access the database backend of the SQL or Redis Database in order to steal/modify sensitive business data.

Denial-of-Service
As an attacker, I want to disturb the functionality of the backend system in order to cause indirect reputational damage via unusable features.

Denial-of-Service of Argo CD Functionality
As a attacker I want to disturb the functionality of Argo CD application areas in order to cause reputational and direct damage.

Denial-of-Service of Argo CD User Functionality
As a attacker I want to disturb the functionality of Argo CD user application areas in order to cause reputational and direct damage.

Identity Theft
As a attacker I want to steal identity data in order to reuse credentials and/or keys on other targets of the same company or outside.

Kubernetes Cluster Compromise
As a attacker I want to compromise the integrity of a Kubernetes init container in order to conduct an attack.

Kubernetes Node Compromise
As a attacker I want to compromise the integrity of a Kubernetes init container in order to conduct an attack.

Kubernetes Pod Container Compromise
As a attacker I want to compromise the integrity of a Kubernetes Container in order to conduct an attack.

Kubernetes Pod Init Container Compromise
As a attacker I want to compromise the integrity of a Kubernetes init container in order to conduct an attack.

Kubernetes Pod Network Resources Compromise
As a attacker I want to compromise the integrity of a Kubernetes pod network resources in order to conduct an attack.

Kubernetes Pod Shared Storage Compromise
As a attacker I want to compromise the integrity of Kubernetes pod shared storage in order to conduct an attack.

Malicious-In-The-Middle Attack
As a attacker I want to compromise Argo CD events, Argo CD rollouts and potentional connections between servers to enumerate as attack on a system

PII Theft
As a attacker I want to steal PII (Personally Identifiable Information) data in order to blackmail the company and/or damage their repudiation by publishing them.

Poor validation
As a attacker I want to find areas in the system where validation is performed poorly so that I can attack systems.

Ransomware
As a attacker I want to encrypt the storage and file systems in order to demand ransom.

Secrets System Compromise
As a attacker I want to find out Argo CD user secrets by attacking an Argo CD user's secrets manager

Supply Chain Compromise
As a attacker I want to inflitrate the codebase of Argo CD so that I can introduce threats to the Argo project, and potentially projects using Argo CD causing both tangiable and reputational damage.

This list is not complete and regulatory or law relevant abuse cases have to be taken into account as well. Also custom individual abuse cases might exist for the project.

Tag Listing

This chapter lists what tags are used by which elements.

argocd
Argo CD Database Export

kubernetes
Argo CD Database Export, Argo CD User Provided Secret

redis
Argo CD Database Export

STRIDE Classification of Identified Risks

This chapter clusters and classifies the risks by STRIDE categories: In total **94 potential risks** have been identified during the threat modeling process of which **6 in the Spoofing** category, **31 in the Tampering** category, **0 in the Repudiation** category, **35 in the Information Disclosure** category, **0 in the Denial of Service** category, and **22 in the Elevation of Privilege** category.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Spoofing

Elevated: **Cross-Site Request Forgery (CSRF)**: 4 / 4 Risks - Exploitation likelihood is *Very Likely* with *Medium* impact.
When a web application is accessed via web protocols Cross-Site Request Forgery (CSRF) risks might arise.

Elevated: **Missing File Validation**: 0 / 1 Risk - Exploitation likelihood is *Very Likely* with *Medium* impact.
When a technical asset accepts files, these input files should be strictly validated about filename and type.

Medium: **Missing Identity Store**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.
The modeled architecture does not contain an identity store, which might be the risk of a model missing critical assets (and thus not seeing their risks).

Tampering

Elevated: **Cross-Site Scripting (XSS)**: 3 / 3 Risks - Exploitation likelihood is *Likely* with *High* impact.
For each web application Cross-Site Scripting (XSS) risks might arise. In terms of the overall risk level take other applications running on the same domain into account as well.

Elevated: **Missing Cloud Hardening**: 3 / 3 Risks - Exploitation likelihood is *Unlikely* with *Very High* impact.
Cloud components should be hardened according to the cloud vendor best practices. This affects their configuration, auditing, and further areas.

Elevated: **Missing Hardening**: 4 / 4 Risks - Exploitation likelihood is *Likely* with *Medium* impact.
Technical assets with a Relative Attacker Attractiveness (RAA) value of 55 % or higher should be explicitly hardened taking best practices and vendor hardening guides into account.

Medium: **Code Backdooring**: 4 / 4 Risks - Exploitation likelihood is *Unlikely* with *High* impact.
For each build-pipeline component Code Backdooring risks might arise where attackers compromise the build-pipeline in order to let backdoored artifacts be shipped into production. Aside from direct code backdooring this includes backdooring of dependencies and even of more lower-level build infrastructure, like backdooring compilers (similar to what the XcodeGhost

malware did) or dependencies.

Medium: **Container Base Image Backdooring**: 9 / 9 Risks - Exploitation likelihood is *Unlikely* with *High* impact.
When a technical asset is built using container technologies, Base Image Backdooring risks might arise where base images and other layers used contain vulnerable components or backdoors.

Medium: **Missing Build Infrastructure**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.
The modeled architecture does not contain a build infrastructure (devops-client, sourcecode-repo, build-pipeline, etc.), which might be the risk of a model missing critical assets (and thus not seeing their risks). If the architecture contains custom-developed parts, the pipeline where code gets developed and built needs to be part of the model.

Medium: **Missing Web Application Firewall (WAF)**: 3 / 3 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
To have a first line of filtering defense, security architectures with web-services or web-applications should include a WAF in front of them. Even though a WAF is not a replacement for security (all components must be secure even without a WAF) it adds another layer of defense to the overall system by delaying some attacks and having easier attack alerting through it.

Medium: **Unchecked Deployment**: 4 / 4 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
For each build-pipeline component Unchecked Deployment risks might arise when the build-pipeline does not include established DevSecOps best-practices. DevSecOps best-practices scan as part of CI/CD pipelines for vulnerabilities in source- or byte-code, dependencies, container layers, and dynamically against running test systems. There are several open-source and commercial tools existing in the categories DAST, SAST, and IAST.

Repudiation

n/a

Information Disclosure

Elevated: **Path-Traversal**: 0 / 1 Risk - Exploitation likelihood is *Likely* with *High* impact.
When a filesystem is accessed Path-Traversal or Local-File-Inclusion (LFI) risks might arise. The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed or stored.

Elevated: **Server-Side Request Forgery (SSRF)**: 28 / 29 Risks - Exploitation likelihood is *Likely* with *Medium* impact.
When a server system (i.e. not a client) is accessing other server systems via typical web protocols Server-Side Request Forgery (SSRF) or Local-File-Inclusion (LFI) or Remote-File-Inclusion (RFI) risks might arise.

Medium: **Accidental Secret Leak**: 3 / 3 Risks - Exploitation likelihood is *Unlikely* with *High* impact.
Sourcecode repositories (including their histories) as well as artifact registries can accidentally contain secrets like checked-in or packaged-in passwords, API tokens, certificates, crypto keys, etc.

Medium: **Missing Vault (Secret Storage)**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.
In order to avoid the risk of secret leakage via config files (when attacked through vulnerabilities being able to read files like Path-Traversal and others), it is best practice to use a separate hardened process with proper authentication, authorization, and audit logging to access config secrets (like credentials, private keys, client certificates, etc.). This component is usually some kind of Vault.

Medium: **Unencrypted Technical Assets**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *High* impact.
Due to the confidentiality rating of the technical asset itself and/or the processed data assets this technical asset must be encrypted. The risk rating depends on the sensitivity technical asset itself and of the data assets stored.

Denial of Service

n/a

Elevation of Privilege

Elevated: **Missing Authentication**: 6 / 10 Risks - Exploitation likelihood is *Likely* with *High* impact.
Technical assets (especially multi-tenant systems) should authenticate incoming requests when the asset processes or stores sensitive data.

Elevated: **Missing Identity Provider Isolation**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Very High* impact.
Highly sensitive identity provider assets and their identity datastores should be isolated from other assets by their own network segmentation trust-boundary (execution-environment boundaries do not count as network isolation).

Elevated: **Unguarded Access From Internet**: 3 / 3 Risks - Exploitation likelihood is *Very Likely* with *Medium* impact.
Internet-exposed assets must be guarded by a protecting service, application, or reverse-proxy.

Medium: **Missing Network Segmentation**: 3 / 3 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
Highly sensitive assets and/or datastores residing in the same network segment than other lower sensitive assets (like webservers or content management systems etc.) should be better protected by a network segmentation trust-boundary.

Medium: **Missing Two-Factor Authentication (2FA)**: 2 / 3 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
Technical assets (especially multi-tenant systems) should authenticate incoming requests with two-factor (2FA) authentication when the asset processes or stores highly sensitive data (in terms of confidentiality, integrity, and availability) and is accessed by humans.

Medium: **Unnecessary Data Transfer**: 2 / 2 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
When a technical asset sends or receives data assets, which it neither processes or stores this is an indicator for unnecessarily transferred data (or for an incomplete model). When the unnecessarily transferred data assets are sensitive, this poses an unnecessary risk of an increased attack surface.

Assignment by Function

This chapter clusters and assigns the risks by functions which are most likely able to check and mitigate them: In total **94 potential risks** have been identified during the threat modeling process of which **3 should be checked by Business Side**, **22 should be checked by Architecture**, **38 should be checked by Development**, and **31 should be checked by Operations**.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Business Side

Medium: **Missing Two-Factor Authentication (2FA)**: 2 / 3 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.

Apply an authentication method to the technical asset protecting highly sensitive data via two-factor authentication for human users.

Architecture

Elevated: **Missing Authentication**: 6 / 10 Risks - Exploitation likelihood is *Likely* with *High* impact.

Apply an authentication method to the technical asset. To protect highly sensitive data consider the use of two-factor authentication for human users.

Elevated: **Unguarded Access From Internet**: 3 / 3 Risks - Exploitation likelihood is *Very Likely* with *Medium* impact.

Encapsulate the asset behind a guarding service, application, or reverse-proxy. For admin maintenance a bastion-host should be used as a jump-server. For file transfer a store-and-forward-host should be used as an indirect file exchange platform.

Medium: **Missing Build Infrastructure**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.

Include the build infrastructure in the model.

Medium: **Missing Identity Store**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.

Include an identity store in the model if the application has a login.

Medium: **Missing Vault (Secret Storage)**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.

Consider using a Vault (Secret Storage) to securely store and access config secrets (like credentials, private keys, client certificates, etc.).

Medium: **Unchecked Deployment**: 4 / 4 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.

Apply DevSecOps best-practices and use scanning tools to identify vulnerabilities in source- or byte-code,dependencies, container layers, and optionally also via dynamic scans against running test systems.

Medium: **Unnecessary Data Transfer**: 2 / 2 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
Try to avoid sending or receiving sensitive data assets which are not required (i.e. neither processed or stored) by the involved technical asset.

Development

Elevated: **Cross-Site Request Forgery (CSRF)**: 4 / 4 Risks - Exploitation likelihood is *Very Likely* with *Medium* impact.
Try to use anti-CSRF tokens ot the double-submit patterns (at least for logged-in requests). When your authentication scheme depends on cookies (like session or token cookies), consider marking them with the same-site flag. When a third-party product is used instead of custom developed software, check if the product applies the proper mitigation and ensure a reasonable patch-level.

Elevated: **Cross-Site Scripting (XSS)**: 3 / 3 Risks - Exploitation likelihood is *Likely* with *High* impact.
Try to encode all values sent back to the browser and also handle DOM-manipulations in a safe way to avoid DOM-based XSS. When a third-party product is used instead of custom developed software, check if the product applies the proper mitigation and ensure a reasonable patch-level.

Elevated: **Missing File Validation**: 0 / 1 Risk - Exploitation likelihood is *Very Likely* with *Medium* impact.
Filter by file extension and discard (if feasible) the name provided. Whitelist the accepted file types and determine the mime-type on the server-side (for example via "Apache Tika" or similar checks). If the file is retrievable by endusers and/or backoffice employees, consider performing scans for popular malware (if the files can be retrieved much later than they were uploaded, also apply a fresh malware scan during retrieval to scan with newer signatures of popular malware). Also enforce limits on maximum file size to avoid denial-of-service like scenarios.

Elevated: **Path-Traversal**: 0 / 1 Risk - Exploitation likelihood is *Likely* with *High* impact.
Before accessing the file cross-check that it resides in the expected folder and is of the expected type and filename/suffix. Try to use a mapping if possible instead of directly accessing by a filename which is (partly or fully) provided by the caller. When a third-party product is used instead of custom developed software, check if the product applies the proper mitigation and ensure a reasonable patch-level.

Elevated: **Server-Side Request Forgery (SSRF)**: 28 / 29 Risks - Exploitation likelihood is *Likely* with *Medium* impact.
Try to avoid constructing the outgoing target URL with caller controllable values. Alternatively use a mapping (whitelist) when accessing outgoing URLs instead of creating them including caller controllable values. When a third-party product is used instead of custom developed software, check if the product applies the proper mitigation and ensure a reasonable patch-level.

Operations

Elevated: **Missing Cloud Hardening**: 3 / 3 Risks - Exploitation likelihood is *Unlikely* with *Very High* impact.
Apply hardening of all cloud components and services, taking special care to follow the individual risk descriptions (which depend on the cloud provider tags in the model).

Elevated: **Missing Hardening**: 4 / 4 Risks - Exploitation likelihood is *Likely* with *Medium* impact.
Try to apply all hardening best practices (like CIS benchmarks, OWASP recommendations, vendor recommendations, DevSec Hardening Framework, DBSAT for Oracle databases, and others).

Elevated: **Missing Identity Provider Isolation**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Very High* impact.
Apply a network segmentation trust-boundary around the highly sensitive identity provider assets and their identity datastores.

Medium: **Accidental Secret Leak**: 3 / 3 Risks - Exploitation likelihood is *Unlikely* with *High* impact.
Establish measures preventing accidental check-in or package-in of secrets into sourcecode repositories and artifact registries. This starts by using good .gitignore and .dockerignore files, but does not stop there. See for example tools like *"git-secrets" or "Talisman"* to have check-in preventive measures for secrets. Consider also to regularly scan your repositories for secrets accidentally checked-in using scanning tools like *"gitleaks" or "gitrob"*.

Medium: **Code Backdooring**: 4 / 4 Risks - Exploitation likelihood is *Unlikely* with *High* impact.
Reduce the attack surface of backdooring the build pipeline by not directly exposing the build pipeline components on the public internet and also not exposing it in front of unmanaged (out-of-scope) developer clients.Also consider the use of code signing to prevent code modifications.

Medium: **Container Base Image Backdooring**: 9 / 9 Risks - Exploitation likelihood is *Unlikely* with *High* impact.
Apply hardening of all container infrastructures (see for example the *CIS-Benchmarks for Docker and Kubernetes* and the *Docker Bench for Security*). Use only trusted base images of the original vendors, verify digital signatures and apply image creation best practices. Also consider using Google's *Distroless* base images or otherwise very small base images. Regularly execute container image scans with tools checking the layers for vulnerable components.

Medium: **Missing Network Segmentation**: 3 / 3 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
Apply a network segmentation trust-boundary around the highly sensitive assets and/or datastores.

Medium: **Missing Web Application Firewall (WAF)**: 3 / 3 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.
Consider placing a Web Application Firewall (WAF) in front of the web-services and/or web-applications. For cloud environments many cloud providers offer pre-configured WAFs. Even

reverse proxies can be enhances by a WAF component via ModSecurity plugins.

Medium: **Unencrypted Technical Assets**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *High* impact.
Apply encryption to the technical asset.

RAA Analysis

For each technical asset the **"Relative Attacker Attractiveness"** (RAA) value was calculated in percent. The higher the RAA, the more interesting it is for an attacker to compromise the asset. The calculation algorithm takes the sensitivity ratings and quantities of stored and processed data into account as well as the communication links of the technical asset. Neighbouring assets to high-value RAA targets might receive an increase in their RAA value when they have a communication link towards that target ("Pivoting-Factor").

The following lists all technical assets sorted by their RAA value from highest (most attacker attractive) to lowest. This list can be used to prioritize on efforts relevant for the most attacker-attractive technical assets:

Technical asset paragraphs are clickable and link to the corresponding chapter.

API Server: RAA 100%
Argo CD API server. Accepts requests from the UI and CLI.

Host Cluster Kubernetes API: RAA 66%
Kubernetes API Server for the cluster Argo CD is deployed to

User CLI: RAA 57%
User CLI

Web UI: RAA 56%
Argo CD web UI - single-page JavaScript app.

ApplicationSet Controller: RAA 48%
Some Description

Repo Server: RAA 39%
Pulls from manifests sources, builds manifests, caches manifests

Application Controller: RAA 39%
Some Description

OIDC Proxy (Dex): RAA 32%
OIDC Proxy (Dex)

Quay: RAA 30%
Quay image repository.

Argo CD Source Repo (GitHub): RAA 30%
GitHub repo holding the Argo CD source code.

Argo CD Build Pipeline (GitHub Actions): RAA 28%
Argo CD build pipeline, hosted on GitHub Actions.

External Cluster Kubernetes API: RAA 24%
Kubernetes API Server for a cluster Argo CD is managing

Rendered Manifests Cache (Redis): RAA 23%
Rendered Manifests Cache (Redis)

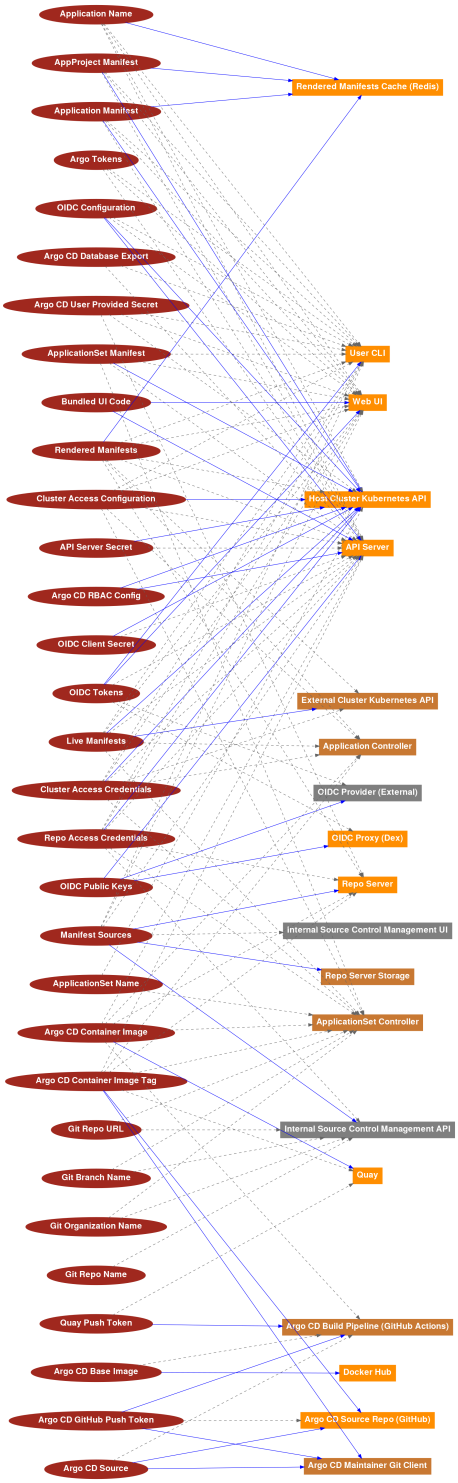
Repo Server Storage: RAA 18%
Local (by default, ephemeral) storage for the repo-server.

Docker Hub: RAA 12%
Docker Hub image repository.

Argo CD Maintainer Git Client: RAA 8%
Git client (and configuration) used by an Argo CD maintainer.

Data Mapping

The following diagram was generated by Threagile based on the model input and gives a high-level distribution of data assets across technical assets. The color matches the identified data breach probability and risk level (see the "Data Breach Probabilities" chapter for more details). A solid line stands for *data is stored by the asset* and a dashed one means *data is processed by the asset*. For a full high-resolution version of this diagram please refer to the PNG image file alongside this report.



Out-of-Scope Assets: 3 Assets

This chapter lists all technical assets that have been defined as out-of-scope. Each one should be checked in the model whether it should better be included in the overall risk analysis:

Technical asset paragraphs are clickable and link to the corresponding chapter.

Internal Source Control Management API: out-of-scope

Internal Source Control Management UI: out-of-scope

OIDC Provider (External): out-of-scope

Potential Model Failures: 5 / 5 Risks

This chapter lists potential model failures where not all relevant assets have been modeled or the model might itself contain inconsistencies. Each potential model failure should be checked in the model against the architecture design:

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium: **Missing Build Infrastructure**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.

The modeled architecture does not contain a build infrastructure (devops-client, sourcecode-repo, build-pipeline, etc.), which might be the risk of a model missing critical assets (and thus not seeing their risks). If the architecture contains custom-developed parts, the pipeline where code gets developed and built needs to be part of the model.

Medium: **Missing Identity Store**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.

The modeled architecture does not contain an identity store, which might be the risk of a model missing critical assets (and thus not seeing their risks).

Medium: **Missing Vault (Secret Storage)**: 1 / 1 Risk - Exploitation likelihood is *Unlikely* with *Medium* impact.

In order to avoid the risk of secret leakage via config files (when attacked through vulnerabilities being able to read files like Path-Traversal and others), it is best practice to use a separate hardened process with proper authentication, authorization, and audit logging to access config secrets (like credentials, private keys, client certificates, etc.). This component is usually some kind of Vault.

Medium: **Unnecessary Data Transfer**: 2 / 2 Risks - Exploitation likelihood is *Unlikely* with *Medium* impact.

When a technical asset sends or receives data assets, which it neither processes or stores this is an indicator for unnecessarily transferred data (or for an incomplete model). When the unnecessarily transferred data assets are sensitive, this poses an unnecessary risk of an increased attack surface.

Questions: 1 / 2 Questions

This chapter lists custom questions that arose during the threat modeling process.

Some question with an answer?
Some answer

Some question without an answer?
- answer pending -

Identified Risks by Vulnerability Category

In total **94 potential risks** have been identified during the threat modeling process of which **0 are rated as critical**, **0 as high**, **32 as elevated**, **59 as medium**, and **3 as low**.

These risks are distributed across **22 vulnerability categories**. The following sub-chapters of this section describe each identified risk category.

Cross-Site Request Forgery (CSRF): 4 / 4 Risks

Description (Spoofing): CWE 352

When a web application is accessed via web protocols Cross-Site Request Forgery (CSRF) risks might arise.

Impact

If this risk remains unmitigated, attackers might be able to trick logged-in victim users into unwanted actions within the web application by visiting an attacker controlled web site.

Detection Logic

In-scope web applications accessed via typical web access protocols.

Risk Rating

The risk rating depends on the integrity rating of the data sent across the communication link.

False Positives

Web applications passing the authentication sate via custom headers instead of cookies can eventually be false positives. Also when the web application is not accessed via a browser-like component (i.e not by a human user initiating the request that gets passed through all components until it reaches the web application) this can be considered a false positive.

Mitigation (Development): CSRF Prevention

Try to use anti-CSRF tokens ot the double-submit patterns (at least for logged-in requests). When your authentication scheme depends on cookies (like session or token cookies), consider marking them with the same-site flag. When a third-party product is used instead of custom developed software, check if the product applies the proper mitigation and ensure a reasonable patch-level.

ASVS Chapter: V4 - Access Control Verification Requirements
Cheat Sheet: Cross-Site_Request_Forgery_Prevention_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Cross-Site Request Forgery (CSRF)** was found **4 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Cross-Site Request Forgery (CSRF) risk at **API Server** via **Get App Code** from **Web UI**: Exploitation likelihood is *Very Likely* with *Medium* impact.

cross-site-request-forgery@api-server@web-ui>get-app-code

Unchecked

Cross-Site Request Forgery (CSRF) risk at **API Server** via **Make Requests to API Server** from **User CLI**: Exploitation likelihood is *Likely* with *Medium* impact.

cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Unchecked

Cross-Site Request Forgery (CSRF) risk at **API Server** via **Make Requests to API Server** from **Web UI**: Exploitation likelihood is *Likely* with *Medium* impact.

cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Unchecked

Cross-Site Request Forgery (CSRF) risk at **OIDC Proxy (Dex)** via **Validate Dex OIDC Token** from **API Server**: Exploitation likelihood is *Likely* with *Medium* impact.

cross-site-request-forgery@dex-server@api-server>validate-dex-oidc-token

Unchecked

Cross-Site Scripting (XSS): 3 / 3 Risks

Description (Tampering): CWE 79

For each web application Cross-Site Scripting (XSS) risks might arise. In terms of the overall risk level take other applications running on the same domain into account as well.

Impact

If this risk remains unmitigated, attackers might be able to access individual victim sessions and steal or modify user data.

Detection Logic

In-scope web applications.

Risk Rating

The risk rating depends on the sensitivity of the data processed or stored in the web application.

False Positives

When the technical asset is not accessed via a browser-like component (i.e not by a human user initiating the request that gets passed through all components until it reaches the web application) this can be considered a false positive.

Mitigation (Development): XSS Prevention

Try to encode all values sent back to the browser and also handle DOM-manipulations in a safe way to avoid DOM-based XSS. When a third-party product is used instead of custom developed software, check if the product applies the proper mitigation and ensure a reasonable patch-level.

ASVS Chapter: V5 - Validation, Sanitization and Encoding Verification Requirements
Cheat Sheet: Cross_Site_Scripting_Prevention_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Cross-Site Scripting (XSS)** was found **3 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.
Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Cross-Site Scripting (XSS) risk at **API Server**: Exploitation likelihood is *Likely* with *High* impact.

cross-site-scripting@api-server

Unchecked

Cross-Site Scripting (XSS) risk at **OIDC Proxy (Dex)**: Exploitation likelihood is *Likely* with *High* impact.

cross-site-scripting@dex-server

Unchecked

Cross-Site Scripting (XSS) risk at **Web UI**: Exploitation likelihood is *Likely* with *High* impact.

cross-site-scripting@web-ui

in Progress 2022-11-18 Michael Crenshaw

In general, Argo CD relies on the anti-XSS tools provided by React and other frontend libraries to sanitize and encode input before injecting them to the DOM.
The Argo CD team has dealt with XSS vulnerabilities in the past:

* A leaked API server encryption key can allow XSS for SSO users - https://github.com/argoproj/argo-cd/security/advisories/GHSA-pmjg-52h9-72qv

* Possible XSS when using SSO with the CLI - https://github.com/argoproj/argo-cd/security/advisories/GHSA-qq5v-f4c3-395c

* Missing XSS Protection Header - https://github.com/argoproj/argo-cd/security/advisories/GHSA-pg99-h5gc-446r

* External URLs for Deployments can include javascript - https://github.com/argoproj/argo-cd/security/advisories/GHSA-h4w9-6x78-8vrj

One area of particular interest is user-supplied links in the interface. GHSA-h4w9-6x78-8vrj showed that, where a user can insert an unsanitized link, they can cause JavaScript code to run in another user's browser.
Other links may only be provided by administrators and are therefore considered relatively trusted.
Some work to mitigate XSS is still underway:

* fix: set security headers on oidc handler responses - https://github.com/argoproj/argo-cd/pull/9854

* fix: add url validation for help chat - https://github.com/argoproj/argo-cd/pull/10417

* feat: stricter CSP - https://github.com/argoproj/argo-cd/pull/10131

Missing Authentication: 6 / 10 Risks

Description (Elevation of Privilege): CWE 306

Technical assets (especially multi-tenant systems) should authenticate incoming requests when the asset processes or stores sensitive data.

Impact

If this risk is unmitigated, attackers might be able to access or modify sensitive data in an unauthenticated way.

Detection Logic

In-scope technical assets (except load-balancer, reverse-proxy, service-registry, waf, ids, and ips and in-process calls) should authenticate incoming requests when the asset processes or stores sensitive data. This is especially the case for all multi-tenant assets (there even non-sensitive ones).

Risk Rating

The risk rating (medium or high) depends on the sensitivity of the data sent across the communication link. Monitoring callers are exempted from this risk.

False Positives

Technical assets which do not process requests regarding functionality or data linked to end-users (customers) can be considered as false positives after individual review.

Mitigation (Architecture): Authentication of Incoming Requests

Apply an authentication method to the technical asset. To protect highly sensitive data consider the use of two-factor authentication for human users.

ASVS Chapter: V2 - Authentication Verification Requirements
Cheat Sheet: Authentication_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Missing Authentication** was found **10 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Authentication covering communication link **Fetching Rendered Manifests from Cache** from **API Server** to **Repo Server**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@api-server>fetching-rendered-manifests-from-cache@api-server@repo-server

Unchecked

Missing Authentication covering communication link **Get App Code** from **Web UI** to **API Server**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@web-ui>get-app-code@web-ui@api-server

Unchecked

Missing Authentication covering communication link **Pull Base Image from Docker Hub** from **Argo CD Build Pipeline (GitHub Actions)** to **Docker Hub**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@argo-cd-build-pipeline>pull-base-image-from-docker-hub@argo-cd-build-pipeline@docker-hub

Unchecked

Missing Authentication covering communication link **Rendered Manifest Requests** from **Application Controller** to **Repo Server**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@application-controller>rendered-manifest-requests@application-controller@repo-server

Unchecked

Missing Authentication covering communication link **Send/Receive Cached Rendered Manifests** from **Repo Server** to **Rendered Manifests Cache (Redis)**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@repo-server>send-receive-cached-rendered-manifests@repo-server@rendered-manifests-cache

Unchecked

Missing Authentication covering communication link **Validate Dex OIDC Token** from **API Server** to **OIDC Proxy (Dex)**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@api-server>validate-dex-oidc-token@api-server@dex-server

Unchecked

Missing Authentication covering communication link **Pull Argo CD Image** from **API Server** to **Quay**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@api-server>pull-argo-cd-image@api-server@quay

False Positive 2022-11-17 Michael Crenshaw
The Argo CD image is public. There is no need to authenticate to Quay.

Missing Authentication covering communication link **Pull Argo CD Image** from **Application Controller** to **Quay**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@application-controller>pull-argo-cd-image@application-controller@quay

False Positive 2022-11-17 Michael Crenshaw
The Argo CD image is public. There is no need to authenticate to Quay.

Missing Authentication covering communication link **Pull Argo CD Image** from **ApplicationSet Controller** to **Quay**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@applicationset-controller>pull-argo-cd-image@applicationset-controller@quay

False Positive 2022-11-17 Michael Crenshaw
The Argo CD image is public. There is no need to authenticate to Quay.

Missing Authentication covering communication link **Pull Argo CD Image** from **Repo Server** to **Quay**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@repo-server>pull-argo-cd-image@repo-server@quay

False Positive 2022-11-17 Michael Crenshaw
The Argo CD image is public. There is no need to authenticate to Quay.

Missing Cloud Hardening: 3 / 3 Risks

Description (Tampering): CWE 1008

Cloud components should be hardened according to the cloud vendor best practices. This affects their configuration, auditing, and further areas.

Impact

If this risk is unmitigated, attackers might access cloud components in an unintended way.

Detection Logic

In-scope cloud components (either residing in cloud trust boundaries or more specifically tagged with cloud provider types).

Risk Rating

The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

False Positives

Cloud components not running parts of the target architecture can be considered as false positives after individual review.

Mitigation (Operations): Cloud Hardening

Apply hardening of all cloud components and services, taking special care to follow the individual risk descriptions (which depend on the cloud provider tags in the model).

For **Amazon Web Services (AWS)**: Follow the *CIS Benchmark for Amazon Web Services* (see also the automated checks of cloud audit tools like *"PacBot", "CloudSploit", "CloudMapper", "ScoutSuite", or "Prowler AWS CIS Benchmark Tool"*).
For EC2 and other servers running Amazon Linux, follow the *CIS Benchmark for Amazon Linux* and switch to IMDSv2.
For S3 buckets follow the *Security Best Practices for Amazon S3* at https://docs.aws.amazon.com/AmazonS3/latest/dev/security-best-practices.html to avoid accidental leakage.
Also take a look at some of these tools: https://github.com/toniblyx/my-arsenal-of-aws-security-tools

For **Microsoft Azure**: Follow the *CIS Benchmark for Microsoft Azure* (see also the automated checks of cloud audit tools like *"CloudSploit" or "ScoutSuite"*).

For **Google Cloud Platform**: Follow the *CIS Benchmark for Google Cloud Computing Platform* (see also the automated checks of cloud audit tools like *"CloudSploit" or "ScoutSuite"*).

For **Oracle Cloud Platform**: Follow the hardening best practices (see also the automated checks of cloud audit tools like *"CloudSploit"*).

ASVS Chapter: V1 - Architecture, Design and Threat Modeling Requirements
Cheat Sheet: Attack_Surface_Analysis_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Missing Cloud Hardening** was found **3 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Cloud Hardening risk at **Build Time Boundary**: Exploitation likelihood is *Unlikely* with *Very High* impact.

missing-cloud-hardening@buildtime-boundary

Unchecked

Missing Cloud Hardening risk at **External Services**: Exploitation likelihood is *Unlikely* with *Very High* impact.

missing-cloud-hardening@external-services-boundary

Unchecked

Missing Cloud Hardening risk at **Organization Network**: Exploitation likelihood is *Unlikely* with *Very High* impact.

missing-cloud-hardening@organization-network

Unchecked

Missing Hardening: 4 / 4 Risks

Description (Tampering): CWE 16

Technical assets with a Relative Attacker Attractiveness (RAA) value of 55 % or higher should be explicitly hardened taking best practices and vendor hardening guides into account.

Impact

If this risk remains unmitigated, attackers might be able to easier attack high-value targets.

Detection Logic

In-scope technical assets with RAA values of 55 % or higher. Generally for high-value targets like datastores, application servers, identity providers and ERP systems this limit is reduced to 40 %

Risk Rating

The risk rating depends on the sensitivity of the data processed or stored in the technical asset.

False Positives

Usually no false positives.

Mitigation (Operations): System Hardening

Try to apply all hardening best practices (like CIS benchmarks, OWASP recommendations, vendor recommendations, DevSec Hardening Framework, DBSAT for Oracle databases, and others).

ASVS Chapter: V14 - Configuration Verification Requirements
Cheat Sheet: Attack_Surface_Analysis_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Missing Hardening** was found **4 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Hardening risk at **API Server**: Exploitation likelihood is *Likely* with *Medium* impact.

missing-hardening@api-server

Unchecked

Missing Hardening risk at **Host Cluster Kubernetes API**: Exploitation likelihood is *Likely* with *Medium* impact.

missing-hardening@host-cluster-kubernetes-api

Unchecked

Missing Hardening risk at **User CLI**: Exploitation likelihood is *Likely* with *Medium* impact.

missing-hardening@user-cli

Unchecked

Missing Hardening risk at **Web UI**: Exploitation likelihood is *Likely* with *Medium* impact.

missing-hardening@web-ui

Unchecked

Missing Identity Provider Isolation: 1 / 1 Risk

Description (Elevation of Privilege): CWE 1008

Highly sensitive identity provider assets and their identity datastores should be isolated from other assets by their own network segmentation trust-boundary (execution-environment boundaries do not count as network isolation).

Impact

If this risk is unmitigated, attackers successfully attacking other components of the system might have an easy path towards highly sensitive identity provider assets and their identity datastores, as they are not separated by network segmentation.

Detection Logic

In-scope identity provider assets and their identity datastores when surrounded by other (not identity-related) assets (without a network trust-boundary in-between). This risk is especially prevalent when other non-identity related assets are within the same execution environment (i.e. same database or same application server).

Risk Rating

Default is high impact. The impact is increased to very-high when the asset missing the trust-boundary protection is rated as strictly-confidential or mission-critical.

False Positives

When all assets within the network segmentation trust-boundary are hardened and protected to the same extend as if all were identity providers with data of highest sensitivity.

Mitigation (Operations): Network Segmentation

Apply a network segmentation trust-boundary around the highly sensitive identity provider assets and their identity datastores.

ASVS Chapter: V1 - Architecture, Design and Threat Modeling Requirements
Cheat Sheet: Attack_Surface_Analysis_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Missing Identity Provider Isolation** was found **1 time** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Identity Provider Isolation to further encapsulate and protect identity-related asset **OIDC Proxy (Dex)** against unrelated lower protected assets **in the same network segment**, which might be easier to compromise by attackers: Exploitation likelihood is *Unlikely* with *Very High* impact.

missing-identity-provider-isolation@dex-server

Unchecked

Server-Side Request Forgery (SSRF): 28 / 29 Risks

Description (Information Disclosure): CWE 918

When a server system (i.e. not a client) is accessing other server systems via typical web protocols Server-Side Request Forgery (SSRF) or Local-File-Inclusion (LFI) or Remote-File-Inclusion (RFI) risks might arise.

Impact

If this risk is unmitigated, attackers might be able to access sensitive services or files of network-reachable components by modifying outgoing calls of affected components.

Detection Logic

In-scope non-client systems accessing (using outgoing communication links) targets with either HTTP or HTTPS protocol.

Risk Rating

The risk rating (low or medium) depends on the sensitivity of the data assets receivable via web protocols from targets within the same network trust-boundary as well on the sensitivity of the data assets receivable via web protocols from the target asset itself. Also for cloud-based environments the exploitation impact is at least medium, as cloud backend services can be attacked via SSRF.

False Positives

Servers not sending outgoing web requests can be considered as false positives after review.

Mitigation (Development): SSRF Prevention

Try to avoid constructing the outgoing target URL with caller controllable values. Alternatively use a mapping (whitelist) when accessing outgoing URLs instead of creating them including caller controllable values. When a third-party product is used instead of custom developed software, check if the product applies the proper mitigation and ensure a reasonable patch-level.

ASVS Chapter: V12 - File and Resources Verification Requirements
Cheat Sheet: Server_Side_Request_Forgery_Prevention_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Server-Side Request Forgery (SSRF)** was found **29 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **OIDC Provider (External)** via **Validate External OIDC Token**: Exploitation likelihood is *Likely* with *Medium* impact.

server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Unchecked

Server-Side Request Forgery (SSRF) risk at **Web UI** server-side web-requesting the target **API Server** via **Get App Code**: Exploitation likelihood is *Likely* with *Medium* impact.

server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Unchecked

Medium Risk Severity

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **External Cluster Kubernetes API** via **Get/Update/Delete Live Resource State from Kubernetes (External)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Get/Update/Delete Live Resource State from Kubernetes (Host)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Update Cluster Access Config**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Update RBAC Config**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Update Repo Access Credentials**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **OIDC Proxy (Dex)** via **Validate Dex OIDC Token**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Quay** via **Pull Argo CD Image**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Repo Server** via **Fetching Rendered Manifests from Cache**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **User CLI** via **Export Database**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@user-cli@api-server>export-database

Unchecked

Server-Side Request Forgery (SSRF) risk at **Application Controller** server-side web-requesting the target **External Cluster Kubernetes API** via **Reconcile Resource State (External Cluster)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Unchecked

Server-Side Request Forgery (SSRF) risk at **Application Controller** server-side web-requesting the target **Host Cluster Kubernetes API** via **Reconcile Resource State (Host Cluster)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Unchecked

Server-Side Request Forgery (SSRF) risk at **Application Controller** server-side web-requesting the target **Quay** via **Pull Argo CD Image**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Unchecked

Server-Side Request Forgery (SSRF) risk at **Application Controller** server-side web-requesting the target **Repo Server** via **Rendered Manifest Requests**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Unchecked

Server-Side Request Forgery (SSRF) risk at **ApplicationSet Controller** server-side web-requesting the target **Host Cluster Kubernetes API** via **Reconcile Resource State (Host Cluster)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Unchecked

Server-Side Request Forgery (SSRF) risk at **ApplicationSet Controller** server-side web-requesting the target **Internal Source Control Management API** via **Git Generator Pull**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Unchecked

Server-Side Request Forgery (SSRF) risk at **ApplicationSet Controller** server-side web-requesting the target **Quay** via **Pull Argo CD Image**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Unchecked

Server-Side Request Forgery (SSRF) risk at **Argo CD Build Pipeline (GitHub Actions)** server-side web-requesting the target **Docker Hub** via **Pull Base Image from Docker Hub**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@argo-cd-build-pipeline@docker-hub@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Unchecked

Server-Side Request Forgery (SSRF) risk at **Argo CD Build Pipeline (GitHub Actions)** server-side web-requesting the target **Quay** via **Push Image to Quay**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@argo-cd-build-pipeline@quay@argo-cd-build-pipeline>push-image-to-quay

Unchecked

Server-Side Request Forgery (SSRF) risk at **Argo CD Maintainer Git Client** server-side web-requesting the target **Argo CD Source Repo (GitHub)** via **Push Code/Tags to GitHub**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@argo-cd-maintainer-git-client@argo-cd-source-repo@argo-cd-maintainer-git-client>push-code-tags-to-github

Unchecked

Server-Side Request Forgery (SSRF) risk at **OIDC Proxy (Dex)** server-side web-requesting the target **OIDC Provider (External)** via **Proxying to an External OIDC Provider**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Unchecked

Server-Side Request Forgery (SSRF) risk at **Repo Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Get Repo Access Credentials**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Unchecked

Server-Side Request Forgery (SSRF) risk at **Repo Server** server-side web-requesting the target **Internal Source Control Management API** via **Fetch Manifest Sources**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Unchecked

Server-Side Request Forgery (SSRF) risk at **Repo Server** server-side web-requesting the target **Quay** via **Pull Argo CD Image**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Unchecked

Server-Side Request Forgery (SSRF) risk at **Repo Server** server-side web-requesting the target **Rendered Manifests Cache (Redis)** via **Send/Receive Cached Rendered Manifests**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Unchecked

Server-Side Request Forgery (SSRF) risk at **User CLI** server-side web-requesting the target **API Server** via **Make Requests to API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Unchecked

Server-Side Request Forgery (SSRF) risk at **Web UI** server-side web-requesting the target **API Server** via **Make Requests to API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Unchecked

Server-Side Request Forgery (SSRF) risk at **Argo CD Build Pipeline (GitHub Actions)** server-side web-requesting the target **Argo CD Source Repo (GitHub)** via **Pull Source**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@argo-cd-build-pipeline@argo-cd-source-repo@argo-cd-build-pipeline>pull-source

Mitigated 2022-11-19 Michael Crenshaw

The Argo CD build pipeline uses GitHub's checkout action to retrieve source code before building. The action accepts no input, and it should be impossible for a malicious actor (outside GitHub itself) to cause the checkout action to retrieve anything besides the Argo CD source code.

Unguarded Access From Internet: 3 / 3 Risks

Description (Elevation of Privilege): CWE 501

Internet-exposed assets must be guarded by a protecting service, application, or reverse-proxy.

Impact

If this risk is unmitigated, attackers might be able to directly attack sensitive systems without any hardening components in-between due to them being directly exposed on the internet.

Detection Logic

In-scope technical assets (excluding load-balancer) with confidentiality rating of confidential (or higher) or with integrity rating of critical (or higher) when accessed directly from the internet. All web-server, web-application, reverse-proxy, waf, and gateway assets are exempted from this risk when they do not consist of custom developed code and the data-flow only consists of HTTP or FTP protocols. Access from monitoring systems as well as VPN-protected connections are exempted.

Risk Rating

The matching technical assets are at low risk. When either the confidentiality rating is strictly-confidential or the integrity rating is mission-critical, the risk-rating is considered medium. For assets with RAA values higher than 40 % the risk-rating increases.

False Positives

When other means of filtering client requests are applied equivalent of reverse-proxy, waf, or gateway components.

Mitigation (Architecture): Encapsulation of Technical Asset

Encapsulate the asset behind a guarding service, application, or reverse-proxy. For admin maintenance a bastion-host should be used as a jump-server. For file transfer a store-and-forward-host should be used as an indirect file exchange platform.

ASVS Chapter: V1 - Architecture, Design and Threat Modeling Requirements
Cheat Sheet: Attack_Surface_Analysis_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Unguarded Access From Internet** was found **3 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Unguarded Access from Internet of **Argo CD Source Repo (GitHub)** by **Argo CD Build Pipeline (GitHub Actions)** via **Pull Source**: Exploitation likelihood is *Very Likely* with *Medium* impact.

unguarded-access-from-internet@argo-cd-source-repo@argo-cd-build-pipeline@argo-cd-build-pipeline>pull-source

Unchecked

Unguarded Access from Internet of **Docker Hub** by **Argo CD Build Pipeline (GitHub Actions)** via **Pull Base Image from Docker Hub**: Exploitation likelihood is *Very Likely* with *Medium* impact.

unguarded-access-from-internet@docker-hub@argo-cd-build-pipeline@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Unchecked

Unguarded Access from Internet of **Quay** by **Argo CD Build Pipeline (GitHub Actions)** via **Push Image to Quay**: Exploitation likelihood is *Very Likely* with *Medium* impact.

unguarded-access-from-internet@quay@argo-cd-build-pipeline@argo-cd-build-pipeline>push-image-to-quay

Unchecked

Accidental Secret Leak: 3 / 3 Risks

Description (Information Disclosure): CWE 200

Sourcecode repositories (including their histories) as well as artifact registries can accidentally contain secrets like checked-in or packaged-in passwords, API tokens, certificates, crypto keys, etc.

Impact

If this risk is unmitigated, attackers which have access to affected sourcecode repositories or artifact registries might find secrets accidentally checked-in.

Detection Logic

In-scope sourcecode repositories and artifact registries.

Risk Rating

The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

False Positives

Usually no false positives.

Mitigation (Operations): Build Pipeline Hardening

Establish measures preventing accidental check-in or package-in of secrets into sourcecode repositories and artifact registries. This starts by using good .gitignore and .dockerignore files, but does not stop there. See for example tools like *"git-secrets" or "Talisman"* to have check-in preventive measures for secrets. Consider also to regularly scan your repositories for secrets accidentally checked-in using scanning tools like *"gitleaks" or "gitrob"*.

ASVS Chapter: V14 - Configuration Verification Requirements
Cheat Sheet: Attack_Surface_Analysis_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Accidental Secret Leak** was found **3 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Accidental Secret Leak risk at **Argo CD Source Repo (GitHub)**: Exploitation likelihood is *Unlikely* with *High* impact.

accidental-secret-leak@argo-cd-source-repo

Unchecked

Accidental Secret Leak risk at **Docker Hub**: Exploitation likelihood is *Unlikely* with *High* impact.

accidental-secret-leak@docker-hub

Unchecked

Accidental Secret Leak risk at **Quay**: Exploitation likelihood is *Unlikely* with *High* impact.

accidental-secret-leak@quay

Unchecked

Code Backdooring: 4 / 4 Risks

Description (Tampering): CWE 912

For each build-pipeline component Code Backdooring risks might arise where attackers compromise the build-pipeline in order to let backdoored artifacts be shipped into production. Aside from direct code backdooring this includes backdooring of dependencies and even of more lower-level build infrastructure, like backdooring compilers (similar to what the XcodeGhost malware did) or dependencies.

Impact

If this risk remains unmitigated, attackers might be able to execute code on and completely takeover production environments.

Detection Logic

In-scope development relevant technical assets which are either accessed by out-of-scope unmanaged developer clients and/or are directly accessed by any kind of internet-located (non-VPN) component or are themselves directly located on the internet.

Risk Rating

The risk rating depends on the confidentiality and integrity rating of the code being handled and deployed as well as the placement/calling of this technical asset on/from the internet.

False Positives

When the build-pipeline and sourcecode-repo is not exposed to the internet and considered fully trusted (which implies that all accessing clients are also considered fully trusted in terms of their patch management and applied hardening, which must be equivalent to a managed developer client environment) this can be considered a false positive after individual review.

Mitigation (Operations): Build Pipeline Hardening

Reduce the attack surface of backdooring the build pipeline by not directly exposing the build pipeline components on the public internet and also not exposing it in front of unmanaged (out-of-scope) developer clients.Also consider the use of code signing to prevent code modifications.

ASVS Chapter: V10 - Malicious Code Verification Requirements
Cheat Sheet: Vulnerable_Dependency_Management_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Code Backdooring** was found **4 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Code Backdooring risk at **Argo CD Build Pipeline (GitHub Actions)**: Exploitation likelihood is *Unlikely* with *High* impact.

code-backdooring@argo-cd-build-pipeline

Unchecked

Code Backdooring risk at **Argo CD Source Repo (GitHub)**: Exploitation likelihood is *Unlikely* with *High* impact.

code-backdooring@argo-cd-source-repo

Unchecked

Code Backdooring risk at **Docker Hub**: Exploitation likelihood is *Unlikely* with *High* impact.

code-backdooring@docker-hub

Unchecked

Code Backdooring risk at **Quay**: Exploitation likelihood is *Unlikely* with *High* impact.

code-backdooring@quay

Unchecked

Container Base Image Backdooring: 9 / 9 Risks

Description (Tampering): CWE 912

When a technical asset is built using container technologies, Base Image Backdooring risks might arise where base images and other layers used contain vulnerable components or backdoors.

See for example:
https://techcrunch.com/2018/06/15/tainted-crypto-mining-containers-pulled-from-docker-hub/

Impact

If this risk is unmitigated, attackers might be able to deeply persist in the target system by executing code in deployed containers.

Detection Logic

In-scope technical assets running as containers.

Risk Rating

The risk rating depends on the sensitivity of the technical asset itself and of the data assets.

False Positives

Fully trusted (i.e. reviewed and cryptographically signed or similar) base images of containers can be considered as false positives after individual review.

Mitigation (Operations): Container Infrastructure Hardening

Apply hardening of all container infrastructures (see for example the *CIS-Benchmarks for Docker and Kubernetes* and the *Docker Bench for Security*). Use only trusted base images of the original vendors, verify digital signatures and apply image creation best practices. Also consider using Google's *Distroless* base images or otherwise very small base images. Regularly execute container image scans with tools checking the layers for vulnerable components.

ASVS Chapter: V10 - Malicious Code Verification Requirements
Cheat Sheet: Docker_Security_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS/CSVS applied?

Risk Findings

The risk **Container Base Image Backdooring** was found **9 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Container Base Image Backdooring risk at **API Server**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@api-server

Unchecked

Container Base Image Backdooring risk at **Application Controller**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@application-controller

Unchecked

Container Base Image Backdooring risk at **ApplicationSet Controller**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@applicationset-controller

Unchecked

Container Base Image Backdooring risk at **External Cluster Kubernetes API**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@external-cluster-kubernetes-api

Unchecked

Container Base Image Backdooring risk at **Host Cluster Kubernetes API**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@host-cluster-kubernetes-api

Unchecked

Container Base Image Backdooring risk at **OIDC Proxy (Dex)**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@dex-server

Unchecked

Container Base Image Backdooring risk at **Rendered Manifests Cache (Redis)**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@rendered-manifests-cache

Unchecked

Container Base Image Backdooring risk at **Repo Server Storage**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@repo-server-storage

Unchecked

Container Base Image Backdooring risk at **Repo Server**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@repo-server

Unchecked

Missing Build Infrastructure: 1 / 1 Risk

Description (Tampering): CWE 1127

The modeled architecture does not contain a build infrastructure (devops-client, sourcecode-repo, build-pipeline, etc.), which might be the risk of a model missing critical assets (and thus not seeing their risks). If the architecture contains custom-developed parts, the pipeline where code gets developed and built needs to be part of the model.

Impact

If this risk is unmitigated, attackers might be able to exploit risks unseen in this threat model due to critical build infrastructure components missing in the model.

Detection Logic

Models with in-scope custom-developed parts missing in-scope development (code creation) and build infrastructure components (devops-client, sourcecode-repo, build-pipeline, etc.).

Risk Rating

The risk rating depends on the highest sensitivity of the in-scope assets running custom-developed parts.

False Positives

Models not having any custom-developed parts can be considered as false positives after individual review.

Mitigation (Architecture): Build Pipeline Hardening

Include the build infrastructure in the model.

ASVS Chapter: V1 - Architecture, Design and Threat Modeling Requirements
Cheat Sheet: Attack_Surface_Analysis_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Missing Build Infrastructure** was found **1 time** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Missing Build Infrastructure in the threat model (referencing asset **Application Controller** as an example): Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-build-infrastructure@application-controller

Unchecked

Missing Identity Store: 1 / 1 Risk

Description (Spoofing): CWE 287

The modeled architecture does not contain an identity store, which might be the risk of a model missing critical assets (and thus not seeing their risks).

Impact

If this risk is unmitigated, attackers might be able to exploit risks unseen in this threat model in the identity provider/store that is currently missing in the model.

Detection Logic

Models with authenticated data-flows authorized via enduser-identity missing an in-scope identity store.

Risk Rating

The risk rating depends on the sensitivity of the enduser-identity authorized technical assets and their data assets processed and stored.

False Positives

Models only offering data/services without any real authentication need can be considered as false positives after individual review.

Mitigation (Architecture): Identity Store

Include an identity store in the model if the application has a login.

ASVS Chapter: V2 - Authentication Verification Requirements
Cheat Sheet: Authentication_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Missing Identity Store** was found **1 time** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Missing Identity Store in the threat model (referencing asset **User CLI** as an example): Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-identity-store@user-cli

Unchecked

Missing Network Segmentation: 3 / 3 Risks

Description (Elevation of Privilege): CWE 1008

Highly sensitive assets and/or datastores residing in the same network segment than other lower sensitive assets (like webservers or content management systems etc.) should be better protected by a network segmentation trust-boundary.

Impact

If this risk is unmitigated, attackers successfully attacking other components of the system might have an easy path towards more valuable targets, as they are not separated by network segmentation.

Detection Logic

In-scope technical assets with high sensitivity and RAA values as well as datastores when surrounded by assets (without a network trust-boundary in-between) which are of type client-system, web-server, web-application, cms, web-service-rest, web-service-soap, build-pipeline, sourcecode-repository, monitoring, or similar and there is no direct connection between these (hence no requirement to be so close to each other).

Risk Rating

Default is low risk. The risk is increased to medium when the asset missing the trust-boundary protection is rated as strictly-confidential or mission-critical.

False Positives

When all assets within the network segmentation trust-boundary are hardened and protected to the same extend as if all were containing/processing highly sensitive data.

Mitigation (Operations): Network Segmentation

Apply a network segmentation trust-boundary around the highly sensitive assets and/or datastores.

ASVS Chapter: V1 - Architecture, Design and Threat Modeling Requirements
Cheat Sheet: Attack_Surface_Analysis_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Missing Network Segmentation** was found **3 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Missing Network Segmentation to further encapsulate and protect **API Server** against unrelated lower protected assets in the same network segment, which might be easier to compromise by attackers: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-network-segmentation@api-server

Unchecked

Missing Network Segmentation to further encapsulate and protect **User CLI** against unrelated lower protected assets in the same network segment, which might be easier to compromise by attackers: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-network-segmentation@user-cli

Unchecked

Missing Network Segmentation to further encapsulate and protect **Web UI** against unrelated lower protected assets in the same network segment, which might be easier to compromise by attackers: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-network-segmentation@web-ui

Unchecked

Missing Two-Factor Authentication (2FA): 2 / 3 Risks

Description (Elevation of Privilege): CWE 308

Technical assets (especially multi-tenant systems) should authenticate incoming requests with two-factor (2FA) authentication when the asset processes or stores highly sensitive data (in terms of confidentiality, integrity, and availability) and is accessed by humans.

Impact

If this risk is unmitigated, attackers might be able to access or modify highly sensitive data without strong authentication.

Detection Logic

In-scope technical assets (except load-balancer, reverse-proxy, waf, ids, and ips) should authenticate incoming requests via two-factor authentication (2FA) when the asset processes or stores highly sensitive data (in terms of confidentiality, integrity, and availability) and is accessed by a client used by a human user.

Risk Rating

medium

False Positives

Technical assets which do not process requests regarding functionality or data linked to end-users (customers) can be considered as false positives after individual review.

Mitigation (Business Side): Authentication with Second Factor (2FA)

Apply an authentication method to the technical asset protecting highly sensitive data via two-factor authentication for human users.

ASVS Chapter: V2 - Authentication Verification Requirements
Cheat Sheet: Multifactor_Authentication_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Missing Two-Factor Authentication (2FA)** was found **3 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Missing Two-Factor Authentication covering communication link **Make Requests to API Server** from **User CLI** to **API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Accepted 2022-11-19 Michael Crenshaw https://github.com/argoproj/argo-cd/issues/10232

Argo CD does not yet support 2FA for API actions. It has been requested, specifically when users attempt sensitive API calls.

Argo CD does support OIDC providers which may require 2FA for login.

Missing Two-Factor Authentication covering communication link **Make Requests to API Server** from **Web UI** to **API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Accepted 2022-11-19 Michael Crenshaw https://github.com/argoproj/argo-cd/issues/10232

Argo CD does not yet support 2FA for API actions. It has been requested, specifically when users attempt sensitive API calls.

Argo CD does support OIDC providers which may require 2FA for login.

Missing Two-Factor Authentication covering communication link **Get App Code** from **Web UI** to **API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-authentication-second-factor@web-ui>get-app-code@web-ui@api-server

False Positive 2022-11-19 Michael Crenshaw

2FA does not make sense when fetching the app code, since Argo CD app code is public.

Missing Vault (Secret Storage): 1 / 1 Risk

Description (Information Disclosure): CWE 522

In order to avoid the risk of secret leakage via config files (when attacked through vulnerabilities being able to read files like Path-Traversal and others), it is best practice to use a separate hardened process with proper authentication, authorization, and audit logging to access config secrets (like credentials, private keys, client certificates, etc.). This component is usually some kind of Vault.

Impact

If this risk is unmitigated, attackers might be able to easier steal config secrets (like credentials, private keys, client certificates, etc.) once a vulnerability to access files is present and exploited.

Detection Logic

Models without a Vault (Secret Storage).

Risk Rating

The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

False Positives

Models where no technical assets have any kind of sensitive config data to protect can be considered as false positives after individual review.

Mitigation (Architecture): Vault (Secret Storage)

Consider using a Vault (Secret Storage) to securely store and access config secrets (like credentials, private keys, client certificates, etc.).

ASVS Chapter: V6 - Stored Cryptography Verification Requirements
Cheat Sheet: Cryptographic_Storage_Cheat_Sheet

Check

Is a Vault (Secret Storage) in place?

Risk Findings

The risk **Missing Vault (Secret Storage)** was found **1 time** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Missing Vault (Secret Storage) in the threat model (referencing asset **Internal Source Control Management API** as an example): Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-vault@internal-source-control-management-api

Unchecked

Missing Web Application Firewall (WAF): 3 / 3 Risks

Description (Tampering): CWE 1008

To have a first line of filtering defense, security architectures with web-services or web-applications should include a WAF in front of them. Even though a WAF is not a replacement for security (all components must be secure even without a WAF) it adds another layer of defense to the overall system by delaying some attacks and having easier attack alerting through it.

Impact

If this risk is unmitigated, attackers might be able to apply standard attack pattern tests at great speed without any filtering.

Detection Logic

In-scope web-services and/or web-applications accessed across a network trust boundary not having a Web Application Firewall (WAF) in front of them.

Risk Rating

The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

False Positives

Targets only accessible via WAFs or reverse proxies containing a WAF component (like ModSecurity) can be considered as false positives after individual review.

Mitigation (Operations): Web Application Firewall (WAF)

Consider placing a Web Application Firewall (WAF) in front of the web-services and/or web-applications. For cloud environments many cloud providers offer pre-configured WAFs. Even reverse proxies can be enhances by a WAF component via ModSecurity plugins.

ASVS Chapter: V1 - Architecture, Design and Threat Modeling Requirements
Cheat Sheet: Virtual_Patching_Cheat_Sheet

Check

Is a Web Application Firewall (WAF) in place?

Risk Findings

The risk **Missing Web Application Firewall (WAF)** was found **3 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Missing Web Application Firewall (WAF) risk at **API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-waf@api-server

Unchecked

Missing Web Application Firewall (WAF) risk at **External Cluster Kubernetes API**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-waf@external-cluster-kubernetes-api

Unchecked

Missing Web Application Firewall (WAF) risk at **Host Cluster Kubernetes API**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-waf@host-cluster-kubernetes-api

Unchecked

Unchecked Deployment: 4 / 4 Risks

Description (Tampering): CWE 1127

For each build-pipeline component Unchecked Deployment risks might arise when the build-pipeline does not include established DevSecOps best-practices. DevSecOps best-practices scan as part of CI/CD pipelines for vulnerabilities in source- or byte-code, dependencies, container layers, and dynamically against running test systems. There are several open-source and commercial tools existing in the categories DAST, SAST, and IAST.

Impact

If this risk remains unmitigated, vulnerabilities in custom-developed software or their dependencies might not be identified during continuous deployment cycles.

Detection Logic

All development-relevant technical assets.

Risk Rating

The risk rating depends on the highest rating of the technical assets and data assets processed by deployment-receiving targets.

False Positives

When the build-pipeline does not build any software components it can be considered a false positive after individual review.

Mitigation (Architecture): Build Pipeline Hardening

Apply DevSecOps best-practices and use scanning tools to identify vulnerabilities in source- or byte-code,dependencies, container layers, and optionally also via dynamic scans against running test systems.

ASVS Chapter: V14 - Configuration Verification Requirements
Cheat Sheet: Vulnerable_Dependency_Management_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Unchecked Deployment** was found **4 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Unchecked Deployment risk at **Argo CD Build Pipeline (GitHub Actions)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

unchecked-deployment@argo-cd-build-pipeline

Unchecked

Low Risk Severity

Unchecked Deployment risk at **Argo CD Source Repo (GitHub)**: Exploitation likelihood is *Unlikely* with *Low* impact.

unchecked-deployment@argo-cd-source-repo

Unchecked

Unchecked Deployment risk at **Docker Hub**: Exploitation likelihood is *Unlikely* with *Low* impact.

unchecked-deployment@docker-hub

Unchecked

Unchecked Deployment risk at **Quay**: Exploitation likelihood is *Unlikely* with *Low* impact.

unchecked-deployment@quay

Unchecked

Unencrypted Technical Assets: 1 / 1 Risk

Description (Information Disclosure): CWE 311

Due to the confidentiality rating of the technical asset itself and/or the processed data assets this technical asset must be encrypted. The risk rating depends on the sensitivity technical asset itself and of the data assets stored.

Impact

If this risk is unmitigated, attackers might be able to access unencrypted data when successfully compromising sensitive components.

Detection Logic

In-scope unencrypted technical assets (excluding reverse-proxy, load-balancer, waf, ids, ips and embedded components like library) storing data assets rated at least as confidential or critical. For technical assets storing data assets rated as strictly-confidential or mission-critical the encryption must be of type data-with-enduser-individual-key.

Risk Rating

Depending on the confidentiality rating of the stored data-assets either medium or high risk.

False Positives

When all sensitive data stored within the asset is already fully encrypted on document or data level.

Mitigation (Operations): Encryption of Technical Asset

Apply encryption to the technical asset.

ASVS Chapter: V6 - Stored Cryptography Verification Requirements
Cheat Sheet: Cryptographic_Storage_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Unencrypted Technical Assets** was found **1 time** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Unencrypted Technical Asset named **Repo Server Storage** missing enduser-individual encryption with data-with-enduser-individual-key: Exploitation likelihood is *Unlikely* with *High* impact.

unencrypted-asset@repo-server-storage

Accepted 2022-11-19 Michael Crenshaw

The Argo CD repo-server does not encrypt resources at rest on the disk cache.

The cache should not contain any secrets. The cache holds the contents of git and Helm repositories, which are not designed for storing secrets. Users may choose to store secrets on the repo-server (for example, when using a plugin that injects secrets into manifests). Those users should consider adding encryption to their plugins.

All users should consider Kubernetes- and cloud provider-level encryption for storage used by Argo CD.

Unnecessary Data Transfer: 2 / 2 Risks

Description (Elevation of Privilege): CWE 1008

When a technical asset sends or receives data assets, which it neither processes or stores this is an indicator for unnecessarily transferred data (or for an incomplete model). When the unnecessarily transferred data assets are sensitive, this poses an unnecessary risk of an increased attack surface.

Impact

If this risk is unmitigated, attackers might be able to target unnecessarily transferred data.

Detection Logic

In-scope technical assets sending or receiving sensitive data assets which are neither processed nor stored by the technical asset are flagged with this risk. The risk rating (low or medium) depends on the confidentiality, integrity, and availability rating of the technical asset. Monitoring data is exempted from this risk.

Risk Rating

The risk assessment is depending on the confidentiality and integrity rating of the transferred data asset either low or medium.

False Positives

Technical assets missing the model entries of either processing or storing the mentioned data assets can be considered as false positives (incomplete models) after individual review. These should then be addressed by completing the model so that all necessary data assets are processed and/or stored by the technical asset involved.

Mitigation (Architecture): Attack Surface Reduction

Try to avoid sending or receiving sensitive data assets which are not required (i.e. neither processed or stored) by the involved technical asset.

ASVS Chapter: V1 - Architecture, Design and Threat Modeling Requirements
Cheat Sheet: Attack_Surface_Analysis_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Unnecessary Data Transfer** was found **2 times** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Unnecessary Data Transfer of **Argo CD User Provided Secret** data at **API Server** from/to **User CLI**: Exploitation likelihood is *Unlikely* with *Medium* impact.

unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Unchecked

Unnecessary Data Transfer of **Argo CD User Provided Secret** data at **API Server** from/to **Web UI**: Exploitation likelihood is *Unlikely* with *Medium* impact.

unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Unchecked

Missing File Validation: 0 / 1 Risk

Description (Spoofing): CWE 434

When a technical asset accepts files, these input files should be strictly validated about filename and type.

Impact

If this risk is unmitigated, attackers might be able to provide malicious files to the application.

Detection Logic

In-scope technical assets with custom-developed code accepting file data formats.

Risk Rating

The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

False Positives

Fully trusted (i.e. cryptographically signed or similar) files can be considered as false positives after individual review.

Mitigation (Development): File Validation

Filter by file extension and discard (if feasible) the name provided. Whitelist the accepted file types and determine the mime-type on the server-side (for example via "Apache Tika" or similar checks). If the file is retrievable by endusers and/or backoffice employees, consider performing scans for popular malware (if the files can be retrieved much later than they were uploaded, also apply a fresh malware scan during retrieval to scan with newer signatures of popular malware). Also enforce limits on maximum file size to avoid denial-of-service like scenarios.

ASVS Chapter: V12 - File and Resources Verification Requirements
Cheat Sheet: File_Upload_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Missing File Validation** was found **1 time** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing File Validation risk at **Repo Server**: Exploitation likelihood is *Very Likely* with *Medium* impact.

missing-file-validation@repo-server

Mitigated 2022-11-18 Michael Crenshaw

The Argo CD repo server accepts files from a number of sources. First, it accepts files from Git and Helm repositories. Second, it accepts files from users via the API when they do "local syncs" or "local diffs".
The repo server has several lines of defense against invalid file inputs.
1) Some storage mechanisms limit file size by default (for example git, unless LFS is enabled).
2) The repo-server enforces a secondary, user-configured file size limit for directory-type apps (since those files are read directly into memory).

3) The repo-server relies on configuration management tools (Helm, Kustomize, jsonnet) to only accept valid input.
4) The repo-server, by default, disallows symlink files which exit the repository boundaries.

Path-Traversal: 0 / 1 Risk

Description (Information Disclosure): CWE 22

When a filesystem is accessed Path-Traversal or Local-File-Inclusion (LFI) risks might arise. The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed or stored.

Impact

If this risk is unmitigated, attackers might be able to read sensitive files (configuration data, key/credential files, deployment files, business data files, etc.) from the filesystem of affected components.

Detection Logic

Filesystems accessed by in-scope callers.

Risk Rating

The risk rating depends on the sensitivity of the data stored inside the technical asset.

False Positives

File accesses by filenames not consisting of parts controllable by the caller can be considered as false positives after individual review.

Mitigation (Development): Path-Traversal Prevention

Before accessing the file cross-check that it resides in the expected folder and is of the expected type and filename/suffix. Try to use a mapping if possible instead of directly accessing by a filename which is (partly or fully) provided by the caller. When a third-party product is used instead of custom developed software, check if the product applies the proper mitigation and ensure a reasonable patch-level.

ASVS Chapter: V12 - File and Resources Verification Requirements
Cheat Sheet: Input_Validation_Cheat_Sheet

Check

Are recommendations from the linked cheat sheet and referenced ASVS chapter applied?

Risk Findings

The risk **Path-Traversal** was found **1 time** in the analyzed architecture to be potentially possible. Each spot should be checked individually by reviewing the implementation whether all controls have been applied properly in order to mitigate each risk.

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Path-Traversal risk at **Repo Server** against filesystem **Repo Server Storage** via **Store Cached Manifest Sources**: Exploitation likelihood is *Likely* with *High* impact.

path-traversal@repo-server@repo-server-storage@repo-server>store-cached-manifest-sources

Mitigated 2022-11-19 Michael Crenshaw

The repo server maintains a cache of git and Helm repo contents. The cache should not contain secrets, but it might contain otherwise-sensitive information. If multiple tenants use the same Argo CD instance, an attacker from one tenant may try to access the manifests owned by another tenant.

The repo server component has suffered from a variety of path traversal and symlink following bugs. In response, we have built strong safeguards against these attacks.

1) Symlinks exiting the repository bounds are blocked by default.

2) All user path inputs are run through a standard path traversal detection library. That library has good unit test coverage.

3) The config management tools (Helm, Jsonnet, Kustomize) have built-in path traversal prevention mechanisms.

4) Cache directories have random names (cryptographically-secure random UUIDs). The directories' permissions are locked down when the directories are not actively in use. This makes many traversal attacks impractical.

Previously discovered and resolved path traversal and symlink following bugs include the following:

* Symlink following allows leaking out-of-bounds YAML files from Argo CD repo-server - https://github.com/argoproj/argo-cd/security/advisories/GHSA-q4w5-4gq2-98vm
* Symlink following allows leaking out-of-bound manifests and JSON files from Argo CD repo-server - https://github.com/argoproj/argo-cd/security/advisories/GHSA-6gcg-hp2x-q54h
* Path traversal and improper access control allows leaking out-of-bound files from Argo CD repo-server - https://github.com/argoproj/argo-cd/security/advisories/GHSA-r9cr-hvjj-496v
* Path traversal allows leaking out-of-bound files from Argo CD repo-server - https://github.com/argoproj/argo-cd/security/advisories/GHSA-h6h5-6fmq-rh28
* Path traversal and dereference of symlinks when passing Helm value files - https://github.com/argoproj/argo-cd/security/advisories/GHSA-63qx-x74g-jcr7

Identified Risks by Technical Asset

In total **94 potential risks** have been identified during the threat modeling process of which **0 are rated as critical**, **0 as high**, **32 as elevated**, **59 as medium**, and **3 as low**.

These risks are distributed across **16 in-scope technical assets**. The following sub-chapters of this section describe each identified risk grouped by technical asset. The RAA value of a technical asset is the calculated "Relative Attacker Attractiveness" value in percent.

API Server: 23 / 24 Risks

Description

Argo CD API server. Accepts requests from the UI and CLI.

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Cross-Site Scripting (XSS) risk at **API Server**: Exploitation likelihood is *Likely* with *High* impact.

cross-site-scripting@api-server

Unchecked

Missing Authentication covering communication link **Get App Code** from **Web UI** to **API Server**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@web-ui>get-app-code@web-ui@api-server

Unchecked

Cross-Site Request Forgery (CSRF) risk at **API Server** via **Get App Code** from **Web UI**: Exploitation likelihood is *Very Likely* with *Medium* impact.

cross-site-request-forgery@api-server@web-ui>get-app-code

Unchecked

Cross-Site Request Forgery (CSRF) risk at **API Server** via **Make Requests to API Server** from **User CLI**: Exploitation likelihood is *Likely* with *Medium* impact.

cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Unchecked

Cross-Site Request Forgery (CSRF) risk at **API Server** via **Make Requests to API Server** from **Web UI**: Exploitation likelihood is *Likely* with *Medium* impact.

cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Unchecked

Missing Hardening risk at **API Server**: Exploitation likelihood is *Likely* with *Medium* impact.

missing-hardening@api-server

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **OIDC Provider (External)** via **Validate External OIDC Token**: Exploitation likelihood is *Likely* with *Medium* impact.

server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Unchecked

Medium Risk Severity

Container Base Image Backdooring risk at **API Server**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@api-server

Unchecked

Missing Network Segmentation to further encapsulate and protect **API Server** against unrelated lower protected assets in the same network segment, which might be easier to compromise by attackers: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-network-segmentation@api-server

Unchecked

Missing Web Application Firewall (WAF) risk at **API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-waf@api-server

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **External Cluster Kubernetes API** via **Get/Update/Delete Live Resource State from Kubernetes (External)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Get/Update/Delete Live Resource State from Kubernetes (Host)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Update Cluster Access Config**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Update RBAC Config**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Update Repo Access Credentials**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **OIDC Proxy (Dex)** via **Validate Dex OIDC Token**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Quay** via **Pull Argo CD Image**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **Repo Server** via **Fetching Rendered Manifests from Cache**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Unchecked

Server-Side Request Forgery (SSRF) risk at **API Server** server-side web-requesting the target **User CLI** via **Export Database**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@api-server@user-cli@api-server>export-database

Unchecked

Unnecessary Data Transfer of **Argo CD User Provided Secret** data at **API Server** from/to **User CLI**: Exploitation likelihood is *Unlikely* with *Medium* impact.

unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Unchecked

Unnecessary Data Transfer of **Argo CD User Provided Secret** data at **API Server** from/to **Web UI**: Exploitation likelihood is *Unlikely* with *Medium* impact.

unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Unchecked

Missing Two-Factor Authentication covering communication link **Make Requests to API Server** from **User CLI** to **API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Accepted 2022-11-19 Michael Crenshaw https://github.com/argoproj/argo-cd/issues/10232
Argo CD does not yet support 2FA for API actions. It has been requested, specifically when users attempt sensitive API calls.
Argo CD does support OIDC providers which may require 2FA for login.

Missing Two-Factor Authentication covering communication link **Make Requests to API Server** from **Web UI** to **API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Accepted 2022-11-19 Michael Crenshaw https://github.com/argoproj/argo-cd/issues/10232
Argo CD does not yet support 2FA for API actions. It has been requested, specifically when users attempt sensitive API calls.
Argo CD does support OIDC providers which may require 2FA for login.

Missing Two-Factor Authentication covering communication link **Get App Code** from **Web UI** to **API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-authentication-second-factor@web-ui>get-app-code@web-ui@api-server

False Positive 2022-11-19 Michael Crenshaw
2FA does not make sense when fetching the app code, since Argo CD app code is public.

Asset Information

ID:	api-server
Type:	process
Usage:	devops
RAA:	100 %
Size:	component
Technology:	application-server
Tags:	none
Internet:	false
Machine:	container
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	true
Custom-Developed:	false
Client by Human:	false
Data Processed:	API Server Secret, AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo CD Container Image, Argo CD Container Image Tag, Argo CD Database Export, Argo CD RBAC Config, Argo Tokens, Cluster Access Configuration, Cluster Access Credentials, Live Manifests, Manifest Sources, OIDC Client Secret, OIDC Configuration, OIDC Public Keys, OIDC Tokens, Rendered Manifests, Repo Access Credentials
Data Stored:	Argo CD RBAC Config, Bundled UI Code, OIDC Configuration, OIDC Public Keys
Formats Accepted:	CSV, File, JSON

Asset Rating

Owner:	Argo CD Operator	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Outgoing Communication Links: 10
Target technical asset names are clickable and link to the corresponding chapter.

Validate External OIDC Token (outgoing)
Get public keys from OIDC provider to validate tokens.

Target:	OIDC Provider (External)
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	business
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	none
Data Received:	OIDC Public Keys

Validate Dex OIDC Token (outgoing)
Get public keys from Dex server to validate tokens.

Target:	OIDC Proxy (Dex)
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	true
Data Sent:	none
Data Received:	OIDC Public Keys

Update Repo Access Credentials (outgoing)
Write changes from the UI/CLI/API to repo secrets.

Target:	Host Cluster Kubernetes API
Protocol:	https

Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Repo Access Credentials
Data Received:	Repo Access Credentials

Update RBAC Config (outgoing)
Write changes from the UI/CLI/API to RBAC config.

Target:	Host Cluster Kubernetes API
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Argo CD RBAC Config
Data Received:	Argo CD RBAC Config

Update Cluster Access Config (outgoing)
Write changes from the UI/CLI/API to cluster secrets.

Target:	Host Cluster Kubernetes API
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false

Data Sent:	Cluster Access Configuration, Cluster Access Credentials
Data Received:	Cluster Access Configuration, Cluster Access Credentials

Pull Argo CD Image (outgoing)

Pull the Argo CD container image from Quay.

Target:	Quay
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Argo CD Container Image Tag
Data Received:	Argo CD Container Image

Get/Update/Delete Live Resource State from Kubernetes (Host) (outgoing)

Get the live state of an Argo CD-managed resource, or potentially update or delete a resource.

Target:	Host Cluster Kubernetes API
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Application Name, Argo CD RBAC Config, Cluster Access Configuration, Cluster Access Credentials, OIDC Client Secret, OIDC Configuration, Rendered Manifests, Repo Access Credentials
Data Received:	API Server Secret, Argo CD RBAC Config, Cluster Access Configuration, Cluster Access Credentials, Live Manifests, OIDC Client Secret, OIDC Configuration, Repo Access Credentials

Get/Update/Delete Live Resource State from Kubernetes (External) (outgoing)

Get the live state of an Argo CD-managed resource, or potentially update or delete a resource on an external cluster.

Target:	External Cluster Kubernetes API
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Application Name, Cluster Access Credentials, Rendered Manifests
Data Received:	Live Manifests

Fetching Rendered Manifests from Cache (outgoing)
Fetch manifests from the repo server to display via UI or CLI.

Target:	Repo Server
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	true
Data Sent:	Application Name
Data Received:	Rendered Manifests

Export Database (outgoing)
Send database export to Admin Argo CD User

Target:	User CLI
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	enduser-identity-propagation

Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Argo CD Database Export
Data Received:	OIDC Tokens

Incoming Communication Links: 3

Source technical asset names are clickable and link to the corresponding chapter.

Make Requests to API Server (incoming)

Make requests to the API server.

Source:	Web UI
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	enduser-identity-propagation
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo CD User Provided Secret, Cluster Access Configuration, Cluster Access Credentials, Manifest Sources, OIDC Tokens, Rendered Manifests, Repo Access Credentials
Data Sent:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo Tokens, OIDC Configuration, Rendered Manifests

Get App Code (incoming)

Get the web app code from the API server.

Source:	Web UI
Protocol:	https
Encrypted:	true
Authentication:	none

Authorization:	none
Read-Only:	true
Usage:	business
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	none
Data Sent:	Bundled UI Code

Make Requests to API Server (incoming)

Make requests to the API server.

Source:	User CLI
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	enduser-identity-propagation
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo CD User Provided Secret, Cluster Access Configuration, Cluster Access Credentials, Manifest Sources, OIDC Tokens, Rendered Manifests, Repo Access Credentials
Data Sent:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo Tokens, OIDC Configuration, Rendered Manifests

Argo CD Source Repo (GitHub): 4 / 4 Risks

Description

GitHub repo holding the Argo CD source code.

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Unguarded Access from Internet of **Argo CD Source Repo (GitHub)** by **Argo CD Build Pipeline (GitHub Actions)** via **Pull Source**: Exploitation likelihood is *Very Likely* with *Medium* impact.

unguarded-access-from-internet@argo-cd-source-repo@argo-cd-build-pipeline@argo-cd-build-pipeline>pull-source

Unchecked

Medium Risk Severity

Accidental Secret Leak risk at **Argo CD Source Repo (GitHub)**: Exploitation likelihood is *Unlikely* with *High* impact.

accidental-secret-leak@argo-cd-source-repo

Unchecked

Code Backdooring risk at **Argo CD Source Repo (GitHub)**: Exploitation likelihood is *Unlikely* with *High* impact.

code-backdooring@argo-cd-source-repo

Unchecked

Low Risk Severity

Unchecked Deployment risk at **Argo CD Source Repo (GitHub)**: Exploitation likelihood is *Unlikely* with *Low* impact.

unchecked-deployment@argo-cd-source-repo

Unchecked

Asset Information

ID:	argo-cd-source-repo
Type:	datastore
Usage:	devops
RAA:	30 %

Size:	application
Technology:	sourcecode-repository
Tags:	none
Internet:	true
Machine:	virtual
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	false
Data Processed:	Argo CD Container Image Tag, Argo CD GitHub Push Token, Argo CD Source
Data Stored:	Argo CD Container Image Tag, Argo CD Source
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	GitHub	
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Incoming Communication Links: 2

Source technical asset names are clickable and link to the corresponding chapter.

Push Code/Tags to GitHub (incoming)

Push code to the Argo CD repo (as when cherry-picking changes) and/or push tags (as when cutting a release).

Source:	Argo CD Maintainer Git Client
Protocol:	https
Encrypted:	true
Authentication:	two-factor
Authorization:	enduser-identity-propagation
Read-Only:	false
Usage:	devops
Tags:	none

VPN:	false
IP-Filtered:	false
Data Received:	Argo CD Container Image Tag, Argo CD GitHub Push Token, Argo CD Source
Data Sent:	Argo CD Container Image Tag, Argo CD Source

Pull Source (incoming)

Pull the Argo CD source from the GitHub repo.

Source:	Argo CD Build Pipeline (GitHub Actions)
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	none
Data Sent:	Argo CD Source

Docker Hub: 5 / 5 Risks

Description

Docker Hub image repository.

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Authentication covering communication link **Pull Base Image from Docker Hub** from **Argo CD Build Pipeline (GitHub Actions)** to **Docker Hub**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@argo-cd-build-pipeline>pull-base-image-from-docker-hub@argo-cd-build-pipeline@docker-hub

Unchecked

Unguarded Access from Internet of **Docker Hub** by **Argo CD Build Pipeline (GitHub Actions)** via **Pull Base Image from Docker Hub**: Exploitation likelihood is *Very Likely* with *Medium* impact.

unguarded-access-from-internet@docker-hub@argo-cd-build-pipeline@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Unchecked

Medium Risk Severity

Accidental Secret Leak risk at **Docker Hub**: Exploitation likelihood is *Unlikely* with *High* impact.

accidental-secret-leak@docker-hub

Unchecked

Code Backdooring risk at **Docker Hub**: Exploitation likelihood is *Unlikely* with *High* impact.

code-backdooring@docker-hub

Unchecked

Low Risk Severity

Unchecked Deployment risk at **Docker Hub**: Exploitation likelihood is *Unlikely* with *Low* impact.

unchecked-deployment@docker-hub

Unchecked

Asset Information

ID:	docker-hub
Type:	datastore
Usage:	devops
RAA:	12 %
Size:	system
Technology:	artifact-registry
Tags:	none
Internet:	true
Machine:	virtual
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	false
Data Processed:	Argo CD Base Image
Data Stored:	Argo CD Base Image
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	Ubuntu	
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Incoming Communication Links: 1

Source technical asset names are clickable and link to the corresponding chapter.

Pull Base Image from Docker Hub (incoming)

Pull the Ubuntu base image from Docker Hub.

Source:	Argo CD Build Pipeline (GitHub Actions)
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops

Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	none
Data Sent:	Argo CD Base Image

Host Cluster Kubernetes API: 3 / 3 Risks

Description

Kubernetes API Server for the cluster Argo CD is deployed to

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Hardening risk at **Host Cluster Kubernetes API**: Exploitation likelihood is *Likely* with *Medium* impact.

missing-hardening@host-cluster-kubernetes-api

Unchecked

Medium Risk Severity

Container Base Image Backdooring risk at **Host Cluster Kubernetes API**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@host-cluster-kubernetes-api

Unchecked

Missing Web Application Firewall (WAF) risk at **Host Cluster Kubernetes API**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-waf@host-cluster-kubernetes-api

Unchecked

Asset Information

ID:	host-cluster-kubernetes-api
Type:	external-entity
Usage:	devops
RAA:	66 %
Size:	system
Technology:	web-service-rest
Tags:	none
Internet:	false
Machine:	container
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false

Custom-Developed:	false
Client by Human:	false
Data Processed:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, ApplicationSet Name, Argo CD RBAC Config, Argo CD User Provided Secret, Cluster Access Configuration, Cluster Access Credentials, Live Manifests, Rendered Manifests
Data Stored:	API Server Secret, AppProject Manifest, Application Manifest, ApplicationSet Manifest, Argo CD RBAC Config, Cluster Access Configuration, Cluster Access Credentials, Live Manifests, OIDC Client Secret, OIDC Configuration, Repo Access Credentials
Formats Accepted:	JSON

Asset Rating

Owner:	Cluster Operator	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:	The Kubernetes API Server is how Argo CD interacts with the cluster. Argo CD's configuration is stored in the cluster, and Argo CD uses the Kubernetes API Server to apply changes to the cluster. If the Kubernetes API Server is down, Argo CD will be down.	

Incoming Communication Links: 7

Source technical asset names are clickable and link to the corresponding chapter.

Get Repo Access Credentials (incoming)

Get repo access credentials from Kubernetes to pull manifest sources from source control.

Source:	Repo Server
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false

IP-Filtered:	false
Data Received:	none
Data Sent:	Repo Access Credentials

Reconcile Resource State (Host Cluster) (incoming)
Reconcile the current desired manifests with the live state.

Source:	ApplicationSet Controller
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	ApplicationSet Manifest, ApplicationSet Name
Data Sent:	Live Manifests

Reconcile Resource State (Host Cluster) (incoming)
Reconcile the current desired manifests with the live state.

Source:	Application Controller
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Application Name, Rendered Manifests
Data Sent:	Live Manifests

Update Repo Access Credentials (incoming)
Write changes from the UI/CLI/API to repo secrets.

Source:	API Server

Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Repo Access Credentials
Data Sent:	Repo Access Credentials

Update RBAC Config (incoming)
Write changes from the UI/CLI/API to RBAC config.

Source:	API Server
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Argo CD RBAC Config
Data Sent:	Argo CD RBAC Config

Update Cluster Access Config (incoming)
Write changes from the UI/CLI/API to cluster secrets.

Source:	API Server
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false

IP-Filtered:	false
Data Received:	Cluster Access Configuration, Cluster Access Credentials
Data Sent:	Cluster Access Configuration, Cluster Access Credentials

Get/Update/Delete Live Resource State from Kubernetes (Host) (incoming)

Get the live state of an Argo CD-managed resource, or potentially update or delete a resource.

Source:	API Server
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Application Name, Argo CD RBAC Config, Cluster Access Configuration, Cluster Access Credentials, OIDC Client Secret, OIDC Configuration, Rendered Manifests, Repo Access Credentials
Data Sent:	API Server Secret, Argo CD RBAC Config, Cluster Access Configuration, Cluster Access Credentials, Live Manifests, OIDC Client Secret, OIDC Configuration, Repo Access Credentials

OIDC Proxy (Dex): 6 / 6 Risks

Description

OIDC Proxy (Dex)

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Identity Provider Isolation to further encapsulate and protect identity-related asset **OIDC Proxy (Dex)** against unrelated lower protected assets **in the same network segment**, which might be easier to compromise by attackers: Exploitation likelihood is *Unlikely* with *Very High* impact.

missing-identity-provider-isolation@dex-server

Unchecked

Cross-Site Scripting (XSS) risk at **OIDC Proxy (Dex)**: Exploitation likelihood is *Likely* with *High* impact.

cross-site-scripting@dex-server

Unchecked

Missing Authentication covering communication link **Validate Dex OIDC Token** from **API Server** to **OIDC Proxy (Dex)**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@api-server>validate-dex-oidc-token@api-server@dex-server

Unchecked

Cross-Site Request Forgery (CSRF) risk at **OIDC Proxy (Dex)** via **Validate Dex OIDC Token** from **API Server**: Exploitation likelihood is *Likely* with *Medium* impact.

cross-site-request-forgery@dex-server@api-server>validate-dex-oidc-token

Unchecked

Medium Risk Severity

Container Base Image Backdooring risk at **OIDC Proxy (Dex)**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@dex-server

Unchecked

Server-Side Request Forgery (SSRF) risk at **OIDC Proxy (Dex)** server-side web-requesting the target **OIDC Provider (External)** via **Proxying to an External OIDC Provider**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Unchecked

Asset Information

ID:	dex-server
Type:	process
Usage:	business
RAA:	32 %
Size:	component
Technology:	identity-provider
Tags:	none
Internet:	false
Machine:	container
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	false
Data Processed:	OIDC Public Keys, OIDC Tokens
Data Stored:	OIDC Public Keys
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	Argo CD Operator	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Outgoing Communication Links: 1

Target technical asset names are clickable and link to the corresponding chapter.

Proxying to an External OIDC Provider (outgoing)

Proxy requests to an external OIDC provider.

Target:	OIDC Provider (External)
Protocol:	https
Encrypted:	true
Authentication:	credentials

Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	none
Data Received:	OIDC Tokens

Incoming Communication Links: 1

Source technical asset names are clickable and link to the corresponding chapter.

Validate Dex OIDC Token (incoming)

Get public keys from Dex server to validate tokens.

Source:	API Server
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	true
Data Received:	none
Data Sent:	OIDC Public Keys

Quay: 4 / 8 Risks

Description

Quay image repository.

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Unguarded Access from Internet of **Quay** by **Argo CD Build Pipeline (GitHub Actions)** via **Push Image to Quay**: Exploitation likelihood is *Very Likely* with *Medium* impact.

unguarded-access-from-internet@quay@argo-cd-build-pipeline@argo-cd-build-pipeline>push-image-to-quay

Unchecked

Missing Authentication covering communication link **Pull Argo CD Image** from **API Server** to **Quay**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@api-server>pull-argo-cd-image@api-server@quay

False Positive 2022-11-17 Michael Crenshaw
The Argo CD image is public. There is no need to authenticate to Quay.

Missing Authentication covering communication link **Pull Argo CD Image** from **Application Controller** to **Quay**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@application-controller>pull-argo-cd-image@application-controller@quay

False Positive 2022-11-17 Michael Crenshaw
The Argo CD image is public. There is no need to authenticate to Quay.

Missing Authentication covering communication link **Pull Argo CD Image** from **ApplicationSet Controller** to **Quay**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@applicationset-controller>pull-argo-cd-image@applicationset-controller@quay

False Positive 2022-11-17 Michael Crenshaw
The Argo CD image is public. There is no need to authenticate to Quay.

Missing Authentication covering communication link **Pull Argo CD Image** from **Repo Server** to **Quay**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@repo-server>pull-argo-cd-image@repo-server@quay

False Positive 2022-11-17 Michael Crenshaw
The Argo CD image is public. There is no need to authenticate to Quay.

Medium Risk Severity

Accidental Secret Leak risk at **Quay**: Exploitation likelihood is *Unlikely* with *High* impact.

accidental-secret-leak@quay

Unchecked

Code Backdooring risk at **Quay**: Exploitation likelihood is *Unlikely* with *High* impact.

code-backdooring@quay

Unchecked

Low Risk Severity

Unchecked Deployment risk at **Quay**: Exploitation likelihood is *Unlikely* with *Low* impact.

unchecked-deployment@quay

Unchecked

Asset Information

ID:	quay
Type:	datastore
Usage:	devops
RAA:	30 %
Size:	system
Technology:	artifact-registry
Tags:	none
Internet:	true
Machine:	virtual
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	false
Data Processed:	Argo CD Container Image, Argo CD Container Image Tag, Quay Push Token
Data Stored:	Argo CD Container Image
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	Red Hat	
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Incoming Communication Links: 5
Source technical asset names are clickable and link to the corresponding chapter.

Pull Argo CD Image (incoming)
Pull the Argo CD container image from Quay.

Source:	Repo Server
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Argo CD Container Image Tag
Data Sent:	Argo CD Container Image

Push Image to Quay (incoming)
Quay image repository.

Source:	Argo CD Build Pipeline (GitHub Actions)
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Argo CD Container Image, Quay Push Token
Data Sent:	none

Pull Argo CD Image (incoming)
Pull the Argo CD container image from Quay.

Source:	ApplicationSet Controller
Protocol:	https

Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Argo CD Container Image Tag
Data Sent:	Argo CD Container Image

Pull Argo CD Image (incoming)

Pull the Argo CD container image from Quay.

Source:	Application Controller
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Argo CD Container Image Tag
Data Sent:	Argo CD Container Image

Pull Argo CD Image (incoming)

Pull the Argo CD container image from Quay.

Source:	API Server
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false

Data Received: Argo CD Container Image Tag
Data Sent: Argo CD Container Image

Rendered Manifests Cache (Redis): 2 / 2 Risks

Description

Rendered Manifests Cache (Redis)

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Authentication covering communication link **Send/Receive Cached Rendered Manifests** from **Repo Server** to **Rendered Manifests Cache (Redis)**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@repo-server>send-receive-cached-rendered-manifests@repo-server@rendered-manifests-cache

Unchecked

Medium Risk Severity

Container Base Image Backdooring risk at **Rendered Manifests Cache (Redis)**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@rendered-manifests-cache

Unchecked

Asset Information

ID:	rendered-manifests-cache
Type:	datastore
Usage:	devops
RAA:	23 %
Size:	component
Technology:	web-service-rest
Tags:	none
Internet:	false
Machine:	container
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	true
Custom-Developed:	false
Client by Human:	false
Data Processed:	none

Data Stored:	AppProject Manifest, Application Manifest, Application Name, Rendered Manifests
Formats Accepted:	JSON

Asset Rating

Owner:	Argo CD Operator	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Incoming Communication Links: 1

Source technical asset names are clickable and link to the corresponding chapter.

Send/Receive Cached Rendered Manifests (incoming)

Sends and receives rendered manifests to and from the cache.

Source:	Repo Server
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	true
Data Received:	Application Name, Rendered Manifests
Data Sent:	Application Name, Rendered Manifests

Repo Server: 7 / 9 Risks

Description

Pulls from manifests sources, builds manifests, caches manifests

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Authentication covering communication link **Fetching Rendered Manifests from Cache** from **API Server** to **Repo Server**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@api-server>fetching-rendered-manifests-from-cache@api-server@repo-server

Unchecked

Missing Authentication covering communication link **Rendered Manifest Requests** from **Application Controller** to **Repo Server**: Exploitation likelihood is *Likely* with *High* impact.

missing-authentication@application-controller>rendered-manifest-requests@application-controller@repo-server

Unchecked

Path-Traversal risk at **Repo Server** against filesystem **Repo Server Storage** via **Store Cached Manifest Sources**: Exploitation likelihood is *Likely* with *High* impact.

path-traversal@repo-server@repo-server-storage@repo-server>store-cached-manifest-sources

Mitigated 2022-11-19 Michael Crenshaw

The repo server maintains a cache of git and Helm repo contents. The cache should not contain secrets, but it might contain otherwise-sensitive information. If multiple tenants use the same Argo CD instance, an attacker from one tenant may try to access the manifests owned by another tenant.
The repo server component has suffered from a variety of path traversal and symlink following bugs. In response, we have built strong safeguards against these attacks.
1) Symlinks exiting the repository bounds are blocked by default.
2) All user path inputs are run through a standard path traversal detection library. That library has good unit test coverage.
3) The config management tools (Helm, Jsonnet, Kustomize) have built-in path traversal prevention mechanisms.
4) Cache directories have random names (cryptographically-secure random UUIDs). The directories' permissions are locked down when the directories are not actively in use. This makes many traversal attacks impractical.
Previously discovered and resolved path traversal and symlink following bugs include the following:
* Symlink following allows leaking out-of-bounds YAML files from Argo CD repo-server - https://github.com/argoproj/argo-cd/security/advisories/GHSA-q4w5-4gq2-98vm
* Symlink following allows leaking out-of-bound manifests and JSON files from Argo CD repo-server - https://github.com/argoproj/argo-cd/security/advisories/GHSA-6gcg-hp2x-q54h
* Path traversal and improper access control allows leaking out-of-bound files from Argo CD repo-server - https://github.com/argoproj/argo-cd/security/advisories/GHSA-r9cr-hvjj-496v
* Path traversal allows leaking out-of-bound files from Argo CD repo-server - https://github.com/argoproj/argo-cd/security/advisories/GHSA-h6h5-6fmq-rh28
* Path traversal and dereference of symlinks when passing Helm value files - https://github.com/argoproj/argo-cd/security/advisories/GHSA-63qx-x74g-jcr7

Missing File Validation risk at **Repo Server**: Exploitation likelihood is *Very Likely* with *Medium* impact.

missing-file-validation@repo-server

Mitigated 2022-11-18 Michael Crenshaw

The Argo CD repo server accepts files from a number of sources. First, it accepts files from Git and Helm repositories. Second, it accepts files from users via the API when they do "local syncs" or "local diffs".
The repo server has several lines of defense against invalid file inputs.
1) Some storage mechanisms limit file size by default (for example git, unless LFS is enabled).
2) The repo-server enforces a secondary, user-configured file size limit for directory-type apps (since those files are read directly into memory).

3) The repo-server relies on configuration management tools (Helm, Kustomize, jsonnet) to only accept valid input.
4) The repo-server, by default, disallows symlink files which exit the repository boundaries.

Medium Risk Severity

Container Base Image Backdooring risk at **Repo Server**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@repo-server

Unchecked

Server-Side Request Forgery (SSRF) risk at **Repo Server** server-side web-requesting the target **Host Cluster Kubernetes API** via **Get Repo Access Credentials**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Unchecked

Server-Side Request Forgery (SSRF) risk at **Repo Server** server-side web-requesting the target **Internal Source Control Management API** via **Fetch Manifest Sources**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Unchecked

Server-Side Request Forgery (SSRF) risk at **Repo Server** server-side web-requesting the target **Quay** via **Pull Argo CD Image**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Unchecked

Server-Side Request Forgery (SSRF) risk at **Repo Server** server-side web-requesting the target **Rendered Manifests Cache (Redis)** via **Send/Receive Cached Rendered Manifests**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Unchecked

Asset Information

ID:	repo-server
Type:	process

Usage:	devops
RAA:	39 %
Size:	component
Technology:	web-service-rest
Tags:	none
Internet:	false
Machine:	container
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	true
Custom-Developed:	true
Client by Human:	false
Data Processed:	Argo CD Container Image, Argo CD Container Image Tag, Argo CD User Provided Secret, Manifest Sources, Rendered Manifests, Repo Access Credentials
Data Stored:	Manifest Sources
Formats Accepted:	File, JSON

Asset Rating

Owner:	Argo CD Repo-Server	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	critical	(rated 4 in scale of 5)
CIA-Justification:	The repo-server is responsible for fetching manifests and performing transformations on them ("building"). It contains sensitive information, i.e. deployment manifests. Changes to these manifests can change what's deployed. If the application controller is down, no other services will be disrupted, but no deployments will be made.	

Outgoing Communication Links: 5

Target technical asset names are clickable and link to the corresponding chapter.

Store Cached Manifest Sources (outgoing)

Cache manifest sources (from git, helm repo, OCI, etc.) to local ephemeral storage.

Target:	Repo Server Storage
Protocol:	local-file-access

Encrypted:	false
Authentication:	none
Authorization:	none
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Manifest Sources
Data Received:	Manifest Sources

Send/Receive Cached Rendered Manifests (outgoing)

Sends and receives rendered manifests to and from the cache.

Target:	Rendered Manifests Cache (Redis)
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	true
Data Sent:	Application Name, Rendered Manifests
Data Received:	Application Name, Rendered Manifests

Pull Argo CD Image (outgoing)

Pull the Argo CD container image from Quay.

Target:	Quay
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false

Data Sent:	Argo CD Container Image Tag
Data Received:	Argo CD Container Image

Get Repo Access Credentials (outgoing)

Get repo access credentials from Kubernetes to pull manifest sources from source control.

Target:	Host Cluster Kubernetes API
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	none
Data Received:	Repo Access Credentials

Fetch Manifest Sources (outgoing)

Pulls manifest sources from source control.

Target:	Internal Source Control Management API
Protocol:	https
Encrypted:	true
Authentication:	credentials
Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Application Name
Data Received:	Manifest Sources

Incoming Communication Links: 2

Source technical asset names are clickable and link to the corresponding chapter.

Rendered Manifest Requests (incoming)

Fetch manifests from the repo server to be applied to the cluster.

Source:	Application Controller
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	true
Data Received:	Application Name
Data Sent:	Rendered Manifests

Fetching Rendered Manifests from Cache (incoming)

Fetch manifests from the repo server to display via UI or CLI.

Source:	API Server
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	true
Data Received:	Application Name
Data Sent:	Rendered Manifests

User CLI: 4 / 4 Risks

Description

User CLI

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Hardening risk at **User CLI**: Exploitation likelihood is *Likely* with *Medium* impact.

missing-hardening@user-cli

Unchecked

Medium Risk Severity

Missing Identity Store in the threat model (referencing asset **User CLI** as an example): Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-identity-store@user-cli

Unchecked

Missing Network Segmentation to further encapsulate and protect **User CLI** against unrelated lower protected assets in the same network segment, which might be easier to compromise by attackers: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-network-segmentation@user-cli

Unchecked

Server-Side Request Forgery (SSRF) risk at **User CLI** server-side web-requesting the target **API Server** via **Make Requests to API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Unchecked

Asset Information

ID:	user-cli
Type:	process
Usage:	devops
RAA:	57 %
Size:	application
Technology:	cli
Tags:	none

Internet:	false
Machine:	physical
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	false
Redundant:	false
Custom-Developed:	false
Client by Human:	true
Data Processed:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo CD Database Export, Argo CD User Provided Secret, Argo Tokens, Cluster Access Configuration, Cluster Access Credentials, Live Manifests, Manifest Sources, OIDC Configuration, OIDC Tokens, Rendered Manifests, Repo Access Credentials
Data Stored:	OIDC Tokens
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	Argo CD User	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Outgoing Communication Links: 1

Target technical asset names are clickable and link to the corresponding chapter.

Make Requests to API Server (outgoing)

Make requests to the API server.

Target:	API Server
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	enduser-identity-propagation
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false

IP-Filtered:	false
Data Sent:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo CD User Provided Secret, Cluster Access Configuration, Cluster Access Credentials, Manifest Sources, OIDC Tokens, Rendered Manifests, Repo Access Credentials
Data Received:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo Tokens, OIDC Configuration, Rendered Manifests

Incoming Communication Links: 1

Source technical asset names are clickable and link to the corresponding chapter.

Export Database (incoming)

Send database export to Admin Argo CD User

Source:	API Server
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	enduser-identity-propagation
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Argo CD Database Export
Data Sent:	OIDC Tokens

Web UI: 5 / 5 Risks

Description

Argo CD web UI - single-page JavaScript app.

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Elevated Risk Severity

Missing Hardening risk at **Web UI**: Exploitation likelihood is *Likely* with *Medium* impact.

missing-hardening@web-ui

Unchecked

Server-Side Request Forgery (SSRF) risk at **Web UI** server-side web-requesting the target **API Server** via **Get App Code**: Exploitation likelihood is *Likely* with *Medium* impact.

server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Unchecked

Cross-Site Scripting (XSS) risk at **Web UI**: Exploitation likelihood is *Likely* with *High* impact.

cross-site-scripting@web-ui

in Progress 2022-11-18 Michael Crenshaw

In general, Argo CD relies on the anti-XSS tools provided by React and other frontend libraries to sanitize and encode input before injecting them to the DOM.
The Argo CD team has dealt with XSS vulnerabilities in the past:

* A leaked API server encryption key can allow XSS for SSO users - https://github.com/argoproj/argo-cd/security/advisories/GHSA-pmjg-52h9-72qv

* Possible XSS when using SSO with the CLI - https://github.com/argoproj/argo-cd/security/advisories/GHSA-qq5v-f4c3-395c

* Missing XSS Protection Header - https://github.com/argoproj/argo-cd/security/advisories/GHSA-pg99-h5gc-446r

* External URLs for Deployments can include javascript - https://github.com/argoproj/argo-cd/security/advisories/GHSA-h4w9-6x78-8vrj

One area of particular interest is user-supplied links in the interface. GHSA-h4w9-6x78-8vrj showed that, where a user can insert an unsanitized link, they can cause JavaScript code to run in another user's browser.
Other links may only be provided by administrators and are therefore considered relatively trusted.
Some work to mitigate XSS is still underway:

* fix: set security headers on oidc handler responses - https://github.com/argoproj/argo-cd/pull/9854

* fix: add url validation for help chat - https://github.com/argoproj/argo-cd/pull/10417

* feat: stricter CSP - https://github.com/argoproj/argo-cd/pull/10131

Medium Risk Severity

Missing Network Segmentation to further encapsulate and protect **Web UI** against unrelated lower protected assets in the same network segment, which might be easier to compromise by attackers: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-network-segmentation@web-ui

Unchecked

Server-Side Request Forgery (SSRF) risk at **Web UI** server-side web-requesting the target **API Server** via **Make Requests to API Server**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Unchecked

Asset Information

ID:	web-ui
Type:	process
Usage:	devops
RAA:	56 %
Size:	application
Technology:	web-application
Tags:	none
Internet:	false
Machine:	physical
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	false
Redundant:	false
Custom-Developed:	false
Client by Human:	true
Data Processed:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo CD User Provided Secret, Argo Tokens, Bundled UI Code, Cluster Access Configuration, Cluster Access Credentials, Live Manifests, Manifest Sources, OIDC Configuration, OIDC Tokens, Rendered Manifests, Repo Access Credentials
Data Stored:	Bundled UI Code, OIDC Tokens
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	Argo CD User	
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Outgoing Communication Links: 2

Target technical asset names are clickable and link to the corresponding chapter.

Make Requests to API Server (outgoing)

Make requests to the API server.

Target:	API Server
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	enduser-identity-propagation
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo CD User Provided Secret, Cluster Access Configuration, Cluster Access Credentials, Manifest Sources, OIDC Tokens, Rendered Manifests, Repo Access Credentials
Data Received:	AppProject Manifest, Application Manifest, Application Name, ApplicationSet Manifest, Argo Tokens, OIDC Configuration, Rendered Manifests

Get App Code (outgoing)

Get the web app code from the API server.

Target:	API Server
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true

Usage:	business
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	none
Data Received:	Bundled UI Code

Application Controller: 6 / 6 Risks

Description

Some Description

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Container Base Image Backdooring risk at **Application Controller**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@application-controller

Unchecked

Missing Build Infrastructure in the threat model (referencing asset **Application Controller** as an example): Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-build-infrastructure@application-controller

Unchecked

Server-Side Request Forgery (SSRF) risk at **Application Controller** server-side web-requesting the target **External Cluster Kubernetes API** via **Reconcile Resource State (External Cluster)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Unchecked

Server-Side Request Forgery (SSRF) risk at **Application Controller** server-side web-requesting the target **Host Cluster Kubernetes API** via **Reconcile Resource State (Host Cluster)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Unchecked

Server-Side Request Forgery (SSRF) risk at **Application Controller** server-side web-requesting the target **Quay** via **Pull Argo CD Image**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Unchecked

Server-Side Request Forgery (SSRF) risk at **Application Controller** server-side web-requesting the target **Repo Server** via **Rendered Manifest Requests**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Unchecked

Asset Information

ID:	application-controller
Type:	process
Usage:	devops
RAA:	39 %
Size:	component
Technology:	web-service-rest
Tags:	none
Internet:	false
Machine:	container
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	true
Client by Human:	false
Data Processed:	Argo CD Container Image, Argo CD Container Image Tag, Cluster Access Configuration, Cluster Access Credentials, Live Manifests, Rendered Manifests
Data Stored:	none
Formats Accepted:	JSON

Asset Rating

Owner:	Argo CD Operator	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	critical	(rated 4 in scale of 5)
CIA-Justification:	The application controller is responsible for deploying applications. It contains sensitive information, i.e. deployment manifests. Changes to these manifests can change what's deployed. If the application controller is down, no other services will be disrupted, but no deployments will be made.	

Outgoing Communication Links: 4

Target technical asset names are clickable and link to the corresponding chapter.

Rendered Manifest Requests (outgoing)

Fetch manifests from the repo server to be applied to the cluster.

Target:	Repo Server
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	true
Data Sent:	Application Name
Data Received:	Rendered Manifests

Reconcile Resource State (Host Cluster) (outgoing)
Reconcile the current desired manifests with the live state.

Target:	Host Cluster Kubernetes API
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Application Name, Rendered Manifests
Data Received:	Live Manifests

Reconcile Resource State (External Cluster) (outgoing)
Reconcile the current desired manifests with the live state in an external cluster.

Target:	External Cluster Kubernetes API
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops

Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Application Name, Cluster Access Credentials, Rendered Manifests
Data Received:	Live Manifests

Pull Argo CD Image (outgoing)

Pull the Argo CD container image from Quay.

Target:	Quay
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Argo CD Container Image Tag
Data Received:	Argo CD Container Image

ApplicationSet Controller: 4 / 4 Risks

Description

Some Description

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Container Base Image Backdooring risk at **ApplicationSet Controller**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@applicationset-controller

Unchecked

Server-Side Request Forgery (SSRF) risk at **ApplicationSet Controller** server-side web-requesting the target **Host Cluster Kubernetes API** via **Reconcile Resource State (Host Cluster)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Unchecked

Server-Side Request Forgery (SSRF) risk at **ApplicationSet Controller** server-side web-requesting the target **Internal Source Control Management API** via **Git Generator Pull**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Unchecked

Server-Side Request Forgery (SSRF) risk at **ApplicationSet Controller** server-side web-requesting the target **Quay** via **Pull Argo CD Image**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Unchecked

Asset Information

ID:	applicationset-controller
Type:	process
Usage:	devops
RAA:	48 %
Size:	component
Technology:	web-service-rest
Tags:	none
Internet:	false

Machine:	container
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	true
Client by Human:	false
Data Processed:	ApplicationSet Manifest, ApplicationSet Name, Argo CD Container Image, Argo CD Container Image Tag, Cluster Access Configuration, Cluster Access Credentials, Git Branch Name, Git Organization Name, Git Repo URL, Live Manifests, Repo Access Credentials
Data Stored:	none
Formats Accepted:	JSON

Asset Rating

Owner:	Argo CD Operator	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	critical	(rated 4 in scale of 5)
CIA-Justification:	The ApplicationSet controller is responsible for deploying ApplicationSets. It contains sensitive information, i.e. deployment manifests. Changes to these manifests can change what's deployed.	

Outgoing Communication Links: 3

Target technical asset names are clickable and link to the corresponding chapter.

Reconcile Resource State (Host Cluster) (outgoing)

Reconcile the current desired manifests with the live state.

Target:	Host Cluster Kubernetes API
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false

IP-Filtered:	false
Data Sent:	ApplicationSet Manifest, ApplicationSet Name
Data Received:	Live Manifests

Pull Argo CD Image (outgoing)

Pull the Argo CD container image from Quay.

Target:	Quay
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Argo CD Container Image Tag
Data Received:	Argo CD Container Image

Git Generator Pull (outgoing)

Get information about organizations, branches, and pull requests from the SCM.

Target:	Internal Source Control Management API
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Git Repo URL, Repo Access Credentials
Data Received:	Git Branch Name, Git Organization Name, Git Repo Name

Argo CD Build Pipeline (GitHub Actions): 4 / 5 Risks

Description

Argo CD build pipeline, hosted on GitHub Actions.

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Code Backdooring risk at **Argo CD Build Pipeline (GitHub Actions)**: Exploitation likelihood is *Unlikely* with *High* impact.

code-backdooring@argo-cd-build-pipeline

Unchecked

Server-Side Request Forgery (SSRF) risk at **Argo CD Build Pipeline (GitHub Actions)** server-side web-requesting the target **Docker Hub** via **Pull Base Image from Docker Hub**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@argo-cd-build-pipeline@docker-hub@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Unchecked

Server-Side Request Forgery (SSRF) risk at **Argo CD Build Pipeline (GitHub Actions)** server-side web-requesting the target **Quay** via **Push Image to Quay**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@argo-cd-build-pipeline@quay@argo-cd-build-pipeline>push-image-to-quay

Unchecked

Unchecked Deployment risk at **Argo CD Build Pipeline (GitHub Actions)**: Exploitation likelihood is *Unlikely* with *Medium* impact.

unchecked-deployment@argo-cd-build-pipeline

Unchecked

Server-Side Request Forgery (SSRF) risk at **Argo CD Build Pipeline (GitHub Actions)** server-side web-requesting the target **Argo CD Source Repo (GitHub)** via **Pull Source**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@argo-cd-build-pipeline@argo-cd-source-repo@argo-cd-build-pipeline>pull-source

Mitigated 2022-11-19 Michael Crenshaw

The Argo CD build pipeline uses GitHub's checkout action to retrieve source code before building. The action accepts no input, and it should be impossible for a malicious actor (outside GitHub itself) to cause the checkout action to retrieve anything besides the Argo CD source code.

Asset Information

ID:	argo-cd-build-pipeline
Type:	process

Usage:	devops
RAA:	28 %
Size:	application
Technology:	build-pipeline
Tags:	none
Internet:	true
Machine:	virtual
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	false
Data Processed:	Argo CD Base Image, Argo CD Container Image, Argo CD Source, Quay Push Token
Data Stored:	Argo CD GitHub Push Token, Quay Push Token
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	GitHub	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Outgoing Communication Links: 3

Target technical asset names are clickable and link to the corresponding chapter.

Push Image to Quay (outgoing)

Quay image repository.

Target:	Quay
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops

Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Argo CD Container Image, Quay Push Token
Data Received:	none

Pull Source (outgoing)

Pull the Argo CD source from the GitHub repo.

Target:	Argo CD Source Repo (GitHub)
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	none
Data Received:	Argo CD Source

Pull Base Image from Docker Hub (outgoing)

Pull the Ubuntu base image from Docker Hub.

Target:	Docker Hub
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	none
Data Received:	Argo CD Base Image

Argo CD Maintainer Git Client: 1 / 1 Risk

Description

Git client (and configuration) used by an Argo CD maintainer.

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Server-Side Request Forgery (SSRF) risk at **Argo CD Maintainer Git Client** server-side web-requesting the target **Argo CD Source Repo (GitHub)** via **Push Code/Tags to GitHub**: Exploitation likelihood is *Unlikely* with *Medium* impact.

server-side-request-forgery@argo-cd-maintainer-git-client@argo-cd-source-repo@argo-cd-maintainer-git-client>push-code-tags-to-github

Unchecked

Asset Information

ID:	argo-cd-maintainer-git-client
Type:	process
Usage:	devops
RAA:	8 %
Size:	application
Technology:	cli
Tags:	none
Internet:	false
Machine:	physical
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	false
Redundant:	false
Custom-Developed:	false
Client by Human:	true
Data Processed:	Argo CD Container Image Tag, Argo CD Source
Data Stored:	Argo CD Container Image Tag, Argo CD GitHub Push Token, Argo CD Source
Formats Accepted:	File

Asset Rating

Owner:	Argo CD Maintainer	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Outgoing Communication Links: 1

Target technical asset names are clickable and link to the corresponding chapter.

Push Code/Tags to GitHub (outgoing)

Push code to the Argo CD repo (as when cherry-picking changes) and/or push tags (as when cutting a release).

Target:	Argo CD Source Repo (GitHub)
Protocol:	https
Encrypted:	true
Authentication:	two-factor
Authorization:	enduser-identity-propagation
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Argo CD Container Image Tag, Argo CD GitHub Push Token, Argo CD Source
Data Received:	Argo CD Container Image Tag, Argo CD Source

External Cluster Kubernetes API: 2 / 2 Risks

Description

Kubernetes API Server for a cluster Argo CD is managing

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Container Base Image Backdooring risk at **External Cluster Kubernetes API**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@external-cluster-kubernetes-api

Unchecked

Missing Web Application Firewall (WAF) risk at **External Cluster Kubernetes API**: Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-waf@external-cluster-kubernetes-api

Unchecked

Asset Information

ID:	external-cluster-kubernetes-api
Type:	external-entity
Usage:	devops
RAA:	24 %
Size:	system
Technology:	web-service-rest
Tags:	none
Internet:	false
Machine:	container
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	false
Data Processed:	Cluster Access Credentials, Live Manifests, Rendered Manifests
Data Stored:	Live Manifests
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	External Cluster Operator	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Incoming Communication Links: 2

Source technical asset names are clickable and link to the corresponding chapter.

Reconcile Resource State (External Cluster) (incoming)

Reconcile the current desired manifests with the live state in an external cluster.

Source:	Application Controller
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Application Name, Cluster Access Credentials, Rendered Manifests
Data Sent:	Live Manifests

Get/Update/Delete Live Resource State from Kubernetes (External) (incoming)

Get the live state of an Argo CD-managed resource, or potentially update or delete a resource on an external cluster.

Source:	API Server
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	false
Usage:	devops
Tags:	none

VPN:	false
IP-Filtered:	false
Data Received:	Application Name, Cluster Access Credentials, Rendered Manifests
Data Sent:	Live Manifests

Repo Server Storage: 2 / 2 Risks

Description

Local (by default, ephemeral) storage for the repo-server.

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Container Base Image Backdooring risk at **Repo Server Storage**: Exploitation likelihood is *Unlikely* with *High* impact.

container-baseimage-backdooring@repo-server-storage

Unchecked

Unencrypted Technical Asset named **Repo Server Storage** missing enduser-individual encryption with data-with-enduser-individual-key: Exploitation likelihood is *Unlikely* with *High* impact.

unencrypted-asset@repo-server-storage

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The Argo CD repo-server does not encrypt resources at rest on the disk cache.
The cache should not contain any secrets. The cache holds the contents of git and Helm repositories, which are not designed for storing secrets. Users may choose to store secrets on the repo-server (for example, when using a plugin that injects secrets into manifests). Those users should consider adding encryption to their plugins.
All users should consider Kubernetes- and cloud provider-level encryption for storage used by Argo CD.

Asset Information

ID:	repo-server-storage
Type:	datastore
Usage:	devops
RAA:	18 %
Size:	component
Technology:	local-file-system
Tags:	none
Internet:	false
Machine:	container
Encryption:	none
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	false

Data Processed: Manifest Sources
Data Stored: Manifest Sources
Formats Accepted: none of the special data formats accepted

Asset Rating

Owner: Cluster Operator
Confidentiality: confidential (rated 4 in scale of 5)
Integrity: mission-critical (rated 5 in scale of 5)
Availability: operational (rated 2 in scale of 5)
CIA-Justification:

Incoming Communication Links: 1

Source technical asset names are clickable and link to the corresponding chapter.

Store Cached Manifest Sources (incoming)

Cache manifest sources (from git, helm repo, OCI, etc.) to local ephemeral storage.

Source: Repo Server
Protocol: local-file-access
Encrypted: false
Authentication: none
Authorization: none
Read-Only: false
Usage: devops
Tags: none
VPN: false
IP-Filtered: false
Data Received: Manifest Sources
Data Sent: Manifest Sources

Internal Source Control Management API: out-of-scope

Description

Source control manager (GitHub, GitLab, Helm repo, etc.) accessible only from the organization's network.

Identified Risks of Asset

Risk finding paragraphs are clickable and link to the corresponding chapter.

Medium Risk Severity

Missing Vault (Secret Storage) in the threat model (referencing asset **Internal Source Control Management API** as an example): Exploitation likelihood is *Unlikely* with *Medium* impact.

missing-vault@internal-source-control-management-api

Unchecked

Asset Information

ID:	internal-source-control-management-api
Type:	datastore
Usage:	devops
RAA:	out-of-scope
Size:	system
Technology:	web-service-rest
Tags:	none
Internet:	false
Machine:	virtual
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	false
Data Processed:	Git Branch Name, Git Organization Name, Git Repo Name, Git Repo URL, Repo Access Credentials
Data Stored:	Manifest Sources
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	Source Control Management Operator	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	mission-critical	(rated 5 in scale of 5)
CIA-Justification:		

Asset Out-of-Scope Justification

Incoming Communication Links: 3

Source technical asset names are clickable and link to the corresponding chapter.

Fetch Manifest Sources (incoming)

Pulls manifest sources from source control.

Source:	Repo Server
Protocol:	https
Encrypted:	true
Authentication:	credentials
Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Application Name
Data Sent:	Manifest Sources

Push Manifest Sources (incoming)

Pushes manifests to source control.

Source:	Internal Source Control Management UI
Protocol:	https
Encrypted:	true

Authentication:	credentials
Authorization:	enduser-identity-propagation
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Manifest Sources
Data Sent:	Manifest Sources

Git Generator Pull (incoming)

Get information about organizations, branches, and pull requests from the SCM.

Source:	ApplicationSet Controller
Protocol:	https
Encrypted:	true
Authentication:	token
Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	Git Repo URL, Repo Access Credentials
Data Sent:	Git Branch Name, Git Organization Name, Git Repo Name

Internal Source Control Management UI: out-of-scope

Description

Internal Source Control Management UI

Identified Risks of Asset

Asset was defined as out-of-scope.

Asset Information

ID:	internal-source-control-management-ui
Type:	datastore
Usage:	devops
RAA:	out-of-scope
Size:	system
Technology:	web-application
Tags:	none
Internet:	false
Machine:	virtual
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	true
Data Processed:	Manifest Sources
Data Stored:	none
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	Source Control Management Operator	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Asset Out-of-Scope Justification

Outgoing Communication Links: 1

Target technical asset names are clickable and link to the corresponding chapter.

Push Manifest Sources (outgoing)

Pushes manifests to source control.

Target:	Internal Source Control Management API
Protocol:	https
Encrypted:	true
Authentication:	credentials
Authorization:	enduser-identity-propagation
Read-Only:	false
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Sent:	Manifest Sources
Data Received:	Manifest Sources

OIDC Provider (External): out-of-scope

Description

OIDC Provider (External)

Identified Risks of Asset

Asset was defined as out-of-scope.

Asset Information

ID:	oidc-provider
Type:	process
Usage:	business
RAA:	out-of-scope
Size:	service
Technology:	identity-provider
Tags:	none
Internet:	true
Machine:	virtual
Encryption:	data-with-symmetric-shared-key
Multi-Tenant:	true
Redundant:	false
Custom-Developed:	false
Client by Human:	false
Data Processed:	OIDC Public Keys, OIDC Tokens
Data Stored:	OIDC Public Keys
Formats Accepted:	none of the special data formats accepted

Asset Rating

Owner:	Organization	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		

Asset Out-of-Scope Justification

Incoming Communication Links: 2

Source technical asset names are clickable and link to the corresponding chapter.

Validate External OIDC Token (incoming)

Get public keys from OIDC provider to validate tokens.

Source:	API Server
Protocol:	https
Encrypted:	true
Authentication:	none
Authorization:	none
Read-Only:	true
Usage:	business
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	none
Data Sent:	OIDC Public Keys

Proxying to an External OIDC Provider (incoming)

Proxy requests to an external OIDC provider.

Source:	OIDC Proxy (Dex)
Protocol:	https
Encrypted:	true
Authentication:	credentials
Authorization:	technical-user
Read-Only:	true
Usage:	devops
Tags:	none
VPN:	false
IP-Filtered:	false
Data Received:	none
Data Sent:	OIDC Tokens

Identified Data Breach Probabilities by Data Asset

In total **94 potential risks** have been identified during the threat modeling process of which **0 are rated as critical**, **0 as high**, **32 as elevated**, **59 as medium**, and **3 as low**.

These risks are distributed across **31 data assets**. The following sub-chapters of this section describe the derived data breach probabilities grouped by data asset.

Technical asset names and risk IDs are clickable and link to the corresponding chapter.

API Server Secret: 39 / 40 Risks

A randomly-generated key used by the API server to sign access tokens.

ID:	api-server-secret	
Usage:	devops	
Quantity:	few	
Tags:	none	
Origin:	Argo CD API Server	
Owner:		
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	operational	(rated 2 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server	
Stored by:	Host Cluster Kubernetes API	
Sent via:	none	
Received via:	Get/Update/Delete Live Resource State from Kubernetes (Host)	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 39 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-network-segmentation@api-server

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

AppProject Manifest: 49 / 50 Risks

Manifest of an AppProject, a CRD which expresses certain rules applied to Applications.

ID:	appproject-manifest	
Usage:	devops	
Quantity:	few	
Tags:	none	
Origin:	Argo CD Operator or Users	
Owner:	Argo CD Operator	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, Host Cluster Kubernetes API, User CLI, Web UI	
Stored by:	Host Cluster Kubernetes API, Rendered Manifests Cache (Redis)	
Sent via:	Make Requests to API Server, Make Requests to API Server	
Received via:	Make Requests to API Server, Make Requests to API Server	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 49 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: container-baseimage-backdooring@rendered-manifests-cache

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@repo-server>send-receive-cached-rendered-manifests@repo-server@rendered-manifests-cache

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Application Manifest: 49 / 50 Risks

Manifest of an Application, defining things such as manifest source and destination cluster.

ID:	application-manifest	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	Argo CD Operator or Users	
Owner:	Argo CD Operator	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	important	(rated 3 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, Host Cluster Kubernetes API, User CLI, Web UI	
Stored by:	Host Cluster Kubernetes API, Rendered Manifests Cache (Redis)	
Sent via:	Make Requests to API Server, Make Requests to API Server	
Received via:	Make Requests to API Server, Make Requests to API Server	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 49 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: container-baseimage-backdooring@rendered-manifests-cache

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@repo-server>send-receive-cached-rendered-manifests@repo-server@rendered-manifests-cache

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Application Name: 49 / 50 Risks

Name of the Application

ID:	application-name	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	Some Origin	
Owner:	Argo CD	
Confidentiality:	restricted	(rated 3 in scale of 5)
Integrity:	operational	(rated 2 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:	The application name is used to identify the application and the project which controls it. It should be protected from tenants or users who do not have access to that application.	
Processed by:	API Server, Host Cluster Kubernetes API, User CLI, Web UI	
Stored by:	Rendered Manifests Cache (Redis)	
Sent via:	Send/Receive Cached Rendered Manifests, Rendered Manifest Requests, Reconcile Resource State (Host Cluster), Reconcile Resource State (External Cluster), Make Requests to API Server, Make Requests to API Server, Get/Update/Delete Live Resource State from Kubernetes (Host), Get/Update/Delete Live Resource State from Kubernetes (External), Fetching Rendered Manifests from Cache, Fetch Manifest Sources	
Received via:	Send/Receive Cached Rendered Manifests, Make Requests to API Server, Make Requests to API Server	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 49 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: container-baseimage-backdooring@rendered-manifests-cache

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@repo-server>send-receive-cached-rendered-manifests@repo-server@rendered-manifests-cache

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

ApplicationSet Manifest: 48 / 49 Risks

Manifest representing an ApplicationSet.

ID:	applicationset-manifest	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	Argo CD Operator	
Owner:		
Confidentiality:	restricted	(rated 3 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, ApplicationSet Controller, Host Cluster Kubernetes API, User CLI, Web UI	
Stored by:	Host Cluster Kubernetes API	
Sent via:	Reconcile Resource State (Host Cluster), Make Requests to API Server, Make Requests to API Server	
Received via:	Make Requests to API Server, Make Requests to API Server	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 48 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@applicationset-controller

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

ApplicationSet Name: 8 / 8 Risks

Name of an ApplicationSet.

ID:	applicationset-name	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	Argo CD Operator	
Owner:		
Confidentiality:	restricted	(rated 3 in scale of 5)
Integrity:	critical	(rated 4 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	ApplicationSet Controller, Host Cluster Kubernetes API	
Stored by:	none	
Sent via:	Reconcile Resource State (Host Cluster)	
Received via:	none	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 8 remaining risks:	

Probable: container-baseimage-backdooring@applicationset-controller

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: missing-cloud-hardening@organization-network

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-waf@host-cluster-kubernetes-api

Argo CD Base Image: 11 / 12 Risks

Ubuntu base image which the Argo CD image is built on.

ID:	argo-cd-base-image	
Usage:	devops	
Quantity:	very-few	
Tags:	none	
Origin:	Ubuntu	
Owner:		
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	Argo CD Build Pipeline (GitHub Actions), Docker Hub	
Stored by:	Docker Hub	
Sent via:	none	
Received via:	Pull Base Image from Docker Hub	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 11 remaining risks:	

Probable: accidental-secret-leak@docker-hub

Probable: code-backdooring@argo-cd-build-pipeline

Probable: code-backdooring@docker-hub

Probable: missing-cloud-hardening@buildtime-boundary

Possible: missing-authentication@argo-cd-build-pipeline>pull-base-image-from-docker-hub@argo-cd-build-pipeline@docker-hub

Possible: server-side-request-forgery@argo-cd-build-pipeline@docker-hub@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Possible: server-side-request-forgery@argo-cd-build-pipeline@quay@argo-cd-build-pipeline>push-image-to-quay

Possible: server-side-request-forgery@argo-cd-maintainer-git-client@argo-cd-source-repo@argo-cd-maintainer-git-client>push-code-tags-to-github

Possible: unchecked-deployment@argo-cd-build-pipeline

Possible: unchecked-deployment@docker-hub

Possible: unguarded-access-from-internet@docker-hub@argo-cd-build-pipeline@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Argo CD Container Image: 51 / 58 Risks

Argo CD container image, primarily hosted on Quay.

ID:	argo-cd-container-image	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	Argo CD GitHub build pipeline	
Owner:		
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, Application Controller, ApplicationSet Controller, Argo CD Build Pipeline (GitHub Actions), Quay, Repo Server	
Stored by:	Quay	
Sent via:	Push Image to Quay	
Received via:	Pull Argo CD Image, Pull Argo CD Image, Pull Argo CD Image, Pull Argo CD Image	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 51 remaining risks:	

Probable: accidental-secret-leak@quay

Probable: code-backdooring@argo-cd-build-pipeline

Probable: code-backdooring@quay

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@application-controller

Probable: container-baseimage-backdooring@applicationset-controller

Probable: container-baseimage-backdooring@repo-server

Probable: missing-cloud-hardening@buildtime-boundary

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@api-server>fetching-rendered-manifests-from-cache@api-server@repo-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@application-controller>rendered-manifest-requests@application-controller@repo-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@argo-cd-build-pipeline@docker-hub@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Possible: server-side-request-forgery@argo-cd-build-pipeline@quay@argo-cd-build-pipeline>push-image-to-quay

Possible: server-side-request-forgery@argo-cd-maintainer-git-client@argo-cd-source-repo@argo-cd-maintainer-git-client>push-code-tags-to-github

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: unchecked-deployment@argo-cd-build-pipeline

Possible: unchecked-deployment@quay

Possible: unguarded-access-from-internet@quay@argo-cd-build-pipeline@argo-cd-build-pipeline>push-image-to-quay

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-network-segmentation@api-server

Improbable: missing-waf@api-server

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Argo CD Container Image Tag: 55 / 62 Risks

Repo name/tag for the Argo CD container image.

ID:	argo-cd-container-image-tag	
Usage:	devops	
Quantity:	very-few	
Tags:	none	
Origin:	Manifests repository.	
Owner:		
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, Application Controller, ApplicationSet Controller, Argo CD Maintainer Git Client, Argo CD Source Repo (GitHub), Quay, Repo Server	
Stored by:	Argo CD Maintainer Git Client, Argo CD Source Repo (GitHub)	
Sent via:	Push Code/Tags to GitHub, Pull Argo CD Image, Pull Argo CD Image, Pull Argo CD Image, Pull Argo CD Image	
Received via:	Push Code/Tags to GitHub	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 55 remaining risks:	

Probable: accidental-secret-leak@argo-cd-source-repo

Probable: accidental-secret-leak@quay

Probable: code-backdooring@argo-cd-build-pipeline

Probable: code-backdooring@argo-cd-source-repo

Probable: code-backdooring@quay

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@application-controller

Probable: container-baseimage-backdooring@applicationset-controller

Probable: container-baseimage-backdooring@repo-server

Probable: missing-cloud-hardening@buildtime-boundary

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@api-server>fetching-rendered-manifests-from-cache@api-server@repo-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@application-controller>rendered-manifest-requests@application-controller@repo-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@argo-cd-build-pipeline@docker-hub@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Possible: server-side-request-forgery@argo-cd-build-pipeline@quay@argo-cd-build-pipeline>push-image-to-quay

Possible: server-side-request-forgery@argo-cd-maintainer-git-client@argo-cd-source-repo@argo-cd-maintainer-git-client>push-code-tags-to-github

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: unchecked-deployment@argo-cd-build-pipeline

Possible: unchecked-deployment@argo-cd-source-repo

Possible: unchecked-deployment@quay

Possible: unguarded-access-from-internet@argo-cd-source-repo@argo-cd-build-pipeline@argo-cd-build-pipeline>pull-source

Possible: unguarded-access-from-internet@quay@argo-cd-build-pipeline@argo-cd-build-pipeline>push-image-to-quay

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-network-segmentation@api-server

Improbable: missing-waf@api-server

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Argo CD Database Export: 41 / 42 Risks

Export once Argo CD admin export command is run. Also contains configuration and potentially secrets

ID:	argocd-db-export	
Usage:	devops	
Quantity:	very-few	
Tags:	argocd, kubernetes, redis	
Origin:	Argo CD	
Owner:	Argo CD	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	critical	(rated 4 in scale of 5)
Availability:	critical	(rated 4 in scale of 5)
CIA-Justification:	Data for customizing of the DB system, which might include full database dumps.	
Processed by:	API Server, User CLI	
Stored by:	none	
Sent via:	Export Database	
Received via:	none	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 41 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@user-cli

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-waf@api-server

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Argo CD GitHub Push Token: 10 / 11 Risks

A token granting push access to the Argo CD GitHub repo.

ID:	argo-cd-github-push-token	
Usage:	devops	
Quantity:	few	
Tags:	none	
Origin:	GitHub UI or API	
Owner:		
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	Argo CD Source Repo (GitHub)	
Stored by:	Argo CD Build Pipeline (GitHub Actions), Argo CD Maintainer Git Client	
Sent via:	Push Code/Tags to GitHub	
Received via:	none	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 10 remaining risks:	

Probable: accidental-secret-leak@argo-cd-source-repo

Probable: code-backdooring@argo-cd-build-pipeline

Probable: code-backdooring@argo-cd-source-repo

Probable: missing-cloud-hardening@buildtime-boundary

Possible: server-side-request-forgery@argo-cd-build-pipeline@docker-hub@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Possible: server-side-request-forgery@argo-cd-build-pipeline@quay@argo-cd-build-pipeline>push-image-to-quay

Possible: server-side-request-forgery@argo-cd-maintainer-git-client@argo-cd-source-repo@argo-cd-maintainer-git-client>push-code-tags-to-github

Possible: unchecked-deployment@argo-cd-build-pipeline

Possible: unchecked-deployment@argo-cd-source-repo

Possible: unguarded-access-from-internet@argo-cd-source-repo@argo-cd-build-pipeline@argo-cd-build-pipeline>pull-source

Argo CD RBAC Config: 39 / 40 Risks

The RBAC settings for an Argo CD instance.

ID:	argo-cd-rbac-config	
Usage:	devops	
Quantity:	very-few	
Tags:	none	
Origin:	Argo CD Operator	
Owner:		
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, Host Cluster Kubernetes API	
Stored by:	API Server, Host Cluster Kubernetes API	
Sent via:	Update RBAC Config, Get/Update/Delete Live Resource State from Kubernetes (Host)	
Received via:	Update RBAC Config, Get/Update/Delete Live Resource State from Kubernetes (Host)	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 39 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-network-segmentation@api-server

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Argo CD Source: 10 / 11 Risks

The source code for Argo CD.

ID:	argo-cd-source	
Usage:	devops	
Quantity:	very-few	
Tags:	none	
Origin:	Argo CD maintainers	
Owner:		
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	Argo CD Build Pipeline (GitHub Actions), Argo CD Maintainer Git Client, Argo CD Source Repo (GitHub)	
Stored by:	Argo CD Maintainer Git Client, Argo CD Source Repo (GitHub)	
Sent via:	Push Code/Tags to GitHub	
Received via:	Push Code/Tags to GitHub, Pull Source	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 10 remaining risks:	

Probable: accidental-secret-leak@argo-cd-source-repo

Probable: code-backdooring@argo-cd-build-pipeline

Probable: code-backdooring@argo-cd-source-repo

Probable: missing-cloud-hardening@buildtime-boundary

Possible: server-side-request-forgery@argo-cd-build-pipeline@docker-hub@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Possible: server-side-request-forgery@argo-cd-build-pipeline@quay@argo-cd-build-pipeline>push-image-to-quay

Possible: server-side-request-forgery@argo-cd-maintainer-git-client@argo-cd-source-repo@argo-cd-maintainer-git-client>push-code-tags-to-github

Possible: unchecked-deployment@argo-cd-build-pipeline

Possible: unchecked-deployment@argo-cd-source-repo

Possible: unguarded-access-from-internet@argo-cd-source-repo@argo-cd-build-pipeline@argo-cd-build-pipeline>pull-source

Argo CD User Provided Secret: 37 / 38 Risks

Secrets within Argo CD that come from Kubernetes shown in the UI but not in the deployment.

ID:	user-provided-secret	
Usage:	devops	
Quantity:	very-many	
Tags:	kubernetes	
Origin:	Argo CD User	
Owner:	Kubernetes	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	mission-critical	(rated 5 in scale of 5)
CIA-Justification:	Potentially very sensitive data being shown within UI. Care here must be shown with regards to transport to UI.	
Processed by:	Host Cluster Kubernetes API, Repo Server, User CLI, Web UI	
Stored by:	none	
Sent via:	Make Requests to API Server, Make Requests to API Server	
Received via:	none	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 37 remaining risks:	

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: container-baseimage-backdooring@repo-server

Probable: missing-cloud-hardening@organization-network

Possible: missing-authentication@api-server>fetching-rendered-manifests-from-cache@api-server@repo-server

Possible: missing-authentication@application-controller>rendered-manifest-requests@application-controller@repo-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: cross-site-scripting@web-ui

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@host-cluster-kubernetes-api

Argo Tokens: 44 / 45 Risks

API access tokens generated by the API server and validated by the API server.

ID:	argo-tokens	
Usage:	devops	
Quantity:	very-many	
Tags:	none	
Origin:	Argo CD API Server	
Owner:		
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	operational	(rated 2 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, User CLI, Web UI	
Stored by:	none	
Sent via:	none	
Received via:	Make Requests to API Server, Make Requests to API Server	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 44 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Bundled UI Code: 41 / 42 Risks

Webpack bundled UI code which runs the Argo CD single-page app.

ID:	bundled-ui-code	
Usage:	devops	
Quantity:	very-few	
Tags:	none	
Origin:	Argo CD Maintainers	
Owner:		
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	Web UI	
Stored by:	API Server, Web UI	
Sent via:	none	
Received via:	Get App Code	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 41 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Cluster Access Configuration: 49 / 50 Risks

Configuration for external cluster access. Includes clusterResources boolean and namespaces list.

ID:	cluster-access-configuration	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	Argo CD Operator	
Owner:		
Confidentiality:	restricted	(rated 3 in scale of 5)
Integrity:	critical	(rated 4 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:	Integrity is critical because an attacker could disable TLS validation or enable write access to cluster resources or out-of-bounds namespaces, of those were previously restricted at the cluster config level. Resource scope and destinations may be restricted elsewhere as well (for example, in an AppProject).	
Processed by:	API Server, Application Controller, ApplicationSet Controller, Host Cluster Kubernetes API, User CLI, Web UI	
Stored by:	Host Cluster Kubernetes API	
Sent via:	Update Cluster Access Config, Make Requests to API Server, Make Requests to API Server, Get/Update/Delete Live Resource State from Kubernetes (Host)	
Received via:	Update Cluster Access Config, Get/Update/Delete Live Resource State from Kubernetes (Host)	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 49 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@application-controller

Probable: container-baseimage-backdooring@applicationset-controller

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Cluster Access Credentials: 52 / 53 Risks

Credentials granting access to manage an external Kubernetes cluster's resources.

ID:	cluster-access-credentials	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	External cluster API.	
Owner:		
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	operational	(rated 2 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, Application Controller, ApplicationSet Controller, External Cluster Kubernetes API, Host Cluster Kubernetes API, User CLI, Web UI	
Stored by:	Host Cluster Kubernetes API	
Sent via:	Update Cluster Access Config, Reconcile Resource State (External Cluster), Make Requests to API Server, Make Requests to API Server, Get/Update/Delete Live Resource State from Kubernetes (Host), Get/Update/Delete Live Resource State from Kubernetes (External)	
Received via:	Update Cluster Access Config, Get/Update/Delete Live Resource State from Kubernetes (Host)	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 52 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@application-controller

Probable: container-baseimage-backdooring@applicationset-controller

Probable: container-baseimage-backdooring@external-cluster-kubernetes-api

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: missing-cloud-hardening@external-services-boundary

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@external-cluster-kubernetes-api

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Git Branch Name: 8 / 8 Risks

Name of a branch in a git repo.

ID:	git-branch-name	
Usage:	devops	
Quantity:	very-many	
Tags:	none	
Origin:	SCM API or Argo CD User	
Owner:		
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	critical	(rated 4 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	ApplicationSet Controller, Internal Source Control Management API	
Stored by:	none	
Sent via:	none	
Received via:	Git Generator Pull	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 8 remaining risks:	

Probable: container-baseimage-backdooring@applicationset-controller

Probable: missing-cloud-hardening@organization-network

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Git Organization Name: 8 / 8 Risks

Name of an organization/project in a git source control management system.

ID:	git-org-name	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	SCM API or Argo CD User	
Owner:		
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	important	(rated 3 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	ApplicationSet Controller, Internal Source Control Management API	
Stored by:	none	
Sent via:	none	
Received via:	Git Generator Pull	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 8 remaining risks:	

Probable: container-baseimage-backdooring@applicationset-controller

Probable: missing-cloud-hardening@organization-network

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Git Repo Name: 4 / 4 Risks

Name of a git repo.

ID:	git-repo-name	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	SCM API or Argo CD User	
Owner:		
Confidentiality:	restricted	(rated 3 in scale of 5)
Integrity:	operational	(rated 2 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	Internal Source Control Management API	
Stored by:	none	
Sent via:	none	
Received via:	Git Generator Pull	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 4 remaining risks:	

Probable: missing-cloud-hardening@organization-network

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Git Repo URL: 8 / 8 Risks

URL of a git repo.

ID:	git-repo-url	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	SCM API or Argo CD User	
Owner:		
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	important	(rated 3 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	ApplicationSet Controller, Internal Source Control Management API	
Stored by:	none	
Sent via:	Git Generator Pull	
Received via:	none	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 8 remaining risks:	

Probable: container-baseimage-backdooring@applicationset-controller

Probable: missing-cloud-hardening@organization-network

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Live Manifests: 52 / 53 Risks

Live manifests representing some Kubernetes resource. May include contents of secrets.

ID:	live-manifests	
Usage:	devops	
Quantity:	very-many	
Tags:	none	
Origin:	Kubernetes	
Owner:	Argo CD User	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, Application Controller, ApplicationSet Controller, External Cluster Kubernetes API, Host Cluster Kubernetes API, User CLI, Web UI	
Stored by:	External Cluster Kubernetes API, Host Cluster Kubernetes API	
Sent via:	none	
Received via:	Reconcile Resource State (Host Cluster), Reconcile Resource State (Host Cluster), Reconcile Resource State (External Cluster), Get/Update/Delete Live Resource State from Kubernetes (Host), Get/Update/Delete Live Resource State from Kubernetes (External)	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 52 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@application-controller

Probable: container-baseimage-backdooring@applicationset-controller

Probable: container-baseimage-backdooring@external-cluster-kubernetes-api

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: missing-cloud-hardening@external-services-boundary

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@external-cluster-kubernetes-api

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Manifest Sources: 49 / 52 Risks

Some Description

ID:	manifest-sources	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	Some Origin	
Owner:	Argo CD	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:	The manifest sources are potentially-sensitive, especially in a multi-tenant Argo CD installation. They shouldn't contain any secrets. Integrity is important to ensure the correct manifests are deployed. The cache helps mitigate denial-of-service on the controller and API server, but Argo CD can still function without the cache.	
Processed by:	API Server, Internal Source Control Management UI, Repo Server, Repo Server Storage, User CLI, Web UI	
Stored by:	Internal Source Control Management API, Repo Server, Repo Server Storage	
Sent via:	Store Cached Manifest Sources, Push Manifest Sources, Make Requests to API Server, Make Requests to API Server	
Received via:	Store Cached Manifest Sources, Push Manifest Sources, Fetch Manifest Sources	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 49 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@repo-server-storage

Probable: container-baseimage-backdooring@repo-server

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@api-server>fetching-rendered-manifests-from-cache@api-server@repo-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@application-controller>rendered-manifest-requests@application-controller@repo-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Improbable: unencrypted-asset@repo-server-storage

OIDC Client Secret: 39 / 40 Risks

Client secret used by the API server to authenticate with an OIDC provider.

ID:	oidc-client-secret	
Usage:	business	
Quantity:	very-few	
Tags:	none	
Origin:	OIDC Provider	
Owner:		
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	important	(rated 3 in scale of 5)
Availability:	important	(rated 3 in scale of 5)
CIA-Justification:		
Processed by:	API Server	
Stored by:	Host Cluster Kubernetes API	
Sent via:	Get/Update/Delete Live Resource State from Kubernetes (Host)	
Received via:	Get/Update/Delete Live Resource State from Kubernetes (Host)	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 39 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-network-segmentation@api-server

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

OIDC Configuration: 47 / 48 Risks

Configuration of Argo CD's OIDC provider (either bundled Dex instance or external).

ID:	oidc-configuration	
Usage:	business	
Quantity:	very-few	
Tags:	none	
Origin:	Argo CD Operator	
Owner:		
Confidentiality:	internal	(rated 2 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	important	(rated 3 in scale of 5)
CIA-Justification:	The OIDC configuration is "internal," because it informs users' CLIs or UIs how to log a user in. But that information should not be public if Argo CD is not exposed to the public internet. The integrity of the configuration is mission critical, because if someone can change the configuration, they can cause Argo CD to trust identity information from an untrustworthy source. Availability is important, because without the configuration, users will be unable to log into Argo CD. Availability is not mission critical, because the core Argo CD components (controller, repo-server, Redis) will be unaffected. An administrator can use Kubernetes API access to restore the configuration.	
Processed by:	API Server, User CLI, Web UI	
Stored by:	API Server, Host Cluster Kubernetes API	
Sent via:	Get/Update/Delete Live Resource State from Kubernetes (Host)	
Received via:	Make Requests to API Server, Make Requests to API Server, Get/Update/Delete Live Resource State from Kubernetes (Host)	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 47 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

OIDC Public Keys: 42 / 43 Risks

Public keys used to validate OIDC tokens.

ID:	oidc-public-keys	
Usage:	business	
Quantity:	few	
Tags:	none	
Origin:	OIDC provider	
Owner:		
Confidentiality:	public	(rated 1 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, OIDC Provider (External), OIDC Proxy (Dex)	
Stored by:	API Server, OIDC Provider (External), OIDC Proxy (Dex)	
Sent via:	none	
Received via:	Validate External OIDC Token, Validate Dex OIDC Token	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 42 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@dex-server

Probable: missing-cloud-hardening@external-services-boundary

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: cross-site-scripting@dex-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@api-server>validate-dex-oidc-token@api-server@dex-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: cross-site-request-forgery@dex-server@api-server>validate-dex-oidc-token

Improbable: missing-hardening@api-server

Improbable: missing-identity-provider-isolation@dex-server

Improbable: missing-network-segmentation@api-server

Improbable: missing-waf@api-server

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

OIDC Tokens: 50 / 51 Risks

JWTs holding user information, including group membership.

ID:	oidc-tokens	
Usage:	business	
Quantity:	very-many	
Tags:	none	
Origin:	OIDC provider	
Owner:		
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	operational	(rated 2 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, OIDC Provider (External), OIDC Proxy (Dex), User CLI, Web UI	
Stored by:	User CLI, Web UI	
Sent via:	Make Requests to API Server, Make Requests to API Server	
Received via:	Proxying to an External OIDC Provider, Export Database	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 50 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@dex-server

Probable: missing-cloud-hardening@external-services-boundary

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: cross-site-scripting@dex-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@api-server>validate-dex-oidc-token@api-server@dex-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: cross-site-request-forgery@dex-server@api-server>validate-dex-oidc-token

Improbable: missing-hardening@api-server

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-identity-provider-isolation@dex-server

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Quay Push Token: 10 / 15 Risks

Quay token with push access to the Argo CD repository.

ID:	quay-push-token	
Usage:	devops	
Quantity:	very-few	
Tags:	none	
Origin:	Quay	
Owner:	Argo CD build team.	
Confidentiality:	strictly-confidential	(rated 5 in scale of 5)
Integrity:	operational	(rated 2 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	Argo CD Build Pipeline (GitHub Actions), Quay	
Stored by:	Argo CD Build Pipeline (GitHub Actions)	
Sent via:	Push Image to Quay	
Received via:	none	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 10 remaining risks:	

Probable: accidental-secret-leak@quay

Probable: code-backdooring@argo-cd-build-pipeline

Probable: code-backdooring@quay

Probable: missing-cloud-hardening@buildtime-boundary

Possible: server-side-request-forgery@argo-cd-build-pipeline@docker-hub@argo-cd-build-pipeline>pull-base-image-from-docker-hub

Possible: server-side-request-forgery@argo-cd-build-pipeline@quay@argo-cd-build-pipeline>push-image-to-quay

Possible: server-side-request-forgery@argo-cd-maintainer-git-client@argo-cd-source-repo@argo-cd-maintainer-git-client>push-code-tags-to-github

Possible: unchecked-deployment@argo-cd-build-pipeline

Possible: unchecked-deployment@quay

Possible: unguarded-access-from-internet@quay@argo-cd-build-pipeline@argo-cd-build-pipeline>push-image-to-quay

Rendered Manifests: 56 / 58 Risks

Some Description

ID:	rendered-manifests	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	Some Origin	
Owner:	Argo CD	
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	mission-critical	(rated 5 in scale of 5)
Availability:	important	(rated 3 in scale of 5)
CIA-Justification:	The manifests are potentially-sensitive, especially in a multi-tenant Argo CD installation. They shouldn't contain any secrets. Integrity is important to ensure the correct manifests are deployed. The cache helps mitigate denial-of-service on the controller and API server, but Argo CD can still function without the cache.	
Processed by:	API Server, Application Controller, External Cluster Kubernetes API, Host Cluster Kubernetes API, Repo Server, User CLI, Web UI	
Stored by:	Rendered Manifests Cache (Redis)	
Sent via:	Send/Receive Cached Rendered Manifests, Reconcile Resource State (Host Cluster), Reconcile Resource State (External Cluster), Make Requests to API Server, Make Requests to API Server, Get/Update/Delete Live Resource State from Kubernetes (Host), Get/Update/Delete Live Resource State from Kubernetes (External)	
Received via:	Send/Receive Cached Rendered Manifests, Rendered Manifest Requests, Make Requests to API Server, Make Requests to API Server, Fetching Rendered Manifests from Cache	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 56 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@application-controller

Probable: container-baseimage-backdooring@external-cluster-kubernetes-api

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: container-baseimage-backdooring@rendered-manifests-cache

Probable: container-baseimage-backdooring@repo-server

Probable: missing-cloud-hardening@external-services-boundary

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@api-server>fetching-rendered-manifests-from-cache@api-server@repo-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@application-controller>rendered-manifest-requests@application-controller@repo-server

Possible: missing-authentication@repo-server>send-receive-cached-rendered-manifests@repo-server@rendered-manifests-cache

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@external-cluster-kubernetes-api

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Repo Access Credentials: 51 / 53 Risks

Credentials for retrieving manifest sources from a source control manager (git, Helm, etc.).

ID:	repo-access-credentials	
Usage:	devops	
Quantity:	many	
Tags:	none	
Origin:	Argo CD Operator	
Owner:		
Confidentiality:	confidential	(rated 4 in scale of 5)
Integrity:	operational	(rated 2 in scale of 5)
Availability:	operational	(rated 2 in scale of 5)
CIA-Justification:		
Processed by:	API Server, ApplicationSet Controller, Internal Source Control Management API, Repo Server, User CLI, Web UI	
Stored by:	Host Cluster Kubernetes API	
Sent via:	Update Repo Access Credentials, Make Requests to API Server, Make Requests to API Server, Git Generator Pull, Get/Update/Delete Live Resource State from Kubernetes (Host)	
Received via:	Update Repo Access Credentials, Get/Update/Delete Live Resource State from Kubernetes (Host), Get Repo Access Credentials	
Data Breach:	**probable**	
Data Breach Risks:	This data asset has data breach potential because of 51 remaining risks:	

Probable: container-baseimage-backdooring@api-server

Probable: container-baseimage-backdooring@applicationset-controller

Probable: container-baseimage-backdooring@host-cluster-kubernetes-api

Probable: container-baseimage-backdooring@repo-server

Probable: missing-cloud-hardening@organization-network

Possible: cross-site-scripting@api-server

Possible: missing-authentication@api-server>fetching-rendered-manifests-from-cache@api-server@repo-server

Possible: missing-authentication@web-ui>get-app-code@web-ui@api-server

Possible: missing-authentication@application-controller>rendered-manifest-requests@application-controller@repo-server

Possible: server-side-request-forgery@api-server@external-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-external

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>get-update-delete-live-resource-state-from-kubernetes-host

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-cluster-access-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-rbac-config

Possible: server-side-request-forgery@api-server@host-cluster-kubernetes-api@api-server>update-repo-access-credentials

Possible: server-side-request-forgery@api-server@oidc-provider@api-server>validate-external-oidc-token

Possible: server-side-request-forgery@api-server@dex-server@api-server>validate-dex-oidc-token

Possible: server-side-request-forgery@api-server@quay@api-server>pull-argo-cd-image

Possible: server-side-request-forgery@api-server@repo-server@api-server>fetching-rendered-manifests-from-cache

Possible: server-side-request-forgery@api-server@user-cli@api-server>export-database

Possible: server-side-request-forgery@application-controller@external-cluster-kubernetes-api@application-controller>reconcile-resource-state-external-cluster

Possible: server-side-request-forgery@application-controller@host-cluster-kubernetes-api@application-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@application-controller@quay@application-controller>pull-argo-cd-image

Possible: server-side-request-forgery@application-controller@repo-server@application-controller>rendered-manifest-requests

Possible: server-side-request-forgery@applicationset-controller@host-cluster-kubernetes-api@applicationset-controller>reconcile-resource-state-host-cluster

Possible: server-side-request-forgery@applicationset-controller@internal-source-control-management-api@applicationset-controller>git-generator-pull

Possible: server-side-request-forgery@applicationset-controller@quay@applicationset-controller>pull-argo-cd-image

Possible: server-side-request-forgery@dex-server@oidc-provider@dex-server>proxying-to-an-external-oidc-provider

Possible: server-side-request-forgery@repo-server@host-cluster-kubernetes-api@repo-server>get-repo-access-credentials

Possible: server-side-request-forgery@repo-server@internal-source-control-management-api@repo-server>fetch-manifest-sources

Possible: server-side-request-forgery@repo-server@quay@repo-server>pull-argo-cd-image

Possible: server-side-request-forgery@repo-server@rendered-manifests-cache@repo-server>send-receive-cached-rendered-manifests

Possible: server-side-request-forgery@user-cli@api-server@user-cli>make-requests-to-api-server

Possible: server-side-request-forgery@web-ui@api-server@web-ui>get-app-code

Possible: server-side-request-forgery@web-ui@api-server@web-ui>make-requests-to-api-server

Possible: missing-authentication-second-factor@user-cli>make-requests-to-api-server@user-cli@api-server

Possible: missing-authentication-second-factor@web-ui>make-requests-to-api-server@web-ui@api-server

Possible: cross-site-scripting@web-ui

Improbable: cross-site-request-forgery@api-server@web-ui>get-app-code

Improbable: cross-site-request-forgery@api-server@user-cli>make-requests-to-api-server

Improbable: cross-site-request-forgery@api-server@web-ui>make-requests-to-api-server

Improbable: missing-hardening@api-server

Improbable: missing-hardening@host-cluster-kubernetes-api

Improbable: missing-hardening@user-cli

Improbable: missing-hardening@web-ui

Improbable: missing-network-segmentation@api-server

Improbable: missing-network-segmentation@user-cli

Improbable: missing-network-segmentation@web-ui

Improbable: missing-waf@api-server

Improbable: missing-waf@host-cluster-kubernetes-api

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@user-cli

Improbable: unnecessary-data-transfer@user-provided-secret@api-server@web-ui

Trust Boundaries

In total **5 trust boundaries** have been modeled during the threat modeling process.

Build Time Boundary
Build infrastructure

ID:	buildtime-boundary
Type:	network-cloud-provider
Tags:	none
Assets inside:	Argo CD Build Pipeline (GitHub Actions), Argo CD Maintainer Git Client, Argo CD Source Repo (GitHub), Docker Hub, Quay
Boundaries nested:	none

External Services
Represents external services used by an Argo CD User.

ID:	external-services-boundary
Type:	network-cloud-provider
Tags:	none
Assets inside:	External Cluster Kubernetes API, OIDC Provider (External)
Boundaries nested:	none

Kubernetes Argo CD Namespace
The Kubernetes namespace where Argo CD is deployed.

ID:	kubernetes-argo-cd-namespace
Type:	network-policy-namespace-isolation
Tags:	none
Assets inside:	API Server, Application Controller, ApplicationSet Controller, OIDC Proxy (Dex), Rendered Manifests Cache (Redis), Repo Server, Repo Server Storage
Boundaries nested:	none

Kubernetes Network
Some Description

ID:	kubernetes-network
Type:	network-policy-namespace-isolation
Tags:	none
Assets inside:	Host Cluster Kubernetes API
Boundaries nested:	Kubernetes Argo CD Namespace

Organization Network

For example, a company VPN.

ID:	organization-network
Type:	network-cloud-provider
Tags:	none
Assets inside:	Internal Source Control Management API, Internal Source Control Management UI, User CLI, Web UI
Boundaries nested:	Kubernetes Network

Shared Runtimes

In total **1 shared runtime** has been modeled during the threat modeling process.

Kubernetes Node
Multiple Argo CD components _may_ share a single node.

ID:	kubernetes-node
Tags:	none
Assets running:	Repo Server, Application Controller

Risk Rules Checked by Threagile

Threagile Version: 1.0.0
Threagile Build Timestamp: 20211121124511
Threagile Execution Timestamp: 20221120002733
Model Filename: /app/work/threagile.yaml
Model Hash (SHA256): 347c151d82ac5b452c4371153f590edf173c60ce7c404fcc791a196491ff288c

Threagile (see https://threagile.io for more details) is an open-source toolkit for agile threat modeling, created by Christian Schneider (https://christian-schneider.net): It allows to model an architecture with its assets in an agile fashion as a YAML file directly inside the IDE. Upon execution of the Threagile toolkit all standard risk rules (as well as individual custom rules if present) are checked against the architecture model. At the time the Threagile toolkit was executed on the model input file the following risk rules were checked:

Accidental Secret Leak
accidental-secret-leak

STRIDE:	Information Disclosure
Description:	Sourcecode repositories (including their histories) as well as artifact registries can accidentally contain secrets like checked-in or packaged-in passwords, API tokens, certificates, crypto keys, etc.
Detection:	In-scope sourcecode repositories and artifact registries.
Rating:	The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

Code Backdooring
code-backdooring

STRIDE:	Tampering
Description:	For each build-pipeline component Code Backdooring risks might arise where attackers compromise the build-pipeline in order to let backdoored artifacts be shipped into production. Aside from direct code backdooring this includes backdooring of dependencies and even of more lower-level build infrastructure, like backdooring compilers (similar to what the XcodeGhost malware did) or dependencies.
Detection:	In-scope development relevant technical assets which are either accessed by out-of-scope unmanaged developer clients and/or are directly accessed by any kind of internet-located (non-VPN) component or are themselves directly located on the internet.
Rating:	The risk rating depends on the confidentiality and integrity rating of the code being handled and deployed as well as the placement/calling of this technical asset on/from the internet.

Container Base Image Backdooring
container-baseimage-backdooring

STRIDE: Tampering
Description: When a technical asset is built using container technologies, Base Image Backdooring risks might arise where base images and other layers used contain vulnerable components or backdoors.
Detection: In-scope technical assets running as containers.
Rating: The risk rating depends on the sensitivity of the technical asset itself and of the data assets.

Container Platform Escape
container-platform-escape

STRIDE: Elevation of Privilege
Description: Container platforms are especially interesting targets for attackers as they host big parts of a containerized runtime infrastructure. When not configured and operated with security best practices in mind, attackers might exploit a vulnerability inside an container and escape towards the platform as highly privileged users. These scenarios might give attackers capabilities to attack every other container as owning the container platform (via container escape attacks) equals to owning every container.
Detection: In-scope container platforms.
Rating: The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

Cross-Site Request Forgery (CSRF)
cross-site-request-forgery

STRIDE: Spoofing
Description: When a web application is accessed via web protocols Cross-Site Request Forgery (CSRF) risks might arise.
Detection: In-scope web applications accessed via typical web access protocols.
Rating: The risk rating depends on the integrity rating of the data sent across the communication link.

Cross-Site Scripting (XSS)
cross-site-scripting

STRIDE: Tampering
Description: For each web application Cross-Site Scripting (XSS) risks might arise. In terms of the overall risk level take other applications running on the same domain into account as well.
Detection: In-scope web applications.
Rating: The risk rating depends on the sensitivity of the data processed or stored in the web application.

DoS-risky Access Across Trust-Boundary

dos-risky-access-across-trust-boundary

STRIDE: Denial of Service

Description: Assets accessed across trust boundaries with critical or mission-critical availability rating are more prone to Denial-of-Service (DoS) risks.

Detection: In-scope technical assets (excluding load-balancer) with availability rating of critical or higher which have incoming data-flows across a network trust-boundary (excluding devops usage).

Rating: Matching technical assets with availability rating of critical or higher are at low risk. When the availability rating is mission-critical and neither a VPN nor IP filter for the incoming data-flow nor redundancy for the asset is applied, the risk-rating is considered medium.

Incomplete Model

incomplete-model

STRIDE: Information Disclosure

Description: When the threat model contains unknown technologies or transfers data over unknown protocols, this is an indicator for an incomplete model.

Detection: All technical assets and communication links with technology type or protocol type specified as unknown.

Rating: low

LDAP-Injection

ldap-injection

STRIDE: Tampering

Description: When an LDAP server is accessed LDAP-Injection risks might arise. The risk rating depends on the sensitivity of the LDAP server itself and of the data assets processed or stored.

Detection: In-scope clients accessing LDAP servers via typical LDAP access protocols.

Rating: The risk rating depends on the sensitivity of the LDAP server itself and of the data assets processed or stored.

Missing Authentication

missing-authentication

STRIDE: Elevation of Privilege

Description: Technical assets (especially multi-tenant systems) should authenticate incoming requests when the asset processes or stores sensitive data.

Detection: In-scope technical assets (except load-balancer, reverse-proxy, service-registry, waf, ids, and ips and in-process calls) should authenticate incoming requests when the asset processes or stores sensitive data. This is especially the case for all multi-tenant assets (there even non-sensitive ones).

Rating: The risk rating (medium or high) depends on the sensitivity of the data sent across

the communication link. Monitoring callers are exempted from this risk.

Missing Two-Factor Authentication (2FA)

missing-authentication-second-factor

STRIDE: Elevation of Privilege

Description: Technical assets (especially multi-tenant systems) should authenticate incoming requests with two-factor (2FA) authentication when the asset processes or stores highly sensitive data (in terms of confidentiality, integrity, and availability) and is accessed by humans.

Detection: In-scope technical assets (except load-balancer, reverse-proxy, waf, ids, and ips) should authenticate incoming requests via two-factor authentication (2FA) when the asset processes or stores highly sensitive data (in terms of confidentiality, integrity, and availability) and is accessed by a client used by a human user.

Rating: medium

Missing Build Infrastructure

missing-build-infrastructure

STRIDE: Tampering

Description: The modeled architecture does not contain a build infrastructure (devops-client, sourcecode-repo, build-pipeline, etc.), which might be the risk of a model missing critical assets (and thus not seeing their risks). If the architecture contains custom-developed parts, the pipeline where code gets developed and built needs to be part of the model.

Detection: Models with in-scope custom-developed parts missing in-scope development (code creation) and build infrastructure components (devops-client, sourcecode-repo, build-pipeline, etc.).

Rating: The risk rating depends on the highest sensitivity of the in-scope assets running custom-developed parts.

Missing Cloud Hardening

missing-cloud-hardening

STRIDE: Tampering

Description: Cloud components should be hardened according to the cloud vendor best practices. This affects their configuration, auditing, and further areas.

Detection: In-scope cloud components (either residing in cloud trust boundaries or more specifically tagged with cloud provider types).

Rating: The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

Missing File Validation

missing-file-validation

STRIDE: Spoofing

Description: When a technical asset accepts files, these input files should be strictly validated about filename and type.
Detection: In-scope technical assets with custom-developed code accepting file data formats.
Rating: The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

Missing Hardening
missing-hardening

STRIDE: Tampering
Description: Technical assets with a Relative Attacker Attractiveness (RAA) value of 55 % or higher should be explicitly hardened taking best practices and vendor hardening guides into account.
Detection: In-scope technical assets with RAA values of 55 % or higher. Generally for high-value targets like datastores, application servers, identity providers and ERP systems this limit is reduced to 40 %
Rating: The risk rating depends on the sensitivity of the data processed or stored in the technical asset.

Missing Identity Propagation
missing-identity-propagation

STRIDE: Elevation of Privilege
Description: Technical assets (especially multi-tenant systems), which usually process data for endusers should authorize every request based on the identity of the enduser when the data flow is authenticated (i.e. non-public). For DevOps usages at least a technical-user authorization is required.
Detection: In-scope service-like technical assets which usually process data based on enduser requests, if authenticated (i.e. non-public), should authorize incoming requests based on the propagated enduser identity when their rating is sensitive. This is especially the case for all multi-tenant assets (there even less-sensitive rated ones). DevOps usages are exempted from this risk.
Rating: The risk rating (medium or high) depends on the confidentiality, integrity, and availability rating of the technical asset.

Missing Identity Provider Isolation
missing-identity-provider-isolation

STRIDE: Elevation of Privilege
Description: Highly sensitive identity provider assets and their identity datastores should be isolated from other assets by their own network segmentation trust-boundary (execution-environment boundaries do not count as network isolation).
Detection: In-scope identity provider assets and their identity datastores when surrounded by other (not identity-related) assets (without a network trust-boundary in-between).

This risk is especially prevalent when other non-identity related assets are within the same execution environment (i.e. same database or same application server).

Rating: Default is high impact. The impact is increased to very-high when the asset missing the trust-boundary protection is rated as strictly-confidential or mission-critical.

Missing Identity Store

missing-identity-store

STRIDE: Spoofing

Description: The modeled architecture does not contain an identity store, which might be the risk of a model missing critical assets (and thus not seeing their risks).

Detection: Models with authenticated data-flows authorized via enduser-identity missing an in-scope identity store.

Rating: The risk rating depends on the sensitivity of the enduser-identity authorized technical assets and their data assets processed and stored.

Missing Network Segmentation

missing-network-segmentation

STRIDE: Elevation of Privilege

Description: Highly sensitive assets and/or datastores residing in the same network segment than other lower sensitive assets (like webservers or content management systems etc.) should be better protected by a network segmentation trust-boundary.

Detection: In-scope technical assets with high sensitivity and RAA values as well as datastores when surrounded by assets (without a network trust-boundary in-between) which are of type client-system, web-server, web-application, cms, web-service-rest, web-service-soap, build-pipeline, sourcecode-repository, monitoring, or similar and there is no direct connection between these (hence no requirement to be so close to each other).

Rating: Default is low risk. The risk is increased to medium when the asset missing the trust-boundary protection is rated as strictly-confidential or mission-critical.

Missing Vault (Secret Storage)

missing-vault

STRIDE: Information Disclosure

Description: In order to avoid the risk of secret leakage via config files (when attacked through vulnerabilities being able to read files like Path-Traversal and others), it is best practice to use a separate hardened process with proper authentication, authorization, and audit logging to access config secrets (like credentials, private keys, client certificates, etc.). This component is usually some kind of Vault.

Detection: Models without a Vault (Secret Storage).

Rating: The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

Missing Vault Isolation
missing-vault-isolation

STRIDE: Elevation of Privilege

Description: Highly sensitive vault assets and their datastores should be isolated from other assets by their own network segmentation trust-boundary (execution-environment boundaries do not count as network isolation).

Detection: In-scope vault assets when surrounded by other (not vault-related) assets (without a network trust-boundary in-between). This risk is especially prevalent when other non-vault related assets are within the same execution environment (i.e. same database or same application server).

Rating: Default is medium impact. The impact is increased to high when the asset missing the trust-boundary protection is rated as strictly-confidential or mission-critical.

Missing Web Application Firewall (WAF)
missing-waf

STRIDE: Tampering

Description: To have a first line of filtering defense, security architectures with web-services or web-applications should include a WAF in front of them. Even though a WAF is not a replacement for security (all components must be secure even without a WAF) it adds another layer of defense to the overall system by delaying some attacks and having easier attack alerting through it.

Detection: In-scope web-services and/or web-applications accessed across a network trust boundary not having a Web Application Firewall (WAF) in front of them.

Rating: The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

Mixed Targets on Shared Runtime
mixed-targets-on-shared-runtime

STRIDE: Elevation of Privilege

Description: Different attacker targets (like frontend and backend/datastore components) should not be running on the same shared (underlying) runtime.

Detection: Shared runtime running technical assets of different trust-boundaries is at risk. Also mixing backend/datastore with frontend components on the same shared runtime is considered a risk.

Rating: The risk rating (low or medium) depends on the confidentiality, integrity, and availability rating of the technical asset running on the shared runtime.

Path-Traversal
path-traversal

STRIDE: Information Disclosure

Description: When a filesystem is accessed Path-Traversal or Local-File-Inclusion (LFI) risks might arise. The risk rating depends on the sensitivity of the technical asset itself

and of the data assets processed or stored.

Detection: Filesystems accessed by in-scope callers.

Rating: The risk rating depends on the sensitivity of the data stored inside the technical asset.

Push instead of Pull Deployment

push-instead-of-pull-deployment

STRIDE: Tampering

Description: When comparing push-based vs. pull-based deployments from a security perspective, pull-based deployments improve the overall security of the deployment targets. Every exposed interface of a production system to accept a deployment increases the attack surface of the production system, thus a pull-based approach exposes less attack surface relevant interfaces.

Detection: Models with build pipeline components accessing in-scope targets of deployment (in a non-readonly way) which are not build-related components themselves.

Rating: The risk rating depends on the highest sensitivity of the deployment targets running custom-developed parts.

Search-Query Injection

search-query-injection

STRIDE: Tampering

Description: When a search engine server is accessed Search-Query Injection risks might arise.

Detection: In-scope clients accessing search engine servers via typical search access protocols.

Rating: The risk rating depends on the sensitivity of the search engine server itself and of the data assets processed or stored.

Server-Side Request Forgery (SSRF)

server-side-request-forgery

STRIDE: Information Disclosure

Description: When a server system (i.e. not a client) is accessing other server systems via typical web protocols Server-Side Request Forgery (SSRF) or Local-File-Inclusion (LFI) or Remote-File-Inclusion (RFI) risks might arise.

Detection: In-scope non-client systems accessing (using outgoing communication links) targets with either HTTP or HTTPS protocol.

Rating: The risk rating (low or medium) depends on the sensitivity of the data assets receivable via web protocols from targets within the same network trust-boundary as well on the sensitivity of the data assets receivable via web protocols from the target asset itself. Also for cloud-based environments the exploitation impact is at least medium, as cloud backend services can be attacked via SSRF.

Service Registry Poisoning

service-registry-poisoning

STRIDE: Spoofing

Description: When a service registry used for discovery of trusted service endpoints Service Registry Poisoning risks might arise.

Detection: In-scope service registries.

Rating: The risk rating depends on the sensitivity of the technical assets accessing the service registry as well as the data assets processed or stored.

SQL/NoSQL-Injection

sql-nosql-injection

STRIDE: Tampering

Description: When a database is accessed via database access protocols SQL/NoSQL-Injection risks might arise. The risk rating depends on the sensitivity technical asset itself and of the data assets processed or stored.

Detection: Database accessed via typical database access protocols by in-scope clients.

Rating: The risk rating depends on the sensitivity of the data stored inside the database.

Unchecked Deployment

unchecked-deployment

STRIDE: Tampering

Description: For each build-pipeline component Unchecked Deployment risks might arise when the build-pipeline does not include established DevSecOps best-practices. DevSecOps best-practices scan as part of CI/CD pipelines for vulnerabilities in source- or byte-code, dependencies, container layers, and dynamically against running test systems. There are several open-source and commercial tools existing in the categories DAST, SAST, and IAST.

Detection: All development-relevant technical assets.

Rating: The risk rating depends on the highest rating of the technical assets and data assets processed by deployment-receiving targets.

Unencrypted Technical Assets

unencrypted-asset

STRIDE: Information Disclosure

Description: Due to the confidentiality rating of the technical asset itself and/or the processed data assets this technical asset must be encrypted. The risk rating depends on the sensitivity technical asset itself and of the data assets stored.

Detection: In-scope unencrypted technical assets (excluding reverse-proxy, load-balancer, waf, ids, ips and embedded components like library) storing data assets rated at least as confidential or critical. For technical assets storing data assets rated as strictly-confidential or mission-critical the encryption must be of type data-with-enduser-individual-key.

Rating: Depending on the confidentiality rating of the stored data-assets either medium or high risk.

Unencrypted Communication
unencrypted-communication

STRIDE: Information Disclosure

Description: Due to the confidentiality and/or integrity rating of the data assets transferred over the communication link this connection must be encrypted.

Detection: Unencrypted technical communication links of in-scope technical assets (excluding monitoring traffic as well as local-file-access and in-process-library-call) transferring sensitive data.

Rating: Depending on the confidentiality rating of the transferred data-assets either medium or high risk.

Unguarded Access From Internet
unguarded-access-from-internet

STRIDE: Elevation of Privilege

Description: Internet-exposed assets must be guarded by a protecting service, application, or reverse-proxy.

Detection: In-scope technical assets (excluding load-balancer) with confidentiality rating of confidential (or higher) or with integrity rating of critical (or higher) when accessed directly from the internet. All web-server, web-application, reverse-proxy, waf, and gateway assets are exempted from this risk when they do not consist of custom developed code and the data-flow only consists of HTTP or FTP protocols. Access from monitoring systems as well as VPN-protected connections are exempted.

Rating: The matching technical assets are at low risk. When either the confidentiality rating is strictly-confidential or the integrity rating is mission-critical, the risk-rating is considered medium. For assets with RAA values higher than 40 % the risk-rating increases.

Unguarded Direct Datastore Access
unguarded-direct-datastore-access

STRIDE: Elevation of Privilege

Description: Datastores accessed across trust boundaries must be guarded by some protecting service or application.

Detection: In-scope technical assets of type datastore (except identity-store-ldap when accessed from identity-provider and file-server when accessed via file transfer protocols) with confidentiality rating of confidential (or higher) or with integrity rating of critical (or higher) which have incoming data-flows from assets outside across a network trust-boundary. DevOps config and deployment access is excluded from this risk.

Rating: The matching technical assets are at low risk. When either the confidentiality rating is strictly-confidential or the integrity rating is mission-critical, the risk-rating is considered medium. For assets with RAA values higher than 40 % the risk-rating increases.

Unnecessary Communication Link
unnecessary-communication-link

STRIDE: Elevation of Privilege
Description: When a technical communication link does not send or receive any data assets, this is an indicator for an unnecessary communication link (or for an incomplete model).
Detection: In-scope technical assets' technical communication links not sending or receiving any data assets.
Rating: low

Unnecessary Data Asset
unnecessary-data-asset

STRIDE: Elevation of Privilege
Description: When a data asset is not processed or stored by any data assets and also not transferred by any communication links, this is an indicator for an unnecessary data asset (or for an incomplete model).
Detection: Modelled data assets not processed or stored by any data assets and also not transferred by any communication links.
Rating: low

Unnecessary Data Transfer
unnecessary-data-transfer

STRIDE: Elevation of Privilege
Description: When a technical asset sends or receives data assets, which it neither processes or stores this is an indicator for unnecessarily transferred data (or for an incomplete model). When the unnecessarily transferred data assets are sensitive, this poses an unnecessary risk of an increased attack surface.
Detection: In-scope technical assets sending or receiving sensitive data assets which are neither processed nor stored by the technical asset are flagged with this risk. The risk rating (low or medium) depends on the confidentiality, integrity, and availability rating of the technical asset. Monitoring data is exempted from this risk.
Rating: The risk assessment is depending on the confidentiality and integrity rating of the transferred data asset either low or medium.

Unnecessary Technical Asset
unnecessary-technical-asset

STRIDE: Elevation of Privilege
Description: When a technical asset does not process or store any data assets, this is an

indicator for an unnecessary technical asset (or for an incomplete model). This is also the case if the asset has no communication links (either outgoing or incoming).

Detection: Technical assets not processing or storing any data assets.

Rating: low

Untrusted Deserialization

untrusted-deserialization

STRIDE: Tampering

Description: When a technical asset accepts data in a specific serialized form (like Java or .NET serialization), Untrusted Deserialization risks might arise.

Detection: In-scope technical assets accepting serialization data formats (including EJB and RMI protocols).

Rating: The risk rating depends on the sensitivity of the technical asset itself and of the data assets processed and stored.

Wrong Communication Link Content

wrong-communication-link-content

STRIDE: Information Disclosure

Description: When a communication link is defined as readonly, but does not receive any data asset, or when it is defined as not readonly, but does not send any data asset, it is likely to be a model failure.

Detection: Communication links with inconsistent data assets being sent/received not matching their readonly flag or otherwise inconsistent protocols not matching the target technology type.

Rating: low

Wrong Trust Boundary Content

wrong-trust-boundary-content

STRIDE: Elevation of Privilege

Description: When a trust boundary of type network-policy-namespace-isolation contains non-container assets it is likely to be a model failure.

Detection: Trust boundaries which should only contain containers, but have different assets inside.

Rating: low

XML External Entity (XXE)

xml-external-entity

STRIDE: Information Disclosure

Description: When a technical asset accepts data in XML format, XML External Entity (XXE) risks might arise.

Detection: In-scope technical assets accepting XML data formats.

Rating: The risk rating depends on the sensitivity of the technical asset itself and of the data

assets processed and stored. Also for cloud-based environments the exploitation impact is at least medium, as cloud backend services can be attacked via SSRF (and XXE vulnerabilities are often also SSRF vulnerabilities).

Disclaimer

Argoproj Maintainers conducted this threat analysis using the open-source Threagile toolkit on the applications and systems that were modeled as of this report's date. Information security threats are continually changing, with new vulnerabilities discovered on a daily basis, and no application can ever be 100% secure no matter how much threat modeling is conducted. It is recommended to execute threat modeling and also penetration testing on a regular basis (for example yearly) to ensure a high ongoing level of security and constantly check for new attack vectors.

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In this particular project, a timebox approach was used to define the analysis effort. This means that the author allotted a prearranged amount of time to identify and document threats. Because of this, there is no guarantee that all possible threats and risks are discovered. Furthermore, the analysis applies to a snapshot of the current state of the modeled architecture (based on the architecture information provided by the customer) at the examination time.

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