From soup to nuts: Building a Detection-as-Code pipeline

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David French / About Me

- 18+ years in IT and cybersecurity
  - Blue team life: Detection Engineer, Threat Hunter, SOC Analyst
  - Vendor life: Threat Research, Detection Engineering, building SIEMs & EDRs
- Currently at Google Cloud (Chronicle Security Operations)
- Formerly Twilio, Elastic, Endgame, Capital Group
- Speaker at Black Hat and BSides
- Creator of Dorothy - Adversary simulation tool for Okta
- Likes to share knowledge & research: Blog, community contributions, MITRE ATT&CK
- Enjoys hiking, fishing, cycling, etc

Intended audience

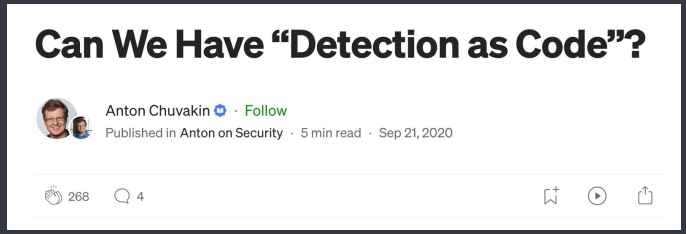
- Anyone curious about how to manage detection content “as code” and how to get started
- Defensive security practitioners: Detection Engineers, SOC Analysts, etc
- Maybe you manage rules/signatures manually in your security tools and want to automate that
- If you’re already an expert in Detection-as-Code, you might not learn a ton 🙂

Agenda

1. What is Detection-as-Code?
2. Example Detection Engineering workflow with Detection-as-Code
3. Benefits of managing detection rules “as code”
4. Designing the pipeline
5. Building a pipeline to manage detection content
6. Wrap up
    a. Key takeaways
    b. Links to useful resources
    c. Q&A

What is Detection-as-Code (DaC)?

- A set of principles that use code and automation to implement and manage threat detection content
- Traditional approach: Security team manually configures rules & signatures in security tools
- Detection-as-Code: Leverages software development practices & tools and treats detection content as code artifacts
- Gaining in popularity; growing acceptance



Can We Have “Detection as Code”? — Anton Chuvakin
Automating Detection-as-Code — John Tuckner
Detection-as-code: Why it works and where to start — Kyle Bailey
Detection as Code: Detection Development Using CI/CD — Patrick Bareiß, Jose Hernandez

Core technologies to automate detection content management

Version Control System (VCS)

Software that tracks changes to code over time

Facilitates structured development processes rollbacks

Examples: Git, Subversion, Mercurial

Software Development Platform

Provides a centralized workspace for managing Git repositories

Provides issue tracking, pull requests, code reviews, etc

Examples: GitHub, GitLab, Bitbucket

Continuous Integration / Continuous Delivery Tools

CI/CD tools automate the building, testing, and deployment of code changes

Examples: Jenkins, CircleCI, GitLab CI/CD, GitHub Actions

Example Detection-as-Code workflow

Propose Changes

Detection Engineer creates a new pull request in GitLab with their proposed rule changes

Example changes include creating a new rule or updating an existing rule

Run Tests

GitLab CI/CD pipeline job runs tests

Check for invalid rule configuration, duplicate rule names, verify rule syntax, etc

Execute tests to trigger rules and validate alert generation

Review & Approve

Security team discusses and collaborates on proposed changes in pull request

Changes are approved by one or more members of the security team

Deploy Changes

Changes are merged into the `main` branch of the GitLab project

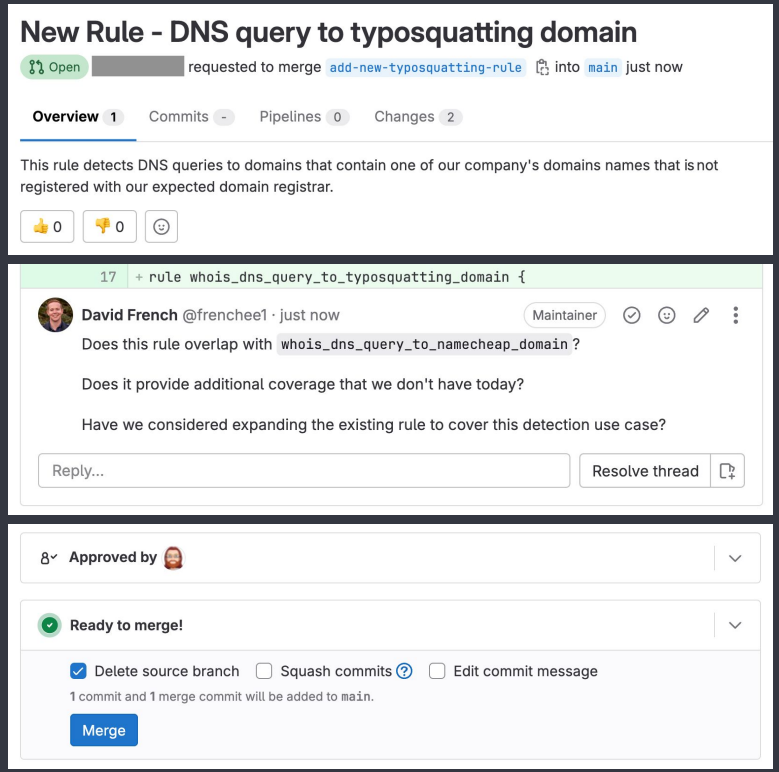
A CI/CD pipeline detects changes to the `main` branch and pushes any pending updates to the SIEM

The latest version of all rules is pulled from the SIEM and committed to the repo to include updated metadata

Benefits of managing detection rules as code

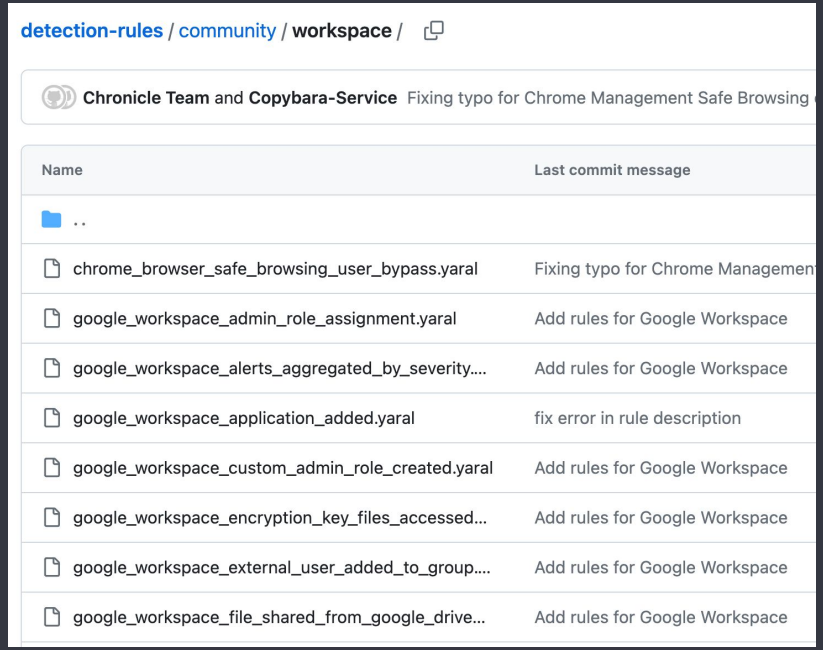
Benefits of DaC: Collaboration (1)

- Challenge with traditional method of managing detection rules: People make mistakes
- DaC makes it easy for the team to discuss and contribute to changes to detection content
- A group of practitioners with unique insights working together will result in more accurate and effective rules
- Peer review reduces risk
  - False negatives
  - False positive explosions



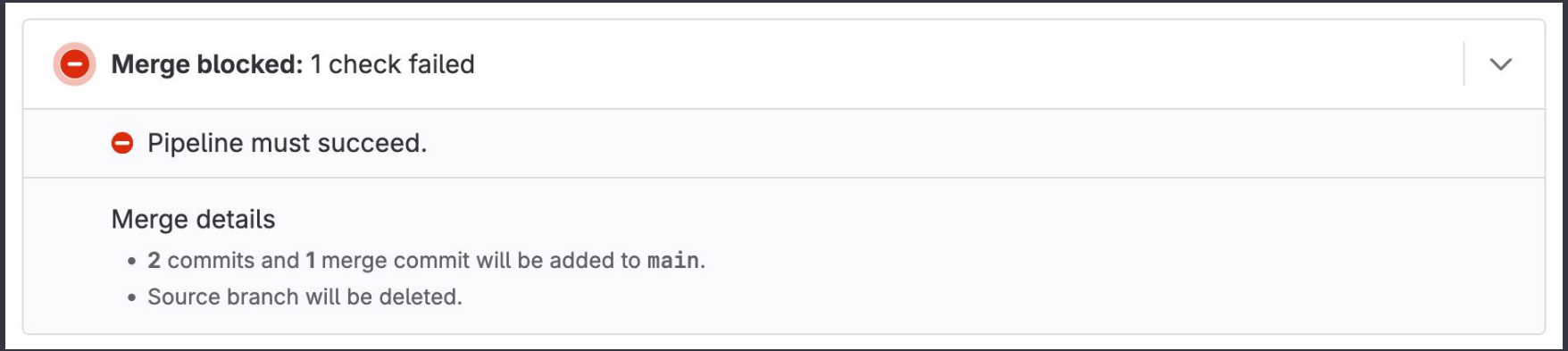
Benefits of DaC: Collaboration (2)

- Easier to share detection content with the security community; stronger defense against attacks
  - Google: https://github.com/chronicle/detection-rules
  - Elastic: https://github.com/elastic/detection-rules
  - Splunk: https://github.com/splunk/security_content
  - Microsoft: https://github.com/Azure/Azure-Sentinel
  - Sigma: https://github.com/SigmaHQ/sigma



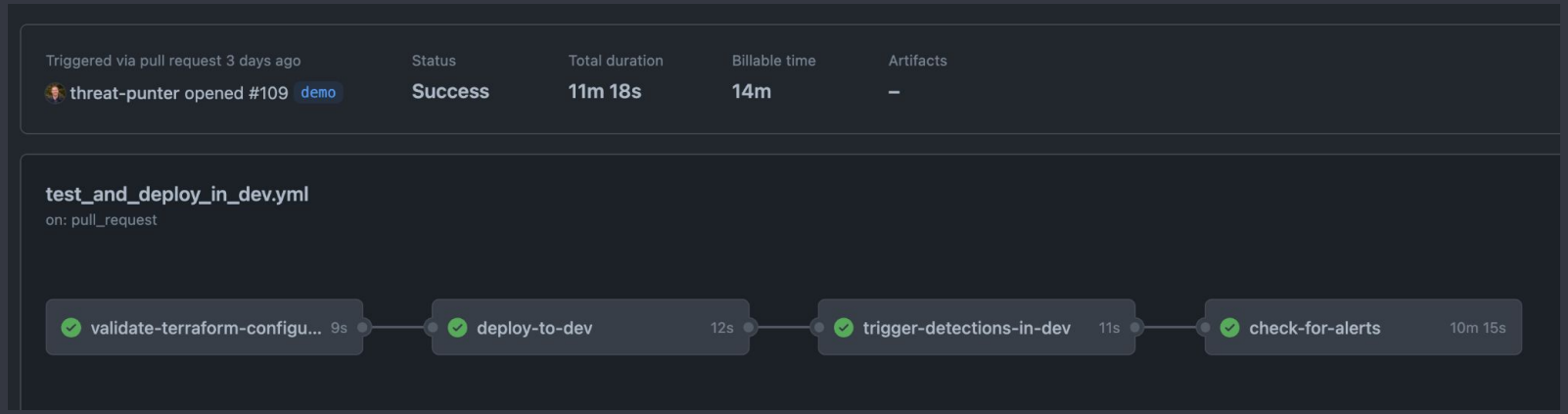
Benefits of DaC: Change management

- DaC provides more control over changes made to detection content
- Detection content stored in a software development platform e.g. GitHub, GitLab
- Changes are tested, reviewed, and approved before getting deployed to prod
- Some organizations require robust change control for both preventive **and** detective security controls



Benefits of DaC: Automation

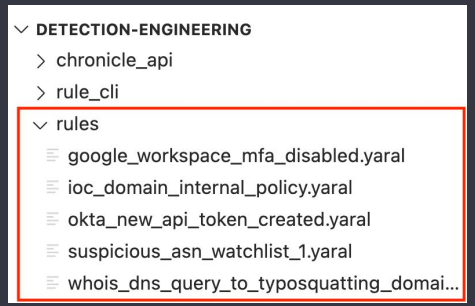
- CI/CD tools used to ensure continuous process for building, testing, and deploying changes to detection content
- Tests reduce risk of introducing false positives/negatives
  - Reduce problem of alert fatigue
- Test in dev before deploying to prod



Designing & building the pipeline

Pipeline design

GitLab



Software development platform and version control system (VCS)

GitLab CI/CD Pipeline Jobs

Run Tests

Get rules

Update rules

Write code to read, create, update, and verify rules via the SIEM's API

SIEM

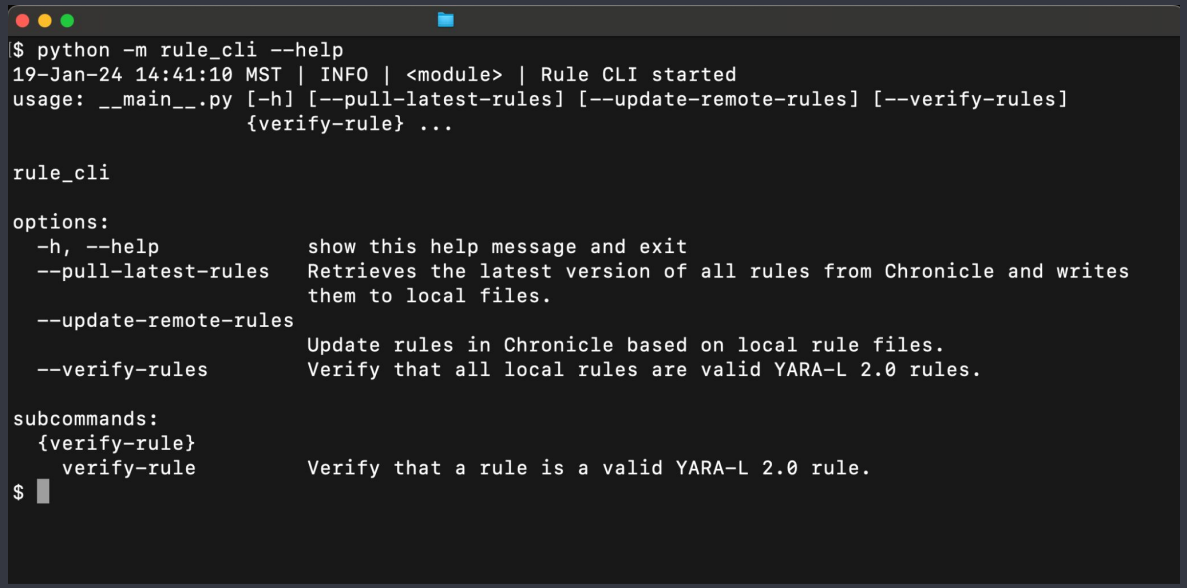
Managing detection rules via an API (1)

- At this point, we're assuming:
  - We have some rules configured in our SIEM
  - Our SIEM has an API endpoint for managing rules
- SIEM vendors may provide example code or engineers may have to write it themselves
- Users expect parity between what they can do in the UI of a security tool versus the API

Example code: https://github.com/chronicle/detection-rules/tree/main/tools/rule_manager

Managing detection rules via an API (2)

- Python modules are wrapped in a simple CLI to use in CI/CD pipeline jobs in GitHub, GitLab, etc
- Additional modules & logic written to handle logic for updating rules



Managing detection rules via an API (3)

- Some teams use Infrastructure-as-Code tools to manage SIEM rules & configuration
  - e.g. Terraform, Pulumi
- Code is stored in central repository and CI/CD jobs “apply” changes to “infrastructure” (security tools)
- These tools can overwrite changes made in the UI if that’s your desired behavior

rule_okta_administrator_role_assigned_to_non_admin_user_account.tf > ...

```
module "rule_okta_administrator_role_assigned_to_non_admin_user_account" {
  source                = "./modules/sumo_monitor"
  standard_name         = "Administrator Role Assigned to Non-Admin User Account"
  standard_description  = "Identifies when an administrator role is assigned to a
  non-admin Okta user account i.e. a standard user account that does not follow our
  company's admin account naming conventions. Investigate using playbook PB-100."
  standard_query        = <<EOF
_sourceCategory="okta" user.account.privilege.grant
| where eventType="user.account.privilege.grant" AND !(%"target[0].alternateId" matches /
^admin\./)
EOF
  standard_folder       = sumologic_monitor_folder.detections.id
  tines_webhook         = sumologic_connection.tines_webhook.id
  tines_webhook_override = <<EOF
{
  "rule.name": "{{Name}}",
  "rule.description": "{{Description}}",
  "query.url": "{{QueryURL}}",
  "query": "{{Query}}",
  "trigger.range": "{{TriggerTimeRange}}",
  "trigger.name": "{{TriggerTime}}",
  "alert.payload": "{{ResultsJson}}"
}
EOF
}
```

```
threatpunter detection-as-code % terraform apply
sumologic_connection.tines_webhook: Refreshing state... [id=000000000003948D]

Terraform used the selected providers to generate the following execution plan.
  + create

Terraform will perform the following actions:

  # sumologic_monitor_folder.detections will be created
  + resource "sumologic_monitor_folder" "detections" {
      + content_type = "Folder"
      (...)
```

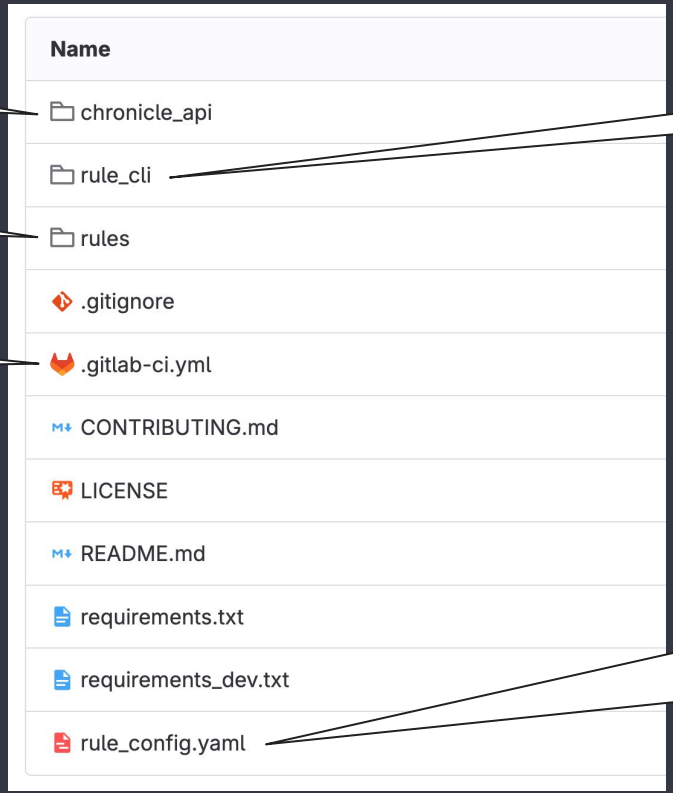
Example code for managing rules in Sumo Logic using Terraform: https://github.com/threat-punter/detection-as-code-example

GitLab project layout

Python modules for managing rules via SIEM's API

SIEM rules stored as code artifacts

GitLab CI/CD pipeline configuration file



CLI with commands to retrieve, update, and verify rules via SIEM's API

Rule configuration file

Used to configure rule state (e.g. enabled/disabled/archived)

Used to store rule metadata (e.g. rule ID, create time, etc)

Example code: https://github.com/chronicle/detection-rules/tree/main/tools/rule_manager

Defining a rule schema: Benefits

- Provides a way to structure and standardize rules
- Ensures rule structure is consistent across authors
- Define which parts are required/optional
- Automation - Easier to validate, test, and deploy detection content if it's in a consistent format
- Easier to share rules within the community
- Example of a schema using Pydantic ➡️

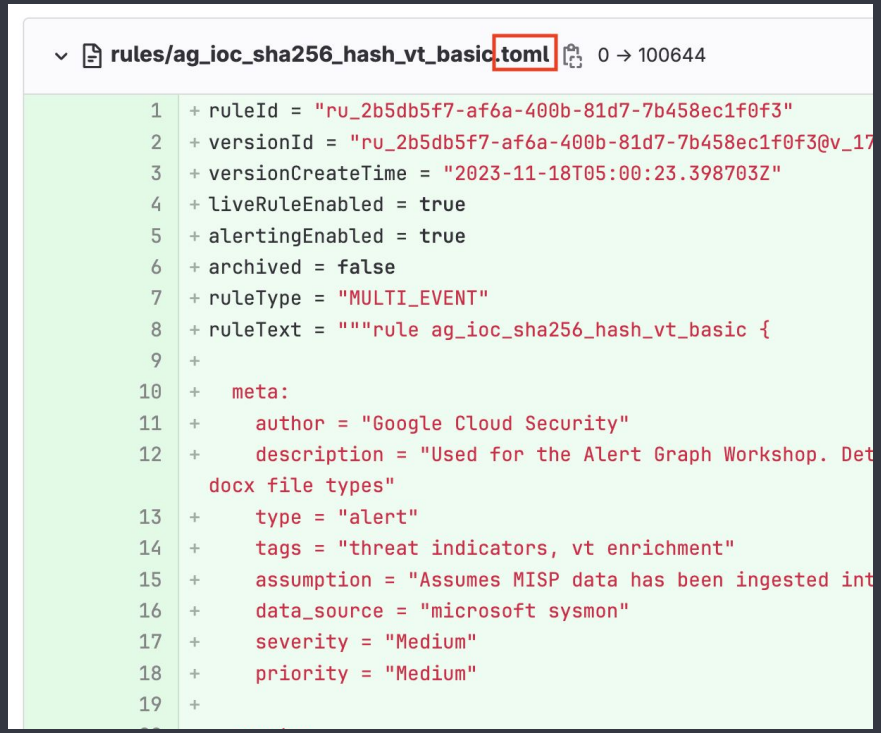
```python
from pydantic import BaseModel


class Rule(BaseModel):
    """Data class for a YARA-L rule."""

    name: str
    id: str | None
    resource_name: str | None
    create_time: str | None
    revision_id: str | None
    revision_create_time: str | None
    enabled: bool
    alerting: bool
    archived: bool | None
    archive_time: str | None
    run_frequency: str | None
    type: str | None
    text: str
```

Defining a rule schema: Popular formats

- YAML - Used by Splunk and Sigma
- TOML - Used by Elastic
- Example of a YARA-L rule in TOML format ➡️
- I decided to decouple the rule config & metadata from the rule logic
  - Granular control over deploying to multiple SIEM instances (e.g. if you're deploying to dev, prod, etc or an MSSP deploying to multiple customers)



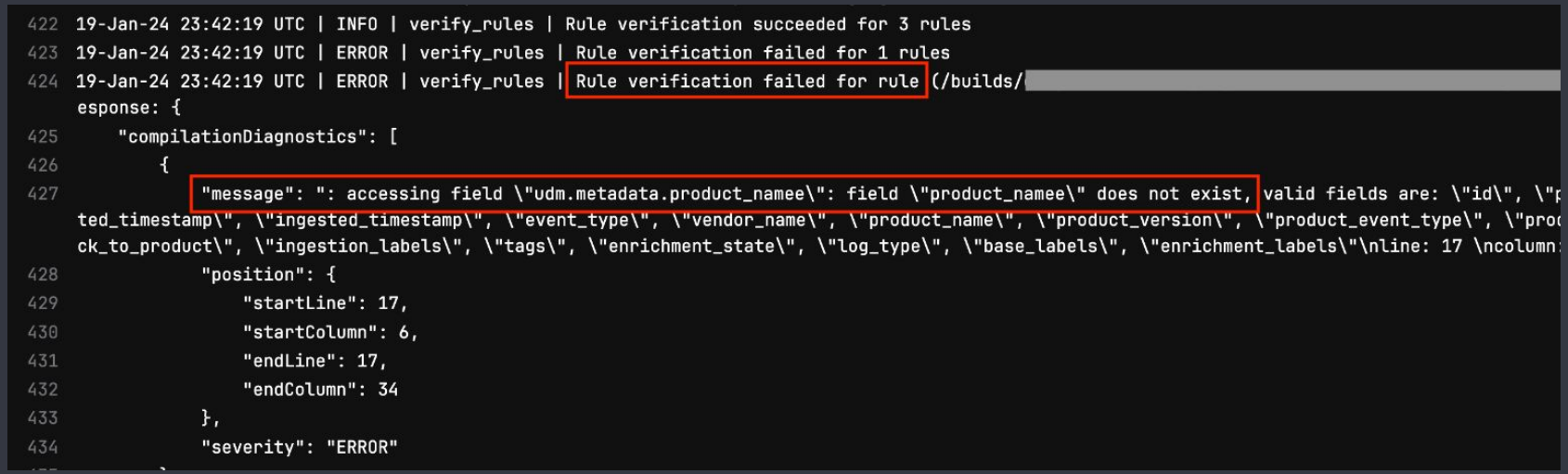
Validating rules against a schema

- Catch issues as early as possible; minimize risk of deploying broken rules
  - Missing/invalid values
  - Misconfigurations e.g. a rule that's enabled cannot be archived until it's disabled
  - Invalid rule/file names
- Pydantic and Marshmallow are great for this ⬇️

```
07-Feb-24 10:55:38 MST | ERROR | <module> | ValidationError occurred for rule
        [
    {
        "type": "bool_type",
        "loc": [
            "enabled"
        ],
        "msg": "Input should be a valid boolean",
        "input": null,
        "url": "https://errors.pydantic.dev/2.6/v/bool_type"
    }
```

Verifying rule syntax

- Options to verify the syntax of a rule:
  - Via your SIEM's API if supported
  - Develop your own linter for rule parsing & validation (++ effort to create and maintain)
- Some SIEMs prevent a rule from being created/modified if syntax errors are found



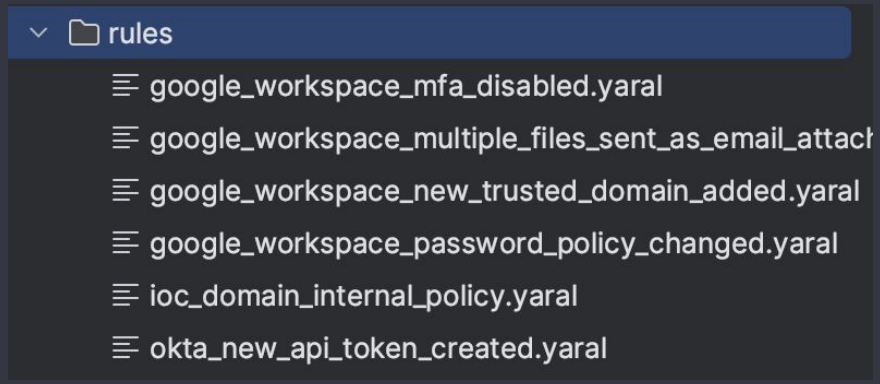
Pulling the latest rules from the SIEM

- We need to keep the GitLab project up-to-date with the latest version of all rules in the SIEM
- CLI argument pulls latest rules from SIEM and writes rule files and rule config file

```
422 Attempting to pull the latest version of all rules from Chronicle
423 $ python -m rule_cli --pull-latest-rules
424 19-Jan-24 23:03:35 UTC | INFO | <module> | Rule CLI started
425 19-Jan-24 23:03:35 UTC | INFO | <module> | Attempting to pull latest version of all Chronicle rules and update local files
426 19-Jan-24 23:03:35 UTC | INFO | get_remote_rules | Attempting to retrieve all rules from Chronicle
427 19-Jan-24 23:03:36 UTC | INFO | get_remote_rules | Retrieved 3 rules
428 19-Jan-24 23:03:36 UTC | INFO | get_remote_rules | Retrieved a total of 3 rules
429 19-Jan-24 23:03:36 UTC | INFO | get_remote_rules | Attempting to retrieve rule deployment state for 3 rules
430 19-Jan-24 23:03:38 UTC | INFO | dump_rules | Writing 3 rule files to /builds/
431 19-Jan-24 23:03:38 UTC | INFO | dump_rule_config | Writing rule config to /builds/
    g.yaml
```

Dumping the rule logic and rule configuration

- Rule logic is written to the `rules` directory
- Rule configuration and metadata is written to a `rule_config.yaml` file

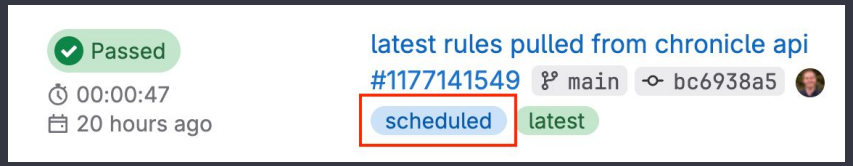


rule_config.yaml

```yaml
google_workspace_mfa_disabled:
  alerting: true
  archive_time: null
  archived: false
  create_time: '2024-01-19T23:01:45.962463Z'
  enabled: true
  id: ru_48a222d0-a3ea-4ed7-9b77-3794cd1d3844
  resource_name: projects/1013673362905/locations/us/inst
  revision_create_time: '2024-01-19T23:01:45.962463Z'
  revision_id: v_1705705305_962463000
  run_frequency: LIVE
  type: SINGLE_EVENT
whois_dns_query_to_typosquatting_domain:
  alerting: false
  archive_time: null
  archived: false
  create_time: '2024-02-06T23:10:44.941199Z'
  enabled: false
```

Syncing rules between the SIEM and GitLab

- CI/CD pipeline job runs on a schedule
- Pulls latest rules from SIEM
- Writes files containing rules and rule config
- Commits any changes to the `main` branch of the GitLab project

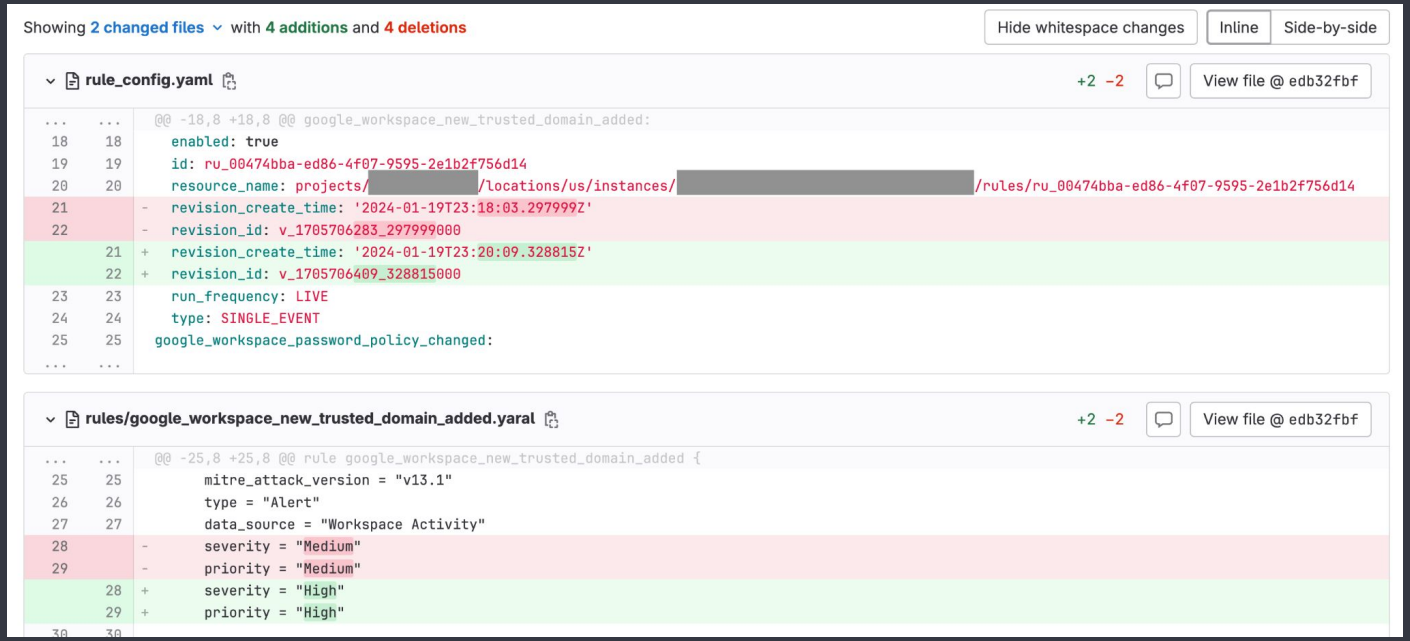


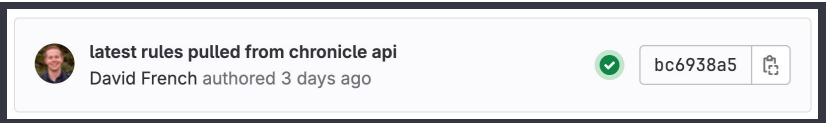

```
435 $ git status
436 On branch main
437 Your branch is up to date with 'origin/main'.
438 Changes to be committed:
439   (use "git restore --staged <file>..." to unstage)
440         new file:   rule_config.yaml
441         new file:   rules/google_workspace_mfa_disabled.yaral
442         new file:   rules/google_workspace_new_trusted_domain_added.yaral
443         new file:   rules/google_workspace_password_policy_changed.yaral
444 $ CHANGES=$(git status --porcelain | wc -l)
445 $ echo "There are $CHANGES changes to commit" && [ "$CHANGES" -gt "0" ] && git comm
446 There are 4 changes to commit
447 [main 2ba0c7e] latest rules pulled from chronicle api
448  4 files changed, 200 insertions(+)
449  create mode 100644 rule_config.yaml
450  create mode 100644 rules/google_workspace_mfa_disabled.yaral
451  create mode 100644 rules/google_workspace_new_trusted_domain_added.yaral
452  create mode 100644 rules/google_workspace_password_policy_changed.yaral
453 To https://gitlab.com/                                                .git
454    f72ea3e..2ba0c7e  main -> main
455 $ echo "Current time is $(date)"
456 Current time is Fri Jan 19 23:03:40 UTC 2024
457 $ git log -1
458 commit 2ba0c7e101d563181062c685ace06a56cdc41837
459 Author: David French <                .com>
460 Date:   Fri Jan 19 23:03:38 2024 +0000
461     latest rules pulled from chronicle api
462 Cleaning up project directory and file based variables
463 Job succeeded
```

Example code for “pull-latest-rules” CI/CD job: https://github.com/chronicle/detection-rules/blob/main/tools/rule_manager/.gitlab-ci.yml#L44

Example commit made by CI/CD job

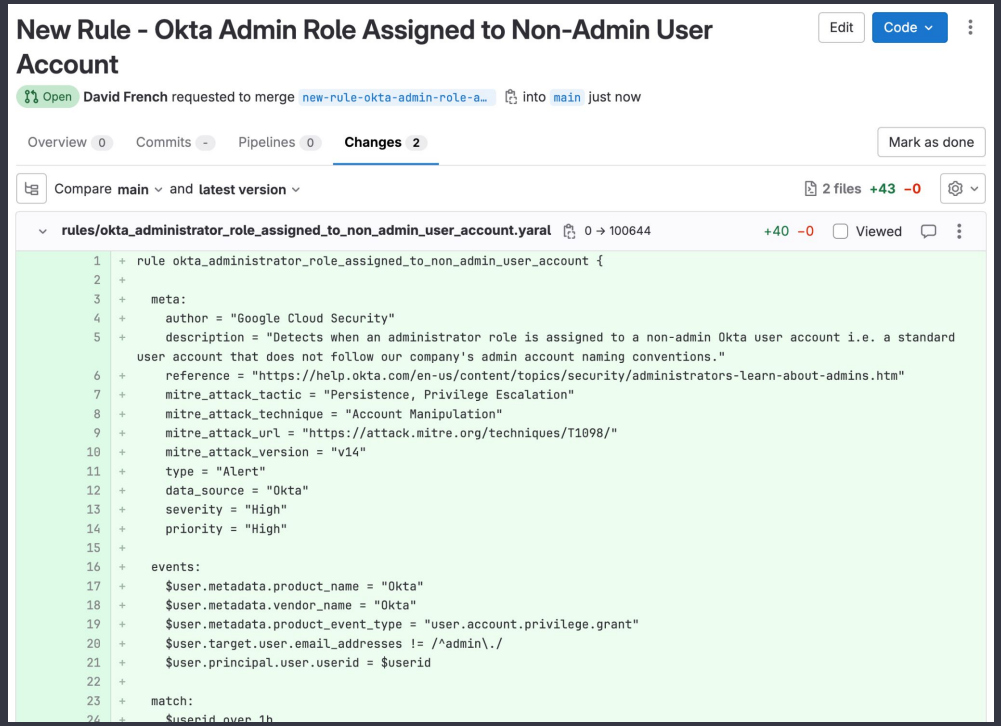
Reviewing rule modifications that were made in the SIEM's UI

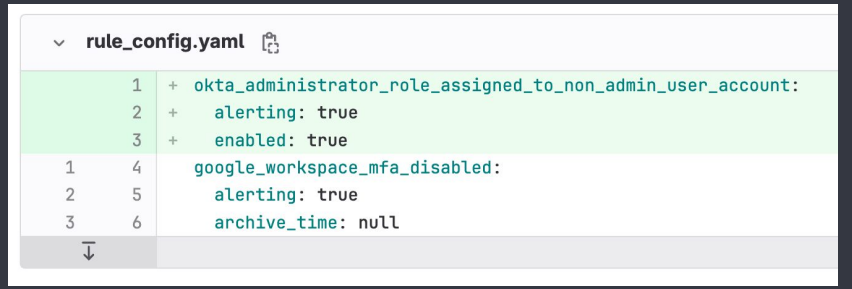


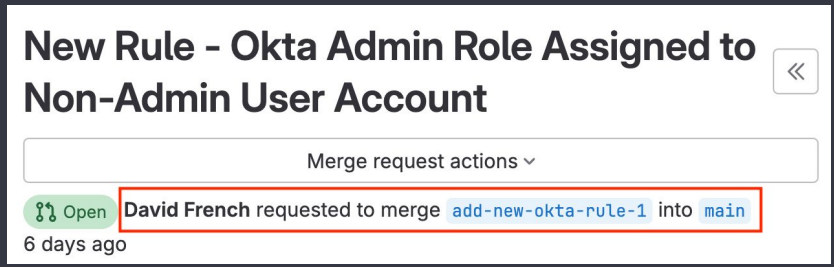


Creating a new rule

Detection Engineer creates a GitLab pull request to create a new SIEM rule

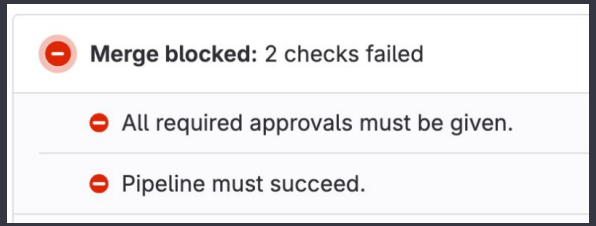






Protecting the main branch

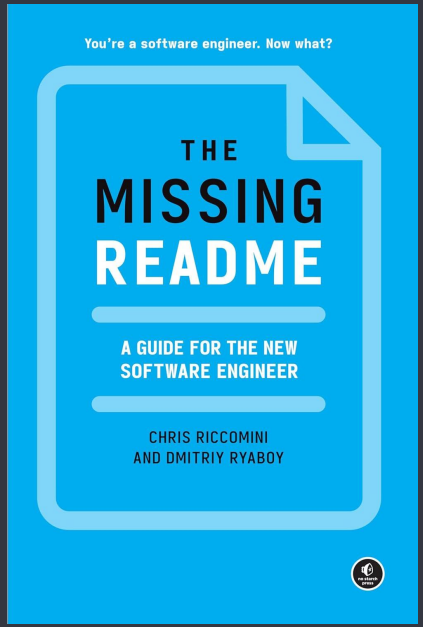
- Protect the `main` branch of your GitLab/GitHub project
- Prevent code from being merged until tests pass and approval is obtained




```
08-Feb-24 22:35:14 UTC | INFO | verify_rules | Rule verification succeeded for 9 rules
08-Feb-24 22:35:14 UTC | ERROR | verify_rules | Rule verification failed for 1 rules
08-Feb-24 22:35:14 UTC | ERROR | verify_rules | Rule verification failed for rule (/builds/[redacted]/detection-engineering/rules/okta_administrator_role_assigned_to_non_admin_user_account.yaral). Response: {
    "compilationDiagnostics": [
        {
            "message": ": accessing field \"udm.metadata.product_namee\": field \"product_namee\" does not exist, valid fields are: \"id\", \"product_log_id\", \"event_timestamp\", \"collected_timestamp\", \"ingested_timestamp\", \"event_type\", \"vendor_name\", \"product_name\", \"product_version\", \"product_event_type\", \"product_deployment_id\", \"description\", \"url_back_to_product\", \"ingestion_labels\", \"tags\", \"enrichment_state\", \"log_type\", \"base_labels\", \"enrichment_labels\", \"structured_fields\"\nline: 17
```

Lessons learned: Code reviews

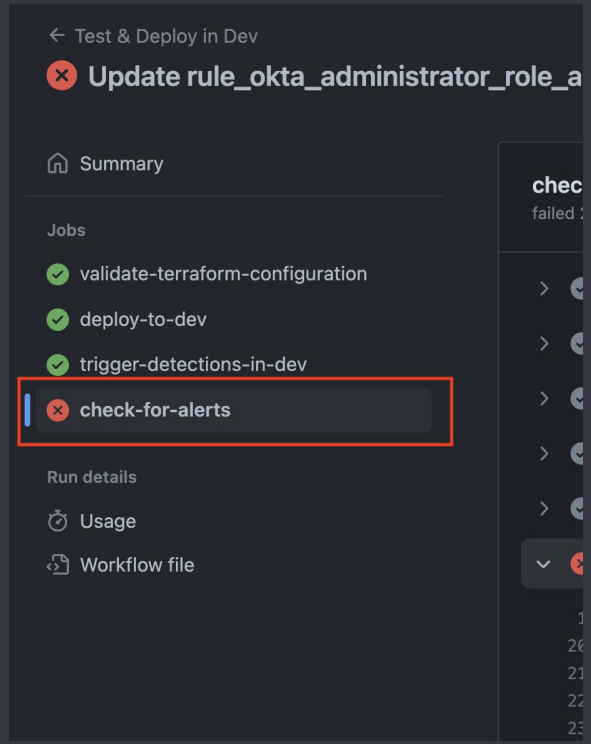
- Your rule may be criticized (its logic or the basis for the rule)
- Common for conflict to occur at this stage
- Authors: Assume positive intent - try to avoid getting defensive
- Reviewers:
  - Provide constructive feedback, explain your thought process, and make suggestions
  - Review in a timely manner
- Build a culture of trust and knowledge sharing
- Develop a rule style guide



"Don't be the reason improvements wither on the vine"

Testing rules: Don’t skip this step!

- If you’re not testing your detection rules on a regular basis, you’re on shaky ground
- Can you say with confidence that your logging, detection, and alerting is working properly?
- Broken detections result in false negatives 😢
- Challenges & considerations
  - Time: It can take longer to develop a test than the rule itself!
  - Build vs. buy: Do we have the expertise to develop & automate tests?
  - Tech debt: What if you have hundreds of rules without tests? 😕



The problem with untested rules

- Environments drift
- Infrastructure and technologies come and go, software is updated
- Logging interruptions occur
- Vendors change their logging schemas
- Attack techniques no longer work (relevancy)
- Active detection rules that will never fire waste detection engine resources

Options for testing rules

- Run the rule against sample data
  - Better than having no tests at all
- Trigger the rule and validate alerts were generated
  - More comprehensive
  - Validates logging, detection, and alerting pipeline is working
  - Get started with free projects like Atomic Red Team and Red Team Automation
  - You can't test everything (and that's okay) e.g. anomaly detections

Triggering the rule

Run code in CI/CD pipeline job to carry out actions via Okta API and trigger detection rule

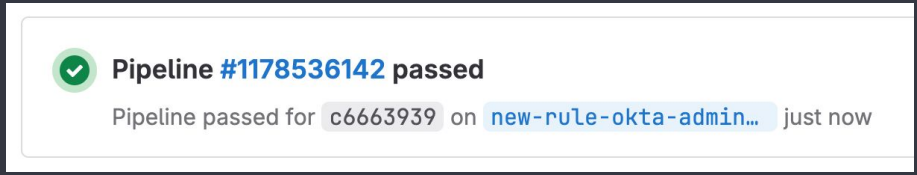
```
(venv) $ python -m detections_cli --run-all-tests
09-Feb-24 15:50:11 MST | INFO | <module> | detections_cli started
09-Feb-24 15:50:11 MST | INFO | <module> | Running all rule tests
09-Feb-24 15:50:11 MST | INFO | main | Executing test 'Assign Admin Role to Okta User' (Test ID: a17971ab-3980-4936-92e0-d65d9f448204)
09-Feb-24 15:50:11 MST | INFO | create_user | Attempting to create new Okta user [redacted]com
09-Feb-24 15:50:12 MST | INFO | create_user | Created new Okta user [redacted].com (ID: 00uf22f6lvYv4xpgk5d7)
09-Feb-24 15:50:12 MST | INFO | assign_admin_role | Attempting to assign admin role 'READ_ONLY_ADMIN' to Okta user ID 00uf22f6lvYv4xpgk5d7
09-Feb-24 15:50:12 MST | INFO | assign_admin_role | Assigned admin role 'READ_ONLY_ADMIN' to Okta user ID 00uf22f6lvYv4xpgk5d7
09-Feb-24 15:50:12 MST | INFO | deactivate_user | Attempting to deactivate Okta user ID 00uf22f6lvYv4xpgk5d7
09-Feb-24 15:50:12 MST | INFO | deactivate_user | Deactivated Okta user ID 00uf22f6lvYv4xpgk5d7
09-Feb-24 15:50:12 MST | INFO | delete_user | Attempting to delete Okta user ID 00uf22f6lvYv4xpgk5d7
09-Feb-24 15:50:13 MST | INFO | delete_user | Deleted Okta user ID 00uf22f6lvYv4xpgk5d7
09-Feb-24 15:50:13 MST | INFO | main | Ending Test 'Assign Admin Role to Okta User' (Test ID: a17971ab-3980-4936-92e0-d65d9f448204)
```

Example code: https://github.com/threat-punter/detection-as-code-example/blob/main/detections_cli/triggers/assign_admin_role_to_okta_user.py

Validating alerts

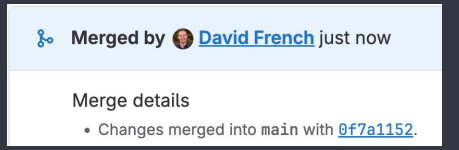
- Validate that alert was generated by detection rule
- Check for your test indicators in alerts
- Close alerts and any tickets/cases that were created
- CI/CD pipeline job success/failure

```
(venv) $ python -m detections_cli --validate-alerts
09-Feb-24 15:52:46 MST | INFO | <module> | detections_cli started
09-Feb-24 15:52:46 MST | INFO | <module> | Validating alerts created by tests
09-Feb-24 15:52:46 MST | INFO | validate_alerts | Checking for alerts created by test 'Assign Admin Role to Okta User'
09-Feb-24 15:52:46 MST | INFO | validate_alerts | Checking for alerts created for rule 'okta_administrator_role_assigned_to_non_admin_user_accou
nt' (Rule ID: ru_340b3f6d-916a-4365-86c0-b63cd5deb265)
09-Feb-24 15:52:46 MST | INFO | validate_alerts | Found 1 matching alerts for test 'Assign Admin Role to Okta User' and indicators for rule 'okt
a_administrator_role_assigned_to_non_admin_user_account' (Rule ID: ru_340b3f6d-916a-4365-86c0-b63cd5deb265)
```



Example code: https://github.com/threat-punter/detection-as-code-example/blob/main/detections_cli/__main__.py#L74

Deploying changes to the SIEM



Changes are pushed to the SIEM after code is merged into the `main` branch

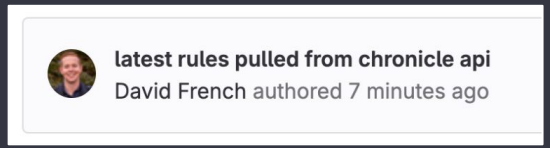
```
update_remote_rules | Checking if any rule updates are required
update_remote_rules | Local rule name okta_administrator_role_assigned_to_non_admin_user_account not found in remote rules
update_remote_rules | Local rule okta_administrator_role_assigned_to_non_admin_user_account has no rule id value. Creating a new rule
update_remote_rules | Created new rule okta_administrator_role_assigned_to_non_admin_user_account (ru_340b3f6d-916a-4365-86c0-b63cd5deb265)
update_remote_rule_state | Rule okta_administrator_role_assigned_to_non_admin_user_account (None) - Enabling rule
update_remote_rule_state | Rule okta_administrator_role_assigned_to_non_admin_user_account (None) - Enabling alerting for rule
update_remote_rules | Logging summary of rule changes...
update_remote_rules | Rules created: 1
update_remote_rules | created okta_administrator_role_assigned_to_non_admin_user_account (ru_340b3f6d-916a-4365-86c0-b63cd5deb265)
update_remote_rules | Rules new_version_created: 0
update_remote_rules | Rules enabled: 1
update_remote_rules | enabled okta_administrator_role_assigned_to_non_admin_user_account (ru_340b3f6d-916a-4365-86c0-b63cd5deb265)
update_remote_rules | Rules disabled: 0
update_remote_rules | Rules alerting_enabled: 1
update_remote_rules | alerting_enabled okta_administrator_role_assigned_to_non_admin_user_account (ru_340b3f6d-916a-4365-86c0-b63cd5deb265)
update_remote_rules | Rules alerting_disabled: 0
update_remote_rules | Rules archived: 0
update_remote_rules | Rules unarchived: 0
```

Example code for “update-remote-rules” CI/CD job: https://github.com/chronicle/detection-rules/blob/main/tools/rule_manager/.gitlab-ci.yml#L90

Syncing rule metadata to GitLab

- After changes are deployed to SIEM
- Pipeline job pulls latest rules from SIEM and commits updated metadata to rule config file in GitLab project

```
63  60    type: MULTI_EVENT
    61  + okta_administrator_role_assigned_to_non_admin_user_account:
    62  +   alerting: true
    63  +   archive_time: null
    64  +   archived: false
    65  +   create_time: '2024-02-08T23:39:19.682863Z'
    66  +   enabled: true
    67  +   id: ru_340b3f6d-916a-4365-86c0-b63cd5deb265
    68  +   resource_name: projects/[redacted]/locations/us/instances/[redacted]
    69  +   revision_create_time: '2024-02-08T23:39:19.682863Z'
    70  +   revision_id: v_1707435559_682863000
    71  +   run_frequency: HOURLY
    72  +   type: SINGLE_EVENT
64  73  okta_new_api_token_created:
65  74    alerting: false
66  75    archive_time: null
...  ...
```

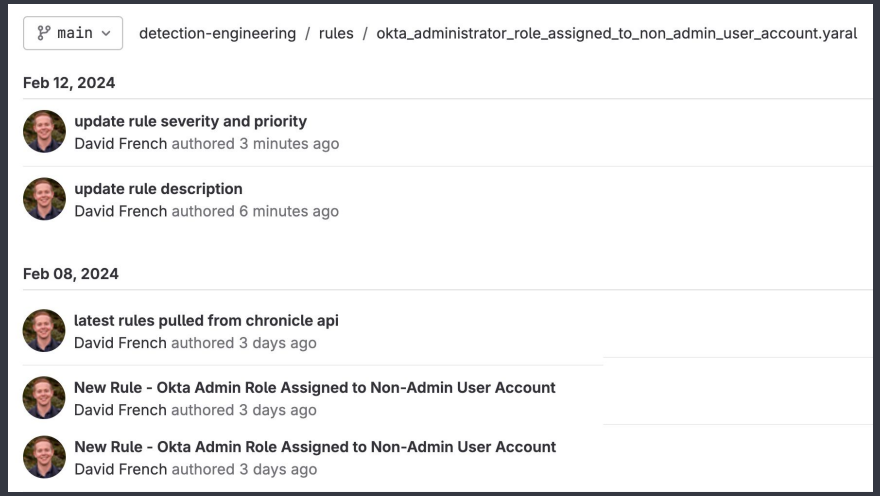


Modifying rules

- Detection Engineer creates a branch and pull request with proposed changes
- Tests succeed
- Peer review & approval obtained
- Changes are merged to the `main` branch
- Rule changes are deployed to SIEM

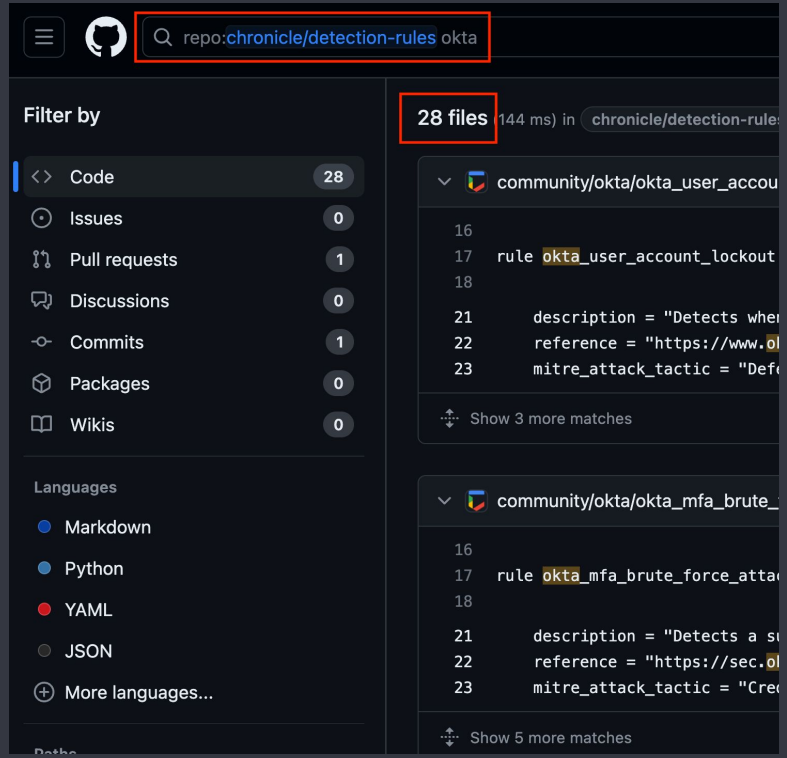
Auditing for rule changes

- Commit history in VCS makes it easy to review prior versions of a rule
- Context around changes is preserved in pull requests
- Can revert to a previous version if needed



Benefits of centralized detection management

- Auditors might ask for proof that you have a detection implemented (and that its tested)
  - For example, detections related to data loss prevention or SWIFT compliance
- Purple Teaming – Offensive team can analyze detections and look for ways to evade them
- Code repository is searchable
  - Can quickly check if you have a rule for an attack technique



Key takeaways

Which organizations can benefit from adopting DaC?

Yes

Large orgs with complex, dynamic IT environment and lots of normalized security data available

Auditing & change management needed for detective security controls

Security budget for Detection Engineers and required engineering expertise

Modern security tools (manage content via API)

No

Small orgs with simple, static IT environment

Limited security budget

Not much security data available for analysis

Small (or no dedicated) security team

Security tools with no support for integration

Partnering with an MSSP may be a good fit (they're likely using DaC to manage rules across multiple customers)

Advantages of adopting Detection-as-Code

- Increased collaboration around rule development and sharing in the community
  - A group of practitioners with unique insights working together will result in more accurate and effective rules
- More control over changes to detections
- Automated testing
  - Reduced risk of introducing false positives/negatives
  - Provides confidence that your logging, detection, and alerting is working
  - Helps identify issues quickly before misses occur

Useful resources

- Detection-as-Code
  - My blog series and example code for getting started: 1 and 2
  - Can We Have “Detection as Code”? — Anton Chuvakin
  - Automating Detection-as-Code — John Tuckner
  - Detection-as-Code: Why it works and where to start — Kyle Bailey
  - Detection as Code: Detection Development Using CI/CD — Patrick Bareiß, Jose Hernandez
  - Detection-as-Code panel — Julie Agnes Sparks, Jackie Bow, Jessica Rozhin, Louis Barrett
- Detection Engineering
  - Detection Engineering Weekly — Zack Allen
  - Practical Threat Detection Engineering — Megan Roddie, Jason Deyalsingh, Gary J. Katz
- Free rules: Google, Elastic, Splunk

Thank you

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Q&A

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