SIGMA

News from Sigma

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EU ATT&CK Workshop

2021-06-01

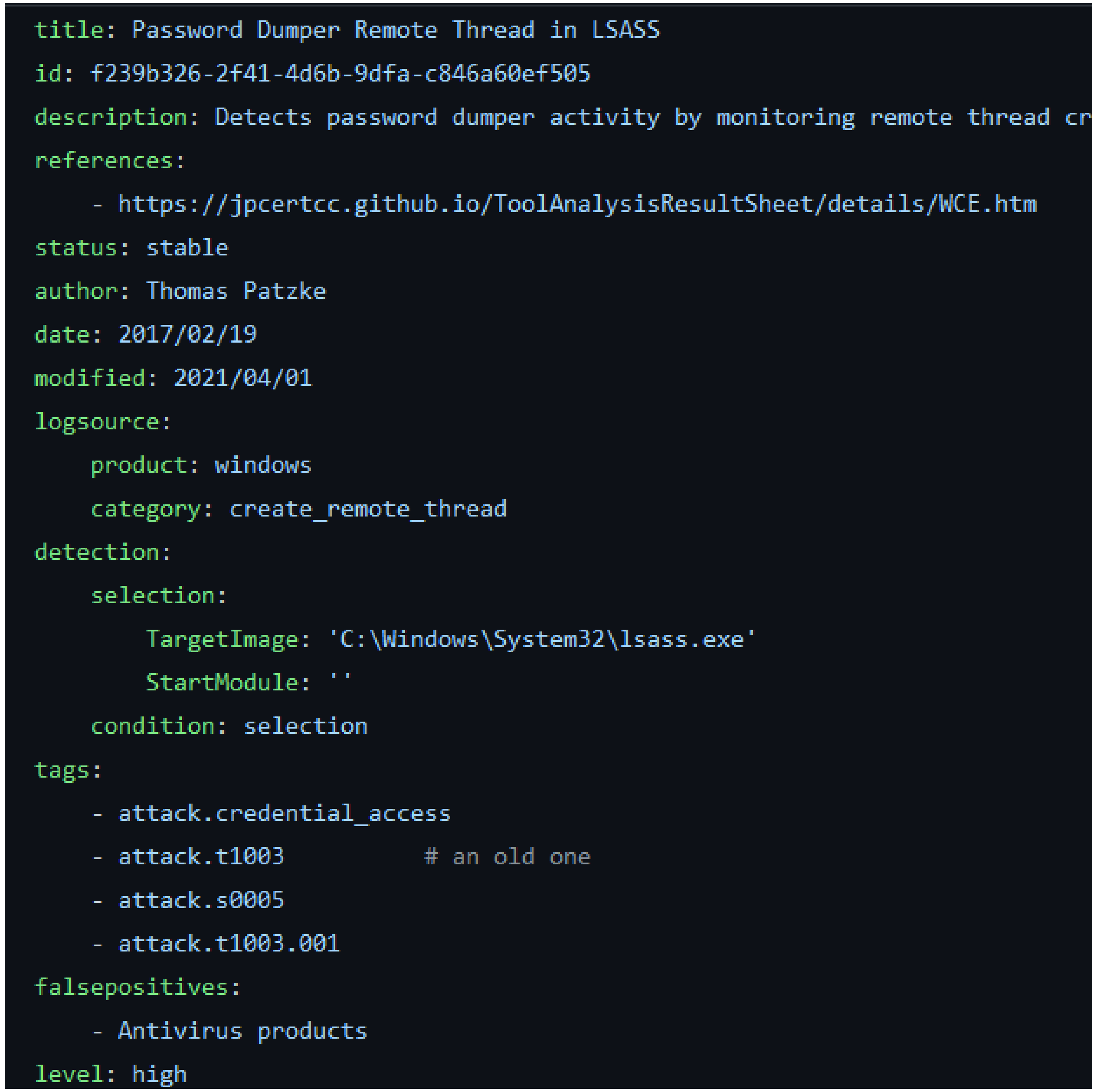
TLP:White

Agenda

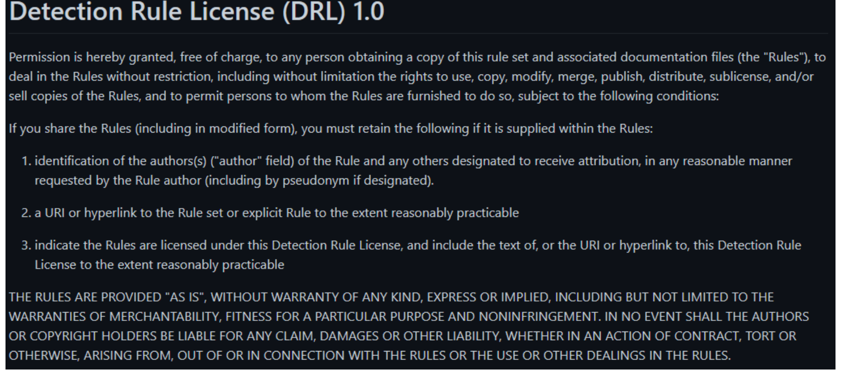
- (Very) Short intro to Sigma
- What was achieved in the last year
- What is currently developed

What is Sigma?

- Format specification for log event signatures
  - generic
  - vendor-agnostic
  - environment-agnostic
- Readable and writable by humans as well as software
- Huge (>950) open source rule set.
- Conversion tool: Sigma to SIEM/EDR query languages



```
title: Password Dumper Remote Thread in LSASS
id: f239b326-2f41-4d6b-9dfa-c846a60ef505
description: Detects password dumper activity by monitoring remote thread cr
references:
    - https://jpcertcc.github.io/ToolAnalysisResultSheet/details/WCE.htm
status: stable
author: Thomas Patzke
date: 2017/02/19
modified: 2021/04/01
logsource:
    product: windows
    category: create_remote_thread
detection:
    selection:
        TargetImage: 'C:\Windows\System32\lsass.exe'
        StartModule: ''
    condition: selection
tags:
    - attack.credential_access
    - attack.t1003          # an old one
    - attack.s0005
    - attack.t1003.001
falsepositives:
    - Antivirus products
level: high
```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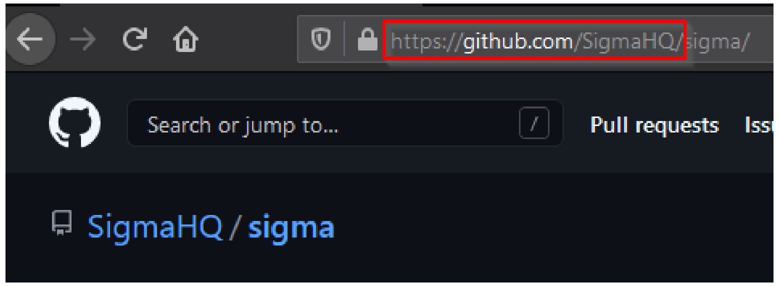
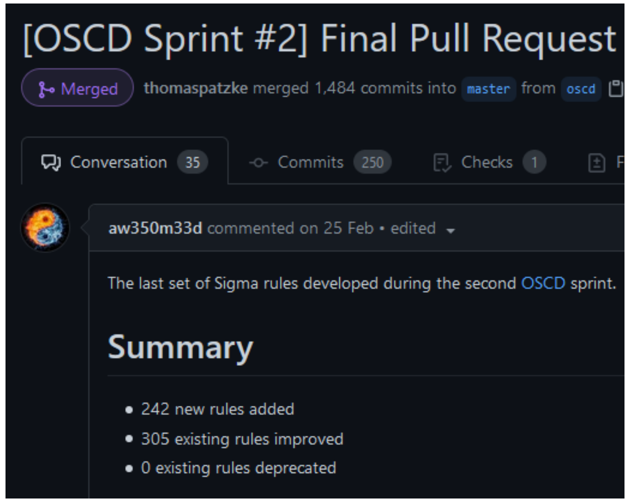
Recent News

- Rules are now licensed under the Detection Rule License (DRL 1.0)
  - Custom developed license (yes, we considered lots of options)
  - DRL = MIT + Attribution + detection rule specific
- Severity level *informational* was introduced for rules which are intended for enrichment/tagging but not for detection.
- OSCD Initiative Sprint #2 was merged into master branch
- Sigma was moved from Florians personal account into the SigmaHQ organization.


https://github.com/SigmaHQ/sigma/

SigmaHQ / sigma


[OSCD Sprint #2] Final Pull Request

Merged thomaspatzke merged 1,484 commits into master from oscd

aw350m33d commented on 25 Feb • edited

The last set of Sigma rules developed during the second OSCD sprint.

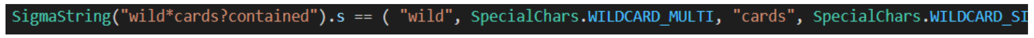
Summary

- 242 new rules added
- 305 existing rules improved
- 0 existing rules deprecated

A new Converter? Why?

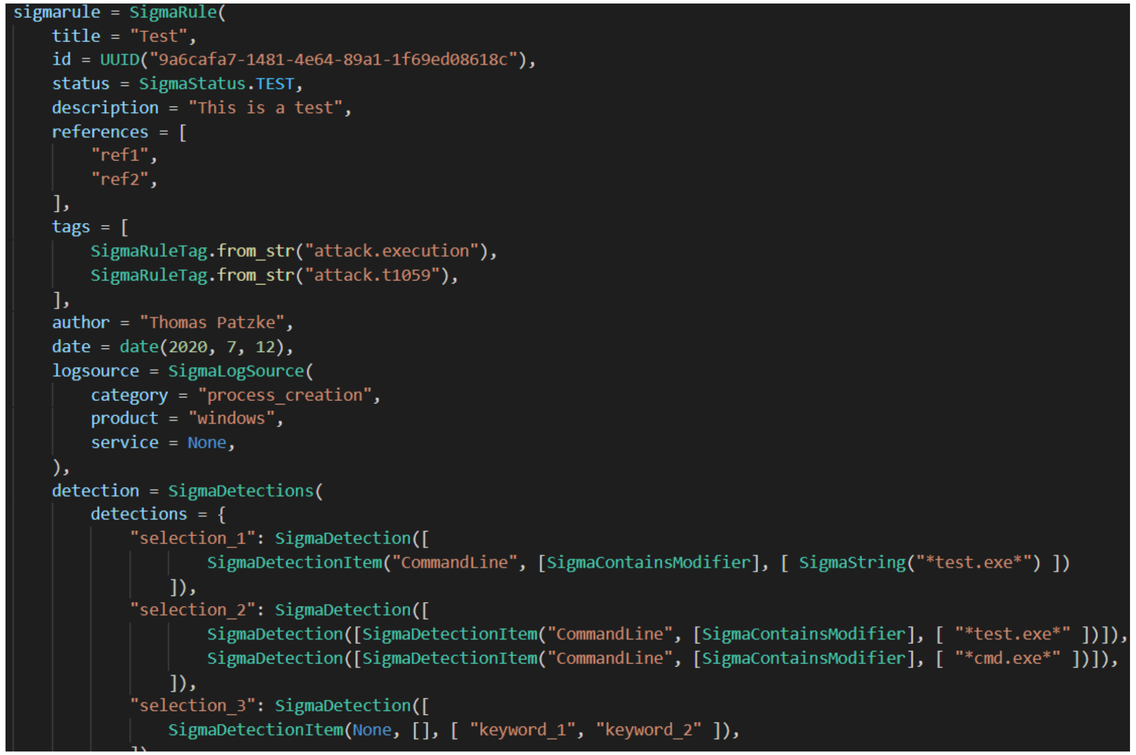
- The old one was written as PoC to prove that it’s possible.
- The initial version had only Splunk and Elasticsearch in mind, other query languages with different structures were added later.
- Lot of stuff is done at the wrong location.
- Code replication instead of code reuse.
- Bad design and missing abstraction makes it hard to implement new features.

Converter Rewrite

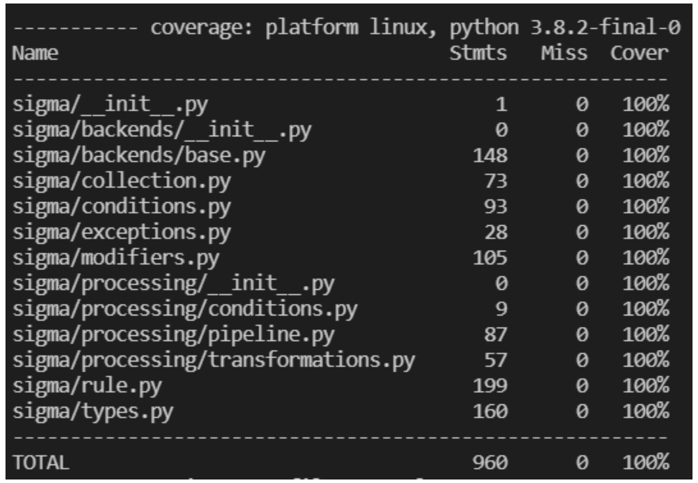


```
SigmaString("wild*cards?contained").s == ( "wild", SpecialChars.WILDCARD_MULTI, "cards", SpecialChars.WILDCARD_SI
```

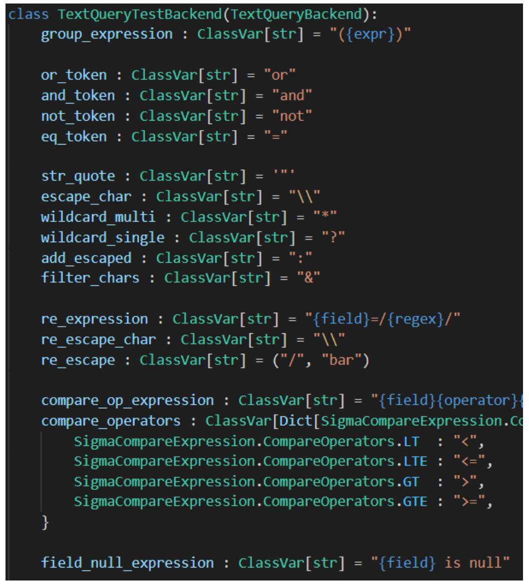
- Clean(er) design
- Sigma rule data model with typing
- More flexible backend templates
- Lots of small improvements, e.g.
  - Prefix/suffix queries
  - numeric comparisons: `response_code|gte: 500`
- Currently 99% test coverage by >200 tests, test run takes <15 seconds



```
sigmarule = SigmaRule(
    title = "Test",
    id = UUID("9a6cafa7-1481-4e64-89a1-1f69ed08618c"),
    status = SigmaStatus.TEST,
    description = "This is a test",
    references = [
        "ref1",
        "ref2",
    ],
    tags = [
        SigmaRuleTag.from_str("attack.execution"),
        SigmaRuleTag.from_str("attack.t1059"),
    ],
    author = "Thomas Patzke",
    date = date(2020, 7, 12),
    logsource = SigmaLogSource(
        category = "process_creation",
        product = "windows",
        service = None,
    ),
    detection = SigmaDetections(
        detections = {
            "selection_1": SigmaDetection([
                    SigmaDetectionItem("CommandLine", [SigmaContainsModifier], [ SigmaString("*test.exe*") ])
                ]),
            "selection_2": SigmaDetection([
                    SigmaDetection([SigmaDetectionItem("CommandLine", [SigmaContainsModifier], [ "*test.exe*" ])]),
                    SigmaDetection([SigmaDetectionItem("CommandLine", [SigmaContainsModifier], [ "*cmd.exe*" ])]),
                ]),
            "selection_3": SigmaDetection([
                SigmaDetectionItem(None, [], [ "keyword_1", "keyword_2" ]),
```



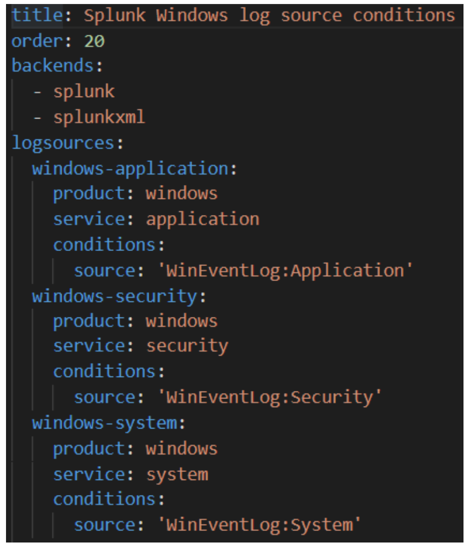
```
---------- coverage: platform linux, python 3.8.2-final-0
Name                                  Stmts   Miss  Cover
---------------------------------------------------------
sigma/__init__.py                         1      0   100%
sigma/backends/__init__.py                0      0   100%
sigma/backends/base.py                  148      0   100%
sigma/collection.py                      73      0   100%
sigma/conditions.py                      93      0   100%
sigma/exceptions.py                      28      0   100%
sigma/modifiers.py                      105      0   100%
sigma/processing/__init__.py              0      0   100%
sigma/processing/conditions.py            9      0   100%
sigma/processing/pipeline.py             87      0   100%
sigma/processing/transformations.py      57      0   100%
sigma/rule.py                           199      0   100%
sigma/types.py                          160      0   100%
---------------------------------------------------------
TOTAL                                   960      0   100%
```



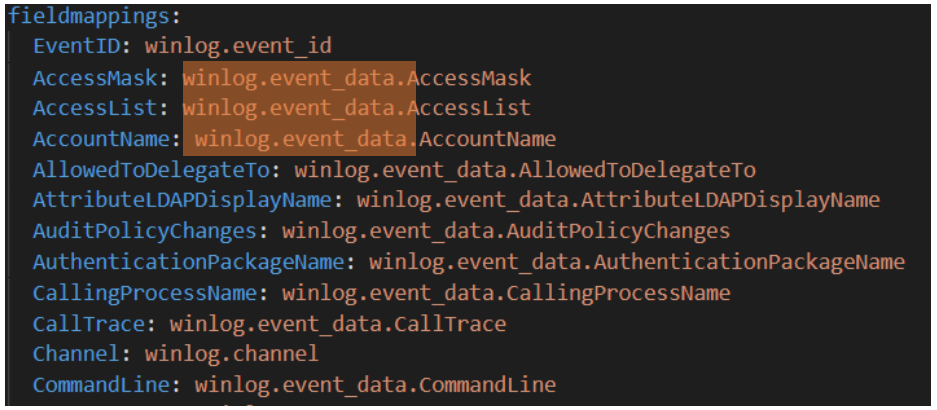
```
class TextQueryTestBackend(TextQueryBackend):
    group_expression : ClassVar[str] = "({expr})"

    or_token : ClassVar[str] = "or"
    and_token : ClassVar[str] = "and"
    not_token : ClassVar[str] = "not"
    eq_token : ClassVar[str] = "="

    str_quote : ClassVar[str] = '"'
    escape_char : ClassVar[str] = "\\"
    wildcard_multi : ClassVar[str] = "*"
    wildcard_single : ClassVar[str] = "?"
    add_escaped : ClassVar[str] = ":"
    filter_chars : ClassVar[str] = "&"

    re_expression : ClassVar[str] = "{field}=/{regex}/"
    re_escape_char : ClassVar[str] = "\\"
    re_escape : ClassVar[str] = ("/", "bar")

    compare_op_expression : ClassVar[str] = "{field}{operator}{
    compare_operators : ClassVar[Dict[SigmaCompareExpression.Co
        SigmaCompareExpression.CompareOperators.LT  : "<",
        SigmaCompareExpression.CompareOperators.LTE : "<=",
        SigmaCompareExpression.CompareOperators.GT  : ">",
        SigmaCompareExpression.CompareOperators.GTE : ">=",
    }

    field_null_expression : ClassVar[str] = "{field} is null"
```

Current State of Conversion Configuration

- It’s inflexible!
- It supports log source definitions…
- …and field name mappings…
- …that’s it!
- No “prefix field names”
- No operations on values (e.g. split, join)



```yaml
title: Splunk Windows log source conditions
order: 20
backends:
  - splunk
  - splunkxml
logsources:
  windows-application:
    product: windows
    service: application
    conditions:
      source: 'WinEventLog:Application'
  windows-security:
    product: windows
    service: security
    conditions:
      source: 'WinEventLog:Security'
  windows-system:
    product: windows
    service: system
    conditions:
      source: 'WinEventLog:System'
```



```yaml
fieldmappings:
  EventID: winlog.event_id
  AccessMask: winlog.event_data.AccessMask
  AccessList: winlog.event_data.AccessList
  AccountName: winlog.event_data.AccountName
  AllowedToDelegateTo: winlog.event_data.AllowedToDelegateTo
  AttributeLDAPDisplayName: winlog.event_data.AttributeLDAPDisplayName
  AuditPolicyChanges: winlog.event_data.AuditPolicyChanges
  AuthenticationPackageName: winlog.event_data.AuthenticationPackageName
  CallingProcessName: winlog.event_data.CallingProcessName
  CallTrace: winlog.event_data.CallTrace
  Channel: winlog.channel
  CommandLine: winlog.event_data.CommandLine
```

New: Rule Transformation Pipeline

- Rule Transformation pipeline = Sequence of transformation operations on Sigma rule
- Operation types like *add condition*, *field name mapping*, …
- Conditions can be attached to each operation which decide if it is applied to a given rule.
- Conditions can also define dependencies between operations.
- Variables

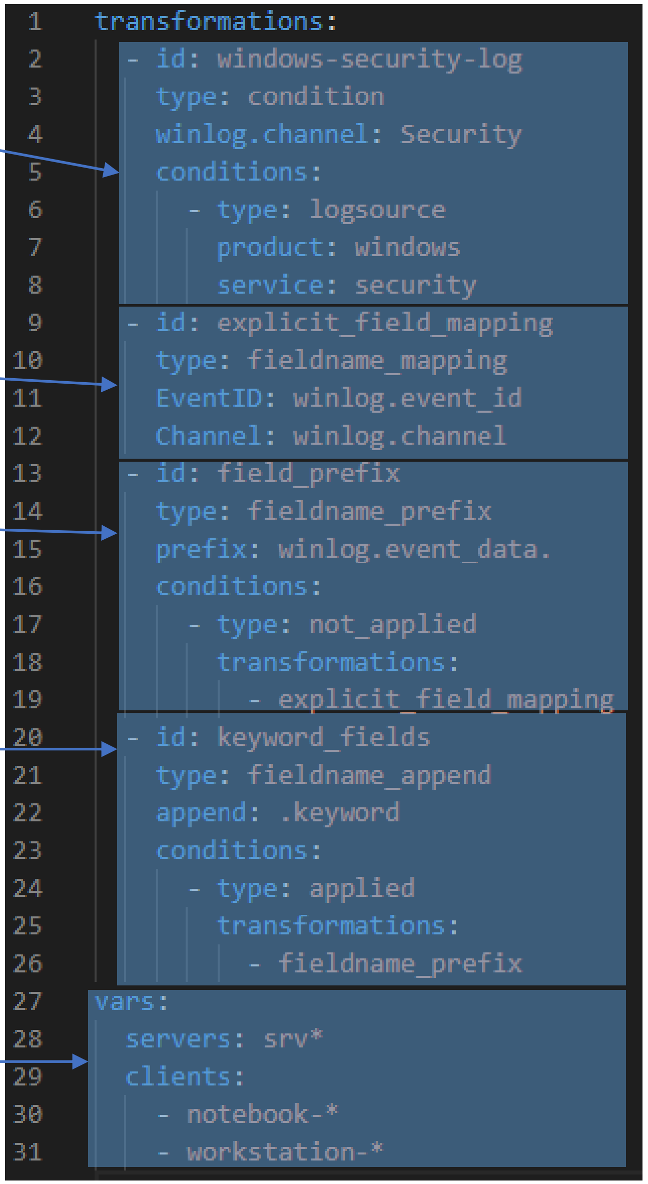
Add condition matching winlog.channel to “Security” if Sigma rule specifies Windows Security log as log source.

Field name mappings

Prefix field names not explicitly mapped by previous rule.

Append a suffix to all fields prefixed by previous rule.

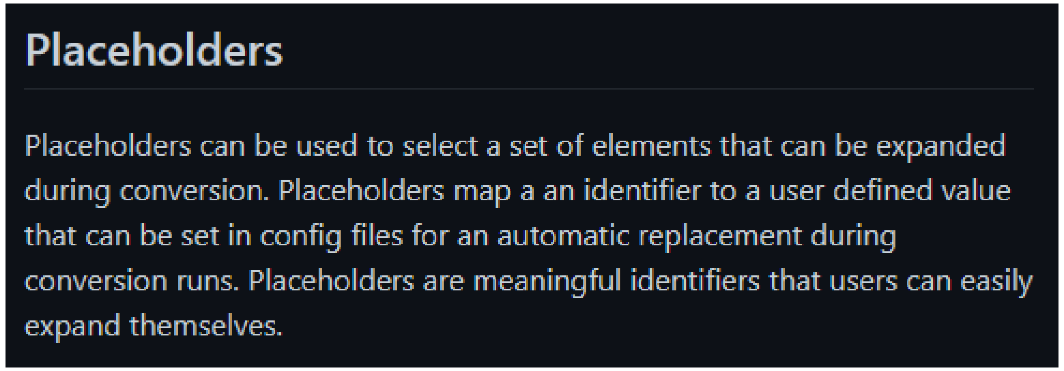
Variables which can be used in placeholders or conditions.



```
transformations:
  - id: windows-security-log
    type: condition
    winlog.channel: Security
    conditions:
      - type: logsource
        product: windows
        service: security
  - id: explicit_field_mapping
    type: fieldname_mapping
    EventID: winlog.event_id
    Channel: winlog.channel
  - id: field_prefix
    type: fieldname_prefix
    prefix: winlog.event_data.
    conditions:
      - type: not_applied
        transformations:
          - explicit_field_mapping
  - id: keyword_fields
    type: fieldname_append
    append: .keyword
    conditions:
      - type: applied
        transformations:
          - fieldname_prefix
vars:
  servers: srv*
  clients:
    - notebook-*
    - workstation-*
```

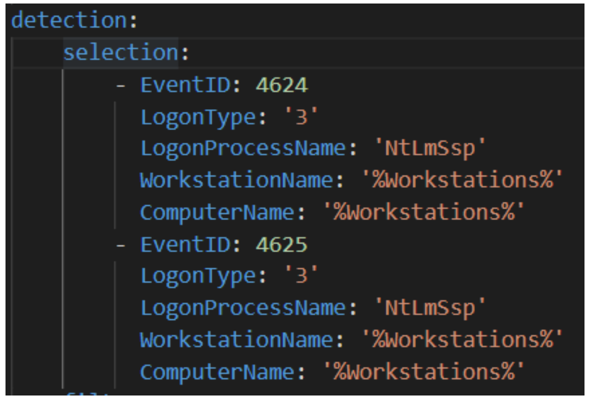
Placeholder History

- Specified since the beginning
- It is used in rules
- But it was never implemented in the converter and is often requested from the community.
- Now it’s coming! ☺



Placeholders

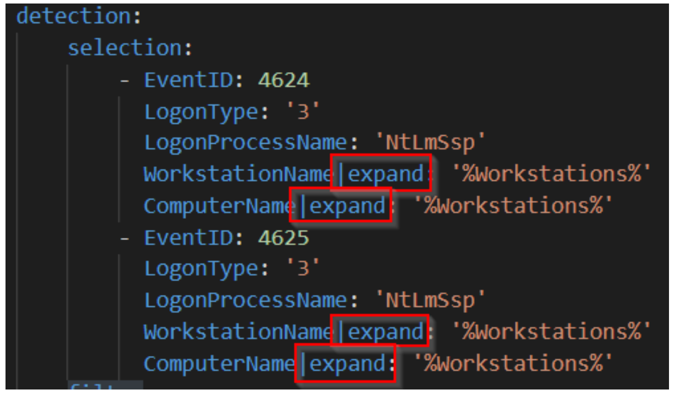
Placeholders can be used to select a set of elements that can be expanded during conversion. Placeholders map a an identifier to a user defined value that can be set in config files for an automatic replacement during conversion runs. Placeholders are meaningful identifiers that users can easily expand themselves.



```
detection:
    selection:
        - EventID: 4624
          LogonType: '3'
          LogonProcessName: 'NtLmSsp'
          WorkstationName: '%Workstations%'
          ComputerName: '%Workstations%'
        - EventID: 4625
          LogonType: '3'
          LogonProcessName: 'NtLmSsp'
          WorkstationName: '%Workstations%'
          ComputerName: '%Workstations%'
```

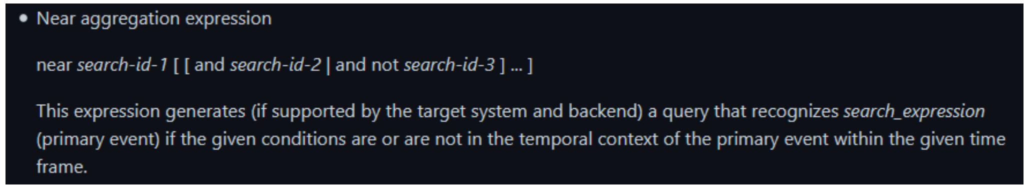
Placeholder Support in new Converter

- Value modifier *expand* to distinguish between intentional `%values%` and `%placeholders%`.
- % can also be escaped (\%) inside expanded value
- Processing pipeline defines expansion
  - Into plain values:
    … `src=notebook-* OR src=workstation-*` …
  - Into condition:
    … `tag=workstation` …
  - Into table lookup:
    … `[ | inputlookup workstations | rename name as src ]` …
  - Into wildcard (last resort fallback):
    … `src=*` …



```yaml
detection:
    selection:
        - EventID: 4624
          LogonType: '3'
          LogonProcessName: 'NtLmSsp'
          WorkstationName|expand: '%Workstations%'
          ComputerName|expand: '%Workstations%'
        - EventID: 4625
          LogonType: '3'
          LogonProcessName: 'NtLmSsp'
          WorkstationName|expand: '%Workstations%'
          ComputerName|expand: '%Workstations%'
```

Aggregations and Correlations



- Near aggregation expression

  near *search-id-1* [[and *search-id-2* | and not *search-id-3*] ...]

  This expression generates (if supported by the target system and backend) a query that recognizes *search_expression* (primary event) if the given conditions are or are not in the temporal context of the primary event within the given time frame.

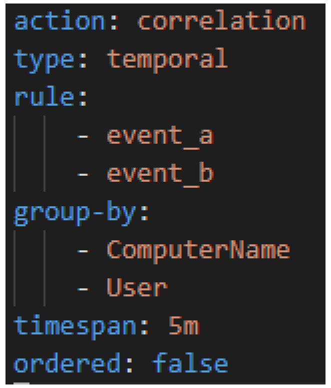
- Not well supported by Sigma converter
- Underspecified
  - Everything must fit within a single Sigma rule
  - This means: no relationship between events from different log sources
  - Overloaded *timeframe* parameter
  - Event Order?
  - Event originating from the same system? The same user? Both?

Sigma Correlations

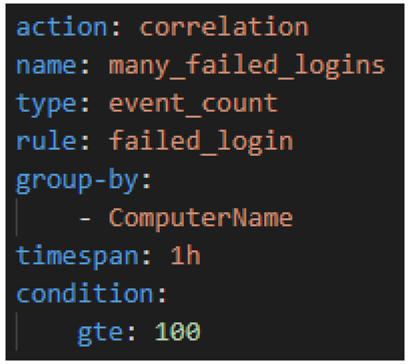
- Aggregations are dropped completely from conditions
- YAML-based, multiple YAML documents in one Sigma file
- Sigma rules describe single events
- Sigma correlation rules describe how the events must be combined to raise a detection

Examples: Sigma Correlations

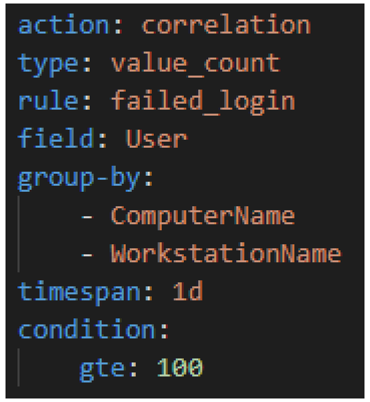
1. Event A and B must appear within five minutes on the same system by the same user.
2. 100 failed logins on a single system within 1 hour.
3. Failed logins to 100 different users counted for each source/target system pair within 1 day.



```yaml
action: correlation
type: temporal
rule:
    - event_a
    - event_b
group-by:
    - ComputerName
    - User
timespan: 5m
ordered: false
```



```yaml
action: correlation
name: many_failed_logins
type: event_count
rule: failed_login
group-by:
    - ComputerName
timespan: 1h
condition:
    gte: 100
```



```yaml
action: correlation
type: value_count
rule: failed_login
field: User
group-by:
    - ComputerName
    - WorkstationName
timespan: 1d
condition:
    gte: 100
```

Roadmap

- First preview release without correlations in the next weeks
  - Processing pipelines support
  - Placeholders
- First correlations support in the next months
- Porting/developing backends
- New Sigma converter will be the 1.x release, old one 0.x
  - Main development efforts go into 1.x
  - Maintenance and bug fixing in 0.x
  - 0.x will be discontinued when most relevant and still maintained backends are ported.
- Rules and converter will be separate projects below the SigmaHQ GitHub organization

Questions?

Answers!

- Now
- https://github.com/SigmaHQ/sigma
- https://siemexchange.slack.com/
- thomas@patzke.org
- Twitter:
  - @blubbfiction
  - @sigma_hq

Want to contribute?

Your code and rules are welcome!

Code:

- Develop or maintain a backend
- Documentation
- Fix an issue

Rules:

- Test existing rules and make a "state: stable" pull request
- Improve existing rules
- Write a missing detection