HAYABUSA

[**English**] | [日本語]

About Hayabusa

Hayabusa is a **Windows event log fast forensics timeline generator** and **threat hunting tool** created by the Yamato Security group in Japan. Hayabusa means "peregrine falcon" in Japanese and was chosen as peregrine falcons are the fastest animal in the world, great at hunting and highly trainable. It is written in Rust and supports multi-threading in order to be as fast as possible. We have provided a tool to convert Sigma rules into Hayabusa rule format. The Sigma-compatible Hayabusa detection rules are written in YML in order to be as easily customizable and extensible as possible. Hayabusa can be run either on single running systems for live analysis, by gathering logs from single or multiple systems for offline analysis, or by running the Hayabusa artifact with Velociraptor for enterprise-wide threat hunting and incident response. The output will be consolidated into a single CSV timeline for easy analysis in Excel, Timeline Explorer, or Elastic Stack.

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Main Goals

Threat Hunting and Enterprise-wide DFIR

Hayabusa currently has over 2400 Sigma rules and over 130 Hayabusa built-in detection rules with more rules being added regularly. It can be used for enterprise-wide proactive threat hunting as well as DFIR (Digital Forensics and Incident Response) for free with Velociraptor's Hayabusa artifact. By combining these two open-source tools, you can essentially retroactively reproduce a SIEM when there is no SIEM setup in the environment. You can learn about how to do this by watching Eric Cupuano's Velociraptor walkthrough here.

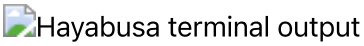
Fast Forensics Timeline Generation

Windows event log analysis has traditionally been a very long and tedious process because Windows event logs are 1) in a data format that is hard to analyze and 2) the majority of data is noise and not useful for investigations. Hayabusa's goal is to extract out only useful data and present it in a concise as possible easy-to-read format that is usable not only by professionally trained analysts but any Windows system administrator. Hayabusa hopes to let analysts get 80% of their work done in 20% of the time when compared to traditional Windows event log analysis.

Screenshots

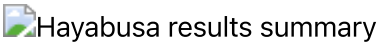
Startup

Terminal Output

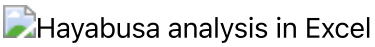


Event Fequency Timeline (–V option)

Results Summary



Analysis in Excel



Analysis in Timeline Explorer

Time	Computername	Eventid	Level	Alert	Details
2021-05-22 05:43:18.227 +09:00	fs01.offsec.lan	4648	informational	Explicit Logon	Source User: FS01$: Target User: admmig
2021-05-22 05:43:22.562 +09:00	fs01.offsec.lan	4625	low	Logon Failure - Wrong Password	User: admmig@offsec.lan : Type: 8 : Wor
2021-05-22 05:43:49.345 +09:00	fs01.offsec.lan	4625	low	Logon Failure - Wrong Password	User: admmig@offsec.lan : Type: 8 : Wor
2021-05-22 05:43:50.131 +09:00	fs01.offsec.lan	4625	low	Logon Failure - Wrong Password	User: admmig@offsec.lan : Type: 8 : Wor
2021-05-22 05:43:50.607 +09:00	fs01.offsec.lan	4625	low	Logon Failure - Wrong Password	User: admmig@offsec.lan : Type: 8 : Wor
2021-05-22 05:43:50.866 +09:00	fs01.offsec.lan	4625	low	Logon Failure - Wrong Password	User: admmig@offsec.lan : Type: 8 : Wor
2021-05-23 06:56:57.685 +09:00	fs01.offsec.lan	1102	high	Security log was cleared	User: admmig
2021-05-23 06:57:11.842 +09:00	fs01.offsec.lan	4688	high	Relevant Anti-Virus Event	
2021-05-23 06:57:11.842 +09:00	fs01.offsec.lan	4688	critical	Mimikatz Use	
2021-05-26 22:02:27.149 +09:00	mssql01.offsec.lan	4624	informational	Logon Type 3 - Network	User: admmig : Workstation: - : IP Addr
2021-05-26 22:02:27.155 +09:00	mssql01.offsec.lan	5145	medium	DCERPC SMB Spoolss Named Pipe	
2021-05-26 22:02:27.155 +09:00	mssql01.offsec.lan	5145	critical	CVE-2021-1675 Print Spooler Exploitation IPC Access	
2021-05-26 22:02:29.726 +09:00	mssql01.offsec.lan	4624	informational	Logon Type 3 - Network	User: admmig : Workstation: - : IP Addr
2021-05-26 22:02:29.734 +09:00	mssql01.offsec.lan	5145	medium	DCERPC SMB Spoolss Named Pipe	
2021-05-26 22:02:29.734 +09:00	mssql01.offsec.lan	5145	critical	CVE-2021-1675 Print Spooler Exploitation IPC Access	
2021-05-26 22:02:34.373 +09:00	mssql01.offsec.lan	4624	informational	Logon Type 3 - Network	User: admmig : Workstation: - : IP Addr
2021-05-26 22:02:34.375 +09:00	mssql01.offsec.lan	5145	medium	DCERPC SMB Spoolss Named Pipe	
2021-05-26 22:02:34.379 +09:00	mssql01.offsec.lan	4624	informational	Logon Type 3 - Network	User: admmig : Workstation: - : IP Addr
2021-05-26 22:02:34.379 +09:00	mssql01.offsec.lan	4624	informational	Logon Type 3 - Network	User: admmig : Workstation: - : IP Addr
2021-05-26 22:02:34.380 +09:00	mssql01.offsec.lan	4624	informational	Logon Type 3 - Network	User: admmig : Workstation: - : IP Addr
2021-05-27 05:24:46.570 +09:00	rootdc1.offsec.lan	4768	medium	Possible AS-REP Roasting	Possible AS-REP Roasting
2021-05-27 05:24:46.570 +09:00	rootdc1.offsec.lan	4768	informational	Kerberos TGT was requested	User: admin-test : Service: krbtgt : IP
2021-06-01 23:06:34.542 +09:00	fs01.offsec.lan	4720	medium	Local user account created	User: WADGUtilityAccount : SID:S-1-5-21-1
2021-06-01 23:08:21.225 +09:00	fs01.offsec.lan	4720	medium	Local user account created	User: elie : SID:S-1-5-21-1081258321-3780
2021-06-03 21:17:56.988 +09:00	fs01.offsec.lan	1102	high	Security log was cleared	User: admmig
2021-06-03 21:18:12.941 +09:00	fs01.offsec.lan	4672	informational	Admin Logon	User: admmig : LogonID: 0x322e5b7
2021-06-03 21:18:12.942 +09:00	fs01.offsec.lan	4624	informational	Logon Type 3 - Network	User: admmig : Workstation: - : IP Addr
2021-06-04 03:34:12.672 +09:00	fs01.offsec.lan	4104	high	Windows Firewall Profile Disabled	
2021-06-04 04:17:44.873 +09:00	fs01.offsec.lan	1102	high	Security log was cleared	User: admmig

Critical Alert Filtering and Computer Grouping in Timeline Explorer

Computername

Line	Tag	Time	Eventid	Level	Alert
=				= critical	
Computername: 01566s-win16-ir.threebeesco.com (Count: 1)					
Computername: alice.insecurebank.local (Count: 3)					
Computername: DC1.insecurebank.local (Count: 18)					
5540		2019-03-26 06:28:45.026 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5539		2019-03-26 06:28:45.026 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5538		2019-03-26 06:28:45.026 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5537		2019-03-26 06:28:45.026 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5536		2019-03-26 06:28:45.025 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5535		2019-03-26 06:28:45.025 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5534		2019-03-26 06:28:45.025 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5533		2019-03-26 06:28:45.025 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5532		2019-03-26 06:28:45.025 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5531		2019-03-26 06:28:45.024 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5530		2019-03-26 06:28:45.024 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5529		2019-03-26 06:28:45.024 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5528		2019-03-26 06:28:45.023 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5527		2019-03-26 06:28:45.023 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5526		2019-03-26 06:28:45.023 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5525		2019-03-26 06:28:45.023 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5524		2019-03-26 06:28:45.022 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
5523		2019-03-26 06:28:45.022 +09:00	5136	critical	Powerview Add-DomainObjectAcl DCSync AD Extend Right
Computername: DESKTOP-PIU87N6 (Count: 1)					

Analysis with the Elastic Stack Dashboard

Analyzing Sample Timeline Results

You can check out a sample CSV timeline here.

You can learn how to analyze CSV timelines in Excel and Timeline Explorer here.

You can learn how to import CSV files into Elastic Stack here.

Features

- Cross-platform support: Windows, Linux, macOS.
- Developed in Rust to be memory safe and faster than a hayabusa falcon!
- Multi-thread support delivering up to a 5x speed improvement.
- Creates a single easy-to-analyze CSV timeline for forensic investigations and incident response.
- Threat hunting based on IoC signatures written in easy to read/create/edit YML based hayabusa rules.
- Sigma rule support to convert sigma rules to hayabusa rules.
- Currently it supports the most sigma rules compared to other similar tools and even supports count rules and new aggregators such as `|equalsfield`.
- Event log statistics. (Useful for getting a picture of what types of events there are and for tuning your log settings.)
- Rule tuning configuration by excluding unneeded or noisy rules.
- MITRE ATT&CK mapping of tactics (only in saved CSV files).
- Rule level tuning.
- Create a list of unique pivot keywords to quickly identify abnormal users, hostnames, processes, etc... as well as correlate events.
- Output all fields for more thorough investigations.
- Successful and failed logon summary.
- Enterprise-wide threat hunting and DFIR on all endpoints with Velociraptor.

Downloads

Please download the latest stable version of Hayabusa with compiled binaries or compile the source code from the Releases page.

Git cloning

You can `git clone` the repository with the following command and compile binary from source code:

Warning: The main branch of the repository is for development purposes so you may be able to access new features not yet officially released, however, there may be bugs so consider it unstable.

```
git clone https://github.com/Yamato-Security/hayabusa.git --recursive
```

Note: If you forget to use --recursive option, the `rules` folder, which is managed as a git submodule, will not be cloned.

You can sync the `rules` folder and get latest Hayabusa rules with `git pull --recurse-submodules` or use the following command:

```
hayabusa-1.4.0-win-x64.exe -u
```

If the update fails, you may need to rename the `rules` folder and try again.

> Caution: When updating, rules and config files in the `rules` folder are replaced with the latest rules and config files in the hayabusa-rules repository. Any changes you make to existing files will be overwritten, so we recommend that you make backups of any files that you edit before updating. If you are performing level tuning with `--level-tuning`, please re-tune your rule files after each update. If you add **new** rules inside of the `rules` folder, they will **not** be overwritten or deleted when updating.

Advanced: Compiling From Source (Optional)

If you have Rust installed, you can compile from source with the following command:

```
cargo clean
cargo build --release
```

You can download the latest unstable version from the main branch or the latest stable version from the Releases page.

Be sure to periodically update Rust with:

```
rustup update stable
```

The compiled binary will be outputted in the `target/release` folder.

Updating Rust Packages

You can update to the latest Rust crates before compiling:

```
cargo update
```

Please let us know if anything breaks after you update.

Cross-compiling 32-bit Windows Binaries

You can create 32-bit binaries on 64-bit Windows systems with the following:

```
rustup install stable-i686-pc-windows-msvc
rustup target add i686-pc-windows-msvc
rustup run stable-i686-pc-windows-msvc cargo build --release
```

macOS Compiling Notes

If you receive compile errors about openssl, you will need to install Homebrew and then install the following packages:

```
brew install pkg-config
brew install openssl
```

Linux Compiling Notes

If you receive compile errors about openssl, you will need to install the following package.

Ubuntu-based distros:

```
sudo apt install libssl-dev
```

Fedora-based distros:

```
sudo yum install openssl-devel
```

Running Hayabusa

Caution: Anti-Virus/EDR Warnings

You may receive an alert from anti-virus or EDR products when trying to run hayabusa or even just when downloading the `.yml` rules as there will be keywords like `mimikatz` and suspicious PowerShell commands in the detection signature. These are false positives so will need to configure exclusions in your security products to allow hayabusa to run. If you are worried about malware or supply chain attacks, please check the hayabusa source code and compile the binaries yourself.

Windows

In Command Prompt or Windows Terminal, just run the 32-bit or 64-bit Windows binary from the hayabusa root directory. Example: `hayabusa-1.4.0-windows-x64.exe`

Linux

You first need to make the binary executable.

```
chmod +x ./hayabusa-1.4.0-linux-x64-gnu
```

Then run it from the Hayabusa root directory:

```
./hayabusa-1.4.0-linux-x64-gnu
```

macOS

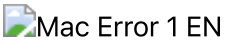
From Terminal or iTerm2, you first need to make the binary executable.

```
chmod +x ./hayabusa-1.4.0-mac-intel
```

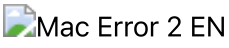
Then, try to run it from the Hayabusa root directory:

```
./hayabusa-1.4.0-mac-intel
```

On the latest version of macOS, you may receive the following security error when you try to run it:


Mac Error 1 EN

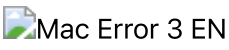
Click "Cancel" and then from System Preferences, open "Security & Privacy" and from the General tab, click "Allow Anyway".


Mac Error 2 EN

After that, try to run it again.

```
./hayabusa-1.4.0-mac-intel
```

The following warning will pop up, so please click "Open".


Mac Error 3 EN

You should now be able to run hayabusa.

Usage

Command Line Options

```
USAGE:
    hayabusa.exe -f file.evtx [OPTIONS] / hayabusa.exe -d evtx-directory
[OPTIONS]

OPTIONS:
        --European-time                             Output timestamp in
European time format (ex: 22-02-2022 22:00:00.123 +02:00)
        --RFC-2822                                  Output timestamp in RFC
```

```
2822 format (ex: Fri, 22 Feb 2022 22:00:00 -0600)
        --RFC-3339                                  Output timestamp in RFC
3339 format (ex: 2022-02-22 22:00:00.123456-06:00)
        --US-military-time                          Output timestamp in US
military time format (ex: 02-22-2022 22:00:00.123 -06:00)
        --US-time                                   Output timestamp in US
time format (ex: 02-22-2022 10:00:00.123 PM -06:00)
        --target-file-ext <EVTX_FILE_EXT>...        Specify additional
target file extensions (ex: evtx_data) (ex: evtx1 evtx2)
        --all-tags                                  Output all tags when
saving to a CSV file
    -c, --rules-config <RULE_CONFIG_DIRECTORY>      Specify custom rule
config folder (default: ./rules/config)
        --contributors                              Print the list of
contributors
    -d, --directory <DIRECTORY>                     Directory of multiple
.evtx files
    -D, --enable-deprecated-rules                   Enable rules marked as
deprecated
        --end-timeline <END_TIMELINE>               End time of the event
logs to load (ex: "2022-02-22 23:59:59 +09:00")
        --exclude-status <EXCLUDE_STATUS>...        Ignore rules according
to status (ex: experimental) (ex: stable test)
    -f, --filepath <FILE_PATH>                      File path to one .evtx
file
    -F, --full-data                                 Print all field
information
    -h, --help                                      Print help information
    -l, --live-analysis                             Analyze the local
C:\Windows\System32\winevt\Logs folder
    -L, --logon-summary                             Print a summary of
successful and failed logons
        --level-tuning [<LEVEL_TUNING_FILE>]        Tune alert levels
(default: ./rules/config/level_tuning.txt)
    -m, --min-level <LEVEL>                         Minimum level for rules
(default: informational)
    -n, --enable-noisy-rules                        Enable rules marked as
noisy
        --no-color                                  Disable color output
    -o, --output <CSV_TIMELINE>                     Save the timeline in CSV
format (ex: results.csv)
    -p, --pivot-keywords-list                       Create a list of pivot
keywords
    -q, --quiet                                     Quiet mode: do not
display the launch banner
    -Q, --quiet-errors                              Quiet errors mode: do
not save error logs
    -r, --rules <RULE_DIRECTORY/RULE_FILE>          Specify a rule directory
or file (default: ./rules)
    -R, --hide-record-ID                            Do not display
EventRecordID numbers
    -s, --statistics                                Print statistics of
event IDs
        --start-timeline <START_TIMELINE>           Start time of the event
```

```
logs to load (ex: "2020-02-22 00:00:00 +09:00")
    -t, --thread-number <NUMBER>                Thread number (default:
optimal number for performance)
    -u, --update-rules                          Update to the latest
rules in the hayabusa-rules github repository
    -U, --UTC                                   Output time in UTC
format (default: local time)
    -v, --verbose                               Output verbose
information
    -V, --visualize-timeline                    Output event frequency
timeline
        --version                               Print version
information
```

Usage Examples

- Run hayabusa against one Windows event log file:

```
hayabusa-1.4.0-win-x64.exe -f eventlog.evtx
```

- Run hayabusa against the sample-evtx directory with multiple Windows event log files:

```
hayabusa-1.4.0-win-x64.exe -d .\hayabusa-sample-evtx
```

- Export to a single CSV file for further analysis with excel, timeline explorer, elastic stack, etc... and include all field information (Warning: your file output size will become much larger with `-F` enabled!):

```
hayabusa-1.4.0-win-x64.exe -d .\hayabusa-sample-evtx -o results.csv -F
```

- Only run hayabusa rules (the default is to run all the rules in `-r .\rules`):

```
hayabusa-1.4.0-win-x64.exe -d .\hayabusa-sample-evtx -r .\rules\hayabusa -
o results.csv
```

- Only run hayabusa rules for logs that are enabled by default on Windows:

```
hayabusa-1.4.0-win-x64.exe -d .\hayabusa-sample-evtx -r
.\rules\hayabusa\default -o results.csv
```

- Only run hayabusa rules for sysmon logs:

```
hayabusa-1.4.0-win-x64.exe -d .\hayabusa-sample-evtx -r
.\rules\hayabusa\sysmon -o results.csv
```

- Only run sigma rules:

```
hayabusa-1.4.0-win-x64.exe -d .\hayabusa-sample-evtx -r .\rules\sigma -o
results.csv
```

- Enable deprecated rules (those with `status` marked as `deprecated`) and noisy rules (those whose rule ID is listed in `.\rules\config\noisy_rules.txt`):

```
hayabusa-1.4.0-win-x64.exe -d .\hayabusa-sample-evtx --enable-noisy-rules
--enable-deprecated-rules -o results.csv
```

- Only run rules to analyze logons and output in the UTC timezone:

```
hayabusa-1.4.0-win-x64.exe -d .\hayabusa-sample-evtx -r
.\rules\hayabusa\default\events\Security\Logons -U -o results.csv
```

- Run on a live Windows machine (requires Administrator privileges) and only detect alerts (potentially malicious behavior):

```
hayabusa-1.4.0-win-x64.exe -l -m low
```

- Create a list of pivot keywords from critical alerts and save the results. (Results will be saved to `keywords-Ip Addresses.txt`, `keywords-Users.txt`, etc...):

```
hayabusa-1.4.0-win-x64.exe -l -m critical -p -o keywords
```

- Print Event ID statistics:

```
hayabusa-1.4.0-win-x64.exe -f Security.evtx -s
```

- Print verbose information (useful for determining which files take long to process, parsing errors, etc...):

```
hayabusa-1.4.0-win-x64.exe -d .\hayabusa-sample-evtx -v
```

- Verbose output example:

```
Checking target evtx FilePath: "./hayabusa-sample-
evtx/YamatoSecurity/T1027.004_Obfuscated Files or Information\u{a0}Compile
After Delivery/sysmon.evtx"
1 / 509 [>----------------------------------------------------------------
----------------------------------------------------------------------------
-] 0.20 % 1s
Checking target evtx FilePath: "./hayabusa-sample-
evtx/YamatoSecurity/T1558.004_Steal or Forge Kerberos Tickets AS-REP
Roasting/Security.evtx"
2 / 509 [>----------------------------------------------------------------
----------------------------------------------------------------------------
-] 0.39 % 1s
Checking target evtx FilePath: "./hayabusa-sample-
evtx/YamatoSecurity/T1558.003_Steal or Forge Kerberos
Tickets\u{a0}Kerberoasting/Security.evtx"
3 / 509 [>----------------------------------------------------------------
----------------------------------------------------------------------------
-] 0.59 % 1s
Checking target evtx FilePath: "./hayabusa-sample-
evtx/YamatoSecurity/T1197_BITS Jobs/Windows-BitsClient.evtx"
4 / 509 [=>--------------------------------------------------------------
----------------------------------------------------------------------------
-] 0.79 % 1s
Checking target evtx FilePath: "./hayabusa-sample-
evtx/YamatoSecurity/T1218.004_Signed Binary Proxy
Execution\u{a0}InstallUtil/sysmon.evtx"
5 / 509 [=>--------------------------------------------------------------
----------------------------------------------------------------------------
-] 0.98 % 1s
```

- Quiet error mode: By default, hayabusa will save error messages to error log files. If you do not want to save error messages, please add `-Q`.

Pivot Keyword Generator

You can use the `-p` or `--pivot-keywords-list` option to create a list of unique pivot keywords to quickly identify abnormal users, hostnames, processes, etc... as well as correlate events. You can customize what keywords you want to search for by editing `config/pivot_keywords.txt`. This is the default setting:

```
Users.SubjectUserName
Users.TargetUserName
Users.User
Logon IDs.SubjectLogonId
Logon IDs.TargetLogonId
Workstation Names.WorkstationName
```

```
Ip Addresses.IpAddress
Processes.Image
```

The format is `KeywordName.FieldName`. For example, when creating the list of `Users`, hayabusa will list up all the values in the `SubjectUserName`, `TargetUserName` and `User` fields. By default, hayabusa will return results from all events (informational and higher) so we highly recommend combining the `--pivot-keyword-list` option with the `-m` or `--min-level` option. For example, start off with only creating keywords from `critical` alerts with `-m critical` and then continue with `-m high`, `-m medium`, etc... There will most likely be common keywords in your results that will match on many normal events, so after manually checking the results and creating a list of unique keywords in a single file, you can then create a narrowed down timeline of suspicious activity with a command like `grep -f keywords.txt timeline.csv`.

Logon Summary Generator

You can use the `-L` or `--logon-summary` option to output logon information summary (logon usernames and successful and failed logon count). You can display the logon information for one evtx file with `-f` or multiple evtx files with the `-d` option.

Testing Hayabusa on Sample Evtx Files

We have provided some sample evtx files for you to test hayabusa and/or create new rules at https://github.com/Yamato-Security/hayabusa-sample-evtx

You can download the sample evtx files to a new `hayabusa-sample-evtx` sub-directory with the following command:

```
git clone https://github.com/Yamato-Security/hayabusa-sample-evtx.git
```

> Note: You need to run the binary from the Hayabusa root directory.

Hayabusa Output

When hayabusa output is being displayed to the screen (the default), it will display the following information:

- `Timestamp`: Default is `YYYY-MM-DD HH:mm:ss.sss +hh:mm` format. This comes from the `<Event><System><TimeCreated SystemTime>` field in the event log. The default timezone will be the local timezone but you can change the timezone to UTC with the `--utc` option.
- `Computer`: This comes from the `<Event><System><Computer>` field in the event log.
- `Channel`: The name of log. This comes from the `<Event><System><Channel>` field in the event log.
- `Event ID`: This comes from the `<Event><System><EventID>` field in the event log.

- `Level`: This comes from the `level` field in the YML detection rule. (`informational`, `low`, `medium`, `high`, `critical`) By default, all level alerts will be displayed but you can set the minimum level with `-m`. For example, you can set `-m high`) in order to only scan for and display high and critical alerts.
- `RecordID`: This comes from the `<Event><System><EventRecordID>` field in the event log. You can hidde this output with the `-R` or `--hide-record-id` option.
- `Title`: This comes from the `title` field in the YML detection rule.
- `Details`: This comes from the `details` field in the YML detection rule, however, only hayabusa rules have this field. This field gives extra information about the alert or event and can extract useful data from the fields in event logs. For example, usernames, command line information, process information, etc... When a placeholder points to a field that does not exist or there is an incorrect alias mapping, it will be outputted as `n/a` (not available). If the `details` field is not specified (i.e. sigma rules), default `details` messages to extract fields defined in `./rules/config/default_details.txt` will be outputted. You can add more default `details` messages by adding the `Provider Name`, `EventID` and `details` message you want to output in `default_details.txt`.

The following additional columns will be added to the output when saving to a CSV file:

- `MitreAttack`: MITRE ATT&CK tactics.
- `Rule Path`: The path to the detection rule that generated the alert or event.
- `File Path`: The path to the evtx file that caused the alert or event.

If you add the `-F` or `--full-data` option, a `RecordInformation` column with all field information will also be added.

Level Abbrevations

In order to save space, we use the following abbrevations when displaying the alert `level`.

- `crit`: `critical`
- `high`: `high`
- `med` : `med`
- `low` : `low`
- `info`: `informational`

MITRE ATT&CK Tactics Abbreviations

In order to save space, we use the following abbreviations when displaying MITRE ATT&CK tactic tags. You can freely edit these abbreviations in the `config/output_tag.txt` configuration file. If you want to output all the tags defined in a rule, please specify the `--all-tags` option.

- `Recon` : Reconnaissance
- `ResDev` : Resource Development
- `InitAccess` : Initial Access
- `Exec` : Execution
- `Persis` : Persistence
- `PrivEsc` : Privilege Escalation
- `Evas` : Defense Evasion
- `CredAccess` : Credential Access

- `Disc` : Discovery
- `LatMov` : Lateral Movement
- `Collect` : Collection
- `C2` : Command and Control
- `Exfil` : Exfiltration
- `Impact` : Impact

Channel Abbreviations

In order to save space, we use the following abbreviations when displaying Channel. You can freely edit these abbreviations in the `config/channel_abbreviations.txt` configuration file.

- `App` : `Application`
- `AppLocker` : `Microsoft-Windows-AppLocker/*`
- `BitsCli` : `Microsoft-Windows-Bits-Client/Operational`
- `CodeInteg` : `Microsoft-Windows-CodeIntegrity/Operational`
- `Defender` : `Microsoft-Windows-Windows Defender/Operational`
- `DHCP-Svr` : `Microsoft-Windows-DHCP-Server/Operational`
- `DNS-Svr` : `DNS Server`
- `DvrFmwk` : `Microsoft-Windows-DriverFrameworks-UserMode/Operational`
- `Exchange` : `MSExchange Management`
- `Firewall` : `Microsoft-Windows-Windows Firewall With Advanced Security/Firewall`
- `KeyMgtSvc` : `Key Management Service`
- `LDAP-Cli` : `Microsoft-Windows-LDAP-Client/Debug`
- `NTLM` `Microsoft-Windows-NTLM/Operational`
- `OpenSSH` : `OpenSSH/Operational`
- `PrintAdm` : `Microsoft-Windows-PrintService/Admin`
- `PrintOp` : `Microsoft-Windows-PrintService/Operational`
- `PwSh` : `Microsoft-Windows-PowerShell/Operational`
- `PwShClassic` : `Windows PowerShell`
- `RDP-Client` : `Microsoft-Windows-TerminalServices-RDPClient/Operational`
- `Sec` : `Security`
- `SecMitig` : `Microsoft-Windows-Security-Mitigations/*`
- `SmbCliSec` : `Microsoft-Windows-SmbClient/Security`
- `SvcBusCli` : `Microsoft-ServiceBus-Client`
- `Sys` : `System`
- `Sysmon` : `Microsoft-Windows-Sysmon/Operational`
- `TaskSch` : `Microsoft-Windows-TaskScheduler/Operational`
- `WinRM` : `Microsoft-Windows-WinRM/Operational`
- `WMI` : `Microsoft-Windows-WMI-Activity/Operational`

Progress Bar

The progress bar will only work with multiple evtx files. It will display in real time the number and percent of evtx files that it has finished analyzing.

Color Output

The alerts will be outputted in color based on the alert `level`. You can change the default colors in the config file at `./config/level_color.txt` in the format of `level,(RGB 6-digit ColorHex)`. If you want to disable color output, you can use `--no-color` option.

Event Fequency Timeline

If you add `-V` or `--visualize-timeline` option, the Event Frequency Timeline feature displays a sparkline frequency timeline of detected events. Note: There needs to be more than 5 events. Also, the characters will not render correctly on the default Command Prompt or PowerShell Prompt, so please use a terminal like Windows Terminal, iTerm2, etc...

Dates with most total detections

A summary of the dates with the most total detections categorized by level (`critical`, `high`, etc...).

Top 5 computers with most unique detections

The top 5 computers with the most unique detections categorized by level (`critical`, `high`, etc...).

Hayabusa Rules

Hayabusa detection rules are written in a sigma-like YML format and are located in the `rules` folder. In the future, we plan to host the rules at https://github.com/Yamato-Security/hayabusa-rules so please send any issues and pull requests for rules there instead of the main hayabusa repository.

Please read the hayabusa-rules repository README to understand about the rule format and how to create rules.

All of the rules from the hayabusa-rules repository should be placed in the `rules` folder. `informational` level rules are considered `events`, while anything with a `level` of `low` and higher are considered `alerts`.

The hayabusa rule directory structure is separated into 3 directories:

- `default`: logs that are turned on in Windows by default.
- `non-default`: logs that need to be turned on through group policy, security baselines, etc...
- `sysmon`: logs that are generated by sysmon.
- `testing`: a temporary directory to put rules that you are currently testing.

Rules are further seperated into directories by log type (Example: Security, System, etc...) and are named in the following format:

- Alert format: `<EventID>_<EventDescription>_<AttackDescription>.yml`
- Alert example: `1102_SecurityLogCleared_PossibleAntiForensics.yml`
- Event format: `<EventID>_<EventDescription>.yml`
- Event example: `4776_NTLM-LogonToLocalAccount.yml`

Please check out the current rules to use as a template in creating new ones or for checking the detection logic.

Hayabusa v.s. Converted Sigma Rules

Sigma rules need to first be converted to hayabusa rule format explained here. Almost all hayabusa rules are compatible with the sigma format so you can use them just like sigma rules to convert to other SIEM formats. Hayabusa rules are designed solely for Windows event log analysis and have the following benefits:

1. An extra `details` field to display additional information taken from only the useful fields in the log.
2. They are all tested against sample logs and are known to work.

> Some sigma rules may not work as intended due to bugs in the conversion process, unsupported features, or differences in implementation (such as in regular expressions).

3. Extra aggregators not found in sigma, such as `|equalsfield`.

Limitations: To our knowledge, hayabusa provides the greatest support for sigma rules out of any open source Windows event log analysis tool, however, there are still rules that are not supported:

1. Rules that use regular expressions that do not work with the Rust regex crate
2. Aggregation expressions besides `count` in the sigma rule specification.
3. Rules that use `|near`.

Detection Rule Tuning

Like firewalls and IDSes, any signature-based tool will require some tuning to fit your environment so you may need to permanently or temporarily exclude certain rules.

You can add a rule ID (Example: `4fe151c2-ecf9-4fae-95ae-b88ec9c2fca6`) to `rules/config/exclude_rules.txt` in order to ignore any rule that you do not need or cannot be used.

You can also add a rule ID to `rules/config/noisy_rules.txt` in order to ignore the rule by default but still be able to use the rule with the `-n` or `--enable-noisy-rules` option.

Detection Level Tuning

Hayabusa and Sigma rule authors will determine the risk level of the alert when writing their rules. However, the actual risk level will differ between environments. You can tune the risk level of the rules by adding them to `./rules/config/level_tuning.txt` and executing `hayabusa-1.4.0-win-x64.exe --level-tuning` which will update the `level` line in the rule file. Please note that the rule file will be updated directly.

`./rules/config/level_tuning.txt` sample line:

```
id,new_level
00000000-0000-0000-0000-000000000000,informational # sample level tuning line
```

In this case, the risk level of the rule with an `id` of `00000000-0000-0000-0000-000000000000` in the rules directory will have its `level` rewritten to `informational`.

Event ID Filtering

You can filter on event IDs by placing event ID numbers in `config/target_eventids.txt`. This will increase performance so it is recommended if you only need to search for certain IDs.

We have provided a sample ID filter list at `config/target_eventids_sample.txt` created from the `EventID` fields in all of the rules as well as IDs seen in actual results.

Please use this list if you want the best performance but be aware that there is a slight possibility for missing events (false negatives).

Other Windows Event Log Analyzers and Related Resources

There is no "one tool to rule them all" and we have found that each has its own merits so we recommend checking out these other great tools and projects and seeing which ones you like.

- APT-Hunter - Attack detection tool written in Python.
- Awesome Event IDs - Collection of Event ID resources useful for Digital Forensics and Incident Response
- Chainsaw - Another sigma-based attack detection tool written in Rust.
- DeepBlueCLI - Attack detection tool written in Powershell by Eric Conrad.
- Epagneul - Graph visualization for Windows event logs.
- EventList - Map security baseline event IDs to MITRE ATT&CK by Miriam Wiesner.
- Mapping MITRE ATT&CK with Window Event Log IDs - by Michel de CREVOISIER
- EvtxECmd - Evtx parser by Eric Zimmerman.
- EVTXtract - Recover EVTX log files from unallocated space and memory images.
- EvtxToElk - Python tool to send Evtx data to Elastic Stack.
- EVTX ATTACK Samples - EVTX attack sample event log files by SBousseaden.
- EVTX-to-MITRE-Attack - EVTX attack sample event log files mapped to ATT&CK by Michel de CREVOISIER
- EVTX parser - the Rust library we used written by @OBenamram.
- Grafiki - Sysmon and PowerShell log visualizer.
- LogonTracer - A graphical interface to visualize logons to detect lateral movement by JPCERTCC.
- RustyBlue - Rust port of DeepBlueCLI by Yamato Security.
- Sigma - Community based generic SIEM rules.
- SOF-ELK - A pre-packaged VM with Elastic Stack to import data for DFIR analysis by Phil Hagen
- so-import-evtx - Import evtx files into Security Onion.
- SysmonTools - Configuration and off-line log visualization tool for Sysmon.
- Timeline Explorer - The best CSV timeline analyzer by Eric Zimmerman.
- Windows Event Log Analysis - Analyst Reference - by Forward Defense's Steve Anson.
- WELA (Windows Event Log Analyzer) - The swiff-army knife for Windows event logs by Yamato Security
- Zircolite - Sigma-based attack detection tool written in Python.

Windows Logging Recommendations

In order to properly detect malicious activity on Windows machines, you will need to improve the default log settings. We recommend the following sites for guidance:

- JSCU-NL (Joint Sigint Cyber Unit Netherlands) Logging Essentials
- ACSC (Australian Cyber Security Centre) Logging and Fowarding Guide
- Malware Archaeology Cheat Sheets

Sysmon Related Projects

To create the most forensic evidence and detect with the highest accuracy, you need to install sysmon. We recommend the following sites:

- Sysmon Modular
- TrustedSec Sysmon Community Guide

Community Documentation

English

- 2022/06/19 Velociraptor Walkthrough and Hayabusa Integration by Eric Cupuano
- 2022/01/24 Graphing Hayabusa results in neo4j by Matthew Seyer (@forensic_matt)

Japanese

- 2022/01/22 Visualizing Hayabusa results in Elastic Stack by @kzzzzo2
- 2021/12/31 Intro to Hayabusa by itiB (@itiB_S144)
- 2021/12/27 Hayabusa internals by Kazuminn (@k47_um1n)

Contribution

We would love any form of contribution. Pull requests, rule creation and sample evtx logs are the best but feature requests, notifying us of bugs, etc... are also very welcome.

At the least, if you like our tool then please give us a star on Github and show your support!

Bug Submission

Please submit any bugs you find here. This project is currently actively maintained and we are happy to fix any bugs reported.

If you find any issues (false positives, bugs, etc...) with Hayabusa rules, please report them to the hayabusa-rules github issues page here.

If you find any issues (false positives, bugs, etc...) with Sigma rules, please report them to the upstream SigmaHQ github issues page here.

License

Hayabusa is released under GPLv3 and all rules are released under the Detection Rule License (DRL) 1.1.

Twitter

You can recieve the latest news about Hayabusa, rule updates, other Yamato Security tools, etc... by following us on Twitter at @SecurityYamato.