
Viper Documentation

Release 2.0-dev

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Sep 06, 2023

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VIPERS

CHAPTER 1

What is Viper?

Viper is a binary analysis and management framework. Its fundamental objective is to provide a solution to easily organize your collection of malware and exploit samples as well as your collection of scripts you created or found over the time to facilitate your daily research. Think of it as a *Metasploit* for malware researchers: it provides a terminal interface that you can use to store, search and analyze arbitrary files with and a framework to easily create plugins of any sort.

Viper is released under [BSD 3-Clause](#) license and is copyrighted by [Claudio Guarnieri](#). The source code is available on [GitHub](#), where also all development efforts and contributions are coordinated. For questions and inquiries, you can find the author's contact details [here](#).

2.1 Installation

Viper is written in Python and requires **Python >= 3.6**. As of Viper 2.0, Python 2.x is no longer supported. In this documentation we will use Debian GNU/Linux based distributions, such as Ubuntu, as a reference platform. The following installation instructions should apply similarly to other distributions and possibly to Mac OS X as well, although it has not been properly tested.

Before proceeding, you should make sure you have the basic tools installed to be able to compile additional Python extensions:

```
$ sudo apt-get install git gcc python3-dev python3-pip
```

To install Viper from pip:

```
$ pip3 install viper-framework
```

To update Viper from pip:

```
$ pip3 install -U viper-framework
```

The console script *viper* will then be installed in *\$HOME/.local/bin*, make sure to have the folder added to your *\$PATH*. If you wish to install Viper globally:

```
$ sudo pip3 install viper-framework
```

To install Viper from sources:

```
$ git clone https://github.com/viper-framework/viper
$ cd viper
$ pip3 install .
```



```
$ sudo apt-get install tor
```

Scraper:

```
$ sudo apt-get install libdpgk-perl
```

2.2 Usage

2.2.1 Concepts

Before proceeding in learning the functioning of each available command and module, you need to understand some fundamental design concept that represent the foundation of Viper itself.

Projects

Viper allows you to create and operate on a collection of files. One collection represent one **project**.

You can create as many projects as you want and you can easily switch from one to another. Each project will have its own local repositories of binary files, a SQLite database containing metadata and an history file which contains all the commands you provided through Viper's shell exclusively in the context of the opened project.

In this way you can for example create different workbenches for each malware campaign, malware family or threat actor you're investigating. You can also easily pack up and share the whole project folder with your friends and colleagues.

As you can see from Viper's help message, you can specify a project name at startup:

```
nex@nex:~/ $ viper -h
usage: viper [-h] [-p PROJECT]

optional arguments:
  -h, --help            show this help message and exit
  -p PROJECT, --project PROJECT
                        Specify a new or existing project name
```

When doing so, Viper will try to open an existing project with the given name and if it doesn't exist it will initialize it under the `projects/` folder.

If you opened a project, it will appear both in a startup message as well as in Viper's terminal:

```
nex@nex:~/ $ viper -p test

  _
 ( )

  _  _  _  _  _  _  _  _  _  _
 | | | | | | | | | | | | | | | |
 \ v / | | | | | | | | | | | |
  \_/ | | | | | | | | | | | | v2.0
      | |
```

```
You have 0 files in your test repository
test viper >
```

From within the terminal, you can see which projects exist and eventually you can switch from one to another:

```
test1 viper > projects --list
[*] Projects Available:
+-----+-----+-----+
| Project Name | Creation Time           | Current |
+-----+-----+-----+
| test2        | Fri Jul 11 02:05:55 2014 |         |
| test1        | Fri Jul 11 02:05:51 2014 | Yes     |
+-----+-----+-----+
test1 viper > projects --switch test2
[*] Switched to project test2
test2 viper >
```

More details on the `projects` command are available in the *Commands* chapter.

Sessions

Most of commands and especially modules provided by Viper, are designed to operate on a single file, being a Windows executable or a PDF or whatever else.

In order to do so, you'll have to open the file of your choice and every time you do so a new **session** will be created. You'll be able to see the name of the file you opened in the terminal:

```
viper > open 9f2520a3056543d49bb0f822d85ce5dd
[*] Session opened on ~/viper/binaries/2/d/7/9/
↪2d79fcc6b02a2e183a0cb30e0e25d103f42badda9fbf86bbe06f93aa3855aff
viper darkcomet.exe >
```

From then on, every command and module you launch will execute against the file you just opened (if the module requires to do so obviously).

Similarly to the `projects`, you can just as easily see which sessions you have currently opened:

```
viper darkcomet.exe > sessions --list
[*] Opened Sessions:
+-----+-----+-----+-----+-----+
↪---+
| # | Name                | MD5                                | Created At           | |
↪Current |
+-----+-----+-----+-----+-----+
↪---+
| 1 | blackshades.exe    | 0d1bd081974a4dcdeee55f025423a72b | 2014-07-11 02:28:45 | |
↪   |
| 2 | poisonivy.exe      | 22f77c113cc6d43d8c12ed3c9fb39825 | 2014-07-11 02:28:49 | |
↪   |
| 3 | darkcomet.exe      | 9f2520a3056543d49bb0f822d85ce5dd | 2014-07-11 02:29:29 | Yes |
↪   |
+-----+-----+-----+-----+-----+
↪---+
```

You can eventually decide to switch to a different one:

```
viper darkcomet.exe > sessions --switch 1
[*] Switched to session #1 on ~/viper/binaries/1/5/c/3/
↪15c34d2b0e834727949dbacea897db33c785a32ac606c0935e3758c8dc975535
viper blackshades.exe >
```

You can also abandon the current session with the `close` command (the session will remain available if you wish to re-open it later):

```
viper blackshades.exe > close
viper >
```

A session will also keep track of the results of the last `find` command so that you'll be able to easily open new sessions without having to perform repeated searches on your repository. You can find more details about this in the [Commands](#) chapter.

Please note that if you switch to a whole different project, you'll lose the opened sessions.

Commands & Modules

The operations you can execute within Viper are fundamentally distinguished between **commands** and **modules**. Commands are functions that are provided by Viper's core and enable you to interact with the file repository (by adding, searching, tagging and removing files), with projects and with sessions. They are static and they should not be modified.

Modules are plugins that are dynamically loaded by Viper at startup and are contained under the `~/.viper/modules/` folder. Modules implement additional analytical functions that can be executed on an opened file or on the whole repository, for example: analyzing PE32 executables, parsing PDF documents, analyzing Office documents, clustering files by fuzzy hashing or imphash, etc.

Modules are the most actively developed portion of Viper and they represent the most important avenue for contributions from the community: if you have an idea or you want to re-implement a script that you have lying around, make sure you [submit it](#) to Viper.

Database

The database that stores all meta information is per default in an sqlite database stored at:

```
$HOME/.viper/viper.db
```

Binaries

The files are stored in a folder structure within:

```
$HOME/.viper/binaries
```

2.2.2 Commands

Viper provides a set of core commands used to interact repositories of files you want to collect. In order to see which commands are available, type `help`:

```
viper > help
Commands:
+-----+-----+
| Command      | Description                                     |
+-----+-----+
| about        | Show information about this Viper instance     |
| analysis     | View the stored analysis                       |
```

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clear	Clear the console	
close	Close the current session	
copy	Copy opened file(s) into another project	
delete	Delete the opened file	
exit, quit	Exit Viper	
export	Export the current session to file or zip	
find	Find a file	
help	Show this help message	
info	Show information on the opened file	
new	Create new file	
notes	View, add and edit notes on the opened file or project	
open	Open a file	
parent	Add or remove a parent file	
projects	List or switch existing projects	
rename	Rename the file in the database	
sessions	List or switch sessions	
stats	Viper Collection Statistics	
store	Store the opened file to the local repository	
tags	Modify tags of the opened file	
update-modules	Download Viper modules from the community GitHub repository	
+-----+	+-----+	+-----+

Following are details for all the currently available commands.

about

The **about** command can be used to display some useful information regarding the Viper instance you are currently running. This includes the versions of both Viper itself and of your Python installation. Additionally the path of the active configuration file is shown:

```
viper > about
```

About		
+-----+	+-----+	+-----+
Viper Version	2.0-dev	
Python Version	3.6.5	
Homepage	https://viper.li	
Issue Tracker	https://github.com/viper-framework/viper/issues	
+-----+	+-----+	+-----+
Configuration		
+-----+	+-----+	+-----+
Configuration File	/home/user/.viper/viper.conf	
Active Project	demo	
Storage Path	/home/user/.viper	
Current Project Database	Engine(sqlite:///home/user/.viper/viper.db)	
+-----+	+-----+	+-----+

analysis

The **analysis** command can be used to display stored analysis.:

```
viper foo.txt > analysis -h
usage: analysis [-h] [-l | -v ANALYSIS ID | -d ANALYSIS ID]
```

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View the stored analysis

optional arguments:

```
-h, --help          show this help message and exit
-l, --list          List all module results available for the current file
-v ANALYSIS ID, --view ANALYSIS ID
                    View the specified analysis
-d ANALYSIS ID, --delete ANALYSIS ID
                    Delete an existing analysis
```

This stores the modules run with the file in question, so after you did some scans and run **analysis -l** to see all stored analysis:

```
viper aasf.jpg > analysis -l
+-----+-----+-----+
| ID | Cmd Line      | Saved On (UTC) |
+-----+-----+-----+
| 1  | yara scan -t | 2018-09-04 13:23:09.250948 |
| 2  | triage       | 2018-09-04 13:23:09.285285 |
| 3  | yara         | 2018-09-04 13:26:21.377030 |
| 4  | yara scan   | 2018-09-04 13:26:24.212498 |
+-----+-----+-----+
```

To view the output of a previously ran analysis use **analysis -v** this has the advantage that it is much faster than run modules again:

```
viper aasf.jpg > analysis -v 6
[*] Cmd Line: xor
[*] Searching for the following strings:
- This Program
- GetSystemDirectory
- CreateFile
- IsBadReadPtr
- IsBadWritePtrGetProcAddress
- LoadLibrary
- WinExec
- CreateFileShellExecute
- CloseHandle
- UrlDownloadToFile
- GetTempPath
- ReadFile
- WriteFile
- SetFilePointer
- GetProcAddress
- VirtualAlloc
- http
[*] Hold on, this might take a while...
[*] Searching XOR
```

To save space it might be useful to delete a stored analysis using **analysis -d**

clear

Clear the console

close

This command simply abandon a session that was previously opened. Note that the session will actually remain available in case you want to re-open it later.

copy

The `copy` command let's you copy the opened file into another project. By default the stored analysis results, notes and tags will also be copied. If the file has children related to it then these will not be copied by default. Also copying all children (recursively) can be enabled by passing the `--children` or `-c` flag.

If the `--delete` or `-d` is passed then the files will be copied to the specified project and then deleted from the local project:

```
viper foo.txt > copy -h
usage: copy [-h] [-d] [--no-analysis] [--no-notes] [--no-tags] [-c] project

Copy opened file into another project

positional arguments:
  project                Project to copy file(s) to

optional arguments:
  -h, --help            show this help message and exit
  -d, --delete          delete original file(s) after copy ('move')
  --no-analysis         do not copy analysis details
  --no-notes           do not copy notes
  --no-tags            do not copy tags
  -c, --children       also copy all children - if --delete was selected also the
                      children will be deleted from current project after copy

viper foo.txt > copy -d foobar
[+] Copied: e2c94230decedbf4174ac3e35c6160a4c9324862c37cf45124920e63627624c1 (foo.txt)
[*] Deleted: e2c94230decedbf4174ac3e35c6160a4c9324862c37cf45124920e63627624c1
[+] Successfully copied sample(s)
```

delete

The `delete` command you simply remove the currently opened file from the local repository:

```
viper poisonivy.exe > delete
Are you sure you want to delete this binary? Can't be reverted! [y/n] y
[+] File deleted
viper >
```

exit, quit

Exit Viper

export

The `export` command is used to export the currently opened file to the target path or archive name. You can zip up the file in a new archive too:

```
usage: export [-h] [-z] [-7] [-p] value

Export the current session to file or zip

positional arguments:
  value          path or archive name

optional arguments:
  -h, --help      show this help message and exit
  -z, --zip       Export session in a zip archive (PW support: No)
  -7, --sevenzip  Export session in a 7z archive (PW support: Yes)
  -p, --password  Protect archive with a password (PW) if supported
```

find

In order to quickly recover files you previously stored in the local repository, you can use the `find` command. Following is its help message:

```
usage: find [-h] [-t]
      [{all,latest,name,type,mime,md5,sha1,sha256,tag,note,any,ssdeep}]
      [value]

Find a file

positional arguments:
  {all,latest,name,type,mime,md5,sha1,sha256,tag,note,any,ssdeep}
                        Where to search.
  value                 String to search.

optional arguments:
  -h, --help            show this help message and exit
  -t, --tags           List available tags and quit
```

This command expects a key and eventually a value. As shown by the help message, these are the available keys:

- **all**: this will simply return all available files.
- **latest** (*optional limit value*): this will return the latest 5 (or whichever limit you specified) files added to the local repository.
- **name** (*required value*): this will find files matching the given name pattern (you can use wildcards).
- **md5** (*required value*): search by md5 hash.
- **sha256** (*required value*): search by sha256 hash.
- **tag** (*required value*): search by tag name.
- **note** (*required value*): find files that possess notes matching the given pattern.
- **any** (*required value*): find files that possess any matching the given pattern.
- **ssdeep** (*required value*): find files that possess any matching the given sseep value.

For example:

```
viper > find tag rat
+---+-----+-----+-----+-----+
| # | Name           | Mime           | MD5           |           |
```

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1	poisonivy.exe	application/x-dosexec	22f77c113cc6d43d8c12ed3c9fb39825
---	---------------	-----------------------	----------------------------------

help

Show help message

info

The `info` command will return you some basic information on the file you currently have opened, for example:

```
viper poisonivy.exe > info
+-----+
| Key    | Value
+-----+
| Name   | poisonivy.exe
| Tags   | rat, poisonivy
| Path   | ~/viper/binaries/5/0/8/5/
|        | 50855f9321de846f6a02b264e25e4c59983badb912c3c51d8c71fcd517205f26
| Size   | 133007
| Type   | PE32 executable (GUI) Intel 80386, for MS Windows
| Mime   | application/x-dosexec
| MD5    | 22f77c113cc6d43d8c12ed3c9fb39825
| SHA1   | dd639a7f682e985406256468d6df8a717e77b7f3
| SHA256 | 50855f9321de846f6a02b264e25e4c59983badb912c3c51d8c71fcd517205f26
| SHA512 | 6743b06e8b243d513457949ad407d80992254c99b9835eb1ed03fbc0e88a062f0bb09bfd4dd9c0d43093b2a5419ecdb689
| SSdeep | 3072:I4lRkAehGfzmuqTPryFm8le+ZNX2TpF3Vb:I4lRkAehaKuqT+FD17NXs7B
| CRC32  | 4090D32C
| Parent |
| Children |
+-----+
```

new

To create new file within viper the new command will then open the default text editor to write input for the file. After exiting the editor a session with the **not stored** file is opened in viper. This might save time without the need to exit viper to touch a new textfile in the viper session:

```
viper > new
Enter a title for the new file: viper_docu_demo.txt
[*] Session opened on /tmp/tmpjo86tcrl
[*] New file with title "viper_docu_demo.txt" added to the current session
```

notes

During an analysis you might want to keep track of your discoveries and results. Instead of having unorganized text files lying around, Viper allows you to create notes directly linked to the relevant files and even search across them. When you have a file opened, you can add any number of text notes associated to it through the notes command. This is the help message:

```
usage: notes [-h] [-l] [-a] [-e <note id>] [-d <note id>] [-p]

Options:
  --help (-h)      Show this help message
  --list (-h)      List all notes available for the current file
  --add (-a)       Add a new note to the current file
  --view (-v)      View the specified note
  --edit (-e)      Edit an existing note
  --delete (-d)    Delete an existing note
  --project (-p)   Use project notes instead of notes being tied to a file
```

As shown in the help message, you can list add a note:

```
viper poisonivy.exe > notes --add
Enter a title for the new note:
```

Now you should enter a title, when you proceed Viper will open your default editor to edit the body of the note. Once done and the editor is closed, the new note will be stored:

```
[*] New note with title "Domains" added to the current file
```

Now you can see the new note in the list and view its content:

```
viper poisonivy.exe > notes --list
+----+-----+
| ID | Title |
+----+-----+
| 1  | Domains |
+----+-----+
viper poisonivy.exe > notes --view 1
[*] Title: Domains
[*] Body:
- poisonivy.malicious.tld
- poisonivy2.malicious.tld
```

It is also possible to add notes directly to the project without associating it to a file. With no file open, notes created will only be added to the project. If a file is open, a project note can be added by using the `--project` flag:

```
viper poisonivy.exe > notes --add --project
Enter a title for the new note:
```

You can list the project notes when a file is open with the command shown below:

```
viper poisonivy.exe > notes --list --project
+----+-----+
| ID | Title |
+----+-----+
| 1  | Domains |
+----+-----+
```

open

As explained in the *Concepts* chapter, Viper supports the concept of **session**, which is an execution context created when a specific file is opened and closed only when requested by the user. In order to create a session, you need to issue an `open` command. Following is the help message:

```
usage: open [-h] [-f] [-u] [-l] [-t] <target|md5|sha256>

Options:
  --help (-h) Show this help message
  --file (-f) The target is a file
  --url (-u)  The target is a URL
  --last (-l) Open file from the results of the last find command
  --tor (-t)  Download the file through Tor

You can also specify a MD5 or SHA256 hash to a previously stored
file in order to open a session on it.
```

You can fundamentally open:

- A file available in the local repository
- Any file available on the local filesystem
- Any URL

If you don't specify any option, Viper will interpret the value you provided as an hash it has to look up in the local database, for example:

```
viper > open 22f77c113cc6d43d8c12ed3c9fb39825
[*] Session opened on ~/viper/binaries/5/0/8/5/
↪50855f9321de846f6a02b264e25e4c59983badb912c3c51d8c71fcd517205f26
viper poisonivy.exe >
```

If you want to open a file elsewhere on the filesystem, you need to specify the `--file` (or `-f`) flag:

```
viper > open -f /tmp/poisonivy.exe
[*] Session opened on /tmp/poisonivy.exe
```

If you want to open an URL you can use the `--url` flag:

```
viper > open --url http://malicious.tld/path/to/file.exe
[*] Session opened on /tmp/tmpcuIOIj
viper tmpcuIOIj >
```

If you have Tor running, you can fetch the file through it by additionally specifying `--tor`.

Through the `open` command you can also directly open one of the entries from the results of the last executed `find` command, for example:

```
viper > find all
+-----+-----+-----+-----+
| # | Name           | Mime           | MD5           |
+-----+-----+-----+-----+
| 1 | poisonivy.exe | application/x-dosexec | 22f77c113cc6d43d8c12ed3c9fb39825 |
+-----+-----+-----+-----+
viper > open --last 1
[*] Session opened on ~/viper/binaries/5/0/8/5/
↪50855f9321de846f6a02b264e25e4c59983badb912c3c51d8c71fcd517205f26
viper poisonivy.exe >
```

parent

Add or remove a parent file.:

```
viper viper_docu_demo.txt > parent --h
usage: parent [-h] [-a SHA256] [-d] [-o]

Add or remove a parent file

optional arguments:
  -h, --help            show this help message and exit
  -a SHA256, --add SHA256
                        Add parent file by sha256
  -d, --delete          Delete Parent
  -o, --open            Open The Parent
```

To add a parent file for an file **parent -a** is used:

```
viper viper_docu_demo.txt > parent -a_
↪749bb1bccfae3bc1996ad093312c4dc1c475a3488a2ea9f269482ce9d90b9af8
[*] parent added to the currently opened file
[*] Refreshing session to update attributes...
[*] Session opened on /home/viper/.viper/projects/demo/binaries/1/c/d/6/
↪1cd63c1dc1004f9d43321be71fa05a4331083e85c500c7b8dade894d82358061
viper viper_docu_demo.txt > info
+-----+-----+-----+-----+
↪ | Key      | Value
↪ |-----|-----|-----|-----|
↪ | Name    | viper_docu_demo.txt
↪ |-----|-----|-----|-----|
↪ | Tags    |
↪ |-----|-----|-----|-----|
↪ | Path    | /home/viper/.viper/projects/demo/binaries/1/c/d/6/
↪ |-----|-----|-----|-----|
↪ | Size    | 11
↪ |-----|-----|-----|-----|
↪ | Type    | UTF-8 Unicode text
↪ |-----|-----|-----|-----|
```

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```

| Mime      | text/plain
↳
| MD5       | b6d4a40a6bb103123288f8baeef2069e
↳
| SHA1      | 1a32142a4136c14f251d180353f7e24d2feafc5
↳
| SHA256    | 1cd63c1dc1004f9d43321be71fa05a4331083e85c500c7b8dade894d82358061
↳
| SHA512    |
↳ eac1f26077f774bfa179bb3bc3640657f844d1d37ba10f5ec95f1b5955a6f8a38d671306a112a73564c91b73ecf3aa7908
↳
| SSdeep    | 3:oEg:oEg
↳
| CRC32     | 49A098FC
↳
| Parent    | aasf.jpg
↳ 749bb1bccfae3bc1996ad093312c4dc1c475a3488a2ea9f269482ce9d90b9af8
↳
| Children  |
↳
+-----+
↳ -----+

```

To open a session for the parent file **parent -o** is used (note the **children** section):

```

viper viper_docu_demo.txt > parent -o
[*] Session opened on /home/viper/.viper/projects/demo/binaries/7/4/9/b/
↳ 749bb1bccfae3bc1996ad093312c4dc1c475a3488a2ea9f269482ce9d90b9af8
demo viper aasf.jpg > info
+-----+
↳ -----+
| Key      | Value
↳
+-----+
↳ -----+
| Name     | aasf.jpg
↳
| Tags     |
↳
| Path     | /home/viper/.viper/projects/demo/binaries/7/4/9/b/
↳ 749bb1bccfae3bc1996ad093312c4dc1c475a3488a2ea9f269482ce9d90b9af8
| Size     | 1120
↳
| Type     | data
↳
| Mime     | application/octet-stream
↳
| MD5      | 6296ff1a94c30a68d18748e7948c3ffa
↳
| SHA1     | bae357a94bffb3f33cae6f2610822f4008fa29e2
↳
| SHA256   | 749bb1bccfae3bc1996ad093312c4dc1c475a3488a2ea9f269482ce9d90b9af8
↳
| SHA512   |
↳ e1408441b83346bb23a8929d86610cc7ac164a3d9b1e963e14b1b6588779766b60fb13c3b10f801052b669a244c659012c
↳
| SSdeep   | 24:k3McZOX52TnV7/
↳ d1QLykkmjoOGBFBKWDZ2hy3tkRCoNp1XNkye13N0B0rLO:k3McE8V7jQnjVG9wYcs3tVOXNkye13N0B0rLO
↳

```

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CRC32	220A0DE7		
Parent			
Children	1cd63c1dc1004f9d43321be71fa05a4331083e85c500c7b8dade894d82358061,		
+-----+-----+-----+-----+			
+-----+-----+-----+-----+			

projects

As anticipated in the *Concepts* section, Viper provides a way to create multiple **projects** which represent isolated collections of files. You can create a project by simply specifying a value to the `--project` argument at launch of viper.

From within the Viper viper, you can list the existing projects and switch from one to another by simply using the `projects` command. Following is the help message:

```
usage: projects [-h] [-l] [-s=project]

Options:
  --help (-h) Show this help message
  --list (-l) List all existing projects
  --switch (-s) Switch to the specified project
```

Each project will have its own local file repository, its own `viper.db` SQLite database and its own `.viperhistory` file, which is used to record the history of commands you entered in the terminal.

For example, this is how to launch Viper with a specific project:

```
nex@nex:$ viper --project test1

  _
 ( )

  _
 | | | | | _ \ | _ | / _ |
 \ V / | | | _ | | _ | |
  \_/ | _ | _ / | _ | ) _ | v2.0-dev
    | _ |
```

```
You have 0 files in your test1 repository
test1 viper >
```

From within the terminal, you can see which projects exist:

```
test1 viper > projects -l
[*] Projects Available:
+-----+-----+-----+-----+
| Project Name | Creation Time           | Current |
+-----+-----+-----+-----+
| test1        | Sat Jul 12 00:53:06 2014 | Yes     |
+-----+-----+-----+-----+
```

You can eventually switch to a different one:

```
test1 viper > projects --switch test2
[*] Switched to project test2
test2 viper >
```

Note that if you specify a name of a project that doesn't exist to the `--switch` parameter, Viper will create that project and open it nevertheless.

rename

Rename the file in the database with a prompt for the new filename (note: this will not rename the file on disk):

```
viper aasf.jpg > rename
[*] Current name is: aasf.jpg
New name: helloworld.jpg
[*] Refreshing session to update attributes...
[*] Session opened on /home/viper/.viper/projects/demo/binaries/7/4/9/b/
↳749bb1bccfae3bc1996ad093312c4dc1c475a3488a2ea9f269482ce9d90b9af8
demo viper helloworld.jpg > info
+-----+
↳-----+
| Key      | Value                                                                                                     |
↳-----+-----+
+-----+-----+
| Name     | helloworld.jpg                                                                                           |
↳-----+-----+
| Tags     |                                                                                                         |
↳-----+-----+
| Path     | /home/viper/.viper/projects/demo/binaries/7/4/9/b/
↳749bb1bccfae3bc1996ad093312c4dc1c475a3488a2ea9f269482ce9d90b9af8 |
| Size     | 1120                                                                                                     |
↳-----+-----+
| Type     | data                                                                                                     |
↳-----+-----+
| Mime     | application/octet-stream                                                                               |
↳-----+-----+
| MD5      | 6296ff1a94c30a68d18748e7948c3ffa                                                                     |
↳-----+-----+
| SHA1     | bae357a94bffb3f33cae6f2610822f4008fa29e2                                                           |
↳-----+-----+
| SHA256   | 749bb1bccfae3bc1996ad093312c4dc1c475a3488a2ea9f269482ce9d90b9af8 |
↳-----+-----+
| SHA512   |
↳e1408441b83346bb23a8929d86610cc7ac164a3d9b1e963e14b1b6588779766b60fb13c3b10f801052b669a244c659012c
↳-----+-----+
| SSdeep   | 24:k3McZOX52TnV7/
↳d1QLykkmjoOGBfBKWDZ2hy3tkRCoNp1XNkye13N0B0rLO:k3McE8V7jQnjVG9wYcs3tVOXNky6N0KG |
↳-----+-----+
| CRC32    | 220A0DE7                                                                                               |
↳-----+-----+
| Parent   |                                                                                                         |
↳-----+-----+
| Children | 1cd63c1dc1004f9d43321be71fa05a4331083e85c500c7b8dade894d82358061, |
↳-----+-----+
↳-----+-----+
```

sessions

You can see which sessions are currently active and eventually switch from one to another through the `sessions` command. Following is the help message:

```
usage: sessions [-h] [-l] [-s SWITCH]

Options:
  --help (-h) Show this help message
  --list (-l) List all existing sessions
  -s SWITCH, --switch SWITCH
                  Switch to the specified session
```

An example of execution is the following:

```
viper poisonivy.exe > sessions --list
[*] Opened Sessions:
+-----+-----+-----+-----+-----+-----+-----+-----+
↪--+
| # | Name                | MD5                                | Created At                | |
↪Current |
+-----+-----+-----+-----+-----+-----+-----+-----+
↪--+
| 1 | poisonivy.exe       | 22f77c113cc6d43d8c12ed3c9fb39825 | 2014-07-12 01:36:14 | Yes |
↪ |
| 2 | zeus.exe            | 9b2de8b062a5538d2a126ba93835d1e9 | 2014-07-12 01:36:19 |    |
↪ |
| 3 | darkcomet.exe       | 9f2520a3056543d49bb0f822d85ce5dd | 2014-07-12 01:36:23 |    |
↪ |
+-----+-----+-----+-----+-----+-----+-----+-----+
↪--+
viper poisonivy.exe > sessions --switch 2
[*] Switched to session #2 on ~/viper/binaries/6/7/6/a/
↪676a818365c573e236245e8182db87ba1bc021c5d8ee7443b9f673f26e7fd7d1
viper zeus.exe >
```

stats

Viper Collection Statistics:

```
viper abc_report1.doc > stats
[*] Projects
+-----+-----+
| Name | Count |
+-----+-----+
| Main | 6     |
| Next | 10    |
+-----+-----+
[*] Current Project
[*] Extensions
+-----+-----+
| Ext  | Count |
+-----+-----+
| jpg  | 1     |
| txt  | 1     |
| mp3  | 1     |
```

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```

| pdf | 1 |
| doc | 1 |
| docx | 1 |
+-----+-----+
[*] Mime Types
+-----+-----+
| Mime | Count |
+-----+-----+
| application/octet-stream | 5 |
| text/plain | 1 |
+-----+-----+
[*] Tags
+-----+-----+
| Tag | Count |
+-----+-----+
| tag333 | 1 |
| tag1 | 1 |
+-----+-----+
[*] Size Stats
- Largest 109.44 KiB
- Smallest 11.00 B
- Average 59.97 KiB

```

store

The `store` command is used to store the currently opened file to the local repository. There are many options and filters you can apply, as shown in the following help message:

```

usage: store [-h] [-d] [-f <path>] [-s <size>] [-y <type>] [-n <name>] [-t]

Options:
  --help (-h) Show this help message
  --delete (-d) Delete the original file
  --folder (-f) Specify a folder to import
  --file-size (-s) Specify a maximum file size
  --file-type (-y) Specify a file type pattern
  --file-name (-n) Specify a file name pattern
  --tags (-t) Specify a list of comma-separated tags

```

If you specify `--delete` it will instruct Viper to delete the original copy of the file you want to store in the local repository, for example:

```

viper > open -f /tmp/poisonivy.exe
[*] Session opened on /tmp/poisonivy.exe
viper poisonivy.exe > store --delete
[+] Stored file "poisonivy.exe" to ~/viper/binaries/5/0/8/5/
↪50855f9321de846f6a02b264e25e4c59983badb912c3c51d8c71fcd517205f26
[*] Session opened on ~/viper/binaries/5/0/8/5/
↪50855f9321de846f6a02b264e25e4c59983badb912c3c51d8c71fcd517205f26
viper poisonivy.exe >

```

If you want, you can store the content of an entire folder by specifying its path to the `--folder` parameter. In case the folder contains a large variety of files, you can filter which ones you're particularly interested in: with `--file-size` you can specify a maximum size in bytes, with `--file-type` you can specify a pattern of magic file type (e.g. `PE32`) and with `--file-name` you can specify a wildcard-enabled pattern to be matched with the file names (e.g. `apt_*`).

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```

| SHA512 | 6743b06e8b243d513457949ad407d80992254c99b9835eb1ed03fbc0e88a062f0bb09bfd4dd9c0d43093b2a5419ecdb689
| SSdeep | 3072:I41RkAehGfzmuqTPryFm81e+ZNX2TpF3Vb:I41RkAehaKuqT+FD17NXs7B
| CRC32 | 4090D32C
| Parent |
| Children |
+-----+

```

update-modules

Through this command you can download and update community modules from the dedicated GitHub repository.

2.2.3 HTTP Interfaces

Viper has two HTTP interfaces that can optionally be enabled alongside the console access.

- Web interface
- REST based API interface

The first one provides a graphical alternative to the traditional command-line interface, while the second one can be used to easily integrate Viper with other tools.

Security Considerations

Both the web interface and the REST API are implemented using the open source Python web framework Django (<https://www.djangoproject.com/>). Django is very widely used and the developers put a strong emphasis on web security.

Viper uses built-in features of Django to provide username/password based login to the web interface and token based authentication for the REST API. Django also provides a built-in web server that can be used to run a HTTP or a HTTPS web server. This works fine for small setups (e.g. single user with only a limited number of samples), but it is not recommended for bigger production scenarios.

Although both interfaces are developed with security in mind, users **MUST** be aware that exposing them to the Internet could potentially have a severe impact on the security of your system(s).

Malicious users/attackers that are able to gain access to the web interface or the REST API will not only have **full access to your Viper sample database** but will also be able to **execute commands on the hosting system**. Access could be gained by stealing/phishing the username/password, brute-forcing credentials or through authentication bypasses caused by implementation mistakes in Viper or bugs/design flaws in Django.

Web Interface

Viper comes with a basic HTML5 browser interface that can run alongside the command-line interface.

Its main features are:

- Project Switching / Creation
- Multiple File Upload
- File Download
- Extraction of Compressed uploads
- Full Search (including tag, name, mime, note, type)
- Hex Viewer
- Run Modules
- Enter Notes
- Add / Delete / Modify Yara rules
- Add / Delete / Modify Tags

Configuration

For the configuration of the web interface please refer to the `[web]` section in your `viper.conf` file. There you can specify the IP address (e.g. `0.0.0.0` or `127.0.0.1`) and port to listen on. Additionally you can configure HTTPS using TLS. This requires an x509 certificate and private key. Lastly you can setup the initial admin account and its password:

```
[web]
host = 0.0.0.0
port = 8080
tls = False
certificate =
key =
admin_username = admin
admin_password = changeme
```

Launching the web interface

To launch the web application, change into the `viper` directory and run the `viper-web` script. By default it launches a single threaded http Django development web server on `localhost:8080`. Please note that if there is no `admin_password` set, then a random password will be generated:

```
user@localhost:~/viper_django/$ ./viper-web
[!] Yara rule directory not found - copying default rules (/home/user/viper_django/
↳viper/data/yara) to: /home/user/.viper/yara
[!] There are outstanding Django DB migrations
[+] Applied outstanding migrations
[+] Created "admin" with initial password: T8UcpRTPxW
[*] Starting Web Server on 127.0.0.1:8080
Performing system checks...

System check identified no issues (0 silenced).
February 04, 2018 - 14:27:59
Django version 2.0.2, using settings 'viper.web.settings'
Starting development server at http://127.0.0.1:8080/
Quit the server with CONTROL-C.
```

You can set the listening IP address and port on the commandline with parameters `-H` and `-p`:

```
user@localhost:~/viper_django$ ./viper-web -h
usage: viper-web [-h] [-H HOST] [-p PORT] [--tls] [-c CERTIFICATE] [-k KEY]

optional arguments:
  -h, --help            show this help message and exit
  -H HOST, --host HOST  bind to host (e.g. 127.0.0.1 or 0.0.0.0)
  -p PORT, --port PORT  bind to port (e.g. 8080)
  --tls                enable TLS
  -c CERTIFICATE, --certificate CERTIFICATE
                        path to .cert file
  -k KEY, --key KEY     path to .key file
```

You can also start an HTTPS web server with TLS enabled. This requires a regular x509 SSL/TLS certificate and key:

```
$: ./viper-web -H 0.0.0.0 -p 443 --tls --certificate viper.pem --key viper.key
[*] Using PEID info from directory: /home/user/.viper/peid
[*] Using Yara rules from directory: /home/user/.viper/yara
[!] There are outstanding Django DB migrations
[+] Applied outstanding migrations
[+] Created "admin" with initial password: nKAmWJluCS
[*] Starting Web Server on 0.0.0.0:8443
Validating models...

System check identified no issues (0 silenced).
February 04, 2018 - 17:49:48
Django version 2.0.1, using settings 'viper.web.settings'
Starting development server at https://0.0.0.0:443/
Using SSL certificate: ssl-cert.pem
Using SSL key: ssl-cert.key
Quit the server with CONTROL-C.
```

API

Viper provides a REST API through which the samples in all projects can be accessed and almost all commands that are available in the CLI can be executed. The REST API is a crucial part of the web interface and is therefore automatically started by the `viper-web` script.

In the past, the REST API was started separately from the web interface. This is no longer possible and the `viper-api` script has been removed.

The REST API is implemented using the [Django REST framework](<http://www.django-rest-framework.org/>), short DRF and is reachable after starting `viper-web` at:

<http://127.0.0.1:8080/api/v3/>

Additionally Viper makes use of [django-rest-swagger](<https://marcgibbons.com/django-rest-swagger/>), which automatically creates an interactive API documentation; all technical details about API endpoints and how to use them can be found at:

<http://127.0.0.1:8080/api/v3/docs/>

All requests to the REST API need to be authenticated with the only exception being a test interface (<http://127.0.0.1:8080/api/v3/test/>). Authentication can either be done by providing a username/password or by sending an authorization header containing a token. These credentials can be managed in the Django admin interface (<http://127.0.0.1:8080/admin/>).

Using tokens is the recommended way of accessing the REST API.

Example: Uploading a file as a new sample using curl looks like this (note the trailing slash):

```
curl -X POST -H 'Authorization: Token 4851aa7772e5a2638d7e3dbe9405d3d4a822815a' -S -F
↪ "file=@/tmp/file1.txt;type=text/plain;filename=your_file_name.txt" http://127.0.0.
↪ 1:8080/api/v3/project/default/malware/upload/
```

Response (HTTP Status Code: 201 Created):

```
[{
  "url": "http://127.0.0.1:8080/api/v3/project/default/malware/
↪ 24a05ea7cca0b976dd3dea2b436627bd70a303e91a82daa58d104f98eb5b7937/",
  "links": [
    "http://127.0.0.1:8080/api/v3/project/default/malware/
↪ 24a05ea7cca0b976dd3dea2b436627bd70a303e91a82daa58d104f98eb5b7937/analysis/",
    "http://127.0.0.1:8080/api/v3/project/default/malware/
↪ 24a05ea7cca0b976dd3dea2b436627bd70a303e91a82daa58d104f98eb5b7937/note/",
    "http://127.0.0.1:8080/api/v3/project/default/malware/
↪ 24a05ea7cca0b976dd3dea2b436627bd70a303e91a82daa58d104f98eb5b7937/tag/"
  ],
  "data": {
    "created_at": "2018-02-04 17:56:53.172641", "sha256":
↪ "24a05ea7cca0b976dd3dea2b436627bd70a303e91a82daa58d104f98eb5b7937",
    "parent": null,
    "size": 192,
    "sha1": "434656fde3f62bef3ed2d1fe2ac88085fbc17150",
    "ssdeep": "3:SQg3D7DQFCdGJMNLm9cFXmdd3WG/
↪ zAh1AHnd1FIati+v3sQ9scKJLAH4:SQg3D7DQFC8qK+wdd3WGYqvFIaFv3sQY",
    "crc32": "95AF7564",
    "type": "ASCII text",
    "id": 1,
    "mime": "text/plain",
    "sha512":
↪ "166a850aa4423b887f14d74eba7a98c8df76bf4584385ce14d7719d5524784f878afae080a1ee2c26a92f98100735a10d
↪ ",
    "parent_id": null,
    "md5": "8c15c2e4a48fe98483c7833bf0044fc4",
    "name": "your_file_name.txt"
  }
}]
```

User management

The credentials can be managed in the Django admin interface (<http://127.0.0.1:8080/admin/>).

Using Viper in a (web) production environment

In production use, its often not recommended to use the Django development web server. There are many generic descriptions of how to run a Django application in e.g. Apache, Nginx or uWSGI.

For Viper there is currently no finished step-by-step guide. Please feel free to send us a Pull Request on Github.. :-D <https://github.com/viper-framework/viper/pulls>

FAQ

Q: What is the default username and password for the web interface? A: The default username is “admin” and the password will be auto generated (or the value of `admin_password` in your `viper.conf` will be used)

Q: I didn't change (or write down) the auto generated password? How can I log in? A: The easiest way is to delete the Django database (`$storage_path/admin.db`) and restart `viper-web`.

Q: Where can I find the API tokens? A: You can view and edit tokens in the Django admin site: <http://127.0.0.1:8080/admin/authtoken/token/>

2.3 Create new modules

Viper in itself is simply a framework, modules are what give it analytical capabilities. We receive and include new modules all the time from contributors, but there are always new features to add. If you have an idea, you should implement a module for it and contribute it back to the community.

The following paragraphs introduce you to the first steps to create a new module.

2.3.1 First steps

First thing first, you need to create your `.py` script under the `modules/` directory: all modules are dynamically loaded by Viper from that folder exclusively. You can create subfolders and place your modules anywhere, Viper will be able to find them.

Any module needs to have some basic attributes that will make it recognizable. It needs to be a Python class inheriting `Module`, it needs to have a `cmd` and `description` attribute and it needs to have a `run()` function. For example the following would be a valid, although not very useful, Viper module:

```
1 from viper.common.abstracts import Module
2
3 class MyModule(Module):
4     cmd = 'mycmd'
5     description = 'This module does this and that'
6
7     def run(self):
8         print("Do something.")
```

2.3.2 Arguments

When a module is invoked from the Viper shell it can be provided with a number of arguments and options. These should be parsed with the python `argparse` module as show in the example below.

```
1 from viper.common.abstracts import Module
2
3 class MyModule(Module):
4     cmd = 'mycmd'
5     description = 'This module does this and that'
6     authors = ['YourName']
7
8     def __init__(self):
9         super(MyModule, self).__init__()
10        self.parser.add_argument('-t', '--this', action='store_true', help=
↪ 'Do This Thing')
11        self.parser.add_argument('-b', '--that', action='store_true', help=
↪ 'Do That')
12
13    def run(self):
```

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```

14     super(MyModule, self).run()
15     if self.args.this:
16         print("This is FOO")
17     elif self.args.that:
18         print("That is FOO")

```

2.3.3 Using the Config File

Viper provides a config file that will allow you to store user editable sections in a single file rather than inside the modules. This file is normally stored under `~/viper/viper.conf`.

You can easily access the config file:

```

1  from viper.core.config import __config__
2
3  cfg = __config__

```

From here you can access any element in the config file by name:

```

1  from viper.core.config import Config
2
3  cfg = Config()
4
5  config_item = cfg.modulename.config_item
6
7  # Example Getting VirusTotal Key
8
9  vt_key = cfg.virustotal.virustotal_key

```

2.3.4 Using common config settings for outbound http connections

A common use case for modules is to implement the API of an external web service (e.g. <https://koodous.com/>). The (great!) requests library (<https://github.com/requests/requests/>) provides an easy interface for making outbound http connections. Viper provides a global configuration section `[http_client]` where certain requests options can be set for Proxies, TLS Verification, CA_BUNDLE and TLS Client Certificates. Please check the current `viper.conf.sample` for more details.

When implementing a custom module settings from the global `[http_client]` can be overridden by specifying them again in the configuration section of the custom module and then calling the `Config.parse_http_client` method for the custom module configuration section. Example:

```

1  # viper.conf
2
3  [http_client]
4  https_proxy = http://prx1.example.internal:3128
5  tls_verify = True
6
7  [mymodule]
8  base_url = https://myapi.example.internal
9  https_proxy = False
10  tls_verify = False

```

```
1 import requests
2 from viper.common.abstracts import Module
3 from viper.core.config import __config__
4
5 cfg = __config__
6 cfg.parse_http_client(cfg.mymodule)
7
8 class MyModule(Module):
9     cmd = 'mycmd'
10    description = 'This module does this and that'
11
12    def run(self):
13        url = cfg.mymodule.base_url
14        r = requests.get(url=url, headers=headers, proxies=cfg.mymodule.
    ↪proxies, verify=cfg.mymodule.verify, cert=cfg.mymodule.cert)
```

2.3.5 Accessing the session

In most cases, you will probably want to execute some analysis function on the currently opened file and in order to do so you'll need to access the session. Sessions are internally made available through a global object called `__sessions__`, which has the following attributes:

- `__sessions__.current`: a `Session` object for the currently opened file.
- `__sessions__.sessions`: the list of all `Session` objects opened during the current Viper execution.
- `__sessions__.find`: a list contains all the results from the last executed `find` command.

A `Session` object has the following attributes:

- `Session.id`: an incremental ID for the session.
- `Session.created_at`: the date and time when the session was opened.
- `Session.file`: a `File` object containing common attributes of the currently opened file (generally speaking, the same information returned by the `info` command).

Following are the information available on the opened file:

- `__sessions__.current.file.path`
- `__sessions__.current.file.name`
- `__sessions__.current.file.size`
- `__sessions__.current.file.type`
- `__sessions__.current.file.mime`
- `__sessions__.current.file.md5`
- `__sessions__.current.file.sha1`
- `__sessions__.current.file.sha256`
- `__sessions__.current.file.sha512`
- `__sessions__.current.file.crc32`
- `__sessions__.current.file.ssdeep`
- `__sessions__.current.file.tags`

Here is an example:

```

1 from viper.common.abstracts import Module
2 from viper.core.session import __sessions__
3
4 class MyModule(Module):
5     cmd = 'mycmd'
6     description = 'This module does this and that'
7
8     def run(self):
9         # Check if there is an open session.
10        if not __sessions__.is_set():
11            # No open session.
12            return
13
14        # Print attributes of the opened file.
15        print("MD5: " + __sessions__.current.file.md5)
16
17        # Do something to the file.
18        do_something(__sessions__.current.file.path)

```

2.3.6 Accessing the database

In case you're interested in automatically retrieving all files stored in the local repository or just a subset, you'll need to access the local database. Viper provides an interface called `Database()` to be imported from `viper.core.database`.

You can then use the `find()` function, specify a key and an optional value and you will obtain a list of objects you can loop through. For example:

```

1 from viper.common.abstracts import Module
2 from viper.core.database import Database
3
4 class MyModule(Module):
5     cmd = 'mycmd'
6     description = 'This module does this and that'
7
8     def run(self):
9         db = Database()
10        # Obtain the list of all stored samples.
11        samples = db.find(key='all')
12
13        # Obtain the list of all samples matching a tag.
14        samples = db.find(key='tag', value='apt')
15
16        # Obtain the list of all samples with notes matching a pattern.
17        samples = db.find(key='note', value='maliciousdomain.tld')
18
19        # Loop through results.
20        for sample in samples:
21            print("Sample " + sample.md5)

```

2.3.7 Printing results

Viper provides several function to facilitate and standardize the output of your modules. Viper uses a logging function to return the output to the console or web application. The format is `self.log('type', "Your Text")` and the following types are made available in Viper.

- `info`: prints the message with a `[*]` prefix.
- `warning`: prints the message with a yellow `[!]` prefix.
- `error`: prints the message with a red `[!]` prefix.
- `success`: prints the message with a green `[+]` prefix.
- `item`: prints an item from a list.
- `table`: prints a table with headers and rows.

You can also easily print tables, such as in the following example:

```
1 from viper.common.abstracts import Module
2
3 class MyModule(Module):
4     cmd = 'mycmd'
5     description = 'This module does this and that'
6
7     def run(self):
8         self.log('info', "This is Something")
9         self.log('warning', "This is the warning Text")
10
11         # This is the header of the table.
12         header = ['Column 1', 'Column 2']
13         # These are the rows.
14         rows = [
15             ['Row 1', 'Row 1'],
16             ['Row 2', 'Row 2']
17         ]
18
19         self.log('table', dict(header=header, rows=rows))
```

2.4 Known issues

2.4.1 Various errors when using unicode characters

unicode and python is a not easy and using unicode in notes, tags or filenames (or other modules where userinput is allowed) might result in unhandled exceptions.

2.4.2 Error storing file names containing unicode characters in database

If you try to store a file with a filename containing Unicode chars it will not be stored to the database.

2.4.3 Problem importing certain modules

If you experience an issue like:

```
[!] Something wrong happened while importing the module modules.office: No module_
↳ named oletools.olevba
```

You are likely missing dependencies.

To install required python modules run:

```
pip install -r requirements.txt
```

2.4.4 The API interface isn't fully aware of projects

Most of the API commands are not able yet to interact with different projects, so most of the commands will be executed against the default repository.

2.4.5 PreprocessError: data/yara/index.yara:0:Invalid file extension '.yara'.Can only include .yar

If you running yara or RAT module and receiving that issue:

```
...
PreprocessError: data/yara/index.yara:0:Invalid file extension '.yara'.Can only_
↪include .yar
...
```

It is most likely the versions of yara are not correct, try to run:

```
viper@viper:/home/viper# yara -version
yara 2.1
```

And check for the yara-python bindings:

```
viper@viper:/home/viper# pip freeze | grep yara
yara-python==2.1
```

If you have installed yara-python using pip it is likely you are running an older version of yara (see yara documentation for compiling howto)

2.4.6 Error Messages in log: ssl.SSLError: EOF occurred in violation of protocol

When running the built-in HTTPS server several error messages are logged, then the favicon is accessed. This does not represent a problem and the favicon is loaded and display. So this is currently in status wontfix.

Log:

```
2018-02-05 14:29:33 - django.server - INFO - basehttp.py:124 - "GET /favicon.ico HTTP/
↪1.1" 301 0
Traceback (most recent call last):
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 138, in run
    self.finish_response()
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 180, in finish_response
    self.write(data)
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 279, in write
    self._write(data)
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 453, in _write
    self.stdout.write(data)
  File "/usr/lib/python3.4/socket.py", line 394, in write
    return self._sock.send(b)
  File "/usr/lib/python3.4/ssl.py", line 702, in send
```

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```

    v = self._sslobj.write(data)
ssl.SSLError: EOF occurred in violation of protocol (_ssl.c:1638)
2018-02-05 14:29:33 - django.server - ERROR - basehttp.py:124 - "GET /favicon.ico_
↳HTTP/1.1" 500 59
-----

```

Exception happened during processing of request from ('192.168.92.66', 52014)

Traceback (most recent call last):

```

  File "/usr/lib/python3.4/wsgiref/handlers.py", line 138, in run
    self.finish_response()
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 180, in finish_response
    self.write(data)
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 279, in write
    self._write(data)
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 453, in _write
    self.stdout.write(data)
  File "/usr/lib/python3.4/socket.py", line 394, in write
    return self._sock.send(b)
  File "/usr/lib/python3.4/ssl.py", line 702, in send
    v = self._sslobj.write(data)
ssl.SSLError: EOF occurred in violation of protocol (_ssl.c:1638)

```

During handling of the above exception, another exception occurred:

Traceback (most recent call last):

```

  File "/usr/lib/python3.4/wsgiref/handlers.py", line 141, in run
    self.handle_error()
  File "/home/robbie/work/viper/venv/lib/python3.4/site-packages/django/core/servers/
↳basehttp.py", line 86, in handle_error
    super().handle_error()
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 368, in handle_error
    self.finish_response()
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 180, in finish_response
    self.write(data)
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 274, in write
    self.send_headers()
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 331, in send_headers
    if not self.origin_server or self.client_is_modern():
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 344, in client_is_modern
    return self.environ['SERVER_PROTOCOL'].upper() != 'HTTP/0.9'
TypeError: 'NoneType' object is not subscriptable

```

During handling of the above exception, another exception occurred:

Traceback (most recent call last):

```

  File "/usr/lib/python3.4/socketserver.py", line 305, in _handle_request_noblock
    self.process_request(request, client_address)
  File "/usr/lib/python3.4/socketserver.py", line 331, in process_request
    self.finish_request(request, client_address)
  File "/usr/lib/python3.4/socketserver.py", line 344, in finish_request
    self.RequestHandlerClass(request, client_address, self)
  File "/usr/lib/python3.4/socketserver.py", line 673, in __init__
    self.handle()
  File "/home/robbie/work/viper/venv/lib/python3.4/site-packages/django/core/servers/
↳basehttp.py", line 154, in handle
    handler.run(self.server.get_app())
  File "/usr/lib/python3.4/wsgiref/handlers.py", line 144, in run
    self.close()

```

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```
File "/usr/lib/python3.4/wsgiref/simple_server.py", line 35, in close
    self.status.split(' ',1)[0], self.bytes_sent
AttributeError: 'NoneType' object has no attribute 'split'
-----
2018-02-05 14:29:33 - django.server - INFO - basehttp.py:124 - "GET /static/viperweb/
↪images/favicon.png HTTP/1.1" 200 2041
```

2.5 Final Remarks

2.5.1 Developers

Viper is an open and collaborative development effort. It is built by volunteers from all over the world. Following are the ones who contributed up to the latest stable release:

```
$ git shortlog -s -n
 717 Nex
 517 Raphaël Vinot
 169 Robert Habermann
 154 kevthehermit
  70 Alexander J
  68 dusby
  33 frenkie
  27 Christophe Vandeplas
  22 emdel
  19 seamus tuohy
  17 xorhex
  15 Chris Taylor
  14 Neriberto C.Prado
   9 kovacsbalu
   8 Luke Snyder
   6 Joakim Kennedy
   6 Sascha Rommelfangen
   6 ptcNOP
   5 2sec4u
   5 Antonio S
   5 Beercow
   5 SnakeByte Lab
   5 magrazia
   5 xor_hex
   4 Brian Maloney
   4 Chris Gardner
   4 Georg Schölly
   4 Jerome Marty
   4 S2R2
   4 Seth Hardy
   4 ltroot
   3 18z
   3 =
   3 Colin Cowie
   3 Csaba Fitzl
   3 Dionysis Grigoropoulos
   3 TcM1911
   3 Yu Ogawa
```

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```
3 nidsche
3 razu
2 2*yo
2 Deventual
2 Enchantertim
2 Lost4Now
2 Maxou56800
2 Sam Brown
2 aaroncoffey
2 dewiestr
2 haellowwyn
2 keram79
2 ph0sec
2 wesinator
1 Akeem Spencer
1 Alex Harvey
1 Ali Ikinici
1 Allen Swackhamer
1 Boris Ryutin
1 Chris Higgins
1 David André
1 Gabor Vaspori
1 Javier Rascón Mesa
1 KevTheHermit
1 Nasicus
1 Nick Price
1 Peter
1 Rocky
1 Rocky De Wiest
1 S. Egbert
1 S0urceC0der
1 Steffen Sauler
1 Steve Clement
1 Tango43
1 Thao Vo
1 Tobias Jarmuzek
1 Tom King
1 William Robinet
1 binjo
1 deralexxx
1 dukebarman
1 dukebarman@gmail.com
1 jekil
1 nheijmans
1 tykkz
```

2.5.2 Join Us

The best way to start contributing to the project is by start digging through the open tickets on our [GitHub](#). Before submitting code make sure you read our [Contribution Guidelines](#) and that you thoroughly tested it.

You can also join our conversions by getting on IRC on [FreeNode](#) on channel `###viper`.