Alec Miller
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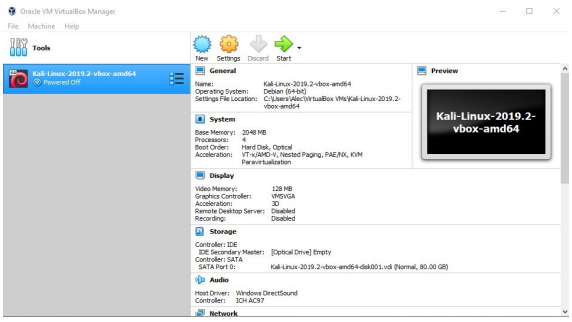
Recon-NG

Recon-NG is a powerful OSINT penetration tool that I explored for my second project as the Plessas Experts Network intern. While Recon-NG is limited to running in a Linux environment, there are workarounds (dual booting or downloading a virtual machine) that allow a Windows PC user to access its capabilities. For my examples, I used Oracle's virtual machine known as VirtualBox* to run Kali-Linux on my PC in order to run Recon-NG. For help with downloading and running the virtual machine and Kali-Linux, this video is very helpful.



When first launching Recon-NG, expect that many API key errors will appear. This is perfectly fine and will be handled later. Recon-NG has three simple, but very effective tools that are constantly in use with this program: "show," "help," and "clear." Show* displays all the usages and what can be viewed using the show command.

```
[recon-ng][default] > show
Shows various framework items

Usage: show [banner|companies|contacts|credentials|dashboard|domains|hosts|keys|leaks|locations|modules|netblocks|options|ports|profiles|pushpins|repositories|schema|vulnerabilities|workspaces]
```

Similarly, when using the help* command, the program displays how the command works and what properties go with it. The clear* command clears away any text on the screen to keep everything neat. Lastly, the back* command removes whatever module is currently set.

```
[recon-ng][default] > help

Commands (type [help|?] <topic>):
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add             Adds records to the database
back            Exits the current context
delete          Deletes records from the database
exit            Exits the framework
help            Displays this menu
keys            Manages framework API keys
load            Loads specified module
pdb             Starts a Python Debugger session
query           Queries the database
record          Records commands to a resource file
reload          Reloads all modules
resource        Executes commands from a resource file
search          Searches available modules
set             Sets module options
shell           Executes shell commands
show            Shows various framework items
snapshots       Manages workspace snapshots
spool           Spools output to a file
unset           Unsets module options
use             Loads specified module
workspaces      Manages workspaces
```
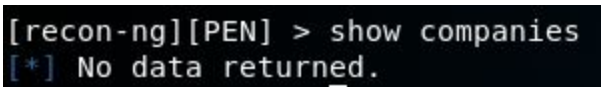
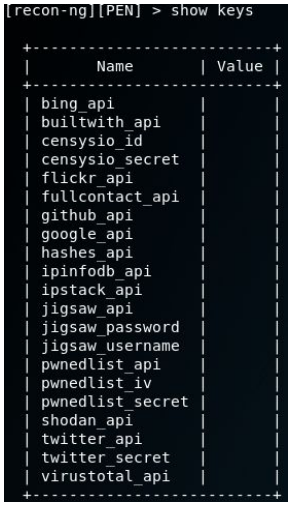

A good starting place in Recon-NG is a new workspace which is displayed with the "show" command. Workspaces are comparable to saved locations in a video game. Any data gathered on that workspace will be saved for later viewing or use. To begin creating your workspace, see the commands for using the workspaces by entering, "help workspaces." After adding a new workspace*, the command line will change to match the new workspace. In my case, the command line now displays "PEN" since that's what I named my new

```
[recon-ng][PEN] >
```

*Hyperlinks of images are given for larger versions of screenshots.

workspace. Since a new workspace has been created, there is no information that we have gathered or added in this space. This can been seen after typing "show" and one of the options (for this example, I used "show companies"), it displays* that we have no data to be viewed. If a word gets misspelled and the user wants to remove them from the database, the "delete" command allows the user to individually remove items by specifying their rowid, delete multiple selections by using a comma between rowids, and bulk-delete items using a dash between the two netids.

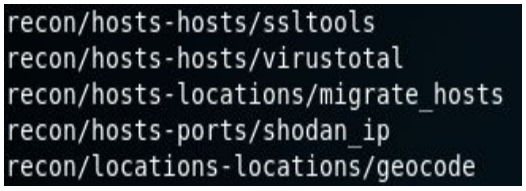




There is some set-up required before beginning to work with Recon-NG's many modules. This required set-up includes adding the API keys to the program which will address the errors we see when first launching Recon-NG.

Figuring out where to acquire these keys was initially tricky for me. Thankfully, Github user Raikia created a Recon-NG API key helper! Once the keys have been added, the user can type "show keys"* to visually confirm their keys are there. The API key cheat sheet was made for a previous version of Recon-NG, so a few modules are missing from that page. The first missing module is ipstack_API, but the key can be located on the ipstack website. Click on "get free API key," fill out the information, and receive the key. The second missing key is the bing_API. Here is a tutorial on how to get this key. Finally, pwnedlist is no longer an available service, so there will not be a key for them. These keys are necessary for running some of the most useful modules for OSINT collection such as the ipinfodb API.

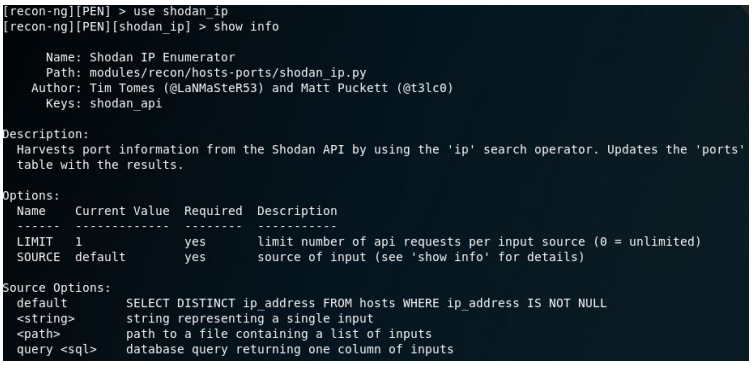
Recon-NG has a great variety of modules, including: discovery, exploitation, import, recon, and reporting. As Recon-NG is focused on reconnaissance, this category has the most robust variety of modules while other categories offer just a few choices. All of the modules* can be viewed by typing the "show modules" command. These modules only work once their required information has been added. Required information for each module is indicated by the "recon/" prompt. For example, the top four modules in the screenshot to the right each require a host. The message after the second "/" is the type of table that will be delivered based on information gathered by the scan. In this case, the "shodan_ip" module requires a host and will return ports based on data gathered from its scan.



While I found modules could be initially confusing, each module has a description that explains its function and type of information necessary to complete the scan. These instructions were displayed when I selected a module and used the "show info" command. With the module

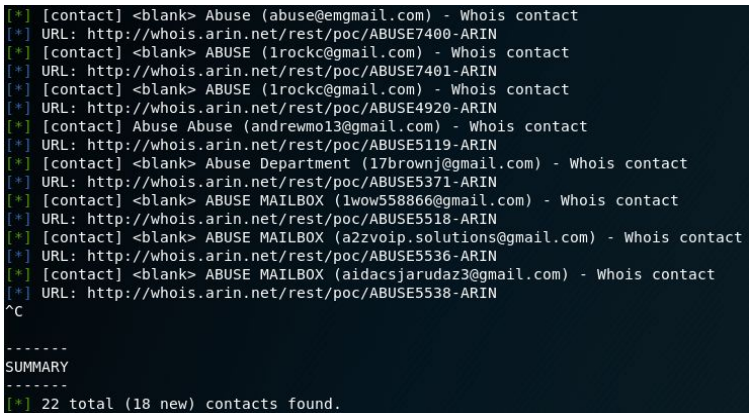
*Hyperlinks of images are given for larger versions of screenshots.

“shodan_ip” from the previous photo as our example, I used the “show info” command and then information* detailing the module is provided.



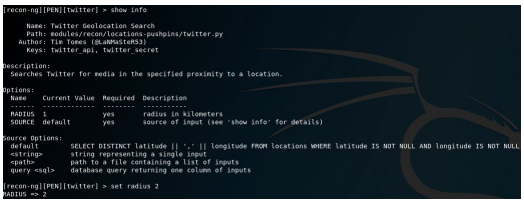
Once a module has been selected and the required information has also been recorded, it’s time to scan and use the program to grab information. To begin using any module, simply type the “run” command. If a case appears such as this one*, where there are multiple pieces of information but only one needs to be scanned; the rowid can be used after the “run” command to specify which source to use. In the example, to use the Desert iNET domain, the corresponding run command is “run 2”.

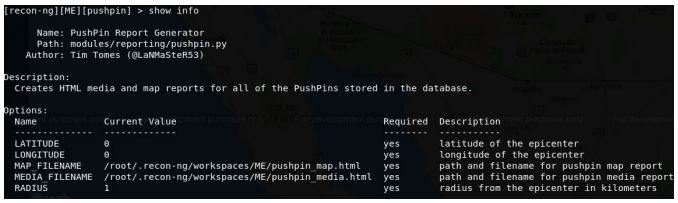
Recon-NG finds a lot of data, so it is important to be aware of the parameters of your search. When I used the google.com domain, it seemed like the module’s search would not reach an endpoint. The command “ctrl+C” can be used to stop the module and keep the already gathered information. In my test, I used the domain “gmail.com” followed by the “whois_pocs” module. Here is a comparison between information received when I used ctrl+C* versus letting the module run*.

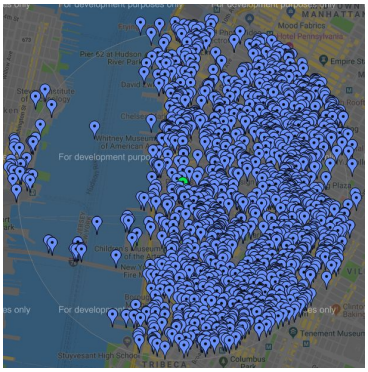


Options within modules allow users to customize their search settings. The information tab for the “twitter” module has two different options: RADIUS and SOURCE. For most of my searches, I kept the source as default, but this can be a useful customization. While the default location scan has a radius of 1 kilometer, the command “set radius 2” adjusts the search to a 2km radius, for example.

*Hyperlinks of images are given for larger versions of screenshots.







In my opinion, one of the most interesting or terrifying discoveries about Recon-NG is the “pushpins” reporting module within its Twitter and Flickr searches. This module uses Google’s API and displays a map with the pinpoint locations of the posts uncovered by previous scans. The pushpin’s info* is shown to the right. The latitude, longitude, and radius portions of this module are required for this function. To add this information use the “set” command from before. Example: “set latitude 78.0192”. Once all information has been set, run the module. A Firefox web browser will pop-up with two tabs; one for the media* and one for the map*. These both have links to every post recorded by Recon-NG. Each pushpin on the map is a different tweet gathered by the Twitter module.

If you are interested in coding, especially in Python, Recon-NG offers a valuable resource. Its “source” tool, paired with the show command is useful to learn from or reference while working with Python. The “show source” command is available to use with any active module. This command brings up the Python code* for the active module. The detailed code behind each module fascinating and, by using this reference, anyone is capable of creating more modules for Recon-NG.

Remember, this project paper is only an introduction to Recon-NG’s capabilities. I look forward to using the guidelines and commands described above to begin OSINT investigation and data collection with Recon-NG and continuing to learn more about its other capabilities.

*Hyperlinks of images are given for larger versions of screenshots.