Searching Shodan For Fun And Profit

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SEARCHING SHODAN FOR FUN AND PROFIT

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Abstract:

This paper act as a guide for penetration testers and security folks who want to use Shodan and helps them to understand how it can be used it for security auditing purposes. This paper also outlines the procedure and explains the methods to find various vulnerable services and devices located on the internet. It helps to explain the basic filters that could be used by Shodan and its integration with other tools .It can be mainly used for reconnaissance phase of penetration testing.

Introduction:

Shodan is basically a search engine which helps to find (routers, switches, Scada etc.) mainly vulnerable systems on the internet .It is widely known as Google for hackers. It was launched in 2009 by computer programmer John Matherly. It is mainly a search engine of service banners in which metadata (data about data) is sent from the server to client. Shodan currently probes for 50+ ports.

What devices can Shodan really find:

1) Servers

2) Routers

3) Switches

4) Printers on public ip

5) Webcams

6) Gas station pumps

7) Voip phones And all Scada devices **Working of Shodan**:

1) User searches for a particular item.

2) Shodan probes for ports and captures the resulting banners.

3) Now, Shodan indexes the captured banners.

4) After indexing,it displays the results.

Difference between Shodan and google:

In Google,the google crawler/spider crawls for data on the web pages and then creates a index of web content and then displays the results according to the page rank which in turn depends on a number of factors. Shodan mainly looks for ports and then grabs the resulting banners and indexes them. And finally, it displays the results. It does not index web content (the key point) like google and thus it is a search engine of banners.

Figure 1.Shodan search working

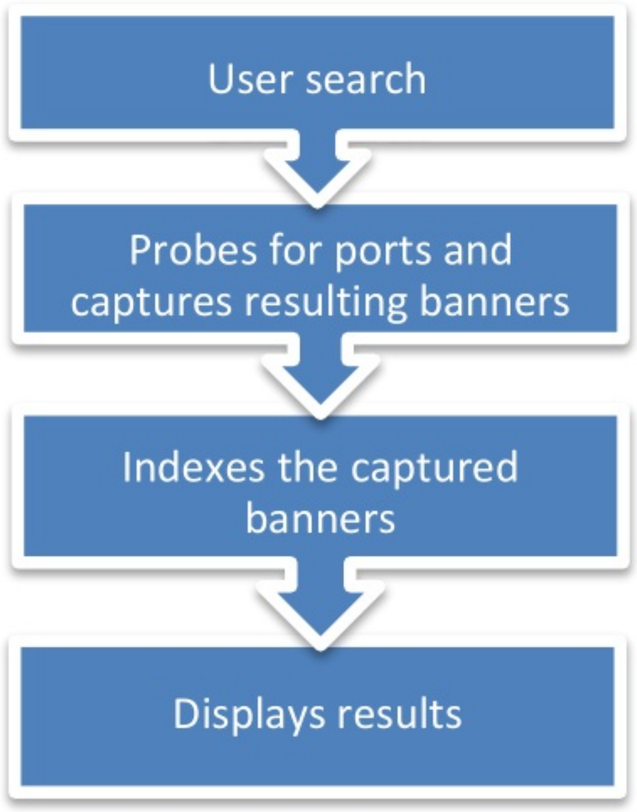
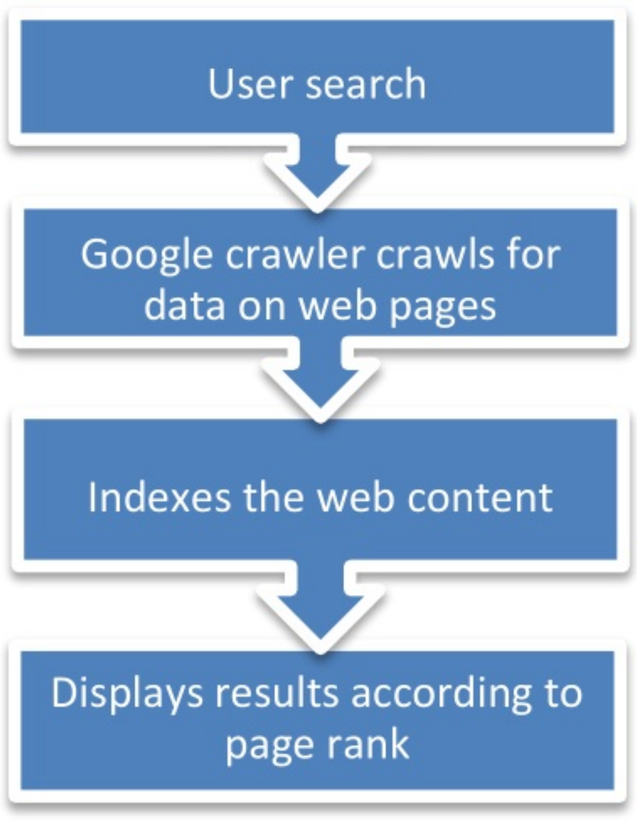


Figure 2. Google search working



Basic filters:

City: The ‘city’ filter is used to find devices that are located in that particular city.

Eg:**iis city:New York**

Country: The ‘country’ filter is used devices running in that particular country.

Eg:iis country: United States

Port: The ‘port’ filter narrows the search by searching for specified ports.

Eg. **https port:443**

Os: The ‘os’ filter is used to find specific operating systems.

Eg: **microsoft-iis os:"windows 2003"**

Geo: The ‘geo’ filter according to certain longitudes and latitudes that are within a given radius. Only 2 3 parameters are allowed and 3 parameter by default is the radius which is 5 km.

Eg: **apache geo:42.9693,-74.1224**

Net: The ‘net’ filter is used to find devices according to certain ip address and subnet mask

Eg: **iis net:216.0.0.0/16**

Hostname: The ‘hostname’ filter always searches host containing a particular hostname.

Eg: **Akamai hostname:.com**

After and Before: The ‘after’ and ‘before’ filter helps you to devices after and before a particular date. The format allowed is

dd/mm/yyyy dd-mm-yy

Eg: apache before:1/01/2014

nginx after:1/01/2014

Note: Most of the filters will work when you are logged in.

Shodan’s integration with other tools:

1) Integration with **Maltego**

Requirements: Download **Maltego** from

http://www.paterva.com/web6/products/download.php

and Shodan maltego entities from **https://static.Shodan.io/downloads/Shodan-maltego-entities.mtz**

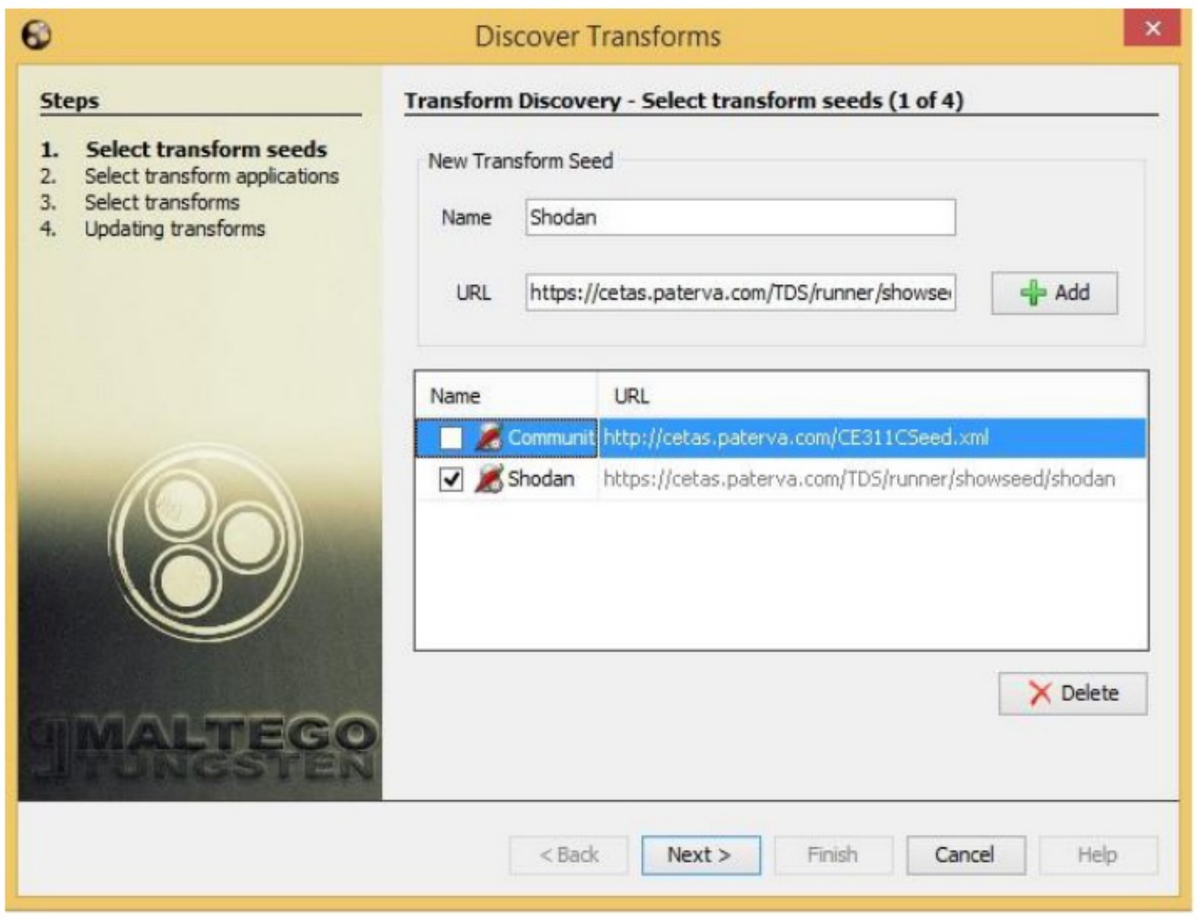
Usage:

i) After installing maltego,select ‘Manage Entities’ in the ‘Manage tab’ and select ‘import’.

ii) Select ‘transforms’ and then ‘advanced’

iii) Now we have do add the Shodan seed by putting

https://cetas.paterva.com/TDS/runner/showseed/Shodan



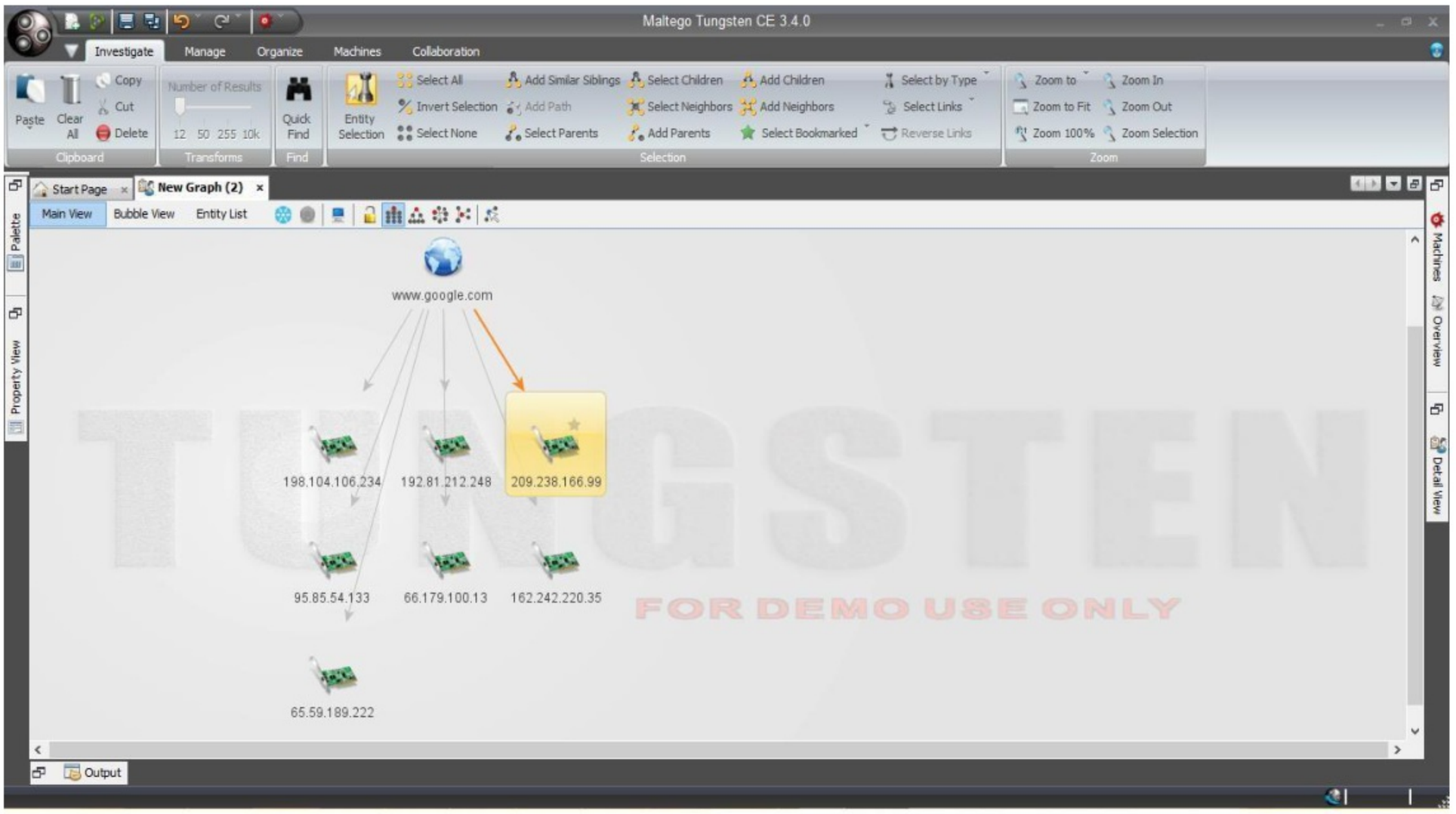
iv) Finally we get a screen ,the transforms and entities have been successfully installed.

It includes:

5 Transforms namely:

i)searchShodan
ii)searchShodanByDomain
iii)searchShodanByNetblock
iv)toShodanHost v)searchExploits

2 Entities namely:
i) Service
ii)Exploit
Here is a screen shot of the transform(**searchShodanByDomain**) performed on **google.com**



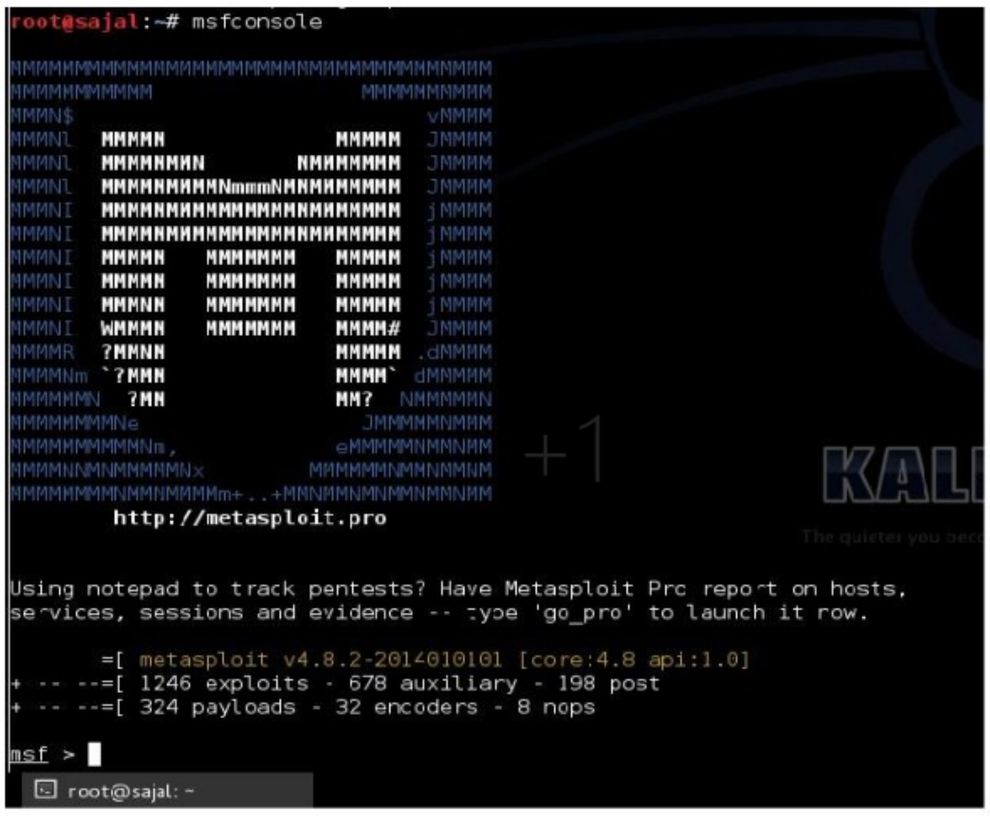
Note:

You can perform Shodan transforms in maltego when you have the API keys and you will get the API keys by logging into your Shodan account.

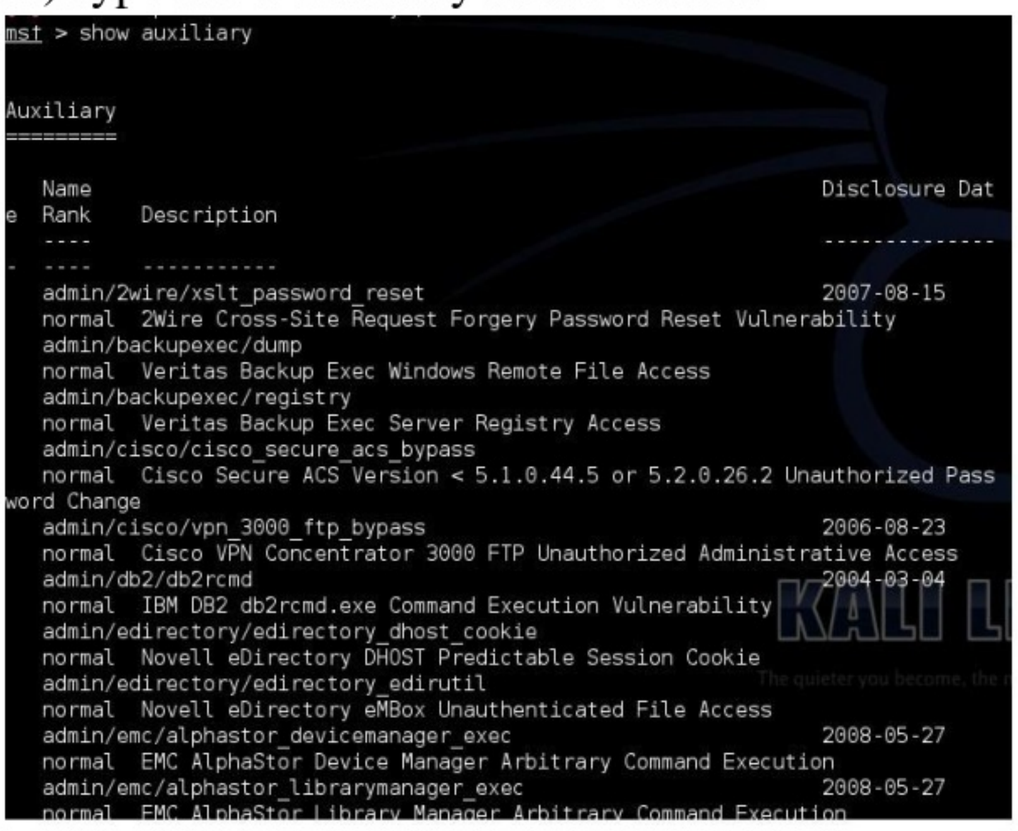
2) Integration with **Metasploit**

Usage:

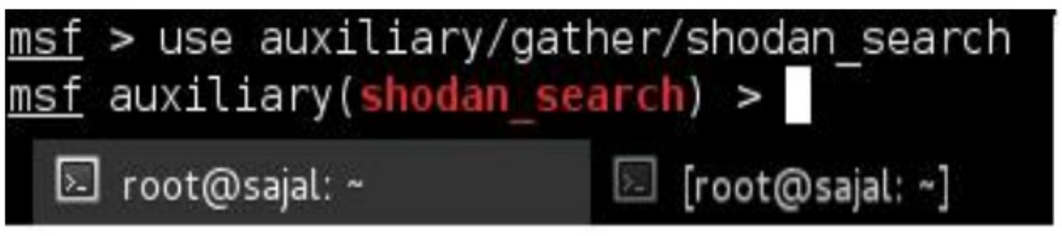
i) Open Metasploit framework in Kali/Backtrack Box



ii.)Type show auxiliary in the console



iii)Using the module **auxiliary/gather/Shodansearch**



iv) Now, we will see the parameters required by the auxiliary by using **show options.**

```
msf > use auxiliary/gather/shodan_search
msf auxiliary(shodan_search) > show options

Module options (auxiliary/gather/shodan_search):

   Name           Current Setting   Required  Description
   ----           ---------------   --------  -----------
   DATABASE       false             no        Add search results to the database
   FILTER                           no        Search for a specific IP/City/Country/Hostname
   MAXPAGE        1                 yes       Max amount of pages to collect
   OUTFILE                          no        A filename to store the list of IPs
   Proxies                          no        Use a proxy chain
   QUERY                            yes       Keywords you want to search for
   SHODAN_APIKEY                    yes       The SHODAN API key
   VHOST          www.shodanhq.com  yes       The virtual host name to use in requests

msf auxiliary(shodan_search) >
```

v.) We need to set query to IIS to search for IIS servers and the API key which we get when we log into our Shodan account.Now we execute it by the Run command.

```
msf auxiliary(shodan_search) >
msf auxiliary(shodan_search) > set QUERY IIS
QUERY => IIS
msf auxiliary(shodan_search) > set SHODAN_APIKEY aXYIPef0mMqv2wg6wR1QuSYcWXHJTMtO
SHODAN_APIKEY => aXYIPef0mMqv2wg6wR1QuSYcWXHJTMtO
msf auxiliary(shodan_search) > run

[*] Total: 13245652 on 264914 pages. Showing: 1
[*] Country Statistics:
[*]     United States (US): 5748342
[*]     Germany (DE): 1075056
[*]     China (CN): 1043387
[*]     United Kingdom (GB): 701634
[*]     Korea, Republic of (KR): 372830
[*] Collecting data, please wait...

IP Results
==========

 IP                   City          Country              Hostname
 --                   ----          -------              --------
 107.149.212.237:80   San Jose      United States        hmsu237.wjljcq.com
 108.160.222.18:80    Plymouth      United States        mail2.DonateESIX.org
 109.104.88.73:8443   N/A           United Kingdom       ds8089.dedicated.turbodns.co.uk
 112.173.140.41:80    N/A           Korea, Republic of
 113.212.67.69:80     N/A           United States        unknown.xeex.net
 115.112.115.165:443  N/A           India                115.112.115.165.static-mumbai.vsnl.net.in
 115.70.205.221:443   Balwyn        Australia            mail.mccrackenlegal.com
 118.38.30.219:80     N/A           Korea, Republic of
 121.197.76.106:80    Beijing       China                ip197.hichina.com
 121.199.63.213:80    Beijing       China
 124.133.2.53:80      Jinan         China
 128.82.97.17:80      Norfolk       United States        lync.odu.edu
 138.91.248.50:80     N/A           United States
```

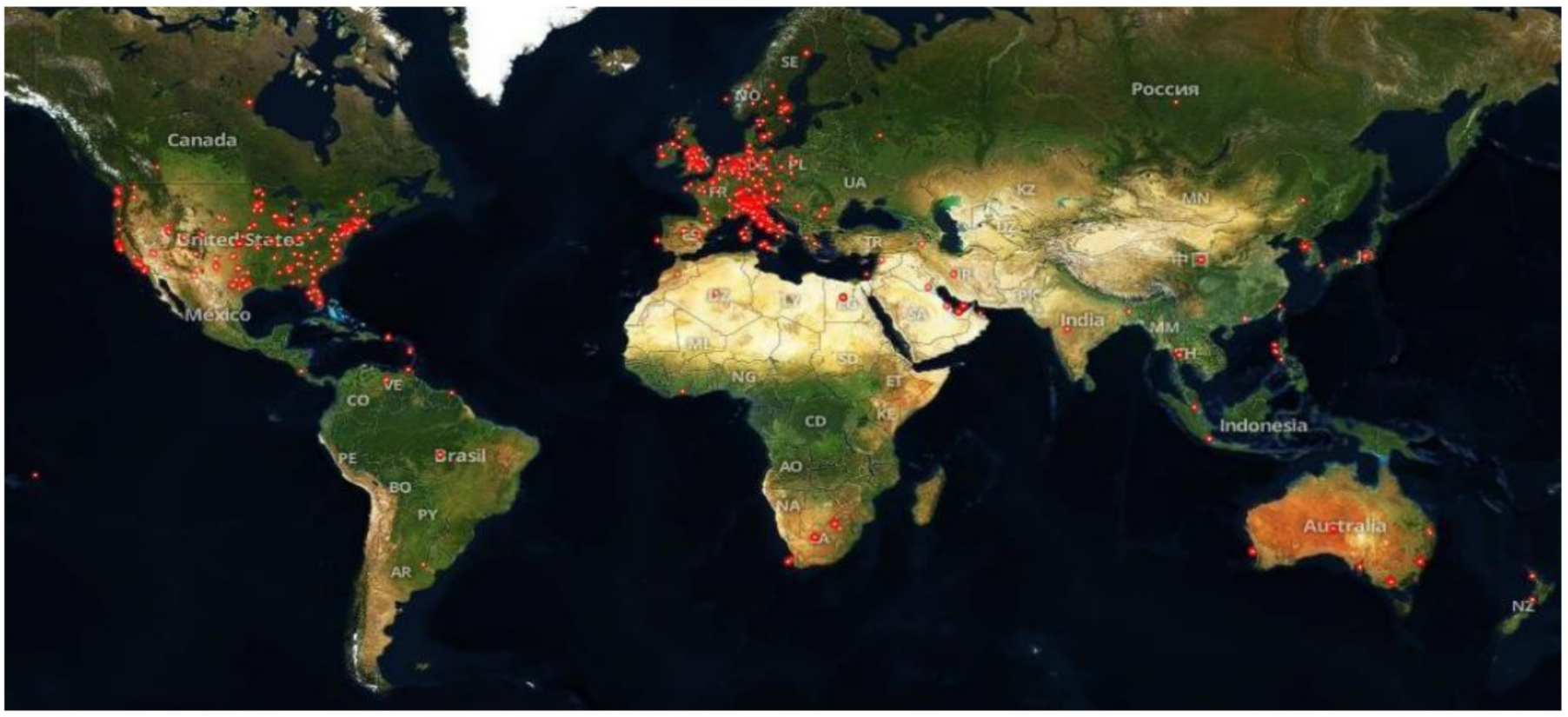
```
 50.241.46.41:443     Minneapolis   United States        mail.mfkcpa.com
 50.30.40.74:80       Saint Louis   United States        static-ip-50-30-40-74.inaddr.ip-pool.com
 54.228.79.27:80      N/A           Ireland              ec2-54-228-79-27.eu-west-1.compute.amazonaws.com
 54.243.32.56:80      Ashburn       United States        ec2-54-243-32-56.compute-1.amazonaws.com
 54.254.103.254:80    N/A           Singapore            ec2-54-254-103-254.ap-southeast-1.compute.amazonaws.com
 59.126.226.244:80    Taipei        Taiwan               59-126-226-244.HINET-IP.hinet.net
 61.75.56.22:80       N/A           Korea, Republic of
 62.154.237.203:80    Clenze        Germany              mail.reseller-one-world.de
 64.78.210.164:80     Buffalo       United States
 65.247.12.57:80      N/A           United States        callyspictures.com
 65.61.33.96:80       Harrisburg    United States
 66.203.152.15:80     Hopkinsville  United States        66-203-152-15.aspwebhosting.com
 66.72.123.181:443    N/A           United States        adsl-66-72-123-181.dsl.chcgil.ameritech.net
 66.96.173.91:80      Burlington    United States        91.173.96.66.static.eigbox.net
 67.226.166.75:80     Thornhill     Canada               static-67-226-166-75.ptr.terago.net
 68.67.203.52:80      Oakland       United States
 70.54.203.33:80      N/A           Canada               MTLXPQAK-1177996065.sdsl.bell.ca
 72.18.154.214:443    Denver        United States
 72.74.85.58:80       Needham       United States        static-72-74-85-58.bstnma.fios.verizon.net
 75.150.38.21:443     Gresham       United States        mailhost.mswhcpa.com
 77.66.83.114:80      N/A           Denmark
 79.143.118.5:1723    Spin          Italy                79-143-118-5.wifi4all.it
 80.14.15.57:443      N/A           France               LPuteaux-156-14-16-57.w80-14.abo.wanadoo.fr
 80.179.222.115:80    Ramat Gan     Israel               80.179.222.115.static.012.net.il
 82.100.225.149:80    N/A           Germany
 82.152.182.34:443    N/A           United Kingdom       remote.woodandpilcher.co.uk
 84.24.43.3:443       Heeswijk      Netherlands          54182B03.cm-5-1a.dynamic.ziggo.nl
 84.55.121.55:80      Stockholm     Sweden               84-55-121-55.customers.ownit.se
 86.11.67.225:80      Reading       United Kingdom       cpc32-rdng21-2-0-cust224.15-3.cable.virginm.net
 87.118.31.35:80      Moss          Norway               smtp.aasen.bz.31.118.87.in-addr.arpa
 89.207.29.78:443     N/A           Netherlands
 92.27.45.180:443     N/A           United Kingdom       remote.grechandgrech.com
 98.142.16.67:443     Maple Grove   United States        mail.anthonylouiscenter.com

[*] Auxiliary module execution completed
msf auxiliary(shodan_search) >
```

Basically the **auxiliary/gather/Shodan_search** module queries the Shodan API to query the database to search for the first 50 IP addresses. The limit of 50 IP address can be increased to 10,000 IP addresses by getting unlimited API keys by purchasing it from our Shodan account.

Components of Shodan:

1)**Exploits**: Shodan Exploits can be used to find exploits for various os, servers, platforms, applications etc present on ExploitDB or Metasploit.

2)**Maps**: Shodan maps is a paid service and you need to pay for it before using. We can see the Shodan results on a map in a easy and convenient manner.It has three kind of map views namely Satellite, Street View (Light) and Street View (Dark).lt can show upto 1000 results on the screen at a time.

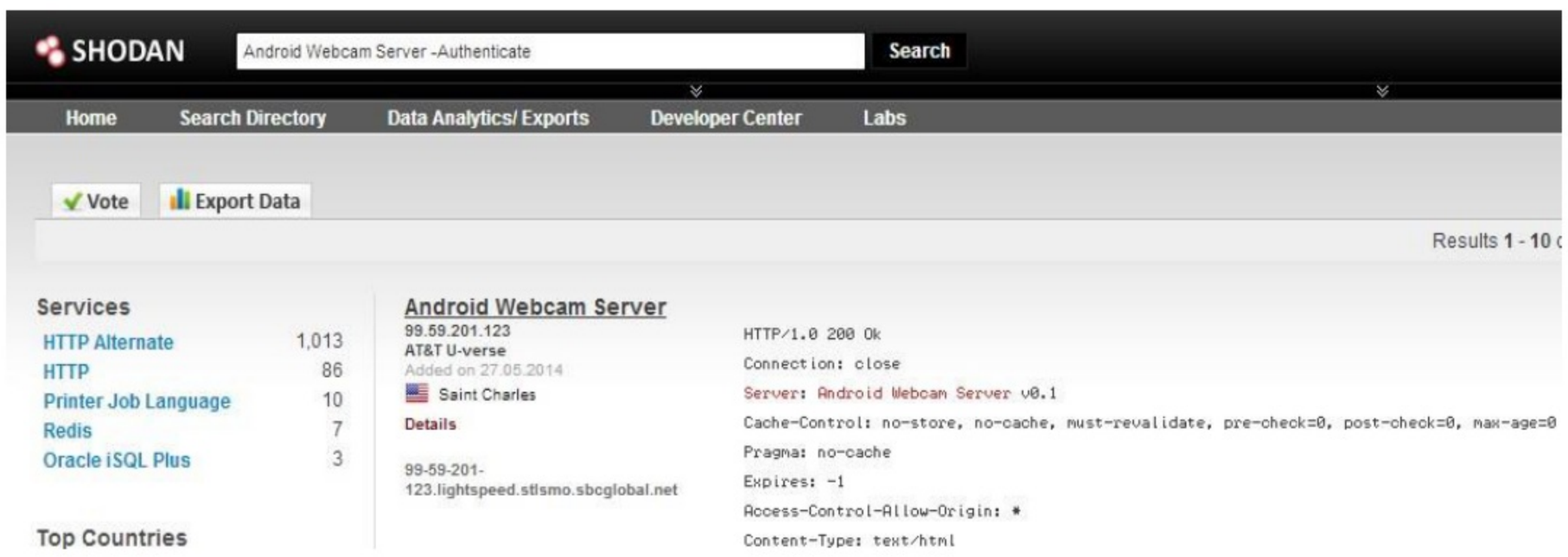


3)**Scanhubs**: Shodan Scanhubs can be used to create an to use to create a search of raw networks scans.Scanhubs supports tools like Nmap and Masscan.To use Scanhub .We have to set the tool(nmap/masscan) to give its output in XML format and then upload it to the Scanhub repository to get the results.Unfortunately this is also a paid component of Shodan.

Some Test Cases:

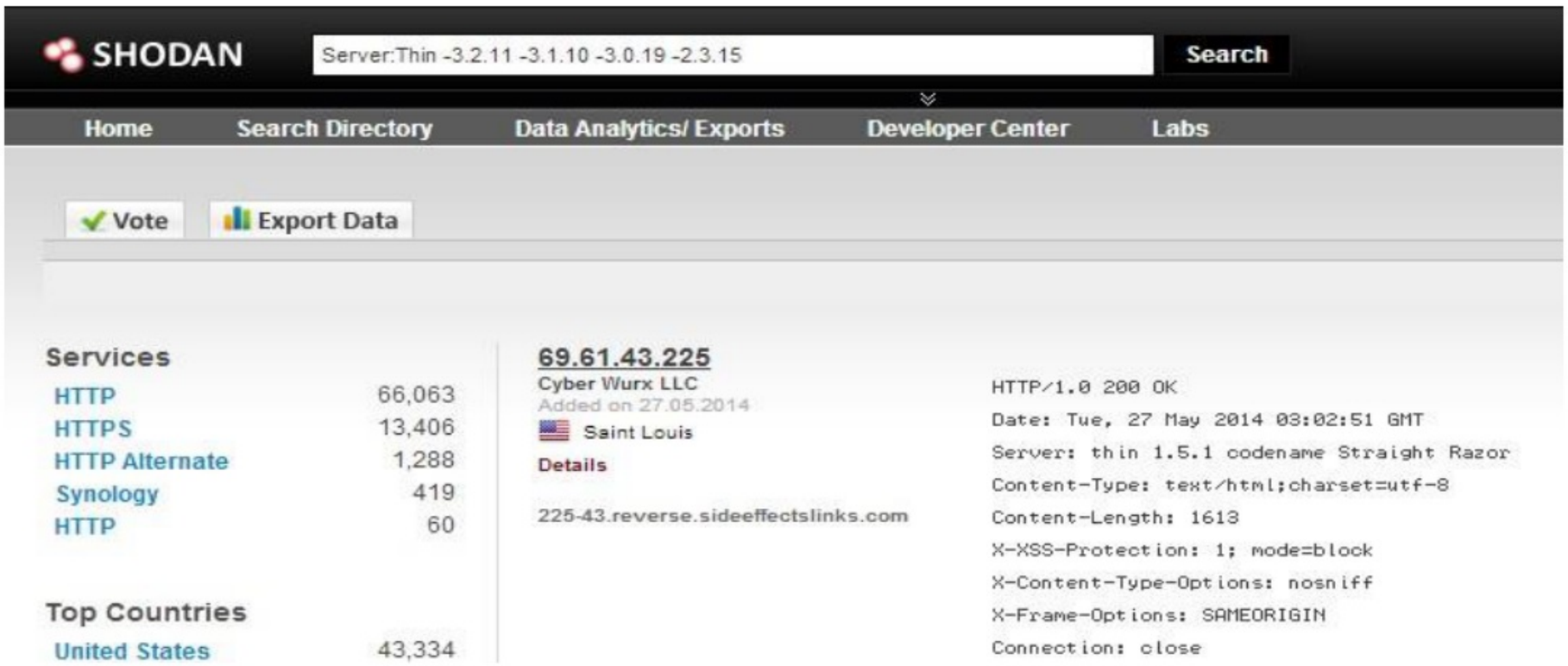
1) **Netgear devices**:

2)**Webcam:**



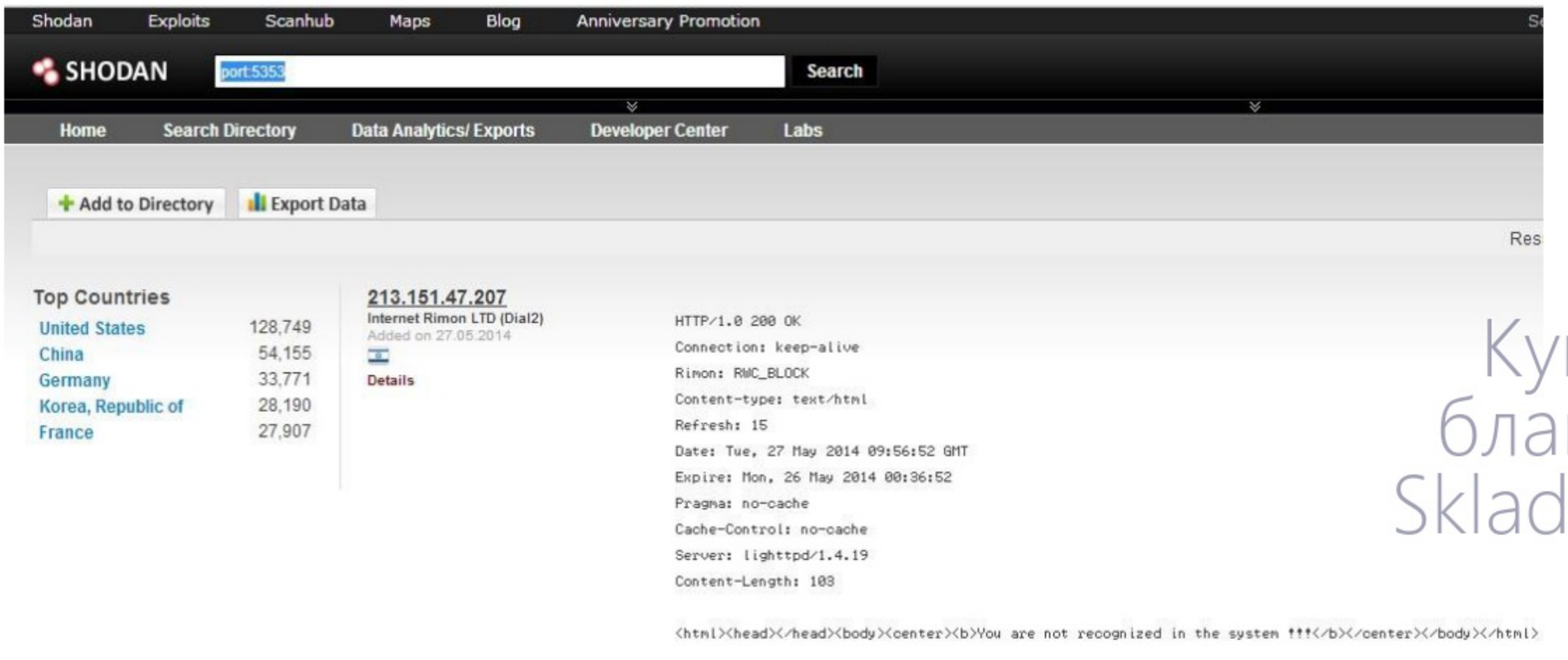
3)**Bitcoin server:**

4)Ruby on Rails Vulnerable Server(CVE-2013-0156 and CVE-2013-0155):



5)Windfarms:

6)DNS service:



Some additional cheat sheet links:

http://www.Shodanhq.com/?q=bitcoin-mining-proxy (Bitcoin proxy mining)

http://www.Shodanhq.com/search?q=port%3A11 (Systat)

http://www.Shodanhq.com/search?q=port%3A8089+splunkd (Splunk servers on tcp/8089)

http://www.Shodanhq.com/search?q=port%3A17(Search for quote of the day)

http://www.Shodanhq.com/search?q=port%3A123(Ntp monlist)

http://www.Shodanhq.com/search?q=port%3A5632 (Vnc)

http://www.Shodanhq.com/search?q=port%3A1434 ((MS-SQL (1434))

http://www.Shodanhq.com/search?q=OpenSSL%2F1.0.1 (Servers running OpenSSL/1.0.1)

http://www.Shodanhq.com/search?q=port%3A79 (Finger protocol)

http://www.Shodanhq.com/search?q=port%3A15 (Netstat)

http://www.Shodanhq.com/?q=telemetry+gateway (Telemetry gateway)

http://www.Shodanhq.com/?q=port:161+country:US+simatic (Simatic automation system on port 161 running in US)

References:

http://www.Shodanhq.com/ https://Shodanio.wordpress.com/

http://www.rapid7.com/db/modules/auxiliary/gather/Shodan_search

https://github.com/rapid7/metasploit-framework/blob/master/modules/auxiliary/gather/Shodan_search.rb

http://www.slideshare.net/theprez98/Shodan-for-penetration-testers-defcon-18