



# Penetration Testing Professional

## INFORMATION GATHERING

### Section 2: Network Security – Module 1



1.1 Information Gathering Introduction

1.2 Search Engines

1.3 Social Media

1.4 Infrastructures

1.5 Tools

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# INFORMATION GATHERING INTRODUCTION

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## 1.1. Information Gathering Introduction



Penetration-Testing (also known as Ethical Hacking) must follow a methodical, organized, and controlled process in order to both effectively review targets and keep the penetration tester safe from consequences if issues arise.

While there are many steps associated with an engagement, none are more important than the act of information gathering or footprinting a designated target.

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## 1.1. Information Gathering Introduction



The detail with which one gathers information for the engagement will determine the effectiveness of the outcome for the entire penetration test.

Pentesters performing *information gathering* must not only be meticulous, but also must know and use different techniques in order to obtain information. Being this detail driven will allow the tester to record only the needed data on the intended target.



## 1.1. Information Gathering Introduction



One must define an accurate scope of engagement in order to ensure that the right information is pursued and obtained in full. In essence, it is like starting with a single seed of grass, and ending up with a sod farm containing grass as far as the eye can see.

Nurturing and building on that single grass seed, resulted in a multiplied return.

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# 1.1. Information Gathering Introduction

MAP

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The **Information gathering** phase is focused on two essential aspects of all targets: Business and Infrastructure.



There are numerous sub-components to both of these categories to be considered when gathering information about your target organization.



## 1.1. Information Gathering Introduction



The **Business** side of information gathering deals with collecting information regarding the type of business, its stakeholders, assets, products, services, employees and generally non-technical information.

The organization will probably operate its business purpose through an **Infrastructure** such as networks, systems, domains, IP addresses and so on.

The second phase of the Information Gathering process will focus on uncovering this type of information.



# 1.1. Information Gathering Introduction



At the end of the **Information Gathering** process you should at least have the following important information about the target:

Infrastructure	Business
Network Maps	Web presence (domains)
Network Blocks	Physical locations
IP addresses	Employees / Departments
Ports	Emails
Services	Partners and third parties
DNS	Press / news releases
Operating systems	Documents
Alive machines	Financial information
Systems	Job postings



# 1.1. Information Gathering Introduction



The following chart shows how we will proceed with our process. These are tasks that we will unpack in the coming slides.

## Information Gathering

### Business

Search engines

### Infrastructure

Social Media

Full scope test

Narrowed scope

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# 1.1. Information Gathering Introduction



Before starting the process, it is important to note that information gathering techniques can be classified into two main disciplines:

**Passive**

**Active**

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## 1.1. Information Gathering Introduction



**Passive** or **OSINT** (Open Source INTelligence) information gathering is gathering as much information about our target (network, system...) without exposing our presence.

In this phase we not only try to gather information such as web presence, partners, financial info, and physical plants but also, infrastructure related information using publicly available resources (accessible by anyone).

With the spread of Social Networking, this is getting easier.





## 1.1. Information Gathering Introduction



**Active** information gathering techniques interact directly with the target system. In this phase, we will gather information about ports, services, running systems, net blocks and so on.

In general, active techniques can reveal the investigation to the organization through IDS or servers logs so caution should be taken to prevent this.

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## 1.1. Information Gathering Introduction



In the coming phases, you will amass a large amount of information therefore, consider how you will collect and record it.

In the first section, we will use a mind mapping technology in order to keep the information well organized. You can find these tools (such as [FreeMind](#), [Xmind](#), etc.) online. We suggest you use the one you are more comfortable with.

[http://freemind.sourceforge.net/wiki/index.php/Main\\_Page](http://freemind.sourceforge.net/wiki/index.php/Main_Page)  
<https://www.xmind.net/>



## 1.1. Information Gathering Introduction



When we start gathering and storing networking information, tools such as [Dradis](#), [Faraday](#) and [Magitree](#) can be very useful due to the fact that they are specifically designed to keep track of networks/vulnerability scans.

As you will see, these tools can facilitate the sharing of gathered information with your colleagues and, in addition, allow you to import scans and reports created with tools like *Burp Suite*, *Nessus*, *Nexpose*, *Nmap* and so on.

<https://dradisframework.com/ce/>  
<https://github.com/infobyte/faraday>

[https://www.gremwell.com/what\\_is\\_magitree](https://www.gremwell.com/what_is_magitree)



# 1.1. Information Gathering Introduction



Also, please make sure to read the [Methodology : Handling information](#) guide that will teach you how to collect and store information about your target.

You can find it in the Members area under the Resources tab.

[https://members.elearnsecurity.com/course/resources/name/ptp\\_v5\\_section\\_2\\_module\\_1\\_attachment\\_eLearnSecurity\\_Handling\\_Information](https://members.elearnsecurity.com/course/resources/name/ptp_v5_section_2_module_1_attachment_eLearnSecurity_Handling_Information)



## 1.2. Search Engine

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# SEARCH ENGINE

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## 1.2. Search Engine



We are now going to see the tasks that a Pentester will undergo in order to perform Business Information Gathering.  
Let's start with **Search Engines**.

### Information Gathering

#### Business

#### Infrastructure

Search engines

Social Media

Full scope test

Narrowed scope

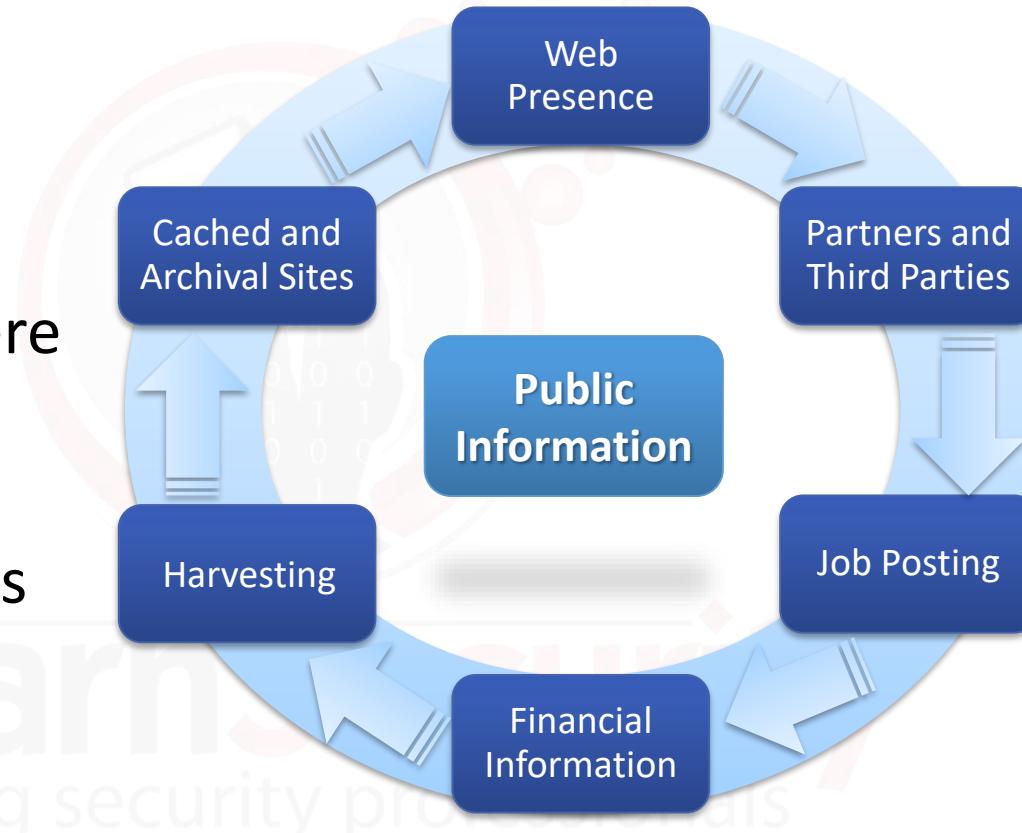




## 1.2.1. Search Engine



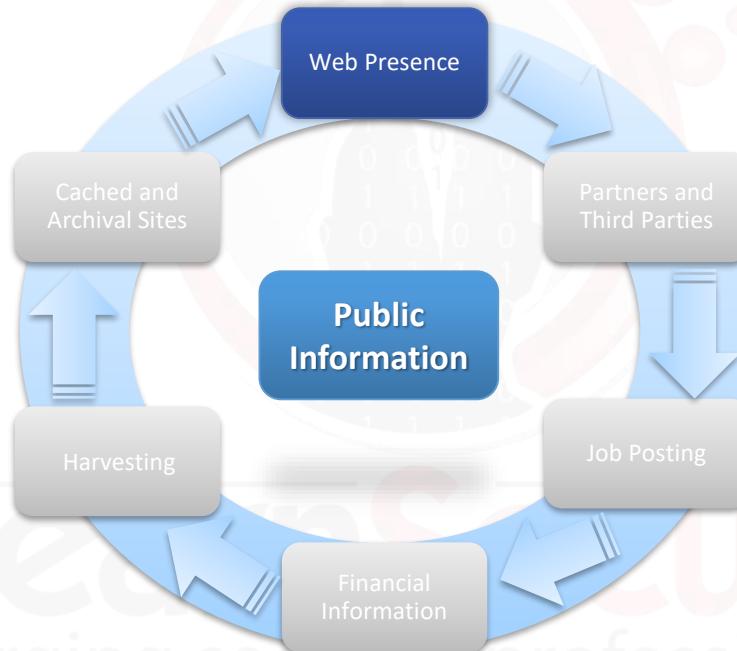
During the Business related information gathering phase, there is a great deal of diverse research conducted and are as follows:





## 1.2.1.1. Web Presence

Let us begin with **Web Presence**.



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## 1.2.1.1. Web Presence

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In this phase, you will learn a great deal more about your target including:

- What they do;
- What is their business purpose;
- Physical and logical locations;
- Employees and departments;
- Email and contact information;
- Alternative web sites and sub-domains;
- Press releases, news, comments, opinions;



## 1.2.1.1. Web Presence



The best way to start is to search the **company name** in order to find the company website. You can easily do it with most common search engines such as Google or Bing.

Google search results for "elearnsecurity":

- elearnsecurity
- elearnsecurity reviews
- elearnsecurity members
- elearnsecurity ejpt

About 26,800 results (0.27 seconds)

**eLearnSecurity - IT Security training courses for individuals ...**  
<https://www.elearnsecurity.com/> ▾  
It's time to bring Web application security up to speed with eLearnSecurity's newest practical training course "Web Application Penetration Testing - WAPTv2".

**Courses**  
IT Security training courses for individuals and corporations.

**Login**  
This is the same as your Members area login. Email. Password I ...

**Certifications**  
eCPPT - Virtual Labs - eJPT - ...

**Resources**  
San Francisco, CA – eLearnSecurity took part in ...

**Virtual Labs**  
The most sophisticated virtual labs on IT Security. This is the ...

**Penetration Testing Professi...**  
Penetration Testing Professional (PTP) is the premier online ...

**eLearnSecurity**  
504 followers on Google+

**Recent posts**  
IT Security researcher, Davide "GiRa" Girardi, shares the scenario of the #SneakyMITMattack Exposed webinar on October 20. More details here. ... 1 hour ago





## 1.2.1.1. Web Presence



Organizations' web sites are usually the best source of information on a target. This is the place where customers, clients and the general public go to understand them.

So the web site is like window shopping where the organization provides the most important information on display for all to see.

Let's study the company website and see what information we mine from it (using [elearnsecurity.com](http://elearnsecurity.com)).

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## 1.2.1.1. Web Presence

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This is an example of information you can obtain:



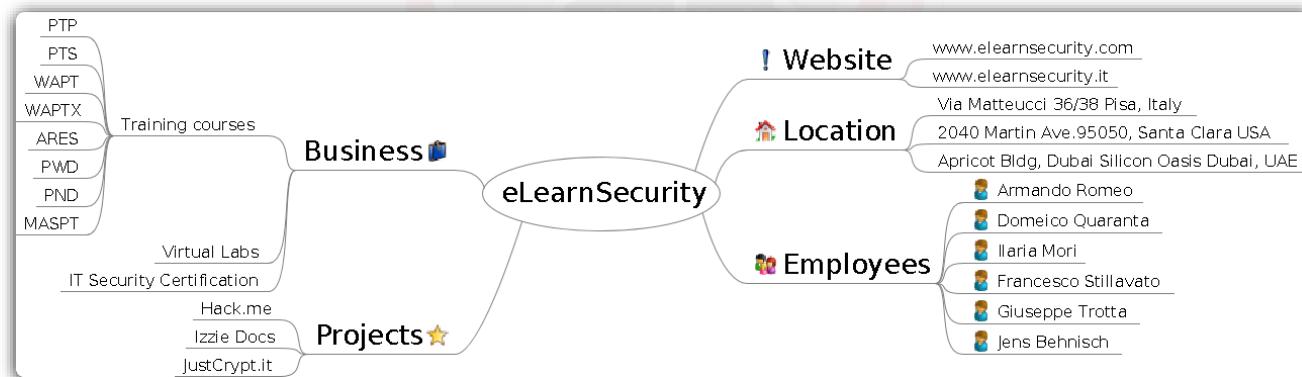
**Projects**





## 1.2.1.1. Web Presence

Each time you find something new on the target company, jot it down in your mind mapping tool. In our case this is what we were able to gather thus far:



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## 1.2.1.1. Web Presence

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Once we have analyzed the website in depth and saved the extracted information (in our mind mapping tool), we can move on with analyzing information that is publicly available on the internet.

The first step is to leverage the power of advanced search engines like Google and its dorks.

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## 1.2.1.1. Web Presence



Google offers the opportunity to perform advanced search queries using special operators. Beyond the common operators (*AND*, *OR*, *+*, *-*, “””) there are more specific filters that you can use.

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## 1.2.1.1. Web Presence



The following are just few of them:

### Cache

**[cache:www.website.com]** will show the cached content of website.com (*type this command in the address bar*)

### Link

**[link:www.website.com]** will display websites that have links to the specific website. In this case the command will show all webpages that have a link to www.website.com

### Site

**[google dorks site:www.website.com]** limits the search results to the website given. In this case it will show the results of *google dorks* search *within* www.website.com

### Filetype

**[google dorks filetype:pdf]** searches for all document with a specific extension. In this case it will display all *PDF* documents related to the query string *google dorks*



## 1.2.1.1. Web Presence



Let us see an example of how to use Google dorks to find all the PDF documents that are somehow related to the query string elearnsecurity.

The screenshot shows a Google search results page. The search query is "elearnsecurity filetype:pdf". The results are categorized under "Web". It displays two search results:

- [PDF] WAPT in pills: - eLearnSecurity**  
https://www.elearnsecurity.com/collateral/Syllabus\_WAPT.pdf ▾  
applications run on-the-fly within the eLearnSecurity cloud infrastructure. Only a web browser and an internet connection are required to access the lab.
- [PDF] PTSv2 in pills: - eLearnSecurity**  
https://www.elearnsecurity.com/collateral/syllabus\_ptsv2.pdf ▾  
PTTv2 in pills: ♦ Self-paced, online, flexible access. ♦ 900+ interactive slides and. 3 hours of video material. ♦ Interactive and guided learning. ♦ No Pre- ...

elearnsecurity filetype:pdf



## 1.2.1.1. Web Presence



The previous command shows all the PDF files that contain the word elearnsecurity or that are somehow linked to the word elearnsecurity.

This type of search can be very useful in finding documents that are no longer linked in the webpage. Google usually stores this information for a long period of time.



## 1.2.1.1. Web Presence



For more information about operators and filters you can refer to the Google documentation listed below:

- [https://support.google.com/websearch/answer/136861?hl=en&ref\\_topic=3081620](https://support.google.com/websearch/answer/136861?hl=en&ref_topic=3081620)
- [www.googleguide.com/advanced\\_operators\\_reference.html](http://www.googleguide.com/advanced_operators_reference.html)
- <http://pdf.textfiles.com/security/googlehackers.pdf>
- <https://www.exploit-db.com/google-hacking-database/>

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## 1.2.1.1. Web Presence

Below are a few additional search engines that could help you retrieve further information:

- [Bing](#)
- [Yahoo](#)
- [Ask](#)
- [Aol](#)
- [Pandastats.net](#)
- [Dogpile.com](#)



**Aol.**

**dogpile**  
dogpile

**Ask**  
.com

**bing**

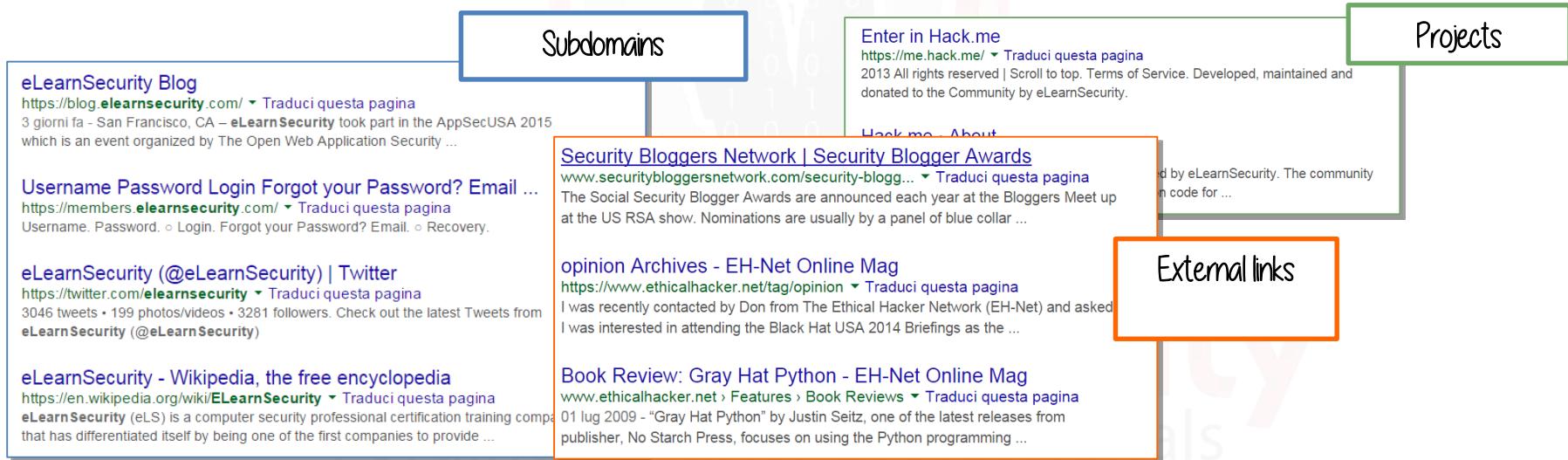




## 1.2.1.1. Web Presence



The following snapshots show the kind of information that you can retrieve using search engine.





## 1.2.1.1. Web Presence



The web presence of an organization is not only its website but also any kind of corporate account to third party services. The simplest example is a company page on LinkedIn.





## 1.2.1.1. Web Presence



In our case, we can find employees, events, products, contact info, locations and more.

The screenshot shows a LinkedIn company profile for 'eLearnSecurity'. The profile picture is a circular logo with a red border containing a black silhouette of a person holding a sword. The company name 'eLearnSecurity' is displayed in blue, followed by 'Events' and 'Computer & Network Security'. Below this, it says '11-50 employees'. A 'Follow' button with '1,990 followers' is visible. A call-to-action banner at the bottom encourages joining a 'Sneaky MITM Attack Exposed - Live Webinar' and booking a free seat. On the right side, there's a section titled 'Employees' showing a photo of three men and the name 'Davide Carmeci' with the title 'VP Business Development'.



## 1.2.1.1. Web Presence

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Websites like LinkedIn show even more information about companies and people that are related to that company especially if you have either a regular account or a premium one.

Unless you restrict your privacy settings, your visits to other LinkedIn profile's will subsequently notify those account owners.

Keep this in mind when performing stealthy operations.



## 1.2.1.1. Web Presence



Organizations that operate globally and have a desire to sell to the U.S. government or government agencies, are required to possess two codes useful to us:

- [DUNS](#) number (DUNS and Bradstreet)
- [CAGE](#) code (or [NCAGE](#) for a non U.S. business)

These two codes allows us to retrieve even more information such as contacts, products lists, active / inactive contracts with the government and much more.

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## 1.2.1.1. Web Presence



We can retrieve the DUNS and CAGE code for a given company from the following web site. Once you arrive click on Search Records:

The screenshot shows the SAM (System for Award Management) homepage. The top navigation bar includes links for HOME, SEARCH RECORDS, DATA ACCESS (which is highlighted with a red arrow), GENERAL INFO, and HELP. Below the navigation is a search interface titled 'QUICK SEARCH:' with a dropdown menu showing suggestions: 'google inc', 'google inc', and 'google apps dude'. There are also fields for 'DUNS Number Search:' and 'CAGE Code Search:', each with a placeholder 'Enter DUNS number ONLY' or 'Enter CAGE code ONLY'. At the bottom right are 'SEARCH' and 'Need Help?' buttons.

<https://www.sam.gov/errors/pageE11Bellow.html>





## 1.2.1.1. Web Presence



As soon as we hit enter, a new page will appear, showing some information about the company and its codes:

TOTAL RECORDS: 1  
Result page 1 of 1

Save PDF | Export Results | Print |

Sort by Modified Date ▾ Order by Descending ▾

**FILTER RESULTS**

Your search for "google\* inc\*" returned the following results...

Entity	GOOGLE INC.	Status: Active <a href="#">+</a>
DUNS: 060902413	CAGE Code: 1XAU1	<a href="#">View Details</a>
Has Active Exclusion?: No	DoDAAC:	
Expiration Date: 05/17/2016	Delinquent Federal Debt?: No	
Purpose of Registration: All Awards		

**Glossary**

[Search Results](#)

Entity

Exclusion

**Search Filters**

By Record Status

By Functional Area - Entity Management

By Functional Area - Performance Information

Note: Filters are case sensitive



## 1.2.1.1. Web Presence



To retrieve even more information, we can click on View Details. In the right navigation pane of the new page, we are able to perform further searches:

Entity Dashboard

- Entity Overview
- Entity Record
- Core Data
- Assertions
- Reps & Certs
- POCs
- Reports
- Service Contract Report

GOOGLE INC.  
DUNS: 060902413 CAGE Code: 1XAU1  
Status: Active  
Expiration Date: 05/17/2016  
Purpose of Registration: All Awards

1600 AMPHITHEATRE PKWY  
MOUNTAIN VIEW, CA, 94043-1351,  
UNITED STATES

Review Core Data

Current Record ▾

VIEW SELECTED RECORD

DUNS Number:	060902413
D&B Legal Business Name:	GOOGLE INC.
Doing Business As:	GOOGLE.COM



## 1.2.1.1. Web Presence



You have probably noticed by now that this process is not set in the stone and is never the same for all the organizations.

Organizations belonging to different industries can be investigated through search in different publicly available databases. Compliance and regulations might force companies to publish different kind of information publicly.

An example is publicly traded companies that have to file their financial documents to SEC database.

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## 1.2.1.1. Web Presence



For this purpose you can use the EDGAR (Electronic Data Gathering, Analysis, and Retrieval system)

- <http://www.sec.gov/edgar.shtml>

The screenshot shows the SEC's homepage with a navigation bar for About, Divisions, Enforcement, Regulation, and Education. On the left, there's a sidebar with links for Filings and Forms, including Edgar Search Tools, Company Filings Search, How To Search Edgar, Requesting Public Documents, and a Quick Edgar Tutorial. The main content area is titled 'ARTICLE' and 'Filings & Forms'. It contains a paragraph about the requirement for companies to file registration statements, reports, and other forms electronically through EDGAR. Below this, there are three links: 'Quick Edgar Tutorial', 'Search for Company Filings' (which is highlighted with a blue box and a blue arrow pointing to it), and 'Descriptions of SEC Forms'. At the bottom of the sidebar, there's a 'Filers' link.



## 1.2.1.1. Web Presence



After that you can perform specific searches:

### Free access to more than 20 millions filings

Since 1934, the SEC has required disclosure in forms and documents. In 1984, EDGAR began collecting electronic documents to help investors get information. The SEC's new system requires data disclosure — the next step to improve how investors find and use information.

#### EDGAR Search Tools

*You can search information collected by the SEC several ways:*

- Company or fund name, ticker symbol, CIK (Central Index Key), file number, state, country, or SIC (Standard Industrial Classification)
- Most recent filings
- Full text (past four years)
  - Boolean and advanced searching, including addresses
  - Key mutual fund disclosures
  - Mutual fund voting records
  - Mutual fund name, ticker, or SEC key (since Feb. 2006)
  - Variable insurance products (since Feb. 2006)



## 1.2.1.1. Web Presence



With these kind of search you will able to see documents like the following:

**APPLE INC CIK#:** 0000320193 (see all company filings)

SIC: 3571 - ELECTRONIC COMPUTERS  
State location: CA | State of Inc.: CA | Fiscal Year End: 0930  
formerly: APPLE COMPUTER INC (filings through 2007-01-04)  
formerly: APPLE COMPUTER INC/ FA (filings through 1997-07-28)  
(Assistant Director Office: 3)  
Get [insider transactions](#) for this issuer.

**Documents**

Filter Results: Filing Type: Prior to: (YYYYMMDD)

Items 1 - 40 [RSS Feed](#)

Filings	Format	Description
8-K	<a href="#">Documents</a>	Current report, item 5.02 Acc-no: 0001181431-11-056354 (34 Act)
10-K	<a href="#">Documents</a>	Annual report [Section 13 and 15(d), not Acc-no: 0001193125-11-282113 (34 Act)
8-K	<a href="#">Documents</a>	Current report, items 2.02 and 9.01 Acc-no: 0001193125-11-273826 (34 Act)
8-K	<a href="#">Documents</a>	Current report, item 8.01 Acc-no: 0001181431-11-051976 (34 Act)
8-K	<a href="#">Documents</a>	Current report, item 5.02 Acc-no: 0001181431-11-047179 (34 Act) Size: 13 KB
UPLOAD	<a href="#">Documents</a>	[Cover]SEC-generated letter Acc-no: 0000000000-11-049720 Size: 45 KB

**Financial info**

(In millions, except number of shares which are per share amounts)

	2011	2010
Three years ended September 24, 2011		
Net sales	\$108,249	\$ 65,225
Cost of sales	64,431	39,541
Gross margin	43,818	25,684
Operating expenses:		
Research and development	2,429	1,782
Selling, general and administrative	7,599	5,517
Total operating expenses	10,028	7,299
Operating income	33,790	18,385
Other income and expense	415	155
Provision for income taxes	34,205	18,540
Income taxes	8,283	4,527
Net income	\$ 25,922	\$ 14,013
Earnings per share:		
Basic	\$ 28.05	\$ 15.41
Diluted	\$ 27.68	\$ 15.15

Via E-mail  
Mr. Peter Oppenheimer  
Senior Vice President and Chief Financial Officer  
Apple, Inc.  
1 Infinite Loop  
Cupertino, California 95014

**Name and positions**



## 1.2.1.1. Web Presence



Note that **Information gathering** is not a linear process but actually a cyclical process.

When you find new organization projects, websites and subdomains, you have to repeat the whole investigation process for each of them. This will widen the attack surface thereby increasing the chances of a successful outcome of the penetration test.



## 1.2.1.1. Web Presence



Since in this phase we will obtain a huge amount of information, a good practice would be to organize it in a clear and clever way.

Remember to use your mind mapping tool to store your findings!

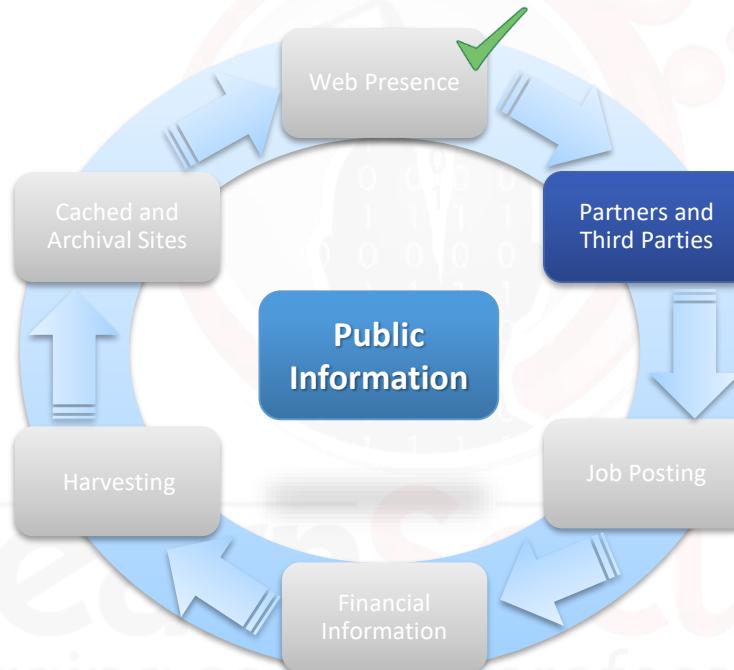
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## 1.2.1.2. Partners and Third Parties



We can now move on with **Partners and third parties**.



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## 1.2.1.2. Partners and Third Parties



Other useful information that you can gather about the company are **mergers** and **acquisitions**, **partnerships**, **third parties**...

With these you can deduce what type of technologies and systems they use internally. You can take advantage of this information in later phases of the pen test.

You can also use it to perform a more effective social engineering attack with a higher chance of success.

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## 1.2.1.2. Partners and Third Parties

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Let us use Agiliance as sample case study:

The screenshot shows the Agiliance website homepage. At the top, there is a navigation bar with the Agiliance logo and the tagline "Managing Risk in Real Time". Below the navigation bar, a main menu includes "GET STARTED" (highlighted in green), "Solutions", "Products", "Services", "Customers", "Partners", "News", and "Company". A large banner below the menu features the text "I want to..." followed by three sections: "CONTACT", "LEARN", and "GET CONNECTED", each with several links and icons.

**CONTACT:**

- Contact Agiliance
- Become a Partner
- Request a Demo
- Meet at a Tradeshow

**LEARN:**

- Tours
- Demo Tuesdays
- Data Sheets
- Whitepapers
- Case Studies
- Webcasts

**GET CONNECTED:**

- Blog (Agiliance Blog)
- LinkedIn (Agiliance on LinkedIn)
- Twitter (Agiliance on Twitter)

At the bottom of the page, a footer bar contains the text "© 2011 Agiliance, Inc. | Privacy Policy | Company | Contact Us | Get Started".



## 1.2.1.2. Partners and Third Parties

Surfing the website you can easily gather information about their partners:

Partners
<a href="#">Overview</a>
<a href="#">MSSPs</a>
<a href="#">Service Providers</a>
<a href="#">Technology Providers</a>
<a href="#">Access Management</a>
<a href="#">Configuration</a>
<b>CMDB</b>
<a href="#">Database Security</a>
<a href="#">Help Desk</a>
<a href="#">Threat &amp; Advisory</a>
<a href="#">SIEM</a>
<a href="#">Vulnerability</a>
<a href="#">Web App Sec</a>
<a href="#">Content Providers</a>
<a href="#">Become a Partner</a>

### Configuration Management Database (CMDB) Technology Providers



**BMC Atrium** imports assets as well as the asset owner from Atrium CMDB, allowing companies to leverage their existing IT infrastructure and investments. One key advantage is that new entities are automatically assessed. Asset entities via risk and assignment of the owner as well as configuration entered into the IT



**The HP Service Manager** is a collection of entities from the HP portfolio. This automation allows for compliance management.



**Microsoft Active Directory** lists all users and networks. Generally, desktops, are listed.

### Partners

Overview
<a href="#">MSSPs</a>
<a href="#">Service Providers</a>
<a href="#">Technology Providers</a>
<a href="#">Access Management</a>
<a href="#">Configuration</a>
<b>CMDB</b>
<a href="#">Database Security</a>
<a href="#">Help Desk</a>
<a href="#">Threat &amp; Advisory</a>
<a href="#">SIEM</a>
<a href="#">Vulnerability</a>
<a href="#">Web App Sec</a>
<a href="#">Content Providers</a>
<a href="#">Become a Partner</a>

### Web Application Security Tools



**HP WebInspect** is an application security tool that identifies all application vulnerabilities. HP WebInspect imports application assets and application vulnerability results in the application. These results are mapped to the National Vulnerability Database (NVD) based on CVE ID, and the CVSS score is assigned from NVD.

**IBM Rational AppScan** is an application scanner that identifies all application-related vulnerabilities. Agilience RiskVision AppScan imports application assets from AppScan results in the application inventory. Along with the application, it will also import all the vulnerabilities for those applications. Vulnerabilities are mapped to National Vulnerability Database (NVD). If a vulnerability

<b>Advisory Service Providers</b> Big 4, Compliance & Risk Consultants	<b>System Service Providers</b> Security, Mobile, Telecom, Utility
<b>Technology Providers</b> Cloud, Managed Service, On Premise	<b>Content Providers</b> Frameworks, Regulations & Standards



## 1.2.1.2. Partners and Third Parties



From these web pages, you can gather information such as the technology stack the organization uses (hardware and software), tools, systems and so on.

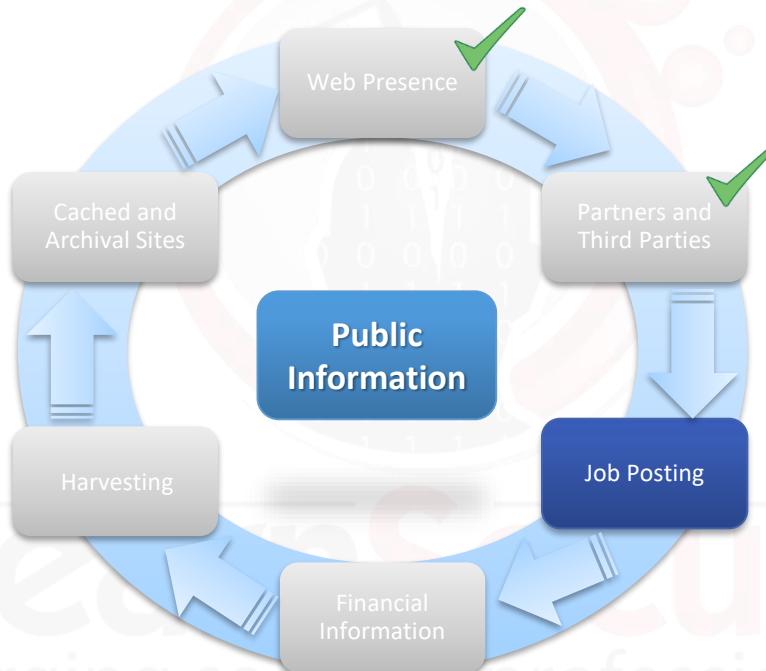
Remember that every piece of information you can acquire may come in handy later on.

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## 1.2.1.3. Job Posting

The next step is finding information from **Job Postings**.



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## 1.2.1.3. Job Posting



At this point of the process you should have already collected a large amount of data.

Is this all you will collect? Absolutely Not! This is a long process that you will even want to expand the scope with experience.

Now we can start looking for **job postings** and frequenting **job boards**.

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## 1.2.1.3. Job Posting



Many organizations have a web site section including open positions and career opportunities.

This might not seem like harmful information however, an investigator can deduce internal hierarchies, vacancies, projects, responsibilities, weak departments, financed projects, technology implementations and more.

Let us see an example in our case study.

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## 1.2.1.3. Job Posting

From the corporate website, we can find useful information about job openings.

### Agilience Current US Job Openings

Agilience offers competitive compensation and a full benefit package including stock options, medical, dental, vision, life insurance, child care reimbursement, and more.

#AG4.51 Sales Director

#AG4.52 Senior Sales Engineer

#AG4.57 Quality Assurance - US Technical

#AG4.59a Java Server Software Developer

#AG4.59b Senior Java Server Software Dev

#AG4.59c Principal Java Server Software Dev

#AG4.60a Java/JavaScript Software Dev

#AG4.61 Product Support Engineer

#AG4.62 Product Marketing Manager

#AG4.66 HR, Office and Projects Coordinator

#AG4.67 GRC Solution Architect

#AG4.68 Product Manager

#### REQUIREMENTS

- Experience in the development of scalable, high performance web applications.
- Excellent working knowledge of Java, J2EE, JSP, JSF, and Spring Framework.
- Strong working knowledge of application servers like GlassFish or JBoss.
- Strong working knowledge of MySQL and/or Oracle databases.
- Experience with the Spring Framework is a plus.
- Experience with JavaScript libraries like jQuery and Angular.js is a plus.
- Experience with reporting frameworks like JasperReports and Crystal Reports.
- Solid knowledge and application of engineering concepts and practices.
- Understands development methodology and development processes.
- Problem solving capabilities and analytical skills.
- Excellent verbal and written communication skills, both written and oral.
- Ability to work in a team environment.
- Enthusiasm to learn new tools and technologies.
- Degree in Computer Science (or equivalent).
- 2-5 years of experience required.

#### Skills

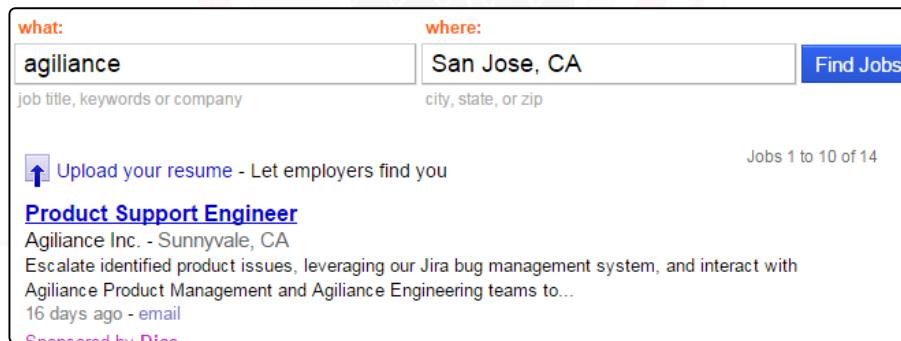
- Apache, Tomcat, Oracle 11g, and MySQL system administration fundamentals.
- Familiarity with at least one interpreted language and frameworks such as JAVA, JSP, AJAX, Hibernate, Web Services, etc.
- Experience with Salesforce.com, Cisco WebEx, FTP, SQLYog, and LDAP Browser.
- Familiarity with standard concepts, practices, and procedures relating to Microsoft Windows Operating Systems, Microsoft Windows networking, and troubleshooting Microsoft Windows network environments.
- Development and debugging of SQL scripts and queries.
- Development and debugging of Oracle data base issues and queries.
- Good working knowledge of security tools, techniques, and methodologies such as Kerberos, SAML, LDAP, and SiteMinder.
- Strong verbal and written communication skills for delivery in document, Web, and presentation form, as well as over the phone.
- People skills that promote personal relationship building between virtual teams - working directly with varied headquarters and overseas resources.
- Highly organized, self-directed with strong ability to prioritize and manage multiple tasks.





## 1.2.1.3. Job Posting

If you do not find useful information on the organization website, you can use more specific search engines such as [Indeed](#).



The screenshot shows a job search interface. In the top left, the word "what:" is followed by a search input field containing "agiliance". To its right, the word "where:" is followed by another input field containing "San Jose, CA". To the right of these fields is a blue "Find Jobs" button. Below the search bar, there are two smaller input fields: one for "job title, keywords or company" and another for "city, state, or zip". Underneath the search bar, there's a link to upload a resume and a note that 16 jobs were found. A single result is displayed: a "Product Support Engineer" position at Agiliance Inc. in Sunnyvale, CA. The job description mentions Jira bug management and interaction with Product Management and Engineering teams. The listing is 16 days old and includes an "email" link.

<https://www.indeed.com/>



## 1.2.1.3. Job Posting

The following is a list of websites that you can use to find job posts:

- [LinkedIn](#)
- [Indeed](#)
- [Monster](#)
- [Careerbuilder](#)
- [Glassdoor](#)
- [Simplyhired](#)
- [Dice](#)

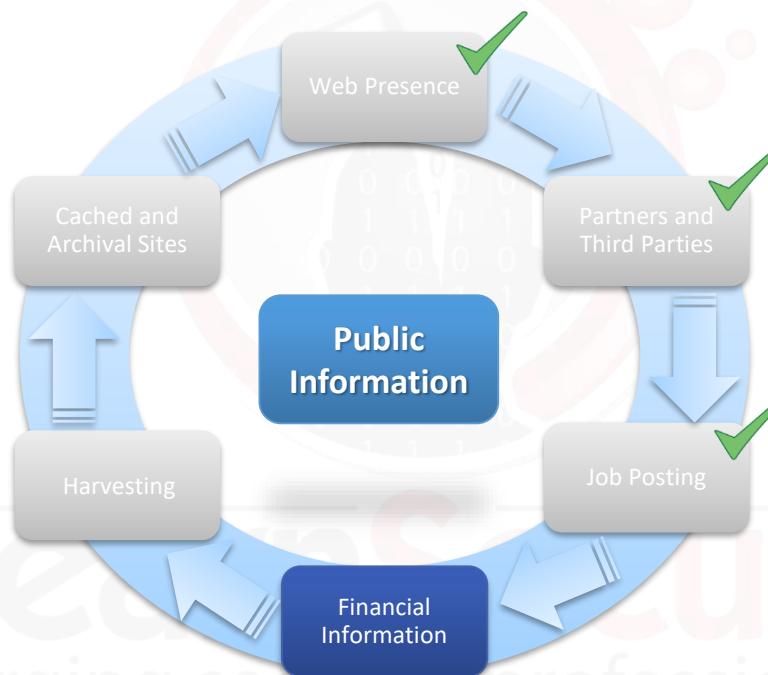




## 1.2.1.4. Financial



Let us focus now on **Financial Information**.



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## 1.2.1.4. Financial



More useful information can be acquired from **financial** details about the organization.

For example, you can easily find out if the organization:

- is going to invest in a specific technology
- might be subject to a possible merge with another organization
- has critical assets and business services

Let us see which tools we can use to gather this information.

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## 1.2.1.4. Financial



The first we will examine is [www.crunchbase.com](http://www.crunchbase.com).

*CrunchBase* is a database where you can find information about:

- Companies
- People
- Investors and financial information

Crunch**Base**

The power of *CrunchBase* is grounded on the concept of anyone being able to edit information in it.

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## 1.2.1.4. Financial



This snapshot shows what kind of information you can find:

**Agilience**

Overview Timeline Followers Contributors

**Overview**

Funding Received  
\$23.96M in 5 Rounds from 10 Investors

Most Recent Funding  
\$5M Venture on May 13, 2014

Headquarters: Sunnyvale, CA

Description: Agilience provides IT solutions and services for businesses and government agencies.

Founders: Pravin Kothari

Categories: Security

Website: <http://www.agilience.com>

Social: [Twitter](#)

**Company Details**

Founded: 2005

Contact: [\(408\) 200-0400](mailto:info@agilience.com)

Employees: 7 in CrunchBase

**Financial info**

**Company info**

**Investors**

**Graph Insights**

Investors in Agilience also invested in:

	Beceem Communications	2
	Funambol	2
	Ikanos	2

SEE ALL [\(2\)](#)

Agilience's Current Team worked at:

	Impresse	2
	Sun Microsystems	2
	Hughes Network Systems	1



## 1.2.1.4. Financial



Another useful online resource is [www.inc.com](http://www.inc.com).

Inc. focuses its attention on growing companies and provides advice, resources and information to companies.

Moreover, Inc. offers a list of the 500/5000 fastest-growing private companies, showing very useful information and statistics on them.

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## 1.2.1.4. Financial

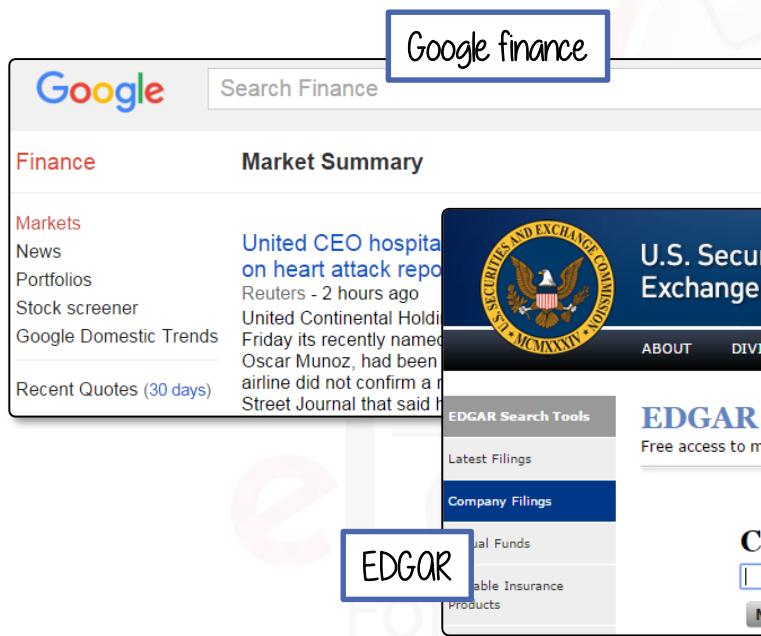
The following snapshot shows the result of a search of our target company, providing us a different look on some information.

	2011 Inc. 5000 Rank	#39
	3-Year Growth	4909%
	2010 Revenue	\$6.3 M
	Jobs Added	20
Location	San Jose, CA	Country
Founded	2005	Employees
Employees	57	



## 1.2.1.4. Financial

The following are additional resources that you can use to find out more financial information on your target.



Google finance

Google Finance Search Finance

Finance Market Summary

Markets News Portfolios Stock screener Google Domestic Trends Recent Quotes (30 days)

United CEO hospitalized on heart attack report

Reuters - 2 hours ago United Continental Holdings' Friday its recently named Oscar Munoz, had been airline did not confirm a report by the Street Journal that said he

U.S. Securities and Exchange Commission

EDGAR | Company Filings

EDGAR Search Tools

Latest Filings Company Filings

EDGAR

YAHOO! FINANCE

Home Mail Search News Sports Finance Weather Search Finance

Recent Quotes you view appear here for quick access.

Stocks to Watch: Mattel slips on Barbie sales; Wynn hit by Macau; Spirit Air

Quote Lookup Go S&P 500 2,031.99 +8.13 (0.40%) Dow 17,205.33 +63.58 (0.37%) Nasd 4,88 +12.0

Finance Home My Portfolio My Quotes News Market Data Yahoo Originals

Crude Oil 47.35 +2.09% Gold 1,180.70 -0.57% EUR/USD 1.1356 -0.20% 10-Yr

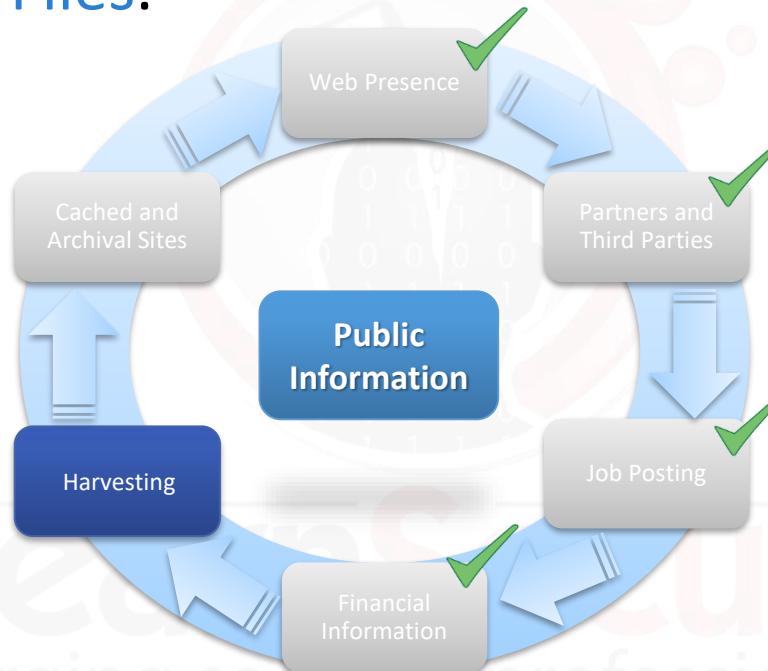
Yahoo F

Company Name  Search More Options ▶



## 1.2.1.5. Harvesting

Let us find out what kind of information we can gather from Documents and Files.



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## 1.2.1.5. Harvesting



In this phase, we unpack methods for gathering **company documents** such as charts (detailing the corporate structure), database files, diagrams, papers, documentation, spreadsheets and so on.

Moreover, this is the right time to begin **harvesting** emails, accounts (Twitter, Facebook, etc.), names, roles and more.



## 1.2.1.5. Harvesting



It is important to know that when a document is created, it automatically stores information (*metadata*) like who created it, date and time of creation, software used, computer name and so on.

If we are able to retrieve documents online and inspect the underlying metadata, we can extract useful information.

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## 1.2.1.5. Harvesting



First, let's see a simple way to find online files and documents using [Google Dorks](#). To do this we can use the following google filters:

```
site:[website] and filetype:[filetype]
```

This will narrow down the results and display only the links to files with the [filetype] extension and stored in the website [website].

Let us see an example for *elearnsecurity.com*



## 1.2.1.5. Harvesting



With the following search string we will obtain all the .pdf files in the [elearnsecurity.com](http://elearnsecurity.com) domain:

```
site:elearnsecurity.com filetype:pdf
```

About 14 results (0.22 seconds)

[PDF] PTSv2 in pills: - eLearnSecurity

[https://www.elearnsecurity.com/collateral/syllabus\\_ptsv2.pdf](https://www.elearnsecurity.com/collateral/syllabus_ptsv2.pdf) ▾

PTSV2 in pills: ♦ Self-paced, online, flexible access. ♦ 900+ interactive slides and. 3 hours of video material. ♦ Interactive and guided learning. ♦ No Pre- ...

[PDF] Download PDF Syllabus - eLearnSecurity

[https://www.elearnsecurity.com/collateral/Syllabus\\_PTSV3.pdf](https://www.elearnsecurity.com/collateral/Syllabus_PTSV3.pdf) ▾

PTSV3 at a glance: ♦ Self-paced, online, flexible access. ♦ 1500+ interactive slides and. 4 hours of video material. ♦ Interactive and guided learning.

**Note:** you can perform this searches for other types of files, such as doc, txt, xls, databases extensions and more.



## 1.2.1.5. Harvesting



As you can imagine, doing this manually can be very tedious and time consuming. A very useful tool that allows us to automatically find and download files is [FOCA](#).

By querying search engines like *google* and *bing*, Foca is able retrieve files and then attempt to extract metadata such as names, usernames, password, OS etc.

Note that this tool works only on Windows unfortunately.

<https://www.elevenpaths.com/labstools/foca/index.html>



## 1.2.1.5. Harvesting



Remember that in this phase, our goal is to retrieve only business information.

Since tools like FOCA allow us to download and extract *infrastructure information* as well, (OS, servers, IP addresses, path etc.) we will see how to use those types of “assets” later on.

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## 1.2.1.5. Harvesting



In the following slides, we will see some other tools that will help automate additional information gathering. The first tool we are going to see is [theHarvester](#). You can download it [here](#).

Thanks to search engines and social networks (*Google, Bing, LinkedIn, etc.*), *theHarvester* is able to enumerate email accounts, user names, domains and hostnames.

<https://github.com/laramies/theHarvester>



## 1.2.1.5. Harvesting



Once we have the tool installed on our machine, we can run the following command in order to retrieve information about elearnsecurity.com:

```
theharvester -d elearnsecurity.com -l 100 -b google
```

where:

- `-d` is the domain or the company to search
- `-l` limits the results to the value specified
- `-b` is the data sources. (I.e. you can set Bing, Google, LinkedIn, etc.)



## 1.2.1.5. Harvesting



The following screenshot shows part of the results of the previous command:

```
[+] Emails found:
```

```
-----  
armando@elearnsecurity.com  
davide@elearnsecurity.com  
jens@elearnsecurity.com  
hostmaster@elearnsecurity.com  
@elearnsecurity.com
```



Email addresses

```
[+] Hosts found in search engines:
```

```
-----  
[-] Resolving hostnames IPs...  
199.193.116.231:www.elearnsecurity.com  
199.193.116.231:members.elearnsecurity.com  
162.220.56.82:blog.elearnsecurity.com  
162.220.56.82:Blog.elearnsecurity.com  
199.193.116.232:ns.elearnsecurity.com  
199.193.116.233:ns1.elearnsecurity.com
```



Hosts



## 1.2.1.5. Harvesting



It is important to know that different search engines return different results, therefore, you should try different data sources in order to obtain the best results. For example, [LinkedIn](#) returns a list of names related to *eLearnSecurity*:

```
theharvester -d elearnsecurity.com -l 100 -b linkedin
```

```
[+] Searching in LinkedIn..
      Searching 100 results..
Users from LinkedIn:
=====
Armando Romeo
Jens Behnisch
Jason Haddix
Edcel Suyo
Schuyler Dorsey
Francesco Stillavato
Domenico Quaranta
```



## 1.2.1.5. Harvesting

At the end of this phase we should have a list of names, email addresses, documents, telephone numbers, usernames and so on.

Remember to log everything, and if needed, go deeper in research for each item of your list.

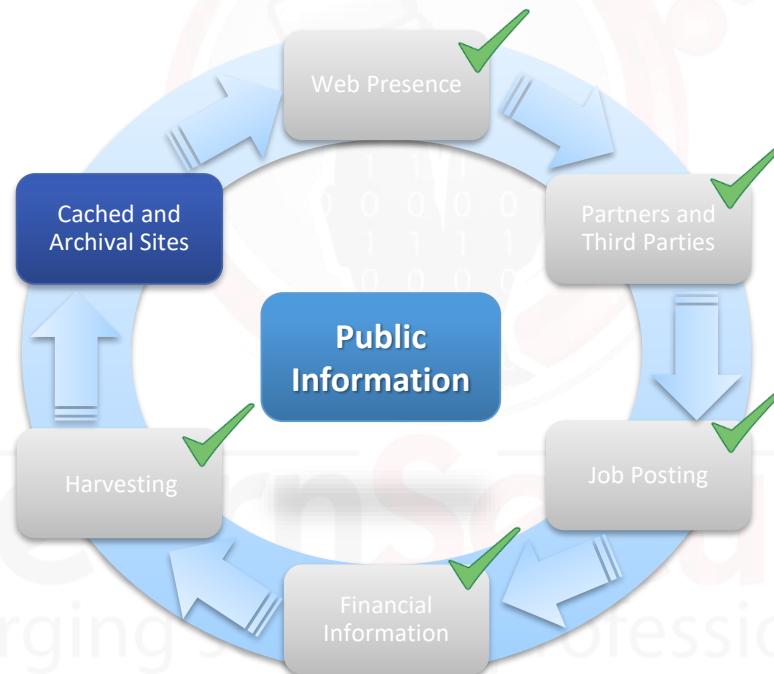
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## 1.2.1.6 Cached and Archival Sites



In the last step (not really last, this is a cyclic process) we will see how to gather information from **Cached and archival sites**.





## 1.2.1.6 Cached and Archival Sites



Since information on the web changes so quickly, sometimes seeking an older version of a site could prove useful to our cause.

Consider a job post. If the organization deletes it from the website, you will “lose” that information; if you could see the web page, before the update, you could harvest that information. Turns out this is entirely possible through cache and archival technology.

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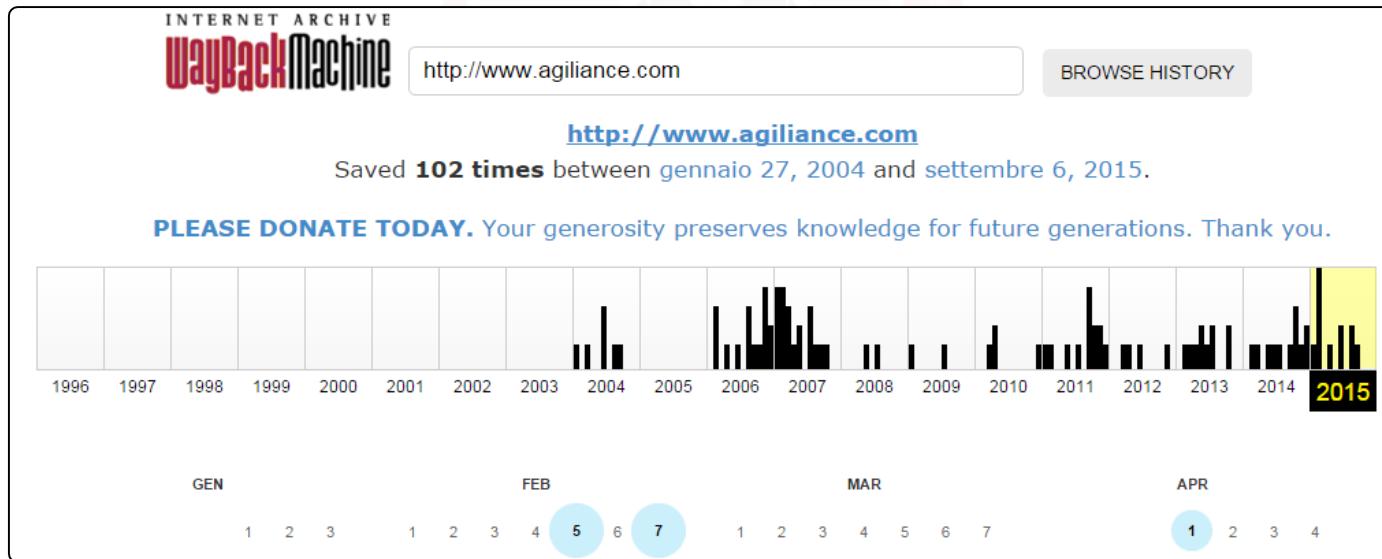




## 1.2.1.6 Cached and Archival Sites



A website that can help us is [archive.org](https://archive.org/). Here you can simply search a specific domain and then navigate through different date and versions of that specific domain.



<https://archive.org/>



## 1.2.1.6 Cached and Archival Sites



Similarly, you can use the Google dork cache : URL. With this technique, you will see a cached version of the website.

This is Google's cache of <http://www.agiliance.com/>. It is a snapshot of the page as it appeared on Oct 17, 2015 19:34:26 GMT.

The current page could have changed in the meantime. [Learn more](#)

[Full version](#)

[Text-only version](#)

[View source](#)

Tip: To quickly find your search term on this page, press **Ctrl+F** or **⌘-F** (Mac) and use the find bar.

[Contact](#)



[GET STARTED](#)

Solutions

Products

Services

Customers

Partners

News

Company

How Cyber Safe is Your Organization?

Stress your cyber security with a test designed by the retired CISO of the CIA.

[Start Now](#)



## 1.2.1. Search Engine



By now, you should have a healthy amount of useful information about your target organization.

Due to the fact that the process takes such a long time, it could be useful to repeat some of the previous steps in order to see if something has changed.

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## 1.2.1. Search Engine



To conclude the first part of the information gathering process, it is imperative to focus on the employees of our target organization.

This is a very important task that can reveal a great deal of information. Thanks to social networks, we can take advantage of private information that is carelessly revealed on the web with little to no thought from the employee.



## 1.2.1. Search Engine



The best way to learn how to perform effective information gathering is by doing it.

In the next slide you will find a special lab on a real world target organization you will need to use the techniques learned in the course thus far and apply them.

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## 1.2.1. Search Engine



**eLSFoo** is a fictitious company created by eLearnSecurity. You are given authorization to perform Information gathering on this organization (no attacks are allowed against the target).

Your goal is to create a mind map containing information about *eLSFoo*:

- Employees
- Emails
- ...

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Labs are available in  
**FULL** and **ELITE** plans only



Each lab has its own manual  
Find it in your members area



## eLSFoo Information Gathering

eLearnSecurity has created eLSFoo, a fictitious company located at  
[www.elsfoo.com](http://www.elsfoo.com).

Apply all the learned techniques to find and collect information regarding the company.

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# SOCIAL MEDIA

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## 1.3. Social Media



The spread of **Social networks** has made Information gathering extremely important (and effective).

With the help of social media, a penetration tester can easily gather employee's personal information such as: phone numbers, addresses, history, CV, opinions, responsibilities, projects and so on.

Since humans are the *weakest link in the IT security chain*, a good penetration test must take care of them (if in the scope).



## 1.3. Social Media



During the entire Information Gathering process we are going to see the **Social Media** tasks. Keep that in mind as you are going through the slides.



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## 1.3. Social Media



In this particular phase, social media is useful in the following ways:

- Learn about corporate culture, hierarchies, business processes, technologies, applications.
- To build a network map of people (relationships).
- Select the most appropriate target for a social engineering attack.



## 1.3. Social Media



In the previous phase you should have already compiled a list of managers, employees etc. What we have to do now, is gather information on every person on this list.

We will use *Apple* for our case study.

Let's take a step back and review how to mine employee lists from social media.

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## 1.3. Social Media



You can use LinkedIn to gather (most of) them:

The screenshot shows the LinkedIn company profile for Apple. At the top left is the Apple logo. To its right, the company name "Apple" is displayed in bold, followed by "Consumer Electronics" and "10,001+ employees". On the far right, there are "2,655,095 followers", a yellow "Follow" button, and a share icon. Below this header, there are two navigation tabs: "Home" (underlined) and "Careers". The main content area features a large photograph of four people (three men and one woman) working together at a desk, looking at papers. To the right of the photo is a section titled "How You're Connected" showing four connection profiles: two 1st degree connections (a woman and a man), and two 2nd degree connections (a woman and a man). Below this, a red box highlights "111,518 Employees on LinkedIn". At the bottom right of the profile is a "See all" link.

Apple  
Consumer Electronics  
10,001+ employees

2,655,095 followers [Follow](#)

[Home](#) [Careers](#)

How You're Connected

1st 1st 2nd 2nd

2 first-degree connections  
926 second-degree connections  
**111,518 Employees on LinkedIn**

[See all ▶](#)



## 1.3. Social Media



Retrieve more by searching in Apple activity:

Overview Careers

All Activity Filter by ▾

**Apple has a new Web Producer**  
is now Web Producer, was We  
Like \* 2 hours ago

**Apple has a new specialist**  
is now specialist, was Dem  
Specialist at **Bose Corporation**  
Like \* 3 hours ago

**Apple has a new Software Engineer**

All Activity  
Profile Changes  
**New Hires**  
Recent Departures  
Promotions & Changes  
Status Updates  
Go to job postings  
Go to products & services



## 1.3. Social Media



On LinkedIn, you can perform advanced search functions on people based upon: current title, position, location, company and so on.

Let's presumably say we have the desire to start building a network map of people in [Agilience](#). Suppose we do not know who the [CEO](#) is.

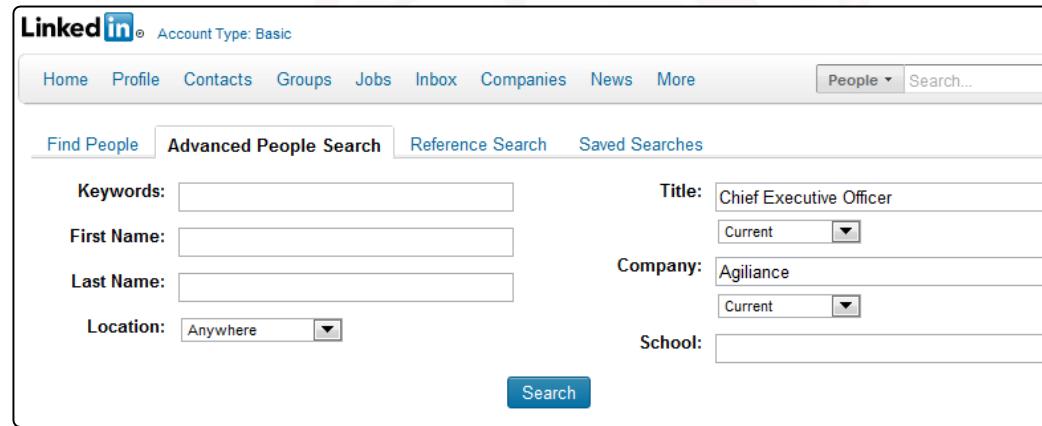
You can click on advanced search in LinkedIn and start filling in search fields.

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## 1.3. Social Media

This is an example of what we can type:



The screenshot shows the LinkedIn Advanced People Search page. At the top, there's a navigation bar with links for Home, Profile, Contacts, Groups, Jobs, Inbox, Companies, News, More, and a People dropdown menu. Below the navigation is a search bar labeled "Search...". Underneath the search bar are four tabs: "Find People", "Advanced People Search" (which is selected), "Reference Search", and "Saved Searches". The main search form consists of several input fields: "Keywords" (empty), "First Name" (empty), "Last Name" (empty), "Location" (set to "Anywhere"), "Title" (set to "Chief Executive Officer"), "Company" (set to "Agilience"), and "School" (empty). A "Current" dropdown menu is positioned next to the Title and Company fields. At the bottom of the search form is a blue "Search" button.

In the next page, we can refine our search by a more specific location, business and more.



Note that when you perform these types of searches within *LinkedIn*, you may not see all the information about the people you are looking for as it depends upon the privacy settings of the target, relationship degree or shared groups.





If your target is a 1st or a 2nd connection, then you will see all their information. If he/she is a 3rd connection you will see only the name and the first letter of the surname.

In all other cases, you will even less limited information, and no full name.

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## 1.3. Social Media



When this occurs, you can do the following:

- upgrade your LinkedIn account
- use a specific query in a search engine (Google, Bing...), in order to find (if exists) the public LinkedIn profile of the target

Let's go back and see what we can retrieve from the previous search.

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# 1.3. Social Media

MAP

REF

98

The following snapshot shows the results of our search. As you can see we are able to see the contact information.

Search

Advanced >

All

People

More...

Keywords

agiliance

First Name

Last Name

18 results for **agiliance**

Some search results have been filtered to improve relevance.  
[Show all results](#)

 **Joe Fantuzzi** GROUP  
President and CEO at Agiliance  
San Francisco Bay Area • Computer Software  
Similar

Current: President and CEO at Agiliance

 **Pravin Kothari** in 2nd  
Founder and CEO at CipherCloud  
San Francisco Bay Area • Computer Software  
1 shared connection • Similar

Current: Founder & CEO at CipherCloud

**Connect**

**Connect**



## 1.3. Social Media



As we said, if LinkedIn does not return a profile, we can still leverage a search engine. In this case it is enough to search '*President and CEO at Agilience*' using the following filter:

site:linkedin.com

Google President and CEO at Agilience site:linkedin.com

Search About 748 results (0.24 seconds)

Everything Joe Fantuzzi profiles | LinkedIn  
www.linkedin.com/pub/dir/Joe/Fantuzzi  
Current: **President and CEO at Agilience**; Past: Advisor to Board at Workshare LTD, CEO and Director at Workshare, CEO and Director at Liquid Engines, CEO ...

Images

Maps

Videos

News

Shopping

Joe Fantuzzi | LinkedIn  
www.linkedin.com/pub/joe-fantuzzi/a/565/357  
San Francisco Bay Area - President and CEO at Agilience  
**President and CEO. Agilience.** Privately Held; 51-200 employees; Computer Software industry. December 2009 – Present (1 year 11 months). Integrated ...



# 1.3. Social Media

MAP

REF

100

We can continue our investigation for additional titles and positions in the company and create a people map. Let's now search for a V.P.

Search

Advanced >

All

**People**

More...

Keywords

vice president

First Name

21 results for **vice president**

Some search results have been filtered to improve relevance  
[Show all results](#)

 **Torsten George**  2<sup>nd</sup>  
Global Marketing Executive / Product Evangelist  
San Francisco Bay Area • Computer Software  
• 1 shared connection • Similar

Current: Vice President, Worldwide Marketing, Products, and Support at A...  
Past: Vice President, Worldwide Marketing at ActivIdentity Inc.  
Member, Strategic Advisory Board at Cordys  
Director, On-Demand Services / General Manager at ActivIdentity ...



**Torsten George**  
Global Marketing Executive / Product Evangelist  
San Francisco Bay Area | Computer Software

Current: Agilience  
Previous: ActivIdentity Inc., Cordys, Solid Information Technology  
Education: Freie Universität Berlin, Germany

[Connect](#) [Send Torsten InMail](#) ▾



## 1.3. Social Media

After a few more searches, you should be able to start building a good network of people:



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Why is building a network of people important?

Social engineering (among the other things) is the art of exploiting trust relationships.

If your target is **Bob** and you know that **Bob** trusts **Adam** therefore, you can get to **Bob** through **Adam**. Figuring out this trust relationship is an important part of the information gathering process.



## 1.3. Social Media

MAP

REF

103

Once you get a list of people, you can start collecting personal information on them.



Once again, *LinkedIn* offers the ability to see the connections a person has with both other colleagues and, friends. This could help you in building a people network map.



## 1.3. Social Media

 MAP REF

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Moreover, thanks to social networks like *Twitter*, *Facebook* and *Linkedin*, you can infer the level of relationship between two people.

*Twitter* is especially good at that very function because you can see public conversations between two people.

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## 1.3. Social Media



We have seen how to get info from LinkedIn, but there are many other sources where you can mine additional data.

People  
search

Social  
Networks

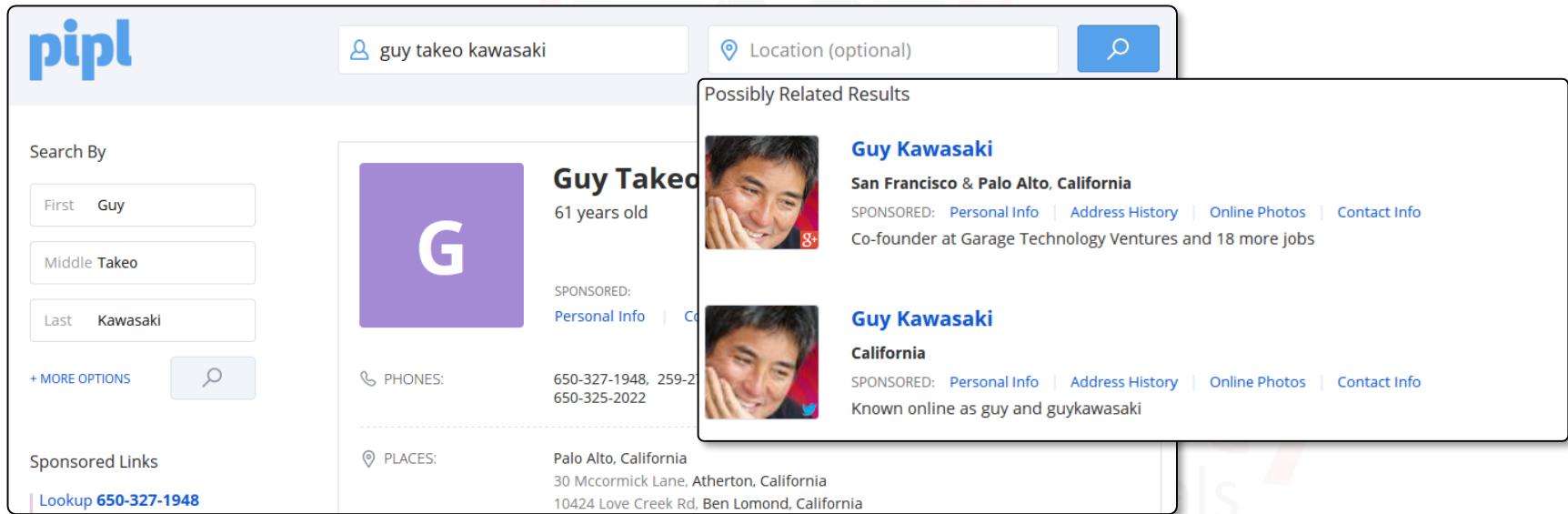
Usenet

**ECCP H3CURITY**  
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## 1.3.1. Social Media – People search

We can use [www.pipl.com](http://www.pipl.com) to retrieve more information about individuals. Let the famous *Guy Kawasaki* be our target and let's see what we can uncover about him using this tool:



The screenshot shows the pipl.com search interface. In the search bar, the query "guy takeo kawasaki" is entered. Below the search bar, there are fields for "Location (optional)" and a search button. On the left, there's a sidebar titled "Search By" with dropdowns for "First" (Guy), "Middle" (Takeo), and "Last" (Kawasaki), along with "MORE OPTIONS" and a search icon. The main results section is titled "Possibly Related Results". It shows two entries for "Guy Kawasaki". The top entry is for "Guy Takeo Kawasaki" from "San Francisco & Palo Alto, California", listing "61 years old" and "SPONSORED: Personal Info | Address History | Online Photos | Contact Info". It also notes he is a "Co-founder at Garage Technology Ventures and 18 more jobs". The bottom entry is for "Guy Kawasaki" from "California", listing "Known online as guy and guykawasaki". Both entries show a small profile picture of a smiling man. At the bottom of the results, there are sections for "PHONES:" (650-327-1948, 259-2122, 650-325-2022) and "PLACES:" (Palo Alto, California; 30 McCormick Lane, Atherton, California; 10424 Love Creek Rd, Ben Lomond, California).



## 1.3.1. Social Media – People search



Other very useful websites that you can use to find more information on someone are spokeo and peoplefinders:

The image shows two side-by-side screenshots of people search websites. On the left is the Spokeo website, which has a background image of a beach and a large search bar with the placeholder "Search people". It features social media sharing icons (Facebook, Twitter, LinkedIn) on the left and a "NAME" and "EMAIL" input field with a "Search" button below it. On the right is the PeopleFinders website, which has a clean white background. It features a navigation bar with links for "People Search", "Background Check", "Criminal Records", "Public Records", "Genealogy Search", and "Reverse Phone". The main content area says "PeopleFinders is the trusted people search service for public records". It has a "People Search" form with fields for "First Name", "Last Name", "City", "State" (with a dropdown menu for "All States"), and a "Search" button. To the right is a "Reverse Phone Lookup" form with a "Phone Number" field in the format "(XX) XXX-XXXX" and a "Search" button.

<https://www.spokeo.com/>

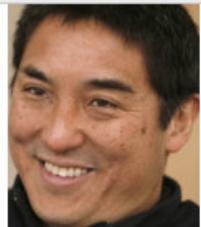
<https://www.peoplefinders.com/>



## 1.3.1. Social Media – People search

We can even use [CrunchBase](#) to find more information about our target:

Guy Kawasaki



[★ FOLLOW](#)

STATISTICS  
51

Date	Invested In	Round	Details
Oct, 2013	<a href="#">GotIt!</a>	\$525k / Angel	Personal Investment
Dec, 2011	<a href="#">Buffer</a>	\$400k / Angel	Personal Investment
Dec, 2008	<a href="#">Posterous</a>	\$725k / Angel	Personal Investment
May, 2006	<a href="#">FilmLoop</a>	\$7M / Series B	<a href="#">Garage Technology Ventures</a>
Jul, 2005	<a href="#">Simply Hired</a>	\$3M / Series B	<a href="#">Garage Technology Ventures</a>
Feb, 2005	<a href="#">FilmLoop</a>	\$5.6M / Series A	<a href="#">Garage Technology Ventures</a>
Sep, 2004	<a href="#">BitPass</a>	\$11.8M / Series B	<a href="#">Garage Technology Ventures</a>

<https://www.crunchbase.com/>



## 1.3.1. Social Media – People search



At this point of our information gathering phase we already know some information seen below:

- Age
- Phone Number
- Business
- Addresses
- Occupation
- Interests

Further searching will tell us:

- Email addresses
- Related Documents
- Website Owned
- Financial Info



## 1.3.1. Social Media – People search



While discussing **Social Networks**, let's see what we can retrieve by searching "Guy Kawasaki" on Twitter.

Accounts View all

  
**Guy Kawasaki**   
@GuyKawasaki  

Mantra: I empower people. Chief evangelist of [@Canva canva.com](#).  
Author of thirteen books. Former chief evangelist of Apple.

  
**Guy Kawasaki**  
@Alltop  

Primarily the postings of [Holykaw.com](#) with no duplication.



## 1.3.1. Social Media – People search

MAP

REF

111

By inspecting the messages and information published online we can retrieve information such as projects, travel, interests and so on. Some of this information may be useful later on.

TWEETS FOLLOWING FOLLOWERS FAVORITES  
148K 130 1.46M 761

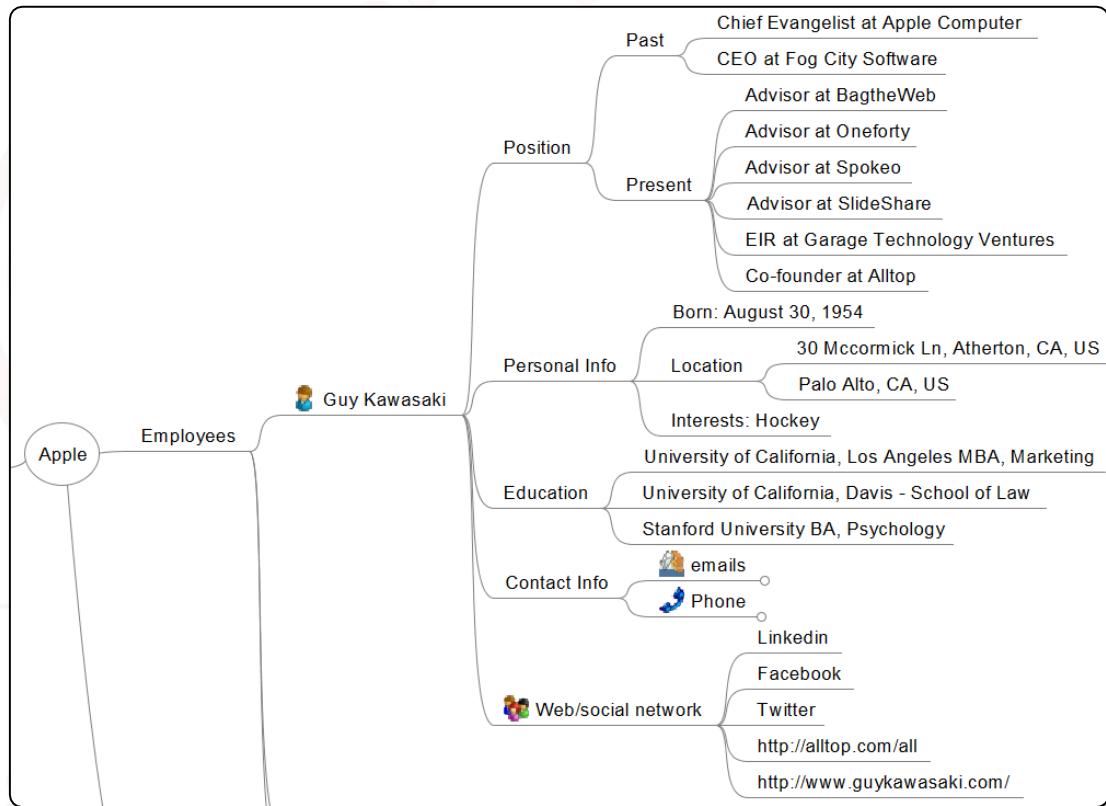
Guy Kawasaki @GuyKawasaki  
Mantra: I empower people. Chief evangelist of [@Canva](#) [canva.com](#). Author of thirteen books. Former chief evangelist of Apple.  
Silicon Valley, California [guykawasaki.com](#)

Guy Kawasaki @GuyKawasaki · 5m  
The epic Halloween house is back:  
Ghostbusters edition [video]  
[holykaw.alltop.com/the-epic-hallo](#) ...



## 1.3.1. Social Media – People search

Now that we have all this information, let us put it all together and organize it in our mind mapping tool.





## 1.3.1. Social Media – People search



At this point, we have amassed a healthy amount of information on our target. In our examples we just barely scratched the surface of the information available online. In a real pen test engagement you will probably need go deeper in detail.

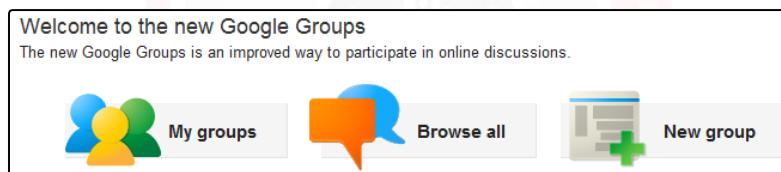
At this point we are almost done, but there is another area that we did not touch yet: [usenet](#) and [newsgroups](#).

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## 1.3.2. Social Media - USENET

Usenet is a world-wide distributed discussion system. It consists of a set of newsgroups with names that are classified hierarchically by subject.



We can also find additional information by searching for individuals' name or email in Google groups. This may lead us to further sensitive data shared by the target company and its employees..



### Your turn

Once again, we want you to try these techniques on eLSFoo! All is theory until you apply the skills you have learned! You can try to collect and organize information such as:

- Company hierarchy
- Personal details about board of directors
  - Email addresses
  - Phone numbers
  - Addresses
  - ...



At this point of our information gathering process, we have gained quite a bit of information however, we focused mainly on the organization's business and people.

We can now start gathering more technical information about infrastructure, systems, networks and so on.

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## 1.3. Social Media



The following chart sums up the tasks already performed and also outlines what we are going to see in the coming slides.



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## 1.3. Social Media



All the information gathered thus far was public and accessible by anyone. In the next section we will see techniques that need the targets' (customers) authorization. You are not authorized to use these techniques against the organizations in the previous slides.

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# INFRASTRUCTURES

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## 1.4. Infrastructures



Having collected business information, we will now move on to collecting infrastructure details.

The main goal here is to retrieve data such as:

- Domains
- Netblocks or IP addresses
- Mail servers
- ISP's used
- Any other technical information



Keep in mind that during this process you could possibly retrieve information that is **outside the scope of engagement**. So, be careful! If you do not have authorization then please avoid performing further action on out of scope assets.

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## 1.4. Infrastructures



As the Scope of Engagement (SoE) for your penetration test, your customer can give you:

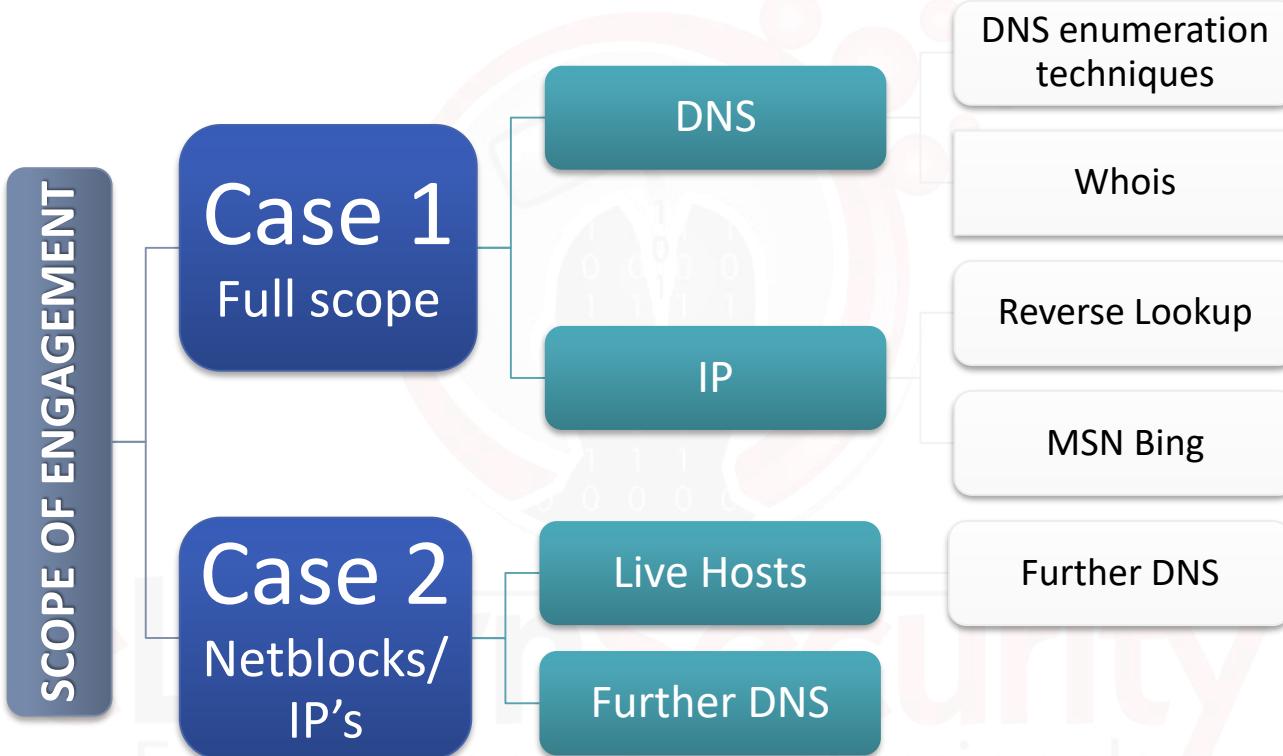
1. The name of the organization (full scope test)
2. IP addresses or net blocks to test

From this moment on, the approach heavily depends upon the SOE. In the following slides, we will assume the below listed cases:

- We have the name of the organization (full scope)
- We only have specific net block(s) to test.



# 1.4. Infrastructures





## 1.4. Infrastructures



Let's first consider a **full scope** engagement.

In this case, your engagement is similar to how a malicious hacker would attack. Indeed the hacker only knows the target organization name at the beginning and then, he tries to derive as much information from that.

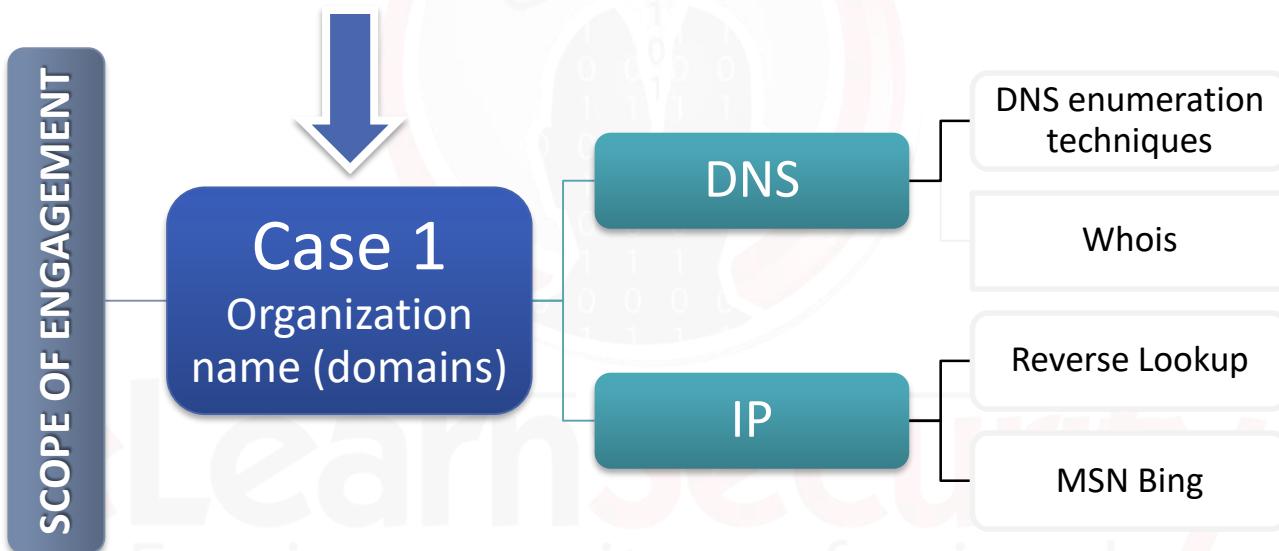
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## 1.4.1. Infrastructures – Domains



This process aims to collect all the hostnames related to the organization and the relative IP addresses.





## 1.4.1. Infrastructures – Domains



This process ends when we obtain the following information:

- Domains
- DNS Servers in use
- Mail servers
- IP addresses

We assume at this point that you know the organization's website domain.



## 1.4.1. Infrastructures – Domains



The first source for information, given a domain name, is [WHOIS](#).

This is a public database and should be the first step in any investigation on infrastructure-related information.





## 1.4.1. Infrastructures – Domains



**WHOIS** (pronounced "who is"; not an acronym) is a query/response protocol, widely used for querying an official domain registrar's database, in order to determine:

- The owner of a domain name
- IP address or range
- Autonomous system
- Technical contacts
- Expiration date of the domain



## 1.4.1. Infrastructures – Domains



WHOIS lookups were traditionally made using a command line interface, but a number of simplified web-based tools now exist for looking up domain ownership details from different databases. Web-based WHOIS clients still rely on the WHOIS protocol to connect to a WHOIS server and execute lookups however, command-line WHOIS clients are still quite widely used by system administrators.

[WHOIS](#) normally runs on TCP port 43.

<https://tools.ietf.org/html/rfc3912>



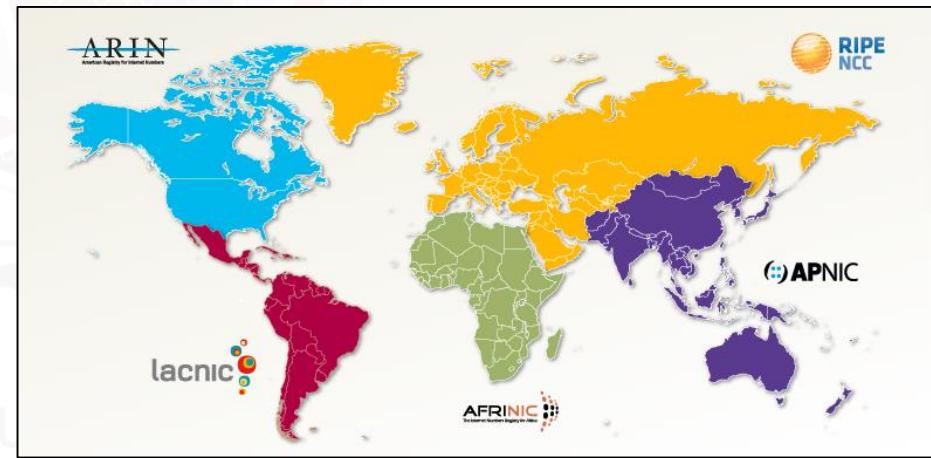
## 1.4.1. Infrastructures – Domains



### Further Information

A Regional Internet Registry (RIR) is an organization that manages resources such as IP addresses and Autonomous Systems for a specific region. There are five main RIR providers for WHOIS information:

- AFRINIC
- APNIC
- RIPE NCC
- ARIN
- LACNIC





## 1.4.1. Infrastructures – Domains



A wealth of information can be obtained from WHOIS searches that will kick start your investigation into the right direction:

- Number Resource Records
- Network Numbers (IP Addresses) referred to as NETs.
- Autonomous System Numbers referred to as ASNs.
- Organization records referred to as ORGs.
- Point of Contact records referred to as POCs.
- Authoritative information for Autonomous System Numbers and registered outside of the RIR being queried



## 1.4.1. Infrastructures – Domains



Note that the RIRs are not responsible for the information within the databases they maintain.

The responsibility for the records validity belongs to the individual organizations. They have to keep their record information accurate and up to date.

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## 1.4.1. Infrastructures – Domains



Note

While using WHOIS databases, be sure to try different searching techniques on your target.

For example, be sure to search for just the name of the target company with no domain, then continue on to other searches leveraging different variations of domain names (i.e. target, target.com, target.net, etc.).



## 1.4.1. Infrastructures – Domains



There are a lot of online tools that allow you to use WHOIS, such as:

- <http://who.is>
- <http://whois.domaintools.com>
- <http://bgp.he.net/>
- <http://networking.ringofsaturn.com/Tools/whois.php>
- <http://www.networksolutions.com/whois/index.jsp>
- <http://www.betterwhois.com/>



## 1.4.1. Infrastructures – Domains



Let us see an example of the WHOIS results: (our target domain will be `elsfoo.com`)

**Whois Record** for ElearnSecurity.com

**Registrar info**

- Whois & Quick Stats

Registrant Org	Domains By Proxy, LLC was found in ~11,112,272 other domains
Registrar	GODADDY.COM, LLC
Registrar Status	clientDeleteProhibited, clientRenewProhibited, clientTransferProhibited, clientUpdateProhibited
Dates	Created on 2009-03-30 - Expires on 2020-03-30 - Updated on 2015-03-30
Name Server(s)	NS.ELEARNSecurity.COM (has 3 domains) NS1.ELEARNSecurity.COM (has 3 domains) NS5.DNSMADEEASY.COM (has 222,771 domains) NS6.DNSMADEEASY.COM (has 222,771 domains) NS7.DNSMADEEASY.COM (has 222,771 domains)
IP Address	199.193.116.231 - 3 other sites hosted on this server
IP Location	USA - Florida - Tampa - Noc4hosts Inc.

**Domain servers**

**Website information**

- Website

Website Title	eLearnSecurity - IT Security training courses for individuals and corporations
Server Type	Microsoft-IIS/7.5
Response Code	200
SEO Score	82%
Terms	271 (Unique: 167, Linked: 92)
Images	19 (Alt tags missing: 5)
Links	57 (Internal: 35, Outbound: 20)



## 1.4.1. Infrastructures – Domains



The Domain Name System server hosted on [dnsmadeeasy.com](http://dnsmadeeasy.com) is an example of a system that **would not be** part of the penetration test engagement because is out of scope.

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## Video: WHOIS Lookup



WHOIS  
Lookup



If you have a **FULL** or **ELITE** plan you can click  
on the image on the left to start the video

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## 1.4.1. Infrastructures – Domains



Question: what information did we get from WHOIS that can help determine the infrastructure of the organization?

Answer: Name servers!

These are servers that store all the DNS related information (records) about the domain.

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## 1.4.1.1. DNS Enumeration



Let's now move on in our investigation and start collecting information about the targets' DNS. A **Domain Name System** (DNS) is a distributed database arranged hierarchically. Its purpose is to provide a means to use *hostnames* (like `elearnsecurity.com`) rather than *IP addresses* (like `199.193.116.231`).

DNS is a key aspect of Information Security as it binds a hostname to an IP address and many protocols such as SSL are as safe as the DNS protocol they bind to.



## 1.4.1.1. DNS Enumeration

MAP

REF

140

DNS servers contain textual records.

Each record has a given type, each with a different role.

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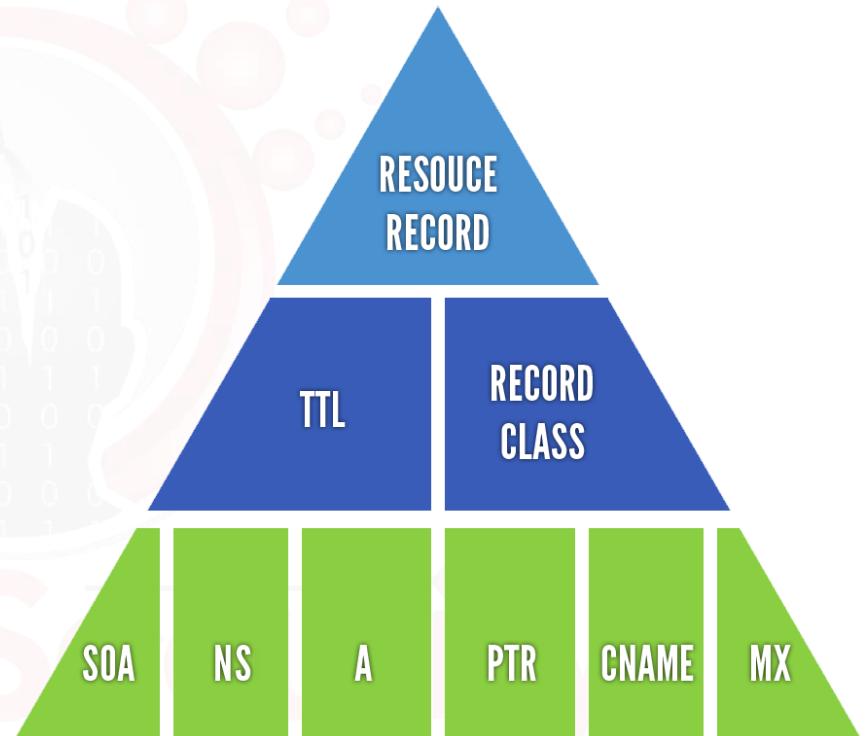


## 1.4.1.1.1. DNS Records



DNS queries produce listings called Resource Records.

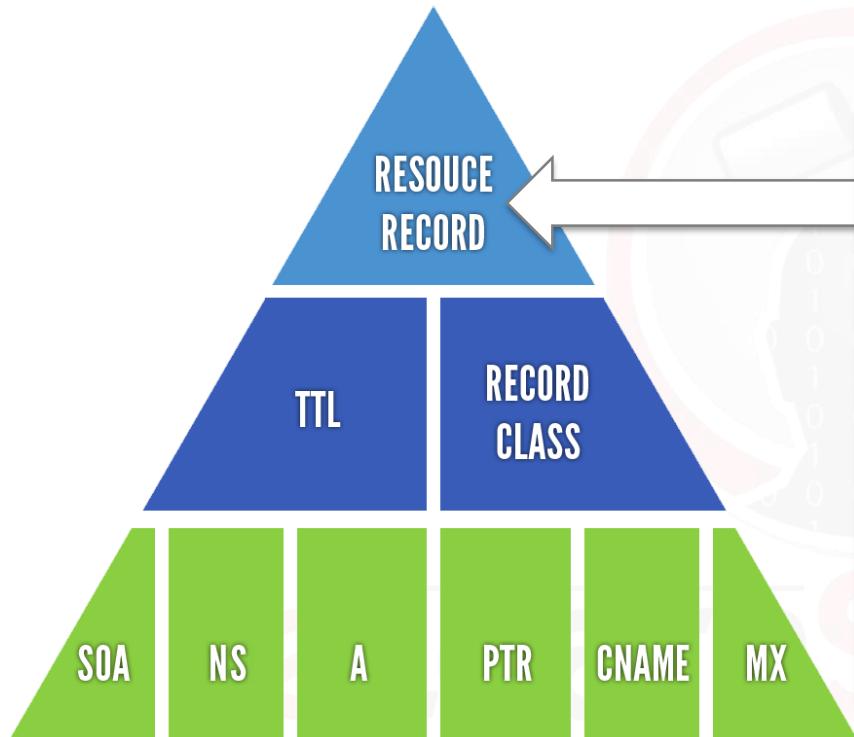
This is a representation of Resource Records.



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## 1.4.1.1.1. DNS Records

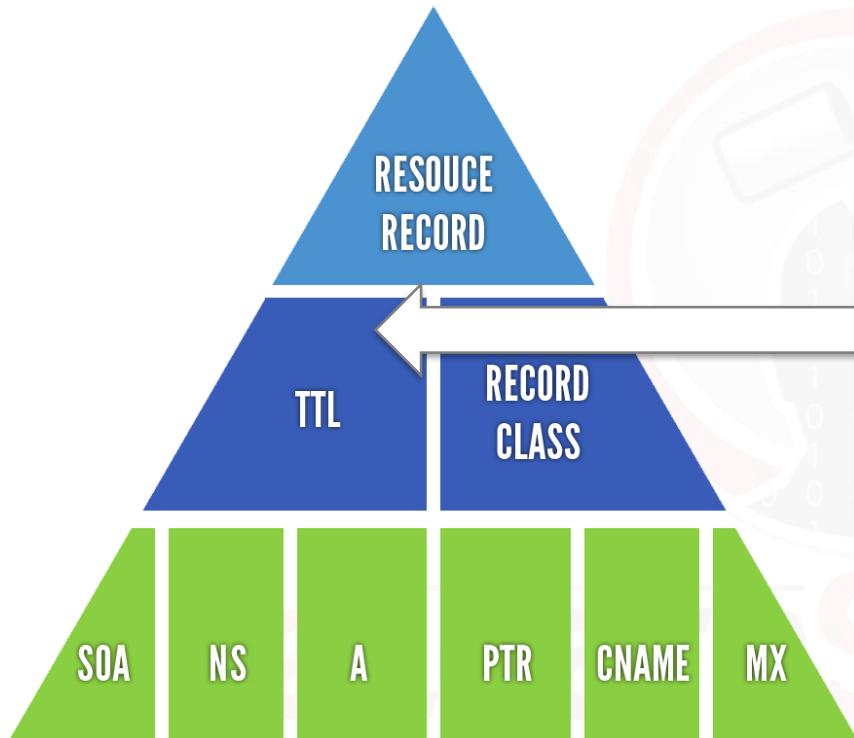


A Resource record starts with a domain name, usually a fully qualified domain name. If anything other than a fully qualified domain name is used, the name of the zone the record is in will automatically be appended to the end of the name.

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## 1.4.1.1.1. DNS Records

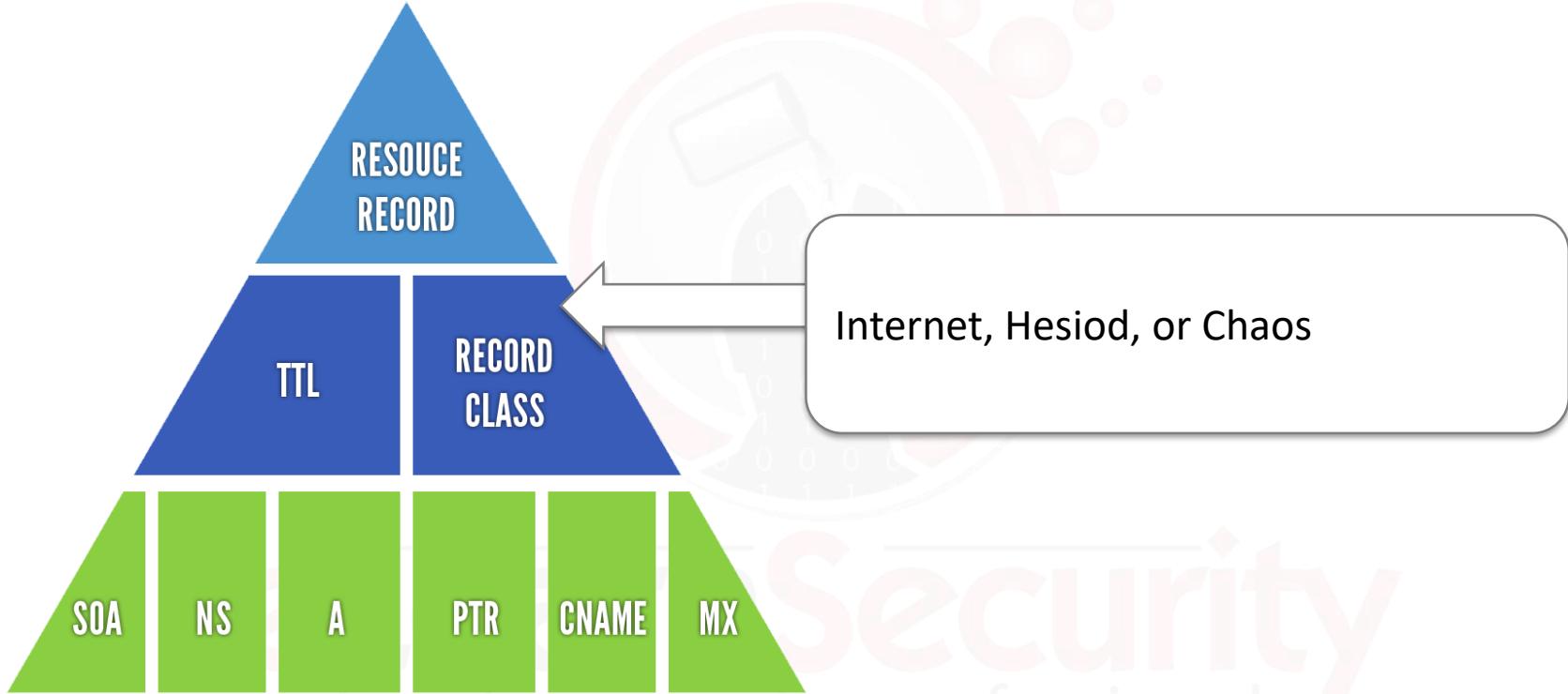


Time-To-Live (TTL), recorded in seconds, defaults to the minimum value determined in the Start of Authority (SOA) record.

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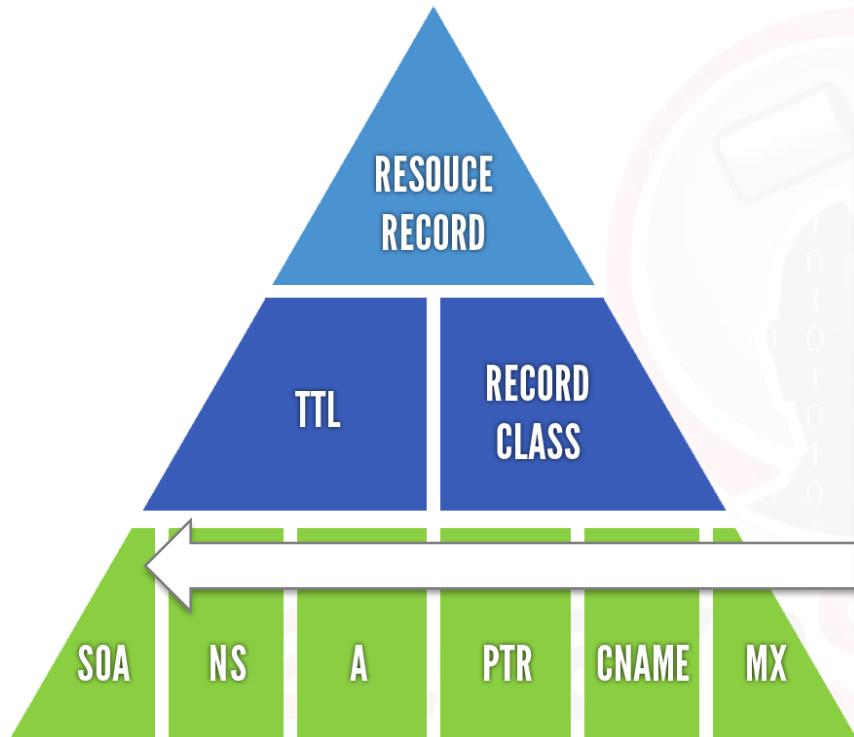
## 1.4.1.1.1. DNS Records



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## 1.4.1.1.1. DNS Records



### Start of Authority

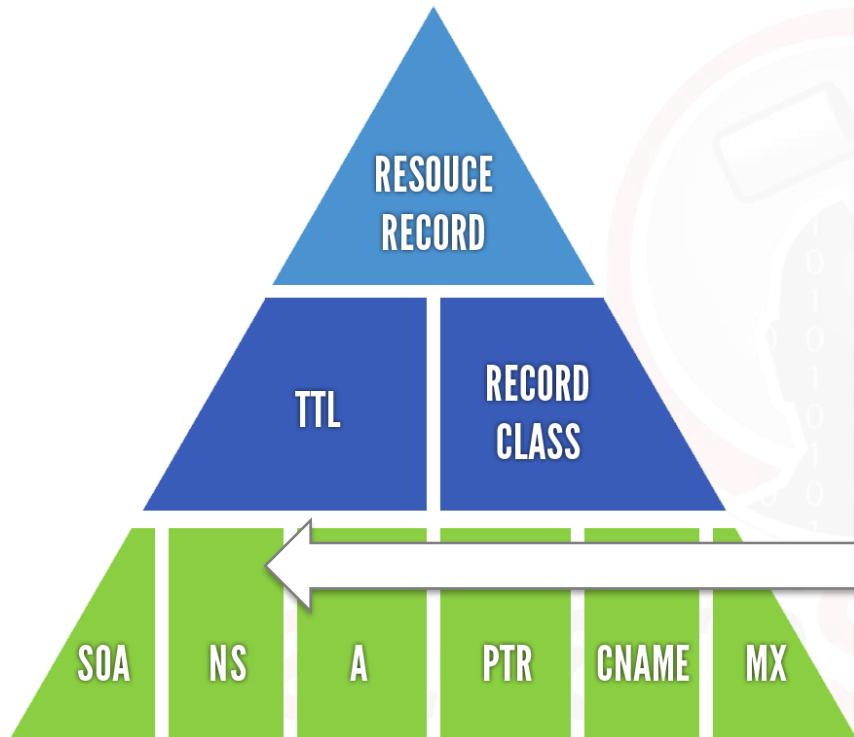
Indicates the beginning of a zone and it should occur first in a zone file.

There can be only one SOA record per zone.

Defines certain values for the zone such as a serial number and various expiration timeouts



## 1.4.1.1.1. DNS Records



### Name Server

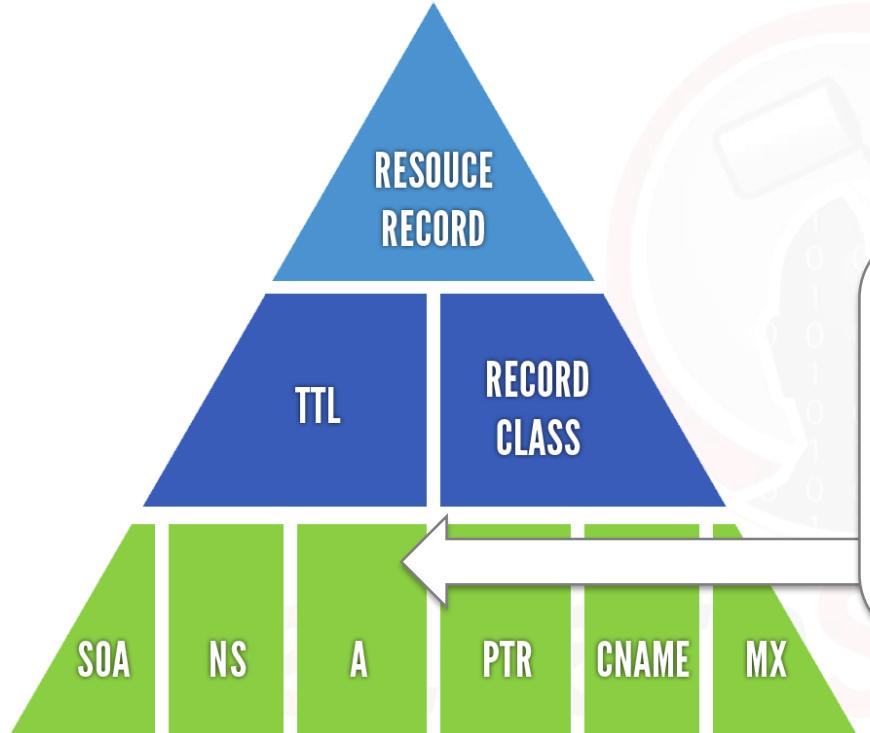
Defines an authoritative name server for a zone.

Defines and delegates authority to a name server for a child zone.

NS Records are the GLUE that binds the distributed database together.



## 1.4.1.1.1. DNS Records

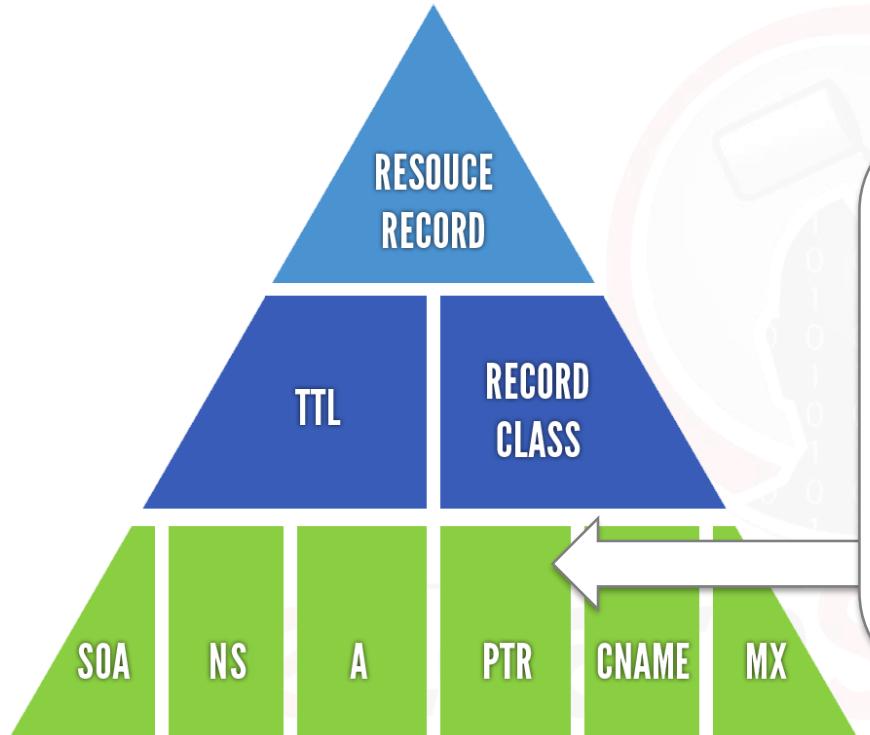


### Address

The A record simply maps a hostname to an IP address. Zones with A records are called 'forward' zones.



## 1.4.1.1.1. DNS Records



### Pointer

The PTR record maps an IP address to a Hostname.

Zones with PTR records are called 'reverse' zones.

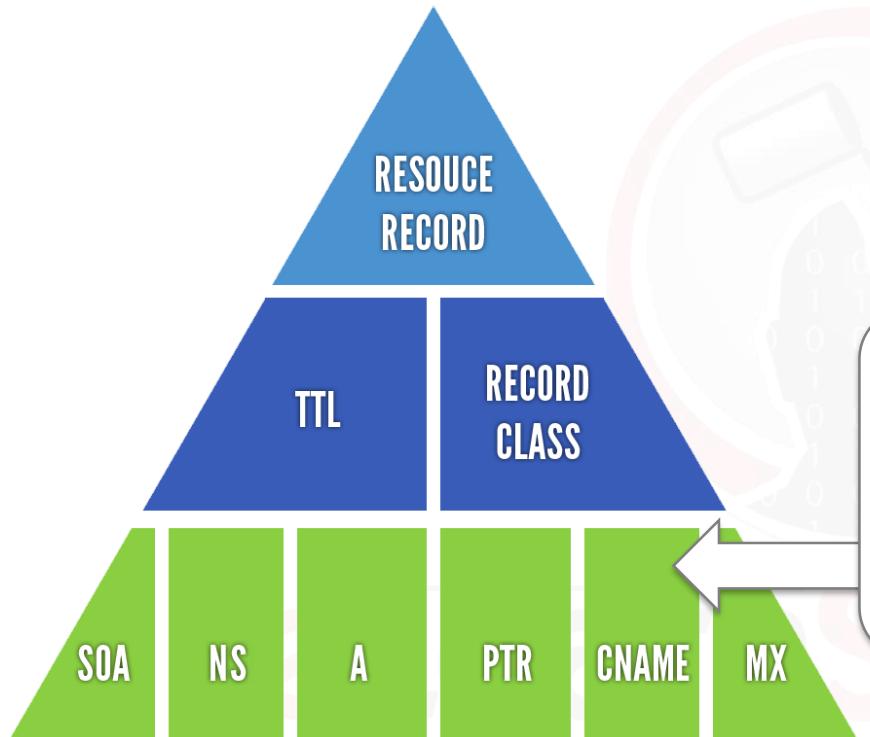


## 1.4.1.1.1. DNS Records

MAP

REF

149



### CNAME

The CNAME record maps an alias hostname to an A record hostname.

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## 1.4.1.1.1. DNS Records



### Mail Exchange

The MX record specifies a host that will accept email on behalf of a given host.

The specified host has an associated priority value

A single host may have multiple MX records.

The records for a specific host make up a prioritized list.



## 1.4.1.1. DNS Enumeration



A [DNS Lookup](#) is the simplest query a DNS server can receive. It asks the DNS to resolve a given hostname to the corresponding IP. You can do so with [nslookup](#):

```
nslookup targetorganization.com
```

In order to obtain the IP addresses of an organization, an attacker will first try to determine the hostnames and then try to resolve them.

[https://docs.microsoft.com/en-us/previous-versions/windows/it-pro/windows-server-2012-R2-and-2012/cc725991\(v=ws.11\)](https://docs.microsoft.com/en-us/previous-versions/windows/it-pro/windows-server-2012-R2-and-2012/cc725991(v=ws.11))



## 1.4.1.1. DNS Enumeration



In order to collect the highest number of domains and subdomains related to the organization, we can use different techniques.

DNS  
lookup

MX  
lookup

Zone  
transfers



## 1.4.1.1. DNS Enumeration



With [Reverse DNS lookup](#), we will receive the IP address associated to a given domain name. This process queries for DNS pointer records (PTR). For this task you can use *nslookup*

```
nslookup -type=PTR IPaddress
```

or online tools such as:

- <http://network-tools.com/nslook/>

Only domains with a PTR record set will respond to the above reverse lookup.



## 1.4.1.1. DNS Enumeration



With the **MX(Mail Exchange) lookup**, we retrieve a list of servers responsible for delivering e-mails for that domain.

Once again you can use nslookup,

```
nslookup -type=MX domain
```

or leverage online tools such as:

- <http://www.dnsqueries.com/en/>
- <http://www.mxtoolbox.com/>



## 1.4.1.1. DNS Enumeration



**Zone transfers** are usually a misconfiguration of the remote DNS server. They should be enabled only for trusted IP addresses (usually trusted downstream name servers).

When zone transfers are enabled, we can enumerate the entire DNS record for that zone.

This includes all the sub domains of our domain (**A** records).



## 1.4.1.1. DNS Enumeration



How does this technique work?

In order to request the entire record, we will have to ask the server that houses this record (organization's name server).

This server can be found by executing:

```
nslookup -type=NS domain.com
```

There are usually two name servers. Take note of both of them.



## 1.4.1.1. DNS Enumeration



You can finally issue a zone transfer request using this command:

```
nslookup  
server [NAME SERVER FOR mydomain.com]  
ls -d mydomain.com
```

If we are lucky, we will see a screen similar to our next slide.

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## 1.4.1.1. DNS Enumeration



```
>nslookup
>server mydomain.com
>ls -d mydomain.com
[mydomain.com]
Mydomain.com.          SOA      ct5154 hostmaster. (18 900 566 45874 5550)
Mydomain.com.          A        66.200.100.84
Mydomain.com.          NS       ns.mydomain.com
Mydomain.com.          MX       30      aspmx2.googlemail.com
Mydomain.com.          MX       30      aspmx3.googlemail.com
Mydomain.com.          MX       20      alt1.aspm.l.google.com
Mydomain.com.          MX       20      alt2.aspm.l.google.com
Mydomain.com.          MX       10      aspmx.l.google.com
Mydomain.com.          TXT      "v=spf1 ip4:66.200.100.32 mx
include:aspmx.googlemail.com ~all"
Mydomain.com.          TXT      "google-site-
verification=omuynasdh867ajh_8djuhadn_sadi8nad_S-Q"
Admin                 A        66.200.100.77
ns                    A        66.200.100.54
ns1                  A        66.200.100.44
www                  A        66.200.100.70
mydomain.com          SOA      ct5154 hostmaster. (18 900 566 45874 5550)
```



## 1.4.1.1. DNS Enumeration



The command's we have seen so far were issued on a Windows machine. The *Linux nslookup* version has some limitations, therefore we suggest a more powerful tool called [dig](#).

In the following slide we will see how to run the same command with dig.

Also something to be aware of: learn both tools, *nslookup* is universal among all the desktop operating systems therefore, having knowledge of both is important.

<https://linux.die.net/man/1/dig>



## 1.4.1.1. DNS Enumeration



```
nslookup target.com
```

+short is optional: returns minimal output

```
dig target.com +short
```

```
nslookup -type=PTR target.com
```

```
dig target.com PTR
```

```
nslookup -type=MX target.com
```

```
dig target.com MX
```

```
nslookup -type=NS target.com
```

```
dig target.com NS
```

```
nslookup  
> server target.com  
> ls -d target.com
```

```
dig axfr @target.com target.com
```

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## 1.4.1.1. DNS Enumeration

 MAP REF

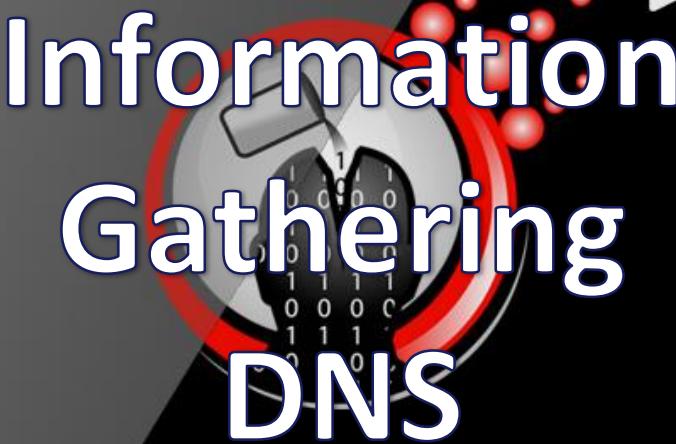
In the next video we will see how to use these commands in order to obtain as much information as we can about our target.



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# Information Gathering DNS



If you have a **FULL** or **ELITE** plan you can click on the image on the left to start the video

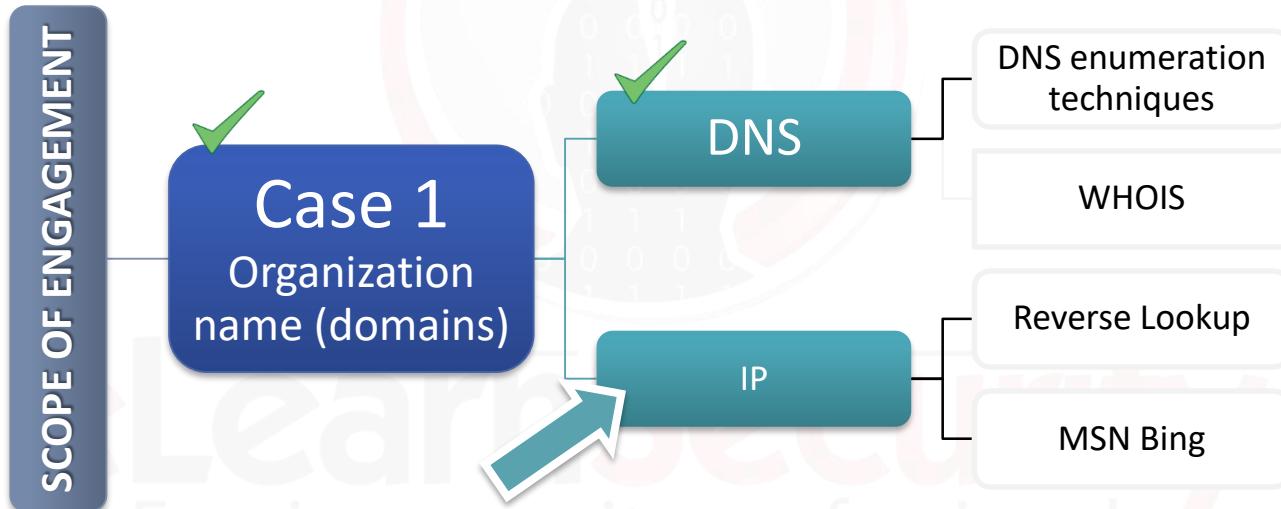
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## 1.4.1.2. IP



Now that we know how to gather DNS information, let's move on and analyze IP addresses.





## 1.4.1.2. IP

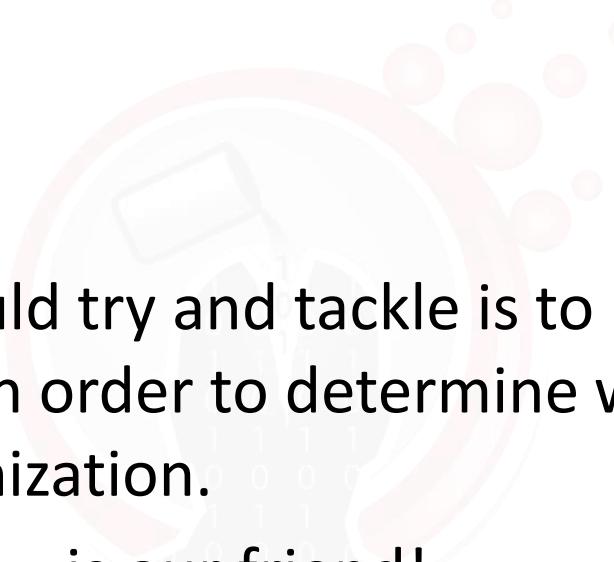
Once we have found a number of host names related to the organization, we can move on with both determining their relative **IP addresses** and, potentially any Netblocks associated with the organization.

*Mail servers, Nameservers, Domains and subdomains* will all be used in this phase.

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## 1.4.1.2. IP



The first task we should try and tackle is to resolve all of the hostnames we have in order to determine what IP addresses are used by the organization.

Once again, nslookup is our friend!

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## 1.4.1.2. IP



The simplest use of nslookup is to perform a lookup of a hostname.

This translates the hostname into an IP address.

```
nslookup ns.targetorganization.com  
Server: 192.168.254.254  
Address: 192.168.254.254
```

hostname

DNS that will handle the query (our DNS)

Non-authoritative answer:

```
Name: targetorganization.com  
Address: 66.200.110.100
```

IP Address of the target hostname



## 1.4.1.2. IP



Once we retrieve one or more IP addresses corresponding to the domains, we have to consider the following:

- Is this IP address hosting only that given domain?
- Who does this IP address belong to?

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## 1.4.1.2. IP



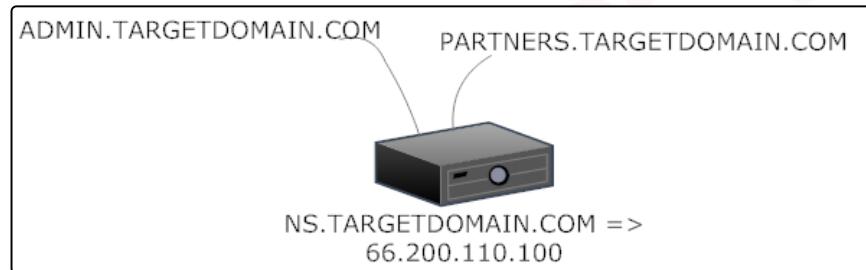
It is possible that more than one domain is configured on the same IP address, even if a PTR record is not set.

This is a common scenario with shared hosting where hundreds of websites are configured on the same server.

This is also typical in corporate networks where multiple sub domains run on the same web server.



## 1.4.1.2. IP



For example, you have discovered that the name server of the target organization is on 66.200.110.100. How do you determine other sub domains on the same IP?

The first technique to try is a [Reverse lookup](#). The second is asking for either Google or Bing's help.



## 1.4.1.3. MSN Bing

Bing offers a query filter that returns all the websites hosted on a given IP address. We just need to use the `ip` filter, followed by the IP address of our target.

```
ip:199.193.116.231
```



```
bing ip:199.193.116.231
```



## 1.4.1.3. MSN Bing

The following is an example of the results that we can obtain. In this specific case there are two sub domains bound to the IP address specified: www and members.

A screenshot of a Bing search results page. The search bar at the top contains the text "bing ip:199.193.116.231". Below the search bar is a navigation menu with "Web" selected and other options like "Images", "Videos", "Maps", "News", and "Explore". The main content area shows "3 RESULTS" and a "Any time" dropdown. The first result is a link to "eLearnSecurity - Official Site" with the URL "https://www.elearnsecurity.com". The description for this result mentions "Projects and Events. Hack.me. Hack.me, powered by eLearnSecurity, is the one and the only free for all Web Application Security virtual lab where everyone can build ...". The second result is a link to "members.elearnsecurity.com" with the URL "https://members.elearnsecurity.com". The description for this result includes links to "Forgot your Password? ... ..." and "Online Users · General".



## 1.4.1.3. MSN Bing



In addition to Bing, there are also few other online tools and web sites that allow subdomain enumeration from a specific IP address. If you suspect that the Bing results are either inaccurate or incomplete, try using one of the following tools:

- [Domain-neighbors](#)
- [Domaintools](#)
- [Robtex](#)

<https://dnslytics.com/reverse-ip>  
<http://reverseip.domaintools.com/>

<https://www.robtex.com/>



## 1.4.1.3. MSN Bing



Since we discovered new sub domains, this process might regress our steps back to the previous phases in order enumerate the data further.

Remember that this is a cyclical process of uncovering the infrastructure of the target organization. For a larger engagement, you will have to map IP addresses and related domains using mind mapping tools.

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## 1.4.1.4. Netblocks & AS



Let us go back to our investigation. Once we retrieve a list of IP addresses, the next question we should ask ourselves is:

*Who is the owner?*

Before visualizing how to obtain this information, let's first clarify the following:

netblocks

autonomous  
systems



## 1.4.1.4. Netblocks & AS



### Netblocks

A netblock is a range or set of IP addresses, usually assigned to someone and has both a starting and an ending IP address. The following is an example of netblock:

**192.168.0.0 – 192.168.255.255**

This network (netblock) can also be described as follows:

- 192.168.0.0/16 (CIDR notation)
- 192.168.0.0 with netmask 255.255.0.0



## 1.4.1.4. Netblocks & AS



Note that larger netblocks are given to larger organizations, such as *Internet Service Providers* (ISP) and Government entities.

Individuals or small organizations usually buy one or more IP addresses from the ISP. This is why running WHOIS on these smaller netblocks, point to the ISP and not to the individual or the smaller organization leasing a sub-pool.



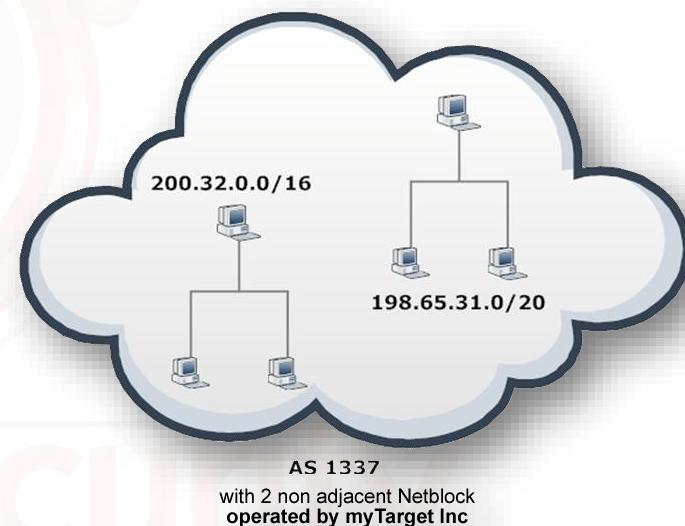
## 1.4.1.4. Netblocks & AS



### Autonomous System

An **Autonomous System** is made of one or more net blocks under the same administrative control.

Big corporations and ISP's have an autonomous system, while smaller companies will barely have a netblock.





## 1.4.1.4. Netblocks & AS

Let us now find out who the owner of the IP address is. We can feed *whois.arin.net* (or one of the WHOIS tools seen earlier) with the IP address of our target.

Network	
NetRange	66.200.96.0 - 66.200.111.255
CIDR	66.200.96.0/20
Name	SOLAR-VPS
Handle	NET-66-200-96-0-1
Parent	NET66 (NET-66-0-0-0-0)
Net Type	Direct Allocation
Origin AS	
Organization	Solar VPS (SVL-7)
Registration Date	2007-06-25
Last Updated	2007-06-25
Comments	
RESTful Link	<a href="http://whois.arin.net/rest/net/NET-66-200-96-0-1">http://whois.arin.net/rest/net/NET-66-200-96-0-1</a>
Function	
Point of Contact	
Tech	RMB34-ARIN ( <a href="#">RMB34-ARIN</a> )
Abuse	RMB34-ARIN ( <a href="#">RMB34-ARIN</a> )
NOC	RMB34-ARIN ( <a href="#">RMB34-ARIN</a> )



## 1.4.1.4. Netblocks & AS



As you can tell from the previous slide, the owner of the netblock is *Solar VPS*. A further investigation into *Solar VPS* will tell us that it is a hosting provider leasing the IP address to our target organization.

We must understand that adjacent IP addresses might not be owned by our organization, as it does not own the entire netblock.



## 1.4.1.4. Netblocks & AS



Note that you can use tools that automatically perform these operations:

Hostmap

Maltego

Foca

Fierce

Dmitry

Some of these tools will be shown later.



## 1.4.1.4. Netblocks & AS



So far we have seen how to get information on the target organization by simply knowing its name. Let us instead see the tasks needed to be performed if the contract with your client indicates specific IP addresses or net blocks.

Of course, this makes the process easier as you can skip the uncovering net blocks.

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## 1.4.2. Netblocks – IP's



We already have a list of IP addresses.

The first step is to identify which of those are alive.

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## 1.4.2.1. Live Hosts



### Case 2 Netblocks/IP's

Once we have our pool of IP addresses, we have to identify the devices and the role(s) played by each IP in the target organization. Is it a server or a workstation?

In this early phase we do not want to enumerate the services. This will be subject of next stages. We want to determine which IP's are alive.

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## 1.4.2.1. Live Hosts



We can:

1. Determine hosts (IP) that are alive
2. Determine if they have an associated host name/domain

As you can see, by uncovering additional domains and host names associated to these IP addresses, we will gather additional information and apply the information gathering techniques on both host names and domains that we have already studied.

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## 1.4.2.1. Live Hosts

There are different methods that one can use to identify live hosts. The most common is the **ICMP ping sweep**. It consists of *ICMP ECHO requests* sent to multiple hosts. If a given host is alive, it will return an *ICMP ECHO reply*.

Many tools allow us to perform a ICMP ping sweep. The following are just a few of them.

fping

nmap

hping



## 1.4.2.1. Live Hosts



fping

Let us briefly introduce these tools. If you do not have [fping](#) already installed on your machine, you can download it [here](#). You can perform a simple scan with the following command:

```
fping -a -g 192.168.1.0/24
```

where `-a` shows systems that are alive and `-g` generate a target list from a supplied IP netmask or a starting and ending IP address.



## 1.4.2.1. Live Hosts



Nmap

Another tool that you can use is Nmap. You can download it at the following address: <http://nmap.org/>.

Nmap is the most popular scanning tool. It allows users the ability to perform very sophisticated scans with very good results. For now though, we will only deal with its sweeping capabilities.



## 1.4.2.1. Live Hosts



In order to perform a host discovery scan, we can use many different techniques however, the most common option is:

```
nmap -sn 10.0.0.0/24
```

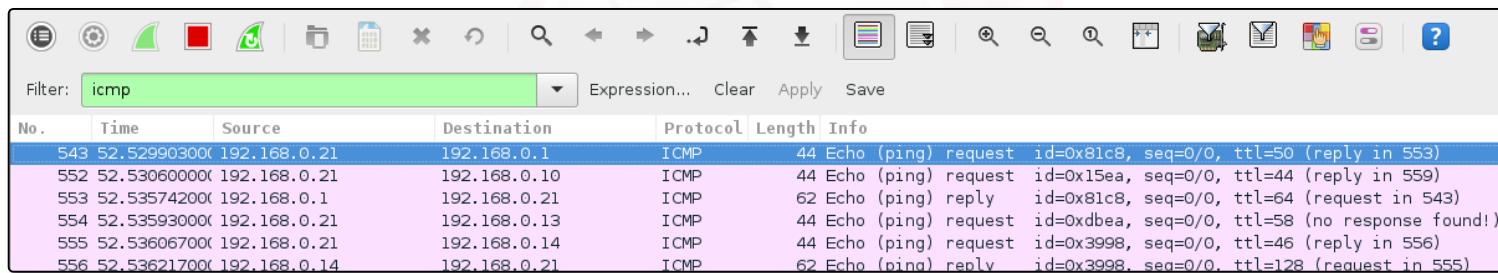
The `-sn` option, also known as ping scan / ping sweep, tells Nmap not to run a port scan on the remote hosts, but instead return only the hosts that respond to the probes sent.  
You will learn more about it in the next video.



## 1.4.2.1. Live Hosts



The following picture shows the ICMP requests under the hood while using Nmap.



A screenshot of the NetworkMiner tool interface. The top bar has a 'Filter' dropdown set to 'icmp'. Below it is a toolbar with various icons. The main window shows a table of network traffic. The columns are: No., Time, Source, Destination, Protocol, Length, and Info. The table contains the following data:

No.	Time	Source	Destination	Protocol	Length	Info
543	52.529903000	192.168.0.21	192.168.0.1	ICMP	44	Echo (ping) request id=0x81c8, seq=0/0, ttl=50 (reply in 553)
552	52.530600000	192.168.0.21	192.168.0.10	ICMP	44	Echo (ping) request id=0x15ea, seq=0/0, ttl=44 (reply in 559)
553	52.535742000	192.168.0.1	192.168.0.21	ICMP	62	Echo (ping) reply id=0x81c8, seq=0/0, ttl=64 (request in 543)
554	52.535930000	192.168.0.21	192.168.0.13	ICMP	44	Echo (ping) request id=0xdbea, seq=0/0, ttl=58 (no response found!)
555	52.536067000	192.168.0.21	192.168.0.14	ICMP	44	Echo (ping) request id=0x3998, seq=0/0, ttl=46 (reply in 556)
556	52.536217000	192.168.0.14	192.168.0.21	ICMP	62	Echo (ping) reply id=0x3998. seq=0/0. ttl=128 (request in 555)

Notice that if you run the scan from a machine within the same network, Nmap runs an *ARP scan* instead of sending *ICMP packets*. To avoid this behavior, you can use the `--disable-arp-ping` or `--send-ip` option.



## 1.4.2.1. Live Hosts



Nowadays though, ICMP is often disabled on perimeter routers and firewalls, and even on latest Windows clients (via Windows Firewall).

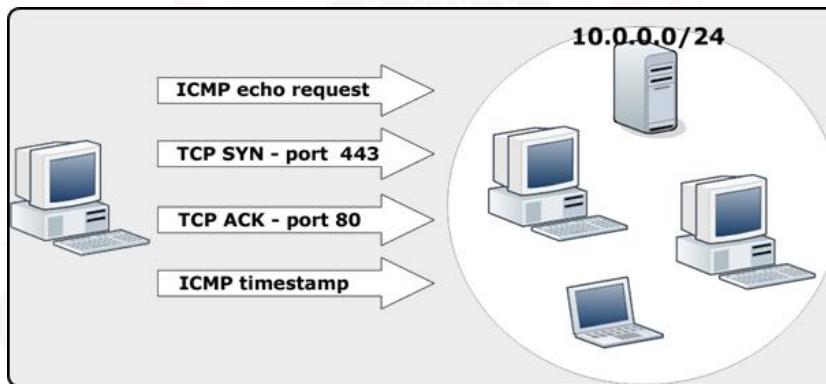
ICMP scans are then no longer reliable in determining whether a host is alive or not.

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## 1.4.2.1. Live Hosts

There are other kinds of techniques that Nmap uses to detect live hosts. Indeed the default host discovery achieved with `-sn` command consists of more than just a simple ICMP echo request:





## 1.4.2.1. Live Hosts



For a complete list of commands, see the reference manual at this link:

- <http://nmap.org/book/man-host-discovery.html>

Nmap will be covered in deeper details in the next modules. For now, we are just scratching the surface of this great tool and trying to remain in context of the sections. In the next video we will see both some basic techniques and tools that we can use to discover alive hosts.

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# Video: Host Discovery



If you have a **FULL** or **ELITE** plan you can click on the image on the left to start the video

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## 1.4.2.2. Further DNS



Now that we know how to discover live hosts, let us investigate more and see how we can find further DNS within the target network

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## 1.4.2.2. Further DNS



This step deals with using Nmap to enumerate all the DNS servers that exist in the remote network.

As you probably noticed, these are steps that you could perform more than once. This happens because each time we find a new domain or a new IP, it could give us other useful information to aid us in further investigations.

Remember, this is a cyclical process.



## 1.4.2.2. Further DNS



In order to determine if DNS servers are in place in a given netblock, we should first know something more about DNS. A DNS server runs on:

- TCP port 53
- UDP port 53

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## 1.4.2.2. Further DNS

We can increase our surface by using Nmap to scan the entire network and find hosts that have these ports open. To do this, we can use the following two commands:

```
nmap -sS -p53 [NETBLOCK]
```

```
nmap -sU -p53 [NETBLOCK]
```

The first can be used to run a TCP scan, while the second can be used to run an UDP scan.



## 1.4.2.2. Further DNS



Once we retrieve more DNS servers, we can perform a reverse lookup to find out if they are serving any particular domain.

Moreover, we can try zone transfer techniques on them as well as any of the techniques studied before.

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## 1.4.2.3. Maltego



Before the end of the chapter, we would like you to become familiar with [Maltego](#). Maltego bills itself as a source intelligence and forensics application.  
It is very unique among the tools available today.



## 1.4.2.3. Maltego



Maltego uses what it calls transformations to discover information about specific targets.

For instance you can begin with a server address and enumerate various information regarding that server, then build on that information until you have a full map of the entities entire internet presence.

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## 1.4.2.3. Maltego



In the next video we will see some use cases that will show you the power that Maltego will bring to your engagements.

### Note

The community version of the tool (free to use) will work just fine for our purposes. In order to obtain and use Maltego, you will have to register on their website.



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## 1.5. Tools



# TOOLS

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We will now leverage the power of automation to make our investigation techniques faster and even more reliable through the use of tools.

Notice that there is a large amount of tools that you can use in this phase however, the ones we are going to see in the next slides are the most used. We do encourage you to use other tools as well.



## 1.5. Tools



The following is a small list of the most common tools that you can use in this phase. We are not going to unpack them all but we encourage you to use them and test each one.

DNSdumpster

DNSEnum

Fierce

Dnsmap

Metagoofil

Foca

Maltego

Dmitry

Recon-ng



## 1.5.1. DNSdumpster



In the previous slides we have seen many different online tools useful to gather information on our target domain.

DNSdumpster is a free domain research tool that can discovered hosts related to a specific domain.

It is straightforward to use: you just need to type the target domain and it will return all the results.

dns recon & research, find & lookup dns records

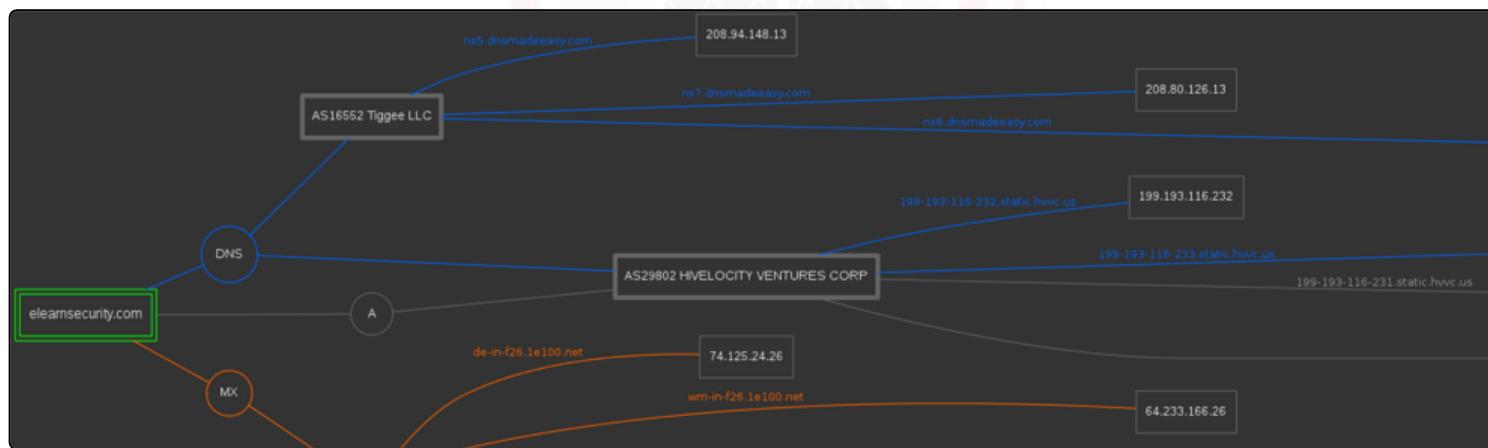
<https://dnsdumpster.com/>



## 1.5.1. DNSdumpster



As you will see, it gives us additional information such as: the hosting behind the target domain, the location of the servers, the DNS records (MX, A, etc.) and it also creates a map with all the information obtained.





## 1.5.1. DNSdumpster



This is a very good tool to start our investigation. Moreover, remember that this tools is not intrusive.

Host Records (A) ** this data may not be current as it uses a static database (updated monthly)			
<a href="#">blog.elearnsecurity.com</a>   	162.220.56.82 162-220-56-82.static.hvvc.us	AS29802 HIVELOCITY VENTURES CORP United States	
<a href="#">elearnsecurity.com</a>   	199.193.116.231 199-193-116-231.static.hvvc.us	AS29802 HIVELOCITY VENTURES CORP United States	
<a href="#">members.elearnsecurity.com</a>   	199.193.116.231 199-193-116-231.static.hvvc.us	AS29802 HIVELOCITY VENTURES CORP United States	
<a href="#">www.elearnsecurity.com</a>   	199.193.116.231 199-193-116-231.static.hvvc.us	AS29802 HIVELOCITY VENTURES CORP United States	



## 1.5.2. DNSEnum



The purpose of **DNSEnum** is to gather as much information as possible about a domain. The tool can be downloaded from the following address:

- <https://github.com/fwaeytens/dnsenum>





The program currently performs the following operations:

- Get the host's addresses (A record)
- Get the name servers (threaded)
- Get the MX record (threaded)
- Perform AXFR queries on name servers (threaded)

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## 1.5.2. DNSEnum



- Get extra names and sub domains via Google dorks  
(allinurl:-www site:domain)
- Brute force sub domains from file, can also perform recursion on sub domain that have NS records (all threaded)
- Calculate C class domain network ranges and perform WHOIS queries on them (threaded)
- Perform reverse lookups on net ranges ( C class or/and WHOIS net ranges) (threaded)



## 1.5.2. DNSEnum



Usage for the tool is :

```
dnsenum.pl [options] <domain>
```

Options include the following:

--private	Show and save private IPs at the end of the file domain_ips.txt.
--subfile <file>	Write all valid subdomains to this file.
--threads <value>	The number of threads that will perform different queries.
-p, --pages <value>	-p, --pages <value> The number of Google search pages to process when scraping names, the default is 20 pages, the -s switch must be specified.
-s, --scrap <value>	The maximum number of subdomains that will be scraped from Google.
-f, --file <file>	Read subdomains from this file to perform brute force.



## 1.5.2. DNSEnum



Let us see now how to run *dnsenum* against *elsfoo.com*. The command will be similar to the following:

```
dnsenum elsfoo.com
```

----- elsfoo.com -----

**Host's addresses:**

elsfoo.com. 5

**Name Servers:**

ns6.dnsmadeeasy.com. 5  
ns7.dnsmadeeasy.com. 5

**Mail (MX) Servers:**

aspmx3.googlemail.com.	5	IN
aspmx.l.google.com.	5	IN
alt1.aspmx.l.google.com.	5	IN
alt2.aspmx.l.google.com.	5	IN
aspmx2.googlemail.com.	5	IN

**Trying Zone Transfers and getting Bind Versions:**

Trying Zone Transfer for elsfoo.com on ns6.dnsmadeeasy



We can see the tool focuses on different sections:

1. In the host address section it performed a reverse lookup on the domain.
2. The tool determined the Name Servers used by the domain.
3. The tool searches for any MX records for the domain.
4. Lastly, it tried zone transfers to see if it could enumerate any sub domains.



## 1.5.2. DNSEnum



It is also important to know that dnsenum comes with a wordlist file containing the most common DNS and sub domain names. This will be useful in running brute force attacks.

You can find the file in the main folder of the tool. In our case it is located in /usr/share/dnsenum.



## 1.5.2. DNSEnum



Let's now try a more complex execution of the tool using the following command:

```
dnsenum --subfile elsfoosubs.txt -v  
-f /usr/share/dnsenum/dns.txt  
-u a -r elsfoo.com
```

With this command, we can store the sub domains obtained in the *elsfoosubs.txt*.

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## 1.5.2. DNSEnum



We are going to receive verbose output with the `-v` option, and subsequently, we are going to use the `dns.txt` file to do the brute force of sub domains using the `-f` option.

We are also using the `-u` option to update any file that may already exist and performing a recursive brute force on any discovered domains with the `-r` option.

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## 1.5.2. DNSEnum



From this test, we see the results change towards the end where the brute force occurs. We can see when the brute force attempts fail or succeed based upon the status provided. If the brute force is successful, we see the pertinent information returned instead of the "*A record query failed: NXDOMAIN*" status.

```
zensus2011.elsfoo.com A record query failed: NXDOMAIN
zfa.elsfoo.com A record query failed: NXDOMAIN
zilverfonds.elsfoo.com A record query failed: NXDOMAIN
zoek.elsfoo.com A record query failed: NXDOMAIN
_sip.elsfoo.com A record query failed: NXDOMAIN
_spf.elsfoo.com A record query failed: NXDOMAIN
_tls.elsfoo.com A record query failed: NXDOMAIN
```



## 1.5.3. Dnsmap

 MAP REF

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Although it is a very old tool, [dnsmap](#) still works great when it comes to sub domain enumeration and brute forcing. You can download it from [github](#).

<https://github.com/makefu/dnsmap>

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## 1.5.3. Dnsmap



Dnsmap uses the primary domain that we provide as a target and then brute forces all the sub domains by using:

- a dictionary file that comes with the tool
- a word list file that the user makes.

There are many different word lists that you can find online: a simple [google search](#) returns a huge amount of resources.

<https://www.google.com/search?q=subdomain+wordlists&cad=h>



## 1.5.3. Dnsmap



Let us see a basic example of how to use *dnsmap*. In this case we are going to use the default wordlist that comes with the tool:

```
dnsmap elsfoo.com
```

```
dnsmap 0.30 - DNS Network Mapper by pagvac (gnucitizen.org)

[+] searching (sub)domains for elsfoo.com using built-in wordlist
[+] using maximum random delay of 10 millisecond(s) between requests

admin.elsfoo.com
IP address #1: 209.133.210.155

intranet.elsfoo.com
IP address #1: 209.133.210.155

ns1.elsfoo.com
IP address #1: 209.133.210.155

private.elsfoo.com
IP address #1: 209.133.210.155
```



## 1.5.3. Dnsmap



The following is a short list of options that can be used:

- \$ dnsmap targetdomain.foo
  - Example of sub domain brute forcing using dnsmap's built-in word-list
- \$ dnsmap targetdomain.foo -w wordlist.txt
  - Example of sub domain brute forcing using a user-supplied wordlist
- \$ dnsmap targetdomain.foo -r /tmp/
  - Example of sub domain brute forcing using the built-in wordlist and saving the results to /tmp/
- \$ dnsmap-bulk.sh domains.txt /tmp/results
  - For brute forcing a list of target domains in a bulk fashion use the bash script provided.



## 1.5.3. Dnsmap



As you can see from the results, as more tools are executed, our results keep growing.

Again, it is very important to be very meticulous about saving information from the tools for use in the later phases. This will ensure a complete and thorough test.

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In the previous slides, we have seen some tools that can help us gather information starting with a simple domain name.

In the next video we will see the tool called FOCA. We introduced it in the early phase of our information gathering, when we talked about harvesting and metadata. As you will see, *FOCA* allows us to mine a ton of information about the target infrastructure. This occurs by analyzing data extracted from an online document.

<https://www.elevenpaths.com/labstools/foca/index.html>



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on the image on the left to start the video

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We are at the end of this long process called Information Gathering. Once again, we give you the chance to try all the techniques you have learned on a real target: *elsfoo.com*.

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# REFERENCES

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## FreeMind

[http://freemind.sourceforge.net/wiki/index.php/Main\\_Page](http://freemind.sourceforge.net/wiki/index.php/Main_Page)



## Xmind

<https://www.xmind.net/>



## Dradis

<https://dradisframework.com/ce/>



## Magictree

[http://www.gremwell.com/what\\_is\\_magictree](http://www.gremwell.com/what_is_magictree)



## Methodology: Handling Information

[https://members.elearnsecurity.com/course/resources/name/ptp\\_v5\\_section\\_2\\_module\\_1\\_attachment\\_eLearnSecurity\\_Handling\\_Information](https://members.elearnsecurity.com/course/resources/name/ptp_v5_section_2_module_1_attachment_eLearnSecurity_Handling_Information)



## Google Operators #2

[http://www.googleguide.com/advanced\\_operators\\_reference.html](http://www.googleguide.com/advanced_operators_reference.html)



## Google Operators #1

[https://support.google.com/websearch/answer/2466433?hl=en&ref\\_topic=3081620&visit\\_id=0-636620933356181961-1111523074&rd=1](https://support.google.com/websearch/answer/2466433?hl=en&ref_topic=3081620&visit_id=0-636620933356181961-1111523074&rd=1)



## Google Operators #3

<http://pdf.textfiles.com/security/googlehackers.pdf>



# References

MAP

REF

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## Google Operators #4

<http://www.mrjoeyjohnson.com/Google.Hacking.Filters.pdf>



## TheHarvester

<https://github.com/laramies/theHarvester>



## WHOIS

<https://tools.ietf.org/html/rfc3912>



## Online WHOIS #2

<http://whois.domaintools.com/>



## Edgar

<https://www.sec.gov/edgar.shtml>



## Archive

<https://archive.org/>



## Online WHOIS #1

<https://who.is/>



## Online WHOIS #3

<https://bgp.he.net/>



# References

MAP

REF

230



## Nslookup

[https://docs.microsoft.com/en-us/previous-versions/windows/it-pro/windows-server-2012-R2-and-2012/cc725991\(v=ws.11\)](https://docs.microsoft.com/en-us/previous-versions/windows/it-pro/windows-server-2012-R2-and-2012/cc725991(v=ws.11))



## DNSqueries

<https://www.dnsqueries.com/en/>



## Dig

<https://linux.die.net/man/1/dig>



## Domaintools

<http://reverseip.domaintools.com/>



## Nslookup Online

<https://network-tools.com/nslook/>



## MXToolBox

<https://mxtoolbox.com/>



## Domain-neighbors

<https://dnslytics.com/reverse-ip>



## Robtex

<https://www.robtex.com/>



# References

MAP

REF

231



## Fping

<http://fping.org/>



## Maltego

<https://www.paterva.com/web7/>



## DNSenum

<https://github.com/fwaeytens/dnsenum>



## Foca

<https://www.elevenpaths.com/labstools/foca/index.html>



## Nmap

<https://nmap.org/>



## DNSDumpster

<https://dnsdumpster.com/>



## Dnsmap

<https://github.com/makefu/dnsmap>



## WHOIS Lookup



## Information Gathering DNS



## Host Discovery with Fping, Hping3 and Nmap



## Maltego



## FOCA and Shodan

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## Information Gathering

eLearnSecurity has created eLSFoo, a fictitious company located at [www.elsfoo.com](http://www.elsfoo.com).

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