Cybersecurity

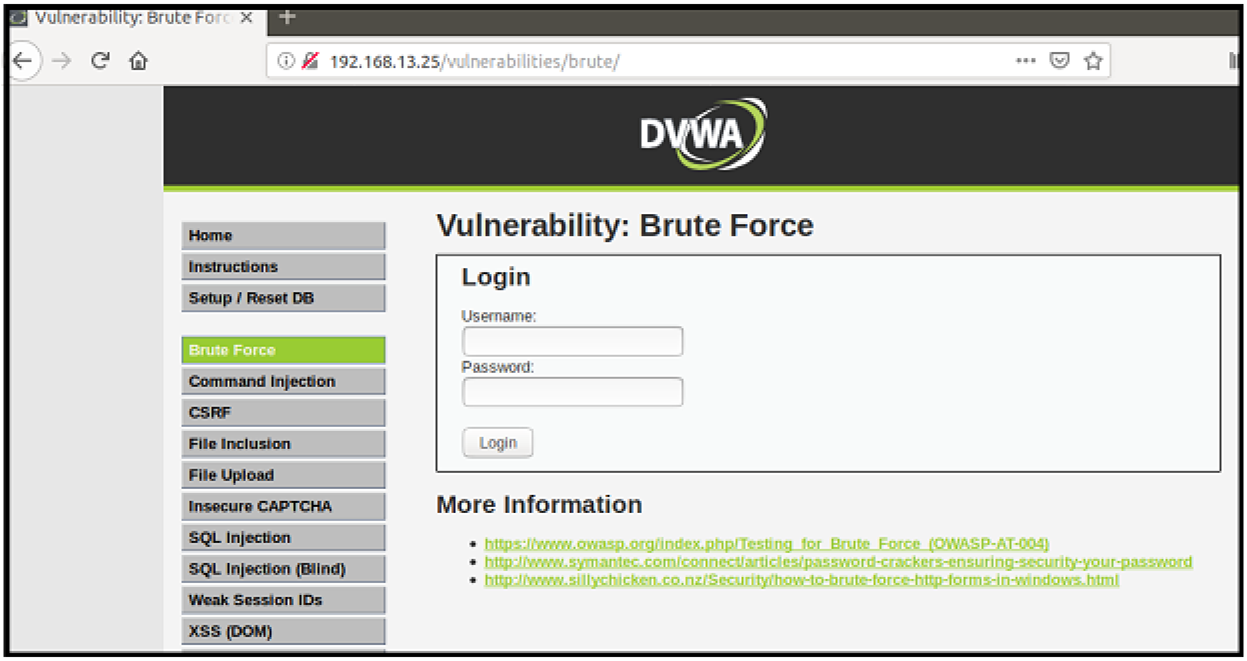
Activity File

Activity File: Conducting Brute-Force Attacks with Burp Intruder

- In this activity, you will continue your role as an application security engineer for Replicants.
- You've just used Burp Suite and discovered session management vulnerabilities.
- Your manager is now concerned that the Replicants web application might have additional authentication vulnerabilities, and the anonymous tipster could exploit them.
- More specifically, your manager is very concerned that the application administrators might have chosen weak passwords for the administration login.
- If an attacker brute forces their way into the admin section of the application, they can potentially cause significant harm to Replicants' business.
- Your manager would like you to use Burp Suite to determine whether any of these administrators are vulnerable to a brute-force attack.
- Additionally, you are tasked with proposing mitigation strategies based on your findings.

Setup

- Access your web lab and open a browser.
    - **Important:** Don't forget to make sure that FoxyProxy is disabled.
- Return to the same webpage from the previous day's activity: http://192.168.13.25.
    - Select the **Brute Force** option from the menu on the left side of the page.
    - Alternatively, access the webpage directly using this link: http://192.168.13.25/vulnerabilities/brute/.
- The page should resemble the following image:



Vulnerability: Brute Force

Login

Username:

Password:

More Information

- https://www.owasp.org/index.php/Testing_for_Brute_Force_(OWASP-AT-004)
- http://www.symantec.com/connect/articles/password-crackers-ensuring-security-your-password
- http://www.sillychicken.co.nz/Security/how-to-brute-force-http-forms-in-windows.html

- **Note:** If you have any issues accessing this webpage, you might need to repeat the activity setup steps from the SQL Injection Activity in 15.1.

Instructions

The webpage you have accessed represents a login page to the administrative section within the Replicants website. Complete the following steps to test for brute-force vulnerabilities. Steps 1 through 6 will be similar to the demonstration conducted by your instructor.

1. Enable the Burp proxy.
   - First, return to Burp Suite. Under Proxy > Intercept, confirm that **Intercept is on**.
     - If you need a recap of these steps, refer to the first activity: GitHub: Configuring Burp.
       - Drop any existing captures by clicking Drop until the whole capture page is empty.
   - Return to your browser and enable the Burp option on FoxyProxy.
2. View the HTTP request with Burp Intercept.
   - Now, you will test the application's intended purpose of the application by entering a username and password that will purposely fail.

        - In the username field, enter "test-user."

        - In the password field, enter "test-passwd."

    - Note that the purpose of inputting these values is to identify how they are added into the HTTP request.

        - Press **Login**.

    - Return to Burp Intercept to see the HTTP request.

    - The top line of the HTTP request contains the username and password that were entered:

        - `GET /vulnerabilities/brute/?username=test-user&password=test-passwd&Login=Login HTTP/1.1`

3. Move the HTTP request to Burp Intruder.

    - Right-click on the Intercept page and select **Send to Intruder** (or press CTRL+I).

        - After you select **Send to Intruder**, the Intruder icon color on your toolbar changes from black to orange.

        - This confirms that the HTTP request has been sent to Intruder!

    - Click on the Intruder icon from your toolbar to view this HTTP request.

        - This will take you to a page with four tabs on the toolbar:

            - Target

            - Positions

            - Payloads

            - Options

    - By default, the first page you will see is the **Target** tab, where the IP and port of the web server will be added automatically.

    - Select the Positions tab on the toolbar.

        - This page should display the same HTTP POST request that you saw under Intercept.

4. Configure the Burp Intruder positions.

    - This page is where you indicate the payloads that you will change with each HTTP request.

    - Because you will be testing two payloads—the username and password—select the Cluster Bomb attack type.

    - Note that the HTTP request includes several **section sign** characters (§).

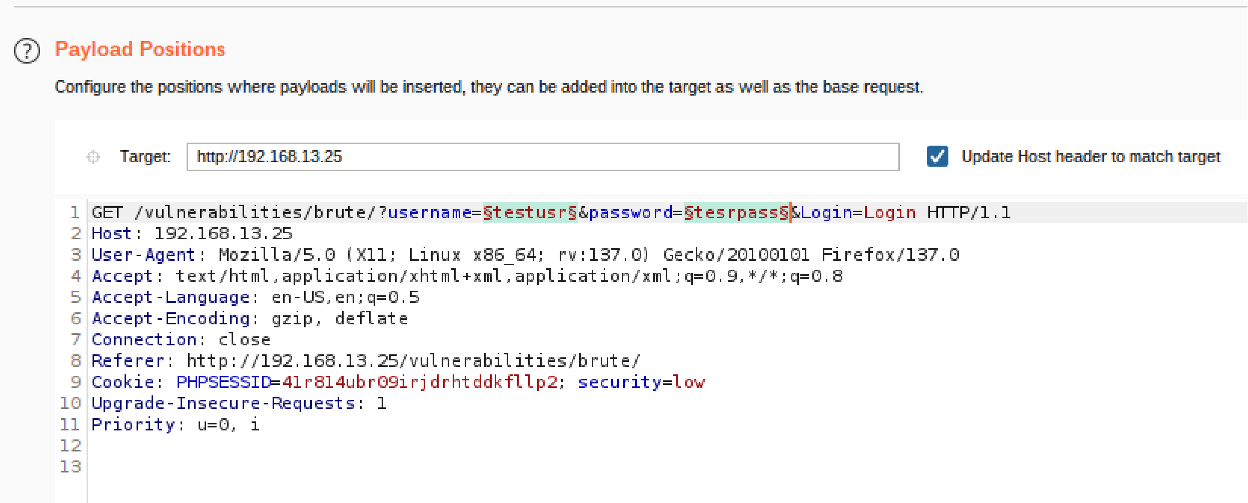
        - Burp uses these section sign characters to indicate the start and end of each payload that you might want to modify.
    - Burp has already guessed all four payloads that you might want to use.

        - But you only want to use two, the username and password.
    - Clear out all of the section sign characters by clicking on **Clear §** on the right side of the page.

    - Create the first new payload by highlighting the value `test-user` and then clicking on **Add §**.

        - Don't include the = or & signs in your data point.
    - Create the second new payload by highlighting the value `test-passwd` and then clicking on **Add §**.

    - Your **Positions** page should now look similar to the following:



Payload Positions

Configure the positions where payloads will be inserted, they can be added into the target as well as the base request.

Target: http://192.168.13.25

☑ Update Host header to match target

```
GET /vulnerabilities/brute/?username=§testusr§&password=§tesrpass§&Login=Login HTTP/1.1
Host: 192.168.13.25
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:137.0) Gecko/20100101 Firefox/137.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: close
Referer: http://192.168.13.25/vulnerabilities/brute/
Cookie: PHPSESSID=41r814ubr09irjdrhtddkfllp2; security=low
Upgrade-Insecure-Requests: 1
Priority: u=0, i


```

Unset

```
○     GET
   /vulnerabilities/brute/?username=§test-user§&password=
   §test-passwd§&Login=Login HTTP/1.1
○     Host: 192.168.13.25
○     User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux
   x86_64; rv:68.0) Gecko/20100101 Firefox/68.0
○     Accept:
   text/html,application/xhtml+xml,application/xml;q=0.9,
   */*;q=0.8
○     Accept-Language: en-US,en;q=0.5
○     Accept-Encoding: gzip, deflate
○     Connection: close
○     Referer:
   http://192.168.13.25/vulnerabilities/brute/
○     Cookie: PHPSESSID=mfubh6vmo9l19vioie07c1aaj7;
   security=low
○     Upgrade-Insecure-Requests: 1
```

-

  Note the following about the two payloads:

  - `§test-user§` is considered the Payload Set 1, as it comes first (starting from the top left).

  - `§test-passwd§` is considered the Payload Set 2, as it comes second (again, starting from the top left).

5. Configure the Burp Intruder payloads.

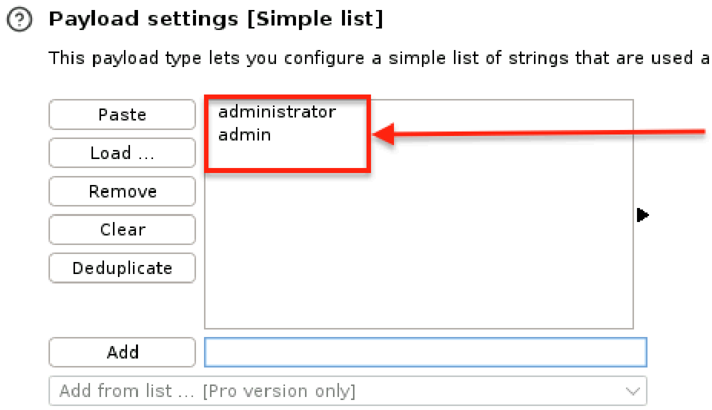
   - Now that you have indicated which payloads to use in your HTTP request, you can choose what will be placed inside them.

   - Select the Payloads tab.

   - Under **Payload set**, select 1 from the drop-down.

     - Remember that this indicates what will be placed in `§test-user§`.
   - Under **Payload set**, select **simple list**.

    - This indicates a list of usernames that we can use to test the brute-force attack.
  - For the first test, let's try two usernames:
    - `administrator`
    - `admin`
  - Enter each one in the field to the right of the **Add** button.
    - Then click **Add** to add them to the box.
  - The box should now contain both usernames, as shown in the following image:



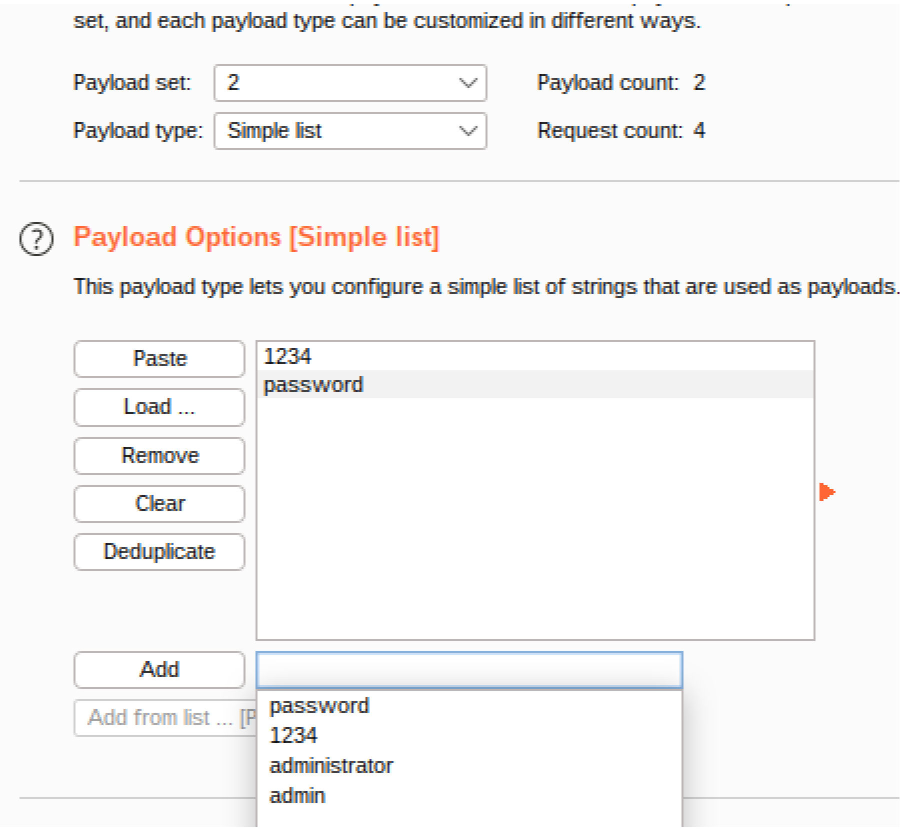
Payload settings [Simple list]

This payload type lets you configure a simple list of strings that are used as payloads.

```
administrator
admin
```

  - Now repeat these steps with the **Payload set** field set to 2, for the password.
  - Under **Payload set**, select 2 from the drop-down.
    - Remember that this indicates what will be placed in the `§test-passwd§` payload.
  - Under **Payload type**, select **simple list**.
    - This indicates a list of passwords that we can use to test the brute-force attack.
  - For the first test, let's try two passwords:
    - `1234`
    - `password`

- Enter each one in the field to the right of the **Add** button.
    - Then click **Add** to add them to the box.
- Note that, after you complete these steps, the payload count is displayed at the top of the page as 4.



set, and each payload type can be customized in different ways.

Payload set: 2 Payload count: 2

Payload type: Simple list Request count: 4

Payload Options [Simple list]

This payload type lets you configure a simple list of strings that are used as payloads.

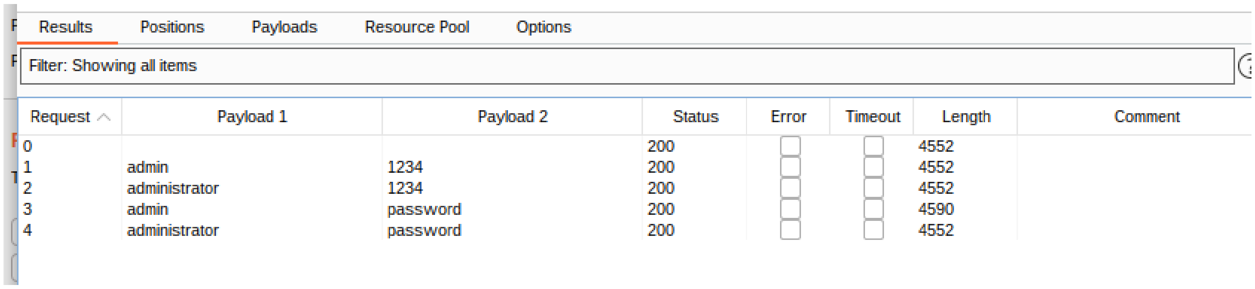
```
1234
password
```

```
password
1234
administrator
admin
```

- This is because we add two possible usernames and two possible passwords.

6. Launch the brute-force attack and analyze the results.

- To launch the brute-force attack, select **Start attack** at the top of your page.



Filter: Showing all items

Request	Payload 1	Payload 2	Status	Error	Timeout	Length	Comment
0			200	□	□	4552	
1	admin	1234	200	□	□	4552	
2	administrator	1234	200	□	□	4552	
3	admin	password	200	□	□	4590	
4	administrator	password	200	□	□	4552	

    - If you receive a notice that you are on the community version of Burp, just click **OK** to bypass it.

- A new page will display the results of the four payload combinations that were run.

    - Note that each of them should have an HTTP response code of 200 (listed under **Status**), and the length of the HTTP response.

    - This doesn't mean that all four were successful logins. It means that you didn't get an HTTP error from the web server.

- One way to view the responses is to render each HTML response to see what the webpage returned.

- To view the results of the first payload combination, highlight the first one:

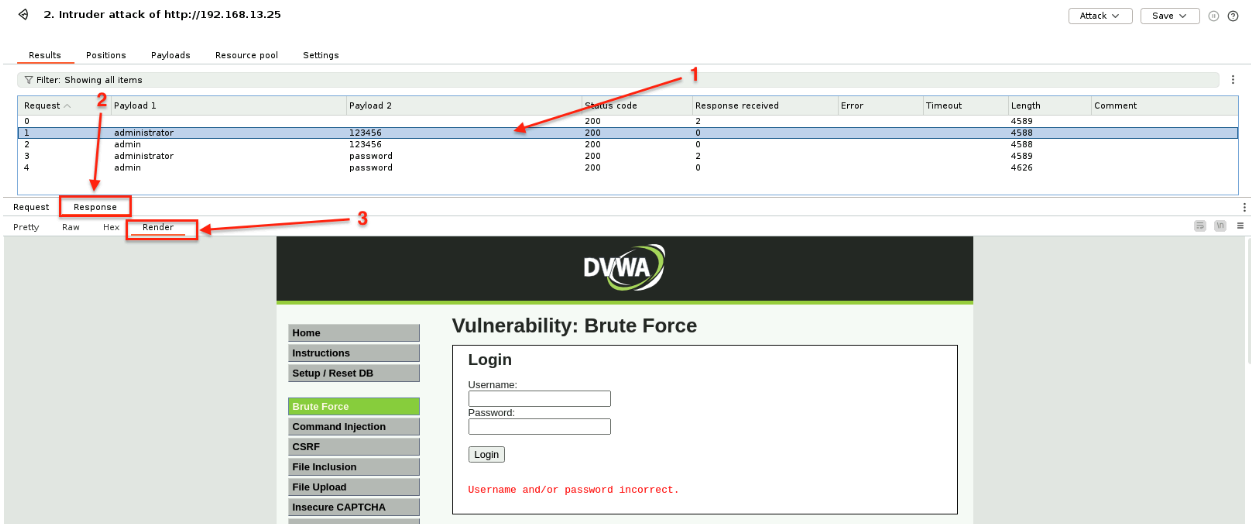
    - Payload1: administrator

    - Payload2: 123456

- On the bottom panel, change the view from Request to Response to view the HTTP response.

- Directly below that option, change the value from Pretty to Render, to render the HTML on the page within Burp.

    - Scroll down on the image until you see the following message: "Username and/or password incorrect."



2. Intruder attack of http://192.168.13.25

Filter: Showing all items

Request	Payload 1	Payload 2	Status code	Response received	Error	Timeout	Length	Comment
0			200	2			4589	
1	administrator	123456	200	0			4588	
2	admin	123456	200	0			4588	
3	administrator	password	200	2			4589	
4	admin	password	200	0			4626	

Vulnerability: Brute Force

Login

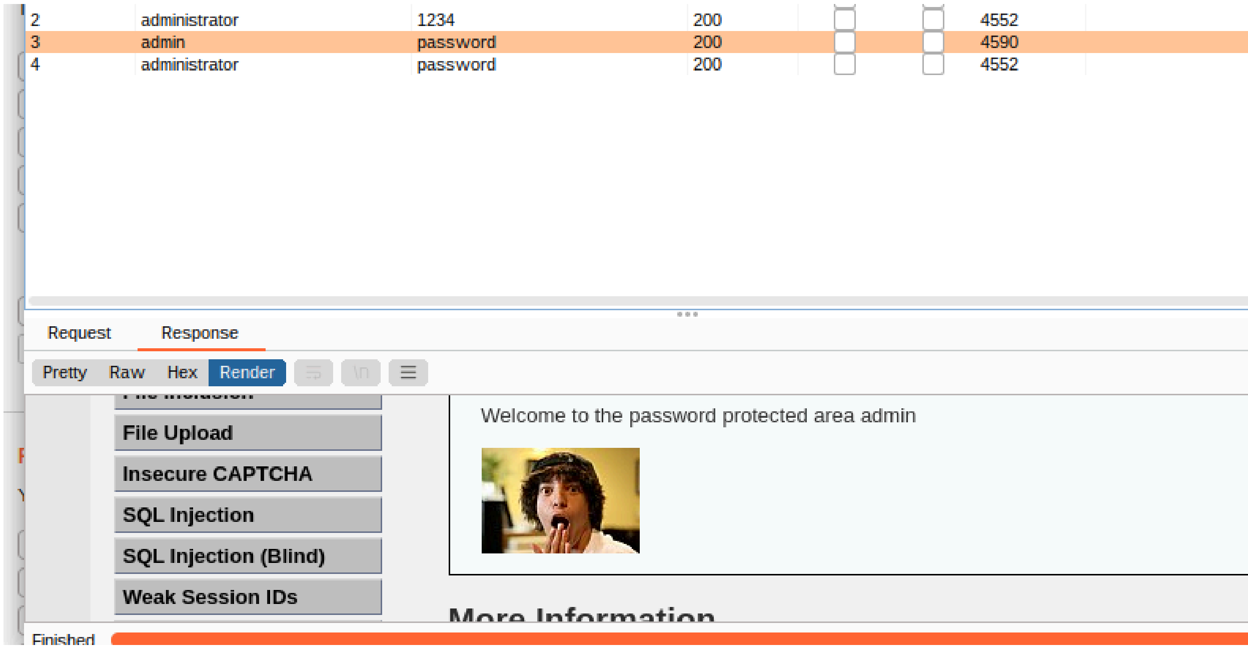
Username:

Password:

Username and/or password incorrect.

- This indicates that the username/password combination of "administrator" and "1234" did not result in a successful login.

  Repeat these steps with the other payload combinations until you find the successful username/password combination.



2	administrator	1234	200	☐	☐	4552
3	admin	password	200	☐	☐	4590
4	administrator	password	200	☐	☐	4552

Welcome to the password protected area admin

  - Additionally, note whether there were any differences in the length of the HTTP response, to indicate a success vs. a failure.

7. Launch the brute-force attack against other users.

   - Now that you know how to launch a brute-force attack and determine whether an administrator's account can be accessed, you are concerned that other administrators' accounts might be vulnerable to a brute-force attack.

   - Repeat the preceding steps to determine whether the other administrator accounts are vulnerable.

   - Here is a list of employee usernames (all lowercase) that have admin accounts:

     - Gordon has the username of "gordonb."

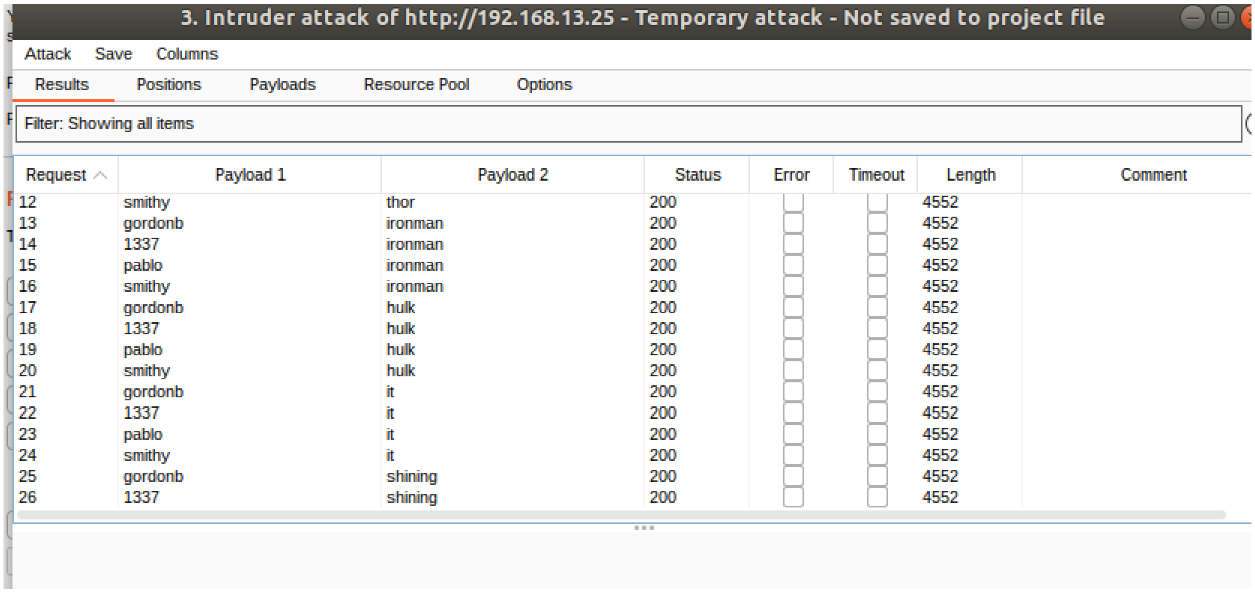
     - Mr. Hack has the username of "1337."

     - Pablo has the username of "pablo."

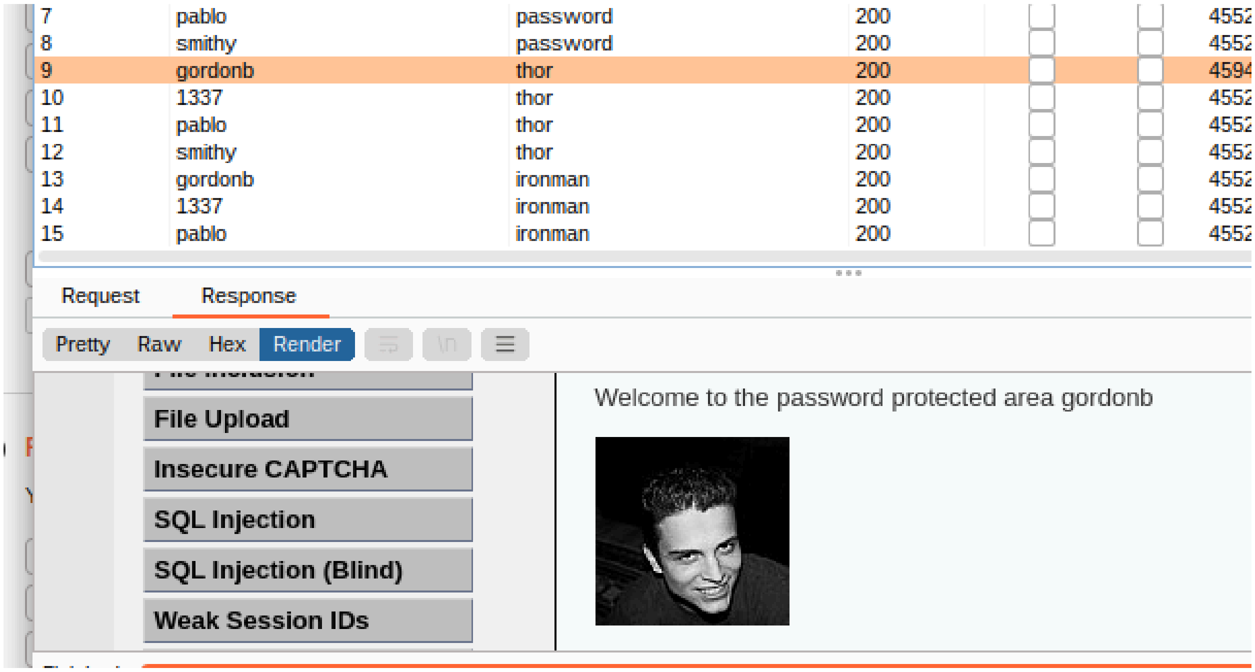
     - Bob has the username of "smithy."

  - For the passwords, try to determine a payload list of passwords to hack into their accounts.
    - Here are a couple of hints to help you figure out their passwords:
      - Gordon likes Marvel characters.
      - Mr. Hack is a huge fan of Stephen King movies.
      - Pablo is always traveling to different Caribbean islands.
      - Bob is always listening to Van Halen songs.

8. Answer the following mitigation strategy questions:
   - Describe to your manager how a malicious user could exploit these vulnerabilities. Be sure to include the potential impact. I was able to guess 2 of the 4 passwords. I mainly only got 2 because I don’t know any Van Halen nor do I know Stephen King outside of The Shining and IT. Anyone with a wordlist could crack these passwords easily.
   - Describe in plain language how you would mitigate the vulnerabilities that you just exploited. Password policy standards. Include numbers, special characters, character minimums, and uppercase letters. Additionally, place account lockout limits.

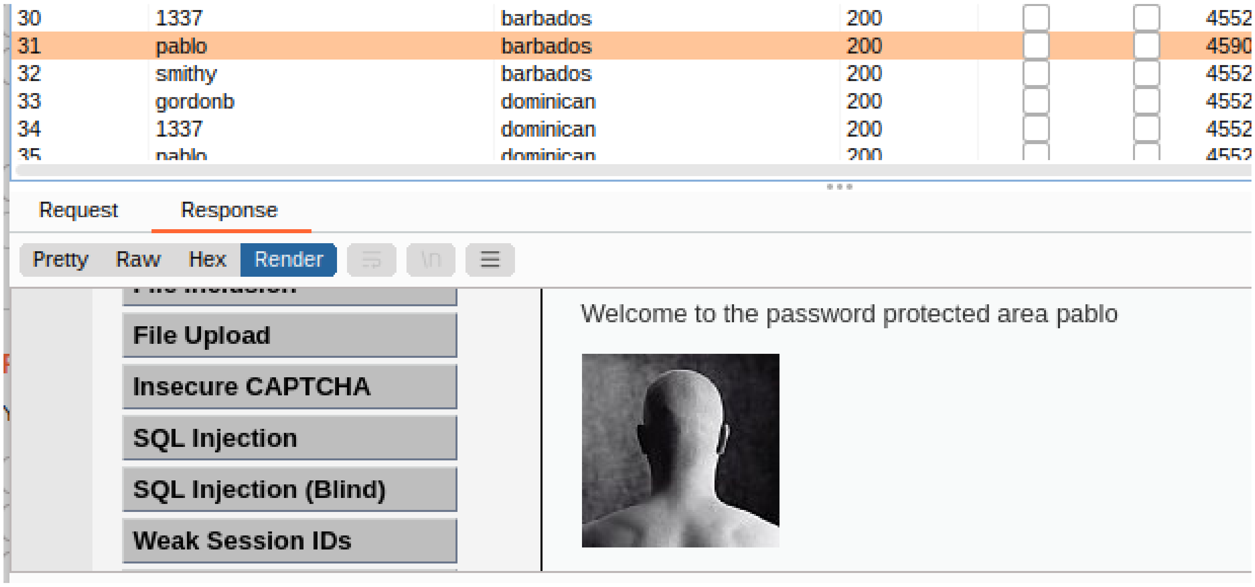

3. Intruder attack of http://192.168.13.25 - Temporary attack - Not saved to project file
Attack
Save
Columns
Results
Positions
Payloads
Resource Pool
Options
Filter: Showing all items

Request	Payload 1	Payload 2	Status	Error	Timeout	Length	Comment
12	smithy	thor	200	□	□	4552	
13	gordonb	ironman	200	□	□	4552	
14	1337	ironman	200	□	□	4552	
15	pablo	ironman	200	□	□	4552	
16	smithy	ironman	200	□	□	4552	
17	gordonb	hulk	200	□	□	4552	
18	1337	hulk	200	□	□	4552	
19	pablo	hulk	200	□	□	4552	
20	smithy	hulk	200	□	□	4552	
21	gordonb	it	200	□	□	4552	
22	1337	it	200	□	□	4552	
23	pablo	it	200	□	□	4552	
24	smithy	it	200	□	□	4552	
25	gordonb	shining	200	□	□	4552	
26	1337	shining	200	□	□	4552	



7	pablo	password	200	☐	☐	4552
8	smithy	password	200	☐	☐	4552
9	gordonb	thor	200	☐	☐	4594
10	1337	thor	200	☐	☐	4552
11	pablo	thor	200	☐	☐	4552
12	smithy	thor	200	☐	☐	4552
13	gordonb	ironman	200	☐	☐	4552
14	1337	ironman	200	☐	☐	4552
15	pablo	ironman	200	☐	☐	4552

Welcome to the password protected area gordonb



30	1337	barbados	200	☐	☐	4552
31	pablo	barbados	200	☐	☐	4590
32	smithy	barbados	200	☐	☐	4552
33	gordonb	dominican	200	☐	☐	4552
34	1337	dominican	200	☐	☐	4552
35	pablo	dominican	200	☐	☐	4552

Welcome to the password protected area pablo