

Penetration Testing Report

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Program: HCPT

Date : 08/08/2024

Introduction

This report document hereby describes the proceedings and results of a Black Box security assessment conducted against the **Week {3} Labs**. The report hereby lists the findings and corresponding best practice mitigation actions and recommendations.

I. Objective

The objective of the assessment was to uncover vulnerabilities in the **Week {3} Labs** and provide a final security assessment report comprising vulnerabilities, remediation strategy and recommendation guidelines to help mitigate the identified vulnerabilities and risks during the activity.

II. Scope

The scope of the penetration testing project by Hacktify Cyber Security aims to identify and address vulnerabilities related to SQL Injection and Cross Site Request Frogery within the specified web application..

SQL Injection (SQLi) allows attackers to manipulate databases, leading to data theft, unauthorized access, and system compromise. Cross-Site Request Forgery (CSRF) exploits user trust, making them perform unintended actions on a web application, potentially resulting in unauthorized changes, data breaches, and account hijacking. Both pose significant security risks.

Application , Name	{Lab 1 – SQL Injection} {Lab 2 – Cross-Site Request Frogery}
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III. Summary

Outlined is a Black Box Application Security assessment for the **Week {3} Labs**.

Total number of Sub-labs: 13(10-SQL Injection, 3-Cross-Site Request Frogery)

High	Medium	Low
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3	4	6
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- High** - 3 Sub-lab with high difficulty level
- Medium** - 4 Sub-labs with medium difficulty level
- Low** - 6 Sub-labs with low difficulty level

1. SQL Injection

1.1. Strings and Errors Part 1!

Reference	Risk Rating
Sub-lab-1: Strings and Errors Part 1!	Low
Tools Used	
Burp-Suite	
Vulnerability Description	
<p>The SQL Injection (SQLi) is a web security vulnerability that allows an attacker to interfere with the queries that an application makes to its database.</p> <p>Attackers insert malicious SQL code into input fields (like login forms) that are not properly sanitized.</p>	
How It Was Discovered	
Automated Tools –Burp-suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sql_lab/lab_1/lab_1.php	
Consequences of not Fixing the Issue	
Data Breaches: Unauthorized access to sensitive data.	
Suggested Countermeasures	

Proof of Concept

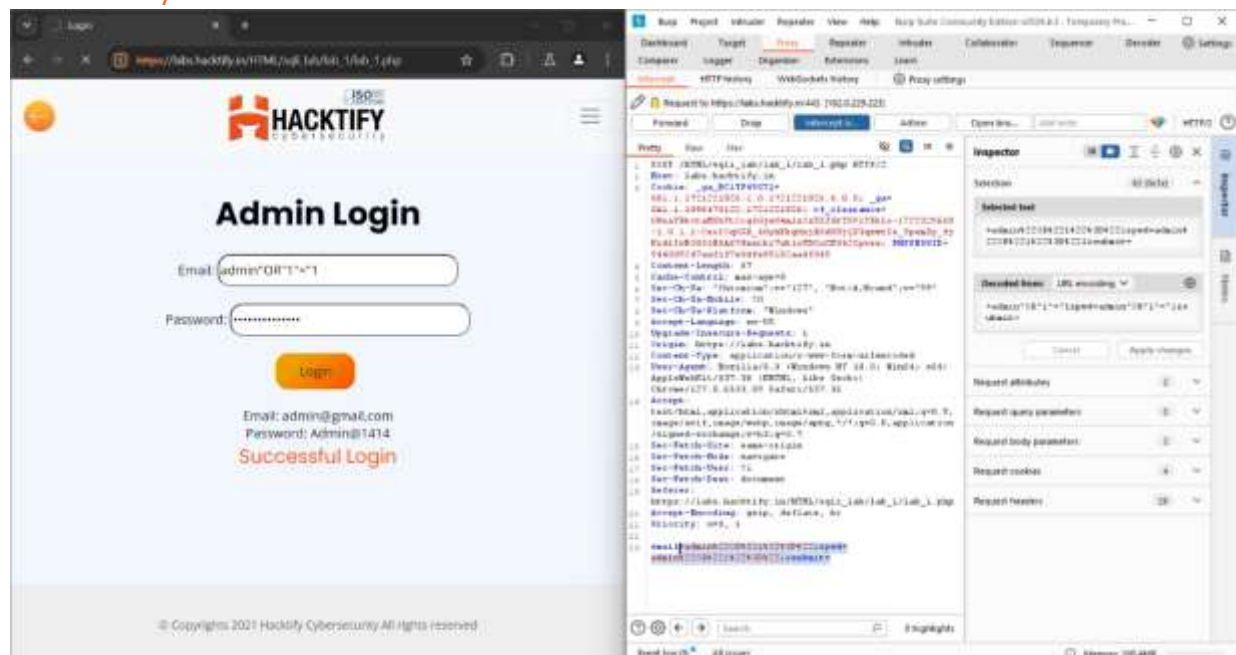
- **Input Validation:** Ensure all user inputs are properly validated and sanitized.
- **Parameterized Queries:** Use parameterized queries or prepared statements to prevent SQL code injection.

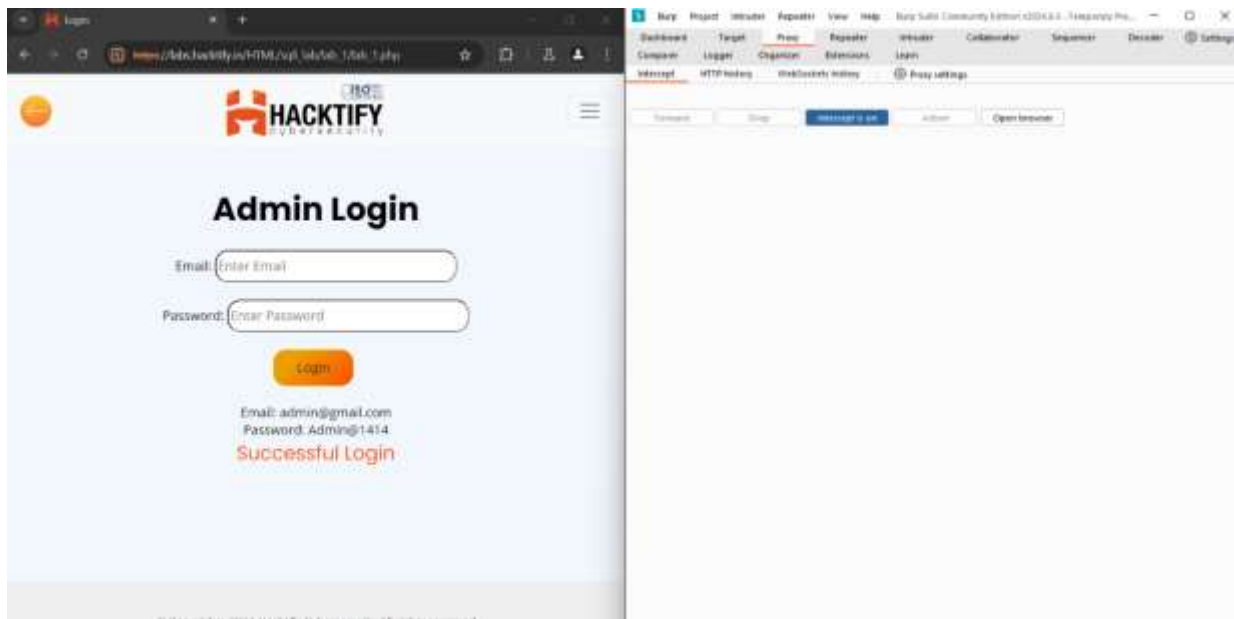
References

https://owasp.org/www-community/attacks/SQL_Injection

<https://portswigger.net/web-security/sql-injection>

This section contains the proof of the above vulnerabilities as the screenshot of the vulnerability of the lab





1.2. Strings and Errors Part 2!

Reference	Risk Rating
Sub-lab-1:Strings and Errors Part 2!	Low
Tools Used	
Bur	
Vulnerability Description	
<p>The SQL Injection (SQLi) is a web security vulnerability that allows an attacker to interfere with the queries that an application makes to its database.</p> <p>Attackers insert malicious SQL code into input fields (like login forms) that are not properly sanitized.</p>	
How It Was Discovered	
Automated Tools – Burp-Suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sql_i_lab/lab_2/lab_2.php	
Consequences of not Fixing the Issue	

Proof of Concept

- **Data Breaches:** Unauthorized access to sensitive data.
- **Data Manipulation:** Alteration or deletion of data.
- **System Compromise:** In some cases, attackers can gain control over the entire database server.

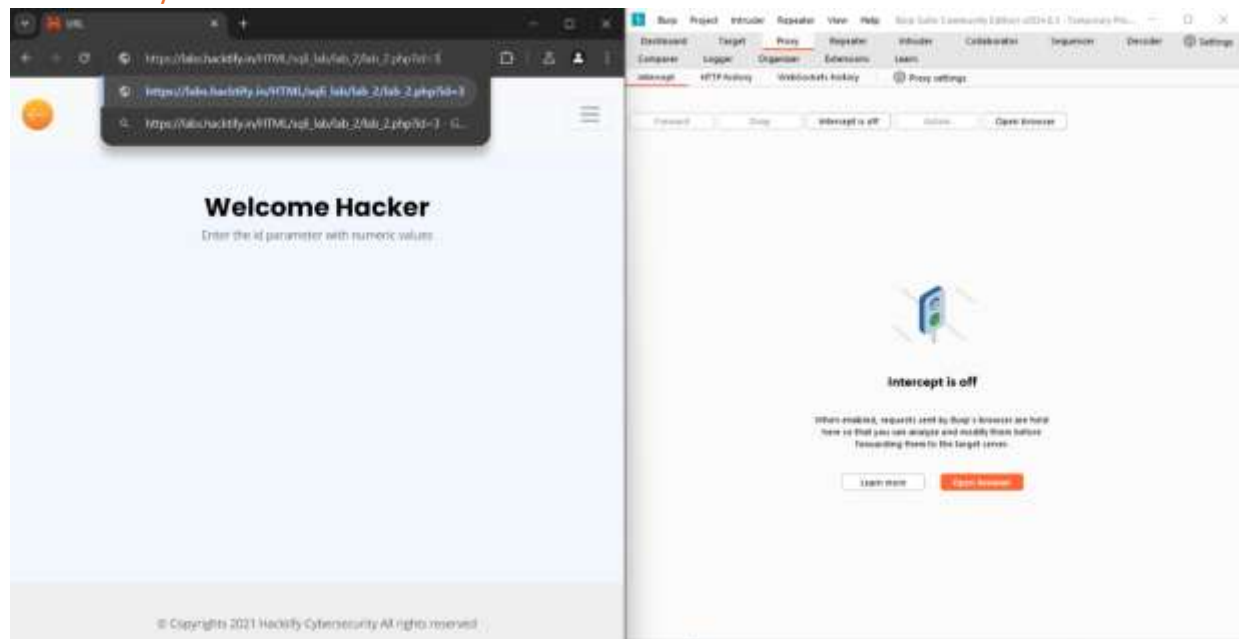
Suggested Countermeasures

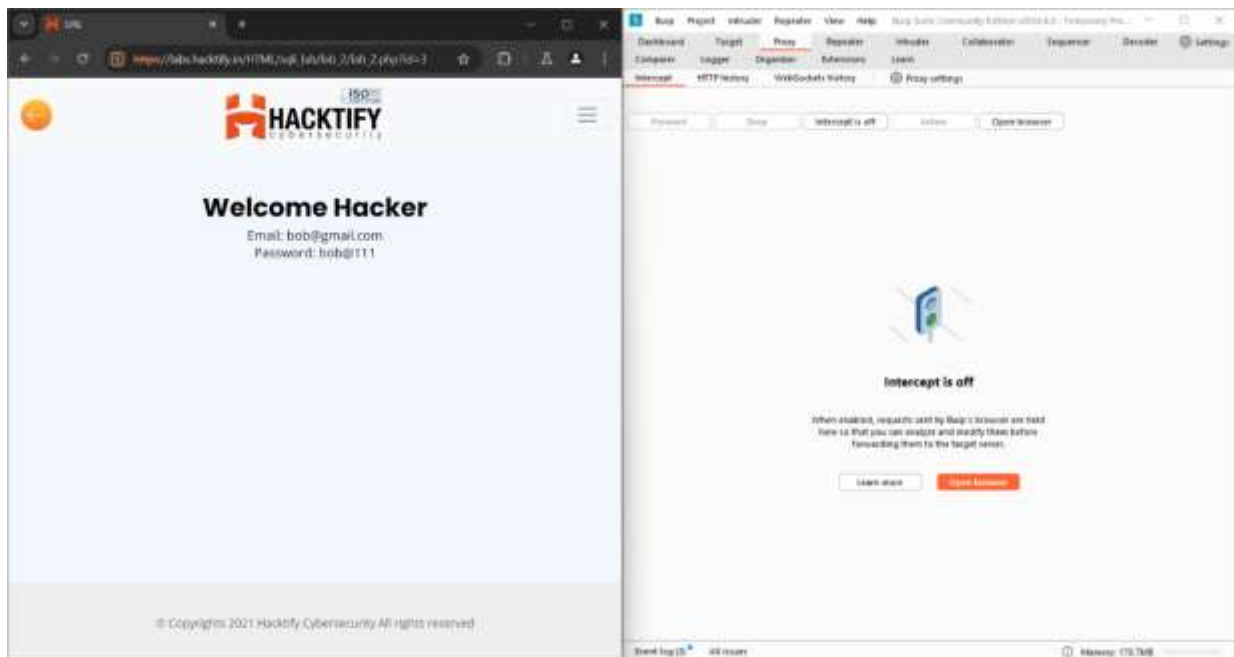
- **Input Validation:** Ensure all user inputs are properly validated and sanitized.
- **Parameterized Queries:** Use parameterized queries or prepared statements to prevent SQL code injection.
- **Stored Procedures:** Utilize stored procedures to handle database operations.

References

<https://www.geeksforgeeks.org/sql-injection/>
https://owasp.org/www-community/attacks/SQL_Injection
<https://portswigger.net/web-security/sql-injection>

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1.3. Strings and Errors Part 3!

Reference	Risk Rating
Sub-lab-3: Strings and Errors Part 3!	Low
Tools Used	
Burp-Suite	
Vulnerability Description	
<p>The SQL Injection (SQLi) is a web security vulnerability that allows an attacker to interfere with the queries that an application makes to its database.</p> <p>Attackers insert malicious SQL code into input fields (like login forms) that are not properly sanitized.</p> <p>Unauthorized Data Access: This can lead to unauthorized access to sensitive data, such as user credentials, personal information, and financial records.</p>	
How It Was Discovered	
Automated Tools –Burp-suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sqli_lab/lab_3/lab_3.php	
Consequences of not Fixing the Issue	

Proof of Concept

- **Data Breaches:** Unauthorized access to sensitive data.
- **Data Manipulation:** Alteration or deletion of data.
- **System Compromise:** In some cases, attackers can gain control over the entire database server.

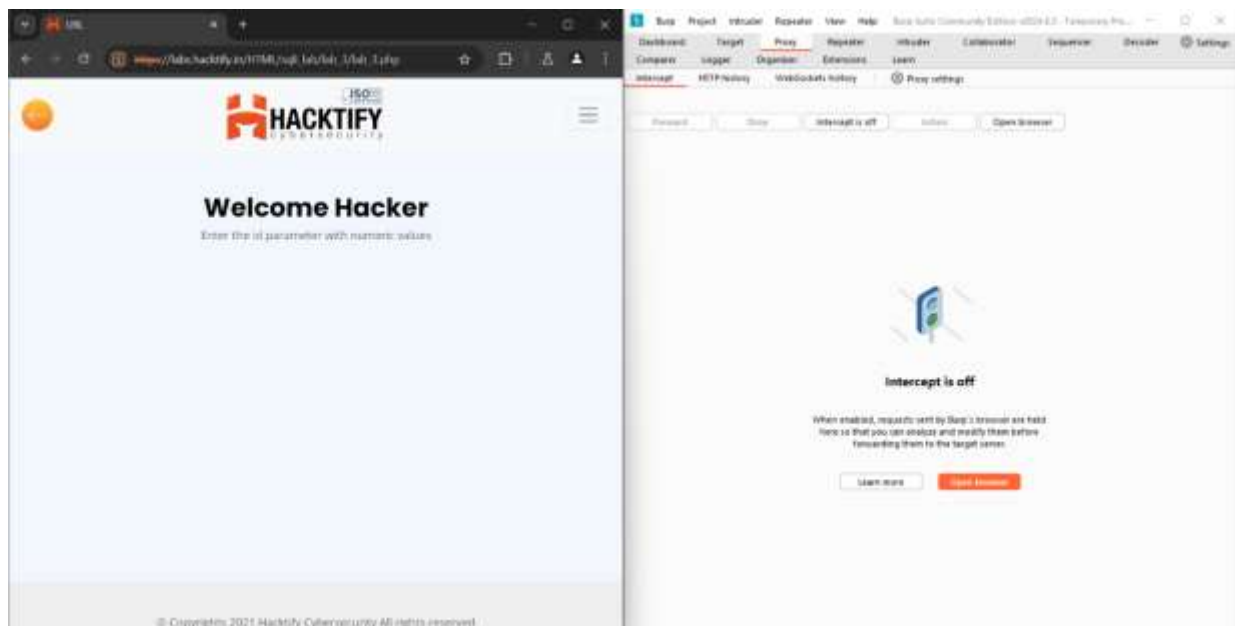
Suggested Countermeasures

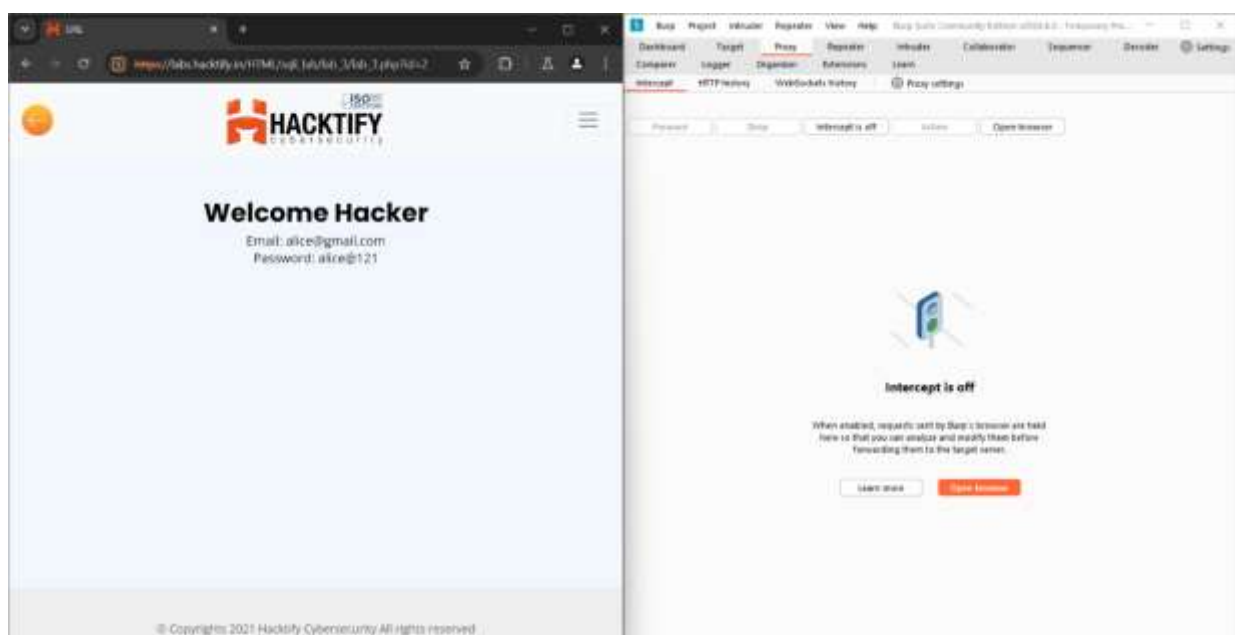
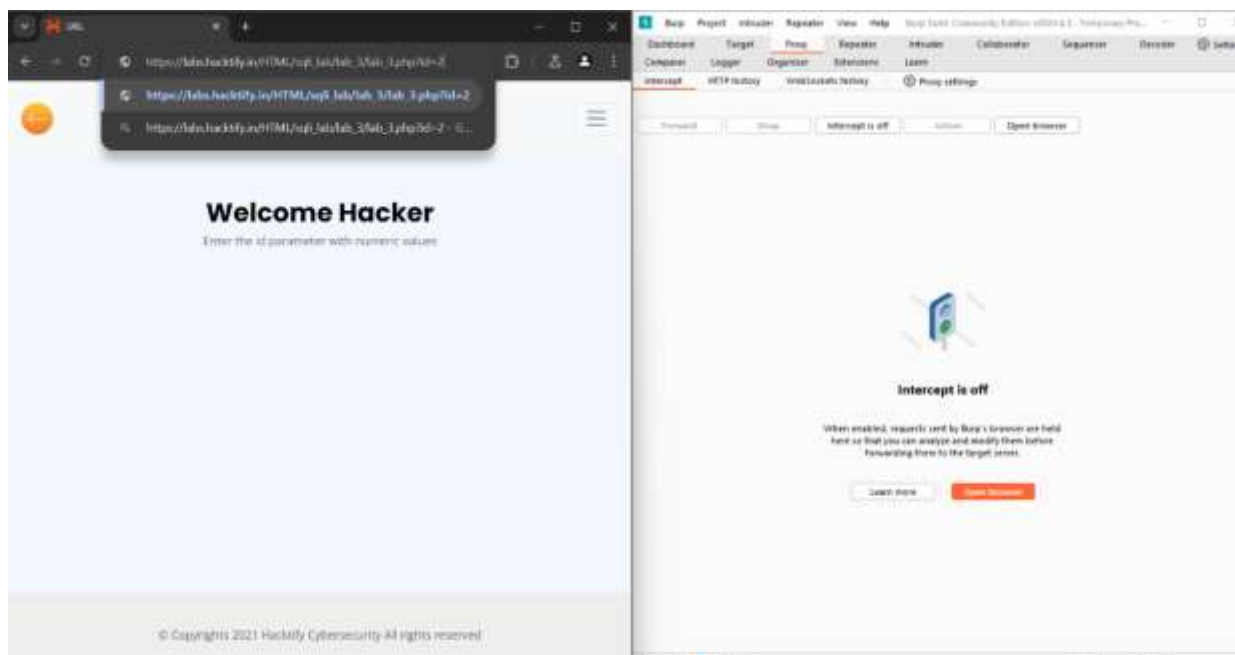
- **Input Validation:** Ensure all user inputs are properly validated and sanitized.
- **Parameterized Queries:** Use parameterized queries or prepared statements to prevent SQL code injection.
- **Stored Procedures:** Utilize stored procedures to handle database operations.

References

<https://www.geeksforgeeks.org/sql-injection/>
https://owasp.org/www-community/attacks/SQL_Injection
<https://portswigger.net/web-security/sql-injection>

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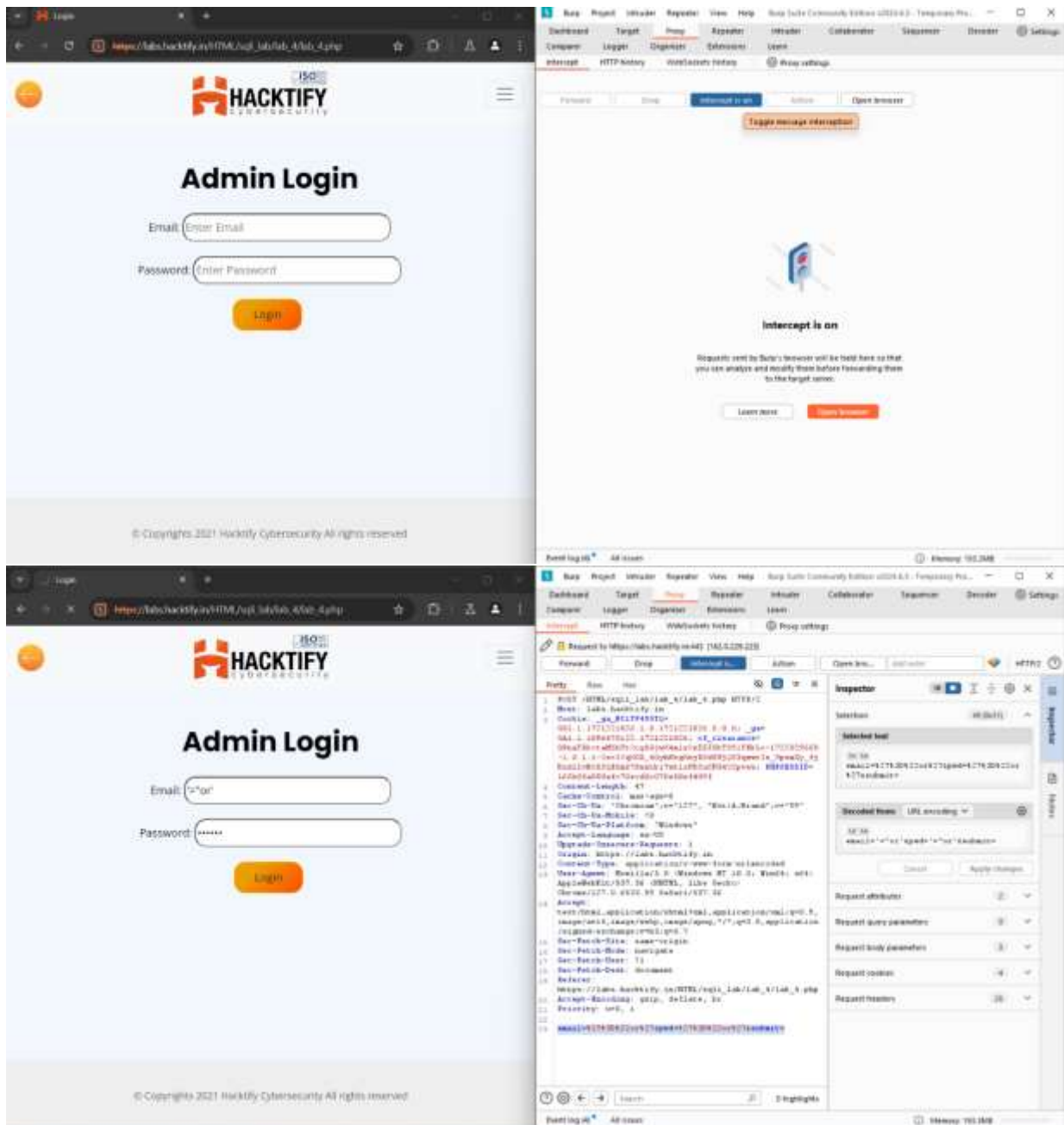


1.4. Let's Trick 'em!

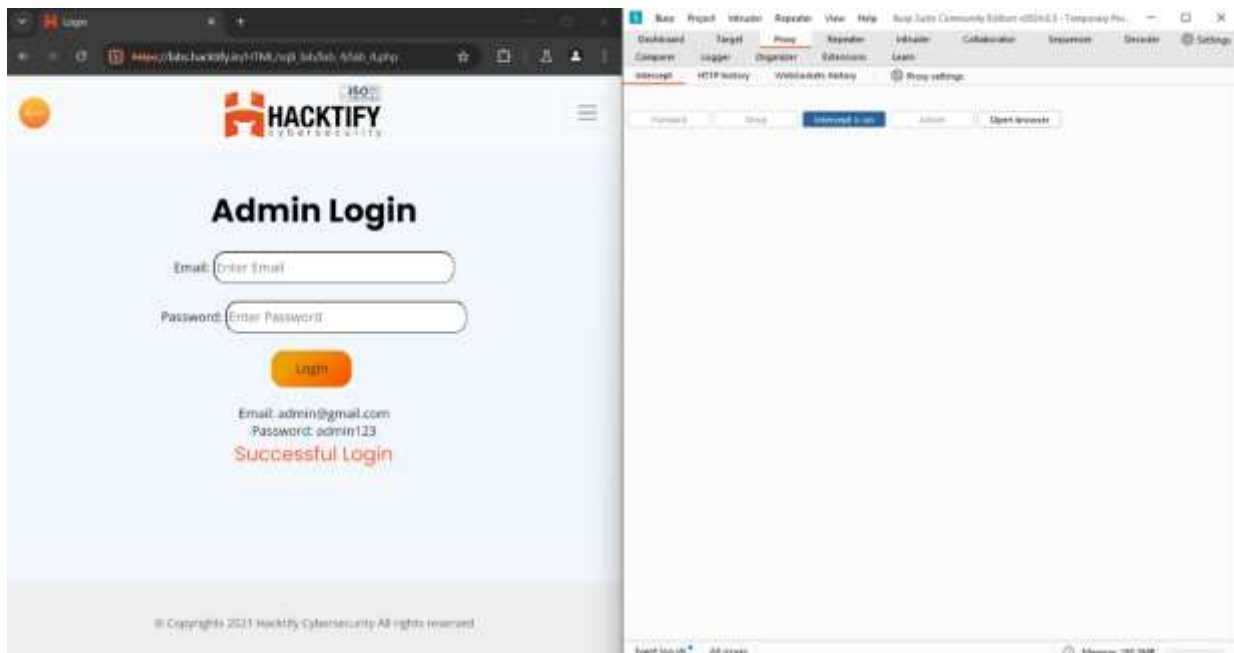
Proof of Concept

Reference	Risk Rating
Sub-lab-4: Let's Trick 'em!	Medium
Tools Used	
Burp-Suite	
Vulnerability Description	
<p>The SQL Injection (SQLi) is a web security vulnerability that allows an attacker to interfere with the queries that an application makes to its database.</p> <p>Attackers insert malicious SQL code into input fields (like login forms) that are not properly sanitized.</p> <p>Unauthorized Data Access: This can lead to unauthorized access to sensitive data, such as user credentials, personal information, and financial records.</p>	
How It Was Discovered	
Automated Tools – Burp-Suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sqli_lab/lab_4/lab_4.php	
Consequences of not Fixing the Issue	
<ul style="list-style-type: none">• Data Breaches: Unauthorized access to sensitive data.• Data Manipulation: Alteration or deletion of data.• System Compromise: In some cases, attackers can gain control over the entire database server.	
Suggested Countermeasures	
<ul style="list-style-type: none">• Input Validation: Ensure all user inputs are properly validated and sanitized.• Parameterized Queries: Use parameterized queries or prepared statements to prevent SQL code injection.• Stored Procedures: Utilize stored procedures to handle database operations	
References	
https://www.geeksforgeeks.org/sql-injection/ https://owasp.org/www-community/attacks/SQL_Injection https://portswigger.net/web-security/sql-injection	

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Proof of Concept



1.5. Booleans and Blind!

Reference	Risk Rating
Sub-lab-5: Booleans and Blind!	High
Tools Used	
Burp- Suite	
Vulnerability Description	
<p>The SQL Injection (SQLi) is a web security vulnerability that allows an attacker to interfere with the queries that an application makes to its database.</p> <p>Attackers insert malicious SQL code into input fields (like login forms) that are not properly sanitized.</p> <p>Unauthorized Data Access: This can lead to unauthorized access to sensitive data, such as user credentials, personal information, and financial records.</p>	
How It Was Discovered	
Automated Tools – Burp-Suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sql_i_lab/lab_5/lab_5.php	

Consequences of not Fixing the Issue

- Attackers can alter, delete, or insert data within the database. This can compromise the integrity of the data, leading to incorrect information being stored and used.
- A successful SQL Injection attack can severely damage an organization's reputation. Customers and partners may lose trust in the organization's ability to protect their data, leading to long-term reputational harm.

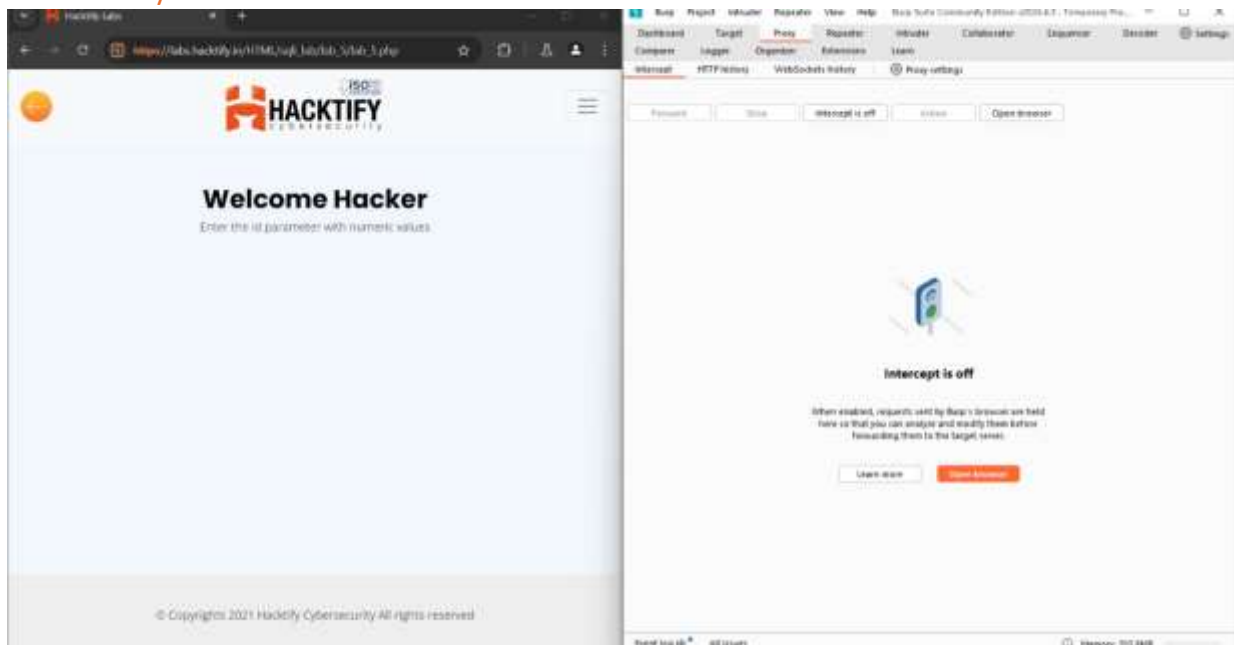
Suggested Countermeasures

- **Sanitize Inputs:** Ensure all user inputs are properly sanitized to remove any potentially harmful characters.
- **Whitelist Validation:** Use whitelisting to allow only expected input formats and values.
- **Prepared Statements:** Use parameterized queries or prepared statements to ensure that user inputs are treated as data, not executable code.

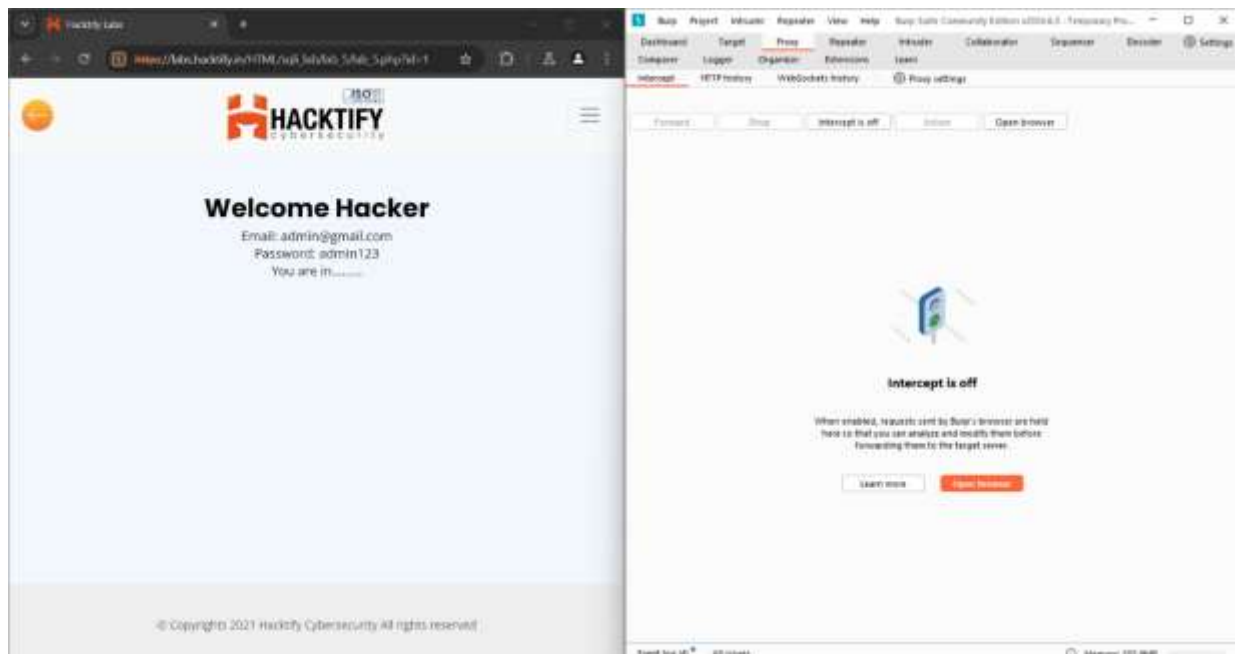
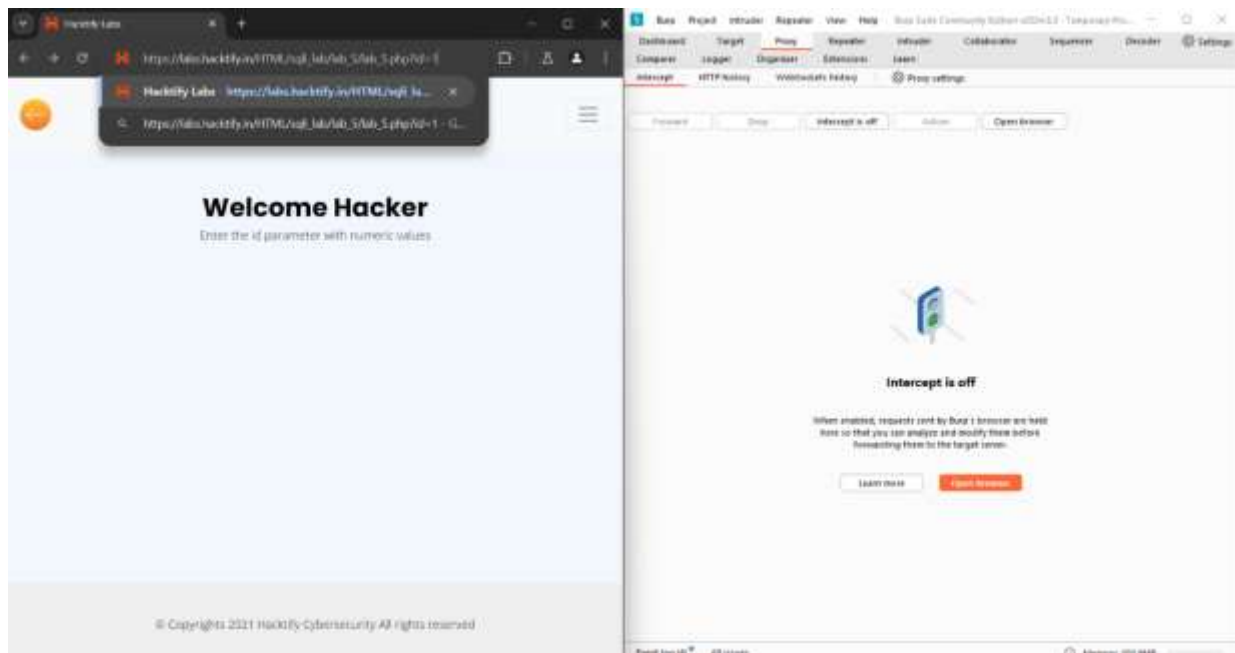
References

<https://www.varonis.com/blog/what-is-sql-injection>
<https://www.geeksforgeeks.org/sql-injection/>
https://owasp.org/www-community/attacks/SQL_Injection
<https://portswigger.net/web-security/sql-injection>

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Proof of Concept

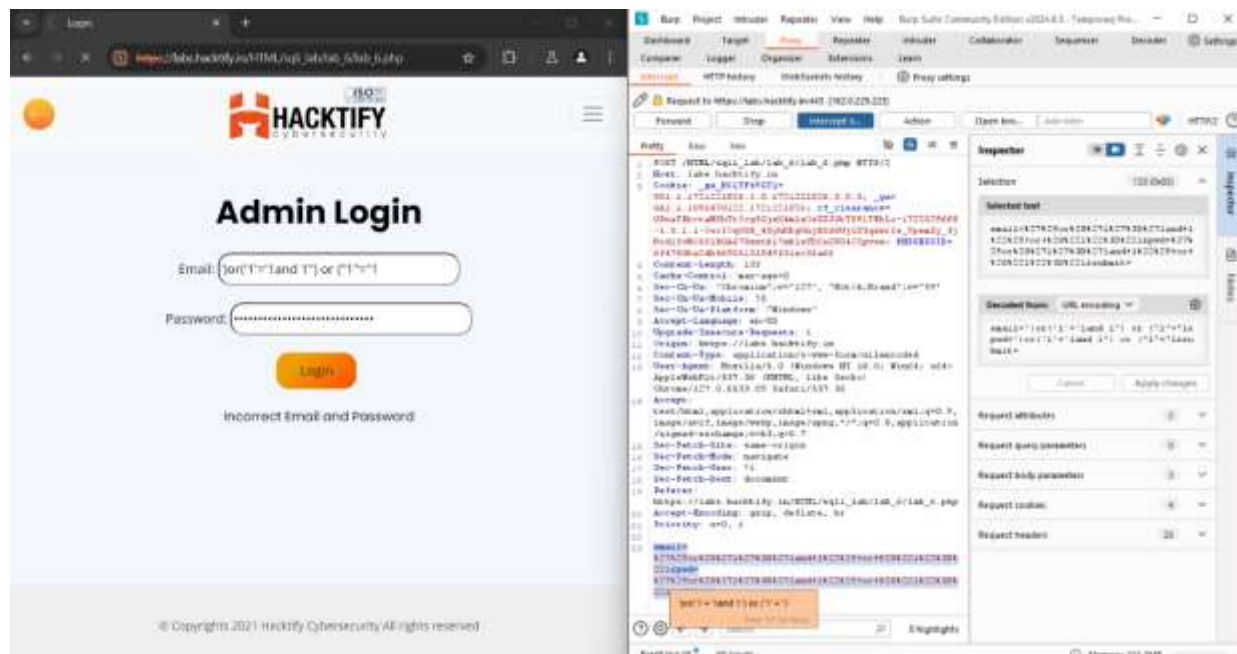
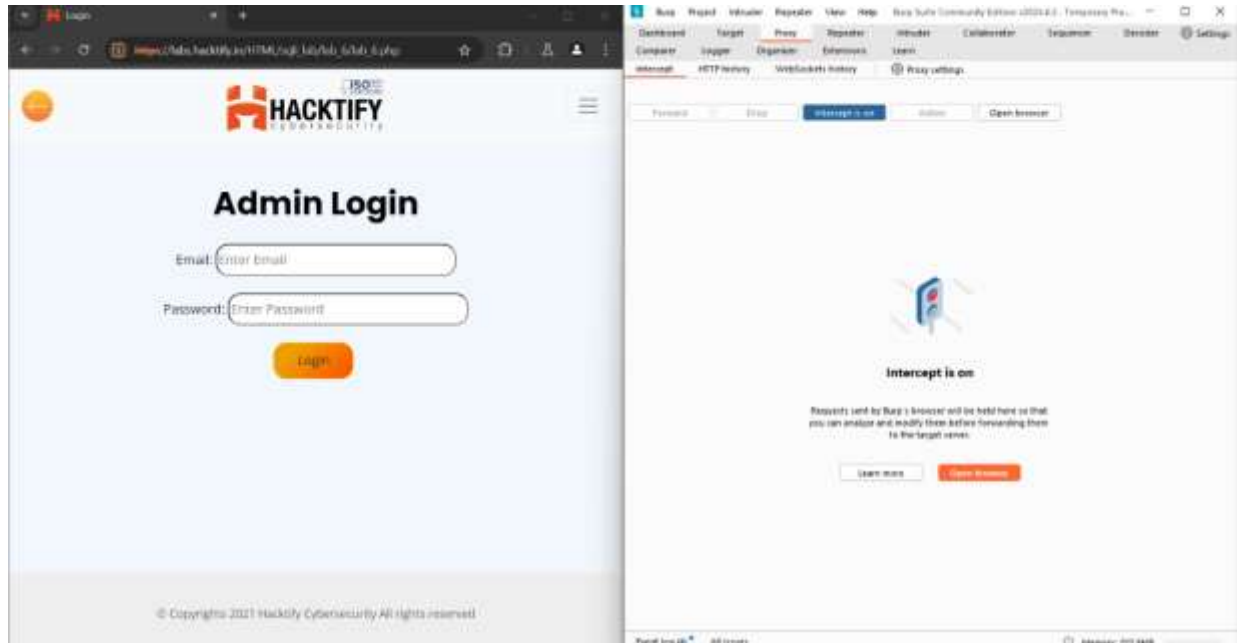


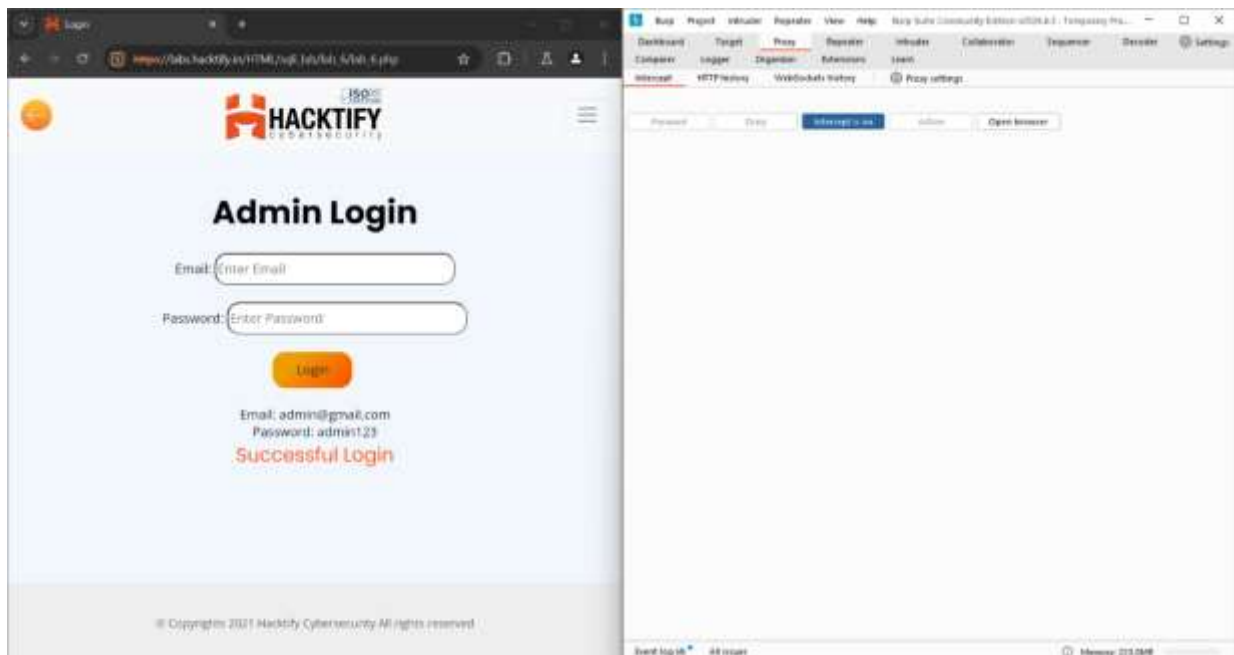
1.6. Error Based : Tricked

Reference	Risk Rating
Sub-lab-6: Error Based : Tricked	Medium
Tools Used	
Burp Suite	
Vulnerability Description	
<p>The SQL Injection (SQLi) is a web security vulnerability that allows an attacker to interfere with the queries that an application makes to its database.</p> <p>Attackers insert malicious SQL code into input fields (like login forms) that are not properly sanitized.</p> <p>Unauthorized Data Access: This can lead to unauthorized access to sensitive data, such as user credentials, personal information, and financial records.</p>	
How It Was Discovered	
Automated Tool----Burp-suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sql_i_lab/lab_6/lab_6.php	
Consequences of not Fixing the Issue	
<ul style="list-style-type: none">• Attackers can gain unauthorized access to sensitive data, such as personal information, financial records, and intellectual property. This can lead to significant privacy violations and legal repercussions.• Attackers can alter, delete, or insert data within the database. This can compromise the integrity of the data, leading to incorrect information being stored and used.	
Suggested Countermeasures	
<ul style="list-style-type: none">• Sanitize Inputs: Ensure all user inputs are properly sanitized to remove any potentially harmful characters.• Whitelist Validation: Use whitelisting to allow only expected input formats and values.• Prepared Statements: Use parameterized queries or prepared statements to ensure that user inputs are treated as data, not executable code.• Traffic Filtering: Deploy a WAF to filter and monitor incoming traffic for malicious SQLi patterns.	
References	
https://owasp.org/www-community/attacks/SQL_Injection https://portswigger.net/web-security/sql-injection https://www.varonis.com/blog/what-is-sql-injection	

Proof of Concept

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1.7. Errors and Post!

Reference	Risk Rating
Sub-lab-7: Errors and Post!	Low
Tools Used	
Burp Suite	
Vulnerability Description	
<p>The SQL Injection (SQLi) is a web security vulnerability that allows an attacker to interfere with the queries that an application makes to its database.</p> <p>Attackers insert malicious SQL code into input fields (like login forms) that are not properly sanitized.</p> <p>Unauthorized Data Access: This can lead to unauthorized access to sensitive data, such as user credentials, personal information, and financial records.</p>	
How It Was Discovered	
Automated Tool---Burp-suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sqli_lab/lab_7/lab_7.php	
Consequences of not Fixing the Issue	

Proof of Concept

- Attackers can gain unauthorized access to sensitive data, such as personal information, financial records, and intellectual property. This can lead to significant privacy violations and legal repercussions.
- Attackers can alter, delete, or insert data within the database. This can compromise the integrity of the data, leading to incorrect information being stored and used.

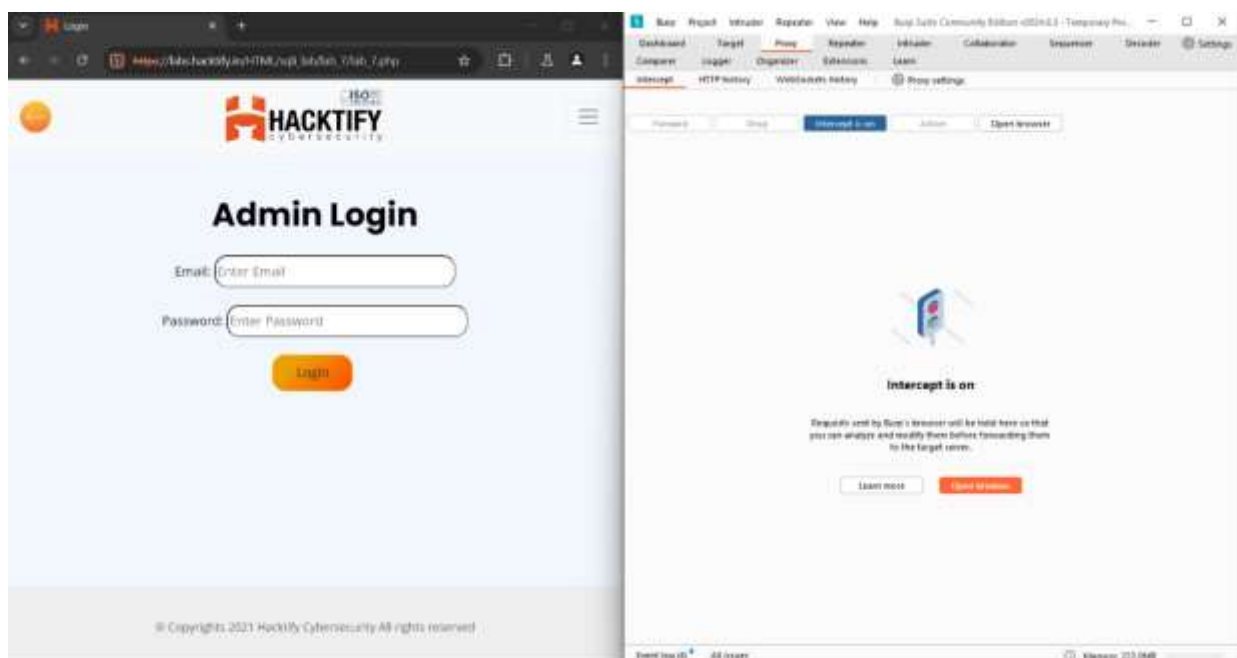
Suggested Countermeasures

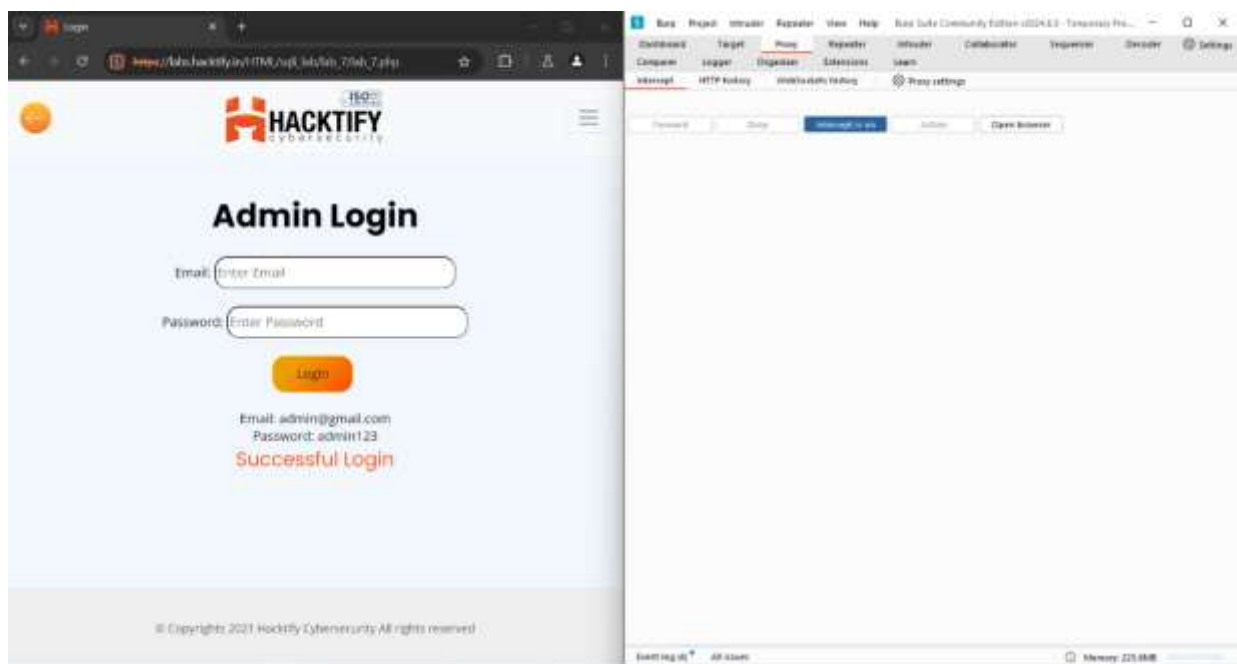
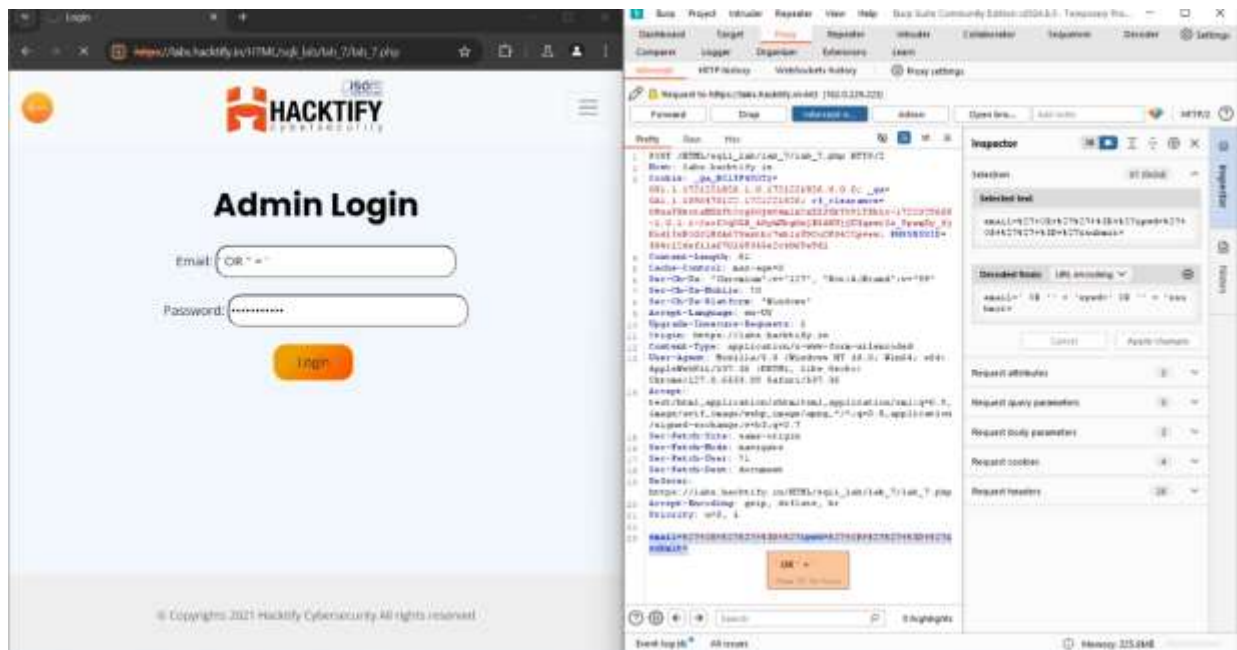
- **Sanitize Inputs:** Ensure all user inputs are properly sanitized to remove any potentially harmful characters.
- **Whitelist Validation:** Use whitelisting to allow only expected input formats and values.
- **Prepared Statements:** Use parameterized queries or prepared statements to ensure that user inputs are treated as data, not executable code.
- **Traffic Filtering:** Deploy a WAF to filter and monitor incoming traffic for malicious SQLi patterns.

References

https://owasp.org/www-community/attacks/SQL_Injection
<https://portswigger.net/web-security/sql-injection>
<https://www.varonis.com/blog/what-is-sql-injection>

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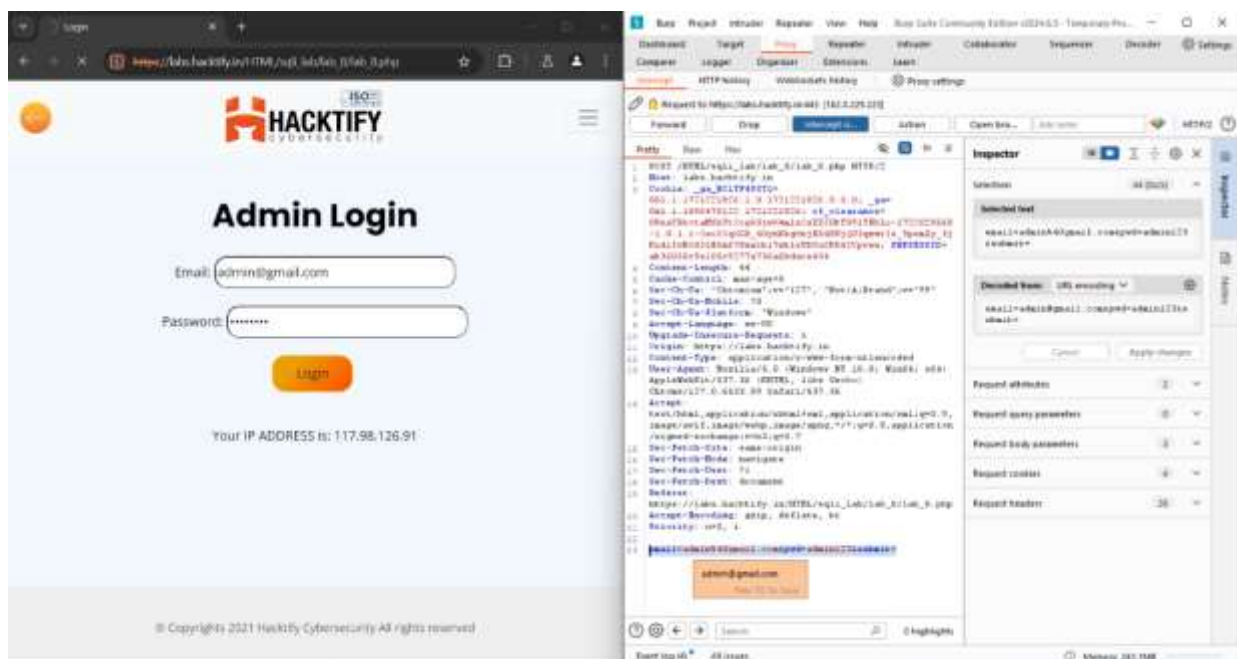
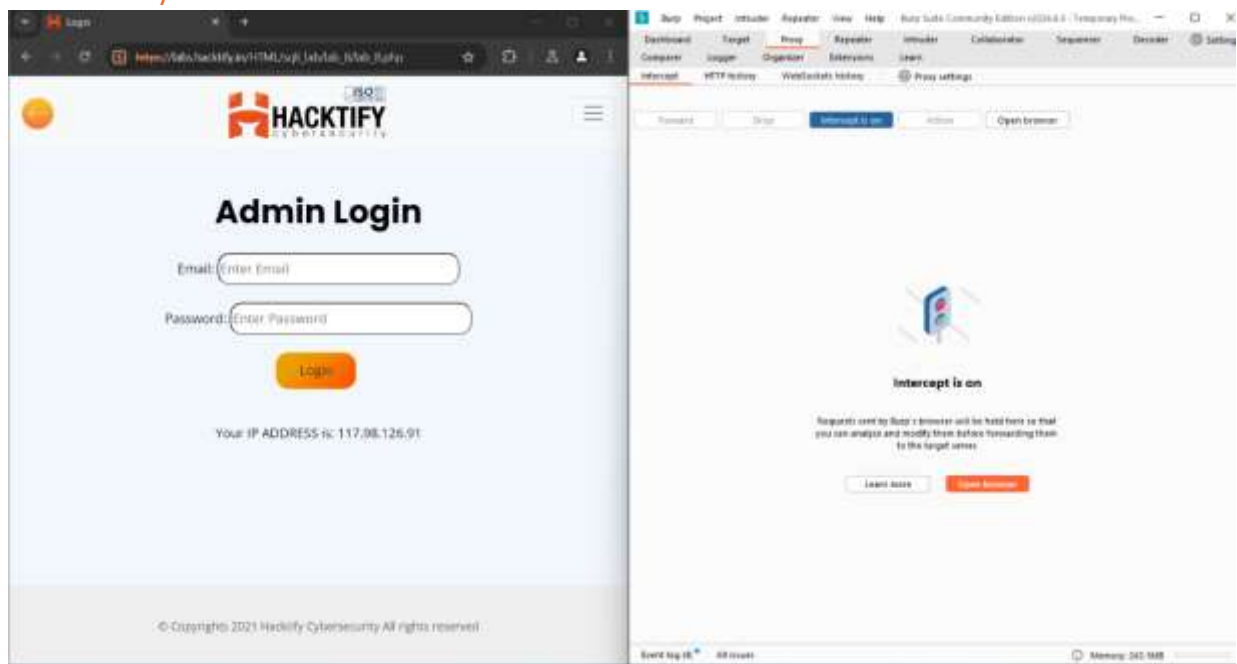


Proof of Concept

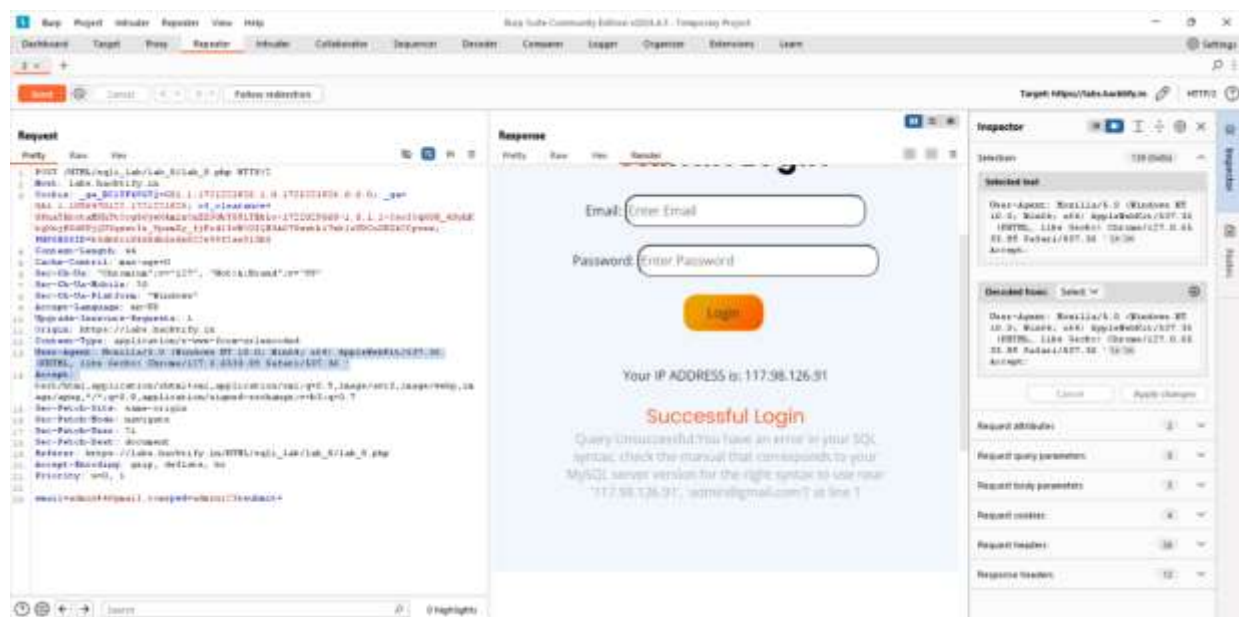
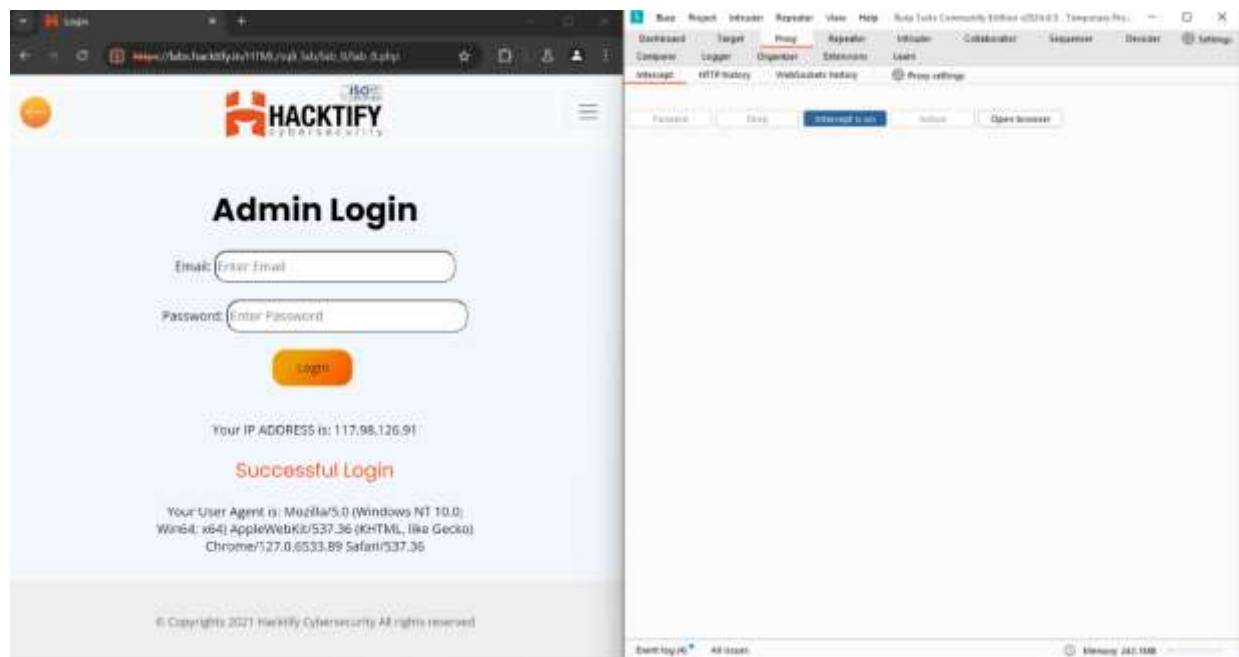
1.8. User Agents lead us!

Reference	Risk Rating
Sub-lab-8: User Agents lead us!	High
Tools Used	
Burp Suite	
Vulnerability Description	
<p>Attackers modify the “User-Agent” header in their HTTP requests to include malicious SQL code. If the application logs or processes the “User-Agent” header without proper sanitization, the malicious code can be executed as part of an SQL query.</p> <p>This can lead to unauthorized access, data manipulation, or even full control over the database.</p>	
How It Was Discovered	
Automated Tool----Burp-suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sqli_lab/lab_8/lab_8.php	
Consequences of not Fixing the Issue	
<ul style="list-style-type: none">• Data Breaches: Unauthorized access to sensitive data.• Data Manipulation: Alteration or deletion of data.• System Compromise: Potential control over the entire database server	
Suggested Countermeasures	
<ol style="list-style-type: none">1. Input Validation: Sanitize and validate all inputs, including HTTP headers.2. Parameterized Queries: Use parameterized queries or prepared statements to handle inputs safely.3. Least Privilege: Apply the principle of least privilege to database accounts.4. Web Application Firewalls (WAF): Deploy a WAF to filter and monitor incoming traffic for malicious patterns.	
References	
https://portswigger.net/kb/issues/00100200_sql-injection https://owasp.org/www-community/attacks/SQL_Injection https://unsql.ai/sql-security/injection-in-sql/	

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Proof of Concept



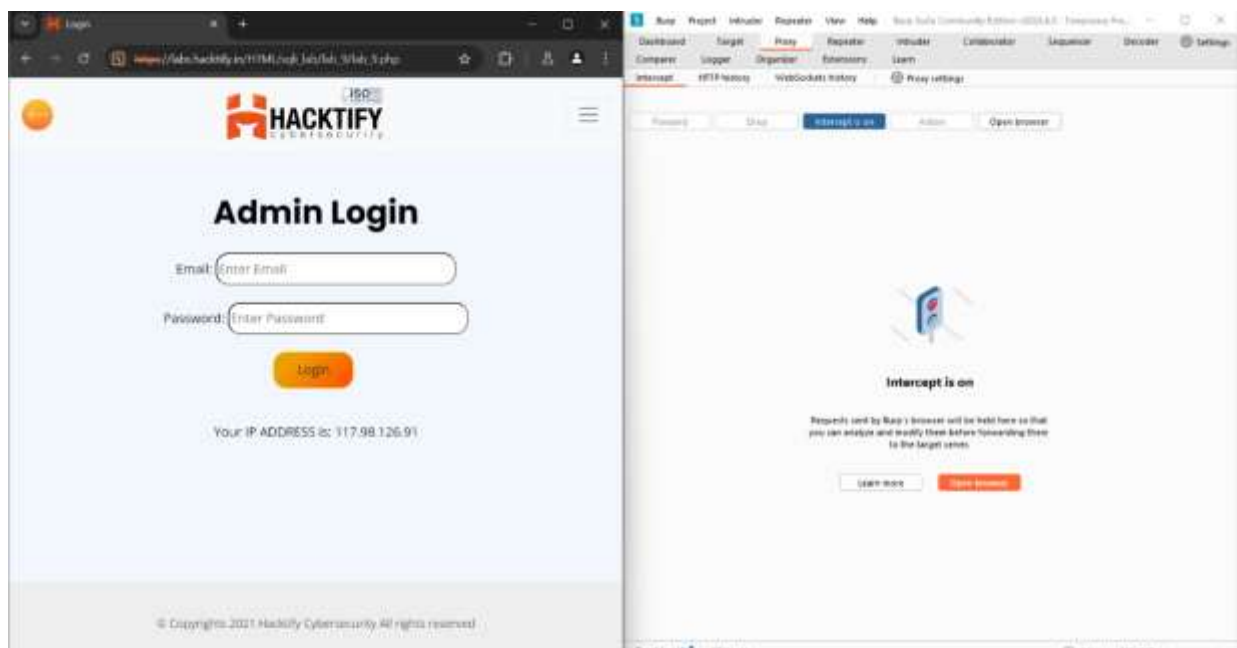
Proof of Concept

1.9. Referer lead us!

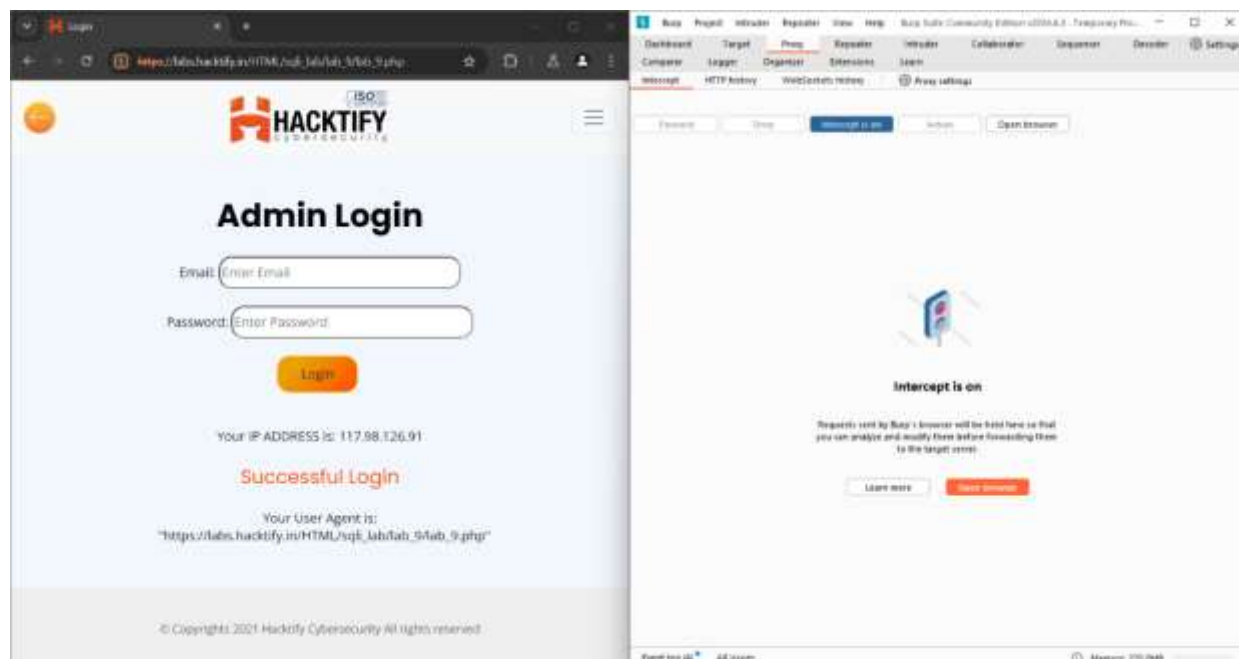
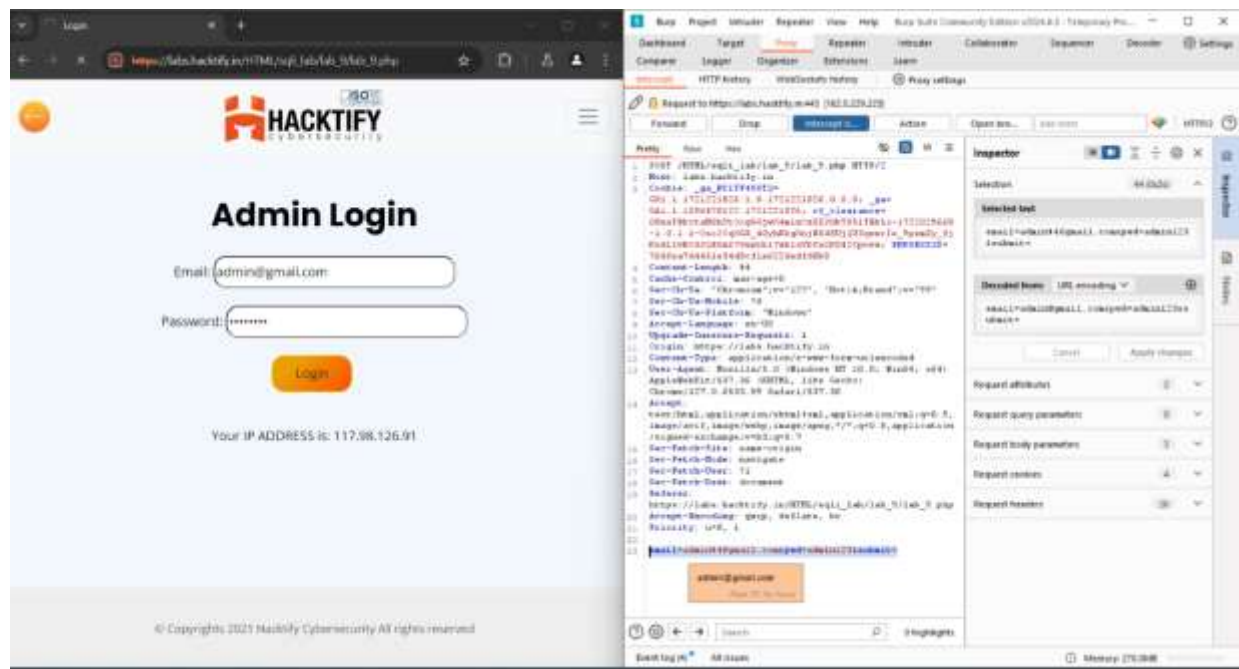
Reference	Risk Rating
Sub-lab-9: Referer lead us!	Medium
Tools Used	
Burp Suite	
Vulnerability Description	
<p>Attackers modify the “User-Agent” header in their HTTP requests to include malicious SQL code. If the application logs or processes the “User-Agent” header without proper sanitization, the malicious code can be executed as part of an SQL query.</p> <p>This can lead to unauthorized access, data manipulation, or even full control over the database.</p>	
How It Was Discovered	
Automated Tool----Burp-suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sqli_lab/lab_9/lab_9.php	
Consequences of not Fixing the Issue	
<ul style="list-style-type: none">• Data Breaches: Unauthorized access to sensitive data.• Data Manipulation: Alteration or deletion of data.• System Compromise: Potential control over the entire database server	
Suggested Countermeasures	
<ul style="list-style-type: none">• Input Validation: Sanitize and validate all inputs, including HTTP headers.• Parameterized Queries: Use parameterized queries or prepared statements to handle inputs safely.• Least Privilege: Apply the principle of least privilege to database accounts.• Web Application Firewalls (WAF): Deploy a WAF to filter and monitor incoming traffic for malicious patterns.	
References	

https://portswigger.net/kb/issues/00100200_sql-injection
https://owasp.org/www-community/attacks/SQL_Injection
<https://unsql.ai/sql-security/injection-in-sql/>

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Proof of Concept

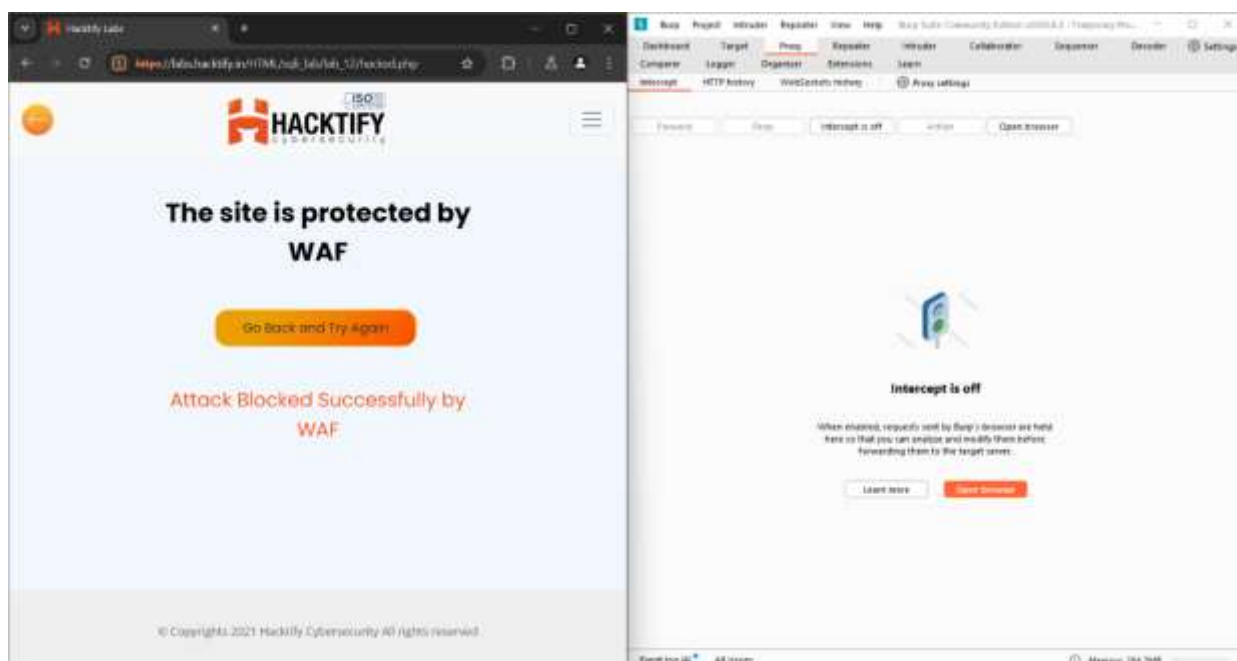
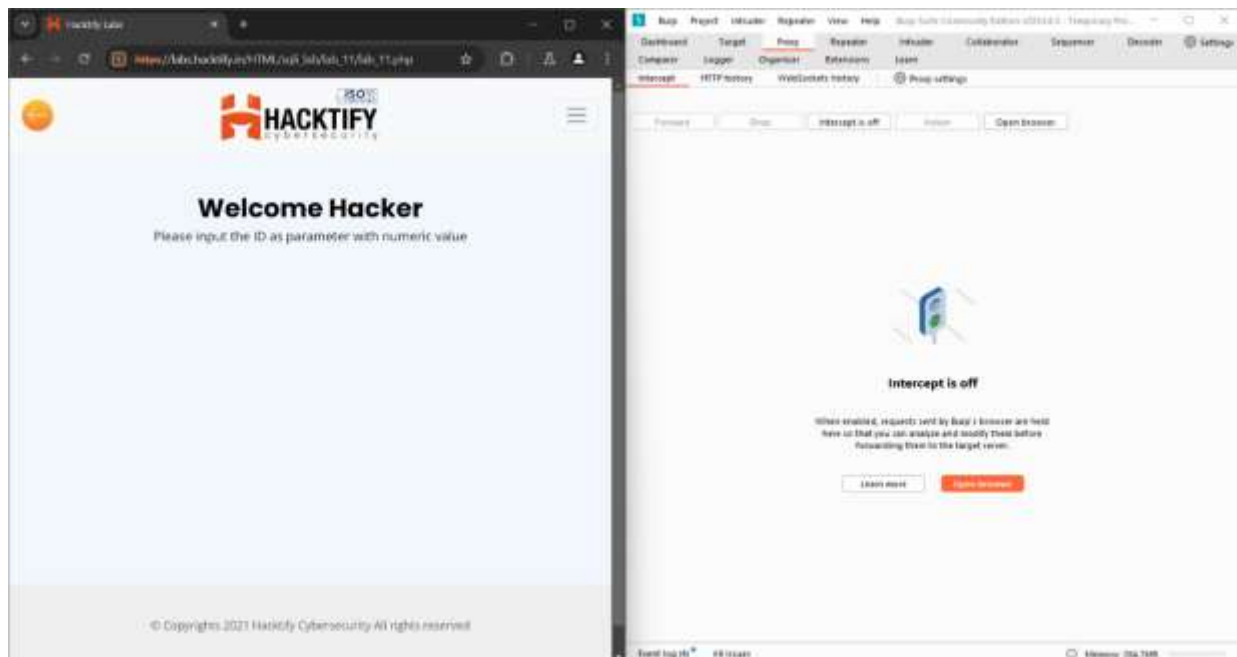


Proof of Concept

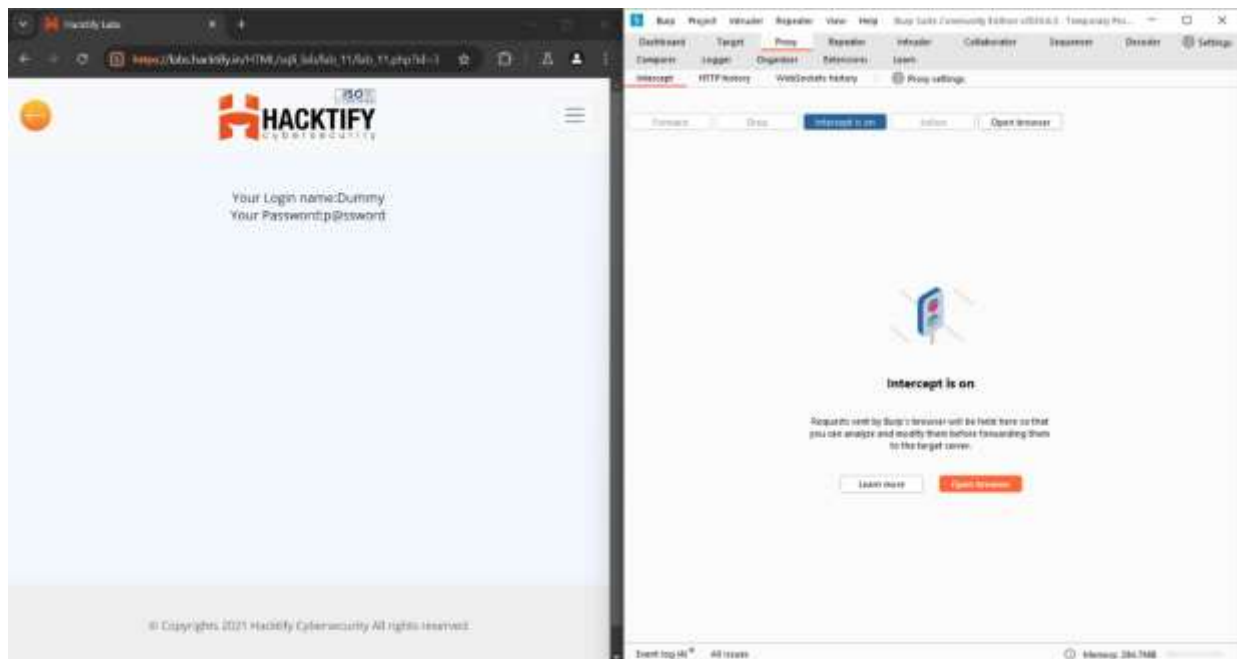
1.10 WAF's are injected!

Reference	Risk Rating
Sub-lab-11: WAF's are injected	High
Tools Used	
Burp Suite	
Vulnerability Description	
Attackers use sophisticated evasion techniques to manipulate SQL queries in a way that bypasses WAF filters. This can include encoding, obfuscation, and altering the structure of the SQL payload.	
How It Was Discovered	
Automated Tool----Burp-suite	
Vulnerable URLs	
https://labs.hacktify.in/HTML/sql_i_lab/lab_12/hacked.php	
Consequences of not Fixing the Issue	
<ul style="list-style-type: none">• Data Breaches: Unauthorized access to sensitive data.• Data Manipulation: Alteration or deletion of data.• System Compromise: Potential control over the entire database server	
Suggested Countermeasures	
<ol style="list-style-type: none">1. Advanced WAF Configuration: Regularly update and configure WAF rules to handle new evasion techniques.2. Input Validation: Implement robust input validation and sanitization on the server side.3. Parameterized Queries: Use parameterized queries or prepared statements to handle inputs safely.4. Regular Security Audits: Conduct regular security audits and penetration testing to identify and fix potential vulnerabilities.	
References	
https://portswigger.net/web-security/sql-injection https://www.varonis.com/blog/what-is-sql-injection https://owasp.org/www-community/attacks/SQL_Injection	

This section contains the proof of the above vulnerabilities as the screenshot of the vulnerability of the lab



Proof of Concept



2. Cross-Site Request Forgery

2.1. Eassyy CSRF

Reference	Risk Rating
Sub-lab-1: Eassyy CSRF	Low
Tools Used	
Burp-Suite .Poc Generator	
Vulnerability Description	
<ul style="list-style-type: none">• CSRF exploits the trust that a web application has in the user's browser. When a user is authenticated to a site, their browser automatically includes their session cookies with every request.• An attacker crafts a malicious request and tricks the user into executing it. This can be done through social engineering techniques, such as sending a link via email or embedding it in a malicious website.• The malicious request inherits the user's identity and privileges, causing the web application to execute actions on behalf of the user without their consent.	
How It Was Discovered	
Automated Tools – Browser Inspect /Proxy /Burp-Suite	

Vulnerable URLs

https://labs.hacktify.in/HTML/csrf_lab/lab_1/login.php

Consequences of not Fixing the Issue

- **Unauthorized Transactions:** Attackers can perform unauthorized transactions, such as transferring funds or making purchases.
- **Data Manipulation:** Attackers can change user settings, such as email addresses or passwords.
- **Compromise of Entire Application:** If the victim is an administrative user, the attacker can potentially compromise the entire web application.

Suggested Countermeasures

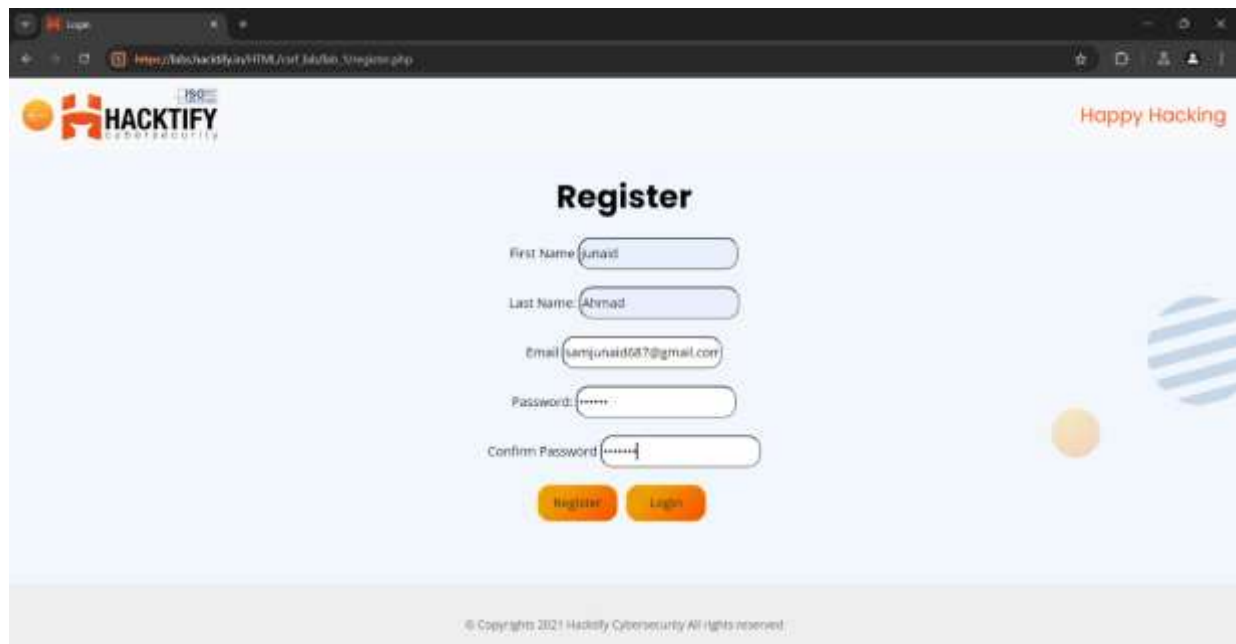
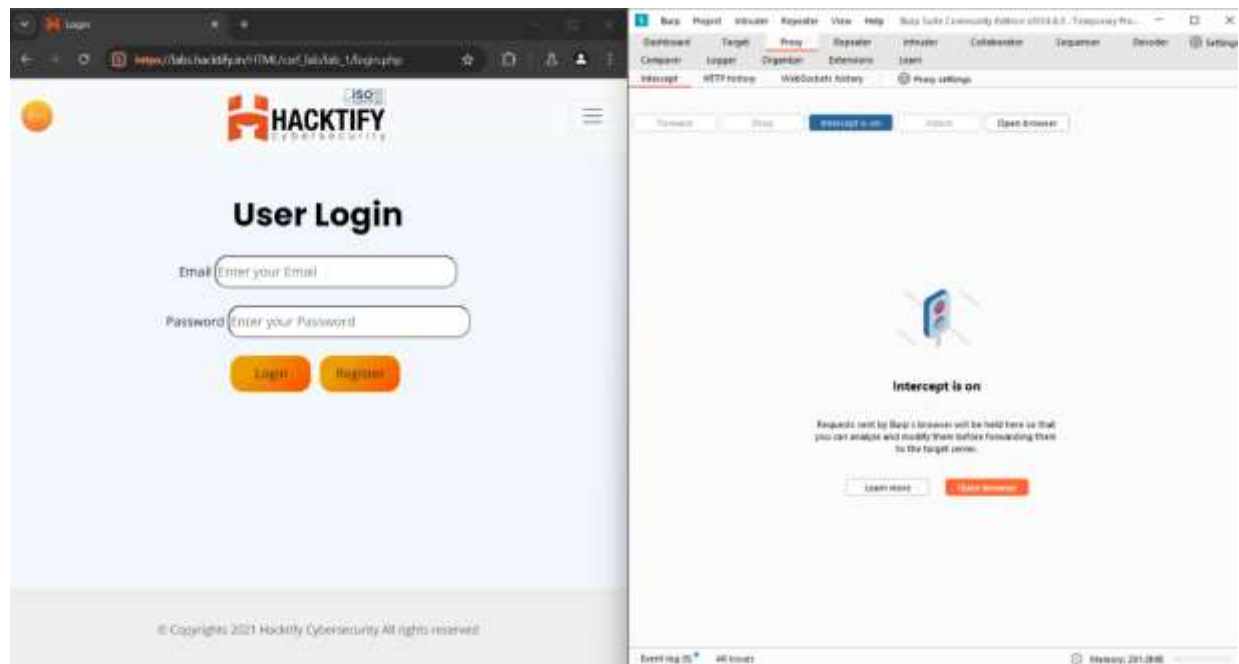
- **Anti-CSRF Tokens:** Use unique tokens for each session or request to verify the legitimacy of requests.
- **SameSite Cookies:** Set cookies with the SameSite attribute to prevent them from being sent with cross-site requests.
- **Referer Header Validation:** Check the Referer header to ensure requests are coming from trusted sources.
- **User Interaction:** Require user interaction (e.g., CAPTCHA) for critical actions to ensure they are intentional.
-

References

<https://www.rapid7.com/fundamentals/cross-site-request-forgery/>
<https://owasp.org/www-community/attacks/csrf>

This section contains the proof of the above vulnerabilities as the screenshot of the vulnerability of the lab

Proof of Concept



Happy Hacking

Register

First Name:

Last Name:

Email:

Password:

Confirm Password:

© Copyrights 2021 Hacktify Cybersecurity All rights reserved

Happy Hacking

Welcome to Dashboard junaid Ahmad

© Copyrights 2021 Hacktify Cybersecurity All rights reserved

Request to https://labs.hacktify.io/api/ (403.0.226.215)

Method: GET

URL: https://labs.hacktify.io/api/

Headers:

```

Host: labs.hacktify.io
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:89.0) Gecko/20100101 Firefox/89.0
Accept: */*
Accept-Language: en-US
Accept-Encoding: gzip, deflate
Referer: https://labs.hacktify.io/
Connection: keep-alive

```

Response:

```

HTTP/1.1 403 Forbidden
Content-Type: application/json
Content-Length: 112
Date: Mon, 04 Jul 2021 14:00:00 GMT

```

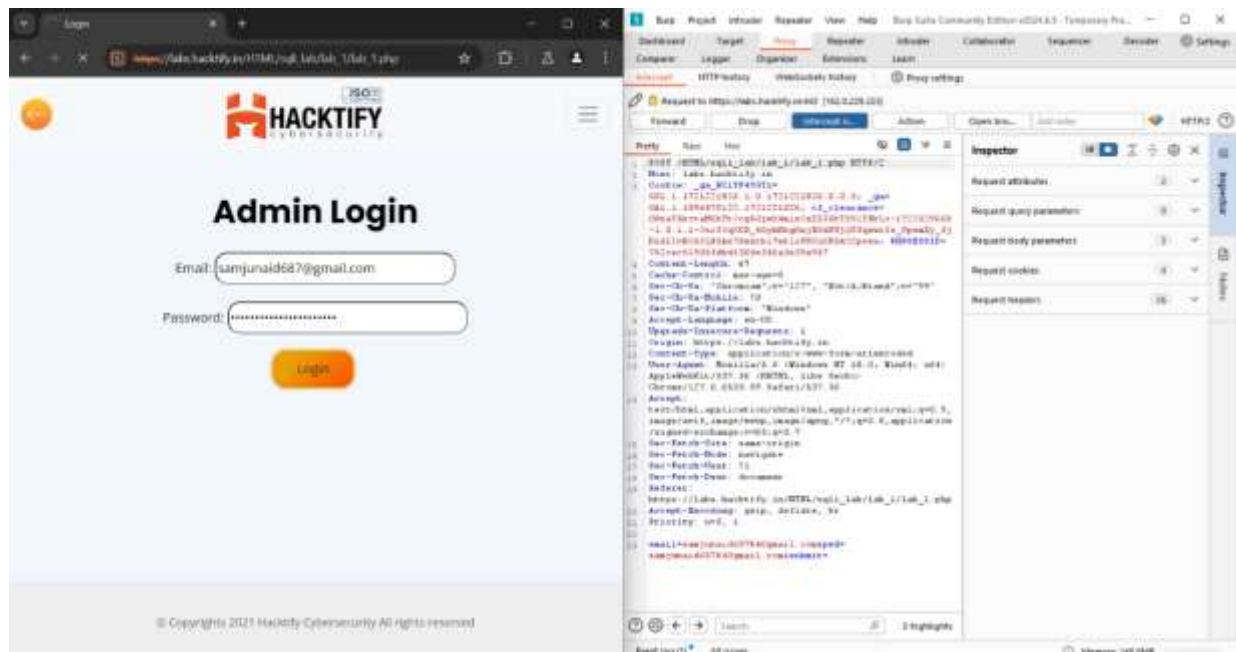
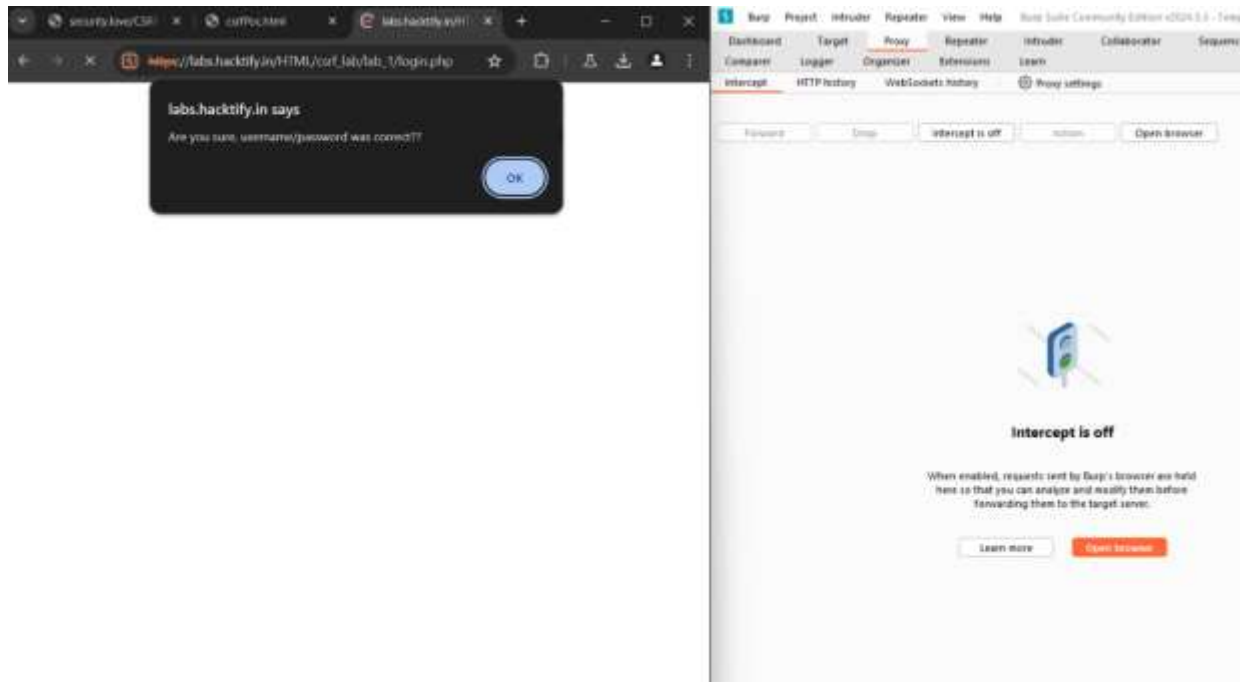
Decoded from: UTF-8 encoding

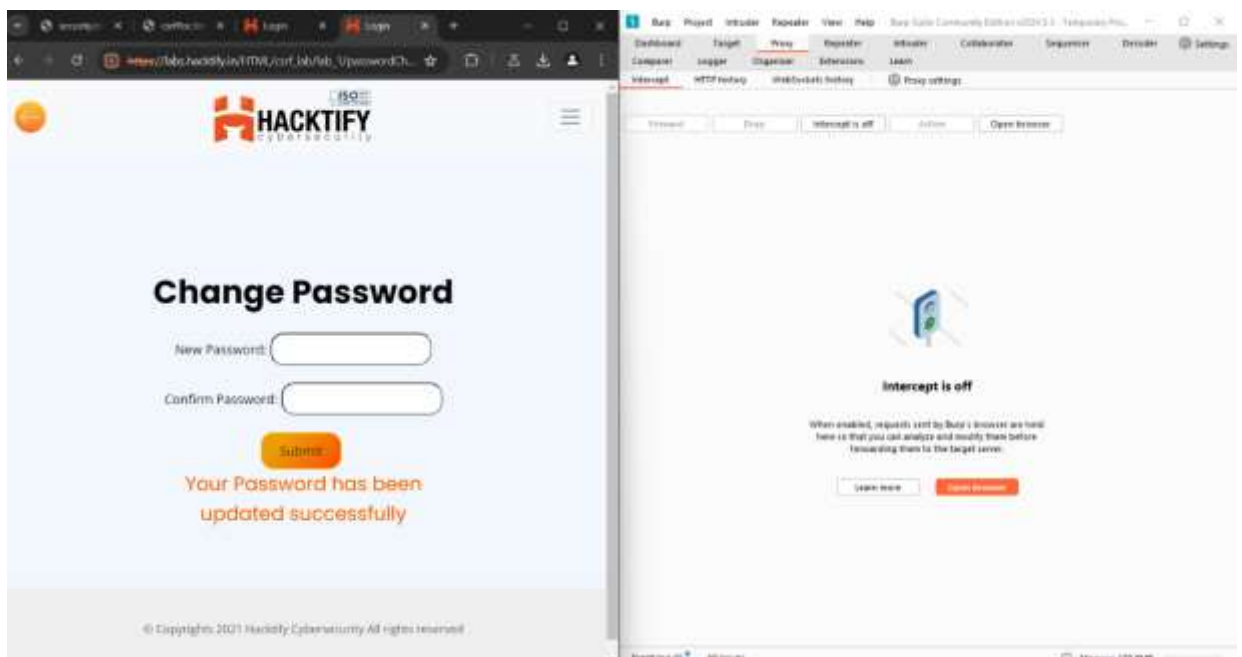
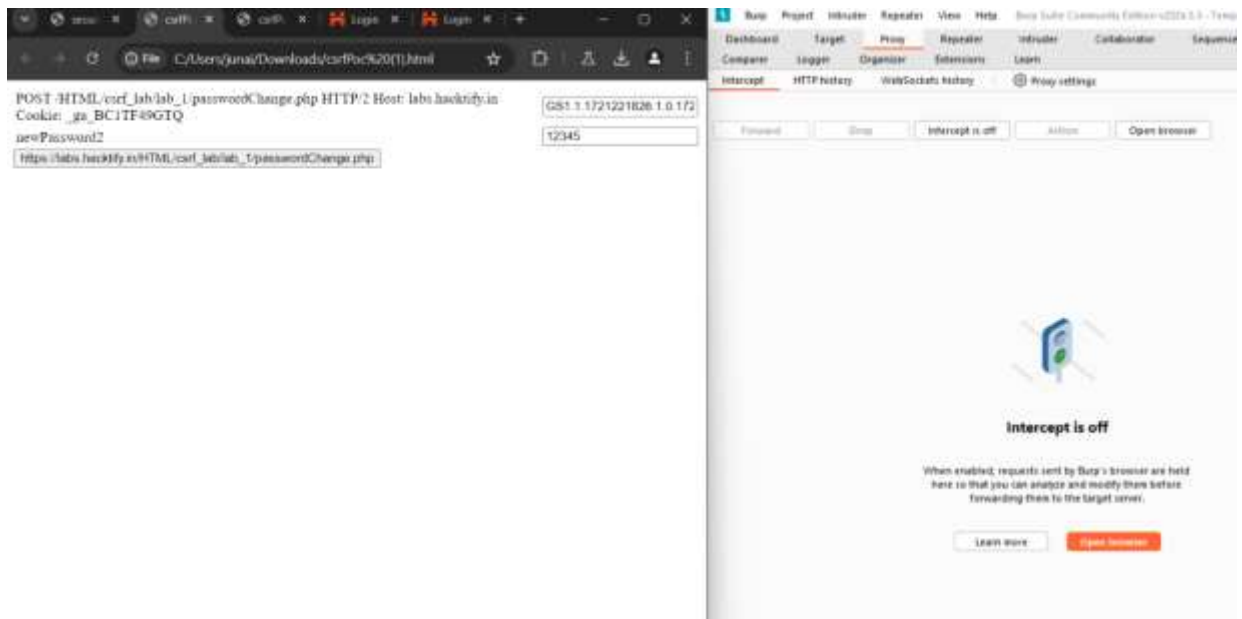
```

{"error": "Access denied"}

```


Proof of Concept





Proof of Concept

2.2. Always Validate Tokens

Reference	Risk Rating
Sub-lab-2: Always Validate Tokens	Medium
Tools Used	
Burp-Suite, Poc Generator	
Vulnerability Description	
<ul style="list-style-type: none">• CSRF exploits the trust that a web application has in the user's browser. When a user is authenticated to a site, their browser automatically includes their session cookies with every request.• An attacker crafts a malicious request and tricks the user into executing it. This can be done through social engineering techniques, such as sending a link via email or embedding it in a malicious website.• The malicious request inherits the user's identity and privileges, causing the web application to execute actions on behalf of the user without their consent.	
How It Was Discovered	
Automated Tools – Proxy. (Burp-Suite)	
Vulnerable URLs	
https://labs.hacktify.in/HTML/csrf_lab/lab_2/login.php	
Consequences of not Fixing the Issue	
<ul style="list-style-type: none">• Unauthorized Transactions: Attackers can perform unauthorized transactions, such as transferring funds or making purchases.• Data Manipulation: Attackers can change user settings, such as email addresses or passwords.• Compromise of Entire Application: If the victim is an administrative user, the attacker can potentially compromise the entire web application.	
Suggested Countermeasures	
<ul style="list-style-type: none">• Anti-CSRF Tokens: Use unique tokens for each session or request to verify the legitimacy of requests.• SameSite Cookies: Set cookies with the SameSite attribute to prevent them from being sent with cross-site requests.• Referer Header Validation: Check the Referer header to ensure requests are coming from trusted sources.• User Interaction: Require user interaction (e.g., CAPTCHA) for critical actions to ensure they are intentional.	

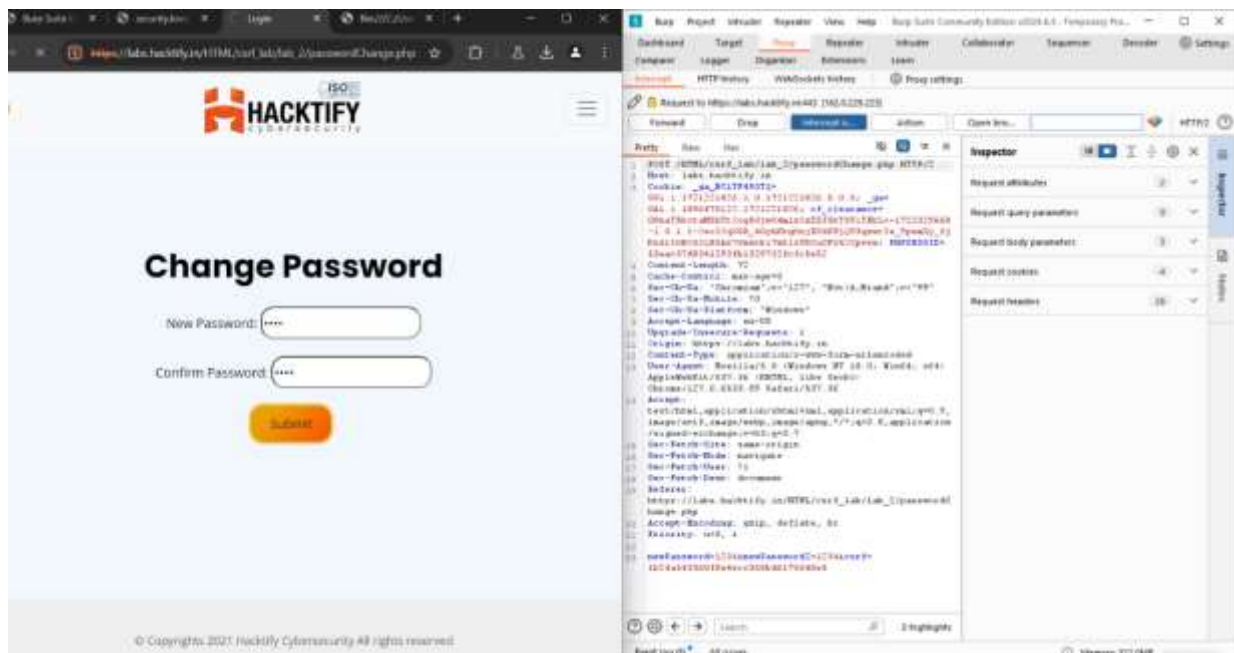
References

<https://www.rapid7.com/fundamentals/cross-site-request-forgery/>

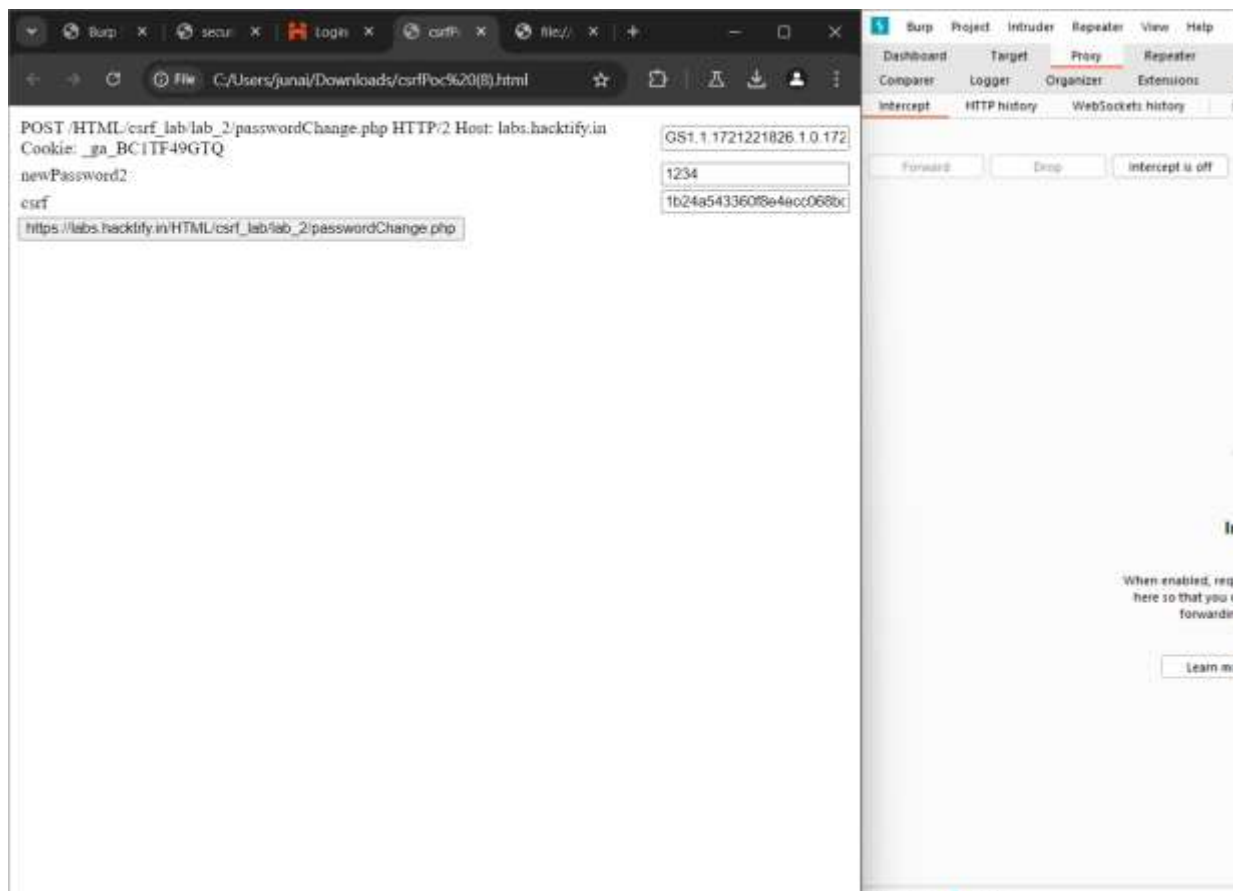
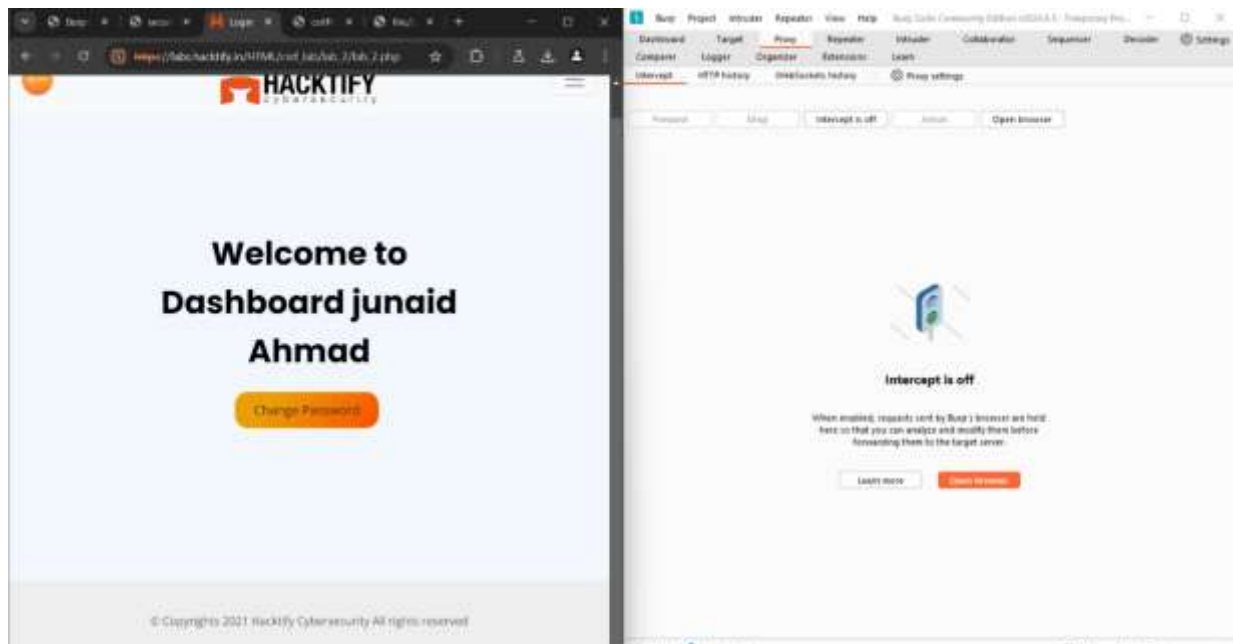
<https://owasp.org/www-community/attacks/csrf>

<https://brightsec.com/blog/cross-site-request-forgery-csrf/>

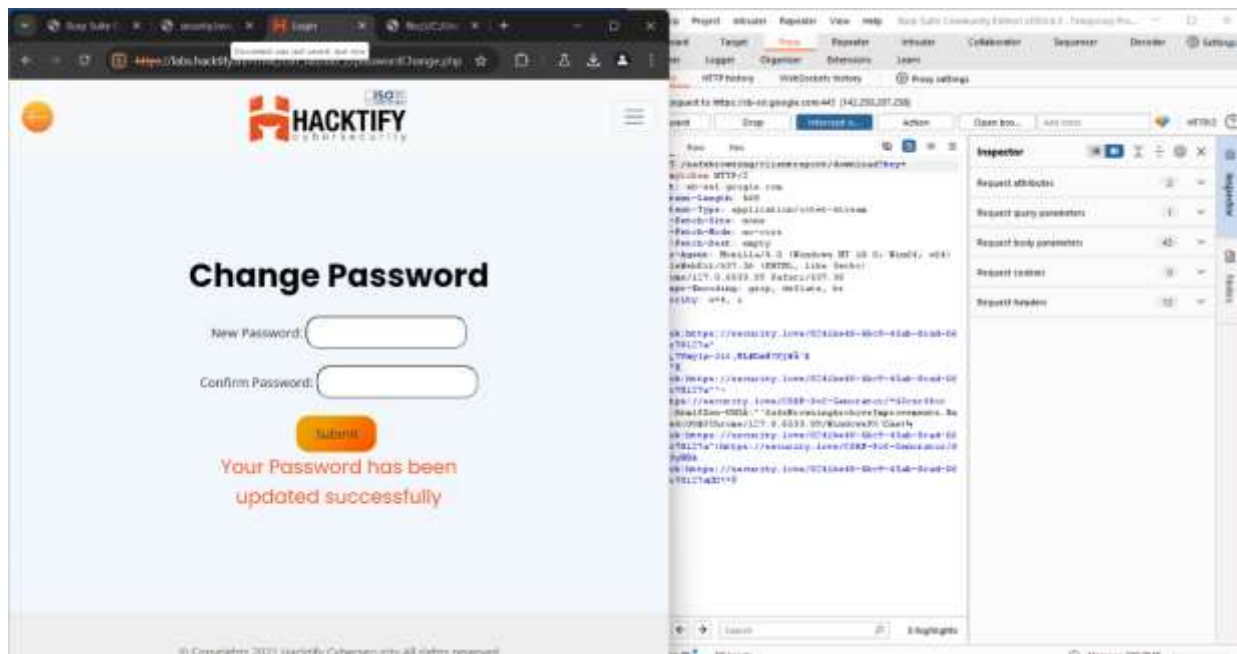
This section contains the proof of the above vulnerabilities as the screenshot of the vulnerability of the lab



Proof of Concept



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2.3. GET Me or POST ME

Reference	Risk Rating
Sub-lab-4: GET Me or POST ME	low
Tools Used	
Burp-Suite	

Proof of Concept

Vulnerability Description

- **Exploitation of Trust:** CSRF exploits the trust that a web application has in the user's browser. When a user is authenticated to a site, their browser automatically includes their session cookies with every request.
- **Malicious Requests:** An attacker crafts a malicious request and tricks the user into executing it. This can be done through social engineering techniques, such as sending a link via email or embedding it in a malicious website.
- **Unintended Actions:** The malicious request inherits the user's identity and privileges, causing the web application to execute actions on behalf of the user without their consent.

How It Was Discovered

Automated Tools –Burp-suite

Vulnerable URLs

https://labs.hacktify.in/HTML/csrf_lab/lab_6/login.php

Consequences of not Fixing the Issue

- **Unauthorized Transactions:** Attackers can perform unauthorized transactions, such as transferring funds or making purchases.
- **Data Manipulation:** Attackers can change user settings, such as email addresses or passwords.
- **Compromise of Entire Application:** If the victim is an administrative user, the attacker can potentially compromise the entire web application

Suggested Countermeasures

- **Anti-CSRF Tokens:** Use unique tokens for each session or request to verify the legitimacy of requests.
- **SameSite Cookies:** Set cookies with the `SameSite` attribute to prevent them from being sent with cross-site requests.
- **Referer Header Validation:** Check the `Referer` header to ensure requests are coming from trusted sources.
- **User Interaction:** Require user interaction (e.g., CAPTCHA) for critical actions to ensure they are intentional.

References

<https://brightsec.com/blog/cross-site-request-forgery-csrf/>
<https://www.cloudflare.com/learning/security/threats/cross-site-request-forgery/>
<https://owasp.org/www-community/attacks/csrf>

This section contains the proof of the above vulnerabilities as the screenshot of the vulnerability of the lab

