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Module 11

Session Hijacking

Session Hijacking :-

Session hijacking is a type of cyberattack where an attacker takes over a valid session between a user and a web server. Once the attacker gains control of the session, they can impersonate the legitimate user and potentially access sensitive data or perform unauthorized actions.

How It Works:

When a user logs into a website, the server creates a **session ID** (usually stored in a cookie or URL). This ID identifies the user's session.

In **session hijacking**, the attacker steals this session ID through methods like:

- **Cross-site scripting (XSS)**
- **Packet sniffing** (on unsecured networks)
- **Man-in-the-middle (MITM) attacks**
- **Session fixation** (forcing a known session ID)

Example:

You're logged into your bank account. If an attacker steals your session ID, they can use it to access your account without needing your username or password.

Prevention Methods:

- Use HTTPS to encrypt communication.
- Implement session timeouts and re-authentication for sensitive actions.
- Use secure, HttpOnly, and SameSite cookie flags.
- Regenerate session IDs after login.

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Certainly! Here's a visual representation of how **session hijacking** works:

Explanation of the Diagram:

1. **Victim's Session Initiation:**
    - The victim logs into a web application, and the server creates a unique session ID to identify the user's session.
2. **Session Hijacking:**
    - An attacker intercepts the session ID through methods like packet sniffing, cross-site scripting (XSS), or man-in-the-middle attacks.
3. **Attacker Gains Access:**
    - The attacker uses the stolen session ID to impersonate the victim, gaining unauthorized access to the web application.

Prevention Measures:

- **Use HTTPS:** Encrypts data to prevent interception.
- **Secure Cookies:** Set cookies with the Secure, HttpOnly, and SameSite attributes.
- **Session Expiry:** Implement session timeouts and re-authentication for sensitive actions.
- **Monitor Sessions:** Detect and respond to unusual session activities.

For more detailed information, you can refer to the following resources:

- OWASP: Session Hijacking Attack
- ResearchGate: Session Hijacking Attacks

Session Hijacking concept :

Table of Contents:

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1. Introduction to Session Hijacking

Session hijacking, also known as TCP session hijacking, is a method where an attacker takes over a valid session between a client and a server. Since many web applications use sessions to maintain state and manage user authentication, hijacking these sessions allows an attacker to impersonate the legitimate user.

Session hijacking can be performed through various techniques, and its impact can range from information theft to complete account takeover.

2. Types of Session Hijacking

2.1 Active Hijacking

In active hijacking, the attacker actively interferes with the user's session by injecting commands or manipulating data. This often occurs after the attacker gains access to session tokens.

2.2 Passive Hijacking

In passive hijacking, the attacker simply monitors the session without interrupting or altering the communication. This is primarily used for data collection or reconnaissance.

2.3 Cross-site Scripting (XSS) Hijacking

XSS-based hijacking allows attackers to execute malicious scripts in the context of the user's browser. This script can steal session tokens or cookies, leading to session takeover.

2.4 Session Fixation

In session fixation, an attacker sets a known session ID for the user and then waits for them to authenticate. Once authenticated, the attacker can access the session using the fixed ID.

2.5 Sidejacking (HTTP Sniffing)

Sidejacking involves intercepting unencrypted traffic between the client and server to capture session cookies. This is effective in environments where HTTPS is not enforced.

2.6 Man-in-the-Middle (MITM) Attacks

MITM attacks allow an attacker to intercept and manipulate communication between the user and the server. This can lead to complete control over the session.

2.7 Man-in-the-Browser (MITB) Attacks

MITB attacks use a compromised browser extension or malware to control the user's browser session, capturing sensitive information or altering transactions.

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3. Techniques Used in Session Hijacking

Session hijacking can be executed using various methods:

- **Session Sniffing**: Capturing traffic to identify session tokens.
- **Cross-Site Scripting (XSS)**: Injecting scripts to steal cookies.
- **Packet Injection**: Interfering with the communication packets.
- **Session Fixation**: Pre-setting a session ID and waiting for login.
- **Brute Force Session Tokens**: Attempting to guess session IDs.

Each of these techniques has unique indicators and can be mitigated with proper security measures.

4. Real-World Examples

Several high-profile cases of session hijacking have occurred:

- **Firesheep (2010)**: A browser extension that allowed users to hijack Facebook and Twitter sessions over open Wi-Fi networks.
- **Cookie Theft Attacks**: Attackers capturing authentication cookies on unsecured networks.

- **Man-in-the-Middle (MITM) Attacks on Public Wi-Fi**: Commonly used to steal banking and login credentials.

These incidents highlight the vulnerabilities of unencrypted connections and weak session management.

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5. Detection Methods

Detecting session hijacking involves monitoring and analyzing traffic for anomalies:

- **Intrusion Detection Systems (IDS)**: IDS tools can detect unauthorized attempts to access or modify sessions.
- **Anomaly Detection**: Monitoring unexpected user behavior such as IP changes, sudden location shifts, or unusual transaction activity.
- **Packet Analysis**: Examining packet content for tampered or malicious data.
- **Session Timeout Policies**: Short session lifespans reduce the window for hijacking.

These methods, when used effectively, can help identify and block hijacking attempts in real-time.

6. Prevention Strategies

To prevent session hijacking, the following measures are recommended:

- **Use of HTTPS (SSL/TLS Encryption)**: Secure connections prevent packet sniffing and sidejacking.
- **Secure Cookies**: Mark cookies with the Secure and HttpOnly flags.
- **Session Timeout and Re-authentication**: Limit session duration and prompt for re-authentication.
- **IP Address Verification**: Monitor for IP address changes during a session.
- **Multi-Factor Authentication (MFA)**: Adds an additional layer of verification.
- **Content Security Policy (CSP)**: Prevents XSS-based session hijacking.

Applying these measures significantly lowers the risk of session hijacking attacks.

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7. Conclusion

Session hijacking remains a significant threat in modern web applications. Understanding its mechanisms, identifying its presence, and applying strong security measures can mitigate its impact. Awareness and proactive defenses are key to safeguarding sensitive information.

8. References

- OWASP Foundation: Session Management
- MITRE ATT&CK: Hijacking Techniques
- Cisco Security Documentation
- NIST Cybersecurity Framework

➢ Here are technique how to do session hijacking using cookie editor extension

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1️⃣ Install Cookie Editor Extension

- Go to the Chrome Web Store.
- Search for **"Cookie Editor"**.
- Click **Add to Chrome** and confirm the installation.

2️⃣ Obtain the Target's Session Cookie

To hijack a session, you need the **session cookie** of the target. This is typically done by:

1. **Packet Sniffing:** Using tools like Wireshark or MITM attacks on public Wi-Fi.

2. **Cross-Site Scripting (XSS):** Injecting a script to steal cookies.
3. **Social Engineering:** Tricking the target into revealing their cookies.
4. **Physical Access:** Getting access to their browser while logged in.

Example of a session cookie:

sessionid=eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9; HttpOnly; Secure

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3️⃣ Import the Stolen Cookie

- Go to the website you want to hijack (e.g., Facebook, Gmail).
- Click the **Cookie Editor** extension icon in the browser toolbar.
- Click the **Import** button.
- Paste the entire cookie string that you have obtained.
- Click **Save**.

4️⃣ Refresh the Page

- After saving the cookie, simply **refresh the page**.
- If the session is still valid, you will be logged in as the target user.

5️⃣ Maintaining Access (Optional)

- If the session expires, you may need to steal a new cookie.
- Techniques like **session persistence** can be used to prolong access.

🛡️ Prevention Techniques

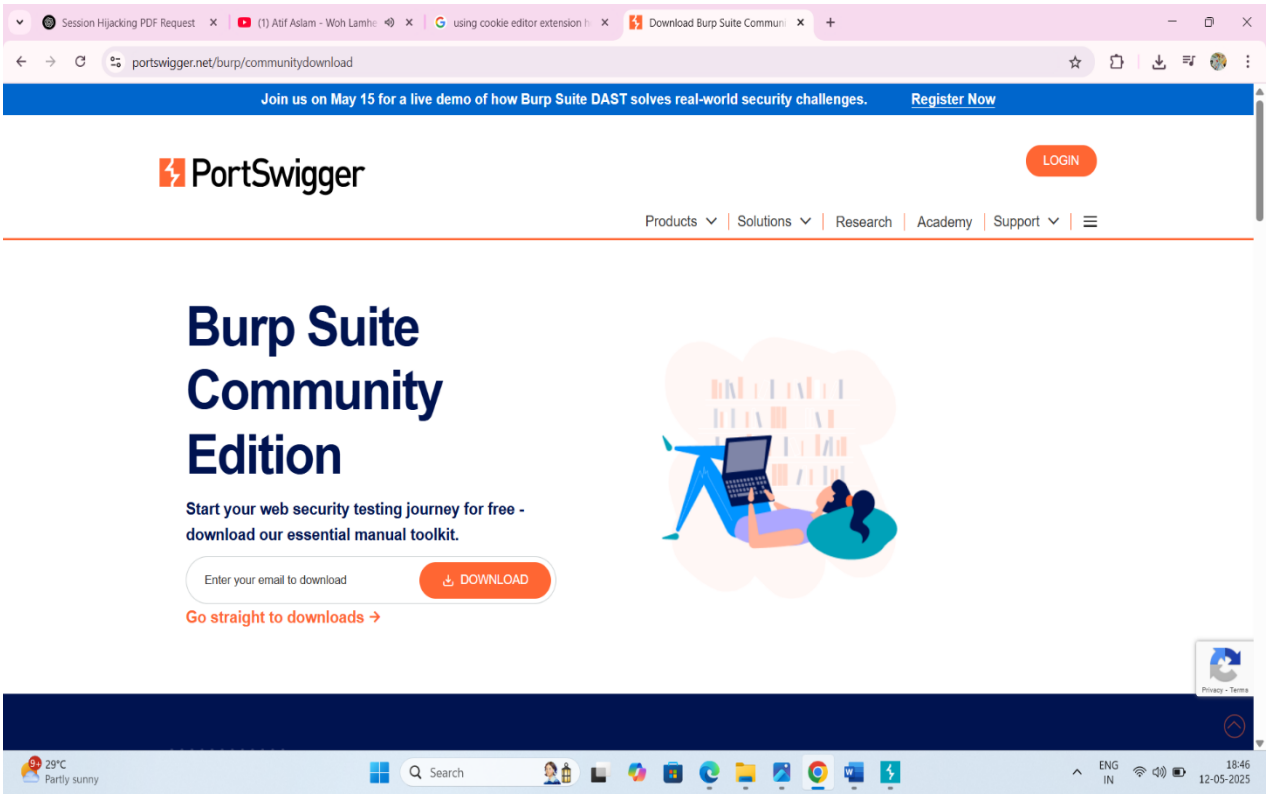
1. **HTTPS Everywhere:** Prevents sniffing on public networks.
2. **HttpOnly and Secure Cookies:** Stops JavaScript-based cookie theft.
3. **Session Timeout Policies:** Reduces the window of hijacking.
4. **Multi-Factor Authentication (MFA):** Adds a second layer of protection.

5. **IP Address Verification:** Ends sessions if the IP address changes.

➢ Session hijacking using burp suite

1️⃣ Setup Burp Suite

1. Download and install **Burp Suite Community Edition** from the PortSwigger website.



2. Configure your browser to use Burp Suite as a proxy:
   - Go to **Preferences** → **Network** → **Settings**.
   - Set the proxy to 127.0.0.1 and port 8080.

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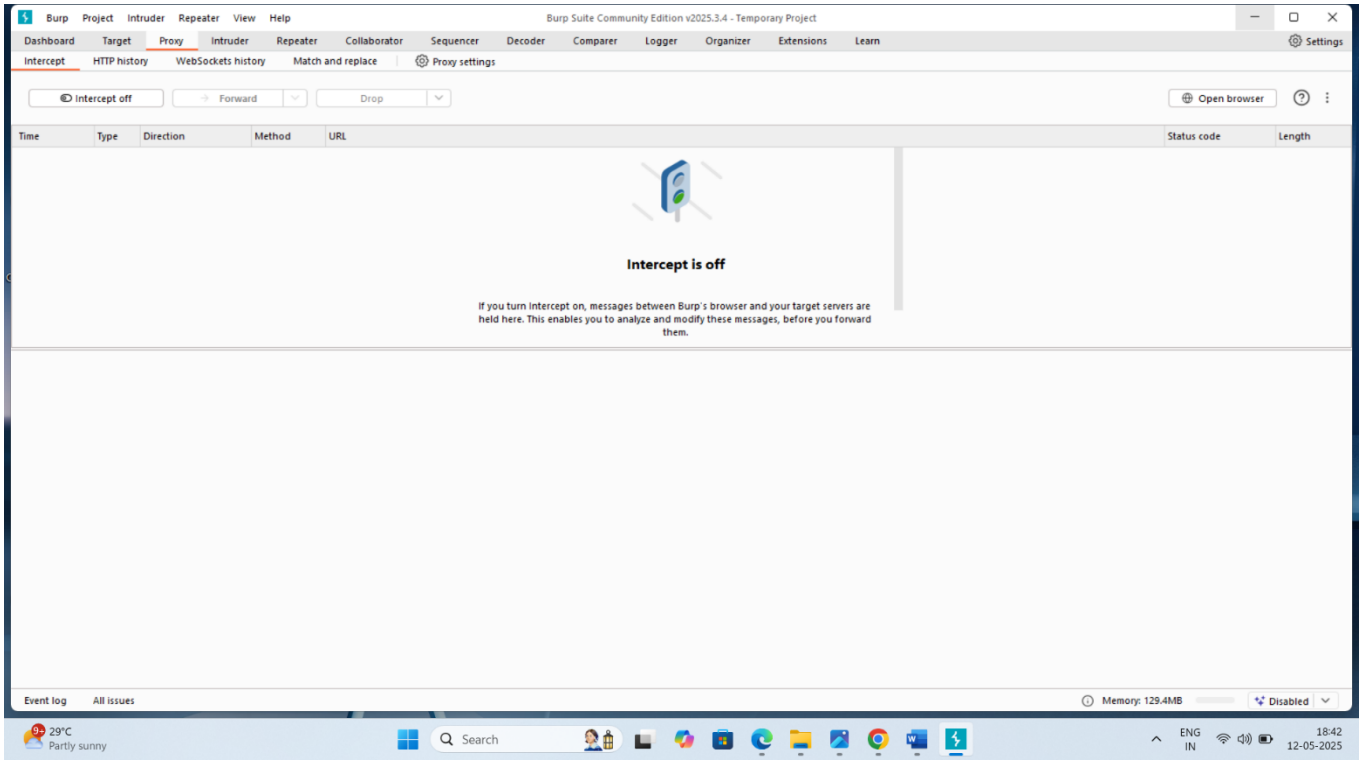
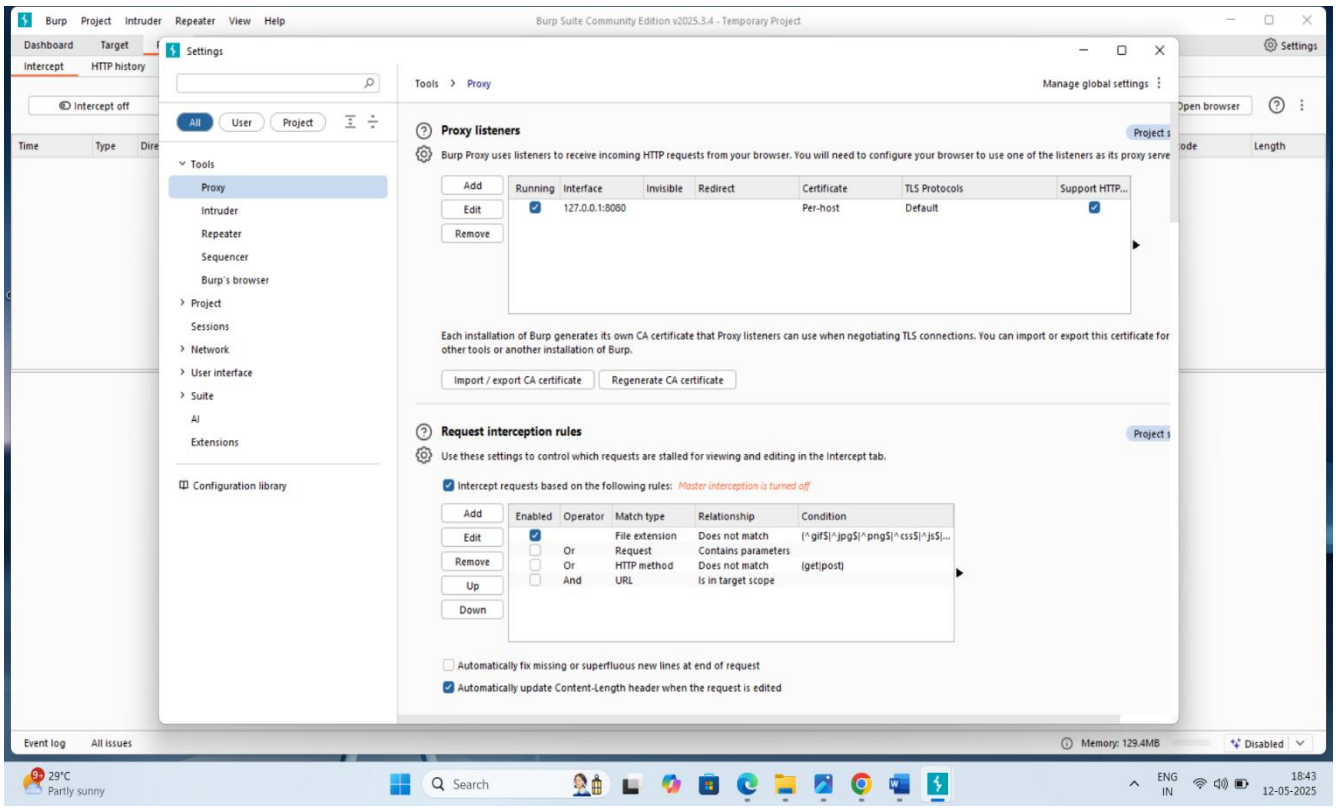


After installation set a proxy



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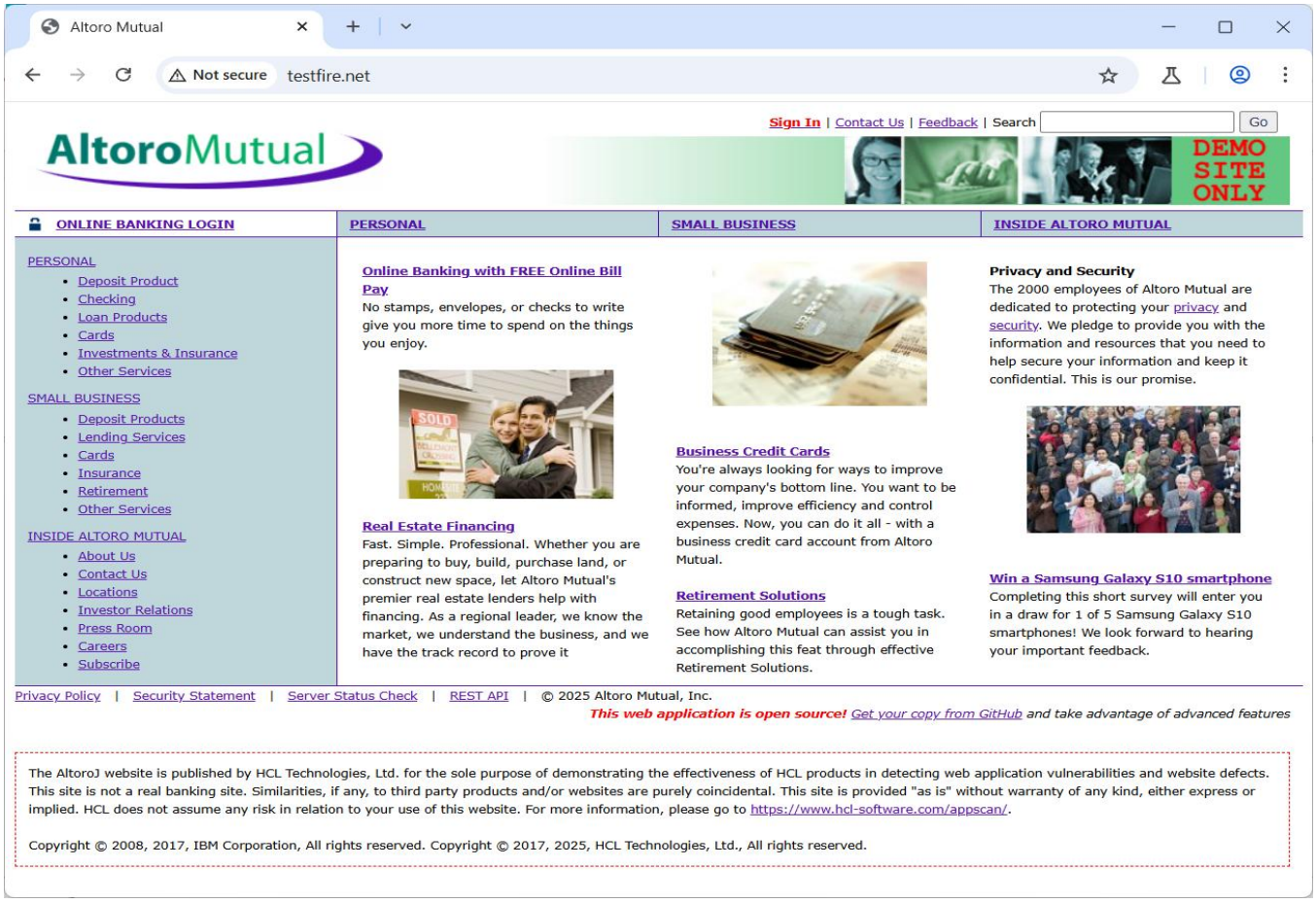
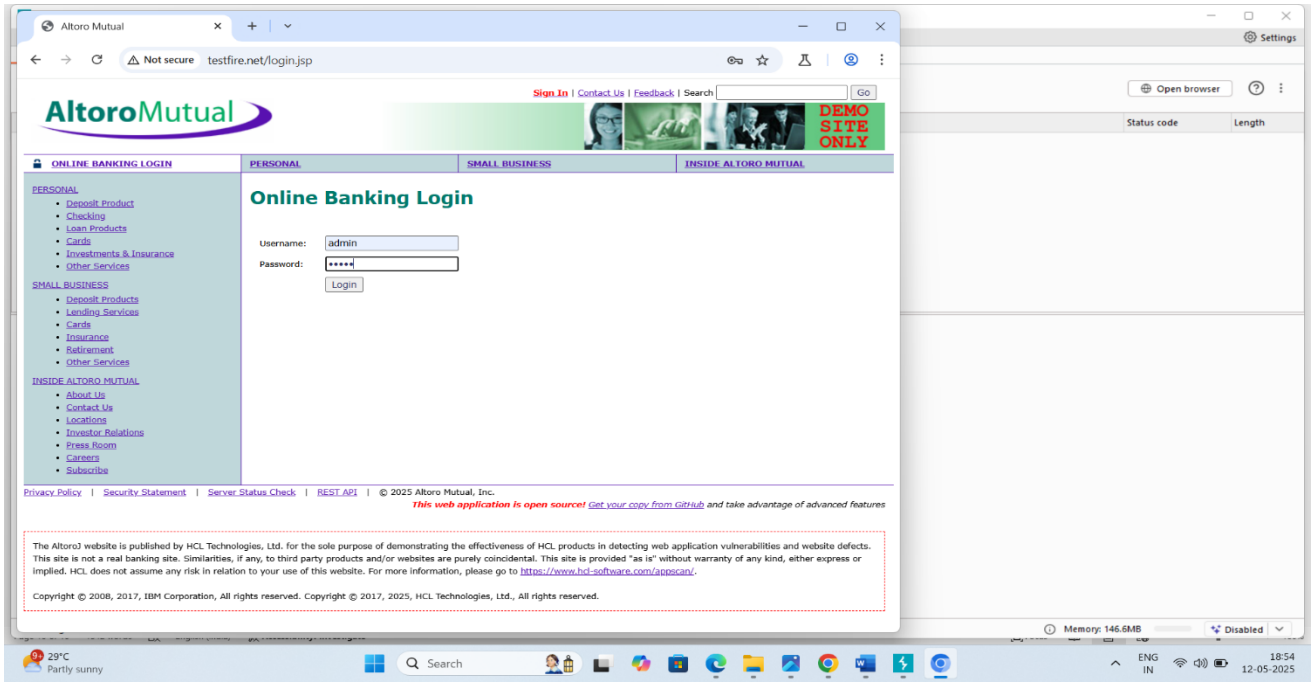
3 In burp suite go to proxy and open browser and search for http website example testfire.net



4 sign in with username and password



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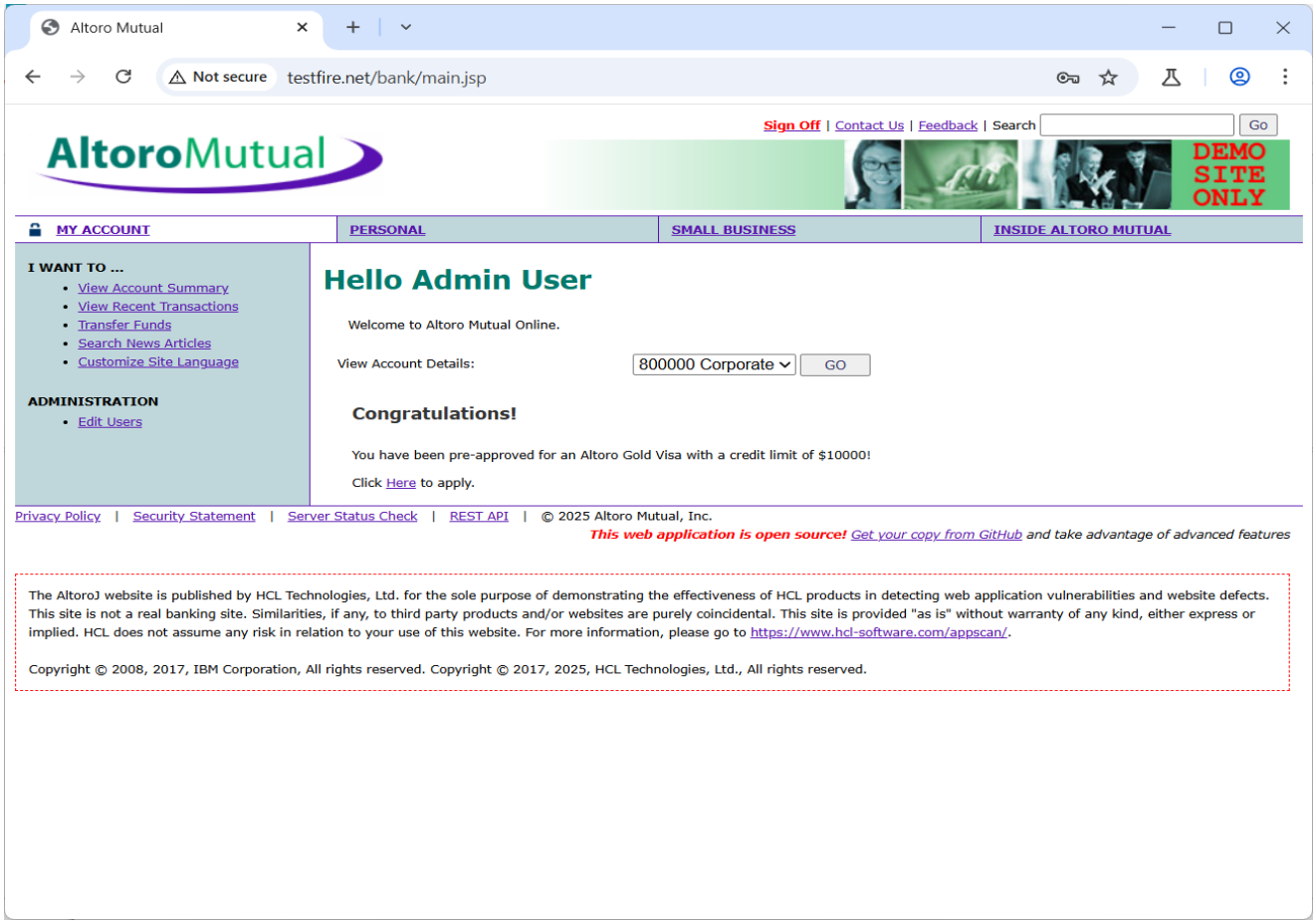
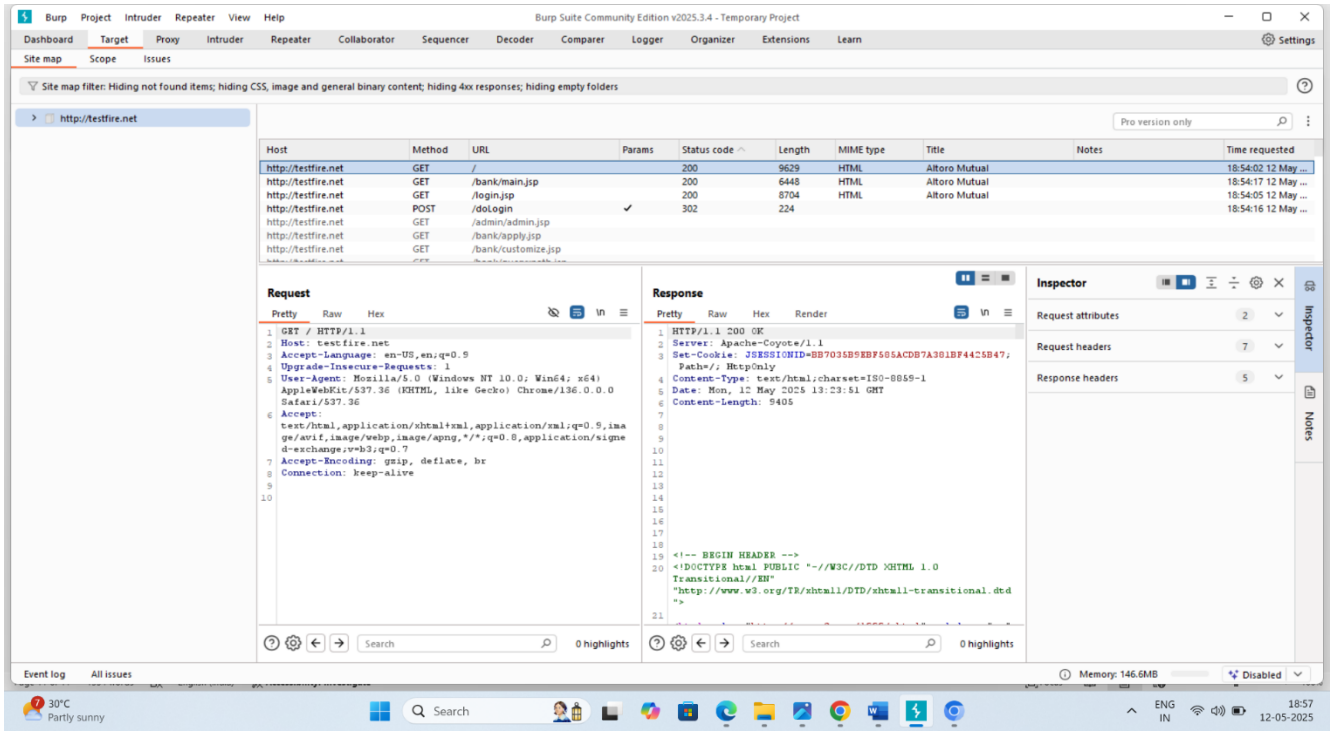


5 after login successfully go to burp suite and go for target



Here we see target add in target section

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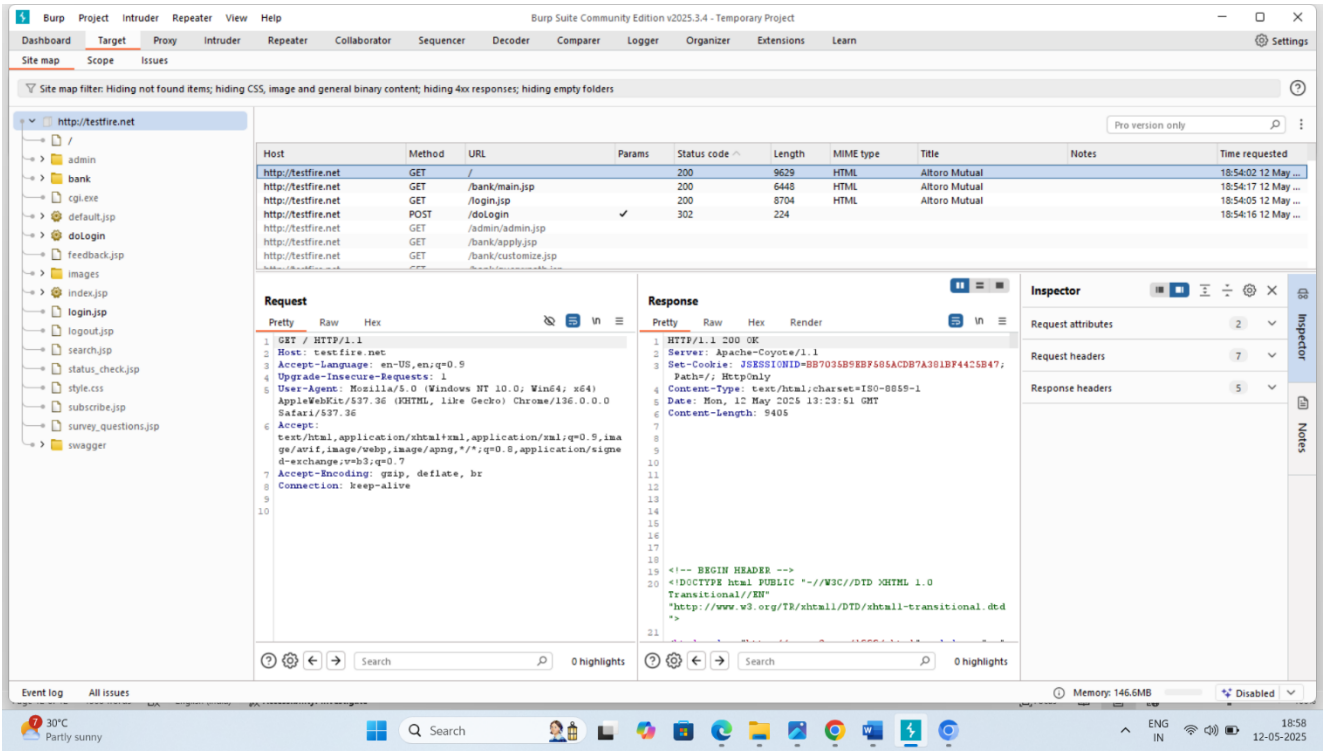
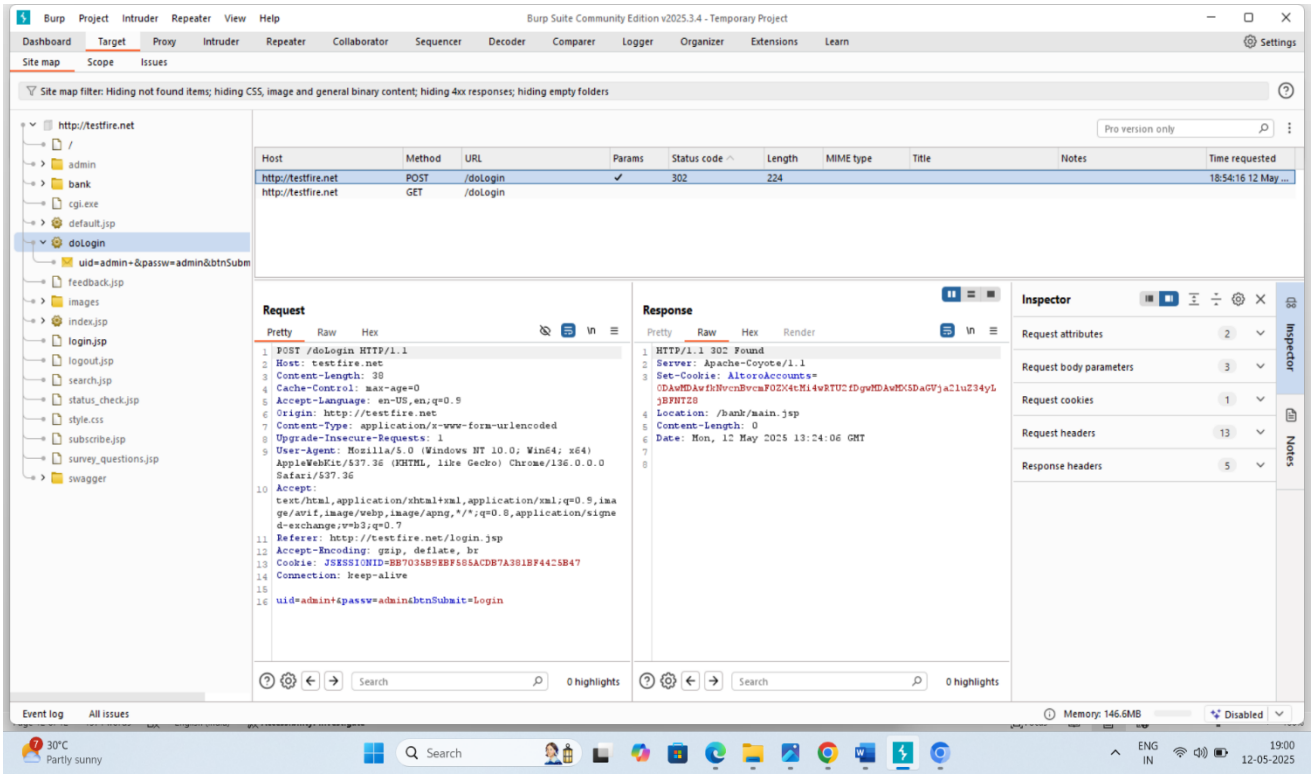
6 right click on website url



7 right click on do login



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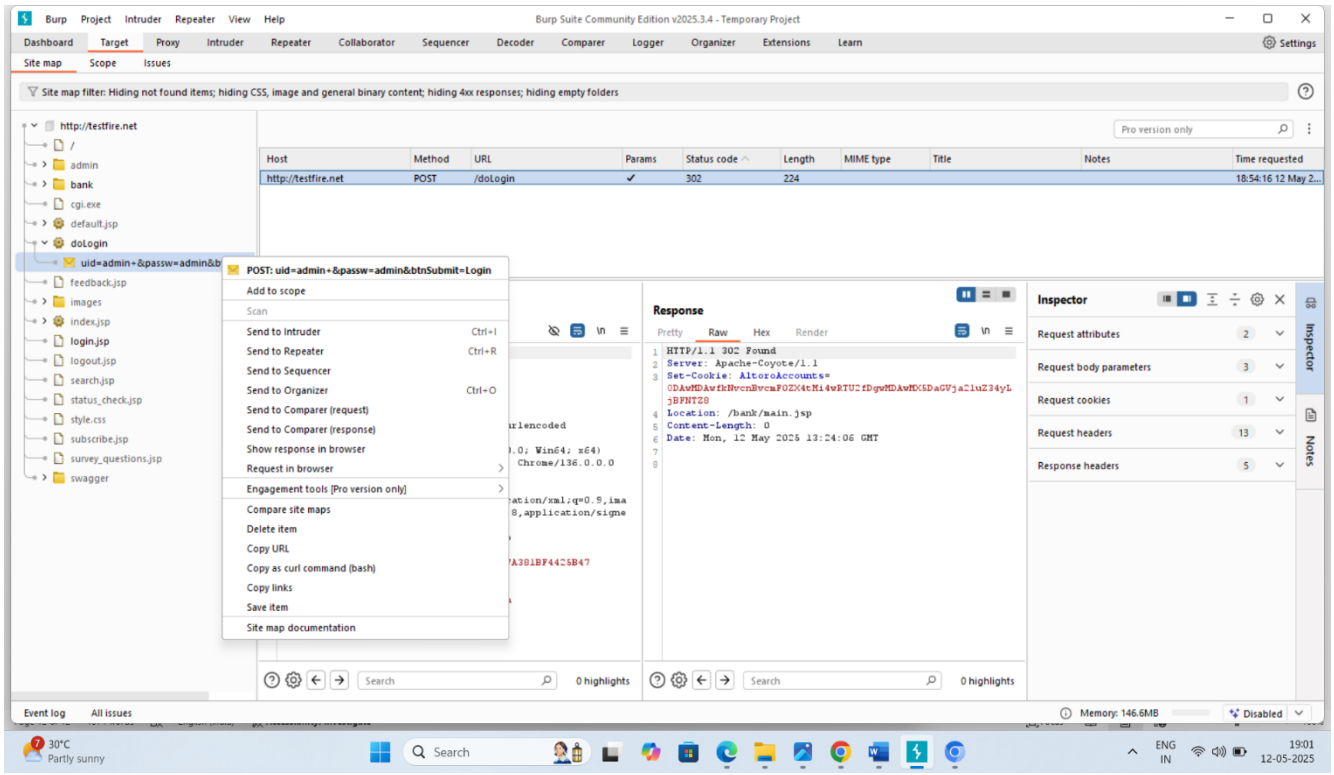
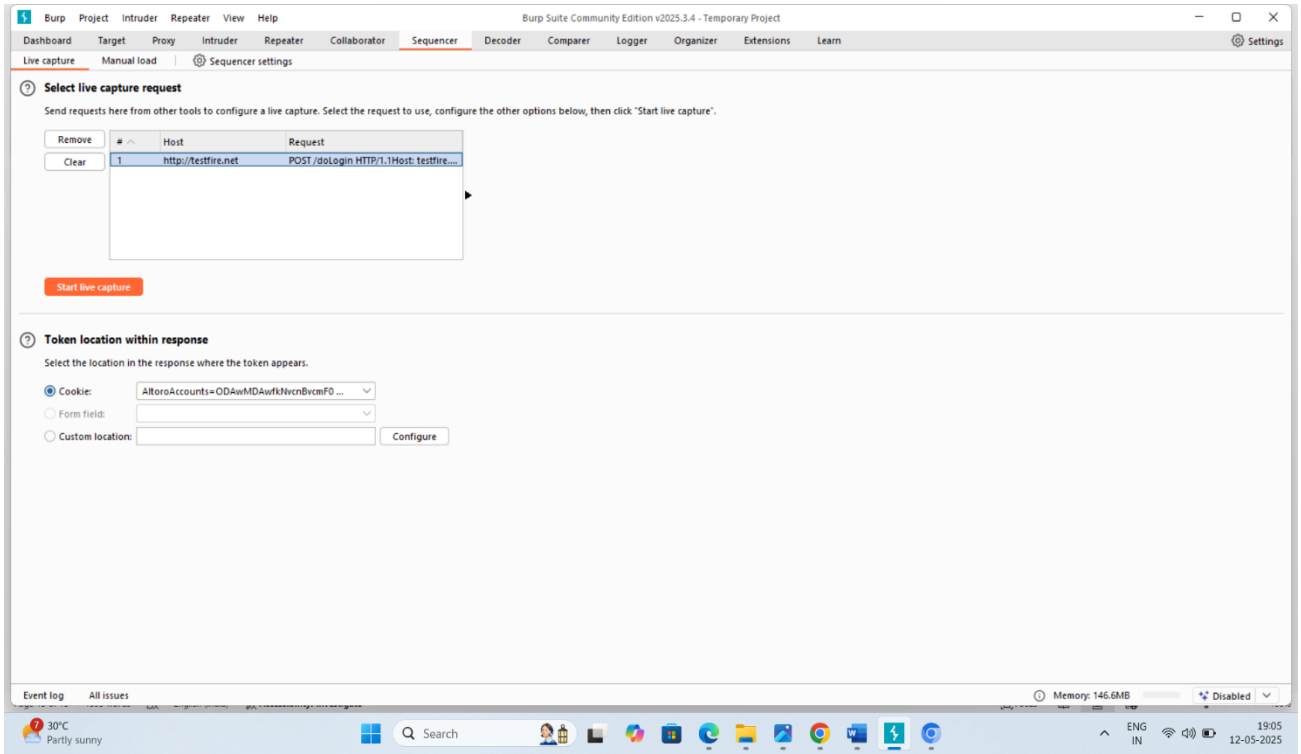
8 after this right click on do login next page and send to sequencer



9 go to sequencer option and click on start live capture



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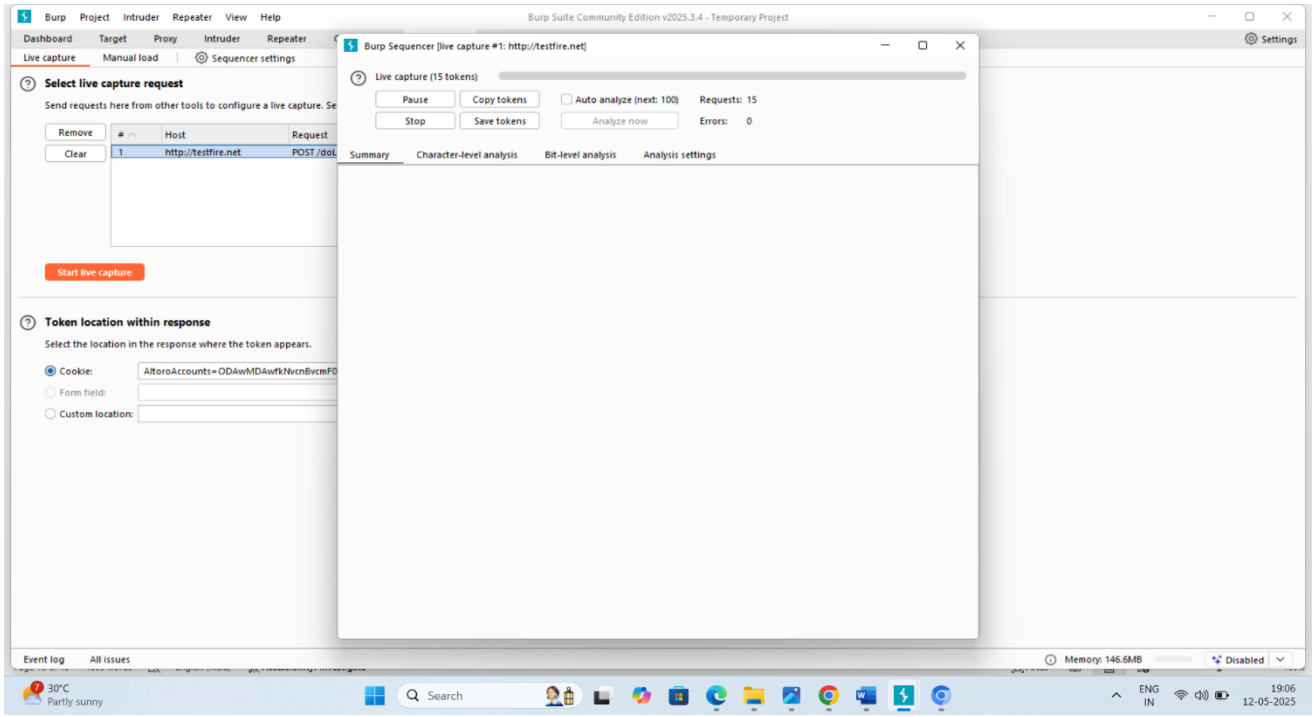
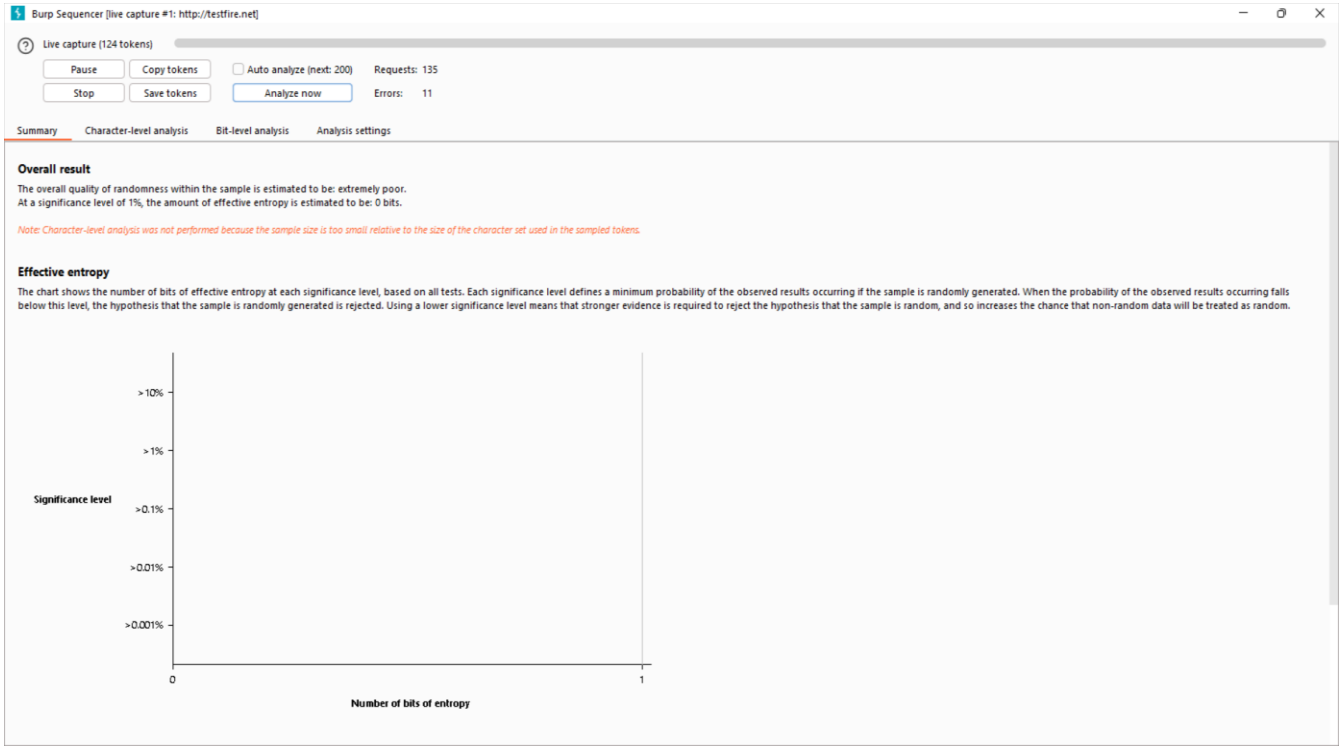


10 after complete 150+ tokens click on analyse now to see the site result



You can see the result this site is extremely poor

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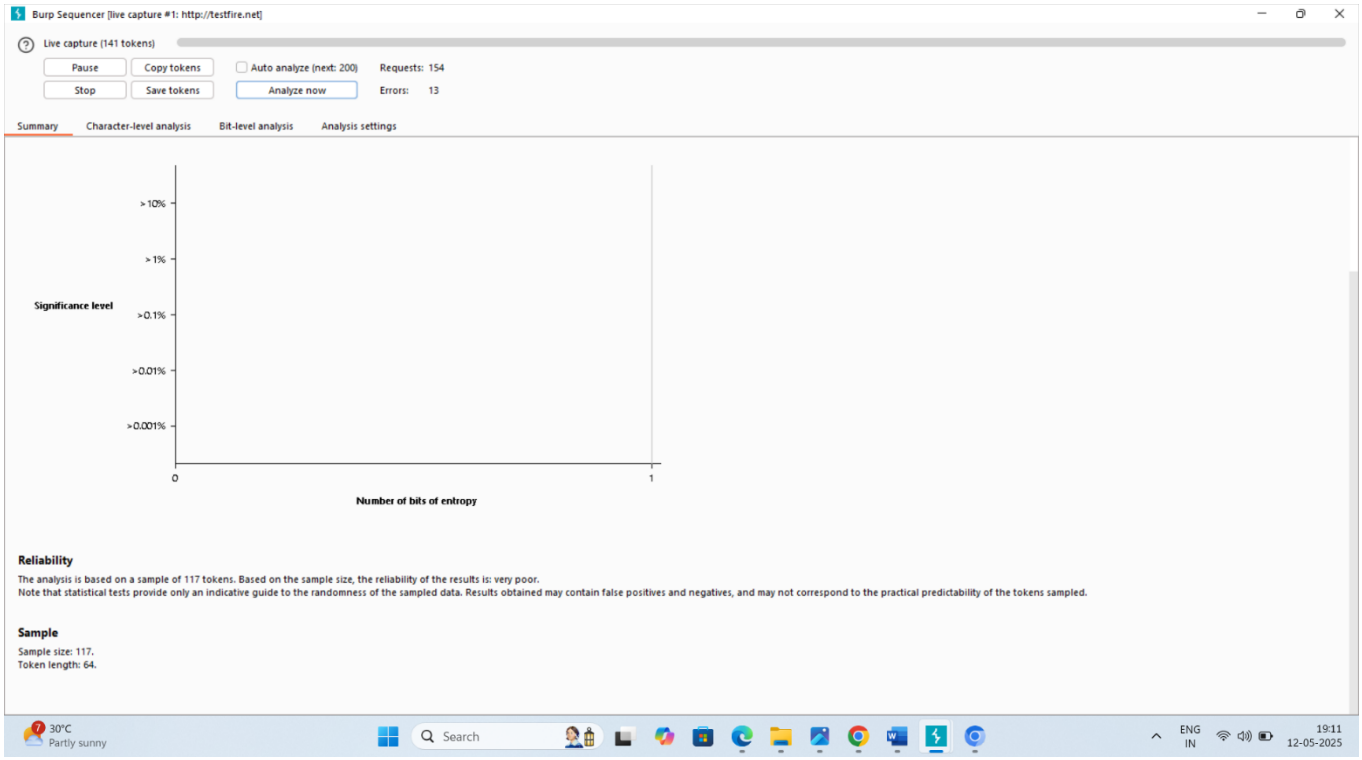

Done .

➢ Here are one session hijacking tool hetty .

Hetty : Hetty is an open-source HTTP toolkit used for security research, particularly by the infosec and bug bounty communities. It functions as a man-in-the-middle (MITM) proxy, allowing users to intercept, inspect, and modify HTTP requests and responses. Additionally, it includes an HTTP client for creating and editing requests, and a web-based admin interface for managing projects and settings.

Here's a more detailed breakdown of Hetty's uses:

- **MITM Proxy:**

  Hetty can act as a man-in-the-middle proxy, intercepting HTTP traffic between a client and a server. This allows researchers to analyze traffic, identify vulnerabilities, and potentially exploit them.

- **HTTP Client:**

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It provides a built-in HTTP client for manually creating and editing requests, as well as replaying intercepted requests. This is useful for testing specific scenarios or replicating attacks.

- **Request and Response Analysis:**

  Hetty allows users to view, edit, send, and receive intercepted requests and responses. This helps in understanding the flow of data and identifying potential issues.

- **Scope Support:**

  Hetty supports scope, which helps organize work and focus on specific parts of an application or website.

- **Project-Based Database Storage:**

  It stores data in a project-based database, which makes it easier to manage different projects and their associated traffic.

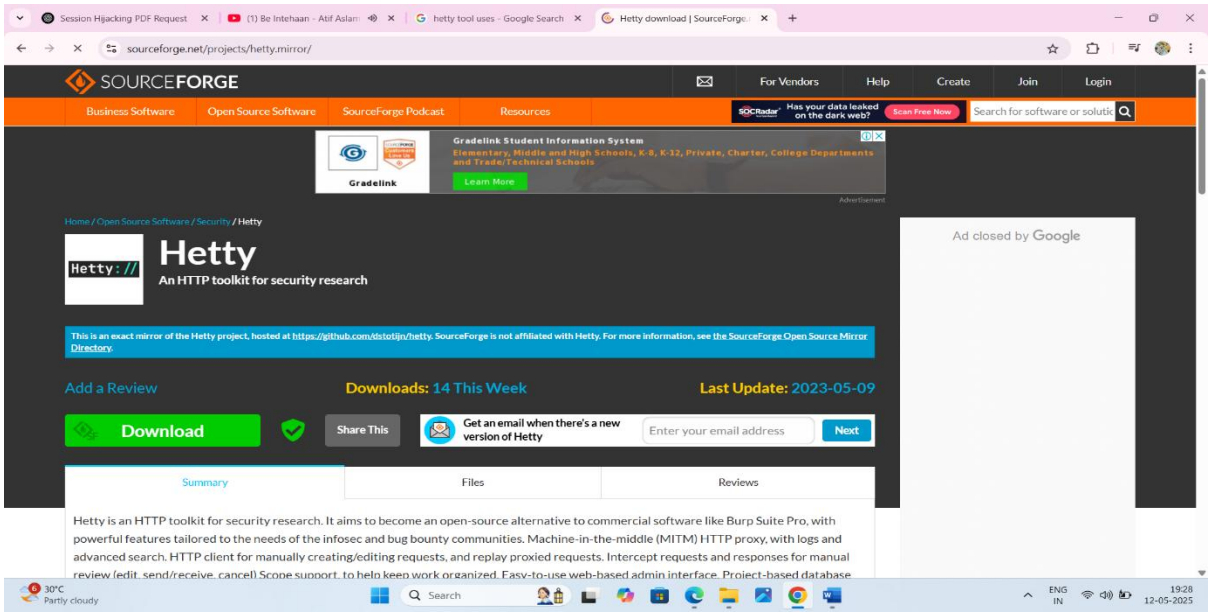
- **Web-Based Admin Interface:**

  A user-friendly web interface is provided for managing Hetty's settings, projects, and other configurations.

- **Security Research:**
  Overall, Hetty is designed for security professionals to conduct research, identify vulnerabilities, and improve the security of applications and infrastructure.

  How yo use explain :

  1. Download hetty on sourceforge.com



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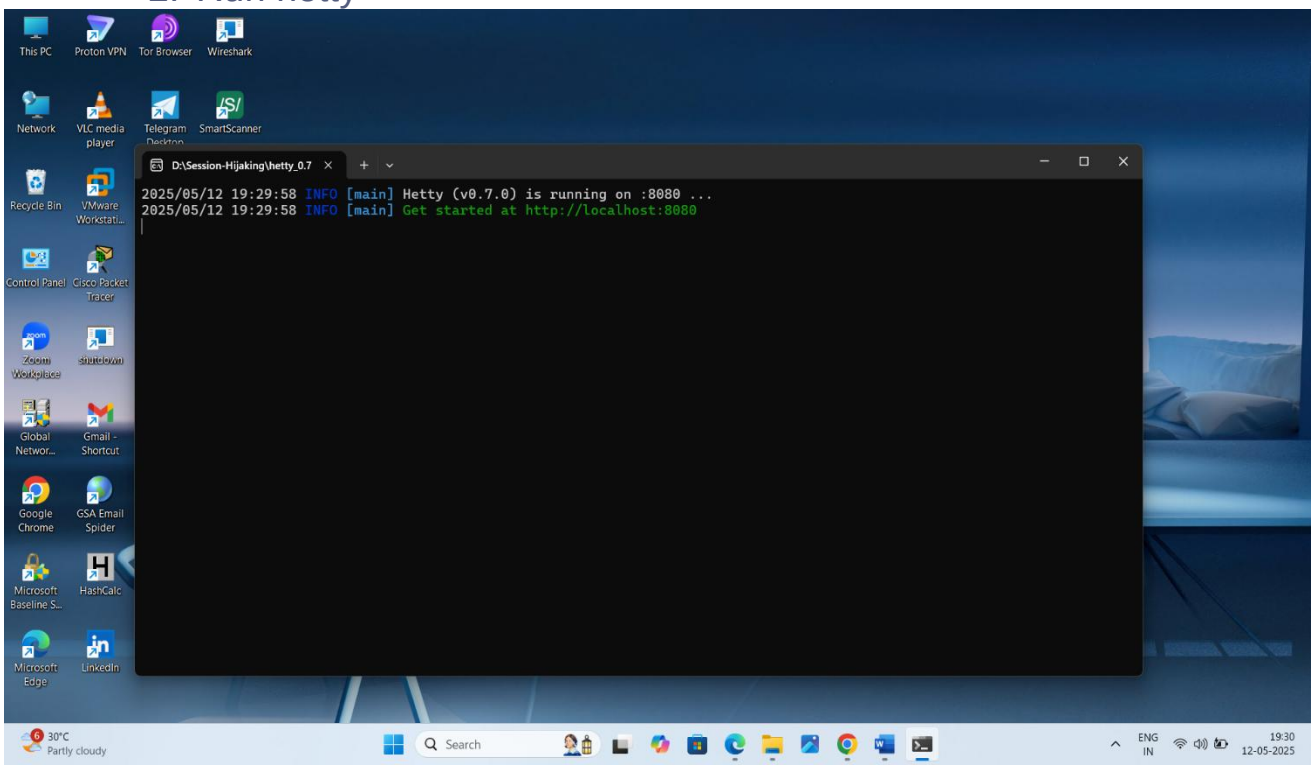
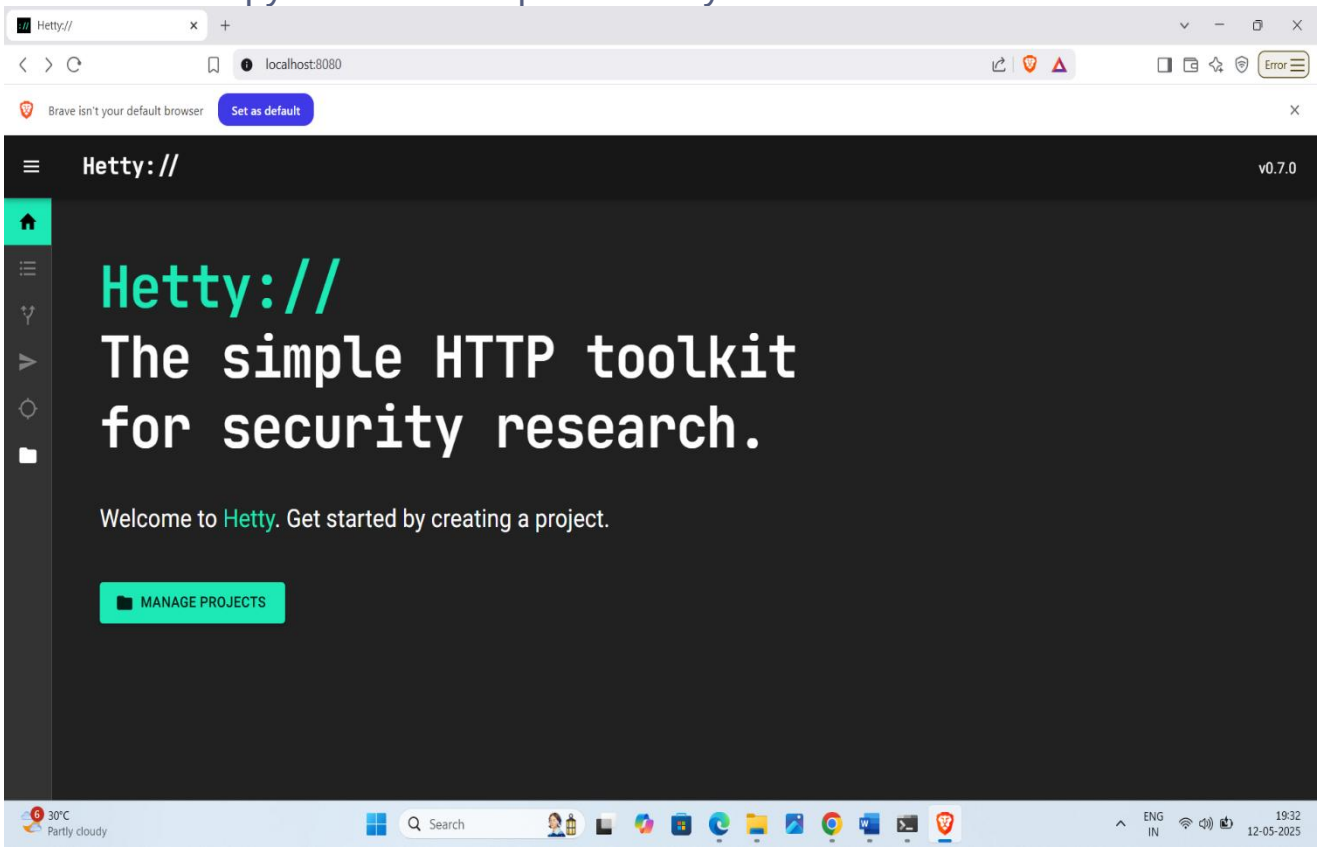
2. Run hetty



3. Copy the URL and paste in any browser



Hetty is normally used for MITM attack

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1. Perform Session Hijacking

Session hijacking allows an attacker to take over an active session by bypassing the authentication process.

1. Hijack a session using Zed attack proxy (ZAP)

Set the browser proxy to go through Attack PC running ZAP. Now go to the break tab (same as intercept in Burp).

Now set the proxy settings

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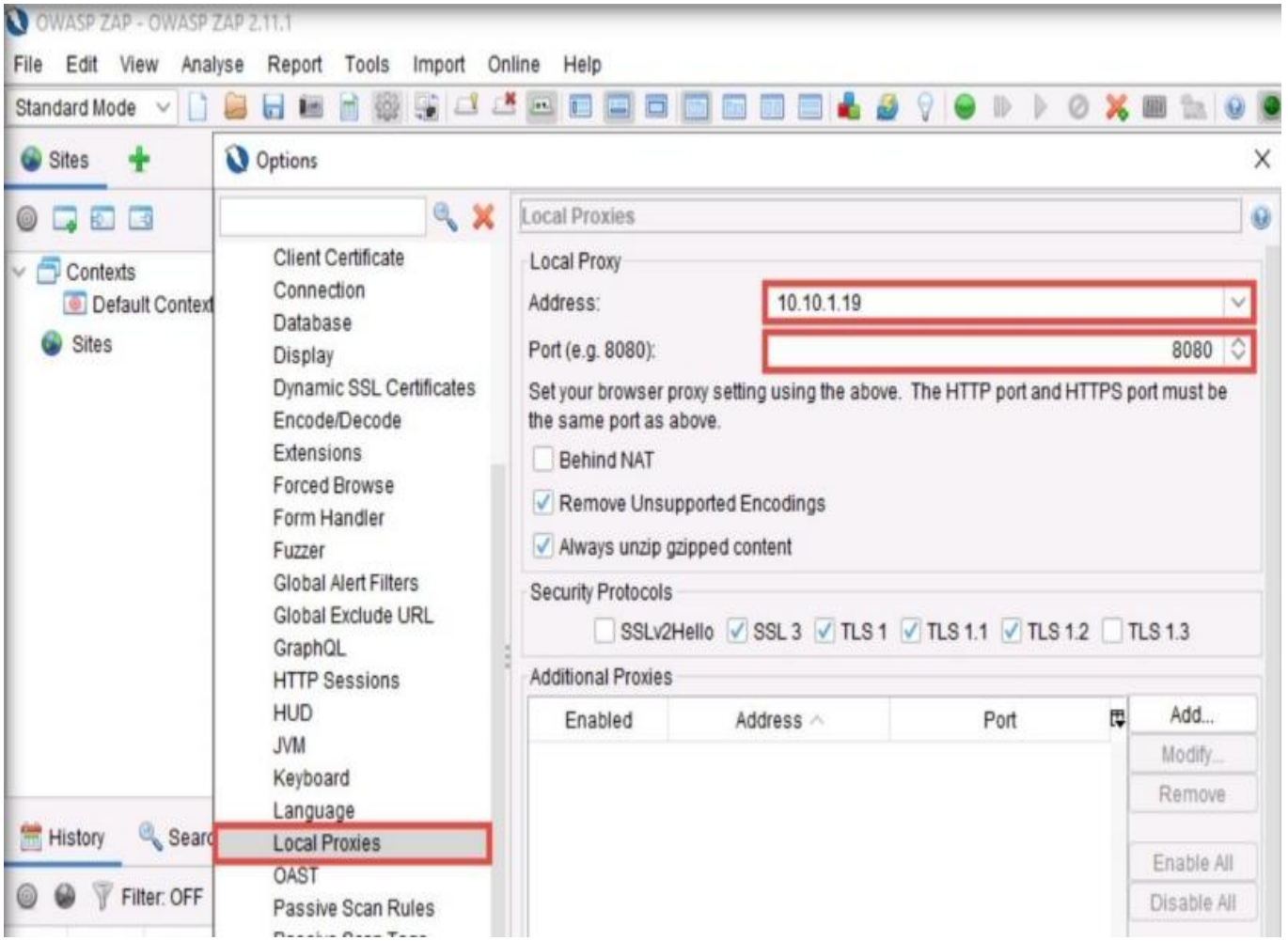
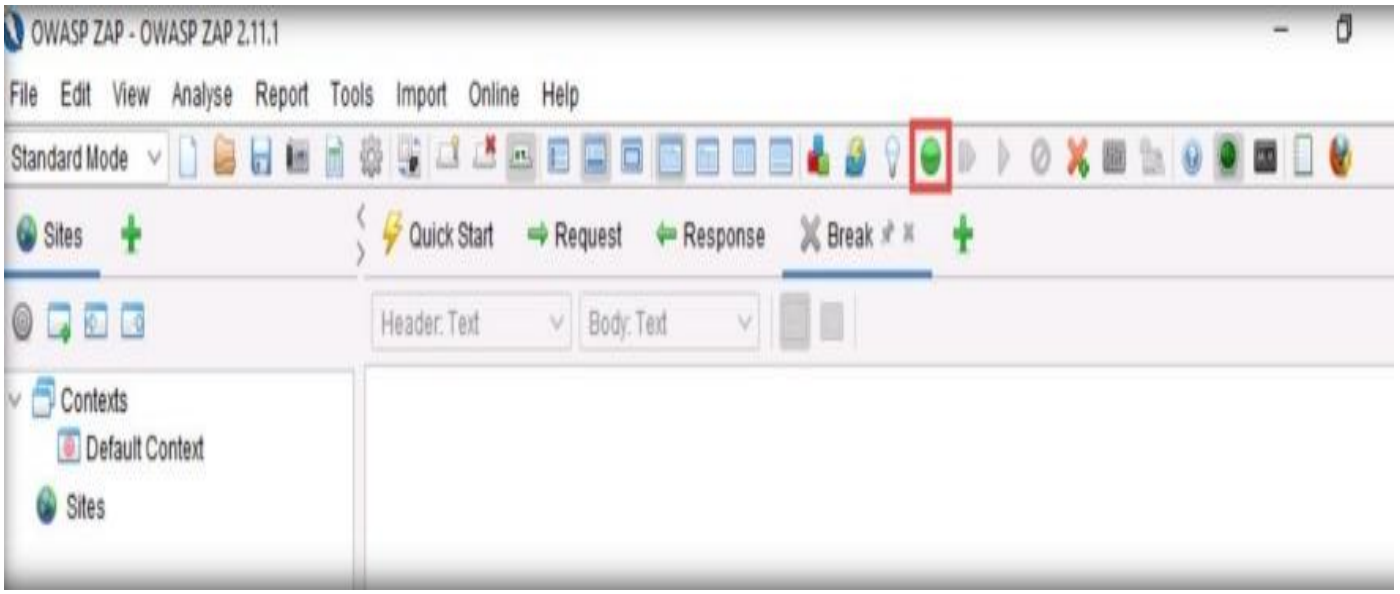
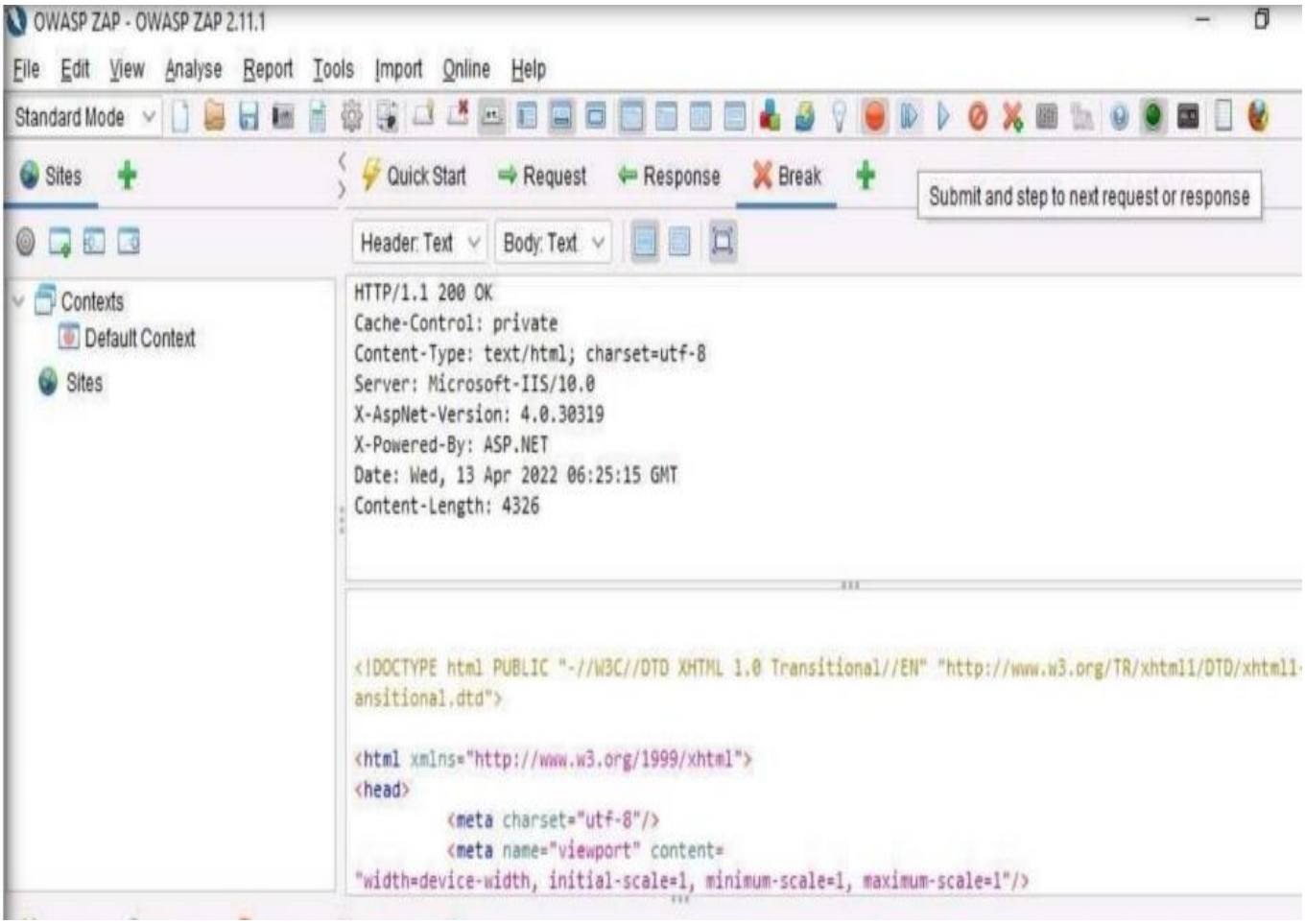


Click the Set break on all requests and responses icon on the main ZAP toolbar. This button sets and unsets a global breakpoint that will trap and display the next response or request from the victim's machine in the Break tab. Note: The Set break on all requests and responses icon turns automatically from green to red.



Now when the victim browses the sites, his request will be intercepted and we can forward request one by one. We can modify the parameter as we want.



3. Hijack a Session using Caido

Caido assists security professionals and enthusiasts in efficiently auditing web applications. It offers exploration tools, including sitemap, history, and intercept features, which aid in identifying vulnerabilities and analyzing requests in real-time.

1. Run **ipconfig/flushdns** command to reset dns cache and close the Command Prompt.

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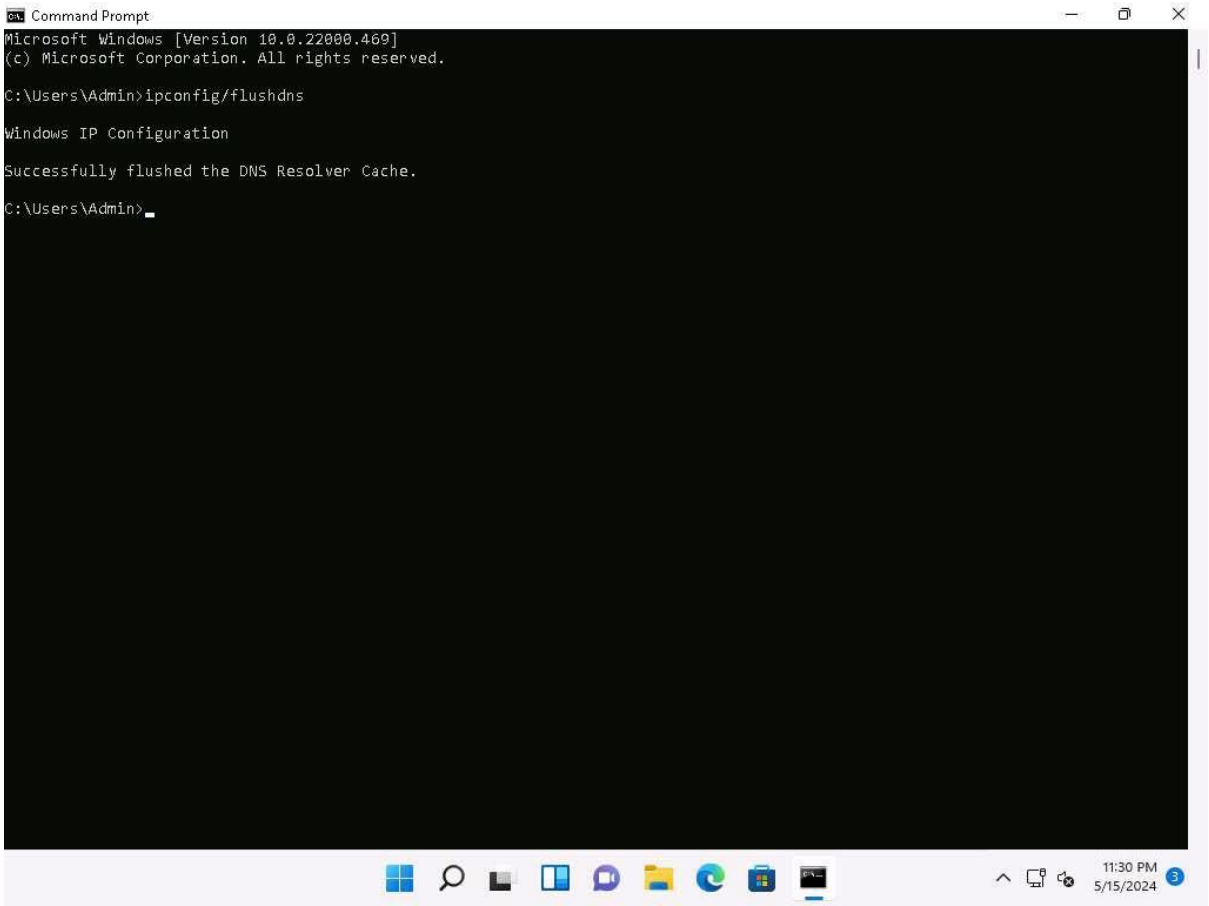
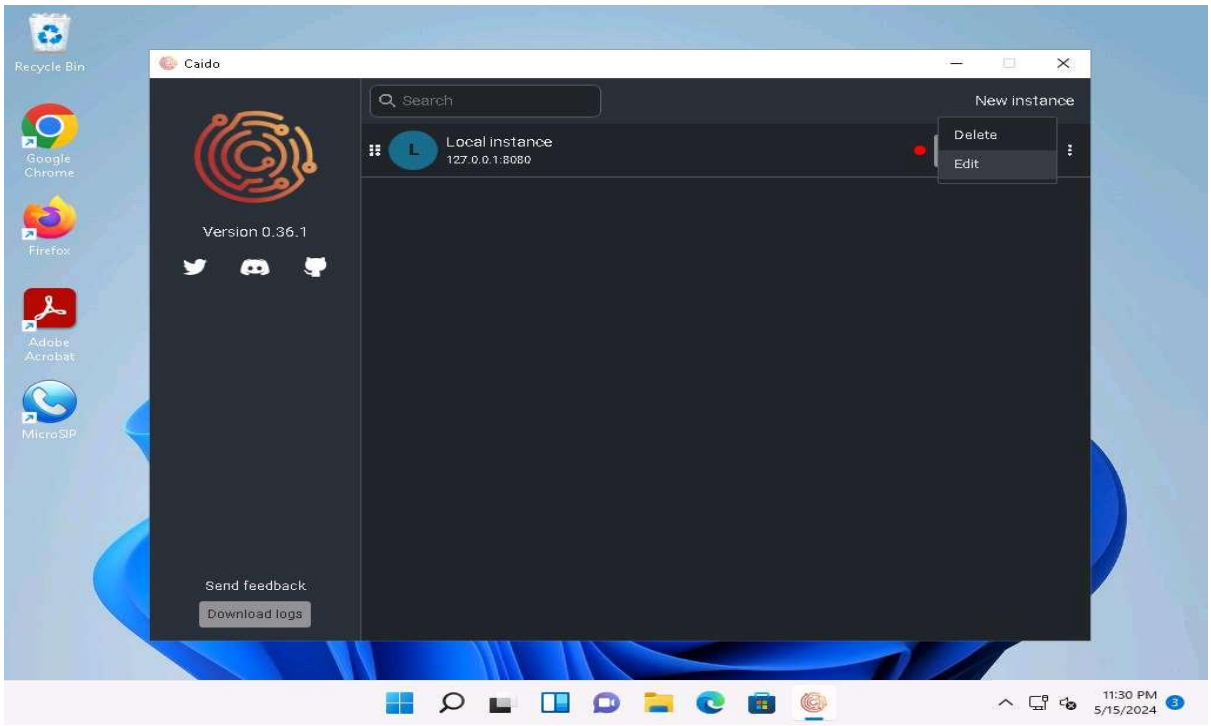


2. Click windows **Search** icon on the **Desktop**, search for **Caido** and launch **Caido** from search bar.

3. **Caido** application window appears, click on **menu** besides Start button and select **Edit**.



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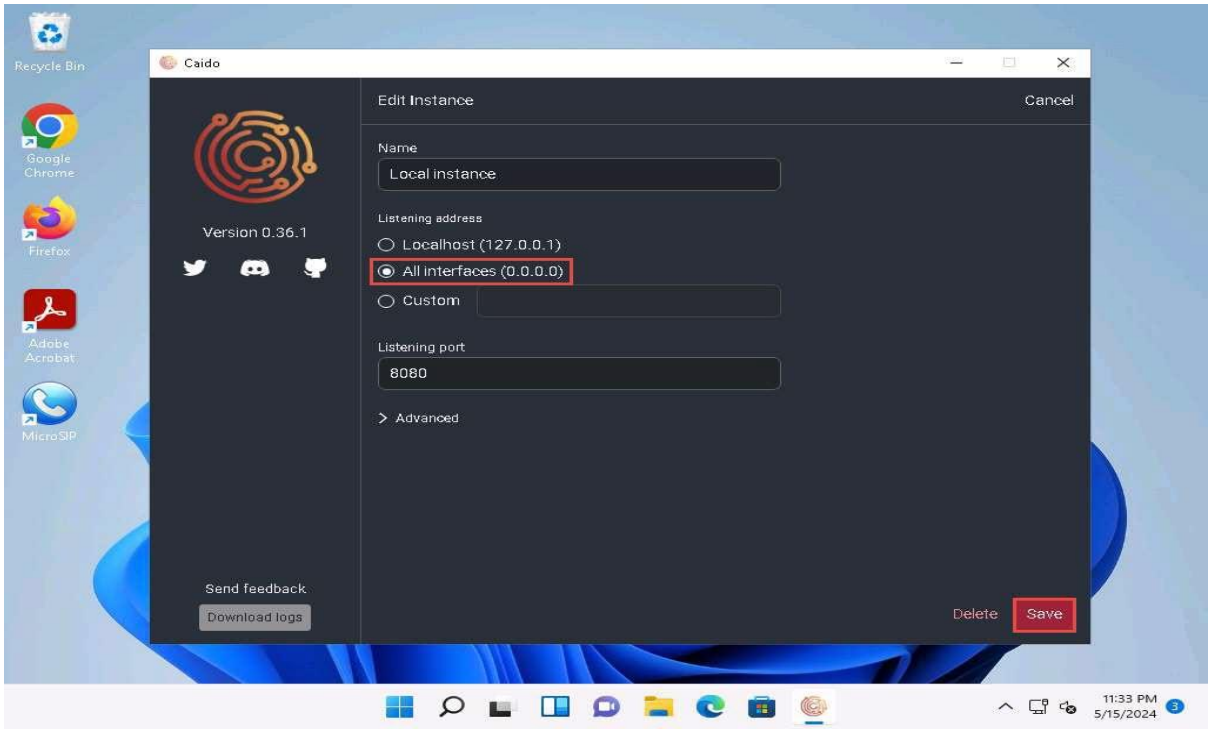
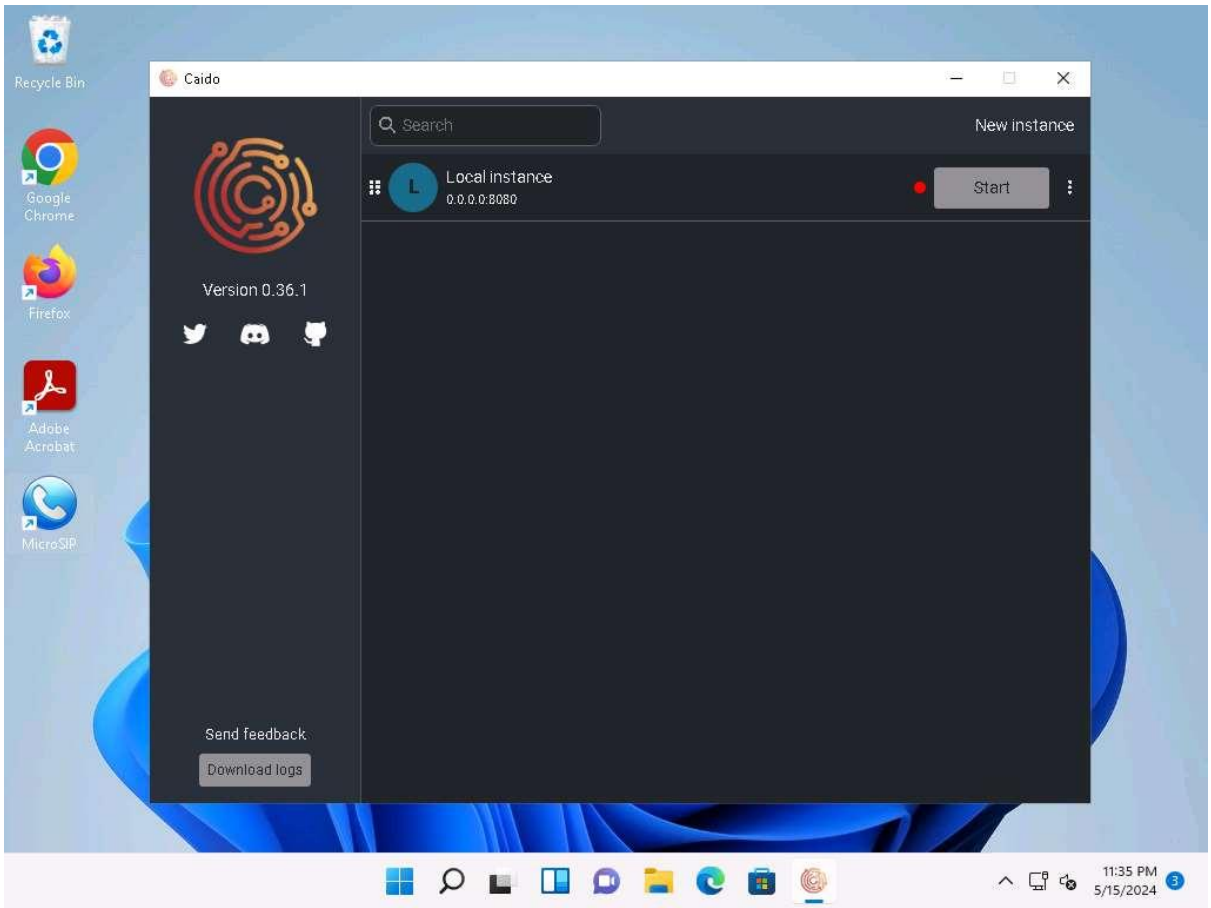
Screeshot

4. In **Edit Instance** window, click on the radio button besides **All interfaces (0.0.0.0)** to listen on all the available network interfaces and click on **Save**.



5. Click on **Start** button to start the local instance.



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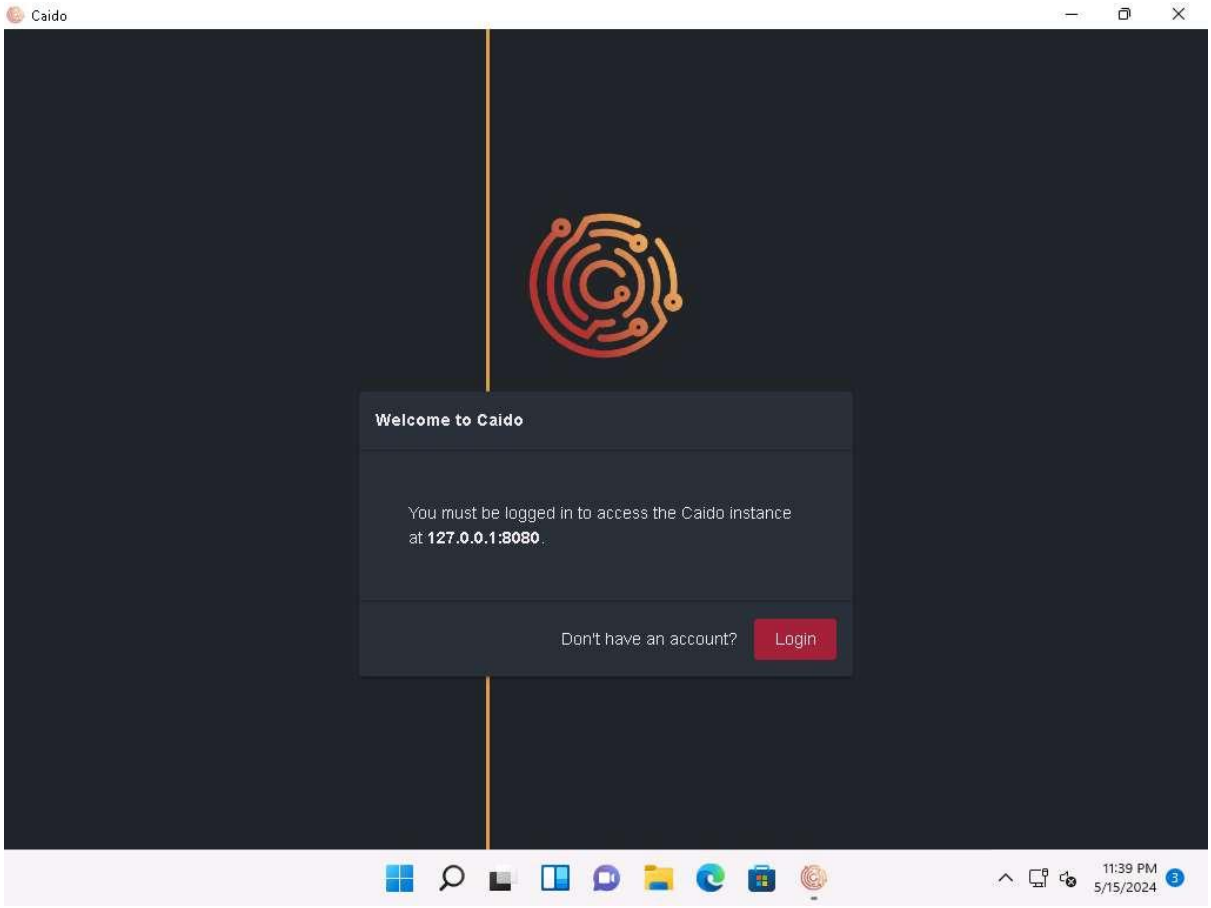
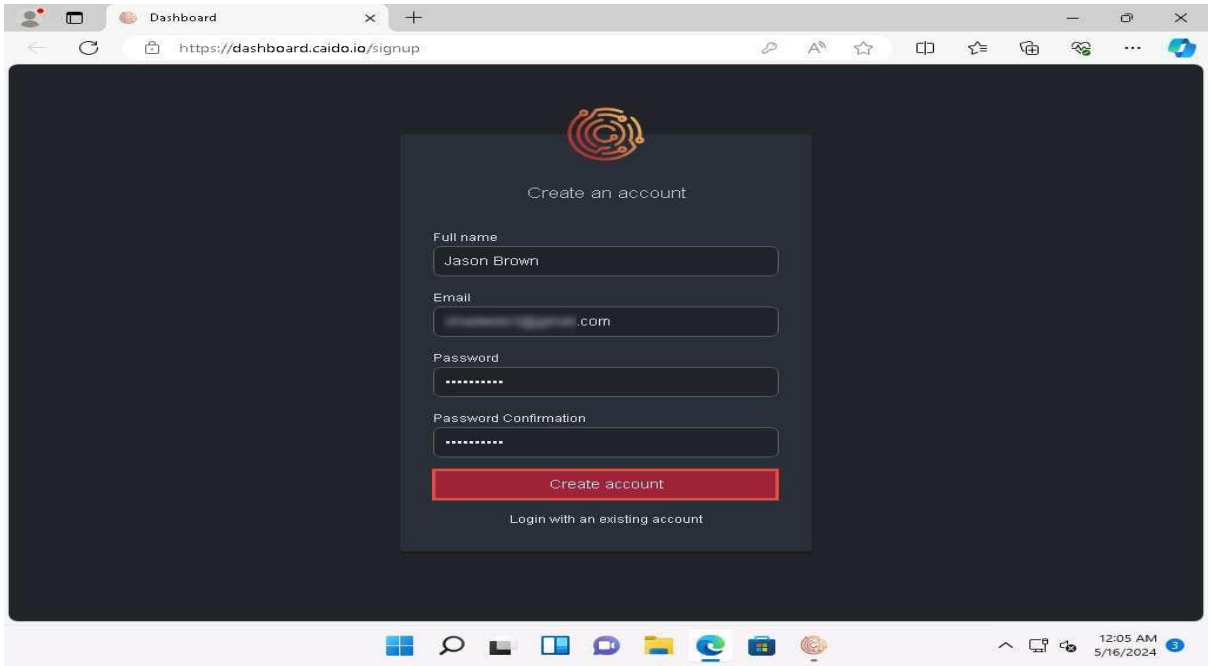
6. **Welcome to Caido** pop-up appears, click on **Login** if you have an account already. If not, select **Don't have an account?**, you will be redirected to Dashboard.



Scrennshot

7. **Create an account** window appears, here fill in the details and click on **Create account**.



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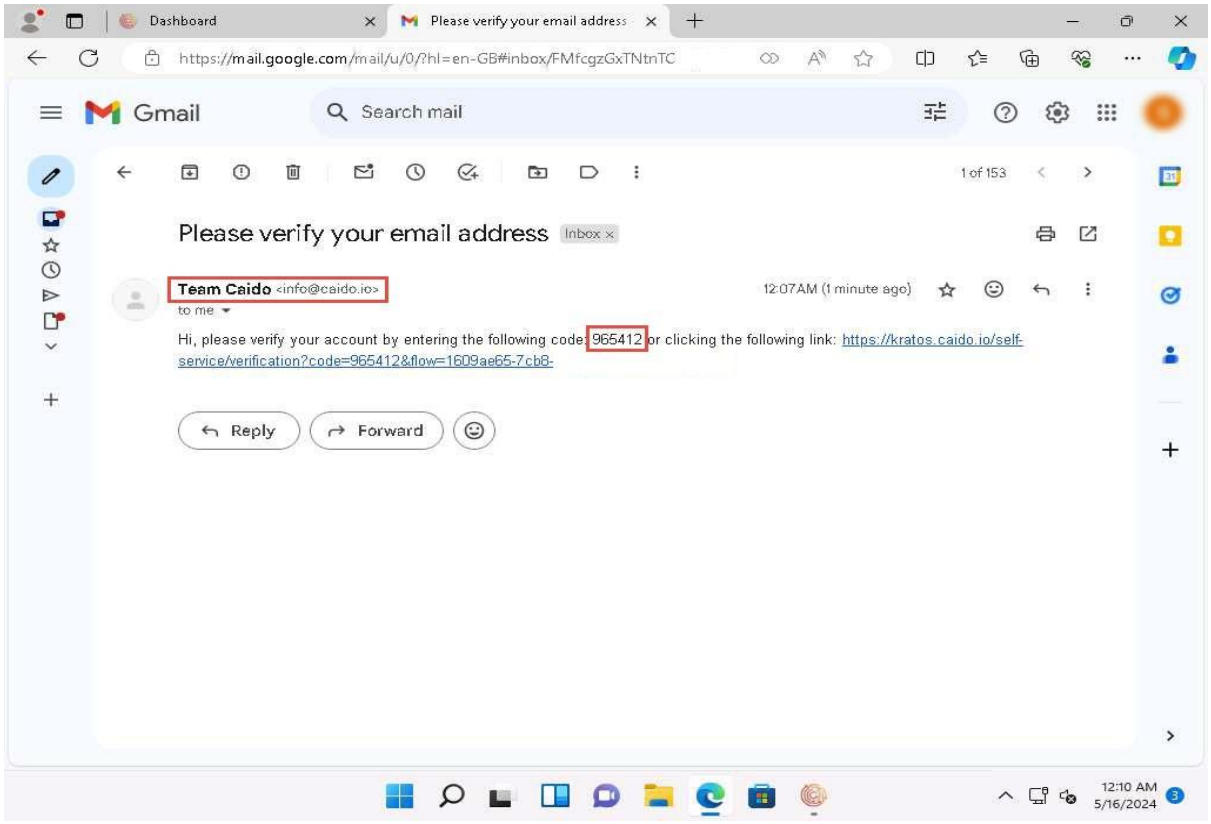
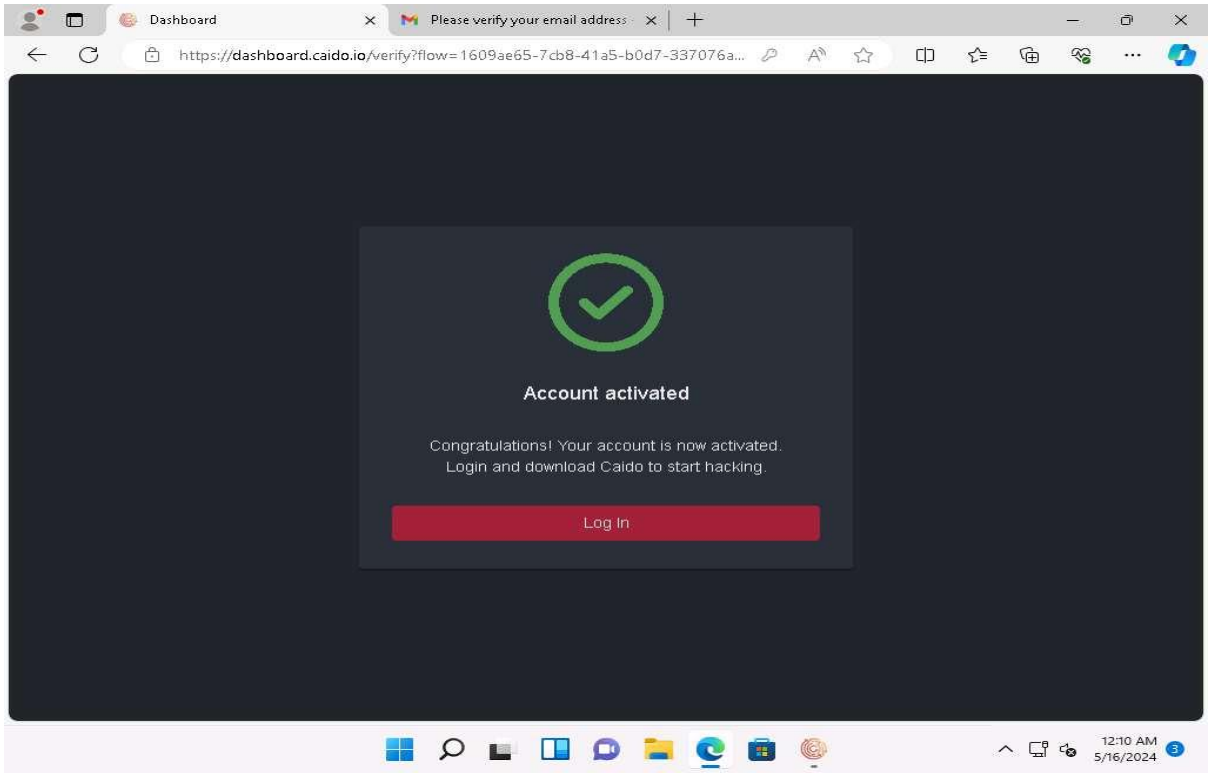
8. Login to your mail account, you will receive a verification mail from **Team Caido** copy the code and paste it in the Caido verification window.



9. After entering the code, your account will be activated as shown in the screenshot.



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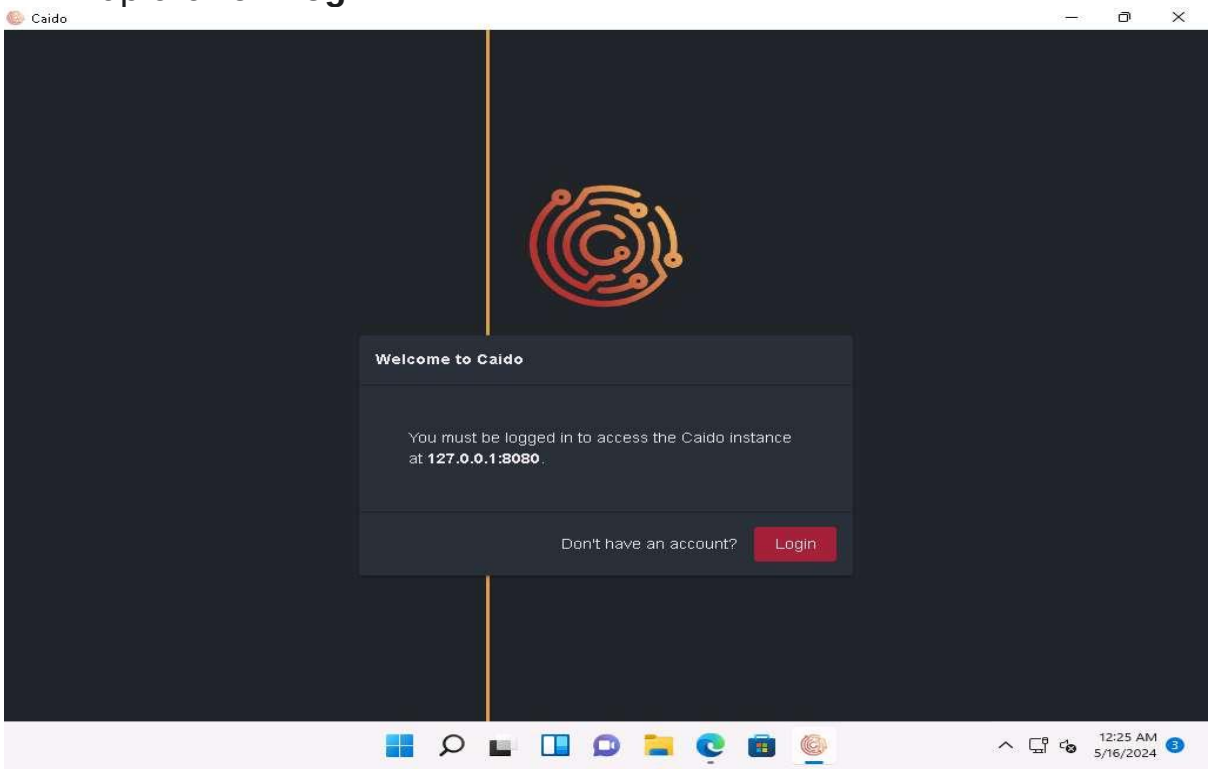
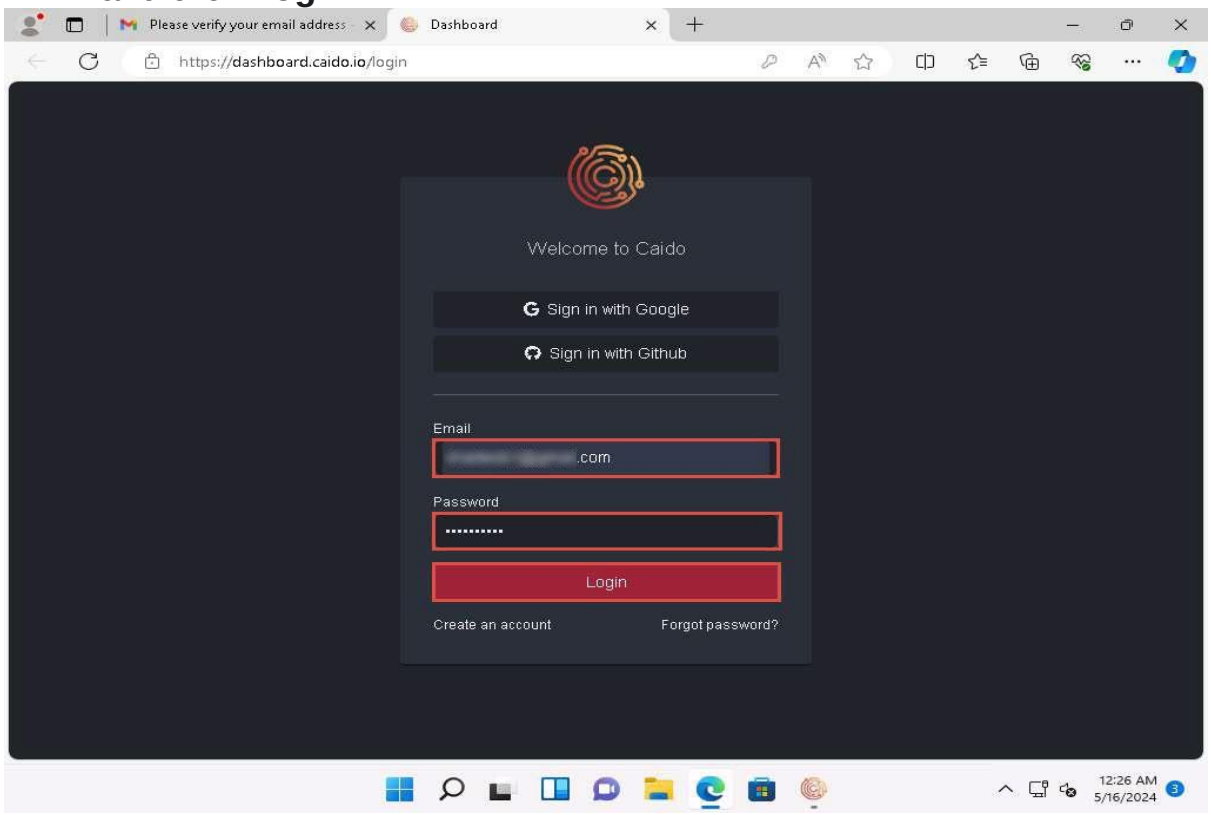
10. Navigate back to Caido application, in **Welcome to Caido** pop-up click on **Login**.



11. **Welcome to Caido** page will appear, enter your credentials and click **Login**.



12. Once logged in, **Register your Caido Instance** pop-up will appear. Type **Session Hijacking** and click **Register**.

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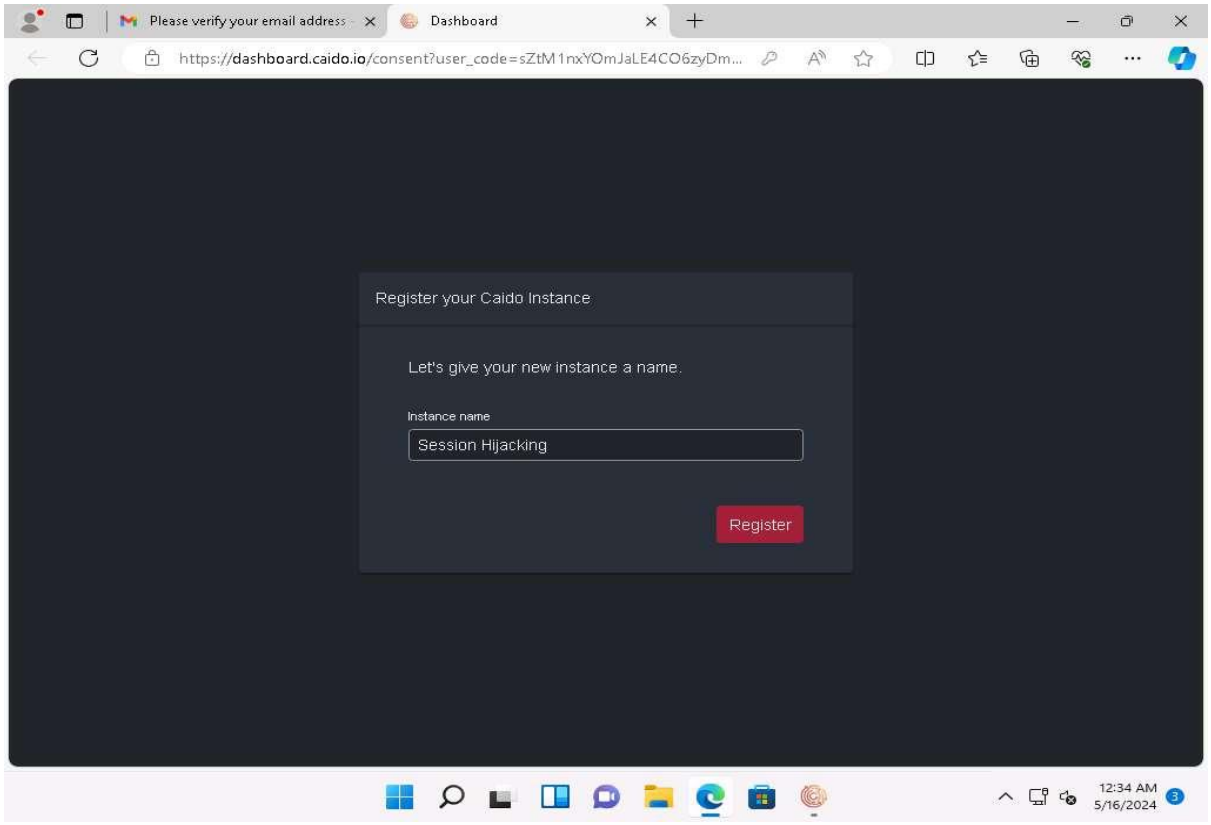
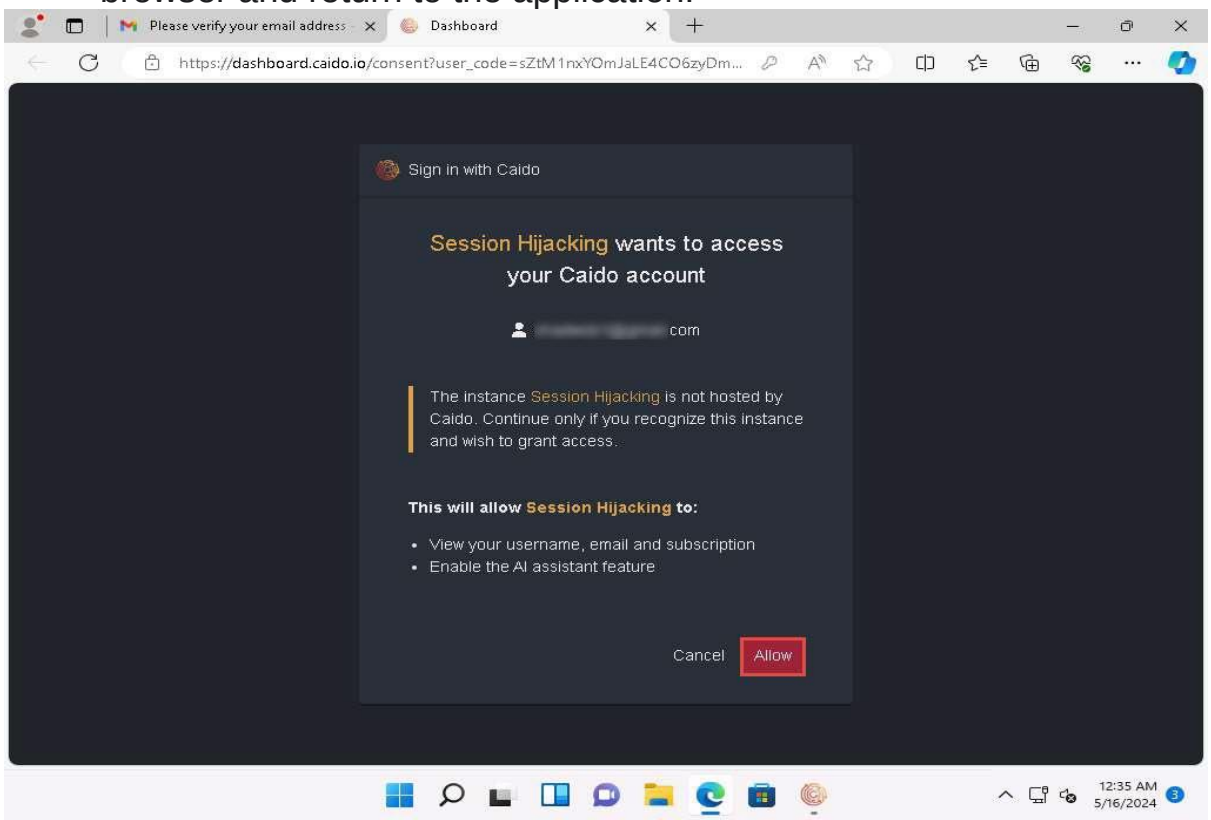


13. **Sign in with Caido** window appears, click **Allow** to allow the access. **Authorization Complete!** pop-up appears, close the web browser and return to the application.



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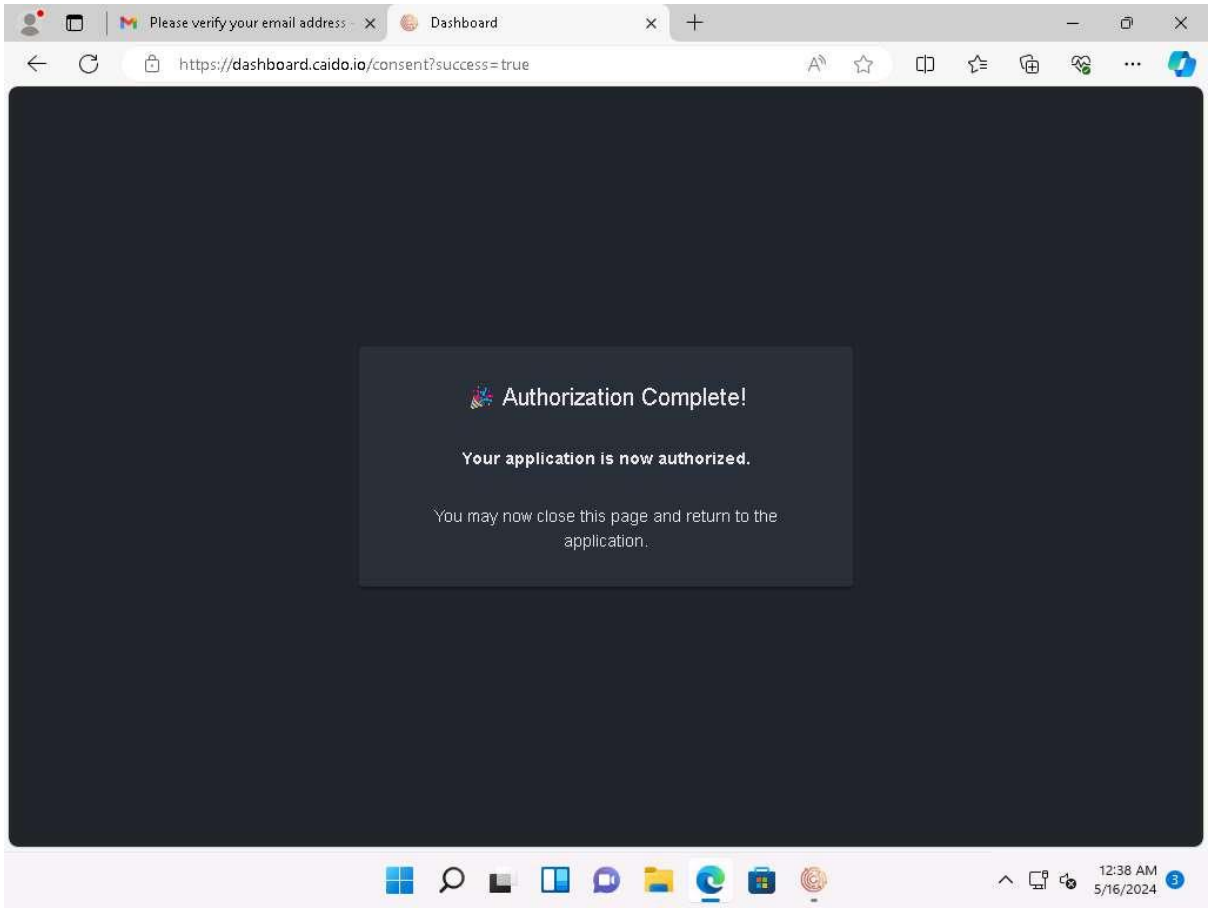
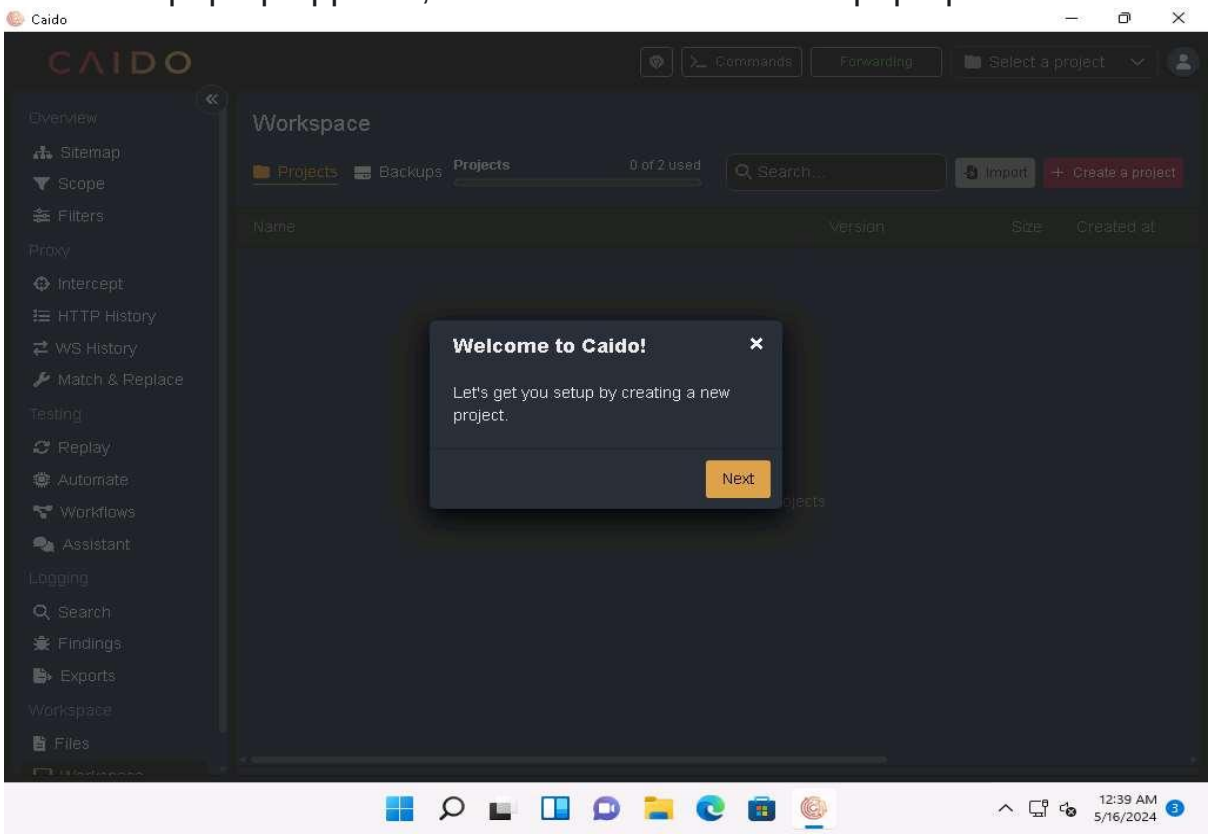


14. The **Caido** main window appears.

If a Caido pop-up appears, click **Next** or **Ok** in all the pop-ups.



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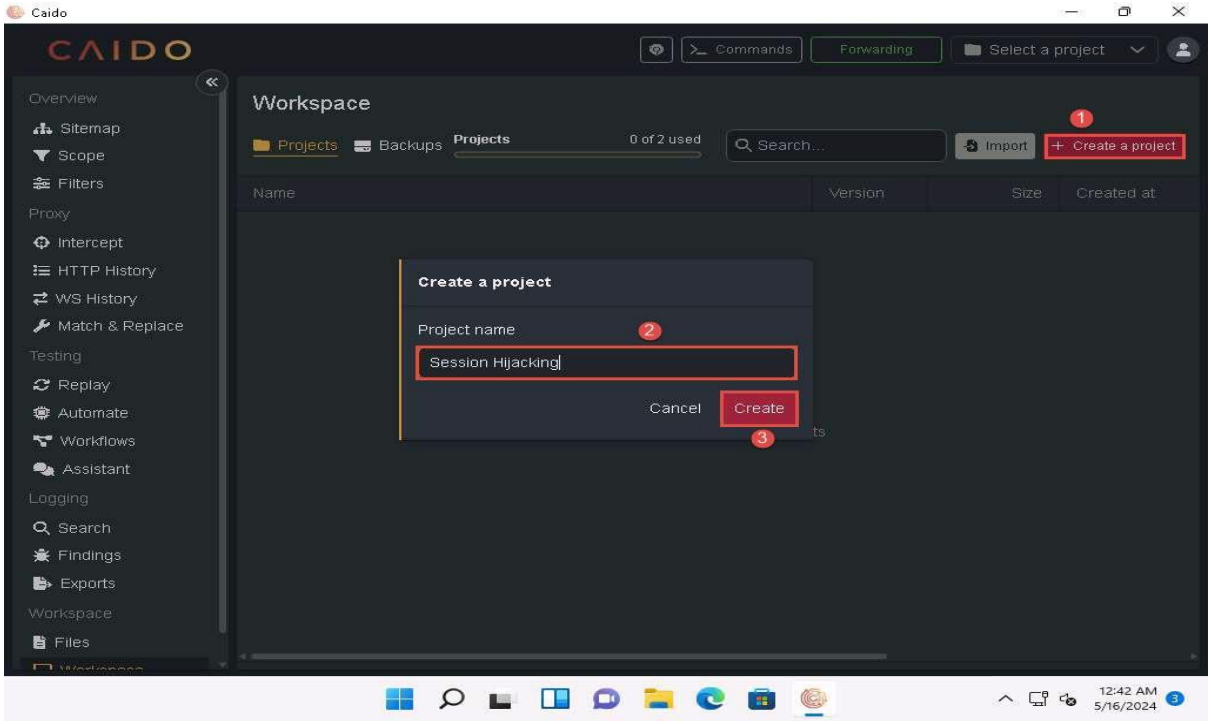
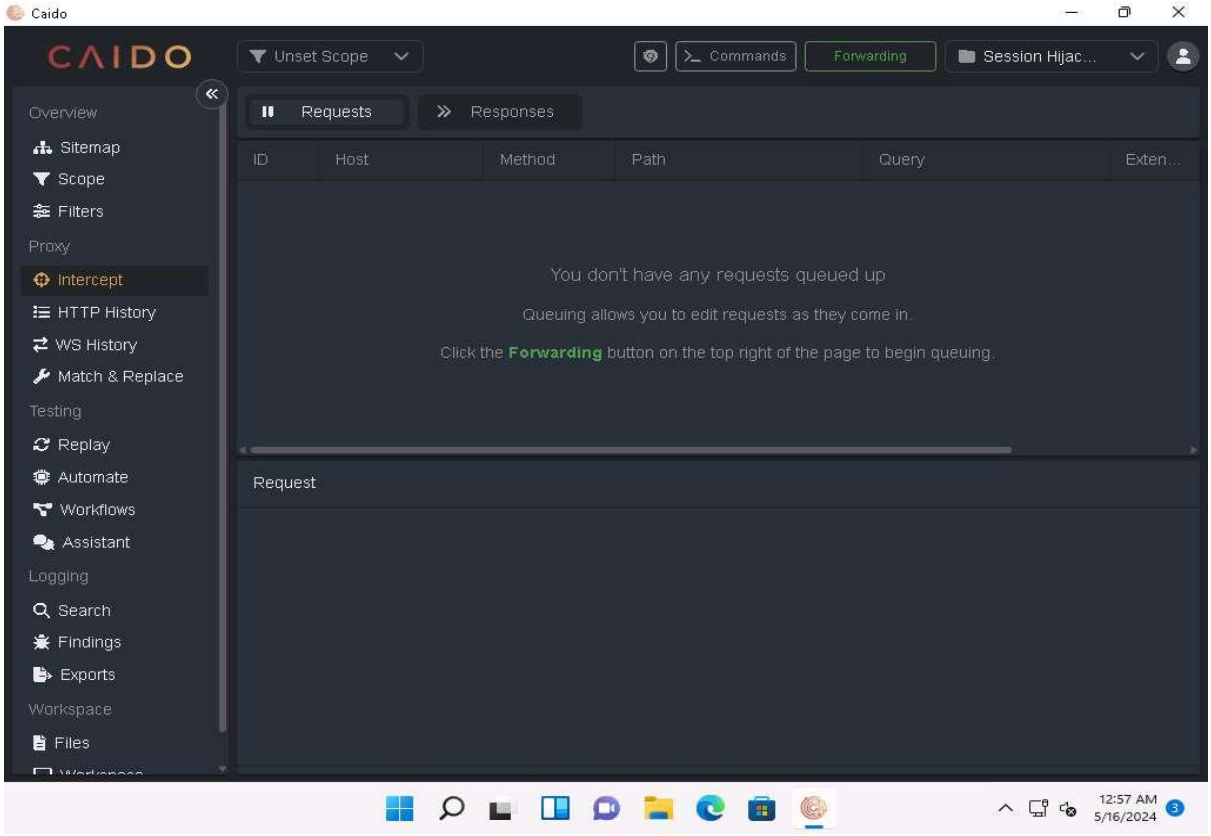
15. Click on **+ Create a project** button to create a new project. **Create a project** pop-up appears, name it as **Session Hijacking** and click **Create**.



16. Click on **Intercept** option on the left pane, as shown in the screenshot below.



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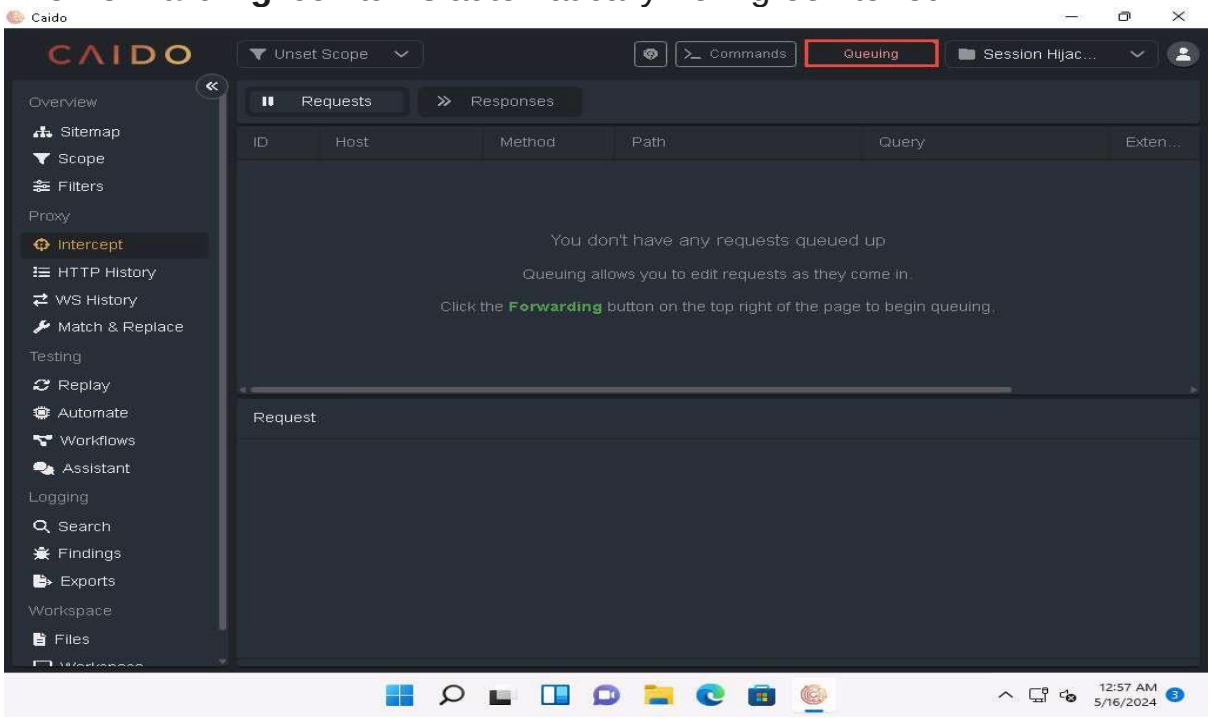
17. Click the **Forwarding** icon and wait until it changes to **Queuing**. This button will trap and display the next response or request from the victim's machine in the **Intercept** tab.

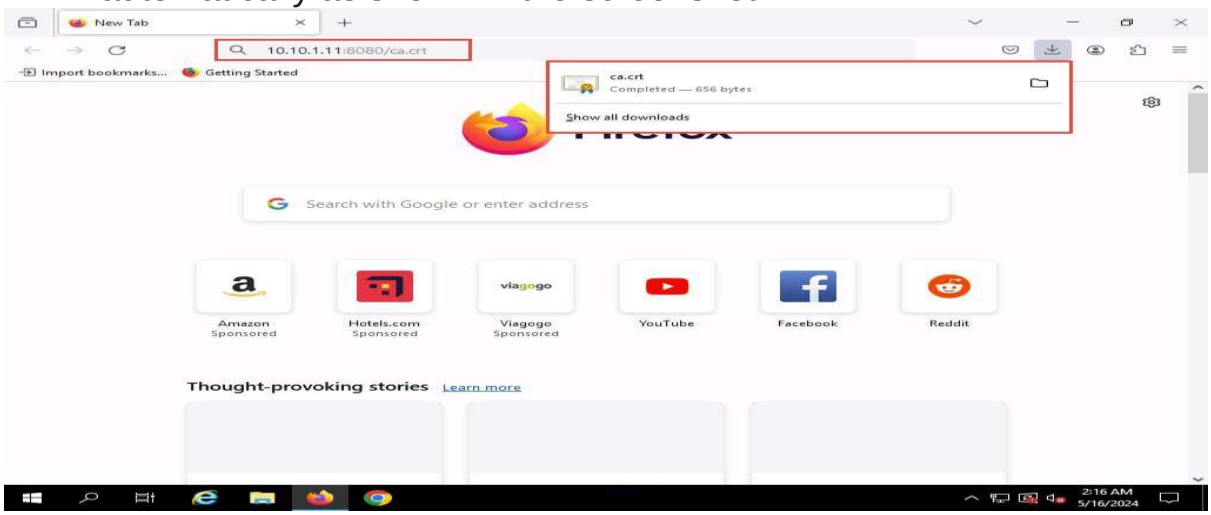
The **Forwarding** icon turns automatically from green to red.



18. Click Windows Server 2019 to switch to the **Windows Server 2019** machine. Click Ctrl+Alt+Delete to activate the machine and login using **Administrator**/**Pa$$w0rd**.

Networks screen appears, click **Yes** to allow your PC to be discoverable by other PCs and devices on the network.

19. Open **Firefox** web browser and navigate to **http://10.10.1.11:8080/ca.crt**. CA certificate will be downloaded automatically as shown in the screenshot.



20. In **Firefox** web browser, select **Settings** from the context menu.

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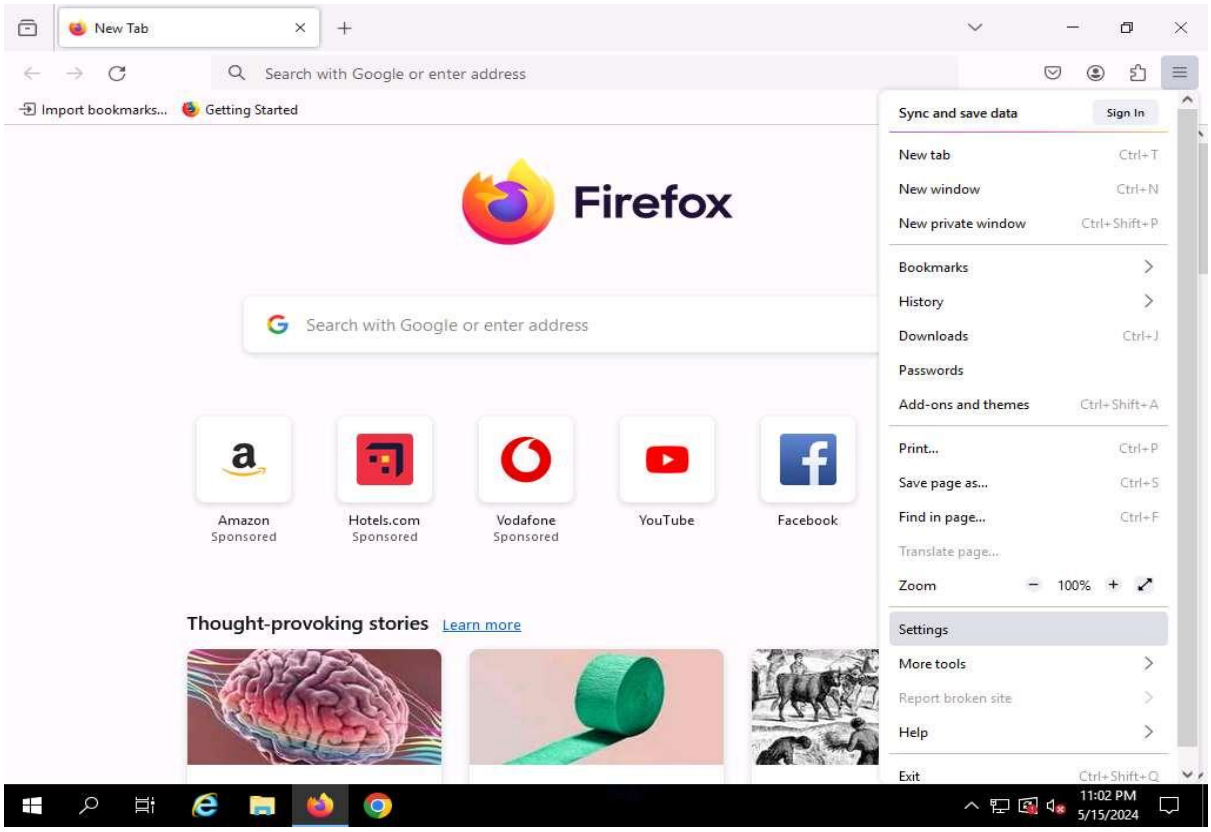
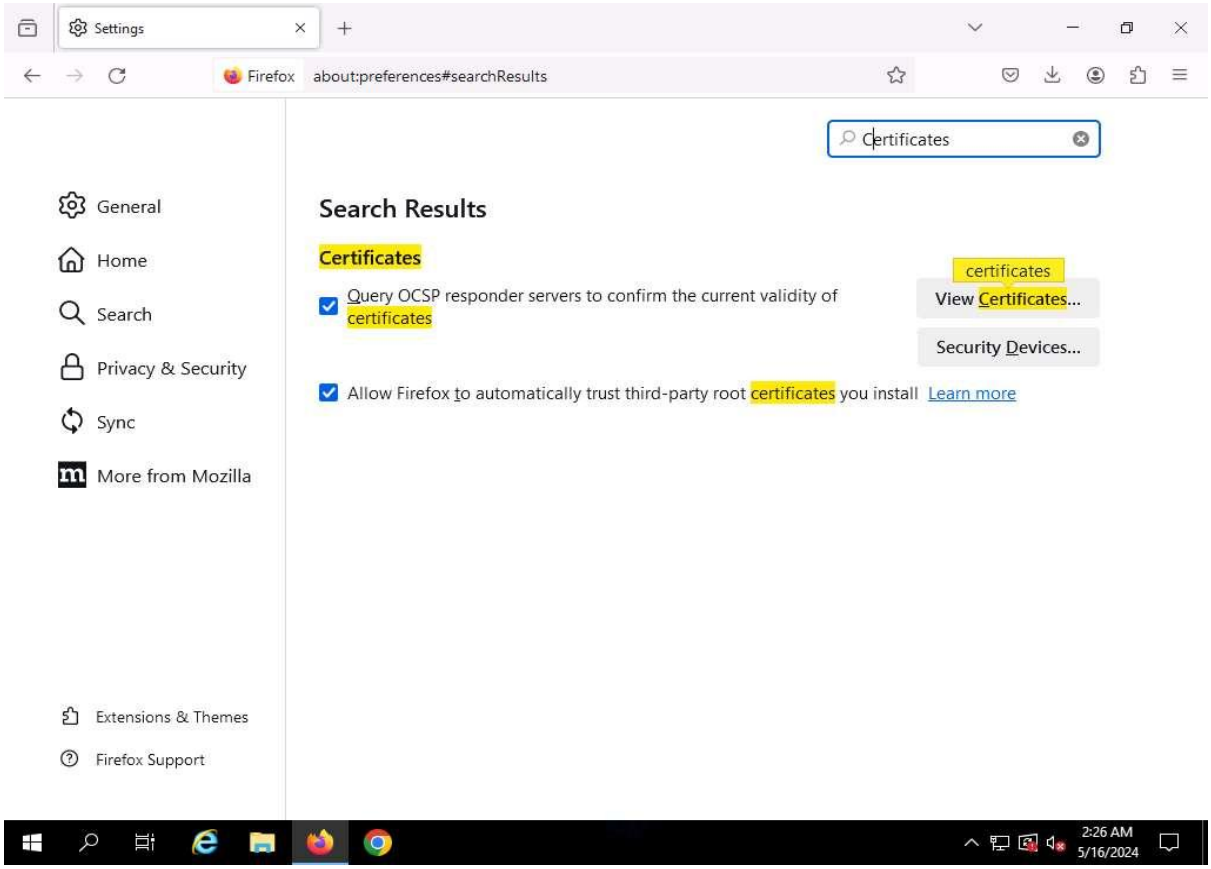


21. On the **Settings** page, search for **Certificates** and open **View Certificates**.



22. Navigate to **Authorities** tab and click on **Import…**

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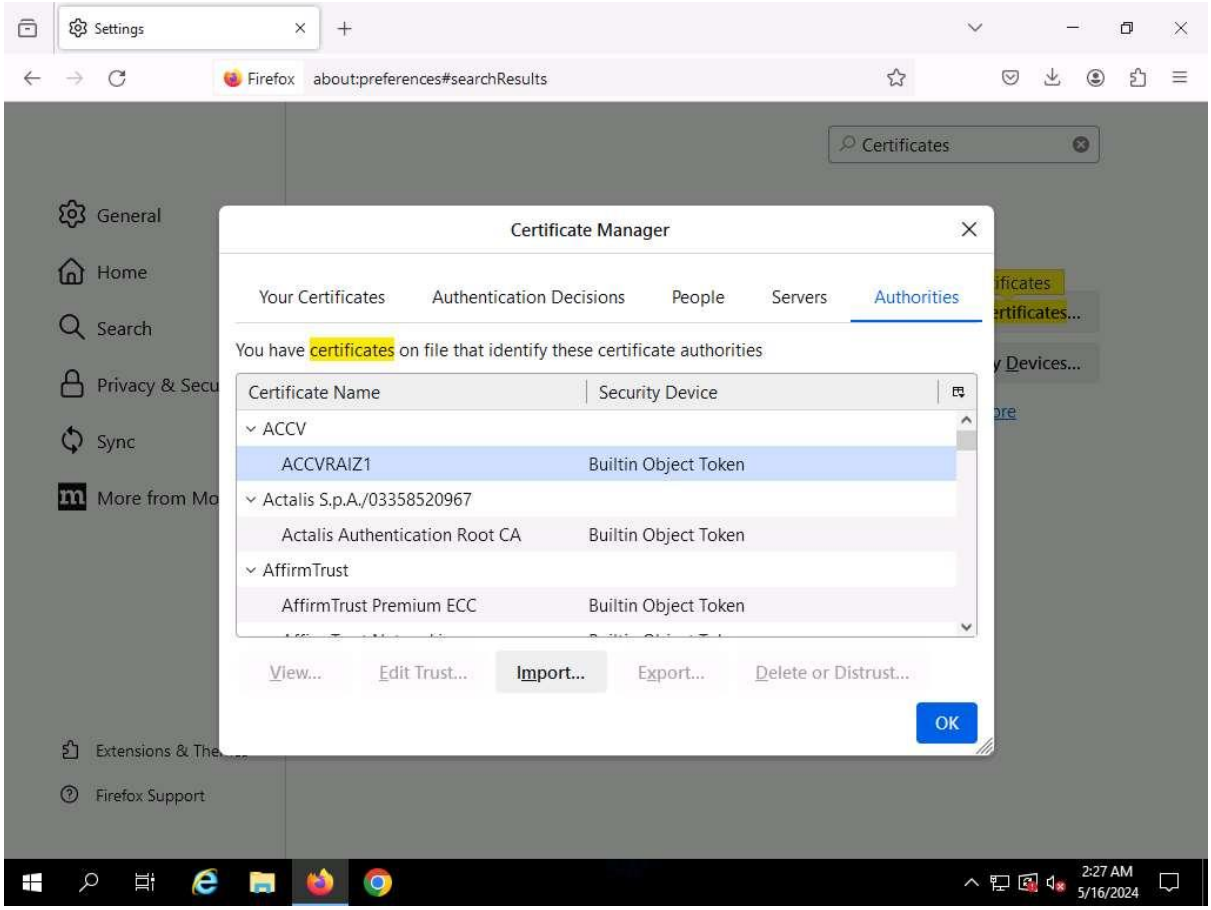
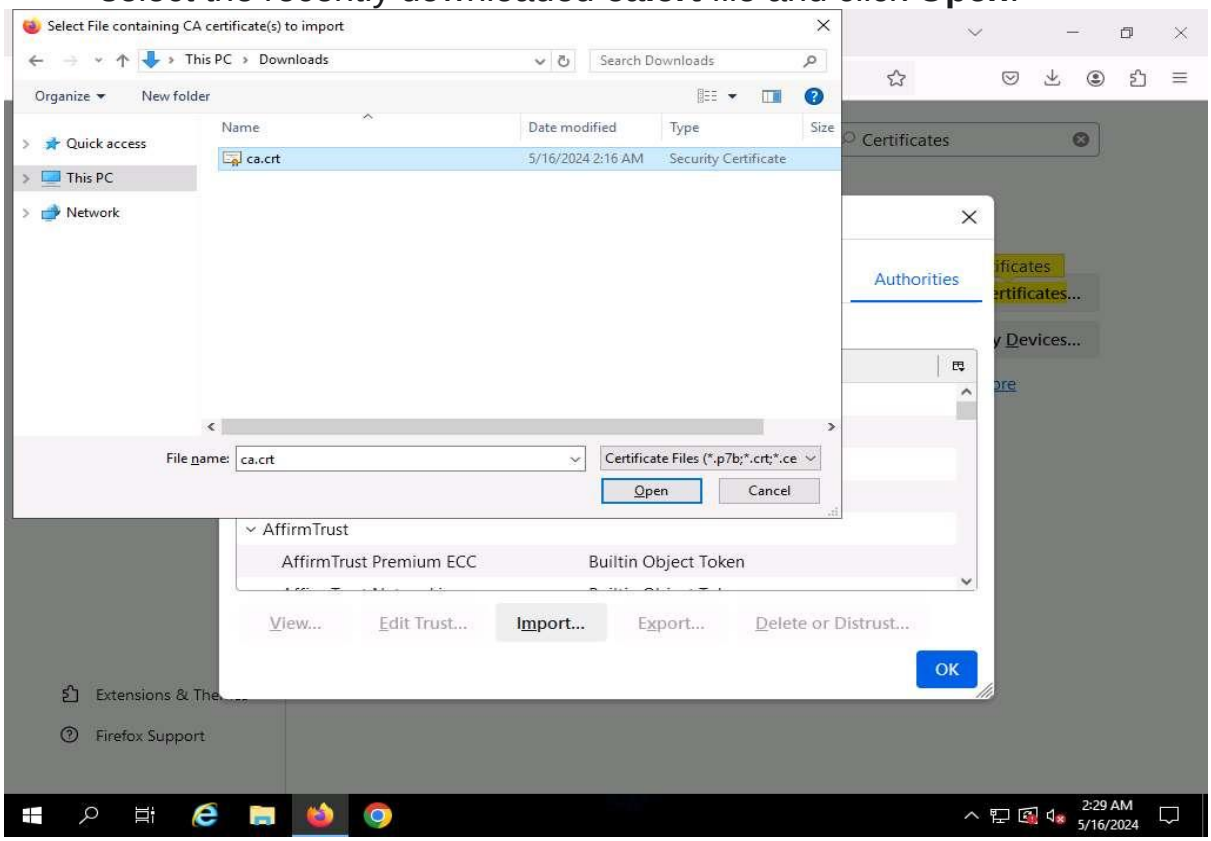


23. In **Select File containing CA certificate(s) to import** window, select the recently downloaded **ca.crt** file and click **Open**.



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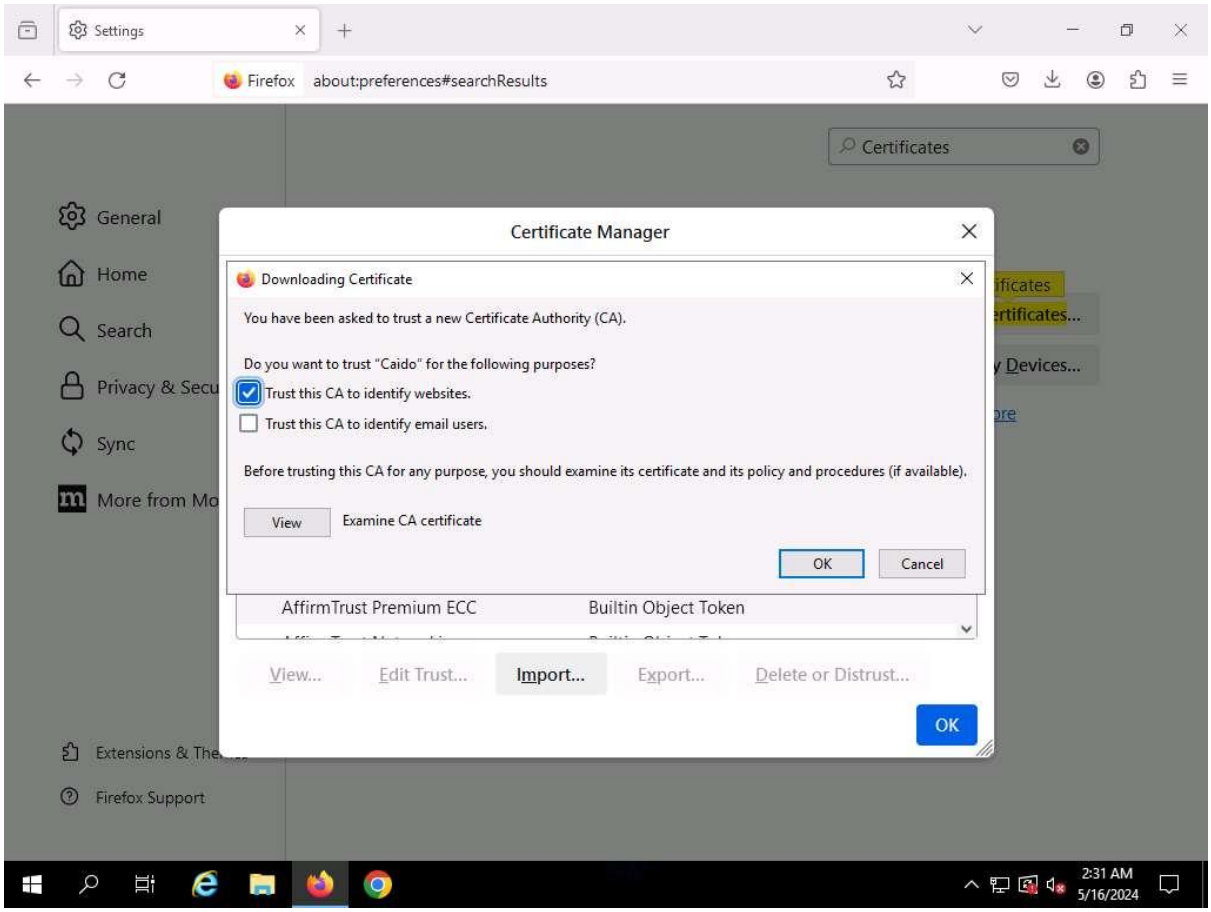
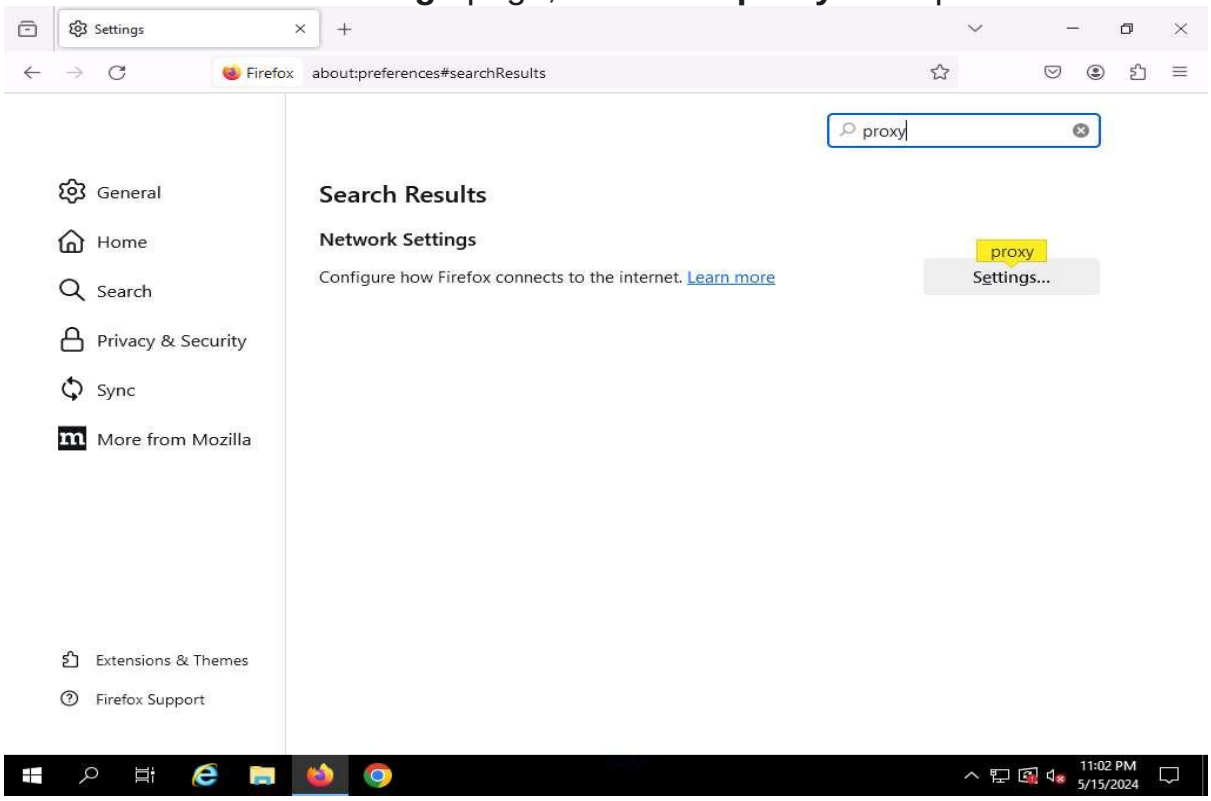
24. When prompted, click the **Trust this CA to identify websites** checkbox and click on **OK**. Click **OK** in the **Certificate Manager** window.

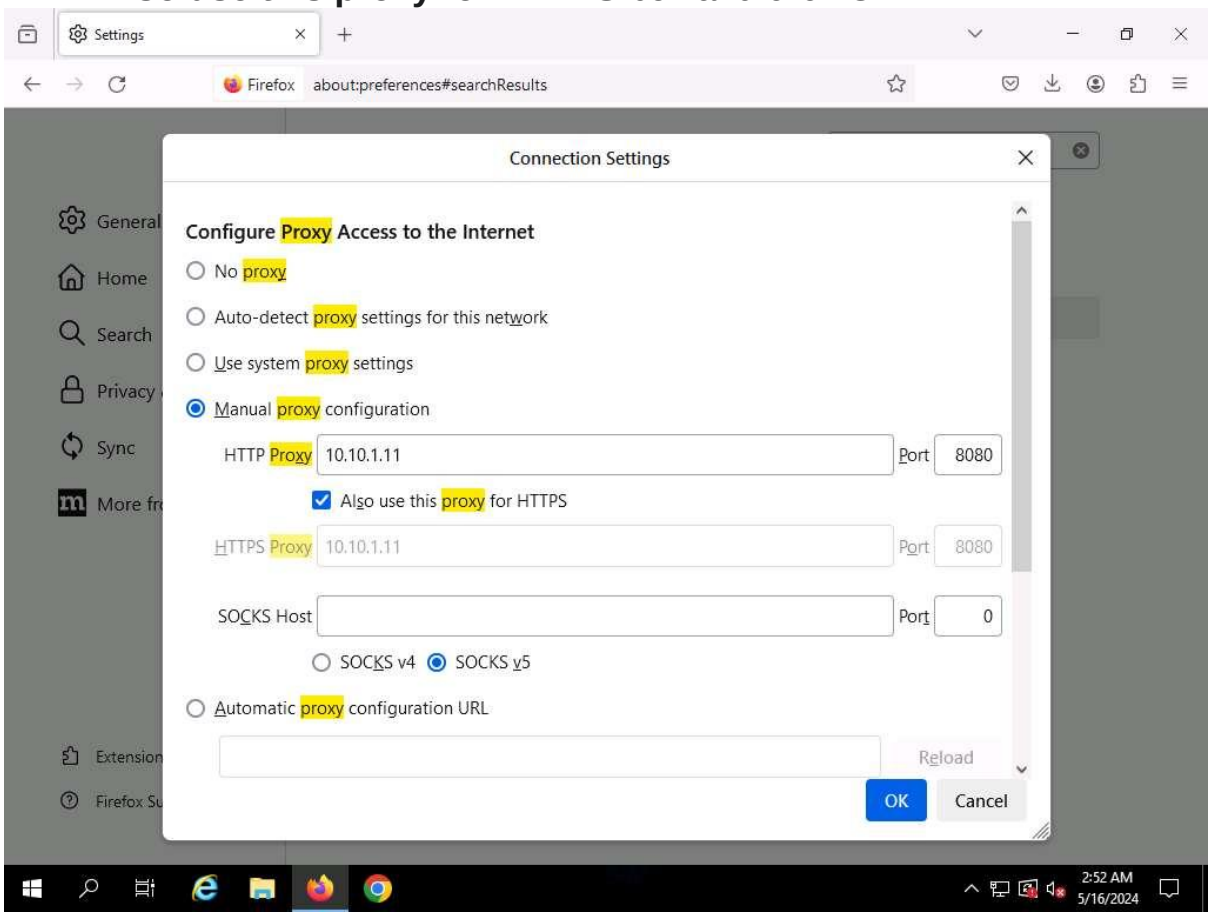


25. On the **Settings** page, search for **proxy** and open it.



26. **Connection Settings** page appears and click **Manual proxy configuration** to configure a proxy.

27. Set HTTP Proxy to **10.10.1.11** and port to **8080**, check the **Also use this proxy for HTTPS** box and click **OK**.



28. After saving, close the **Settings** and browser windows. You have now configured the proxy settings of the victim's machine.

29. Open a new tab in **Firefox** web browser and place your mouse cursor in the address bar, type **www.moviescope.com** and press **Enter**.

30. If a message appears, stating that **Your connection is not private**. Click the **Advanced** button.

31. On the next page, click **Proceed to www.moviescope.com (unsafe)** to open the website.

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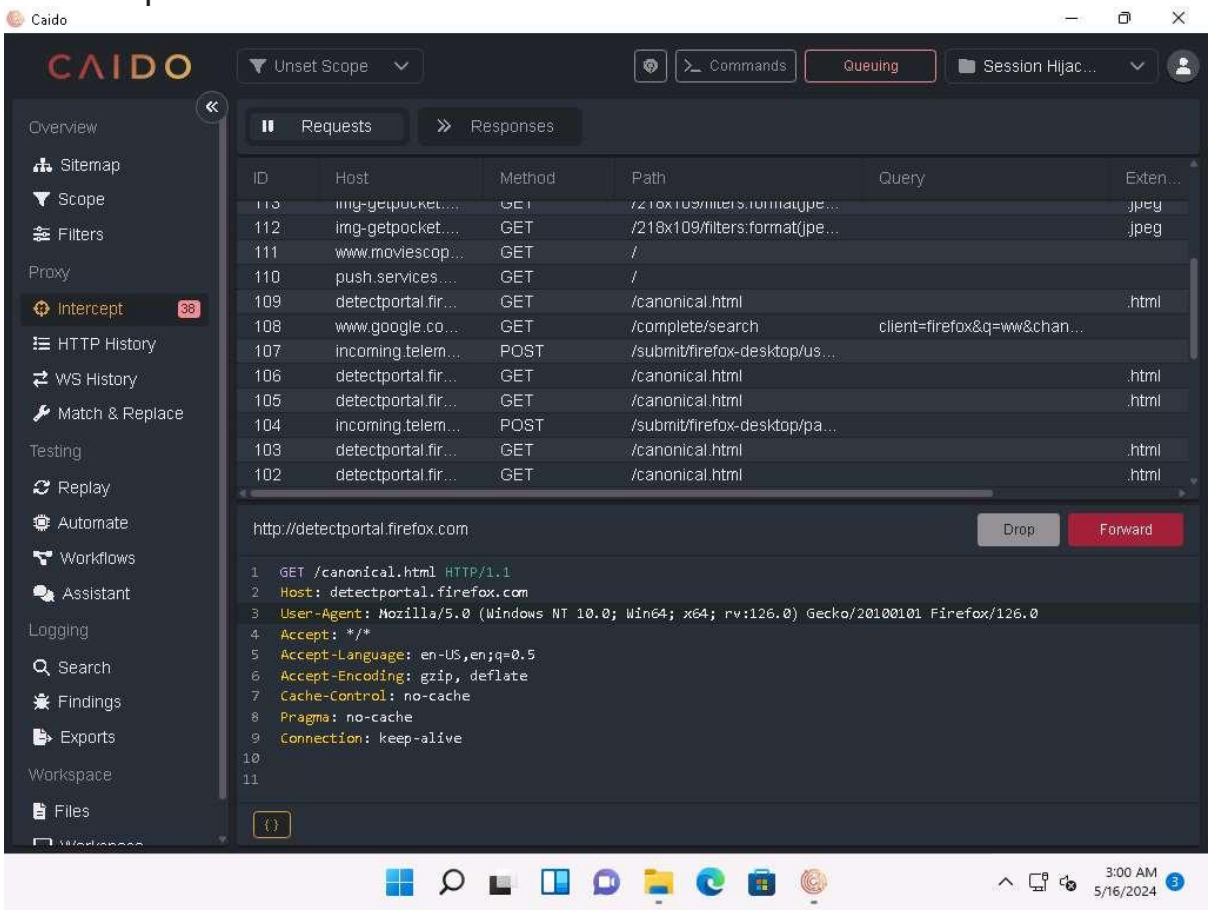
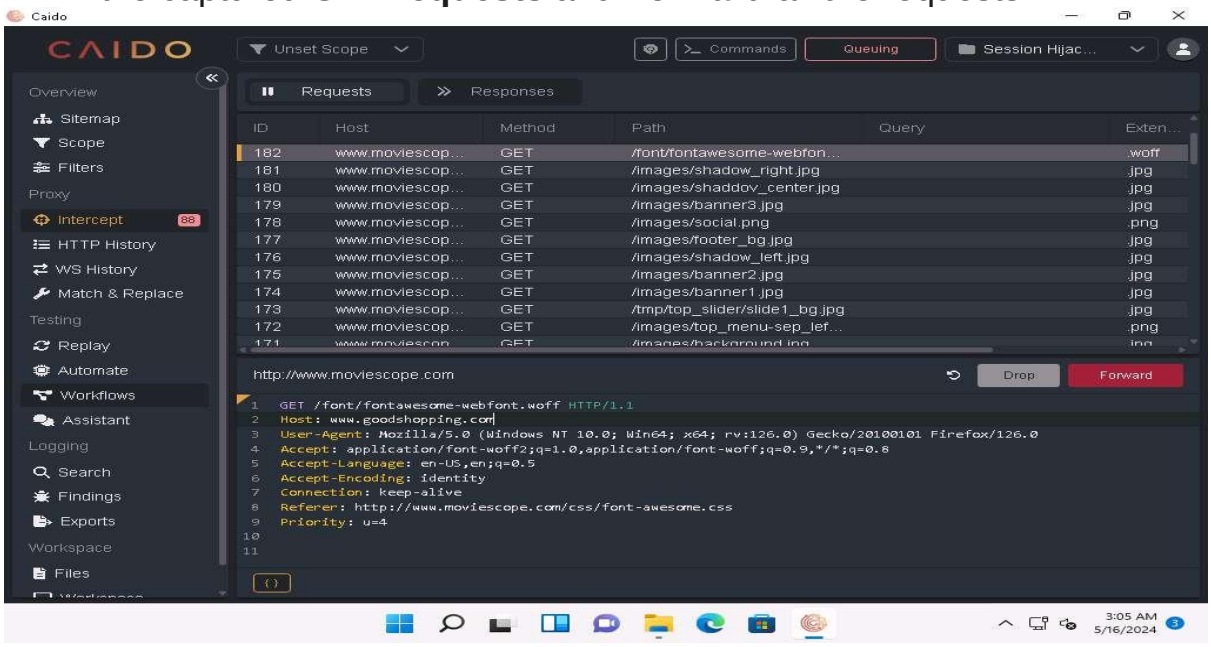
32. Now, click Windows 11 to switch back to the attacker machine (**Windows 11**) and observe that **Caido** has begun to capture the requests of the victim's machine.



33. On the **Requests** tab, for all www.moviescope.com requests, modify **www.moviescope.com** to **www.goodshopping.com** in all the captured GET **requests** and **Forward** all the requests.

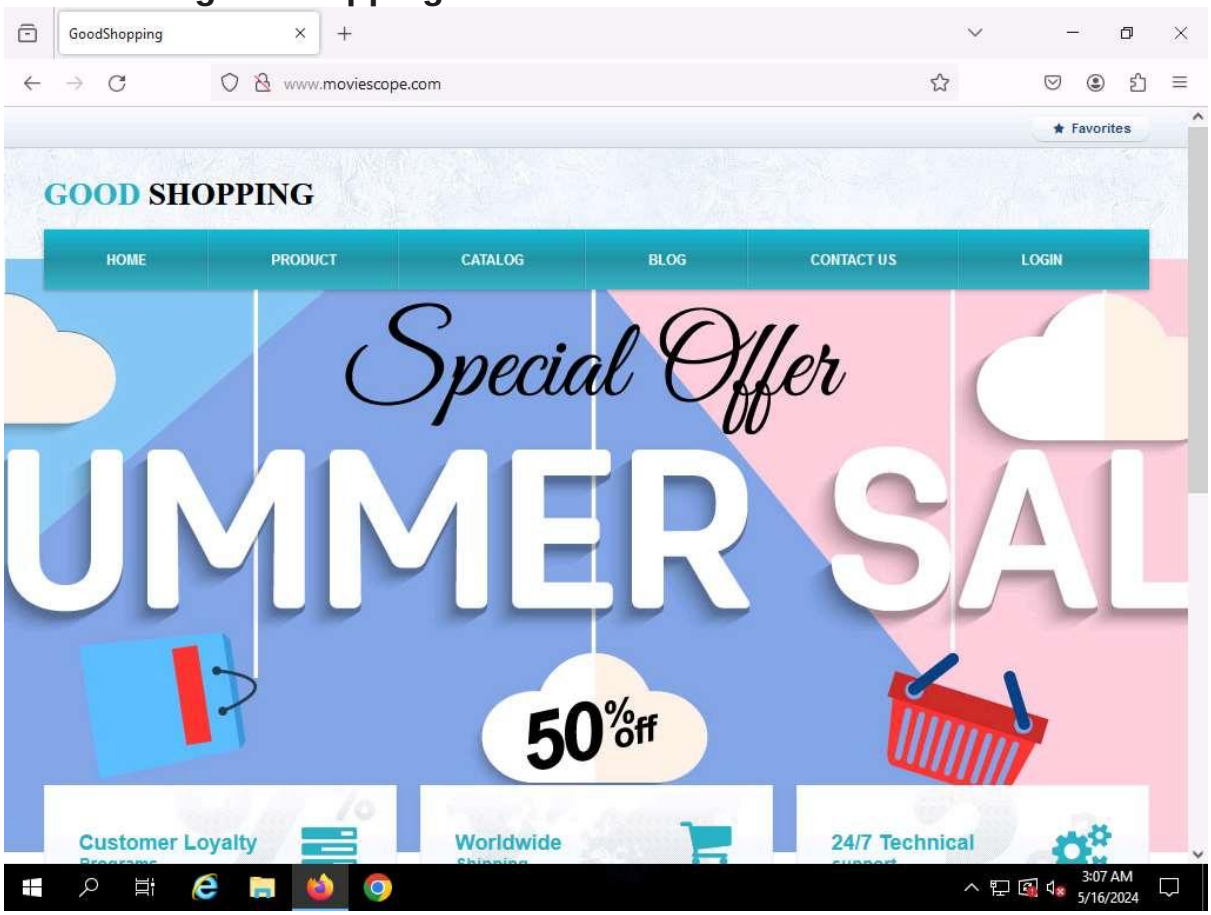


34. In a similar way, modify every **GET** request captured by **Caido** until you see the **www.goodshopping.com** page in the victim's machine. You will need to switch back and forth from the victim's machine to see the browser status while you do this.

If you do not receive any request or you see a blank Requests tab then switch to **Windows Server 2019** machine and refresh the browser to capture the request again.

35. Now, click on Windows Server 2019 to switch to the victim's machine (**Windows Server 2019**); the browser displays the website that the attacker wants the victim's machine to see (in this example, **www.goodshopping.com**).

36. The victim has navigated to **www.moviescope.com**, but now sees **www.goodshopping.com**; while the address bar displays **www. moviescope.com**, the window displays **www.goodshopping.com**.



37. Now, we shall change the proxy settings back to the default settings. To do so, in the **Firefox** browser, select **Settings** from the context menu. On the **Settings** page, search for **proxy** and open it. **Connection Settings** page appears, check **No Proxy** radio button and click **OK**.

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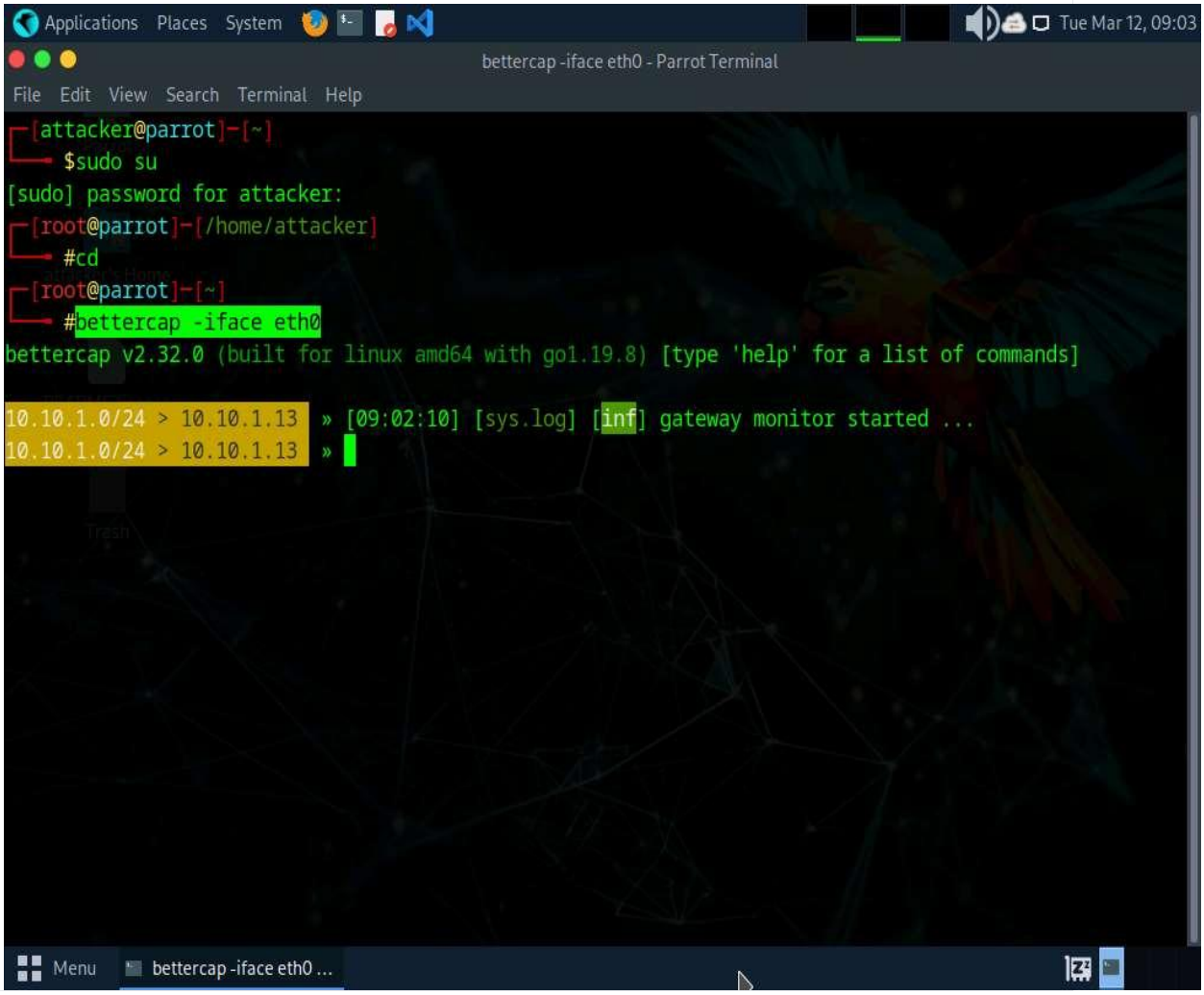
1. Detect Session Hijacking using Wireshark

Launch MITM attack

1. Run **bettercap -iface eth0** to set the network interface.
   -iface: specifies the interface to bind to (here, **eth0**).



2. Type **net.probe on** and press **Enter**. This module will send different types of probe packets to each IP in the current subnet for the **net.recon** module to detect them.

3. Type **net.recon on** and press **Enter**. This module is responsible for periodically reading the system ARP table to detect new hosts on the network.

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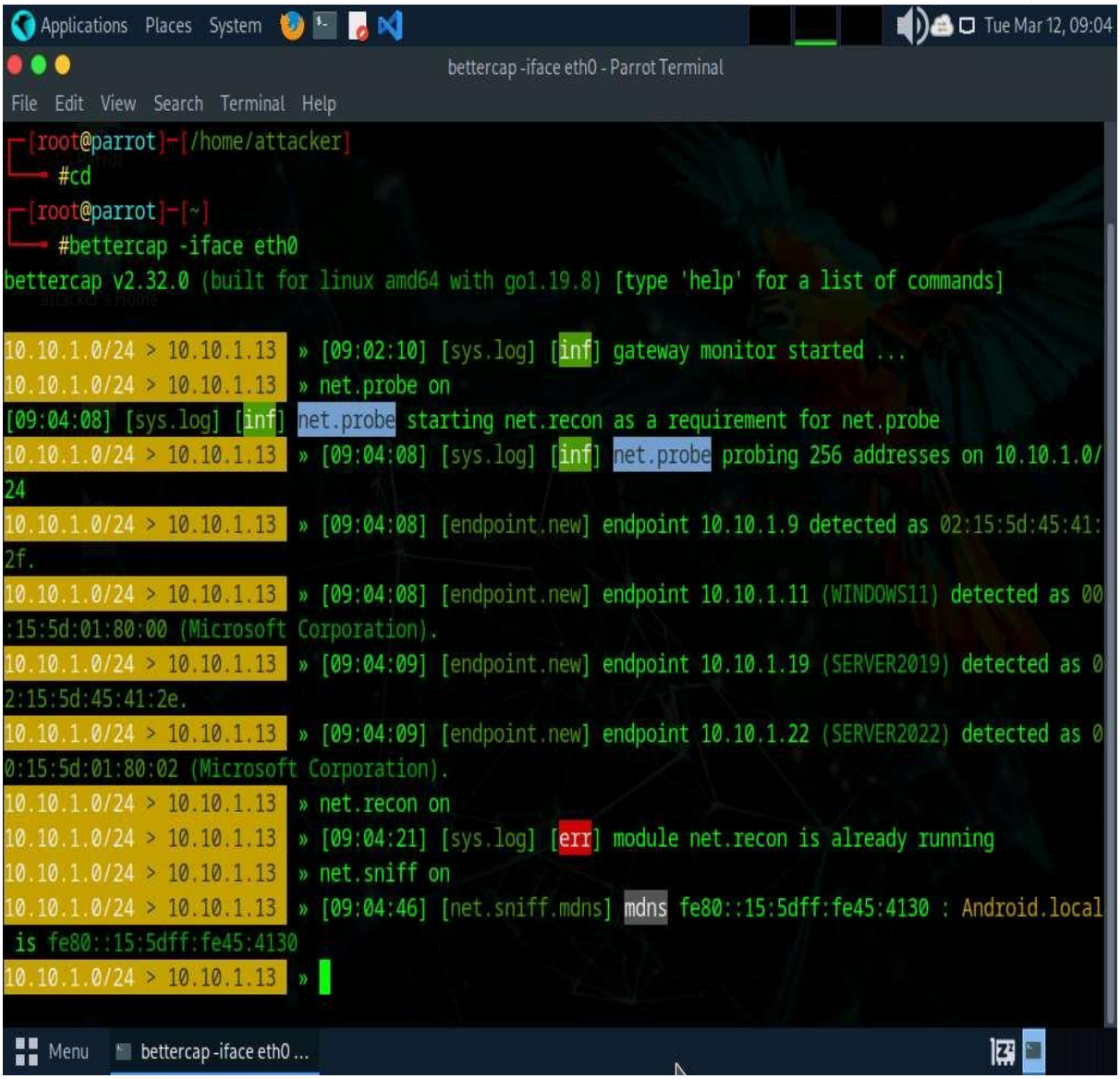
The net.recon module displays the detected active IP addresses in the network. In real-time, this module will start sniffing network packets.

4. Type **net.sniff on** and press **Enter**. This module is responsible for performing sniffing on the network.

5. You can observe that bettercap starts sniffing network traffic on different machines in the network, as shown in the screenshot.



A huge number of Arp requests, indicate attack in progress.

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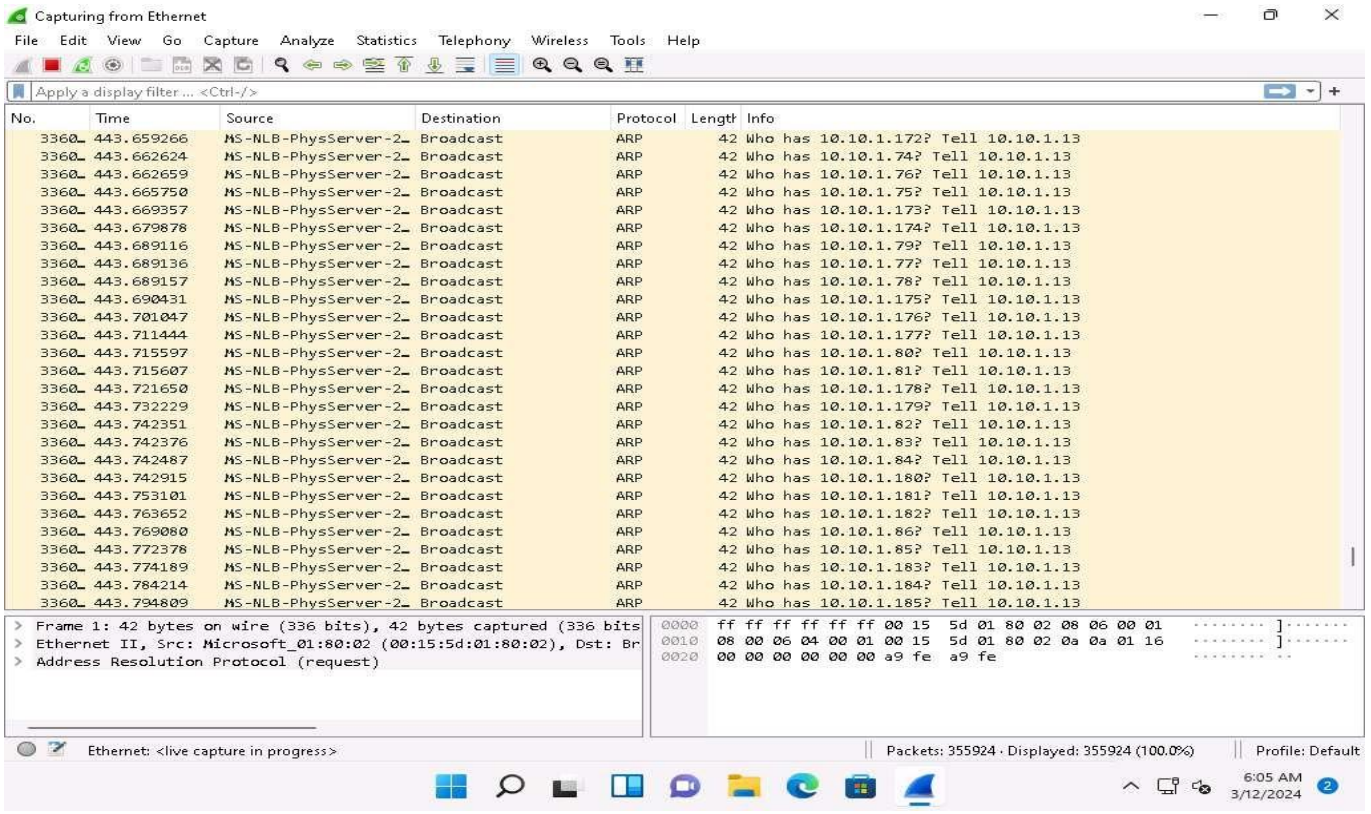

Lab 2: Detect Session Hijacking

Overview of Detecting Session Hijacking

There are two primary methods that can be used to detect session hijacking:

- **Manual Method**: Involves using packet sniffing software such as Wireshark and SteelCentral Packet Analyzer to monitor session hijacking attacks; the packet sniffer captures packets being transferred across the network, which are then analyzed using various filtering tools.
- **Automatic Method**: Involves using Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS) to monitor incoming network traffic; if a packet matches any of the attack signatures in the internal database, the IDS generates an alert, and the IPS blocks the traffic from entering the database.

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