

Web Manual: Apache Web Server Installation & Maintenance

Lab: 1

Objectives

- Install, administer, and maintain an Apache web server.
- Host multiple virtual websites on a single Apache server.
- Host simple dynamic websites using HTML and JavaScript.
- Understand Apache configuration files and directories.

Task 1: Setting up an Apache Web Server

Step 1: Installing Apache

Apache was installed on Ubuntu using:

```
sudo apt update  
sudo apt install apache2
```

The Apache service was verified:

```
sudo systemctl status apache2
```

Observation: Apache was active and running. Accessible via <http://localhost> and 172.31.2.0

Step 2: Configuring the Firewall

Firewall was configured to allow HTTP traffic:

```
sudo ufw allow 'Apache'
sudo ufw status
```

Observation: HTTP traffic allowed, enabling browser access.

Step 3: Testing Apache

`/etc/hosts` was updated to map a custom domain:

172.31.2.0 webserverlab.com

Accessing <http://webserverlab.com> displayed the default Apache landing page.

Image:

```

jessia@JESSIA: ~
256 sshA256: SUBU11vDc374JH8tppf30Y0M/AxcV/cdMwA/272Ewo root@JESSIA (ECDSA)
Creating SSH2 ED25519 key; this may take some time ...
256 sshA256: rKcb6Gx19YVfx11AwUd1WKS9vQU2/RT2-YBhoZezM root@JESSIA (ED25519)
Created symlink /etc/systemd/system/sockets.target.wants/ssh.socket → /usr/lib/systemd/system/ssh.socket.
Created symlink /etc/systemd/system/ssh.service.requires/ssh.socket → /usr/lib/systemd/system/ssh.socket.
Processing triggers for ufw (0.36.2-6) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
jessia@JESSIA:~$ sudo ufw app list
Available applications:
Apache
Apache Full
Apache Secure
OpenSSH
jessia@JESSIA:~$ sudo ufw allow 'Apache'
Rule added
Rule added (v6)
jessia@JESSIA:~$ sudo ufw status
Status: active

To Action From
--
Apache ALLOW Anywhere
Apache (v6) ALLOW Anywhere (v6)

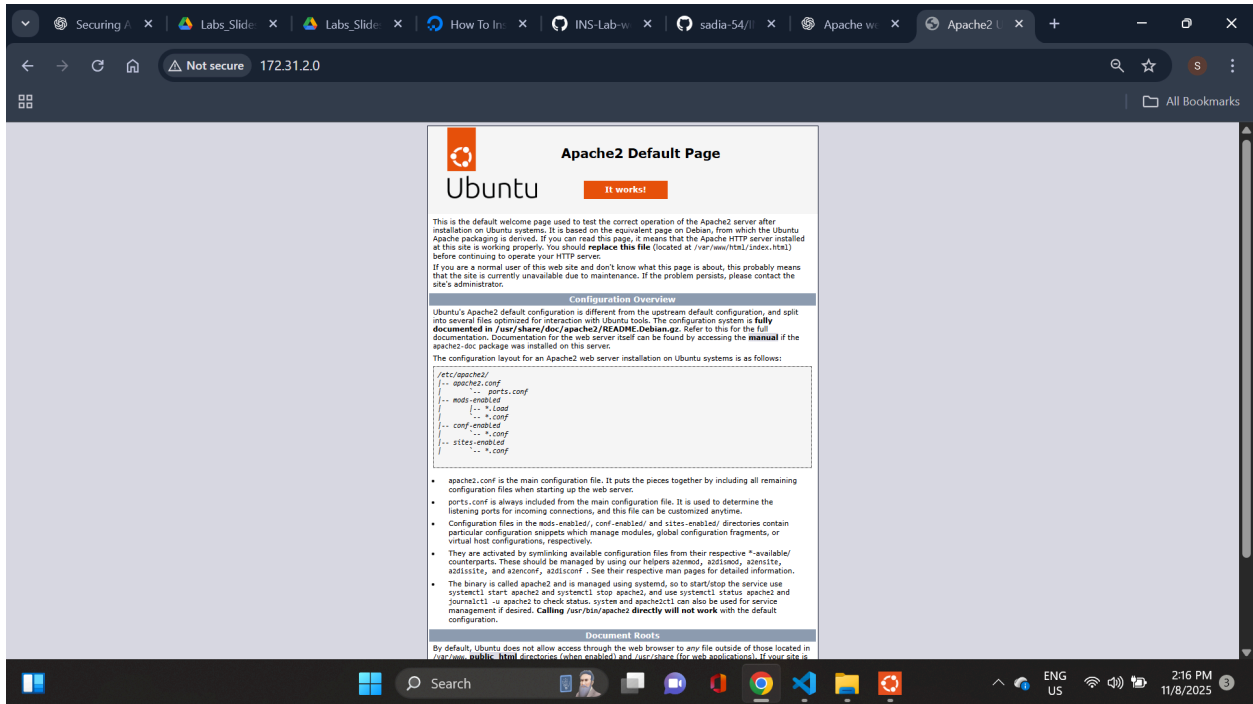
jessia@JESSIA:~$ sudo ufw allow 'OpenSSH'
Rule added
Rule added (v6)
jessia@JESSIA:~$ sudo ufw status
Status: active

To Action From
--
Apache ALLOW Anywhere
OpenSSH ALLOW Anywhere
Apache (v6) ALLOW Anywhere (v6)
OpenSSH (v6) ALLOW Anywhere (v6)

jessia@JESSIA:~$ sudo systemctl status apache2
sudo: systemctl: command not found
jessia@JESSIA:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
Active: active (running) since Sat 2025-11-08 14:03:31 +06; 8min ago
Docs: https://httpd.apache.org/docs/2.4/
Main PID: 1427 (apache2)
Tasks: 35 (limit: 4680)
Memory: 5.5M (peak: 5.9M)
CPU: 107ms
CGroup: /system.slice/apache2.service
├─1427 /usr/sbin/apache2 -k start
├─1429 /usr/sbin/apache2 -k start
└─1430 /usr/sbin/apache2 -k start

Nov 08 14:03:31 JESSIA systemd[1]: Starting apache2.service - The Apache HTTP Server...
Nov 08 14:03:31 JESSIA systemd[1]: Started apache2.service - The Apache HTTP Server.
jessia@JESSIA:~$

```



Checkpoint 1: Apache installation verified successfully.

Task 2: Setting Up Virtual Hosts

Step 1: Directory Structure and Index Pages

example.com

Directories were created:

```
sudo mkdir -p /var/www/example.com/html
sudo chown -R $USER:$USER /var/www/example.com/html
sudo chmod -R 755 /var/www/example.com
```

index.html content:

```
<html>
<head>
<title>Welcome to Example.com!</title>
</head>
```

```
<body>
<h1>Success! The example.com server block is working!</h1>
</body>
</html>
```

Step 2: Virtual Host Configuration

Virtual host configuration for `example.com`:

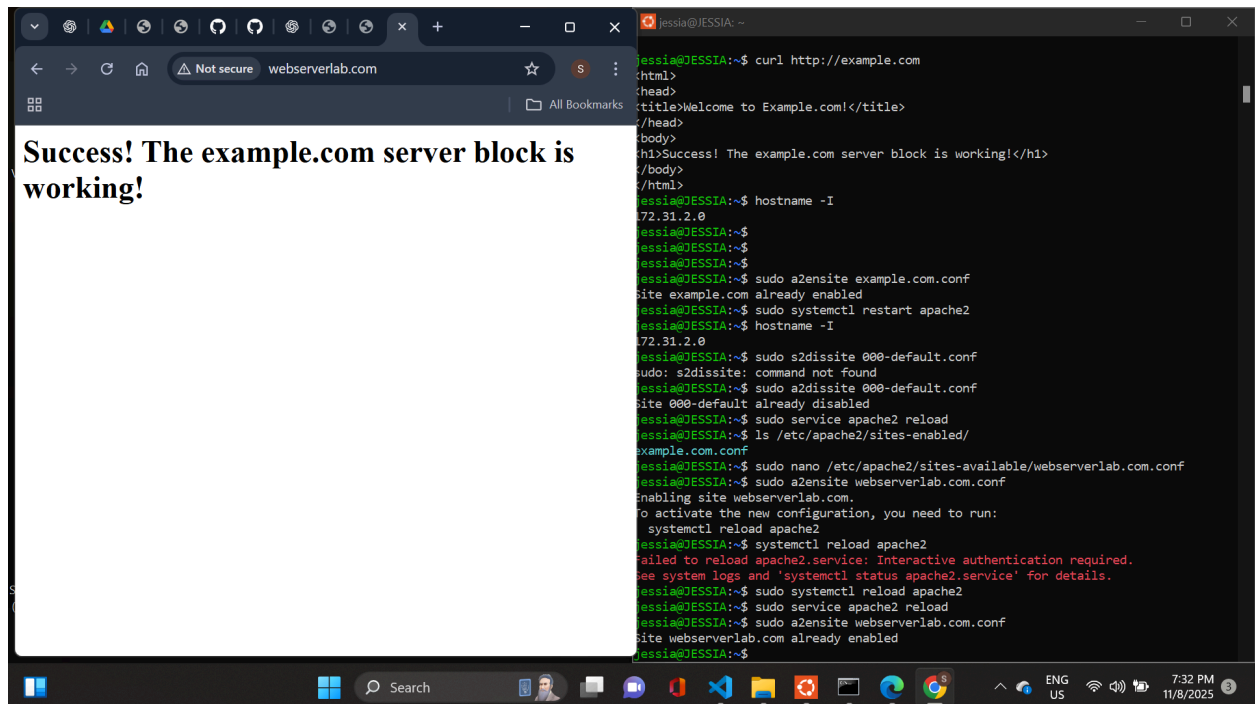
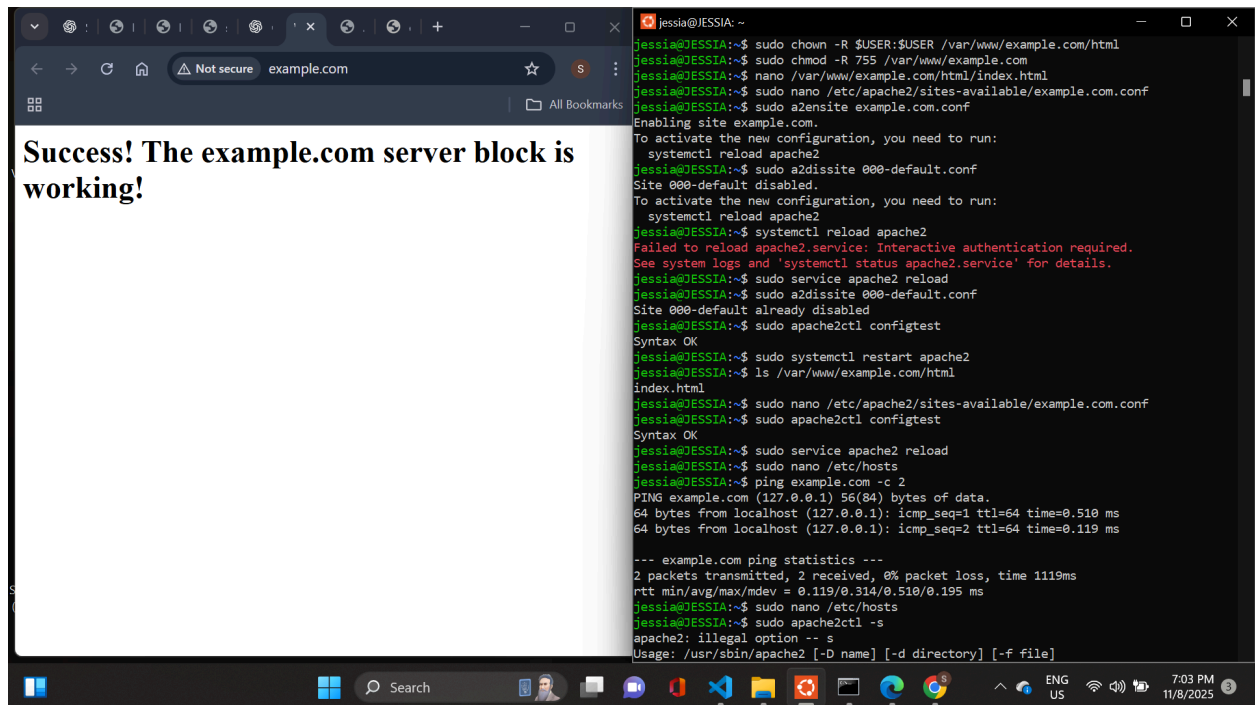
```
<VirtualHost *:80>
ServerAdmin admin@example.com
ServerName example.com
ServerAlias www.example.com
DocumentRoot /var/www/example.com/html
ErrorLog ${APACHE_LOG_DIR}/error.log
CustomLog ${APACHE_LOG_DIR}/access.log combined
</VirtualHost>
```

Commands to enable site and reload Apache:

```
sudo a2ensite example.com.conf
sudo a2dissite 000-default.conf
sudo systemctl restart apache2
sudo apache2ctl configtest
# Syntax OK
```

Observation: Accessing `http://example.com` displayed the correct content.

Image:



Step 3: Multiple Virtual Hosts

anotherhost.com

Directories and permissions:

```
sudo mkdir -p /var/www/anothervhost.com/html
sudo chown -R $USER:$USER /var/www/anothervhost.com/html
sudo chmod -R 755 /var/www/anothervhost.com
```

index.html:

```
<html>
<head>
<title>Another Virtual Host</title>
</head>
<body>
<h1>Welcome to anothervhost.com!</h1>
<p>This is a different site from example.com.</p>
</body>
</html>
```

Virtual host configuration:

```
<VirtualHost *:80>
ServerAdmin admin@anothervhost.com
ServerName anothervhost.com
ServerAlias www.anothervhost.com
DocumentRoot /var/www/anothervhost.com/html
ErrorLog ${APACHE_LOG_DIR}/anothervhost_error.log
CustomLog ${APACHE_LOG_DIR}/anothervhost_access.log combined
</VirtualHost>
```

Enable site and reload Apache:

```
sudo a2ensite anothervhost.com.conf
sudo service apache2 reload
```

/etc/hosts entries:

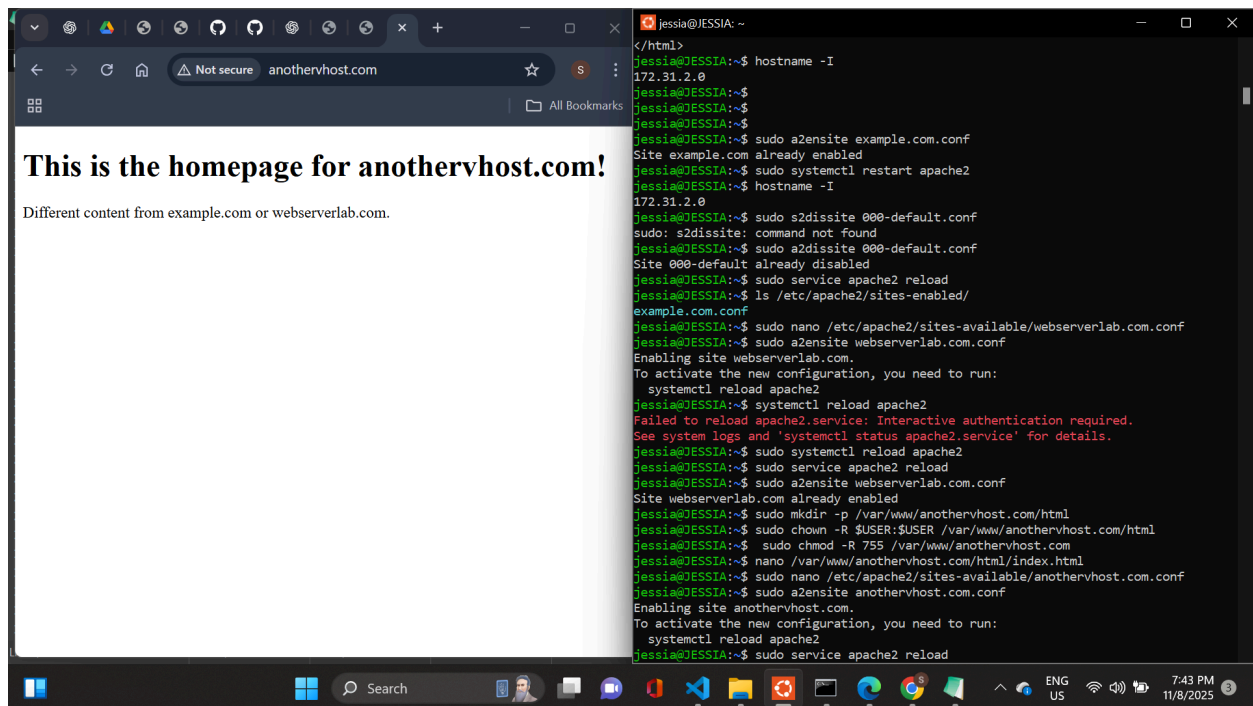
```
172.31.2.0 example.com
172.31.2.0 anothervhost.com
```

172.31.2.0 webserverlab.com

Observation:

- <http://example.com> → Example.com content
- <http://anothervhost.com> → Another Virtual Host content

Image:



Checkpoint 4: Multiple virtual hosts working successfully.

Task 3: Hosting Dynamic Websites (HTML + JavaScript)

Dynamic Site 1 — dynsite1.com

Directory setup:

```
sudo mkdir -p /var/www/dynsite1.com/html
```

```
sudo chown -R $USER:$USER /var/www/dynsite1.com/html
sudo chmod -R 755 /var/www/dynsite1.com
```

index.html:

```
<!DOCTYPE html>
<html>
<head>
<title>Dynamic Site 1</title>
<script>
function handleForm(event) {
    event.preventDefault();
    var name = document.getElementById('name').value;
    var age = document.getElementById('age').value;
    alert('Hello ' + name + '! You are ' + age + ' years old.');
```

```
}
```

```
</script>
```

```
</head>
```

```
<body>
```

```
<h1>Welcome to Dynamic Site 1</h1>
```

```
<form onsubmit="handleForm(event)">
```

```
Name: <input type="text" id="name" required><br><br>
```

```
Age: <input type="number" id="age" required><br><br>
```

```
<input type="submit" value="Submit">
```

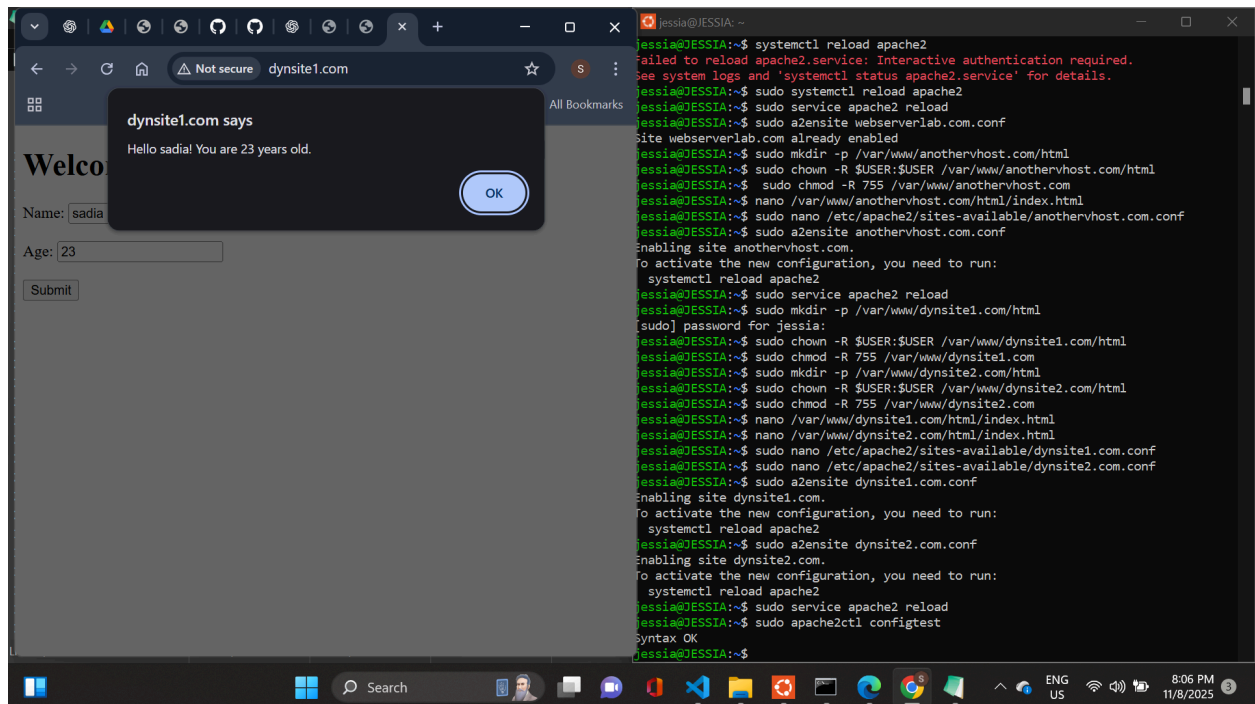
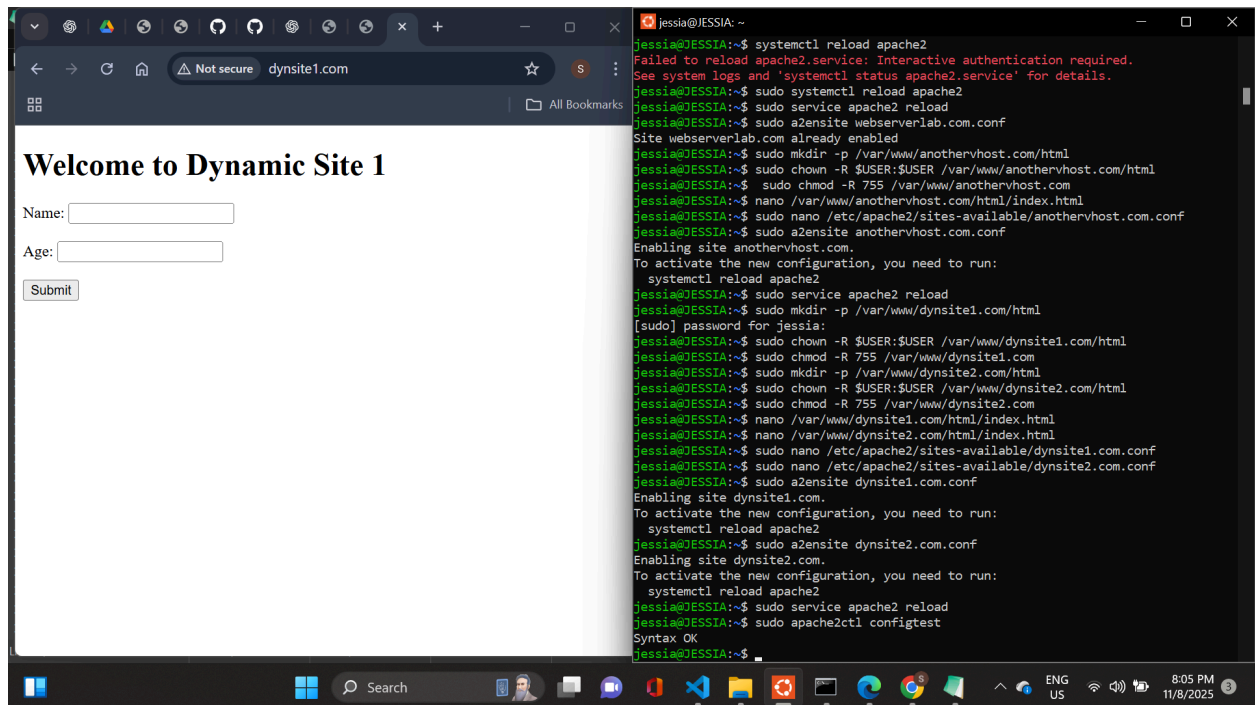
```
</form>
```

```
</body>
```

```
</html>
```

Observation: Form inputs displayed an alert with the correct values.

Image:



Dynamic Site 2 — dynsite2.com

Directory setup:

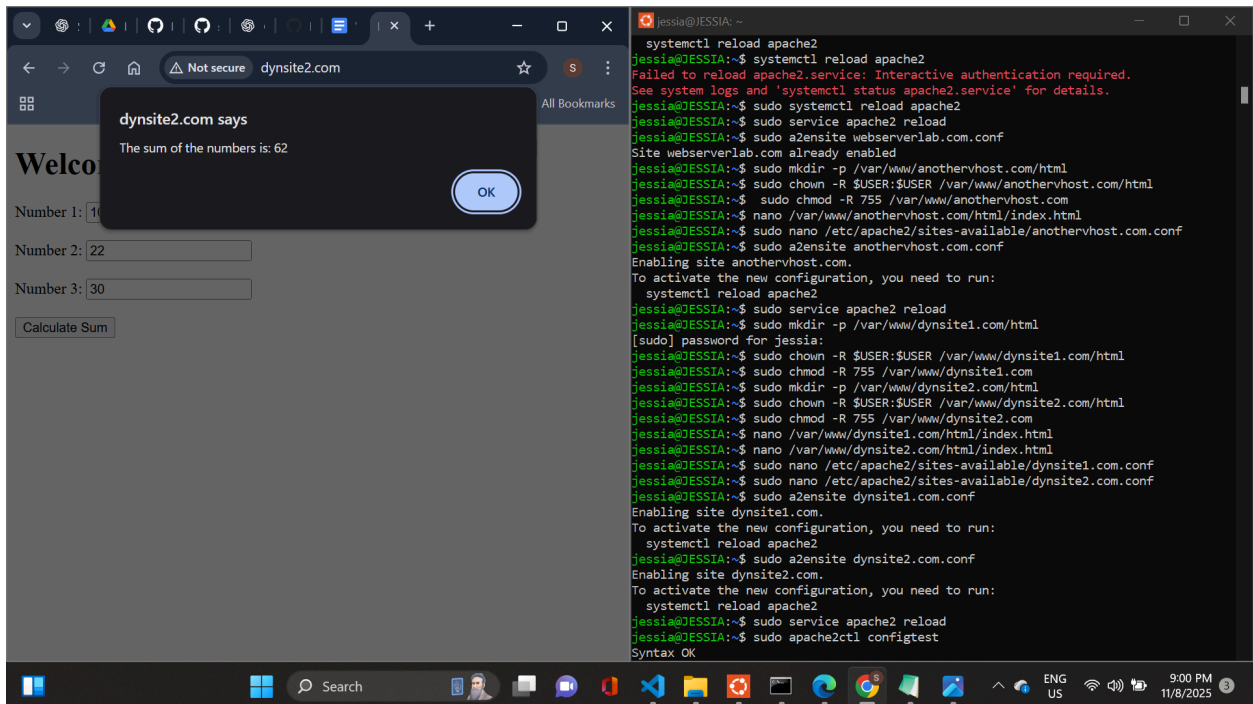
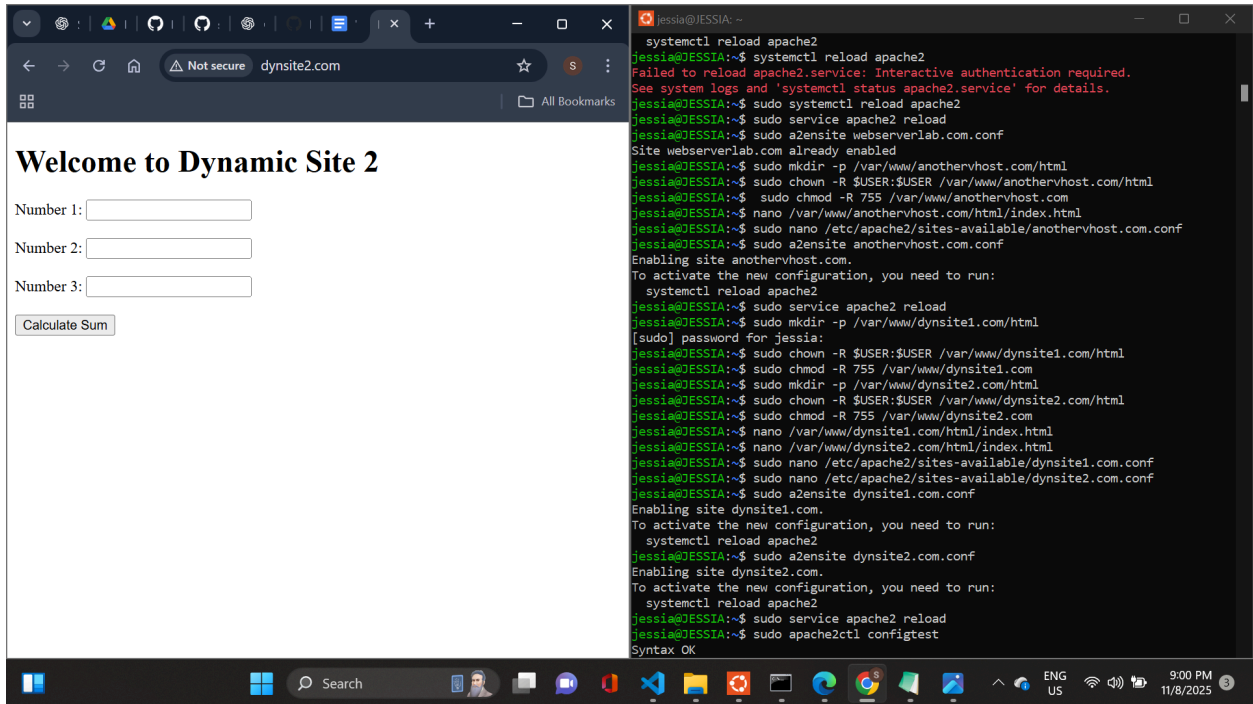
```
sudo mkdir -p /var/www/dynsite2.com/html
sudo chown -R $USER:$USER /var/www/dynsite2.com/html
sudo chmod -R 755 /var/www/dynsite2.com
```

index.html:

```
<!DOCTYPE html>
<html>
<head>
<title>Dynamic Site 2</title>
<script>
function calculateSum(event) {
    event.preventDefault();
    var num1 = parseFloat(document.getElementById('num1').value);
    var num2 = parseFloat(document.getElementById('num2').value);
    var num3 = parseFloat(document.getElementById('num3').value);
    var sum = num1 + num2 + num3;
    alert('The sum of the numbers is: ' + sum);
}
</script>
</head>
<body>
<h1>Welcome to Dynamic Site 2</h1>
<form onsubmit="calculateSum(event)">
Number 1: <input type="number" id="num1" required><br><br>
Number 2: <input type="number" id="num2" required><br><br>
Number 3: <input type="number" id="num3" required><br><br>
<input type="submit" value="Calculate Sum">
</form>
</body>
</html>
```

Observation: Form correctly calculated and displayed the sum.

Image:



Checkpoint 5: Two dynamic websites deployed successfully.

Apache File Structure & Directories

Directory/File	Description
<code>/var/www/html</code>	Default web content
<code>/var/www/example.com/html</code>	Example.com content
<code>/var/www/anotherhost.com/html</code>	Another VHost content
<code>/var/www/dynsite1.com/html</code>	Dynamic site 1 content
<code>/var/www/dynsite2.com/html</code>	Dynamic site 2 content
<code>/etc/apache2/apache2.conf</code>	Main Apache configuration
<code>/etc/apache2/ports.conf</code>	Apache ports configuration
<code>/etc/apache2/sites-available/</code>	Virtual host configuration files
<code>/etc/apache2/sites-enabled/</code>	Enabled virtual host symlinks
<code>/etc/apache2/mods-available/</code>	Available Apache modules
<code>/etc/apache2/mods-enabled/</code>	Enabled modules
<code>/var/log/apache2/access.log</code>	Access logs
<code>/var/log/apache2/error.log</code>	Error logs