Task-1: Apache Web Server Setup

1.Apache install (`sudo apt install apache2`)
2.Firewall configure (`sudo ufw allow 'Apache'`):

What is a Firewall?

- A firewall is like a **security guard** at your computer's door
- It blocks all incoming connections by default
- Only specifically allowed services can be accessed from outside

What `sudo ufw allow 'Apache'` does:

With this command, you're telling the firewall:

- Allow **Port 80** (HTTP traffic)
- So that external people can view your website through a browser

In your case:

Your firewall is **inactive** (`Status: inactive`), so:

- **You won't have any problems**
- The firewall isn't imposing any restrictions
- All connections are automatically allowed

For the lab:

Since the firewall is inactive, you **can skip this step for now**. But if you want to follow the lab instructions exactly, you can run:

bash
- sudo ufw allow 'Apache'

sudo ufw enable

But remember: If you do `ufw enable`, the firewall will become active and only allowed services will work.

Recommendation: Don't enable the firewall right now for the lab. You can do it later when you need external access.

After this:
Inside File we have to add these after hit into bash (sudo nano etc/hosts):

127.0.0.1 localhost
127.0.0.1 webserverlab.com
127.0.0.1 example.com
127.0.0.1 anothervhost.com

hese lines create **fake domain names** that point to your own computer.

What they do:

- When you type `webserverlab.com` in your browser, it redirects to `127.0.0.1` (your own computer)
- When you type `example.com` in your browser, it redirects to `127.0.0.1` (your own computer)
- Same for `anothervhost.com`

Why we need this for the lab:

1. **Testing without internet:** You can test websites without buying real domains
2. **Multiple websites on one server:** You can host multiple "different" websites on your single Apache server
3. **Local development:** Everything works on your local machine without needing real web hosting

Real life example:

It's like having multiple **business cards** for the same person:

- One card says "Web Developer - webserverlab.com"
- Another says "Example Company - example.com"
- But both point to the SAME person (your computer)

How it works in the lab:

- You'll create separate folders for each domain
- Apache will show different websites for each domain
- Even though all domains point to the same computer, Apache knows which website to show based on the domain name

Without these lines:

If you type `webserverlab.com` in browser, it would try to find the **real website** on the internet and show "Site not found" error.

With these lines:

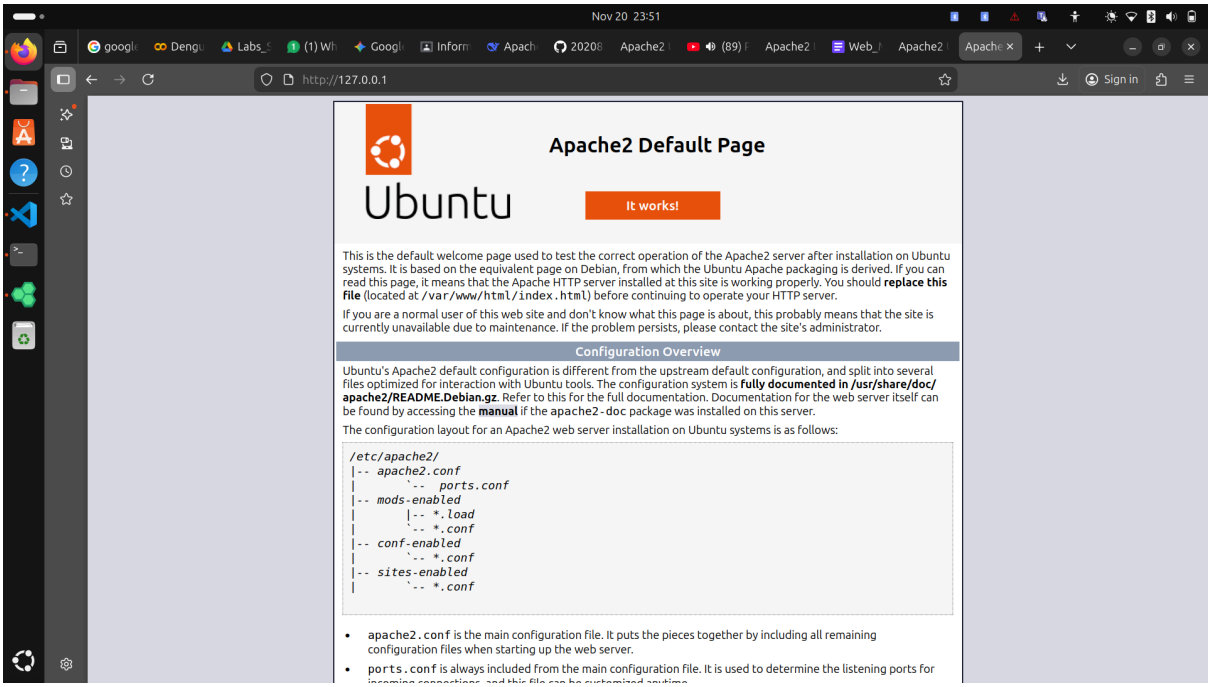
When you type `webserverlab.com`, your computer says "I know this one!" and shows your local Apache website.

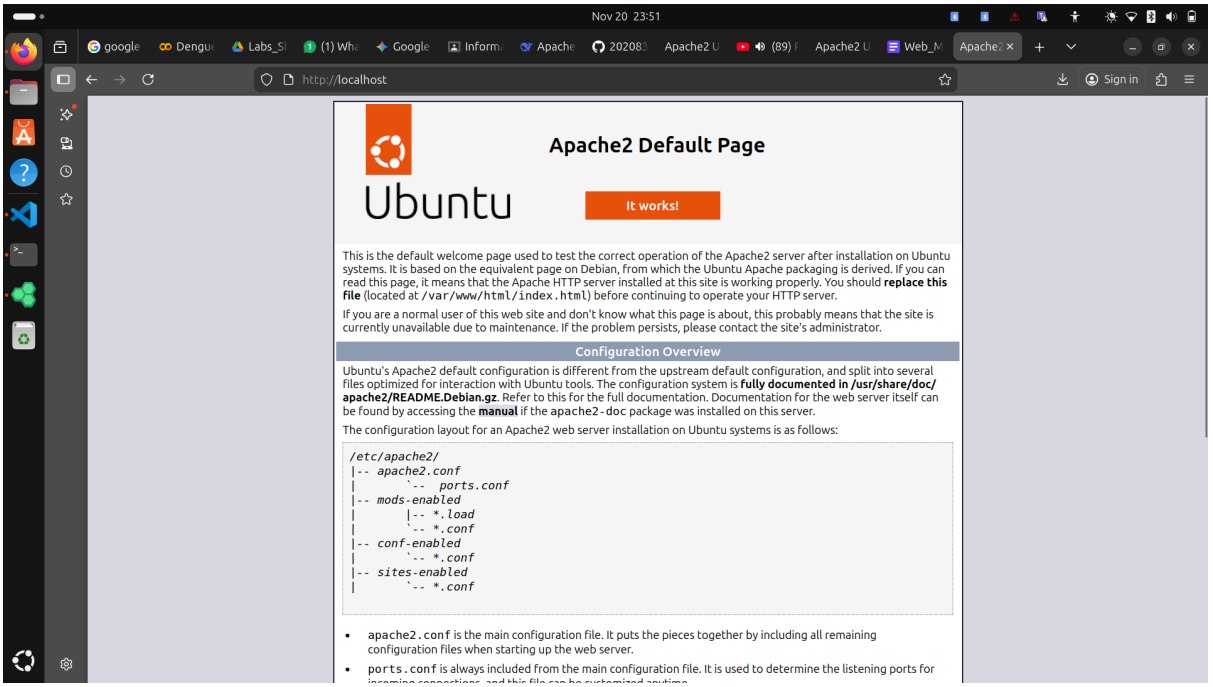
Then save(ctrl+x -> y -> enter)
Try in browser:

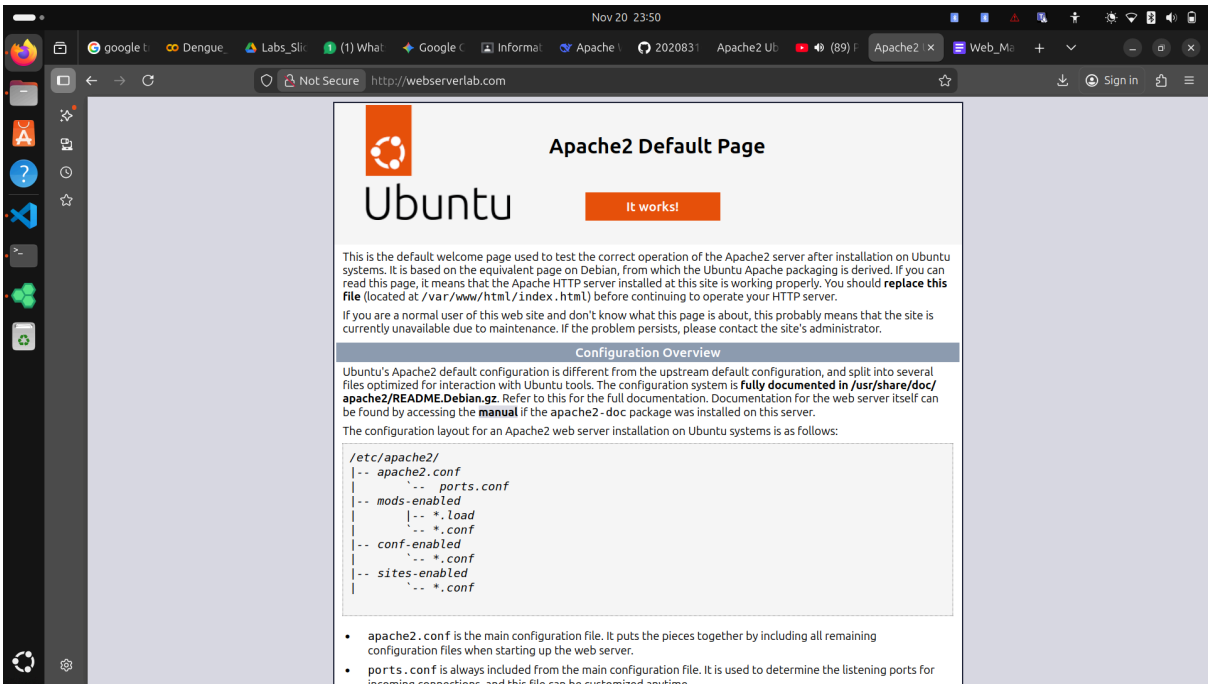
- `http://localhost`
- `http://webserverlab.com`
- `http://127.0.0.1`

Now in browser we can see the page of apache web server
3.To show the page of apache hit Browser `http://webserverlab.com` or `http://localhost`

We can check it by ping webserverlab.com







Task-2: Virtual Host Setup

Step-1: Single Virtual Host

A. Directory Structure Creation:

```
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
```

B. HTML Content Creation:

```
<html>
<head>
    <title>Welcome to Example.com!</title>
</head>
<body>
    <h1>Success! The example.com server block is working!</h1>
</body>
</html>
```

B. Virtual host configuration file create (sudo nano/etc/apache2/sites-available/example.com.conf)

C. Inside the file :

```
<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>
```

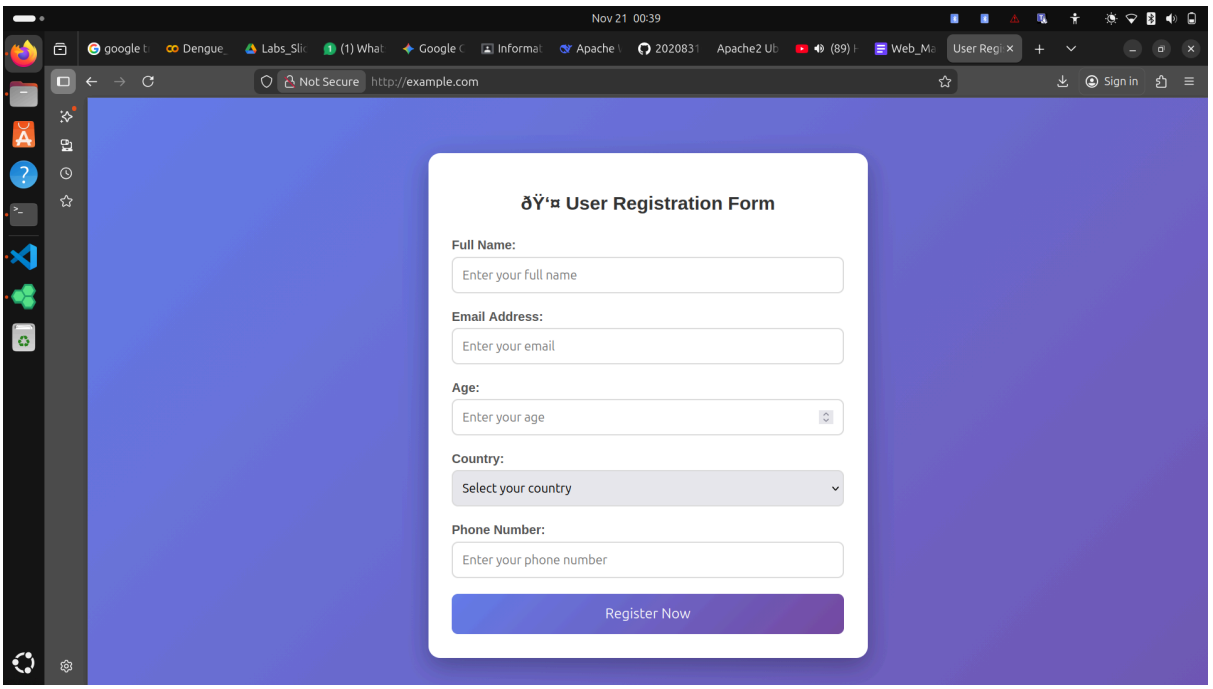
C.Save and exit

D.Enable the file (sudo a2ensite example.com.conf)

E.Default site disable (sudo a2dissite 000-default.conf)

F.Configuration test (**Syntax OK)**

G.Test in browser (http://example.com)



Step-2: Default Site Behavior Testing

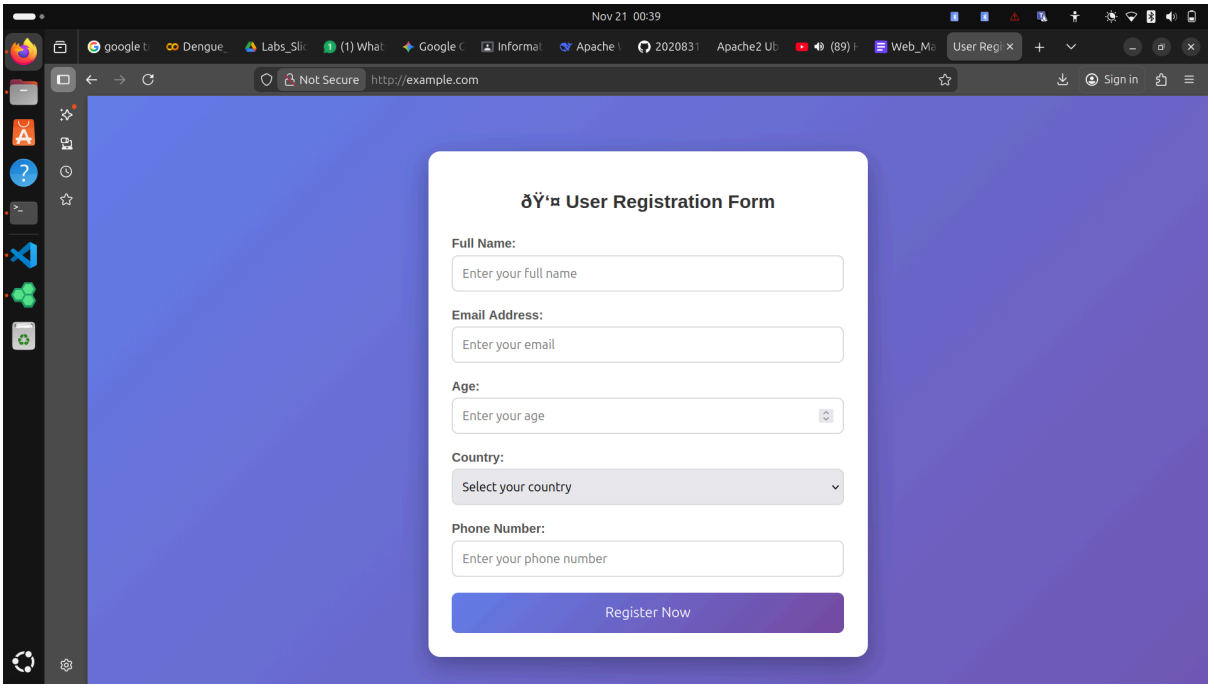
Commands Executed:

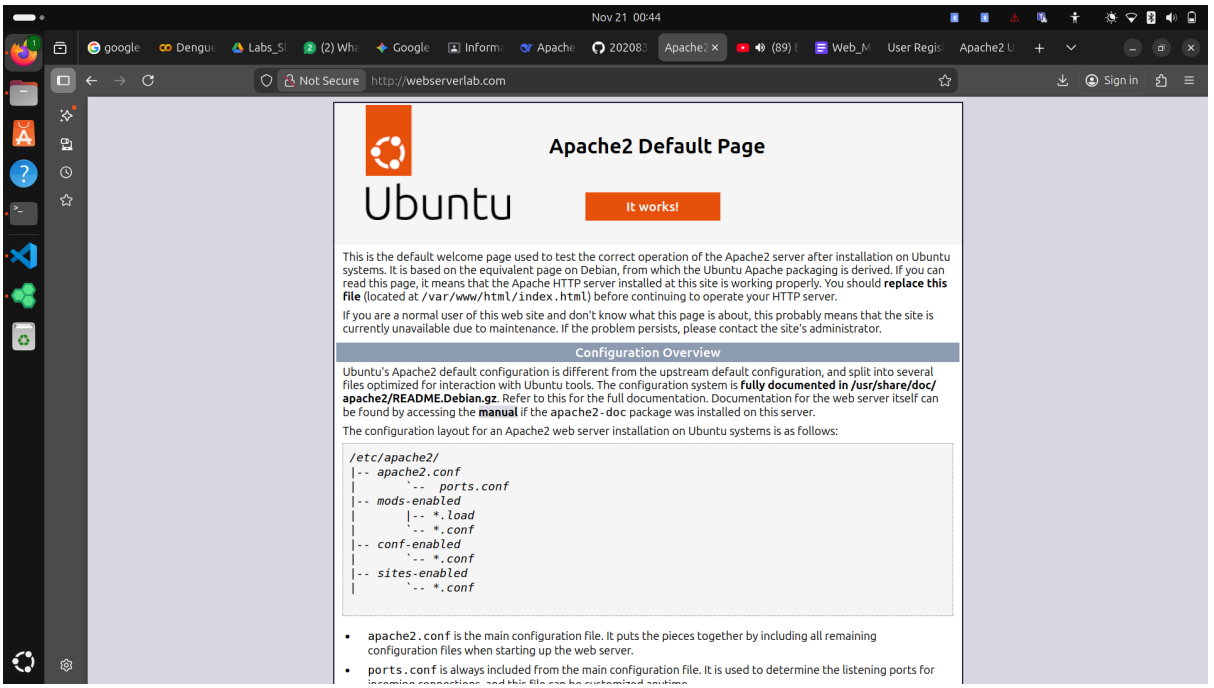
bash

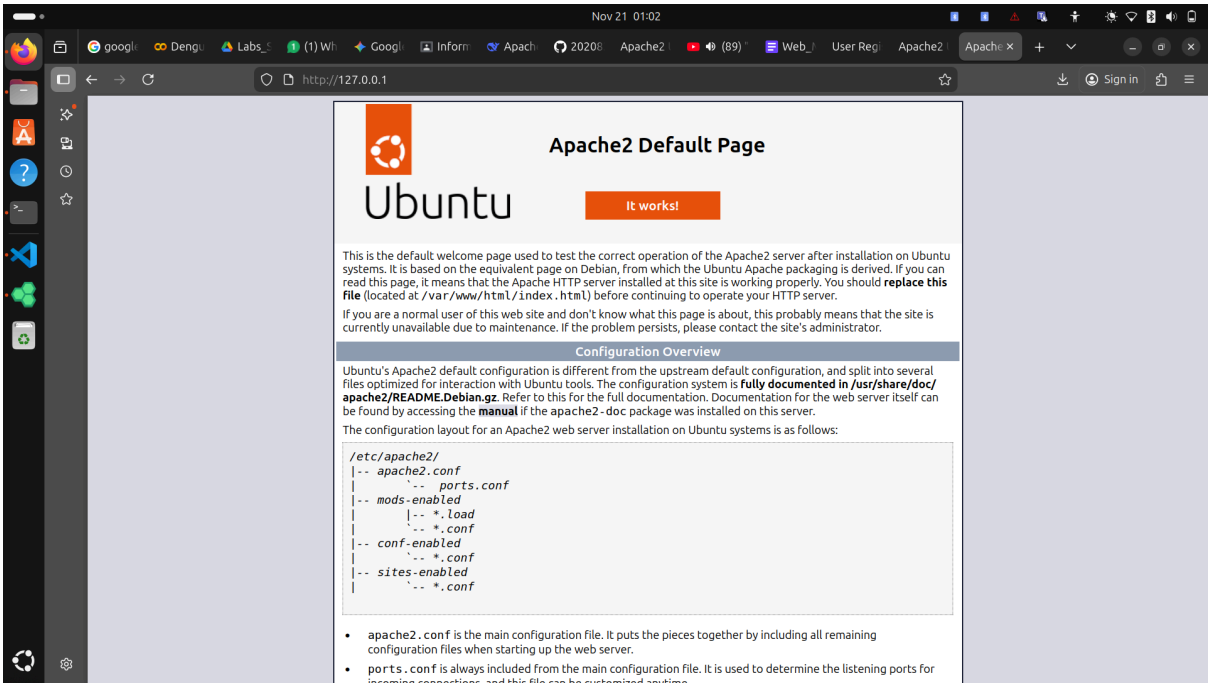
```
sudo a2ensite example.com.conf
sudo systemctl restart apache2
```

Observations:

- http://example.com → Showed custom example.com page
- http://webserverlab.com → Showed Apache default page
- http://127.0.0.1 → Showed Apache default page







Explanation:

- Only example.com.conf was enabled
- Other domains (webserverlab.com, 127.0.0.1) had no specific virtual host
- Apache fell back to default virtual host behavior
- Demonstrates Apache's domain-based virtual host routing

আমার **case-এ** example.com **virtual host** টি **first enabled site** হওয়ায় সেটা **default virtual host** হয়ে গেছে। যে কোনো **unmatched domain request automatically** example.com**-এ redirect** হচ্ছে। এটা **fix** করতে আমাদের প্রতিটি **domain-এর** জন্য **explicit virtual host configuration** করতে হবে।**"**

Step-3 - Multiple Virtual Hosts Configuration

Objective

To configure multiple virtual hosts on a single Apache web server, demonstrating the ability to host multiple independent websites with separate content and domains.

Steps Performed

1. Directory Structure Creation

bash

Created directory structure for second virtual host

sudo mkdir -p /var/www/anothervhost.com/html

 # Set proper ownership

sudo chown -R $USER:$USER /var/www/anothervhost.com/html

Set appropriate permissions

sudo chmod -R 755 /var/www/anothervhost.com

2. HTML Content Creation

Created `/var/www/anothervhost.com/html/index.html` with unique content:

File Content:

```
html

<!DOCTYPE html>

<html>

<head>

    <title>Welcome to AnotherVHost.com!</title>

    <style>

        body {

                font-family: Arial, sans-serif;

            background-color: #e6f7ff;

            margin: 50px;

        }
```

```
        .container {
            background: white;
            padding: 30px;
            border-radius: 10px;
            box-shadow: 0 0 10px rgba(0,0,0,0.1);
        }
        h1 {
            color: #ff6600;
        }
    </style>
</head>
<body>
    <div class="container">
        <h1>🎉 Success! AnotherVHost.com is Working!</h1>
        <p>This is the <strong>second virtual host</strong> on our Apache server.</p>
            <p>We are successfully hosting multiple websites on the same server!</p>
        <hr>
        <p><strong>Domain:</strong> anothervhost.com</p>
        <p><strong>Server:</strong> Apache Virtual Host</p>
        <p><strong>Status:</strong> ✅ Active and Running</p>
    </div>
</body>
```

</html>

3. Virtual Host Configuration

Created `/etc/apache2/sites-available/anothervhost.com.conf`:

Configuration File Content:

apache

<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>

4. Virtual Host Activation

bash

Enable the new virtual host

sudo a2ensite anothervhost.com.conf

Restart Apache to apply changes

sudo systemctl restart apache2

5. Domain Mapping

Updated `/etc/hosts` file with:

text

127.0.0.1 localhost

127.0.0.1 webserverlab.com

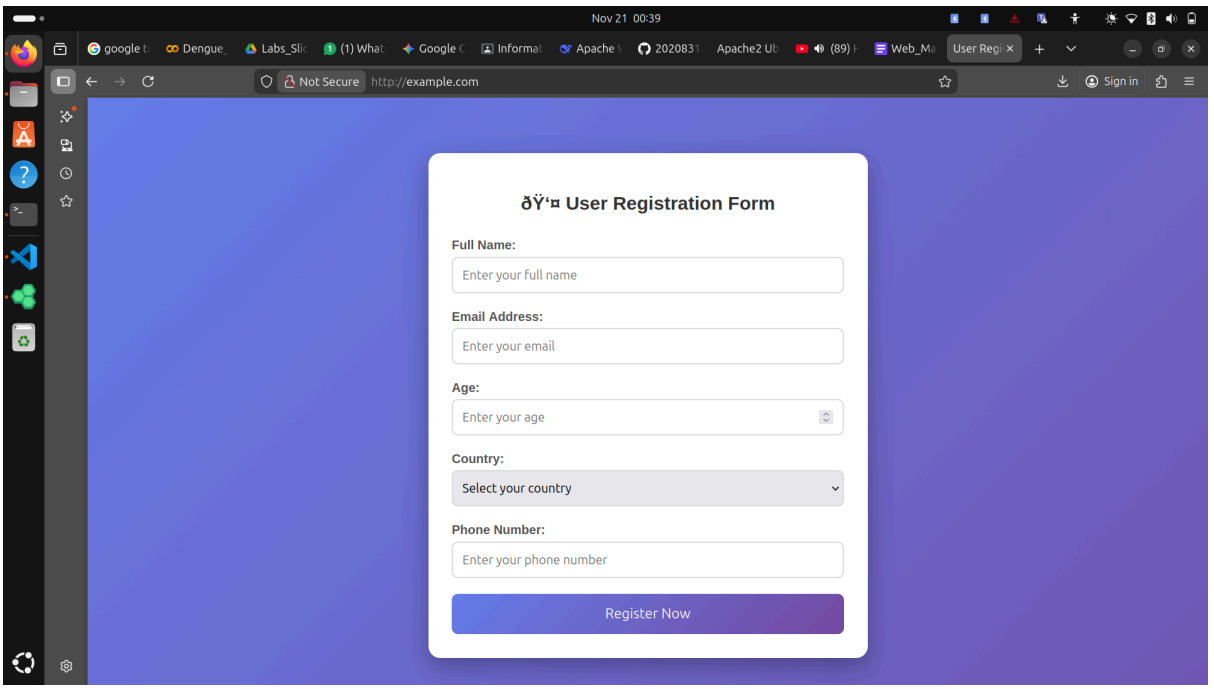
127.0.0.1 example.com

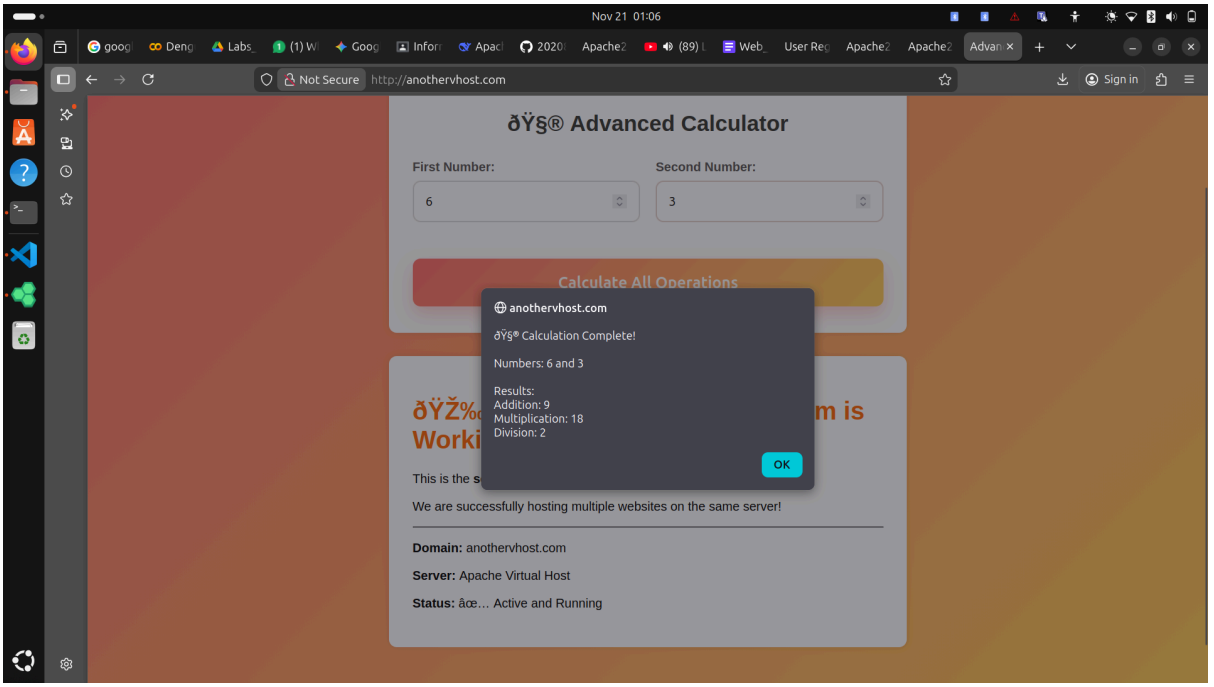
127.0.0.1 anothervhost.com

Testing & Verification

Test 1: Individual Domain Access

- http://example.com ✅ - Displayed custom example.com page
- http://anothervhost.com ✅ - Displayed custom anothervhost.com page





Test 2: Simultaneous Operation

Both websites running concurrently on the same Apache instance:

- Different designs and styling
- Separate content and branding
- Independent domain names
- Shared server resources

Test 3: Configuration Validation

bash

Verified configuration syntax

sudo apache2ctl configtest

Output: Syntax OK

Checked enabled sites

ls -la /etc/apache2/sites-enabled/

Output: example.com.conf & anothervhost.com.conf both present

---

Technical Details

Directory Structure:

text

/var/www/

├── example.com/

│ └── html/

│ └── index.html

└── anothervhost.com/

└── html/

└── index.html

Configuration Files:

- `/etc/apache2/sites-available/example.com.conf`
- `/etc/apache2/sites-available/anothervhost.com.conf`

Enabled Sites:

`example.com.conf` → **Symbolic link in sites-enabled**
`anothervhost.com.conf` → **Symbolic link in sites-enabled**

Task-3 - Dynamic Website Deployment with HTML & JavaScript

Objective

To deploy two dynamic websites using HTML forms and JavaScript for client-side form handling and data processing, demonstrating interactive web applications without server-side programming.

Implementation Details

Website 1: User Registration System (example.com)

Location:

`/var/www/example.com/html/index.html`

Features Implemented:

1. Comprehensive Registration Form with 5 input fields:
    - Full Name (Text input)
    - Email Address (Email validation)
    - Age (Number input with range 18-100)
    - Country (Dropdown selection)
    - Phone Number (Telephone input)
2. JavaScript Functionality:
    - Form submission handling with `event.preventDefault()`
    - Input validation
    - Dynamic result display
    - Automatic form reset
    - Alert notifications
3. CSS Styling:
    - Gradient background
    - Modern card layout
    - Responsive design
    - Hover effects and animations

Code Structure:

html

```
<form id="registrationForm">
    <!-- Form fields -->
</form>
```

<script>

```
    document.getElementById('registrationForm').addEventListener('submit', function(event) {
        // Form handling logic
        // Data processing
        // Result display
    });
</script>
```

Website 2: Advanced Calculator (anothervhost.com)

Location:

`/var/www/anothervhost.com/html/index.html`

Features Implemented:

1. **Mathematical Operations:**
    - Addition
    - Subtraction
    - Multiplication
    - Division
    - Modulus
    - Power Calculation
    - Square Root
2. JavaScript Functionality:
    - Multiple calculation functions
    - Input validation
    - Dynamic result generation
    - Error handling (division by zero)
    - Keyboard support (Enter key)
3. CSS Styling:
    - Orange gradient theme
    - Grid layout for inputs
    - Card-based result display
    - Interactive animations

Code Structure:

```
html
<div class="calculator-grid">
    <!-- Input fields -->
</div>
<button onclick="performAllCalculations()">Calculate</button>


<script>
    function performAllCalculations() {
        // Get input values
        // Perform calculations
        // Display results
    }
</script>
```

Technical Implementation

HTML Forms Used:

```
html
<!-- Text Input -->
<input type="text" id="fullName" required>


<!-- Email Input -->
<input type="email" id="email" required>
```

```
<!-- Number Input -->
<input type="number" id="age" min="18" max="100" required>

<!-- Dropdown Selection -->
<select id="country" required>
    <option value="bd">Bangladesh</option>
</select>

<!-- Telephone Input -->
<input type="tel" id="phone" required>
```

JavaScript Event Handling:

```
javascript
// Event Listener Approach
document.getElementById('registrationForm').addEventListener('submit',
function(event) {
        event.preventDefault();
    // Process form data
});

// Inline Event Handler Approach
<button onclick="performAllCalculations()">Calculate</button>
```

DOM Manipulation:

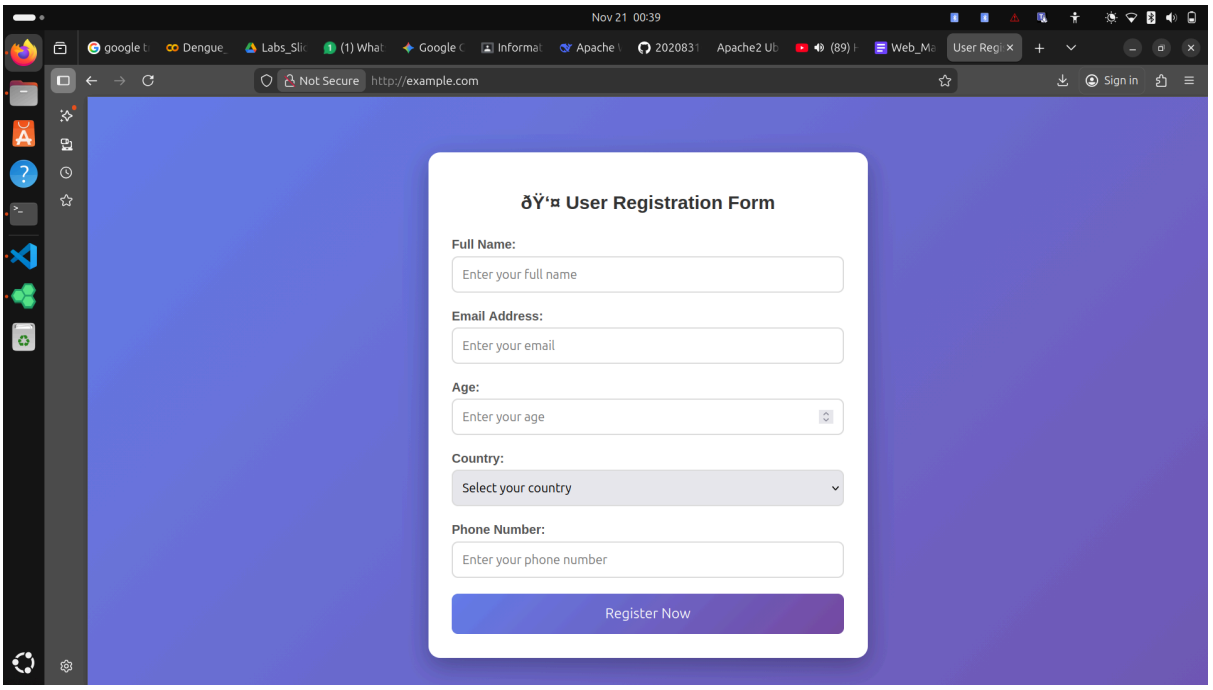
```
javascript
// Showing results dynamically
```

```
resultDiv.innerHTML = `
    <h3>🎉 Registration Successful!</h3>
    <p><strong>Name:</strong> ${fullName}</p>
`;

// Display control
resultSection.style.display = 'block';
```

Testing & Verification

Test 1: User Registration System (example.com)



Steps:

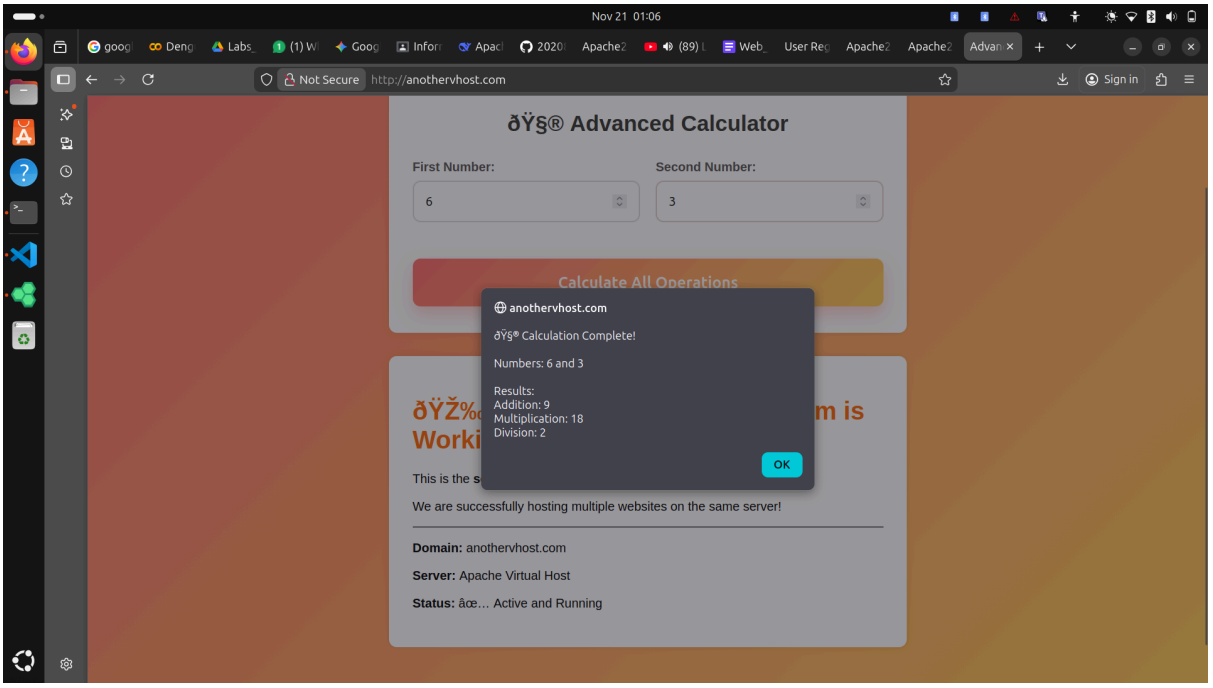
1. Accessed `http://example.com`
2. Filled all form fields:
    - Name: "John Doe"
    - Email: "john@example.com"
    - Age: 25

- Country: Bangladesh
- Phone: "+8801712345678"

Results:

✅ JavaScript Alert showed registration details
✅ Dynamic Result Display on page with all information
✅ Form Validation worked for empty fields
✅ Automatic Reset after 5 seconds

Test 2: Advanced Calculator (anothervhost.com)



Steps:

1. Accessed `http://anothervhost.com`
2. Entered numbers: 15 and 3
3. Clicked "Calculate All Operations"

Results:
✅ All Mathematical Operations calculated correctly:

- Addition: 18
- Subtraction: 12
- Multiplication: 45
- Division: 5
- Modulus: 0
- Power: 3375

- Square Root: 4.2426

✅ Results Displayed in organized layout
✅ Error Handling for division by zero
✅ Keyboard Support with Enter key

Key Features Demonstrated

1. Client-Side Processing

- No server-side programming required
- All processing done in browser using JavaScript
- Immediate feedback to users

2. Form Handling

- Input validation
- Data collection and processing
- User-friendly error messages

3. Dynamic Content

- Real-time result updates
- DOM manipulation without page reload
- Interactive user experience

4. Cross-Browser Compatibility

- Standard HTML5 form elements
- Vanilla JavaScript (no frameworks)
- Responsive CSS design