Web Lab Report — Apache Web Server

Objective:

To install and configure Apache Web Server on Ubuntu, create and manage multiple virtual hosts, and understand how hostname resolution works using the **/etc/hosts** file.

Checkpoint-1: Apache Installation and Default Page

Step 1.1 – Install Apache

```
sudo apt update
```

```
sudo apt install apache2 -y
```

Step 1.2 – Allow Apache Through Firewall

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

```
sudo ufw status
```

Step 1.3 – Verify Apache Service

```
sudo systemctl status apache2
```

Confirm it shows **active (running)**.

Step 1.4 – Add Local Domain

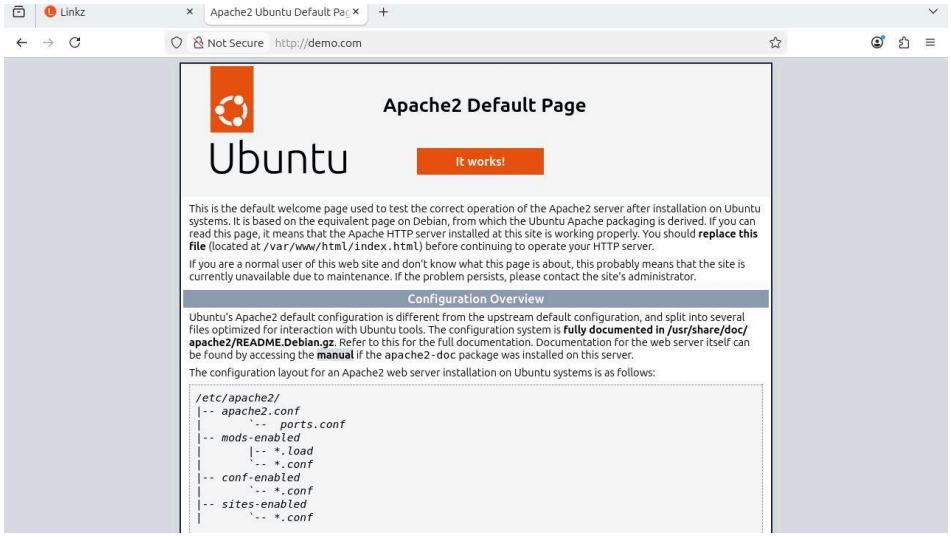
Edit **/etc/hosts** and add:

```
127.0.0.1   localhost demo.com
```

Step 1.5 – Test in Browser

Visit: http://demo.com

Apache2 Ubuntu Default Page. is seen



Checkpoint-2: Create and Configure First Virtual Host (example.com)

Step 2.1 – Create Directory Structure and Provide Privilege for Ownership and Execution

```
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
```

Step 2.2 – Create Website Content

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

```
<html>
  <head><title>Welcome to Example.com!</title></head>
  <body><h1>Success! example.com virtual host is working!</h1></body>
```

```
</html>
```

Step 2.3 – Create Virtual Host Config

```
sudo nano /etc/apache2/sites-available/example.com.conf
```

```
<VirtualHost *:80>
    ServerAdmin admin@example.com
    ServerName example.com
    ServerAlias www.example.com
    DocumentRoot /var/www/example.com/html

    ErrorLog ${APACHE_LOG_DIR}/example_error.log
    CustomLog ${APACHE_LOG_DIR}/example_access.log combined
</VirtualHost>
```

Step 2.4 – Enable Site and Disable Default

```
sudo a2ensite example.com.conf
```

```
sudo a2dissite 000-default.conf
```

```
sudo systemctl restart apache2
```

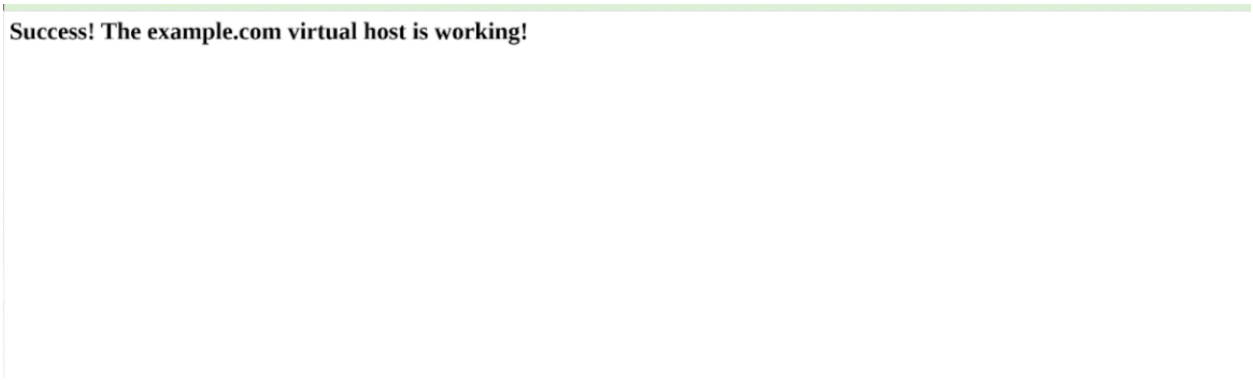
Step 2.5 – Update /etc/hosts

```
127.0.0.1   localhost webserverlab.com example.com
```

Step 2.6 – Test Site

Visit:

http://example.com



Checkpoint-3: Observing Default Host Behavior

Now visit:

http://demo.com
http://127.0.0.1

Both URLs will load the same content as example.com.

Reason:
When 000-default.conf is disabled, Apache treats whichever virtual host appears first among the enabled sites as the default for handling requests that don't match any specific host

Checkpoint-4: Creating a Second Virtual Host (alternative.com)

Step 4.1 – Create Directory Structure and Provide Privilege for Ownership and Execution

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

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

```
sudo chmod -R 755 /var/www/alternative.com
```

Step 4.2 – Create HTML Content

```
nano /var/www/alternative.com/html/index.html
```

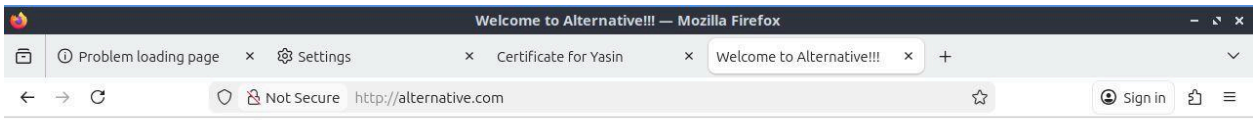
```
<html>
  <head><title>Welcome to Alternative!!</title></head>
  <body><h1>This is alternative host site.</h1></body>
</html>
```

Step 4.3 – Create Configuration File

```
sudo nano /etc/apache2/sites-available/alternative.com.conf
```

```
<VirtualHost *:80>
    ServerAdmin admin@alternative.com
    ServerName alternative.com
    ServerAlias www.alternative.com
    DocumentRoot /var/www/alternative.com/html

    ErrorLog ${APACHE_LOG_DIR}/another_error.log
    CustomLog ${APACHE_LOG_DIR}/another_access.log combined
</VirtualHost>
```



Step 4.4 – Enable Site and Restart Apache

```
sudo a2ensite alternative.com.conf
```

```
sudo apache2ctl configtest
```

```
sudo systemctl restart apache2
```

Step 4.5 – Update Hosts File

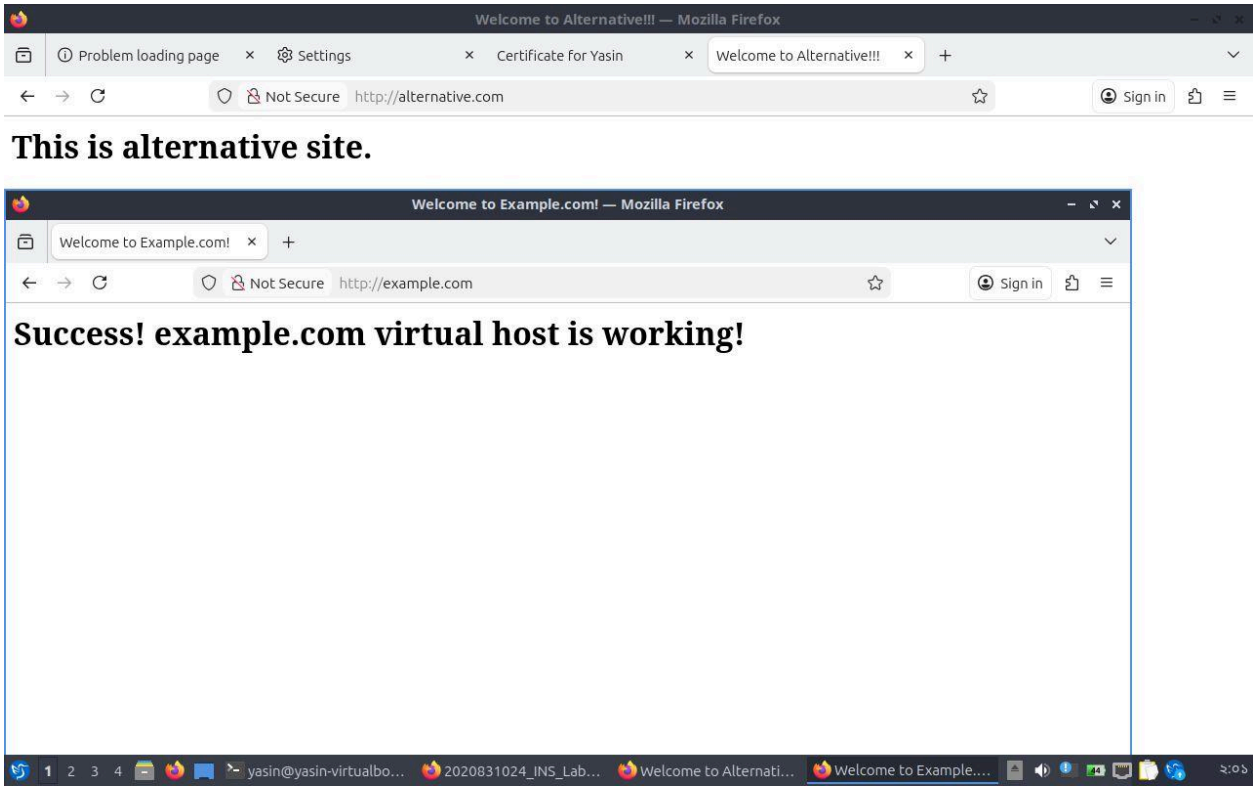
```
127.0.0.1   localhost demo.com example.com alternative.com
```

Step 4.6 – Test Both Sites

Visit:

http://example.com
http://alternative.com

Each should load its own distinct page.



Checkpoint-5: Hosting Two Dynamic JavaScript-Based Websites

Step 5.1 – Verify Existing Virtual Hosts

Ensure both virtual hosts are already configured and working:

```
sudo a2ensite example.com.conf
```

```
sudo a2ensite alternative.com.conf
```

```
sudo systemctl restart apache2
```

Verify in /etc/hosts:

```
127.0.0.1   localhost demo.com example.com alternative.com
```

Step 5.2 – Dynamic Website 1: example.com (Simple Calculator)

a. Create/Replace HTML file

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

Paste the following:

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8" />
    <title>Example.com - Simple Calculator</title>
  </head>
  <body>
    <h1>Simple Addition Calculator</h1>
    <form id="calcForm">
      <label>Number 1:
        <input type="number" id="num1" required />
      </label><br /><br />
      <label>Number 2:
        <input type="number" id="num2" required />
      </label><br /><br />
      <button type="submit">Add</button>
    </form>
    <h2 id="result"></h2>

    <script>
      const form = document.getElementById("calcForm");
      const result = document.getElementById("result");
      form.addEventListener("submit", function (e) {
        e.preventDefault();
        const a = parseFloat(document.getElementById("num1").value);
        const b = parseFloat(document.getElementById("num2").value);
        if (isNaN(a) || isNaN(b)) {
          result.textContent = "Please enter valid numbers.";
        } else {
          result.textContent = "Result: " + (a + b);
        }
      });
```

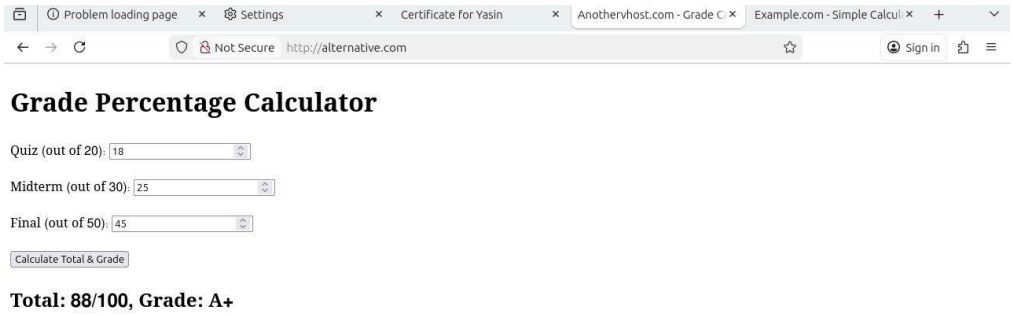
```
    </script>
  </body>
</html>
```

b. Test in Browser

Visit:

http://example.com

Enter two numbers and press **Add**.
The result should appear dynamically.



Step 5.3 – Dynamic Website 2: alternative.com (Grade Calculator)

a. Create/Replace HTML file

```
nano /var/www/alternative.com/html/index.html
```

Paste:

```
<!DOCTYPE html>
<html>
```

```
  <head>
    <meta charset="utf-8" />
    <title>Anothervhost.com - Grade Calculator</title>
  </head>
  <body>
    <h1>Grade Percentage Calculator</h1>
    <form id="gradeForm">
      <label>Quiz (out of 20): <input type="number" id="quiz" required /></label><br /><br />
      <label>Midterm (out of 30): <input type="number" id="midterm" required /></label><br
/><br />
      <label>Final (out of 50): <input type="number" id="final" required /></label><br /><br />
      <button type="submit">Calculate Total & Grade</button>
    </form>
    <h2 id="gradeResult"></h2>

    <script>
      const form = document.getElementById("gradeForm");
      const output = document.getElementById("gradeResult");
      form.addEventListener("submit", function (e) {
        e.preventDefault();
        const quiz = parseFloat(document.getElementById("quiz").value);
        const mid = parseFloat(document.getElementById("midterm").value);
        const fin = parseFloat(document.getElementById("final").value);
        if (isNaN(quiz) || isNaN(mid) || isNaN(fin)) {
          output.textContent = "Please enter all scores.";
          return;
        }
        const total = quiz + mid + fin;
        let grade;
        if (total >= 80) grade = "A+";
        else if (total >= 70) grade = "A";
        else if (total >= 60) grade = "B";
        else if (total >= 50) grade = "C";
        else grade = "F";
        output.textContent = "Total: " + total + "/100, Grade: " + grade;
      });
    </script>
  </body>
</html>
```

b. Test in Browser

Visit:

http://anothervhost.com

Input quiz, midterm, and final marks → click **Calculate** → total and grade appear instantly.

Step 5.4 – Validation

Both sites work independently and dynamically:

Virtual Host	Functionality	Dynamic Feature
example.com	Addition Calculator	JavaScript form + instant result
anothervhost.com	Grade Calculator	JavaScript form + instant grade output

Observations

- ➔ Apache successfully serves multiple dynamic front-end websites.
- ➔ No server-side language was used; all logic handled via client-side JavaScript.
- ➔ Each virtual host uses its own document root and configuration file.