This document provides instructions for configuring a Virtual Host server as part of the Final Project I for the course 420-635-AB Network Installation and Administration I. The project involves setting up name-based and IP-based virtual hosting using Apache, modifying configuration files, and verifying access to the hosted websites.

Project Part II

420-635-AB-Network Installation and Administration I

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1 Introduction

This document provides detailed instructions for Part II of the Final Project I for the course 420-635-AB Network Installation and Administration I. The primary objectives of this assignment are configuring a Virtual Host server and creating multiple websites that are identified by a combination of IP address, domain name, and port number. The process involves setting up name-based and IP-based virtual hosting using Apache, modifying configuration files, and verifying access to the hosted websites through appropriate network identifiers.

2 Topology

The network topology to be used is the same as used in previous assignments
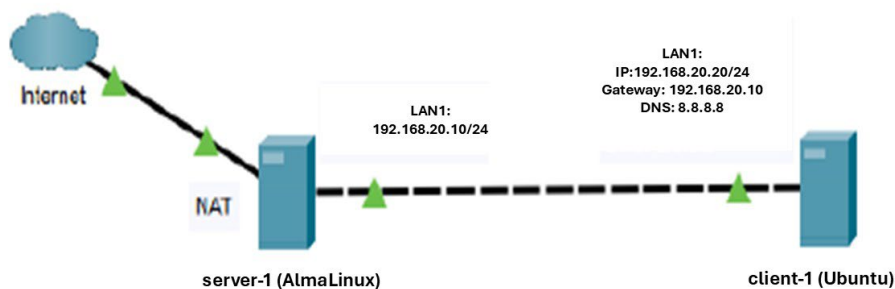
The base of this project is Part I

3 Requirements

The project is divided in 5 different tasks.

3.1 TASK 1 – Preparation

- The root directory for this project must be "**/var/www/html_project2**".

- A web page named **master_project2.html** should be placed in this directory and configured as the default page for the root.

- The **master_project2.html** page must include hyperlinks allowing users to test each question and every scenario related to each question in this lab. See the example provided on the last page of this document.

3.2 TASK 2 – Name-Based and Port-Based Virtual Hosts

- Create **virtual hosts** identified by both **hostname** and **port**, using the names provided below.

- All servers in this exercise will use the same IP address: **10.35.16.1.**

  o However, this address must be different from the main non-virtual website.

  o You will need to edit the **/etc/hosts** file accordingly to resolve the hostnames.

- Since these are virtual hosts, the basic Apache configuration will be similar for all of them:

  o Each server will have its **own directory** to store web pages.

  o Each server must also use its **own log files**.

- Virtual Hosts configuration details:

  ➢ Hostname: **virtual1.aucegep.com**

    o Port: **80**

    o Document Root: **/var/www/ virtuals/virtual1_80**

  ➢ Hostname: **virtual2.aucegep.com**

    o Port: **80**

    o Document Root: **/var/www/virtuals/virtual2_80**

  ➢ Hostname**: virtual1.aucegep.com**

    o Port: **8000**

    o Document Root: **/var/www/virtuals/virtual1_8000**

  ➢ Hostname: **virtual2.aucegep.com**

    o Port: **8000**

    o Document Root: **/var/www/virtuals/virtual2_8000**

3.3 TASK 3 – Name-based virtual hosts with access control

- Server IP addresses: **10.35.17.1**

- You are required to create virtual servers using **name-based hosting**, with **access permissions** and **document roots** as described below:

  - ➢ Hostname: **www.ici.com**
    - ○ Port: **80**
    - ○ Document Root: **/var/www/virtuals/ici**
    - ○ Accessible to everyone (no restrictions).

  - ➢ Hostname: **intranet.ici.com**
    - ○ Port: **80**
    - ○ Document Root: **/var/www/virtuals/intranet**
    - ○ Accessible to everyone (no restrictions).

  - ➢ Hostname: **intranet.ici.com**
    - ○ Port **8000**
    - ○ Document Root: **/var/www/virtuals/pre_production**
    - ○ Accessible only from the **10.35.17.0/24** subnet.

  - ➢ Hostname: **development.ici.com**
    - ○ Port **80**
    - ○ Document Root: **/var/www/virtuals/development**
    - ○ Accessible only from the **10.35.17.0/24** subnet.

3.4 TASK 4 – Virtual Web Servers by IP and Port

- Create and configure **four virtual web servers** as described below.

- Use a separate directory for each server under:

  /var/www/virtuals/q4/<*server_name*>

- For example, the **sales** web server will use:
  /var/www/virtuals/q4/sales

- To access each server, use the IP address **10.35.16.1** followed by the corresponding port number. For example:

http://10.35.16.1:8080 should display the **sales** web server homepage.

- Virtual servers to create:
    - **Sales** server on port **8080.**
    - **Admin** server on port **8081.**
    - **Thing** server on port **8082.**
    - **Other** server on port **8083.**

3.5 TASK 5 – Dynamic Virtual Hosting

- Server IP address: **10.50.1.1**
- You are required to configure your Apache web server to support five virtual servers using only one **<VirtualHost>** block and the **VirtualDocumentRoot** directive.
- Virtual Servers to Configure:

Server Name	IP Address
www.itmt.com	10.50.1.1
www.itmt.ca	10.50.1.1
www2.itmt.com	10.50.1.1
www.montmo.com	10.50.1.1
www.montmo.ca	10.50.1.1

- Each website will have its own **directory** based on the following path format:
  /var/www/virtuals/q5/x/y/z/

  Where:
    - **x** = TLD of the domain (com or ca).
    - **y** = The name of the company.
    - **z** = The prefix before the domain (e.g., www, www2).

- For example, **www.itmt.com**, the full directory would be:
  /var/www/virtuals/q5/com/itmt/www/

- All virtual host errors should logged to:

/ var/www/virtuals/q5/logs/virtual_error_q5_log

Note: For this question you can use **tree** to help you visualize the directory structure.

4 Task 1 – Preparation

4.1 Pre-activity

1. Connect to AlmaLinux
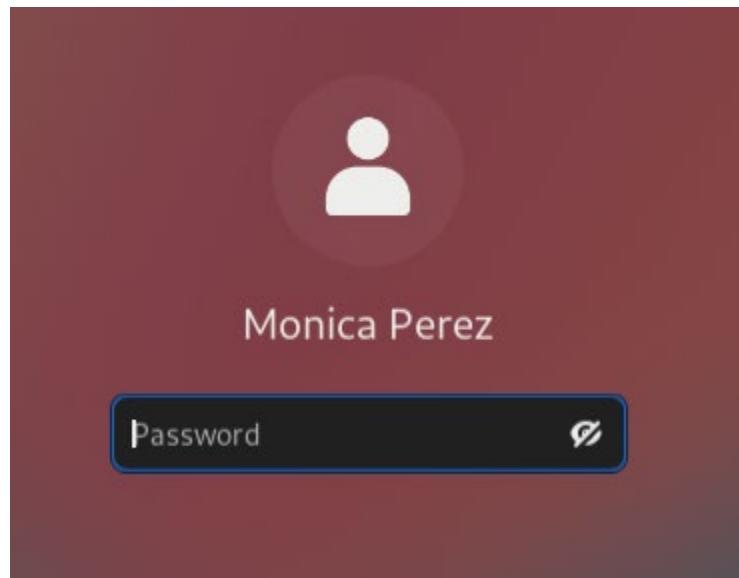
2. Connect as root

su –

4.2 Create html page for main menu

1. The root directory for this project must be "/var/www/html_project2". Create the directory.

   mkdir -p /var/www/html_project2

2. A web page named master_project2.html should be placed in this directory and configured as the default page for the root.

   touch /var/www/html_project2/master_project2.html

```
[root@server1 ~]# touch /var/www/html_project2/master_project2.html
```

3. Set Permissions: Ensure Apache can access the directory and file

      chmod -R 755 /var/www/html_project2

      chown -R apache:apache /var/www/html_project2

```
[root@server1 www]# sudo chmod -R 755 /var/www/html_project2
[root@server1 www]# sudo chown -R apache:apache /var/www/html_project2
```

      ll /var/www/html_project2

```
[root@server1 ~]# ll /var/www/html_project2
total 4
-rwxr-xr-x. 1 apache apache 2137 Apr 22 02:38 master_project2.html
```

4. The master_project2.html page must include hyperlinks allowing users to test each question and every scenario related to each question in this lab. See the example provided on the last page of this document

      vim /var/www/html_project2/master_project2.html

```html
<!DOCTYPE html>
<html>
<head>
    <title>Project Part II - Homepage</title>
</head>
<body>
    <h1>Welcome to Project Part 2 - Virtual hosts</h1>
    <hr>

    <!-- Task 2 -->
    <h2>Task 2</h2>
    <h3>Task 2 - Named-based and Port-based</h3>
    <ul>
        <li><a href="http://virtual1.aucegep.com/"
target="_blank">http://virtual1.aucegep.com/</a></li>
        <li><a href="http://virtual1.aucegep.com:8000/"
target="_blank">http://virtual1.aucegep.com:8000/</a></li>
        <li><a href="http://virtual2.aucegep.com/"
target="_blank">http://virtual2.aucegep.com/</a></li>
        <li><a href="http://virtual2.aucegep.com:8000/"
target="_blank">http://virtual2.aucegep.com:8000/</a></li>
    </ul>

    <!-- Task 3 -->
    <h2>Task 3</h2>
    <h3>Task 3 - Subdomains</h3>
    <ul>
        <li><a href="http://www.ici.com" target="_blank">http://www.ici.com</a></li>
        <li><a href="http://intranet.ici.com"
target="_blank">http://intranet.ici.com</a></li>
```

```
        <li><a href="http://intranet.ici.com:8000"
target="_blank">http://intranet.ici.com:8000</a></li>
        <li><a href="http://development.ici.com"
target="_blank">http://development.ici.com</a></li>
    </ul>

    <!-- Task 4 -->
    <h2>Task 4</h2>
    <h3>Task 4 - IP-based URLs</h3>
    <ul>
        <li><a href="http://10.35.16.1:8080"
target="_blank">http://10.35.16.1:8080</a></li>
        <li><a href="http://10.35.16.1:8081"
target="_blank">http://10.35.16.1:8081</a></li>
        <li><a href="http://10.35.16.1:8082"
target="_blank">http://10.35.16.1:8082</a></li>
        <li><a href="http://10.35.16.1:8083"
target="_blank">http://10.35.16.1:8083</a></li>
    </ul>

    <!-- Task 5 -->
    <h2>Task 5</h2>
    <h3>Task 5 - Domains</h3>
    <ul>
        <li><a href="http://www.itmt.com" target="_blank">http://www.itmt.com</a></li>
        <li><a href="http://www.itmt.ca" target="_blank">http://www.itmt.ca</a></li>
        <li><a href="http://www2.itmt.com" target="_blank">http://www2.itmt.com</a></li>
        <li><a href="http://www.montmo.com"
target="_blank">http://www.montmo.com</a></li>
        <li><a href="http://www.montmo.ca" target="_blank">http://www.montmo.ca</a></li>
    </ul>
</body>
</html>
```

4.3 Modify httpd.conf file

1. Make a copy of Project1 httpd

```
[root@server1 conf]#
[root@server1 conf]# cp /etc/httpd/conf/httpd.conf /etc/httpd/conf/httpd.conf_Part1
```

ll /etc/httpd/conf

```
[root@server1 conf]# ll /etc/httpd/conf
total 76
-rw-r--r--. 1 root root 11634 Apr 21 19:08 httpd.conf
-rw-r--r--. 1 root root 11436 Apr 21 02:21 httpd.conf~
-rw-r--r--. 1 root root 11817 Apr 21 16:04 httpd.conf_bkp_1FAIL
-rw-r--r--. 1 root root 12005 Apr 16 18:32 httpd.conf.original
-rw-r--r--. 1 root root 11634 Apr 22 11:53 httpd.conf_Part1
-rw-r--r--. 1 root root 13430 Jan 21 16:24 magic
[root@server1 conf]#
```

2. Open httpd config to edit

    vim /etc/httpd/conf/httpd.conf

3. Modify the DocumentRoot

    a) Change DocumentRoot to point to /var/www/html_project2

    b) Set <Directory> permissions
          <Directory "/var/www/html_project2">
            AllowOverride None
            Require all granted
          </Directory>

    c) Delete all directory block related to Part1

    d) Update the DirectoryIndex directive in the Apache configuration to explicitly set master_project2.html as the default

```
ServerRoot "/etc/httpd"
Listen 80
Include conf.modules.d/*.conf

User apache
Group apache

#ServerAdmin root@localhost
ServerName 192.168.50.10

<Directory />
    AllowOverride none
    Require all denied
</Directory>

DocumentRoot "/var/www/html_project2"

<Directory "/var/www">
    AllowOverride None
    Require all granted
</Directory>

<Directory "/var/www/html_project2">
    Options Indexes FollowSymLinks
    AllowOverride All
    Require all granted
</Directory>


<IfModule dir_module>
    DirectoryIndex master_project2.html
</IfModule>

#
# The following lines prevent .htaccess and .htpasswd files from being
# viewed by Web clients.
#
```

4. Verify the syntax of configuration file after changes

   httpd -t

   ```
   [root@server1 conf]# httpd -t
   Syntax OK
   [root@server1 conf]#
   ```

5. Restart Apache: Apply the configuration changes

   systemctl restart httpd

   ```
   [root@server1 conf]# systemctl restart httpd
   ```

6. Verify httpd status

   systemctl status httpd

   ```
   [root@server1 html_project2]# systemctl status httpd
   ● httpd.service - The Apache HTTP Server
        Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
        Active: active (running) since Tue 2025-04-22 12:32:06 EDT; 22min ago
          Docs: man:httpd.service(8)
      Main PID: 18432 (httpd)
        Status: "Total requests: 10; Idle/Busy workers 100/0;Requests/sec: 0.00735; Bytes served/sec:   6 B/sec"
         Tasks: 177 (limit: 22829)
        Memory: 35.9M
           CPU: 1.704s
        CGroup: /system.slice/httpd.service
                ├─18432 /usr/sbin/httpd -DFOREGROUND
                ├─18433 /usr/sbin/httpd -DFOREGROUND
                ├─18434 /usr/sbin/httpd -DFOREGROUND
                ├─18435 /usr/sbin/httpd -DFOREGROUND
                └─18436 /usr/sbin/httpd -DFOREGROUND

   Apr 22 12:32:06 server1 systemd[1]: Starting The Apache HTTP Server...
   Apr 22 12:32:06 server1 httpd[18432]: Server configured, listening on: port 80
   Apr 22 12:32:06 server1 systemd[1]: Started The Apache HTTP Server.
   [root@server1 html_project2]#
   ```

4.4 Test

1. Test with curl

   curl -I http://192.168.50.10/master_project2.html

```
[root@server1 html_project2]# curl -I http://192.168.50.10/master_project2.html
HTTP/1.1 200 OK
Date: Tue, 22 Apr 2025 16:45:08 GMT
Server: Apache/2.4.62 (AlmaLinux)
Last-Modified: Tue, 22 Apr 2025 06:38:49 GMT
ETag: "859-633583cb8a551"
Accept-Ranges: bytes
Content-Length: 2137
Content-Type: text/html; charset=UTF-8

[root@server1 html_project2]#
```

See result indicate 200 **OK**

2. Test in browser
   http://192.168.50.10/master_project2.html

Welcome to Project Part 2 - Virtual hosts

Task 2

Task 2 - Named-based and Port-based

- http://virtual1.aucegep.com/
- http://virtual1.aucegep.com:8000/
- http://virtual2.aucegep.com/
- http://virtual2.aucegep.com:8000/

Task 3

Task 3 - Subdomains

- http://www.ici.com
- http://intranet.ici.com
- http://intranet.ici.com:8000
- http://development.ici.com

Task 4

Task 4 - IP-based URLs

- http://10.35.16.1:8080
- http://10.35.Hi.1:8081
- http://10.35.16.1:8082
- http://10.35.16.1:8083

Task 5

Task 5 - Domains

- http://www.itmt.com
- http://www.itmt.ca
- http://www2.itmt.com
- http://www.montmo.com
- http://www.montmo.ca

5 Task 2 – Name-Based and Port-Based Virtual Hosts

Configuration

5.1 IP address

5.1.1 /etc/hosts

Server

Configure DNS name resolution. In our case we will use the file/etc/hosts

1. Verify current config

   cat /etc/hosts

   ```
   </html>
   [root@server1 html_project2]# cat /etc/hosts
   127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
   ::1          localhost localhost.localdomain localhost6 localhost6.localdomain6
   192.168.50.10 server1.project.com
   10.35.16.1 server1.project.com
   10.35.17.1 server1.project.com
   192.168.100.1 server1.project.com

   [root@server1 html_project2]#
   ```

2. Edit /etc/hosts to resolve the virtual hostnames

   vim /etc/hosts

   add:

   10.35.16.1 virtual1.aucegep.com
   10.35.16.1 virtual2.aucegep.com

   ```
   127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
   ::1          localhost localhost.localdomain localhost6 localhost6.localdomain6

   ### Project 2
   10.35.16.1    virtual1.aucegep.com
   10.35.16.1    virtual2.aucegep.com

   ~
   ~
   ~
   ```

   Client

   Configure DNS name resolution. In our case we will use the file/etc/hosts

1. Verify current config

   cat /etc/hosts

```
root@client1:~# cat /etc/hosts
127.0.0.1         localhost
127.0.1.1         client1

# The following lines are desirable for IPv6 capable hosts
::1       ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
```

2. Edit /etc/hosts to resolve the virtual hostnames

    nano /etc/hosts

    add:

    10.35.16.1 virtual1.aucegep.com
    10.35.16.1 virtual2.aucegep.com

```
  ⌐+⌐

  GNU nano 6.2
127.0.0.1         localhost
127.0.1.1         client1

# The following lines are desirable for IPv6 capable hosts
::1       ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
10.35.16.1 virtual1.aucegep.com
10.35.16.1 virtual2.aucegep.com
```
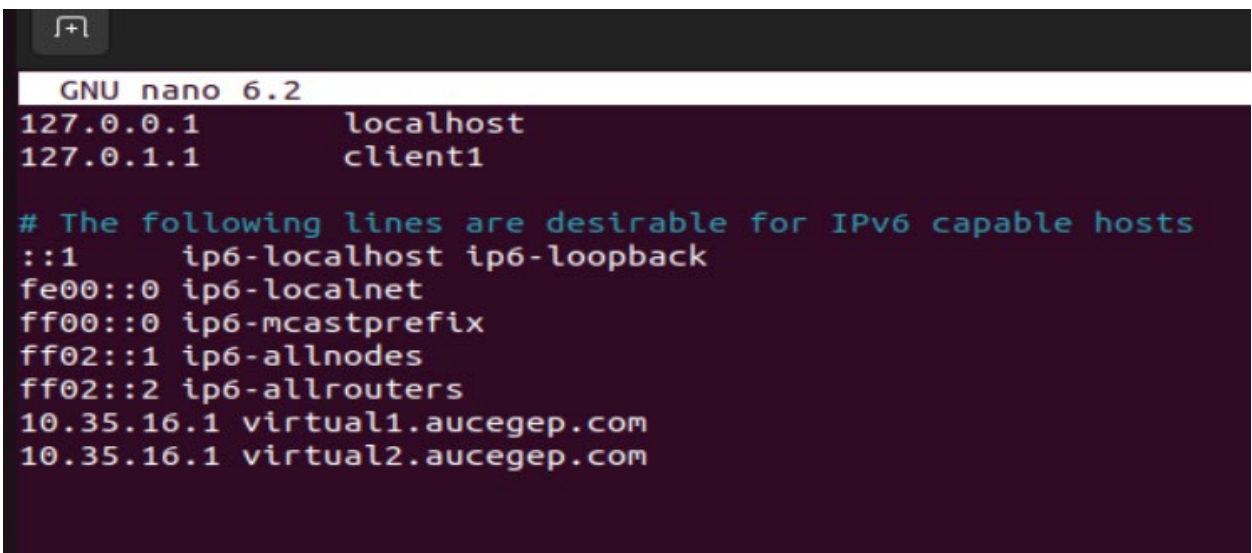
3. Verify changes

5.1.2 Configure the IP addresses

5.1.2.1 Server

nmcli

See 10.35.16.1   is included

5.1.2.2 Client

nmcli

See 10.35.16.2   is included

5.2   Create directories and files for virtual hosts

5.2.1   Create directories

mkdir -p /var/www/virtuals/virtual1_80

mkdir -p /var/www/virtuals/virtual2_80

mkdir -p /var/www/virtuals/virtual1_8000

 mkdir -p /var/www/virtuals/virtual2_8000

5.2.2 Create sample index files

echo "<h1>Virtual1 Port 80</h1>" | sudo tee /var/www/virtuals/virtual1_80/index.html

echo "<h1>Virtual2 Port 80</h1>" | sudo tee /var/www/virtuals/virtual2_80/index.html

echo "<h1>Virtual1 Port 8000</h1>" | sudo tee /var/www/virtuals/virtual1_8000/index.html

echo "<h1>Virtual2 Port 8000</h1>" | sudo tee /var/www/virtuals/virtual2_8000/index.html

```
httpd_unitied 05> 0Pr
[root@server1 html_project2]# echo "<h1>Virtual1 Port 80</h1>" | sudo tee /var/www/virtuals/virtual1_80/index.html
<h1>Virtual1 Port 80</h1>
[root@server1 html_project2]# echo "<h1>Virtual2 Port 80</h1>" | sudo tee /var/www/virtuals/virtual2_80/index.html
<h1>Virtual2 Port 80</h1>
[root@server1 html_project2]# echo "<h1>Virtual1 Port 8000</h1>" | sudo tee /var/www/virtuals/virtual1_8000/index.html
<h1>Virtual1 Port 8000</h1>
[root@server1 html_project2]# echo "<h1>Virtual2 Port 8000</h1>" | sudo tee /var/www/virtuals/virtual2_8000/index.html
<h1>Virtual2 Port 8000</h1>
[root@server1 html_project2]#
```

5.2.3 Create the logs subdirectories

mkdir -p /var/www/virtuals/virtual1_80/logs

mkdir -p /var/www/virtuals/virtual2_80/logs

mkdir -p /var/www/virtuals/virtual1_8000/logs

mkdir -p /var/www/virtuals/virtual2_8000/logs

```
pegasus_https_port_t            tcp       5989
[root@server1 html_project2]# mkdir -p /var/www/virtuals/virtual1_80/logs
[root@server1 html_project2]# mkdir -p /var/www/virtuals/virtual2_80/logs
[root@server1 html_project2]# mkdir -p /var/www/virtuals/virtual1_8000/logs
[root@server1 html_project2]#  mkdir -p /var/www/virtuals/virtual2_8000/logs
[root@server1 html_project2]#
```

5.2.4 Change permissions and ownership

1. Set proper permissions:

   chown -R apache:apache /var/www/virtuals

   chmod -R 755 /var/www/virtuals

```
-rw-r--r--. 1 root root 28 Apr 22 14:48 index.html
[root@server1 html_project2]# chown -R apache:apache /var/www/virtuals
[root@server1 html_project2]#  chmod -R 755 /var/www/virtuals
[root@server1 html_project2]#
```

2. Verify directories and files

   ls -ltrqha -R /var/www/virtuals/

```
[root@server1 html_project2]# ls -ltrqha -R  /var/www/virtuals/
/var/www/virtuals/:
total 0
drwxr-xr-x. 8 root    root   105 Apr 22 14:29 ..
drwxr-xr-x. 6 apache apache  86 Apr 22 14:30 .
drwxr-xr-x. 3 apache apache  36 Apr 22 15:52 virtual1_80
drwxr-xr-x. 3 apache apache  36 Apr 22 15:52 virtual2_80
drwxr-xr-x. 3 apache apache  36 Apr 22 15:52 virtual1_8000
drwxr-xr-x. 3 apache apache  36 Apr 22 15:53 virtual2_8000

/var/www/virtuals/virtual1_80:
total 4.0K
drwxr-xr-x. 6 apache apache 86 Apr 22 14:30 ..
-rwxr-xr-x. 1 apache apache 26 Apr 22 14:47 index.html
drwxr-xr-x. 2 apache apache  6 Apr 22 15:52 logs
drwxr-xr-x. 3 apache apache 36 Apr 22 15:52 .

/var/www/virtuals/virtual1_80/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 15:52 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 15:52 .

/var/www/virtuals/virtual2_80:
total 4.0K
drwxr-xr-x. 6 apache apache 86 Apr 22 14:30 ..
-rwxr-xr-x. 1 apache apache 26 Apr 22 14:48 index.html
drwxr-xr-x. 2 apache apache  6 Apr 22 15:52 logs
drwxr-xr-x. 3 apache apache 36 Apr 22 15:52 .

/var/www/virtuals/virtual2_80/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 15:52 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 15:52 .

/var/www/virtuals/virtual1_8000:
total 4.0K
drwxr-xr-x. 6 apache apache 86 Apr 22 14:30 ..
-rwxr-xr-x. 1 apache apache 28 Apr 22 14:48 index.html
drwxr-xr-x. 2 apache apache  6 Apr 22 15:52 logs
drwxr-xr-x. 3 apache apache 36 Apr 22 15:52 .

/var/www/virtuals/virtual1_8000/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 15:52 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 15:52 .

/var/www/virtuals/virtual2_8000:
total 4.0K
drwxr-xr-x. 6 apache apache 86 Apr 22 14:30 ..
-rwxr-xr-x. 1 apache apache 28 Apr 22 14:48 index.html
drwxr-xr-x. 2 apache apache  6 Apr 22 15:53 logs
drwxr-xr-x. 3 apache apache 36 Apr 22 15:53 .

/var/www/virtuals/virtual2_8000/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 15:53 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 15:53 .
[root@server1 html_project2]#
```

3. Verify directories and files

tree /var/www/virtuals/

```
[root@server1 html_project2]# tree  /var/www/virtuals/
/var/www/virtuals/
├── virtual1_80
│   ├── index.html
│   └── logs
├── virtual1_8000
│   ├── index.html
│   └── logs
├── virtual2_80
│   ├── index.html
│   └── logs
└── virtual2_8000
    ├── index.html
    └── logs

8 directories, 4 files
[root@server1 html_project2]#
```

5.3 SeLinux

5.3.1 Context of the Directories

httpd_sys_rw_content_t

1. Change SELinux context of the folder /var/www/virtuals/ (and all files/directories inside it) to allow read and write access by Apache.

   Authorize the writing in the folders used by virtuals in SELinux

   chcon -R -t httpd_sys_rw_content_t /var/www/virtuals

```
[root@server1 html_project2]# chcon -R -t httpd_sys_rw_content_t /var/www/virtuals
[root@server1 html_project2]#
```

2. Check the SELinux Context of the Directory

   ls -lZ -R /var/www/virtuals

```
[root@server1 html_project2]# ls -lZ -R /var/www/virtuals
/var/www/virtuals:
total 0
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 15:52 virtual1_80
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 15:52 virtual1_8000
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 15:52 virtual2_80
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 15:53 virtual2_8000

/var/www/virtuals/virtual1_80:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 26 Apr 22 14:47 index.html
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr 22 15:52 logs

/var/www/virtuals/virtual1_80/logs:
total 0

/var/www/virtuals/virtual1_8000:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 28 Apr 22 14:48 index.html
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr 22 15:52 logs

/var/www/virtuals/virtual1_8000/logs:
total 0

/var/www/virtuals/virtual2_80:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 26 Apr 22 14:48 index.html
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr 22 15:52 logs

/var/www/virtuals/virtual2_80/logs:
total 0

/var/www/virtuals/virtual2_8000:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 28 Apr 22 14:48 index.html
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr 22 15:53 logs

/var/www/virtuals/virtual2_8000/logs:
total 0
[root@server1 html_project2]#
```

5.3.2 httpd_unified

Set to enable to allow Apache to treat all content as **readable and writable**, simplifying permission checks.

1. Check current value

   getsebool httpd_unified

   ```
   [root@server1 html_project2]# getsebool httpd_unified
   httpd_unified --> off
   [root@server1 html_project2]#
   ```

2. Enable http_unified

   setsebool -P httpd_unified1

   ```
   [root@server1 html_project2]# setsebool -P httpd_unified 1
   [root@server1 html_project2]#
   ```

3. Check changed value

getsebool httpd_unified

```
[root@server1 html_project2]# getsebool httpd_unified
httpd_unified --> on
[root@server1 html_project2]#
```

5.3.3 Authorize the tcp port in SELinux.

1. Check Authorized Ports

semanage port -l | grep http

```
server1
[root@server1 html_project2]# semanage port -l | grep http
http_cache_port_t               tcp      8080, 8118, 8123, 10001-10010
http_cache_port_t               udp      3130
http_port_t                     tcp      80, 81, 443, 488, 8008, 8009, 8443, 9000
pegasus_http_port_t             tcp      5988
pegasus_https_port_t            tcp      5989
[root@server1 html_project2]#
```

2. Authorize a New Port

sudo semanage port -a -t http_port_t -p tcp 8000

```
zope_port_t                     tcp      8021
[root@server1 html_project2]# sudo semanage port -a -t http_port_t -p tcp 8000
Port tcp/8000 already defined, modifying instead
[root@server1 html project2]# semanage port -l | grep http
```

** **Note** – port was already assigned to :

soundd_port_t   tcp   8000, 9433, 16001
The soundd_port_t SELinux type is associated with processes related to sound servers or sound-related daemons. Ports like 8000, 9433, and 16001 are typically used for sound-related services, such as audio streaming or sound server communication.

semanage port -l | grep http

```
[root@server1 html_project2]#
[root@server1 html_project2]# semanage port -l | grep http
http_cache_port_t              tcp      8080, 8118, 8123, 10001-10010
http_cache_port_t              udp      3130
http_port_t                    tcp      8000, 80, 81, 443, 488, 8008, 8009, 8443, 9000
pegasus_http_port_t            tcp      5988
pegasus_https_port_t           tcp      5989
[root@server1 html_project2]#
```

5.4 Firewall

1. Verify open ports

firewall-cmd --list-all --zone=nm-shared

```
[root@server1 ~]#
[root@server1 ~]# firewall-cmd --list-all --zone=nm-shared
nm-shared (active)
  target: ACCEPT
  icmp-block-inversion: no
  interfaces: ens192
  sources:
  services: dhcp dns ssh
  ports: 80/tcp
  protocols: icmp ipv6-icmp
  forward: no
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
        rule priority="32767" reject
[root@server1 ~]#
```

MobaXterm is available only to teachers and students in classrooms or at home

2. Reload firewall

firewall-cmd –reload

```
[root@server1 ~]# firewall-cmd --reload
success
```

3. Open port 8080

firewall-cmd --permanent --add-port=8000/tcp

```
success
[root@server1 ~]# firewall-cmd --permanent --add-port=8000/tcp --zone=nm-shared
success
[root@server1 ~]#
```

4. Verify open ports

firewall-cmd --list-all --zone=nm-shared

```
[root@server1 ~]# firewall-cmd --list-all --zone=nm-shared
nm-shared (active)
  target: ACCEPT
  icmp-block-inversion: no
  interfaces: ens192
  sources:
  services: dhcp dns ssh
  ports: 80/tcp 8000/tcp
  protocols: icmp ipv6-icmp
  forward: no
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
        rule priority="32767" reject
[root@server1 ~]# firewall-cmd --list-all --zone=public
```

5.1 Modify httpd.conf file

1. Edit /etc/httpd/conf/httpd.conf

vim /etc/httpd/conf/httpd.conf

Add listening ports

```
Listen 192.168.50.10:80
Listen 10.35.16.1:80
Listen 10.35.16.1:8000
```
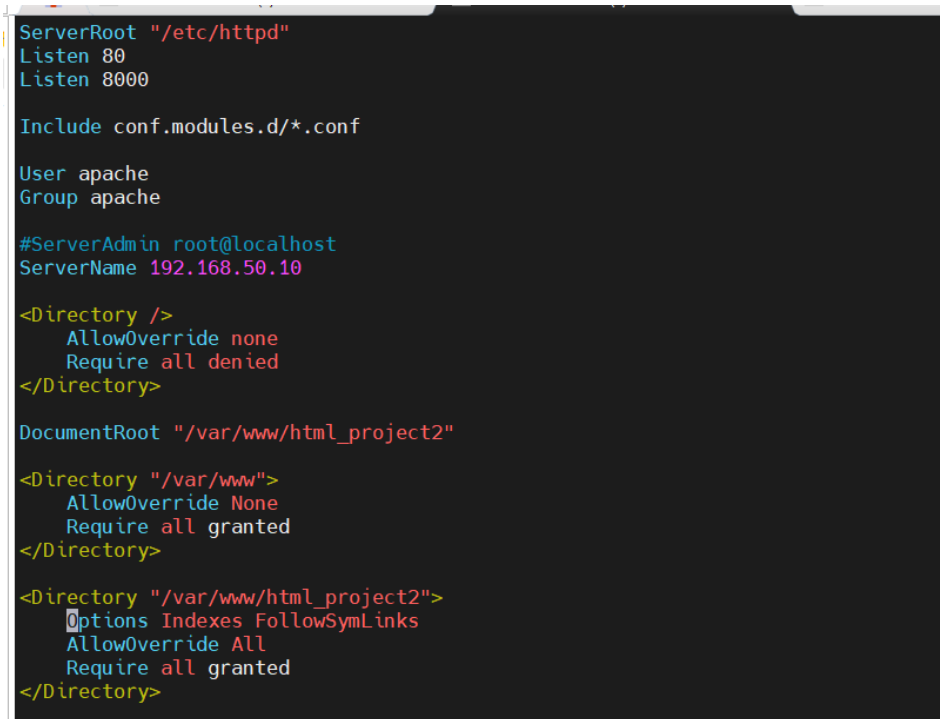
```
# Virtual Host for virtual1.aucegep.com on port 80
<VirtualHost 10.35.16.1:80>
```

```
    ServerName virtual1.aucegep.com
    DocumentRoot /var/www/virtuals/virtual1_80
    ErrorLog /var/www/virtuals/virtual1_80/logs/virtual1_80_error.log
    TransferLog /var/www/virtuals/virtual1_80/logs/virtual1_80_access.log
</VirtualHost>

# Virtual Host for virtual2.aucegep.com on port 80
<VirtualHost 10.35.16.1:80>
    ServerName virtual2.aucegep.com
    DocumentRoot /var/www/virtuals/virtual2_80
    ErrorLog /var/www/virtuals/virtual2_80/logs/virtual2_80_error.log
    TransferLog /var/www/virtuals/virtual2_80/logs/virtual2_80_access.log
</VirtualHost>

# Virtual Host for virtual1.aucegep.com on port 8000
<VirtualHost 10.35.16.1:8000>
    ServerName virtual1.aucegep.com
    DocumentRoot /var/www/virtuals/virtual1_8000
    ErrorLog /var/www/virtuals/virtual1_8000/logs/virtual1_8000_error.log
    TransferLog
/var/www/virtuals/virtual1_8000/logs/virtual1_8000_access.log
</VirtualHost>

# Virtual Host for virtual2.aucegep.com on port 8000
<VirtualHost 10.35.16.1:8000>
    ServerName virtual2.aucegep.com
    DocumentRoot /var/www/virtuals/virtual2_8000
    ErrorLog /var/www/virtuals/virtual2_8000/logs/virtual2_8000_error.log
    TransferLog
/var/www/virtuals/virtual2_8000/logs/virtual2_8000_access.log
</VirtualHost>
```

```
ServerRoot "/etc/httpd"
Listen 80
Listen 8000

Include conf.modules.d/*.conf

User apache
Group apache

#ServerAdmin root@localhost
ServerName 192.168.50.10

<Directory />
    AllowOverride none
    Require all denied
</Directory>

DocumentRoot "/var/www/html_project2"

<Directory "/var/www">
    AllowOverride None
    Require all granted
</Directory>

<Directory "/var/www/html_project2">
    Options Indexes FollowSymLinks
    AllowOverride All
    Require all granted
</Directory>
```

```
# Virtual Host for virtual1.aucegep.com on port 80
<VirtualHost 10.35.16.1:80>
    ServerName virtual1.aucegep.com
    DocumentRoot /var/www/virtuals/virtual1_80
    ErrorLog /var/www/virtuals/virtual1_80/logs/virtual1_80_error.log
    TransferLog /var/www/virtuals/virtual1_80/logs/virtual1_80_access.log
</VirtualHost>

# Virtual Host for virtual2.aucegep.com on port 80
<VirtualHost 10.35.16.1:80>
    ServerName virtual2.aucegep.com
    DocumentRoot /var/www/virtuals/virtual2_80
    ErrorLog /var/www/virtuals/virtual2_80/logs/virtual2_80_error.log
    TransferLog /var/www/virtuals/virtual2_80/logs/virtual2_80_access.log
</VirtualHost>

# Virtual Host for virtual1.aucegep.com on port 8000
<VirtualHost 10.35.16.1:8000>
    ServerName virtual1.aucegep.com
    DocumentRoot /var/www/virtuals/virtual1_8000
    ErrorLog /var/www/virtuals/virtual1_8000/logs/virtual1_8000_error.log
    TransferLog /var/www/virtuals/virtual1_8000/logs/virtual1_8000_access.log
</VirtualHost>

# Virtual Host for virtual2.aucegep.com on port 8000
<VirtualHost 10.35.16.1:8000>
    ServerName virtual2.aucegep.com
    DocumentRoot /var/www/virtuals/virtual2_8000
    ErrorLog /var/www/virtuals/virtual2_8000/logs/virtual2_8000_error.log
    TransferLog /var/www/virtuals/virtual2_8000/logs/virtual2_8000_access.log
</VirtualHost>


<IfModule dir_module>
    DirectoryIndex index.html master_project2.html
</IfModule>
```

2. Verify the syntax of configuration file after changes

httpd -t

```
[root@server1 conf]# httpd -t
Syntax OK
[root@server1 conf]#
```

httpd -S

```
[root@server1 ~]# httpd -S
VirtualHost configuration:
10.35.16.1:80          is a NameVirtualHost
         default server virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:32)
         port 80 namevhost virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:32)
         port 80 namevhost virtual2.aucegep.com (/etc/httpd/conf/httpd.conf:40)
10.35.16.1:8000          is a NameVirtualHost
         default server virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:48)
         port 8000 namevhost virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:48)
         port 8000 namevhost virtual2.aucegep.com (/etc/httpd/conf/httpd.conf:56)
ServerRoot: "/etc/httpd"
Main DocumentRoot: "/var/www/html_project2"
Main ErrorLog: "/etc/httpd/logs/error_log"
Mutex authdigest-client: using_defaults
Mutex dav_fs-lockdb: using_defaults
Mutex lua-ivm-shm: using_defaults
Mutex proxy: using_defaults
Mutex authn-socache: using_defaults
Mutex default: dir="/etc/httpd/run/" mechanism=default
Mutex cache-socache: using_defaults
Mutex authdigest-opaque: using_defaults
Mutex watchdog-callback: using_defaults
Mutex proxy-balancer-shm: using_defaults
Mutex rewrite-map: using_defaults
PidFile: "/etc/httpd/run/httpd.pid"
Define: DUMP_VHOSTS
Define: DUMP_RUN_CFG
User: name="apache" id=48
Group: name="apache" id=48
[root@server1 ~]#
[root@server1 ~]#
```

3. Restart Apache: Apply the configuration changes

   systemctl restart httpd

```
[root@server1 conf]# systemctl restart httpd
```

4. Verify httpd status

systemctll status httpd

5.2 Testing

5.2.1 Server

curl http://virtual1.aucegep.com

curl http://virtual2.aucegep.com

curl http://virtual1.aucegep.com:8000

curl http://virtual2.aucegep.com:8000

5.2.2 Client

Task 2

Task 2 - Named-based and Port-based

- http://virtual1.aucegep.com/
- http://virtual1.aucegep.com:8000/
- http://virtual2.aucegep.com/
- http://virtual2.aucegep.com:8000/

5.2.2.1 http://virtual1.aucegep.com/

5.2.2.2 http://virtual1.aucegep.com:8000/

5.2.2.3 *http://virtual2.aucegep.com/*

5.2.2.4 *http://virtual2.aucegep.com:8000/*
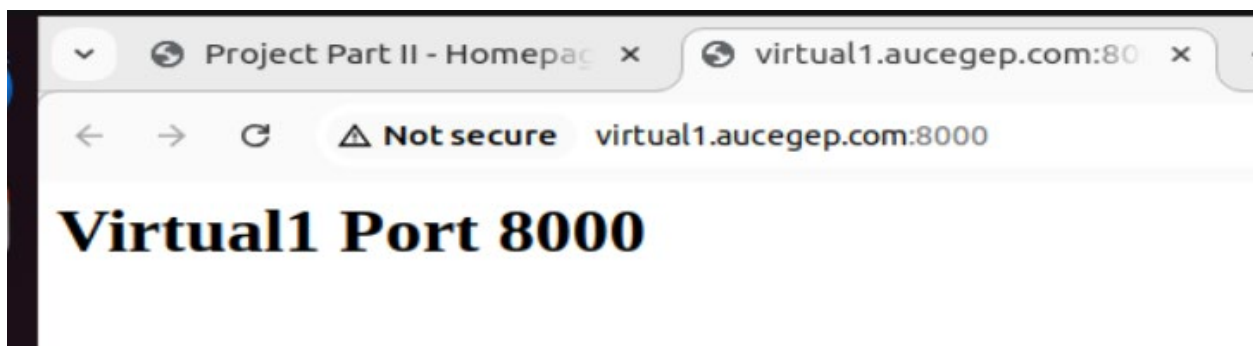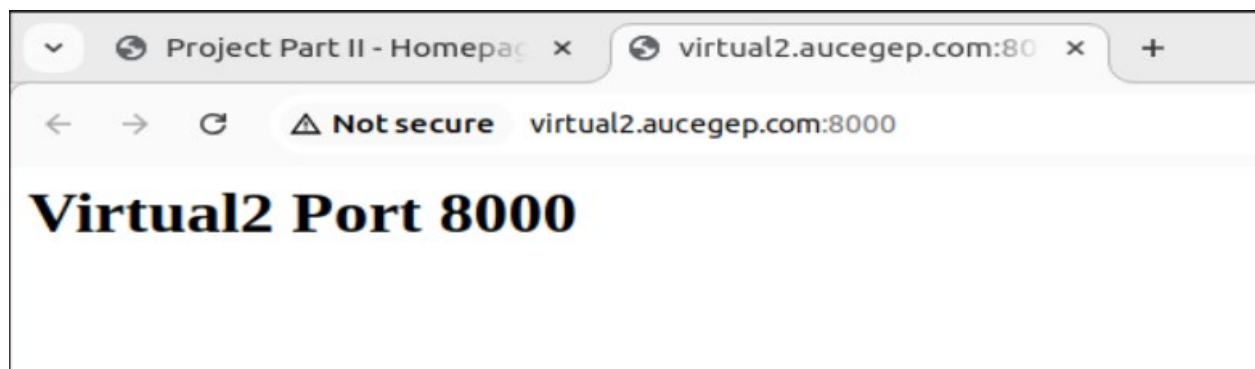
6 Task 3 – Name-based virtual hosts with access control

6.1 Etc/hosts

Client

```
J+l                                          root@clien
  GNU nano 6.2                                   /etc/ho
127.0.0.1        localhost
127.0.1.1        client1

# The following lines are desirable for IPv6 capable hosts
::1      ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
10.35.16.1 virtual1.aucegep.com
10.35.16.1 virtual2.aucegep.com
10.35.17.1 www.ici.com intranet.ici.com development.ici.com
```

```
root@client1:~# cat /etc/hosts
127.0.0.1        localhost
127.0.1.1        client1

# The following lines are desirable for IPv6 capable hosts
::1      ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
10.35.16.1 virtual1.aucegep.com
10.35.16.1 virtual2.aucegep.com
10.35.17.1 www.ici.com intranet.ici.com development.ici.com
root@client1:~#
```

Server

6.2 Verify IP assignment

Server

ip addr show ens192

```
[root@server1 ~]# ip addr show ens192
3: ens192: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:0c:29:f6:c5:0f brd ff:ff:ff:ff:ff:ff
    altname enp11s0
    inet 192.168.50.10/24 brd 192.168.50.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.35.16.1/24 brd 10.35.16.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.35.17.1/24 brd 10.35.17.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 192.168.100.1/24 brd 192.168.100.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.50.1.1/24 brd 10.50.1.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.51.1.1/24 brd 10.51.1.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.52.1.1/24 brd 10.52.1.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.53.1.1/24 brd 10.53.1.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet6 fe80::3e70:81df:4f1a:15be/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
[root@server1 ~]#
```

Client

ip addr show ens33

```
root@client1:~# ip addr show ens33
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:2c:6a:1b brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.50.20/24 brd 192.168.50.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.35.16.2/24 brd 10.35.16.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.35.17.2/24 brd 10.35.17.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 192.168.100.2/24 brd 192.168.100.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.50.1.2/24 brd 10.50.1.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.51.1.2/24 brd 10.51.1.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.52.1.2/24 brd 10.52.1.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.53.1.2/24 brd 10.53.1.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet6 fe80::6ef0:de03:28d2:41cf/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
root@client1:~#
```

6.3 Directory Structure Setup

sudo mkdir -p /var/www/virtuals/ici

sudo mkdir -p /var/www/virtuals/intranet

sudo mkdir -p /var/www/virtuals/pre_production

sudo mkdir -p /var/www/virtuals/development

```
            valid_ttl forever preferred_ttl forever
[root@server1 ~]# sudo mkdir -p /var/www/virtuals/ici
[root@server1 ~]# sudo mkdir -p /var/www/virtuals/intranet
[root@server1 ~]# sudo mkdir -p /var/www/virtuals/pre_production
[root@server1 ~]# sudo mkdir -p /var/www/virtuals/development
[root@server1 ~]# _
```

6.4 Create sample index files

echo "<h1>www.ici.com (Public)</h1>" | sudo tee /var/www/virtuals/ici/index.html

echo "<h1>intranet.ici.com Port 80 (Public)</h1>" | sudo tee /var/www/virtuals/intranet/index.html

echo "<h1>intranet.ici.com Port 8000 (Restricted)</h1>" | sudo tee /var/www/virtuals/pre_production/index.html

echo "<h1>development.ici.com (Restricted)</h1>" | sudo tee /var/www/virtuals/development/index.html

```
[root@server1 ~]# echo "<h1>www.ici.com (Public)</h1>" | sudo tee /var/www/virtuals/ici/index.html
<h1>www.ici.com (Public)</h1>
[root@server1 ~]# echo "<h1>intranet.ici.com Port 80 (Public)</h1>" | sudo tee /var/www/virtuals/intranet/index.html
<h1>intranet.ici.com Port 80 (Public)</h1>
[root@server1 ~]# echo "<h1>intranet.ici.com Port 8000 (Restricted)</h1>" | sudo tee /var/www/virtuals/pre_production/index.html
<h1>intranet.ici.com Port 8000 (Restricted)</h1>
[root@server1 ~]# echo "<h1>development.ici.com (Restricted)</h1>" | sudo tee /var/www/virtuals/development/index.html
<h1>development.ici.com (Restricted)</h1>
[root@server1 ~]# 
```

6.5 Create logs directories

sudo mkdir -p /var/www/virtuals/ici/logs

sudo mkdir -p /var/www/virtuals/intranet/logs

sudo mkdir -p /var/www/virtuals/pre_production/logs

sudo mkdir -p /var/www/virtuals/development/logs

```
[root@server1 virtuals]# sudo mkdir -p /var/www/virtuals/ici/logs
[root@server1 virtuals]# sudo mkdir -p /var/www/virtuals/intranet/logs
[root@server1 virtuals]# sudo mkdir -p /var/www/virtuals/pre_production/logs
[root@server1 virtuals]# sudo mkdir -p /var/www/virtuals/development/logs
[root@server1 virtuals]#
```

6.6 Set proper permissions

sudo chown -R apache:apache /var/www/virtuals

sudo chmod -R 755 /var/www/virtuals

List created files

tree /var/www/virtuals/

```
[root@server1 virtuals]#
[root@server1 virtuals]# tree /var/www/virtuals/
/var/www/virtuals/
├── development
│   ├── index.html
│   └── logs
├── ici
│   ├── index.html
│   └── logs
├── intranet
│   ├── index.html
│   └── logs
├── pre_production
│   ├── index.html
│   └── logs
├── virtual1_80
│   ├── index.html
│   └── logs
│       ├── virtual1_80_access.log
│       └── virtual1_80_error.log
├── virtual1_8000
│   ├── index.html
│   └── logs
│       ├── virtual1_8000_access.log
│       └── virtual1_8000_error.log
├── virtual2_80
│   ├── index.html
│   └── logs
│       ├── virtual2_80_access.log
│       └── virtual2_80_error.log
└── virtual2_8000
    ├── index.html
    └── logs
        ├── virtual2_8000_access.log
        └── virtual2_8000_error.log

16 directories, 16 files
```

List permissions

```
/var/www/virtuals/ici:
total 4.0K
drwxr-xr-x. 10 apache apache 154 Apr 22 21:01 ..
-rwxr-xr-x.  1 apache apache  30 Apr 22 21:03 index.html
drwxr-xr-x.  2 apache apache   6 Apr 22 21:16 logs
drwxr-xr-x.  3 apache apache  36 Apr 22 21:16 .

/var/www/virtuals/ici/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 21:16 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 21:16 .

/var/www/virtuals/intranet:
total 4.0K
drwxr-xr-x. 10 apache apache 154 Apr 22 21:01 ..
-rwxr-xr-x.  1 apache apache  43 Apr 22 21:04 index.html
drwxr-xr-x.  2 apache apache   6 Apr 22 21:17 logs
drwxr-xr-x.  3 apache apache  36 Apr 22 21:17 .

/var/www/virtuals/intranet/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 21:17 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 21:17 .

/var/www/virtuals/pre_production:
total 4.0K
drwxr-xr-x. 10 apache apache 154 Apr 22 21:01 ..
-rwxr-xr-x.  1 apache apache  49 Apr 22 21:04 index.html
drwxr-xr-x.  2 apache apache   6 Apr 22 21:17 logs
drwxr-xr-x.  3 apache apache  36 Apr 22 21:17 .

/var/www/virtuals/pre_production/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 21:17 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 21:17 .

/var/www/virtuals/development:
total 4.0K
drwxr-xr-x. 10 apache apache 154 Apr 22 21:01 ..
-rwxr-xr-x.  1 apache apache  42 Apr 22 21:04 index.html
drwxr-xr-x.  2 apache apache   6 Apr 22 21:17 logs
drwxr-xr-x.  3 apache apache  36 Apr 22 21:17 .

/var/www/virtuals/development/logs:
total 0
```

6.7 SeLinux

6.7.1 Context of the Directories

httpd_sys_rw_content_t

3. Change SELinux context of the folder /var/www/virtuals/ (and all files/directories inside it) to allow read and write access by Apache.

Authorize the writing in the folders used by virtuals in SELinux

chcon -R -t httpd_sys_rw_content_t /var/www/virtuals

```
[root@server1 virtuals]# chcon -R -t httpd_sys_rw_content_t /var/www/virtuals
```

4. Check the SELinux Context of the Directory

ls -lZ -R /var/www/virtuals

```
[root@server1 virtuals]# ls -lZ -R /var/www/virtuals
/var/www/virtuals:
total 0
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 21:17 development
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 21:16 ici
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 21:17 intranet
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 21:17 pre_production
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 15:52 virtual1_80
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 15:52 virtual1_8000
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 15:52 virtual2_80
drwxr-xr-x. 3 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 36 Apr 22 15:53 virtual2_8000

/var/www/virtuals/development:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 42 Apr 22 21:04 index.html
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr 22 21:17 logs

/var/www/virtuals/development/logs:
total 0

/var/www/virtuals/ici:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 30 Apr 22 21:03 index.html
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr 22 21:16 logs

/var/www/virtuals/ici/logs:
total 0

/var/www/virtuals/intranet:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 43 Apr 22 21:04 index.html
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr 22 21:17 logs

/var/www/virtuals/intranet/logs:
total 0

/var/www/virtuals/pre_production:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 49 Apr 22 21:04 index.html
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr 22 21:17 logs

/var/www/virtuals/pre_production/logs:
total 0

/var/www/virtuals/virtual1_80:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 26 Apr 22 14:47 index.html
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 65 Apr 22 19:55 logs

/var/www/virtuals/virtual1_80/logs:
total 8
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0  324 Apr 22 20:46 virtual1_80_access.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0 1351 Apr 22 20:46 virtual1_80_error.log
```

6.7.2 httpd_unified

Set to enable to allow Apache to treat all content as **readable and writable**, simplifying permission checks.

1. Check current value

getsebool httpd_unified

```
[root@server1 html_project2]# getsebool httpd_unified
httpd_unified --> on
[root@server1 html_project2]#
```

6.7.3 Authorize the tcp port in SELinux.

1. Check Authorized Ports

semanage port -l | grep http

```
[root@server1 html_project2]#
[root@server1 html_project2]# semanage port -l | grep http
http_cache_port_t            tcp      8080, 8118, 8123, 10001-10010
http_cache_port_t            udp      3130
http_port_t                  tcp      8000, 80, 81, 443, 488, 8008, 8009, 8443, 9000
pegasus_http_port_t          tcp      5988
pegasus_https_port_t         tcp      5989
[root@server1 html_project2]#
```

6.8 Firewall

1. Verify open ports

   firewall-cmd --list-all --zone=nm-shared

```
[root@server1 ~]# firewall-cmd --list-all --zone=nm-shared
nm-shared (active)
  target: ACCEPT
  icmp-block-inversion: no
  interfaces: ens192
  sources:
  services: dhcp dns ssh
  ports: 80/tcp 8000/tcp
  protocols: icmp ipv6-icmp
  forward: no
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
        rule priority="32767" reject
[root@server1 ~]# firewall-cmd --list-all --zone=public
```

6.9 Apache Configuration

6.9.1 Modified VirtualHost configurations in httpd.conf

1. Modify httpd/conf

Add these near other Listen directives

```
Listen 10.35.17.1:80
Listen 10.35.17.1:8000
```

```
# Public: www.ici.com on port 80
<VirtualHost 10.35.17.1:80>
   ServerName www.ici.com
   DocumentRoot /var/www/virtuals/ici
   ErrorLog /var/www/virtuals/ici/logs/ici_error.log
   TransferLog /var/www/virtuals/ici/logs/ici_access.log
   <Directory "/var/www/virtuals/ici">
     Require all granted
   </Directory>
</VirtualHost>

# Public: intranet.ici.com on port 80
<VirtualHost 10.35.17.1:80>
   ServerName intranet.ici.com
   DocumentRoot /var/www/virtuals/intranet
   ErrorLog /var/www/virtuals/intranet/logs/intranet_error.log
   TransferLog /var/www/virtuals/intranet/logs/intranet_access.log
   <Directory "/var/www/virtuals/intranet">
     Require all granted
   </Directory>
</VirtualHost>

# Restricted: intranet.ici.com on port 8000
<VirtualHost 10.35.17.1:8000>
   ServerName intranet.ici.com
   DocumentRoot /var/www/virtuals/pre_production
   ErrorLog /var/www/virtuals/pre_production/logs/preprod_error.log
   TransferLog /var/www/virtuals/pre_production/logs/preprod_access.log
   <Directory "/var/www/virtuals/pre_production">
```

```
        Require ip 10.35.17.0/24
    </Directory>
</VirtualHost>


# Restricted: development.ici.com on port 80
<VirtualHost 10.35.17.1:80>
    ServerName development.ici.com
    DocumentRoot /var/www/virtuals/development
    ErrorLog /var/www/virtuals/development/logs/devel_error.log
    TransferLog /var/www/virtuals/development/logs/devel_access.log
    <Directory "/var/www/virtuals/development">
        Require ip 10.35.17.0/24
    </Directory>
</VirtualHost>
```

```
ServerRoot "/etc/httpd"
Listen 192.168.50.10:80
Listen 10.35.16.1:80
Listen 10.35.16.1:8000
Listen 10.35.17.1:80
Listen 10.35.17.1:8000
```
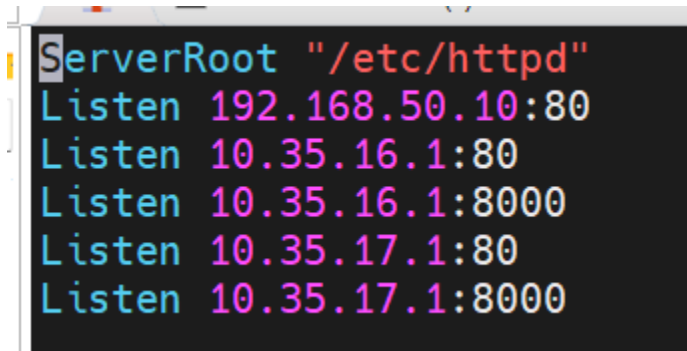
```
## Task 3
# Public: www.ici.com on port 80
<VirtualHost 10.35.17.1:80>
    ServerName www.ici.com
    DocumentRoot /var/www/virtuals/ici
    ErrorLog /var/www/virtuals/ici/logs/ici_error.log
    TransferLog /var/www/virtuals/ici/logs/ici_access.log
    <Directory "/var/www/virtuals/ici">
        Require all granted
    </Directory>
</VirtualHost>

# Public: intranet.ici.com on port 80
<VirtualHost 10.35.17.1:80>
    ServerName intranet.ici.com
    DocumentRoot /var/www/virtuals/intranet
    ErrorLog /var/www/virtuals/intranet/logs/intranet_error.log
    TransferLog /var/www/virtuals/intranet/logs/intranet_access.log
    <Directory "/var/www/virtuals/intranet">
        Require all granted
    </Directory>
</VirtualHost>

# Restricted: intranet.ici.com on port 8000
<VirtualHost 10.35.17.1:8000>
    ServerName intranet.ici.com
    DocumentRoot /var/www/virtuals/pre_production
    ErrorLog /var/www/virtuals/pre_production/logs/preprod_error.log
    TransferLog /var/www/virtuals/pre_production/logs/preprod_access.log
    <Directory "/var/www/virtuals/pre_production">
        Require ip 10.35.17.0/24
    </Directory>
</VirtualHost>

# Restricted: development.ici.com on port 80
<VirtualHost 10.35.17.1:80>
    ServerName development.ici.com
    DocumentRoot /var/www/virtuals/development
    ErrorLog /var/www/virtuals/development/logs/devel_error.log
    TransferLog /var/www/virtuals/development/logs/devel_access.log
    <Directory "/var/www/virtuals/development">
        Require ip 10.35.17.0/24
    </Directory>
</VirtualHost>
```

2. Verify the syntax of configuration file after changes

httpd -t

```
[root@server1 conf]# httpd -t
Syntax OK
[root@server1 conf]#
```

httpd -S

```
[root@server1 virtuals]# httpd -S
VirtualHost configuration:
10.35.16.1:80          is a NameVirtualHost
        default server virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:35)
        port 80 namevhost virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:35)
        port 80 namevhost virtual2.aucegep.com (/etc/httpd/conf/httpd.conf:43)
10.35.16.1:8000        is a NameVirtualHost
        default server virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:51)
        port 8000 namevhost virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:51)
        port 8000 namevhost virtual2.aucegep.com (/etc/httpd/conf/httpd.conf:59)
10.35.17.1:8000        intranet.ici.com (/etc/httpd/conf/httpd.conf:90)
10.35.17.1:80          is a NameVirtualHost
        default server www.ici.com (/etc/httpd/conf/httpd.conf:68)
        port 80 namevhost www.ici.com (/etc/httpd/conf/httpd.conf:68)
        port 80 namevhost intranet.ici.com (/etc/httpd/conf/httpd.conf:79)
        port 80 namevhost development.ici.com (/etc/httpd/conf/httpd.conf:101)
ServerRoot: "/etc/httpd"
Main DocumentRoot: "/var/www/html_project2"
Main ErrorLog: "/etc/httpd/logs/error_log"
Mutex authdigest-client: using_defaults
Mutex dav_fs-lockdb: using_defaults
Mutex lua-ivm-shm: using_defaults
Mutex proxy: using_defaults
Mutex authn-socache: using_defaults
Mutex default: dir="/etc/httpd/run/" mechanism=default
Mutex cache-socache: using_defaults
Mutex authdigest-opaque: using_defaults
Mutex watchdog-callback: using_defaults
Mutex proxy-balancer-shm: using_defaults
Mutex rewrite-map: using_defaults
PidFile: "/etc/httpd/run/httpd.pid"
Define: DUMP_VHOSTS
Define: DUMP_RUN_CFG
User: name="apache" id=48
Group: name="apache" id=48
[root@server1 virtuals]#
```

3. Restart Apache: Apply the configuration changes

systemctl restart httpd

```
[root@server1 conf]# systemctl restart httpd
```

4. Verify httpd status

systemctl status httpd

```
Similar command is: 'systemctl'
[root@server1 virtuals]# systemctl status httpd
● httpd.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
     Active: active (running) since Tue 2025-04-22 21:55:26 EDT; 1min 33s ago
       Docs: man:httpd.service(8)
   Main PID: 25074 (httpd)
     Status: "Total requests: 0; Idle/Busy workers 100/0;Requests/sec: 0; Bytes served/sec:    0 B/sec"
      Tasks: 177 (limit: 22829)
     Memory: 39.7M
        CPU: 481ms
     CGroup: /system.slice/httpd.service
             ─25074 /usr/sbin/httpd -DFOREGROUND
             ─25075 /usr/sbin/httpd -DFOREGROUND
             ─25076 /usr/sbin/httpd -DFOREGROUND
             ─25077 /usr/sbin/httpd -DFOREGROUND
             ─25078 /usr/sbin/httpd -DFOREGROUND

Apr 22 21:55:25 server1 systemd[1]: Starting The Apache HTTP Server...
Apr 22 21:55:26 server1 httpd[25074]: Server configured, listening on: 10.35.17.1 port 8000, ...
Apr 22 21:55:26 server1 systemd[1]: Started The Apache HTTP Server.
[root@server1 virtuals]#
```

5. Permissions and SeLinux changes for logs

   a) Set permissions and ownership

   sudo chown apache:apache /var/www/virtuals/*/logs/*.log

   sudo chmod 755 /var/www/virtuals/*/logs/*.log

   b) Authorize the writing in the folders used by virtuals in SELinux

   chcon -R -t httpd_sys_rw_content_t /var/www/virtuals/*/logs/*.log

6. Verify setup

   a) ls -lqrtha /var/www/virtuals/*/logs/*.log

```
[root@server1 virtuals]# ls -lqrtha /var/www/virtuals/*/logs/*.log
-rwxr-xr-x. 1 apache apache 1.1K Apr 22 20:45 /var/www/virtuals/virtual2_80/logs/virtual2_80_error.log
-rwxr-xr-x. 1 apache apache  216 Apr 22 20:45 /var/www/virtuals/virtual2_80/logs/virtual2_80_access.log
-rwxr-xr-x. 1 apache apache 1.1K Apr 22 20:46 /var/www/virtuals/virtual2_8000/logs/virtual2_8000_error.log
-rwxr-xr-x. 1 apache apache  216 Apr 22 20:46 /var/www/virtuals/virtual2_8000/logs/virtual2_8000_access.log
-rwxr-xr-x. 1 apache apache 1.4K Apr 22 20:46 /var/www/virtuals/virtual1_80/logs/virtual1_80_error.log
-rwxr-xr-x. 1 apache apache  324 Apr 22 20:46 /var/www/virtuals/virtual1_80/logs/virtual1_80_access.log
-rwxr-xr-x. 1 apache apache 1.4K Apr 22 20:47 /var/www/virtuals/virtual1_8000/logs/virtual1_8000_error.log
-rwxr-xr-x. 1 apache apache  324 Apr 22 20:47 /var/www/virtuals/virtual1_8000/logs/virtual1_8000_access.log
-rwxr-xr-x. 1 apache apache    0 Apr 22 21:55 /var/www/virtuals/pre_production/logs/preprod_error.log
-rwxr-xr-x. 1 apache apache    0 Apr 22 21:55 /var/www/virtuals/development/logs/devel_error.log
-rwxr-xr-x. 1 apache apache    0 Apr 22 21:55 /var/www/virtuals/intranet/logs/intranet_error.log
-rwxr-xr-x. 1 apache apache    0 Apr 22 21:55 /var/www/virtuals/ici/logs/ici_error.log
-rwxr-xr-x. 1 apache apache    0 Apr 22 21:55 /var/www/virtuals/pre_production/logs/preprod_access.log
-rwxr-xr-x. 1 apache apache    0 Apr 22 21:55 /var/www/virtuals/intranet/logs/intranet_access.log
-rwxr-xr-x. 1 apache apache    0 Apr 22 21:55 /var/www/virtuals/development/logs/devel_access.log
-rwxr-xr-x. 1 apache apache    0 Apr 22 21:55 /var/www/virtuals/ici/logs/ici_access.log
[root@server1 virtuals]#
```

   b) ls -lZ -R /var/www/virtuals/*/logs/*.log

```
[root@server1 virtuals]# ls -lZ -R /var/www/virtuals/*/logs/*.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0    0 Apr 22 21:55 /var/www/virtuals/development/logs/devel_access.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0    0 Apr 22 21:55 /var/www/virtuals/development/logs/devel_error.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0    0 Apr 22 21:55 /var/www/virtuals/ici/logs/ici_access.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0    0 Apr 22 21:55 /var/www/virtuals/ici/logs/ici_error.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0    0 Apr 22 21:55 /var/www/virtuals/intranet/logs/intranet_access.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0    0 Apr 22 21:55 /var/www/virtuals/intranet/logs/intranet_error.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0    0 Apr 22 21:55 /var/www/virtuals/pre_production/logs/preprod_access.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0    0 Apr 22 21:55 /var/www/virtuals/pre_production/logs/preprod_error.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0  324 Apr 22 20:47 /var/www/virtuals/virtual1_8000/logs/virtual1_8000_access.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0 1368 Apr 22 20:47 /var/www/virtuals/virtual1_8000/logs/virtual1_8000_error.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0  324 Apr 22 20:46 /var/www/virtuals/virtual1_80/logs/virtual1_80_access.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0 1351 Apr 22 20:46 /var/www/virtuals/virtual1_80/logs/virtual1_80_error.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0  216 Apr 22 20:46 /var/www/virtuals/virtual2_8000/logs/virtual2_8000_access.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0 1094 Apr 22 20:46 /var/www/virtuals/virtual2_8000/logs/virtual2_8000_error.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0  216 Apr 22 20:45 /var/www/virtuals/virtual2_80/logs/virtual2_80_access.log
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0 1077 Apr 22 20:45 /var/www/virtuals/virtual2_80/logs/virtual2_80_error.log
[root@server1 virtuals]#
```

6.10 Testing

6.10.1   Server

6.10.1.1 Public sites (should work from anywhere)

curl -v http://www.ici.com

curl -H "Host: www.ici.com" http://10.35.17.1

```
[root@server1 virtuals]#
[root@server1 virtuals]# curl -v http://www.ici.com
*   Trying 10.35.17.1:80...
* Connected to www.ici.com (10.35.17.1) port 80 (#0)
> GET / HTTP/1.1
> Host: www.ici.com
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 02:10:50 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 01:03:34 GMT
< ETag: "1e-63367ab9c9b6f"
< Accept-Ranges: bytes
< Content-Length: 30
< Content-Type: text/html; charset=UTF-8
<
<h1>www.ici.com (Public)</h1>
* Connection #0 to host www.ici.com left intact
[root@server1 virtuals]#
[root@server1 virtuals]#
[root@server1 virtuals]# curl -H "Host: www.ici.com" http://10.35.17.1
<h1>www.ici.com (Public)</h1>
[root@server1 virtuals]#
[root@server1 virtuals]#
```

curl -v --interface 10.50.1.1 http://www.ici.com

curl --interface 10.50.1.1 -H "Host: www.ici.com" http://10.35.17.1

```
[root@server1 ~]#
[root@server1 ~]# curl -v --interface 10.50.1.1  http://www.ici.com
*   Trying 10.35.17.1:80...
* Name '10.50.1.1' family 2 resolved to '10.50.1.1' family 2
* Local port: 0
* Connected to www.ici.com (10.35.17.1) port 80 (#0)
> GET / HTTP/1.1
> Host: www.ici.com
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 02:17:47 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 01:03:34 GMT
< ETag: "1e-63367ab9c9b6f"
< Accept-Ranges: bytes
< Content-Length: 30
< Content-Type: text/html; charset=UTF-8
<
<h1>www.ici.com (Public)</h1>
* Connection #0 to host www.ici.com left intact
[root@server1 ~]# curl --interface 10.50.1.1  -H "Host: www.ici.com" http://10.35.17.1
<h1>www.ici.com (Public)</h1>
[root@server1 ~]#
[root@server1 ~]#
[root@server1 ~]#
```

curl -v http://intranet.ici.com

curl -H "Host: intranet.ici.com" http://10.35.17.1

```
[root@server1 virtuals]# curl -v http://intranet.ici.com:8000
*   Trying 10.35.17.1:8000...
* Connected to intranet.ici.com (10.35.17.1) port 8000 (#0)
> GET / HTTP/1.1
> Host: intranet.ici.com:8000
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 02:12:12 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 01:04:13 GMT
< ETag: "31-63367adfc5518"
< Accept-Ranges: bytes
< Content-Length: 49
< Content-Type: text/html; charset=UTF-8
<
<h1>intranet.ici.com Port 8000 (Restricted)</h1>
* Connection #0 to host intranet.ici.com left intact
[root@server1 virtuals]# curl -H "Host: development.ici.com" http://10.35.17.1
<h1>development.ici.com (Restricted)</h1>
[root@server1 virtuals]#
```

curl -v --interface 10.50.1.1   http://intranet.ici.com

curl --interface 10.50.1.1 -H "Host: intranet.ici.com" http://10.35.17.1

```
[root@server1 ~]#
[root@server1 ~]# curl -v --interface 10.50.1.1   http://intranet.ici.com
*   Trying 10.35.17.1:80...
* Name '10.50.1.1' family 2 resolved to '10.50.1.1' family 2
* Local port: 0
* Connected to intranet.ici.com (10.35.17.1) port 80 (#0)
> GET / HTTP/1.1
> Host: intranet.ici.com
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 02:19:45 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 01:04:03 GMT
< ETag: "2b-63367ad646a96"
< Accept-Ranges: bytes
< Content-Length: 43
< Content-Type: text/html; charset=UTF-8
<
<h1>intranet.ici.com Port 80 (Public)</h1>
* Connection #0 to host intranet.ici.com left intact
[root@server1 ~]#
[root@server1 ~]#
[root@server1 ~]# curl --interface 10.50.1.1  -H "Host: intranet.ici.com" http://10.35.17.1
<h1>intranet.ici.com Port 80 (Public)</h1>
[root@server1 ~]#
```

6.10.1.2 Restricted sites (should only work from 10.35.17.0/24)

curl -v http://intranet.ici.com:8000

curl -H "Host: intranet.ici.com" http://10.35.17.1:8000

```
[root@server1 ~]# curl -v http://intranet.ici.com:8000
*   Trying 10.35.17.1:8000...
* Connected to intranet.ici.com (10.35.17.1) port 8000 (#0)
> GET / HTTP/1.1
> Host: intranet.ici.com:8000
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 02:20:31 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 01:04:13 GMT
< ETag: "31-63367adfc5518"
< Accept-Ranges: bytes
< Content-Length: 49
< Content-Type: text/html; charset=UTF-8
<
<h1>intranet.ici.com Port 8000 (Restricted)</h1>
* Connection #0 to host intranet.ici.com left intact
[root@server1 ~]# curl -H "Host: intranet.ici.com" http://10.35.17.1:8000
<h1>intranet.ici.com Port 8000 (Restricted)</h1>
[root@server1 ~]#
```

curl -v http://development.ici.com

curl -H "Host: development.ici.com" http://10.35.17.1

```
[root@server1 ~]# curl -v http://development.ici.com
*   Trying 10.35.17.1:80...
* Connected to development.ici.com (10.35.17.1) port 80 (#0)
> GET / HTTP/1.1
> Host: development.ici.com
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 02:21:01 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 01:04:23 GMT
< ETag: "2a-63367ae8f462b"
< Accept-Ranges: bytes
< Content-Length: 42
< Content-Type: text/html; charset=UTF-8
<
<h1>development.ici.com (Restricted)</h1>
* Connection #0 to host development.ici.com left intact
[root@server1 ~]# curl -H "Host: development.ici.com" http://10.35.17.1
<h1>development.ici.com (Restricted)</h1>
[root@server1 ~]#
```

These will return 403 if not from allowed subnet

curl -v --interface 10.50.1.1   http://intranet.ici.com:8000

curl --interface 10.50.1.1   -H "Host: development.ici.com" http://10.35.17.1

```
[root@server1 ~]#
[root@server1 ~]# curl -v --interface 10.50.1.1   http://intranet.ici.com:8000
*   Trying 10.35.17.1:8000...
* Name '10.50.1.1' family 2 resolved to '10.50.1.1' family 2
* Local port: 0
* Connected to intranet.ici.com (10.35.17.1) port 8000 (#0)
> GET / HTTP/1.1
> Host: intranet.ici.com:8000
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 403 Forbidden
< Date: Wed, 23 Apr 2025 02:23:44 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Content-Length: 199
< Content-Type: text/html; charset=iso-8859-1
<
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>403 Forbidden</title>
</head><body>
<h1>Forbidden</h1>
<p>You don't have permission to access this resource.</p>
</body></html>
* Connection #0 to host intranet.ici.com left intact
[root@server1 ~]# curl --interface 10.50.1.1    -H  "Host: development.ici.com" http://10.35.17.1
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>403 Forbidden</title>
</head><body>
<h1>Forbidden</h1>
<p>You don't have permission to access this resource.</p>
</body></html>
[root@server1 ~]#
```

6.10.2   Client

Task 3

Task 3 - Subdomains

- http://www.ici.com
- http://intranet.ici.com
- http://intranet.ici.com:8000
- http://development.ici.com

6.10.2.1 http://www.ici.com

6.10.2.2 http://intranet.ici.com

6.10.2.3 http://intranet.ici.com:8000

6.10.2.4 http://development.ici.com

7 Task 4 – Virtual Web Servers by IP and Port

Create directories

7.1 Create document root directories

mkdir -p /var/www/virtuals/q4/{sales,admin,thing,other}

```
[root@server1 ~]# sudo mkdir -p /var/www/virtuals/q4/{sales,admin,thing,other}
[root@server1 ~]# ls -lqrtha /var/www/virtuals/q4/{sales,admin,thing,other}
/var/www/virtuals/q4/thing:
total 0
drwxr-xr-x. 2 root root  6 Apr 22 22:40 .
drwxr-xr-x. 6 root root 58 Apr 22 22:40 ..

/var/www/virtuals/q4/sales:
total 0
drwxr-xr-x. 2 root root  6 Apr 22 22:40 .
drwxr-xr-x. 6 root root 58 Apr 22 22:40 ..

/var/www/virtuals/q4/admin:
total 0
drwxr-xr-x. 2 root root  6 Apr 22 22:40 .
drwxr-xr-x. 6 root root 58 Apr 22 22:40 ..

/var/www/virtuals/q4/other:
total 0
drwxr-xr-x. 6 root root 58 Apr 22 22:40 ..
drwxr-xr-x. 2 root root  6 Apr 22 22:40 .
[root@server1 ~]#
```

7.2 Create sample index files

echo "<h1>Sales Department (Port 8080)</h1>" | sudo tee
/var/www/virtuals/q4/sales/index.html

echo "<h1>Admin Portal (Port 8081)</h1>" | sudo tee
/var/www/virtuals/q4/admin/index.html

echo "<h1>Thing Service (Port 8082)</h1>" | sudo tee
/var/www/virtuals/q4/thing/index.html

echo "<h1>Other Resources (Port 8083)</h1>" | sudo tee
/var/www/virtuals/q4/other/index.html

```
[root@server1 ~]# echo "<h1>Sales Department (Port 8080)</h1>" | sudo tee /var/www/virtuals/q4/sales/index.html
<h1>Sales Department (Port 8080)</h1>
[root@server1 ~]# echo "<h1>Admin Portal (Port 8081)</h1>" | sudo tee /var/www/virtuals/q4/admin/index.html
<h1>Admin Portal (Port 8081)</h1>
[root@server1 ~]# echo "<h1>Thing Service (Port 8082)</h1>" | sudo tee /var/www/virtuals/q4/thing/index.html
<h1>Thing Service (Port 8082)</h1>
[root@server1 ~]# echo "<h1>Other Resources (Port 8083)</h1>" | sudo tee /var/www/virtuals/q4/other/index.html
<h1>Other Resources (Port 8083)</h1>
[root@server1 ~]#
```

7.2.1 Create log directories for each virtual host

mkdir -p /var/www/virtuals/q4/{sales,admin,thing,other}/logs

7.2.2 Set permissions

chown -R apache:apache /var/www/virtuals/q4

chmod -R 755 /var/www/virtuals/q4

```
[root@server1 ~]# chown -R apache:apache /var/www/virtuals/q4
[root@server1 ~]# chmod -R 755 /var/www/virtuals/q4
[root@server1 ~]#
```

ls -lqrtha /var/www/virtuals/q4/{sales,admin,thing,other}

```
[root@server1 ~]# ls -lqrtha /var/www/virtuals/q4/{sales,admin,thing,other}
/var/www/virtuals/q4/sales:
total 4.0K
drwxr-xr-x. 6 apache apache 58 Apr 22 22:40 ..
-rwxr-xr-x. 1 apache apache 38 Apr 22 22:41 index.html
drwxr-xr-x. 2 apache apache  6 Apr 22 22:45 logs
drwxr-xr-x. 3 apache apache 36 Apr 22 22:45 .

/var/www/virtuals/q4/thing:
total 4.0K
drwxr-xr-x. 6 apache apache 58 Apr 22 22:40 ..
-rwxr-xr-x. 1 apache apache 35 Apr 22 22:41 index.html
drwxr-xr-x. 2 apache apache  6 Apr 22 22:45 logs
drwxr-xr-x. 3 apache apache 36 Apr 22 22:45 .

/var/www/virtuals/q4/admin:
total 4.0K
drwxr-xr-x. 6 apache apache 58 Apr 22 22:40 ..
-rwxr-xr-x. 1 apache apache 34 Apr 22 22:41 index.html
drwxr-xr-x. 2 apache apache  6 Apr 22 22:45 logs
drwxr-xr-x. 3 apache apache 36 Apr 22 22:45 .

/var/www/virtuals/q4/other:
total 4.0K
drwxr-xr-x. 6 apache apache 58 Apr 22 22:40 ..
-rwxr-xr-x. 1 apache apache 37 Apr 22 22:41 index.html
drwxr-xr-x. 2 apache apache  6 Apr 22 22:45 logs
drwxr-xr-x. 3 apache apache 36 Apr 22 22:45 .
[root@server1 ~]#
```

7.3 SELinux

Configure SELinux for Non-Standard Ports

Add all required ports to SELinux

sudo semanage port -a -t http_port_t -p tcp 8080

sudo semanage port -a -t http_port_t -p tcp 8081

sudo semanage port -a -t http_port_t -p tcp 8082

sudo semanage port -a -t http_port_t -p tcp 8083

```
[root@server1 logs]#
[root@server1 logs]# sudo semanage port -a -t http_port_t -p tcp 8080
Port tcp/8080 already defined, modifying instead
[root@server1 logs]# sudo semanage port -a -t http_port_t -p tcp 8081
Port tcp/8081 already defined, modifying instead
[root@server1 logs]# sudo semanage port -a -t http_port_t -p tcp 8082
Port tcp/8082 already defined, modifying instead
[root@server1 logs]# sudo semanage port -a -t http_port_t -p tcp 8083
Port tcp/8083 already defined, modifying instead
[root@server1 logs]#
```

Verify they're added

sudo semanage port -l | grep http_port_t

```
[root@server1 logs]# sudo semanage port -l | grep http_port_t
http_port_t               tcp      8083, 8082, 8081, 8080, 8000, 80, 81, 443, 488, 8008, 8009, 8443, 9000
pegasus_http_port_t       tcp      5988
[root@server1 logs]#
```

7.4 Firewall

Add ports to firewall

sudo firewall-cmd --list-ports --zone=nm-shared

sudo firewall-cmd --permanent --add-port=8080-8083/tcp --zone=nm-shared

sudo firewall-cmd –reload

```
[root@server1 logs]# sudo firewall-cmd --list-ports --zone=nm-shared
80/tcp 8000/tcp
[root@server1 logs]# sudo firewall-cmd --permanent --add-port=8080-8083/tcp --zone=nm-shared
success
[root@server1 logs]# sudo firewall-cmd --reload
success
[root@server1 logs]# sudo firewall-cmd --list-ports --zone=nm-shared
80/tcp 8000/tcp 8080-8083/tcp
[root@server1 logs]#
```

7.5 Apache Configuration

1. Edit your main configuration file:

vim /etc/httpd/conf/httpd.conf

Add Ports

Listen 10.35.16.1:8080

```
Listen 10.35.16.1:8081
Listen 10.35.16.1:8082
Listen 10.35.16.1:8083
```

Add Virtual hosts

```
# Sales Server (Port 8080)
<VirtualHost 10.35.16.1:8080>
   DocumentRoot /var/www/virtuals/q4/sales
   ErrorLog /var/www/virtuals/q4/sales/logs/sales_error.log
   TransferLog /var/www/virtuals/q4/sales/logs/sales_access.log
   <Directory "/var/www/virtuals/q4/sales">
     Require all granted
   </Directory>
</VirtualHost>

# Admin Server (Port 8081)
<VirtualHost 10.35.16.1:8081>
   DocumentRoot /var/www/virtuals/q4/admin
   ErrorLog /var/www/virtuals/q4/admin/logs/admin_error.log
   TransferLog /var/www/virtuals/q4/admin/logs/admin_access.log
 <Directory "/var/www/virtuals/q4/admin">
     Require all granted
   </Directory>
</VirtualHost>

# Thing Server (Port 8082)
<VirtualHost 10.35.16.1:8082>
   DocumentRoot /var/www/virtuals/q4/thing
   ErrorLog /var/www/virtuals/q4/thing/logs/thing _error.log
   TransferLog /var/www/virtuals/q4/thing/logs/thing_access.log
   <Directory "/var/www/virtuals/q4/thing">
     Require all granted
   </Directory>
</VirtualHost>

# Other Server (Port 8083)
<VirtualHost 10.35.16.1:8083>
   DocumentRoot /var/www/virtuals/q4/other
   ErrorLog /var/www/virtuals/q4/other/logs/other _error.log
   TransferLog /var/www/virtuals/q4/other/logs/other_access.log
   <Directory "/var/www/virtuals/q4/other">
     Require all granted
```

```
    </Directory>
</VirtualHost>
```

7. Verify the syntax of configuration file after changes

httpd -t

```
[root@server1 conf]# httpd -t
Syntax OK
[root@server1 conf]#
```

httpd -S

```
[root@server1 logs]# httpd -S
VirtualHost configuration:
10.35.16.1:80          is a NameVirtualHost
        default server virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:40)
        port 80 namevhost virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:40)
        port 80 namevhost virtual2.aucegep.com (/etc/httpd/conf/httpd.conf:48)
10.35.16.1:8000        is a NameVirtualHost
        default server virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:56)
        port 8000 namevhost virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:56)
        port 8000 namevhost virtual2.aucegep.com (/etc/httpd/conf/httpd.conf:64)
10.35.16.1:8080          virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:120)
10.35.16.1:8081          virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:130)
10.35.16.1:8082          virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:140)
10.35.16.1:8083          virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:150)
10.35.17.1:8000          intranet.ici.com (/etc/httpd/conf/httpd.conf:95)
10.35.17.1:80          is a NameVirtualHost
        default server www.ici.com (/etc/httpd/conf/httpd.conf:73)
        port 80 namevhost www.ici.com (/etc/httpd/conf/httpd.conf:73)
        port 80 namevhost intranet.ici.com (/etc/httpd/conf/httpd.conf:84)
        port 80 namevhost development.ici.com (/etc/httpd/conf/httpd.conf:106)
ServerRoot: "/etc/httpd"
Main DocumentRoot: "/var/www/html_project2"
Main ErrorLog: "/etc/httpd/logs/error_log"
Mutex authdigest-opaque: using_defaults
Mutex watchdog-callback: using_defaults
Mutex proxy-balancer-shm: using_defaults
Mutex rewrite-map: using_defaults
Mutex authdigest-client: using_defaults
Mutex dav_fs-lockdb: using_defaults
Mutex lua-ivm-shm: using_defaults
Mutex proxy: using_defaults
Mutex authn-socache: using_defaults
Mutex default: dir="/etc/httpd/run/" mechanism=default
Mutex cache-socache: using_defaults
PidFile: "/etc/httpd/run/httpd.pid"
Define: DUMP_VHOSTS
Define: DUMP_RUN_CFG
```

8. Restart Apache: Apply the configuration changes

systemctl restart httpd

```
[root@server1 conf]# systemctl restart httpd
```

9. Verify httpd status

systemctl status httpd

```
[root@server1 logs]# systemctl status httpd
● httpd.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
     Active: active (running) since Tue 2025-04-22 23:15:11 EDT; 6s ago
       Docs: man:httpd.service(8)
   Main PID: 26346 (httpd)
     Status: "Started, listening on: 10.35.16.1 port 8083, ..."
      Tasks: 177 (limit: 22829)
     Memory: 34.0M
        CPU: 221ms
     CGroup: /system.slice/httpd.service
             ─26346 /usr/sbin/httpd -DFOREGROUND
             ─26347 /usr/sbin/httpd -DFOREGROUND
             ─26348 /usr/sbin/httpd -DFOREGROUND
             ─26349 /usr/sbin/httpd -DFOREGROUND
             ─26350 /usr/sbin/httpd -DFOREGROUND

Apr 22 23:15:11 server1 systemd[1]: Starting The Apache HTTP Server...
Apr 22 23:15:11 server1 httpd[26346]: Server configured, listening on: 10.35.16.1 port 8083, ...
Apr 22 23:15:11 server1 systemd[1]: Started The Apache HTTP Server.
[root@server1 logs]#
```

10. Permissions and SeLinux changes for logs
    a) Set permissions and ownership

    sudo chown apache:apache -R /var/www/virtuals/*/*/logs

    sudo chmod 755 -R /var/www/virtuals/*/*/logs

    b) Authorize the writing in the folders used by virtuals in SELinux

    chcon -R -t httpd_sys_rw_content_t /var/www/virtuals/*/logs/*.log

11. Verify setup
    a) ls -lqrtha /var/www/virtuals/*/*/logs

```
[root@server1 logs]# ls -lqrtha /var/www/virtuals/*/*/logs
/var/www/virtuals/q4/thing/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 22:45 ..
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:15 thing_error.log
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:15 thing_access.log
drwxr-xr-x. 2 apache apache 53 Apr 22 23:15 .

/var/www/virtuals/q4/sales/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 22:45 ..
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:15 sales_error.log
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:15 sales_access.log
drwxr-xr-x. 2 apache apache 53 Apr 22 23:15 .

/var/www/virtuals/q4/other/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 22:45 ..
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:15 other_error.log
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:15 other_access.log
drwxr-xr-x. 2 apache apache 53 Apr 22 23:15 .

/var/www/virtuals/q4/admin/logs:
total 0
drwxr-xr-x. 3 apache apache 36 Apr 22 22:45 ..
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:15 admin_error.log
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:15 admin_access.log
drwxr-xr-x. 2 apache apache 53 Apr 22 23:15 .
[root@server1 logs]#
```

b) ls -lZ -R /var/www/virtuals/*/logs/*.log

```
-rwxr-xr-x. 1 apache apache system_u:object_r:httpd_sys_rw_content_t:s0 1923 Apr 22 22:25 virtual2_0000_
[root@server1 logs]# ls -lZ -R /var/www/virtuals/*/*/logs
/var/www/virtuals/q4/admin/logs:
total 0
-rw-r--r--. 1 root root system_u:object_r:httpd_sys_rw_content_t:s0 0 Apr 22 23:15 admin_access.log
-rw-r--r--. 1 root root system_u:object_r:httpd_sys_rw_content_t:s0 0 Apr 22 23:15 admin_error.log

/var/www/virtuals/q4/other/logs:
total 0
-rw-r--r--. 1 root root system_u:object_r:httpd_sys_rw_content_t:s0 0 Apr 22 23:15 other_access.log
-rw-r--r--. 1 root root system_u:object_r:httpd_sys_rw_content_t:s0 0 Apr 22 23:15 other_error.log

/var/www/virtuals/q4/sales/logs:
total 0
-rw-r--r--. 1 root root system_u:object_r:httpd_sys_rw_content_t:s0 0 Apr 22 23:15 sales_access.log
-rw-r--r--. 1 root root system_u:object_r:httpd_sys_rw_content_t:s0 0 Apr 22 23:15 sales_error.log

/var/www/virtuals/q4/thing/logs:
total 0
-rw-r--r--. 1 root root system_u:object_r:httpd_sys_rw_content_t:s0 0 Apr 22 23:15 thing_access.log
-rw-r--r--. 1 root root system_u:object_r:httpd_sys_rw_content_t:s0 0 Apr 22 23:15 thing_error.log
[root@server1 logs]#
```

ATIONAL EDITION - This edition of MobaXterm is available only to teachers and students in classrooms or at home

7.6 Testing

7.6.1 Client

Task 4

Task 4 - IP-based URLs

- http://10.35.16.1:8080
- http://10.35.Hi.1:8081
- http://10.35.16.1:8082
- http://10.35.16.1:8083

7.6.1.1 http://10.35.16.1:8080

7.6.1.2 http://10.35.16.1:8081

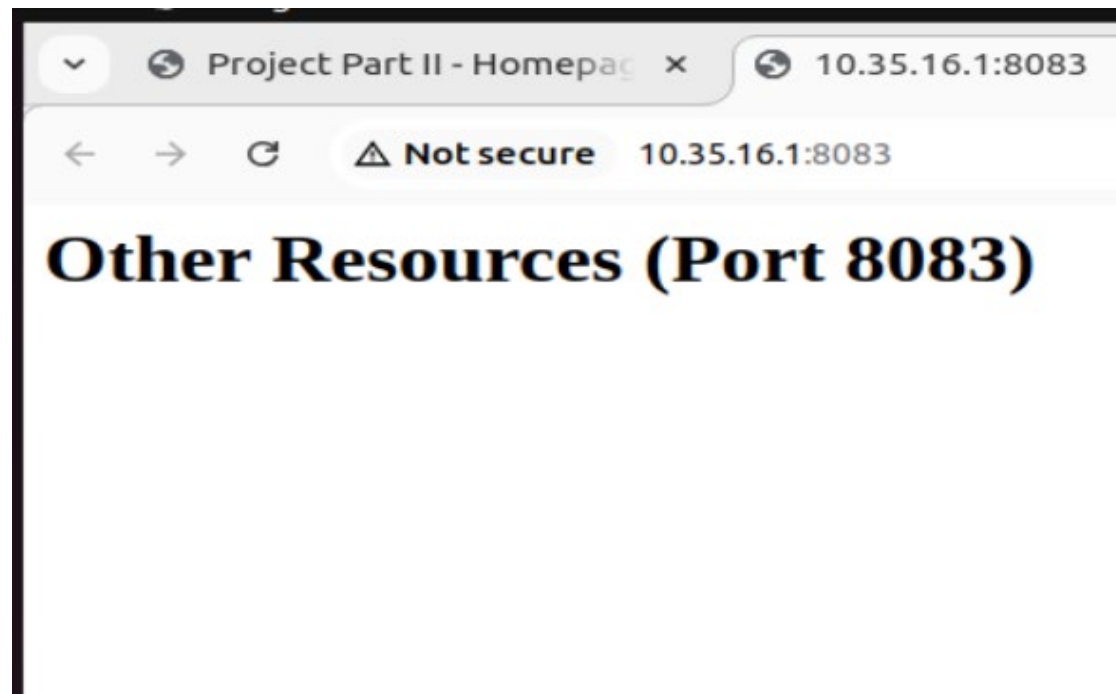### 7.6.1.3 http://10.35.16.1:8082

7.6.1.4 http://10.35.16.1:8083

8   Task 5 – Dynamic virtual hosting

8.1   Hosts File Configuration

Add 10.50.1.1 and sites to /etc/hosts

8.1.1 Server

echo "10.50.1.1 www.itmt.com www.itmt.ca www2.itmt.com www.montmo.com www.montmo.ca" | sudo tee -a /etc/hosts

```
[root@server1 /]#
[root@server1 /]# cat /etc/hosts
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1          localhost localhost.localdomain localhost6 localhost6.localdomain6

### Project 2
10.35.16.1    virtual1.aucegep.com
10.35.16.1    virtual2.aucegep.com
10.35.17.1    www.ici.com intranet.ici.com development.ici.com

[root@server1 /]# echo "10.50.1.1 www.itmt.com www.itmt.ca www2.itmt.com www.montmo.com www.montmo.ca" | sudo tee -a /etc/hosts
10.50.1.1 www.itmt.com www.itmt.ca www2.itmt.com www.montmo.com www.montmo.ca
[root@server1 /]# cat /etc/hosts
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1          localhost localhost.localdomain localhost6 localhost6.localdomain6

### Project 2
10.35.16.1    virtual1.aucegep.com
10.35.16.1    virtual2.aucegep.com
10.35.17.1    www.ici.com intranet.ici.com development.ici.com


10.50.1.1 www.itmt.com www.itmt.ca www2.itmt.com www.montmo.com www.montmo.ca
[root@server1 /]#
```

ip addr show ens192

```
drwxr-xr-x. 2 apache apache 63 Apr 23 00:21 .
[root@server1 /]# ip addr show ens192
3: ens192: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:0c:29:f6:c5:0f brd ff:ff:ff:ff:ff:ff
    altname enp11s0
    inet 192.168.50.10/24 brd 192.168.50.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.35.16.1/24 brd 10.35.16.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.35.17.1/24 brd 10.35.17.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 192.168.100.1/24 brd 192.168.100.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.50.1.1/24 brd 10.50.1.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.51.1.1/24 brd 10.51.1.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.52.1.1/24 brd 10.52.1.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet 10.53.1.1/24 brd 10.53.1.255 scope global noprefixroute ens192
       valid_lft forever preferred_lft forever
    inet6 fe80::3e70:81df:4f1a:15be/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
[root@server1 /]#
```

8.1.2 Client

```
root@client1:~# cat /etc/hosts
127.0.0.1        localhost
127.0.1.1        client1

# The following lines are desirable for IPv6 capable hosts
::1      ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
10.35.16.1 virtual1.aucegep.com
10.35.16.1 virtual2.aucegep.com
10.35.17.1 www.ici.com intranet.ici.com development.ici.com
10.50.1.1 www.itmt.com www.itmt.ca www2.itmt.com www.montmo.com www.montmo.ca
```

ip addr show ens33

```
root@client1:~# ip addr show ens33
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:2c:6a:1b brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.50.20/24 brd 192.168.50.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.35.16.2/24 brd 10.35.16.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.35.17.2/24 brd 10.35.17.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 192.168.100.2/24 brd 192.168.100.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
→   inet 10.50.1.2/24 brd 10.50.1.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.51.1.2/24 brd 10.51.1.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.52.1.2/24 brd 10.52.1.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet 10.53.1.2/24 brd 10.53.1.255 scope global noprefixroute ens33
       valid_lft forever preferred_lft forever
    inet6 fe80::6ef0:de03:28d2:41cf/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
root@client1:~#
```

8.2 Create directory structure for all sites

Create directory structure

sudo mkdir -p /var/www/virtuals/q5/{com,ca}/{itmt,montmo}/{www,www2}

8.3 Create sample index files

Create index files

echo "<h1>www.itmt.com</h1>" | sudo tee /var/www/virtuals/q5/com/itmt/www/index.html

echo "<h1>www.itmt.ca</h1>" | sudo tee /var/www/virtuals/q5/ca/itmt/www/index.html

echo "<h1>www2.itmt.com</h1>" | sudo tee /var/www/virtuals/q5/com/itmt/www2/index.html

echo "<h1>www.montmo.com</h1>" | sudo tee
/var/www/virtuals/q5/com/montmo/www/index.html

echo "<h1>www.montmo.ca</h1>" | sudo tee
/var/www/virtuals/q5/ca/montmo/www/index.html

```
[root@server1 logs]# sudo mkdir -p /var/www/virtuals/q5/{com,ca}/{itmt,montmo}/{www,www2}
[root@server1 logs]# echo "<h1>www.itmt.com</h1>" | sudo tee /var/www/virtuals/q5/com/itmt/www/index.html
<h1>www.itmt.com</h1>
[root@server1 logs]# echo "<h1>www.itmt.ca</h1>" | sudo tee /var/www/virtuals/q5/ca/itmt/www/index.html
<h1>www.itmt.ca</h1>
[root@server1 logs]# echo "<h1>www2.itmt.com</h1>" | sudo tee /var/www/virtuals/q5/com/itmt/www2/index.html
<h1>www2.itmt.com</h1>
[root@server1 logs]# echo "<h1>www.montmo.com</h1>" | sudo tee /var/www/virtuals/q5/com/montmo/www/index.html
<h1>www.montmo.com</h1>
[root@server1 logs]# echo "<h1>www.montmo.ca</h1>" | sudo tee /var/www/virtuals/q5/ca/montmo/www/index.html
<h1>www.montmo.ca</h1>
[root@server1 logs]#
```

```
[root@server1 /]#
[root@server1 /]# tree -L 4 /var/www/virtuals/q5/
/var/www/virtuals/q5/
├── ca
│   ├── itmt
│   │   ├── www
│   │   │   └── index.html
│   │   └── www2
│   └── montmo
│       ├── www
│       │   └── index.html
│       └── www2
└── com
    ├── itmt
    │   ├── www
    │   │   └── index.html
    │   └── www2
    │       └── index.html
    └── montmo
        ├── www
        │   └── index.html
        └── www2

14 directories, 5 files
[root@server1 /]#
```

8.4 Create Error log

All virtual host errors should be logged to:

/ var/www/virtuals/q5/logs/virtual_error_q5_log

sudo mkdir -p /var/www/virtuals/q5/logs

sudo touch /var/www/virtuals/q5/logs/virtual_error_q5_log

```
[root@server1 /]#
[root@server1 /]# sudo mkdir -p /var/www/virtuals/q5/logs
[root@server1 /]# sudo touch /var/www/virtuals/q5/logs/virtual_error_q5_log
[root@server1 /]#
[root@server1 /]# tree -L 4 /var/www/virtuals/q5/
/var/www/virtuals/q5/
├── ca
│   ├── itmt
│   │   ├── www
│   │   │   └── index.html
│   │   └── www2
│   └── montmo
│       ├── www
│       │   └── index.html
│       └── www2
├── com
│   ├── itmt
│   │   ├── www
│   │   │   └── index.html
│   │   └── www2
│   │       └── index.html
│   └── montmo
│       ├── www
│       │   └── index.html
│       └── www2
└── logs
    └── virtual_error_q5_log

15 directories, 6 files
[root@server1 /]#
```

8.5 Set permissions

sudo chown -R apache:apache /var/www/virtuals/

sudo chmod -R 755 /var/www/virtuals/

List to verify permissions

```
[root@server1 /]# ls -lqrtha -R /var/www/virtuals/q5/
/var/www/virtuals/q5/:
total 0
drwxr-xr-x. 12 apache apache 174 Apr 22 23:51 ..
drwxr-xr-x.  4 apache apache  32 Apr 22 23:51 com
drwxr-xr-x.  4 apache apache  32 Apr 22 23:51 ca
drwxr-xr-x.  5 apache apache  39 Apr 22 23:55 .
drwxr-xr-x.  2 apache apache  34 Apr 22 23:55 logs

/var/www/virtuals/q5/com:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 montmo
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 itmt
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 .
drwxr-xr-x. 5 apache apache 39 Apr 22 23:55 ..

/var/www/virtuals/q5/com/montmo:
total 0
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 www2
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 ..
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 .
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 www

/var/www/virtuals/q5/com/montmo/www2:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 .

/var/www/virtuals/q5/com/montmo/www:
total 4.0K
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
-rwxr-xr-x. 1 apache apache 24 Apr 22 23:53 index.html
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 .

/var/www/virtuals/q5/com/itmt:
total 0
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 ..
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 .
drwxr-xr-x. 2 apache apache 24 Apr 22 23:52 www
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 www2

/var/www/virtuals/q5/com/itmt/www:
total 4.0K
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
-rwxr-xr-x. 1 apache apache 22 Apr 22 23:52 index.html
drwxr-xr-x. 2 apache apache 24 Apr 22 23:52 .

/var/www/virtuals/q5/com/itmt/www2:
total 4.0K
```

```
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 .
-rwxr-xr-x. 1 apache apache 23 Apr 22 23:53 index.html


/var/www/virtuals/q5/ca:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 montmo
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 itmt
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 .
drwxr-xr-x. 5 apache apache 39 Apr 22 23:55 ..


/var/www/virtuals/q5/ca/montmo:
total 0
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 www2
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 ..
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 .
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 www


/var/www/virtuals/q5/ca/montmo/www2:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 .


/var/www/virtuals/q5/ca/montmo/www:
total 4.0K
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 .
-rwxr-xr-x. 1 apache apache 23 Apr 22 23:53 index.html


/var/www/virtuals/q5/ca/itmt:
total 0
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 www2
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 ..
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 .
drwxr-xr-x. 2 apache apache 24 Apr 22 23:52 www


/var/www/virtuals/q5/ca/itmt/www2:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 .


/var/www/virtuals/q5/ca/itmt/www:
total 4.0K
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
-rwxr-xr-x. 1 apache apache 21 Apr 22 23:52 index.html
drwxr-xr-x. 2 apache apache 24 Apr 22 23:52 .


/var/www/virtuals/q5/logs:
total 0
drwxr-xr-x. 5 apache apache 39 Apr 22 23:55 ..
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:55 virtual_error_q5_log
```

```
drwxr-xr-x. 2 apache apache 34 Apr 22 23:55 .
[root@server1 /]#
```

8.6 SELinux Configuration

chcon -R -t httpd_sys_rw_content_t /var/www/virtuals/

```
[root@server1 /]# chcon -R -t httpd_sys_rw_content_t /var/www/virtuals/
[root@server1 /]# ls -lZ -R /var/www/virtuals/q5/
/var/www/virtuals/q5/:
total 0
drwxr-xr-x. 4 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 32 Apr
22 23:51 ca
drwxr-xr-x. 4 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 32 Apr
22 23:51 com
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 34 Apr
22 23:55 logs

/var/www/virtuals/q5/ca:
total 0
drwxr-xr-x. 4 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 29 Apr
22 23:51 itmt
drwxr-xr-x. 4 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 29 Apr
22 23:51 montmo

/var/www/virtuals/q5/ca/itmt:
total 0
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 24 Apr
22 23:52 www
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr
22 23:51 www2

/var/www/virtuals/q5/ca/itmt/www:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 21 Apr
22 23:52 index.html

/var/www/virtuals/q5/ca/itmt/www2:
total 0

/var/www/virtuals/q5/ca/montmo:
total 0
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 24 Apr
22 23:53 www
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr
22 23:51 www2

/var/www/virtuals/q5/ca/montmo/www:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 23 Apr
22 23:53 index.html
```

```
/var/www/virtuals/q5/ca/montmo/www2:
total 0

/var/www/virtuals/q5/com:
total 0
drwxr-xr-x. 4 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 29 Apr
22 23:51 itmt
drwxr-xr-x. 4 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 29 Apr
22 23:51 montmo

/var/www/virtuals/q5/com/itmt:
total 0
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 24 Apr
22 23:52 www
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 24 Apr
22 23:53 www2

/var/www/virtuals/q5/com/itmt/www:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 22 Apr
22 23:52 index.html

/var/www/virtuals/q5/com/itmt/www2:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 23 Apr
22 23:53 index.html

/var/www/virtuals/q5/com/montmo:
total 0
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 24 Apr
22 23:53 www
drwxr-xr-x. 2 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0  6 Apr
22 23:51 www2

/var/www/virtuals/q5/com/montmo/www:
total 4
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 24 Apr
22 23:53 index.html

/var/www/virtuals/q5/com/montmo/www2:
total 0

/var/www/virtuals/q5/logs:
total 0
-rwxr-xr-x. 1 apache apache unconfined_u:object_r:httpd_sys_rw_content_t:s0 0 Apr 22
23:55 virtual_error_q5_log
[root@server1 /]#
```

8.7 Apache Configuration

1. Add to /etc/httpd/conf/httpd.conf:

   vim /etc/httpd/conf/httpd.conf
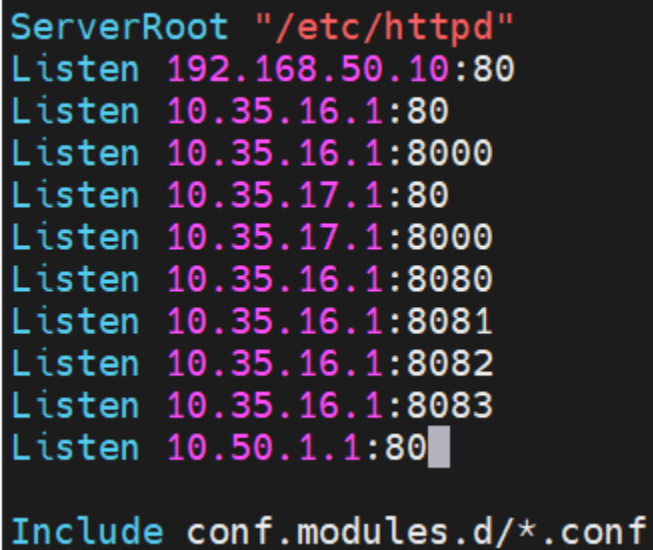
```
# Task 5 Configuration

<VirtualHost 10.50.1.1:80>
    ServerName dynamic-vhosts
    UseCanonicalName Off

    # Dynamic document root
    VirtualDocumentRoot "/var/www/virtuals/q5/%3/%2/%1/"

    # Centralized error logging
    ErrorLog "/var/www/virtuals/q5/logs/virtual_error_q5_log"
    TransferLog "/var/www/virtuals/q5/logs/virtual_access_q5_log"

    <Directory "/var/www/virtuals/q5">
        Options Indexes FollowSymLinks
        AllowOverride None
        Require all granted
    </Directory>
</VirtualHost>
# End Task 5 Configuration
```



```
ServerRoot "/etc/httpd"
Listen 192.168.50.10:80
Listen 10.35.16.1:80
Listen 10.35.16.1:8000
Listen 10.35.17.1:80
Listen 10.35.17.1:8000
Listen 10.35.16.1:8080
Listen 10.35.16.1:8081
Listen 10.35.16.1:8082
Listen 10.35.16.1:8083
Listen 10.50.1.1:80

Include conf.modules.d/*.conf
```

```
# Task 5 Configuration

<VirtualHost 10.50.1.1:80>
    ServerName dynamic-vhosts
    UseCanonicalName Off

    # Dynamic document root
    VirtualDocumentRoot "/var/www/virtuals/q5/%3/%2/%1/"

    # Centralized error logging
    ErrorLog "/var/www/virtuals/q5/logs/virtual_error_q5_log"
    TransferLog "/var/www/virtuals/q5/logs/virtual_access_q5_log"

    <Directory "/var/www/virtuals/q5">
        Options Indexes FollowSymLinks
        AllowOverride None
        Require all granted
    </Directory>
</VirtualHost>
# End Task 5 Configuration

<IfModule dir_module>
    DirectoryIndex index.html master_project2.html
</IfModule>
```

2. Verify configuration

httpd -t

```
[root@server1 /]#
[root@server1 /]# httpd -t
Syntax OK
[root@server1 /]#
```

httpd -S

```
[root@server1 /]# httpd -S
VirtualHost configuration:
10.35.16.1:80            is a NameVirtualHost
        default server virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:40)
        port 80 namevhost virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:40)
        port 80 namevhost virtual2.aucegep.com (/etc/httpd/conf/httpd.conf:48)
10.35.16.1:8000          is a NameVirtualHost
        default server virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:56)
        port 8000 namevhost virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:56)
        port 8000 namevhost virtual2.aucegep.com (/etc/httpd/conf/httpd.conf:64)
10.35.16.1:8080          virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:120)
10.35.16.1:8081          virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:130)
10.35.16.1:8082          virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:140)
10.35.16.1:8083          virtual1.aucegep.com (/etc/httpd/conf/httpd.conf:150)
10.50.1.1:80             dynamic-vhosts (/etc/httpd/conf/httpd.conf:161)
10.35.17.1:8000          intranet.ici.com (/etc/httpd/conf/httpd.conf:95)
10.35.17.1:80            is a NameVirtualHost
        default server www.ici.com (/etc/httpd/conf/httpd.conf:73)
        port 80 namevhost www.ici.com (/etc/httpd/conf/httpd.conf:73)
        port 80 namevhost intranet.ici.com (/etc/httpd/conf/httpd.conf:84)
        port 80 namevhost development.ici.com (/etc/httpd/conf/httpd.conf:106)
ServerRoot: "/etc/httpd"
Main DocumentRoot: "/var/www/html_project2"
Main ErrorLog: "/etc/httpd/logs/error_log"
Mutex default: dir="/etc/httpd/run/" mechanism=default
Mutex cache-socache: using_defaults
Mutex authdigest-opaque: using_defaults
Mutex watchdog-callback: using_defaults
Mutex proxy-balancer-shm: using_defaults
Mutex rewrite-map: using_defaults
Mutex authdigest-client: using_defaults
Mutex dav_fs-lockdb: using_defaults
Mutex lua-ivm-shm: using_defaults
Mutex proxy: using_defaults
Mutex authn-socache: using_defaults
PidFile: "/etc/httpd/run/httpd.pid"
Define: DUMP_VHOSTS
Define: DUMP_RUN_CFG
User: name="apache" id=48
Group: name="apache" id=48
[root@server1 /]#
```

8.8 Restart httpd

systemctl restart httpd

systemctl status httpd

```
[root@server1 /]#
[root@server1 /]#
[root@server1 /]# systemctl status httpd
● httpd.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
     Active: active (running) since Wed 2025-04-23 01:00:48 EDT; 24min ago
       Docs: man:httpd.service(8)
   Main PID: 28290 (httpd)
     Status: "Total requests: 26; Idle/Busy workers 100/0;Requests/sec: 0.0178; Bytes served/sec:  10 B/sec"
      Tasks: 230 (limit: 22829)
     Memory: 45.0M
        CPU: 1.799s
     CGroup: /system.slice/httpd.service
             ├─28290 /usr/sbin/httpd -DFOREGROUND
             ├─28291 /usr/sbin/httpd -DFOREGROUND
             ├─28292 /usr/sbin/httpd -DFOREGROUND
             ├─28293 /usr/sbin/httpd -DFOREGROUND
             ├─28294 /usr/sbin/httpd -DFOREGROUND
             └─28645 /usr/sbin/httpd -DFOREGROUND

Apr 23 01:00:48 server1 systemd[1]: Starting The Apache HTTP Server...
Apr 23 01:00:48 server1 httpd[28290]: Server configured, listening on: 10.50.1.1 port 80, ...
Apr 23 01:00:48 server1 systemd[1]: Started The Apache HTTP Server.
[root@server1 /]# █
```

8.8.1 Verify and Set permissions

sudo chown -R apache:apache /var/www/virtuals/

sudo chmod -R 755 /var/www/virtuals/

chcon -R -t httpd_sys_rw_content_t /var/www/virtuals/

```
[root@server1 /]# sudo chown -R apache:apache /var/www/virtuals/
sudo chmod -R 755 /var/www/virtuals/
[root@server1 /]# chcon -R -t httpd_sys_rw_content_t /var/www/virtuals/
[root@server1 /]# tree -L 4 /var/www/virtuals/q5/
/var/www/virtuals/q5/
├── ca
│   ├── itmt
│   │   ├── www
│   │   │   └── index.html
│   │   └── www2
│   └── montmo
│       ├── www
│       │   └── index.html
│       └── www2
├── com
│   ├── itmt
│   │   ├── www
│   │   │   └── index.html
│   │   └── www2
│   │       └── index.html
│   └── montmo
│       ├── www
│       │   └── index.html
│       └── www2
└── logs
    ├── virtual_access_q5_log
    └── virtual_error_q5_log
```

```
[root@server1 /]# ls -lqrtha -R /var/www/virtuals/q5/
/var/www/virtuals/q5/:
total 0
drwxr-xr-x. 12 apache apache 174 Apr 22 23:51 ..
drwxr-xr-x.  4 apache apache  32 Apr 22 23:51 com
drwxr-xr-x.  4 apache apache  32 Apr 22 23:51 ca
drwxr-xr-x.  5 apache apache  39 Apr 22 23:55 .
drwxr-xr-x.  2 apache apache  63 Apr 23 00:21 logs

/var/www/virtuals/q5/com:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 montmo
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 itmt
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 .
drwxr-xr-x. 5 apache apache 39 Apr 22 23:55 ..

/var/www/virtuals/q5/com/montmo:
total 0
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 www2
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 ..
```

```
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 .
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 www

/var/www/virtuals/q5/com/montmo/www2:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 .

/var/www/virtuals/q5/com/montmo/www:
total 4.0K
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
-rwxr-xr-x. 1 apache apache 24 Apr 22 23:53 index.html
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 .

/var/www/virtuals/q5/com/itmt:
total 0
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 ..
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 .
drwxr-xr-x. 2 apache apache 24 Apr 22 23:52 www
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 www2

/var/www/virtuals/q5/com/itmt/www:
total 4.0K
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
-rwxr-xr-x. 1 apache apache 22 Apr 22 23:52 index.html
drwxr-xr-x. 2 apache apache 24 Apr 22 23:52 .

/var/www/virtuals/q5/com/itmt/www2:
total 4.0K
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 .
-rwxr-xr-x. 1 apache apache 23 Apr 22 23:53 index.html

/var/www/virtuals/q5/ca:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 montmo
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 itmt
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 .
drwxr-xr-x. 5 apache apache 39 Apr 22 23:55 ..

/var/www/virtuals/q5/ca/montmo:
total 0
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 www2
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 ..
```

```
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 .
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 www

/var/www/virtuals/q5/ca/montmo/www2:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 .

/var/www/virtuals/q5/ca/montmo/www:
total 4.0K
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache 24 Apr 22 23:53 .
-rwxr-xr-x. 1 apache apache 23 Apr 22 23:53 index.html

/var/www/virtuals/q5/ca/itmt:
total 0
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 www2
drwxr-xr-x. 4 apache apache 32 Apr 22 23:51 ..
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 .
drwxr-xr-x. 2 apache apache 24 Apr 22 23:52 www

/var/www/virtuals/q5/ca/itmt/www2:
total 0
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
drwxr-xr-x. 2 apache apache  6 Apr 22 23:51 .

/var/www/virtuals/q5/ca/itmt/www:
total 4.0K
drwxr-xr-x. 4 apache apache 29 Apr 22 23:51 ..
-rwxr-xr-x. 1 apache apache 21 Apr 22 23:52 index.html
drwxr-xr-x. 2 apache apache 24 Apr 22 23:52 .

/var/www/virtuals/q5/logs:
total 0
drwxr-xr-x. 5 apache apache 39 Apr 22 23:55 ..
-rwxr-xr-x. 1 apache apache  0 Apr 22 23:55 virtual_error_q5_log
-rwxr-xr-x. 1 apache apache  0 Apr 23 00:21 virtual_access_q5_log
drwxr-xr-x. 2 apache apache 63 Apr 23 00:21 .
[root@server1 /]#
```

8.9 Testing

8.9.1 Server

8.9.1.1 Test www.itmt.com

curl -v -H "Host: www.itmt.com" http://10.50.1.1

```
[root@server1 /]# curl -v -H "Host: www.itmt.com" http://10.50.1.1
*   Trying 10.50.1.1:80...
* Connected to 10.50.1.1 (10.50.1.1) port 80 (#0)
> GET / HTTP/1.1
> Host: www.itmt.com
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 05:05:24 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 03:52:43 GMT
< ETag: "16-6336a08960f6c"
< Accept-Ranges: bytes
< Content-Length: 22
< Content-Type: text/html; charset=UTF-8
<
<h1>www.itmt.com</h1>
* Connection #0 to host 10.50.1.1 left intact
```

8.9.1.2 Test www.itmt.ca

curl -v -H "Host: www.itmt.ca" http://10.50.1.1

```
* Connection #0 to host 10.50.1.1 left intact
[root@server1 /]# # Test www.itmt.ca
[root@server1 /]# curl -v -H "Host: www.itmt.ca" http://10.50.1.1
*   Trying 10.50.1.1:80...
* Connected to 10.50.1.1 (10.50.1.1) port 80 (#0)
> GET / HTTP/1.1
> Host: www.itmt.ca
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 05:05:44 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 03:52:52 GMT
< ETag: "15-6336a091856e2"
< Accept-Ranges: bytes
< Content-Length: 21
< Content-Type: text/html; charset=UTF-8
<
<h1>www.itmt.ca</h1>
* Connection #0 to host 10.50.1.1 left intact
```

8.9.1.3 Test www2.itmt.com

curl -v -H "Host: www2.itmt.com" http://10.50.1.1

```
[root@server1 /]# # Test www2.itmt.com
[root@server1 /]# curl -v -H "Host: www2.itmt.com" http://10.50.1.1
*   Trying 10.50.1.1:80...
* Connected to 10.50.1.1 (10.50.1.1) port 80 (#0)
> GET / HTTP/1.1
> Host: www2.itmt.com
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 05:06:03 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 03:53:01 GMT
< ETag: "17-6336a099e6330"
< Accept-Ranges: bytes
< Content-Length: 23
< Content-Type: text/html; charset=UTF-8
<
<h1>www2.itmt.com</h1>
* Connection #0 to host 10.50.1.1 left intact
```

8.9.1.4 Test www.montmo.com

curl -v -H "Host: www.montmo.com" http://10.50.1.1

```
* Connection #0 to host 10.50.1.1 left intact
[root@server1 /]# # Test www.montmo.com
[root@server1 /]# curl -v -H "Host: www.montmo.com" http://10.50.1.1
*   Trying 10.50.1.1:80...
* Connected to 10.50.1.1 (10.50.1.1) port 80 (#0)
> GET / HTTP/1.1
> Host: www.montmo.com
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 05:06:20 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 03:53:09 GMT
< ETag: "18-6336a0a1d6a9f"
< Accept-Ranges: bytes
< Content-Length: 24
< Content-Type: text/html; charset=UTF-8
<
<h1>www.montmo.com</h1>
* Connection #0 to host 10.50.1.1 left intact
```

8.9.1.5 Test www.montmo.ca

curl -v -H "Host: www.montmo.ca" http://10.50.1.1

```
* Connection #0 to host 10.50.1.1 left intact
[root@server1 /]# # Test www.montmo.ca
[root@server1 /]# curl -v -H "Host: www.montmo.ca" http://10.50.1.1
*   Trying 10.50.1.1:80...
* Connected to 10.50.1.1 (10.50.1.1) port 80 (#0)
> GET / HTTP/1.1
> Host: www.montmo.ca
> User-Agent: curl/7.76.1
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 200 OK
< Date: Wed, 23 Apr 2025 05:06:44 GMT
< Server: Apache/2.4.62 (AlmaLinux)
< Last-Modified: Wed, 23 Apr 2025 03:53:16 GMT
< ETag: "17-6336a0a8bc48a"
< Accept-Ranges: bytes
< Content-Length: 23
< Content-Type: text/html; charset=UTF-8
<
<h1>www.montmo.ca</h1>
* Connection #0 to host 10.50.1.1 left intact
[root@server1 /]#
```
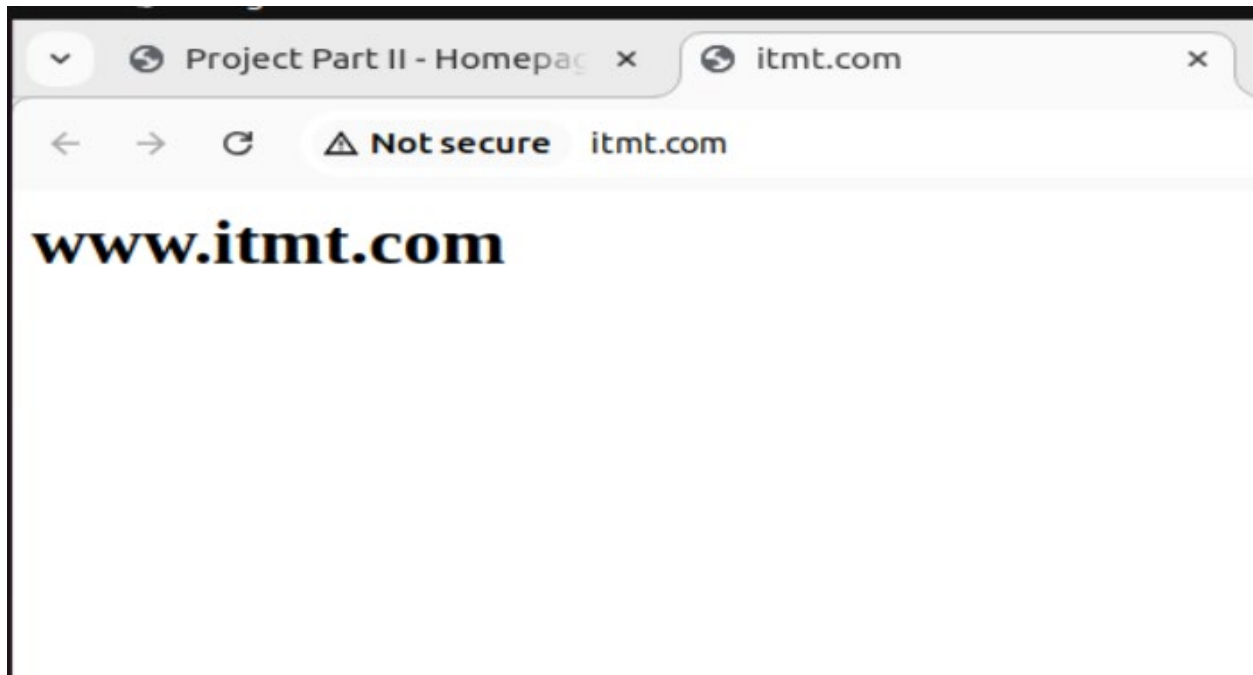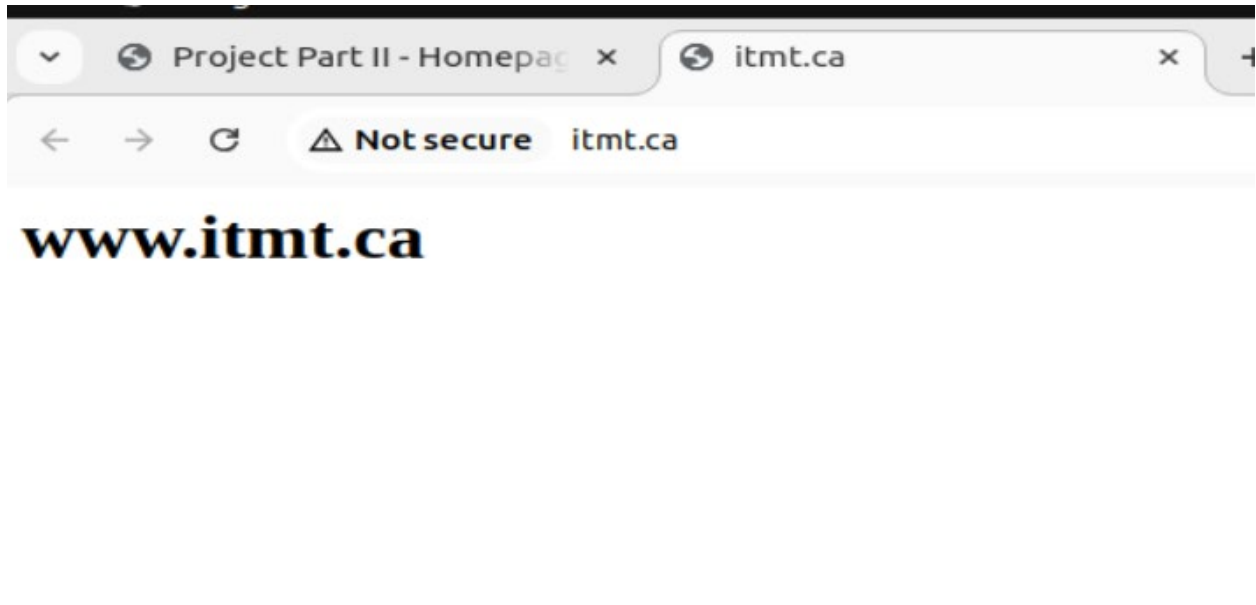
8.9.2 Client

Task 5

Task 5 - Domains

- http://www.itmt.com
- http://www.itmt.ca
- http://www2.itmt.com
- http://www.montmo.com
- http://www.montmo.ca

8.9.2.1 http://www.itmt.com

8.9.2.2 http://www.itmt.ca

8.9.2.3 http://www2.itmt.com

8.9.2.4 http://www.montmo.com

8.9.2.5 http://www.montmo.ca