Comprehensive Linux Operations

Part 1: Creating and Editing Text Files

1. Using Nano

Create a file server_config.txt using Nano#!/bin/bash

Part 2: User & Group Management

Add a new user **developer**:

sudo adduser developer

1. **Managing Groups**

Create a group devteam:

sudo groupadd devteam

Add the user developer to the devteam group:

sudo usermod -aG devteam developer

Remove the user developer from the devteam group:

sudo gpasswd -d developer devteam

```
einfochips@AHMLPT2608: ~
rtkit:x:116:123:RealtimeKit,,,:/proc:/usr/sbin/nologin
whoopsie:x:117:124::/nonexistent:/bin/false
sssd:x:118:125:SSSD system user,,,:/var/lib/sss:/usr/sbin/nologin
speech-dispatcher:x:119:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
fwupd-refresh:x:120:126:fwupd-refresh user,,,:/run/systemd:/usr/sbin/nologin
nm-openvpn:x:121:127:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
saned:x:122:129::/var/lib/saned:/usr/sbin/nologin
colord:x:123:130:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:124:131::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:125:132:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:126:65534::/run/gnome-initial-setup/:/bin/false
hplip:x:127:7:HPLIP system user,,,:/run/hplip:/bin/false
gdm:x:128:134:Gnome Display Manager:/var/lib/gdm3:/bin/false
einfochips:x:1000:1000:einfochips,,,:/home/einfochips:/bin/bash
mdatp:x:999:999::/home/mdatp:/usr/sbin/nologin
sshd:x:129:65534::/run/sshd:/usr/sbin/nologin
developer:x:1001:1001:developer,123,,:/home/developer:/bin/bash
einfochips@AHMLPT2608:~$ who
einfochips tty2         2024-07-08 14:52 (tty2)
einfochips@AHMLPT2608:~$ who
einfochips tty2         2024-07-08 14:52 (tty2)
einfochips@AHMLPT2608:~$ sudo adduser developer
adduser: The user `developer' already exists.
einfochips@AHMLPT2608:~$ sudo deluser developer
Removing user `developer' ...
Warning: group `developer' has no more members.
userdel: user developer is currently used by process 192655
/usr/sbin/deluser: `/sbin/userdel developer' returned error code 8. Exiting.
einfochips@AHMLPT2608:~$ sudo grpadd devteam
sudo: grpadd: command not found
einfochips@AHMLPT2608:~$ sudo groupadd devteam
einfochips@AHMLPT2608:~$ sudo usermod -aG devteam developer
einfochips@AHMLPT2608:~$ sudo gpasswd -developer devteam
Removing user eveloper from group devteam
gpasswd: user 'eveloper' is not a member of 'devteam'
einfochips@AHMLPT2608:~$ sudo gpasswd -d developer devteam
Removing user developer from group devteam
einfochips@AHMLPT2608:~$
```

```
nm-openvpn:x:121:127:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
saned:x:122:129::/var/lib/saned:/usr/sbin/nologin
colord:x:123:130:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:124:131::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:125:132:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:126:65534::/run/gnome-initial-setup/:/bin/false
hplip:x:127:7:HPLIP system user,,,:/run/hplip:/bin/false
gdm:x:128:134:Gnome Display Manager:/var/lib/gdm3:/bin/false
einfochips:x:1000:1000:einfochips,,,:/home/einfochips:/bin/bash
mdatp:x:999:999::/home/mdatp:/usr/sbin/nologin
sshd:x:129:65534::/run/sshd:/usr/sbin/nologin
developer:x:1001:1001:developer,123,,:/home/developer:/bin/bash
einfochips@AHMLPT2608:~$ who
einfochips tty2         2024-07-08 14:52 (tty2)
einfochips@AHMLPT2608:~$ who
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adduser: The user `developer' already exists.
einfochips@AHMLPT2608:~$ sudo deluser developer
Removing user `developer' ...
Warning: group `developer' has no more members.
userdel: user developer is currently used by process 192655
/usr/sbin/deluser: `/sbin/userdel developer' returned error code 8. Exiting.
einfochips@AHMLPT2608:~$ sudo grpadd devteam
sudo: grpadd: command not found
einfochips@AHMLPT2608:~$ sudo groupadd devteam
einfochips@AHMLPT2608:~$ sudo usermod -aG devteam developer
einfochips@AHMLPT2608:~$ sudo gpasswd -developer devteam
Removing user eveloper from group devteam
gpasswd: user 'eveloper' is not a member of 'devteam'
einfochips@AHMLPT2608:~$ sudo gpasswd -d developer devteam
Removing user developer from group devteam
einfochips@AHMLPT2608:~$ ls -l server_config.txt
-rw-rw-r-- 1 einfochips einfochips 10 Jul  9 10:19 server_config.txt
einfochips@AHMLPT2608:~$ chmod 644 server_config.txt
einfochips@AHMLPT2608:~$ ls -l server_config.txt
-rw-r--r-- 1 einfochips einfochips 10 Jul  9 10:19 server_config.txt
einfochips@AHMLPT2608:~$
```

Part 3: File Permissions Management

Understanding File Permissions

View permissions for server_config.txt:

ls -l server_config.txt

- Discuss the output (e.g., -rw-r--r--).
2. **Changing Permissions and Ownership**

Change permissions to read/write for the owner and read-only for others:

chmod 644 server_config.txt

Verify the change:

ls -l server_config.txt

-

Change the owner to developer and the group to devteam:

sudo chown developer:devteam server_config.txt

-

Verify the change:

ls -l server_config.txt

```
nm-openvpn:x:121:127:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
saned:x:122:129::/var/lib/saned:/usr/sbin/nologin
colord:x:123:130:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:124:131::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:125:132:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:126:65534::/run/gnome-initial-setup/:/bin/false
hplip:x:127:7:HPLIP system user,,,:/run/hplip:/bin/false
gdm:x:128:134:Gnome Display Manager:/var/lib/gdm3:/bin/false
einfochips:x:1000:1000:einfochips,,,:/home/einfochips:/bin/bash
mdatp:x:999:999::/home/mdatp:/usr/sbin/nologin
sshd:x:129:65534::/run/sshd:/usr/sbin/nologin
developer:x:1001:1001:developer,123,,:/home/developer:/bin/bash
einfochips@AHMLPT2608:~$ who
einfochips tty2         2024-07-08 14:52 (tty2)
einfochips@AHMLPT2608:~$ who
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einfochips@AHMLPT2608:~$ sudo deluser developer
Removing user `developer' ...
Warning: group `developer' has no more members.
userdel: user developer is currently used by process 192655
/usr/sbin/deluser: `/sbin/userdel developer' returned error code 8. Exiting.
einfochips@AHMLPT2608:~$ sudo grpadd devteam
sudo: grpadd: command not found
einfochips@AHMLPT2608:~$ sudo groupadd devteam
einfochips@AHMLPT2608:~$ sudo usermod -aG devteam developer
einfochips@AHMLPT2608:~$ sudo gpasswd -developer devteam
Removing user eveloper from group devteam
gpasswd: user 'eveloper' is not a member of 'devteam'
einfochips@AHMLPT2608:~$ sudo gpasswd -d developer devteam
Removing user developer from group devteam
einfochips@AHMLPT2608:~$ ls -l server_config.txt
-rw-rw-r-- 1 einfochips einfochips 10 Jul  9 10:19 server_config.txt
einfochips@AHMLPT2608:~$ chmod 644 server_config.txt
einfochips@AHMLPT2608:~$ ls -l server_config.txt
-rw-r--r-- 1 einfochips einfochips 10 Jul  9 10:19 server_config.txt
einfochips@AHMLPT2608:~$
```

Part 4: Controlling Services and Daemons

1 Managing Services with systemctl

Start the Apache service:

sudo systemctl start apache2

- Stop the Apache service:

sudo systemctl stop apache2

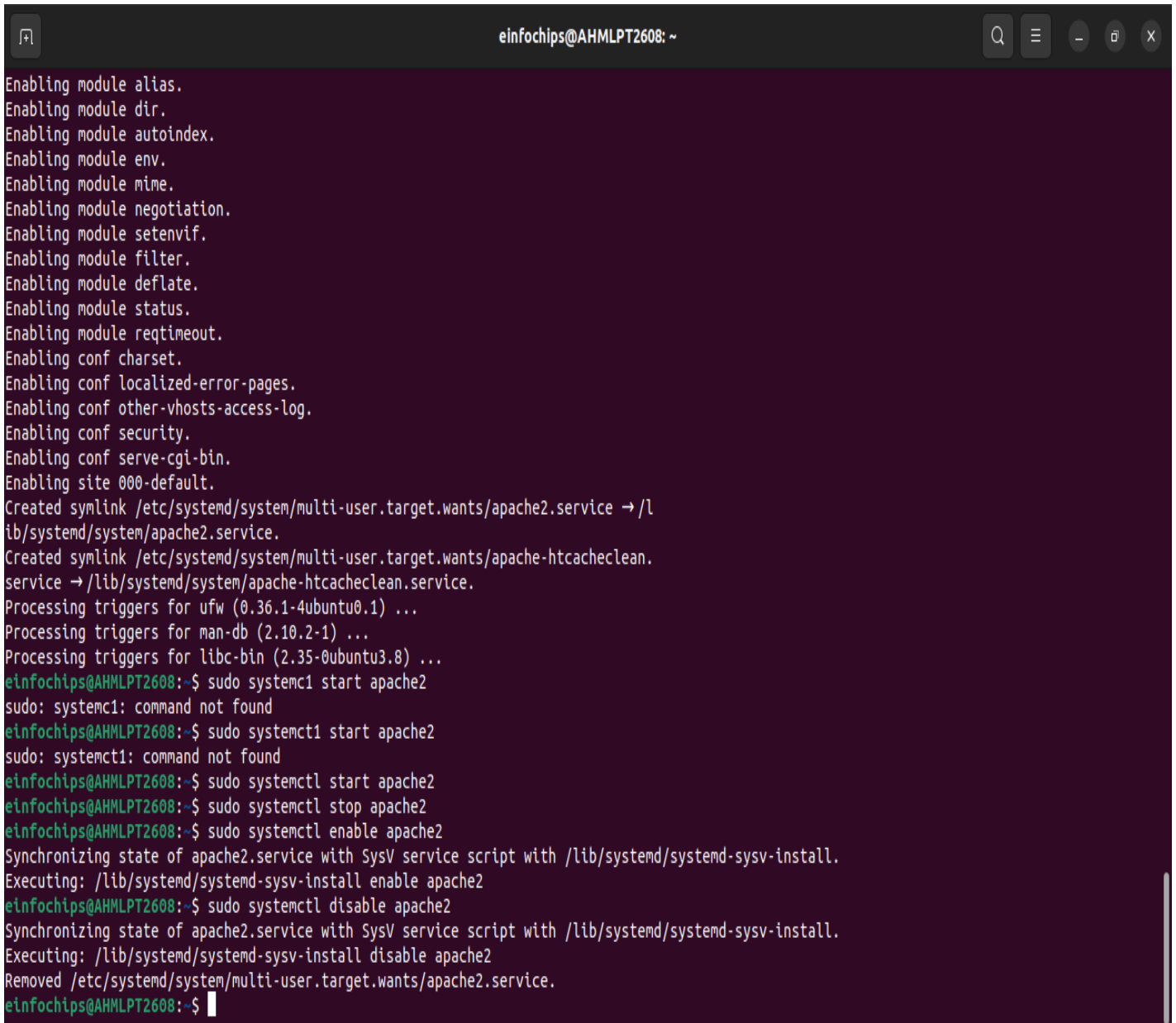- Enable the Apache service to start on boot:

sudo systemctl enable apache2

-

Disable the Apache service:

sudo systemctl disable apache2

-

Check the status of the Apache service:

sudo systemctl status apache2

```
Enabling module alias.
Enabling module dir.
Enabling module autoindex.
Enabling module env.
Enabling module mime.
Enabling module negotiation.
Enabling module setenvif.
Enabling module filter.
Enabling module deflate.
Enabling module status.
Enabling module reqtimeout.
Enabling conf charset.
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service →/l
ib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.
service →/lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ufw (0.36.1-4ubuntu0.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.8) ...
einfochips@AHMLPT2608:~$ sudo systemc1 start apache2
sudo: systemc1: command not found
einfochips@AHMLPT2608:~$ sudo systemct1 start apache2
sudo: systemct1: command not found
einfochips@AHMLPT2608:~$ sudo systemctl start apache2
einfochips@AHMLPT2608:~$ sudo systemctl stop apache2
einfochips@AHMLPT2608:~$ sudo systemctl enable apache2
Synchronizing state of apache2.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable apache2
einfochips@AHMLPT2608:~$ sudo systemctl disable apache2
Synchronizing state of apache2.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install disable apache2
Removed /etc/systemd/system/multi-user.target.wants/apache2.service.
einfochips@AHMLPT2608:~$
```

```
Enabling module alias.
Enabling module dir.
Enabling module autoindex.
Enabling module env.
Enabling module mime.
Enabling module negotiation.
Enabling module setenvif.
Enabling module filter.
Enabling module deflate.
Enabling module status.
Enabling module reqtimeout.
Enabling conf charset.
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /l
ib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.
service → /lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ufw (0.36.1-4ubuntu0.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.8) ...
einfochips@AHMLPT2608:~$ sudo systemc1 start apache2
sudo: systemc1: command not found
einfochips@AHMLPT2608:~$ sudo systemct1 start apache2
sudo: systemct1: command not found
einfochips@AHMLPT2608:~$ sudo systemctl start apache2
einfochips@AHMLPT2608:~$ sudo systemctl stop apache2
einfochips@AHMLPT2608:~$ sudo systemctl enable apache2
Synchronizing state of apache2.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable apache2
einfochips@AHMLPT2608:~$ sudo systemctl disable apache2
Synchronizing state of apache2.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install disable apache2
Removed /etc/systemd/system/multi-user.target.wants/apache2.service.
einfochips@AHMLPT2608:~$
```

Part 5: Process Handling

Viewing Processes

List all running processes:

```
ps aux
```

-

Use top to view processes in real-time:

top

Creating and Deploying a Static Website with Apache2

Part 1: Installing Apache2 (5 minutes)

    1. **Update Package Lists**

Open the terminal and run:

sudo apt update

        •

    2. **Install Apache2**

Install Apache2 by running:

sudo apt install apache2

        •

    3. **Start and Enable Apache2**

Start the Apache2 service:

sudo systemctl start apache2

Enable Apache2 to start on boot:

sudo systemctl enable apache2

```
    6 root       0 -20        0        0        0 I   0.0    0.0    0:00.00 [netns]
    8 root       0 -20        0        0        0 I   0.0    0.0    0:00.00 [kworker/0:0H-events_highpri]
   11 root       0 -20        0        0        0 I   0.0    0.0    0:00.00 [mm_percpu_wq]
   12 root      20   0        0        0        0 I   0.0    0.0    0:00.00 [rcu_tasks_kthread]
   13 root      20   0        0        0        0 I   0.0    0.0    0:00.00 [rcu_tasks_rude_kthread]
   14 root      20   0        0        0        0 I   0.0    0.0    0:00.02 [rcu_tasks_trace_kthread]
   15 root      20   0        0        0        0 S   0.0    0.0    0:00.81 [ksoftirqd/0]
   16 root      20   0        0        0        0 I   0.0    0.0    0:15.43 [rcu_preempt]
   17 root      rt   0        0        0        0 S   0.0    0.0    0:00.04 [migration/0]
   18 root     -51   0        0        0        0 S   0.0    0.0    0:00.00 [idle_inject/0]
   19 root      20   0        0        0        0 S   0.0    0.0    0:00.00 [cpuhp/0]
einfochips@AHMLPT2608:~$ kill <PID>
bash: syntax error near unexpected token `newline'
einfochips@AHMLPT2608:~$ sudo systemctl status apache2
○ apache2.service - The Apache HTTP Server
     Loaded: loaded (/lib/systemd/system/apache2.service; disabled; vendor pres▶
     Active: inactive (dead) since Tue 2024-07-09 10:59:06 IST; 9min ago
       Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 212073 (code=exited, status=0/SUCCESS)
        CPU: 89ms

Jul 09 10:57:04 AHMLPT2608 systemd[1]: Starting The Apache HTTP Server...
Jul 09 10:57:04 AHMLPT2608 apachectl[212072]: AH00558: apache2: Could not relia▶
Jul 09 10:57:04 AHMLPT2608 systemd[1]: Started The Apache HTTP Server.
Jul 09 10:59:06 AHMLPT2608 systemd[1]: Stopping The Apache HTTP Server...
Jul 09 10:59:06 AHMLPT2608 apachectl[212656]: AH00558: apache2: Could not relia▶
Jul 09 10:59:06 AHMLPT2608 systemd[1]: apache2.service: Deactivated successfull▶
Jul 09 10:59:06 AHMLPT2608 systemd[1]: Stopped The Apache HTTP Server.

einfochips@AHMLPT2608:~$ sudo systemctl enable apache2
Synchronizing state of apache2.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable apache2
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service →/lib/systemd/system/apache2.service.
einfochips@AHMLPT2608:~$ cd /var/www/html
einfochips@AHMLPT2608:/var/www/html$ sudo mkdir mystaticwebsite
einfochips@AHMLPT2608:/var/www/html$ sudo chown -R $developer:$devteam /var/www/html/mystaticwebs
chown: cannot access '/var/www/html/mystaticwebs': No such file or directory
einfochips@AHMLPT2608:/var/www/html$ sudo mkdi
```

Part 2: Creating the Website
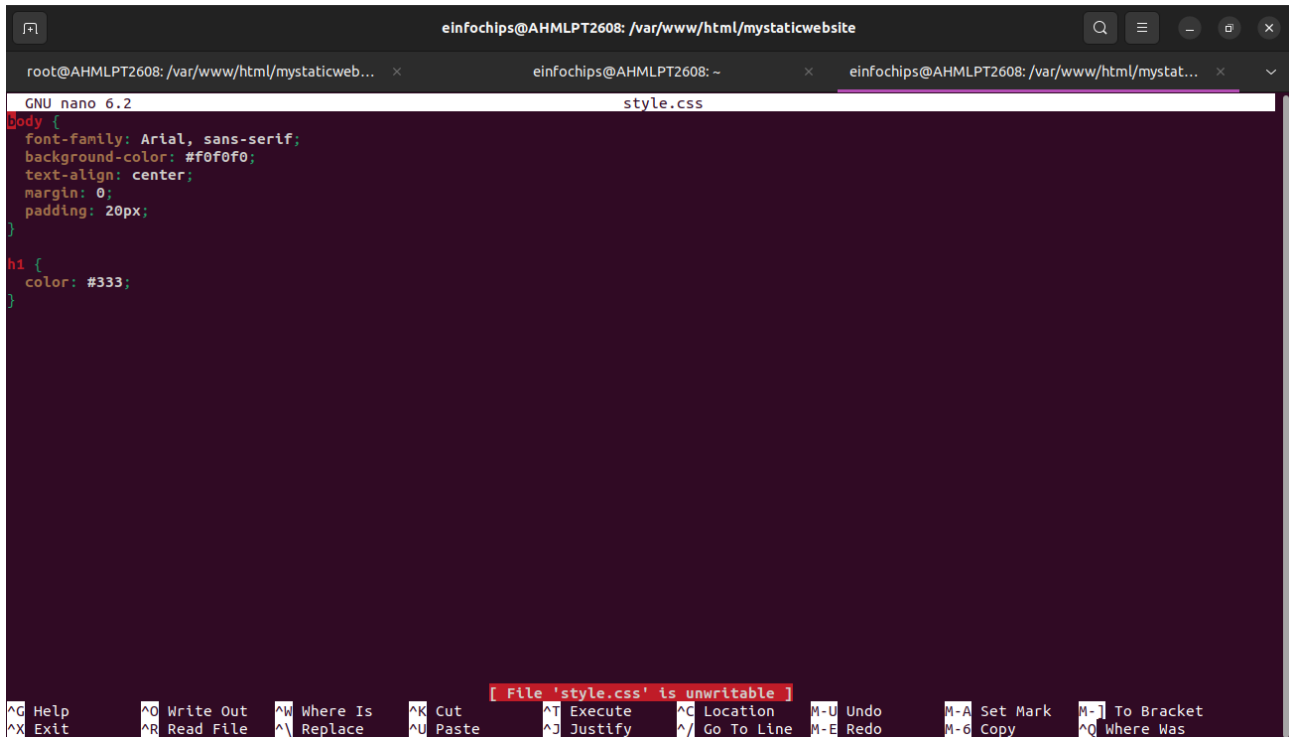
Create HTML File


```
  GNU nano 6.2                                  index.html
<!DOCTYPE html>
<html>
<head>
  <title>My Static Website</title>
  <link rel="stylesheet" type="text/css" href="styles.css">
</head>
<body>
  <h1>Welcome to My Static Website</h1>
  <p>This is a simple static website using Apache2.</p>
  <img src="logo.png" alt="Logo">
  <script src="script.js"></script>
</body>
</html>
```

```
                              [ File 'index.html' is unwritable ]
^G Help      ^O Write Out  ^W Where Is   ^K Cut       ^T Execute   ^C Location   M-U Undo   M-A Set Mark   M-] To Bracket
^X Exit      ^R Read File  ^\ Replace    ^U Paste     ^J Justify   ^/ Go To Line M-E Redo   M-6 Copy       ^Q Where Was
```

Create CSS File


```
GNU nano 6.2                                    style.css
body {
  font-family: Arial, sans-serif;
  background-color: #f0f0f0;
  text-align: center;
  margin: 0;
  padding: 20px;
}

h1 {
  color: #333;
}
```
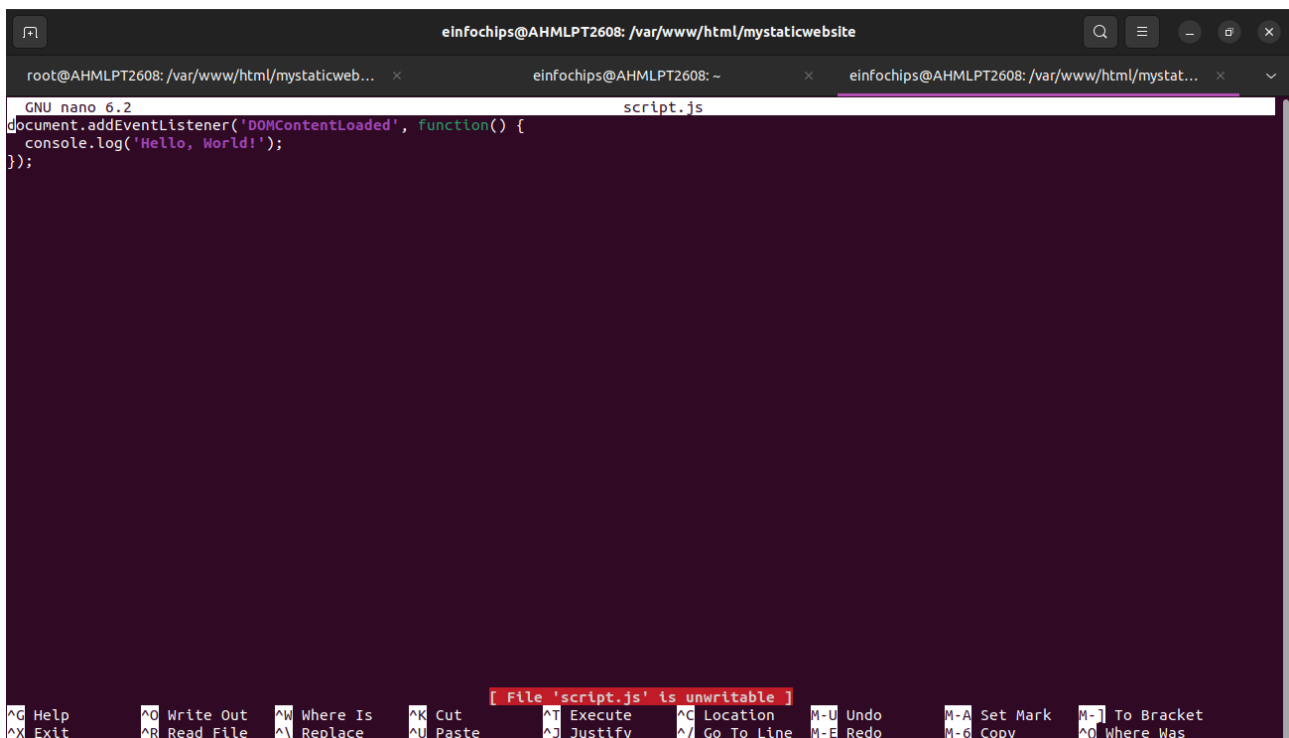
[File 'style.css' is unwritable]

```
^G Help        ^O Write Out    ^W Where Is    ^K Cut      ^T Execute   ^C Location   M-U Undo    M-A Set Mark   M-] To Bracket
^X Exit        ^R Read File    ^\ Replace     ^U Paste    ^J Justify   ^/ Go To Line M-E Redo    M-6 Copy       ^Q Where Was
```

Create JavaScript File


```
GNU nano 6.2                                    script.js
document.addEventListener('DOMContentLoaded', function() {
  console.log('Hello, World!');
});
```

[File 'script.js' is unwritable]

```
^G Help        ^O Write Out    ^W Where Is    ^K Cut      ^T Execute   ^C Location   M-U Undo    M-A Set Mark   M-] To Bracket
^X Exit        ^R Read File    ^\ Replace     ^U Paste    ^J Justify   ^/ Go To Line M-E Redo    M-6 Copy       ^Q Where Was
```

Part 3: Configuring Apache2 to Serve the Website (10 minutes)

1. **Create a Virtual Host File**

Create and edit the virtual host configuration file:

sudo nano /etc/apache2/sites-available/mystaticwebsite.conf

-

Add the following content:

<VirtualHost *:80>

  ServerAdmin webmaster@localhost

  DocumentRoot /var/www/html/mystaticwebsite

  ErrorLog ${APACHE_LOG_DIR}/error.log

  CustomLog ${APACHE_LOG_DIR}/access.log combined

</VirtualHost>

-
- Save and exit (Ctrl+O, Enter, Ctrl+X).
2. **Enable the New Virtual Host**

Enable the virtual host configuration:

sudo a2ensite mystaticwebsite.conf

-

3. **Disable the Default Site**

Disable the default site configuration:

sudo a2dissite 000-default.conf
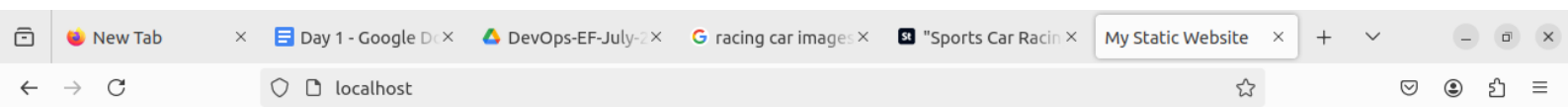
Reload Apache2

Reload the Apache2 service to apply the changes:

```
sudo systemctl reload apache2
```

-

2. **Test the Configuration**
   - Open a web browser and navigate to http://your_server_ip. You should see the static website with the HTML, CSS, JS, and image.