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Roll No: 242466

Assignment No: 2

Aim: To Implement Continuous Deployment Using Ansible

What is Ansible?

Ansible is an open-source automation tool used for configuration management, application deployment, and IT orchestration. It operates on an agentless architecture, meaning no software needs to be installed on the managed systems. Users define a desired state for their infrastructure using simple, human-readable YAML files, and Ansible works to efficiently and reliably enforce that state across all targeted machines, ensuring consistency and reducing manual effort.

What key problem did Ansible's creators aim to solve that existing agent-based tools had not?

Before tools like Ansible, system administrators faced the challenge of manually configuring servers and applications, a slow and error-prone process. Scaling this manual effort for dozens or hundreds of servers was practically impossible. While other configuration tools existed, many required agents to be installed and maintained on every machine, adding complexity and security concerns that Ansible's creators sought to eliminate with a simpler, more robust solution.

Describe the role and structure of an Ansible Playbook in the automation process.

Ansible's approach is declarative and idempotent. Automation is defined in Playbooks, which are YAML files listing a set of tasks. These tasks use modular code to perform specific functions. The core engine connects to nodes via SSH (or WinRM for Windows), executes these modules, and ensures the system matches the declared state. A key feature is idempotency, meaning playbooks can be run safely multiple times without causing unintended changes.

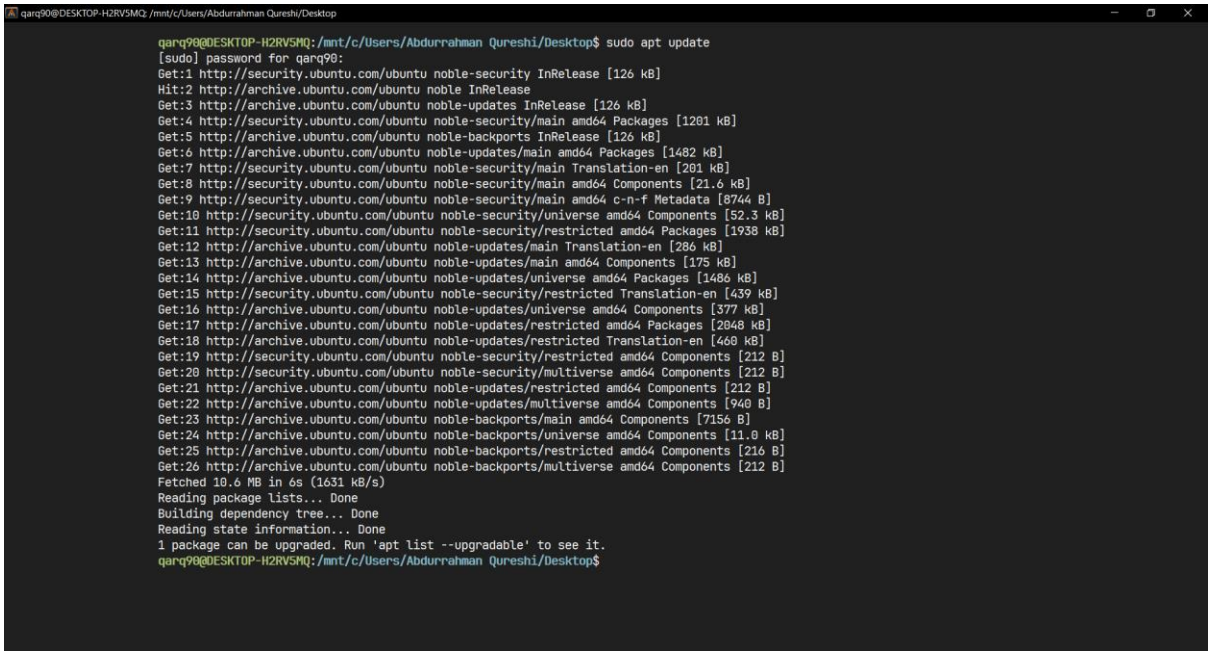
How does the principle of idempotency provide a practical advantage in IT operations?

The primary advantage of Ansible is its simplicity and low barrier to entry, thanks to its agentless design and readable YAML syntax. This reduces management overhead and enhances security. Its idempotent nature ensures predictable and reliable outcomes. Furthermore, its powerful modules and extensive community support make it highly versatile for automating a wide range of tasks, from simple server configuration to complex multi-tier application deployments.

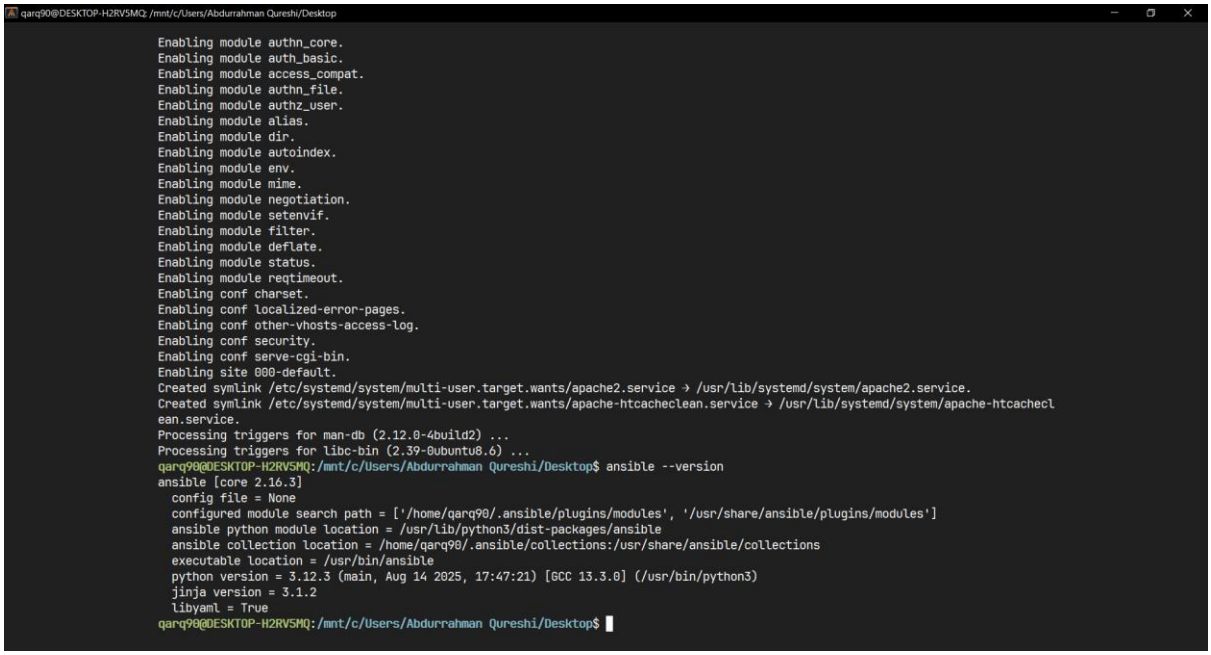
From a business perspective, why should an organization choose to implement Ansible?

You should use Ansible because it fundamentally simplifies IT automation. It saves significant time, eliminates manual errors, and ensures a consistent environment, which is crucial for stability and compliance. By treating your infrastructure as code, Ansible enables version control, repeatability, and seamless scaling. It is the pragmatic choice for organizations seeking to improve operational efficiency, accelerate deployments, and reliably manage complex infrastructure across hybrid environments.

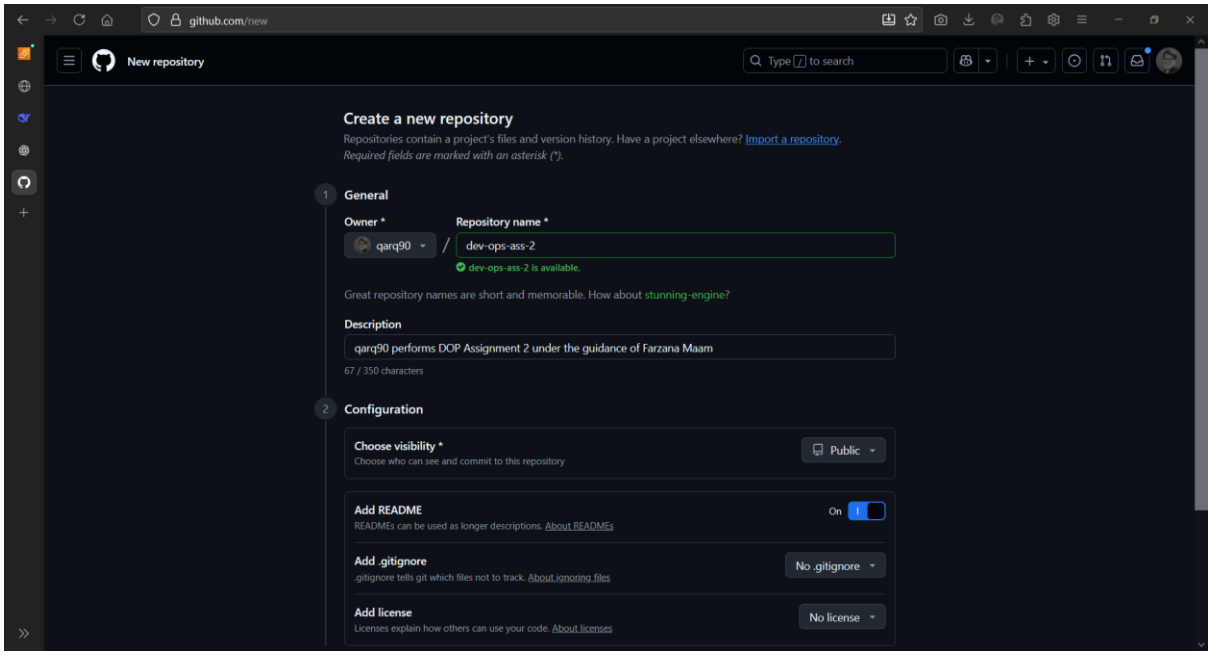
Procedure:



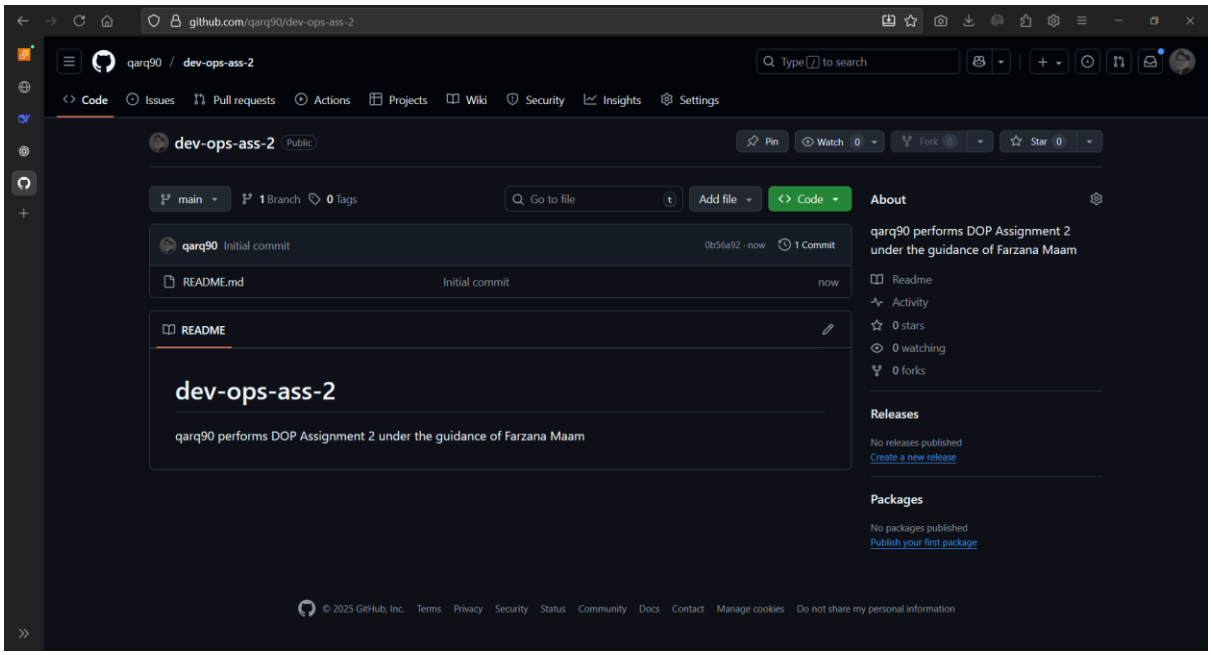
Updating package lists from repositories.



Successfully Installed Ansible



Creating New GitHub Repository



Repository Created Successfully

```
qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop$ git clone https://github.com/qarq90/dev-ops-ass-2.git
Cloning into 'dev-ops-ass-2'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (3/3), done.
qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop$ ls
'Docker Desktop.lnk'   desktop.ini   dev-ops-ass-2   Yoshi-train-induction-planning
qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop$ cd dev-ops-ass-2
qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop/dev-ops-ass-2$ ls
README.md
qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop/dev-ops-ass-2$
```

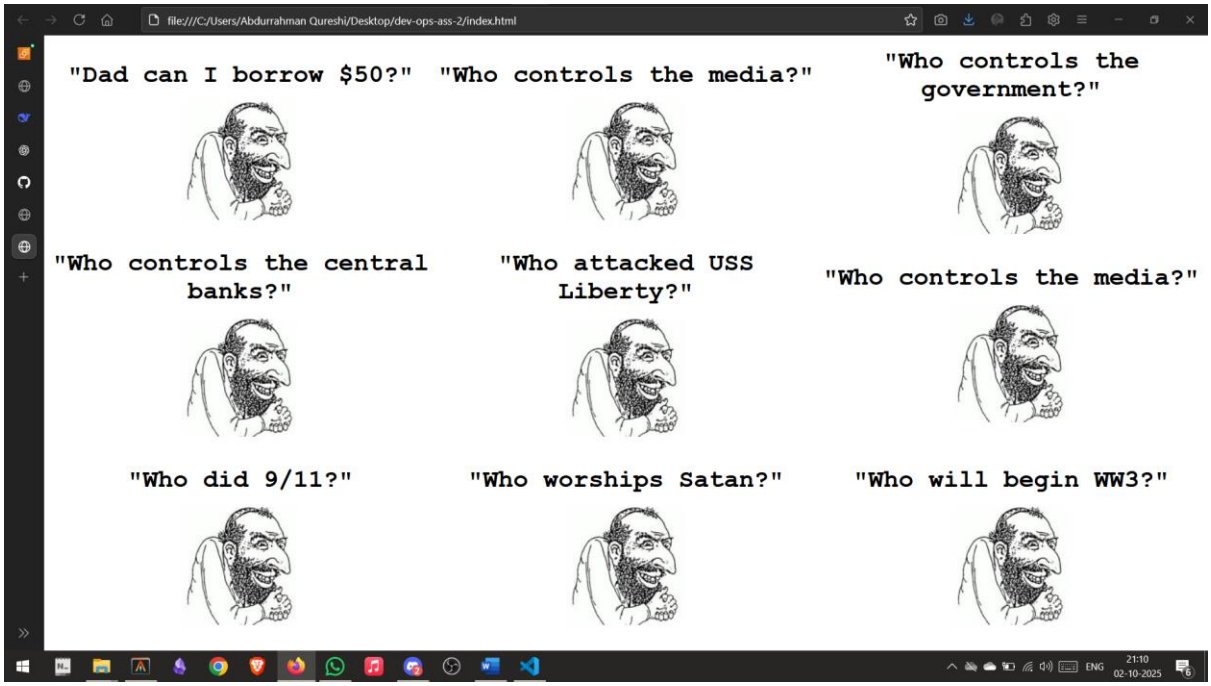
Repository Cloned

index.html:

```
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <title>Hello Page</title>

<style>
        body {
            display: grid;
            grid-template-columns: repeat(3, 1fr);
            grid-template-rows: repeat(3, 1fr);
            gap: 10px;
            height: 100vh;
            margin: 0;
            padding: 10px;
            box-sizing: border-box;
            font-family: 'Courier New', Courier, monospace;
        }

        img {
            grid-column: 2;
            grid-row: 1;
            max-width: 100%;
            height: auto;
            justify-self: center;
            align-self: center;
        }

        h1 {
            grid-column: 2;
```

```
            grid-row: 2;
            text-align: center;
            margin: 0;
            align-self: center;
        }

        div {
            display: flex;
            flex-direction: column;
            align-items: center;
            justify-content: center;
            gap: 16px;
        }
    </style>
</head>

<body>
    <div>
        <h1>
            "Dad can I borrow $50?"
        </h1>
        <img src="The_Happy_Merchant.jpg" alt="" srcset="">
    </div>
    <div>
        <h1>
            "Who controls the media?"
        </h1>
        <img src="The_Happy_Merchant.jpg" alt="" srcset="">
    </div>
    <div>
        <h1>
            "Who controls the government?"
        </h1>
        <img src="The_Happy_Merchant.jpg" alt="" srcset="">
    </div>
    <div>
        <h1>
            "Who controls the central banks?"
        </h1>
        <img src="The_Happy_Merchant.jpg" alt="" srcset="">
    </div>
    <div>
        <h1>
            "Who attacked USS Liberty?"
        </h1>
```

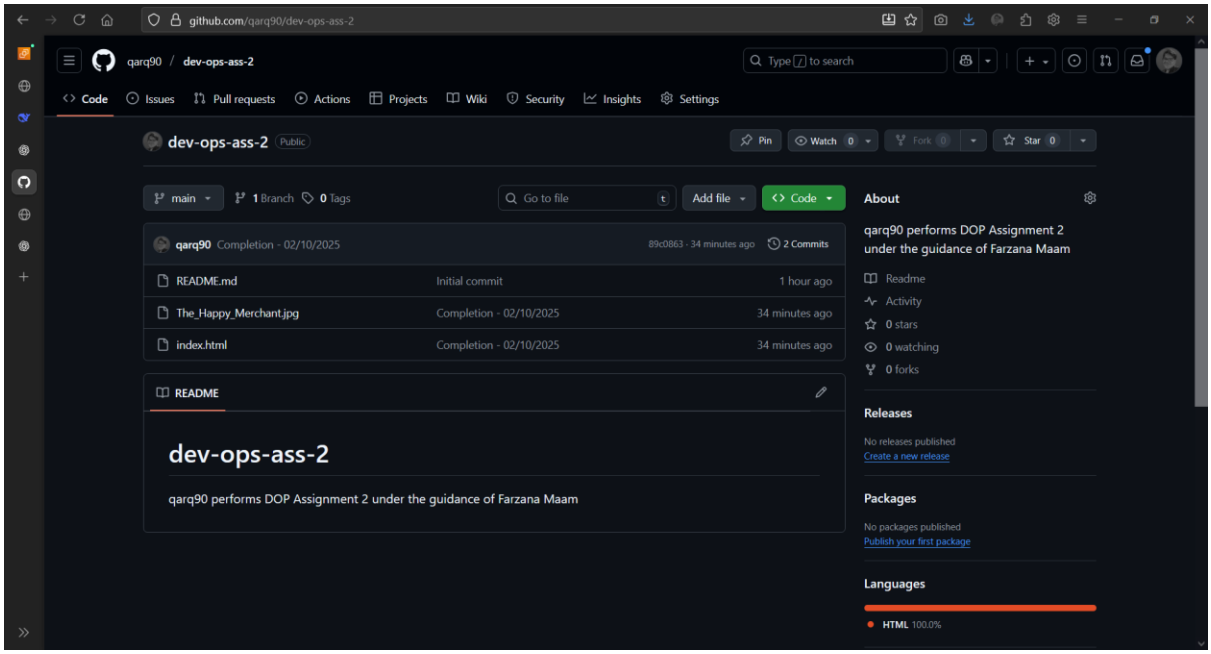
```
        <img src="The_Happy_Merchant.jpg" alt="" srcset="">
    </div>
    <div>
        <h1>
            "Who controls the media?"
        </h1>
        <img src="The_Happy_Merchant.jpg" alt="" srcset="">
    </div>
    <div>
        <h1>
            "Who did 9/11?"
        </h1>
        <img src="The_Happy_Merchant.jpg" alt="" srcset="">
    </div>
    <div>
        <h1>
            "Who worships Satan?"
        </h1>
        <img src="The_Happy_Merchant.jpg" alt="" srcset="">
    </div>
    <div>
        <h1>
            "Who will begin WW3?"
        </h1>
        <img src="The_Happy_Merchant.jpg" alt="" srcset="">
    </div>
</body>

</html>
```



Output of index.html

```
qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop/dev-ops-ass-2$ git add .
qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop/dev-ops-ass-2$ git commit -m "Completion - 02/10/2025"
[main 89c0863] Completion - 02/10/2025
 2 files changed, 104 insertions(+)
 create mode 100644 The_Happy_Merchant.jpg
 create mode 100644 index.html
```

Changes committed and pushed to repository



Repository Updated

hosts.ini

[local]
localhost ansible_connection=local

deploy.yml

```
---
- name: Continuous Deployment on Localhost
  hosts: local
  become: yes
  tasks:
    - name: Install Apache Web Server
      apt:
        name: apache2
        state: present
        update_cache: yes
```

```
- name: Configure Git safe directory
  command: git config --global --add safe.directory /var/www/html/app
  become: yes

- name: Remove existing app directory to avoid conflicts
  file:
    path: /var/www/html/app
    state: absent

- name: Pull code from GitHub
  git:
    repo: 'https://github.com/qarq90/dev-ops-ass-2.git'
    dest: /var/www/html/app
    version: main
    force: yes

- name: Copy ALL website files to root web folder
  copy:
    src: /var/www/html/app/
    dest: /var/www/html/
    remote_src: yes
    owner: www-data
    group: www-data
    mode: '0755'

- name: Set proper permissions on web directory
  file:
    path: /var/www/html
    owner: www-data
    group: www-data
    mode: '0755'
    recurse: yes

- name: Restart Apache
  service:
    name: apache2
    state: restarted:
- name: Install Apache Web Server
  apt:
    name: apache2
    state: present
    update_cache: yes

- name: Pull code from GitHub
```

```
    git:
      repo: 'https://github.com/qarq90/dev-ops-ass-2.git'
      dest: /var/www/html/app
      version: main

  - name: Copy index.html to root web folder
    copy:
      src: /var/www/html/app/index.html
      dest: /var/www/html/index.html
      remote_src: yes

  - name: Restart Apache
    service:
      name: apache2
      state: restarted
```

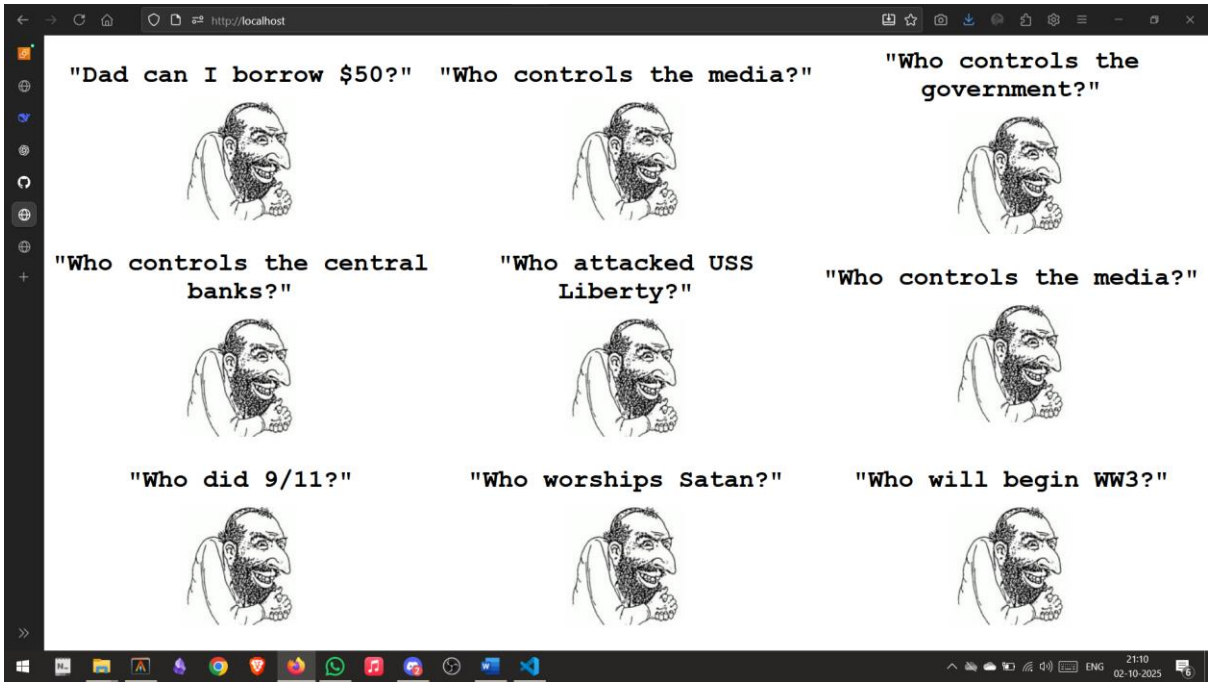
deploy.yml

```yaml
---
- name: Continuous Deployment on Localhost
  hosts: local
  become: yes
  tasks:
    - name: Install Apache Web Server
      apt:
        name: apache2
        state: present
        update_cache: yes

    - name: Configure Git safe directory
      command: git config --global --add safe.directory /var/www/html/app
      become: yes

    - name: Remove existing app directory to avoid conflicts
      file:
        path: /var/www/html/app
        state: absent

    - name: Pull code from GitHub
      git:
        repo: 'https://github.com/qarq90/dev-ops-ass-2.git'
        dest: /var/www/html/app
        version: main
        force: yes

    - name: Copy ALL website files to root web folder
      copy:
        src: /var/www/html/app/
        dest: /var/www/html/
        remote_src: yes
        owner: www-data
        group: www-data
        mode: '0755'

    - name: Set proper permissions on web directory
      file:
        path: /var/www/html
        owner: www-data
        group: www-data
        mode: '0755'
        recurse: yes

    - name: Restart Apache
      service:
        name: apache2
        state: restarted
```

deploy.yml File

```
qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop/ansible$ ansible-playbook -i hosts.ini deploy.yml --ask-become-pas
s
BECOME password:

PLAY [Continuous Deployment on Localhost] ***************************************************************************************

TASK [Gathering Facts] **********************************************************************************************************
ok: [127.0.0.1]

TASK [Install Apache Web Server] ************************************************************************************************
ok: [127.0.0.1]

TASK [Pull code from GitHub] ****************************************************************************************************
changed: [127.0.0.1]

TASK [Copy index.html to root web folder] ***************************************************************************************
changed: [127.0.0.1]

TASK [Restart Apache] ***********************************************************************************************************
changed: [127.0.0.1]

PLAY RECAP **********************************************************************************************************************
127.0.0.1                  : ok=5    changed=3    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop/ansible$
```

Ansible Playbook executed successfully



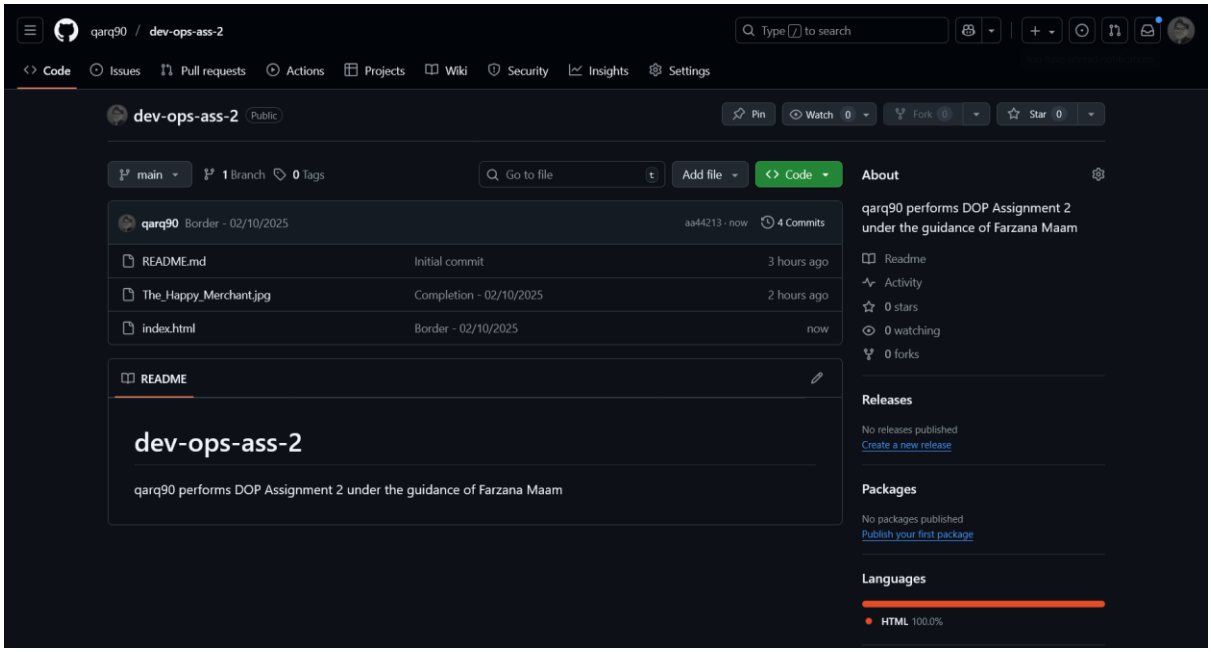
Output on localhost

Code Changes:

```
div {
 border: 2px black solid;    // Added this Line
 border-radius: 10px;                // Added this Line
 padding: 10px;                      // Added this Line
 box-sizing: border-box;     // Added this Line
```

```
}
```

Output Changes (Added a border)



Changes pushed to repository

```
qarq90@DESKTOP-H2RV5MQ:/mnt/c/Users/Abdurrahman Qureshi/Desktop/ansible$ ansible-playbook -i hosts.ini deploy.yml --ask-become-pas
s
BECOME password:

PLAY [Continuous Deployment on Localhost] ***************************************************************************

TASK [Gathering Facts] **********************************************************************************************
ok: [127.0.0.1]

TASK [Install Apache Web Server] ************************************************************************************
ok: [127.0.0.1]

TASK [Configure Git safe directory] *********************************************************************************
changed: [127.0.0.1]

TASK [Remove existing app directory to avoid conflicts] *************************************************************
changed: [127.0.0.1]

TASK [Pull code from GitHub] ****************************************************************************************
changed: [127.0.0.1]

TASK [Copy ALL website files to root web folder] ********************************************************************
changed: [127.0.0.1]

TASK [Set proper permissions on web directory] **********************************************************************
changed: [127.0.0.1]

TASK [Restart Apache] ***********************************************************************************************
changed: [127.0.0.1]

PLAY RECAP **********************************************************************************************************
127.0.0.1                  : ok=8    changed=6    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

Playbook executed again successfully

Latest changes reflected on localhost