Integrating OAuth 2.0 Authentication into a Flask Application Using GitHub

INTRODUCTION

This report details the process of integrating OAuth 2.0 authentication into a simple Flask web application using GitHub as the OAuth provider. The objective was to gain hands-on experience with OAuth 2.0 by developing a Flask app that allows users to authenticate via GitHub and access their profile information.

Steps to Implement OAuth 2.0 Authentication

1. Set Up GitHub OAuth

Create a GitHub Account:

1. If you do not already have a GitHub account, create one at GitHub Signup.

Register a New OAuth Application:

1. Log in to GitHub and navigate to **Settings** > **Developer settings** > **OAuth Apps**.
2. Click **New OAuth App** to register a new application.
3. Fill out the application form with the following details:
    1. **Application name**: Enter a name for your application.
    2. **Homepage URL**: Use `http://localhost:5000` for local testing.
    3. **Authorization callback URL**: Set this to `http://localhost:5000/github_login/github/authorized`.
4. Click **Register application**.
5. Note the **Client ID** and **Client Secret** provided by GitHub. These credentials are needed for your Flask app.

2. Develop the Flask Application

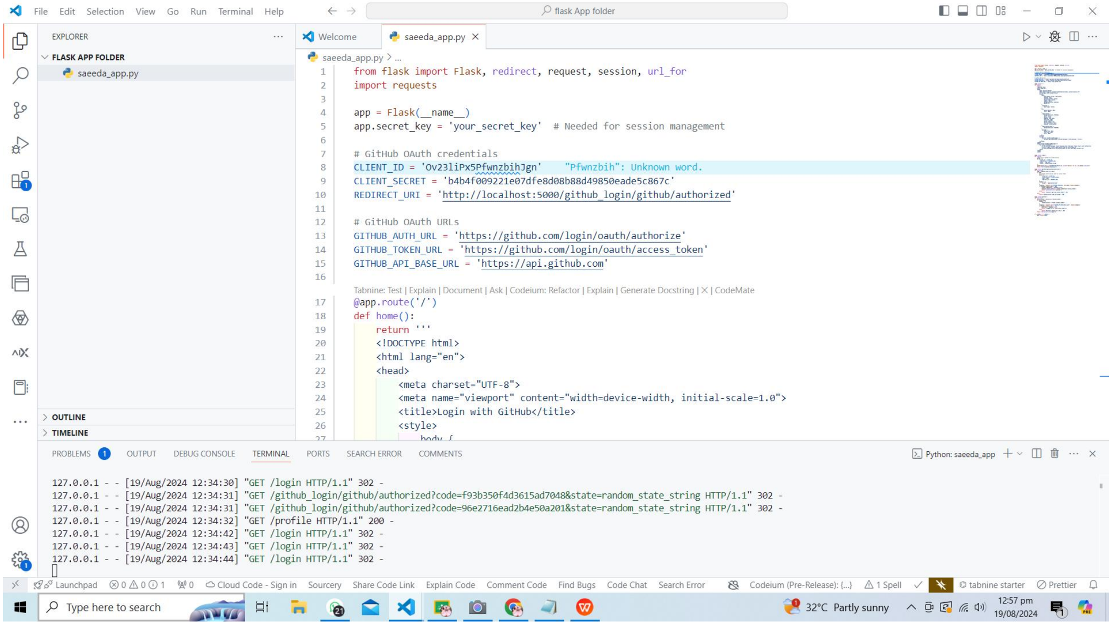
Create Project Directory:

1. Created a new directory for project, “flask app folder”

Set Up the Flask App:

1. Inside your project directory, created a file named saeeda_`app.py`.

Flask Application Code:



```python
from flask import Flask, redirect, request, session, url_for
import requests

app = Flask(__name__)
app.secret_key = 'your_secret_key'  # Needed for session management

# GitHub OAuth credentials
CLIENT_ID = 'Ov23liPx5PfwnzbihJgn'
CLIENT_SECRET = 'b4b4f009221e07dfe8d08b88d49850eade5c867c'
REDIRECT_URI = 'http://localhost:5000/github_login/github/authorized'

# GitHub OAuth URLs
GITHUB_AUTH_URL = 'https://github.com/login/oauth/authorize'
GITHUB_TOKEN_URL = 'https://github.com/login/oauth/access_token'
GITHUB_API_BASE_URL = 'https://api.github.com'

@app.route('/')
def home():
    return '''
    <!DOCTYPE html>
    <html lang="en">
    <head>
        <meta charset="UTF-8">
        <meta name="viewport" content="width=device-width, initial-scale=1.0">
        <title>Login with GitHub</title>
        <style>
            body {
```

```
127.0.0.1 - - [19/Aug/2024 12:34:30] "GET /login HTTP/1.1" 302 -
127.0.0.1 - - [19/Aug/2024 12:34:31] "GET /github_login/github/authorized?code=f93b350f4d3615ad7048&state=random_state_string HTTP/1.1" 302 -
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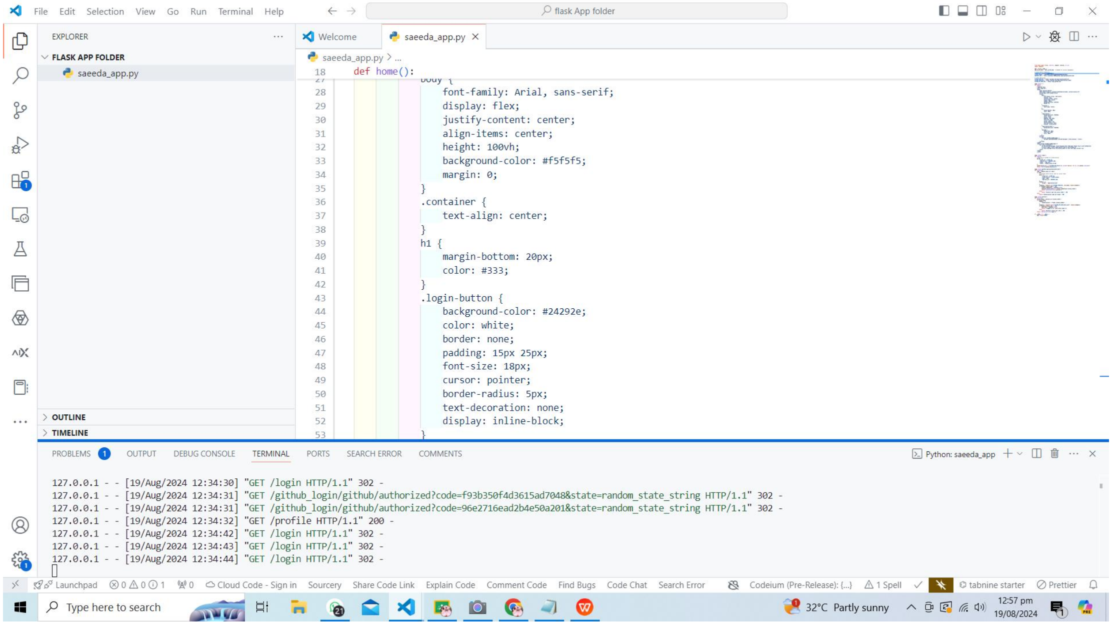

```python
def home():
            body {
                font-family: Arial, sans-serif;
                display: flex;
                justify-content: center;
                align-items: center;
                height: 100vh;
                background-color: #f5f5f5;
                margin: 0;
            }
            .container {
                text-align: center;
            }
            h1 {
                margin-bottom: 20px;
                color: #333;
            }
            .login-button {
                background-color: #24292e;
                color: white;
                border: none;
                padding: 15px 25px;
                font-size: 18px;
                cursor: pointer;
                border-radius: 5px;
                text-decoration: none;
                display: inline-block;
            }
```

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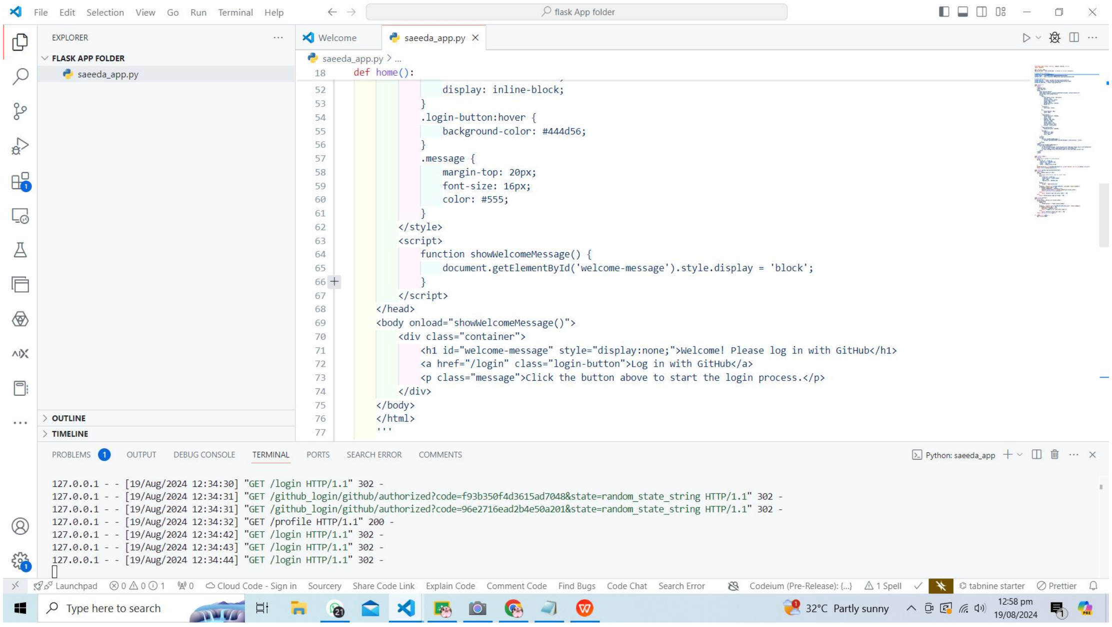

```
def home():
                display: inline-block;
            }
            .login-button:hover {
                background-color: #444d56;
            }
            .message {
                margin-top: 20px;
                font-size: 16px;
                color: #555;
            }
        </style>
        <script>
            function showWelcomeMessage() {
                document.getElementById('welcome-message').style.display = 'block';
            }
        </script>
    </head>
    <body onload="showWelcomeMessage()">
        <div class="container">
            <h1 id="welcome-message" style="display:none;">Welcome! Please log in with GitHub</h1>
            <a href="/login" class="login-button">Log in with GitHub</a>
            <p class="message">Click the button above to start the login process.</p>
        </div>
    </body>
    </html>
    '''
```

```
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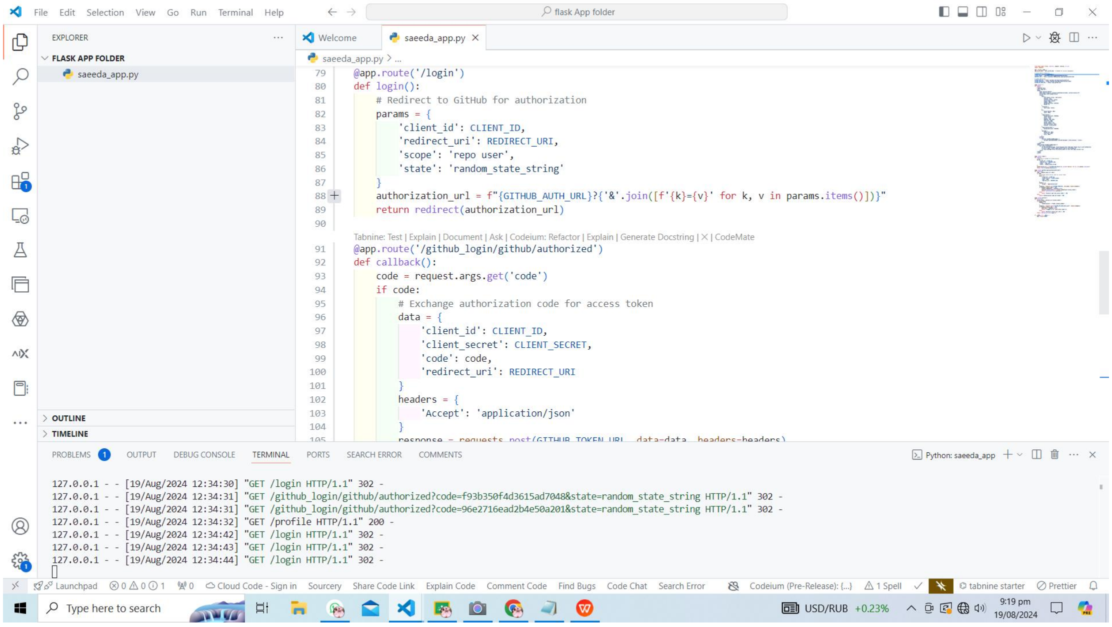

```
@app.route('/login')
def login():
    # Redirect to GitHub for authorization
    params = {
        'client_id': CLIENT_ID,
        'redirect_uri': REDIRECT_URI,
        'scope': 'repo user',
        'state': 'random_state_string'
    }
    authorization_url = f"{GITHUB_AUTH_URL}?{'&'.join([f'{k}={v}' for k, v in params.items()])}"
    return redirect(authorization_url)

@app.route('/github_login/github/authorized')
def callback():
    code = request.args.get('code')
    if code:
        # Exchange authorization code for access token
        data = {
            'client_id': CLIENT_ID,
            'client_secret': CLIENT_SECRET,
            'code': code,
            'redirect_uri': REDIRECT_URI
        }
        headers = {
            'Accept': 'application/json'
        }
        response = requests.post(GITHUB_TOKEN_URL, data=data, headers=headers)
```

```
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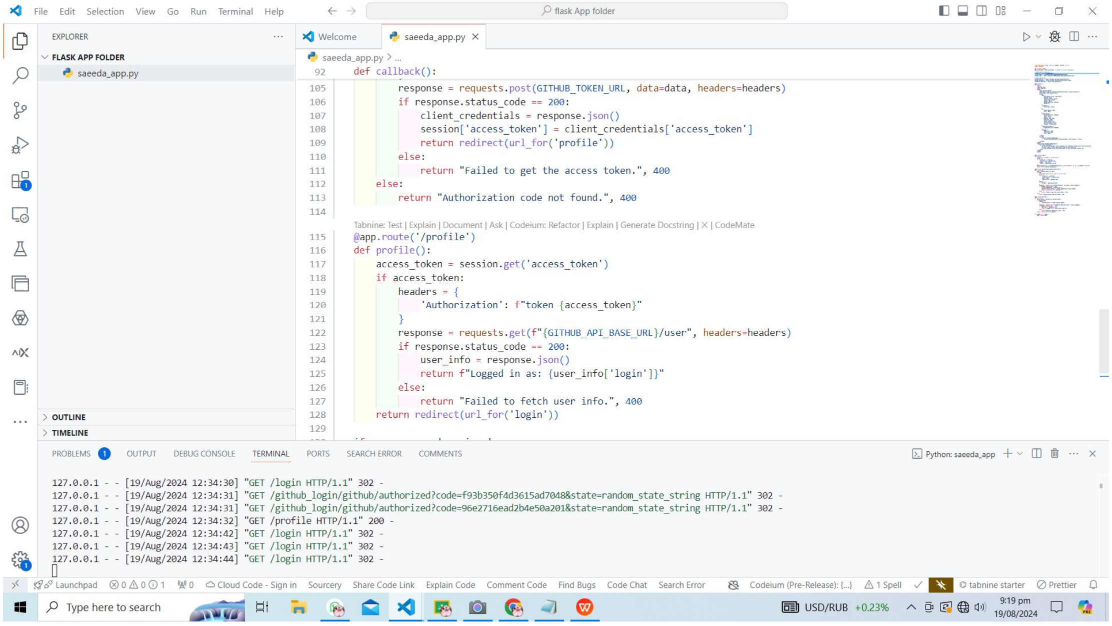

```
def callback():
        response = requests.post(GITHUB_TOKEN_URL, data=data, headers=headers)
        if response.status_code == 200:
            client_credentials = response.json()
            session['access_token'] = client_credentials['access_token']
            return redirect(url_for('profile'))
        else:
            return "Failed to get the access token.", 400
    else:
        return "Authorization code not found.", 400

@app.route('/profile')
def profile():
    access_token = session.get('access_token')
    if access_token:
        headers = {
            'Authorization': f"token {access_token}"
        }
        response = requests.get(f"{GITHUB_API_BASE_URL}/user", headers=headers)
        if response.status_code == 200:
            user_info = response.json()
            return f"Logged in as: {user_info['login']}"
        else:
            return "Failed to fetch user info.", 400
    return redirect(url_for('login'))
```

```
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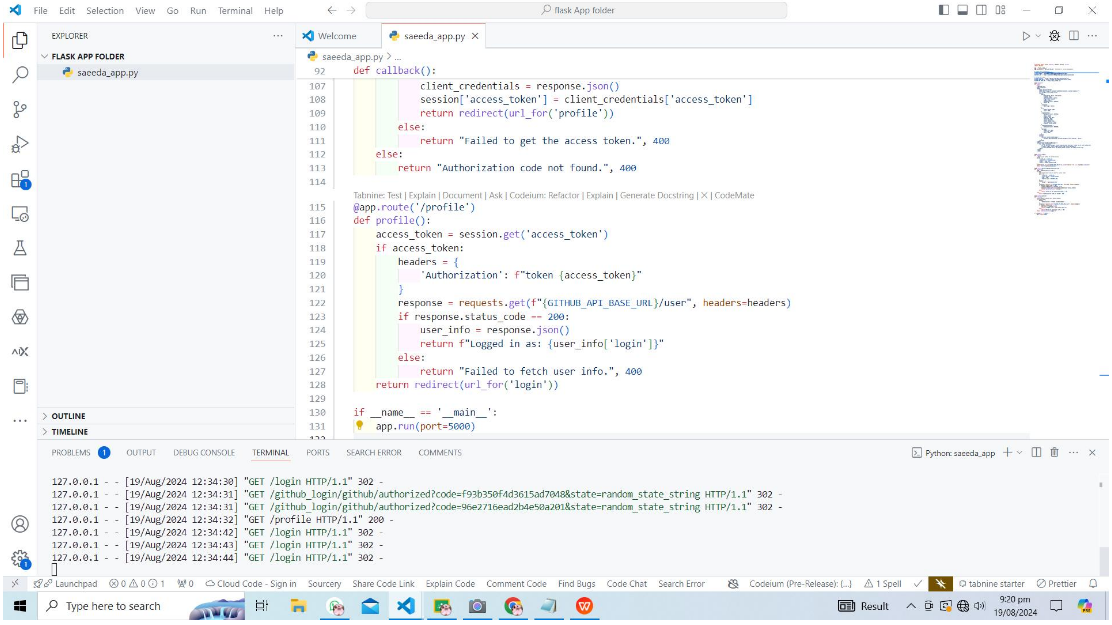

```
def callback():
            client_credentials = response.json()
            session['access_token'] = client_credentials['access_token']
            return redirect(url_for('profile'))
        else:
            return "Failed to get the access token.", 400
    else:
        return "Authorization code not found.", 400

@app.route('/profile')
def profile():
    access_token = session.get('access_token')
    if access_token:
        headers = {
            'Authorization': f"token {access_token}"
        }
        response = requests.get(f"{GITHUB_API_BASE_URL}/user", headers=headers)
        if response.status_code == 200:
            user_info = response.json()
            return f"Logged in as: {user_info['login']}"
        else:
            return "Failed to fetch user info.", 400
    return redirect(url_for('login'))

if __name__ == '__main__':
    app.run(port=5000)
```

```
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```

1. The code implements OAuth 2.0 authentication using GitHub and includes the following components:

    1. **Homepage Route:** Provides a link to initiate GitHub login.
    2. **Login Route:** Redirects users to GitHub for authorization.
    3. **Callback Route:** Handles GitHub's response, exchanges the authorization code for an access token, and stores it in the session.
    4. **Profile Route:** Uses the access token to fetch and display user information from GitHub.

3. Instructions for Running the Application

Install Dependencies:

Ensure you have Flask and requests installed. Install them using pip:

```
pip install Flask requests
```

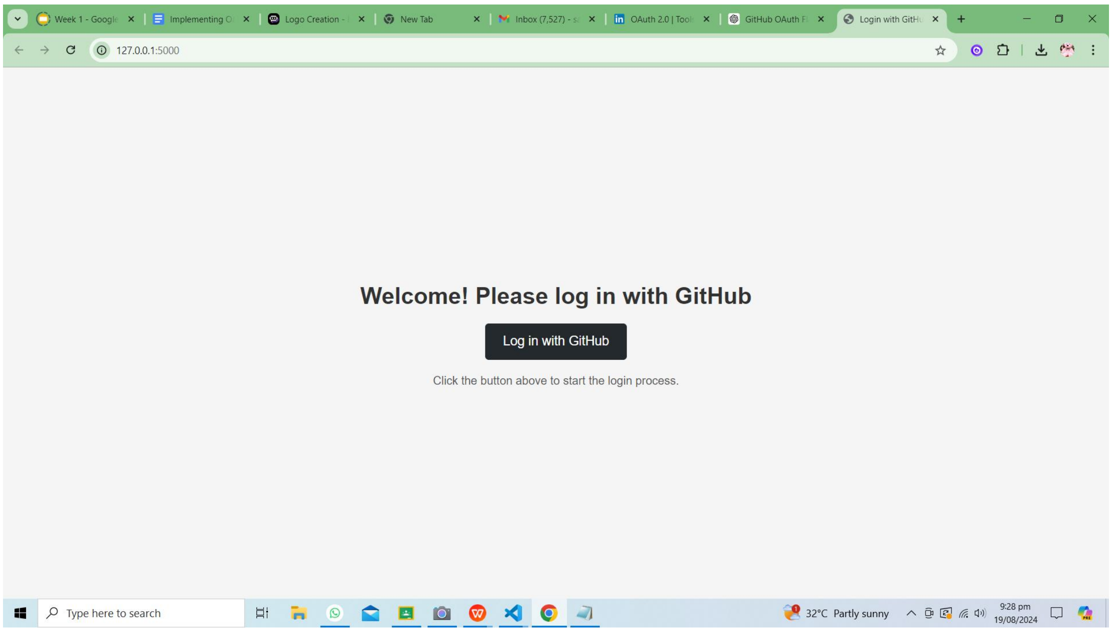
Run the Flask Application:

Open a terminal or command prompt, navigate to the project directory, and execute:

Python saeeda_app.py

Access the Application:

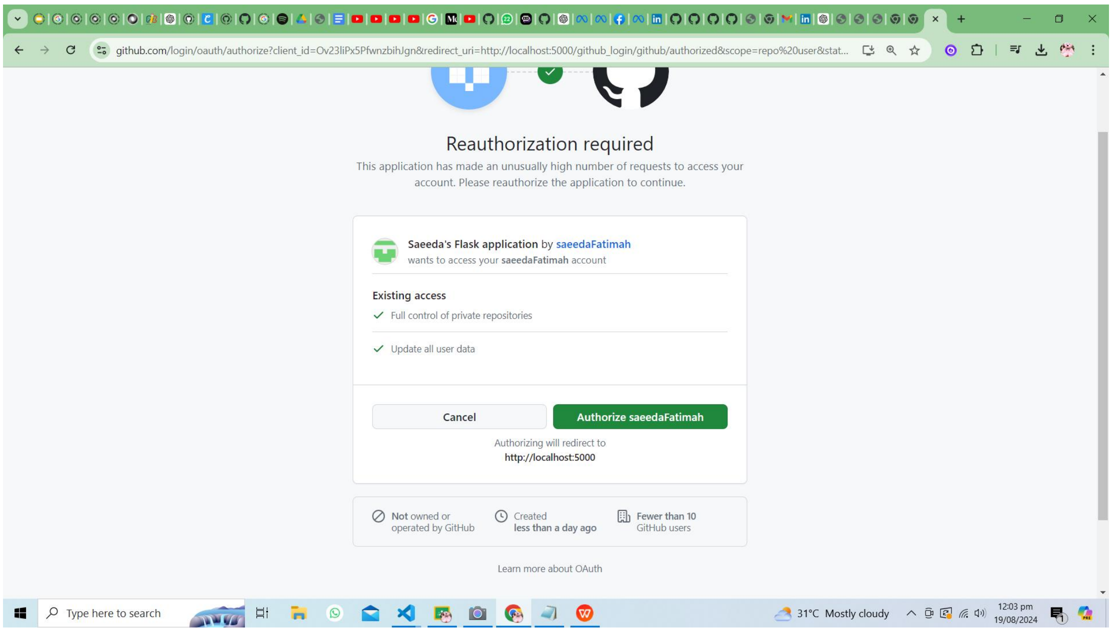
1. Open a web browser and go to [http://localhost:5000.](http://localhost:5000)



Welcome! Please log in with GitHub

Click the button above to start the login process.

2. Click the link to log in with GitHub, authorize the application, and view your GitHub profile information.



github.com/login/oauth/authorize?client_id=Ov23liPx5PfwnzbihJgn&redirect_uri=http://localhost:5000/github_login/github/authorized&scope=repo%20user&stat...

Reauthorization required

This application has made an unusually high number of requests to access your account. Please reauthorize the application to continue.

Saeeda's Flask application by saeedaFatimah
wants to access your saeedaFatimah account

Existing access

✓ Full control of private repositories

✓ Update all user data

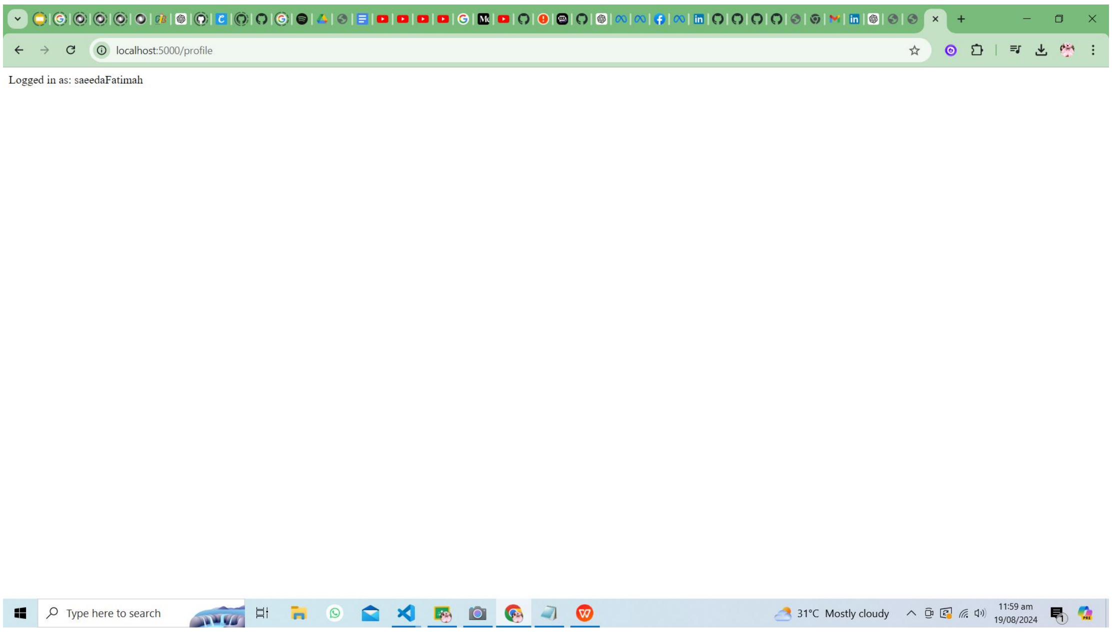
Authorizing will redirect to
http://localhost:5000

Not owned or operated by GitHub

Created less than a day ago

Fewer than 10 GitHub users

Learn more about OAuth



localhost:5000/profile

Logged in as: saeedaFatimah