Project Title: CMP2204 Introduction to Computer Networks Spring 2024, Term Project

Development Tools:

- Python 3.12.2

- Visual Studio Code

- Git for Version Control

- GitHub Copilot AI Tool

Team Members:

- Ömer İnkaya

- Uygar Tatar

Platform Selection:

For our project, we selected Windows 11 as our primary development platform due to its compatibility with a wide range of development tools and software libraries necessary for our application. Most of our team members were also already familiar with the Windows environment.

Challenges Faced:

1. **Network Programming:**
   - As this was our first experience with network programming, understanding and implementing the TCP and UDP protocols was a challenge. We had to learn about socket programming and how to handle data transmission over a network.
2. **Encryption:**
   - Implementing the Diffie-Hellman encryption for secure communication was another challenge. We had to understand the mathematical principles behind the algorithm and how to apply it in Python.
3. **JSON Implementation:**
   - We properly implemented Diffie-Hellman encryption, and it was working, but we forgot to use JSON to send the keys and encrypted messages. Initially, we could send integers, but we couldn't send string messages due to an error related to encrypted message is in byte format. We then added the encrypted message to a integer list then, dumped it into JSON format, and sent it. After making this change, it worked, so we didn't make any further modifications.

Division of Workload:

- **Ömer İnkaya:**

  - Responsible for managing the project.
  - Implemented TCP Functions to the Project (Chat_Initiator and Chat_Responder).
  - Integrated the Diffie-Hellman Key Exchange algorithm in the TCP_Client.py and TCP_Server.py scripts to ensure secure communication between clients.

- **Uygar Tatar:**

  - Implemented UDP Functions to the Project (Peer_Discovery and Service_Announcer).
  - Captured Wireshark screenshots of both encrypted and unencrypted message exchanges.
  - Coordinated with Ömer to use JSON integration properly.

Conclusion:

Despite these challenges, we were able to successfully complete the project through teamwork, research, and continuous learning.