



Department of Electrical and Computer Engineering (EECE)

Course: Introduction to Operating Systems

Code: EECE 432

Fall: 2023-2024

## **Operating System Project: Designing a Chat Room**

### ➤ **Objectives:**

1. Design a chat room via a client-server scenario.
2. Implement an IPC tool which is the socket.
3. Understand what is socket and how it can be implemented.
4. Understand the multi-threading implementation, and how can be used in a client-server scenario.
5. Apply synchronization techniques in a client-server scenario.
6. Integrate different programming and operating system concepts together for building an efficient chat room.
7. The project must be displayed within a Graphical User Interface (GUI) framework.

### ➤ **Required Knowledge:**

1. Basic networking concepts like IP address, Port Number, TCP, and UDP.
2. Process definition and Inter-Process Communication concept.
3. Socket definition and implementation.
4. Multi-threading definition and implementation.
5. Thread synchronization definition and implementation.
6. Programming skills like C, C++, Java, Python, etc. (C is a preferable Language)

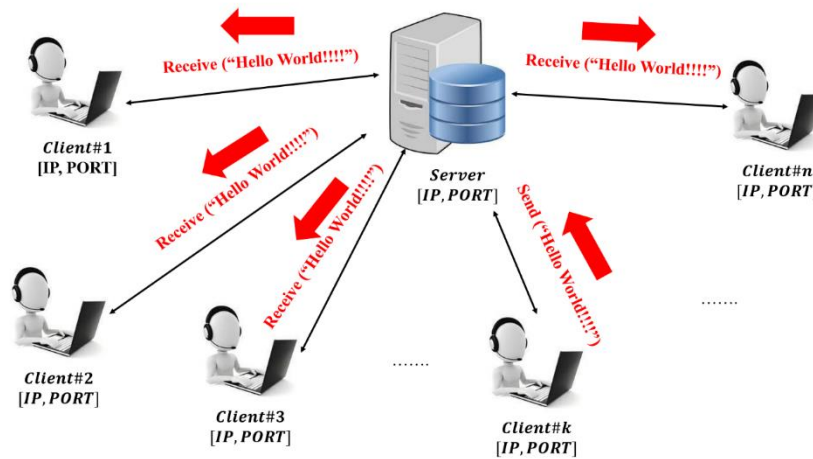
### ➤ **Required tools:**

1. Unix/Linux environment (Ubuntu, Fedora, Kali, Centos, etc).
2. A compiler based on the chosen programming language. (For example, in case of C is adopted as a programming language, gcc debugger is mandatory).

### ➤ **Proposal:**

1. The basic idea of the project is simple, but its implementation needs some programming skills and knowing basic operating system tools and concepts.
2. Each client requests a connection, a new thread should be created to serve the concerned clients.
3. Afterward, each client will join the chat room, indeed the latter is formed from the server and different clients that joined the chat room.

4. The communication between a client and the server is carried out using socket implementation as IPC practical tool.
5. A client can send a message to the server, based on the IPC tool defined above, and this message is broadcasted to all other clients in the room except the sender as presented in Figure 2 below.



**Figure 2: Closed Chat Room Scenario**

➤ **Evaluation:**

1. The work is carried out by a group of 2 students.
2. Each group at the end of the project should present a written report of 20-30 pages that contains a theoretical explanation of the different parts of the project, a discussion about the challenges faced during the implementation, and a real-time demo of the resultant chat room.
3. A discussion session of 10 minutes will be done with each group. Of course, during the discussion, some deep questions related to the code and the socket implementation.
4. It is not necessary that all the group members will take the same grade, the grade is based on the knowledge, the work, and the answer of each member of the group.
5. You have until the end of the semester to present the project.

**Remark:** It is welcomed to propose other projects by the students, but it is better to discuss it first with the instructor.

***Good Luck***