

## Contact

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## Building Socket-based distributed systems

### 1. Objectives

- Building distributed systems
- Synchronous network communication systems
- Introduction to Java Sockets

### 2. Prerequisites

- Java programming

### 3. Description of work

- a) Run the provided examples of mono-threaded programs: first, the server program, then, the client program.
- b) Extend the server program and the client program with additional operations, e.g., output a message for the user on the client, output a message on the server side.
- c) Stop all runs. Run again the server program. Then, run the client program. And run again another instance of the client program. What do you observe?
- d) Run the provided examples of multi-threaded programs: first, the multi-threaded server program, then, the client program.
- e) Specify the design principles and communication protocol of a distributed system that represents a chat system, where users can dynamically join, leave, and exchange messages.
- f) Describe the implementation details of the chat system using sockets.
- g) Build the socket-based chat system.
- h) Implement a graphical user interface for the chat system.

- i) Add a history to the chat system: a new user who joins the system first receives the messages exchanged before by other users. This first version of the history is ephemeral, i.e., when the chat system is stopped, the history of messages is lost.
- j) Implement a persistent history of exchanged messages, i.e., when the chat server is stopped and restarted, the history of exchanged messages is restored.
- k) Implement a distributed chat system with group communication multicast.

## **4. Software environment**

### **Used software**

- Java 2 SDK
- IDE (e.g. Eclipse)

### **Directory organization**

Organize your directory as follows:

- src/
  - .java files
- classes/
  - .class files
- doc/
  - Javadoc API and HTML files
- lib/
  - .jar files