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**TECHNICAL UNIVERSITY**

OF CLUJ-NAPOCA, ROMANIA

**FACULTY OF AUTOMATION AND COMPUTER SCIENCE  
COMPUTER SCIENCE DEPARTMENT**

# DISTRIBUTED SYSTEMS

## Assignment 3

### Web sockets and security

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## 1. Requirements

Develop a chat microservice and an authorization component for the Energy Management System. The authorization component should provide secured access of users to systems' microservices. The chat microservice should allow communication between the users and the administrator of the system, allowing them to ask questions and receive answers.

### 1.1. Functional requirements

Chat microservice:

- The front-end application displays a chat box where users can type messages.
- The message is sent asynchronously to the administrator, that receives the message together with the user identifier, being able to start a chat with the user.
- Messages can be sent back and forth between the user and the administrator during a chat session.
- The administrator can chat with multiple users at once.
- A notification is displayed for the user when the other administrator reads the message and vice versa.
- A notification is displayed for the user (e.g., typing) while the administrator from the other end of communication types of its message and vice versa.

Authorization component: -

### 1.2. Implementation technologies

- Chat component: web sockets technology
- Authorization component: Spring Security OAuth2 JWT for user's authentication and authorization. Should be integrated into User Management Microservice.

## 2. Deliverables

- A solution description document (about 4 pages, Times New Roman, 10pt, Single Spacing) containing:
  - a) Conceptual architecture of the distributed system.
  - b) UML Deployment diagram.
  - c) Readme file containing build and execution considerations.
- Source files. The source files and the database dump will be uploaded on the personal GitLab account created at the Lab resources laboratory work, following the steps:
  - Create a repository on GitLab with the exact name: *DS2024\_Group\_LastName\_FirstName\_Assignment\_3*
  - Push the source code and the documentation (push the code not an archive with the code or war files)
  - Share the repository with the user *utcn\_dsrl*

## 3. Evaluation

### 3.1. Assignment Related Basic Questions:

During project evaluation and grading you will be asked details about the following topics:

- Distributed objects middleware components: Stub, Skeleton, Dispatcher, etc.
- RPC model
- HTTP vs. HTTPs
- Distributed objects vs Local objects
- Sockets, Web sockets
- Security in web applications.

### 3.2. Grading

The assignment will be graded as follows:

Points	Requirements
5 p	<b>Minimum to pass.</b> <ul style="list-style-type: none"> <li>• Chat microservice implementation supporting message send and receive primitives.</li> <li>• Authorization component implementation and integration into User Management Microservice</li> <li>• Simple GUI</li> <li>• Documentation</li> <li>• Correct answers to 3.1 questions</li> </ul>
2 p	Administrator can chat with multiple clients at once
2 p	A notification is displayed for the user when the other user reads the message.
1 p	Notification is displayed while user is typing its message

### 4. Bibliography

1. <https://dsrl.eu/courses/sd/>
2. Lab Book: I. Salomie, T. Cioara, I. Anghel, T. Salomie, Distributed Computing and Systems: A practical approach, Albastra, Publish House, 2008, ISBN 978-973-650-234-7
3. Lab Book: M. Antal, C. Pop, D. Moldovan, T. Petrican, C. Stan, I. Salomie, T. Cioara, I. Anghel, Distributed Systems – Laboratory Guide, Editura UTPRESS Cluj-Napoca, 2018 ISBN 978-606-737-329-5, 2018, <https://biblioteca.utcluj.ro/files/carti-online-cu-coperta/329-5.pdf>
4. Spring Security, <https://spring.io/projects/spring-security/>