Distributed Systems (521290S)   
Course Project Report

<Team Tesla>

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# *Instructions:*

***1. DEADLINE (31.Jan.2024): Registration of topic, i.e. the Section “Course project overview” described.***

***2. DEADLINE (12.Feb.2024): Submission of project design. Includes all the red parts marked ”Design:” in the beginning of each section below. At this point, you don’t need to provide full detailed solution(s) description.***

***3. DEADLINE (24.Feb.2024): Final submission of this report, including full detailed description of the project.***

*After each deadline, you can modify your design, implementation and this report based on feedback.*

*Hints:*

* *Remember take a look at the course project slideset and video recording in Moodle.*
* *The way of writing is free (e.g. text / bullet points / figures), only English please.*
* *A picture is worth thousand words.. recommended length* ***3-4 pages*** *(including the title page).*
* *Instead of MS Word, you can use another format (e.g.* ***latex****, RTF), but follow exactly the same document structure.*
* *Submission must be a* ***PDF*** *format*
* *Regarding sections 1-8 below, if some sections are not applicable to your project (e.g. you did not consider fault tolerance) just write “Not applicable, because <short one sentence explanation>”.*
* *In your initial idea registration, already think of architecture, organization and communication pattern in a general level. Just saying its client-server is not enough.*
* *Course book has lots of protocols and solutions described, so saves your workload if you take a look. A bonus is that you can find code or a library for the solutions (e.g. P2P / AMQP / MQTT in python).*

*To save space, for the final submission remove the above instructions and replace with overview section.* ***Submit your final report as PDF.***

# Course project overview

A brief description (abstract) of the project, including 1) the application and 2) the software and system architecture and 3) distributed systems topic that your project addresses.

# 1. Architecture

Design: Describe the software architecture of your application and the distributed system.

1. Drawing (preferred, but text description also ok) of the system architecture, including:

* Outline of the software architecture: architectural style and organization
* Roles of the system components in your application: client / server / (super)peer / dispatcher / broker / etc
* Services that are either provided by servers or used by the clients / peers / etc
* Interactions / logical connections between components: e.g. directed arrows with short text explaining what is the purpose of each interaction
* Middleware or external services (if applicable)
* Data: e.g. file / database / external data source and its contents

2. Description of how your project demonstrates the distributed systems topic you selected?

3. How does your design support / implement the evaluation you planned for the project? Its important think about the evaluation (see section below), since it can affect your design a lot!

Advice: Use the terminology from the course book, the design may not be accepted if the used terms are not clear. The level of detail is *subsection title*. For example, just saying “its P2P” is not accepted, but is it *structured / unstructured / hierarchical*?

# 2. Implementation

Describe how you implemented the functionality for each system component (e.g. client and server), including software solutions and possible hardware.

Advice: For the design, is it already beneficial to think about the implementation of the components. You save a lot of iterations in development, if you, at this point take the design seriously. For example: what are the components’ internal architectures, how components are virtualized, what software is needed to realize functionalities, etc?

# 3. Communication

Design: Describe how the components in your distributed system interact to implement the application, and possible communicate with system-level services.

It pays to describe the following:

* Interaction pattern, e.g. publish / subscribe
* Application-level protocol (if applicable), i.e. the messages / events you use in your application
* Interfaces, e.g. RPC or REST API
* Communication protocol (stack) you used in the project

For example, you are using HTTP atop TCP/IP and the RESTful interface is the following / With MQTT, these events are published..

# 4. Naming

Design: Describe briefly how the components in your distributed system identify and/or discover other components and resources. For example, is your system using flat / structured /attribute-based naming? What kind address + name scheme you implement? How do peers know their neighbors? etc..

# 5. Coordination

Design: If your project implements a synchronization / coordination / election / etc scheme or uses a such protocol, describe briefly your solution here. Refer back to section 1 and describe the components and their roles and the utilized algorithm (i.e. election / gossip / etc) in more detail. Again, a picture is worth thousand words, see examples in the course book.

# 6. Consistency and replication

Design: If your project follows a data- or client-centric consistency model or implements replica management / protocol or such a scheme, describe it here briefly. Refer back to section 1 and describe the components and their roles in more detail. Again, a picture is worth thousand words, see examples in the course book.

# 7. Fault tolerance

Design: If your project implements a fault detection or tolerance mechanism, solution for reliable communication or distributed commit protocol describe it here briefly. Refer back to section 1 and describe the components and their roles in more detail. Again, a picture is worth thousand words, see examples in the course book.

# 8. Security

Design: If your project implements security, authentication, authorization mechanism, describe it here briefly. Refer back to section 1 and describe the components and their roles in more detail. Again, a picture is worth thousand words, see examples in the course book.

# Evaluation

A table with numeric data speaks thousand words. Include a (very) brief analysis of the evaluation results.. what can be seen, is something missing, etc.

Advice: Already, for the design, is it necessary to think of the evaluation you planned for your project. This way you will have a “placeholders” built-in into your system. enabling easy evaluation once you are at this stage. Think of the test cases and what and how data is collected in your system, do you use a logging tool, etc. General rule is “everything is related to everything”..

# Workload distribution

Plan of sharing the workload (wl )and estimated hours. Please fill in the real calculated workload only on the final submission of the report.

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| Student name | Tasks | Estimated wl. (h) | Real wl. (h) |
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# References

In case you utilized existing work or software in your project, please list the sources here.

Design: You should already have some ideas which (existing) software you are using in your project..