

Algoritmos e Sistemas Distribuídos- Project 1 (Default Variant)

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1 Overview

This document discusses the second ASD project for 2018/19. There are three options: A, B, C. These options all evaluate for a final project grade of 20. They differ both on the concrete objectives and on the number of students in the group. Regarding this last aspect, option A aims at groups composed of 3 students, option B targets groups of 2 students; and finally, Option C aims at allowing students to pursue an individual project that can have additional freedom.

For Option A and B students are free to use any programming language or technologies they feel more comfortable with. The concrete suggestion is for students to use the Scala/Akka ecosystem. Using Akka, you probably want to have each process in the system to be modeled as a set of Actors, where each actor represents one protocol used by that process. Notice that, you cannot make use of any mechanism provided by the runtime to get knowledge about the system membership. Java is also another option that students, although this might bring some additional complexity to your implementation. Students doing options A or B should discuss with the course professor before starting to use different programming languages.

Option C is the continuation of the individual project assigned to students in the first project.

Evidently, each student should only do one of the available options for the project, and they should strive to maintain the same groups as in the first project

Below each of the options is discussed.

Part I

System Description for Option A and Option B

The application layer (i.e, the service) is a simple key value store, where all replicas should have the same information. The service itself provides two client operations to manipulate the key value store: read(Key) and write(key, value). For simplicity both Keys and Values can be modeled as strings. As an implementation suggestion, students can, at the application level, rely on a HashMap.

In addition to this the service should also support two additional management operations: AddReplica(Replica) and RemoveReplica(Replica). Replica can be any data format that assists students in their implementation, a suggestion is to provide the necessary information for contacting that replica (e.g, IP + PORT).

At bootstrap the replicas should be made aware (through a configuration file) of the initial set of replicas. This information should be used to initialize the Paxos/Multi-Paxos (see below) component. Replicas that fail should be automatically removed from the system.

Part II

Option A: Publish-Subscribe using Structured

Approaches

In this option the students are asked to implement a replicated service using state machine replication. In this variant the state machine replication layer should use Multi Paxos.

Part III

Option B: Publish-Subscribe using Unstructured

Approaches

In this option the students are asked to implement a replicated service using state machine replication. In this variant the state machine replication layer should use Paxos.

Part IV

Option C: Individual Project

Continuation of the individual project from the first phase.

2 Evaluation Rules & Criteria

The project includes both the delivery of the code and a written report that must contain clear and readable pseudo-code for each of the implemented layers alongside a description of the intuition of the protocol. A correctness argument for each layer will be positively considered during grading. The written report should provide information about any experimental work conducted by the students to evaluate their solution in practice (including results).

The project will be evaluated by the correctness of the implemented solutions, its efficiency, and the quality of the implementation. With a distribution of 50%, 25%, and 25% respectively for each of the layers.

The quality and clearness of the report of the project will impact the final grade in 10%, however the students should notice that a poor report might have a significant impact on the evaluation of the correctness of the used solutions (which weight 50% of the evaluation for each component of the solution).

Each component of the project will have a maximum grade of (out of 20):

Developed Distributed Protocols: 12/20

Test Application and Evaluation: 6/20.

Written Report: 3/20

(Yes, the sum of this is not 20)

3 Delivery Rules

Delivery of all components of the project is due on 8 December 2018 at 23:59:59.

Discussions of both projects will happen in the the 17 of December. I will only download mails with the project deliveries on December 14th.

The project should be delivered by e-mail with a subject stating "ASD Project Delivery 2 - <Student Numbers>"