Multi-Threading Programming and Inter-Process Communication

M.Sc. course on "Technologies for Big Data Analysis" - Assignment 1

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1 Introduction

The current document is a technical report for the first programming assignment in the M.Sc. course on *Technologies for Big Data Analysis*, offered by the *DWS M.Sc Program*[1] of the Aristotle University of Thessaloniki, Greece. The course is taught by Professor Apostolos Papadopoulos [2]. The authors attended the course during their first year of Ph.D. studies at the Institution.

The assignment contains 4 sub-problems and is part of a series, comprising 3 programming assignments on the following topics:

Assignment 1 Multi-threading Programming and Inter-Process Communication
Assignment 2 The Map-Reduce Programming Paradigm
Assignment 3 Big Data Analytics with Scala and Apache Spark

In this document we focus on Assignment 1 and its 4 sub-problems. We refer to them as *problems* in the rest of the document for simplicity. The source code of our solution has been made available at `https://github.com/Bilpapster/big-data-playground`.

Roadmap. The rest of our work is structured as follows. We devote one section for each one of the 4 problems. That means problems 1, 2, 3 and 4 are presented in sections 2, 3, 4 and 5 respectively. For each problem, we first provide the problem statement, as given by the assignment. Next, we thoroughly present the reasoning and/or methodology we have adopted to approach the problem and devise a solution. Wherever applicable, we also provide insights about the source code implementation we have developed. For problems 2 and 4, we complete the respective sections with a discussion about alternatives or improvements the solution could accept, in order to successfully support more complex requirements. Finally, we conclude our work in section 6.

2 Problem 1: Concurrent Array-Vector Multiplication

This is the section for the first problem.

2.1 Problem Statement

3 Problem 2: Simulating a pandemic

This is the section for the second problem.

3.1 Problem Statement

4 Problem 3: Key-value server store

This is the section for the third problem.

[1] https://dws.csd.auth.gr/
[2] https://datalab-old.csd.auth.gr/~apostol/

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This is the section for the fourth problem.

This is the section for the conclusion.