National College of Ireland

Enhancing Load Balancing in Cloud Computing and Reducing Makespan by using Hybrid Particle Swarm Optimisation Algorithm to Improve Task Scheduling.

MSc Research Project
Cloud Computing

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Project Submission Sheet
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Programme:	Cloud Computing
Year:	2022
Module:	MSc Research Project
Supervisor:	Rashid Mijumbi
Submission Due Date:	15/12/2022
Project Title:	Enhancing Load Balancing in Cloud Computing and Reducing Makespan by using Hybrid Particle Swarm Optimisation Algorithm to Improve Task Scheduling.
Word Count:	800
Page Count:	6

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Enhancing Load Balancing in Cloud Computing and Reducing Makespan by using Hybrid Particle Swarm Optimisation Algorithm to Improve Task Scheduling.

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1 Introduction

The approach for recreating the implementation of an optimization-based load-balancing algorithm is outlined in this configuration manual/handbook. Additionally, it contains the general configuration for setting up the necessary tools for the research. This document's overall objective is to give the instructions and details required to execute the code submitted as part of the research project submission. The coding of the entire project is carried out using the objective C programming language.

2 Pre-requisites

The user recreating the setup using this configuration manual must have a basic understanding of Objective-C programming language and scripts written in Matlab (".m" scripts). Additionally, the user must also have the latest version of Matlab installed or at least version "R2018a" or later.

3 Hardware Specifications

- **Operating System -** Windows 10 Home Single Language
- **Processor -** AMD Ryzen 5 4600H with Radeon Graphics
- **Installed Memory (RAM)-** 16 GB
- **System Type -** 64-bit Operating System, x64-based Processor
- **Storage Capacity -** 1 TB Hard Disk

4 Minimum System Requirememnts

The minimal system requirements necessary to reproduce the research scenario are described in this section.

- **Operating System -** Windows/Linux based OS.

- **Memory (RAM) -** Minimum of 8 GB.
- **Disk Space -** At least 30 GB of empty space.

5 Installation of Matlab Tool

This section guides the user about how to download and install Matlab simulation tool.

- Navigate to the Mathworks website with the help of following link - `https://uk.mathworks.com/store/`. Figure 1 depicts the Mathworks store page.

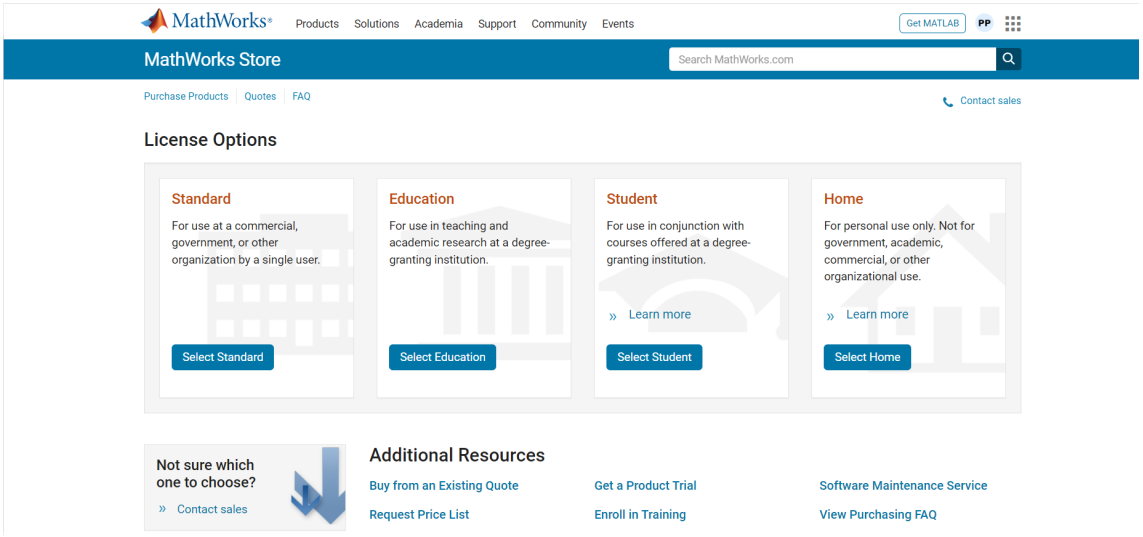

Figure 1: Mathworks official webstore for downloading Matlab Simulation tool

- Click on "Get Matlab" icon present at the top right corner of the window as shown in figure 1. The website will then transfer your request to the "create account or Sign In" page (Figure 2). If you have an existing account click on "Sign In" to proceed or else click on "Create Account"

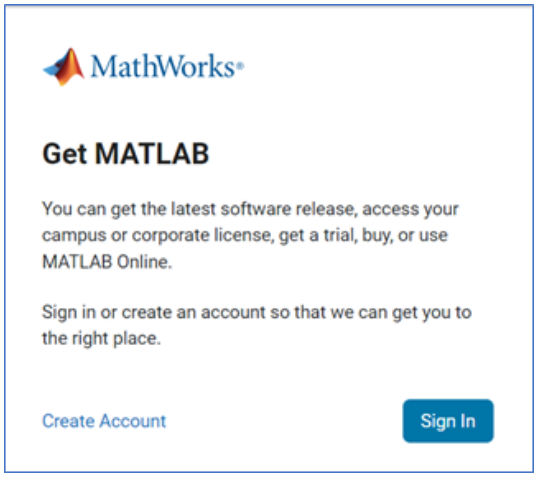

Figure 2: SignIn or Create Account Page

- Now follow the steps for creating an account and fill out all the required details (Refer Figure 3).

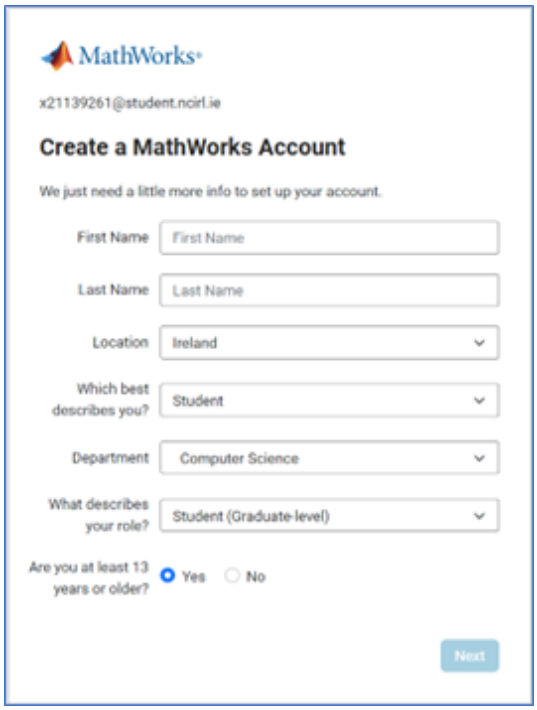

Figure 3: User Details Page

- After successful creation of the user account, it will transfer you to dashboard page as shown in Figure 4.

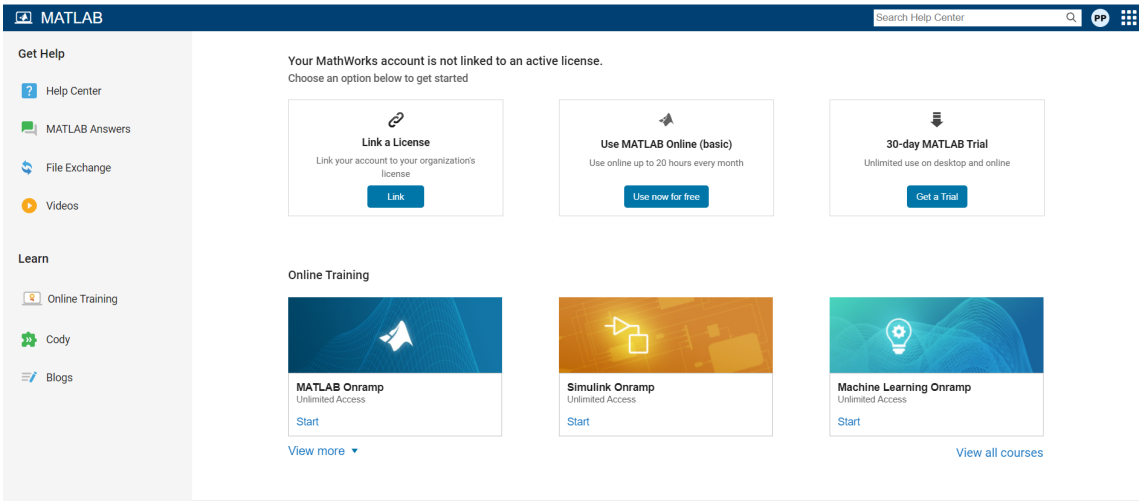

Figure 4: Mathworks Dashboard Page

- Matlab provides a free trial for students to practice and get hands-on experience. Hence, for implementation of this research, I have utilised the student trial version by clicking on the "Get a free trail" button. If the user recreating the scenario has a license for Matlab, he/she can import the license and use the paid version.

6 Loading code repository in Matlab

This section will provide user with an understanding of how to set the code repository path in Matlab in order to navigate through the code.

- To re-execute the proposed research, the user has to download and extract the "CodeArtifact.zip" provided in the submission. Additionally, the user has to copy the path of the directory where the code has been extracted. After extracting and copying the path, user can navigate to the windows search bar and type in "matlab". Next, click on the matlab icon to execute the "matlab run" command (as shown in Figure 5).

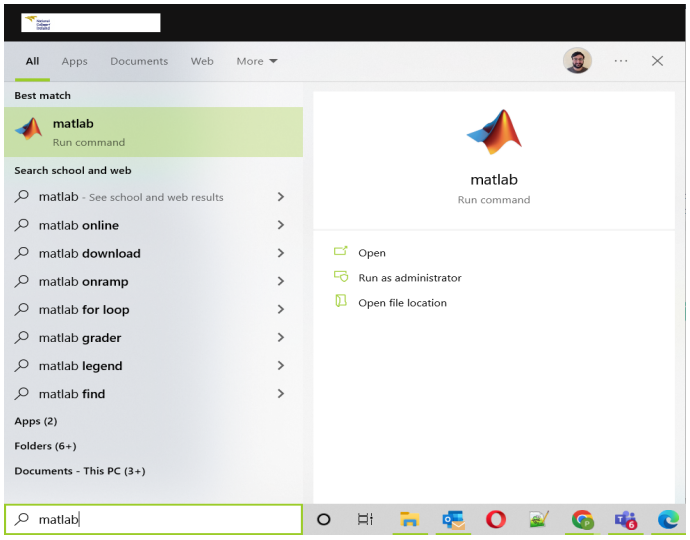

Figure 5: Executing the Matlab run command

- After executing the matlab run command, the matlab simulation tool will boot up as shown in the Figure 6

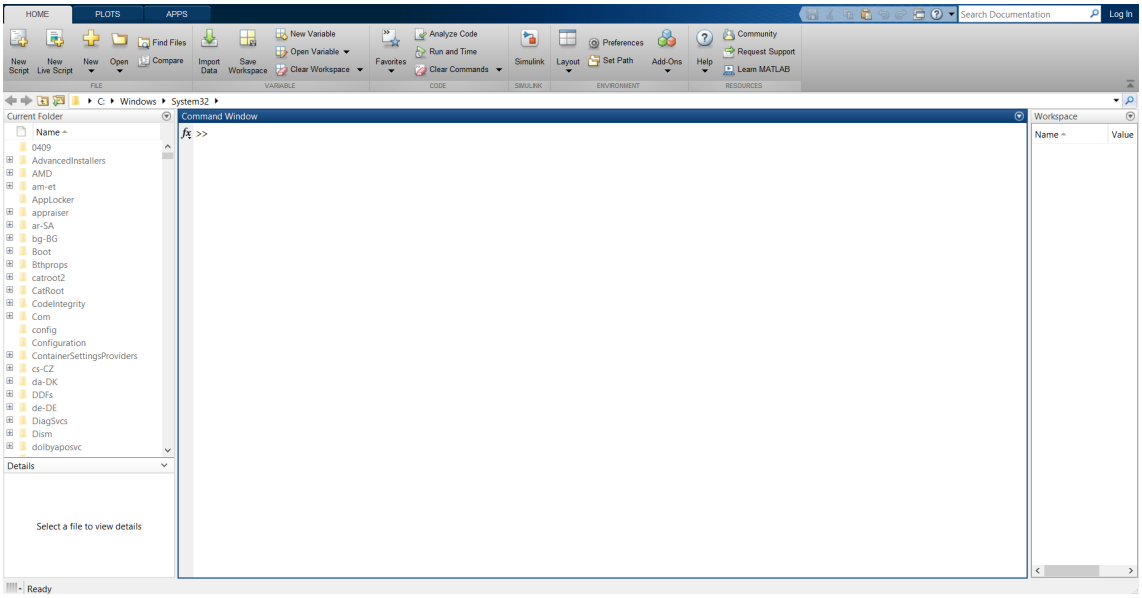

Figure 6: Matlab Simulation tool dashboard

- Now paste the copied code repository path that is, the copied code directory path into the Matlab's file navigation bar. As outlined in the figure 7, in our case the code repository path was `E:\CodeRepository\Code` which is been pasted in the file navigation bar.

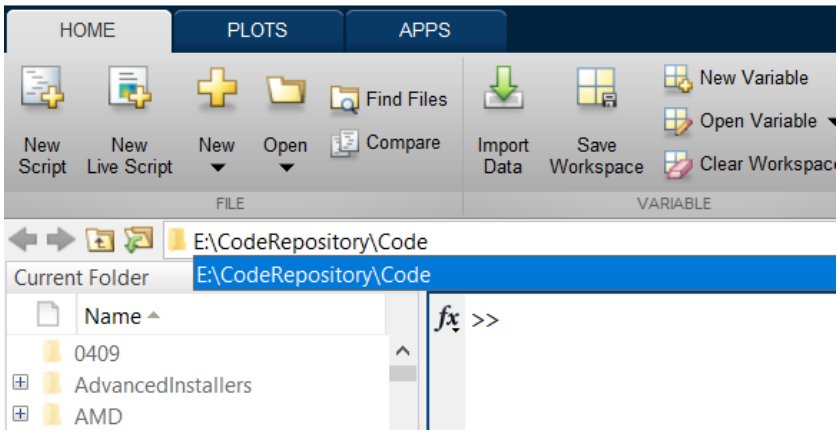

Figure 7: Pasting Code Repository Path in Search bar

- After mentioning the path, the files are loaded in the navigation panel and are ready to be executed (as shown in Figure8).

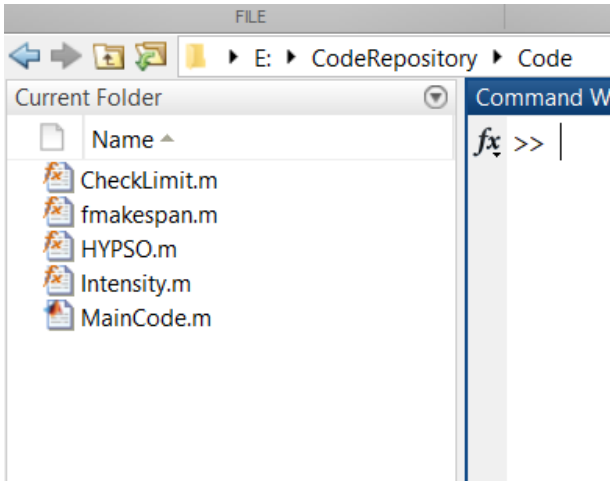

Figure 8: Loaded Code in Matlab

7 Executing the Matlab Code

In this section, guidance about execution of the proposed load balancing algorithm will be provided to the user recreating the scenario.

- After the code repository is loaded in Matlab, now in order to execute simulation of the proposed load balancing algorithm and get the comparison results, navigate to the "MainCode.m" file which is located in the navigation panel. Right click on the file and click on "run code" as shown in the Figure 9

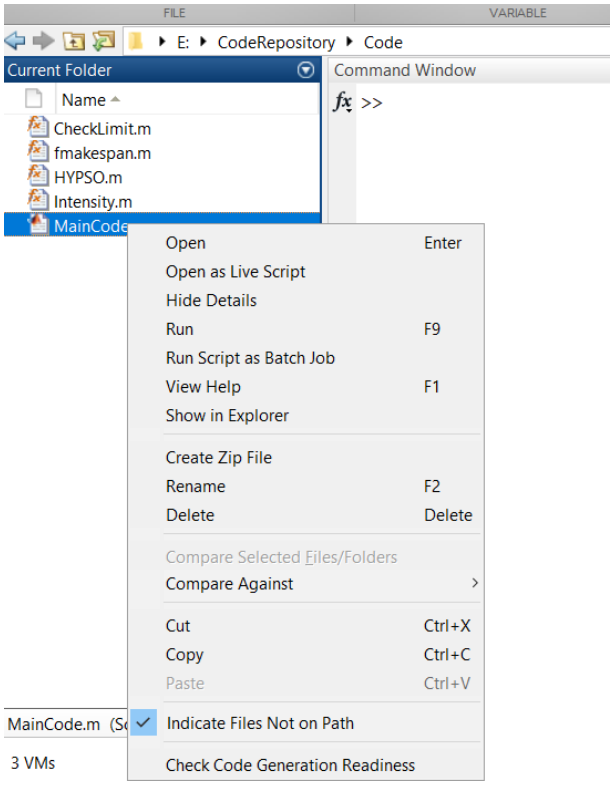

Figure 9: Execution of the code

- After executing the "MainCode.m" file, it calls all the required Matlab functions and performs the required simulation to produce the results. Additionally, Graphical representation of comparison with existing approaches are displayed on the screen. In our case, results for three sets of experiments are displayed, of which each experiment consists of three outputs that is for makespan, resource utilization and convergence curve respectively.

References

Guide to Install Matlab and Mathworks Products (n.d.).
URL: *https://uk.mathworks.com/help/install/install-products.html*

Tutorial to learn Objective-C Language (n.d.).
URL: *https://www.tutorialspoint.com/objective$_c$/index.htm*