Document version: 1.1 (2015-11-15)

Curtin University – Department of Computing

**Assignment Cover Sheet /**

**Declaration of Originality**

Complete this form if/as directed by your unit coordinator, lecturer or the assignment specification.

|  |  |  |  |
| --- | --- | --- | --- |
| Last name: | McAuliffe | Student ID | 20184641 |
| Other name(s): | Kenji Liam | |  |
| Unit name: | Operating System | Unit ID: | COMP2006 |
| Lecturer / unit coordinator: | Dr Sie Teng Soh | Tutor: | Dr Sie Teng Soh |
| Date of submission: | 05/05/2024 | Which assignment? | (Leave blank if the unit has only one assignment.) |

I declare that:

* The above information is complete and accurate.
* The work I am submitting is *entirely my own*, except where clearly indicated otherwise and correctly referenced.
* I have taken (and will continue to take) all reasonable steps to ensure my work is *not accessible* to any other students who may gain unfair advantage from it.
* I have *not previously submitted* this work for any other unit, whether at Curtin University or elsewhere, or for prior attempts at this unit, except where clearly indicated otherwise.

I understand that:

* Plagiarism and collusion are dishonest, and unfair to all other students.
* Detection of plagiarism and collusion may be done manually or by using tools (such as Turnitin).
* If I plagiarise or collude, I risk failing the unit with a grade of ANN (“Result Annulled due to Academic Misconduct”), which will remain permanently on my academic record. I also risk termination from my course and other penalties.
* Even with correct referencing, my submission will only be marked according to what I have done myself, specifically for this assessment. I cannot re-use the work of others, or my own previously submitted work, in order to fulfil the assessment requirements.
* It is my responsibility to ensure that my submission is complete, correct and not corrupted.

Date of signature:

Signature: Kenji McAuliffe 05/05/2024

*(By submitting this form, you indicate that you agree with all the above text.)*

COMP2006 – Operating Systems

Assignment Report

Kenji McAuliffe

20184641

1. Synchronization of Shared Variables

To coordinate writing to shared memory, the variables that would be modified by different threads first had to be identified. Although row, col, and sub were all written to by different threads, each thread was allocated an independent region of the array, meaning there was no opportunity for race conditions. One variable that would be written to by multiple threads was the counter variable, which would be incremented after each thread had completed. To prevent race conditions when modifying this variable, a mutex lock was used. The mutex was locked before increasing the counter, and unlocked after increasing the counter.

A second shared variable called finishedCount was used to track how many threads had finished, so that the final thread could output its ID as per the assignment specification. This variable was incremented after each thread had completed, and therefore synchronization was achieved. A mutex was used here as well, in the same manner as before.

1. Testing Regime

A white box testing methodology was used to test the program. This way, test cases could be run that assessed the accuracy of each thread. For each row-focused thread, the program was executed with an erroneous value on each row in each sub-grid for that thread, totalling in 9 test cases per row thread. For the column thread, the program was executed with an erroneous value in each column of the sudoku. Finally, the program was tested with a correct solution. Following this testing regime, it was verified that the program was behaving as expected.

1. Sample Inputs and Outputs

Case 1: Correct Sudoku.

A blue dot in a black background

Description automatically generatedA black screen with white text

Description automatically generated

Output is correct.

Case 2: Incorrect Digit on row 2, column 1 (sub-grid 1).

A black background with white numbers

Description automatically generatedA screen shot of a computer

Description automatically generated

Output is correct.

Case 3: Incorrect Digit on row 5, column 9 (sub-grid 6).

A black background with white numbers

Description automatically generatedA computer screen with white text

Description automatically generated

Output is correct.

Case 4: Incorrect Digit on row 8, column 4 (sub-grid 8).

A black background with white numbers

Description automatically generatedA screen shot of a computer

Description automatically generated

Output is correct.