CS1073 - Assignment #1 - Winter 2024

Submission Deadline: Thursday, January 18th before 12:00 NOON (Atlantic) in the Assignment 1 submission folder in Desire2Learn. (Read the submission instructions at the end of this document carefully).

The purpose of this assignment is to:

- help develop your problem-solving abilities
- give you practice implementing, compiling, and running a basic Java program.

Important habits to develop for all assignments:

- Start each assignment early so you have time to ask questions if / when you encounter problems.
- Plan your solutions on paper before typing at a computer. This will help you to better organize your thoughts a it will lead to cleaner solutions.
- For each program that you write, include your name and student number in a javadoc comment block at the top of the program (refer to the sample programs in Lab #1 to see how/where to do this).
- Don't forget to make a back-up copy of your work (e.g. on a USB flash drive or cloud drive, etc.)

This assignment is to be done individually. What you hand in must be your own work. Incidents of plagiarism <u>will</u> be reported.

If you have questions, direct them to an FCS tutor, lab assistant or course instructor. You are NOT to discuss this assignment with anyone else (including your classmates).

Please note:

- UNB Faculty of Computer Science (FCS) computer labs are available to you for your CS 1073 course work. Please refer to Lab #1 for instructions about working in the FCS Linux labs (starting with how to log in).

- You are permitted to use your own computer when working on this assignment, but that is optional. If you do choose to do some of the Assignment #1 work on your personal computer, be sure to save a copy of your work on a USB flash drive or cloud drive so that you can easily access your files when you are at UNB. That way, you will be able to continue working on the assignment in a UNB FCS lab.

Create folders (directories): You will need to use folders (directories) to help keep your work organized (as this will make it easier for you to find things later when you want to review what you have done). We recommend that you begin by creating a new folder for this course, if you have not already done so, and then create another folder inside of that one to hold all of your files for this assignment. For example, you could create a new folder called `CS1073` and then create another one called `assign1` inside your `CS1073` folder. As you work on this assignment, save all of your files in that location.

Helpful Tip: Avoid spaces (blanks) in the names of the folders that you create. (This will make it easier when working with these folders in the terminal or Command Prompt window later.)

Once your folders have been created, you may then start this assignment.
(Remember to save all of your files in the folder that you created for assignment 1.)

Create your assignment report: Begin by creating a new document for your Assignment #1 report. Options:

- The online version of MS Word (available through the MyUNB Intranet). If you choose this option, please see the note that was included on the 2nd to last page of Lab #1 (with regards to tab characters).
- A locally installed version of MS Word (which you can download & install on your personal computer – refer to the instructions that are linked in D2L).
- LibreOffice Writer (which is installed on the computers in the Linux labs).

The first page of your document should be a title page. Please include the following information on the title page: the course (CS 1073), your section (FR01A, FR02A, FR03A, FR04A, FR05A or FR06A), the assignment number (Assignment #1 in this case), your full name, and your UNB student number.

I. Writing an Algorithm

As you arrive at the Engineering and Computer Science Library in Head Hall, you meet your friend in the doorway as they are exiting the library. Your friend notes that there is a tutoring session starting shortly in the Faculty of Computer Science Foundation Course Tutoring space (Gillin Hall E128). She would like to go to the tutoring but isn't sure how to get to that room.

Describe an **algorithm** that your friend can follow to get from the door of the Engineer and Computer Science Library to the door of G-E128.

Create a new heading in your report document for question I. Below that, type the algorithm that your friend should follow. No Java code is required here; describe each step in English (refer to your notes & the posted course materials for examples of algorithms). Number each step.

II. Puzzle Problems:

Create a new heading in your report document for question II. Type the solutions to each of the puzzles described below. Again, no Java code is required here; describe each step in English and number each step. You do not need to include any images/drawings with your solutions; we just need the numbered steps (in English).

Part A:

Four house leaders are at the Student Union Building (SUB) when they suddenly realize that House Dodge Ball is being held at the Currie Center and is starting in 15 minutes. Luckily, one of them has a tandem bicycle which will allow two people to ride the bicycle together. When two people are riding the bicycle together, they can only travel as fast as the slowest person. One person must then return to the rest of the group with the bicycle. The Babbage house leader can make the trip in one minute, the Hopper house leader takes two minutes to make the trip, the Knuth house leader takes five minutes, and the Turing house leader takes eight minutes. Write an **algorithm** that describes how all the house leaders will get to the Currie Center on time.

Note: the house leaders must remain at the SUB to wait for the bicycle. Walking or other modes of transportation to the Currie Center is **not** an option.

Part B:

At a CSA Pancake Breakfast you see three plates lined up on the counter. The first (left-most plate) has a stack of 3 pancakes on it. The other two plates (the middle plate and the right-most plate) are empty. The stack of pancakes on the first plate is arranged so that the largest pancake is on the bottom of the stack, the medium-sized pancake is in the middle, and the smallest pancake is on the top. Your goal is to move the stack of pancakes to the right-most plate. However, you need to follow these rules:

- You can move only one pancake at a time, from one plate to another;
- You can only move the top-most pancake from any stack; and
- A pancake can never rest on another pancake smaller than itself.

Write an **algorithm** to describe how you will achieve your goal. Note: The optimal solution only requires 7 moves.

III. Programming Question:

NOTE: Before doing this question, you should complete at least part of the Lab #1 exercise (as it steps you through how to write, compile and run a Java program). Specifically, that you complete the first three Lab #1 sections before attempting this question.

Open your text editor. Write a Java class, named `Initials`, that displays your initials as block letters. For ***example***:

```
******   *        *
*     *  **      **
*     *  * *    * *
******   *  * *  *
**       *   *   *
* *      *       *
*  *     *       *
*   *    *       *
```

Your program will be very similar to MyFirstProgram.java from Lab #1, except the name of the class will be different and the println() statements will be different. (Include the @author tag with your name and student number in a javadoc comment at the start of your class.)

Be sure to save this Java program in the folder with all of your other files for this assignment.

Once your program is working correctly, capture an image of the terminal/Command Prompt window to save for submission. (**Note:** You might want to adjust the size of your terminal/Command Prompt window before capturing the image to make sure that it will be legible when you insert it into your report.) Give this image file a descriptive name (e.g. Assign1Q3.png).

Create a new heading in your assignment report document for question III and copy the Java source code for your program into the document. (Be sure to use a monospaced font for the program source code). Add the image of the terminal/Command Prompt window that you captured to the report as well (& check to make sure it is legible.)

Submission instructions are on the next page…

Your electronic assignment submission (submitted via Desire2Learn) will consist of two files:

i. a written report. This should begin with a title page; your title page should include: the course (CS 1073), your section (FR01A, FR02A, FR03A, FR04A, FR05A or FR06A), the assignment number (Assignment #1 in this case), your full name, and your UNB student number. That should be followed by three sections, with each part clearly identified with a section heading. Include:

   a. The algorithm that you wrote for question I

   b. The algorithms that you wrote to solve the puzzle problems (A & B) in question II.

   c. The source code for the program that you wrote for question III, and the image of the terminal/Command Prompt window showing successful compilation and the output.

   This written report should be prepared using a word processor. (Three options for word processing software are listed on page 3 of this assignment document.) Your algorithms should be typed into the report document. Then, copy & paste your java source code & required output into the report document. (Side note: If your source code contains any tab characters and you are using the online version of MS Word, please see the note on the 2nd to last page of Lab #1.) Add appropriate headings for each part. Fix up the formatting where necessary, adjusting line breaks & page breaks to ensure that your document is easy to read. Use a monospaced font for your code to maintain proper indentation. (A monospaced font is one where all of the characters are the same width. Examples: Courier, Consolas, FreeMono, etc.)

   Once the report is complete and you've checked it all over, save the document (.docx or .odt file) for your own records, and then save a second copy in PDF format for submission. You can do this by either saving/exporting the file in PDF format or by printing it to a PDF file. You can NOT just change the file extension to ".pdf"; you must actually generate a proper PDF file. (Note: Be sure to open the file in a PDF viewer to verify that the PDF was generated correctly.) The single .pdf file containing your report will be submitted to the appropriate assignment submission folder in Desire2Learn. (It is important that you submit a PDF file and NOT the original Word or LibreOffice document. This PDF will allow the marker to write comments directly on your work to give you better feedback.)

   Note: Please name this report as follows: **YourName_As1_Report.pdf**

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ii. an archive file (**.zip**) that contains your Java source code and output for this assignment (question III). Make sure that your archive includes the .java file (in case the marker wishes to compile & run your code to test it), and the output image file (with a clear filename). You should not include the report document or the .class file in your archive. This archive should be submitted as a **single file** to the appropriate drop box on Desire2Learn.

Note: Please name this archive file as follows: **YourName_As1_Archive.zip**

If you are working on your own computer…

Helpful Tip: Here is how you can create an archive file:

On macOS, open a Finder window and go to the folder where you have saved all of the files for this assignment. Hold down the command key and click on each of the files that you want to include in your archive (the .java file and the image). Once you have selected both files, hold down the control key and click again on one of the selected items; a menu should then pop up. Select "Compress 2 Items..." from that menu, and this will create an Archive.zip file in the same folder. Then you just need to rename that file (using the filename noted above).

On Windows, open the File Explorer window and go to the folder where you have saved all the files for this assignment. Hold down the Ctrl key and click on each of the files that you want to include in your archive (the .java file and the image). Once you have selected both files, right click on one of the selected files; a menu should then pop up. Select "Send to" from the menu and another menu will open. Select "Compressed (zipped) folder" and this will create a zip file in the same folder with a default file name. Then you just need to rename that file (using the filename noted above).

Reminder: Your submission in Desire2Learn should consist of TWO files (a .pdf and a .zip). Do NOT put your report inside your archive.

End of Assignment 1