

HW03 Problem Set

CS-3160

Assignment

HW03: Sebesta Problems 6.(1,7,9,10,14,15,22), Programming Exercise 6.7

HANDWRITTEN – Due at beginning of class on due date.

PROGRAM – Due at midnight, via Blackboard, at midnight on day prior to due date.

Handwritten Portion

1. What are the arguments for and against representing Boolean values as single bits in memory?
7. What significant justification is there for the `->` operator in C and C++?
9. The unions in C and C++ are separate from the records of those languages, rather than combined as they are in Ada. What are the advantages and disadvantages to these two choices?
10. Multidimensional arrays can be stored in row major order, as in C++, or in column major order, as in Fortran. Develop the access functions for both of these arrangements for three-dimensional arrays.
14. Write a short discussion of what was lost and what was gained in Java's designers' decision to not include the pointers of C++.
15. What are the arguments for and against Java's implicit heap storage recovery, when compared with the explicit heap storage recovery required in C++? Consider real-time systems.
22. Explain how coercion rules can weaken the beneficial effect of strong typing?

Programming Portion

7. Write a C program that does a large number of references to elements of two-dimensional arrays, using only subscripting. Write a second program that does the same operations but uses pointers and pointer arithmetic for the storage-mapping function to do the array references. Compare the time efficiency of the two programs. Which of the two programs is likely to be more reliable? Why?

You should have a single program in which the main() function call each of two functions that perform the indicated tasks and should time the functions. The number of operations should be such that each function takes at least a minute to run.

Your program should output the necessary information to the console and you should capture this information and paste it into a ReadMe.txt file to be submitted along with your code files. Also in the ReadMe.txt should be your explanation of the results. There is no need for any graphs or figures, just a text explanation.

Your C program should be ANSI-C and/or C99 compliant – if you just use the standard library functions you should be okay. Each file should contain a header according to the header template linked on the Course Homepage (on GetTched).

Place your source code (*.c and *.h) files and the ReadMe.txt file in a directory named HW03 and zip this directory up into a file names HW03.zip and submit electronically to Blackboard. It is fine to include any other files that your programming environment needs/creates (including the executable file) as long as the ZIP file does not exceed 1MB in size. In other words, you don't need to clear out a bunch of files or copy the submittal files someplace else unless you want to.

Grading Rubric

The assignment is worth 25 pts (as a whole) and the score will be recorded as a percentage of that amount.

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| Problem | 1 | 7 | 9 | 10 | 14 | 15 | 22 |
| Points | 2 | 2 | 3 | 4 | 3 | 4 | 2 |

Programming Problem: 5pts

10% Physical Format

50% Answers correct (and supported by work)

40% Effort evidenced by the submitted work