CPE/EE 421/521: Laboratory Assignment 2

Purpose: to study the 68000 instructions set, the Easy68K simulator, and the M68000 C cross-compiler.

Assignment #1:
Using M68000 assembler write a subroutine to sort an array of $N$ 32-bit signed integers in main memory. The subroutine inputs, passed through the stack, are the number of elements and a pointer to the array.
Main program should display a greeting message on the console, read the size of the array $N$ ($N \leq N_{\text{max}}$), and then read $N$ integers. Call the subroutine to sort the received values, and then display the result on the console. Use the appropriate assembler directives to reserve the required memory area for array of $N_{\text{max}} = 20$ integers.
Bonus question: What is execution time for the sorting procedure? Try to improve it.

Assignment #2:
Write a recursive C function that calculates the factorial of a 16-bit integer declared as $\text{int fact}(\text{int } n)$. Write the main program that calls the function with $n=4$. Compile the program using M68000 cross-compiler.
(a) Show the known content of the stack during execution, when it reaches its maximum size.
(b) What is the required size of the stack when $n = 12$.

Assignment #3:
(a) Write a C subroutine that copies string1 to string2
void string_copy(char *source, char *destination).
(b) Write a C subroutine that will parse a string and replace each lower case character ('a'-'z') with the corresponding upper case character ('A'-'Z').
(c) Write a main program in Easy68K that will test your procedures from (a) and (b).

Notes:
1. M68000 cross compiler is available on the CD that accompanies the textbook.
2. To compile your program type in the following (read documentation files):
   $<\text{Your Path}>\backslash \text{I2DEMO} \backslash \text{ITOOLS} \backslash \text{X} \backslash \text{C68332.EXE} \text{ fact.c -S <Your_path>\backslash \text{I2DEMO} \backslash \text{ITOOLS} \backslash \text{INC} \text{ -no -i -q}$
3. The assembly program generated by the compiler can be used with minor modifications with Easy68K simulator.

Submission: Check lab submission policy at the course Web site:
http://www.ece.uah.edu/~milenka/cpe421-06S/.