

ME/ECE/EMA/CS 759
High Performance Computing for Engineering Applications
Assignment 1

Date Assigned: September 9, 2013
Date Due: September 16, 2013 [11:59 PM]

1. Summarize a list of three good coding practices that you believe in. In one or two sentences comment on each of them. If necessary, use code snippets to make your point across.

You might find these references useful:

- http://en.wikibooks.org/wiki/C%2B%2B_Programming/Code_Style
- http://en.wikipedia.org/wiki/Hungarian_notation

2. The purpose of this exercise is to understand how to generate an executable on Euler, the cluster that we'll be using in ME759. To this end, write a very short program whose output is "Hello! I'm student XYZ.", where XYZ is the set of three most significant digits of your student ID. For instance, if I was student 903422, the output would be "Hello! I'm student 903." You might want to use the `g++` or `gcc` compiler to compile/link. To get the first three digits, use the `itoa` function or friends to convert your id to a string, and then pick up the relevant three characters of the string.

3. Write a C program that reads a string that is provided as a command line argument. Pass the string to a function that you write. Within the function count the total number of characters in the string excluding the null character. Return this value and print it out in the main program. We are going to test your program by passing it all sorts of strings: from empty strings, to strings that are 256 characters. We won't pass it a string that is longer than that.

4. The purpose of this problem is to learn how to use the `gdb` debugger under Euler and to understand better how pointer arithmetic works. To this end, you will have to use the flag `-g` when compiling your code with `g++` to include debug information in the executable. Consider the code in the text-box below. Use the `gdb` debugger to step through the code and answer the following questions:

- a) What is the value stored in `p` at various times in the program, and why? What is the size of this variable on Euler?
- b) What is the address of `p` and `c`?
- c) What is the value of `arr[0]` after the assignment on line 16?
- d) What is the value of `arr[0]` at the end of the program?
- e) Explain: (i) why the value of `arr[0]` changes; and (ii) why exactly you got the value that you got.

```
#include<iostream>

int main() {
    int d;
    char c;
    short s;
    int* p;
    int arr[2];

    p = &d;
    *p = 10;
    c = (char)1;

    p = arr;
    *(p+1) = 5;
    p[0] = d;

    *( (char*)p + 1 ) = c;

    return 0;
}
```

FURTHER NOTES ON YOUR HOMEWORK:

- Drop a zipped directory containing all your work, which includes a readme.pdf file that explains your work in the box HW01 at Learn@UW. There is a 11:59 PM cutoff time on September 16.
- Use the ME759 Forum for exchanging ideas or sharing links to helpful information. No posting of the solutions please.
- This is an individual assignment. Please visit the first notes of the first lecture to review what's allowed and what's not allowed in terms of using information from a third party