ELEN2004: Software Development I

Laboratory Assignment No 2

Due Date: Friday March 5th, 2015, By 18:59Hrs

Outcome

After the assignment is completed we should improve our skills on the following:

1. Some more of Unix/Linux programming environment - Ubuntu/Cygwin,
2. The use of our favorite editor, e.g., gedit, vi/vim/gvim, nano, emacs, etc.,
3. How to read and understand what a simple program does,
4. How to develop and write a solution to a problem given our understanding of some code snippets
5. Improve our understanding of information representation in a computer
6. How to use a simple random number generator.

The Work Schedule

There are three tasks to be completed in this 3hr laboratory session.

1. Task-1: Clean up a code snippet with lots of redundancies
2. Task-1: Use Unix utilities "hexdump" and "od" to explore contents of a file.
3. Task-3: Print out in a nice table form, the decimal, octal and hexadcimal form of some randomly generated numbers.

Task-1

```
#include <iostream>     // std::cout, std::dec, std::hex, std::oct
#include <iomanip>
using namespace std;

int main (int argc, char **argv)
{
    int n = 707;
    std::cout << std::dec << n << '\n';
    std::cout << std::hex << n << '\n';
    std::cout << std::oct << n << '\n' << '\n';

    int x =   21;
    int y = 255;

    cout << showbase // show the 0x prefix
        << internal // fill between the prefix and the number
        << setfill('0'); // fill with 0s

    cout << hex << setw(4) << x << dec << " = " << setw(3) << x << endl;
```

```
    cout << hex << setw(4) << y << dec << " = " << setw(3) << y << endl;
    std::cout << std::hex << std::uppercase << y << std::nouppercase
        << std::dec << " = " << setw(3) << y << std::endl;
    return 0;
}

Output
======
707
2c3
1303

0x15 = 021
0xff = 255
0XFF = 255
```

The above program has the output shown but has lots of redundant syntax. The task is to generate a more compact but easily readable code that produces the same output. Explain in very briefly, what it line does by adding comments to the compact form of your program.

Task-2

Create a data file, call it "Sample.dat," with the content
"The quick brown fox jumped over the shinning moon of ELEN2004"

Printout and direct the output of the following commands to a file

1. % cat Sample.dat
2. % hexdump -c Sample.dat
3. % hexdump -x Sample.dat
4. % hexdump -o Sample.dat
5. % hexdump -C Sample.dat
6. % od -a Sample.dat
7. % od -c Sample.dat
8. % od -x Sample.dat

The ouputs of all the above commands should be stored in one file.

Task-3

The sample code shown below a program that generates 20 random numbers between 1 and 32768. You can type the code in a file, compile it and run it to see what output you get. The task is to modify the code and combine it with the sample code of Task-1 to print the 20 random numbers generated nicely tabulated according to the format shown below. You may include column headings if you wish.

```
#include <iostream>
#include <cstdlib>
#include <iomanip>

using namespace std;

int main(int argc, char* argv[])
{
    const int HighInt = 32768 ;
    int i;              // counter
```

```
    unsigned randseed;      /* number used to initialize the
                               random number generator */
    cout << "Enter value for randseed: ";
    cin >> randseed;        // capture an unsigned random seed

    srand(randseed);        // initialize the random number generator

    for (i = 0; i < 20; i++) { // do this 20 times
        /* generate a random number between 1 and 32768 */
        cout << 1 + (rand() % HighInt) << endl;

        /* if counter+1 is divisible by 5, begin a new line of output */

        if ((i+1) % 5 == 0) {
            cout << "\n";
        } // end if
    } // end for

    return 0;
} // end of main

Output:
=======

No   Decimal No   Octal No   Hexadecimal No
1    xxxxxxxxxx   xxxxxxxx   xxxxxxxxxxxxx
2    xxxxxxxxxx   xxxxxxxx   xxxxxxxxxxxxx
.
.
.
20   xxxxxxxxxx   xxxxxxxx   xxxxxxxxxxxxx
```

The Deliverables

- Submit the text of the program of Task-1 and the output appended to the program
- The file of the outputs of the commands executed in Task-2.
- The text and output of the program that prints the 20 random numbers generated; the decimal values, the equivalent octal and hexadecimal values in the output format illustrated.

Submission should be under the name of the first student of the pair of students that worked together.