CIS 314 Computer Organization
Lab 1
Worth 10%

Assigned Oct. 9, 2015

Due Oct. 16, 2015

https://www.cs.uoregon.edu/Classes/15F/cis314/

Summary:

There are many programming languages available: Pascal, C, C++, Java, Ada, Perl and Python. All of these languages share core concepts. By focusing on these concepts, you are able to learn any programming language. In this class, we are learning core programming concepts through the powerful C language. Most of legacy code in use are in C and many other programming languages are based it. It provides stability and small size code, functionality through rich set of function libraries and it is the perfect gateway to other professional languages like C++ and Java.

The learning objectives in this laboratory are: (1) problem solving (number system conversion) using C, (2) inputs, outputs and file manipulations, and (3) recursive programming.

Setting up:

The dedicated machine for class use is

ix.cs.uoregon.edu

The course machine use CIS passwords, but only class members may log into them. If you have trouble logging in to the course machines, you may not have an account. In this case, email the class teaching assistants or systems staff to obtain an account. If you choose to use your own machine or an environment other than the lab machine, you are responsible to set up your environment.

Move the lab1handout into your working environment. To compile and run, you may find these commands useful:

```
% cd lab1handout
% make clean
% make
% make run1
% make run2
```

Project: Description

Programs 1: (Almost) Universal Base Convertor [50]

Write a program that:

1. Takes a number and its base from the user and convert the number into decimal. It should be able to use any base system from binary to hexadecimal. [20]

2. Convert the decimal number from task 1. into any user-defined base (binary to hexadecimal). [20]

3. Combine tasks 1. And 2. into a program/function that converts an input number from any user-defined base to another (binary to hexadecimal). [10]

Hints: Use a global char array to represent possible digits (0, 1, 'A', etc.)
If you want to use the *pow()* function in C you must include math.h and add *–lm* to the compile command after the source file name.

General I/O should be:

=== CIS314 Fall 2014 - Lab 1: Program 1 ===

Inputs:
Input Base: in_base
Input Number: in_number
Output Base: out_base

Outputs:
Decimal representation of in_number
Representation of in_number with out_base

Other possible outputs:
> You have entered an invalid number in base X.
> I/O base is out of range: 16.
> Input number is too large to be converted/overflow, etc.

Program 2: Binary Search [50]

Write a program that
1. Reads an array of integers from a file [10]
2. Performs a binary search on an array (a) iteratively and (b) recursively [25]
3. Displays the array, results for (a) and (b), and execution times of (a) and (b). [5]

Hint for timing:

```
#include<time.h>

int delta;
clock_t t1, t2;
t1 = clock();
// CODE HERE
t2 = clock();
delta = t2 - t1;
```

The program should be modular and readable. Suggested functions are reading input, performing an iterative search, performing a recursive search, and displaying output. [10]

To turn in

Upload a .zip file titled [your name]_lab1handout.zip (example: BrianGravelle_lab1handout.zip) to the **Canvas** assignment posting. This file should contain program1.c, program2.c , the Makefile, and the data file holding the array. Also, be sure to include your name in the comments at the start of the source code.

We will use a script to run your programs during grading so name them **exactly** as above and do not change the Makefile.
Note: The Makefile works directly on Linux or Unix systems.

The deadline for submission is 23:59:59 PDT 16 October 2015. **No Late Submissions will be accepted**!