CS 200: Computer Organization

Project 3: Bitwise Ops

Shariq M. Jamil

Due: Friday, February 21, 2014

Overview

Purpose

The purpose of this project was to provide an introduction to C/C++ programming and implementing various bitwise operations.

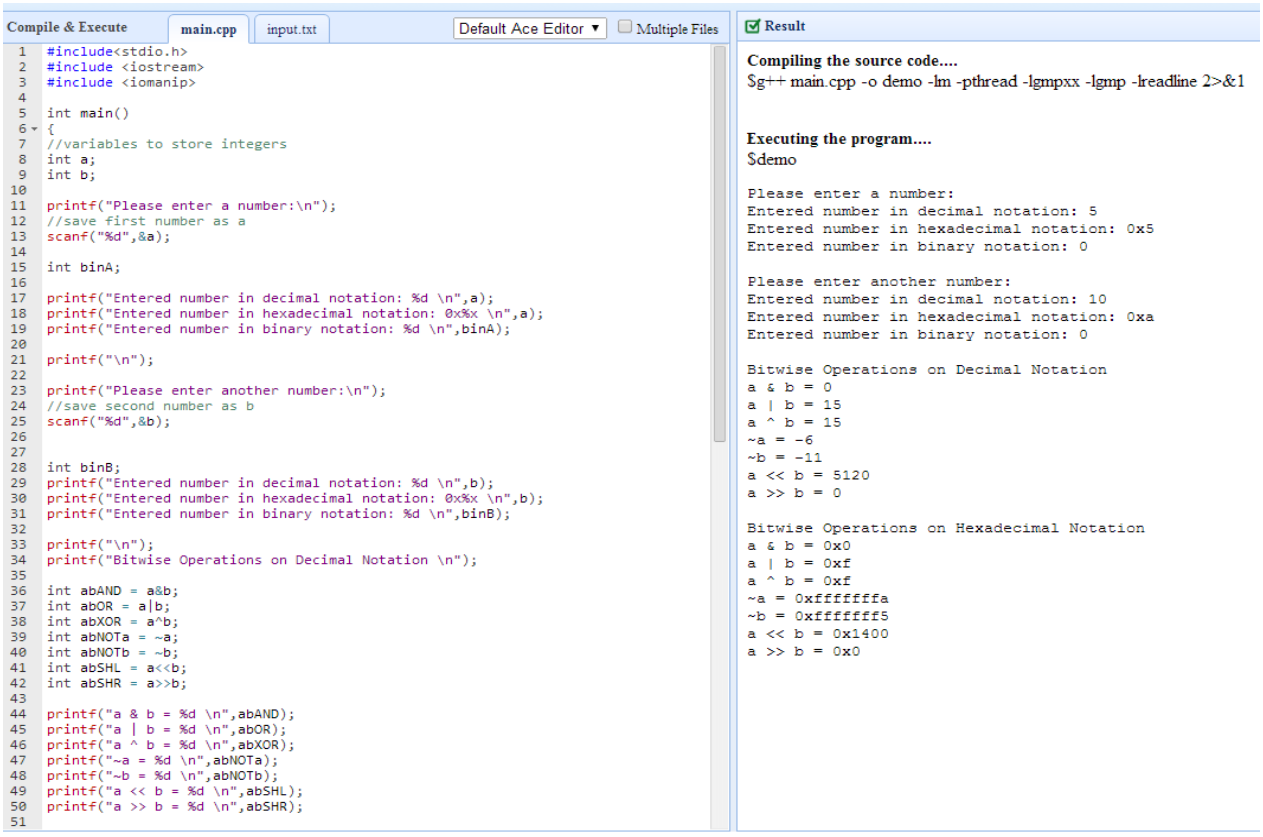
Approach

I started by using printf and scanf statements to have the user provide the program with two integers. Then I wrote out the bitwise operations and had the program print out the results. After this, I planned on performing the same operations on integers once they were converted to hexadecimal and binary numbers.

Solution

The solution is in the attached .cpp file.

Sample Output



Compile & Execute | main.cpp | input.txt | Default Ace Editor | Multiple Files

```
#include<stdio.h>
#include <iostream>
#include <iomanip>

int main()
{
//variables to store integers
int a;
int b;

printf("Please enter a number:\n");
//save first number as a
scanf("%d",&a);

int binA;

printf("Entered number in decimal notation: %d \n",a);
printf("Entered number in hexadecimal notation: 0x%x \n",a);
printf("Entered number in binary notation: %d \n",binA);

printf("\n");

printf("Please enter another number:\n");
//save second number as b
scanf("%d",&b);


int binB;
printf("Entered number in decimal notation: %d \n",b);
printf("Entered number in hexadecimal notation: 0x%x \n",b);
printf("Entered number in binary notation: %d \n",binB);

printf("\n");
printf("Bitwise Operations on Decimal Notation \n");

int abAND = a&b;
int abOR = a|b;
int abXOR = a^b;
int abNOTa = ~a;
int abNOTb = ~b;
int abSHL = a<<b;
int abSHR = a>>b;

printf("a & b = %d \n",abAND);
printf("a | b = %d \n",abOR);
printf("a ^ b = %d \n",abXOR);
printf("~a = %d \n",abNOTa);
printf("~b = %d \n",abNOTb);
printf("a << b = %d \n",abSHL);
printf("a >> b = %d \n",abSHR);

```

Result

```
Compiling the source code....
$g++ main.cpp -o demo -lm -pthread -lgmpxx -lgmp -lreadline 2>&1


Executing the program....
$demo

Please enter a number:
Entered number in decimal notation: 5
Entered number in hexadecimal notation: 0x5
Entered number in binary notation: 0

Please enter another number:
Entered number in decimal notation: 10
Entered number in hexadecimal notation: 0xa
Entered number in binary notation: 0

Bitwise Operations on Decimal Notation
a & b = 0
a | b = 15
a ^ b = 15
~a = -6
~b = -11
a << b = 5120
a >> b = 0

Bitwise Operations on Hexadecimal Notation
a & b = 0x0
a | b = 0xf
a ^ b = 0xf
~a = 0xfffffffa
~b = 0xfffffff5
a << b = 0x1400
a >> b = 0x0
```

Conclusion

This lab was a great exercise in getting used to working with C++. I quickly learned how to get input, print statements and perform bitwise operations on integers. The tough part was figuring out how to convert decimal numbers to hexadecimal and binary. It took me hours to find a binary conversion method online which would work with my code. The online compiler I use would not let me compile using it for some reason though. The code is added in the compiler as comment and was posted on http://groups.engin.umd.umich.edu/CIS/course.des/cis400/cpp/binary.html.

I used the online compiler because neither Code:Blocks, not NetBeans, nor Visual C++ Express would compile on my Windows 8 computer. I will attempt to reinstall the C++ compiler in the days to come.

Similarly it took me a while to be able to get the C++ hexadecimal conversion function to work with my code. Overall, this was still good practice in coding with C++ in different number notations and it was fulfilling to see the results print properly.