

CS250 Assignment Three

Large Integer Abstract Data Type (ADT)

Date Assigned: Friday, March 2, 2007

Date Due: Wednesday, March 14, 2007

Points: 35

Introduction

For this assignment, you are to program a large integer class that uses a 40-element array of digits to store integers as large as 40 digits each. Provide member functions to add, subtract, and compare the large integers.

I am providing you with the interface for the class, and you must write the implementation of this class. I am also providing you with a driver for this class, so you do not need to implement one.

Constructors

Your class will contain three constructors:

1. A default constructor that will accept no arguments and will initialize your array to zeros.
2. A constructor that will accept a long argument, and will place that value into the array.

3. A constructor that will accept a char * and will convert each character to a digit and place it into the array at the appropriate location. If the string contains more than 40 characters, then discard the necessary lower order digits.

Member Functions

Your class must also contain implementations of the following member functions:

1. toString will return a the integer array as a string
2. add will add two large integers and return a reference to a large integer object. Make sure that you take into account the carry, and if the addition of the two large integers returns a number that is too long to fit into the array, then just discard the higher order digits.
3. subtract will subtract two large integer objects and return a reference to a large integer object. Make sure that you subtract the smaller object from the larger object.
4. isEqualTo will return true if the two objects are equal, otherwise will return false.
5. isNotEqualTo will return true if the two objects are not equal, otherwise will return false.
6. isGreaterThan will return true if this object is greater than the one being passed in, otherwise will return false.
7. isGreaterThanOrEqualTo will return true if this object is greater than or equal to the one being passed in, otherwise will return false.
8. isLessThan will return true if this object is less than the one being passed in, otherwise will return false.
9. isLessThanOrEqualTo will return true if this object is less than or equal to the one being passed in, otherwise will return false.
10. isZero will return true if this object is zero, otherwise false.

Other details

- I will not be testing your program with negative numbers, so don't worry about them!
- You must follow the coding standards.

How to submit

- Submit a hard copy of the code by 9am on the day the assignment is due. Your code must be stapled together in the following order: main.cpp, LargeInteger.h, LargeInteger.cpp
- Name your project "03PUNETLargeInteger", substituting PUNET with your PU Net ID, and place the complete project folder in the CS250 drop folder on Turing by 9am on the day the assignment is due.

Goals

1. Implement a program using OOP techniques.
2. Code and test your program one function at a time .
3. Learn to organize your program using .h & .cpp files for code reusability.
4. Use the new C++ coding standards.
5. Do basic error checking.