Number Operators Exercise (Value Type)

This exercise is to demonstrate the creation and use of operators for a value type. In order to justify some of the functionality the 'value' is to be stored via a pointer. During the early steps run-time errors may occur whilst the necessary operator/member functions are not defined.

1)   Create Project

Create a new empty console project called 'NumberDemo'. Add a source file to the project. Add an include for 'iostream' and a main function.

2)   Add the MyNumber class

Add a MyNumber class to represent a number. Store the 'value' via a pointer to integer and add a member function to 'get' this value.

Add a constructor to initialise a MyNumber object with a value and also a default constructor.

3)   Create a number of MyNumber objects

Within the main function (within a nested block) add code to declare a number of MyNumber objects, including using the copy constructor.

Output the values to the console.

Build and test.

4)   Add a destructor

Add a destructor to delete the integer pointer.

Build and test. Anything happen?

5)   Add a copy constructor

Create an new integer and initialise it from the parameter.

Build and test.

6)   Add an assignment operator (copy assignment)

Add an assignment operator using the style of:

- o   Create a temporary object for copy of the right hand operand

- o   Swap the bodies of the temporary object and left hand operand

- o   Return dereference this.

Define a private function to perform the swap.

Build and test.

7) Add plus operator

Define a member function 'add' to add a MyNumber object and return the resulting MyNumber. Create a free operator+ function. Within this operator function call the 'add' member function.

Add code to main to add two MyNumber objects using the + operator. Output the result.

Build and test.

8) Add a move constructor

Define a constructor taking an Rvalue reference to MyNumber. Within this constructor move the address from the parameter to the new object and set the address in the parameter to nullptr.

Add code to construct an object from an expression adding two MyNumber objects.

Build and test. Step through the code to see which constructor is stepped through.

9) Add a move assignment

Define a move assignment operator taking an Rvalue reference to MyNumber. Within this move assignment operator swap the bodies of the left and right hand operands.

Add code to assign to an object from an expression adding two MyNumber objects.

Build and test. Step through the code to see which assignment operator is stepped through.

10) Add a type conversion operator

Add a type conversion operator to return an integer from the value within the MyNumber.

Build the project. What happens?

Try adding the 'explicit' keyword to the one parameter constructor.

Build the project. What happens?