Report

Name: Vanamala Aman Preetham

Roll No. CS23BTECH11063

Github ID: AMAN-PREETHAM-VANAMALA

Name: Varukolu Vishal

Roll No. CS23BTECH11064

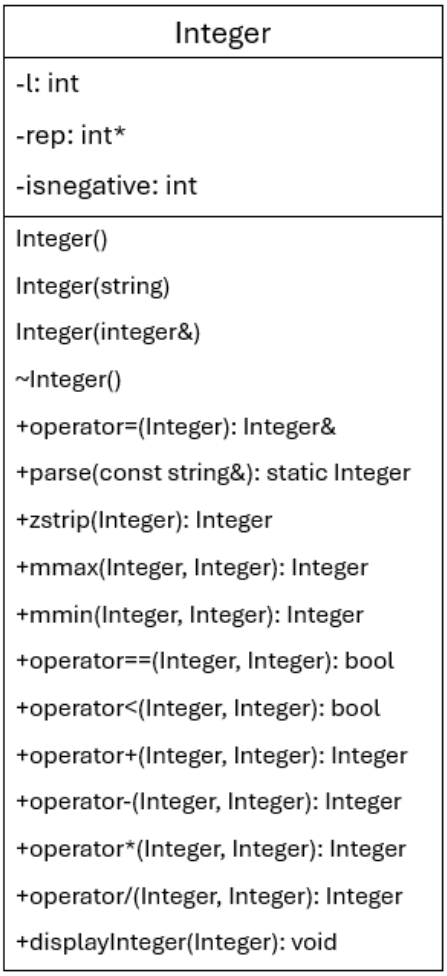
Github ID: Vishal45187

April 2024

Design:

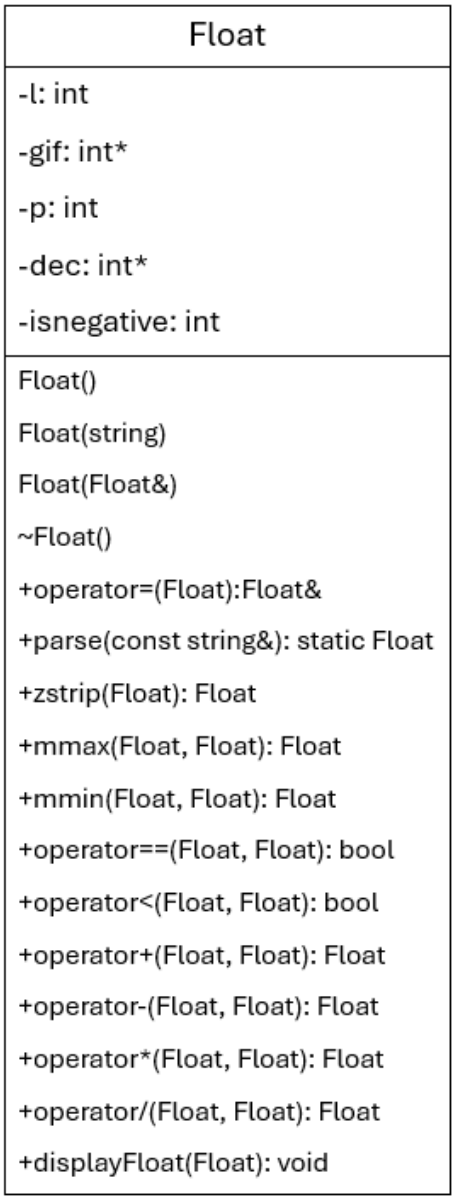
Integer Class:

In the integer class, it was decided to have a pointer with properly allocated size to store the string taken as input and implement it as an array of integers(digits). The length of the array is stored as a data member. The sign of the integer is kept track of by another data member. Default constructor, constructor for string input, copy constructor, destructor are given. The operators =,==,¡,+,-,*,/ are overloaded for Integer class. Other member functions like parse, zstrip, mmax, mmin and displayInteger are given. The UML diagram for integer class is given below.



Float class:

In the float class, it was declared to have a pointer for the integer part of the number and the length for it is also stored as a separate data member. The pointer for the decimal part is dec and its length is stored as a data member. The sign of integer is stored as another data member. Default constructor, constructor for string input, copy constructor, destructor are given. The operators =,==,¡,+,-,*,/ are overloaded for Float class. Other member functions like parse, zstrip, mmax, mmin and displayFloat are given. The UML diagram for float class is given below.



README

Integer class:

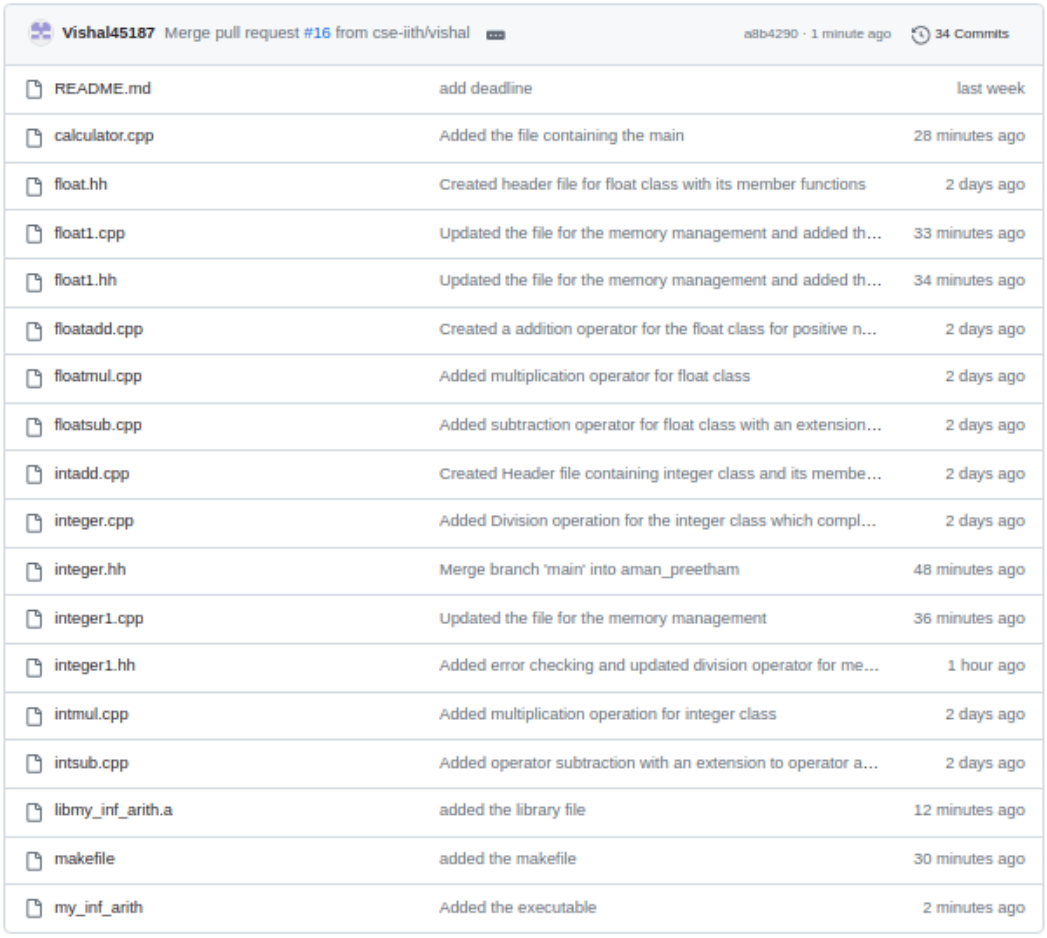
The default constructor initialises Integer class to positive zero(0). The constructor for string input will take a string input and initialise the Integer

class accordingly. If the input is invalid, default constructor will be called making it 0. The copy constructor copies the Integer. The destructor frees the memory created by new. The assignment operator is an alternative for copy constructor. The zero stripping function takes in an Integer and returns an Integer stripping out the left end zeroes. The mmax and mmin functions are like maximum and minimum functions but they only compare the absolute values of the Integers. These were created to use them in overaloading the operators. The displayInteger function is used to display the integer after stripping out the zeroes.

Float class:

The default constructor initialises Float class to positive zero with no decimal part(0). The constructor for string input will take a string input and initialise the Float class accordingly. If the input is invalid, default constructor will be called making it 0. The copy constructor copies the Float. The destructor frees the memory created by new. The assignment operator is an alternative for copy constructor. The zero stripping function takes in a Float and returns a Float by stripping out the left end and right end zeroes. The mmax and mmin functions are like maximum and minimum functions but they only compare the absolute values of the Floats. These were created to use them in overaloading the operators. The displayFloat function is used to display the float after stripping out the zeroes.

Snapshot of Git Commits:



Vishal45187 Merge pull request #16 from cse-iith/vishal ... a8b4290 · 1 minute ago · 34 Commits

README.md	add deadline	last week
calculator.cpp	Added the file containing the main	28 minutes ago
float.hh	Created header file for float class with its member functions	2 days ago
float1.cpp	Updated the file for the memory management and added th...	33 minutes ago
float1.hh	Updated the file for the memory management and added th...	34 minutes ago
floatadd.cpp	Created a addition operator for the float class for positive n...	2 days ago
floatmul.cpp	Added multiplication operator for float class	2 days ago
floatsub.cpp	Added subtraction operator for float class with an extension...	2 days ago
intadd.cpp	Created Header file containing integer class and its membe...	2 days ago
integer.cpp	Added Division operation for the integer class which compl...	2 days ago
integer.hh	Merge branch 'main' into aman_preetham	48 minutes ago
integer1.cpp	Updated the file for the memory management	36 minutes ago
integer1.hh	Added error checking and updated division operator for me...	1 hour ago
intmul.cpp	Added multiplication operation for integer class	2 days ago
intsub.cpp	Added operator subtraction with an extension to operator a...	2 days ago
libmy_inf_arith.a	added the library file	12 minutes ago
makefile	added the makefile	30 minutes ago
my_inf_arith	Added the executable	2 minutes ago

Limitations of Library

The library does overload the primary operators but other operators like ¿, ¡=, ¿=, ¡¡, ¿¿ etc., were not overloaded. The mmin and mmax are not the actual max and min functions. The implementation is through an array of digits which could instead be done by using string which would have been more reliable, consistent and memory-efficient. The division operator could have been better handled in cases where it would give Division by zero error(It cannot be used in an expression with multiple operators because of Division by zero error). The algorithms can be optimised further to implement Infinite Precision Arithmetic.

Verification Approach

First we checked with basic cases to ensure the correctness of the algorithm. We came up with corner cases according to our algorithm to improve its accuracy. Then we checked our algorithm with the public test cases given. The verification process was done manually case by case.

Key Learnings

We learnt how to develop a software by collaborative measures. We learnt how to separate the code into different stages. We learnt to use github, makefile, latex etc. We learnt how to manage the memory and how to debug the errors caused by memory management issues. We learnt that debugging can be done through better ways.