

BigInteger-Library

- Create a class called `BigInteger` that should represent large integer values with the following features
- Your class should be able to store integer values of any compile-time defined size (runtime-defined size is possible but not required)
- When templated, your class should either be able to deduce its template parameters or you should provide a derived template that only takes the size (in bits) as a template parameter
- Any part of your program should be platform-independent C++-Code according to the C++14 or C++17 specification

First Stage

- Implement the following operations for your class:
 - (In)Equality-check
 - Comparison (less-than, etc)
 - Addition, Subtraction
 - Bit-shift
 - Constructor that takes a 64 bit sized integer value as input

Second Stage

- Implement the following operations for your class:
 - Multiplication
 - Division
 - Modulo (remainder of division)

Third Stage

- Implement a square-and-multiply-based algorithm to calculate nth power in a residue class ring
- Make sure your `BigInteger` class is printable (can be appended to an `std::ostream`)
- Create a constructor that takes a `std::string` as input
- Make sure your `BigInteger` class can be constructed from a `std::istream`

Evaluation Criteria

- Functionality:
 - The code needs to compile and run without errors in C++14 or C++17
 - The code needs to provide the required functionality and follow the specifications
- Readability:
 - The implemented functions need to be comprehensible
 - The structure of the source code should be obvious and reasonable
- Best practices:
 - Use known best practices for the placement and hierarchy of implemented functions
 - No functionality should be implemented twice or even more often
 - Avoid compiler warnings where possible, don't create quick workarounds for compiler warnings
- Performance:
 - Faster and more efficient code is preferred
 - This should not come with a tradeoff of readability
 - Real time performance as well as theoretical complexity is measured