605.202 - Data Structures Project 0

Implement a decimal to binary converter with a stack.

Changing the base of numbers is a common operation in digital computing systems. Human input is generally in base-10, but most common computers operate in base-2.

A standard technique for converting base-10 numbers to base-2 numbers is to divide the base-10 number by 2 repeatedly, saving the remainder and result in separate areas. When the remainder vanishes, the results are reversed in sequence to produce the base-2 (binary) answer.

Example: If a base-10 (decimal) number = 12, then the base-2 (binary) number = 1100.

```
12/ 2 = 6 rem 0
 6 / 2 = 3 rem 0
 3 / 2 = 1 rem 1
 1 / 2 = 0 rem 1
```

Reverse 0, 0, 1, 1 to get 12 [decimal] = 1100 [binary]

The student will implement a conversion routine that will convert an unsigned decimal integer into a binary number that can fit into a 32-bit CPU register. The program is expected to gracefully handle negative integers and decimal numbers that are too large for representation by 32 bits.

In your Analysis consider the possible use of recursion.

Input for the program will be a simple text file. Each line of the text file will be a simple decimal number. The input file must fully exercises possible evaluation sequences and input errors.

Output for the program will be a text file that contains three items in sequence:

- A line for each decimal number in the input file. The output for each line will be a numerical 32-bit representation of the decimal number or an error message that describes the problem. The 32-bits will be divided into groups of four bits, with leading zeros.
- A report of the total number of conversions successfully done.
- A list of metrics, for use in the Analysis.

Required Input:

```
2
3
5
10
100
1000000
1000000000
10000000000104420
```