

CSE225 Data Structures

PROJECT #1 (Due October 24, 2024, Thursday at 9:30)

Problem:

Assume two positive decimal numbers of (theoretically) *infinitely many digits*. How can we multiply them in our computer? We look for a solution that is capable of multiplying two such numbers.

Example 1:

$$\begin{array}{r} 5238.12 \\ 21.85 \\ \times \\ \hline 114452.922 \end{array}$$

Example 2:

$$\begin{array}{r} 120.25 \\ 10.4 \\ \times \\ \hline 1250.6 \end{array}$$

The requirement that the numbers may be infinitely large implies that you cannot use standard data types to represent these numbers. Therefore, you will need a data structure that appropriately represents such large natural numbers and you will redefine the multiplication operation in terms of these data structures. A typical data structure to exploit in this case is linked lists (LLs).

In this project you are expected to develop an algorithm that is capable of finding a solution to the above problem and ***implement this algorithm in ANSI C that runs under linux***. Provided that your program correctly finds a solution, you will earn the more credits for your algorithm the shorter it requires to run to completion. The following points are given to clarify what is given and what is expected at the end of this project:

Input:

An input file containing

- the multiplicand,
- the multiplier

Output:

An output file containing

- the multiplicand
- the multiplier and
- the result
- execution time of the program

You are responsible for demonstrating your program to Mr. Mehmet Kaya at the due date above. By the due date you are to electronically submit

1. the **source code of your program**
2. an **executable version of your program**,

3. a **sample input file**
4. a **sample output file**
5. and a documentation in a proper word processor that contains a detailed discussion of your algorithm.

Good luck!!! ☺