DATA STRUCTURES PROJECT

CSE2225

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Problem=Assume two positive natural numbers of (theoretically) infinitely many digits specified in any-base number system such as binary, octal, decimal etc. (but no number base system larger than the decimal system is mandatory). How can we multiply them in our computer?

Before I started writing code, I first thought how we could solve the problem. I needed to keep every multiplier and multiplier in the input file in a linked list. Because it can be more than an integer in size but I need to reverse the numbers. Because when I start to call nodes while multiplying two numbers, the last node will come first. Because there is a first in last out(filo) logic. Afterwards, I thought to print the result of a linked list by calling each node to the multiplication function in turn, multiplying it according to the base with the carry logic and shifting it. I can then convert the multiplier and multiplication to base 10 by sending it to a separate function. If I then send the two numbers that I converted to base 10 to this function as a product, I will get all the outputs.

For all this, I started my code by creating a linked list. I created two pointers called multiplicand and multiplier. I created the value integer variable to hold the value in the pointer and I created the nextNode pointer to hold the next node. Then, to read the multiplier and the multiplication from the file, I opened a file into the main function, read the file line by line, and marked one of the multipliers with a multiplicand pointer and the other with a multiplier pointer. I took these values as chars and then converted them to integers by type converting and We added this to nodes with the add Node To End function then define base to base variable and the file reading process is finished. Then I closed the file and we printed these values with the printList functionAfter that, we did our multiplication by sending the base and two multipliers with the get product function. Because when I tried to do it by

sending node by node, I constantly encountered an error. I see this as an error in my code. I defined a simple sequence to convert the multipliers we hold in the pointer to integers, and after that I started to keep our multipliers in two integers as multiplicatio and multiplie. Then I created the get product,getProductWithASingleDigit and getSum functions to multiply these two numbers. When we send the base value and the multipliers to our function, it returns the result according to the base value sent to us. Then I created the convertNumber function because we need to switch to base 10. When we send the base value and our number to the function, it returns us its base 10 equivalent. Then we printed the numbers that we converted to base 10. Then we multiplied the two base 10 numbers using the multiply function and returned the result and print it to the screen then I printed all these values as output to the file named sample_output. Since n*n is done here, my big(o) value is n^2. This is the fastest way to run this operation.