

National Institute of Technology Silchar

Semester: 3rd. Branch: CSE

Data Structures Lab Assignment 4

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1. Some applications such as cryptography and security algorithms, may require an unbounded integer. One way to store and manipulate integer of unlimited size is by using a linked list. Each digit is stored in a node of the list.

- (a) Write a program to store such an integer of unlimited size.
- (b) Now include a function in (a) to add two integers represented by such a list.
- (c) Using the function in (b) write a function in (a) that multiplies two integers.

2. Write the following C programs using linked lists:

- (a) Write a C program to interchange the position of the largest and smallest numbers for a given list of n numbers.
- (b) Write a C function `search(l, x)` that accepts a pointer `l` to a list of integers and an integer `x` and returns a pointer to a node containing `x`, if it exists, and the null pointer otherwise. Write another function, `srchinsrt(l, x)`, that adds `x` to `l` if it is not found and always returns a pointer to a node containing `x`.

3. Suppose that a character string is represented by a list of single characters. Write a program with the following set of routines to manipulate such lists as follows (in the following `l1`, `l2`, and `list` are pointers to a header node of a list representing a character string, `str` is an array of characters, and `i1` and `i2` are integers):

- (a) `strcnvcl(str)` to convert the character string `str` to a list. This function returns a pointer to header node.
- (b) `strvrfyl(l1,l2)` to determine the first position of the string represented by `l1` that is not contained in the string represented by `l2`. This function returns an integer.
- (c) `strsbstr(l1,i1,i2)` to perform a `substr` function starting with the string at position `i1` of `l1` and ending at position `i2` of `l1`.
- (d) `strcmpl(l1,l2)` to compare the length of two character strings represented by lists. This function returns -1 if the character string represented by `l1` is less than the string represented by `l2`, 0 if they are equal, and 1 if the string represented by `l1` is greater.

4. Write a C program to reverse a given list of elements represented by a linked list.

5. Write a C program that merges two ordered (ascending) lists into one list. When two lists are merged, the data in the resulting lists are also ordered (ascending).