National University of Computer and Emerging Sciences

Laboratory Manual

for

Data Structures Lab

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Objectives:

In this lab, students will practice:

1. Recursion
2. Recursive operations on singly linked lists

1. Implement a global function stringCompare which compares two character strings recursively and:
    a. returns 0 if the two strings are equal.
    b. If the character of the first string at the index, where the first mismatch occurred, is greater in ASCII value; then it returns 1
    c. else it returns -1.

```
int stringCompare (char const* string1, char const* string2)
```

2. Implement a recursive function to find the product of two numbers a and b.

```
int product(int a, int b)
```

Note: Use your singly linked list implementation for the following question. Use only recursion to implement these operations

1. Implement a recursive member function recursivePrint which prints the singly linked in reverse order. `void recursivePrint() const`
2. Implement a recursive member function "length" which recursively finds the length of the linked list. `int length() const`
3. Implement a recursive member function "isSorted" which recursively checks whether the linked list is sorted (ascendingly). `bool isSorted() const`
4. Implement a function deleteAll which recursively deletes all nodes of linked list.

```
void deleteAll();
```

5. Implement a recursive function calcProfit(). If each node of the linked list stores the monthly **sales record** and **expenses** than calculate the total **profit** by subtracting expenses from sales record and return the total profit to main function.

6. Create a main function with following instructions:
    a. Compare "ab" and "abC". Print the result.
    b. Compare "abc" and "ab". Print the result.
    c. Compare "abc" and "abc". Print the result.
    d. Find product of 15 and -9. Print the result
    e. Insert at head of your singly linked list: 10, 9, 7, 5.
    f. Call recursivePrint function.
    g. Print the output of isSorted.
    h. Print the length of linked list.
    i. Call deleteAll function.
    j. Print the length of linked list.
    k. Store the sales record and expenses for at-least four months and calculate the total profit.