TDRK12 Data Structures, 7.5 credits, Spring 2022

Lab: Linked Lists, 1 February 2022
Due: 8 February 2022

1 Introduction

The task is to create a telephone directory to store names and phone numbers of people. The telephone directory shall be implemented as a singly linked list with a number of functions implementing operations on telephone directory. Each record in the telephone directory shall be implemented by a linked list node containing:

1. A phone number as a string of digits (no spaces, dashes or parentheses inside the phone number).

2. The name of a person having this phone number. You can choose a reasonable length of a name that will be enough for the purpose of this lab.

2 Functions Implementing Operations on Telephone Directory

You shall implement the functions specified in Table 1 to operate on a telephone directory.

3 Deliverables

The deliverable is the source code that includes the functions specified in Table 1 as well as the `main()` function that is supposed to demonstrate the work of all the functions in Table 1. It is up to you to decide how you code the `main()` function. All the source code has to include reasonable amount of comments, that is the code is supposed to be well-readable.

Table 1: Specification of functions to implement

Function Description	Input parameters	Return value
Displays records in the telephone directory. For each record: (1) the ordinal number of the record in the directory (linked list), (2) the phone no., and (3) the name.	None	None
Inputs record data (a phone number and the name) from a console and creates a new node for this record.	None	The pointer to the created node
Inserts a record (node) at the beginning of the directory. Fist checks that the record already exists.	The pointer to the node to insert	0 if the insertion is successful or -1 if the node already exists in the directory
Deletes a record with the given phone no. Fist checks that the record already exists.	The phone no.	0 if successful, -1 otherwise
Searches the directory for a record with the given phone no. It is also used when inserting and deleting records.	The phone no. and a reference to a `flag` that is set to 1 if the record is found and to 0 otherwise.	The pointer to the previous record; NULL if the found node is the first one (`flag == 1`) or if the directory is empty (`flag == 0`)
Queries the directory by phone no. or name.	An option flag that is set to 1 to search by phone or 0 to search by name; The phone no. or name	The pointer to the found record of NULL if not found