

Data Structures Lab Project

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Telephone Book System



Project Description

A telephone book system, also known as a telephone directory, telephone address book, or Phone book, is a listing of telephone subscribers in a geographical area or subscribers to services provided by the organization that publishes the directory. Its purpose is to allow the telephone number of a subscriber identified by name and address to be found.

Project Features

The features of telephone book system are mainly related to adding, listing, searching, sorting, modifying and deleting telephone directory-related records. All these operations are done through **Linked-List**.

The information contained in the telephone directory records are the first name, last name, phone number, city, address, sex and email of the person whose record is entered in the telephone directory system.

Project Operations

Write a JAVA program that will maintain a phone directory using a **Linked-List**. The program should be able to perform the following operations:

- 1) Add persons details (first name, last name, phone number, city, address, sex and email) to the phone directory, where phone numbers in the directory have to be unique. (Note: each person record will store in one node in the linked-list and insert each person to the last)
- 2) Delete any person details by a given phone number.
- 3) Update telephone number by providing person first name.
- 4) Display all details of persons from a phone directory.
- 5) Search telephone number based on person first name. (Note: use sequential search to find all telephones for the given first name)
- 6) Sort all persons in the phone directory ascending based on person first name. (Note: use bubble or selection sort to arrange the entire phone directory)

Project Outputs

The output has to display a menu of choices. Then the user can select which operation want to perform. Also, you can use the method *System.exit(0);* to exit the program. The menu of choices will be:

- 1) Add person details into the telephone book.
- 2) Remove a person from the telephone book.
- 3) Update a telephone number by providing person first name.
- 4) Display the entire telephone book.
- 5) Search a telephone number based on person first name.
- 6) Sort the entire telephone book.
- 7) Exit the program.

Project instructions

- 1) The total grade for the project is 10 marks.
- 2) Each student must implement the project individually without any participation with other students.
- 3) Your program has to be split into several appropriate functions and classes.
- 4) You need to use descriptive variable names by using comments.
- 5) The style and readability of your program will also determine your grade, in addition to the correctness of the program.

Write your Code here ↓

Answer

We have 3 class (Node , List , PhoneBook)

((((Node Code)))

```
public class Node {

    private String firstName;
    private String lastName;
    private String phoneNumber;
    private String city;
    private String address;
    private String sex;
    private String email;

    Node next;

    public Node() {
        //data = -1;
        next = null;
    }

    public String getFirstName() {
        return firstName;
    }

    public void setFirstName(String name) {
        this.firstName = name;
    }

    public String getLastName() {
```

```
        return lastName;
    }

    public void setLastName(String name) {
        this.lastName = name;
    }


    public String getPhoneNumber() {
        return phoneNumber;
    }

    public void setPhoneNumber(String phoneNumber) {
        this.phoneNumber = phoneNumber;
    }

    public String getCity() {
        return city;
    }

    public void setCity(String city) {
        this.city = city;
    }

    public String getEmail() {
        return email;
    }

    public void setEmail(String email) {
        this.email = email;
    }


    public String getAddress() {
        return address;
    }

    public void setAddress(String address) {
        this.address = address;
    }

    public String getSex() {
        return sex;
    }

    public void setSex(String sex) {
        this.sex = sex;
    }


    public Node getNext() {
        return next;
    }

    public void setNext(Node next) {
        this.next = next;
    }
}
```

```

        public String toString() {
            return "firstName = " + firstName + ", lastName = " + lastName + " ,
Phone Number = "
                + phoneNumber + " , city = " + city + " , address = " +
address + " , sex = " + sex + " , Email = " + email;
        }
    }
}

```

(((List Code)))

```

public class List {

    private Node head;
    private Node tail;
    private int length;

    public List() {
        head = tail = null;
        length = 0;
    }

    public void add(String firstName,String lastName,String phoneNumber , String
city , String address , String sex , String email ) {

        Node newNode = new Node();
        newNode.setFirstName(firstName);
        newNode.setLastName(lastName);
        newNode.setPhoneNumber(phoneNumber);
        newNode.setCity(city);
        newNode.setAddress(address);
        newNode.setSex(sex);
        newNode.setEmail(email);

        if (isEmpty())
        {
            head = tail = newNode;
        }
        else
        {
            tail.setNext(newNode);
            tail = newNode;
        }
        ++length;
    }

    public void delete (String phoneNumber)
    {
        Node current = head;
        Node prev = null;
        boolean exist = true;

        if (isEmpty())
        {

```

```

        System.out.println("The list is empty!");
    }
else
{
    while(true)
    {
        if(current.getPhoneNumber() == phoneNumber)
        {
            exist = true;
            break;
        }
        if(current.getNext() == null)
            break;

        prev = current;
        current = current.getNext();
    }

    if(exist)
    {
        if(length>1)
            prev.setNext(current.getNext());

        --length;
    }
    else
    {
        System.out.println("The phone number does not exist!");
    }
}
}

public void printList () {
    Node tempNode = head;
    if (head == null) {
        System.out.println("The list is empty!");
    } else {
        for (int i = 0; i < length; i++) {
            System.out.print("Index = " + (i+1) + " ");
            System.out.println(tempNode);
            tempNode = tempNode.getNext();
        }
    }
    System.out.println();
}

public boolean isEmpty() {
    return (length == 0);
}

public void update(String firstName, String phoneNumber)
{

```

```

Node current = head;
boolean exist = true;

if (isEmpty())
{
    System.out.println("The list is empty! no member name matching
that name!");
}
else
{
    while(true)
    {
        if(current.getFirstName() == firstName)
        {
            exist = true;
            break;
        }
        if(current.next == null)
            break;

        current = current.getNext();
    }

    if(exist)
    {
        current.setPhoneNumber(phoneNumber);
    }
    else
    {
        System.out.println("no member name matching that name!");
    }
}
}

public String searchByFirstName(String firstName)
{
    Node current = head;
    boolean exist = false ;
    String fs = "";
    if (isEmpty())
    {
        System.out.println("The list is empty! no member name matching
that name!");
        return fs;
    }
    else
    {
        while(true)
        {
            if(current.getFirstName().equals(firstName))
            {
                exist = true;
                break;
            }
            if(current.next == null)
                break;

```

```

        current = current.getNext();
    }

    if(exist)
    {
        return current.getPhoneNumber();
    }
    else
    {

        System.out.println("no member name matching that name!");
        return fs ;
    }
}
}

public void sortList()
{

    Node current = head, index = null;

    String temp;

    if (head == null) {
        return;
    }
    else {
        while (current != null) {

            index = current.getNext();

            while (index != null) {

                if (current.getFirstName().compareTo(index.getFirstName()) > 0) {
                    temp = current.getFirstName();
                    current.setFirstName(index.getFirstName());
                    index.setFirstName(temp);

                }

                index = index.getNext();
            }
            current = current.getNext();
        }
    }
}

}

```


(((((((PhoneBook Code)))))

[illegible]

```

        sex = in.nextLine();
        System.out.print("Enter an Email : ");
        email = in.nextLine();

        newList.add(firstName , lastName , phoneNumber
, city , address , sex , email);
        break;
    case "2":
        System.out.print("Enter a Phone Number to delete:
");

        String delete = in.nextLine();
        newList.delete(delete);
        break;
    case "3":
        System.out.println(" Enter First Name to Update
Telephone Number : ");

        String update = in.nextLine();
        System.out.println("Enter the New Telephone Number :
");

        String newPhone = in.nextLine();
        newList.update(update, newPhone);
        break;
    case "4":
        System.out.println("Print Phonebook");
        newList.printList();
        break;
    case "5":

        System.out.print("Enter an First Name to Search for
: ");

        firstName = in.nextLine();
        String result =
        newList.searchByFirstName(firstName);
        if(result != "")
            System.out.print("The Phone Number of " +
firstName + " is " + result);

        break;

    case "6":
        System.out.println("Sort Phonebook");
        newList.sortList();
        newList.printList();
        break;

    case "7":
        System.out.println(" { Exit successfully } ");
        done = true;
        break;
    default:
        System.out.println("Unknown Entry");
}

} while (!done);
System.out.println(" { Thanks for using Telephone Book System } ");

```

} }

Paste your Output Screen here ↓

Project Operations I

```

Console
PhoneBook [Java Application] C:\Program Files\Java\jre1.8.0_111\bin\javaw.exe (Apr 3, 2021, 3:50:52 AM)

=====
{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

=====
Please Enter a command from list : [

```

Add persons details

```

Console
PhoneBook [Java Application] C:\Program Files\Java\jre1.8.0_111\bin\javaw.exe (Apr 3, 2021, 3:50:52 AM)

{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

Please Enter a command from list : 1
Add details
Enter a First Name: Omar
Enter a last Name: Adel
Enter a Phone Number : 9874567
Enter a City : abha
Enter an Address : street 1247
Enter a Sex : male
Enter an Email : omar@gmail.com

```

Project Operations 2

Display before Delete any person details by a given phone number

```

{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

Please Enter a command from list : 4
Print Phonebook
Index = 1 firstName = Omar, lastName = Adel , Phone Number = 9874567 , city = abha , address = street 1247 , sex = male , Email = omar@gmail.com

```

Delete any person details by a given phone number

```

{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

Please Enter a command from list : 4
Print Phonebook
Index = 1 firstName = Omar, lastName = Adel , Phone Number = 9874567 , city = abha , address = street 1247 , sex = male , Email = omar@gmail.com

{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

Please Enter a command from list : 2
Enter a Phone Number to delete: 9874567

{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

Please Enter a command from list : 4
Print Phonebook

```

Project Operations 3

Update telephone number by providing person first name.

```
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

=====
Please Enter a command from list : 1
Add details
Enter a First Name: Omar
Enter a last Name: Adel
Enter a Phone Number : 154579
Enter a City : jeddeh
Enter an Address : 514 street
Enter a Sex : male
Enter an Email : omar@gmail.com

=====
{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

=====
Please Enter a command from list : 3
Enter First Name to Update Telephone Number :
Omar
Enter the New Telephone Number :
569897
[
=====
```

Display Update after telephone number

```

Please Enter a command from list : 3
Enter First Name to Update Telephone Number :
Omar
Enter the New Telephone Number :
569897

*****
{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program
*****

Please Enter a command from list : 4
Print Phonebook
Index = 1 firstName = Omar, lastName = Adel , Phone Number = 569897 , city = jeddeh , address = 514 street , sex = male , Email = omar@gmail.com

*****

```

Project Operations 4

Display all details of persons from a phone directory

```
{1} Add persons details  
{2} Delete person details by phone number  
{3} Update telephone number by First Name  
{4} Display all details of persons  
{5} Search telephone number based on person first name  
{6} Sort all persons based on person first name  
{7} Exit the program
```

```
~~~~~  
Please Enter a command from list : 4  
Print Phonebook  
Index = 1 firstName = Omar, lastName = Adel , Phone Number = 569897 , city = jeddeh , address = 514 street , sex = male , Email = omar@gmail.com  
  
~~~~~
```

Project Operations 5

Search telephone number based on person first name

```

=====
{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

=====
Please Enter a command from list : 5
Enter an First Name to Search for : Omar
The Phone Number of Omar is 569897
=====

```

Project Operations 6

Display before sorting

```

{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

*****
Please Enter a command from list : 4
Print Phonebook
Index = 1 firstName = Omar, lastName = Adel , Phone Number = 569897 , city = jeddeh , address = 514 street , sex = male , Email = omar@gmail.com
Index = 2 firstName = Ali, lastName = fahed , Phone Number = 99779 , city = cairo , address = 6898 street , sex = male , Email = ali@gmail.com
Index = 3 firstName = moaiz, lastName = mahmoud , Phone Number = 2689784 , city = jazin , address = 1678street , sex = male , Email = moaiz@gmail.com
Index = 4 firstName = zyad, lastName = omran , Phone Number = 1678785 , city = london , address = 65454 street , sex = male , Email = zyad@gmail.com
Index = 5 firstName = basil, lastName = ahmed , Phone Number = 154574 , city = abha , address = 1154 street , sex = male , Email = basil@yahooocm
Index = 6 firstName = sayed, lastName = ammar , Phone Number = 15878 , city = abha , address = 154548 street , sex = male , Email = sayed@gmail.com

*****

```

```

{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

=====
Please Enter a command from list : 6
Sort Phonebook
Index = 1 firstName = Ali, lastName = Adel, Phone Number = 569897, city = jeddeh, address = 514 street, sex = male, Email = omar@gmail.com
Index = 2 firstName = Omar, lastName = fahed, Phone Number = 99779, city = cairo, address = 6898 street, sex = male, Email = ali@gmail.com
Index = 3 firstName = basil, lastName = mahmoud, Phone Number = 2689784, city = jazin, address = 1678street, sex = male, Email = moaiz@gmail.com
Index = 4 firstName = moaiz, lastName = omran, Phone Number = 1678785, city = london, address = 65454 street, sex = male, Email = zyad@gmail.com
Index = 5 firstName = sayed, lastName = ahmed, Phone Number = 154574, city = abha, address = 1154 street, sex = male, Email = basil@yahoo.com
Index = 6 firstName = zyad, lastName = ammar, Phone Number = 15878, city = abha, address = 154548 street, sex = male, Email = sayed@gmail.com

=====

```

Exit the program

```

{1} Add persons details
{2} Delete person details by phone number
{3} Update telephone number by First Name
{4} Display all details of persons
{5} Search telephone number based on person first name
{6} Sort all persons based on person first name
{7} Exit the program

Please Enter a command from list : 7
[ { Exit successfully }
  { Thanks for using Telephone Book System }

```