COMP 202– Spring 2016 - Project #1(in-lab part)
March 3, 2016

- *Your in-lab submissions will be checked against plagiarism and the rules in the course syllabus will be effective.*

In this project, you will continue working on BSTs based on what you did in project#1 at-home part. In addition to Insert and Delete queries, that you have already done in at-home part, you need to support two other type of queries: **Display** and **Position**.

Consider the following database and its corresponding trees in Figures 1,2 and 3.

Jim Carrey 0954924809
Anne Hathaway 0648572102
David Beckham 0222301329
Lionel Messi 0159921548
Antonio Banderas 0396408083

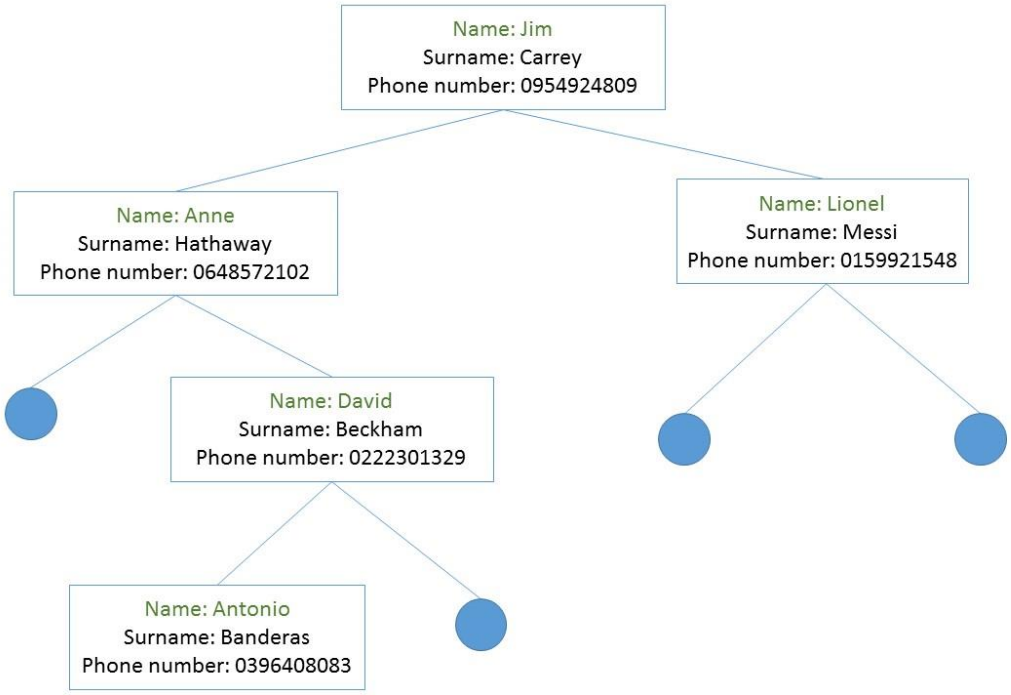

Figure 1) BST#1 based on names

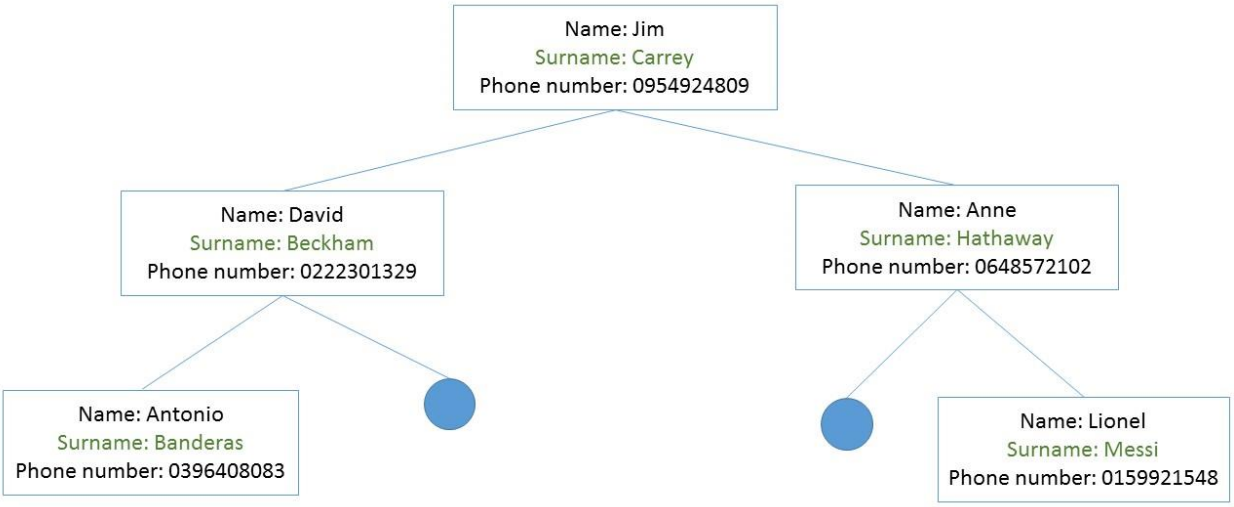

Figure 2) BST#2 based on surnames

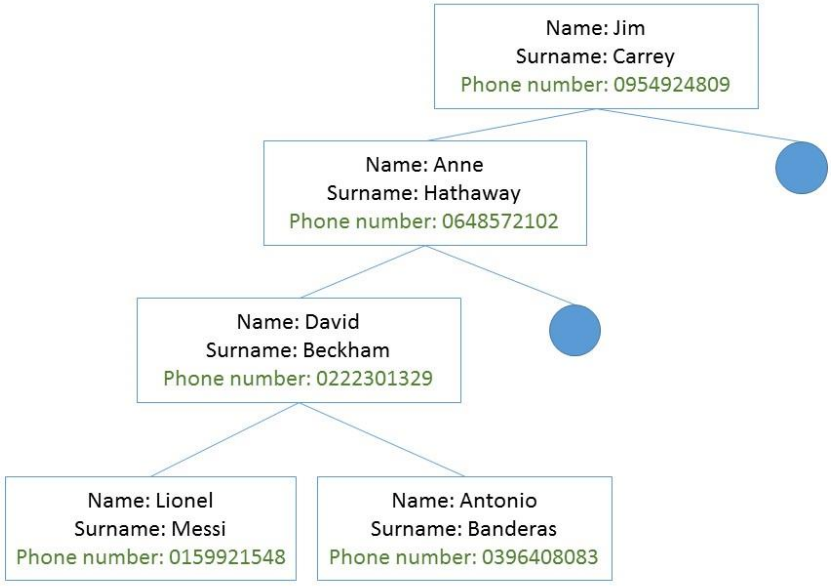

Figure 3) BST#3 based on phone numbers

You need to support two other queries as given below:

- **<Display><space><Tree Attribute><space><order>**
  Means that traverse and display the nodes of a tree which is created based on the given **Tree Attribute i.e.** "*name*", "*surname*" or "*phone*". How to traverse the tree is given as **order** which can be "*inorder*", "*preorder*" or "*postorder*". The result must be displayed in console.
- **<Position><space><Tree Attribute><space><order><space><name><space><surname><space><phone number>**
  Means that print the position of a record having the given **name**, **surname** and **phone number** by traversing the BST which is created based on the given **Tree Attribute i.e.** "*name*", "*surname*" or "*phone*", considering the given **order** which can be "*inorder*", "*preorder*" or "*postorder*". The result must be displayed into the console.

<space> stands for a single space.

The following is an example of query.txt content.

```
delete Anne Hathaway 0648572102
Insert Taylor swift 0614334734
Position name inorder Taylor swift 0614334734
Display surname postorder
Display name inorder
Position surname postorder Taylor swift 0614334734
display phone preorder
Position phone preorder Lionel Messi 0159921548
Delete David Beckham 0222301329
Display phone inorder
```

9th query

For the queries which do not result in any output, i.e. delete and insert, just change the trees accordingly. **For the queries that you need to display the result in the console, consider the following rule: in one line print the query itself and in the next line display the result**. Figures 4, 5 and 6 show the results after first query execution i.e. "delete Anne Hathaway 0648572102", and Figures 7, 8 and 9 represent the final BSTs after applying both first and second query i.e. "delete Anne Hathaway 0648572102" and "Insert Taylor swift 0614334734". Figures 10, 11 and 12 show the BSTs after the 9th query. You can find the proper outputs for the rest of the queries, which all need some outputs, in Figure 13.

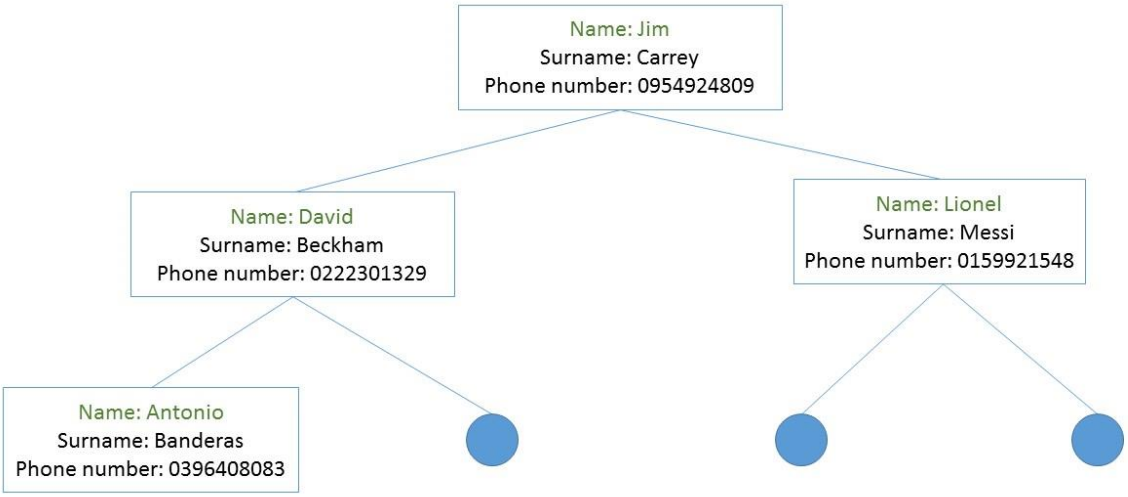

Figure 4) BST#1 after the first query: *"delete Anne Hathaway 0648572102"*

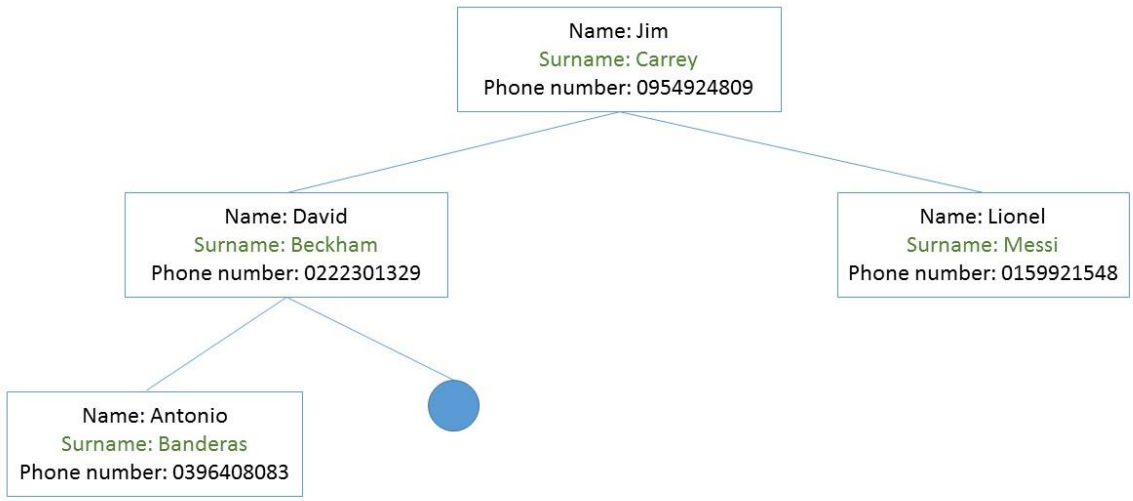

Figure 5) BST#2 after the first query: *"delete Anne Hathaway 0648572102"*

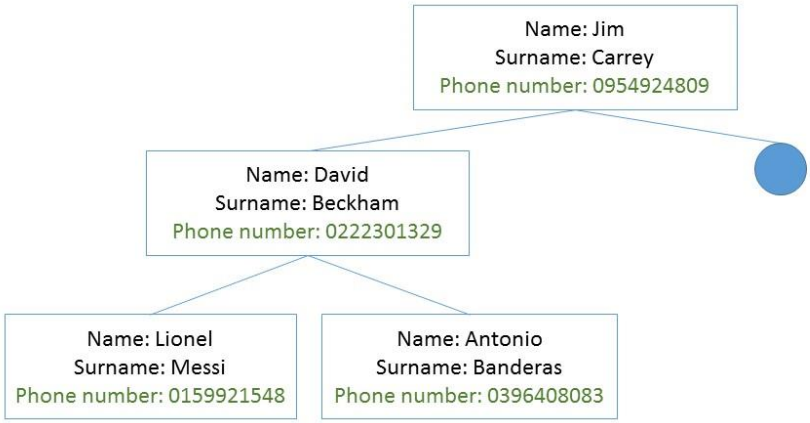

Figure 6) BST#3 after the first query: *"delete Anne Hathaway 0648572102",*

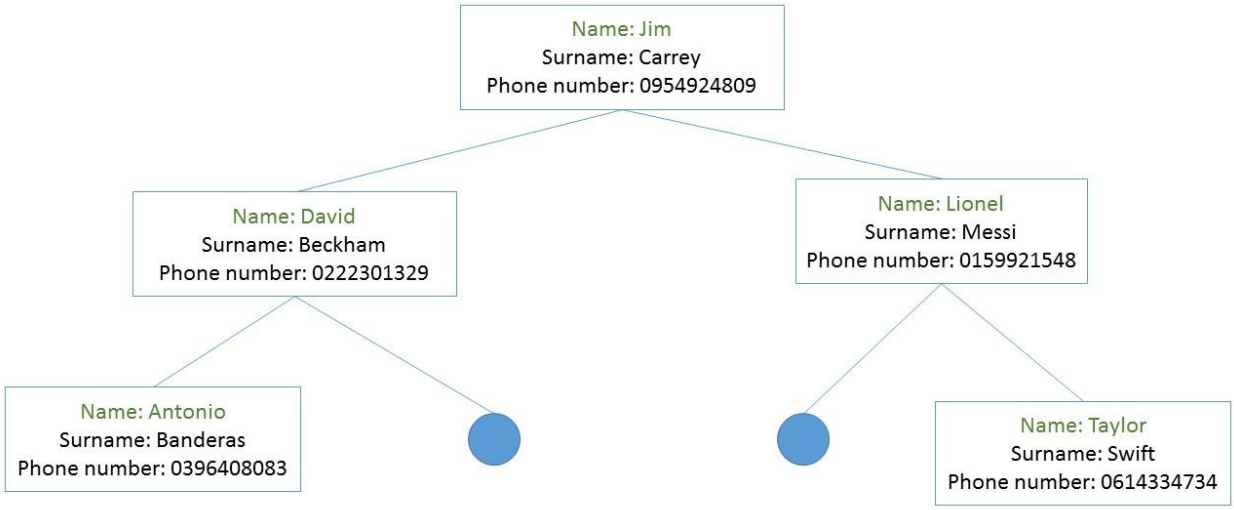

Figure 7) BST#1 after first and second query:

"delete Anne Hathaway 0648572102" and "Insert Taylor swift 0614334734"

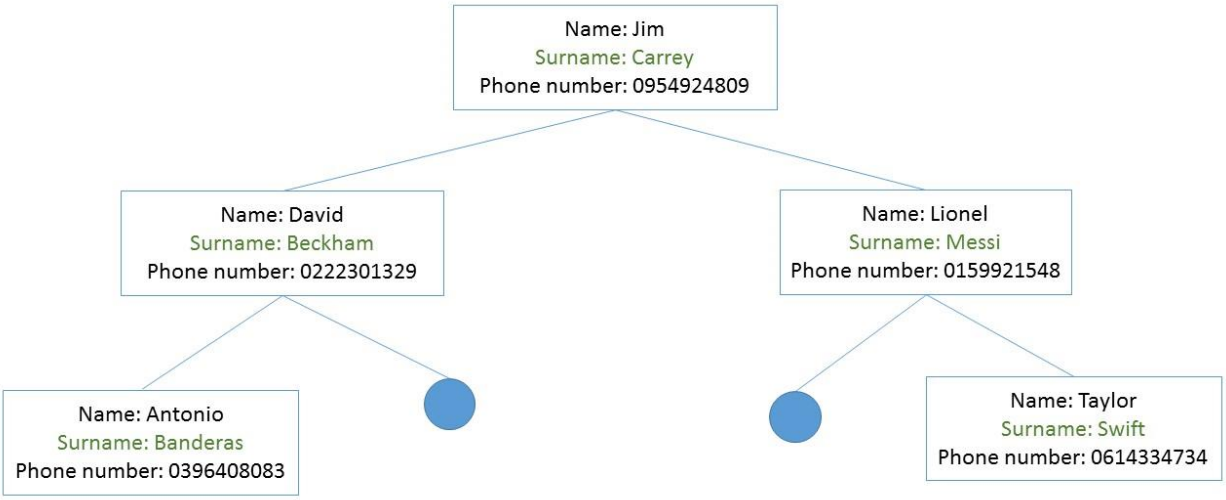

Figure 8) BST#2 after first and second query

"delete Anne Hathaway 0648572102" and "Insert Taylor swift 0614334734"

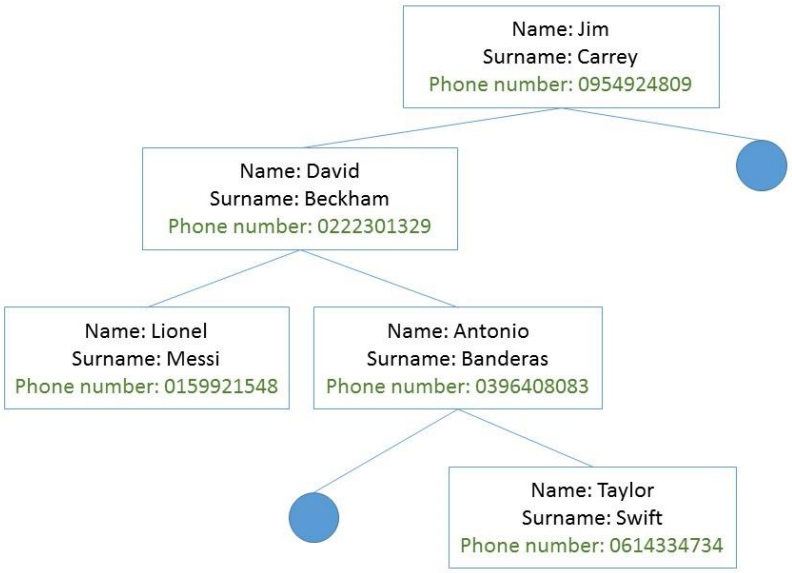

Figure 9) BST#3 after first and second query

"delete Anne Hathaway 0648572102" and "Insert Taylor swift 0614334734"

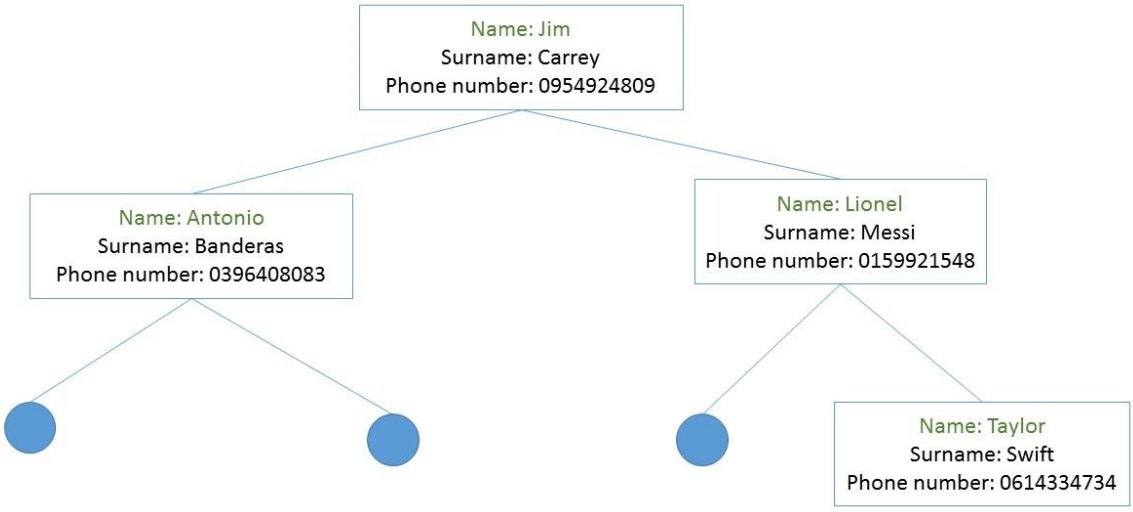

Figure 10) BST#1 after 9th query*:* "Delete David Beckham 0222301329"

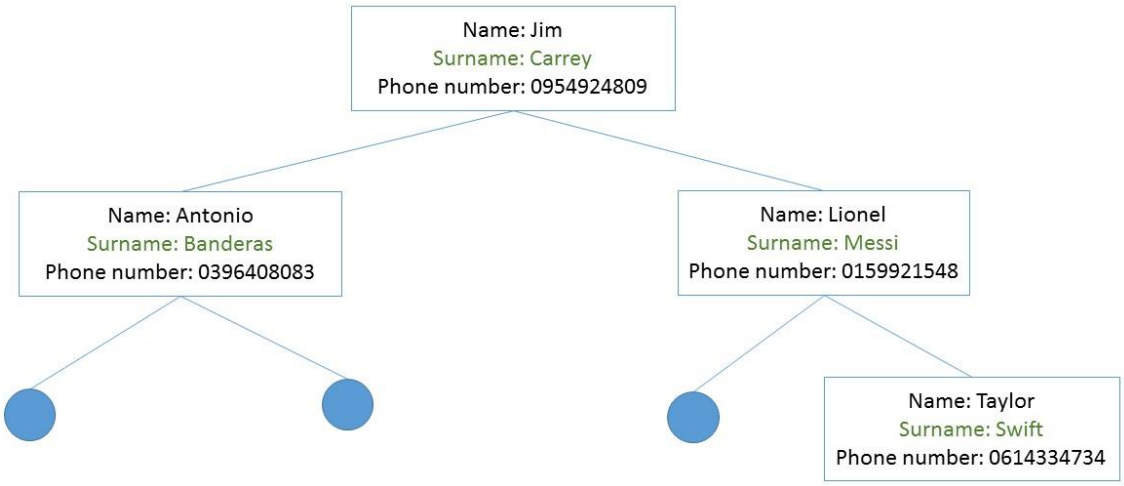

Figure 11) BST#2 after 9th query: *"Delete David Beckham 0222301329"*

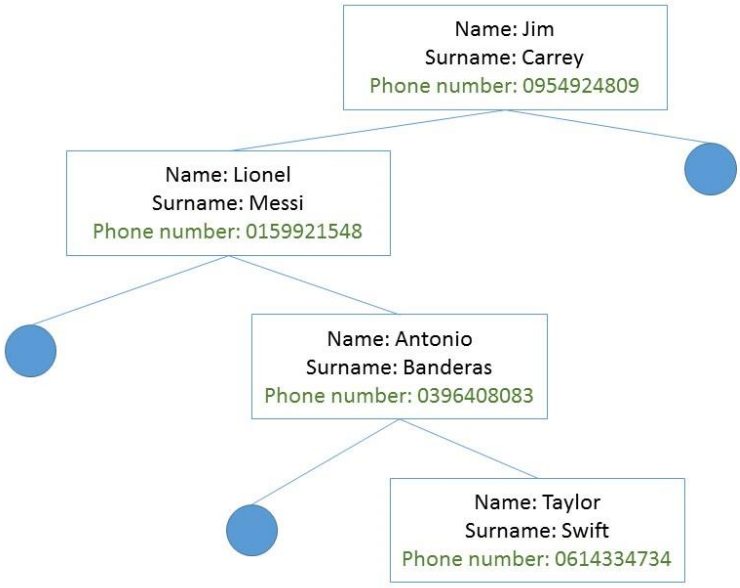

Figure 12) BST#3 after 9th query: *"Delete David Beckham 0222301329"*

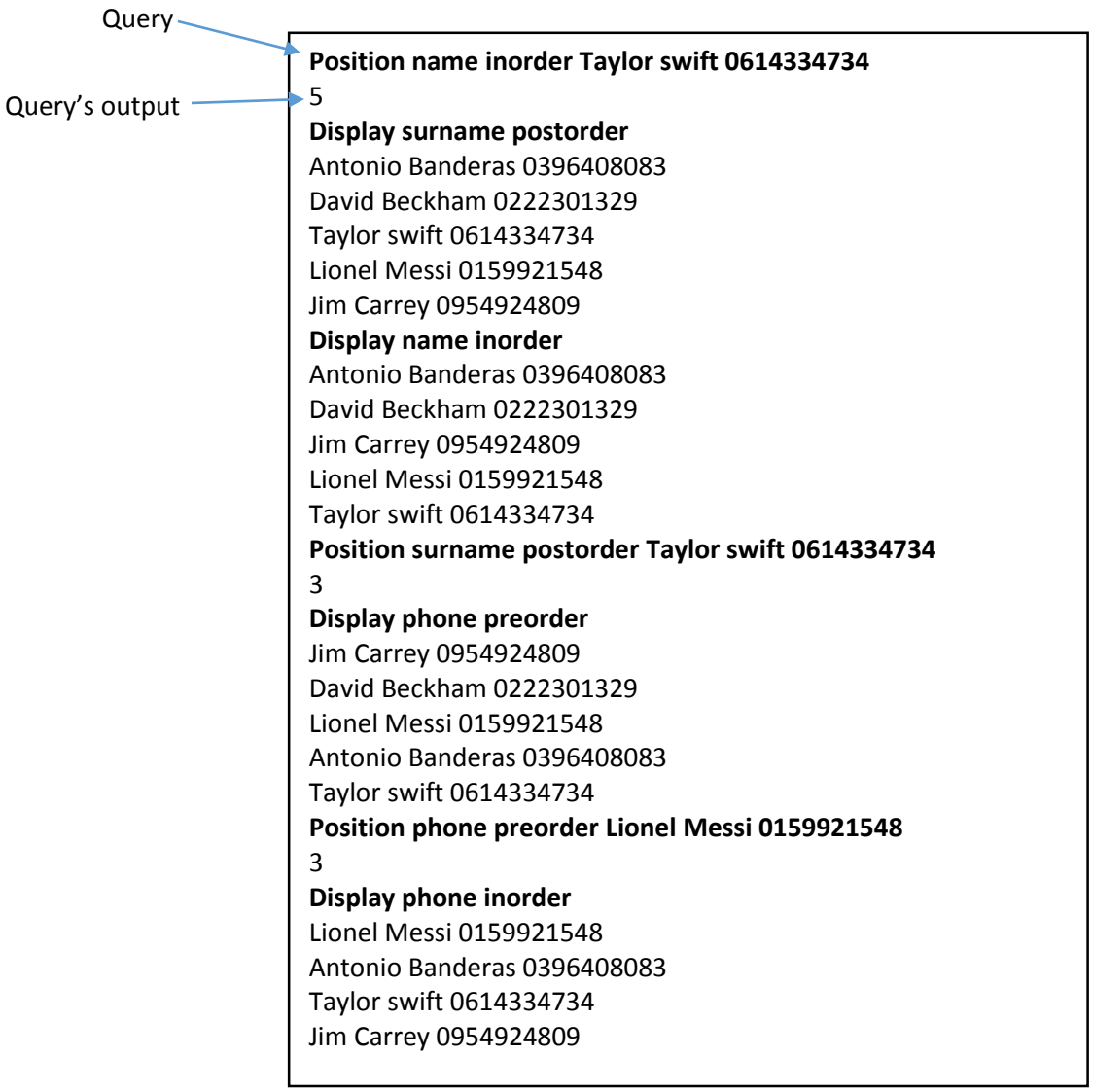

Figure 13) Output of queries

Consider the followings while you are writing your program:

- Your code must be written in **Java**
- **Implement your own tree data structure and methods**
- Your code should not be case sensitive
- Your code must be able to read database.txt and query.txt located in your project's root directory
- You must check against possible error conditions and throw an exception if error is encountered