COSC2430: Programming and Data Structures
HW3: Database System

1 Introduction

You will write a C++ program to simulate database operation (*add*, *get* and *delete*).

2 Input and Output Specification

The records input file is very clean (but may contain duplicated records) and have uniform attributes(columns). Each record stream begins with operation *add*, *delete* or *get*, then follows by a space and a record. For add operation, you will need to add a record with full attributes. However, when you do *delete* or *get* operation, you may only have partial attributes. For *get* operation, you need to output the result in the origin record order and an empty line.

Example of input files (between the lines)

```
input1.txt
------------------------------------------------------------
add {id:1234567,first:Mary,last:Green,DOB:1996-10-03,GPA:4.0}
add {id:1234568,first:Peter,last:White,DOB:1997-05-22,GPA:3.8}
add {id:1654238,first:Nick,last:Park,DOB:1995-08-18,GPA:4.0}
add {id:1234587,first:Katy,last:Green,DOB:1995-08-18,GPA:4.0}
get {GPA:4.0}
delete {first:Mary}
add {id:1234567,first:Mary,last:Green,DOB:1996-10-03,GPA:4.0}
get {last:Green,GPA:4.0}
------------------------------------------------------------
output1.txt
------------------------------------------------------------
{id:1234567,first:Mary,last:Green,DOB:1996-10-03,GPA:4.0}
{id:1654238,first:Nick,last:Park,DOB:1995-08-18,GPA:4.0}
{id:1234587,first:Katy,last:Green,DOB:1995-08-18,GPA:4.0}

{id:1234587,first:Katy,last:Green,DOB:1995-08-18,GPA:4.0}
{id:1234567,first:Mary,last:Green,DOB:1996-10-03,GPA:4.0}
------------------------------------------------------------
```

3 Program specification

The main program should be called "database". Call syntax is as follows (from the OS prompt):

```
./database input=input1.txt output=output1.txt
```

Notice that the file name will not necessarily be the same every time. Therefore, your program will have to take that into account.

4 Requirements

- Homework is **individual**. Your homework will be automatically screened for code plagiarism against code from the other students and code from external sources. If you copy/download source code from the Internet or a book it is better you acknowledge it in your comments, instead of the TAs detecting it. Code that is detected to be copied from another student (for instance, renaming variables, changing for and while loops, changing indentation, etc) will result in "Fail" in the course and being reported to UH upper administration.

- The maximum number of records is 100,000. Timeout is set to 2s. That said, your program must get the result file in 2 seconds.

- **For each operation** *add*, *get* **and** *delete*, **you need to do it in** $O(max(k, n))$ **time complexity at maximum, where** n **is current number of records in the database,** k **is the number of attributes in one record. Failing to do this is likely to get a timeout error. That said, hash table and binary search tree are preferred. Any data structures and algorithms in stl library are allowed.**