Problem 6

The Logging Industry

6 Points

Program Name: log.cpp **Input File: log.dat**

Introduction

After starting work at a commercial database company, you've been assigned to work on a recovery utility for crashed databases. Your utility will be given a restored version of the last good backup of the database along with the transaction log containing operations that were performed since the last backup. Your utility must "replay" the transaction log to bring the database up-to-date.

Input

Input to this problem will consist of a (non-empty) series of up to 100 data sets. Each data set will be formatted according to the following description, and there will be **no blank lines** separating data sets:

1. *Database Start Line* – A single line, "DATABASE *n*", where $1 \leq n \leq 100$ and *n* is sequential identifier for this data set (starting with 1 for the first data set and incrementing by 1 for each data set thereafter).

2. *Database Entries* – A series of zero to 10 lines (inclusive) representing the most recent restored backup of the database. Each entry will follow the format `Name Value`. The Name is a string composed of 1 to 20 (inclusive) alphabetical characters (no spaces). The value is an integer in the range -10000 < Value < 10000.

3. *Log line* -- A single line, "LOG". [You can assume that none of the Names for any of the *Database Entries* will be "LOG".]

4. *Log Entries* – A series of zero to 10 lines (inclusive) representing the transaction log entries which occurred since the most recent backup of the database. There will be three types of entries:

   Inserts – "Insert Name Value"
   Deletes – "Delete Name"
   Updates – "Update Name Value"

[Note: The operations will only appear when they make sense. Inserts will only appear if there is no existing record in the database with a matching Name, Deletes will only appear if there is a record with a matching Name to be deleted, and Updates will only appear if there is a record with a matching Name that should have its Value updated.]

Output

Output for each data set will consist of two parts. The first is an exact replica of the *Database Start Line* for the data set. The second will be the sorted contents of the database after replaying the log. Sorting should occur in ascending order according to the ASCII values of the characters in each entry's *Name* field. [Please assume that, within a single data set, the *Name* fields of entries in the database at any time during the transaction replay will be unique.]

Example: Input File

```
DATABASE 1
James 1000
Marc 1000
Tim 1000
LOG
Insert Laura 100
Delete Tim
Update Marc 500
DATABASE 2
Nochange 0
LOG
DATABASE 3
LOG
Insert Allnew 1
```

Output to screen

```
DATABASE 1
James 1000
Laura 100
Marc 500
DATABASE 2
Nochange 0
DATABASE 3
Allnew 1
```