

HomeworkII Report

Following instructions provided in the course website, we accomplished this task using the Java programming language and implemented our index as a hash map.

We created four classes for this assignment: class DB which handles actual data and indexes, class Film which is used for film object, class Util which takes care of all methods for reading and writing files, class test which has main function and three test cases.

The class Film is the most straightforward. We defines a enum type Attributes and an Array of String, m_attributes, to store data. The constants of attributes has the same order as data in m_attributes, so you can find the data by name of attribute. What' more, we assume combination of title and year is unique for each film. So We use title|year to identify films.

The class Util contains four methods, readDataFile, writeDateFile, readIndexFile,writeIndexFile. Every time when DB is initiating, readDataFile and readIndexFile will be called. If IndexFile exists, index stored in IndexFile will be read into INDEX_LIST_OF_KEYS of which type is Map<String, Set<String>>. The key in this map is the index which is Year|Format in first test and Year in second test. The value of this map is a set of keys of films. If indexFile does not exist, then we will call method getKeys for each film and calculate year|Format index or Year index and push keys and indexes into INDEX_LIST_OF_KEYS. Every time when we update data or index, we will rewrite the s542.db and indexFile to ensure every change will be recorded and be accurate.

The class DB is the very much part in this project. First, we define five variables in the every beginning of this class, INDEX_LIST_OF_KEYS which stored index and set of keys of films, KEY_FILM which stored key and the actual data for each film, INDEX_FILE which is a file to store index information, DATA_FILE which is cs542.db, KEY_LIST_OF_INDEXES of which key is as same as key of films and value is a set of all associated indexes. The last variable is used to retrieve index for a given key of film. Another important part of this class are three methods: put, get and remove. According to the interface, the “put” method is design for add the index entry. So when we call it, all we do is to put arguments into

KEY_LIST_OF_INDEXES, INDEX_LIST_OF_KEYS and update the indexFile. The get method pass an index and return a set of film's key. The remove method pass an key as its argument. We first find its corresponding indexes from KEY_LIST_OF_INDEXES and delete associated entries in KEY_LIST_OF_INDEXES and INDEX_LIST_OF_KEYS. If this entry is empty after deleting the key, then delete the index, otherwise, only delete the key. After doing all of these, update the index file.

The last class is test class. It does not include much information. First two test in this class are as same as requirements in course website. However, as far as I see, these two tests are not enough for this assignment because the first two test cases only call get method and put method. So, we build the third case to test whether this methods meets need.

Additional Assumption:

- 1: For each film, combination of title and year is unique so title|year can be key of film.
2. We use hash as the index mechanism.

Test result:

Case I:

We use "Year|Format" as the index to:

- 1 Find all DVD movies made in 1977.
- 2 Find all VHS movies made in 1990.
- 3 Find all DVD movies made in 2001.

String index = attributes[Film.Attributes.Year.ordinal()] + "|" + attributes[Film.Attributes.Format.ordinal()];

```
Initializing database...
Database is running

Starting Test 1...
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All DVD movies made in 1977:
Index: 1977|DVD doesn't exist!

All VHS movies made in 1990:
Pacific Heights,1990,VHS,Thriller,John Schlesinger,Daniel Pyne,USA,20th Century Fox,$15.00 ,286

All DVD movies made in 2001:
Legally Blonde,2001,DVD,Comedy,Robert Luketic,Karen McCullough Lutz,USA,MGM,$15.00 ,231
Amélie,2001,DVD,Comedy,Jean-Pierre Jeunet,Guillaume Laurant,France,Miramax,$15.00 ,22
The Lord of the Rings: The Fellowship of the Ring,2001,DVD,Action,Peter Jackson,Philippa Boyens,USA,New Line Cinema,$13.81 ,787
Moulin Rouge,2001,DVD,Musical,Baz Luhrmann,Craig Pearce,USA,20th Century Fox,$15.00 ,268
A Beautiful Mind,2001,DVD,Drama,Ron Howard,Akiva Goldsman,USA,Universal Pictures,$15.00 ,54
```

Case II:

In the second test case, we use “Year” as the index to:

- 1 Find all movies made in 2000.
- 2 Find all movies made in 2005.
- 3 Find all movies made in 2010.

String index = attributes[Film.Attributes.Year.ordinal()];

```
Starting Test 2...
*****

Find all movies made in 2000:
Crouching Tiger; Hidden Dragon,2000,DVD,Action,Ang Lee,Du Lu Wang,Taiwan,Asia / Columbia Pictures / Good Machine / Sony Pic,$15.00 ,528
Gladiator,2000,DVD,Epic,Ridley Scott,John Logan,USA,DreamWorks / Universal (Foreign),$15.00 ,109
Molena,2000,DVD,Drama,Giuseppe Tornatore,Giuseppe Tornatore,Italy,Miramax,$15.00 ,243

Find all movies made in 2005:
Mr. & Mrs. Smith,2005,DVD,Action,Doug Liman,Simon Kinberg,USA,20th Century Fox,$15.00 ,261

Find all movies made in 2010:
Index: 2010 doesn't exist!
```

Case III:

In order to test remove function, we created the third case. First, we find all movies made in 1977, then we removed film *Jack the Giant Killer* which was made in 1977 and search films made in 1977 again. We use 1977 as the index to search films. And we use key, *Jack the Giant Killer|1977*, to remove the certain item. The following result shows the change after the item was removed.

```
Starting Test 3...
*****

All movies made in 1977

Before removing:
A Man About the House,1977,VHS,Comedy,Bill Hobin,Don Nicholl,USA,,,$0.00
Jack the Giant Killer,1977,VHS,Comedy,Bill Hobin,Dennis Koenig,USA,,,$0.00
And Mother Makes Four,1977,VHS,Comedy,Bill Hobin,Don Nicholl,USA,,,$0.00
No Children; No Pets,1977,VHS,Comedy,Bill Hobin,Paul Wayne,USA,,,$0.00
Roper's Niece,1977,VHS,Comedy,Bill Hobin,Paul Wayne,USA,,,$0.00
It's Only Money,1977,VHS,Comedy,Bill Hobin,Paul Wayne,USA,,,$0.00

Removing entry: Jack the Giant Killer|1977
There are other keys associated with index 1977|VHS. Index has been refreshed.
There are other keys associated with index 1977. Index has been refreshed.

After removing:
A Man About the House,1977,VHS,Comedy,Bill Hobin,Don Nicholl,USA,,,$0.00
And Mother Makes Four,1977,VHS,Comedy,Bill Hobin,Don Nicholl,USA,,,$0.00
No Children; No Pets,1977,VHS,Comedy,Bill Hobin,Paul Wayne,USA,,,$0.00
Roper's Niece,1977,VHS,Comedy,Bill Hobin,Paul Wayne,USA,,,$0.00
It's Only Money,1977,VHS,Comedy,Bill Hobin,Paul Wayne,USA,,,$0.00
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