CIS211: Data Structures

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**Project #2: Bag 2 – Array Approach**

1. **Introduction:**

We continue with the Bag data structure. However, in this project we focus on the representation of the Bag structure using array as described in your textbook.

Inventory of an online shopping mall is very dynamic. Some items come and go in no time. So, in this project we are going to simulate the dynamic state of an inventory. In order to save time, we are going to use a file called “**p2changes.txt**”. The file, tab delimited, contains two types of record and each record contains two fields as following:

|  |  |
| --- | --- |
| Action | ID or Name |
| A or a | Artist Name |
| D or d | Artist ID |

Where ‘A’ means “Add” and ‘D’ means “Delete”.

1. **Details:**
   1. **Description:**

To help you understand why we care how data is structured, we are going to use 3 different ways to maintain data while it is being changed.

Assume that we start with the following records (Table-1):

|  |  |
| --- | --- |
| ArtistID | Artist Name |
| 1 | Acconci |
| 2 | Ames |
| 3 | Aserty |
| 4 | Baron |
| 5 | Battenberg |

Later on, the file needs to be updated according to the following (Table-2):

|  |  |  |
| --- | --- | --- |
| Action | ArtistID | Artist Name |
| A | 6 | Bindner |
| A | 7 | Blain |
| D | 2 |  |
| A | 8 | Blum |
| D | 4 |  |
| A | 9 | Budd |
| D | 8 |  |

(NOTE: For Add, the Artist ID is assigned by the program. In this case, we simply use the number continuous from the last ID number. The number that has been deleted is not reassigned.)

Using Array structure the 3 different approaches will end up with the following:

|  |  |
| --- | --- |
| (1. Without Gap) | |
| ArtistID | Artist Name |
| 1 | Acconci |
| 3 | Aserty |
| 5 | Battenberg |
| 6 | Bindner |
| 7 | Blain |
| 9 | Budd |

|  |  |  |
| --- | --- | --- |
| (2. Use Delete Field) | | |
| ArtistID | Artist Name | Delete |
| 1 | Acconci | F |
| 2 | Ames | T |
| 3 | Aserty | F |
| 4 | Baron | T |
| 5 | Battenberg | F |
| 6 | Bindner | F |
| 7 | Blain | F |
| 8 | Blum | T |
| 9 | Budd | F |
|  |  |  |
| (3. Use Next Field) | | |
| ArtistID | Artist Name | Next |
| 1 | Acconci | 3 |
| 2 | Ames | 0 |
| 3 | Aserty | 5 |
| 4 | Baron | 0 |
| 5 | Battenberg | 6 |
| 6 | Bindner | 7 |
| 7 | Blain | 9 |
| 8 | Blum | 0 |
| 9 | Budd | -1 |

* 1. **Assignment:**
     1. Use Excel to trace every change that Table-2 makes to Tble-1. Name this file ***p2transition (Your name).xlsx***.
     2. Write a program that uses the 3 different approaches mentioned above to produce the updated version of “**p1artists.txt**” through the use of “**p2changes.txt**”. Let’s call the output files “p2artists2a.txt”, “p2artists2b.txt”, and “p2artistis2c.txt”. Compare the files and they should be same.
     3. Use *System.nanoTime()* as following to find the time spent on each approach:

long startTime = System.nanoTime();

methodToTime(); //This is your code to be measured.

long endTime = System.nanoTime();

long duration = (endTime - startTime);

You are encouraged to try *System.currentTimeMillis()* to see the difference.

* + 1. Write a summary to compare the 3 different approaches.