Hacettepe University

Department of Computer Engineering

BiL341 Programming Lab.

Assignment 5 Design Report

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Problem And Solution

In this experiment we will implement a program that uses B+ Tree structure and organizes a file system with the given informations.Managing free systems is a wide subject that we can say a lot of algorithhms and solution methods.These are like ;

Chaining

Linear Hashing

Extendible Hashing

Double Hashing

Non - Linear Hashing etc..

All of these methods have advantages and disadvantages.And my solution will be the best for this experiment.We can use more than 1 solution methods combined for this experiment.For example we can use extendible hashing and chaining combinelly.

I will use JAVA’s String Tokenizer element to read the input file.I will take the first parameter as the command type , after that the second parameter will be name of the file and the last parameter will be the size of the file.And we will find the block number of the file with the given parameter in the first line as the block size of the file system and we will calculate the block number to divide the file size in the line which contains the informations of the file to the block size.

But before all of this I will read the first line that I will take the information for the file system.And I will control all of this.For example if first line does not contain the information I will give an error message that the input file format is not true for this experiment.

After designing the B+ Tree data structure , we will remove a file from the file system , but if the file name does not exist in the file system we made , I will give an error message to the output file that the given file does not exist in the file system.

In designing the data structure ; I will use 2 B+ Trees.One of them is about the free spaces in the file system and the other is about the files in the file system with the block numbers.In this case , while I were reading the block numbers of the files from the input file , I will send the block number informations of the files to an array , and I will design the data structure fort his informations.For example I have 9 files in the file system and 4 files have 3 blocks , 3 files have 5 blocks , 1 file has 1 block , and the last file has 8 blocks , I will design the branches of the files with the information of the most common block numbers in the file system.In this case my branches will be 3 and 5 .If the common block numbers will be the neighbor numbers like 3 and 4 I will decide to take the common block number information as the bigger one.With this design mentality , I will reduce the disk access numbers and it will be so useful for the mentality of the experiment and the goal of the experiment.

I will have an Operations class that has an empty constructor and the functions which are necessary to cope with the experiment.It has the function of the reading the input file , Designing the B+ Tree data structure , writing the results to the output.I want to maket he main class so short , it will be so useful to be understandable for everybody which are interested to learn it.And in the Operations class I will use a lot of comment line to explain all of the functions and their properties , jobs , usages to explain the experiment well.

I will send it in the BPTREE folder but briefly I will tell that my read input file function in the operation class will be like this.

```
Public void readInputFile(String inputfile , String outputfile)
{
    İf the command is createtree
        Take the necessary parameters
        Go to the createFile() function

    Else if the command is removetree
        Take the necessary parameters
        Go to the removeFile() function

    Else if the command is listfreeblocksbysize
        Go to the listFreeBlocksBySize() function with the necessary parameters and data structures

    Else if the command is listfreeblocksbylocation
```

```
        Go to the listFreeBlocksByLocation() function with the necessary parameters and the data structures(B+ Trees)

    Else if the command is defragtree
        Go to the defragTree() function with the necessary parameters and the data structures

    Else if the command is listfiles
        Go to the listFiles() function with the necessary files and the data structures

    Else
        Give an error message that command is not a suitable command for this experiment

    Make this operations until the input file will be ended.
}
```

With usage of the Operations class my main class will be so short and understandable.

In the functions which are given in the files I will submit with the design report , there are some non existed parameters in some functions like B+ Trees in most of the functions.I don’t want to put them in to the functions as a parameter before finishing design of the experiment totally.But the prototypes are in the files ….

And my main class will be like this

```
import java.util.*;
import java.io.*;

public class Main {

      public static void main(String[] args) throws IOException {

                  Operations o = new Operations();
                  String InputFile = args[0];
                  String OutputFile = args[1];
                  o.ReadInputFile(InputFile , OutputFile);

      }

}
```

The File data structure must be well-designed to make the whole job in the B+ Trees in the experiment.

It is so important to cope with this experiment.

A file should have the block number , name , size.

File system class should have 2 B+ trees.One of them will be for the free blocks by the size and the other one is for the free blocks by the location.And file system should have a total block number , total size information.