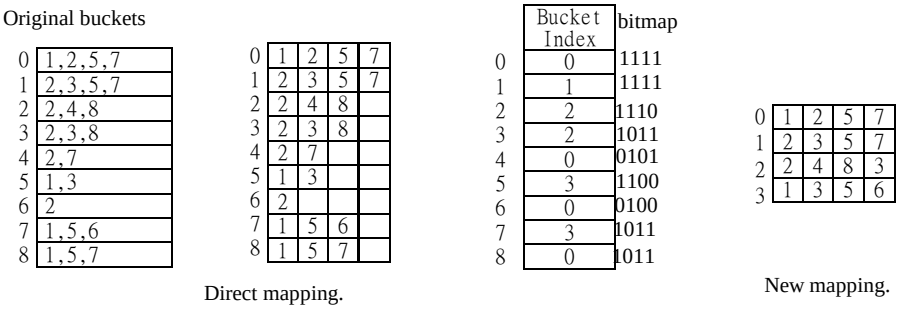
C Language Programming: Homework #5
Assigned on 10/30/2018(Tuesday), Due on 11/13/2018(Tuesday)

Description:

This assignment allows you to practice processing numbers stored in a file. You are required to do the following:

1. Input numbers **n**, **m**, **d, s** by command line, where **n** is the number of buckets and **m** is the maximum number of integers in a bucket, and **d** indicates that the input integers must be in the range of 0 to **d – 1**, and **s** is a seed of *srand()* which is used for *rand()*. All of four numbers are in the range of 1 to 100.

2. Randomly generate these buckets and store in the direct mapping array.



3. Compress the direct mapping array into a new mapping array whose maximum bucket size is set to the maximum bucket size of original buckets:

(a) Original bucket 0 or 1 already occupy a full bucket, and so it needs not to be merged with others as will be stored in buckets 0 and 1 in new array.

(b) Bucket 2 is no possibly be merged with new buckets 0 and 1 and so it is stored in new bucket 2. Similar process is used

for bucket 5.

(c) Bucket 8 can be mergerd into new bucket 0 because integers 1, 5, 7 already exist bucket we need to record the positions of these three integers for bucket 8 by using the bitmap.

4. In addition to the main function, you need at least the following:

(a) int bucket_union(…) *//return new bucket index*

(b) int new_mapping(…) *//return new mapping array*

(c) void fprint_result(…)
//output total number of buckets and the the original buckets and new buckets with right format to a ***file***

5. Score:

(10%) Right file name and path and format

(10%) Output to a file and named as ***hw5.out***

(10%) Print out correct total number of buckets

(20%) Print out correct original buckets

(40%) Print out correct new buckets

(10%) Report

Remark

1. If you want to randomly generate numbers, the code can be referred, assuming **s** is stored in *argv[4]*, and **d** is stored in *argv[3]*.

```
int random_num;
srand(atoi(argv[4]));
d = atoi(argv[3]);
random_num = (rand()%d);
```

Command Line:

./hw5 n m d s

Example of File Content in *hw5.out* :

4

0 / 1 2 5 7
1 / 2 3 5 7
2 / 2 4 8
3 / 2 3 8
4 / 2 7
5 / 1 3
6 / 2
7 / 1 5 6
8 / 1 5 7

0 / 1 2 5 7
1 / 2 3 5 7
2 / 2 4 8 3
3 / 1 3 5 6