===Lab Info===

* 100 points

* Due 11:59pm on Sunday 9/27 for Monday and Wednesday Lab.

==Assignment==

In this assignment you will work on open hashing with chaining. You are to read in the numbers from a data file of integers. The first number is a prime number that shows the size of the hash table. The rest of the file contains the "key numbers" that should be inserted in the hash table. Because the numbers are keys so there shouldn't be any duplicate numbers in the hash table. Use % (mod) as the hash function. The file of numbers you read from will be data.txt. You may hard code the file name in your program if you wish.

If the load factor is larger than 1, you should rehashing. Use the smallest prime number which is larger than two times the previous prime number used for the size of the hash table. Like the previous labs, a simple user interface should be designed to do some insertion into and deletion from the hash table:

After building the structure your program should ask the user to choose one of the options below:

1- insert

2- delete

3- print

4- exit

and act according to what has been chosen (Look at examples)

==Hash==

The Hash should implement an appropriate constructor and destructor. The rest of the methods should be implemented as follows:

*insert(x) should insert x to the Hash table. insert must be done at the end of the chain.

*remove(x) should remove the key from the hash table.

*print() should print out all the elements of the hash table. Each chain must be separated by a space and end with an endl.

*hash(x) Use % (mod) as the hash function and return the index for key x.

*find(x) return true if the key x is in the hash table and false if not.

==Output==

Consider that the data.txt is as below:

5 16 12 17 4 2

As mentioned the first number (here 5, but can be any prime number) shows the prime number that is needed for the hash function.

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 3

0:

1: 16

2: 12 17 2

3:

4: 4

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 1

Which number do you want to insert into the hash table?

> 16

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 1

Which number do you want to insert into the hash table?

> 14

0:

1: 12

2: 2

3: 14

4: 4

5: 16

6: 17

7:

8:

9:

10:

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 1

Which number do you want to insert into the hash table?

> 3

0:

1: 12

2: 2

3: 14 3

4: 4

5: 16

6: 17

7:

8:

9:

10:

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 1

Which number do you want to insert into the hash table?

> 8

0:

1: 12

2: 2

3: 14 3

4: 4

5: 16

6: 17

7:

8: 8

9:

10:

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 1

Which number do you want to insert into the hash table?

> 15

0:

1: 12

2: 2

3: 14 3

4: 4 15

5: 16

6: 17

7:

8: 8

9:

10:

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 2

Which number do you want to remove from the hash table?

> 17

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 2

Which number do you want to remove from the hash table?

> 14

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 3

0:

1: 12

2: 2

3: 3

4: 4 15

5: 16

6:

7:

8: 8

9:

10:

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 1

Which number do you want to insert into the hash table?

> 2

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 1

Which number do you want to insert into the hash table?

> 25

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 1

Which number do you want to insert into the hash table?

> 13

.....

Please choose one of the following commands:

1- insert

2- delete

3- print

4- exit

> 3

0:

1: 12

2: 2 13

3: 3

4: 4 15 25

5: 16

6:

7:

8: 8

9:

10:

===Files===

* Files to include in folder:

** All source files

** A functioning makefile

** data.txt

* Folder name: Lastname_Lab4

* Compressed file name: Lastname_Lab4.zip (or .rar or.tar.gz)

* Executable name: lab4