

# Lab 1: Basic Problem Solving

## **Team Members:**

1. Dhrumil Amish Shah

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## **Subject:**

Software Development Concepts

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## **Professor:**

Matthew Amy

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## Items that needed clarification

1. What to do if a key already exists in a map?
2. How to arrange multiple key-value pairs if all the keys generate the same hash value (during a collision)?
3. Is NULL key allowed?
4. Is NULL value allowed?
5. When to increase the size of a map to maintain constant time put and get operations?
6. What to do if we try to get value for a key that does not exist?
7. What to do if we try to get value for a key when the map is NULL or empty?
8. What can be the type of key and value (Type of data it can hold)?

## My decisions on items that needed clarification

### **1. What to do if a key already exists in a map?**

If a key already exists in a map, we can return 'false' or throw an exception that says, 'Key key\_name already exist'.

### **2. How to arrange multiple key-value pairs if all the keys generates the same hash value (during a collision)?**

In the case of multiple key-value pairs with the same hash value, we can use internal data structure like an array-list or a linked-list and append the key-value pairs to the list.

### **3. Is NULL key allowed?**

Use of NULL key is allowed.

### **4. Is NULL value allowed?**

Use of NULL value is allowed. Multiple keys can have a NULL value.

## **5. When to increase the size of map to maintain constant time put and get operations?**

We can increase the size of a map when the ratio size/capacity is greater than load factor where size indicates the number of key-value pairs in a map, capacity indicates the number of cells/buckets in a map and load factor is a value that enforces constant time put and get operations. Load factor by default is 0.75.

## **6. What to do if we try to get value for a key that does not exist?**

If we try to get value for a key that does not exist, we can either return NULL or throw an exception that says, 'Key key\_name does not exist'.

## **7. What to do if we try to get value for a key when the map is NULL or empty?**

If we try to get value for a key when the map is NULL or empty, we can either return NULL or throw an exception that says, 'Key key\_name does not exist' or 'No elements inserted'.

## **8. What can be the type of key and value (Type of data it can hold)?**

We can create map objects with different types of data using the concept of generics. Although, it must be homogeneous in nature.

## **Proof that my work so far is working**

In my project, I have a file '**Lab1Map.java**' that contains a total of 13 tests. Each scenario is mentioned as a comment before the test and running this file will execute all the test cases.

## **What I did well in developing the implementation that could be use as an approach to implement another problem?**

1. Use of interface enforces the implementation and makes sure that all the methods in an interface are implemented.
2. Use of generics makes sure that users have flexibility in defining objects of any data type.

3. Obeying Separation of Concerns (SoC) design principle. Separate class/interface in their respected files for better code readability, reusability, and to make changes.
4. Comment code for future revisions and for others to understand easily.
5. Write test cases to cover end to end scenarios.