UNIVERSITÉ DU LUXEMBOURG

Hash Table

Programming Fundamentals 2

Goals

- ✯ Manipulation and implementation of hash table.
- ✯ **Relevant videos**:
  - Hash table data structure.

Deliverables

1. The code on your Github repository generated by clicking here: `https://classroom.github.com/a/BGXq8N7n`
2. **Reviewer**: Pierre Talbot (ptal on Github).
3. **Automated testing** using JUnit and unit testing.

Exercise 1 – From scratch

In this exercise, you are asked to implement your own generic hash table. Your implementation must consider any type for the keys and values. The only restriction is that it should not be allowed to add in the table a pair key/value with a key `null`. The reason is that keys must be compared between themselves for searching elements. A key `null` would not thus be comparable with other keys.

1. In file `HashTable.java`, implement a hash table from the template provided. The three main methods for a hash table are the following.
   - `public V get(K key)` Return the value associated with the given key, and `null` if the given key is not present in the table.
   - `public V put(K key, V value)` Associate the given value with the given key in the table. If the key is already present in the table, this method changes the associated value and returns the former value; otherwise a new pair key/value is added in the table and this method returns `null`.
   - `public V remove(K key)` Remove the pair key/value associated with the given key if such an entry is already in the table. This method returns the value associated with the given key if the latter exists in the table, and `null` otherwise. .
2. Test your code with the file `HashTableTest.java` where you can implement your unit tests.

Exercise 2 – Visualisation

1. Implement the method `public String toString()` in class `HashTable` which returns a string description of the content of the table (you can choose any format to visualise your hash table).
2. Add a method `public List<K> keys()` which returns a list of every key stored in the hash table (you can use the list data structure provided by Java).