Research Week 4

1. What are the differences between Lists, Sets, and Maps in Java?

Lists, Sets, and Maps are all collections but have different properties that make them useful in different situations. Lists and Sets both extend the Collection interface. Maps are special elements or objects that do not extend the Collection interface.

A List is an ordered collection that uses indexes to manipulate the elements contained in the list. It maintains the insertion order of the elements and can contain duplicates and nulls. A Set is an unordered collection that does not allow duplicate elements, including allowing only one null. A Map is a little different in that it stores data in key and value pairs, like how a dictionary stores words for lookup (Key) and provides the definition (Value) at that entry. Maps also cannot contain duplicates.

References

Difference between List, Set and Map in Java. (2021, September 27). Retrieved December 2, 2022 from https://www.geeksforgeeks.org/difference-between-list-set-and-map-in-java/

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2. List at least two different implementations for each collection (List, Set, and Map). When would you use one of the implementations over the other?

List implementation choices include ArrayList (most common) and LinkedList. Neither implementation have a requirement to set an initial size; they will adjust their size as needed during use. An ArrayList is better for a constant time in accessing the elements in the List. A LinkedList is better when the data need to be manipulated or iterated over.

Set implementation choices include HashSet (most common), LinkedHashSet, and TreeSet. HashSet and LinkedHashSet are similar in that both allow constant speed access to the data which improves the time performance of a program. The main difference is that LinkedHashSet preserves the order of the data as it was inserted. TreeSet is best when used for storing huge amounts of stored data.

Map implementation choices include HashMap (most common), TreeMap, and LinkedHashMap. HashMap is the most common because the access method of Key and Value allows for the fastest time to access an entry. TreeMap differs from HashMap in that the data entered maintains the natural ordering of the Keys or can be ordered during the data entry of the keys. LinkedHashMap is almost as fast as HashMap but maintains the insertion order for iteration.

References

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