Collection Framework and Maps Assignment Solutions

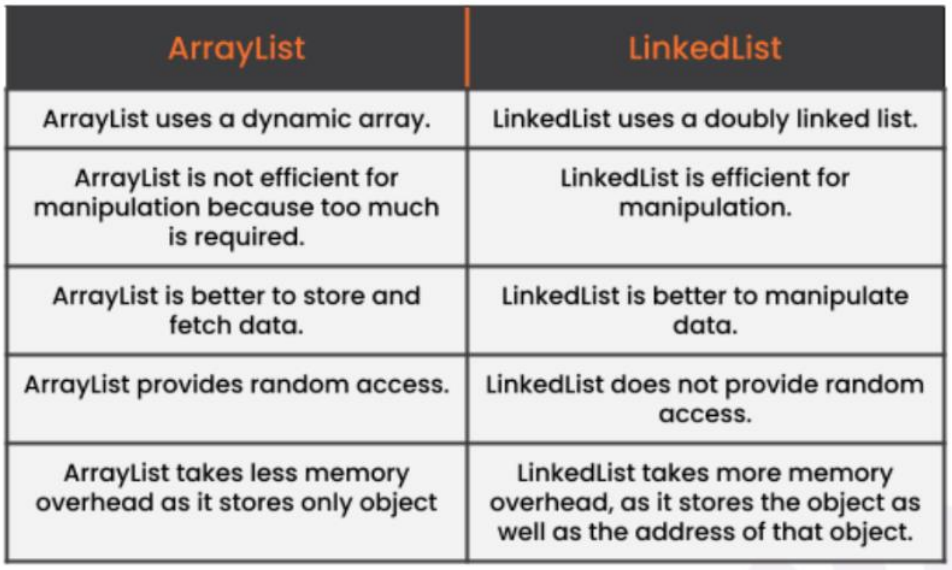
1. What is the Collection framework in Java?

Ans: Collection Framework is a combination of classes and interface, which is used to store and manipulate the data in the form of objects. It provides various classes such as ArrayList, Vector, Stack, and HashSet, etc.

and interfaces such as List, Queue, Set, etc. for this purpose.

2. What is the difference between ArrayList and LinkedList?

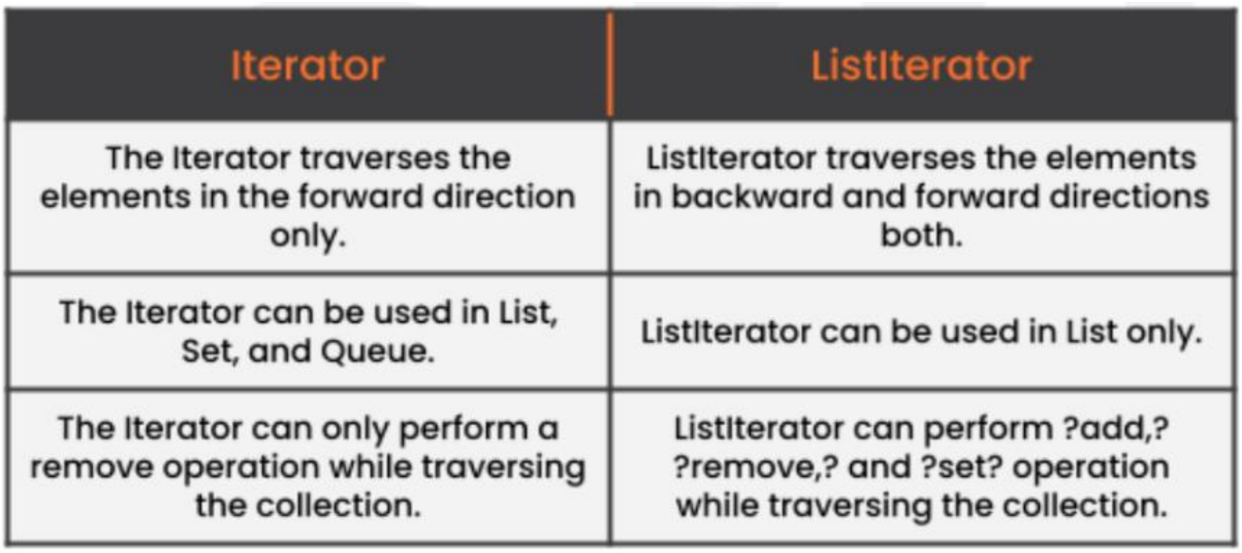
Ans:



ArrayList	LinkedList
ArrayList uses a dynamic array.	LinkedList uses a doubly linked list.
ArrayList is not efficient for manipulation because too much is required.	LinkedList is efficient for manipulation.
ArrayList is better to store and fetch data.	LinkedList is better to manipulate data.
ArrayList provides random access.	LinkedList does not provide random access.
ArrayList takes less memory overhead as it stores only object	LinkedList takes more memory overhead, as it stores the object as well as the address of that object.

2. What is the difference between Iterator and ListIterator?

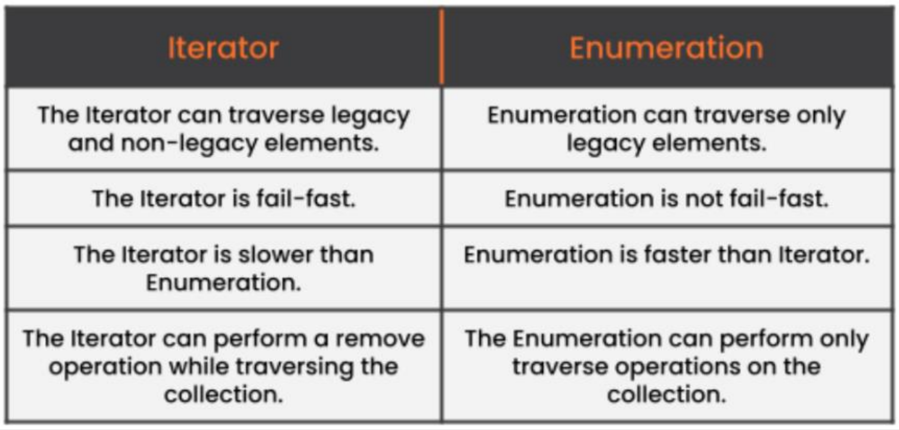
Ans:



Iterator	ListIterator
The Iterator traverses the elements in the forward direction only.	ListIterator traverses the elements in backward and forward directions both.
The Iterator can be used in List, Set, and Queue.	ListIterator can be used in List only.
The Iterator can only perform a remove operation while traversing the collection.	ListIterator can perform ?add,? ?remove,? and ?set? operation while traversing the collection.

4. What is the difference between Iterator and Enumeration?

Ans:



Iterator	Enumeration
The Iterator can traverse legacy and non-legacy elements.	Enumeration can traverse only legacy elements.
The Iterator is fail-fast.	Enumeration is not fail-fast.
The Iterator is slower than Enumeration.	Enumeration is faster than Iterator.
The Iterator can perform a remove operation while traversing the collection.	The Enumeration can perform only traverse operations on the collection.

5. What is the difference between List and Set ?

Ans. The List and set both extended the collection interface. However , there are some differences between the two which are listed below.

- The List can contain duplicate elements whereas Set includes unique items.
- The List is an ordered collection which maintains the insertion order whereas Set is an unordered collection which does not preserve the insertion order.
- The least interface contains a single legacy class, which is vector class, where as the set interface does not have any legacy class.
- The interface can allow a number of null values, whereas set interface only allows a single null value.

6. What is the difference between HashSet and TreeSet ?

Ans. Both HashSet and TreeSet are implementations of Set interface in Java, but they have some differences in terms of their properties and usage:

- **Ordering:** HashSet is an unordered collection of elements while TreeSet is a sorted set of elements based on their natural order or a custom comparator.
- **Duplication:** HashSet does not allow duplicate elements while TreeSet does not allow duplicates as well.
- **Implementation:** as HashSet is implemented using a hash table, while TreeSet is implemented using a self-balancing binary search tree (Red-Black tree).
- **Performance:** HashSet has constant time complexity O(1) for adding, removing and testing the existence of an element while tree set as a logarithmic time complexity O(log n) for these operations due to the self balancing property.

- **Memory usage:** HashSet uses less memory than TreeSet, because it only stores the elements. While TreeSet stores additional information for maintaining the order.
- **Iteration:** HashSet provides no guarantees regarding the order of iteration, while tree set guarantees the elements are iterated in sorted order.
- **Usage:** HashSet is suitable when ordering is not important and fast access and membership tests are needed. TreeSet is suitable when elements need to be sorted or accessed in a specific order.

7. What is the difference between Array and ArrayList?

Ans. Both arrays and ArrayList are used to store collections of elements in Java, but they have some differences in terms of their properties and usage:

- **Types:** Arrays can store elements or primitive data types as well as objects, while ArrayList can only store objects.
- **Mutability:** Arrays are mutable, meaning that we can modify the elements in an array after it has been created. ArrayList is also mutable, but the only way to modify it is by adding, removing or modifying elements.
- **Performance:** Arrays have better performance than ArrayList for certain operations, such as accessing elements by index, because they are implemented as a continuous block of memory. ArrayList on the other hand, use dynamic memory allocation and are implemented as a dynamic array, which may result in more memory overhead and slower performance for certain operations.
- **Methods:** Arrays have a limited set of methods compared to ArrayList, which provides more methods for manipulating the collection, such as adding, removing and sorting elements.
- **Initialization:** Arrays can be initialized with values at the time of creation, while ArrayList requires the use of methods to add element to the collection.
- **Compatibility:** Arrays are compatible with traditional for-loops and can be easy passed to other methods while ArrayList requires the use of a special for-each loop, and may require more code to be passed to other methods.

8. What is a Map in Java?

Ans: A Map is a collection in Java that stores data as key-value pairs, where each key is unique.

10. What age the commonly used implementations of Map in Java?

Ans: The commonly used implementations of Map in Java are HashMap, TreeMap, LinkedHashMap, and ConcurrentHashMap.

10. What is the difference between HashMap and TreeMap?

Ans. HashMap is an unordered collection that uses hashing to store the key-value pairs, while TreeMap is a sorted collection that stores the key-value pairs in a sorted order based on the natural order of the keys or a custom Comparator.

11. How do you check if a key exists in a Map in Java?

Ans: We can check if a key exists in a Map in Java using the containsKey() method or the get() method. While containsKey() method returns a Boolean value indicating whether the Map contains the specified key, while the get() method returns the value associated with the specified key, or null if the key is not present in the Map.