**Collections**

**http://javabypatel.blogspot.in/2015/10/what-is-load-factor-and-rehashing-in-hashmap.html**

* **What is the collection hierarchy and advantage of collection framework?**
* **Why Map interface doesn’t implement collection interface?**
* **Array List to Array and Array to array List conversion?**
* **What is the difference and similarities b/w vector, Array List and Linked List?**
* **Different method in ArrayList, vector and LinkedList?**
* **What will be the output if two iterator iterate a list.**
* **Difference b/w Contains () and binary Search () method?**
* **Difference b/w List and Set?**
* **What is the difference between ArrayList clear () and remove All () methods?**
* **If an ArrayList contains duplicate objects and remove () method is invoked on the same object, will it remove the duplicates?**
* **How to remove object from ArrayList by using remove method?**
* **Similarity b/w LinkedList and ArrayList?**
* **How to clone collection in java and add All use which cloning?**
* **How to synchronize ArrayList?**
* **Difference b/w list, set and map?**
* **Is Collection.synchronizedList thread-safe?**
* **Explain set hierarchy?**
* **What is the initial capacity of has-set and what is load factor?**
* **Difference between Hash Set, Linked Hash Set and Tree Set?**
* **What copy technique internally used by HashSet clone () method?**
* **How HashSet and LinkedHashSet works internally?**
* **How TreeSet works internally?**
* **Difference b/w Iterator and Enumerator?**
* **Difference b/w Con-Current Hash Map and Hash table?**
* **Why collection interface not implementing clone and sterilization interface.**
* **Difference between Concurrent Hash Map and Collections.synchronizedMap?**
* **Difference b/w Hash map and Hash table?**
* **What is the fail-safe and fail-fast iterator in java?**
* Difference/similarity b/w array List Hash Map?
* Difference and similarity b/w Hash Map, Linked HashMap and Tree-Map?
* **Difference b/w Keyset and enter Set?**
* **Difference b/w tree set and tree map?**
* **How to make collection read-only?**
* **What are Identity HashMap and Weak HashMap?**
* **Difference between Hash Map and Weak HashMap in Java?**
* **What is Enum Set in Java?**
* **How hash map works in java?**
* **How will you retrieve Value object if two Keys will have same hash code?**
* **What happens On HashMap in Java if the size of the Hash Map exceeds a given threshold defined by load factor?**
* **Difference between Iterator and List Iterator?**

**--------------------------------------- Collection------------------------------**

**Q. What is the difference and similarities b/w vector, Array List and Linked List?**

**http://beginnersbook.com/2013/12/how-to-synchronize-arraylist-in-java-with-example/**

Ans :

Similarities:

* Both are index based.
* Both maintain the insertion order.
* Both allow null and duplicate value.
* Both iterator and List Iterator are fail fast.
* Both implement list interface.
* Both implemented using array data structure.

Diff:

* Vector is synchronized while array List is not.
* Vector is thread safe while array List is not.
* Vector is slow than array List.
* Whenever vector cross the threshold specified it increases twice itself by value specified in capacity Increment. While we can increase the size of array by calling ensure Capacity method();
* LinkedList has more overhead than ArrayList and vector because in ArraList and vector each index store only data but in LibkedList each index strore data and address of next node.
* Insertion and removal is faster in LinkedList then arrayList and vector.
* Searching is easy in arrayList and vecotr but slow in LinkedList.
* Bineary search is not sutiable for LinkedList but suitable of Arraylist and vector.

**Q: Difference b/w Contains() and binarySearch() method ?**

Ans : Contains() method is more faster then binarySearch() method if the collections implement RandomAccess interface.

* If list is not sorted the result can be undefined in case of binarySearch().
* If list has multiple elements equal to specified object ,there is no guarantee which will be returned.
* **Q: ArrayList conversion ?**

Ans :

**Array to ArrayList using asList() and using CollectionUtils.arrayToList in spring :**

1. List returned by this method would be fixed size.
2. When you change an element into this List corresponding element in original array will also be changed.
3. List is fixed size, you can not add element into it. If you try you will get [exception](http://javarevisited.blogspot.com/2011/12/checked-vs-unchecked-exception-in-java.html).

**Array to ArrayList using addAll() :**

1. Its not as fast as Arrays.asList() but more flexible.
2. Can add, modify and remove any element without affecting original one.

**Array List to array using toArray() :**

List.toArray(array)

**Array List To hash set:**

**Pending----**

**Q: Difference b/w List and Set?**

* List allows duplicates while Set does not allow.
* List is ordered collection while set is unordered collection.

**Q: Difference b/w hash set and tree set?**

* Hast set is faster than tree set.
* Hash set doesn’t provide ordering while tree set support ordering.
* Hash set allow null object while tree set doesn’t allow null object.
* Hash set is backed by hash map while tree set backed by tree map.
* Hash set uses equals() while tree set uses compareTo().

Q: **Difference between Hash Set, LinkedHashSet and TreeSet ?**

* **Performance** and **Speed**: First difference between them comes in terms of speed.  HashSet is fastest, LinkedHashSet is second on performance or almost similar to HashSet but TreeSet is bit slower because of sorting operation it needs to perform on each insertion
* **Ordering:** HashSet does not maintain any order while LinkedHashSet maintains insertion order of elements much like List interface and TreeSet maintains sorting order or elements.
* **Internal Implementation:** HashSet is backed by an HashMap instance, LinkedHashSet is implemented using HashSet and LinkedList while TreeSet is backed up by NavigableMap in Java and by default it uses TreeMap.
* **null** : Both HashSet and LinkedHashSet allows null but TreeSet doesn't allow null
* **Comparison:** HashSet and LinkedHashSet uses [equals () method in Java](http://javarevisited.blogspot.sg/2011/02/how-to-write-equals-method-in-java.html) for comparison but TreeSet uses [compareTo() method](http://javarevisited.blogspot.sg/2011/11/how-to-override-compareto-method-in.html) for maintaining ordering.

**Q: Difference b/w Iterator and Enumerator?**

**Ans :**

* Enumerator does not has remove method while iterator has.
* Enumerator is read only interface because it has the method to traverse and fetch while by using iterator we can manipulate the objects.
* Iterator is thread safe then Enumerator because it does not allow other thread to modify the collection object while some thread is iterating over it and throws.
* <http://javarevisited.blogspot.in/2011/11/how-to-override-compareto-method-in.html>

**Q. Why collection interface not implementing clone and serializable interface.**

- Less flexible and more restrictive

- Collection is abstract implementation clone and serializable interface implemented in actual implementation not in abstract

**Q: Difference b/w ConCurrentHashMap and Hash table?**

Ans : once the size of Hashtable becomes considerable large performance degrade because for iteration it has to be lockedfor longer duration . Since ConcurrentHashMap introduced concept of segmentation , how large it becomes only certain part of it get locked to provide thread safety so many other readers can still access map without waiting for iteration to complete.

**Q: Difference between ConcurrentHashMap and Collections.synchronizedMap ?**

Ans : ConcurrentHashMap do not allow null keys or null values while HashMap allows null keys.

**Q.  Difference b/w Hashmap and Hashtable ?**

Ans. HasMap and hastable both implement map interface.

* HasMap is not synchronized but hashtable is synchronized.
* Hasmap allow null values while hashtable does not allow.
* HashMap is much faster than hashtable.
* The iterator in hasmap is fail-fast iterator while the enumerator for the Hashtable is not and throws ConcurrentModificationException.

**Q. What is the fail-safe and fail-fast iterator in java ?**

Ans.

Fail-fast iterator : Fail-fast iterators fail as soon as they realized that structure of collection has been changed since iteration has begun. Structural changes mean adding, removing or updating any element from collection while one thread is Iterating over that collection. fail-fast behavior is implemented by keeping a modification count and if iteration thread realizes the change in modification count it throws ConcurrentModificationException.

Fail-safe iterator : fail-safe iterator doesn't throw any Exception if Collection is modified structurally while one thread is Iterating over it because they work on clone of Collection instead of original collection

**Q. Difference/similarity b/w array List Hash Map?**

Ans : Difference :

* Array List maintains the insertion order while Hash Map doesn’t maintain insertion order.
* Array-list implements List while Hash-Map implements Map interface.
* Array-List allows duplicates while Hash-Map allow duplicates value not key.

Similarity:

* Both allow null values.
* Both are not synchronized.
* Both have fails-fast iterator.

Q. **Difference and similarity b/w HashMap,LinkedHashMap and Tree-Map ?**

Difference:

* HashMap has No Iteration Order,LinkedhashMap maintain Iteration order and treemap maintains sorting order.
* HashMap implements map interface, LinkedhasMap is Implementation of Hash Table and Linked List, TreeMap is Implements NavigableMap and SortedMap interfaces.

**Q. Difference b/w Keyset and enterySet?**

- Enteryset is faster than keyset.

- In enteryset no need to manually print the key it implements toString(). While in keyset we have to manually print keyset.

**Q. Difference b/w treeset and treemap ?**

- Treeset implements set and Treemap implements map interface.

- Treeset donesn’t allow duplicate object while map allow duplicate value.

- Treeset implements navigableset while Treemap implements navigablemap.

- Treeset doesn’t allow null value while treempa allow;

**Q. How to make collection read-only?**

- Collections.unmodifiableCollection (Collection c)

##### Q. Difference between Hash Map and WeakHashMap in Java?

Ans.

**1. Entry object Garbage Collected :**  In Hash Map , entry object is not eligible for garbage collection .In other words, entry object will remain in the memory even if the key object associated with key-value pair is null.  
An entry in a  WeakHashMap will automatically be removed when its key is no longer in ordinary use When a key is discarded then its entry is automatically removed from the map , in other words, garbage collected.  
**2. Key objects Reference:**In Hash Map key objects have strong (also called soft) reference. Each key object in the WeakHashMap is stored indirectly as the referent of a Weak reference (also called hard) reference.  
Therefore, a key will automatically be removed only after the weak references to it , both inside and outside of the map , have been cleared by the garbage collector  
**3. Automatic** **Size decrease:** Calling size () method on Hash Map object will return the same number of key-value pairs. Size will decrease only if remove () method is called explicitly on the Hash Map object.in WeakHashMap size decrease happens automatically.  
 **4.  Clone method:** Hash Map implements Clone able interface. Hash Map class clone () method returns the shallow copy of the object. WeakHashMap does not implement clone able interface.  
-  **Serialize and DE serialize objects:** Hash Map implements Serializable interface. So Hash Map class object state can be serialized or. WeakHashMap does not implement Serializable interface. As a result, WeakHashMap object will not have any of their state serialized or DE serialized

##### Q. What are IdentityHashMap and WeakHashMap?

Ans.

* [**WeakHashMap**](http://docs.oracle.com/javase/7/docs/api/java/util/WeakHashMap.html) and [**IdentityHashMap**](http://docs.oracle.com/javase/7/docs/api/java/util/IdentityHashMap.html)is a class present in java.util package.
* It is a Hashtable based implementation of Map interface with weak keys.
* An entry in WeakHashMap will automatically be removed when its key is no longer in ordinary use.
* More precisely the presence of a mapping for a given key will not prevent the key from being discarded by the garbage collector.
* It permits null keys and null values. Like most collection classes, this class is not synchronized.
* A synchronized WeakHashMap may be constructed using the Collections.synchronizedMap () method.
* Iterators returned by the iterator() method are fail-fast , hence , will throw ConcurrentModificationException.
* [IdentityHashMap](http://docs.oracle.com/javase/7/docs/api/java/util/IdentityHashMap.html) use [reference equality instead of object equality](http://javahungry.blogspot.co.uk/2013/06/difference-between-equals-and-double-equals-method-with-example-java-collections-interview-question.html) when comparing keys and values. In other words, in IdentityHashMap two keys k1 and k2 are considered equal if only if (k1==k2).

1. **What is EnumSet in Java?**

[**http://docs.oracle.com/javase/7/docs/api/java/util/EnumSet.html**](http://docs.oracle.com/javase/7/docs/api/java/util/EnumSet.html)

* A specialized [Set](http://docs.oracle.com/javase/7/docs/api/java/util/Set.html) implementation for use with enum types.
* All of the elements in an enum set must come from a single enum type that is specified, explicitly or implicitly, when the set is created.
* Enum sets are represented internally as bit vectors. This representation is extremely compact and efficient.
* The space and time performance of this class should be good enough to allow its use as a high quality, typesafe alternative to traditional int-based "bit flags." Even bulk operations (such as containsAll and retainAll) should run very quickly if their argument is also an enum set.
* The iterator returned by the iterator method traverses the elements in their natural order (the order in which the enum constants are declared). The returned iterator is weakly consistent: it will never throw [ConcurrentModificationException](http://docs.oracle.com/javase/7/docs/api/java/util/ConcurrentModificationException.html) and it may or may not show the effects of any modifications to the set that occur while the iteration is in progress.
* Null elements are not permitted. Attempts to insert a null element will throw [NullPointerException](http://docs.oracle.com/javase/7/docs/api/java/lang/NullPointerException.html).
* EnumSet is not synchronized .
* Q. **How hash map works?**
* Ans : HashMap works on principle of hashing, it has put(key, value) and get(key) method for storing and retrieving Objects from HashMap. When we pass Key and Value object  to put() method on Java HashMap, HashMap implementation calls [hashCode method](http://javarevisited.blogspot.sg/2011/10/override-hashcode-in-java-example.html) on Key object and applies returned hashcode into its own hashing function to find a bucket location for storing Entry object. HashMap in Java stores both key and value object as Map.Entry in .
* Q. **How will you retrieve Value object  if two Keys will have same hashcode?**
* Ans : HashMap uses Key Object's hashcode to find out bucket location and retrieves Value object. but two Value objects are stored in same bucket ,we have to [traversal in LinkedList](http://javarevisited.blogspot.sg/2010/10/how-do-you-find-length-of-singly-linked.html) until we find the value object . finding bucket location , we will call keys.equals() method to identify correct node in LinkedList and return associated value object for that key in Java HashMap .
* Q. "**What happens On HashMap in Java if the size of the HashMap  exceeds a given threshold defined by load factor ?**
* Ans : it will act to re-size the map once it filled 75%. Similar to other collection classes like [ArrayList](http://javarevisited.blogspot.sg/2011/05/example-of-arraylist-in-java-tutorial.html),  Java HashMap re-size itself by creating a new bucket array of size twice of previous size of HashMap , and then start putting every old element into that new bucket array.

##### Q. Difference between Iterator and ListIterator?

Ans : 1.

- we can use iteration all collection but listIterator only of list type collection.

- listIterator is bidrection we can use previous and hasPrevious method.

- listIterator has add and remove method and iterator having only remove

**----------------------------------------------------------------------------------------------------------------------**

### What is the collection hierarchy?

### Collection is the root interface of collection framework. It is implemented by Set and List interface.

### MAP is not implementing the Collection interface. It is member of collection framework.

### Advantage:

* It provides high-performance implementations of useful data structures and algorithms that increases the performance.
* Reduces effort to learn and to use new APIs.
* Reduces effort to design new APIs.
* Reduced development effort by using core collection classes rather than implementing our own collection classes.
* Code quality is enhanced with the use of well-tested collections framework classes.
* Reduced effort for code maintenance by using collection classes shipped with JDK.
* Reusability and Interoperability

### 

### Why Map interface doesn’t implement collection interface?

* Some methods declared in Collections do not fit a Map interface. Map views as key value pair.

### Array List to Array and Array to array List conversion?

### To convert array List to array we use toArray () method.

### Object [] objects = list.toArray ()

### To convert array to as we sue asList ();

### List al = Arrays.asList (array Name);

### The list generated by this method fixed size, we cannot change the size.

### If we modify any element in list, it will be modified in array also.

### What is the difference and similarities b/w vector, Array List and Linked List?

### Similarities:

### Both are index based.

### Both maintain the insertion order.

### Both allow null and duplicate value.

### Both iterator and List Iterator are fail fast.

### Both implement list interface.

### Both implemented using array data structure.

### Difference:

### Vector is synchronized while array List is not.

### Vector is thread safe while array List is not.

### Vector is slow than array List.

### Whenever vector cross the threshold specified it increases twice itself by value specified in capacity Increment. While we can increase the size of array by calling ensure Capacity method ();

### LinkedList has more overhead than ArrayList and vector because in ArraList and vector each index store only data but in LinkedList each index store data and address of next node.

### Insertion and removal is faster in LinkedList because each node store the address of next node so for insert or delete just we need to change the address of next and previous node but in case of ArrayList and vector we need to iterate and adjust the index for all element.

### Searching is easy in ArrayList and vector but slow in LinkedList.

### LinkedList initial capacity is zero and arrayList is 10.

### ArrayList implements Random Access interface but LinkedList does not.

### Different method in ArrayList, vector and LinkedList?

### What will be the output if two iterator iterate a list?

### IllegalStateException will be thrown.

### Difference b/w Contains () and binary Search () method?

### Contains () method is faster then binarySearch () method if the collections implement Random-access interface.

* If list is not sorted, the result can be undefined in case of binarySearch ().
* If list has multiple elements equal to specified object, there is no guarantee, which will be returned.

### Difference b/w List and Set?

* List allows duplicates while Set does not allow.
* List is ordered collection while set is unordered collection

### What is the difference between ArrayList clear () and removeAll () methods?

* Clear () method removes all the elements from an ArrayList.
* RemoveAll () method takes a collection as parameter. It removes all of the ArrayList elements that are part of the collection.

### If an ArrayList contains duplicate objects and remove () method is invoked on the same object, will it remove the duplicates?

* No, it removed first occurrence.

### How to remove object from ArrayList by using remove method?

* We need to implement equal method to remove object from ArrayList.

### Similarity b/w LinkedList and ArrayList?

|  |  |  |
| --- | --- | --- |
| 1 | synchronization | ***ArrayList*** *and* **LinkedList both** are **not synchronized** (because 2 threads on same ArrayList/LinkedList object can access it at same time) in java. |
| 2 | Iterator and listIterator are Fail-fast | Iterator and listIterator returned by ***ArrayList*** *and* **LinkedList both** are [**Fail-fast**](http://www.javamadesoeasy.com/2015/04/concurrentmodificationexception-fail.html) in java. |
| 3 | Enumeration is fail-fast | **Enumeration** of ***ArrayList*** *and* **LinkedList both** is **fail-fast**; means any modification made to ArrayList during iteration using Enumeration will throw ConcurrentModificationException in java.   |  | | --- | | Enumeration<String> listEnum= Collections.*enumeration*(arrayList);  **while**(listEnum.hasMoreElements()){  //adding element will throw   ConcurrentModificationException        System.*out*.println(listEnum.nextElement());  } | |
| 4 | Insertion order | ***ArrayList*** *and* **LinkedList both maintains insertion order** in java. |
| 5 | Allows null | ***ArrayList*** *and* **LinkedList** both **allows to store null** in java. |
| 6 | Implements java.util.List | ***ArrayList*** *and* **LinkedList** both are implementation of the java.util.**List** interface. |
| 7 | Introduced in which java version | ***ArrayList*** *and* **LinkedList** both were introduced in second version of java (1.2) i.e. **JDK 2.0** |

### How to clone collection in java and addAll use which cloning?

### To clone the collection we should use deep cloning. AddAll use shallow copy

### How to synchronized arrayList?

### ArrayList return by collection.sy

### Difference b/w list, set and map?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Property | ***java.util.List*** | ***java.util.Set*** | ***java.util.Map*** |
| 1 | Duplicate elements | List **allows to store duplicate elements** in java. | *Set does* ***not allow to store duplicate elements*** in java*.* | *Map stores data in form of* ***key-value pair*** *it does not allow to store duplicate keys but allows duplicate values* in java*.* |
| 2 | Insertion order | Java.util.List is ordered collection it **maintain insertion order** in java. | *Most of the java.util.Set implementation* does not **maintain insertion order**.  Hash Set does not maintains insertion order in java.  Thought LinkedHashSet maintains insertion order in java.    TreeSet is sorted by natural order in java. | *Most of the java.util.Map implementation* does not **maintain insertion order**.  Hash Map does not maintains insertion order in java.  Thought LinkedHashMap maintains insertion order of keys in java.    Tree Map is sorted by natural order of keys in java. |
|  |  |  |  |  |
| 3 | Null keys | List allows to store **many null keys** in java. | Most of the Set implementations allow to add only **one null** in java**.**  [**TreeSet**](http://www.javamadesoeasy.com/2015/04/hashset-vs-linkedhashset-vs-treeset.html) and [**ConcurrentSkipListSet**](http://www.javamadesoeasy.com/2015/04/treeset-vs-concurrentskiplistset.html) does not allow to add null in java. | Lets look at Map implementations -  [HashMap](http://www.javamadesoeasy.com/2015/04/hashmap-in-java.html) allows one null key and many null values.  [LinkedHashMap](http://www.javamadesoeasy.com/2015/04/hashmap-vs-hashtable-vs-linkedhashmap.html) allows one null key and many null values.  [TreeMap](http://www.javamadesoeasy.com/2015/04/hashmap-vs-hashtable-vs-linkedhashmap.html) doesn't allow null key but allow many null values.  [Hashtable](http://www.javamadesoeasy.com/2015/04/hashmap-and-hashtable-similarity-and.html) doesn't allow null key or null values.  [ConcurrentHashMap](http://www.javamadesoeasy.com/2015/04/hashmap-and-concurrenthashmap.html) doesn't allow null key or null values.  [ConcurrentSkipListMap](http://www.javamadesoeasy.com/2015/04/treemap-vs-concurrentskiplistmap.html) doesn't allow null key or null values. |
| 4 | Getting element on specific **index** | List implementations provide get method to get element on specific index in java.  ArrayList, Vector, copyOnWriteArrayList and LinkedList provides -  *get(int index)*  Method returns element on specified *index*.  **Get method directly gets element on specified index. Hence, offering O(1) complexity.** | Set implementations does not provide any such get method to get element on specified index in java. | Map implementations does not provide any such get method to get element on specified index in java. |
| 5 | Implementing classes | [**ArrayList**](http://www.javamadesoeasy.com/2015/04/arraylist-in-java.html)***,*** [**LinkedList**](http://www.javamadesoeasy.com/2015/04/linkedlist-in-java.html)***,*** [**Vector**](http://www.javamadesoeasy.com/2015/04/arraylist-vs-vector-similarity-and.html)***,*** [**CopyOnWriteArrayList**](http://www.javamadesoeasy.com/2015/04/arraylist-vs-copyonwritearraylist.html) classes implements [**List**](http://www.javamadesoeasy.com/2015/04/list-vs-set-similarity-and-differences.html) interface in java. | [**HashSet**](http://www.javamadesoeasy.com/2015/04/hashset-in-java.html)***,*** [**CopyOnWriteArraySet**](http://www.javamadesoeasy.com/2015/04/hashset-vs-copyonwritearrayset.html)***,*** [**LinkedHashSet**](http://www.javamadesoeasy.com/2015/04/hashset-vs-linkedhashset-vs-treeset.html)***,*** [**TreeSet**](http://www.javamadesoeasy.com/2015/04/hashset-vs-linkedhashset-vs-treeset.html), [**ConcurrentSkipListSet**](http://www.javamadesoeasy.com/2015/04/treeset-vs-concurrentskiplistset.html), [**EnumSet**](http://www.javamadesoeasy.com/2015/04/enumset-in-java-with-program.html) classes implements [**Set**](http://www.javamadesoeasy.com/2015/04/list-vs-set-similarity-and-differences.html) interface in java. | [HashMap, Hashtable, ConcurrentHashMap,  LinkedHashMap,  TreeMap,  ConcurrentSkipListMap,  IdentityHashMap,WeakHashMap,  EnumMap classes](http://www.javamadesoeasy.com/2015/04/map-hierarchy-in-java-detailed-hashmap.html) implements [Map](http://www.javamadesoeasy.com/2015/04/map-hierarchy-in-java-detailed-hashmap.html) interface in java. |
| 6 | listIterator | **listIterator** method returns listIterator to iterate over elements in List in java.  **listIterator provides** additional methods as compared to iterator like  **hasPrevious(), previous(), nextIndex(), previousIndex(), add(E element), set(E element)** | Set does not provide anything like listIterator. It simply return Iterator in java. | Map provides three type of iterators -  *map. Keyset().iterator()* method returns iterator to iterate over keys in HashMap  *map. Values ().iterator ()* method returns iterator to iterate over keys in HashMap in java.  *map.entrySet ().iterator ()* method returns iterator to iterate over keys in HashMap. |
| 7 | Structure and resizable | **List** are Resizable-array implementation of the java.util.**List** interface in java. | Set uses [**Map**](http://www.javamadesoeasy.com/2015/04/map-hierarchy-in-java-detailed-hashmap.html)for their implementation.  Hence, structure is map based and resizing depends on Map implementation.  *Example >* [***Hash Set***](http://www.javamadesoeasy.com/2015/04/hashset-in-java.html) *internally uses* [*Hash Map*](http://javamadesoeasy.com/2015/02/hashmap-custom-implementation.html)*.* | [**Map**](http://www.javamadesoeasy.com/2015/04/map-hierarchy-in-java-detailed-hashmap.html) **uses hashing technique for storing** key-value pairs. |
| 8 | Index based structure /Random-access | As **ArrayList** uses array for implementation it is index based structure, hence provides random access to elements.  But [**LinkedList**](http://www.javamadesoeasy.com/2015/04/linkedlist-in-java.html) is not indexed based structure in java. | Set is not index-based structure at all in java. | Map is not index-based structure at all in java. |
| 9 | unsynchronized implementations | [**ArrayList**](http://www.javamadesoeasy.com/2015/04/arraylist-in-java.html)***,*** [**LinkedList**](http://www.javamadesoeasy.com/2015/04/linkedlist-in-java.html) | [**Hash Set**](http://www.javamadesoeasy.com/2015/04/hashset-in-java.html)***,*** [**LinkedHashSet**](http://www.javamadesoeasy.com/2015/04/hashset-vs-linkedhashset-vs-treeset.html)***,*** [**TreeSet**](http://www.javamadesoeasy.com/2015/04/hashset-vs-linkedhashset-vs-treeset.html), [**EnumSet**](http://www.javamadesoeasy.com/2015/04/enumset-in-java-with-program.html) | [HashMap, LinkedHashMap, TreeMap, IdentityHashMap, WeakHashMap, EnumMap](http://www.javamadesoeasy.com/2015/04/map-hierarchy-in-java-detailed-hashmap.html) |
| 10 | synchronized implementations | [**Vector**](http://www.javamadesoeasy.com/2015/04/arraylist-vs-vector-similarity-and.html)***,*** [**CopyOnWriteArrayList**](http://www.javamadesoeasy.com/2015/04/arraylist-vs-copyonwritearraylist.html) | [**CopyOnWriteArraySet**](http://www.javamadesoeasy.com/2015/04/hashset-vs-copyonwritearrayset.html), [**ConcurrentSkipListSet**](http://www.javamadesoeasy.com/2015/04/treeset-vs-concurrentskiplistset.html) | [Hashtable](http://www.javamadesoeasy.com/2015/04/map-hierarchy-in-java-detailed-hashmap.html), [ConcurrentHashMap](http://www.javamadesoeasy.com/2015/04/map-hierarchy-in-java-detailed-hashmap.html), [ConcurrentSkipListMap](http://www.javamadesoeasy.com/2015/04/map-hierarchy-in-java-detailed-hashmap.html), |

* **Is Collection.synchronizedList thread-safe?**

### NO

* **Explain set hierarchy?**

### 

* **What is the initial capacity of hasset and what is loadfactor?**
* Initial capacity is 10 and Default load factor is 0.75
* That means when set will be 75% filled, it’s capacity will be doubled
* **Difference between Hash Set, Linked Hash Set and Tree Set?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Property | *java.util.HashSet* | *java.util.LinkedHashSet* | *java.util.TreeSet* |
| 1 | Insertion order | Java.util.HashSet does not maintains insertion order in java. | Java.util.LinkedHashSet maintains insertion order in java. | Java.util.TreeSet is sorted by natural order in java. |
| 2 | Null elements | HashSet allows storing **one null** in java**.** | LinkedHashSet allows storing **one null** in java. | TreeSet does **not** allows storing **any null** in java.  Any attempt to add null throws runtime Exception (NullPointerException). |
| 3 | Data structure internally used for storing data | For storing elements, HashSet internally uses HashMap. | For storing elements, LinkedHashSet internally uses LinkedHashMap. | For storing elements, TreeSet internally uses TreeMap. |
| 4 | Introduced  in which java version | java.util.HashSet was introduced in second version of java (1.2) i.e. **JDK 2.0** | java.util.LinkedHashSet was introduced in second version of java (1.4) i.e. **JDK 4.0** | java.util.TreeSet was introduced in second version of java (1.2) i.e. **JDK 2.0** |
| 5 | Implements which interface | HashSet implements **java.util.**[**Set**](http://www.javamadesoeasy.com/2015/04/set-hierarchy-in-java-detailed-hashset.html)interface. | LinkedHashSet implements **java.util.Set** interface. | TreeSet implements **java.util.Set**  **java.util.SortedSet**  **Java.util.NavigableSet** interface. |
| 6 | Performance | HashSet comes first in performance. | LinkedHashSet comes in 2nd in performance. | TreeSet is comes in last in performance. |
|  | Comparison | HashSet use equal to compare element. | LinkedHashSet use equal to compare element. | TreeSet uses compare |

* **What copy technique internally used by HashSet clone () method?**
* Shallow copy
* **How set works internally and LinkedHashSet?**
* **HashSet** uses HashMap internally to store its objects. Whenever you create a HashSet object, one **HashMap** object associated with it is also created. This HashMap object is used to store the elements you enter in the HashSet. The elements you add into HashSet are stored as **keys** of this HashMap object. The value associated with those keys will be a **constant**.
* <https://docs.oracle.com/javase/8/docs/api/java/util/HashSet.html>
* LinkedHashSet works similar to HashSet. It uses the LinkedHashMap to store the element added to LinkedHashSet. LinkedHashSet does not have any method it inherit all the method from super class HashSet.
* **How TreeSet works internally?**