

What's collection

a framework/architecture(a set of classes /interface) to store and manipulation group(-single unit) of objects

sorting, searching, insert, delete, iterate etc.

many interfaces: List, Set, Queue, Dequeue

many classes: ArrayList, Vector, LinkedList, PriorityQueue, HashSet, TreeSet etc

Collection framework hierarchy

iterable --> collection --> List, Queue/Deque, Set/SortedSet

list->ArrayList, LinkedList, Vector <-Sack

Queue ->PriorityQueue

Deque ->ArrayDeque, LinkedList

SortedSet->TreeSet

Set->HashSet, LinkedHashSet

Collection Methods

public boolean add(E e)	append an item
public boolean addAll(Collection<? extends E> c)	addAll
public boolean remove(Object element)	remove 1 element
public boolean removeAll(Collection<? c)	removeAll
default boolean removeIf(Predicate<? super E> filter)	removeIf

Collection Methods (cont)

public boolean retainAll(Collection<?> c)	retainAll
public int size()	size()
public void clear()	clear
public boolean isEmpty()	isEmpty
public boolean contains(Object element)	contains
public boolean containsAll(Collection<?> c)	containsAll
public Iterator iterator()	iterator
public Object[] toArray()	toArray
public <T> T[] toArray(T[] a)	toArray type
public boolean equals(Object element)	equals
public int hashCode()	hashCode
default Stream<E> parallelStream()	
default Stream<E> stream()	
default Spliterator<E> spliterator()	

Iterator interface

```
public boolean hasNext()
public Object next()
public void remove()

enumeration hasMoreElement(), nextElement(), but no remove()
```

Iterable interface

top of collection

Only one method:

```
Iterator<T> iterator() return the iterator over the items of type T
```

4 way to iterate

1. iterator hasNext(), next()
2. for loop size()
3. for each loop
4. lambda expression list.forEach(name->name.charAt(0)='h') forEach()

mapAscii.forEach((key, value) can be used to iterate map

List Interface

Duplicable

ArrayList	random access, add/remove expensive(shift), not ordered
LinkedList	sequence access, add/remove cheap(no shift), ordered
Vector	like ArrayList, but synchronized, more methods
Stack	extends Vector, LIFO, more methods

boolean push(), boolean peek(), boolean push(obj)

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By **Jianmin Feng** (taotao)
cheatography.com/taotao/

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Queue interface	
FIFO	first in first out
Ordered list of item to be processed	
PriorityQueue	no null item, ordered by priority
Deque	interface, doubled ended queue
ArrayDeque	add/remove from both end, faster than ArrayList and Stack

Set	
unordered	no duplicate, at most one null
HashSet	
LinkedListHashSet	maintain insertion order, permit nulls
SortedSet interface	sorted ascending/decending/natural ordering
TreeSet	ascending order, faster access

Java Collections	
java.util.Collections	Static methods
max()	min()
sort()	shuffle()
binarySearch()	copy()
reverse()	synchronizedCollection()
disjoin(): split into 3 collection w/o commons	

Comparable and Comparator interfaces	
Comparator	equals(), Compare()
Comparable	compareTo()

Java Map	
key value pairs	not iterable
NoSuchElementException	ClassCastException
NullPointerException	UnsupportedOperationException
Object put(Object k, Object v)	add
void putAll(Map m)	addAll
Object remove(Object k)	remove
Object get(Object k)	get
boolean containsKey(Object k)	ContainsKey
boolean containsValue(Object v)	containsValue
Set entrySet()	value->set
Set keySet()	key->set
Collection values()	value->collection
int size()	size
void clear()	clear
boolean isEmpty()	isEmpty
boolean equals(Object obj)	equals
int hashCode()	hashCode

iterate on map	
No iterator	
1 for each loop	for (Map.Entry<String,String> e:myMap.entrySet()){} for (String k:myMap.keySet()){} for (String v:myMap.value()){} Oterator<Map.Entry<String,String>> itr=myMao.entrySet().iterator() size() for loop
2 indirect iterator	myMap.forEach((k,v)->...) forEach(lambdas)
3 standard for loop	set value myMap.get(key) on key not efficient, not practical

HashMap, Treemap and Hashable	
HashMap:	unique key, dup values; allow null values and null keys
TreeMap	ordered object
HashTable	synchronized, no nulls



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