

## Java - Collections, Maps and Iterators

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## Collections in Java

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- A collection is a data structure for holding elements
- `java.util.Collection<T>` is an interface implemented by many classes in Java
  - ◆ `ArrayList<t>`
  - ◆ `Vector<T>`
  - ◆ `HashSet<T>`
  - ◆ `LinkedList<T>`
  - ◆ etc. see the API
- Some methods in the Collection interface:
  - ◆ `isEmpty()`, `contains(e)`, `add(e)`, `remove(e)`, `iterator()`

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## Maps in Java

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- A map is an object that associates keys with values.
- A map cannot contain duplicate keys; each key can map to at most one value.
- `java.util.Map<K,V>` is an interface implemented by many classes in Java
  - ◆ `HashMap<K,V>`, `Hashtable<K,V>`
  - ◆ `TreeMap<K,V>`
- Some methods in the Map interface:
  - ◆ `isEmpty`, `containsKey(e)`, `put(k,v)`, `get(k)`, `remove(k)`
  - ◆ `values(): Collection<V>`

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## Iterators in Java

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- An iterator is an object that cycles through all the elements in a collection.
- `java.util.Iterator<T>` is an interface with the following methods:
  - ◆ `public T next()` returns the next element in the collection (and advances)
  - ◆ `public boolean hasNext()` returns true if next() is not done.
  - ◆ `public void remove()` (Optional) removes the last element returned by next.
- You can get Iterators from Collections (and Maps):
  - ◆ `ArrayList<Double> x = new ArrayList<Double>;`  
`Iterator<Double> it = x.iterator();`
  - ◆ `HashMap<String,Double> hm = new HashMap<String,Double>;`  
`Iterator<Double> it = hm.values().iterator();`

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## Collections and Iterators: example

```
import java.util.HashSet;
import java.util.Iterator;

public class HashSetIteratorDemo {
    public static void main(String args[]) {
        HashSet<String> s = new HashSet<String>();

        s.add("health");
        s.add("love");
        s.add("money");

        System.out.println("The set contains:");

        Iterator<String> i = s.iterator();
        while (i.hasNext())
            System.out.println(i.next());
    }
}
```

output:

```
The set contains:
love
money
health
```