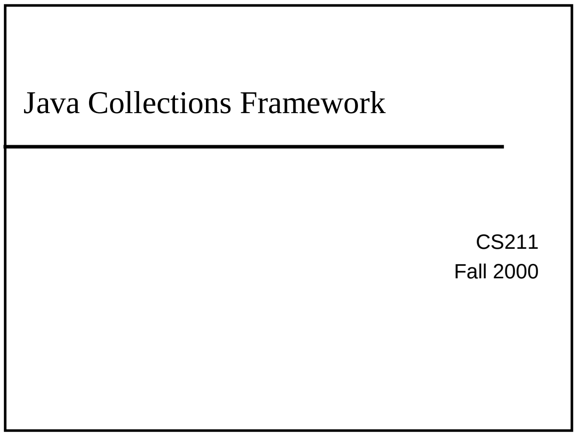
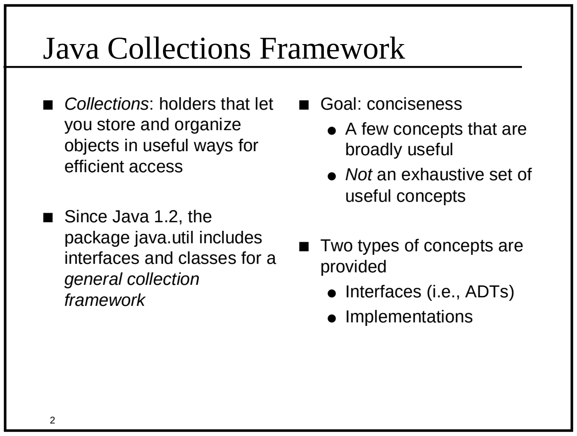


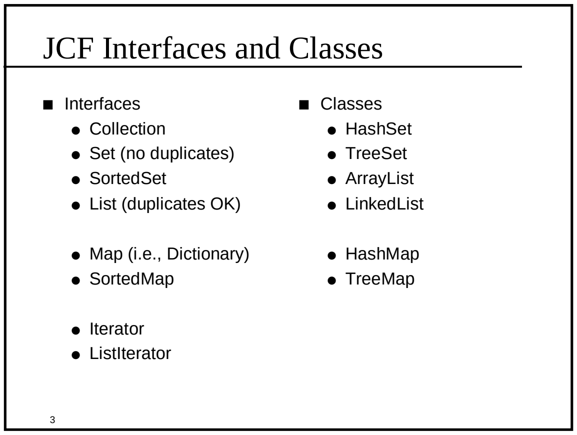
Java Collections Framework

CS211
Fall 2000



Java Collections Framework

- *Collections*: holders that let you store and organize objects in useful ways for efficient access
- Since Java 1.2, the package java.util includes interfaces and classes for a *general collection framework*
- Goal: conciseness
  - A few concepts that are broadly useful
  - *Not* an exhaustive set of useful concepts
- Two types of concepts are provided
  - Interfaces (i.e., ADTs)
  - Implementations



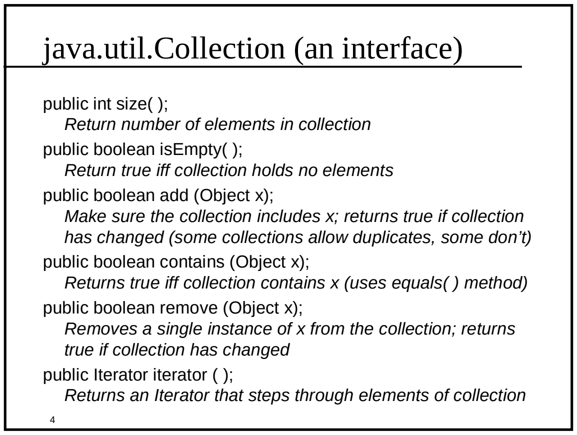
JCF Interfaces and Classes

- Interfaces
  - Collection
  - Set (no duplicates)
  - SortedSet
  - List (duplicates OK)

  - Map (i.e., Dictionary)
  - SortedMap

  - Iterator
  - ListIterator
- Classes
  - HashSet
  - TreeSet
  - ArrayList
  - LinkedList

  - HashMap
  - TreeMap



java.util.Collection (an interface)

public int size( );
Return number of elements in collection

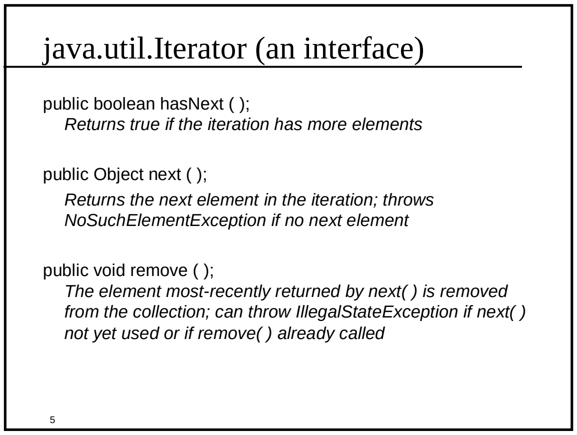
public boolean isEmpty( );
Return true iff collection holds no elements

public boolean add (Object x);
Make sure the collection includes x; returns true if collection has changed (some collections allow duplicates, some don't)

public boolean contains (Object x);
Returns true iff collection contains x (uses equals( ) method)

public boolean remove (Object x);
Removes a single instance of x from the collection; returns true if collection has changed

public Iterator iterator ( );
Returns an Iterator that steps through elements of collection

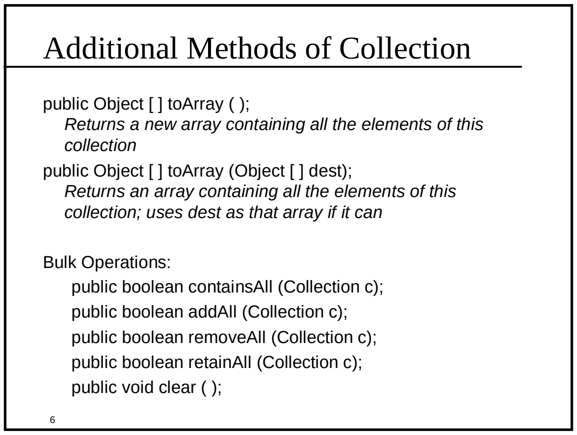


java.util.Iterator (an interface)

public boolean hasNext ( );
Returns true if the iteration has more elements

public Object next ( );
Returns the next element in the iteration; throws NoSuchElementException if no next element

public void remove ( );
The element most-recently returned by next( ) is removed from the collection; can throw IllegalStateException if next( ) not yet used or if remove( ) already called



Additional Methods of Collection

public Object [ ] toArray ( );
Returns a new array containing all the elements of this collection

public Object [ ] toArray (Object [ ] dest);
Returns an array containing all the elements of this collection; uses dest as that array if it can

Bulk Operations:
public boolean containsAll (Collection c);
public boolean addAll (Collection c);
public boolean removeAll (Collection c);
public boolean retainAll (Collection c);
public void clear ( );

java.util.Set (an interface)

- Set *extends* Collection
  - Set has no methods of its own, but it inherits the methods from Collection
- A Set contains no duplicates
  - If you attempt to add( ) an element twice then the second add( ) will return false (i.e., the Set has not changed)
- Write a method that checks if a given word is within a Set of words
- Write a method that removes all words longer than 5 letters from a Set
- Write methods for the union and intersection of two Sets

Set Implementations

- java.util.HashSet (a hashtable)
  - Constructors

    public HashSet ( );
    public HashSet (Collection c);
    public HashSet (int initialCapacity);
    public HashSet (int initialCapacity, float loadFactor);
- java.util.TreeSet (a balanced BST [red-black tree])
  - Constructors

    public TreeSet ( );
    public TreeSet (Collection c);
    …
- Both implement Cloneable