- The selection sort algorithm sorts an array by repeatedly finding the smallest element of the unsorted tail region and moving it to the front.
- To measure the running time of a method, get the current time immediately before and after the method call.

ch14/selsort/StopWatch.java (cont.)

```
23:       isRunning = true;
24:       startTime = System.currentTimeMillis();
25:    }
26:
27:    /**
28:       Stops the stopwatch. Time stops accumulating and is
29:       is added to the elapsed time.
30:    */
31:    public void stop()
32:    {
33:       if (!isRunning) return;
34:       isRunning = false;
35:       long endTime = System.currentTimeMillis();
36:       elapsedTime = elapsedTime + endTime - startTime;
37:    }
38:
39:    /**
40:       Returns the total elapsed time.
41:       @return the total elapsed time
42:    */
43:    public long getElapsedTime()
44:    {
```

Continued

-
- Computer scientists use the big-Oh notation to describe the growth rate of a function.
- Selection sort is an $O(n2)$ algorithm. Doubling the data set means a fourfold increase in processing time.
- Insertion sort is an $O(n2)$ algorithm.
- The merge sort algorithm sorts an array by cutting the array in half, recursively sorting each half, and then merging the sorted halves.
- A linear search examines all values in an array until it finds a match or reaches the end.
- A linear search locates a value in an array in $O(n)$ steps.
- A binary search locates a value in a sorted array by determining whether the value
  occurs in the first or second half, then repeating the search in one of the halves.
- A binary search locates a value in a sorted array in $O(\log(n))$ steps
- The Arrays class implements a sorting method that you should use for your Java programs.
-
- The Collections class contains a sort method that can sort array lists.
- The sort method of the Arrays class sorts objects of classes that implement the
  Comparable interface.
-

Insertion Sort

- Assume initial sequence a[0] . . . a[k] is sorted (k = 0):

11	9	16	5	7

- Add a[1]; element needs to be inserted before 11

9	11	16	5	7

- Add a[2]

9	11	16	5	7

- Add a[3]

5	9	11	16	7

- Finally, add a[4]

5	9	11	16	7