```
 1  using System;
 2  using System.IO;
 3  using System.Diagnostics;
 4
 5  namespace BubbleSort
 6  {
 7      class Bubble_Sort
 8      {
 9          static void Main(string[] args)
10          {
11              int seed = (int)DateTime.Now.Ticks & 0x0000FFFF;
12
13              // Pirmas etapas
14              Test_Array_List(seed);
15
16          }
17          public static void BubbleSort(DataArray items)
18          {
19              double prevdata, currentdata;
20              for (int i = items.Length - 1; i >= 0; i--)
21              {
22                  currentdata = items[0];
23                  for (int j = 1; j <= i; j++)
24                  {
25                      prevdata = currentdata;
26                      currentdata = items[j];
27                      if (prevdata > currentdata)
28                      {
29                          items.Swap(j, currentdata, prevdata);
30                          currentdata = prevdata;
31                      }
32                  }
33              }
34          }
35
36          public static void BubbleSort(DataList items)
37          {
38              double prevdata, currentdata;
39              for (int i = items.Length - 1; i >= 0; i--)
40              {
41                  currentdata = items.Head();
42                  for (int j = 1; j <= i; j++)
43                  {
44                      prevdata = currentdata;
45                      currentdata = items.Next();
46                      if (prevdata > currentdata)
47                      {
48                          items.Swap(currentdata, prevdata);
49                          currentdata = prevdata;
50                      }
51                  }
52              }
```

```
53          }
54
55          public static void Test_Array_List(int seed)
56          {
57              int n = 12;
58              MyDataArray myarray = new MyDataArray(n, seed);
59              Console.WriteLine("\n ARRAY \n");
60              myarray.Print(n);
61              BubbleSort(myarray);
62              myarray.Print(n);
63
64              MyDataList mylist = new MyDataList(n, seed);
65              Console.WriteLine("\n LIST \n");
66              mylist.Print(n);
67              BubbleSort(mylist);
68              mylist.Print(n);
69          }
70
71      }
72      abstract class DataArray
73      {
74          protected int length;
75          public int Length { get { return length; } }
76          public abstract double this[int index] { get; }
77          public abstract void Swap(int j, double a, double b);
78          public void Print(int n)
79          {
80              for (int i = 0; i < n; i++)
81                  Console.Write(" {0:F5} ", this[i]);
82              Console.WriteLine();
83          }
84      }
85
86      abstract class DataList
87      {
88          protected int length;
89          public int Length { get { return length; } }
90          public abstract double Head();
91          public abstract double Next();
92          public abstract void Swap(double a, double b);
93          public void Print(int n)
94          {
95              Console.Write(" {0:F5} ", Head());
96              for (int i = 1; i < n; i++)
97                  Console.Write(" {0:F5} ", Next());
98              Console.WriteLine();
99          }
100     }
101 }
102
```

```
1  using System;
2  using System.IO;
3
4  namespace BubbleSort
5  {
6      class MyDataArray : DataArray
7      {
8          double[] data;
9          public MyDataArray(int n, int seed)
10         {
11             data = new double[n];
12             length = n;
13             Random rand = new Random(seed);
14             for (int i = 0; i < length; i++)
15             {
16                 data[i] = rand.NextDouble();
17             }
18         }
19         public override double this[int index]
20         {
21             get { return data[index]; }
22         }
23         public override void Swap(int j, double a, double b)
24         {
25             data[j - 1] = a;
26             data[j] = b;
27         }
28     }
29
30 }
31
```

```
1  using System;
2  using System.IO;
3
4  namespace BubbleSort
5  {
6      class MyDataList : DataList
7      {
8          class MyLinkedListNode
9          {
10             public MyLinkedListNode nextNode { get; set; }
11             public double data { get; set; }
12             public MyLinkedListNode(double data)
13             {
14                 this.data = data;
15             }
16         }
17         MyLinkedListNode headNode;
18         MyLinkedListNode prevNode;
19         MyLinkedListNode currentNode;
20
21         public MyDataList(int n, int seed)
22         {
23             length = n;
24             Random rand = new Random(seed);
25             headNode = new MyLinkedListNode(rand.NextDouble());
26             currentNode = headNode;
27             for (int i = 1; i < length; i++)
28             {
29                 prevNode = currentNode;
30                 currentNode.nextNode = new MyLinkedListNode(rand.NextDouble());
31                 currentNode = currentNode.nextNode;
32             }
33             currentNode.nextNode = null;
34         }
35         public override double Head()
36         {
37             currentNode = headNode;
38             prevNode = null;
39             return currentNode.data;
40         }
41         public override double Next()
42         {
43             prevNode = currentNode;
44             currentNode = currentNode.nextNode;
45             return currentNode.data;
46         }
47
48         public override void Swap(double a, double b)
49         {
50             prevNode.data = a;
51             currentNode.data = b;
52         }
```

```
53      }
54
55  }
56
```