Programming 1

Tutorial 12

# Activity 1

Implement the selection sort algorithm from the given pseudocode below:

**Function:** Selection sort

**Input:** A non-empty integer array A

**Output:** An integer array B which is the sorted version of array A in ascending order

1. **Let** B be an array, |B| = |A|

2. **For** i = 0 to |A| - 1

3. p ← i

4. **For** j = i + 1 to |A| - 1

5. **If** A[j] < A[p] **Then**

6. p ← j

7. **End If**

8. **End For**

9. B[i] ← A[p]

10. A[p] ← A[i]

11. **End For**

12. **Return** B

Create a class named SelectionSortDemo. Implement this algorithm in a static method named selectionSort and write some code in the main method to test the algorithm.

# Activity 2

Implement the binary search algorithm from the given pseudocode below:

**Function:** binarySearch(A, k, low, high)

**Input:** Integer array A

Integer k

Integer low

Integer high

**Output:** Position of k in A or -1 if A does not contain A

1. **If** high < low **Then**

2. **Return** -1

3. **End** **If**

4. mid ← (low + high) ÷ 2

5. **If** A[mid] = k **Then**

6. **Return** mid

7. **Else** **If** A[mid] > k **Then**

8. **Return** binarySearch(A, k, low, mid – 1)

9. **Else**

10. **Return** binarySearch(A, k, mid + 1, high)

11. **End If**

Create a class named BinarySearchDemo. Implement this algorithm in a static method named binarySearch and write some code in the main method to test the algorithm.

# Activity 3

Implement the algorithm to find the intersection of two integer arrays from pseudocode:

**Function:** Intersect

**Input:** Two finite sets A, B

**Output:** A finite set C such that C = A ∩ B

1. C ← Ø

2. **If** |A| > |B|

3. **Then** Swap(A, B)

4. **End**

5. **For** **every** x ∈ A **Do**

6. **If** x ∈ B

7. **Then** C ← C ∪ {x}

8. **End**

9. **End**

10. **Return** C

A, B and C are sets, so the suitable data structure for them is Set (HashSet, TreeSet, your choice). Create a class named ArrayIntersectionDemo. Implement this algorithm in a static method named intersect and write some code in the main method to test the algorithm.