Instructions to run the code

- In Eclipse, place the java files within the default package.
- Place the data.txt file in the local desktop location.
- Run the code.
- Please enter the below details when requested in the console:
 - Enter the input file (data.txt) location
 - Enter the number of inputs present in the file
 - Choose one of the simple sorting methods i.e. selection sort, insertion sort, bubble sort
 - Choose one of the O(Nlog2N) sorts (Quick sort, Merge Sort, Heap sort).
 - Enter the number to be searched within the array.

Results

i. Selection sort and merge sorting is selected in the first run by the user

```
Project for comparing complexities of sorting and searching alogrithms
Enter the path where file is placed
C:\Users\vaish\Downloads\data.txt
Please enter the number of inputs present in the file to be uploaded
Printing the data provided in the file
                                                                     [54] [55] [56] [57]
64] [65] [66] [67]
            [ 112 ] [ 113 ] [ 114 ] [ 115 ] [ 116 ] [ [ 122 ] [ 123 ] [ 51 ] [ 52 ] [ 53 ] [ 54 ] [ 59 ] [ 60 ] [ 61 ] [ 62 ] [ 63 ] [ 64 ]
                                                                                                   [ 119 ] [ 120 ]
    121 1
                                        ] [ 72 ]
] [ 82 ]
    68 1
                                  [ 91 ] [ 92 ]
                                                                                95 ]
             [ 99 ] [ 100 ] [ 101 ] [ 102 ] [ 103 ] [ 104 ] [ 105 ]
[ 109 ] [ 110 ] [ 1 ] [ 2 ] [ 3 ] [ 4 ] [ 5 ] [ 6 ]
    98 ]
                                                                                        16]
    8 1
                       [ 20 ] [ 21 ] [ 22 ] [ 23 ] [ 24 ] [ 25 ] [ 30 ] [ 31 ] [ 32 ] [ 33 ] [ 34 ] [ 35 ]
    18 ]
                                                                                        [ 36
                                                                                        [ 46
```

```
Please choose the one of corresponding number of the simple sorting techniques for sorting the data provided
2. Insertion sorting
3. Bubble sorting
selection sorting compare count is 7626
Printing the sorted data for the values provided in the file
Selection sorting
                                             16]
                                                                     [ 19 ]
   11 ]
         [ 12 ]
                                                                             [ 20
                                                     27 ]
         [ 42
                  [ 43
                                                            [ 48
                  [ 53
                  [ 83
         [ 82
                                             86]
   91 1
         [ 92 1
                    93 ]
                                                            F 98
                                                                               100 1
         [ 102 ]
[ 112 ]
                                                            107 1
                                                                                       [ 110 ]
                      113
```

```
Please choose the one of corresponding number of the better sorting techniques for sorting the data provided

    Merge sorting

2. Quick sorting
Heap sorting
Merge sorting compare count is 740
Printing the sorted data for the values provided in the file
Merge sorting
                         [4] [5] [6] [15] [15] [15] [25] [25]
        [2]
                                                [ 16 ]
[ 26 ]
                                                                                       [ 20 ]
                                                                             [ 29
   21 1
          [ 22 ]
                   [ 23 ]
                                                          [ 27 ]
                                                                   [ 28 ]
                                                                                       [ 30 ]
   31 ]
                                                   46
   51 ]
          [ 52 ]
                   [ 53
                             [ 54
                                       [ 55 ]
                                                [ 56
                                                                   [ 58 ]
                                                                             [ 59
                                                                                       [ 60
                                                                                       [ 90 ]
          [ 82 ]
                   [ 83 ]
                             [ 84
                                       [ 85 ]
                                                [ 86
                                                                   [ 88
                      93 ] [94 ] [95 ] [
[103 ] [104 ] [105
[113 ] [114 ] [115
                                                                                      [ 100 ]
[ 109 ]
                                           5 ] [ 96 ] [ 97
[ 105 ] [ 106 ]
[ 115 ] [ 116 ]
                                                         [ 97 ] [ 98 ] [ 99
106 ] [ 107 ] [ 108
           [ 122 ]
 [ 121 ]
Please enter the number to be searched within the array
dataCheck is present in 123 index of the array
target is present at location 123
Hashfunction Value for the 999 is 123
```

ii. Insertion sort and quick sort are selected in the second run by the user

```
= ×
🗏 Console 🗡 🍶 ProjectMain.java
<terminated> ProjectMain (3) [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.4.v20220805-1047\jre\bin
Project for comparing complexities of sorting and searching alogrithms
Please enter the number of inputs present in the file to be uploaded
Printing the data provided in the file
           [ 112 ] [ 113 ] [ 114 ] [ 115 ] [ 116 ] [ 117 ] [ 118 ] [ 119 ] [ 120 ] [ 122 ] [ 123 ] [ 51 ] [ 52 ] [ 53 ] [ 54 ] [ 55 ] [ 56 ] [ 57 ] [ 59 ] [ 60 ] [ 61 ] [ 62 ] [ 63 ] [ 64 ] [ 65 ] [ 66 ] [ 67 ]
                                                           ] [84] [85]
                      [80] [81] [82] [83
[90] [91] [92] [93
   [ 24 ]
[ 34 ]
                      [ 20 ] [ 21 ] [ 22 ] [ 23 ]
[ 30 ] [ 31 ] [ 32 ] [ 33 ]
                                                                         [ 25
[ 35
                                                                                    [ 26
[ 36
           [ 29 ]
                      [ 40
[ 50
                                                                  44
                                                                                     F 46
                                 [ 999 ]
            [ 49
```

```
Please choose the one of corresponding number of the simple sorting techniques for sorting the data provided
1. Selection sorting
  Insertion sorting
3. Bubble sorting
insertion sorting compare count is 4551
Printing the sorted data for the values provided in the file
Insertion sorting
                            [ 14 ]
[ 24 ]
 [ 11 ]
          [ 12 ]
                                                                                         [ 20 ]
                                          35 ]
45 ]
            32 ]
                    [ 33 ]
                                                            [ 57 ]
                      53 ]
                                       [ 75 ]
[ 85 ] [ 86 ]
[ 95 ] [ 96 ]
[ 105 ] [
                    [ 83 ]
           [ 92 ]
[ 102 ]
112 ]
                                                                                         [ 100 ]
                      [ 103 ] [ 104 ] [ 105
[ 113 ] [ 114 ] [ 115
                                                       [ 106 ]
[ 116 ]
                                                                                                    [ 110 ]
                                                                     117 ]
                                                                                                    [ 120 ]
            [ 122
```

```
Please choose the one of corresponding number of the better sorting techniques for sorting the data provided
1. Merge sorting
2. Quick sorting
Heap sorting
Quick sorting compare count is 7626
Printing the sorted data for the values provided in the file
                                                                       [ 10 ]
                  [ 13 ]
[ 23 ]
                           [ 14 ]
[ 24 ]
                                    [ 15 ]
[ 25 ]
                                              [ 16 ]
[ 26 ]
                                                                                    20
                  [ 33 ]
                                     [ 35
                                              [ 36 ]
                                                                         [ 39
                                                                                  [ 40
                  [ 43 ]
 [ 41 ]
                            [ 44 ]
                                                                  48
          F 62
                   [ 63 ]
                                                       [ 67
 [ 61 ]
                  [ 93 ]
                            [ 94 ]
                                                                        [ 99
                                                                                    100 1
                     [ 103 ] [ 104 ] [ 105 ] [ 106 ] [ 107 ] [ 108 ]
[ 113 ] [ 114 ] [ 115 ] [ 116 ] [ 117 ] [ 118 ]
 [ 101 ]
                                                                                            [ 110 ]
   111 ]
          [ 122
Please enter the number to be searched within the array
dataCheck is present in 123 index of the array
target is present at location 123
Hashfunction Value for the 999 is 123
```

iii. Bubble sort and Heap sort are selected in the second run by the user

```
■ Console × 🐶 ProjectMain.java
<terminated> ProjectMain (3) [Java Application] C:\Users\vaish\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.4.v202
Project for comparing complexities of sorting and searching alogrithms
Enter the path where file is placed
C:\Users\vaish\Downloads\data.txt
Please enter the number of inputs present in the file to be uploaded
Printing the data provided in the file
          [ 112 ] [ 113 ] [ 114 ] [ 115 ] [ 116 ] [ 117 ] [ 118 ] [ 119 ] [ 120 ]
                  [60] [61] [62] [63] [64] [65] [66] [67]
          [ 69 ]
 [ 68
      ] [79] [80] [81] [82] [83] [84] [85] [86] [87]
] [89] [90] [91] [92] [93] [94] [95] [96] [97]
] [99] [100] [101] [102] [103] [104] [105] [106] [107]
3] [109] [110] [1] [2] [3] [4] [5] [6] [7]
   108 ]
                                                                            16]
                   [ 20 ]
                                                                                     [ 27 ]
          [ 29
                   [ 30 ]
                             [31] [32] [33]
                                                        [ 34 ]
                                                                  [35] [36]
                                                                                     [ 37 ]
                   [ 40 ]
                             [ 41 ]
                                      [ 42 ]
                                                [ 43 ]
                                                         [ 44 ]
                                                                   [ 45 ]
                                                                            [ 46 ]
          [ 49
   48
                    [ 50 ]
                             [ 999 ]
```

```
Please choose the one of corresponding number of the simple sorting techniques for sorting the data provided
1. Selection sorting
2. Insertion sorting
3. Bubble sorting
Bubble sorting compare count is 7626
Printing the sorted data for the values provided in the file
Bubble sorting
                   [3] [4] [5] [6] [7] [8]
] [13] [14] [15] [16] [17]
] [23] [24] [25] [26] [27]
           [ 12 ]
                                                                                       [ 19 ]
[ 29 ]
            [ 32
                       [ 33 ] [ 34 ]
 [ 31 ]
                                                                                                  [ 40
                                                                             r 48
 r 41 1
            f 42
                       [ 43 ]
                                                       [ 46
                                                                                       [ 49
                                                                 [ 57 ]
   51 ]
                                                                                                   [ 60
                         83 ] [84 ] [85 ] [86 ] [87 ] [88 ]
93 ] [94 ] [95 ] [96 ] [97 ] [98 ]
[103 ] [104 ] [105 ] [106 ] [107 ]
[113 ] [114 ] [115 ] [116 ] [117 ]
                                                                                      [ 89
[ 99
                         83 ]
93 ]
   81 1
    91 1
                                                                                                               [ 110 ]
                122 ]
Please choose the one of corresponding number of the better sorting techniques for sorting the data provided
1. Merge sorting
2. Quick sorting
Heap sorting
Heap sorting compare count is 1053
Printing the sorted data for the values provided in the file
Heap sorting
           [2] [3] [4] [5] [6] [7] [8] [12] [13] [14] [15] [16] [17] [22] [23] [24] [25] [26] [27] [32] [33] [34] [35] [36] [37]
                                                                              [ 18 ] [ 19 ]
[ 28 ] [ 29 ]
                                                                                                     [ 20 ]
                                                                                                     [ 30
[ 40
    41 ]
            [ 42
                       [ 43 ]
                                     44 ]
                                             [ 45
                                                        [ 46 ]
                                                                                          [ 49
                                                                                          [ 59 ]
                                     54 ]
                                                                               [ 58
                        [ 63 ]
                                     64 ]
                          73 ]
                                     74 ] [75 ] [76 ] [77 ]
84 ] [85 ] [86 ] [87 ]
94 ] [95 ] [96 ] [97 ]
                       [ 83 ]
[ 93 ]
                                                                                                     [ 90 ]
[ 100 ]
                                                                               [ 88 ] [ 89 ]
[ 98 ] [ 99 ]
                                  [ 104 ] [ 105 ] [ 97 ] [ 98 ] [ 99 ]
] [ 104 ] [ 105 ] [ 106 ] [ 107 ] [ 108 ]
] [ 114 ] [ 115 ] [ 116 ] [ 117 ] [ 118 ]
] [ 999 ]
   101 ] [ 102 ] [ 103 ]
111 ] [ 112 ] [ 113 ]
                                                                                                                  [ 110 ]
                                                                                                                  f 120 1
    121 ] [ 122 ]
                        [ 123 ]
Please enter the number to be searched within the array
dataCheck is present in 123 index of the array
```

Hashfunction Value for the 999 is 123