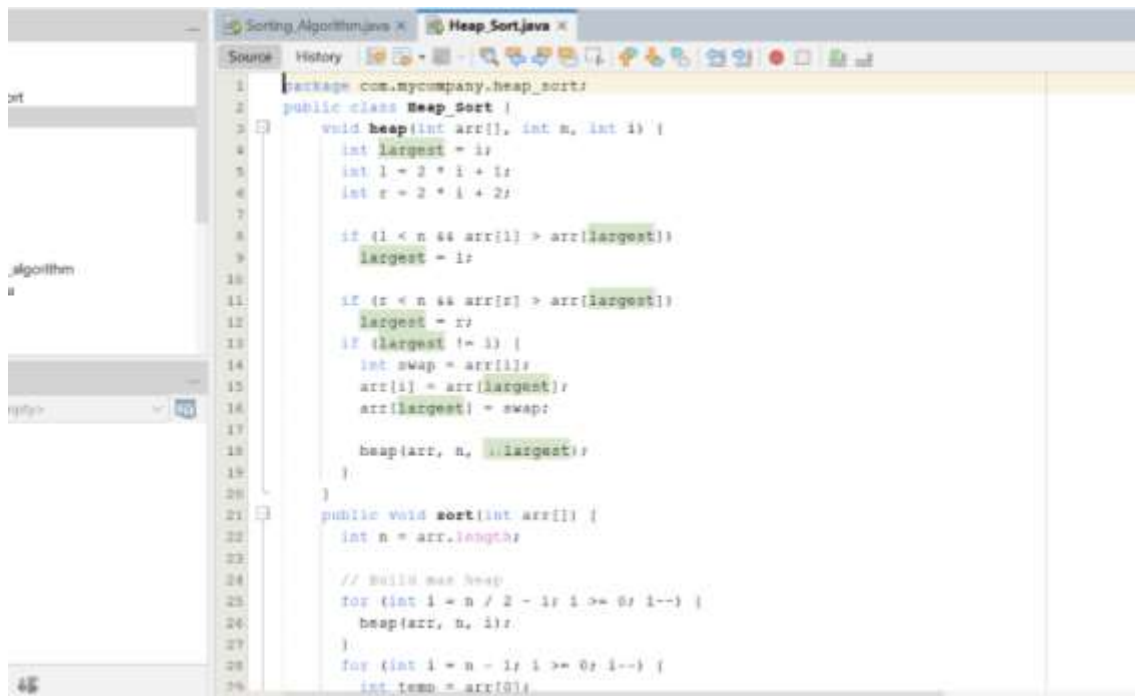
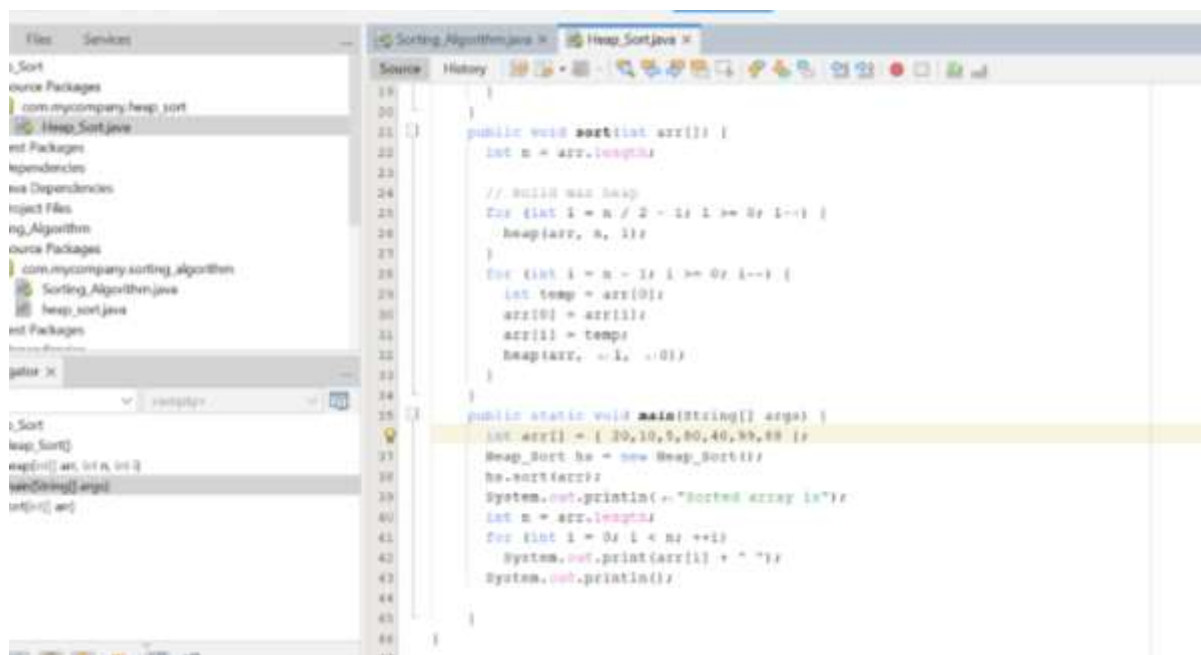


Today's Task (Sorting Algorithm)

Heap Sort



```
1 package com.mycompany.heap_sort;
2 public class Heap_Sort {
3     void heapify(int arr[], int n, int i) {
4         int largest = i;
5         int l = 2 * i + 1;
6         int r = 2 * i + 2;
7
8         if (l < n && arr[l] > arr[largest])
9             largest = l;
10
11         if (r < n && arr[r] > arr[largest])
12             largest = r;
13         if (largest != i) {
14             int swap = arr[i];
15             arr[i] = arr[largest];
16             arr[largest] = swap;
17
18             heapify(arr, n, largest);
19         }
20     }
21     public void sort(int arr[]) {
22         int n = arr.length;
23
24         // Build max heap
25         for (int i = n / 2 - 1; i >= 0; i--) {
26             heapify(arr, n, i);
27         }
28         for (int i = n - 1; i >= 0; i--) {
29             int temp = arr[0];
```



```
19     }
20
21     public void sort(int arr[]) {
22         int n = arr.length;
23
24         // Build max heap
25         for (int i = n / 2 - 1; i >= 0; i--) {
26             heapify(arr, n, i);
27         }
28         for (int i = n - 1; i >= 0; i--) {
29             int temp = arr[0];
30             arr[0] = arr[i];
31             arr[i] = temp;
32             heapify(arr, i, 0);
33         }
34     }
35
36     public static void main(String[] args) {
37         int arr[] = { 20, 10, 5, 80, 40, 90, 60 };
38         Heap_Sort hs = new Heap_Sort();
39         hs.sort(arr);
40         System.out.println("Sorted array is");
41         int n = arr.length;
42         for (int i = 0; i < n; i++)
43             System.out.print(arr[i] + " ");
44         System.out.println();
45     }
46 }
```

```
Input - run heap_sort

cd C:\Users\AS\Documents\NetBeansProjects\Heap_Sort/ "JAVA_HOME=C:\Program Files\Java\jdk-10" cmd /c "%C:\Program Fil
Running NetBeans Compile On Save execution. Phase execution is skipped and output directories of dependency projects (with
Scanning for projects...

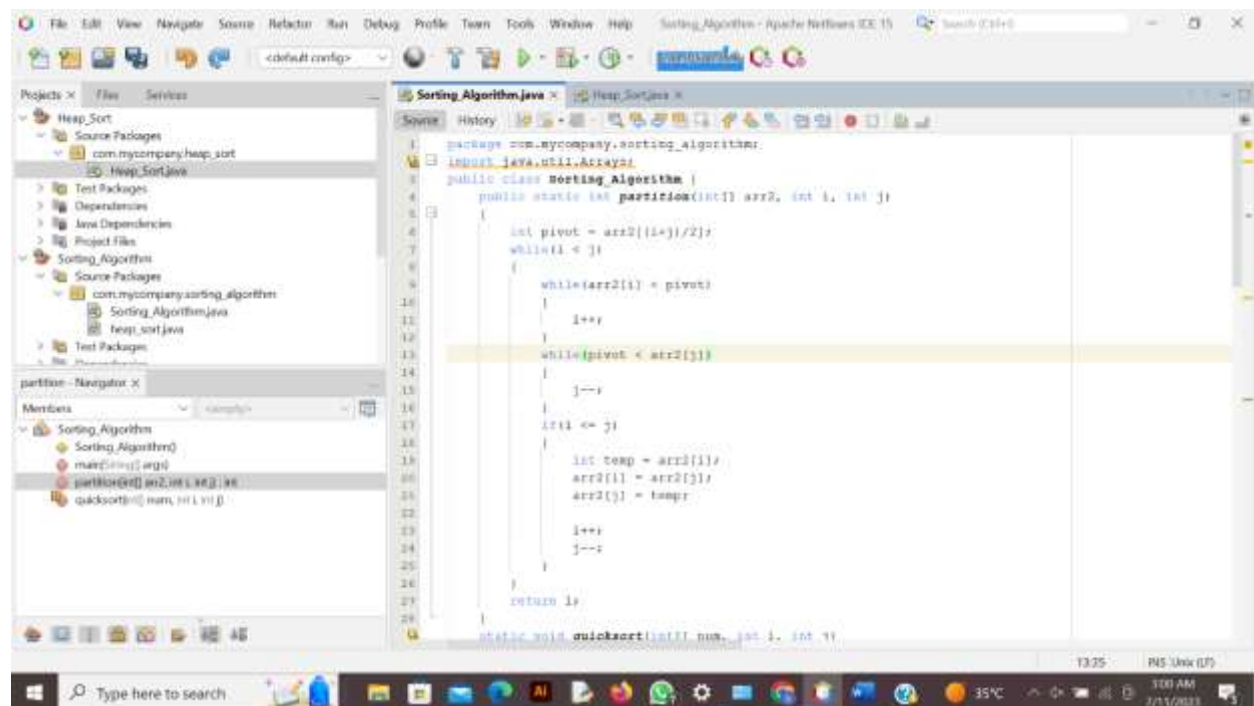
-----< com.mycompany:Heap_Sort >-----
Building Heap_Sort 1.0-SNAPSHOT
-----[ jar ]-----

--- exec-maven-plugin(3.0.0)exec (default-cli) @ Heap_Sort ---
Sorted array is
5 10 20 40 60 80 95

BUILD SUCCESS

Total Time: 0.814 s
Finished at: 2023-07-11T02:57:20-07:00
```

Quick Sort



```

20         arr2[i] = arr2[j];
21         arr2[j] = temp;
22
23         i++;
24         j--;
25     }
26 }
27
28     return i;
29 }
30
31     static void quicksort(int[] num, int i, int j)
32     {
33         int pivot_index = partition(num, i, j);
34         if(i < pivot_index-1)
35         {
36             quicksort(num, i, pivot_index-1);
37         }
38         if(pivot_index < j)
39         {
40             quicksort(num, pivot_index, j);
41         }
42     }
43
44     public static void main(String[] args) {
45         System.out.println("-----Quick Sort Algorithm-----");
46         int[] num = {27, 23, 11, 7, 9, 17, 6};
47         System.out.println("Unsorted Array : "+Arrays.toString(num));
48         quicksort(num, 0, num.length-1);
49         System.out.println("Sorted Array : "+Arrays.toString(num));
50     }

```

```

Output - Run (Sorting_Algorithm)

cd C:\Users\hp\Documents\NetBeansProjects\Sorting_Algorithm/ "JAVA_HOME=C:\Program Files\Java\jdk-19" cmd /c "%C%\Program Files\NetBeans
Running NetBeans: Compile On Save execution. Please execution is skipped and output directorio of dependency projects (with Compile on Save to
Scanning for projects...

-----< com.mycompany:Sorting_Algorithm >-----
Building Sorting_Algorithm 1.0-SNAPSHOT
-----[ jar ]-----
--- exec-maven-plugin:3.0.8:exec (default-cli) @ Sorting_Algorithm ---
Quick Sort Algorithm
Unsorted Array : [27, 23, 11, 7, 9, 17, 6]
Sorted Array : [6, 7, 9, 11, 17, 23, 27]

BUILD SUCCESS

Total time: 0.819 s
Finished at: 2023-07-11T03:02:21-07:00

```

Insertion Sort

```

41 }
42
43 public static void main(String[] args) {
44     /* System.out.println("-----Quick Sort Algorithm-----");
45     int[] num = {27, 23, 11, 7, 9, 17, 6};
46     System.out.println("Unsorted Array : "+Arrays.toString(num));
47     quickSort(num, 0, num.length-1);
48     System.out.println("Sorted Array : "+Arrays.toString(num)); */
49
50     int[] num = {10, 6, 15, 4, 1, 5};
51     System.out.println("unsorted array "+Arrays.toString(num));
52     System.out.println("-----Insertion Sort Algorithm-----");
53     for(int i=1; i<num.length; i++) {
54         int temp = num[i];
55         int j = i-1;
56         while(j>=0 && temp < num[j]) {
57             num[j+1] = num[j];
58             j = j-1;
59         }
60         num[j+1] = temp;
61     }
62     System.out.println("Sorted Array" + Arrays.toString(num));
63     /* System.out.println("-----Selection Sort Algorithm-----");

```

```

[INFO] Running com.mycompany.Sorting_Algorithm
cd C:\Users\HP\Documents\NetBeansProjects\Sorting_Algorithm; "JAVA_HOME=C:\Program Files\Java\jdk-19" cmd /c "%C%\Program Files\
Running NetBeans compile on save execution. Phase execution is skipped and output directories of dependency projects (with Compile =
Scanning for projects...

-----com.mycompany:Sorting_Algorithm >-----
[INFO] Building Sorting_Algorithm 1.0-SNAPSHOT
[INFO] [ jar ]
[INFO]
[INFO] --- exec-maven-plugin:1.0.0:exec (default-cli) @ Sorting_Algorithm ---
unsorted array [10, 6, 15, 4, 1, 5]
-----Insertion Sort Algorithm-----
Sorted Array:[1, 4, 5, 6, 10, 15]
[INFO]
BUILD SUCCESS

Total time: 0.788 s
Finished at: 2023-07-11T03:03:40-07:00

```

Selection Sort

```

53:         int temp = num[i];
54:         int j = i+1;
55:         while(j <= num.length-1) {
56:             num[j+1] = num[j];
57:             j = j+1;
58:         }
59:         num[i] = temp;
60:     }
61:     System.out.println("Sorted Array:" + Arrays.toString(num)); */
62:     System.out.println("-----Selection Sort Algorithm-----");
63:     double [] arr1 = {2.3, 5.5, 1.1, 0.10, 20.4, 15.5};
64:     int len = arr1.length;
65:     int M_index;
66:     for (int i = 0; i < len-1; i++) {
67:         M_index = i;
68:         for (int j = i+1; j < len; j++) {
69:             if (arr1[j] < arr1[M_index]) {
70:                 M_index = j;
71:             }
72:         }
73:         double temp = arr1[M_index];
74:         arr1[M_index] = arr1[i];
75:         arr1[i] = temp;
76:     }
77:     System.out.println("Sorted Array:" + Arrays.toString(arr1));

```

```

Run (Sorting_Algorithm)
cd C:\Users\RP\Documents\NetBeansProjects\Sorting_Algorithm; "JAVA_HOME=C:\\Program Files\\Java\\jdk-18" cmd /c "%C:\\P
Running NetBeans Compile On Save execution. Phase execution is skipped and output directories of dependency projects (wi
Scanning for projects...

-----< com.mycompany:Sorting_Algorithm >-----
Building Sorting_Algorithm 1.0-SNAPSHOT
-----[ jar ]-----
--- exec-maven-plugin:3.0.0:exec (default-cli) @ Sorting_Algorithm ---
-----Selection Sort Algorithm-----
Sorted Array:[0.1, 1.1, 2.3, 5.5, 15.5, 20.4]

BUILD SUCCESS

Total time: 0.791 s
Finished at: 2021-07-11T03:05:00-07:00

```