Mathematical Physics II

Insertion Sort using Python

- **Insertion Sort Process:**

  Here we shall explain this process pictorially with an example. Let we have a set of 6 numbers in random order and we want to arrange them in ascending order. The given set of number is:

3	5	4	1	0	2

  In the insertion method of sorting one has to choose a key number at each step, which has been marked in red colour here. The choice has to start from the second place. At each particular step this key number searches its proper position by comparing its own value consecuitively with the numbers located on its left side, marked in green colour, as per the requirement of ordering (ascending or descending). In consecuitive steps the position of the key number shifts towards right and the numbers at the left of the key number to be choosen in the next step get ordered. In this way in the final step the position of the key number reaches the right most position and with its proper positioning we get the ordered number set fulfilling the requirement.

- **Step1:**

initial	3	5	4	1	0	2
final	3	5	4	1	0	2

No Change

- **Step2:**

initial	3	5	4	1	0	2
final	3	4	5	1	0	2

4 has been inserted in between 3 and 5

- **Step3:**

initial	3	4	5	1	0	2
final	1	3	4	5	0	2

1 has been placed infront of 3

- **Step4:**

initial	1	3	4	5	0	2
final	0	1	3	4	5	2

0 has been placed infront of 1

- **Step5:**

initial	0	1	3	4	5	2
final	0	1	2	3	4	5

2 has been inserted in between 1 and 3

  From the above pictorial presentation it is clear that in insertion sort method how the key number is placed in proper position by comparing its value with the numbers located in its leftside. The choice of key number in each successive step shifts towards right and with its proper positioning finally we get an ordered number set as per our requirement.

Sample python program for the above example and the output is shown in the next page.

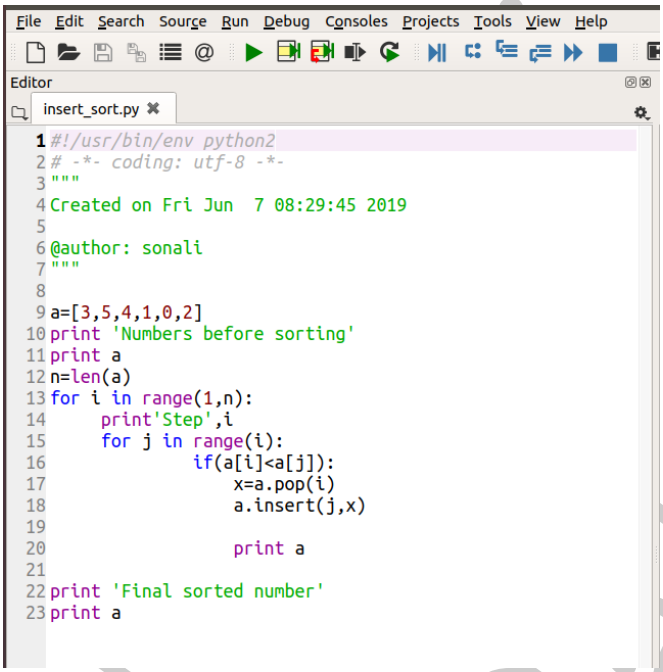

Figure 1: Python program for insertion sort.

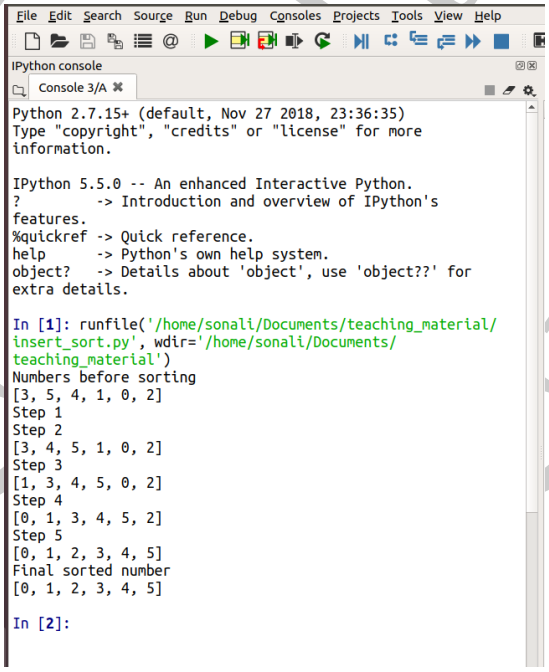

Figure 2: Output of the Python code for insertion sort.