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Write a C program to analyse the time complexity of insertion sort algorithm. Also plot their graph for all cases.

```
#include <stdio.h>

#include <stdlib.h>

#include <time.h>

double insertionSort(int arr[], int n)
{
    clock_t start, end;

    start = clock();

    int i, key, j;

    for (i = 1; i < n; i++)
    {
        key = arr[i];
        j = i - 1;
        while (j >= 0 && arr[j] > key)
        {
            arr[j + 1] = arr[j];
            j = j - 1;
        }
        arr[j + 1] = key;
    }

    end = clock();

    return ((double)(end - start)) / CLOCKS_PER_SEC;
}

int main()
{
    int n;
```



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```
FILE *fptr;

fptr = fopen("insert.txt", "w");

for (n = 0; n < 100000; n = n + 5000)
{
    int A[n], i;

    for (i = 0; i < n; i++)

        A[i] = rand();

    double d1 = insertionSort(A, n);

    for (i = 0; i < n; i++)

        A[i] = i;

    double d2 = insertionSort(A, n);

    fprintf(fptr, "%d %lf %lf\n",

n, d1, d2);

}

fclose(fptr);

return 0;

}
```

TEXT FILE (insert.txt) :

```
0 0.000007 0.000002
5000 0.025991 0.000029
10000 0.060046 0.000037
15000 0.123756 0.000055
20000 0.218935 0.000073
25000 0.348913 0.000091
30000 0.498893 0.000108
35000 0.675817 0.000126
40000 0.884518 0.000145
```



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45000 1.117490 0.000163
50000 1.385748 0.000180
55000 1.697873 0.000199
60000 1.993543 0.000217
65000 2.386291 0.000235
70000 2.717943 0.000252
75000 3.168348 0.000270
80000 3.570536 0.000290

insert.p FILE :

```
set autoscale # scale axes automatically
unset log # remove any log-scaling
unset label # remove any previous labels
set xtic auto # set xtics automatically
set ytic auto # set ytics automatically
set tics font "Helvetica,10"
set title "Insertion sort time complexity"
set xlabel "Input size"
set ylabel "Time taken"
#set key 0.01,100
#set label "Yield Point" at 0.003,260
#set arrow from 0.0028,250 to 0.003,280
set xr [0:100000]
set yr [0:40]
plot "bub.txt" using 1:2 title 'Average Case & Worst Case' with linespoints
```

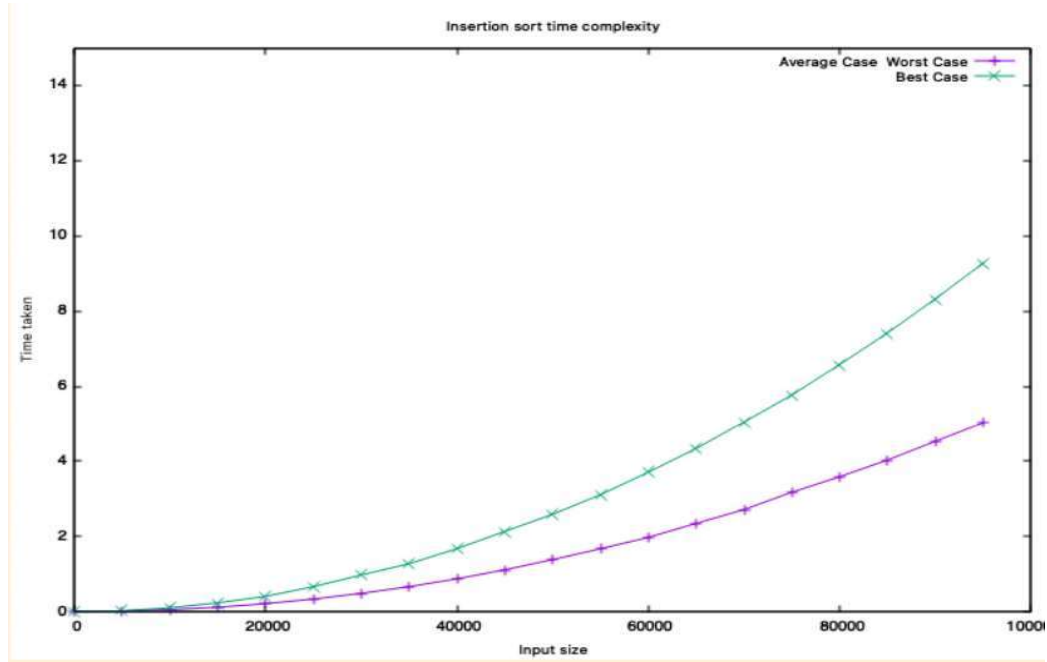


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GRAPH:



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