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

```
#include <stdio.h>

#include <stdlib.h>

#include <time.h>

void swap(int* xp, int* yp)

{

    int temp = *xp;

    *xp = *yp;

    *yp = temp;

}

double bubbleSort(int arr[], int n)

{

    clock_t start, end;

    start = clock();

    int i, j;

    for (i = 0; i < n - 1; i++){

        for (j = 0; j < n - i - 1; j++){

            if (arr[j] > arr[j + 1])

                swap(&arr[j], &arr[j + 1]);

        }

    }

    end = clock();

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

}

int main(){

    int n;
```



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```
FILE *fptr;

fptr=fopen("bub.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 = bubbleSort(A, n);

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

A[i]=i;

double d2 = bubbleSort(A, n);

fprintf(fptr, "%d" , n);

fputc(' ', fptr);

fprintf(fptr, "%lf" , d1);

fputc(' ', fptr);

fprintf(fptr, "%lf" , d2);

fprintf(fptr, "\n");

}

fclose(fptr);

return 0
```

TEXT FILE (bub.txt) :

```
0 0.000000 0.000000
5000 0.100000 0.030000
10000 0.280000 0.110000
15000 0.630000 0.240000
20000 1.150000 0.410000
25000 1.850000 0.670000
30000 2.750000 0.980000
```



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```
35000 3.700000 1.280000
40000 4.810000 1.680000
45000 6.140000 2.140000
50000 7.450000 2.590000
55000 9.120000 3.110000
60000 10.800000 3.710000
65000 12.630000 4.340000
70000 14.720000 5.050000
75000 16.940000 5.770000
80000 19.310000 6.580000
85000 21.800000 7.420000
90000 24.550000 8.330000
95000 27.320000 9.280000
```

bubplot.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 "Bubble 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]
```



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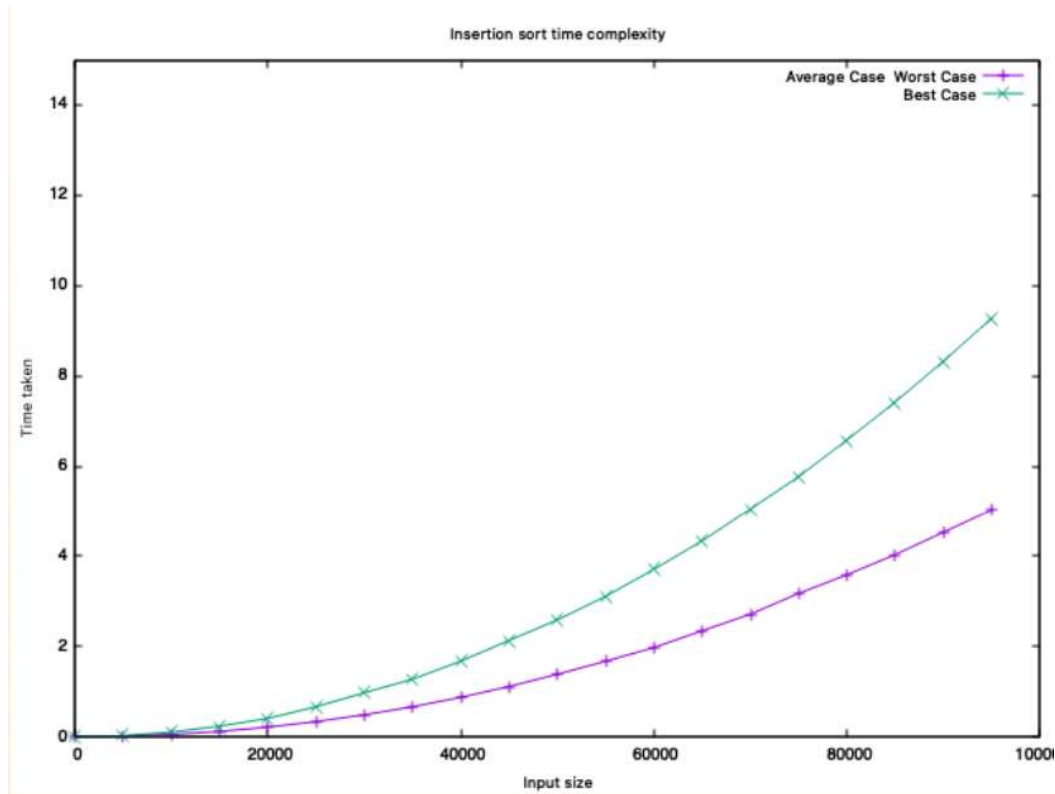
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```
set yr [0:40]
```

```
plot "bub.txt" using 1:2 title 'Average Case & Worst Case' with linespoints,\
```

```
"bub.txt" using 1:3 title 'Best Case' with linespoints
```

GRAPH:



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