DAA Assignment-2.
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1.1. **Implement the above algorithms using the programming language of your choice**.

Ans: I chose C++ to implement the above algorithms.

1.2. **Provide the details of Hardware/Software you used to implement algorithms and to measure the time.**

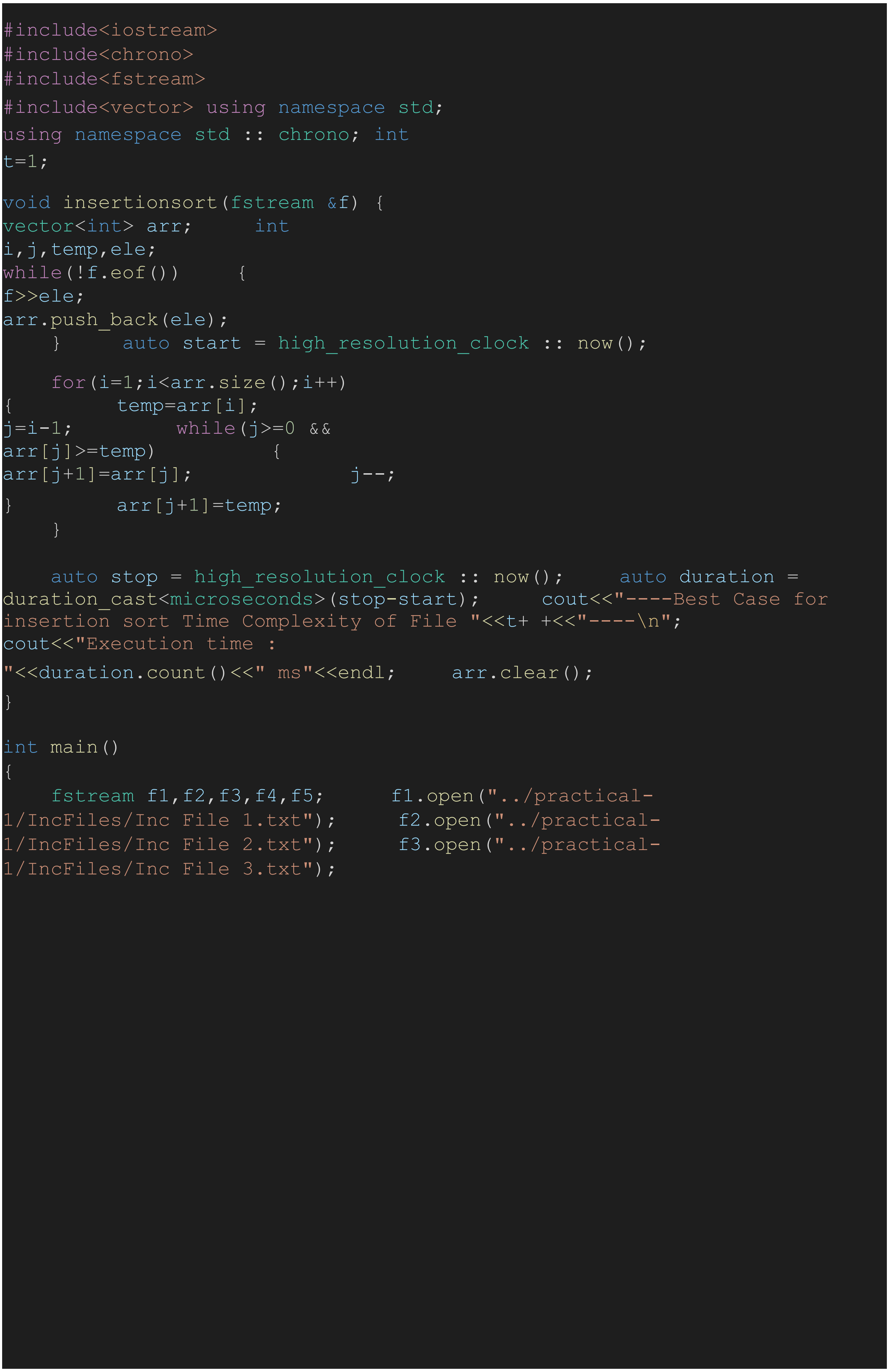
Device Specifications:

Device name :	DESKTOP-I1BTHD7
Processor :	AMD Ryzen 5 3500U with Radeon Vega Mobile Gfx 2.10GHz
Installed RAM :	8.00 GB (5.89 GB usable)
Device ID :	[redacted]
Product ID :	[redacted]
System type :	64-bit operating system, x64-based processor
Pen and touch	No pen or touch input is available for this display

Windows Specifications:

Edition :	Windows 10 Home Single Language
Version :	21H2
Installed :	23-08-2021
OS build :	19044.1415
Experience :	Windows Feature Experience Pack 120.2212.3920.0

1.3. **Submit the code (complete programs) Insertion Sort:**



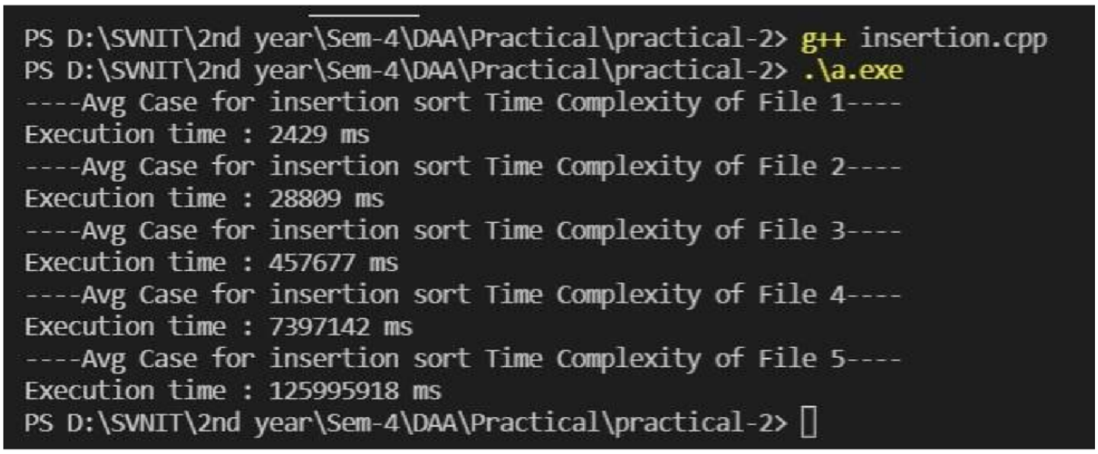
```
#include<iostream>
#include<chrono>
#include<fstream>
#include<vector> using namespace std;
using namespace std :: chrono; int
t=1;

void insertionsort(fstream &f) {
vector<int> arr;     int
i,j,temp,ele;
while(!f.eof())     {
f>>ele;
arr.push_back(ele);
    }     auto start = high_resolution_clock :: now();

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

    auto stop = high_resolution_clock :: now();     auto duration =
duration_cast<microseconds>(stop-start);     cout<<"----Best Case for
insertion sort Time Complexity of File "<<t+ +<<"----\n";
cout<<"Execution time :
"<<duration.count()<<" ms"<<endl;     arr.clear();
}

int main()
{
    fstream f1,f2,f3,f4,f5;     f1.open("../practical-
1/IncFiles/Inc File 1.txt");     f2.open("../practical-
1/IncFiles/Inc File 2.txt");     f3.open("../practical-
1/IncFiles/Inc File 3.txt");
```

```
    f4.open("../practical-1/IncFiles/Inc File 4.txt");
f5.open("../practical-1/IncFiles/Inc File 5.txt");
    insertionsort(f1);                   insertionsort(f2);
insertionsort(f3);                       insertionsort(f4);
insertionsort(f5);           f1.close();          f2.close();
f3.close();      f4.close();      f5.close();     return
0;
}
```

1.4. **Measure the avg-case time and worst-case time of Insertion sort for all six files. Plot a graph.**

Ans: The best-case and worst-case time of insertion sort is given below.

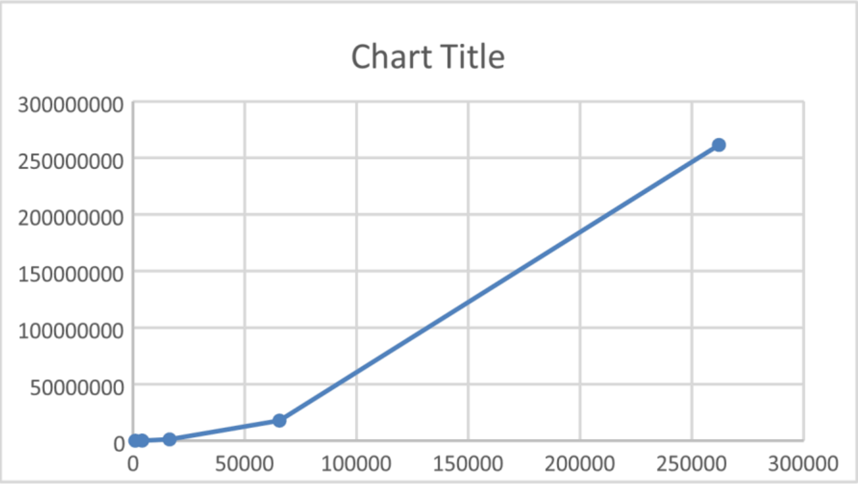
Avg Case Time Complexity:



```
PS D:\SVNIT\2nd year\Sem-4\DAA\Practical\practical-2> g++ insertion.cpp
PS D:\SVNIT\2nd year\Sem-4\DAA\Practical\practical-2> .\a.exe
----Avg Case for insertion sort Time Complexity of File 1----
Execution time : 2429 ms
----Avg Case for insertion sort Time Complexity of File 2----
Execution time : 28809 ms
----Avg Case for insertion sort Time Complexity of File 3----
Execution time : 457677 ms
----Avg Case for insertion sort Time Complexity of File 4----
Execution time : 7397142 ms
----Avg Case for insertion sort Time Complexity of File 5----
Execution time : 125995918 ms
PS D:\SVNIT\2nd year\Sem-4\DAA\Practical\practical-2> 
```

Avg

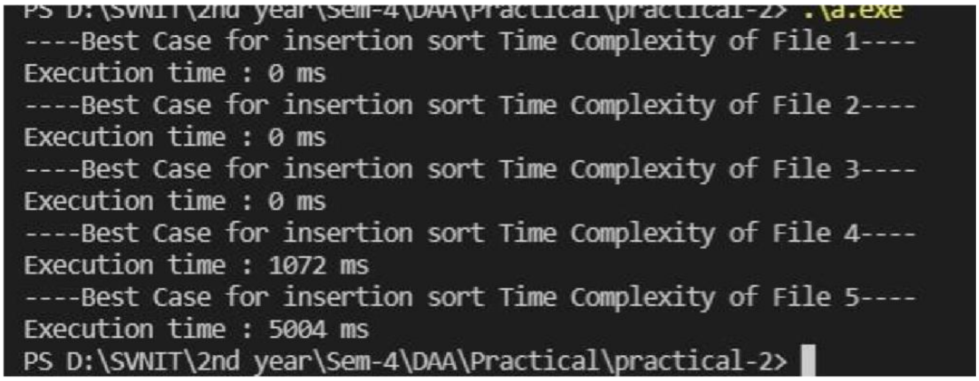
Case Time Complexity Graph:



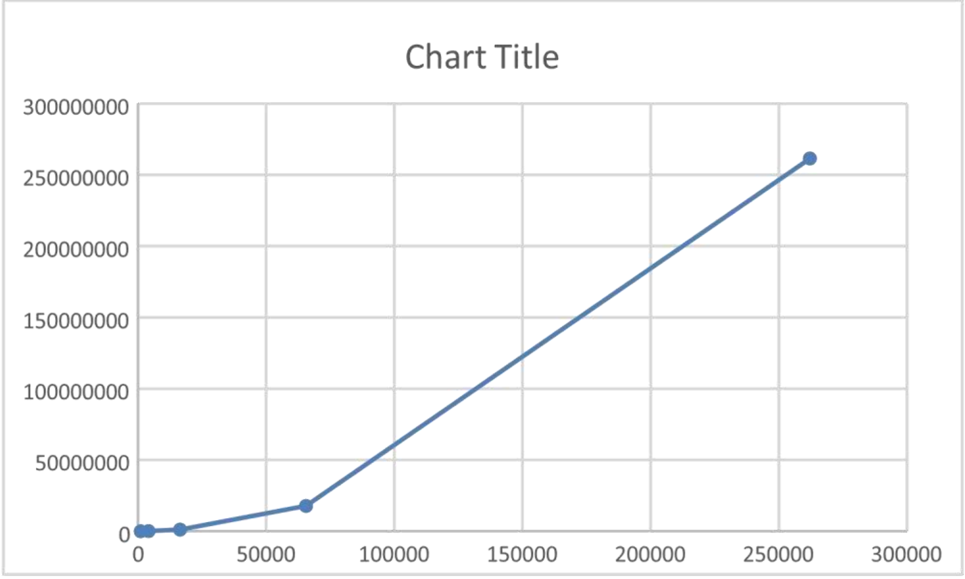
1.5. **Measure the best-case time (considering current data of six files) of bubble sort, and selection sort for all six files. Plot a graph.**

Ans: The average-case time of insertion sort is given below.

Insertion Sort



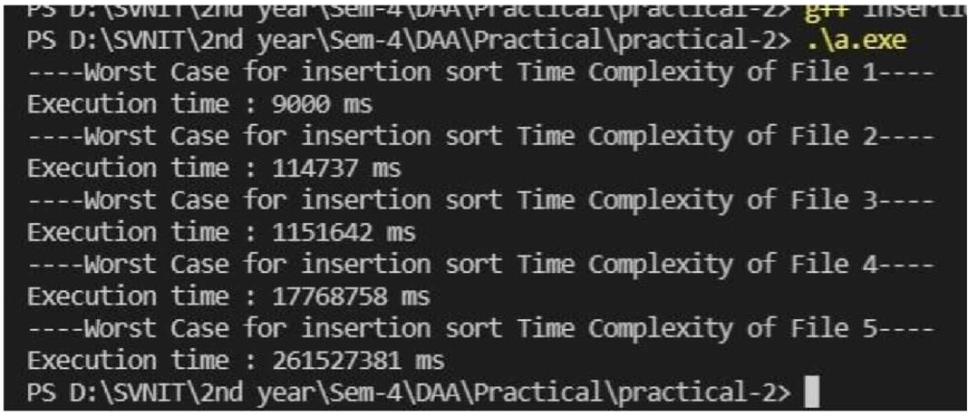
```
PS D:\SVNIT\2nd year\Sem-4\DAA\Practical\practical-2> .\a.exe
----Best Case for insertion sort Time Complexity of File 1----
Execution time : 0 ms
----Best Case for insertion sort Time Complexity of File 2----
Execution time : 0 ms
----Best Case for insertion sort Time Complexity of File 3----
Execution time : 0 ms
----Best Case for insertion sort Time Complexity of File 4----
Execution time : 1072 ms
----Best Case for insertion sort Time Complexity of File 5----
Execution time : 5004 ms
PS D:\SVNIT\2nd year\Sem-4\DAA\Practical\practical-2> 
```



1.6. **Measure the worst-case time of bubble sort, and selection sort for all six files. Plot a graph.**

Ans: The worst-case time of Insertion Sort is given below.

Insertion Sort



```
PS D:\SVNIT\2nd year\Sem-4\DAA\Practical\practical-2> g++ inserti
PS D:\SVNIT\2nd year\Sem-4\DAA\Practical\practical-2> .\a.exe
----Worst Case for insertion sort Time Complexity of File 1----
Execution time : 9000 ms
----Worst Case for insertion sort Time Complexity of File 2----
Execution time : 114737 ms
----Worst Case for insertion sort Time Complexity of File 3----
Execution time : 1151642 ms
----Worst Case for insertion sort Time Complexity of File 4----
Execution time : 17768758 ms
----Worst Case for insertion sort Time Complexity of File 5----
Execution time : 261527381 ms
PS D:\SVNIT\2nd year\Sem-4\DAA\Practical\practical-2> █
```

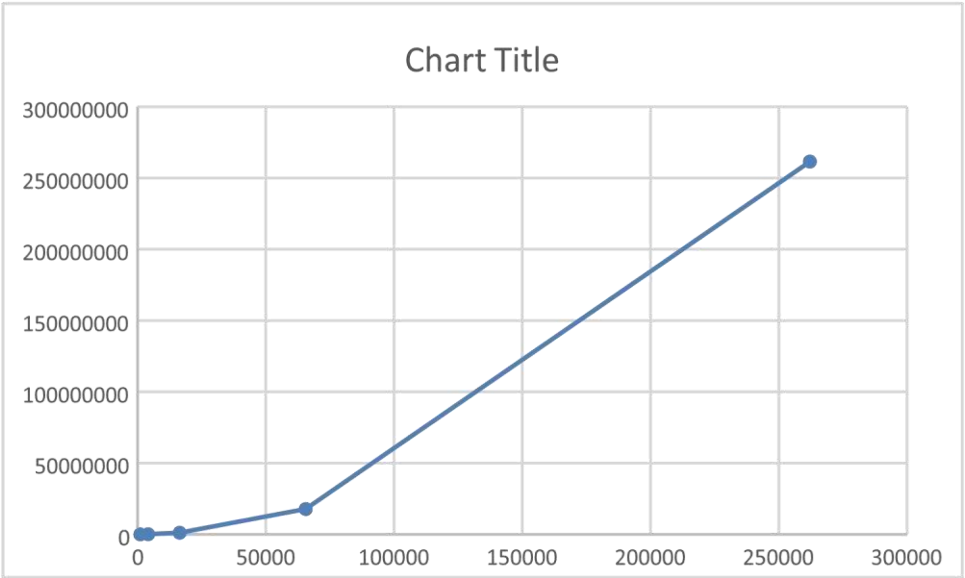


Chart Title