

Bubble Sort

```
#include <algorithm>
#include <iostream>
#include <vector>
#include <time.h>
#define LL long long
using namespace std;

void bsort(vector<LL>& arr) {
    for(LL i=arr.size()-1; i>=0; i--) {
        for(LL j=0; j<i; j++) {
            if(arr[j] > arr[j+1]) {
                LL temp = arr[j];
                arr[j] = arr[j+1];
                arr[j+1] = temp;
            }
        }
    }
}

mt19937 rnd;
uniform_int_distribution<uint64_t> dist(0,1e4);
LL gen() {
    return dist(rnd);
}

int main()
{
    vector<LL> time;
    for(LL n=1; n<=30001; n+=5000)
    {
        vector<LL> V(n,0);

        //Average Case:
        generate(V.begin(), V.end(), gen);
        //Best Case:
        //for(LL i=0; i<n; i++) {
        //    V[i] = i;
        //}
        //Worst Case: use n-i instead of i

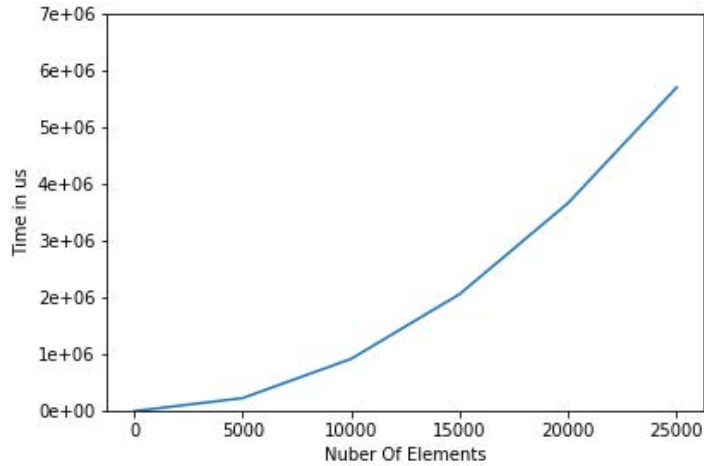
        starttime = getTime();
        bsort(V);
        endtime = getTime();
        time.push_back(endtime-starttime);
        cout<<"Sorted: "<<(is_sorted(V.begin(), V.end()) == 1? "True":"False")<<endl;
    }

    return 0;
}
```

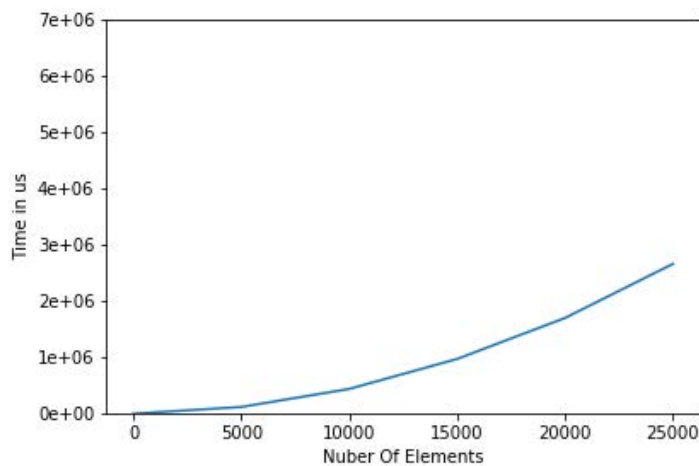
Output:

```
D:\Code\ada\bubble-sort\bin\Debug\bubble-sort.exe
Size: 5000      Sorted: True      Time Taken = 236014
Size: 10000     Sorted: True      Time Taken = 945054
Size: 15000     Sorted: True      Time Taken = 2094120
Size: 20000     Sorted: True      Time Taken = 3723213
Size: 25000     Sorted: True      Time Taken = 5835333
Size: 30000     Sorted: True      Time Taken = 8400480
Process returned 0 (0x0)   execution time : 21.291 s
Press any key to continue.
```

Average Case:



Best Case:



Worst Case:

