Competitive Programming….

Why Competitive Programming?

A successful competitive programmer has to be able to implement programs that do not have bugs. This is a valuable skill in software engineering, and it is not a coincidence that IT companies are interested in people who have background in competitive programming.

1. Programming Techniques

- Time Complexity
- Language Features
- Designing Algorithms

Language doesn't matter!!

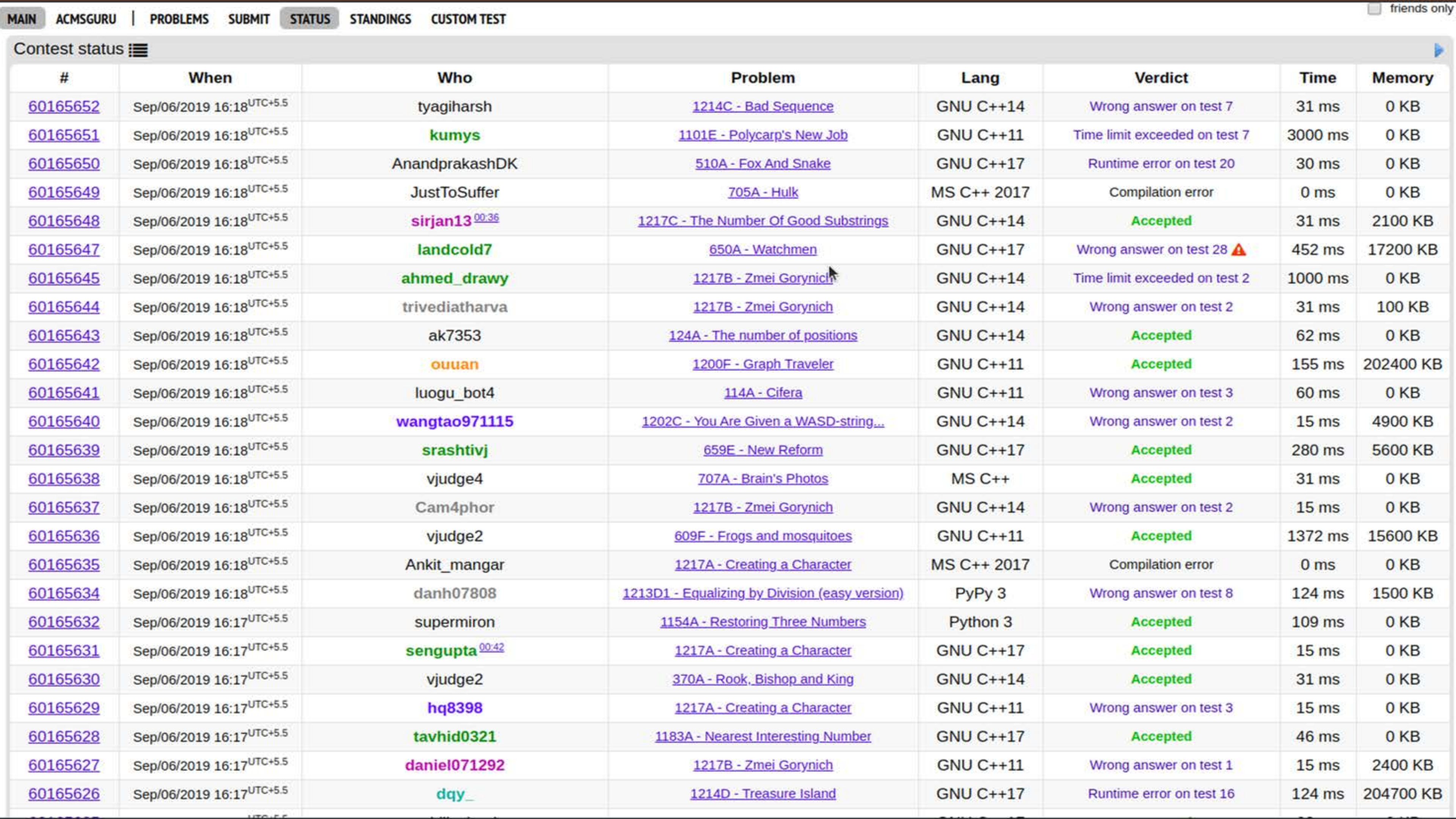
Use any language of your choice

1. C++
2. Java
3. Python
4. C

Make sure you are well versed with the syntax or just google it.

Problems faced during competitive

1. Taking I/O
2. Wrong Answer
3. Time Limit Exceeded
4. Accepted



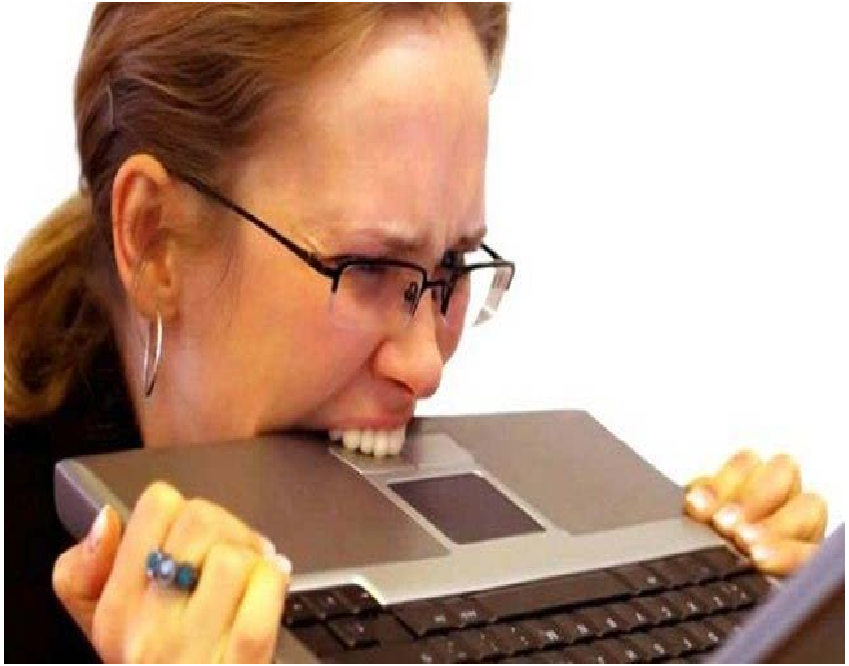
MAIN ACMSGURU | PROBLEMS SUBMIT STATUS STANDINGS CUSTOM TEST

□ friends only

Contest status

#	When	Who	Problem	Lang	Verdict	Time	Memory
60165652	Sep/06/2019 16:18$^{UTC+5.5}$	tyagiharsh	1214C - Bad Sequence	GNU C++14	Wrong answer on test 7	31 ms	0 KB
60165651	Sep/06/2019 16:18$^{UTC+5.5}$	kumys	1101E - Polycarp's New Job	GNU C++11	Time limit exceeded on test 7	3000 ms	0 KB
60165650	Sep/06/2019 16:18$^{UTC+5.5}$	AnandprakashDK	510A - Fox And Snake	GNU C++17	Runtime error on test 20	30 ms	0 KB
60165649	Sep/06/2019 16:18$^{UTC+5.5}$	JustToSuffer	705A - Hulk	MS C++ 2017	Compilation error	0 ms	0 KB
60165648	Sep/06/2019 16:18$^{UTC+5.5}$	sirjan13$^{00:36}$	1217C - The Number Of Good Substrings	GNU C++14	Accepted	31 ms	2100 KB
60165647	Sep/06/2019 16:18$^{UTC+5.5}$	landcold7	650A - Watchmen	GNU C++17	Wrong answer on test 28 ⚠	452 ms	17200 KB
60165645	Sep/06/2019 16:18$^{UTC+5.5}$	ahmed_drawy	1217B - Zmei Gorynich	GNU C++14	Time limit exceeded on test 2	1000 ms	0 KB
60165644	Sep/06/2019 16:18$^{UTC+5.5}$	trivediatharva	1217B - Zmei Gorynich	GNU C++14	Wrong answer on test 2	31 ms	100 KB
60165643	Sep/06/2019 16:18$^{UTC+5.5}$	ak7353	124A - The number of positions	GNU C++14	Accepted	62 ms	0 KB
60165642	Sep/06/2019 16:18$^{UTC+5.5}$	ouuan	1200F - Graph Traveler	GNU C++11	Accepted	155 ms	202400 KB
60165641	Sep/06/2019 16:18$^{UTC+5.5}$	luogu_bot4	114A - Cifera	GNU C++11	Wrong answer on test 3	60 ms	0 KB
60165640	Sep/06/2019 16:18$^{UTC+5.5}$	wangtao971115	1202C - You Are Given a WASD-string...	GNU C++14	Wrong answer on test 2	15 ms	4900 KB
60165639	Sep/06/2019 16:18$^{UTC+5.5}$	srashtivj	659E - New Reform	GNU C++17	Accepted	280 ms	5600 KB
60165638	Sep/06/2019 16:18$^{UTC+5.5}$	vjudge4	707A - Brain's Photos	MS C++	Accepted	31 ms	0 KB
60165637	Sep/06/2019 16:18$^{UTC+5.5}$	Cam4phor	1217B - Zmei Gorynich	GNU C++14	Wrong answer on test 2	15 ms	0 KB
60165636	Sep/06/2019 16:18$^{UTC+5.5}$	vjudge2	609F - Frogs and mosquitoes	GNU C++11	Accepted	1372 ms	15600 KB
60165635	Sep/06/2019 16:18$^{UTC+5.5}$	Ankit_mangar	1217A - Creating a Character	MS C++ 2017	Compilation error	0 ms	0 KB
60165634	Sep/06/2019 16:18$^{UTC+5.5}$	danh07808	1213D1 - Equalizing by Division (easy version)	PyPy 3	Wrong answer on test 8	124 ms	1500 KB
60165632	Sep/06/2019 16:17$^{UTC+5.5}$	supermiron	1154A - Restoring Three Numbers	Python 3	Accepted	109 ms	0 KB
60165631	Sep/06/2019 16:17$^{UTC+5.5}$	sengupta$^{00:42}$	1217A - Creating a Character	GNU C++17	Accepted	15 ms	0 KB
60165630	Sep/06/2019 16:17$^{UTC+5.5}$	vjudge2	370A - Rook, Bishop and King	GNU C++14	Accepted	31 ms	0 KB
60165629	Sep/06/2019 16:17$^{UTC+5.5}$	hq8398	1217A - Creating a Character	GNU C++11	Wrong answer on test 3	15 ms	0 KB
60165628	Sep/06/2019 16:17$^{UTC+5.5}$	tavhid0321	1183A - Nearest Interesting Number	GNU C++17	Accepted	46 ms	0 KB
60165627	Sep/06/2019 16:17$^{UTC+5.5}$	daniel071292	1217B - Zmei Gorynich	GNU C++11	Wrong answer on test 1	15 ms	2400 KB
60165626	Sep/06/2019 16:17$^{UTC+5.5}$	dqy_	1214D - Treasure Island	GNU C++17	Runtime error on test 16	124 ms	204700 KB

SORRY, TIME LIMIT EXCEEDED!!



REASON -

Your code is not efficient enough for the given problem

SOLUTION -

Make your code Efficient enough for the given problem.

BUT HOW ??!!!

Time Complexity

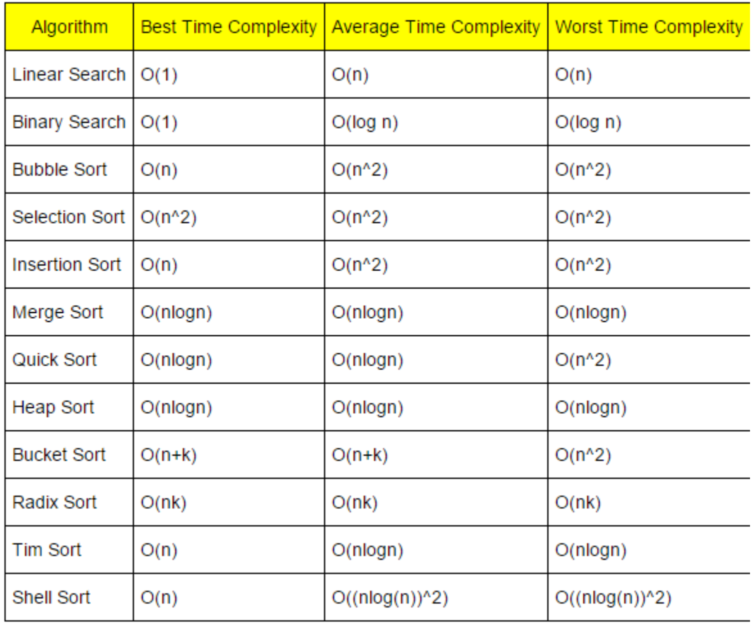
The time complexity of an algorithm estimates how much time the algorithm will use for a given input. By calculating the time complexity, we can often find out whether the algorithm is fast enough for solving a problem—without implementing it.

We will be concentrating on O(Big-oh) time complexities.

Big -oh is the worst time complexity of the algorithm . It is the one of most used concept/term in competitive programming.

Some of the time complexities are:--

- O(n^3)
- O(n^2)
- O(n!)
- O(2^n)
- O(nlogn)
- O(n)
- O(logn)
- O(1)



Algorithm	Best Time Complexity	Average Time Complexity	Worst Time Complexity
Linear Search	O(1)	O(n)	O(n)
Binary Search	O(1)	O(log n)	O(log n)
Bubble Sort	O(n)	O(n^2)	O(n^2)
Selection Sort	O(n^2)	O(n^2)	O(n^2)
Insertion Sort	O(n)	O(n^2)	O(n^2)
Merge Sort	O(nlogn)	O(nlogn)	O(nlogn)
Quick Sort	O(nlogn)	O(nlogn)	O(n^2)
Heap Sort	O(nlogn)	O(nlogn)	O(nlogn)
Bucket Sort	O(n+k)	O(n+k)	O(n^2)
Radix Sort	O(nk)	O(nk)	O(nk)
Tim Sort	O(n)	O(nlogn)	O(nlogn)
Shell Sort	O(n)	O((nlog(n))^2)	O((nlog(n))^2)

Most of the time complexity of an algorithm can easily be identified simply by analysing .

For example:-

```
a++;
b++;
print(a,b);
```

The time complexity of the above code is O(1) as the code consist of single line commands.

```
for (int i = 1; i <= n; i++) {
...
}
```

The time complexity of a loop estimates the number of times the code inside the loop is executed. For example, the time complexity of the following code is O(n), because the code inside the loop is executed n times. We assume that “...” denotes a code whose time complexity is O(1).