# Lesson 2:

* 10^8 instructions take 1 sec to be completed.
* Instruction = Complexity (Max Constraints)
* Example:

Number of test cases, T=10^4

Variables m, n: 0<=m<=100; 0<=n<=200

Complexity of the algorithm= O (T\*m\*n)

Instructions roughly= (10^4) \* (100) \* (200) = 2\*10^8

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Name | Size(bit) | Size(B) | Signed | Unsigned |
| Integer | short int | 16 | 2 | (-2^15)..0..(2^15)-1 | 0…(2^16 – 1) |
|  | Int /long int | 32 | 4 | (-2^31)..0..(2^31-1) | 0…(2^32) |
|  | long long int | 64 | 8 | (-2^63)..0..(2^63-1) | 0…(2^64) |
|  | char | 8 | 1 | N/A | 0..(2^8 -1)=255 |
|  | bool | 8 | 1 | N/A | 0:False; 1:True |
| Real Number | float | 32 | 4 |  |  |
| double | 64 | 8 |

* 2^4=16
* 2^8=256
* 2^10=1024=10^3
* 2^20=10^6=1millinon
* 2^30=10^9=1 billion
* 32 bit unsigned = 2^32=2^(10+10+10+2)=2^10 \* 2^10 \* 2^10 \* 2^2=1024\*1024\*1024\*4= 4Billionish = 4\*10^9
* 4B signed= 2^(32-1)= 2 Billion

Quick Questions:

Ques: Test case count=1, N=10^4, time= 1sec, what can be the highest order?

Ans: (10^4)^2=10^8/10^8=1sec

Ques: Test case count=1, N=10^6, time= 1sec, what can be the highest order?

Ans: 106=220; log2(2)20=20\*1; NlogN=(20\*10^6)/108=0.2 sec

Ques: Test case =10^4, N=10^4, time=1 sec, what is the highest order?

Ans: O(N); N\*T=(10^8)/10^8=1 sec