Analyzing an algorithm

- Time
- Space
- Network Consumption/ Data transfer
- Power
- CPU registers

Time analysis

Every statement takes one unit of time.

```
Algorithm swap(a,b)
{
        Temp =a;        ---1 unit of time
        a = b;          ---1 unit of time
        b = temp;       ---1 unit of time
}
```

f(n)=3

Frequency count method

```
Algorithm sum(A,n)
{
        S = 0;   ---1
        for (i=0; i < n; i++){      --- n + 1
                S = S + A[i];       --- n
        }

        Return S;          --- 1
}
```

f(n) = 2n + 3 ---- O(n)

Sum of two matrices

```
Algorithm Add(A,B,n)
{
        for ( i =0; i < n; i++){    --- n + 1
```

```
            for(j=0; j < n ; j++){      --- n * (n+1)
                C[i,j] = A[i,j] + B[i,j];    ---n * n
            }
        }
}       f(n) = 2n^2 + 2n + 1   --- O(n^2)
```

```
Algorithm Multiply(A,B,n)
{
        for ( i =0; i < n; i++){    --- n + 1
            for(j=0; j < n ; j++){      --- n * (n+1)
                C[i,j] = 0          ---n * n
                for(k = 0; k<n; k++){    ---n * n *(n +1)
                    C[i,j] = C[i,j] + A[i,k] * B[k,j];   --- n * n * n
                }
            }
        }
}       f(n)=2n^3 + 3n^2 + 2n + 1        O(n^3)
```

- Even if the loop is going from n to 0 , or decrementing, the n degree is the same.