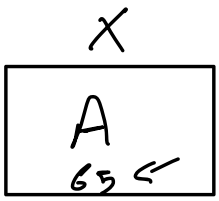
Every char symbol has its own ASCII number

char has one byte only ⟶ 8-bits

Ex:

```
char x;
x = 'A';
```




```
char s[] = {65, 66, 67, 68}
```

A B C D

// Array of char ⟶ String

In c, c++ last char in string is null char '\0' it take Place

```
char name[5] = {'m', 'b', 'c', 'D', '\0'};
```

// double quote Puts '\0' Automatically

In cin >>, it insert '\0' whenever user finishs

To read more than 1 word use gets( );

Finding length 2

use loop condition A[i] != '\0' to traverse

changing case 3

by using ASCII code numbers

A = 65 a = 97 97 - 65 = 32

B = 66 b = 98 98 - 66 = 32

code

```
for (i=0; A[i] != '\0' ; i++)  \\ capital to Small
    A[i] = A[i]+32
```

```
for (i=0; A[i] != '\0' ; i++) \\ Small to capital
    A[i] = A[i]-32
```

toggle 97 – 122 capital
65 – 90 small

```
for (i=0; A[i] != '\0' ; i++)
    if(A[i] >= 65 && A[i] <= 90)
        A[i] += 32
    else if (A[i] >= 97 && A[i] <= 122 )
        A[i] -= 32
```

reversing string 6

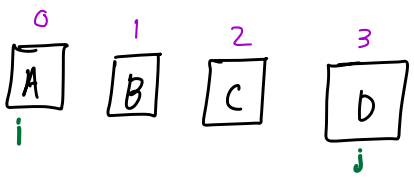
1- using another array

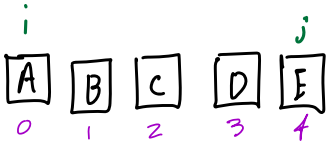
2- without using other array

Ex :-

```
for (i=0; A[i] != '\0' ; i++)
 j= i-1 ; \\ last element not '\0'
for(i=0; i < j ; i++, j-- )
{    char temp= A[i];
     A[i]= A[j];
     A[j]= temp;
}
```

Test





Palindrome ?

```
for(i=0; A[i] != '\0' ;i++);
i--;
for(j=0; j < i ; i--, j++)
      if( A[i] != A[j] )
      {
          cout << "not Palindrome";
          break;
      }
```

if (j >= i) cout << " palindrome ;

---

finding duplicates in a string

using hash table

let's take finding (102 100 105 110 105 110 103) as a string we should know ASCII code for each letter

small letters ASCII start from 97 (a) - 122 (z) 25 numbers for them

hashtable Array will have only 25 element

code

```
int hash[25] = {0}; //set all zero
for (int i=0; i< 7; i++) -> n
  hash[string[i] - 97] ++;

for(int i=0; i< 25; i++) -> n
if (hash[i] > 1) cout << " letter ASCII " << i+97 << endl;
in C printf("%c", i+97);
```

O(n) time complexity

---

now using bits (difficult)

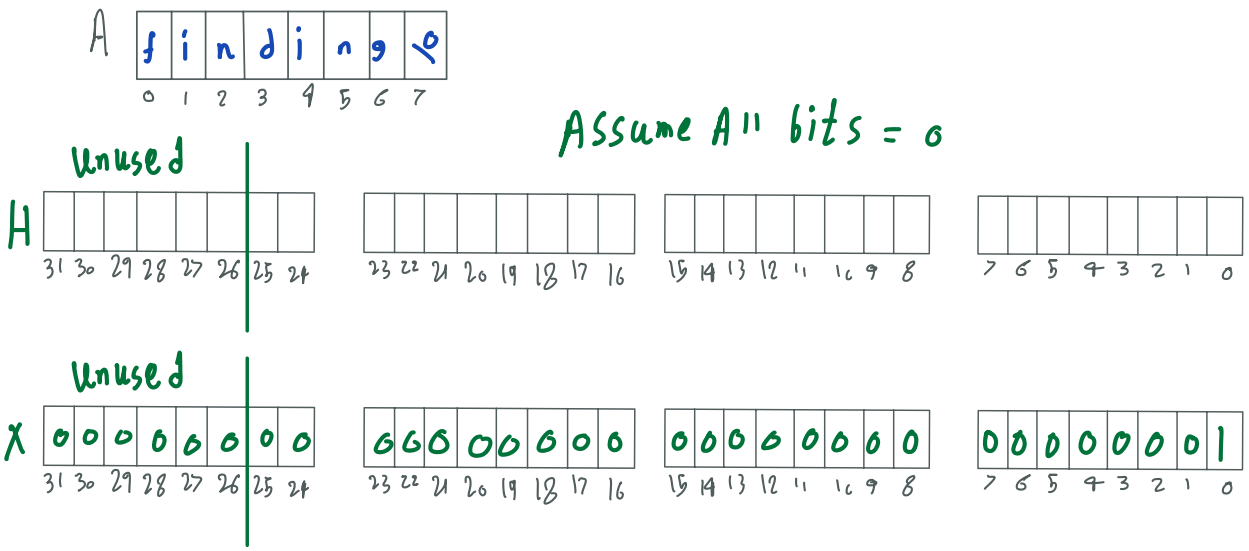
- Should know bitwise operations

masking to set bit on
masking to check wether a bit is on or off

---

char A[] = "finding"; → ASCII code small letters

we need 26 bit, but we count using byte, we get 4 byte 4x8=32
6 bits unused, data type based on compiler



we trace the string then in each itration we check the bit in H that represent the letter by ASCII code using masking method, if its on then duplicated, off put it 1 then keep going

Code

```
Char A[] = "finding";
int H=0, x=0;
For(int i=0; A[i] != '\0'; i++)
{
```

```
x=1;
x= x<<(A[i]-97);
if(H&x > 0) cout << A[i] << "duplicated "<<endl;
else -> check by masking
H= H | x; ---> Put 1 by merging
        -> OR
}
```