2D Array

int a[3][2] = { {1, 2, 3}, {4, 5, 6} }

$\uparrow$ $\uparrow$
no of rows   no of columns

0th row   1st wt

{
  {1,2},
  {3,4},
  {5,6}
};

0th row →

1 $\textcircled{a_{00}}$	2 $\textcircled{a_{01}}$
3 a_{10}	4 a_{11}
5 a_{20}	6 a_{21}

1st row →
2nd row

int a[5] = { 10, 20, 30, 40, 50};

10	20	30	40	50

a[0][0]	a[1][0]
a[0][1]	a[1][1]
a[0][2]	a[1][2]

```
for ( i=0; i < n; i++)
  { for (j=0; j < m; j++)
      scanf (" %d", & a[i][j]);
```

row major order

$a_{01} \Rightarrow 104$

a_{00}	a_{01}	a_{02}	a_{10}	a_{11}	a_{12}	a_{20}	a_{21}	a_{22}

100 104 108 112 116 120 124 128

a_{00}	a_{01}	a_{02}
a_{10}	a_{11}	a_{12}
a_{20}	a_{21}	a_{22}

loc = 112   Column major order

100	104	108	112	116	120	124		
a_{00}	a_{10}	a_{20}	a_{01}	a_{11}	a_{21}	a_{02}	a_{12}	a_{22}

$O(n^2)$

```
for (i=0; i<N; i++)
    for (j=0; j<M; j++)
        printf(" %d", a[i][j]);
```

addition

$a[ ]$ $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ $b[ ]$ $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$

$c = a[ ] + b[ ] = \begin{bmatrix} 2 & 4 & 6 \end{bmatrix}$

```
take 1st Matrix a[][]
take 2nd Matrix b[][]
for (i=0; i<n; i++)
    { for (j=0; j<n; j++)

        c[i][j] = a[i][j] (+) b[i][j] ;
    }
for (i=0; i<n; j++)
    { for (j=0; j<n; j++)
        print ("./d"; c[i][j]);
```

$$\boxed{\text{Transpose}}$$

$$a = \begin{bmatrix} a_{00} & a_{01} \\ a_{10} & a_{11} \\ a_{20} & a_{21} \end{bmatrix} \qquad a^T = \begin{bmatrix} a_{00} & a_{10} & a_{20} \\ a_{01} & a_{11} & a_{21} \end{bmatrix}$$
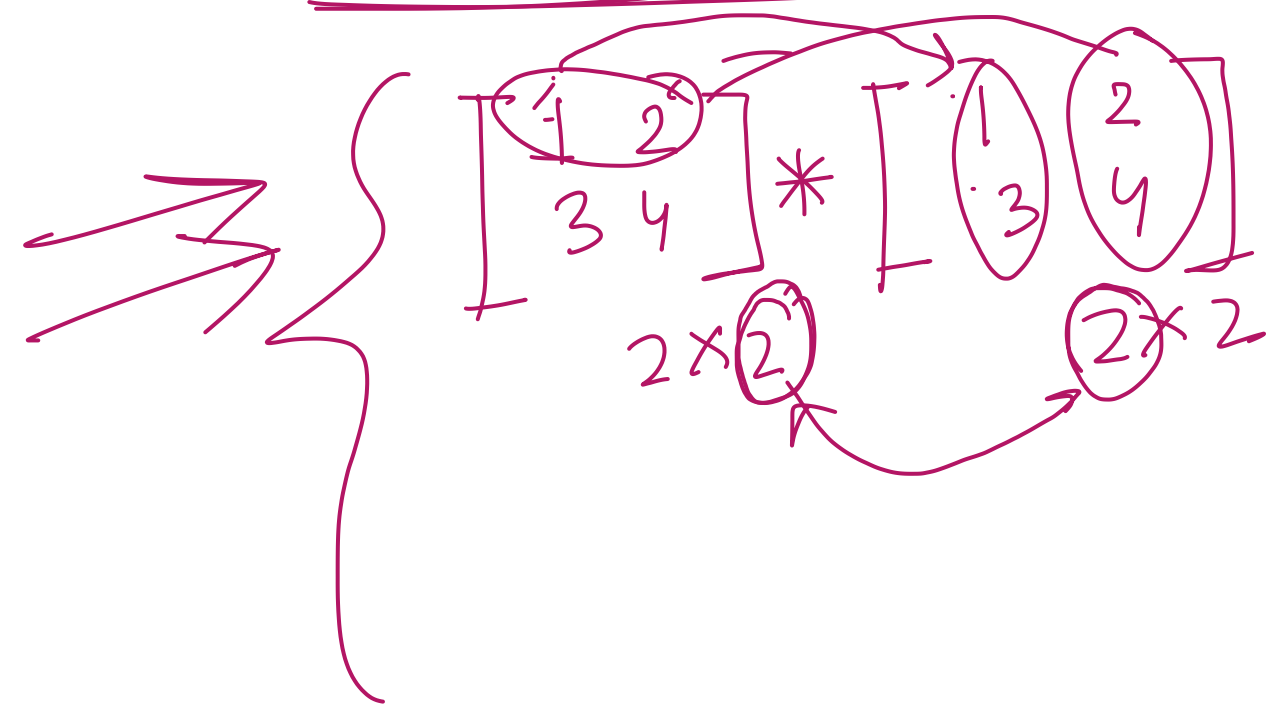
$$a = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \end{bmatrix} \qquad a^T = \begin{bmatrix} 1 & 5 & 9 \\ 2 & 6 & 10 \\ 3 & 7 & 11 \\ 4 & 8 & 12 \end{bmatrix}$$

Matrix Multiplication

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} * \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 1*1 + 2*3 & 1*2 + 2*4 \\ 3*1 + 4*3 & 3*2 + 4*4 \end{bmatrix}$$

$$2 \times 2 \qquad 2 \times 2$$

$$= \begin{bmatrix} 7 & 10 \\ 15 & 22 \end{bmatrix}$$

$O(n^2)$

$O(n^3)$

Strings.

array of type char

'A'

"debayan"

debayan ganguly

d	e	b	a	y	a	n	\0

buffer

gets (str)
puts (str)

buffer:- A temporary storage area.

		4	1

gets (str);

d	e	b	a	y	a	n	\0

| d | e | b | a | y | a | n | y | g | a | n | g | u | l | y | \0 | | | | | |
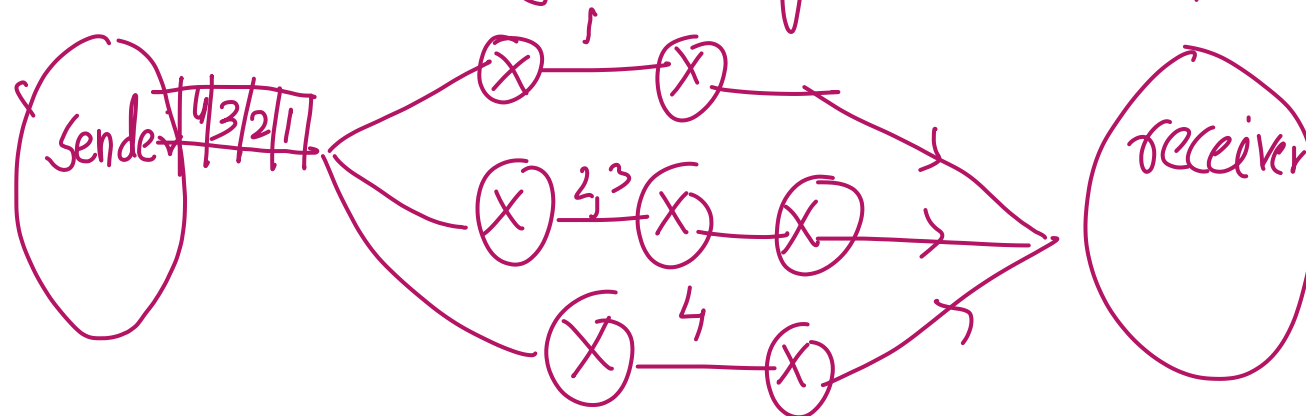
strlen ( )
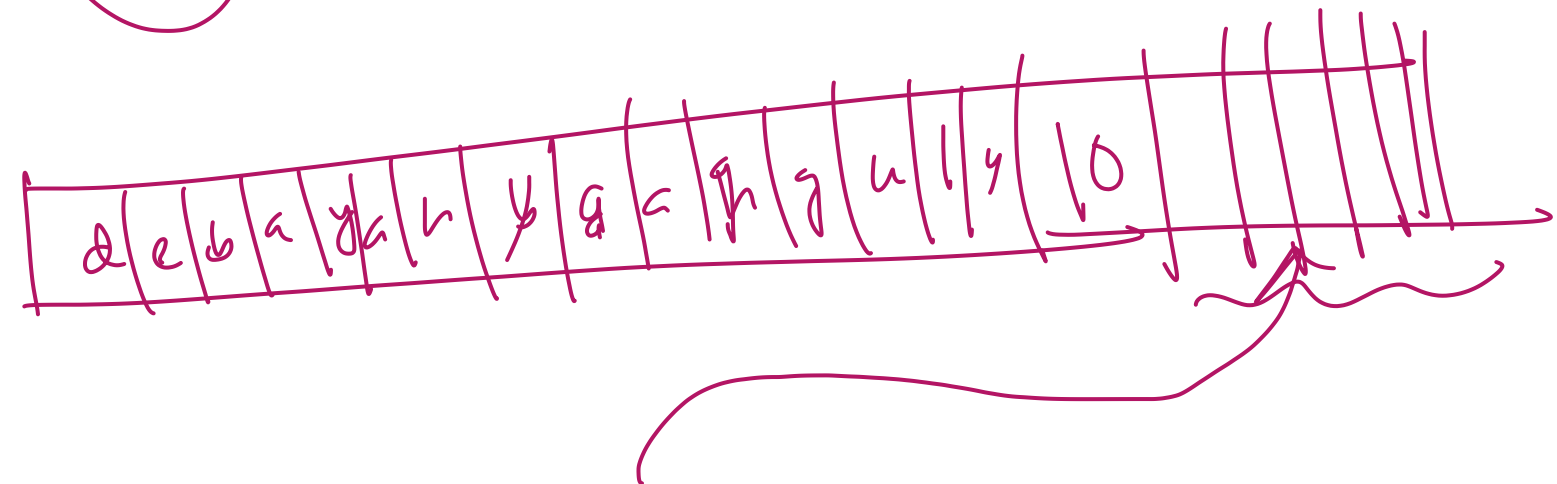
strcpy()
strcpr()
strrex()

debayan_ganguly/o   O/p:- 15

* Multiplication

* implement strlen() without using library function

```
{
  while ( str[i] != '\0')
    count ++;
}
```