INTRODUCTION TO ARRAYS IN PROGRAMMING LANGUAGE -- C

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ARRAYS

An array is a set of homogeneous data (same type).

It is a series of elements of the same type placed in contiguous memory locations that can be individually referenced by adding an index to a unique identifier.

Syntax:

data type Array Name[size];

or

data type Array Name[row size][column size];

Types of Array

Linear Array or one dimensional Array: Only one subscript is used. It is written either in row or column form.

Syntax:

data type array name[size];

Example:

```
float salary[30];
char city[9];
```

All arrays have 0 as the index of their first element.

Example:

```
char city[9];
```

```
city[0]————————A
city[1]————————M
 city[2]————————R
 city[3]————————I
 city[4]————————T
 city[5]————————S
 city[6]————————A
 city[7]————————R
 city[8]————————'\o'
```

Program to find average of N numbers

```
main()
{
int n,a[30],i,s;
float av;
clrscr();
Printf(“Enter value of N:”);
Scanf(“%d”,&n);
Printf(“Enter values:”);
for(i=0;i<n;i++)
{
scanf(“%d”,&a[i]);
}
s=0;
for(i=0;i<n;i++)
{
s = s + a[i];
}
Printf(“\n Sum = %d”,s);
av = (float)s/n;
Printf(“\n Average = %f”,av);
getch();
}
```

Program to find smalllest of N numbers

```
main()
{
int n,a[30],i,small;
clrscr();
Printf("Enter value of N:");
Scanf("%d",&n);
Printf("Enter values:");
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
small=a[0];
for(i=1;i<n;i++)
{
if(a[i]<small)
{
small=a[i];
}
}
Printf("\n Smallest Number = %d",small);
getch();
}
```

Program to display elements of an array in reverse order

```
main()
{
int n,a[30],i;
clrscr();
Printf(“Enter value of N:”);
Scanf(“%d”,&n);
Printf(“Enter Elements:”);
for(i=0;i<n;i++)
{
scanf(“%d”,&a[i]);
}
Printf(“Elements in Reverse Order are:”);
for(i=n-1;i>=0;i--)
{
Printf(“\n%d”,a[i]);
getch();
}
```

Program to count number of occurrences of an item in an array

```
main()
{
int n,a[30],i,count=0,item;
clrscr();
Printf(“Enter number of elements:”);
scanf(“%d”,&n);
Printf(“Enter Elements:”);
for(i=0;i<n;i++)
{
scanf(“%d”,&a[i]);
}
Printf(“Enter item to be searched:”);
scanf(“%d”,&item);
for(i=0;i<n;i++)
{
if(item==a[i])
Count ++;
}
Printf(“Item %d occurred %d times”,item,count);
getch();
}
```

Program to sort the numeric data in descending order

```
main()
{
int n,a[30],i,j,temp;
clrscr();
Printf("Enter number of elements:");
scanf("%d",&n);
Printf("Enter Elements:");
for(i=0;i<n;i++)
{
scanf("%d",&a[i]);
}
for(i=0;i<n-1;i++)
{
for(j=0;j<n-i-1;j++)
{
if(a[j]<a[j+1])
{
temp= a[j];
a[j] = a[j+1];
a[j+1] =temp;
}}}
Printf("Sorted Data is:");
for(i=0;i<n;i++)
printf("%d",a[i]);
getch();
}
```

Program to count the negative elements from the list

```
main()
{
int n,a[30],i,count=0;
clrscr();
Printf(“Enter number of elements:”);
scanf(“%d”,&n);
Printf(“Enter Elements:”);
for(i=0;i<n;i++)
{
scanf(“%d”,&a[i]);
}
for(i=0;i<n;i++)
{
if(a[i]<0)
{
Count ++;
}
}
Printf(“Number of negative elements are=%d”,count);
getch();
}
```

Non Linear Array or Multi dimensional Array:

Array having different dimensions or n-subscripts.

Two Dimensional Array:

These arrays are in row and column form. It has two subscripts. Two dimensional arrays can be written in matrix form.

Syntax:

data type array-name[row-size][column-size];

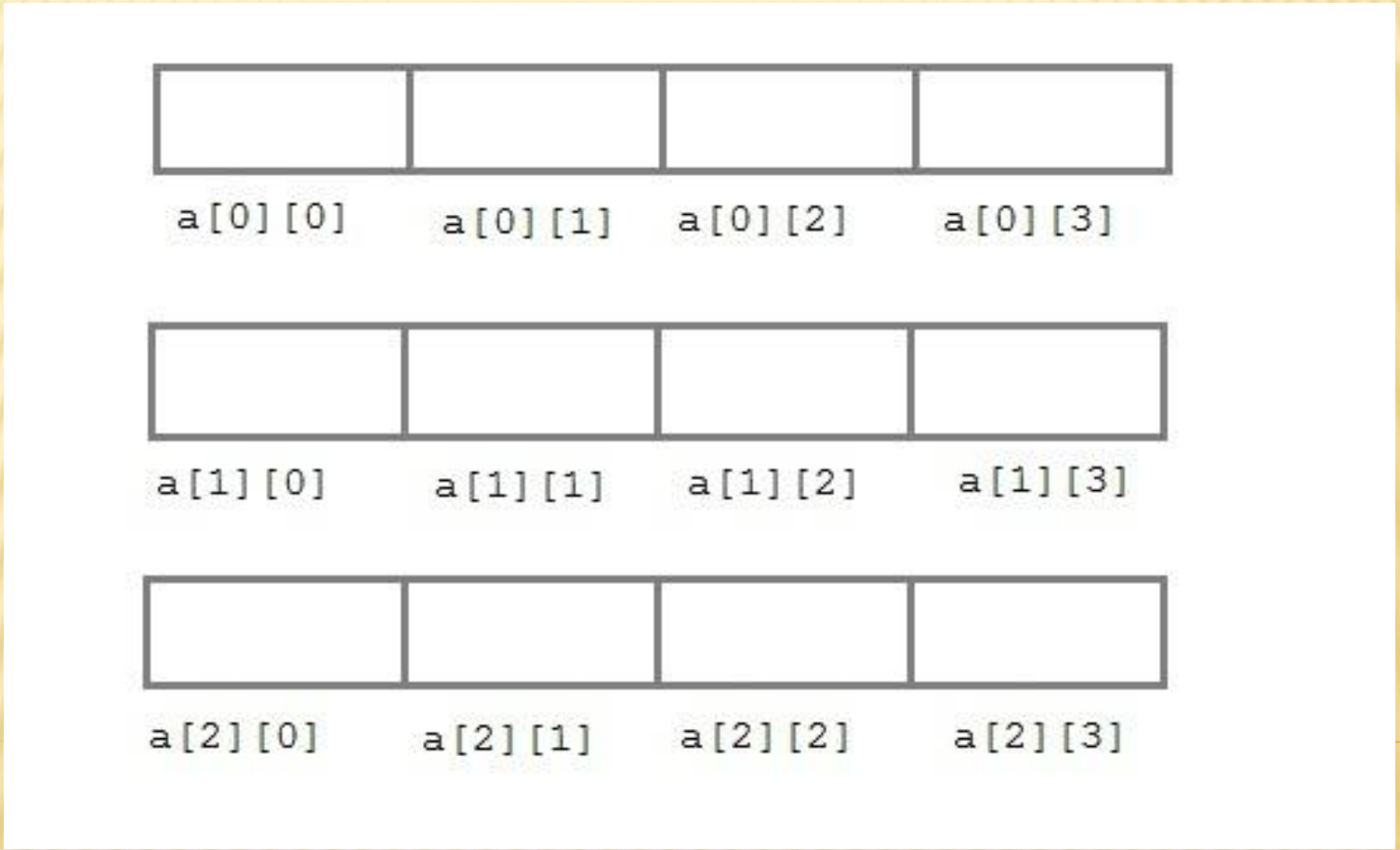
Example :

int a[3][4];

char name[10][20];

Example :

int a[3][4];



Program to read and write a matrix

```
main()
{
int i,j,a[10][10],n,m;
clrscr();
Printf(“Enter number of rows and columns of matrix:”);
scanf(“%d%d”,&n,&m);
Printf(“Enter Elementsof matrix:”);
        for(i=0;i<n;i++)
        {
        for(j=0;j<m;j++)
        {
        scanf(“%d”,&a[i][j]);
        }
        }
Printf(“Entered matrix is:”);
        for(i=0;i<n;i++)
        {
        for(j=0;j<m;j++)
        {
        printf(“%6d”,a[i][j]);
        }
        printf(“\n”);
        }
getch();
}
```

Program to find sum of diagonal elements of a matrix

```
main()
{
int i,j,a[10][10],n,m,sum=0;
clrscr();
Printf("Enter number of rows and columns of matrix:");
scanf("%d%d",&n,&m);
Printf("Enter Elementsof matrix:");
        for(i=0;i<n;i++)
        {
        for(j=0;j<m;j++)
        {
        scanf("%d",&a[i][j]);
        }
        }
        for(i=0;i<n;i++)
        {
        for(j=0;j<m;j++)
        {
        if(i==j)
        {
        sum = sum + a[i][j];
        }
        }}
Printf("\nSum of diagonal elements:%d",sum);
getch();  }
```

Program to find transpose of a matrix

```
main()
{
int i,j,a[10][10],r,c;
clrscr();
Printf("Enter number of rows and columns of matrix:");
scanf("%d%d",&r,&c);
Printf("Enter Elementsof matrix:");
        for(i=0;i<r;i++)
        {
        for(j=0;j<m;j++)
        {
        scanf("%d",&a[i][j]);
        }
        }
Printf("\nTranspose of Marix is");
        for(i=0;i<c;i++)
        {
        for(j=0;j<r;j++)
        {
        printf("%d",a[j][i]);
        }
        printf("\n");
        }
getch();
}
```

Program to add two matrices

```
main()
{
int i,j,a[10][10],b[10][10],c[10][10]ra,ca,rb,cb;
clrscr();
Printf("Enter number of rows and columns of matrix:");
scanf("%d%d",&ra,&ca);
Printf("Enter number of rows and columns of matrix:");
scanf("%d%d",&rb,&cb);
If(ra!=rb || ca!=cb)
{
printf("Matrix addition not possible");
exit(0);
}
else
{
Printf("Enter Elementsof matrix A:");
        for(i=0;i<ra;i++)
        {
        for(j=0;j<ca;j++)
        {
        scanf("%d",&a[i][j]);
        }
        }
```

```
Printf("Enter Elementsof matrix B:");
            for(i=0;i<rb;i++)
            {
            for(j=0;j<cb;j++)
            {
            scanf("%d",&b[i][j]);
            }
            }
             for(i=0;i<ra;i++)
            {
            for(j=0;j<ca;j++)
            {
            c[i][j] = a[i][j] + b[i][j];
            }
            }
printf("Addition of two matrices");
            for(i=0;i<ra;i++)
            {
            for(j=0;j<ca;j++)
            {
            printf("%d",c[i][j]);
            }
            printf("\n");
            }}
getch();
}
```

Program to multiply two matrices

```
main()
{
int i,j,k,a[10][10],b[10][10],c[10][10]ra,ca,rb,cb;
clrscr();
Printf("Enter number of rows and columns of matrix:");
scanf("%d%d",&ra,&ca);
Printf("Enter number of rows and columns of matrix:");
scanf("%d%d",&rb,&cb);
If(ca!=rb)
{
printf("Matrix multiplication not possible");
exit(0);
}
else
{
Printf("Enter Elementsof matrix A:");
        for(i=0;i<ra;i++)
        {
        for(j=0;j<ca;j++)
        {
        scanf("%d",&a[i][j]);
        }
        }
```

```
Printf("Enter Elementsof matrix B:");
        for(i=0;i<rb;i++)
        {
        for(j=0;j<cb;j++)
        {
        scanf("%d",&b[i][j]);
        }
        }
         for(i=0;i<ra;i++)
        {
        for(j=0;j<cb;j++)
        {
        c[i][j]=0;
         for(k=0;k<ca;k++)
        c[i][j] = c[i][j]+a[i][k] * b[k][j];
        }
        }
printf("Multiplication of two matrices");
        for(i=0;i<ra;i++)
        {
        for(j=0;j<cb;j++)
        {
        printf("%5d",c[i][j]);
        }
        printf("\n");
        }}getch();}
```

Three Dimensional Array or Space Array:

Syntax:

data type array-name[space size][row-size][column-size];

Example :

int a[2][3][4];

char name[10][20][5];

N-Dimensional Array

This type of array has n size of rows, columns, space and so on.

data type array-name[s1][s2].....[sn];

Sn--- is the nth size of the array