

Chapter : 5  
Structure data types – Arrays

Examples:

**1. Arrays and basic manipulation on arrays:**

```
# include <iostream.h> [Pg-128]
# include <conio.h>
int a[5], ctr = 0, sum;
void main()
{
for(;ctr<5;ctr++)
{
cout<<"\n Enter value..";
cin>>a[ctr];
}
for(ctr=0, sum=0;ctr<5;ctr++)
sum += a[ctr];
clrscr();
for(ctr=0;ctr<5;ctr++)
cout<<"\n Sum of the elements.."
<<sum;
getch();
}
```

Output:

Enter value..2 6 4 7 8
Sum of the elements..27

**2. [Pg-129]**

```
# include <iostream.h>
# include <conio.h>
char
ch[]={'a','b','c','d','e','f'};
void main()
{
for(int i=0;i<5;i++)
cout<<ch[i];
for(int j=4;j>=0;j--)
cout<<ch[j];
getch();
}
```

Output:

abcdeedcba
------------

**3. [Pg-129]**

```
# include <iostream.h>
# include <conio.h>
void main()
{
int even[3]={0,2,4};
int reverse[3];
for(int i=0,int j=2;i<3;i++,j--)
reverse[j]=even[i];
clrscr();
for(i=0;i<3;i++)
cout<<'\\t'<<even[i]<<'\\t'
```

```
<<reverse[i]<<'\\n';
getch();
}
```

Output:

0	4
2	2
4	0

**4. [Pg-130]**

```
# include <iostream.h>
# include <conio.h>
void main()
{
int x[5]={1,2,3,4,5},
y[5]={5,4,3,2,1},
result[5]={0,0,0,0,0};
int i=0;
while(i++<5)
result[i]=x[i]-y[i];
clrscr();
cout<<"\n The contents of the
array
are: \\n";
i=0;
do
{
cout<<'\\t'<<x[i]<<'\\t'<<y[i]<<'\\t'
<<result[i]<<'\\n';
i++
}while(i<5);
getch();
}
```

Output:

1	-1	0
2	4	-2
3	3	0
4	2	2
5	1	4

**5. [Pg-131]**

```
# include <iostream.h>
# include <conio.h>
void main()
{
int vector[]={2,4,8,10,0};
for(int i=4;i>2;i--)
vector[i]=vector[i-1];
clrscr();
cout<<"\n Elements of array
before
insertion \\n";
for(i=0;i<5;i++)
cout<<vector[i];
vector[2]=6;
```

```

cout<<"\nElements after
insertion\n";
for(i=0;i<5;i++)
    cout<<vector[i];
getch();
}

```

**Output:**

```

Elements of array before insertion
248810
Elements after insertion
246810

```

**7.[Pg-133]**

```

#include <iostream.h>
#include <conio.h>
void main()
{
clrscr();
char name[]="Tendulkar";
int i=1;
while(i<10)
{
    cout.write(name,i);
    cout<<' \n';
    i++;
}
getch();
}

```

**Output:**

```

T
Te
Ten
Tend
Tendu
Tendul
Tendulk
Tendulka
Tendulka

```

If the test condition is (i>=1) and the increment statement is i--

```

Tendulkar
Tendulka
Tendulk
Tendul
Tendu
Tend
Ten
Te
T

```

**6.[Pg-132]**

```

#include <iostream.h>
#include <stdio.h>
#include <conio.h>
#include <string.h>

```

```

void main()
{
clrscr();
char
name[30],address[30],pincode[7];
cout<<"Enter name..";
cin>>name;

```

```

cout<<"\n Enter address..";
gets(address);
cout<<"\n Enter pincode..";
cin.getline(pincode,7,'#');
clrscr();
cout<<"\n Hello.."<<name;
cout<<"\n Your address is.."
    <<address;
cout<<"\n Pincode..."<<pincode;
cout.write(pincode,sizeof(pincode));
getch();
}

```

**8.Manipulating a string: [Pg-135]**

```

#include <iostream.h>
#include <conio.h>
void main()
{
clrscr();
char name[]="Pascal", reverse[7];
int i = 0;
while (name[i]!='\0')
    i++;
reverse[i]='\0';
--i;
int j=0;
while(i>=0)
    reverse[i--]=name[j++];
cout<<"\n The contents of the
string
    are : "<<name;
cout<<"\nThe contents of the
reversed
    string : "<<reverse;
getch();
}

```

**Output:**

```

The contents of the string are: Pascal
The contents of the reversed string: lacsap

```

**9. [Pg-141]**

```

#include <iostream.h>
#include <conio.h>

```

```

void accept(int s[3][4],int
&total)
{
int r=0,c=0;
for(;r<3;r++)
{
cout<<"\n Month: "<<r+1;
for(c=0;c<4;c++)
{
cout<<' \n'<<c+1<<"Quarter...";
cin>>s[r][c];
total += s[r][c];
}
}
}
void display(int d[3][4],int
total)
{
int r,c;
clrscr();
cout<<"\n Sales figures for 3
months
        & their respective
quarters.";
for(r=0;r<3;r++)
{
cout<<"\n Month..."<<r+1;
for(c=0;c<4;c++)
cout<<' \t'<<d[r][c];
}

cout<<"\n Total sales..."<<total;
}
void main()
{
clrscr();
int sales[3][4],t=0;
accepy(sales,t);
display(sales,t);
getch();
}

```

**Output:**

If the values are 2,3,2,1,4,3,2,1,2,1,4,2 then

**THE INPUT:**

```

Month1
1Quarter...2
2Quarter...3
3Quarter...2
4Quarter...1
Month2
1Quarter...4
2Quarter...3
3Quarter...2
4Quarter...1
Month3

```

**THE OUTPUT:**

```

Sales figures for 3 months & their
respective quarters.
Month1 2 3 2 1
Month2 4 3 2 1
Month3 2 1 4 2
Total sales..27

```

**10.[Pg-142]**

```

# include <iostream.h>
# include <conio.h>
void accept(int a)
{
cout<<"\n Enter a number...";
cin>>a;
}
void display(int a)
{
cout<<' \n'<<a;
}
void main()
{
int
num[2][2]={{0,0},{0,0}},r=0,c=0;
clrscr();
for(;r<2;r++)
for(;c<2;c++)
accept(num[r][c]);
clrscr();
for(r=0;r<2;r++)
for(c=0;c<2;c++)
display(num[r][c]);
getch();
}

```

**Output:**

Values=1,2,3,4

```

○
○
○
○

```

If the line "void accept(int a)" is rewritten as "void accept(int &a)" then the output is

```
1
2
3
4
```

**11. [Pg-144]**

```
# include <iostream.h>
# include <conio.h>
void accept(int mat[3][3])
{
clrscr();
int r=0,c=0;
for(;r<3;r++)
{
cout<<"\n Enter elements for
row.."
>>r;
for(;c<3;c++)
cin>>mat[r][c];
}
}
void main()
{
int m1[3][3],m2[3][3];
accept(m1);
accept(m2);
int i=0,j=0,flag=1;
for(;j<3;j++)
if(m1[i][j]!=m2[i][j])
{
flag=0;
break;
}
if(flag==0)
break;
}
if(flag)
cout<<"\n The matrices are
equal.";
else
cout<<"\n The matrices are not
equal.";
getch();
}
```

**Output:**

**FOR EQUAL MATRICES:**

```
Enter elements for row..0 2 5 3
Enter elements for row..1 5 7 3
Enter elements for row..2 4 9 6

Enter elements for row..0 2 5 3
Enter elements for row..1 5 7 3
Enter elements for row..2 4 9 6

The matrices are equal.
```

**FOR NON\_EQUAL MATRICES:**

```
Enter elements for row..0 2 5 3
Enter elements for row..1 5 7 3
Enter elements for row..2 4 6 4

Enter elements for row..0 2 5 3
Enter elements for row..1 5 7 3
Enter elements for row..2 4 9 6

The matrices are not equal.
```

**Exercises:**

**1. Why do the following snippets show errors?**

a) int a[5.5];

**Error;**

Dimension of the array should be an integer.

**Correction:**

int a[5];

b) float f[3]={1,0,2.0};

**Error;**

No error, But the number of elements is one less than the size of the array.

c) float num[A];

**Error;**

Dimension of the array should be explicitly mentioned. The identifier A does not have a value.

**Correction:**

float num['A'];

(or)

const A=10;

float num[A];

d) char[3][]={"one", "two", "three"};

**Error;**

The option for omitting the size of an array is given only for 1<sup>st</sup> index and not the 2<sup>nd</sup> index.

**Correction:**

char[][6]={"one", "two", "three"};

e) char ch[1]='s';

**Error;**

Character array should be initialized using double quotes.

**Correction:**

char ch[1]="s"; (or)

```
char ch[1]={"s"};
```

```
f)char test[4];  
test={"abc"};
```

**Error;**

An array cannot be assigned in this manner.

**Correction:**

```
char test[4]="abc";  
(or)  
char test[4];  
strcpy(test,"abc");
```

```
g)int num[]={1,2,3},num2[3];  
num2=num;
```

**Error;**

Group assignment of array is not allowed. One can assign only component by component.

**Correction:**

```
int num[]={1,2,3},num2[3];  
num2[1]=num[2];
```

```
h)int num[3];  
cout<<num;  
cin>>num;
```

**Error;**

Manipulation of arrays is possible only by specific direction to its elements or components.

**Correction:**

```
int num[3];  
cin>>num[1];  
cout<<num[1];
```

```
i)int roster={1,2,3,4};
```

**Error;**

The variable roster cannot take more than one value since it is declared as simple variable.

**Correction:**

```
int roster=10 (or)  
int roster[]={1,2,3,4};
```

**2. What would be the contents of the array after initialization ?**

```
a)int rate[]={30,40,50};
```

**Contents:**

```
rate[0] = 30,  
rate[1] = 40,  
rate[2] = 50
```

```
b)char ch[6]={"bbbb\0"};  
ch[0]='C';  
ch[4]='T';  
ch[3]='A';
```

**Contents:**

```
ch[0]='C' ch[1]=' ' ch[2]=' '  
ch[3]='A' ch[4]='T' ch[5]='\0'
```

```
c)char product-list[][5]
```

```
={"nuts","bolts","screw"};
```

**Contents:**

```
product-list[0]="Nuts\0",  
product-list[1]="Bolts\0",  
product-list[2]="Screw\0"
```

**3. What would be the output of the following programs ?**

```
a)# include <iostream.h>  
# include <conio.h>  
void main()  
{char ch[]={"END\0"};  
cout<<ch;  
getch();
```

**Output:**

```
END
```

```
b)# include<iostream.h>  
# include <conio.h>  
void main()  
{int a[]={1,2,3,4,5};  
for(int i=0;i<4;i++)  
a[i+1]=a[i];  
for(i=0;i<5;i++)  
cout<<'\\n'<<a[i];  
getch();  
}
```

```
1  
1  
1  
1  
1
```

**Output:**

```
c) # include <iostream.h>  
# include <conio.h>  
void main()  
{  
char name[]={"Jerry\0"};  
int k=5;  
for(int i=0;i<3;i++,k--)  
name[k]=name[i];  
cout<<name;  
getch();  
}
```

**Output:**

```
JerreJ
```

**4. Program writing:**

a)Write a program to declare and initialize an array called as int\_array, that stores number

**10,20,30,40 and 50. Display the sum of all the elements of int\_array.**

**Source code:**

```
# include<iostream.h>
# include<conio.h>
void main()
int
int_array[]={10,20,30,40,50},s=0;
for(int i=0;i<5;i++)
{
s += int_array[i];
}
cout<<"Sum is.."<<s;
getch();
}
```

**Output:**

```
Sum is..150
```

**b)Write a program to declare an array of integers that can hold 10 values. Read the elements of the array from the user, and also display the contents in the reverse order.**

**Source code:**

```
# include<iostream.h>
# include<conio.h>
void main()
{
clrscr();
int a[10];
cout<<"\n Entering the
elements.";
for(int i=0;i<10;i++)
cin>>a[i];
cout<<"\n The elements in reverse
order.\n";
for(i=9;i>=0;i--)
cout<<a[i]<<"\t";
getch();
}
```

**Output:**

If the values are  
1,3,5,7,9,2,4,6,8,3

```
Entering the elements.
1 3 5 7 9 2 4 6 8 3
The elements in reverse order.
3 8 6 4 2 9 7 5 3 1
```

**c)Write a program to read a sentence into an identifier called as word from the user. Using while loop and switch statements, display the count of vowels present in the sentence.**

**Source code:**

```
# include<iostream.h>
```

```
# include<conio.h>
# include<stdio.h>
# include<ctype.h>
void main()
{
char word[50];
char ch;
int count=0,i=0;
clrscr();
cout<<"\n Enter a sentence.\n";
gets(word);
ch=word[0];
while(ch != '\0')
{
ch=tolower(word[i]);
switch(ch)
{
case 'a': count++;
break;
case 'e': count++;
break;
case 'i': count++;
break;
case 'o': count++;
break;
case 'u': count++;
break;
}
i++;
}
cout<<"\n The vowel count is: "
<<count;
getch();
}
```

**Output:**

If the sentence is "I am intelligent"

```
Enter a sentence.
I am intelligent
The vowel count is: 6
```

**d)Write a program to create a matrix[3][3]. Display the diagonal elements along with the sum of diagonal elements.**

**Source code:**

```
# include<iostream.h>
# include<conio.h>
void main()
{
clrscr();
int mat[3][3];
int i,j,sum=0;
cout<<"\n Enter the matrix
values: ";
```

```

for(i=0;i<3;i++)
for(j=0;j<3;j++)
{
cin>>mat[i][j];
}
cout<<"\n\nThe diagonal elements
are:";
for(i=0;i<3;i++)
{
cout<<mat[i][j];
sum += mat[i][j];
}
cout<<"\n Sum of elements:
"<<sum;
getch();
}

```

**Output:**

```

Enter the matrix values:
3 5 2 4 7 9 0 4 6
The diagonal elements are:
3 7 6
Sum of elements: 16

```

```

sum_matrix[i][j]=matrixA[i][j] +
matrixB[i][j];
cout<<"To print sum_matrix.";
for(i=0;i<4;i++)
{
for(j=0;j<4;j++)
{
cout<<'t'<<sum_matrix[i][j];
}
cout<<'n';
}
getch();
}

```

**Output:**

```

Enter the elements of matrixA:
1 3 2 5 7 5 9 0 6 8 0 3 5 2 6 8
Enter the elements of matrixB:
2 4 6 8 4 5 0 2 5 4 7 4 6 5 3 1
To print sum_matrix.
3 7 8 13
11 10 9 2
11 12 7 7
7 11 7 9 9

```

e)Write a program to read values for two matrices namely matrixA[4][4], matrix[4][4]. Write a program to create sum-matrix[4][4] that stores the sum of elements of matrixA and matrixB.

**Source code:**

```

#include<iostream.h>
#include<conio.h>
void main()
{
clrscr();

int matrixA[4][4],matrix[4][4],
sum_matrix[4][4];
int r,c;
cout<<"Enter the elements of
matrixA: \n ";
for(int i=0;i<4;i++)
for(int j=0;j<4;j++)
cin>>matrixA[i][j];
cout<<"Enter the elements of
matrixB: \n ";
for(i=0;i<4;i++)
for(j=0;j<4;j++)
cin>>matrixB[i][j];
for(i=0;i<4;i++)
for(j=0;j<4;j++)

```