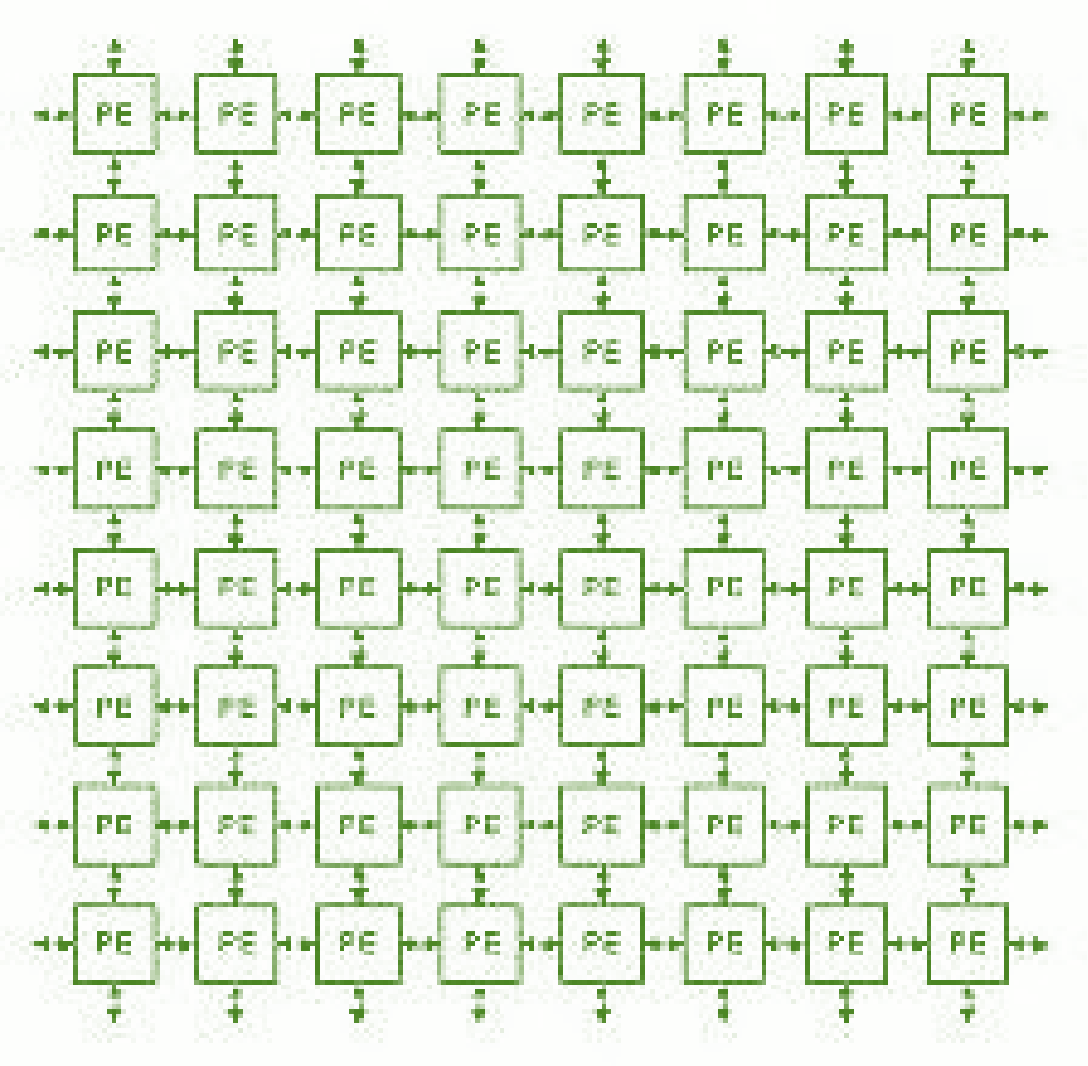


S10_1

1 D - A r r a y s

Objectives

To learn and appreciate the following concepts:

- Declare, initialize and access 1D array.
- Write programs using common data structures namely arrays and strings and solve problems.

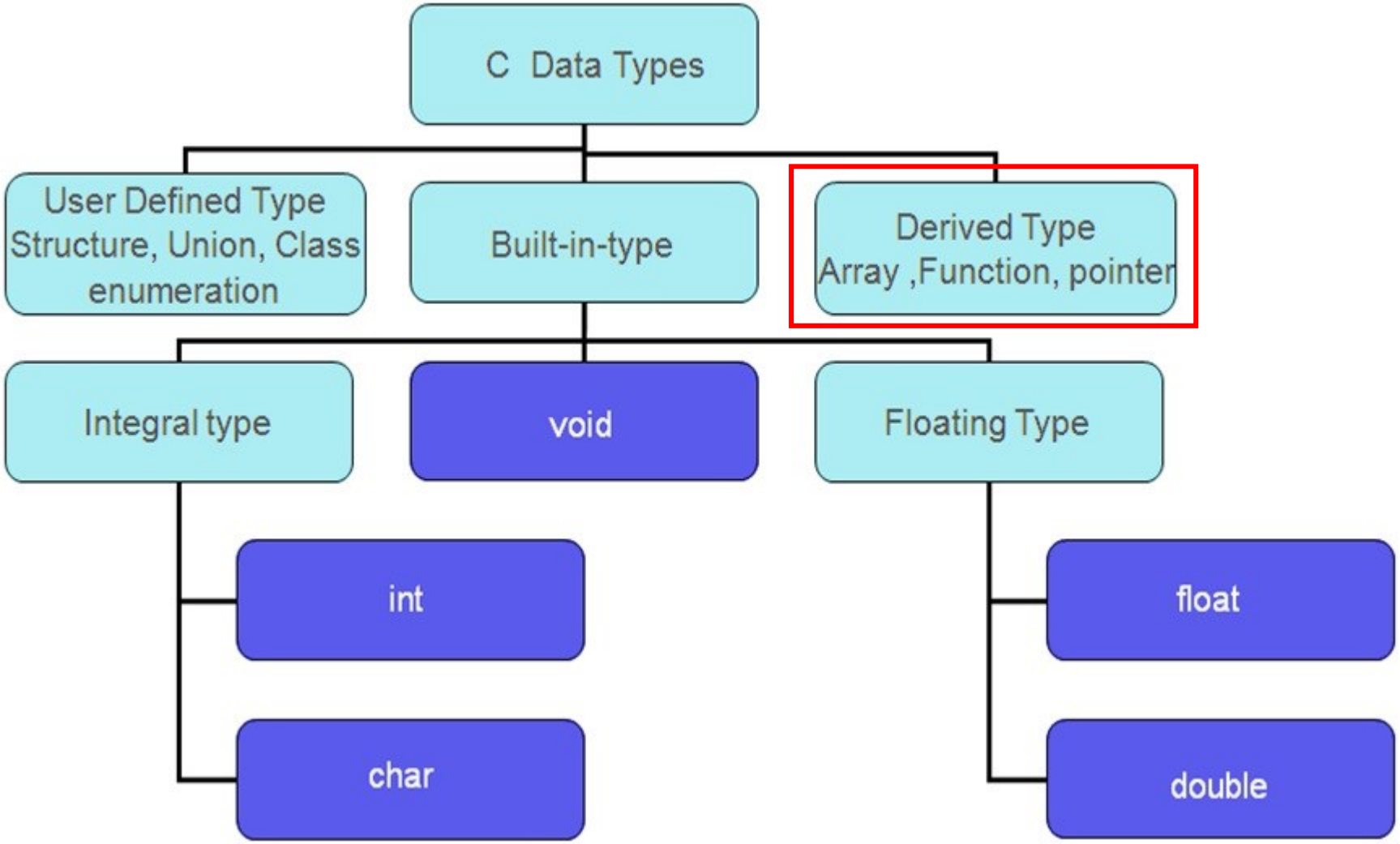
Session outcome

- At the end of session student will be able to

  → Declare, initialize and access 1D array

  → Write programs using 1D array

Data types - Revisit



Arrays

- **An array is a group of related data items that share a common name.**
- The array elements are placed in contiguous **memory locations.**
- A particular value in an array is indicated by writing an integer number called **index number** or **subscript** in **square brackets** after the array name.
- The least value that an index can take in array is 0..

Arrays

Array Declaration:

data-type name [size];

where data-type is a valid data type (like int, float, char...)

✓name is a valid identifier

✓size specifies how many elements the array has to contain.

- size field is always enclosed in square brackets [ ] and takes static values.

- For example an array salary containing 5 elements is declared as follows

int salary [5];

Arrays - *One Dimensional*

Name	roll[0]	roll[1]	roll[2]	roll[3]	roll[4]	roll[5]	roll[6]	roll[7]
Values	12	45	32	23	17	49	5	11
Address	1000	1002	1004	1006	1008	1010	1012	1014

1-D Array memory arrangement

- A **linear list** of fixed number of data items of same type.
- These items are accessed using the same name using a single subscript. E.g. **roll[0], roll[1]….** or **salary [1], salary [4]**
- A list of items can be given one variable name using only one subscript and such a variable is called a **single-subscripted variable** or a **one- dimensional array.**

Arrays - 1D

Total size:

Name	roll[0]	roll[1]	roll[2]	roll[3]	roll[4]	roll[5]	roll[6]	roll[7]
Values	12	45	32	23	17	49	5	11
Address	1000	1002	1004	1006	1008	1010	1012	1014

1-D Array memory arrangement

The Total memory that can be allocated to 1Darray is computed as

int roll [8];

Total size =size *(sizeof(data_type));

Total memory computed for array *roll* is
8*sizeof(int) = 16 bytes
(Assuming a 16-bit architecture)

where size→ number of elements in 1-D array

data_type→ basic data type

sizeof()→ **is an unary operator which returns the size of data type in bytes.**

Arrays - 1D

How to read & display the values of an array and store it !

```
int main() {
  int arr[50],n; // declaration of 'arr'
  printf(" enter value  of n\n");   // no of elements
  scanf("%d", &n);                  // reading the limit into n
 for(int i=0;i<n;i++)
   {
        scanf("%d",&arr[i]);  // reading n elements
   }
for(int j=0; j<n;j++) //displaying n elements
  {
      printf("%d",arr[j]);
      printf("\t");
   }
       return 0;
}
```

```
enter value  of n
5
1
2
3
4
5
1       2       3       4       5
```

Initializing one-dimensional array

```
int number[3] ={0,0,0}; or {0} ;
```

→ declares the variable number as an array of size 3 and will assign 0 to each element.

```
int age[ ] ={16,25,32,48,52,65};
```

→ declares the age array to contain 6 elements with initial values 16, 25, 32, 48, 52, 65 respectively

Initializing one-dimensional array

Initialize all the elements of an integer array 'values' to zero

```
int values[20];
```

Begin for loop

Initialize counter

Set limit for counter

```
for ( int  i=0; i<20;  i++)
```

Initialize element in array 'values'

```
values[i]=0;
```

Increment counter

Printing one-dimensional array

For example

```
int x[3] = {9,11,13};

printf("%d\n",x[0]);

printf("%d\n",x[1]);

printf("%d\n",x[2]);
```

or

```
int x[3] = {9,11,13};

for (int i = 0; i<3; i++)

printf("%d\n",x[i]);
```

Output:

9
11
13

Program to read n elements into an array and print it

```
int x[10], i, n;
printf("enter no of numbers“);
scanf(“%d”, &n);
printf(“enter n numbers  \n”);
for(i=0;i<n;i++)
  scanf(“%d\n”, &x[i]);

printf(“\nNumbers entered are:\n”);
for(i=0;i<n;i++)
  printf(“%d\n”, x[i]);
```

Output:

enter no of numbers

3

enter n numbers

9

11

13

Numbers entered are:

9

11

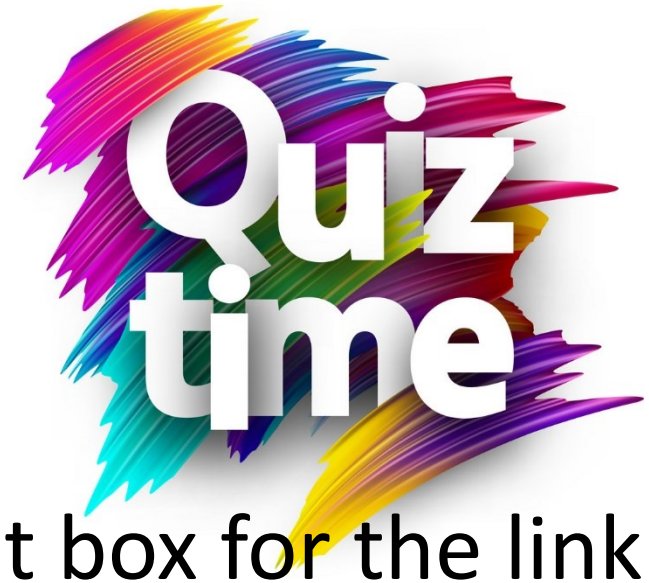
13

Program to add two array elements and store the corresponding sum elements in another array

```
int a[10], b[10], c[10],n, m, i;
printf("enter no. of numbers in first array\n“);
scanf(“%d”,&n);
//first  array reading
for(i=0;i<n;i++)
      scanf(“%d”,&a[i]);
printf("enter no of numbers in second array\n“);
scanf(“%d”,&m);
//second array reading
for(i=0;i<m;i++)
      scanf(“%d”,&b[i]);
if(m==n)
{     //addition
   for(i=0;i<m;i++)
         c[i]=a[i]+b[i];

  printf(“Sum of given array elements\n”);

   for(i=0;i<n;i++)
         printf(“%d\n”,c[i]);
}
else
printf("cannot add“);
}
```



Go to posts/chat box for the link to the question

submit your solution in next 2 minutes

The session will resume in 3 minutes

Write a program to reverse an array

```
int a[20], i, j, n, temp;

printf("enter  n \n“);

scanf(“%d”, &n);

printf("\n Enter values for an array“);

for(i=0;i<n;i++)

 scanf(“%d”, &a[i]);
```

Example : a[ ]={1, 2, 3, 4, 5}

Enter values

n=5

1 2 3 4 5

Reversed array

5 4 3 2 1

Array	**Reversed array**
a[0]=1	**a[0]=5**
a[1]=2	**a[1]=4**
a[2]=3	**a[2]=3**
a[3]=4	**a[3]=2**
a[4]=5	**a[4]=1**

Contd…

Reversing an array

```
for(i=0, j=n-1; i<n/2; i++, j--)
{
   temp=a[i];
   a[i]=a[j];
   a[j]=temp;
}
printf("\n Reversed array: \n“);
for(i=0;i<n;i++)
printf(“%d\t”, a[i]);
}
```

Example :
a[ ]={1, 2, 3, 4, 5}

Output:
Enter values for an array
n=5
1 2 3 4 5
Reversed array
5 4 3 2 1

Arrays

1D Array:

Syntax: **type array_name[size];**

- **Initialization:**

  type array-name [size]={list of values};

  ```
  int arr[]={1,2,3,4,5};
  ```

- **Read:** **Write:**

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

- **examples:**

```
int arr[5]={1,2};
```

arr is 

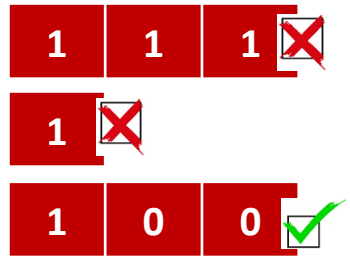

```
int arr[]={1,2};
```

arr is 


```
int arr[5]={0};
```

arr is 


```
int arr[3]={1};
```

arr is 

Summary

- Arrays
- 1 Dimensional arrays (lists)
- Problems on 1D arrays