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Computer Programing in C Department

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ARRAYS in C

* Introduction:

- As we know, in a language there are three three of data types:
 - 1. Primary/Fundamental data thes: int, float, char.
 - 2. Perived data types: array, function, pointer
 - 5. User defined doubt tipes: estaucture, union, enumeration.
- Primary dota types are int, float and char. We already learned primary dota types in detail.
- Arrays are collect derived data types because it uses primary data types as its basic data types.

* What is Array &

- Let's consider a situation where a program needs number of similar these of deuta elements to be stood-
- A variable is used to store one data elements at a time so to store number of data elements; number of variables are required. This solution has many problems:
 - -> As the list of variables increases the length of Program also increases.
 - → To manipulate those variables several cossignment statements also needed.
 - The variables. Leads to semember values of all.
- An auternate solution to above situation is to store similar type of data dements is create an array.

Definition

- ATTOM is collection of elements of similar data. tipes referred by the same variable name. Onliguous memory block is allocented to all these array elements.
- Array elements one of same data type i.e. once array is declared as integer, then all values abido erre present in an array will be of type interior only.

* Need of Array :-

* First Scenario

To store weight of 5 children we need 5 variables as follows.

Void main ()

rajesh, suvarna, surva, Pritesh, Chitra; rajesh = 15;

Surgand = 20; SU070 = 30;

chita = 22;

Pritesh = 21;

Pointf("In *** Weight of Children * * * *");

Pointf ("In Surama = %d In Chitag = %d. In Rajesh = %d In Poitesh= % In Surya= %d, suvarna, chitra, rajesh,

Poitesh, Surya);

If count of variables is small then this idea will work. Similarly to store weight of 100, 1000, or more opilaren bendlaammer apomg geolare that unop

number of variables which is bad idea. Also it is difricult to retrieve particular child's weight as the programmer needs to remember all the variables.

Second Scenario

- Another idea is to use single variable to store these information as shown in following program.
 - int Weight;

 Weight = 25;

 Weight = 20;

 Pointf ("In Weight of child = %d"; Weight);
 - No doubt, this program will point the most recently updated value of the variable i.e. 20. Because initially the variable weight is assigned to 25; and when 20 is assigned to weight. Previous value of weight is assigned to weight.
- A situation in which more than one values needs to be stored at a time, this idea will not work.
- Arroy our handle lots of elements using single name. Instead of declaring lots of variables, used subscript of the variable owled as arroy to store the oxight of children. Using the subscript we can manage random elements of arroy.

Example

- consider the following group Weight = 2 25,20,30,21,229

- DOWNLOADED FROM BATU-EXAMS. In children, to refer the elements 20 of the group the notation weight 2 is used. Similarly, to refer the element 22 of the group notation weight 5 is used.
- But in cose of array, the element 25 is refer-

Weight [1]

→ subscript.

name

- Element's counting start with a instead of 1.

 Bimilating the element 22 referred as weight[4].

 In general to refer and dement of an array

 following notation should be used.
 - Here weight is the subscripted variable (array), where as i is subscript. Where is in the range 0-4 in our-example.

Need of assen -

- Let's consider the following scenario ber proper understanding the need of arrays.
- Array variables are needed because of following requirements of user:
 - -> store multiple values in the vortiable with some name.
 - -> store multiple values (with the same dotatypes) together i.e. store them one after another.
 - -> For easy access or retrieval of stored data elements.

Note that the elements should be of same date type means it ain be group of integers (int B), group of real numbers (floats or doubles), group of characters (charsts) etc. Usually array of characters called as stoing.

& characteristics of an Adout ?-

- Assay can hold only similar type of data.
- Avory is a subsoripted verticable which holds several elements at a time.
- Using subscript random elements can be referred.
- contiguous memory is allocated for elements of among
- Always the array-name is followed by [] wich tells the compiler that we are dealing with an arrowy. Between [and] bracket int tipe of value is needed.
- An array is a collection of similar elements.
- The first elements in the array is numbered as O, so the last element is I less that the size of the array.
- Defore using an arrow its the and dimension must be declared.

* Array Declaration and Initialization

* Array Pedaration -

- While using aroun in a program the first Step is to dedure an array.

An array declaration is performed to tell the compiler what type of dota the array will hold and how much dota elements it can hold.

Syntax

Following statax is used to declare an array.

data_tipe array_name[sixe];

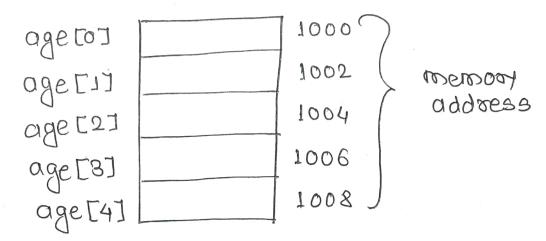
Example

- To declare an array which holds age of five persons following statement is used. int age [5];
- Here, int is the dota the of the arrow age and the number 5 specifies the maximum number of elements which the age arrow an hold.

Assurgement of array elements in memory after declaration:

- As soon as the control goes to the statement of declaring array age [], Immediately contiguous memory block of 10 bytes get reserved in memory for 5 integers.
- According to 16 bit compiler each integer occupies a bytes in memory; 80 5*2=10 bytes should be reserved for array of 5 integers.

The memorpowner from BATU-EXAMBLISHED OB 60110008:



tigures- Memory structure after declaring

- size of array can be conculated by using the size of () operator. Like:

Bizeof (age);

it will give the memory space occupied by the array in bytes. Suppose age is an intger array and has the corpacity of storing 5 humbers. Then the size of (age) will owbut 5*2=10.

- All the locations will contain garbage values until the we initialize the array.

* Arroy Initialization :-

- Array initialization is the process of assigning the value to array elements. After declaring the array it will contain garbage values until we initialize it. There are different ears to initialize an array.

```
Ways to Initialize as array once it is declared.

2. Initialize an array while declaring

tig: Ways to initialize array.
```

1. Initialize an array once it is declared:

Example:

```
int age [5]; // declaring array.

age [0] = 20; // initialize 20 to first location.

age [1] = 25; // initialize 25 to Second location.

age [2] = 30; // initialize 30 to third location.

age [3] = 40; // initialize 40 to fourth location.

age [4] = 45; // initialize 45 to fifth location.
```

- 2. Initialize on arroy while declaring:
 - We can combine the declaration and initialization of array like:

Example:-

```
int age[5] = {20,25,30,40,459;
int age[] = {20,25,30,40,459;
```

Then the Gize of array is optional (as shown in example). The values going to be initialized and separated by comma (.).

- Above two stevements assigned to excond element i.e. age[0], 25 is assigned to excond element i.e. age[1], 30 is assigned to third element i.e. age[2], 40 is assigned to fourth element i.e. age[8], and 45 is assigned to fifth elementice.

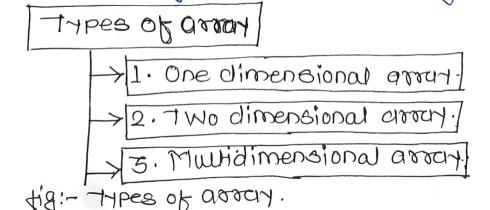
 age[8].
- Arrangement twof array elements in memory after initialization is shown below.

agetoj	20	1000
age[17	25	1002 (Memory
age[2]	30	1004 Address
age[3]	40	1006
age[4]	45	1008

figure: Memory structure after initializing the arroy of 5 integers.

* Types of Assery :-

- Arouns are contegorized according to the dimensions used to define it. Here dimensions indicates the number of rows and columns used to set size of array.
- Array has contegorized into following thee.



- An array with single subscript is couled as one dimensional array.

Declaration of one dimensional amor-

Syntax:-

data_type array_name [sixe];

Example -

- Declare an array to store percentage of 10 students. Hoat percentage [10];

Initialization of one dimentional error-

Syntax:-

array_name [subscript] = value;

Example:-

- Initialize an array to store percentage of 10 etudents.

Percentage [0] = 99.07;

Percentage [1] = 54.04;

Percentage [2] = 60.60;

Percentage [3] = 79.47;

Percentage [4] = 92.70;

Percentage [5] = 80.60;

Percentage [6] = 85.27;

Percentage [7] = 90.30;

Percentage [8] = 99.70;

Percentage [9] = 94.50;

- Using subscript we can assign value to specific and element the order of assignment statement doesn't mother in above example. It will form following of otherwise in memory.
- memory arrangement after declaring one dimensional

Entering or Writting Deuter into One Dimentional Arroy-

- We can enter devel into arrow by array initializotion or by accepting array elements from user. We have seen how to initialize data, now we are going to study how array to accept array elemeut from user & store it in array.

for (i=0; i<10; i++)

3

Pointf ("In Enter proceedage of Student %d:", i+1); Scanf ("% t", & percewege [i]);

Accessing or Reading pota from an one Dimentional

- While accessing array element are can use loop

Just like used in assisting down into array down't

difference is that reading down into array down't

```
for (i=0; i<10; i++)
        Printf ("In percentage of Student %d: %f, i+1,
                                        percewage[i]);
* Majte a broducion do georgia assert 40
  tage of 10 students. Accept percentage fours usex
   and point on the screen.
 #include <stdio.h>
 #Include <conto.h>
  int main ()
    float percewage [10];
     inti;
     too (i=0; i<10; i++)
       Pointf ("In Enter percentage of student %d: ", i+1);
       Scanf ("% f", & percewage [i]);
    for (i=0; i<10; i++)
      Pointf ("In percentage of Student %d: %=====, i+1,
                                        percentage [i]);
      Jeturn 1;
```

```
DOWNLOADED FROM BATU-EXAMS.in
                           the following program.
  * Write the output of
    Void main ()
     3
        int sub[10]; i;
        for (i=0; i <= 8; i++)
             sub[i] = i;
          g Paintf("In%d", subli]);
 Solution -
     at will beagace combilation easons: "i mas not
     declare". After declaring i tollowing output will
     be displayed.
     \bigcirc
     1
     3
     5
     7
     8
* Write the output of following program.
   #include <oldinin>
    Void main ()
     2
        inta [5] = {1,2,8,4.59:
        boint ( "% d", a [4]);
```

```
Solution -
```

It will produce following output.

```
5
```

Find the error in following program and justiffit:

#include (estation h) void main () ?

int i, a[5] = {7,5,2,1,9,14};

for (i=0; i<5; i++)

Paintf ("%t", a[2]);

getch ();

3

Solution :-

It will beagance following eason:

- Too many initialization for "int [5]"
- As the capacity of away is to store 5 elements, in code 6 elements are initialized.
- % f wrong modifier.
- getch() will show error as conioih is not included.
- * Find the Error in following Program & justify it:

 #include < etdio.h>

 Void main()

 2

int x;
int xx[3] = { 111, 222, 333, 444 };
for (i=0; j<3; i++)
point ("", f", a[i]);

solutions-

It will produce following ordors

- Too many initializers for int [3]'
As the carpacity of around is to store 3 elements, in code 4 elements are initialized.

i' was not declared in this ecope.

'i' was not declared in this ecope.

'd' was not declared in this scope.

Exect variable should be declared first before it is used.

% t is used for float and not for this.

expected '3' at end of in put every 3 should have 3.

* Find error in following program and justiff it. #include <etdio.h>
Void main ()

§

int I, a[5] = {7,5,2,1,9,14};

Point ("% f", a[2]);

get ch ();

solution :-

- Too many initially east for int [6]?
- % t is used for floats and not for ints.
- getch() is not declared in the scope.
 getch() will show error at conioih is not included.

* TWO DIMENSIONAL ATTOLISMS.in

An array with two subscripts is couled as two dimensional array. 20 arrays are mostly used to perform matrix operations.

Declaration of two dimentional array-

Syntax %-

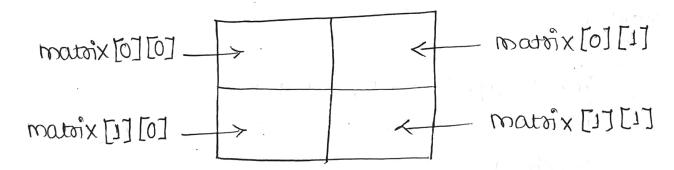
data-type array-name [row size] [column size];

Example:

- Declare an array to store a 2x2 matrix int matrix [2][2];

The 2x2 mostrix cetare 2x2=4 values. In our example data the of array is integer means the four values are of int the.

In user's view the matrix looks like;



- But in memory it will form different structure.
- Memory management arrangement after declaring two dimensional arran shown in figure on next page.

matrix [0][0] (3000)
modrix [0][1] 3002 memory
matrix [17 [0] 3004
matrix [1][1] 3006)
Initialization of two dimentional array
8-intax:
array_nome[row-number] [rolumn_number] = value;
Example:-
- Initialize an array to store values for 2x2 matsi
metrix [1] = 9;
matrix [0][0] = 7;
matrix [0][1]=6;
matrix [1] [0] = 5;
- Using subswipt are on assign value to specifi
array element. The order of designment state
ment accept mouter in above example. It
will assign the values given as following fig.
matrix [0][0] 7 6 matrix [0][1]
matrix [1][0] 5 9 matrix [1][1]
- In memory initialized values are stored in
sequential row as shown in figure on next
page.

	DOWNLOADED FROM BATU-EXAMS in
	matoix [0][0] 3002 memory
	matrix LOJLIJ add ress
	100000111001 =====
	matoix [1][1] 3008
	5 in mention that into 7000 Dimention
	Entering or writting Data into 7000 pimention
	ATTOCK 0-
	- We can enter dated into array by array
	initialization or by accepting entrar
	Third action of by account
	elements Leon neer.
	- Mala la constant de initialize data.
	- We have seen how to initialize data.
	Now we are going to estudy how to accept arong element from user and estore into
	groady eleroleur from user and creek with
	2P arroy.
	- The reliance and is used to account value
	- The following code is used to accept values es for exe moutoix foores uses fotose
	in into 210 Aroch.
	II) IINO ZD MOCH.
	Drint H ("ID Foter date for DD matrix \D"),
	point f("In Enter data for 20 matrix \n");
· ×	
	ter (j=0; j<2; j++)
	Ž
	Pointy ("In mowoix [%d] [%d]: 1t", i,j);
-	Scant ("%d", 4 matrix [i] [i]);
	7
•	35
	- For 2D array, two for loops are used. One
	The land (i.e. outer for loop) for son and
	another for 100p (i.e. inner for 100p) is for
	Column.
	- Point +() tripotion is used to reminet
	- Point () function is used to request Uses to enter the data.
7/	COUNTY OF COUNTY

	DOWNLOADED FROM BATU-EXAMS. in
	- Scent to function is used to take input from user. & motrix [i] [i] tells the compiler to
	grove the entered value as ith row and jth column in mourix. Here value of i and j
	ith column in matrix, Here value of i and i
	varies from 0 to 1.
	Accessing or Reading Data from an two Dime-
	nsional Array-
	- As we use two for loops for writting the data into 20 array, likewise we
	the data into 20 array, likewise are
	an use two few loops to read greated
	from 50 aread.
	- Only difference is that in reading data from
	array cloesn't require the scanf () function. The following code is used to access elements
	The tollowing code is used to access elements
	of two dimentional array:
	Pointh ("In The mouth'x is: \n");
	tor (1=0;1<2;1++)
	9
	fer (j=0;j<2;j++)
	Point ("%d", motrix [i][i]);
	Print ("\n");
	3
	* Write a program to accept values for
	exe matorix & point them.
	11 9 1 1 1 1 1 1 1
7	#include <stdio.h></stdio.h>
	#include <conio.b></conio.b>
	int main ()
	int matrix[2][2], i, i;
	point ("In Enter close the 2D motoix/"):
	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

```
DOWNLOADED FROM BATU-EXAMS.in
        point ("),d", & modojx [i,d]: It", i,i);
 point ( The modoix is: In");
      ter (j=0; j<2; j++)
                  "b", mousix [i] [i]);
 Teturn 1;
output:
Enter data for matrix
 [0] [0] xiotom
                      12
 [1] [0] xiotusm
 COJ CLJ Xiotom
                      32
 matrix [1] [1]
                      10
 the moder'x is:
   12
  82 10
```

- But in memory it will from different staucture.

- Memory arrange ment after declaring mutidinentional arran shown in figure on next page.

	DOWNLOADED FROM BATU	EVAMC in	
	COJ EOJ EOJ EOJ	-EXAMS.III	1000
	CIJ EOJ EOJ EIJ		1002 (memory
	LOJ LIJ LOJ HOLLO		1004 Address
	ETJ ETJ EOJ FIDTO		1006
	LOJ LOJ LIJ LOSED		1008
	CL21 CO2 C17		1010
	LOJ LIJ LIJ LOJ		1012
	CETET LIT LITE		1014)
*	CORTE		
	Disitialization of musti	dimentio	nal grock
	Sintax -		
. La	&		
	array - hame Frow-num	ber][wi	o_number [column
		number.	j
	Example -		
	Initialize the mu	Hidime	utional array
-	01807 [0] C7] C	17 = 9;	
	TOJ TOJ		
	[] [o] [o]] = 6;	
	67 [17 [0		
-	to to to	7 = 2;	
	E12 C02 C1] =8,	
=	בוש בנוש בנוש	57 = 4;	
	י בוזבוזבו] = 8;	
-			
		7	
-			
	Come , Fort Kart Mit		
	7.47		[[][0][0] ha
	0 5 [0][1][0] porto		1 COT [] [D] PO
-		3 000	97 [1][0][1]
	array[17[17[0] 84 7	88 am	at [1][1][1]
	7	1	•
	- In memory initial	ized ve	wes are stored
	in esquented row	DY NOW	manner as
	appear on next po	ige.	
		7	The state of the s

LOJ COJ COJ HOGED	7	1000)
	6	1002
	5	1004 > wewce,
	9	1009 Add 0888
7	2	
		1008
	4	7010
	8	1012
	3	1014)
Entering or	20st tiro	data into mutidimentional
	20	
- The following	og eod	er 4 store it into BP
elements to	su mor	er 4 store it into BP
aread:		A
	14	96
baut ("IN F	nter d	ora for 80 arear (b");
fae (1=0;	1<2;	1+)
	-	
7		
Par (1=0	1,122,1	++)
7		
for (K	=0; KC	2; K++).
		Sec.
		THE [Not [Not] [Not] [Not];
Sour Sour	x("% d	", famoy [i] [i] [k]);
3	0	
~ ~		
~~~~?		
٧		
•		

- For example: Initialize an array to etobe  ""Hello" word.  """Hello" word.  """  """  """  """  """  """  """		DOWNLOADED FROM BATU-EXAMS.in
Therefor and character army as input  Orach [2] = 1,  Orach [2]   1,  Orach [2		- For example: Initialize an array to store
array [1] = "e"  array [2] = "1"  array [3] = (1"  array [4] = "0"  — The will form following etaneure in memory  — Memory arrangement after declaring chance  ther array enoun in figure.  Orray [7]   8002   Address  array [4]   0 8004    array [4]   0 8005    **Character and etaing Input Output  — For taking a character array as input  yie access expecifier is used with early  tunction.  — The following code is used to accept a  character from user and store it in  array.  **Core (i=0; i<10; i+t)  **Jan (i=0; i<10; i+t)		so Hello,, coosa.
arroy [2] = *1"  arroy [3] = (1"  arroy [5] = *10"  — The will form following extructure in memory.  — Memory arrangement after declaring character arroy [2]   8002   Address  arroy [2]   8002   Address  arroy [3]   1 8002   Address  arroy [4]   0 8004    arroy [4]   0 8005    * Character and character arroy as input  yic access specifier is used with early  tunction:  — The following access is used to accept a  character from user and store it in  arroy (i=0; i<10; i+t)		
array [3] = 12°  array [5] = 10°  — The will form following etaneure in menony—  — Memory arrangement after declaring changement after declaring as input you accept a changement after and end end end end end end end end end e		
array [4] = "0"  Orray [5] = "10"  — The will form following etal chare in menony.  — Memory arrangement after declaring character array examples in tigure.  Orray [0] H 3000 7  Orray [1] E 8001 (Memory Address Address Address Address Address Address Address Address Address Array [4] O 3004  Quaray [4] O 3004  Quaray [4] O 3005  * Character and String Input Output  — For taking a character array as input yie access specifier is used with sanfi) tunction.  — The following ade is used to accept a character from user and store it in array.  * tar (i=0; i<10; i+t)		array [2] = 61,
- The will form following entructure in memory  - Memory arrangement after declaring change their array enoun in figure.  CHER ARRAY END I 8002 Address  CHER ARRAY ENT I 8002 Address  CHERCALLY O 8004 Address  CHERCALLY ON 8005  **Character and String Input Output  - For taking a character array as input  1/10 accept a character following code is used to accept a character following code is used t		
- It will torm following extructure in memory.  - Memory arrangement after declaring changement after declaring and after array [1] \$000 }  - Address  -		
- Memory arrangement after declaring change cher array shown in figure.  Orray [0] H 3000 7  Orray [1] E 8001 (Memory)  Orray [2] I 8002 (Address)  Orray [4] O 8004  Orray [4] O 8005  **Character and String Input Output  To access specifier is used with sanki)  tunction.  - The following ade is used to accept a character from user and store it in  Orray [4] O 9000 is used to accept a character from user and store it in  Orray [6] (i=0; i<10; i++)		07707 [5] = 207
Orroy [7] E 8001 (Memory)  Orroy [7] I 8002 Address  Orroy [8] I 8003  Orroy [4] O 8004  Orroy [4] O 8005  **Character and String Input Output  "Ic access-specifier is used with santo  tunction.  The tollowing ade is used to accept a  character toom user and store it in  Orroy [4] O 10; i++)		- It will form following extructure in memory.
Orroy [7] E 8001 (Memory)  Orroy [7] I 8002 Address  Orroy [8] I 8003  Orroy [4] O 8004  Orroy [4] O 8005  **Character and String Input Output  "Ic access-specifier is used with santo  tunction.  The tollowing ade is used to accept a  character toom user and store it in  Orroy [4] O 10; i++)		- Memory arribagement after declaring chara-
Orroy [7] E 8001 (Memory)  Orroy [7] I 8002 Address  Orroy [8] I 8003  Orroy [4] O 8004  Orroy [4] O 8005  **Character and String Input Output  "Ic access-specifier is used with santo  tunction.  The tollowing ade is used to accept a  character toom user and store it in  Orroy [4] O 10; i++)		cter array shown in figure.
Array [7] [ 3001 (Memor)  Array [7] [ 3002 (Address  Array [8] [ 3003 (Memor)  Array [4] [ 3003 (Memor)  Array [8] [ 1 3003 (Memor)  Array [8] [ 1 3003 (Memor)  Address  Address  Array [4] [ 3004 (Memor)  Array [8] [ 1 3003 (Memor)  Array [8] [ 1 3003 (Memor)  Array [8] [ 1 3003 (Memor)  Address  Address  Address  Array [8] [ 1 3003 (Memor)  Address  Address  Address  Address  Array [8] [ 1 3003 (Memor)  Address  Address  Address  Address  Address  Array [8] [ 1 3003 (Memor)  Array [8] [ 1 3004 (Memor)  Array [8]		0.000
Array [27]   3002 Address  Gray [3]   3003  Gray [47]   0 3004  Gray [47]   0 3005    ** Character and String Input Output  To taking a character array as input  "I'c access-specifier is used with santo  tunction.  The tollowing code is used to accept a  character from user and store it in  Gracy:  (i=0; i<10; i+t)		0,100
Grantel 1 3003  Grantel 0 3004  Grantel 10 3005  ** Character and String Input Output  - For taking a character array as input  1.c access-specifier is used with sanfor  tunction.  - The tollowing code is used to accept a  character from user and store it in  array.  tor (i=0; i<10; i+t)		00007 [1]
Array[47] O 3004  Array[5] 10 3005  ** Character and String Input Output  The taking a character array as input  Yie access-specifier is used with sanfor  tunction:  The tollowing ade is used to accept a  character from user and store it in  array:  tar (i=0; i<10; i+t)		0,100,100
A Character and String Input Output  The tollowing and is used with sanking and and is used to accept a character from user and store it in a sory.  The (i=0; i<10; i++)  The character from user and store it in a sory.		9,100 [0]
* Character and String Input Output  - For taking a character array as input  1/10 access-specifier is used with sanfor  tunction:  - The tollowing ade is used to accept a  character from user and store it in  array:  tor (i=0; i<10; i++)		9005
Too taking a character array as input  1.c access-specifier is used with sanfor  tunction.  The tollowing code is used to accept a  character from user and store it in  array.  tor (i=0; i<10; i++)		9,000
tunction.  — The tollowing code is used to accept a character from user and store it in arran.  tor (i=0; i<10; i++)		* Character and String Input/Output
tunction.  — The tollowing code is used to accept a character from user and store it in arran.  tor (i=0; i<10; i++)		- Fox taking a character agree as input
tunction.  — The tollowing code is used to accept a character from user and store it in arran.  tor (i=0; i<10; i++)		of access execution is used with sant)
- The tollowing code is used to accept a character from user and store it in arach.		tipotion:
\$00 (i=0; i<10; i++)		
dasch.		character tours user and stone it is
tor (1=0; 1<10; 1++)		I variable to the second of t
point ("In Fotor of character. 12").	100	
		wint ("In Enter of character: 11").
acompt coop and a coop of the state of the s		point (" "> Enter a character: 1 !");
O Coco, a array [i]);		O Coco, a array [i];
J		J
- And for displaying entered character around as output following code will be used:  point ("In Entered around is:");  tor (1=0; i<10; i+1)		- And for displaying entered character
array as output tollowing code will be used!		citrary as output tollowing code millbeugh!
point ("In Entered aroun 13.").		point ("In Entered arread is .").
tor (1=0; i<10;i+1)		108 (1=0; i<10;1+1)

```
DOWNLOADED FROM BATU-EXAMS.in
    pointh ("%c", array [i]);
* Waite a propagation to declare a character crown
                     Store 10 Chanacters and printit.
   to accept and
 501<sup>n</sup>→
  #include < stdio. b>
  #include (conio.h)
   int main ()
     Char array [10];
      int :
       point ("In Enter 10 characters; It'");
           Scort ( "%C", & assarti];
      Point ("In Entered array is:");
            point ("%c", aroay [i]);
    return 1:
  Enter 10 Characters:
                          book
  Entered
```

*	Dillemance Lateren Cl	paracter Arroy and
	Difference between Ch	TO G G G G
	31700900 113041	
parameters	Character Array	JUFEDER YOLAY
pata type		Data type of a integer
	array is char.	grown is int.
Access	% c is used to access	% d is used to access
ebecilier	elements of characters	elements of integer
	oused.	0.00014.
_		
Includes	The character array con	The integer aroun con
	contain numbers, Embos	contain only integer
	as well as alphabets , But	values.
	all ralines will be treated	
	as characters.	
Declaration	Char array [5];	int one tet.
pacy doubles	C1201 01100   L039	int age [5];
Initialization	char aroay [5] = {a', 'b',	int age (5) = 310 02 23 422
4-11/100/10/00/10	'c', '1', (2'?;	(32, 22, 23, 7)
-	<del>, , , , , , , , , , , , , , , , , , , </del>	
Size	Size of an array depends	An integer uses 2 bite
	on its data type. A charage	to store so the size
	ctor uses 1 byte to store	Of an integer groun
	so the size of a chara-	is double of the
	often array is equal to	number of integers
	the number of chara-	it stores.
	cters it stores.	tor example:
	to example:	int array [5]:
	Char assay (27;	Need 5*2 = 10 12/185
	Heed 5 bytes to reserve.	to reserve.

		DOWNLOADED FROM BATU-EXAM	S.in
	* Woite a	program to accept	a stoing from
	user a	nd paint it.	7
	#include	<stdio.h></stdio.h>	
	#include -	(conio.h)	
	int main	( )	
	3		
		3to [10];	
	points	(CIN Enter a string:)	(£'');
		(eco/08", Sto);	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	points	("In Entered strong"	(S; % S", Str);
	Tetur	1 9	· · · · · · · · · · · · · · · · · · ·
-	Q GCOTOT	1 in the second of the second	· · · · · · · · · · · · · · · · · · ·
	5		
	output	- de le	1-
	<u> </u>		
	Epter a	String: programmin	Q
	Enterred	etring is: program	omina .S
1 1		10. 1000	1,710
7	Difference	res bet Array 4	String
			4.01
	Parameters	Array	String
	Darlor du co	21 21 21 21 21 21	Cl 'a Call call and
	Duta 74 pe	Array otores ele-	6+ono is collection of
	2	ments of some	numbers, letters 4
		data type.	characters; but every
			Bingle unit of the
			string treated as
			CE 100000 0137.
	Space	The space character	String contains
		is not allowed in	space as a
		crosoly. Elements	Character.
		of array should be	
	_	countinious.	
	Contain	Array can herre	ctoing is made
		muniple types like	up of
		integer creat, cha-	characters.
		eacher areal.	
		746	

*	Operations on Array:
	- Apast from inputing and outputting elements
	This and array from array, many operati-
	one can be performed on array.
	Operations on Aman an
	1. Peleting elements in anay
	2. Calallating sum and average of arrely elements
	3. counting Prositive and negative numbers in
	the dosay.
	4. Searching an element in an array.
	5. Finding the smallest or largest element
	trom an arroy.
	B. Sooting the array elements in escending
	7. Addition, substraction, Multiplication and
•	: Division of two Databetts, arrays.
	2. Cinding Transpose of Motoix.
	8. Finding Transpose of matrix. g. Addition, Substraction, Mutiplication and
	pivision of two Matrices.
	10. Converting the case of characters.
	110 Calculate the length of stoing.
-	12. Check Whether string is palindrome or not.
	15. compare two stong.
	14. Opt stoing into another stoing.
١	
_ 4	

```
Deleting elements from array:-
    the deletion of elements of array doesn't
     Offeet around Bixe.
     following program shows the example of deleting the element at specified location
      in groot. And also check whether the given
      Position is less than arout size or not.
Write the program to accept the position from user and delete the element at that position
   trom array.
 # include (Bldio.h)
 # include < conio. h>
  int main ()
    int array [20], pos, i, n;
    points ("In Enter the elements you wants to insent
              into assayin");
    Scant (" % d", (n);
    point ("Enter the elements \n", n);
     too (i=0;i<0;i++).
          Scant ("%d", 40000/[1]);
```

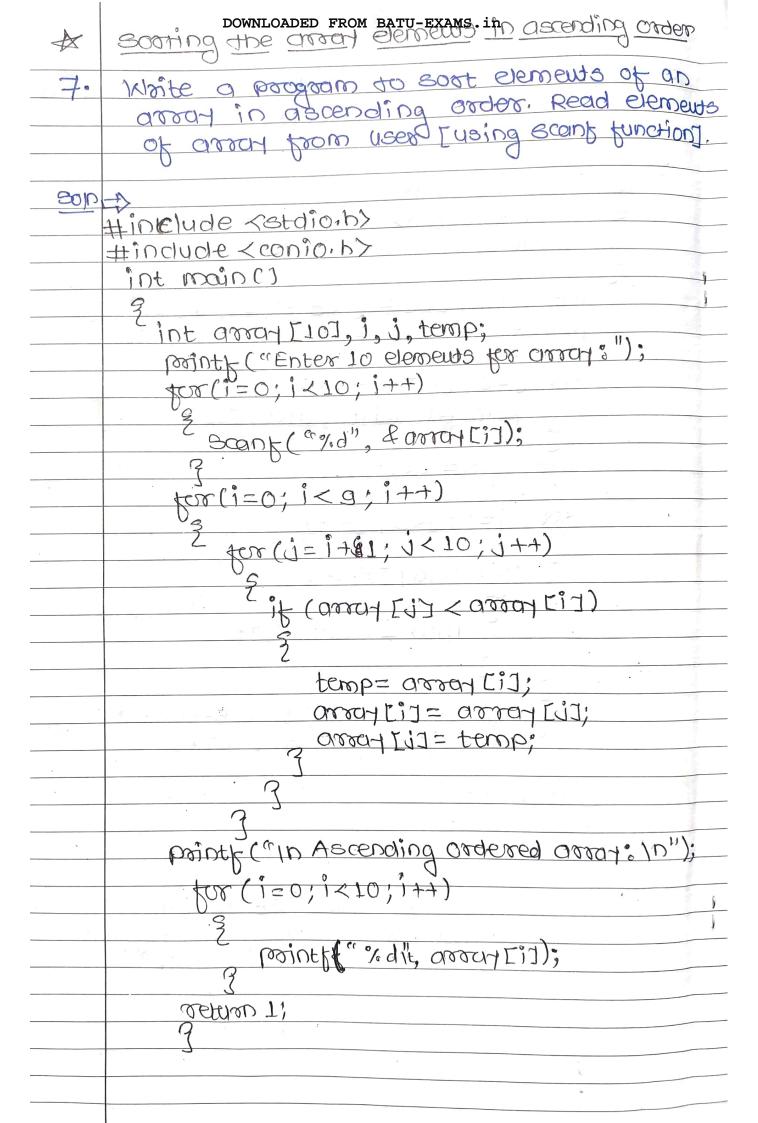
	DOWNLOADED FROM BATU-EXAMS.in
	point + ("Enter the position of elements to be
	point; ("Enter the position of elements to be deleted In");
	sant ( " / d", 4 pos);
	14 (000 > - 0.11)
	$\frac{1}{1}\left(\frac{1}{1}\left(\frac{1}{1}\right) + \frac{1}{1}\left(\frac{1}{1}\right)$
	point (" Deletion not posible. \n");
	paint ( Deletion not bospiple / 10 );
	S
	Use
	9 -
	for (i= pos-1; i< n-1; i++)
	-5
	assar[i] = assar[i+1];
7-	
	point+ ("Alter deleting elements at ").d
	point ("After deleting elements at 1.d. location the other is In", Pos);
- "	(i=0; i< Þ n−1; i++)
	3
	point ( «%d/D", array[i]);
	3
	J
	geturn 0;
<u> </u>	tout:
	Enter number of elements want to insert in
	the array
	Enter 4 elements
	2
	3
	4
	Enter the nonition of clament 1-1 101111
	Enter the position of element to be deleted.
	After deleting element at 3 location the array is
	1.
	2
	4
· ·	

2.	Calculating DOWNLOADED FROM BATU-EXAMS.in array elements
,	* Write a program to find sum and average manks
	* Write a program to find sum and average manks obtained by a class of 10 students in a test.
	#include (stdio.h)
	#include <conio.b></conio.b>
	int main ()
	3
	int avg = sum = 0;
	int i;
	int marks [10];
	tor (i=0; i<10; i++)
	of the control of steed out of de " ) o
	pointly ("In Enter Mark of Student"/od;", i);
	Book ( "%d", & marks[i]);
0	for (i=0; i<10; i++)
	. 12 10 11 11
8	Sum = Sum + mark[i];
	B
f -	point ("in sum of marks = "/d", sum);
	avg = Sum /10; point ("In Average marks = %d", avg);
-	printf ("In Average marks = %d", avg);
-	
0	
Q	tput;-
7	Enter Mark of Student 1: 70
	Enter Mank of Student 2: 89
	Enter Mark of Student 4: 82 Enter Mark of Student 4: 97
	Enter Mark of Student 5: 76
	Enter Mark of Student 6: 66
	Enter Mark of Student 7: 64
	Enter Mark of Student 8: 72
	Enter Mark of Student 9: 88
	Enter Marc of Student 10: 60
	sum of Marks = 764
	Average of Marks = 76
	0-0.5.15

	DOWNLOADED FROM BAIU-EXAMS.III
3"	Counting positive and negative numbers in the
	02201
*	Naite a paragram to find out number of positive negative and zero elements from an array.
	#include (stdio.h)
	#include < conio. h>
	Void main ()
	ş :
	int numbers[5];
	int i=0, cnt-pos=0, cnt-neg=0, cot-zeroso;
	tor(i=0; i<5; i++)
	3
	points ("In Enter the Number;");
	ean f ( "%d', fnumbers[i]);
	if (numbers [i] <0)
	2
	Cot-neg++;
	it (numbers [i] == 6)
	S
	Cnt-zero++;
,	9
	it (numberstil =>0)
	2
	CDt-POS++;
	3
	get che;
	3
	printf("In Number of the numbers = %d" (nt-pos);
	brinth ("In Namper of -xe nampers= %" cuteron),
	point ("In Number of Zeros = %d", cnt-zero);
	getch();
	?

5	Monte a program to find smallest Number in 5-element integer array.
801 ^D	<b>\</b>
	#include <stdio.h></stdio.h>
	#include < conio. h>
	int main ()
	9
	int array [5] = 983, 30, 34, 51, 329, j;
	point ("In Array elements are;");
	for (j=0; j<5; j++)
	pointf("%dIt", Orray[i]);
	3
	int main = arroy [0];
	for (j=1;j<5;j++)
	(aim>[i] (orm) di
	3
	min = array [i];
	3
	3
	Print ("In smallest humber in 5-element
	Pointf("in smallest humber in 5-element integer arroll is: 1, d", min);
	return 1;
	3
<u>C</u>	output o-
	Array elements are; 39 30 34 31, 32
	emallest number in 5-element integer.  array is: 30.

6.	Write a program to find largest number in 5-elements integer array.
	5-elements integer array.
8	olwion =>
	#include <stdio.b></stdio.b>
	#include < conio.h>
	înt main ()
	int array [5] = ? 38, 30, 34, 31, 829, j;
	10t 0mon (6) = 7 35, 30, 57, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 51, 52, 52, 51, 52, 52, 52, 52, 52, 52, 52, 52, 52, 52
_	point ("In Array elements are: 1t");
	tor (j=0;j<5;j++) =
	100 (1-0, 10 50 11 1 1 Carada 12:17);
	point ("%d/t", aroan [i]);
	3 - 1 2001 - 00000 1 1011
- 12	int wax = assat [0];
	for (j=1; j<5; j++)
	3
	it (array [i] > max)
	3
	max = array[j];
	3
	3
	point ("In largest number in 5-element integer
	point ("In largest number in 5-element integer array is: It % d", max);
	Jetum 1;
	Z.
	J
C	atput ?-
	Array elements cite; 38 30 34 81 32 10 regest number in 5-element in-leger enrey is; 30
	10 rest number in 5-evenieur 11) again array 100



01	utputo-
-	Enter 10 elements for array: 40
1	46
	24
	73
	80
	10
	79
	44
Bert States	21
	23
	ascending ordered array:
	10 21 23 24 40 44 46 79 79 80
8.	Write a program to sort elements of an
	arroy in descending order.
- I	O C
, sol'	
	#indude <stdio.h></stdio.h>
•	#indude < conio.h>
	int main ()
	5
	int array [6], i, i, temp;
	point ("Enter & elements for array:"); for (1=0; 1<6; 1+1)
	tor (1=0; 1<6; 1+1)
	3
*	Scanf ("%d", Larray Til);
, , Ha	

```
temp= orray [i];
         CITY HORED = [1] HORED
pointf("In decending ordered array; In");
       Pointy ("%d It", around [1]);
  return 1;
Enter 6 elements for anoch:3
descending ordered array:
```

```
Addition, Bown condense from, BATULLE AME ation, and Division
of two arrays
Write a program to accept values for 2 integer
arrays and add and muliply them and print the
 result of addition and muliplication.
#include <stdio.h>
# include < conjo.h>
 Void main ()
  Z
    int a may [5], array 2 [5], amay 3 [6];
    int 1= 0;
    point ("In Enter elements of first arrays");
    tox (i=0; i<5; i++)
       Point ("Enter number for array 1 [ % d] ? ", i);
       scanf ("%d", & asser/1[i]);
     9
    Point ("In Enter elements for arrange cond" ");
    ter (i=0; i<5; i++)
       point/ ("Enter number for array2[1,0];");
    Pointk ("In Addition of Orrall and array2");
      ter (i=0;i<5;i++)
        arroy3[i] = array1[i] + array2[i];
       boint/ ("In assay1 [%] + assay2 [%] = assay8 [%]
                 = % d", i,i,i, array 3 [i]):
      point/ ("in muliplication of orall and array2");
      $00 (i=0; i<5; i++)
         array & [i] = array[i] * array 2[i];
         point ( "In array 1 [ % d] * array 2 [ % d] = arrays
                 [%d] = %d", i,i,i, anch3[i]);
a detchen;
```

	DOWNLOADED FROM BATU-EXAMS.in
	0222MT19-1-6110-1210]
	the standing the till did
	Enter element for allogical
	EVEN SIGNOTIF 46W CHICATETY
	Fotox element for allogical
	ENTOR BLOWDILL PAR ALIANIES.
	Enter element for array 1 (4)
	Enter elements to allar occió
	Enter element for amounts.
	Enter element for critical 2 [1]: 9
	Enter exemply for amony 2 (2): 13
	Enter element for among [8]:2
	Enter element for array2[4]: 1
	Enter element for anough [5]:
	addition of arrays and arrays
	arrays [0] + arrays [0] = arrays[0] = 6
	0,000041[1] + 0,00042[1] = 0,0043[1]=6
	antay 1 [2] + artich 2 [2] = artoh 3 [2] = 6
	array [B] + array 2 [B] = array 8 [B] = 6
-	92247[4] + arrays[8] = arrays[4]=6
	multiplication of array 1 and arrays
	array 1 [0] * array 2 [0] = array 3 [0] = 5
	aurati [1] * arats[1] = arrats[1] = 8
	C12847[5] * 012045[5] = 012048[5] = 3
	arrays [3] = arrays [3] = 8
	0 = C43 & CH3040 = [4] = GROOND KE C43 [43 = 5
1-	
10.	Monthe a program to accept values per 2
- 1	integer arrays and substract and divide
	then and point the result of substracti-
	on and division.
-	#include Kotdio·h>
	#include <conio.h></conio.h>

```
DOWNLOADED FROM BATU-EXAMS.in
void main ()
  int arount[5], array 2[5], array 3[5];
  int 1=0;
  point ("in Enter the elements for first array");
   tor (i=0; i<5; i++)
         point ("In Enter number of array) [1,d]; 1);
         ([[][HOTTO & ""63") } ( TILD);
  point ("In Enter the elements for second arout);
  tor (i=0; i<5; i++)
        point ("In Enter number of crocks [% d] &);
        Scan ( "% d", & array 2 [i]);
  print ("In Substraction of array 1 and array 2");
   tor (1:0;1<5;1++)
       022043[i] = 022047 [i] -022045 [i];
      point ("In $10041 [%d] - 000042 [%d] =
                array 8 [%d] = %d", i,i, array 8 [i]);
  Point("In division of around and arrang");
   tor (i=0; i<5; i++)
      array 3[i] = array 1[i]/ array 2[i];
      bejuth ( un account [1.9] / account [2.9] = account [2.9]
             = %d", i,i, @00043[i]);
   getch();
```

```
DOWNLOADED FROM BATU-EXAMS in
 3. Finding
   (8x3) mossix.
11.
   #include < stdio.h>
   #include < conio. h>
     void main ()
          Orign_matrix [8] [8], trans_matrix [9] [8] i=0,j=0;
      (i=0; i<3; i++)
        tor(j=0;j(8;j++)
           point ("In Enter mousix [vod] [v.d] element", i,i);
           300 ( 11 11 11 x 10 ton _ nigio - 1600);
          trans_marsix [i][i] = Origh_marsix [i][i];
     paint ("In Original Marix: 1717");
       98 (i=0; i<3; i++)
            print ("%d/t", orgn_modrix [i] [i]);
     point ("In Transposed moun'x: In It");
       too (i=0; i<3; i++)
            point ("%dit", toons_mornix (1) [i] [i] [i];
         logiuf ("ID/F");
```

	DOWNLOADED FROM BATU-EXAMS.in
9.	Addition, Substraction, Multiplication and
	Division of two matrices.
	Write a program to read two mostrices and
	point their addition.
	#include < stdio. h>
	#include < conio.h>
	int main()
	2 Contraction of the traction
	int marix1[2][2], marrix2[2][2], marrix8[2][2]
	int $i=0$ , $j=0$ ;
	pointy ("In Enter array element of first matrix:");
	tor (1=0; i<2; i++)
-	₹or (j=0; j<2;j++)
	5
	Point ("In Enter matrix [1,d] [1,d] element [t",i,j);
	Scont ("%d", Emorix [i][i]);
	Z V
	3
	print ("In Enter and elements of second mutrix:");
	tos(i=0;i<2;i++)
	ter (j=0; j<2; j++)
	9
	printf("In Enter matrix2[v.d][v.d] element [t", i, i);
	Scont ("rd", 4 matrix 2 [ i] [ i]);
	3
	3
	points ("In matrix1: In It It");
-	tor (i=0; i<2; i++)
	Jes Ciani i an i u
-	ter (j=0;j<2;j++)
	point f ("%d/t", mousix) [i][i];
	9
	point ("InItIt");
-	3
	J

```
Pointf("In matrix2: In/E)E");

+cor(i=0; i<2; i++)

{
cor(i=0; i<2; i++)
}
         printf ("%d$)t", motoix2[i][i]);
      pointf ("In Addition of two 2x2 motrix is: In) Ele");
        fer (i=0; j(2; j++)
           point ("%d")t", mousix3[i][i]+mousix2[i][i];
Output :-
    Enter array elements of first moraix:
     Enter matrix 1 [0][1] element
     Enter modoix 1 [1][0] Element 3
     Enter majoix1 [1][1] element 4
```

	DOWNLOADED FROM BATU-EXAMS.in
	Enter array elements of second matrix:
	Enter roatoix 2 [0] [0] Elevieur 7
	Fotor matrix2 [0][1] element 3
	Fotor matrix 2 [1] Co] Chement 2
	Enter mounix 2 [1] [1] element 1
	matrix1:
	1 2
	3 4
	motoix 2:
	4 3
	2 1
	Addition of two 2x2 moutrix is:
	5 5
	5 5
	X 0 X
13.	Write a program to read two matrices and
	point their Substaction, division, and Muti-
	plication.
001	
<u>301. 1</u>	
	#include <btdio.h></btdio.h>
	#include < onio.h>
	3
	int modrix1[2][2], modrix2[2][2], modrix3[2][2];
	int i=0,0=0;
	point ("In Enter array elements of first marix:");
	too(i=0; i<2; i++)
	for(j=0;j<2;j++)
	2
	BOINT ("%d", 4 matrix 1 [i][i]);
	25
	point ("In Enter grown elements of second marrix:");
	too (1=0;1<2; 1++)
	5

```
DOWNLOADED FROM BATU-EXAMS.in
    scent ("%d", & mostrix 2 [i] [i]);
 toputt ("In worsixT: InIFIF");
   tor (120; 1<2; 1++)
      Point ("% d It", modrix I [I][]);
 point ("In modeix2: In 1 + 1 +");
     tor (j=0;j<2;j++)
      Pointf ("%dIE", matrix2[i][j]);
      too of ("IDIFIF");
 point ("In Bubestraction of two 2x2 motoix is: InItIF");
  (1=0; i<2; i++)
   tor (i=0; i<2; i++)
      :[i][i]xirom-[i][i]kirom=[i][i][xirom
      point ("%d/t", matrix8[i][i]);
point; ("In division of two 2x2 motoix is: In (LIL");
   tor (i=0; i<2; j++) $
     ; [i][i][xiotocan | [i][i][xiotocan = [i][i][xiotocan
   3 (2010 FK ("89/4", 10000 X3 CIJEIJ);
```

```
Point ("In 1+1+");
point ("In muliplication of two 2x2 moder's: Intelly

for (1=0; 1<2; 1++)
    modoix8[i][i]= modoix1[i][i] * modoix[i][i];
point+ ("%d'1+", modoix8[i][i]);
```

```
Converting the case of characters
    Write a program to accept lower ease characters and convert them to upper case characters.
15.
801 =>
    #include < Stdio.h>
    #include <conjo.h>
     total main()
       Char array [5];
       înt î=0;
tor (î=0; i<5; i++)
          pointf("In Enter character in lower case:");
array [i] = getche();
           assay [i] = assay [i] - 32;
       too(i=0; i<5; i++)
         point ("In the converted characteris %C",
        getch();
```

	DOWNLOADED FROM BATU-EXAMS.in
	Enter character in lowercase: h  Enter character in lowercase: l  Enter character in lowercase: l  Enter character in lowercase: l  Enter character in lowercase: 0
	The converted character is H The converted character is E The converted character is L The converted character is L The converted character is L The converted character is C
77.	Calculate length of String
76.	White a program to accept a string and display the length of it without using standard library function.
	#include (stdio.h)  #include (conio.h)  Void main()  int i=0;  char etr [10];  point ("In Enter Stoing:");  scant ("%s", etr);
	While (eta[i]!=p')  { 1++; 3
	point ("In Length of Storing %3=%d", stor, i);  getch();  }  Foton Quince
	Forter stoing: programming = 11



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## at MET Bhujbal Knowledege City

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