ARRAYS

It is collection of homogeneous [same type] variables.

Array is nothing but collection of contiguous memory locations, where we can store and manage more than one value of same type under one name.

It is a derived data type.

It is an implicit / internal pointer.

It is a implicit const pointer

It is one of data structure.

Advantages:

Generally to store several values of same type, we have to declare several variables. Here we have to remember all these variable names also. When the program is too big, it is very difficult to remember all the variable names. In this situation, the only solution is array.

Array reduce program length.

Array minimize the errors.

In functions to carry several values of same type at a time, we are using arrays.

It allows to arrange our data in a order.

Disadvantage:

Array size is Constant Positive Integer value. Due to this we are not able to change the array size at run time. Sometimes it causes memory wastage / shortage.

In C language we are using

1. **One dimensional arrays**
2. **Multi dimensional arrays**

One dimensional arrays:

- **An array with one row and several columns.**
- **An array with single subscripting operator [ ] is called one dimensional array.**
- **It is an implicit single pointer.**

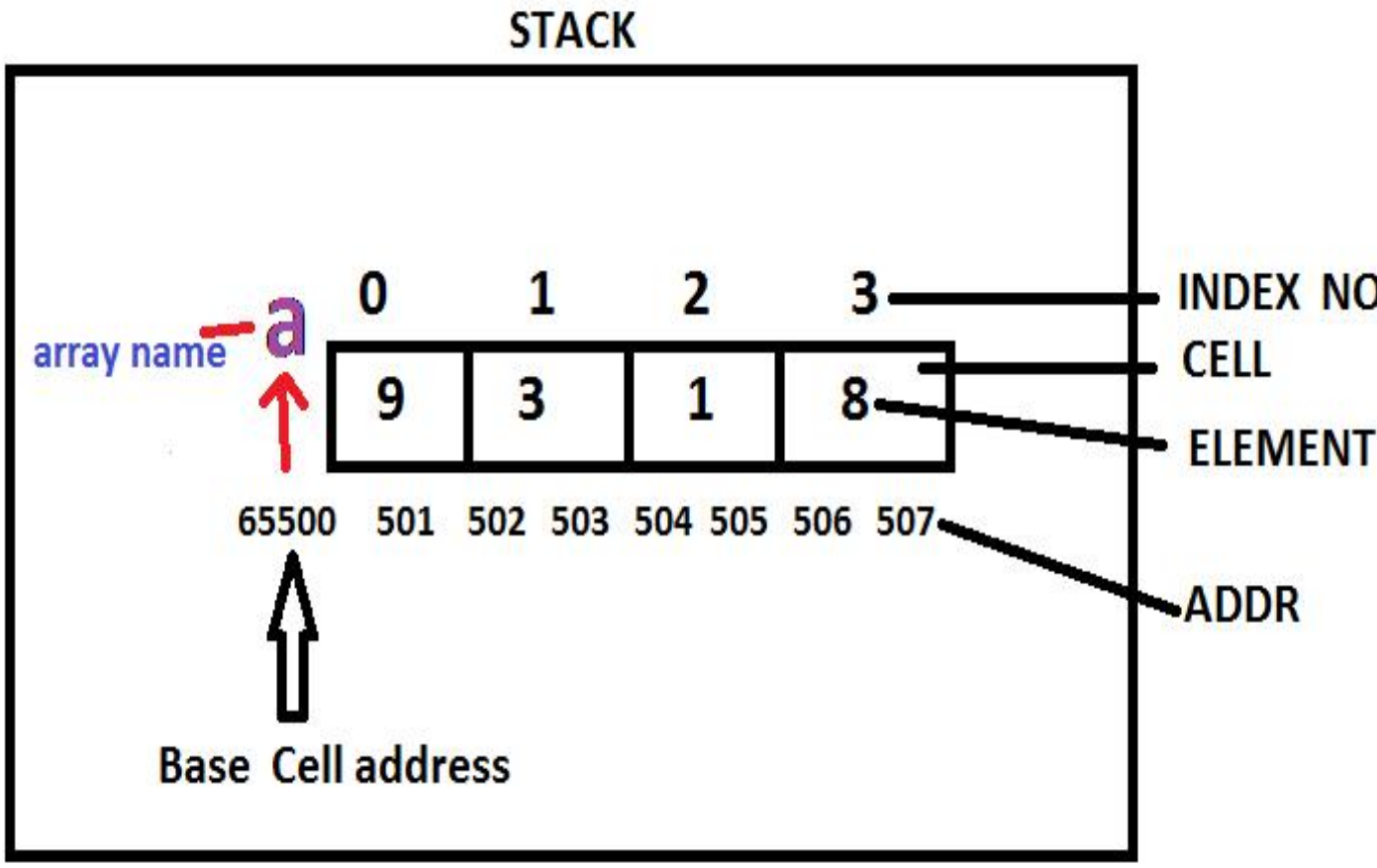
Syntax:

```
datatype  variable[size] = {elements};
```

Eg:

```
int  a[4] = { 9, 3, 1, 8 };
```

Memory allocation for array:



Array is implicit pointer because of array variable stores base cell [0 cell 1st byte] address. Hence array variable value and 0 cell address both are same.

Array declaration methods:

int a[3]; Ok

int a[ ]; No

int a[3]={1,2,3}; Ok

int a[ ]={1,2,3}; Ok

int a[0]={1,2,3}; Ok

int a[-5]; No

int a[5.5]; No

int n = 5, a[n]; No

int a[3]={10,20}; Ok

int a[3]={1, 2, 3, 4}; No

int a[0]; error

#define n 5 /* macro */

int a[n]; Ok

const int n=5, a[n]; No

int a[5>3]; ➔ int a[1]; Ok

int a[3<2]; ➔ int a[0]; No

int a[2+3]; ➔int a[5]; Ok

int a[5%3]; ➔ int a[2]; Ok

int a[5%5]; ➔ int a[0]; No

int a[1,2,3]; ➔ error

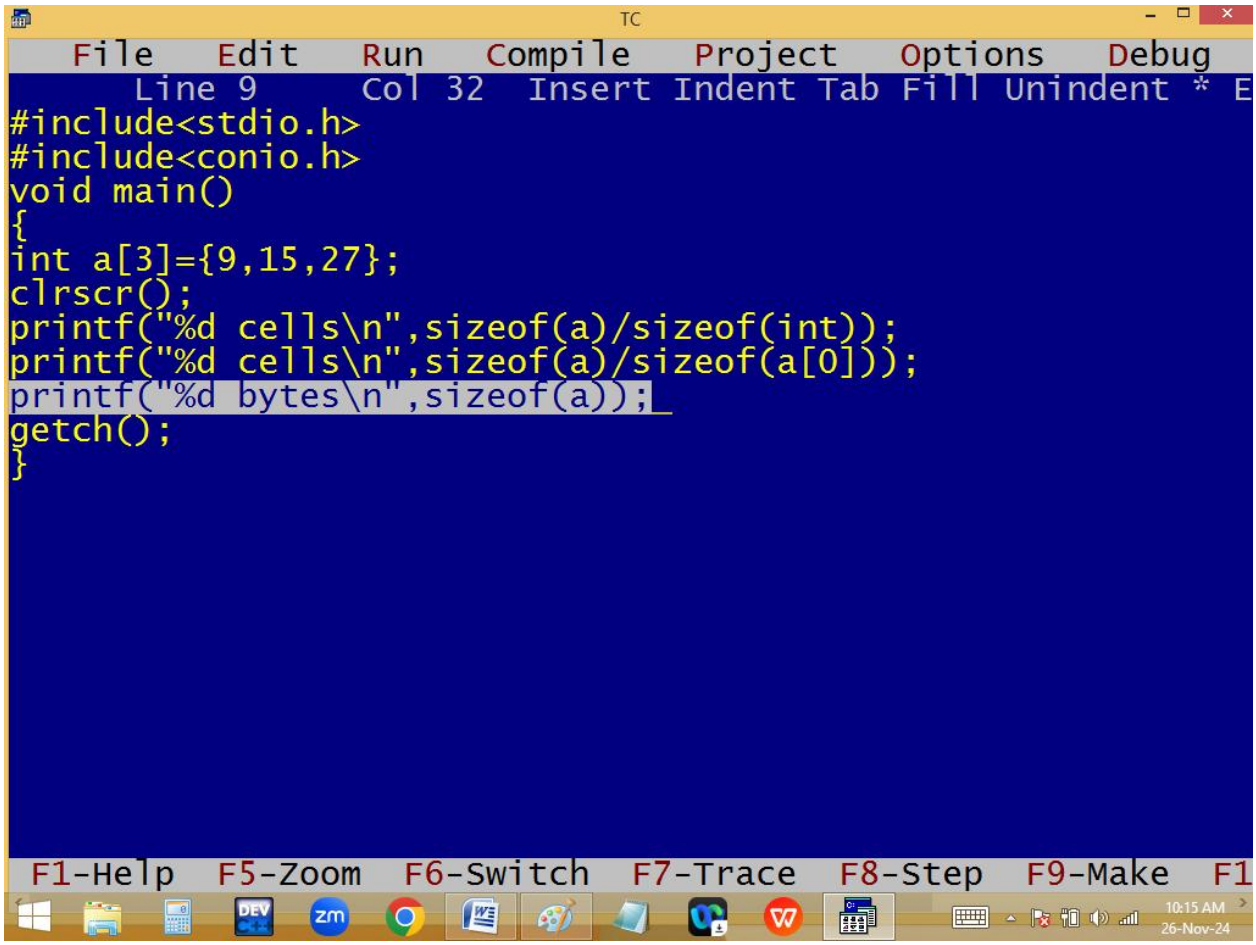
int a[40000]; ➔ 40000 * 2 = 80000 bytes ➔ No

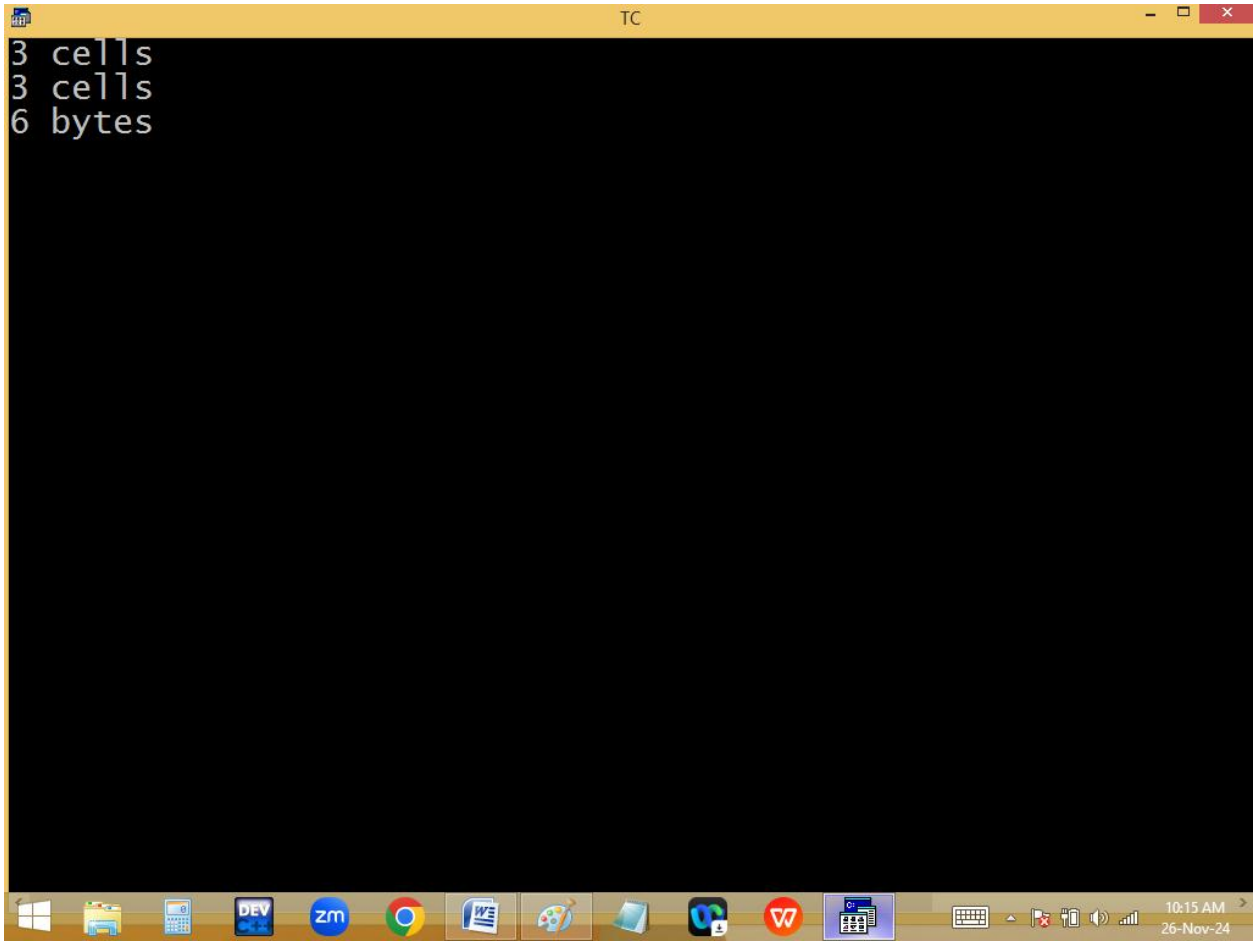
Note: Stack size is 65536 bytes(64kb) Only.

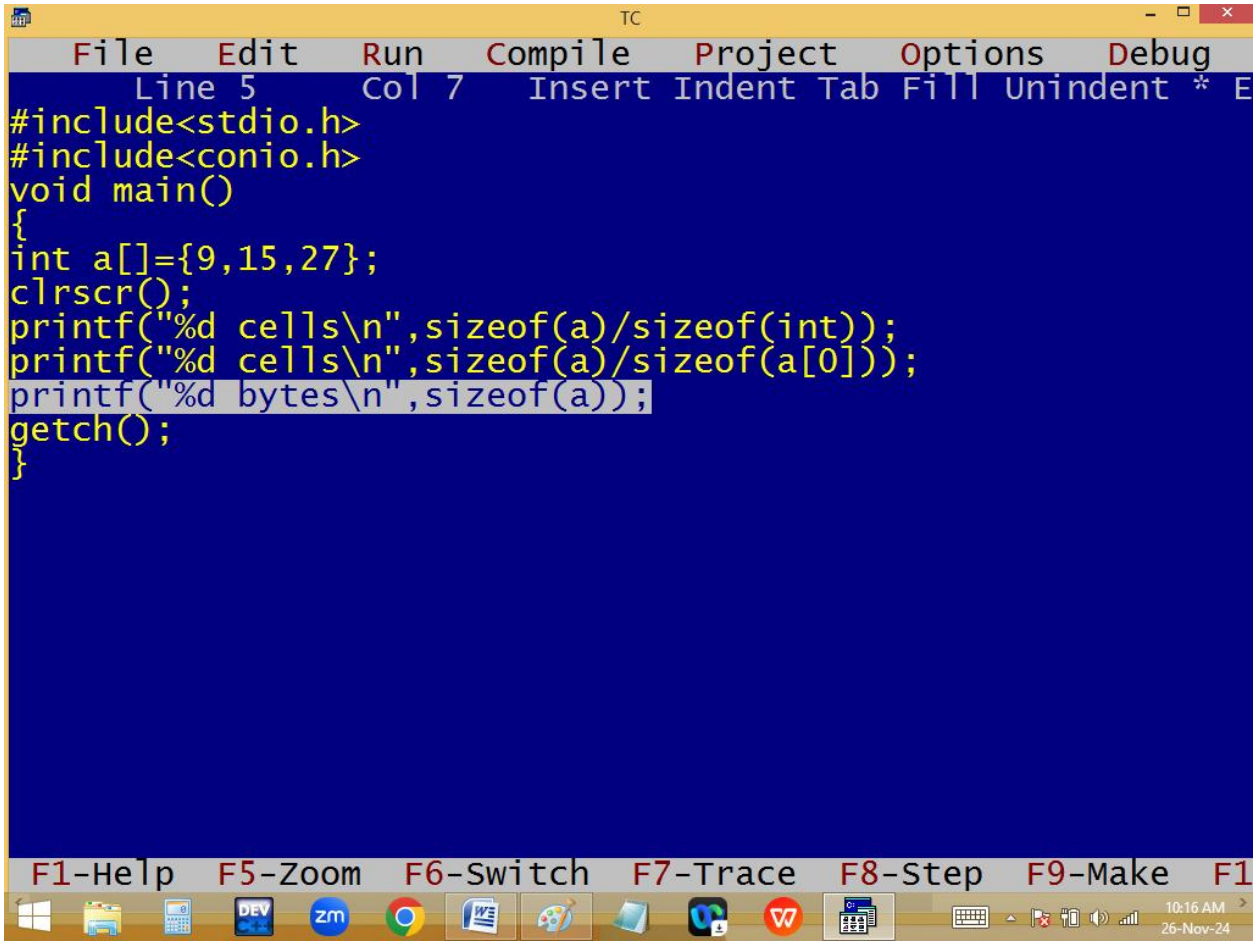
float a[10000]; Ok ➔ 10000 * 4 = 40000 bytes

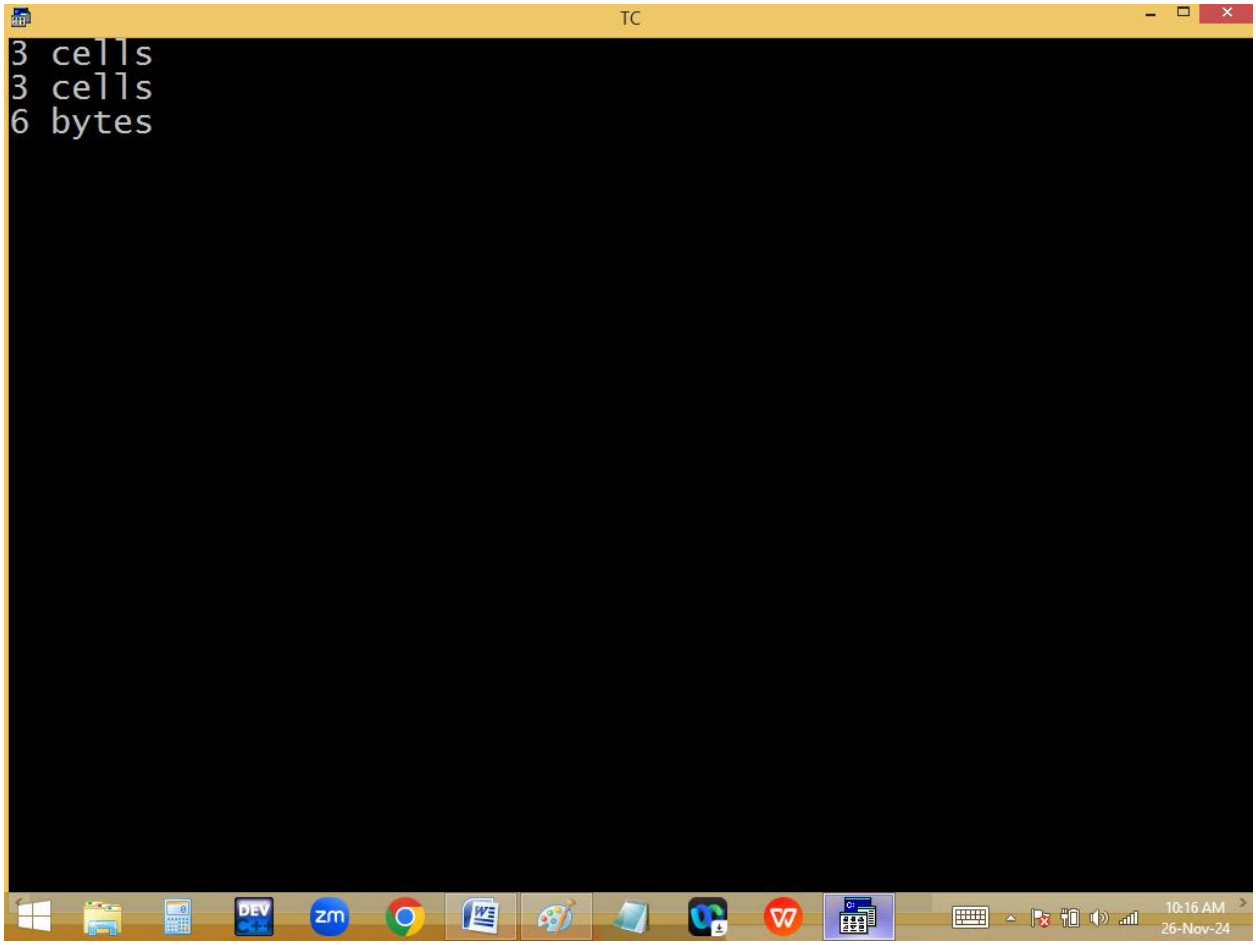
float a[20000]; No ➔ 20000 * 4 = 80000 bytes

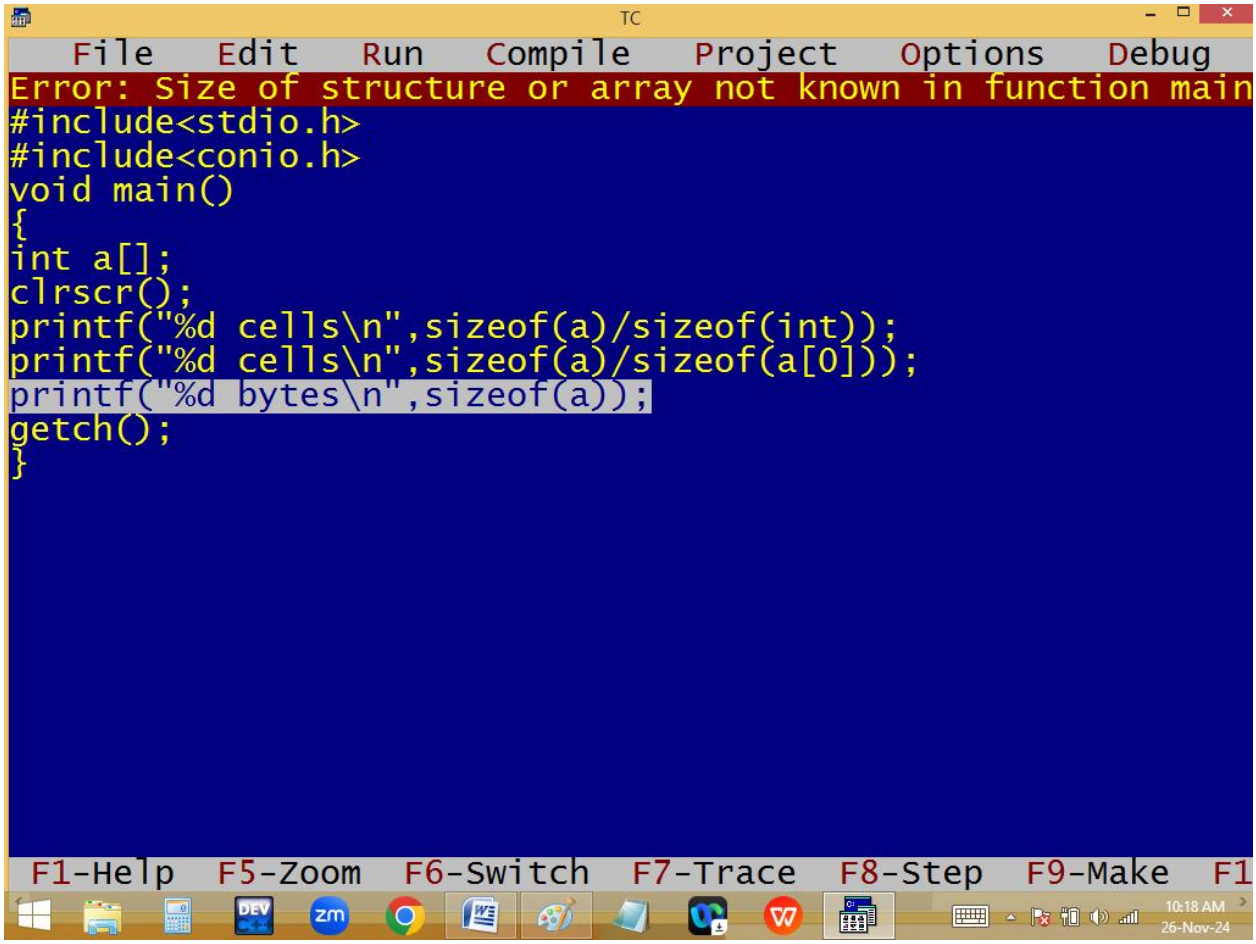
Finding array size:



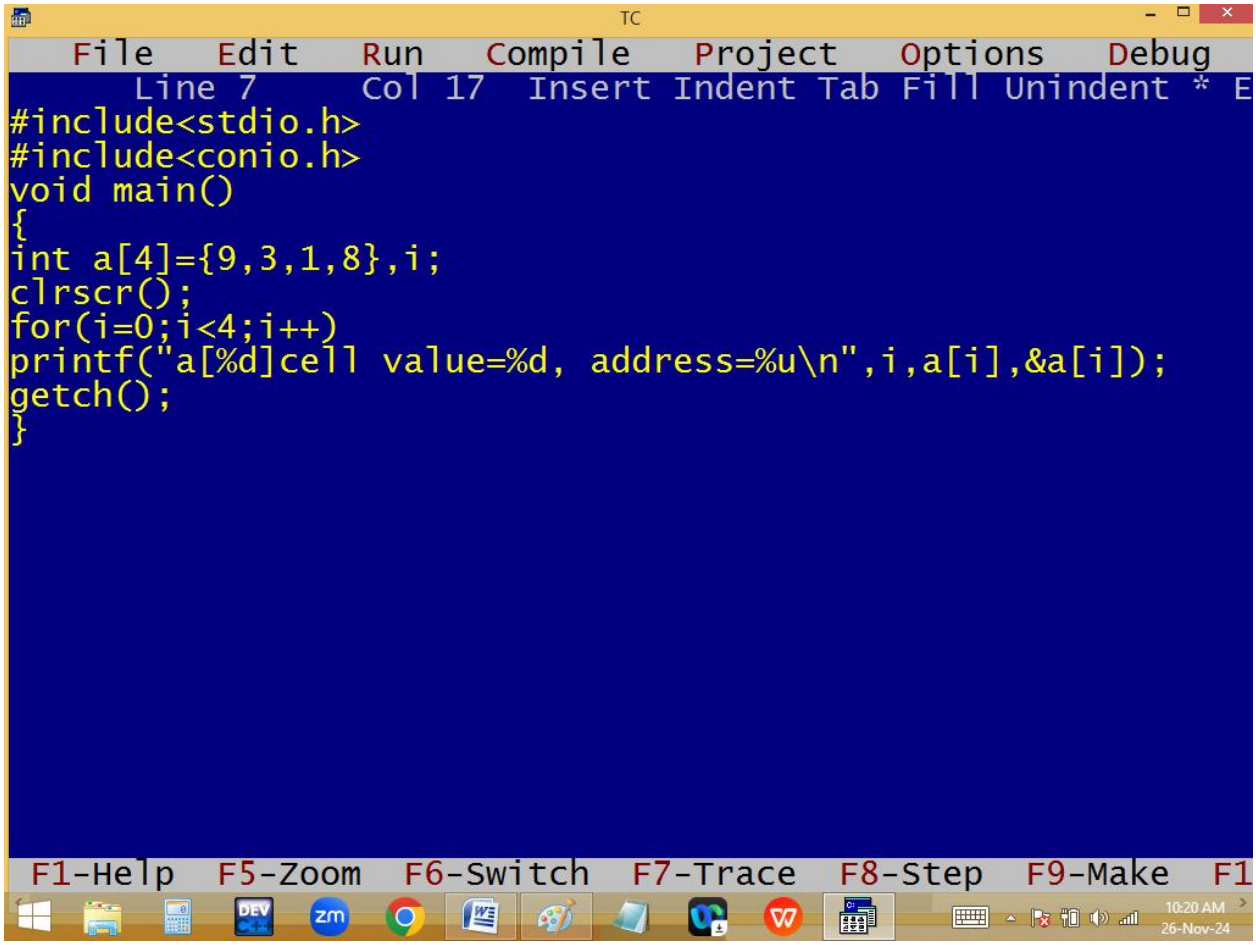

TC
3 cells
3 cells
6 bytes
10:15 AM
26-Nov-24

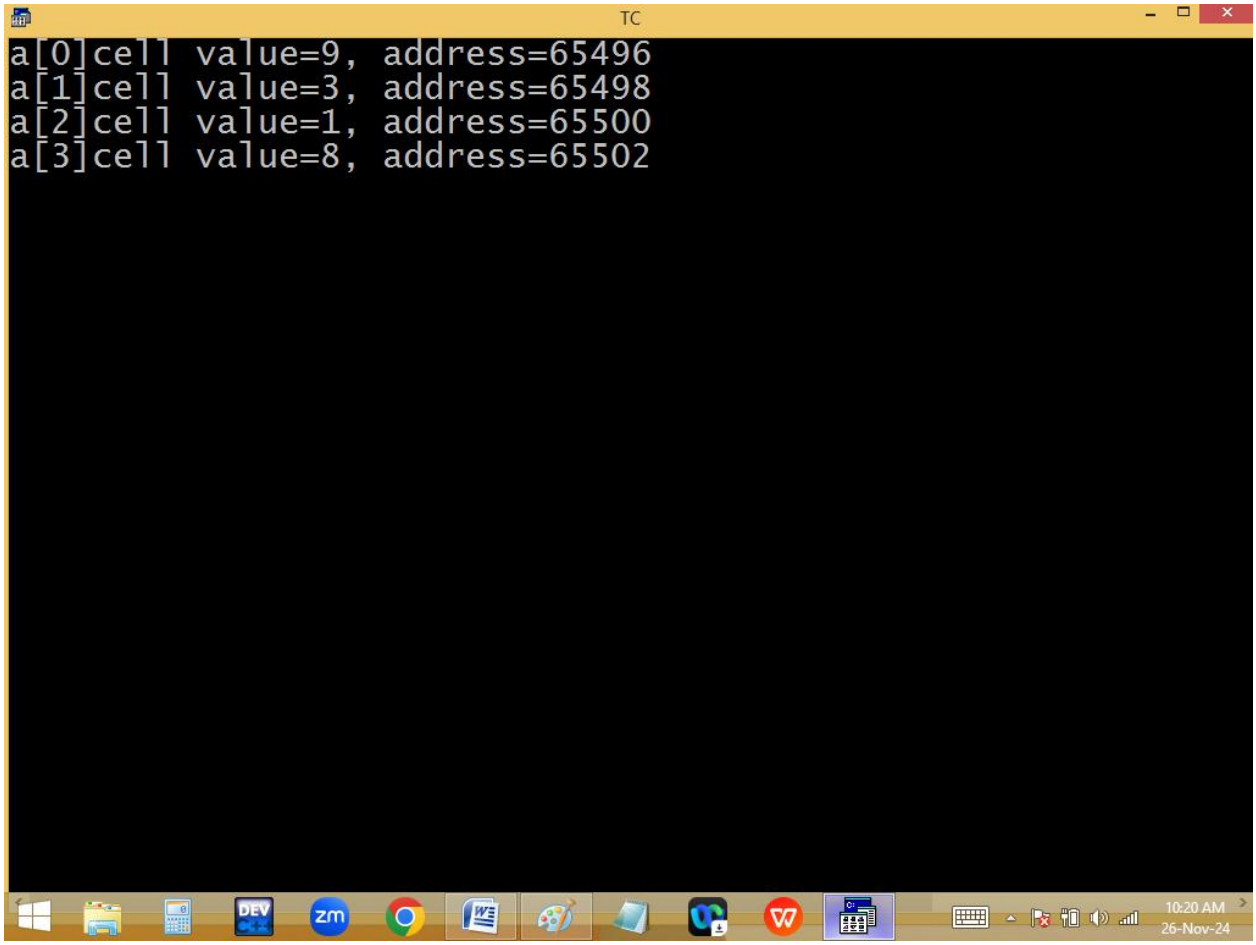

TC
File Edit Run Compile Project Options Debug
Line 5 Col 7 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9,15,27};
clrscr();
printf("%d cells\n",sizeof(a)/sizeof(int));
printf("%d cells\n",sizeof(a)/sizeof(a[0]));
printf("%d bytes\n",sizeof(a));
getch();
}
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:16 AM
26-Nov-24


TC
3 cells
3 cells
6 bytes
10:16 AM
26-Nov-24

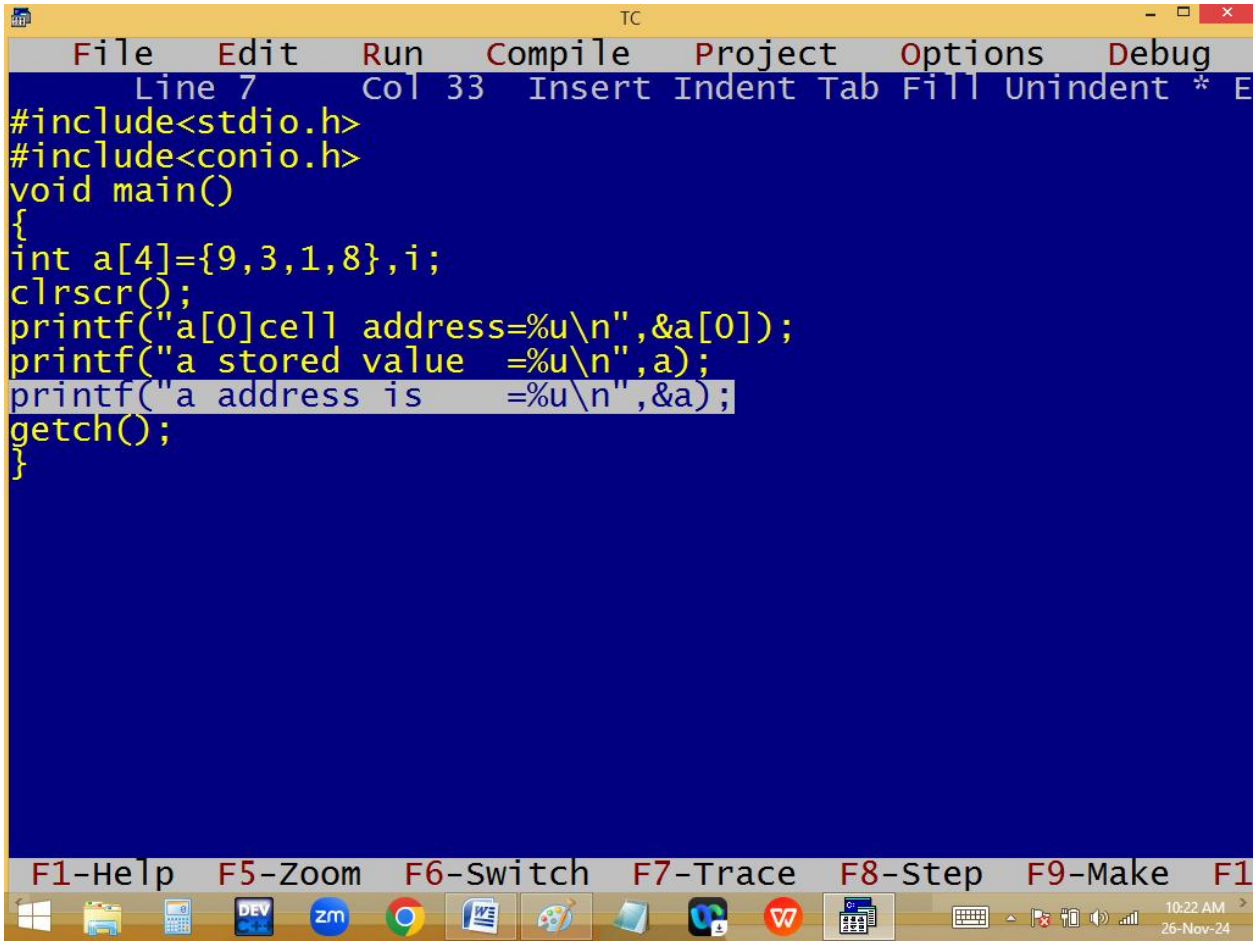


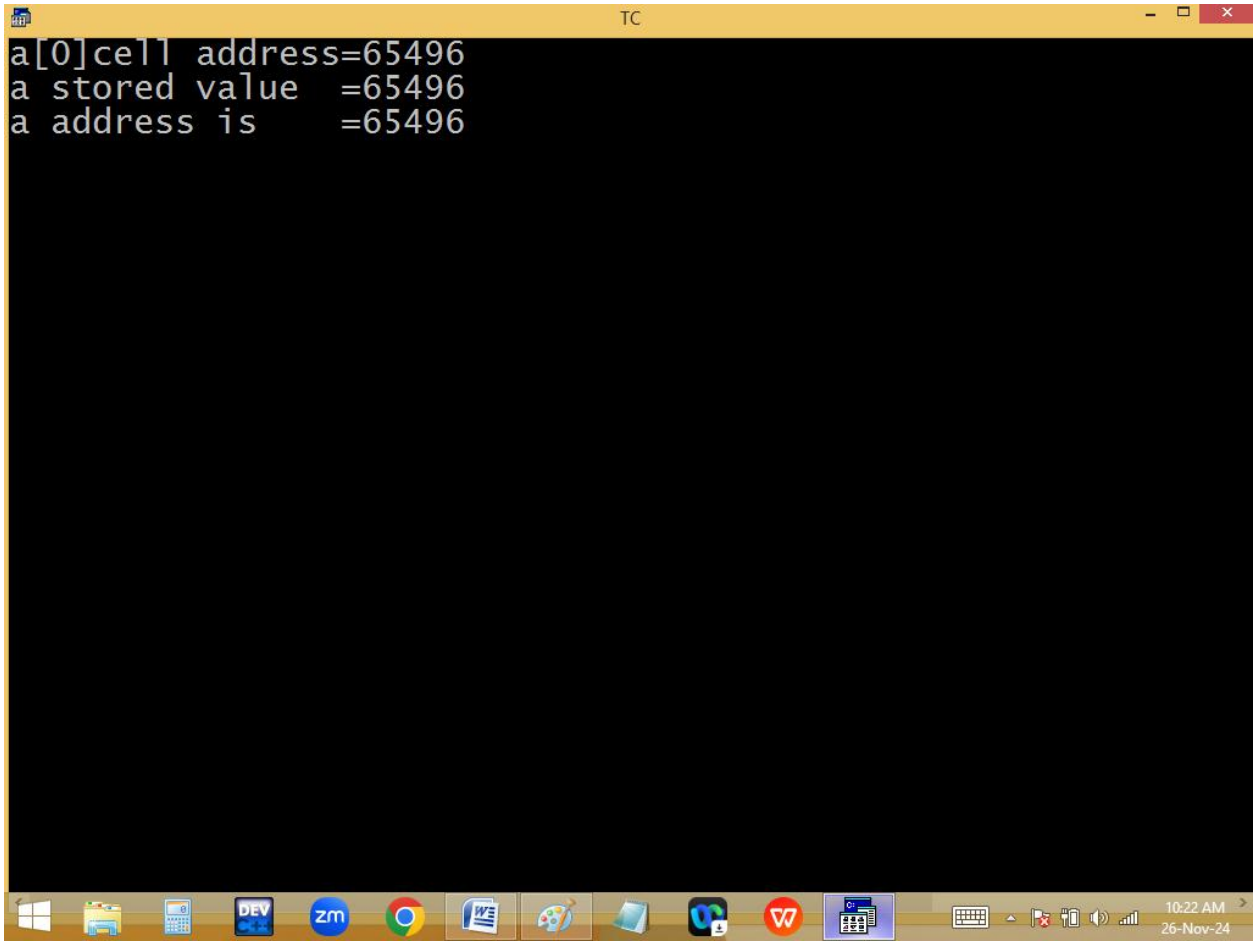
Finding array element index no, value and address:


TC
File Edit Run Compile Project Options Debug
Line 7 Col 17 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8},i;
clrscr();
for(i=0;i<4;i++)
printf("a[%d]cell value=%d, address=%u\n",i,a[i],&a[i]);
getch();
}
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:20 AM
26-Nov-24

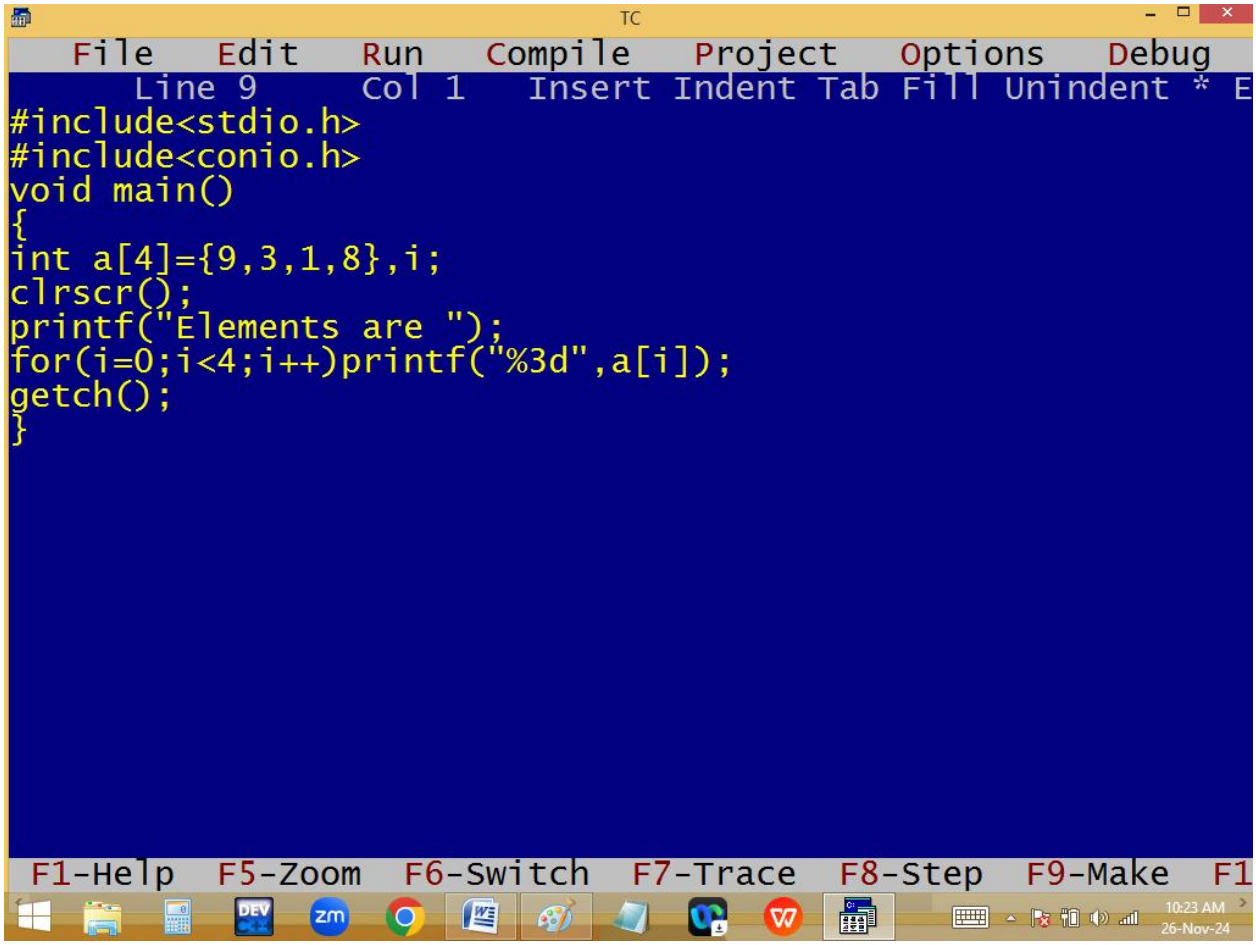


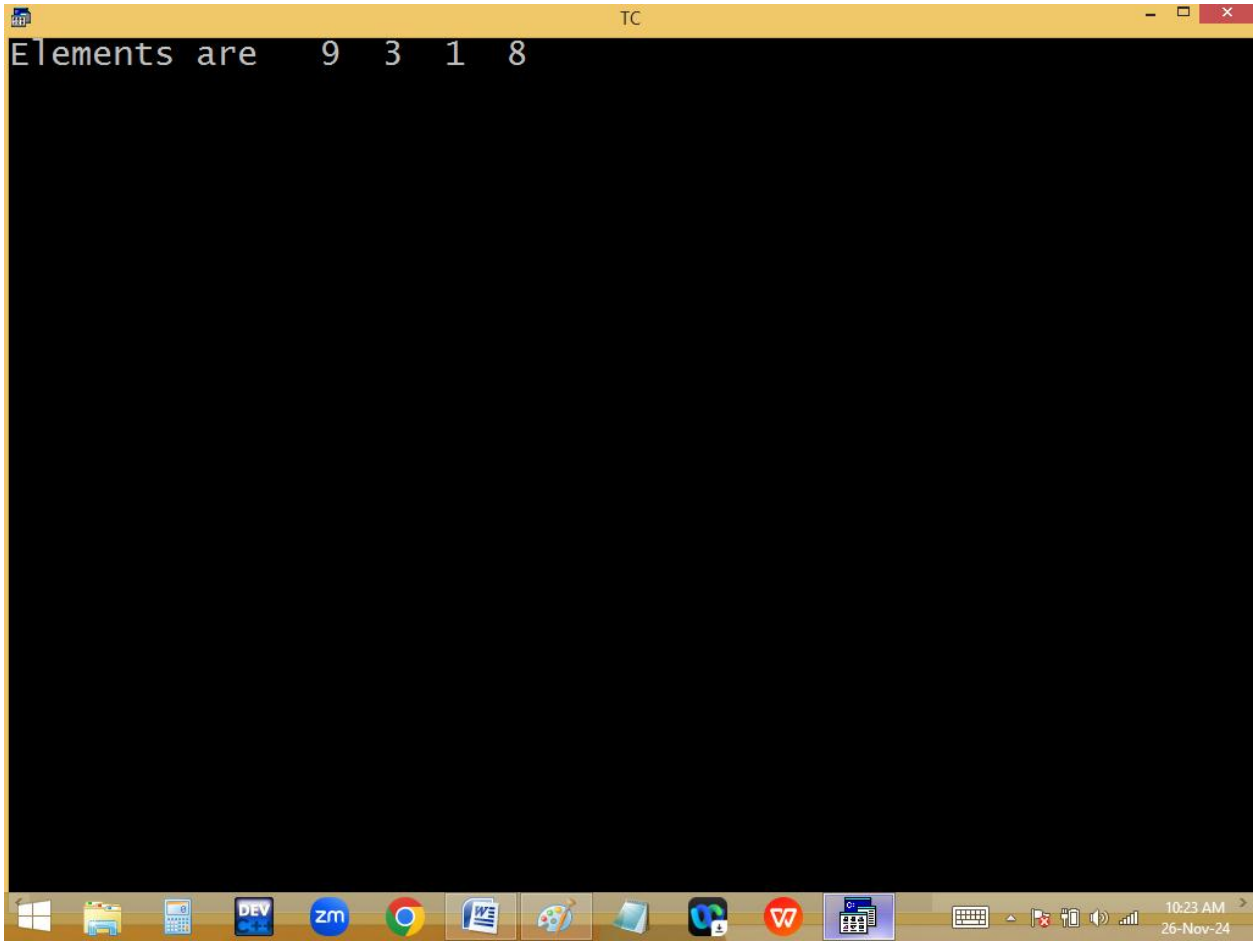
Finding array base address:

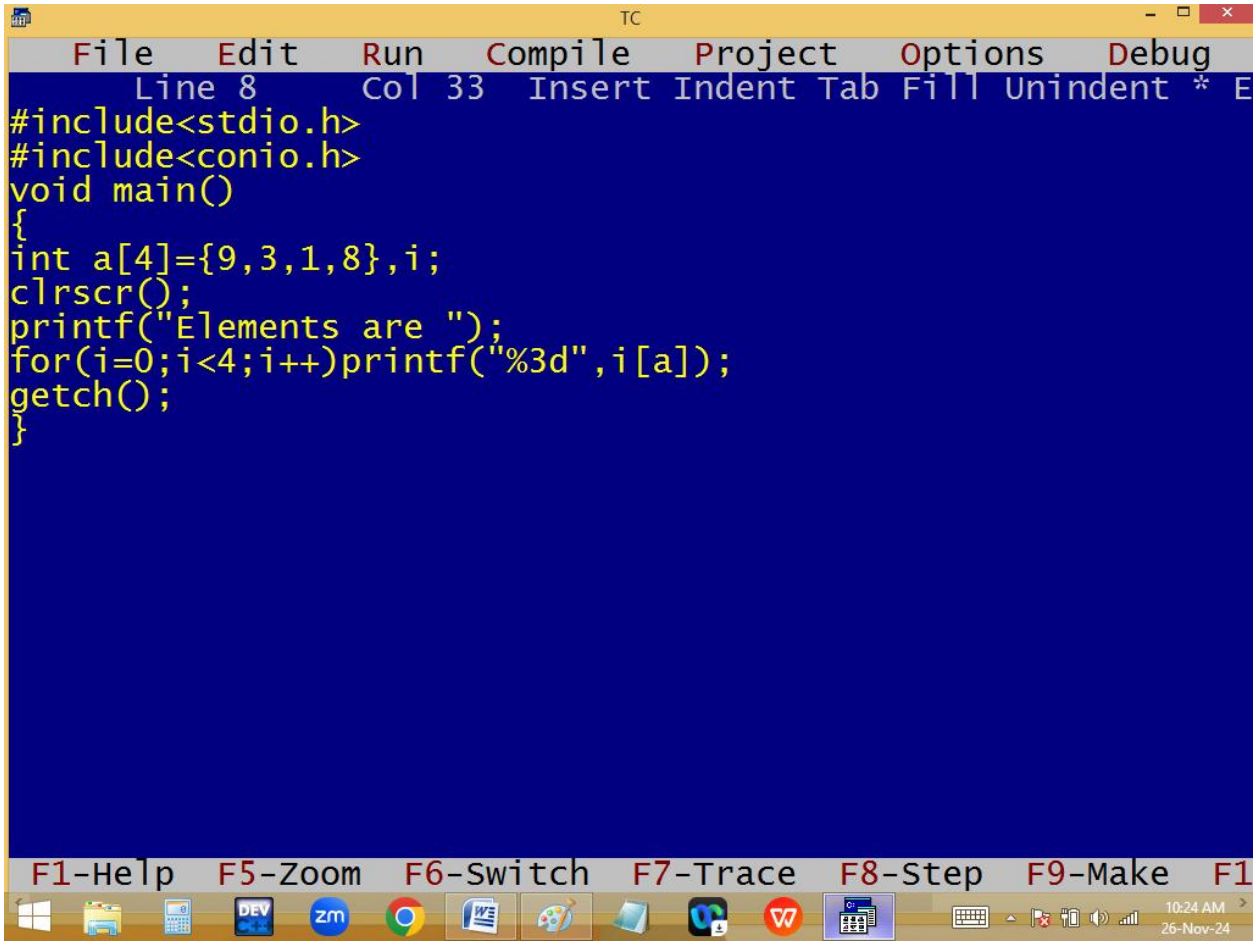

TC
File Edit Run Compile Project Options Debug
Line 7 Col 33 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8},i;
clrscr();
printf("a[0]cell address=%u\n",&a[0]);
printf("a stored value =%u\n",a);
printf("a address is =%u\n",&a);
getch();
}
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:22 AM
26-Nov-24

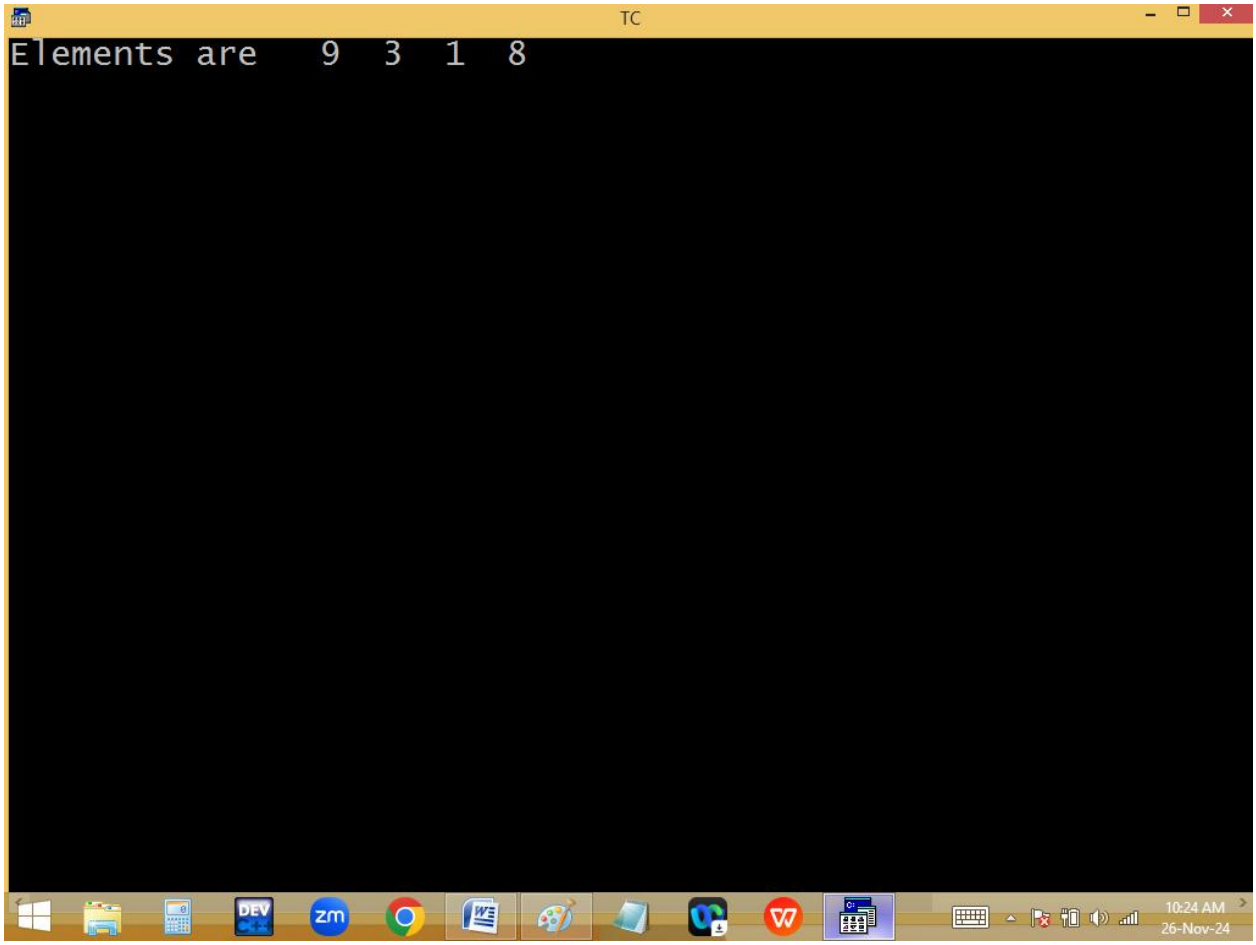


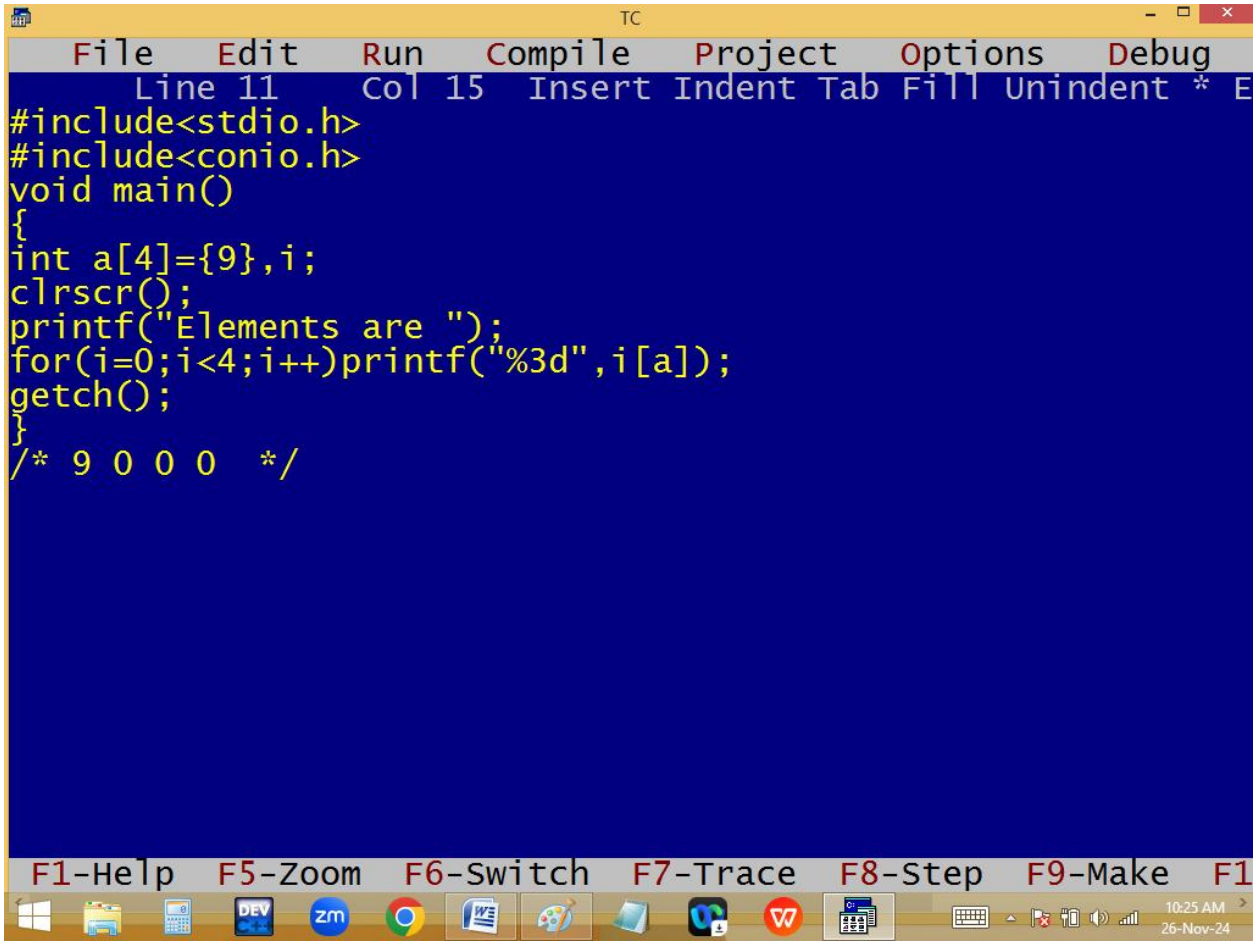
Eg: Direct initialization of array elements:

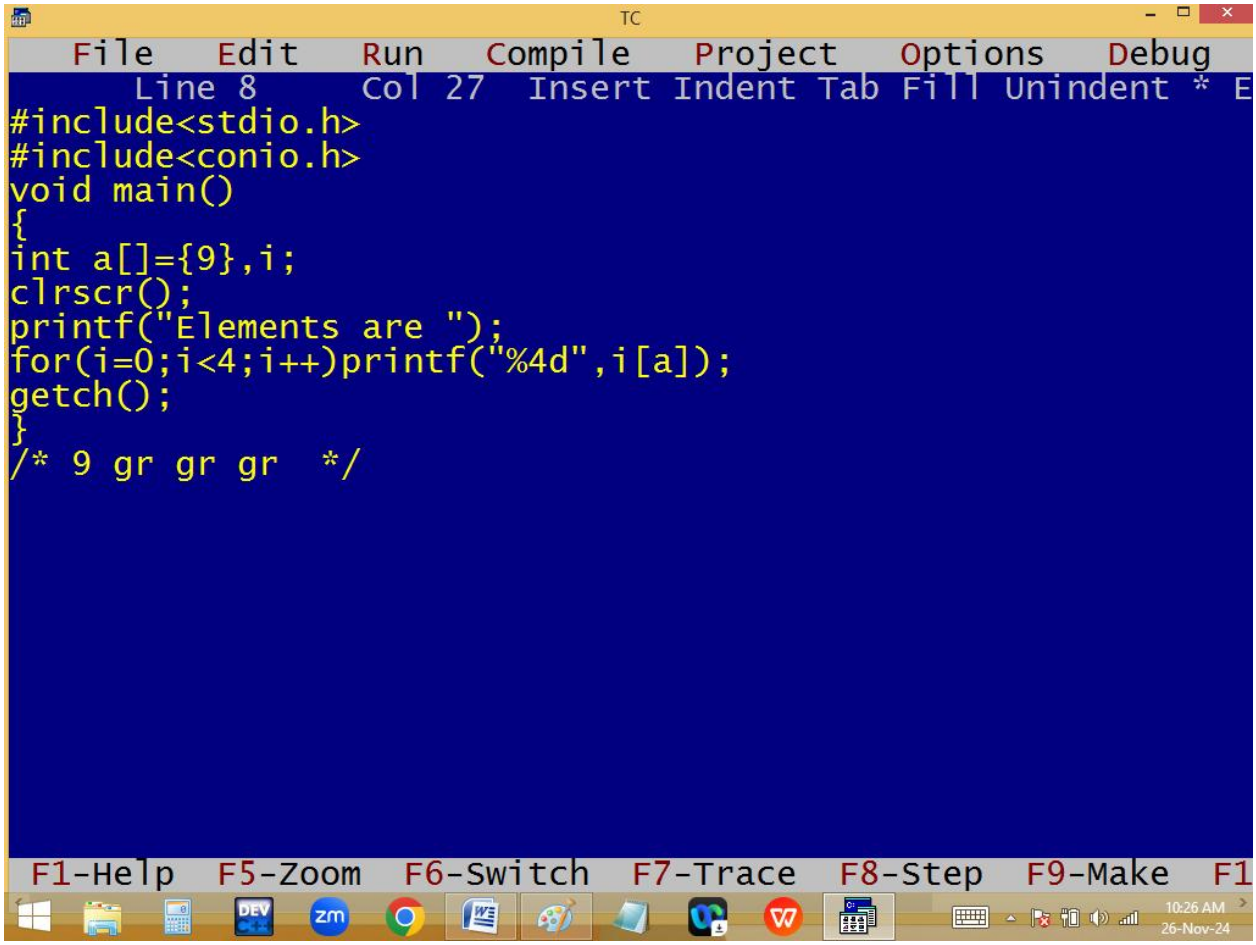

TC
File Edit Run Compile Project Options Debug
Line 9 Col 1 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8},i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%3d",a[i]);
getch();
}
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:23 AM
26-Nov-24

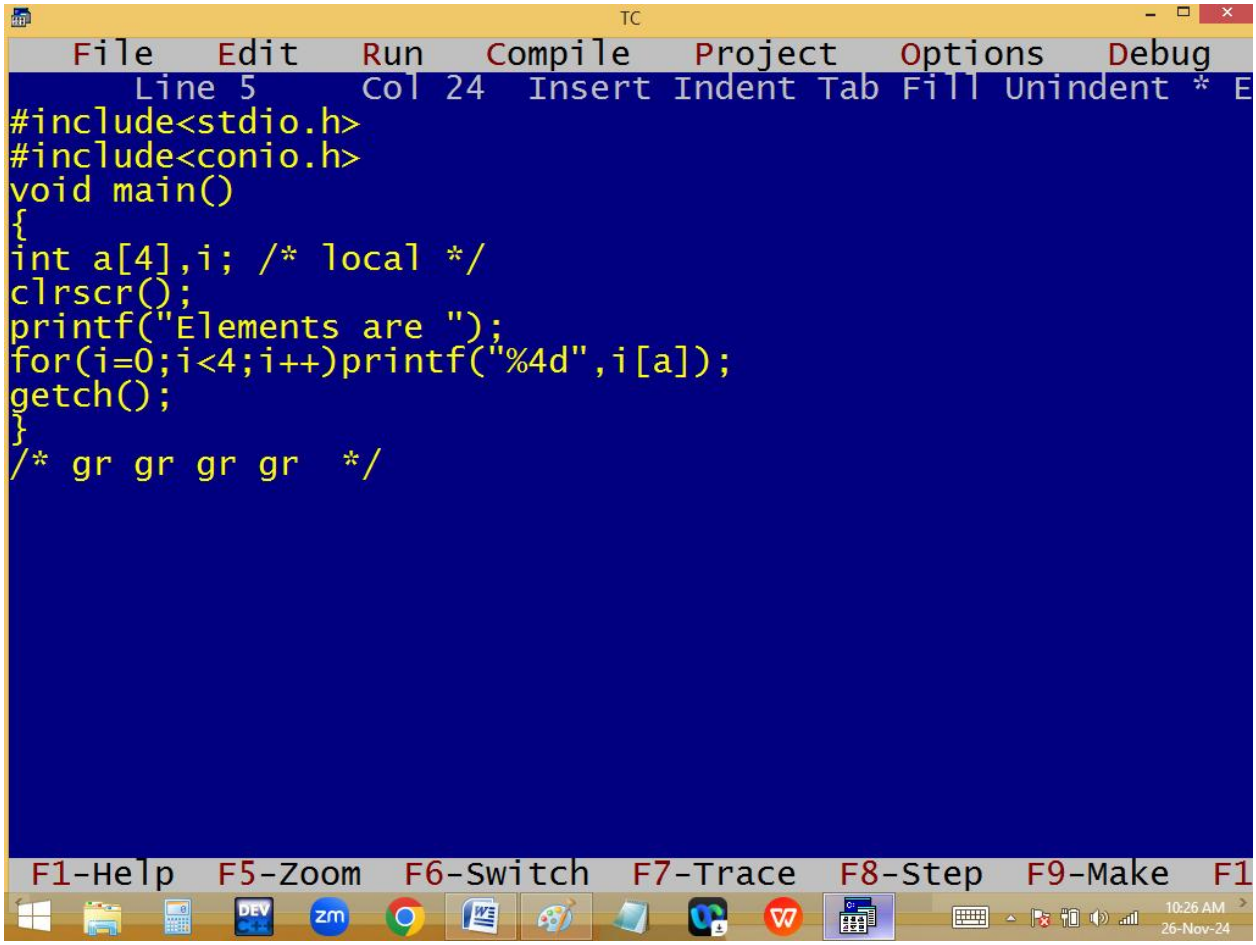

TC
Elements are 9 3 1 8
10:23 AM
26-Nov-24

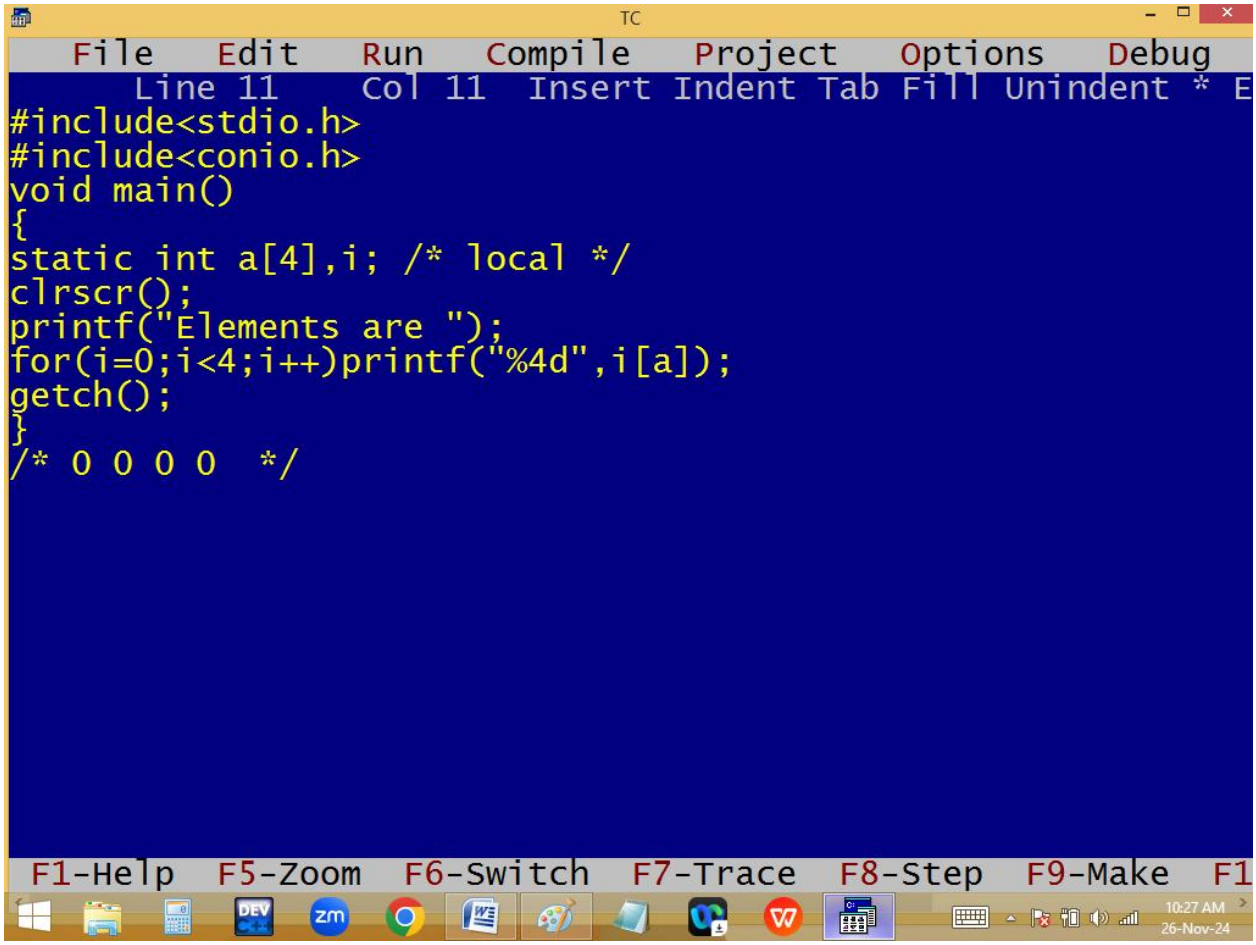

TC
File Edit Run Compile Project Options Debug
Line 8 Col 33 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8},i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%3d",i[a]);
getch();
}
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:24 AM
26-Nov-24

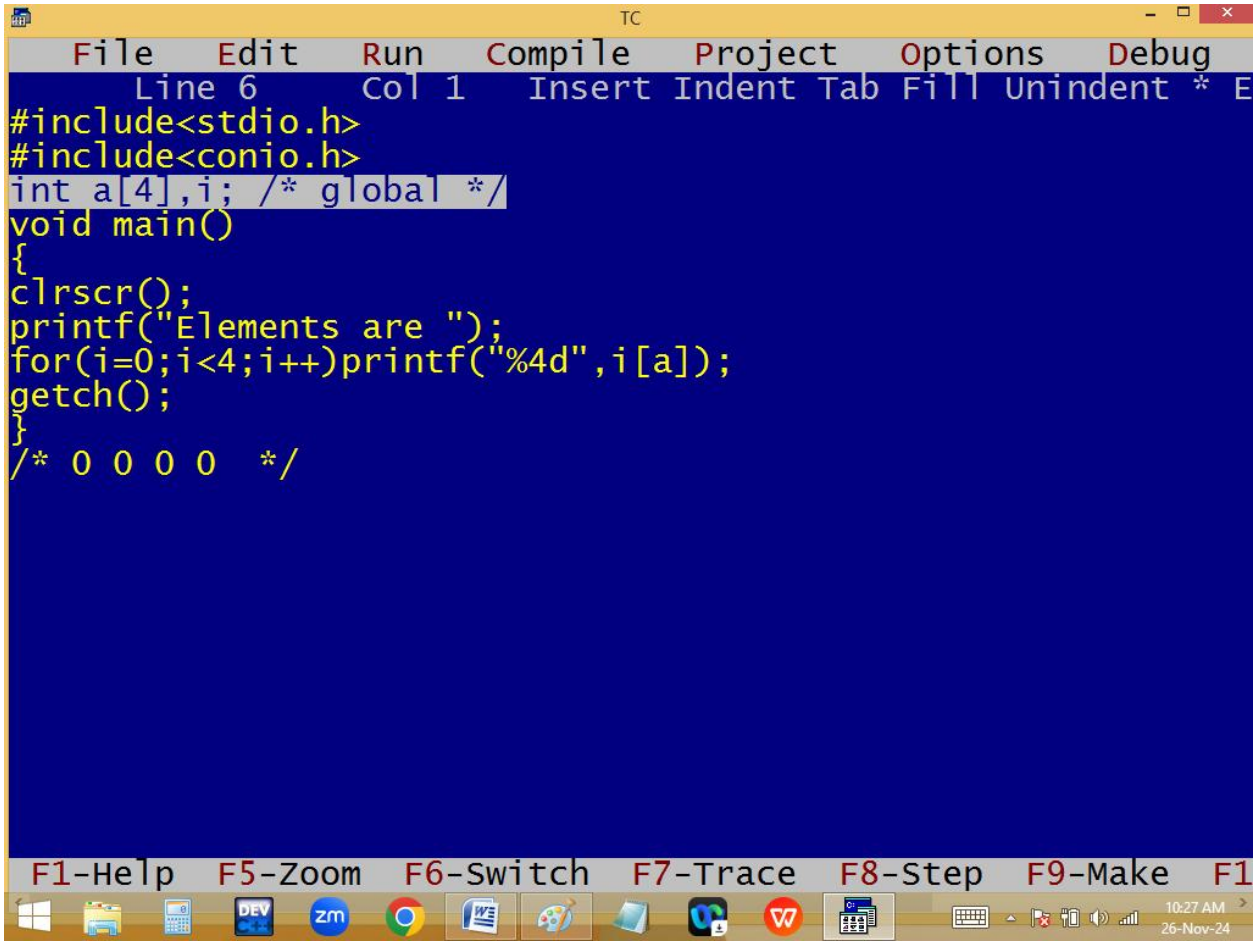

TC
Elements are 9 3 1 8
10:24 AM
26-Nov-24

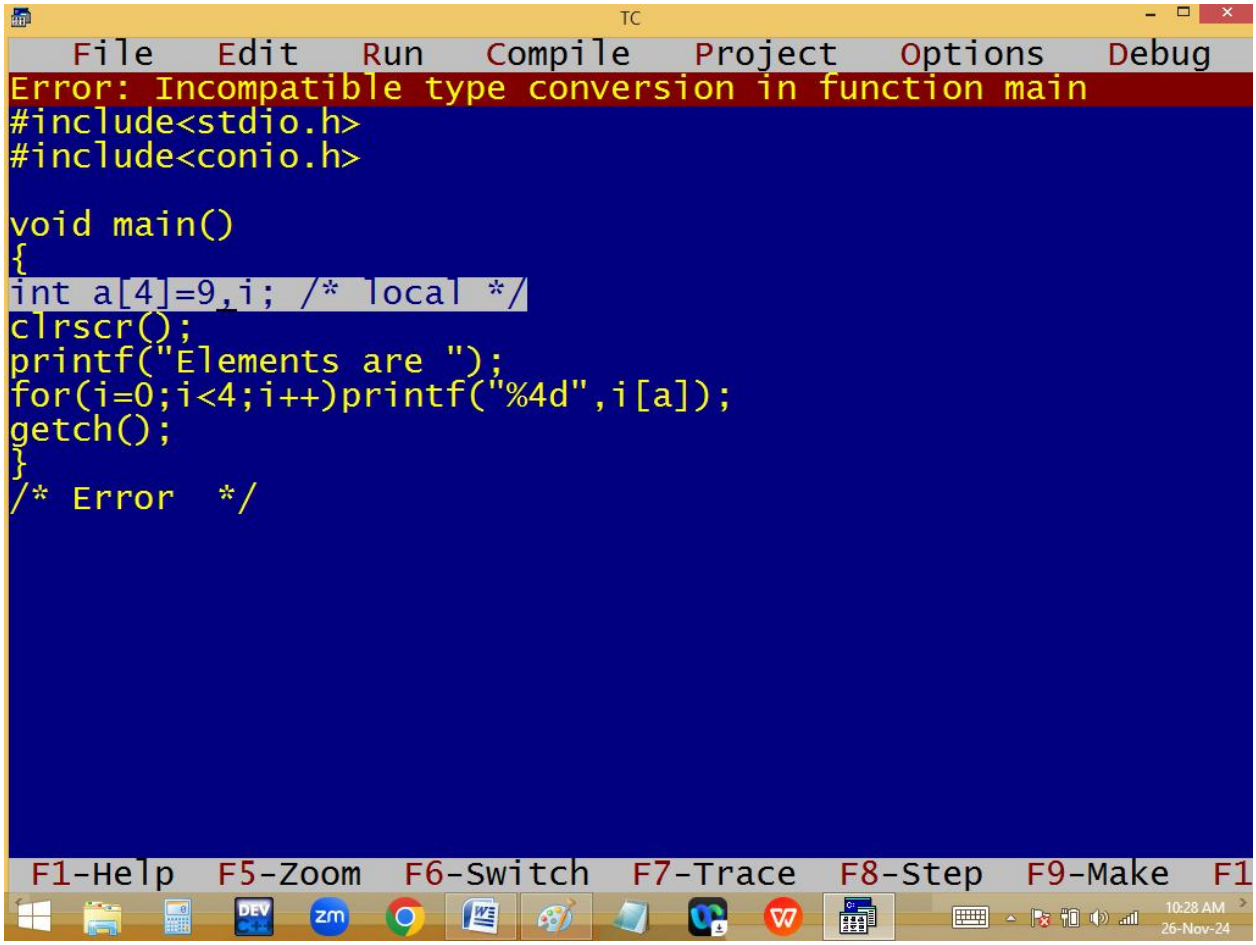

TC
File Edit Run Compile Project Options Debug
Line 11 Col 15 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9},i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%3d",i[a]);
getch();
}
/* 9 0 0 0 */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:25 AM
26-Nov-24

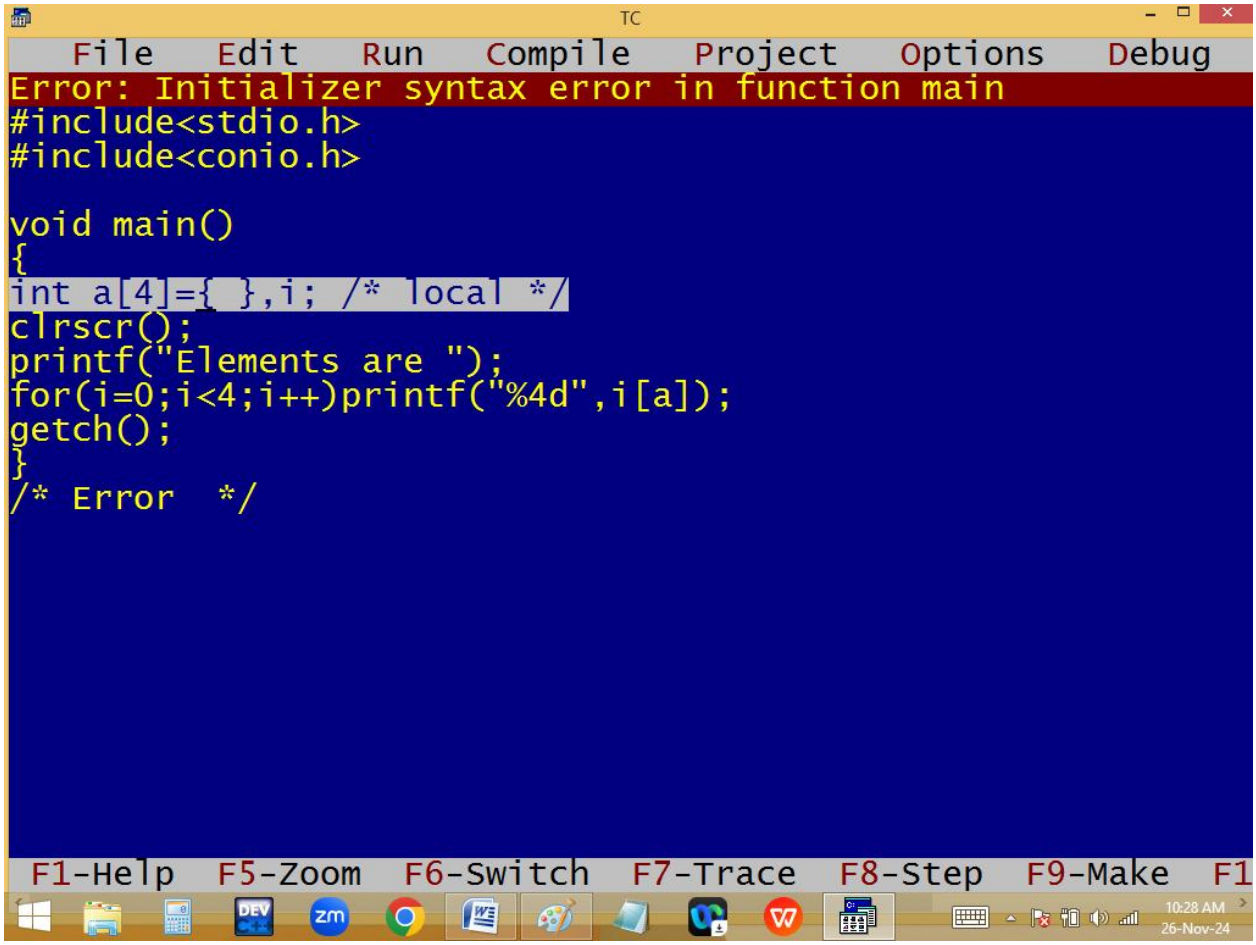

TC
File Edit Run Compile Project Options Debug
Line 8 Col 27 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9},i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* 9 gr gr gr */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:26 AM
26-Nov-24

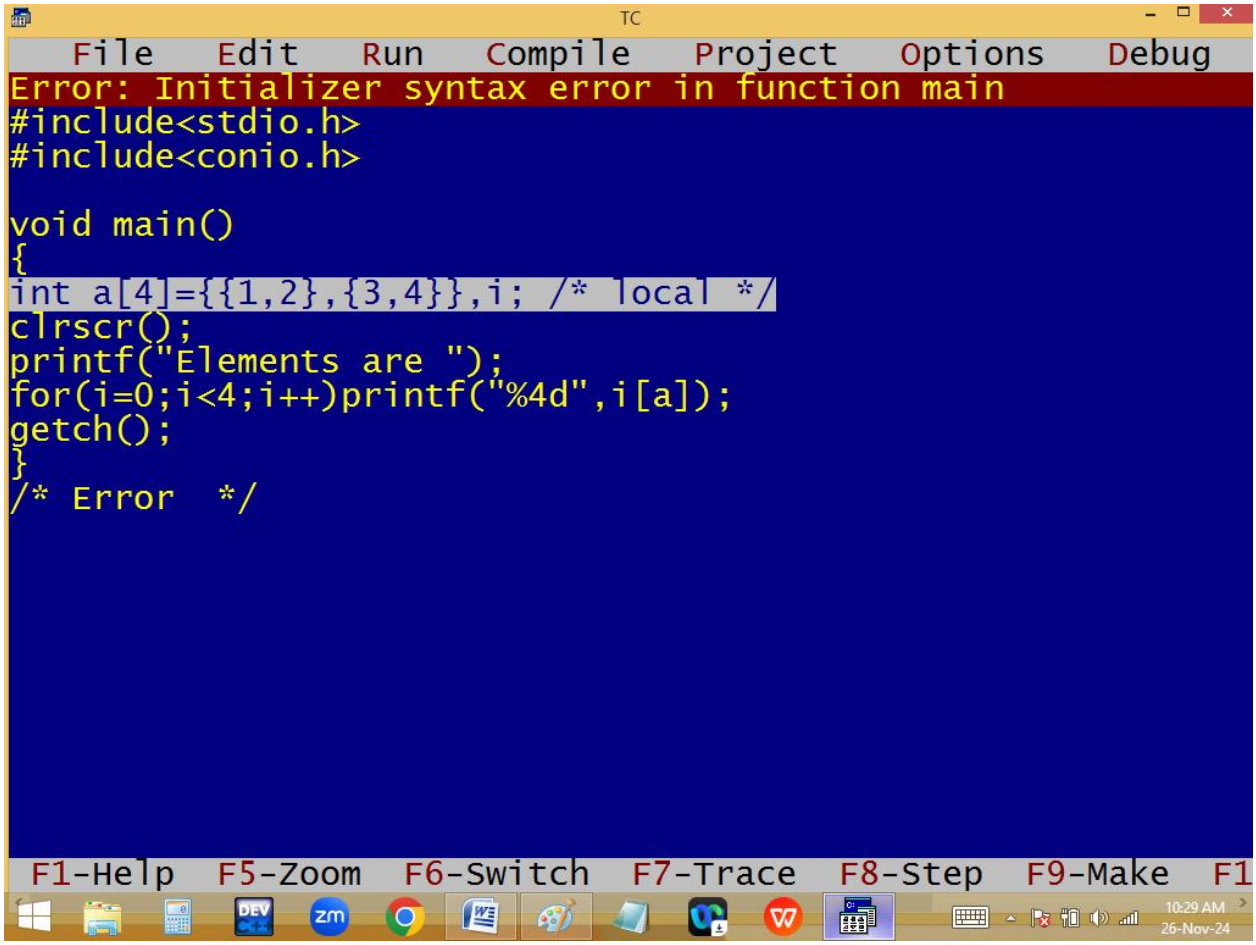

TC
File Edit Run Compile Project Options Debug
Line 5 Col 24 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4],i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* gr gr gr gr */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:26 AM
26-Nov-24

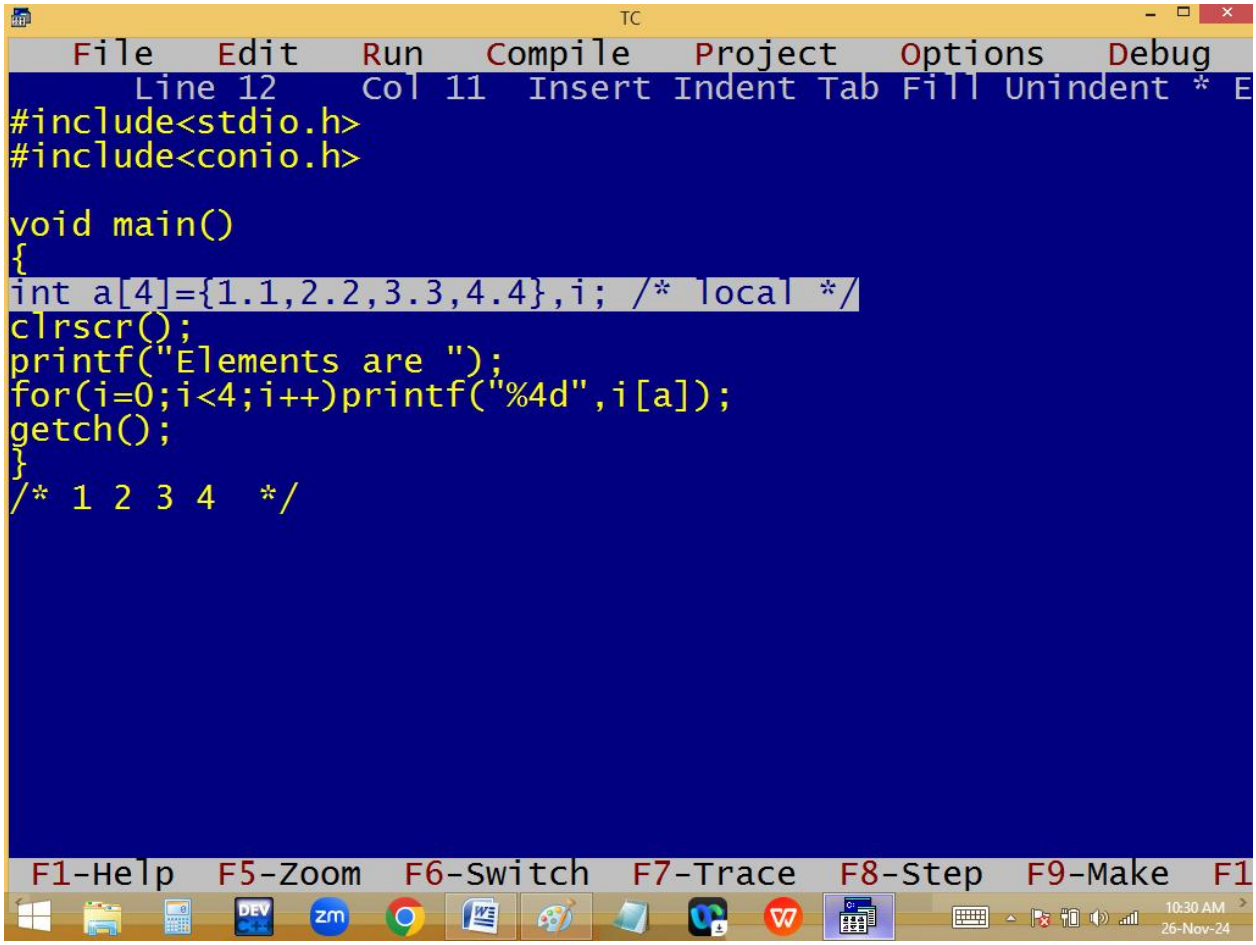

TC
File Edit Run Compile Project Options Debug
Line 11 Col 11 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
static int a[4],i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* 0 0 0 0 */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:27 AM
26-Nov-24

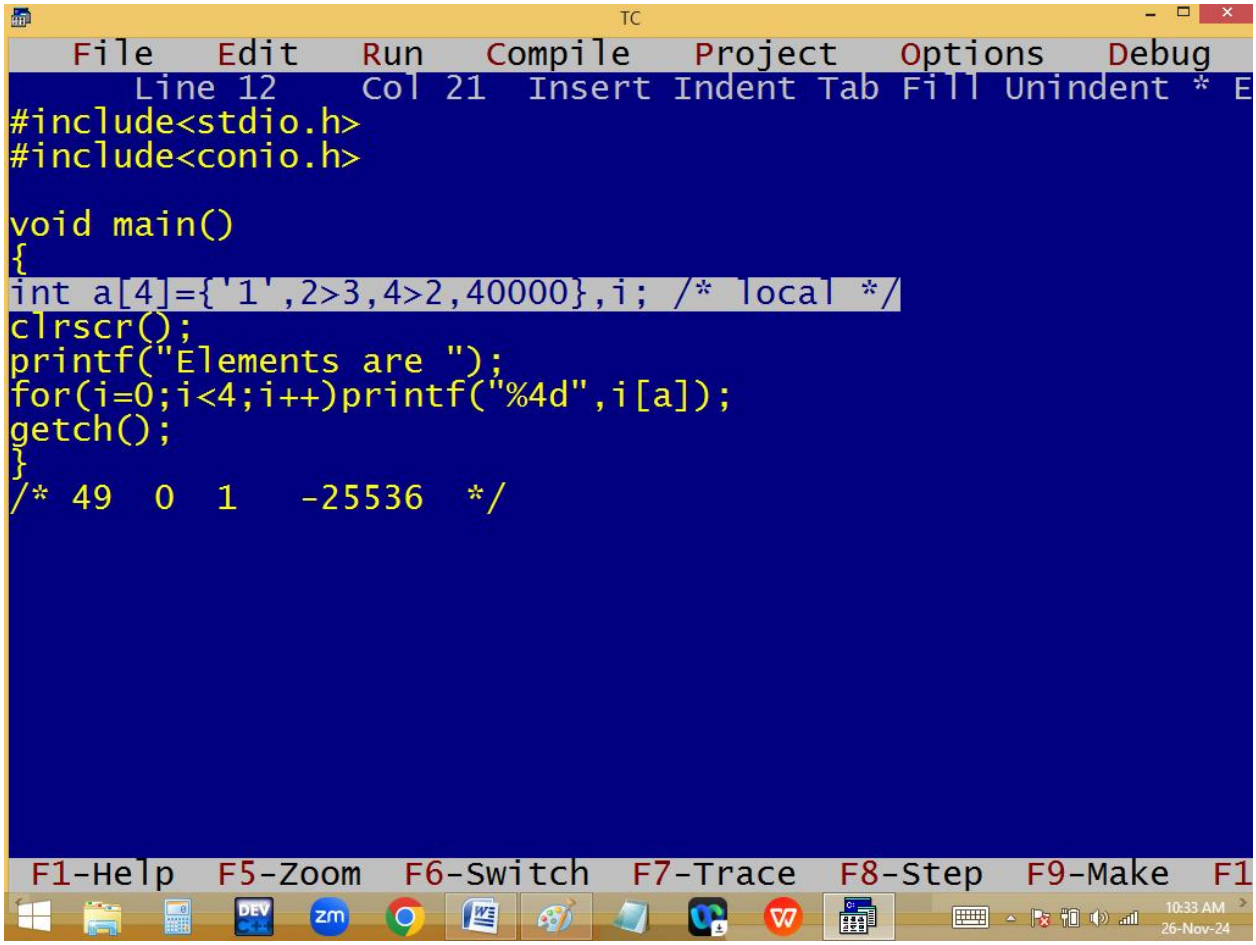

TC
File Edit Run Compile Project Options Debug
Line 6 Col 1 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
int a[4],i; /* global */
void main()
{
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* 0 0 0 0 */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:27 AM
26-Nov-24

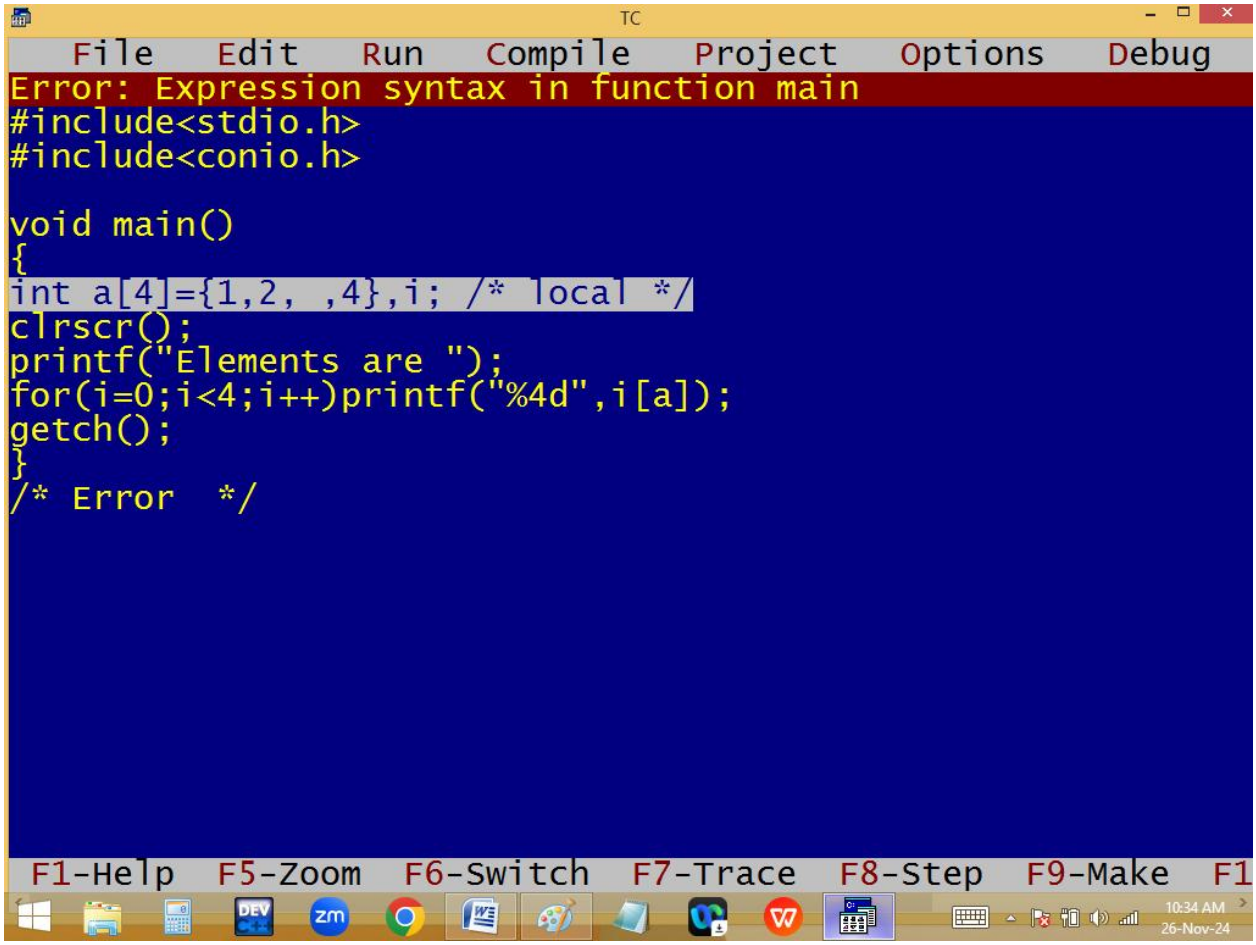

TC
File Edit Run Compile Project Options Debug
Error: Incompatible type conversion in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]=9,i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* Error */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:28 AM
26-Nov-24

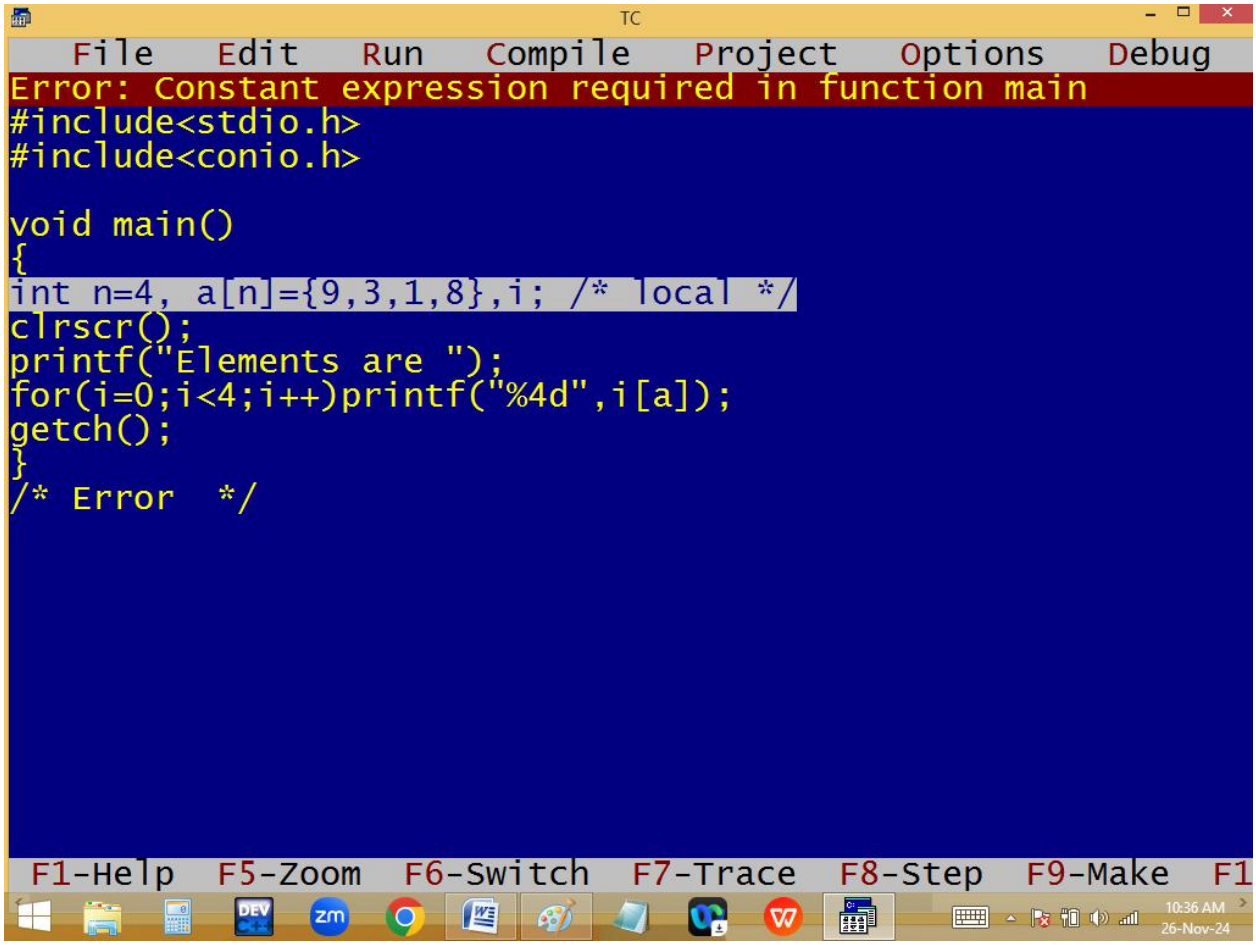

TC
File Edit Run Compile Project Options Debug
Error: Initializer syntax error in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={ },i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* Error */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:28 AM
26-Nov-24

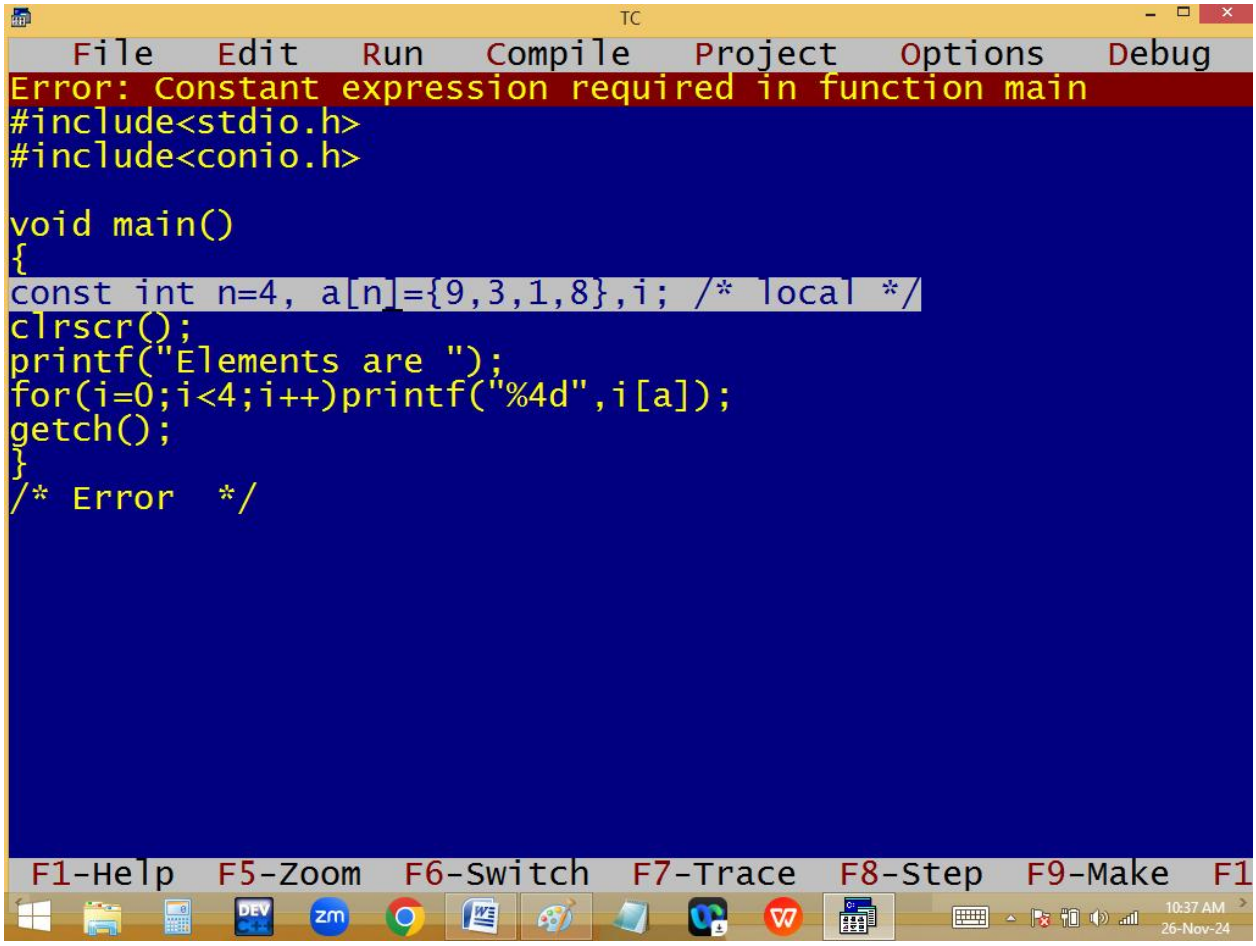

TC
File Edit Run Compile Project Options Debug
Error: Initializer syntax error in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={{1,2},{3,4}},i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* Error */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:29 AM
26-Nov-24

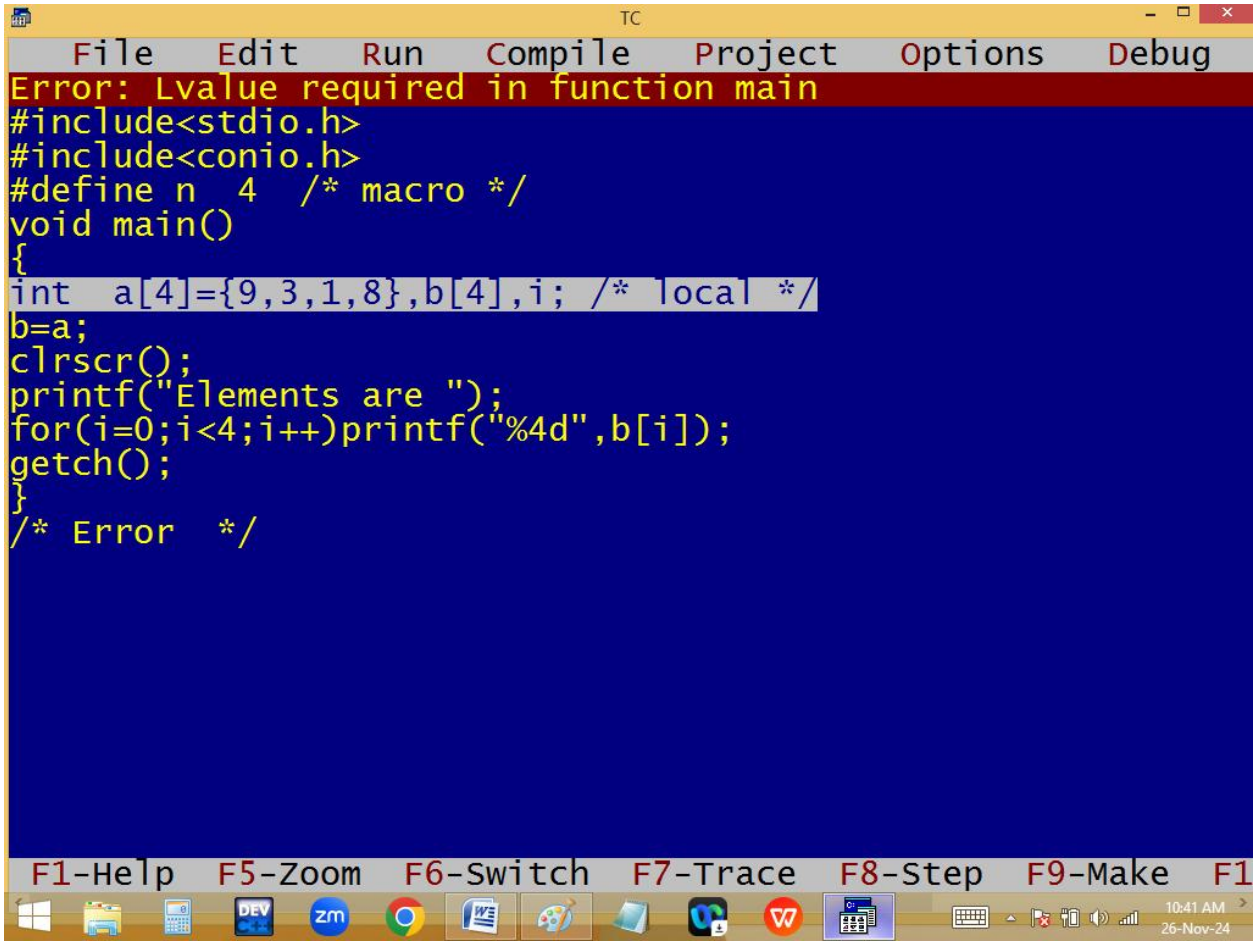

TC
File Edit Run Compile Project Options Debug
Line 12 Col 11 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={1.1,2.2,3.3,4.4},i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* 1 2 3 4 */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:30 AM
26-Nov-24

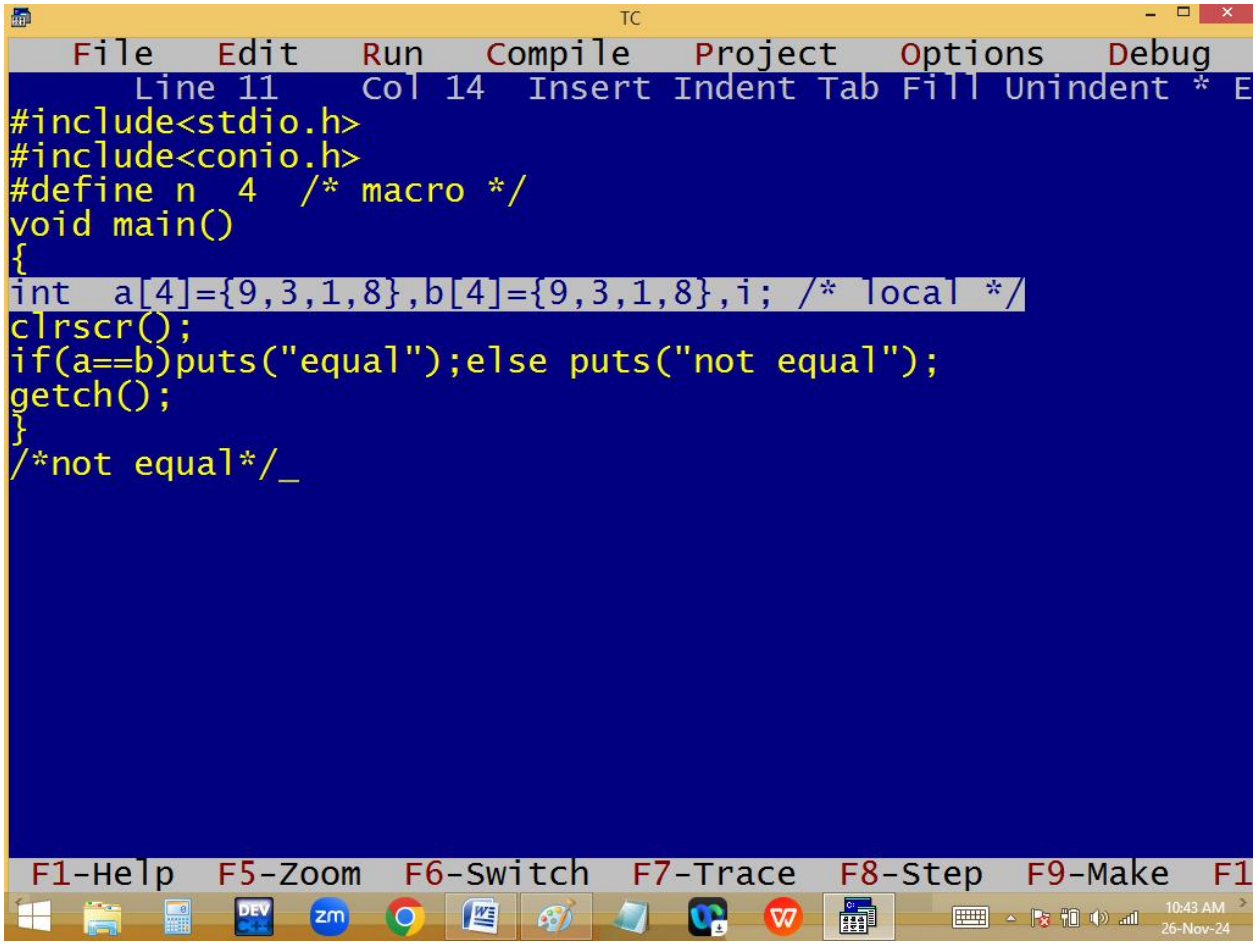

TC
File Edit Run Compile Project Options Debug
Line 12 Col 21 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={'1',2>3,4>2,40000},i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* 49 0 1 -25536 */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:33 AM
26-Nov-24

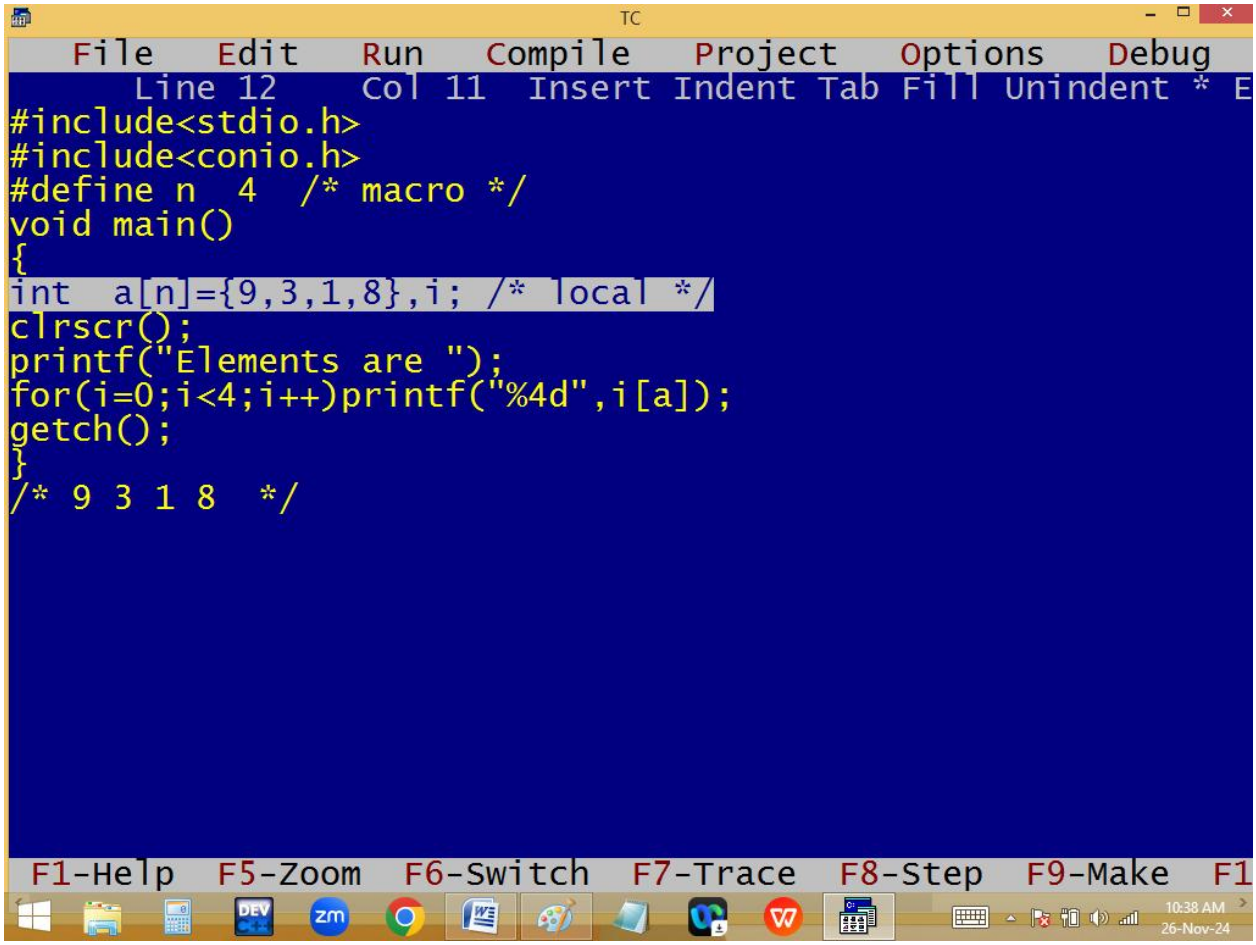

TC
File Edit Run Compile Project Options Debug
Error: Expression syntax in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={1,2, ,4},i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* Error */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:34 AM
26-Nov-24

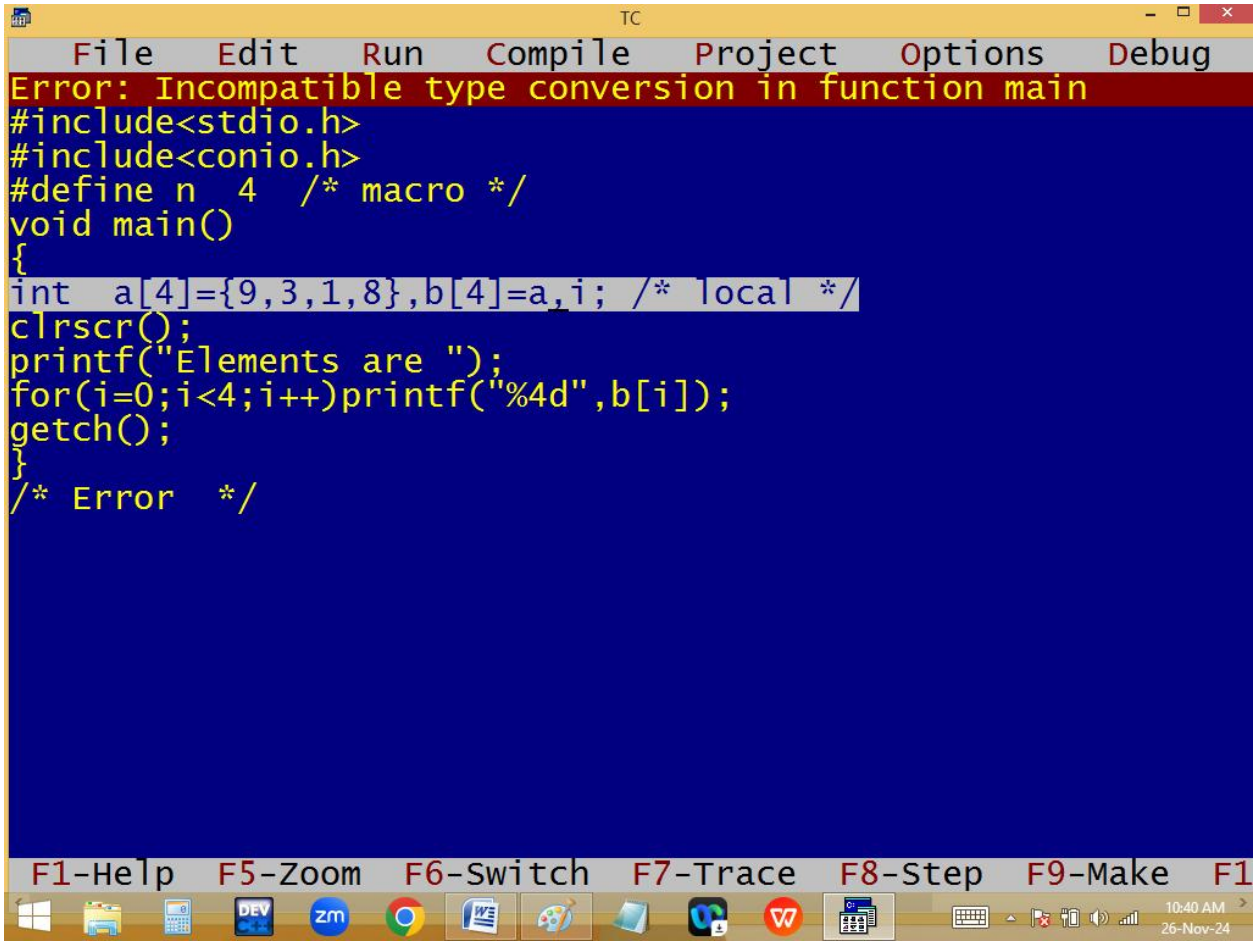

TC
File Edit Run Compile Project Options Debug
Error: Constant expression required in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int n=4, a[n]={9,3,1,8},i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* Error */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:36 AM
26-Nov-24


TC
File Edit Run Compile Project Options Debug
Error: Constant expression required in function main
#include<stdio.h>
#include<conio.h>
void main()
{
const int n=4, a[n]={9,3,1,8},i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* Error */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:37 AM
26-Nov-24


TC
File Edit Run Compile Project Options Debug
Error: Lvalue required in function main
#include<stdio.h>
#include<conio.h>
#define n 4 /* macro */
void main()
{
int a[4]={9,3,1,8},b[4],i; /* local */
b=a;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",b[i]);
getch();
}
/* Error */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:41 AM
26-Nov-24


TC
File Edit Run Compile Project Options Debug
Line 11 Col 14 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
#define n 4 /* macro */
void main()
{
int a[4]={9,3,1,8},b[4]={9,3,1,8},i; /* local */
clrscr();
if(a==b)puts("equal");else puts("not equal");
getch();
}
/*not equal*/_
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:43 AM
26-Nov-24


TC
File Edit Run Compile Project Options Debug
Line 12 Col 11 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
#define n 4 /* macro */
void main()
{
int a[n]={9,3,1,8},i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* 9 3 1 8 */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:38 AM
26-Nov-24


TC
File Edit Run Compile Project Options Debug
Error: Incompatible type conversion in function main
#include<stdio.h>
#include<conio.h>
#define n 4 /* macro */
void main()
{
int a[4]={9,3,1,8},b[4]=a,i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",b[i]);
getch();
}
/* Error */
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F1
10:40 AM
26-Nov-24