

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.

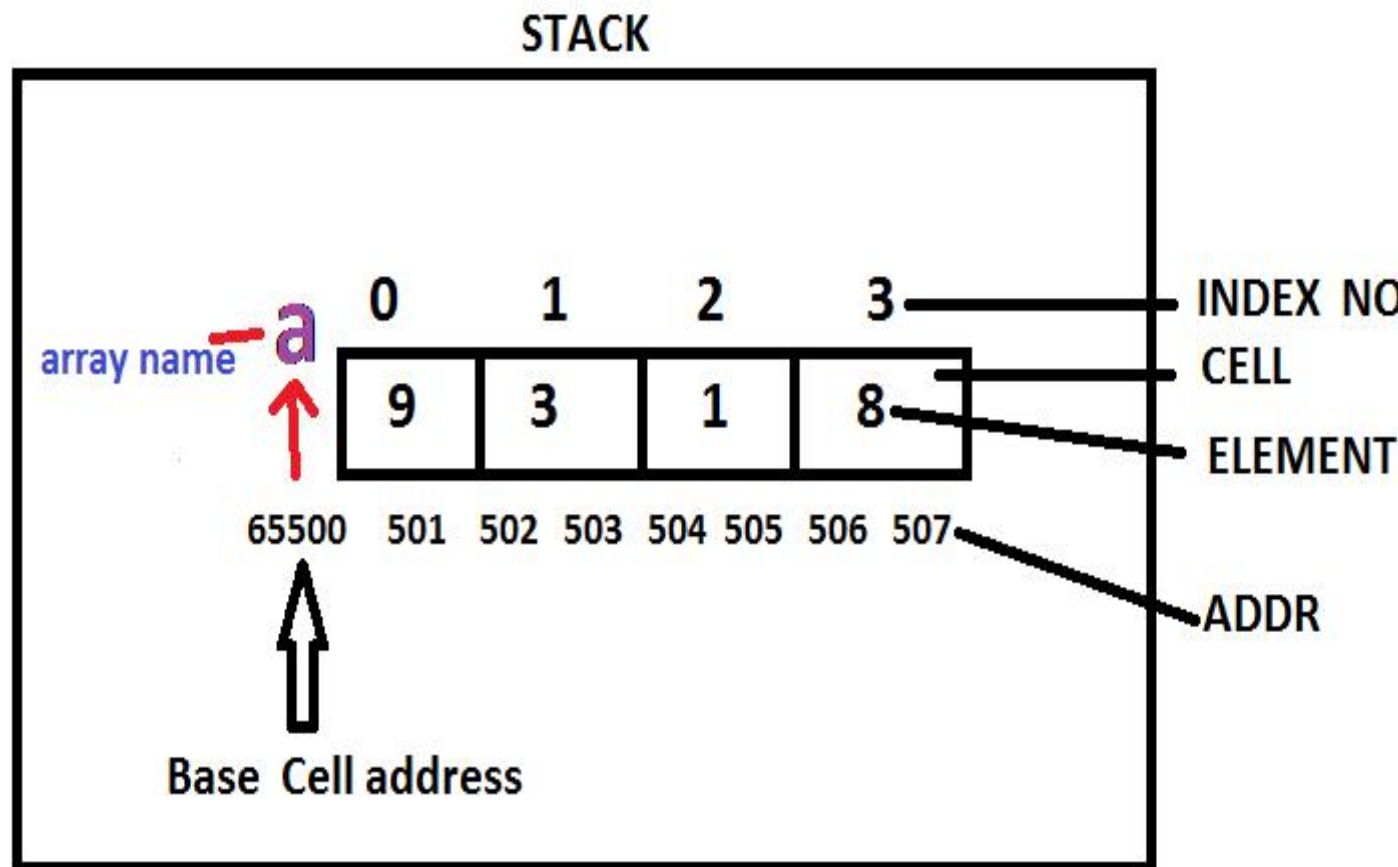
Syntax:

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

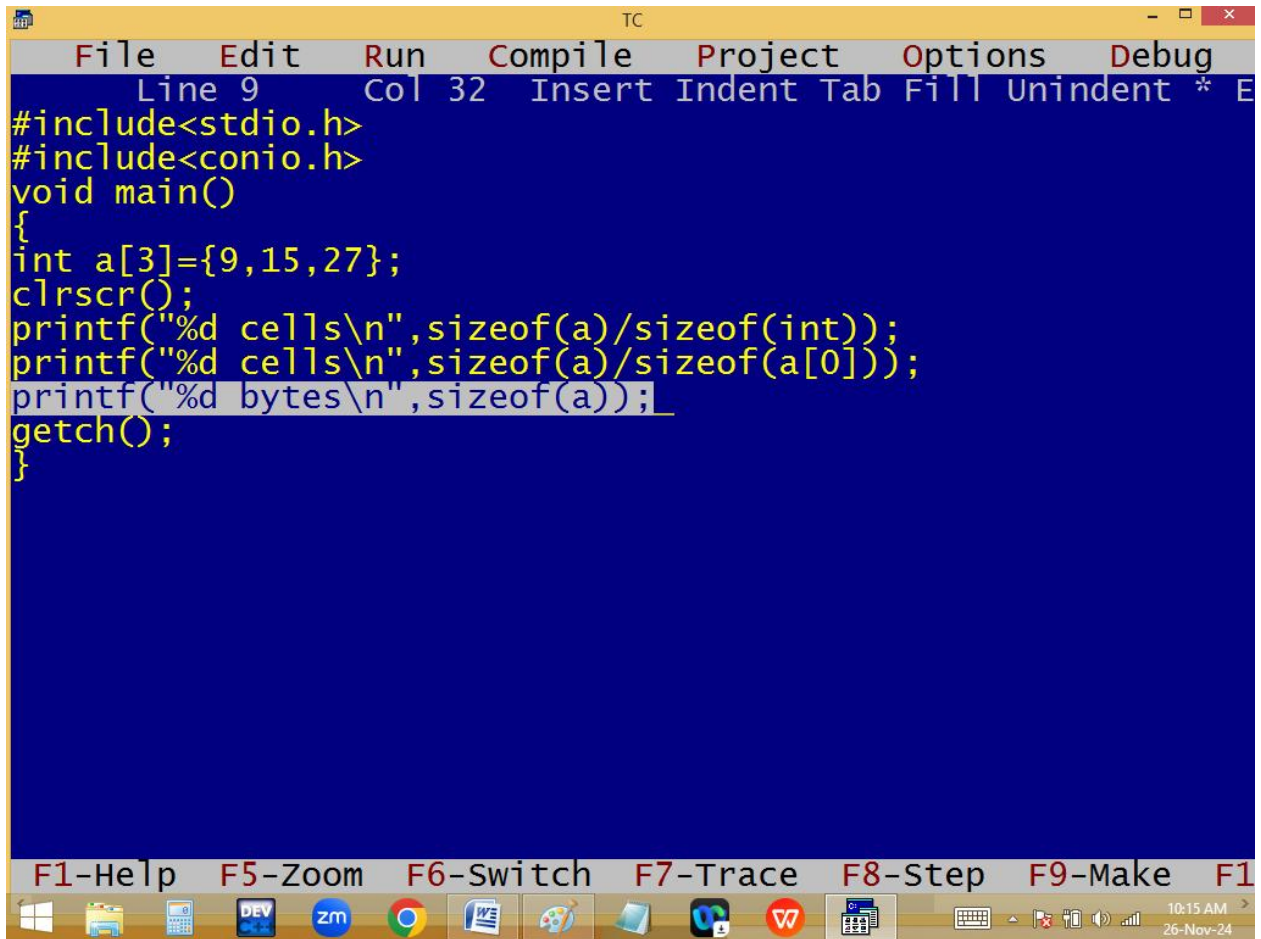
int a[40000]; → 40000 * 2 = 80000 bytes → No

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:

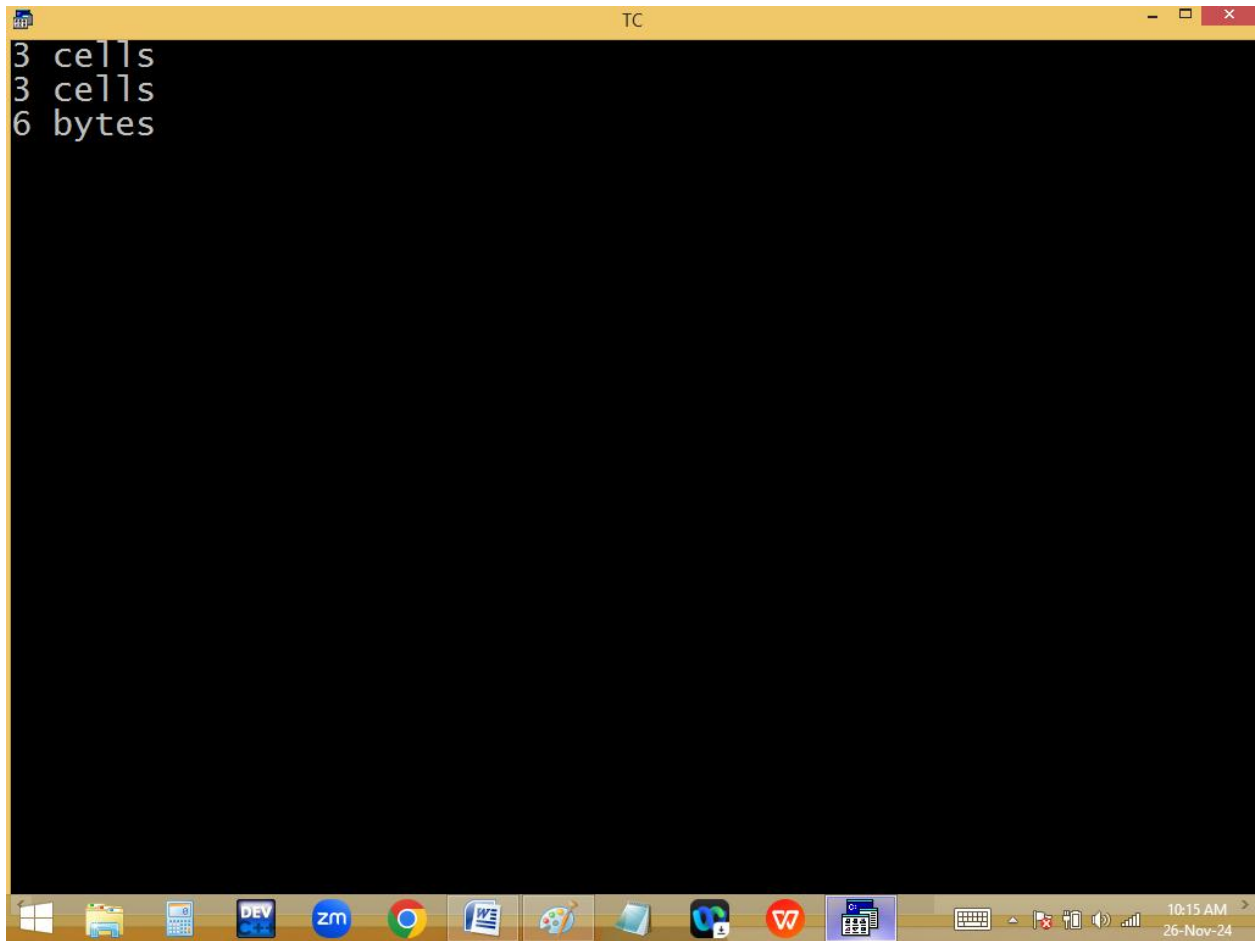


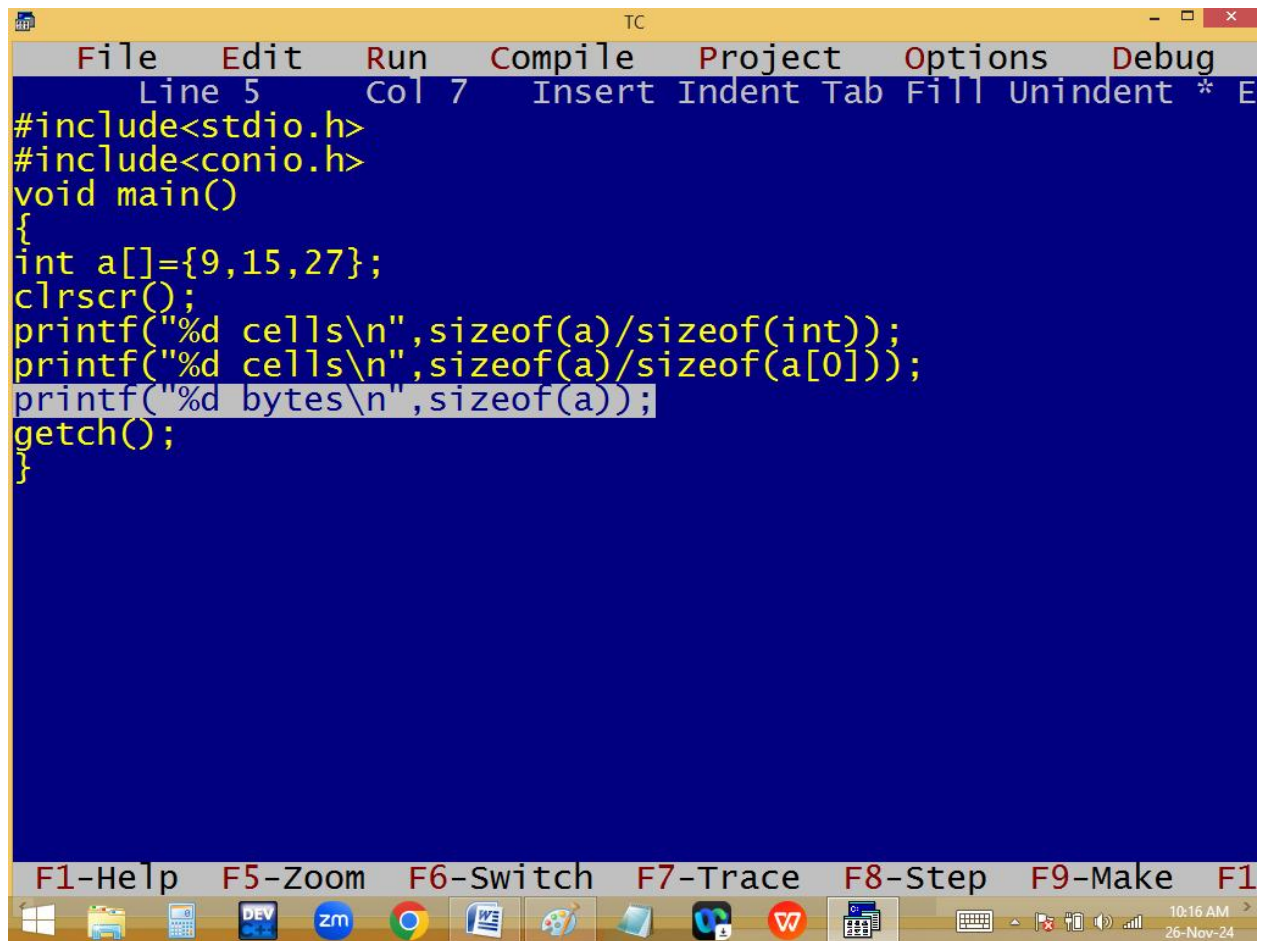
The screenshot shows the Turbo C++ (TC) IDE interface. The menu bar includes File, Edit, Run, Compile, Project, Options, and Debug. The status bar at the top indicates 'Line 9 Col 32' and provides editing options: Insert, Indent, Tab, Fill, Unindent, and *. The main editor area has a dark blue background with yellow text. The code defines an array 'a' of 3 integers and uses 'sizeof' to calculate its size in cells and bytes. The line 'printf("%d bytes\n", sizeof(a));' is highlighted. The bottom status bar shows function key shortcuts: F1-Help, F5-Zoom, F6-Switch, F7-Trace, F8-Step, F9-Make, and F10-Run. The Windows taskbar at the bottom displays various application icons and the system clock showing 10:15 AM on 26-Nov-24.

```
File Edit Run Compile Project Options Debug
Line 9 Col 32 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[3]={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 F10-Run

10:15 AM
26-Nov-24

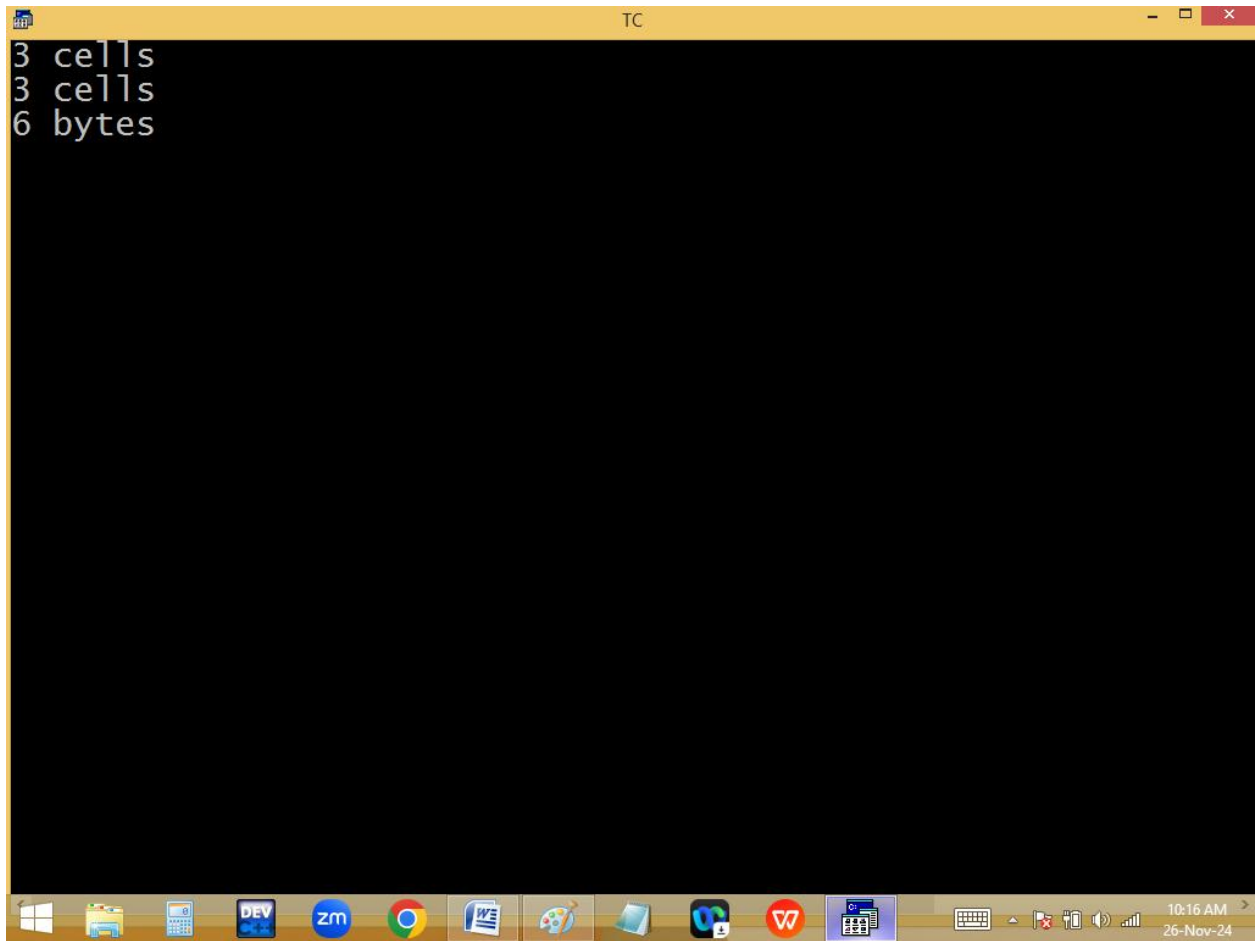


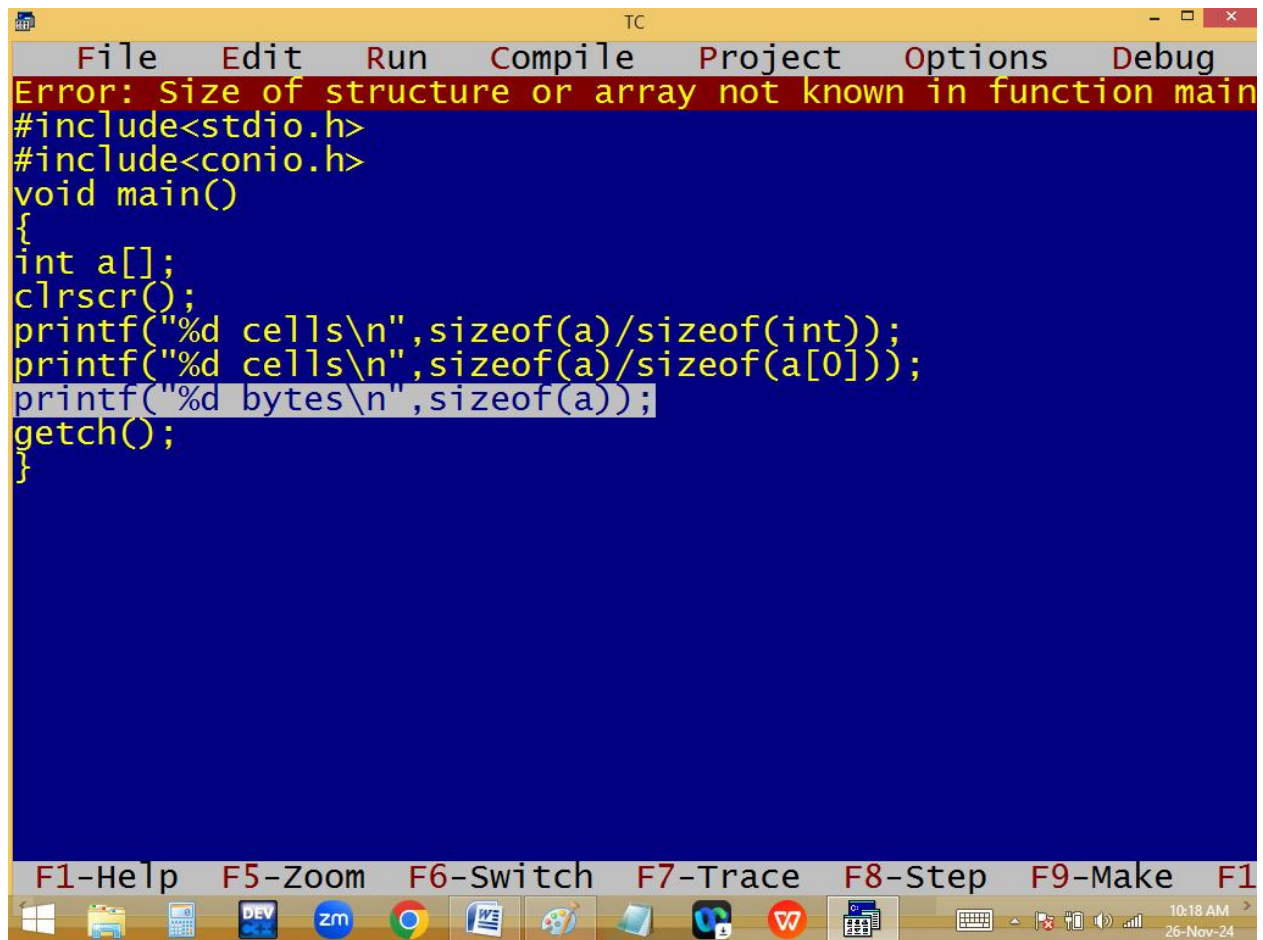


```
TC
File Edit Run Compile Project Options Debug
Line 5 Col 7 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9,15,27};
clrscr();
printf("%d cells\n",sizeof(a)/sizeof(int));
printf("%d cells\n",sizeof(a)/sizeof(a[0]));
printf("%d bytes\n",sizeof(a));
getch();
}
```

F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F10-Run

10:16 AM 26-Nov-24



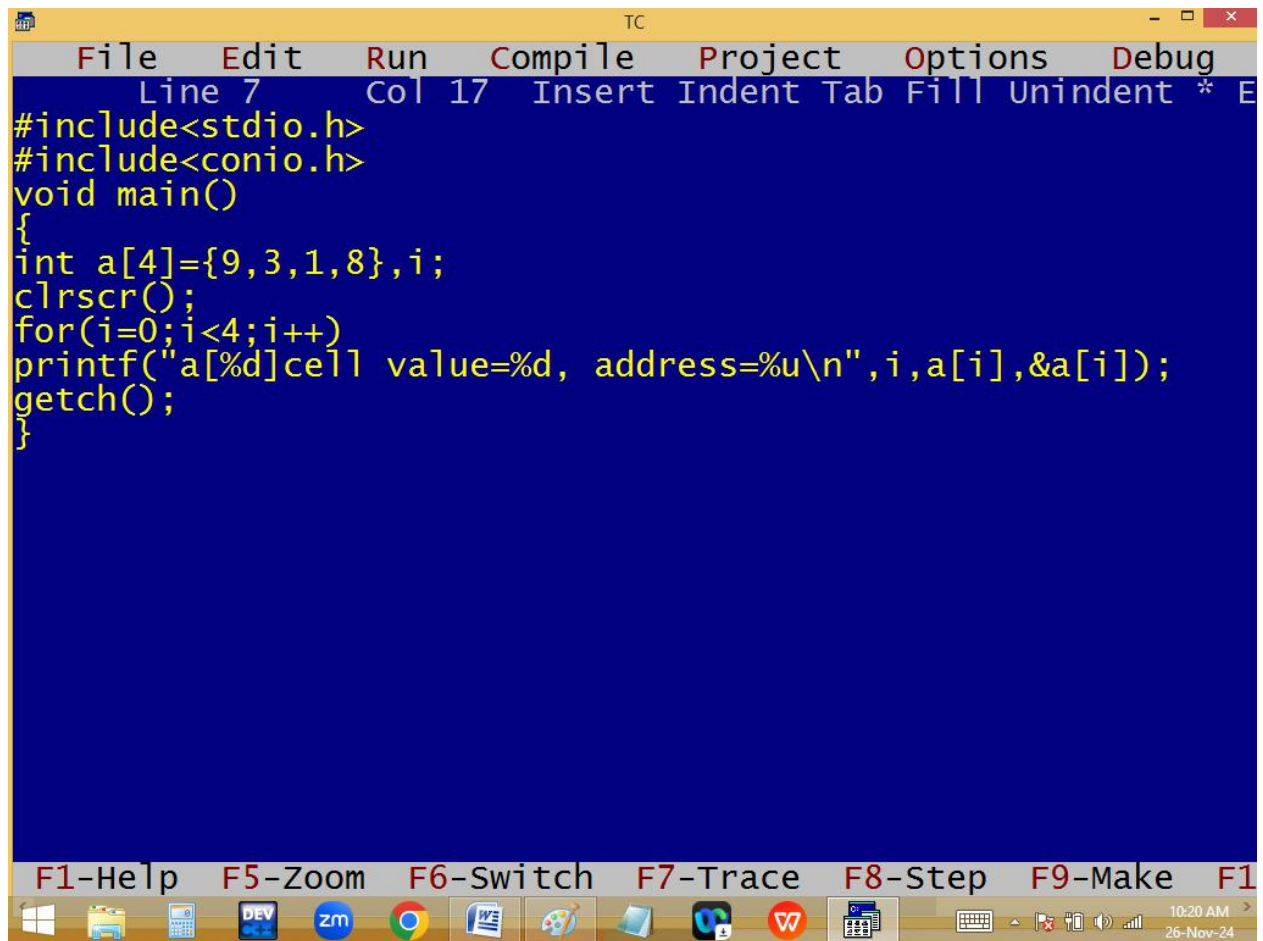


The screenshot shows the Turbo C++ (TC) IDE interface. The title bar reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", and "Debug". A red error message banner at the top states: "Error: Size of structure or array not known in function main". The code editor contains the following C code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[];
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();
}
```

The bottom status bar displays function key shortcuts: "F1-Help", "F5-Zoom", "F6-Switch", "F7-Trace", "F8-Step", "F9-Make", and "F10-Run". The Windows taskbar at the very bottom shows various application icons and the system clock indicating "10:18 AM" on "26-Nov-24".

Finding array element index no, value and address:

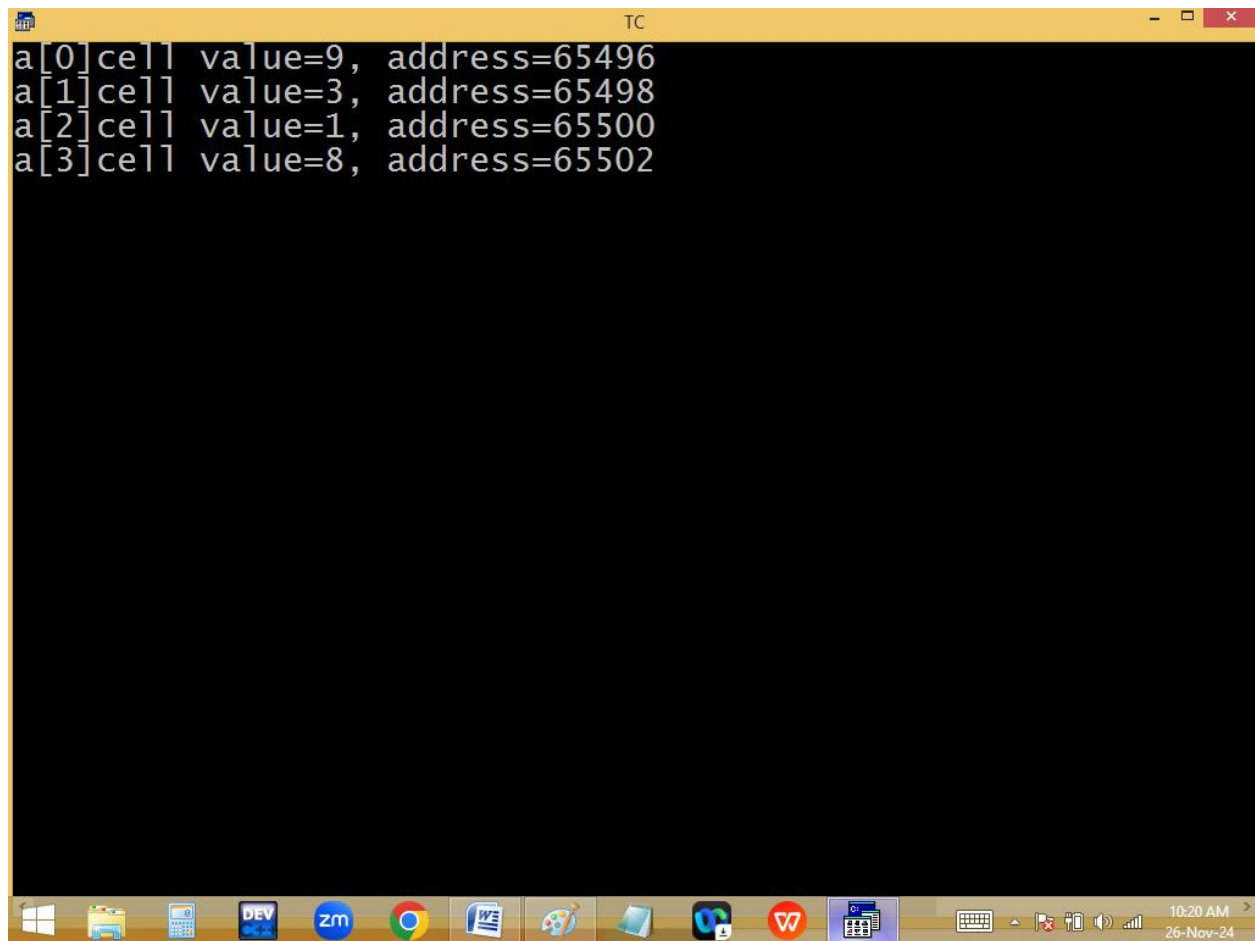


```
TC
File Edit Run Compile Project Options Debug
Line 7 Col 17 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8},i;
clrscr();
for(i=0;i<4;i++)
printf("a[%d]cell value=%d, address=%u\n",i,a[i],&a[i]);
getch();
}
```

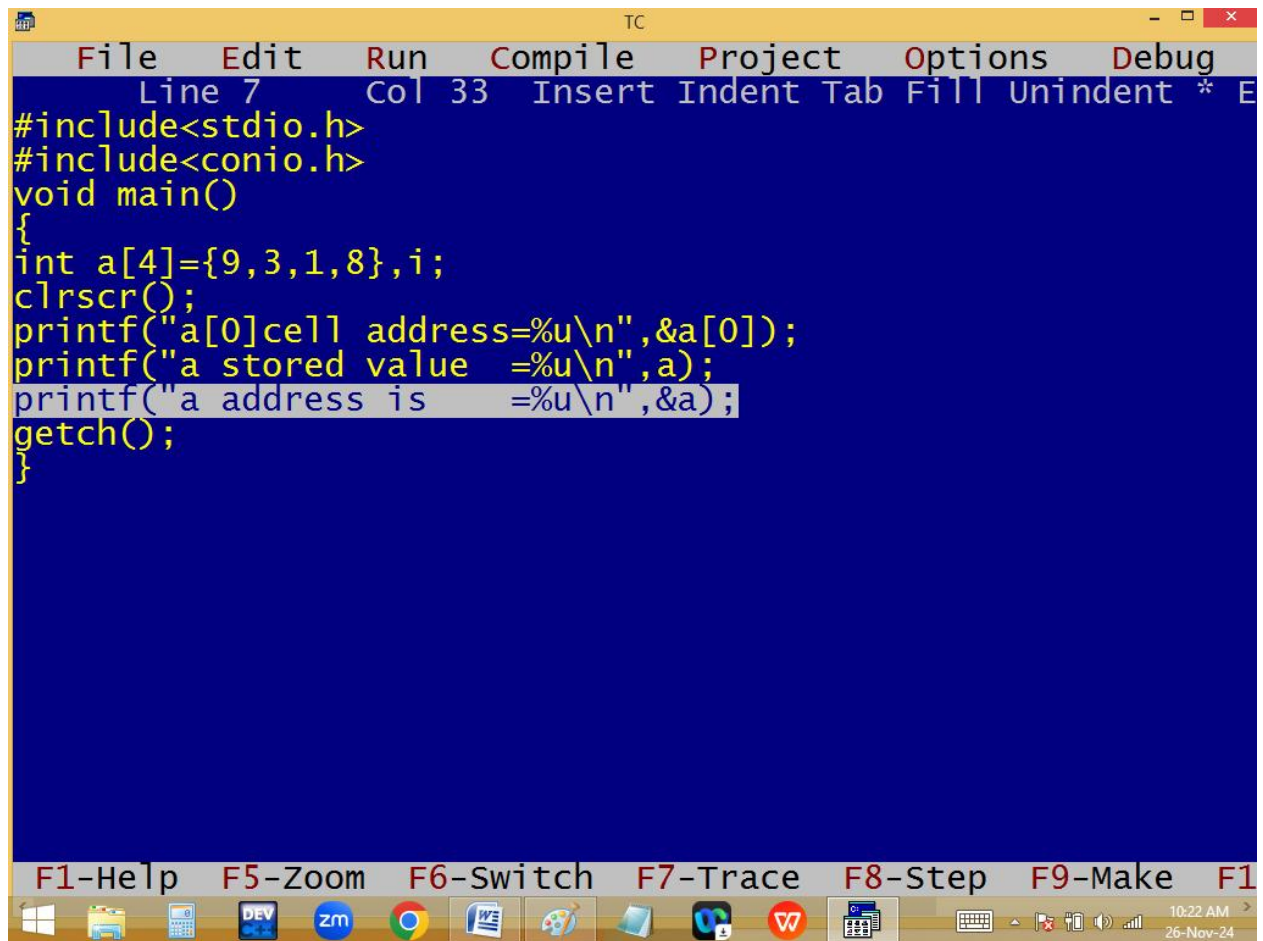
F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F10-Run

10:20 AM 26-Nov-24

```
TC
a[0] cell value=9, address=65496
a[1] cell value=3, address=65498
a[2] cell value=1, address=65500
a[3] cell value=8, address=65502
```

A screenshot of a Windows 10 desktop. At the top, a yellow terminal window titled 'TC' displays four lines of text: 'a[0] cell value=9, address=65496', 'a[1] cell value=3, address=65498', 'a[2] cell value=1, address=65500', and 'a[3] cell value=8, address=65502'. Below the terminal is a taskbar with icons for Windows, File Explorer, Calculator, DEV, zm, Chrome, Word, a game controller, a folder, a blue icon, a red 'W' icon, and a calendar. The system tray on the right shows the time as 10:20 AM and the date as 26-Nov-24.

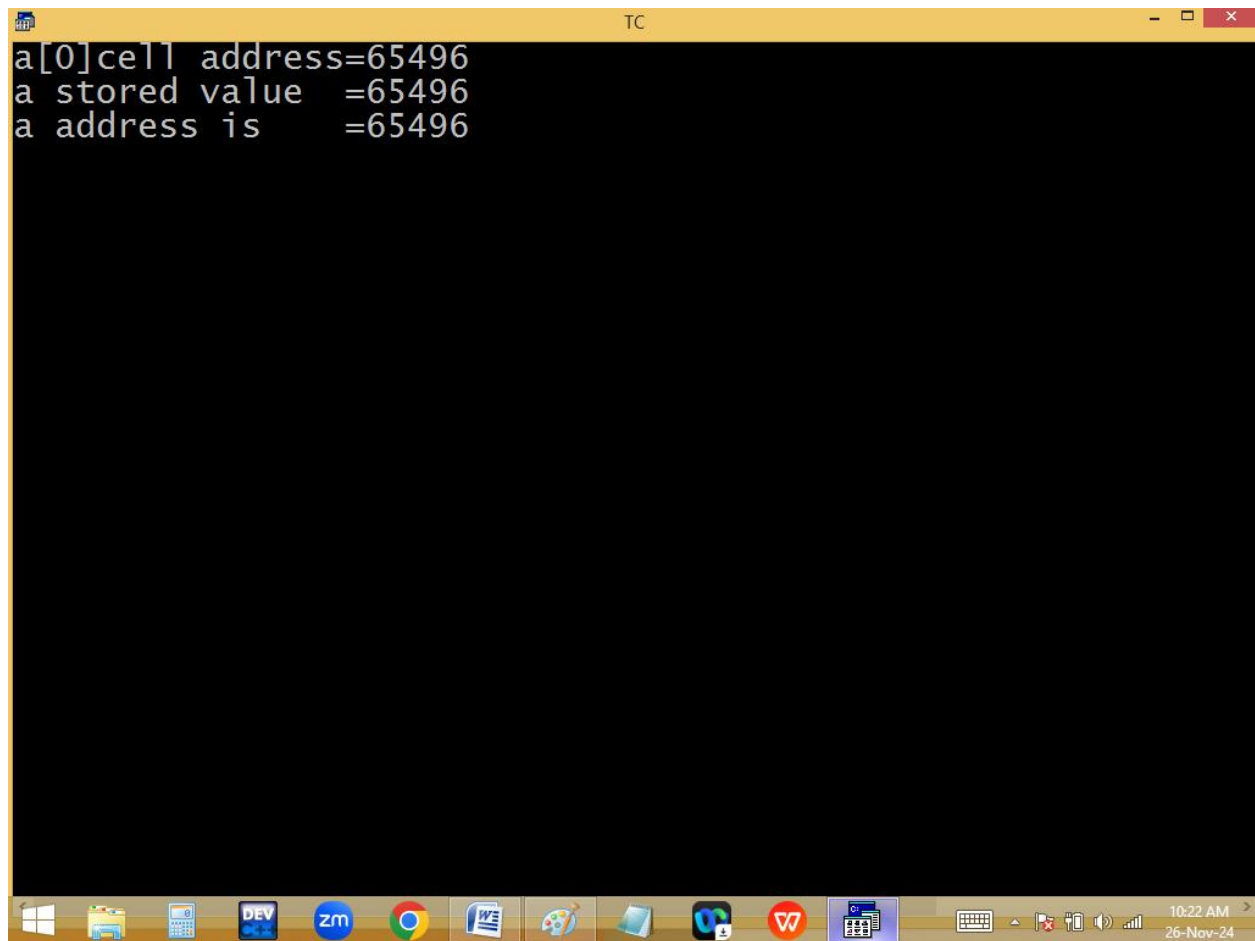
Finding array base address:



```
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 F10-Run

10:22 AM 26-Nov-24

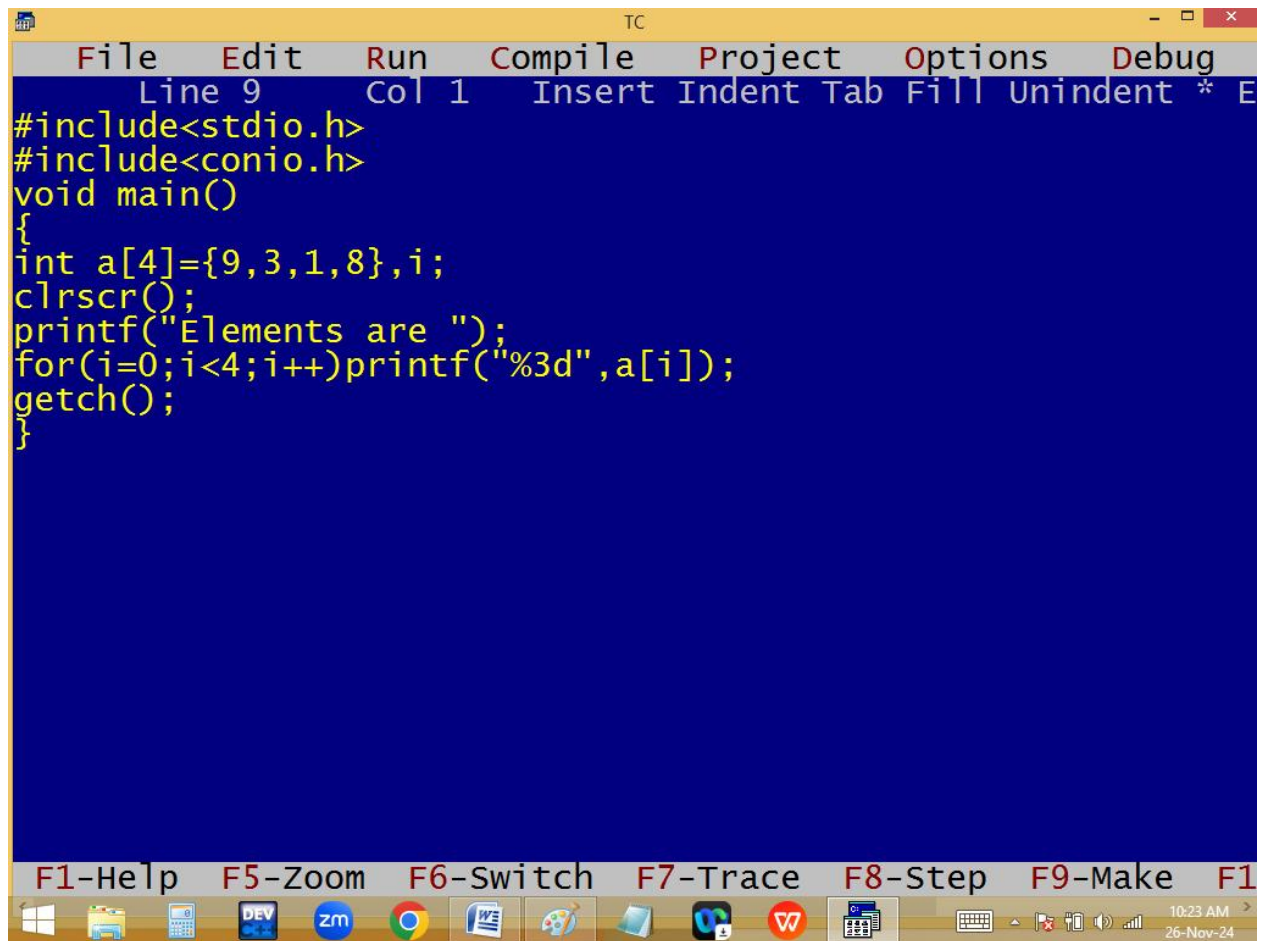


The image shows a screenshot of a Turbo C++ (TC) window. The window has a yellow title bar with the text "TC" and standard window controls. The main area is black with white text. The text displayed is:

```
a[0] cell address=65496  
a stored value =65496  
a address is =65496
```

The Windows taskbar is visible at the bottom, showing various application icons and the system clock indicating 10:22 AM on 26-Nov-24.

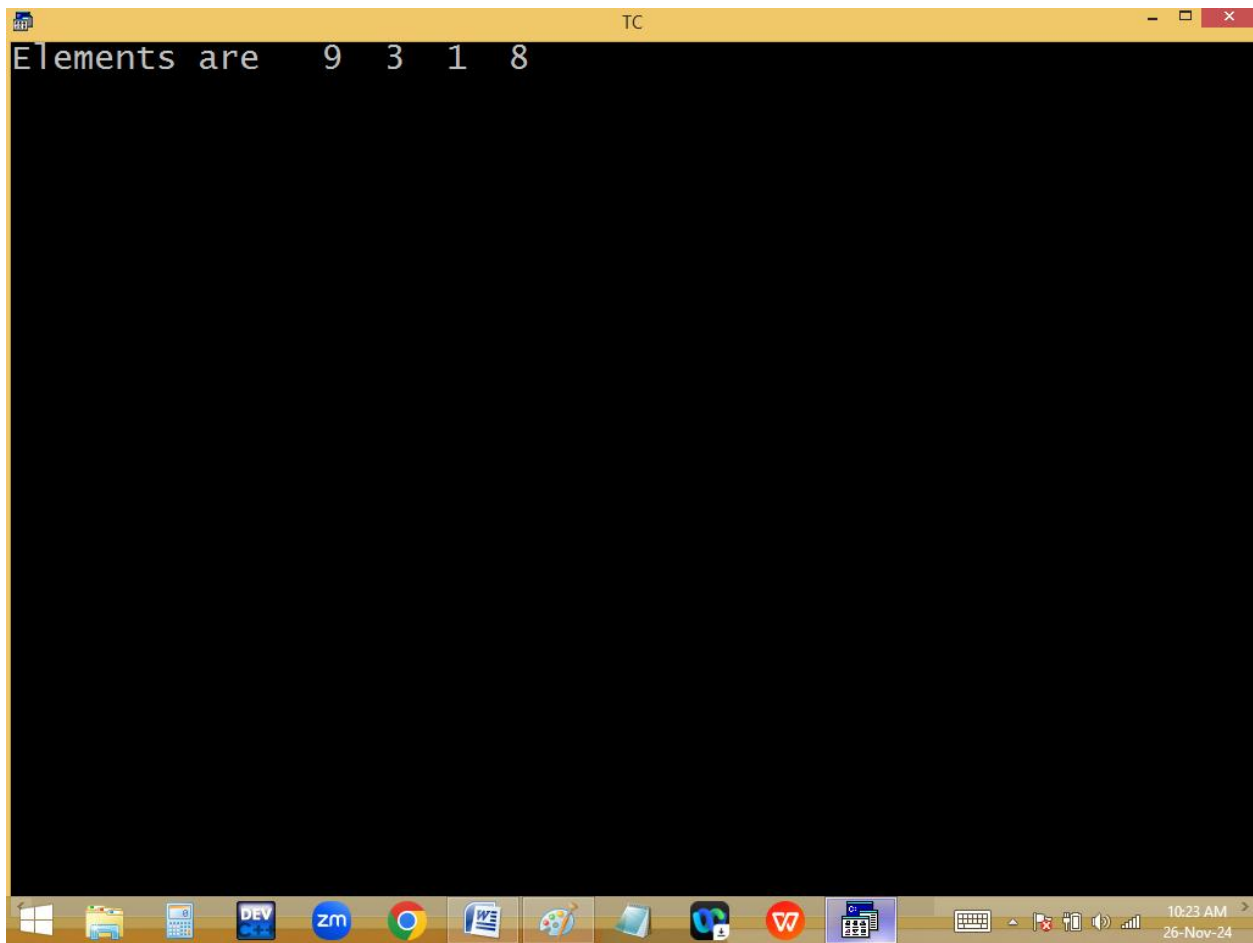
Eg: Direct initialization of array elements:

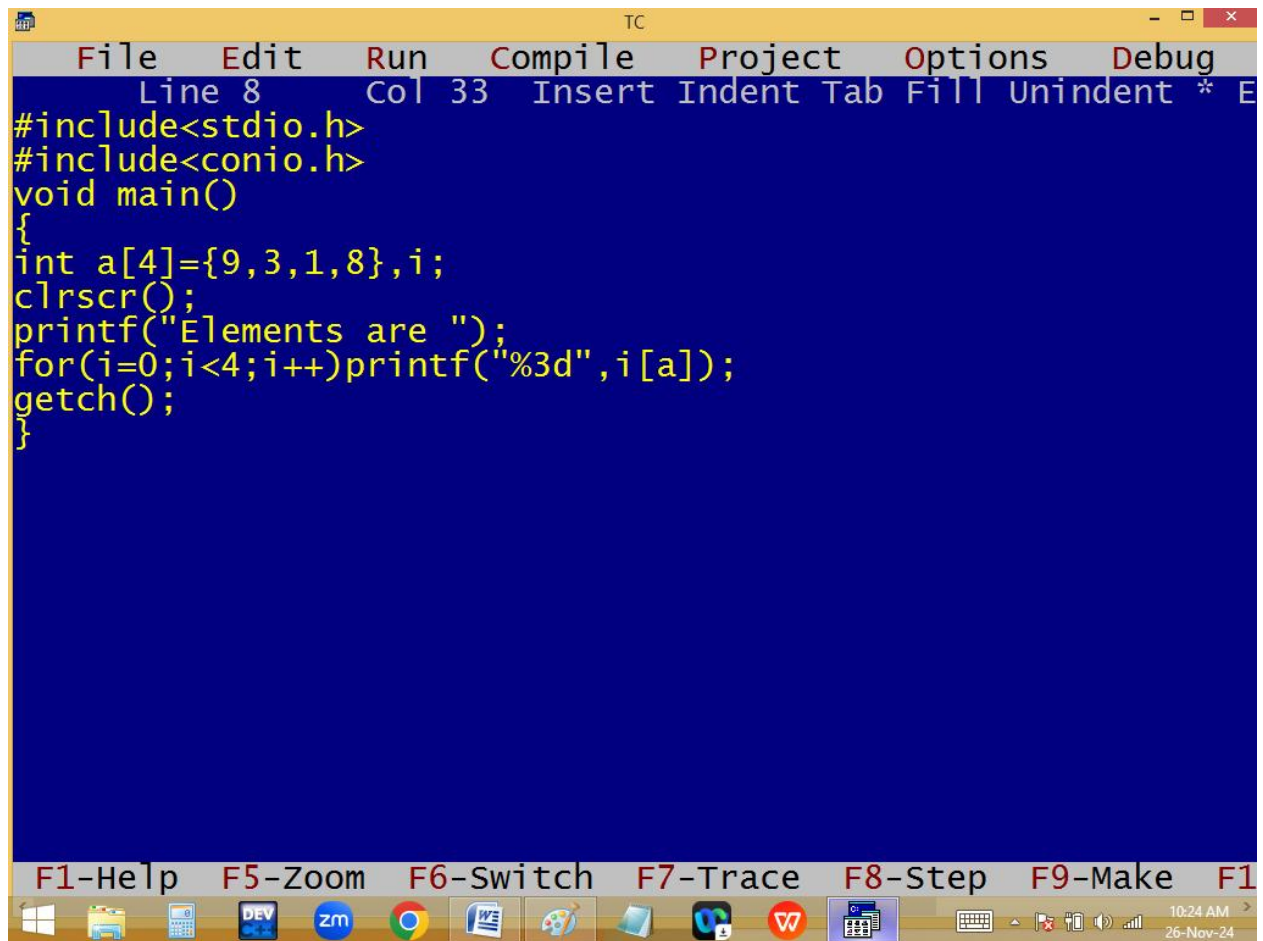


The image shows a screenshot of the Turbo C++ (TC) IDE. The main window has a dark blue background with yellow text. The menu bar at the top includes File, Edit, Run, Compile, Project, Options, and Debug. Below the menu bar, the status bar shows "Line 9 Col 1" and "Insert Indent Tab Fill Unindent * E". The code being edited is a C program that prints the elements of an array. The code is as follows:

```
#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();
}
```

At the bottom of the IDE, there is a toolbar with various icons and a row of function key shortcuts: F1-Help, F5-Zoom, F6-Switch, F7-Trace, F8-Step, F9-Make, and F10-Run. The Windows taskbar is visible at the very bottom, showing several open applications and the system clock indicating 10:23 AM on 26-Nov-24.

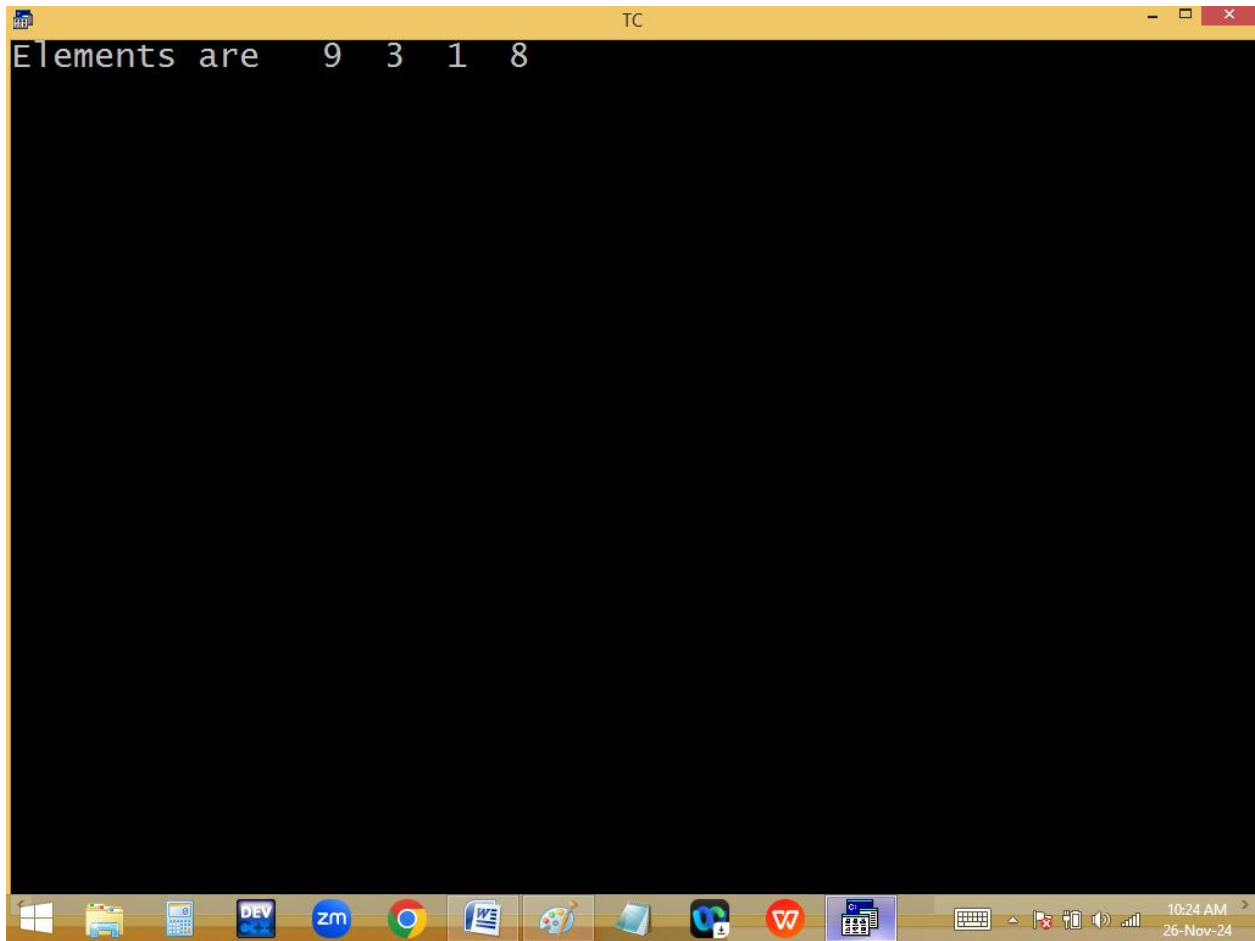


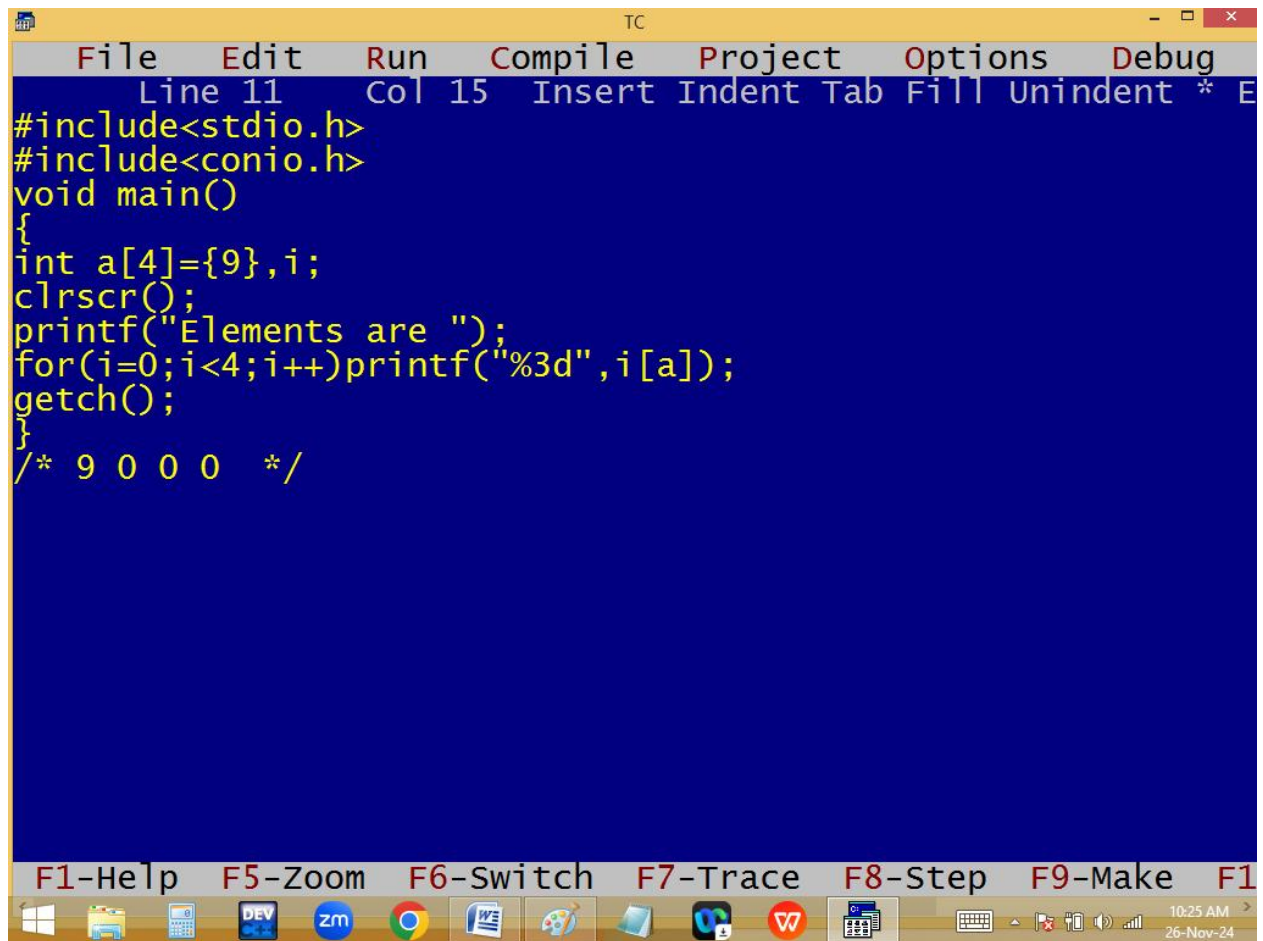


The image shows a screenshot of a Turbo C++ (TC) IDE window. The window has a yellow title bar with the text "TC" and standard window controls. The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", and "Debug". Below the menu bar, a status bar shows "Line 8", "Col 33", and various editing options like "Insert", "Indent", "Tab", "Fill", "Unindent", and "E". The main editing area has a blue background and contains the following C code:

```
#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();
}
```

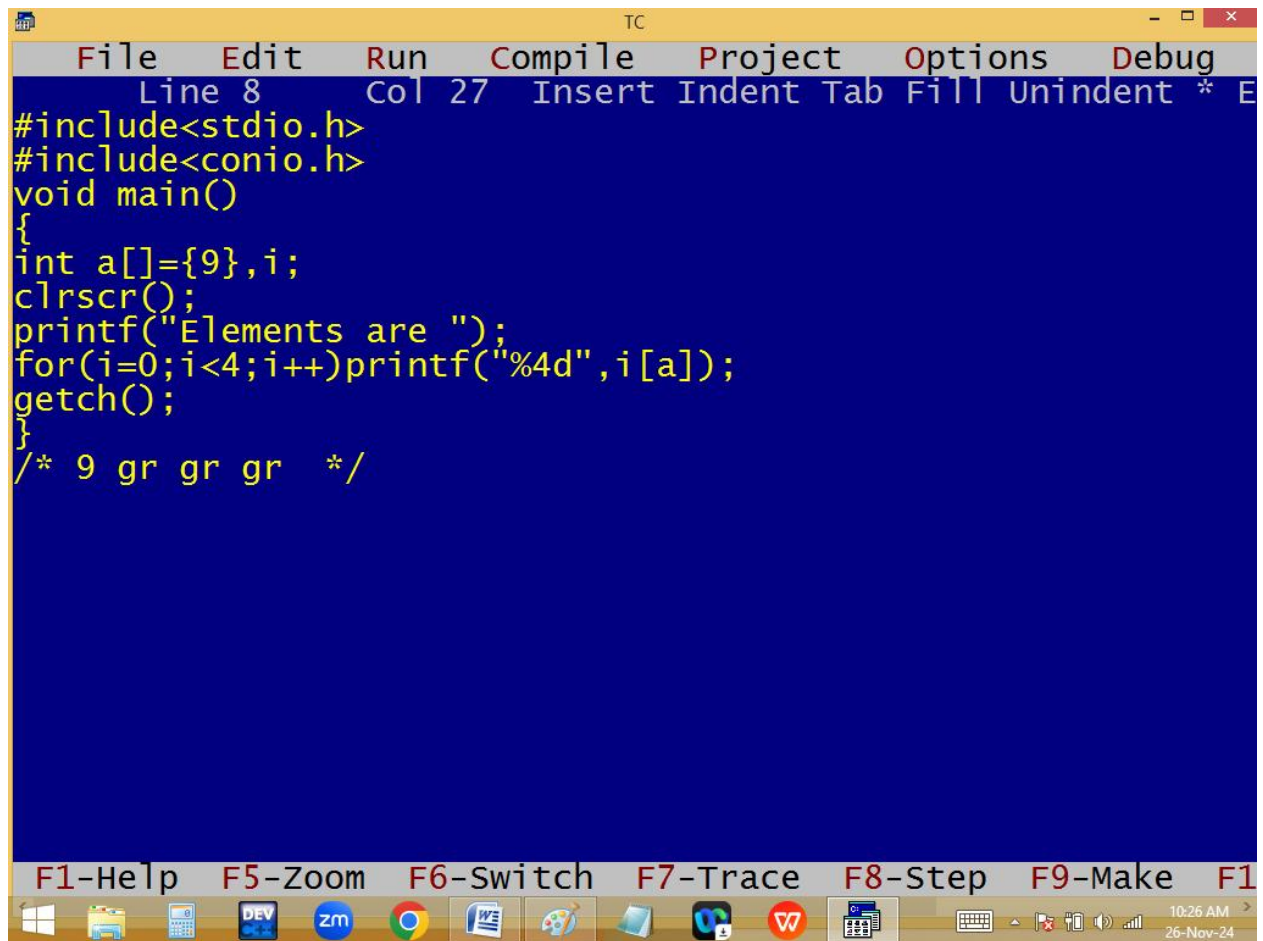
At the bottom of the window, there is a toolbar with function key shortcuts: "F1-Help", "F5-Zoom", "F6-Switch", "F7-Trace", "F8-Step", "F9-Make", and "F10-Run". The Windows taskbar is visible at the very bottom, showing icons for various applications and the system clock displaying "10:24 AM" and "26-Nov-24".





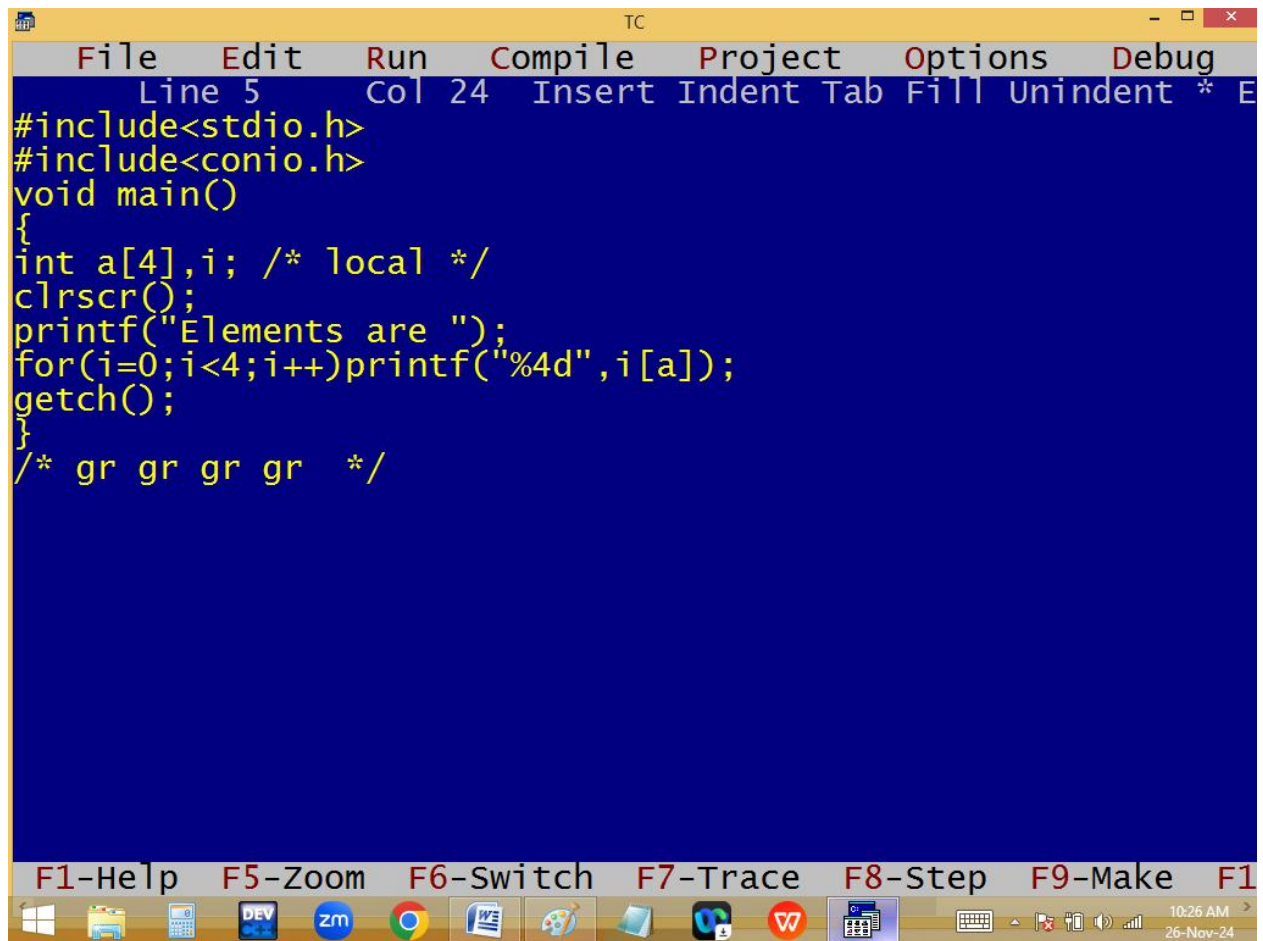
```
TC
File Edit Run Compile Project Options Debug
Line 11 Col 15 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9},i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%3d",i[a]);
getch();
}
/* 9 0 0 0 */

F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F10-Run
10:25 AM
26-Nov-24
```



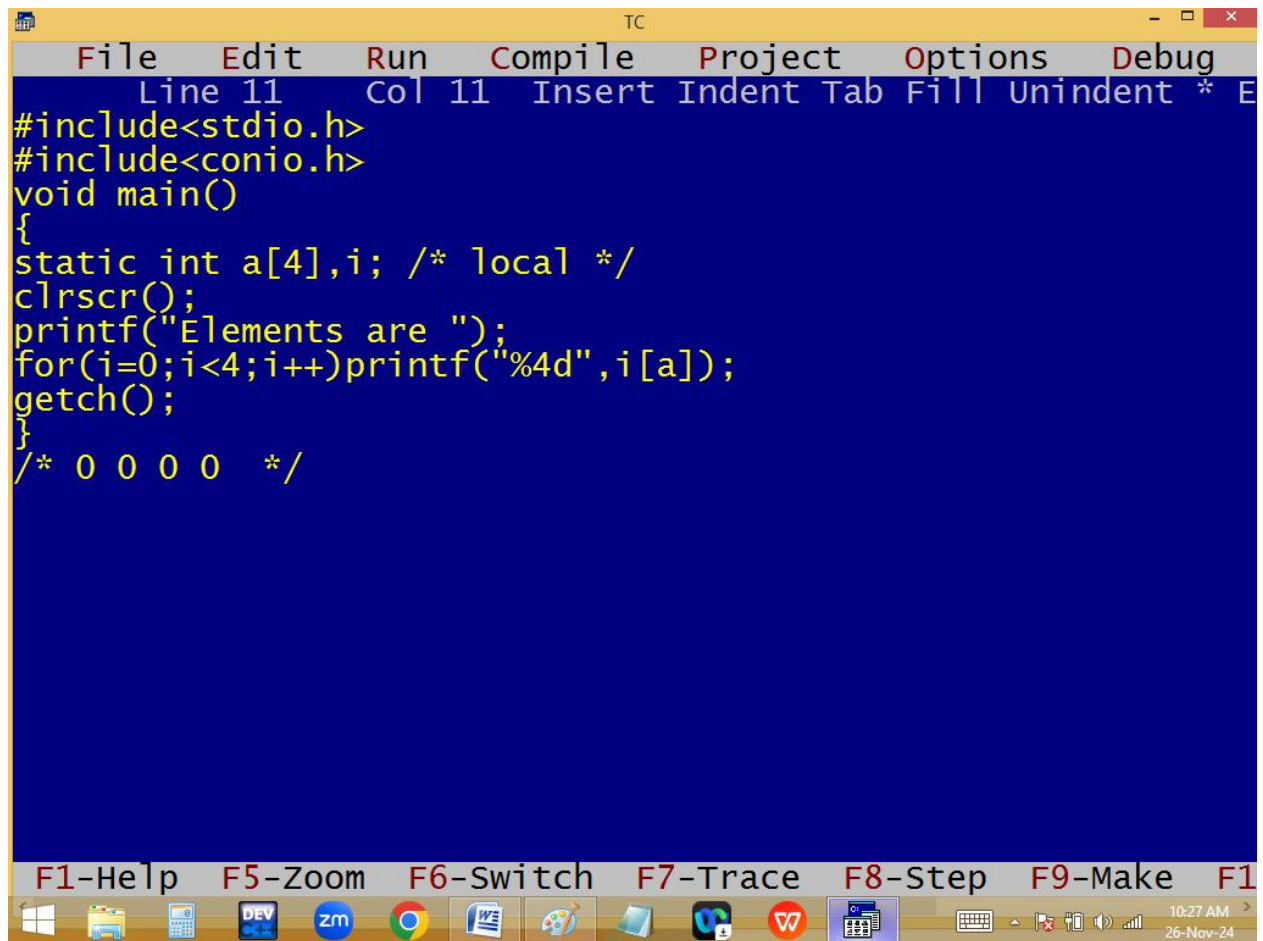
```
TC
File Edit Run Compile Project Options Debug
Line 8 Col 27 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9},i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* 9 gr gr gr */

F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F10-Run
10:26 AM
26-Nov-24
```



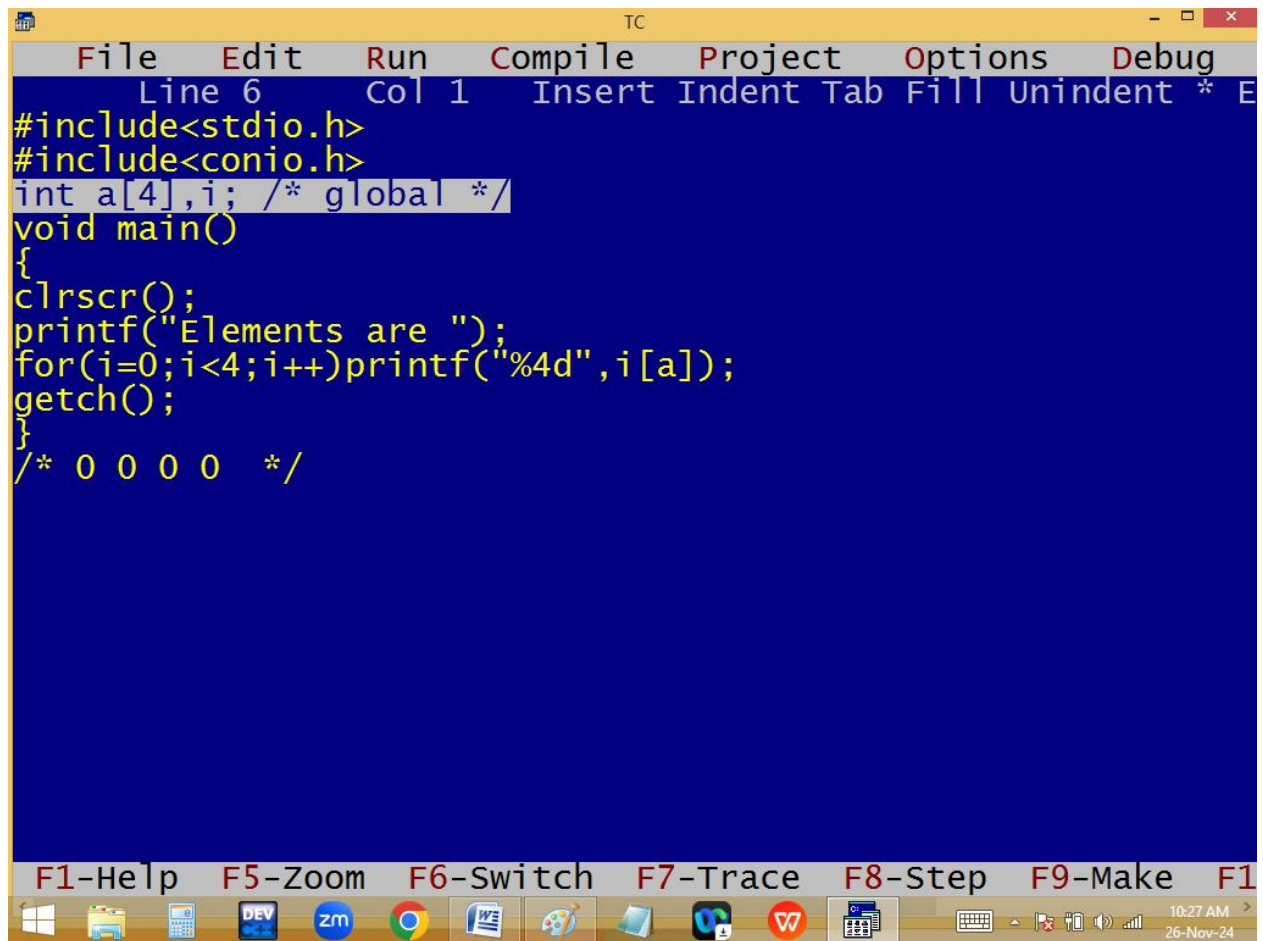
```
TC
File Edit Run Compile Project Options Debug
Line 5 Col 24 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4],i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* gr gr gr gr */

F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F10-Exit
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 F10-Run
10:27 AM 26-Nov-24
```



The image shows a screenshot of a Turbo C++ (TC) IDE window. The window has a yellow title bar with the text "TC" and standard window controls. Below the title bar is a menu bar with the following items: File, Edit, Run, Compile, Project, Options, and Debug. Under the "Run" menu, there is a status bar showing "Line 6 Col 1" and a list of actions: Insert, Indent, Tab, Fill, Unindent, and * E. The main editing area has a dark blue background with yellow text. The code is as follows:

```
#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 */
```

At the bottom of the window, there is a toolbar with function key shortcuts: F1-Help, F5-Zoom, F6-Switch, F7-Trace, F8-Step, F9-Make, and F10-Run. Below the toolbar is a Windows taskbar with various application icons, including Windows Explorer, Calculator, DEV C++, Zoom, Google Chrome, Word, and others. The system clock in the bottom right corner shows "10:27 AM" and "26-Nov-24".

TC

File Edit Run Compile Project Options Debug

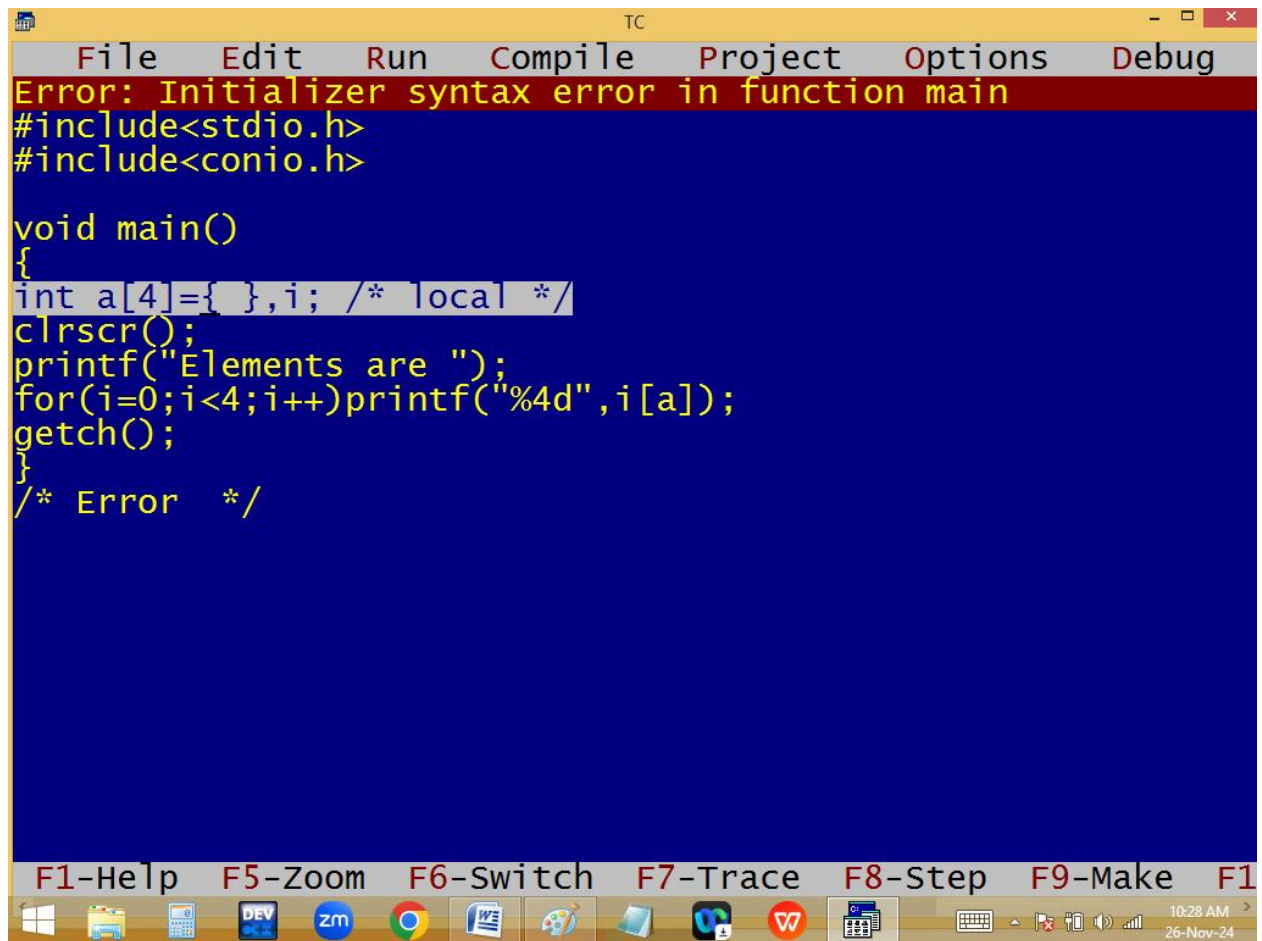
Error: Incompatible type conversion in function main

```
#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 F10-Run

10:28 AM
26-Nov-24

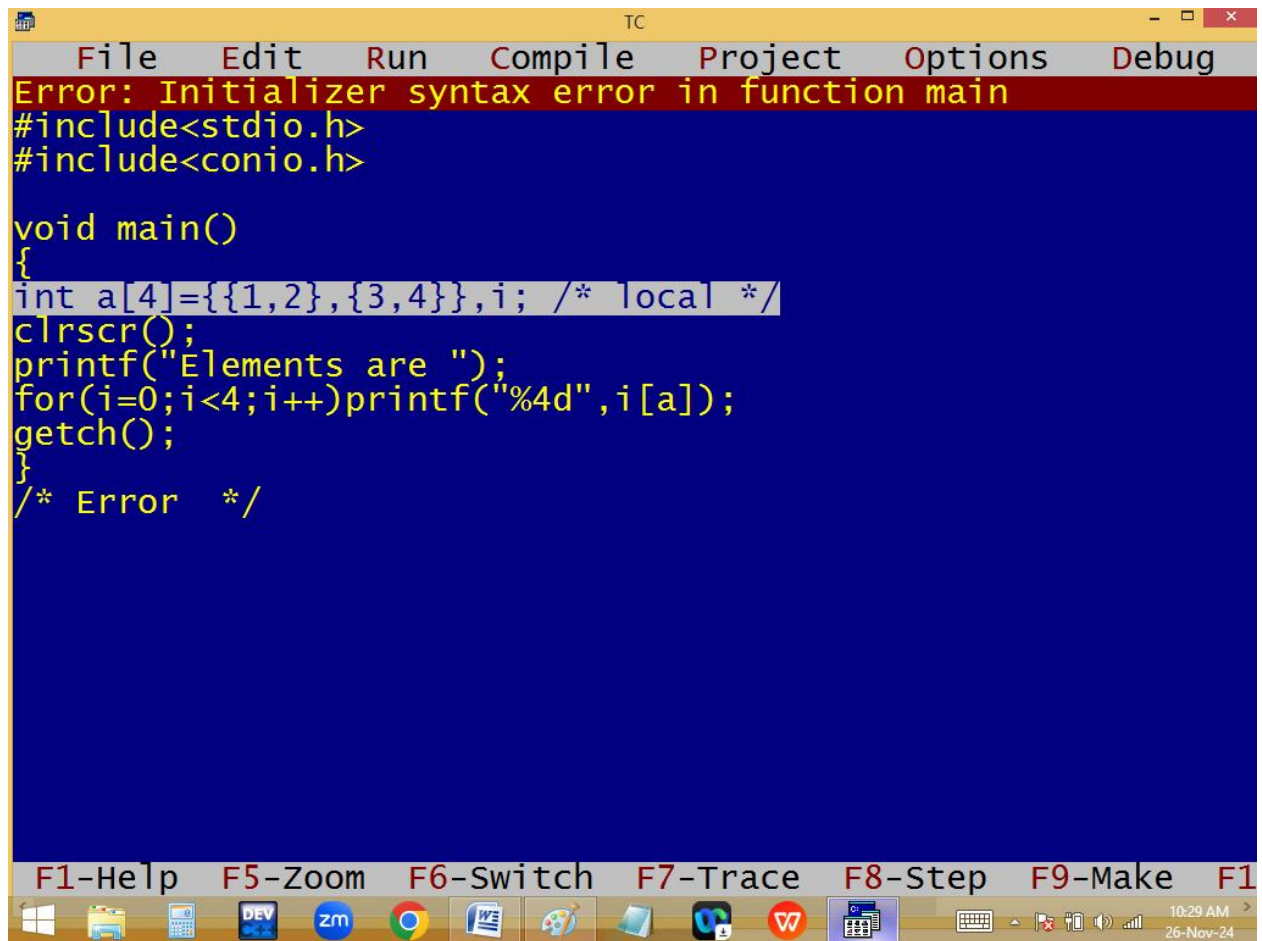


The image shows a screenshot of the Turbo C++ (TC) IDE. The title bar at the top reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", and "Debug". A red error banner at the top of the code window states "Error: Initializer syntax error in function main". The code in the editor is as follows:

```
#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 */
```

Below the code window, there is a toolbar with function key shortcuts: F1-Help, F5-Zoom, F6-Switch, F7-Trace, F8-Step, F9-Make, and F10-Run. The Windows taskbar at the bottom shows various application icons, including File Explorer, Calculator, DEV C++, Zoom, Google Chrome, Word, and others. The system clock in the bottom right corner indicates the time is 10:28 AM on 26-Nov-24.

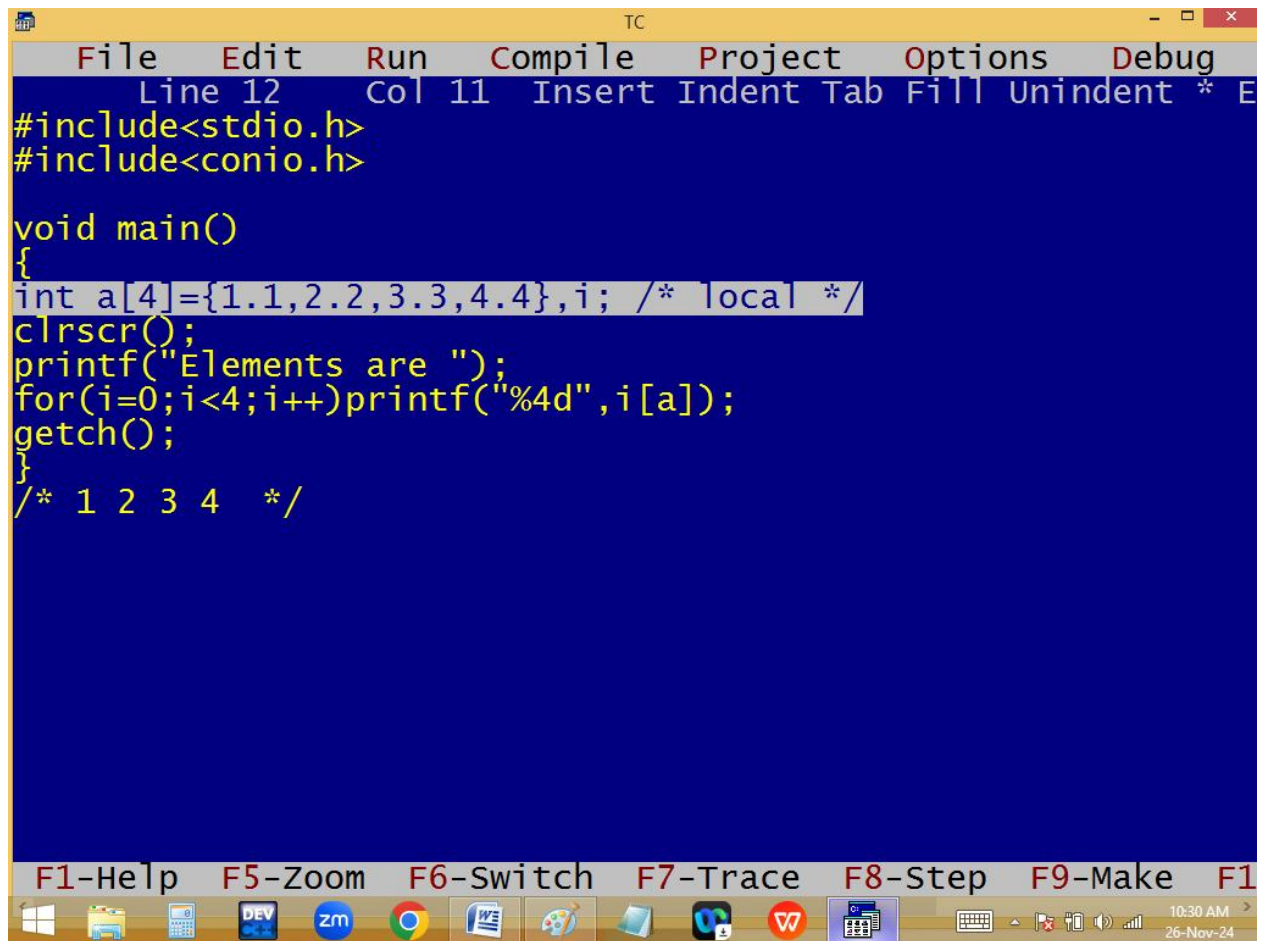


The image shows a screenshot of the Turbo C++ (TC) IDE. The title bar at the top reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", and "Debug". A red error banner at the top of the code editor states "Error: Initializer syntax error in function main". The code in the editor is as follows:

```
#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 */
```

Below the code editor, there is a toolbar with function key shortcuts: "F1-Help", "F5-Zoom", "F6-Switch", "F7-Trace", "F8-Step", "F9-Make", and "F10-Run". The Windows taskbar at the bottom displays various application icons, including the Start button, File Explorer, Calculator, DEV C++, Zoom, Google Chrome, Word, and others. The system clock in the bottom right corner shows "10:29 AM" and "26-Nov-24".



The image shows a screenshot of the Turbo C++ (TC) IDE. The window title is "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", and "Debug". Below the menu bar, the status bar shows "Line 12", "Col 11", and "Insert Indent Tab Fill Unindent * E". The main editing area has a blue background and contains the following C code:

```
#include<stdio.h>
#include<conio.h>

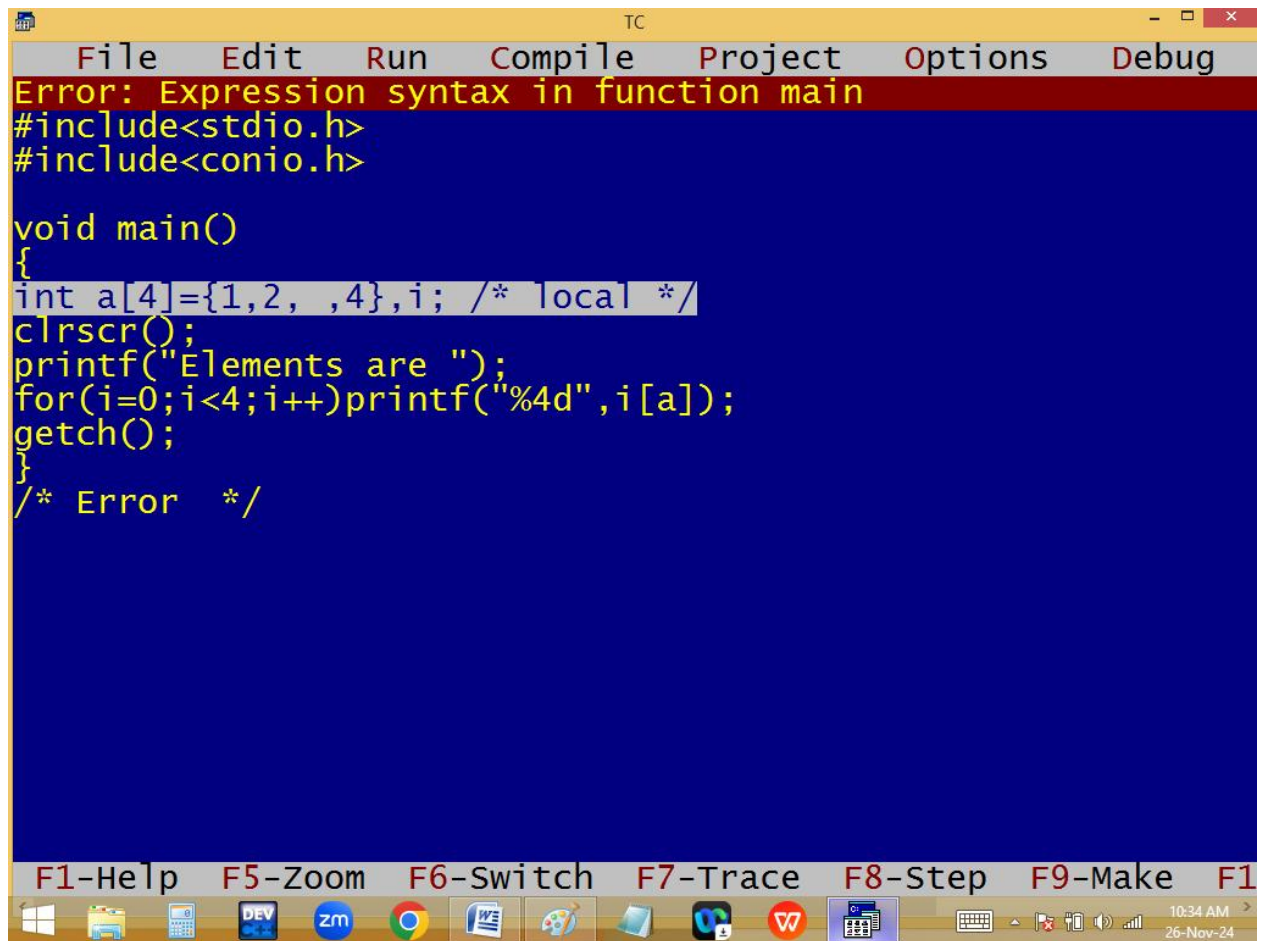
void main()
{
int a[4]={1.1,2.2,3.3,4.4},i; /* local */
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
/* 1 2 3 4 */
```

The bottom of the window features a toolbar with icons for various functions and a status bar. The status bar displays "10:30 AM" and "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 F10-Run
10:33 AM
26-Nov-24
```

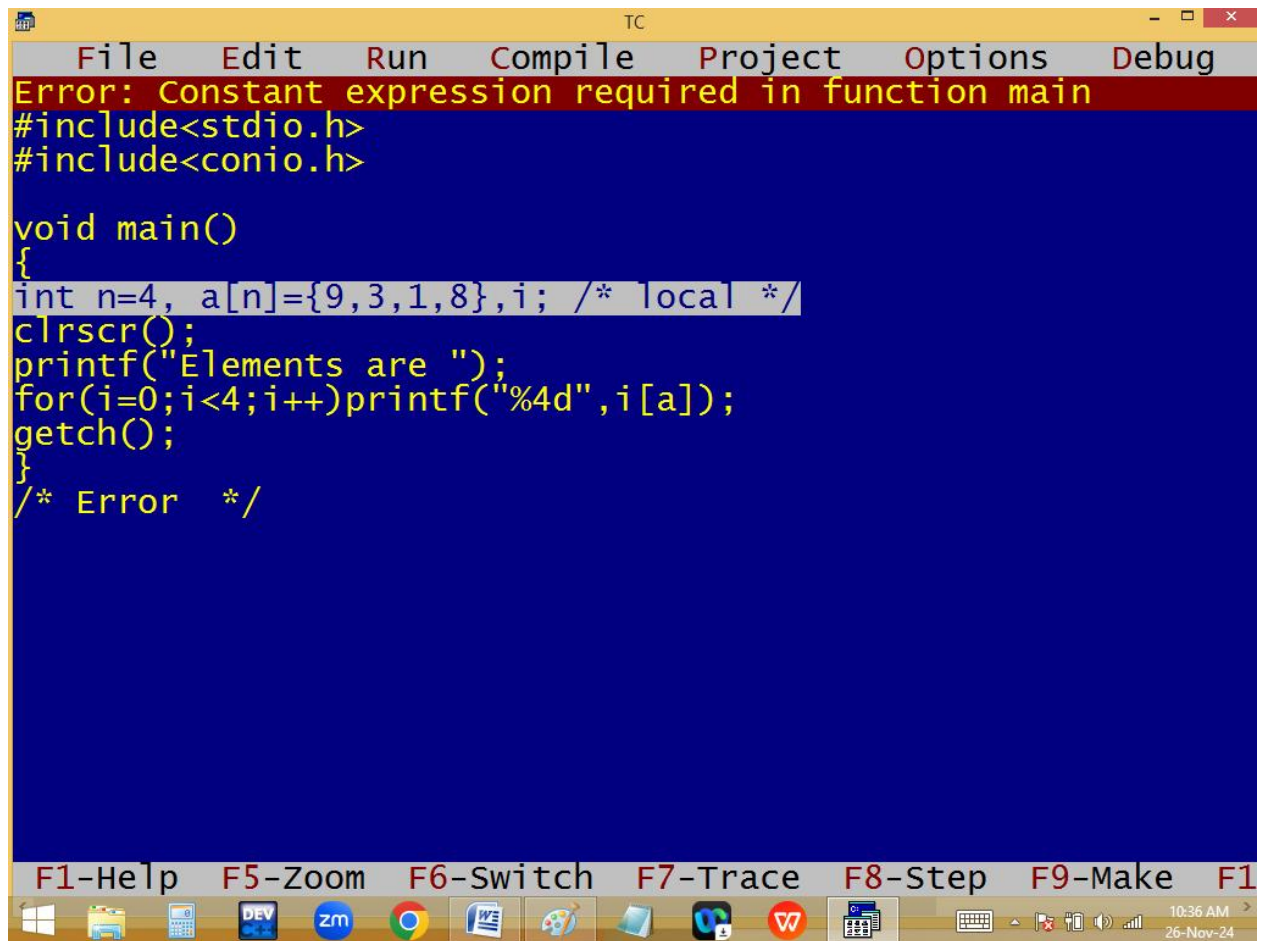


The image shows a screenshot of the Turbo C++ (TC) IDE. The title bar at the top reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", and "Debug". A red error banner at the top of the editor window states "Error: Expression syntax in function main". The code in the editor is as follows:

```
#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 */
```

Below the editor window, there is a toolbar with function key shortcuts: F1-Help, F5-Zoom, F6-Switch, F7-Trace, F8-Step, F9-Make, and F10-Run. The Windows taskbar at the bottom shows various application icons, including the Start button, File Explorer, Calculator, DEV C++, Zoom, Google Chrome, Word, and a game controller icon. The system clock in the bottom right corner displays "10:34 AM" and "26-Nov-24".

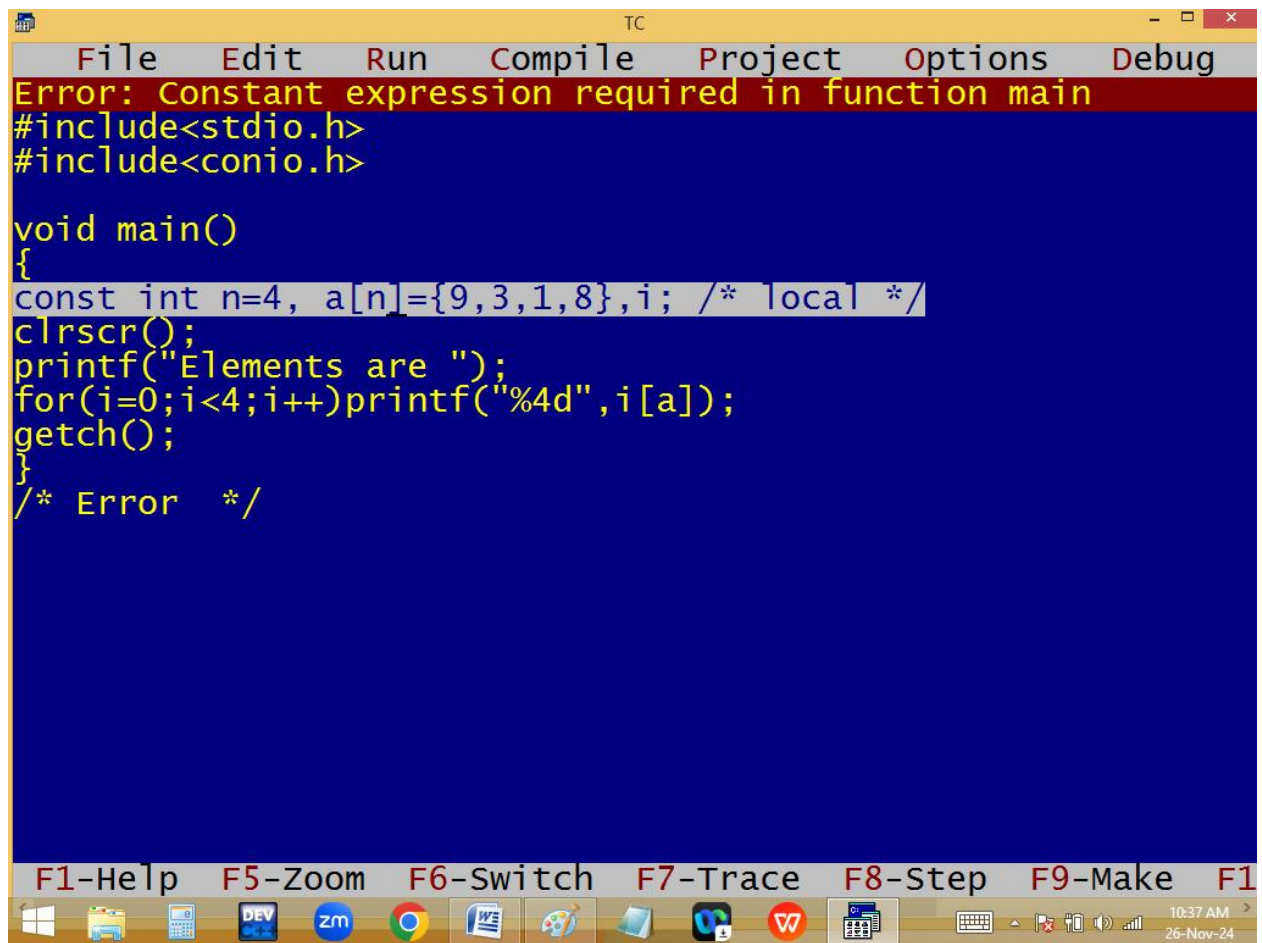


The image shows a screenshot of the Turbo C++ (TC) IDE. The title bar at the top reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", and "Debug". A red error message banner at the top states: "Error: Constant expression required in function main". The code editor has a blue background and contains the following C code:

```
#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 */
```

At the bottom of the IDE, there is a toolbar with function key shortcuts: "F1-Help", "F5-Zoom", "F6-Switch", "F7-Trace", "F8-Step", "F9-Make", and "F10-Run". The Windows taskbar is visible at the very bottom, showing icons for various applications and the system clock indicating 10:36 AM on 26-Nov-24.



The image shows a screenshot of the Turbo C++ (TC) IDE. The title bar at the top reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", and "Debug". A red error message banner at the top states "Error: Constant expression required in function main". The code editor has a blue background and contains the following C code:

```
#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 */
```

Below the code editor, there is a toolbar with function key shortcuts: "F1-Help", "F5-Zoom", "F6-Switch", "F7-Trace", "F8-Step", "F9-Make", and "F10-Run". The Windows taskbar at the bottom shows various application icons, including the Start button, File Explorer, Calculator, DEV C++, Zoom, Google Chrome, Word, and others. The system clock in the bottom right corner displays "10:37 AM" and "26-Nov-24".

TC

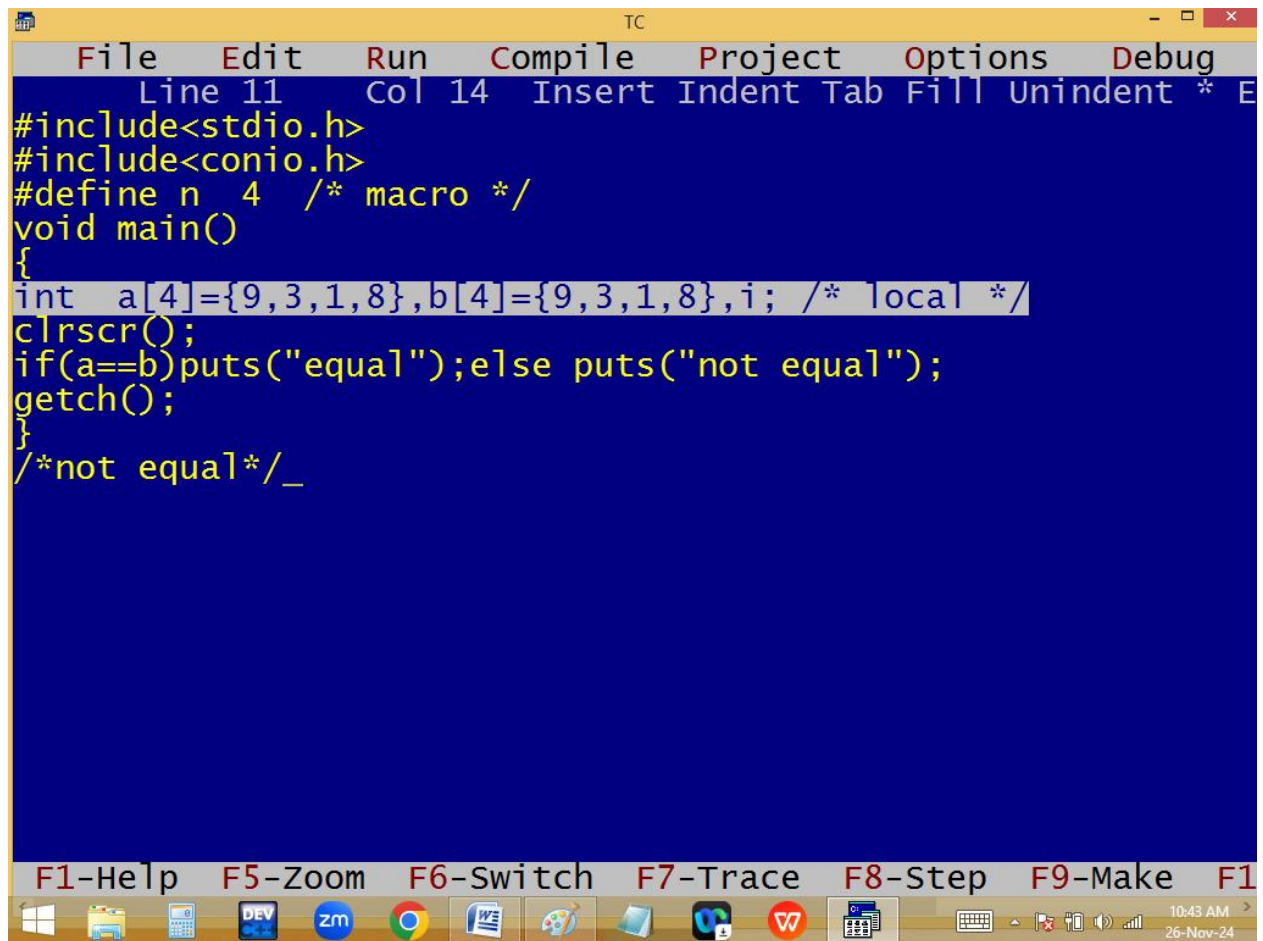
File Edit Run Compile Project Options Debug

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 F10-Run

10:41 AM
26-Nov-24



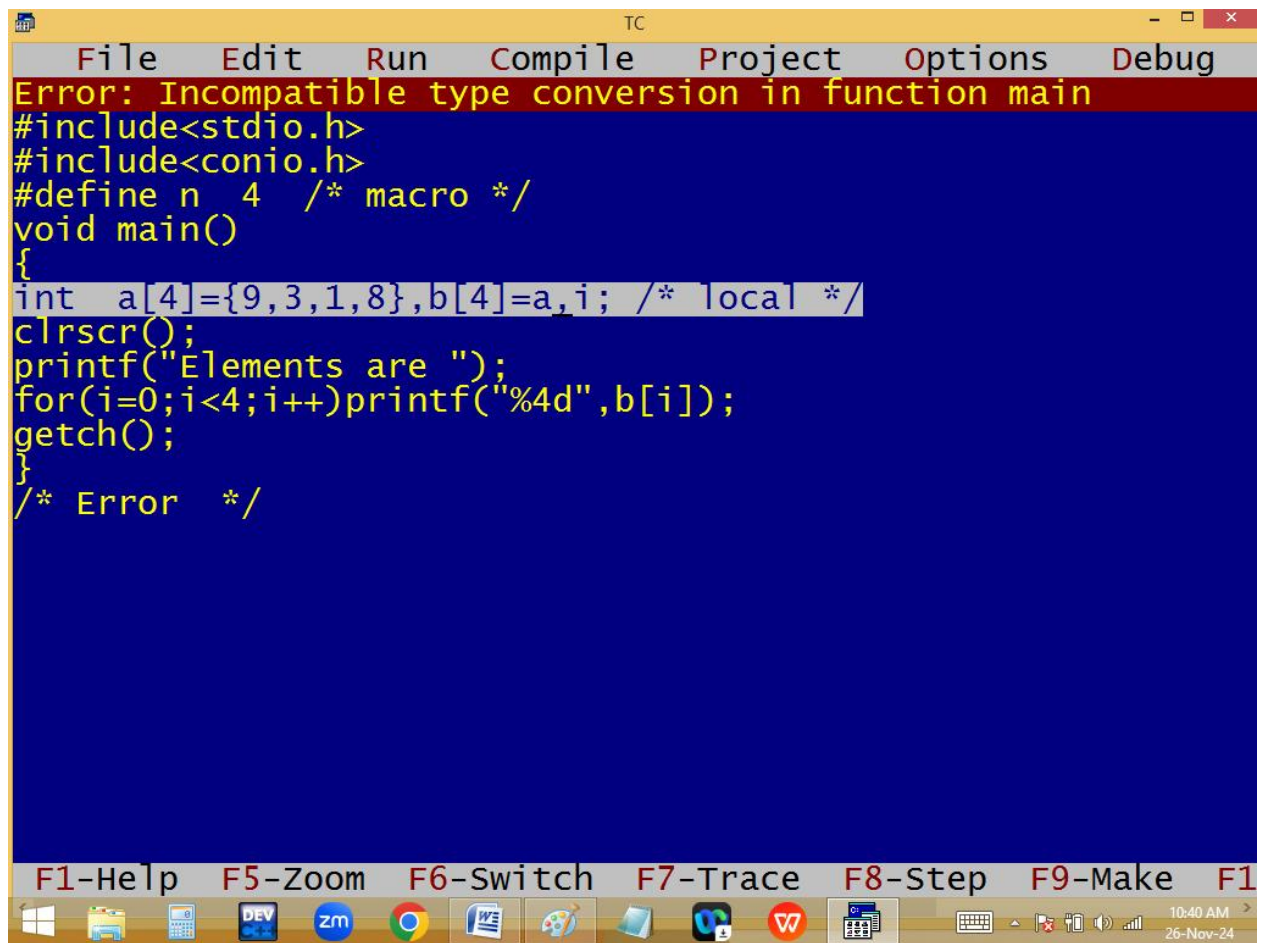
```
TC
File Edit Run Compile Project Options Debug
Line 11 Col 14 Insert Indent Tab Fill Unindent * E
#include<stdio.h>
#include<conio.h>
#define n 4 /* macro */
void main()
{
int a[4]={9,3,1,8},b[4]={9,3,1,8},i; /* local */
clrscr();
if(a==b)puts("equal");else puts("not equal");
getch();
}
/*not equal*/_

F1-Help F5-Zoom F6-Switch F7-Trace F8-Step F9-Make F10-Run
```



```
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 F10-Run
```



The image shows a screenshot of the Turbo C++ (TC) IDE. The title bar at the top reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", and "Debug". A red error message banner at the top of the code editor states: "Error: Incompatible type conversion in function main". The code in the editor is as follows:

```
#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 */
```

Below the code editor, there is a toolbar with function key shortcuts: "F1-Help", "F5-Zoom", "F6-Switch", "F7-Trace", "F8-Step", "F9-Make", and "F10-Run". The Windows taskbar at the bottom shows various application icons, including the Start button, File Explorer, Calculator, DEV C++, Zoom, Google Chrome, Microsoft Word, and others. The system clock in the bottom right corner displays "10:40 AM" and "26-Nov-24".