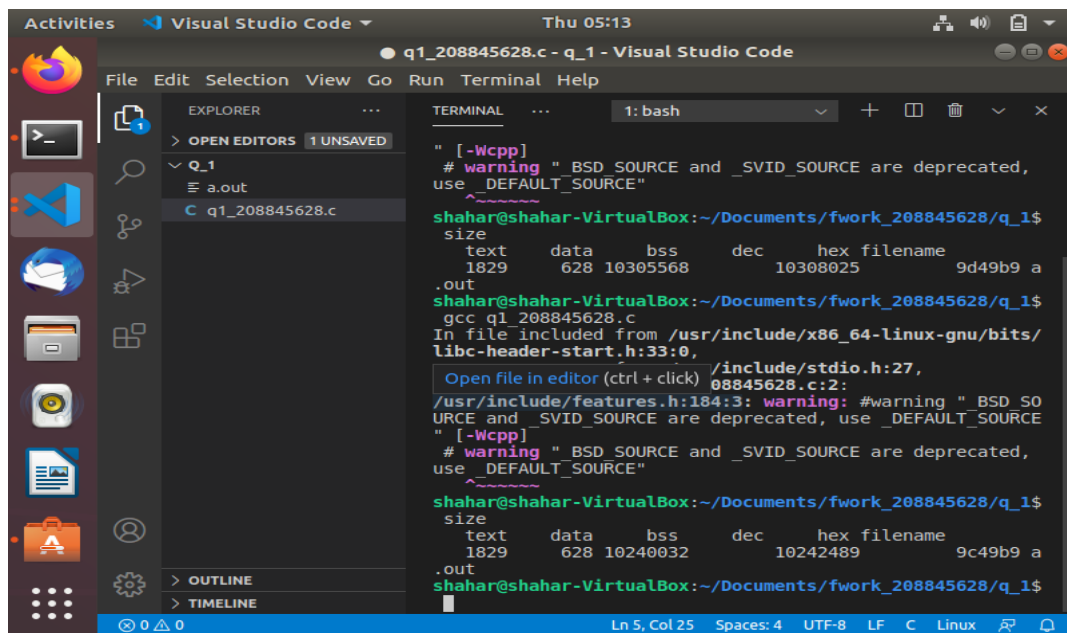


Question 1:

```
/*1. bss */ 5 char globBuf[65536];
```



```
q1_208845628.c - q1 - Visual Studio Code

File Edit Selection View Go Run Terminal Help

EXPLORER
> OPEN EDITORS 1 UNSAVED
  Q_1
  a.out
  C q1_208845628.c

TERMINAL
1: bash

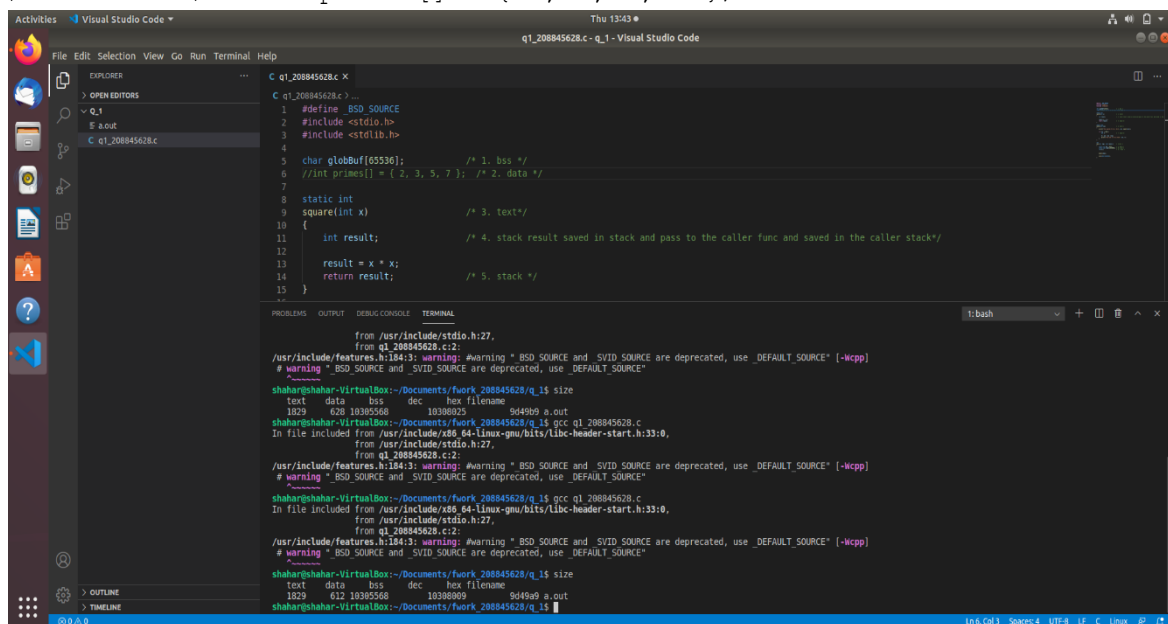
" [-Wcpp]
# warning " BSD_SOURCE and _SVID_SOURCE are deprecated,
use _DEFAULT_SOURCE"

shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_1$
size
text    data    bss      dec    hex filename
1829    628    10305568  10308025  9d49b9 a.out
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_1$
gcc q1_208845628.c
In file included from /usr/include/x86_64-linux-gnu/bits/
libc-header-start.h:33:0,
Open file in editor (ctrl + click) /include/stdio.h:27,
08845628.c:2:
/usr/include/features.h:184:3: warning: " BSD_SO
URCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE"
" [-Wcpp]
# warning " BSD_SOURCE and _SVID_SOURCE are deprecated,
use _DEFAULT_SOURCE"

shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_1$
size
text    data    bss      dec    hex filename
1829    628    10240032  10242489  9c49b9 a.out
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_1$
```

I used size command before and after putting this line in comment and the bss size decreased.

```
/*2. data */ 6 int primes[] = { 2, 3, 5, 7 };
```



```
q1_208845628.c - q1 - Visual Studio Code

File Edit Selection View Go Run Terminal Help

EXPLORER
> OPEN EDITORS 1 UNSAVED
  Q_1
  a.out
  C q1_208845628.c

C q1_208845628.c
1 #define _BSD_SOURCE
2 #include <stdio.h>
3 #include <stdlib.h>
4
5 char globBuf[65536]; /* 1. bss */
6 //int primes[] = { 2, 3, 5, 7 }; /* 2. data */
7
8 static int
9 square(int x) /* 3. text */
10 {
11     int result; /* 4. stack result saved in stack and pass to the caller func and saved in the caller stack */
12
13     result = x * x;
14     return result; /* 5. stack */
15 }

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
1: bash

from /usr/include/stdio.h:27,
/usr/include/features.h:184:3: warning: " BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE" [-Wcpp]
# warning " BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE"

shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_1$ size
text    data    bss      dec    hex filename
1829    628    10305568  10308025  9d49b9 a.out
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_1$ gcc q1_208845628.c
In file included from /usr/include/x86_64-linux-gnu/bits/libc-header-start.h:33:0,
from /usr/include/stdio.h:27,
from q1_208845628.c:2:
/usr/include/features.h:184:3: warning: " BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE" [-Wcpp]
# warning " BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE"

shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_1$ gcc q1_208845628.c
In file included from /usr/include/x86_64-linux-gnu/bits/libc-header-start.h:33:0,
from /usr/include/stdio.h:27,
from q1_208845628.c:2:
/usr/include/features.h:184:3: warning: " BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE" [-Wcpp]
# warning " BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE"

shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_1$ size
text    data    bss      dec    hex filename
1829    612    10305568  10306009  9c49b9 a.out
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_1$
```

I used size command before and after putting this line in comment and the data size decreased.

```
/*3. text */ 9 static int square(int x)
```

The screenshot shows the Visual Studio Code interface with the file `q1_208845628.c` open. The code contains a function `square` and a `main` function. A line of code is commented out with `/* 7. stack */`. The terminal window shows the output of the `nm` command, displaying the memory layout of the program. The output includes sections like `.text`, `.data`, `.bss`, and `.rodata`, along with various symbols and their addresses.

I used the nm command to show where every line is allocated.(the text keep the “instructions” that the program need)

```
/*4. stack */ 11. int result;
```

The screenshot shows the Visual Studio Code interface with the file `q1_208845628.c` open. The code contains a function `square` and a `main` function. A line of code is commented out with `/* 7. stack */`. The terminal window shows the output of the `nm` command, displaying the memory layout of the program. The output includes sections like `.text`, `.data`, `.bss`, and `.rodata`, along with various symbols and their addresses.

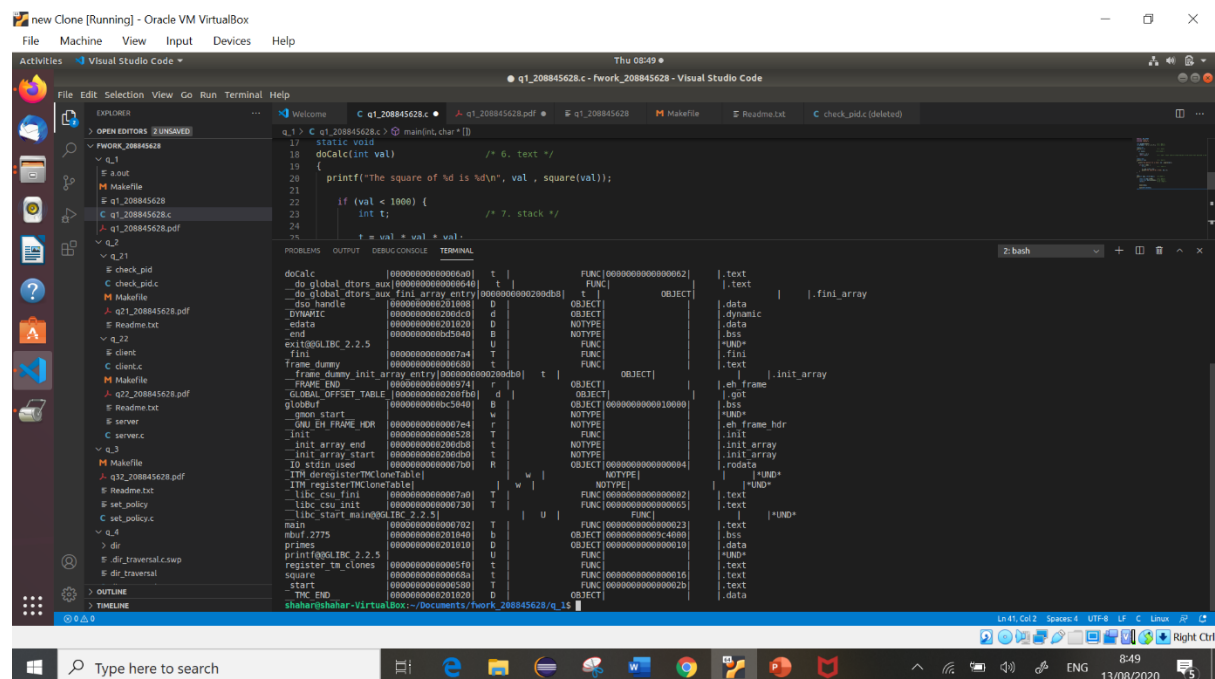
I used the objdump command to so show that in function square we use stack functions like push , pop and mov.

Therefor ,local variables inside a scope (not global or static) is kept in stack .

```
/*5. stack */ 14 return result;
```

The memory saves the variable result and move it to the caller function's stack to save it there.(same pic as in 4)

```
/*6. text */ 18 static void doCalc(int val)
```

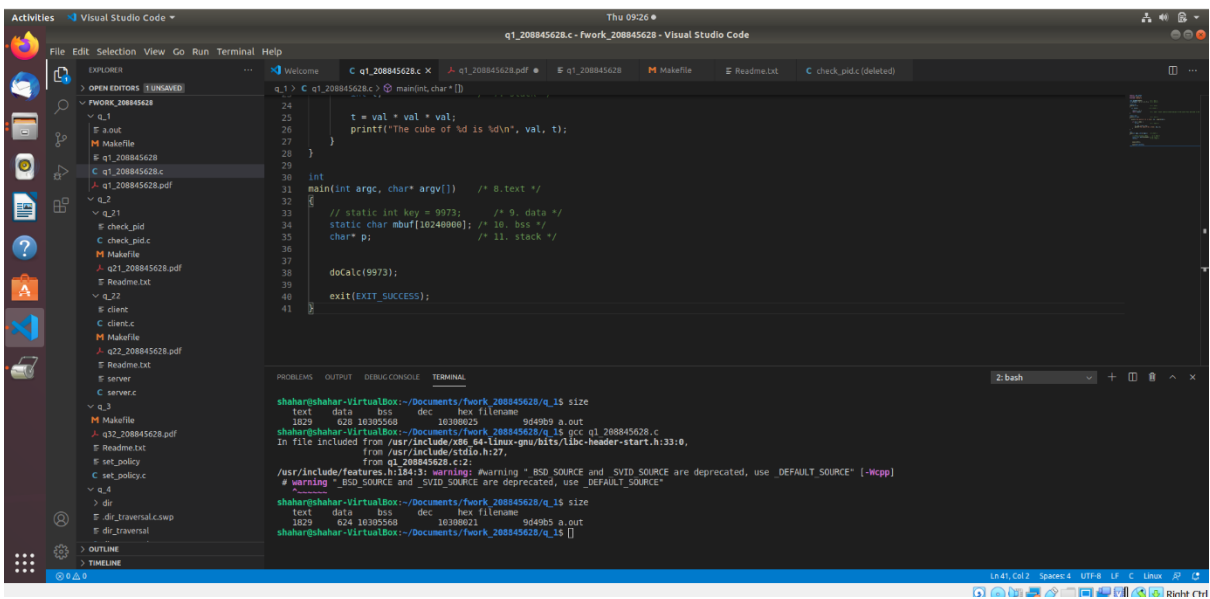


I used the nm command to show where every line is allocated.

Therefore, local variables inside a scope (not global or static) is kept in stack.

The image shows a Windows 10 desktop environment. At the top, a taskbar contains icons for File Explorer, Microsoft Edge, and other applications. The main area of the screen is occupied by a window titled 'new clone [Running] - Oracle VM VirtualBox'. Inside this window, the Visual Studio Code editor is open, displaying a C program named 'q1_208845628.c'. The program is a simple calculator that takes an integer input, calculates its square, and prints the result. It also includes a macro for the stack size. The code is written in C and includes comments in Hindi. The output window at the bottom of the Visual Studio Code interface shows the execution results, including the square of 1000 and the stack size. The taskbar at the bottom of the screen shows various application icons and the system clock.

```
/*9.data */ 33 static int key = 9973;
```



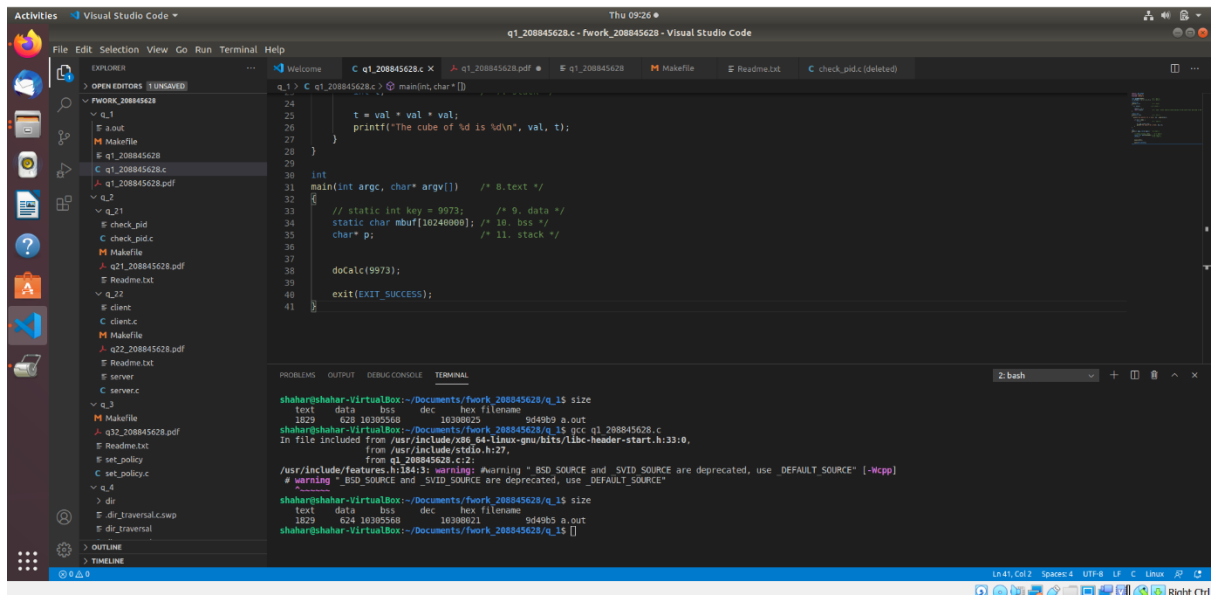
```
q1_208845628.c - fwork_208845628 - Visual Studio Code

24  text    data    bss    dec    hex filename
25      t = val * val * val;
26      printf("The cube of %d is %d\n", val, t);
27  }
28  }
29
30  int
31  main(int argc, char* argv[]) /* 8.text */
32  {
33      // static int key = 9973; /* 9.data */
34      static char mbuf[10240000]; /* 10.bss */
35      char* p; /* 11.stack */
36
37      doCalc(9973);
38
39      exit(EXIT_SUCCESS);
40  }
41

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_15 size
text    data    bss    dec    hex filename
1829    624    10305568    10306192    9d49b5 a.out
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_15 gcc q1_208845628.c
In file included from /usr/include/x86_64-linux-gnu/bits/libc-header-start.h:33:0,
                 from /usr/include/stdio.h:27,
                 from q1_208845628.c:2:
/usr/include/features.h:184:3: warning: #warning "BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE" [-Wcpp]
# warning "BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE"
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_15 size
text    data    bss    dec    hex filename
1829    624    10305568    10306192    9d49b5 a.out
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_15 []
```

I used size command before and after putting this line in comment and the data size decreased.

```
/*10.bss */ 34 static char mbuf[10240000];
```



```
q1_208845628.c - fwork_208845628 - Visual Studio Code

24  text    data    bss    dec    hex filename
25      t = val * val * val;
26      printf("The cube of %d is %d\n", val, t);
27  }
28  }
29
30  int
31  main(int argc, char* argv[]) /* 8.text */
32  {
33      // static int key = 9973; /* 9.data */
34      static char mbuf[10240000]; /* 10.bss */
35      char* p; /* 11.stack */
36
37      doCalc(9973);
38
39      exit(EXIT_SUCCESS);
40  }
41

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_15 size
text    data    bss    dec    hex filename
1829    624    10305568    10306192    9d49b5 a.out
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_15 gcc q1_208845628.c
In file included from /usr/include/x86_64-linux-gnu/bits/libc-header-start.h:33:0,
                 from /usr/include/stdio.h:27,
                 from q1_208845628.c:2:
/usr/include/features.h:184:3: warning: #warning "BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE" [-Wcpp]
# warning "BSD_SOURCE and _SVID_SOURCE are deprecated, use _DEFAULT_SOURCE"
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_15 size
text    data    bss    dec    hex filename
1829    624    10305568    10306192    9d49b5 a.out
shahar@shahar-VirtualBox:~/Documents/fwork_208845628/q_15 []
```

I used size command before and after putting this line in comment and the bss size decreased.

```
/*11. stack */ 35 char* p;
```

The screenshot shows the Visual Studio Code editor with a C program in the main editor and its assembly output in the terminal. The C program is as follows:

```

24
25
26     t = val * val * val;
27     printf("The cube of %d is %d\n", val, t);
28 }
29
30 int
31 main(int argc, char* argv[]) /* 8.text */
32 {
33     static int key = 9973; /* 0.data */
34     static char mbuf[1024000]; /* 10.bss */
35     char* p; /* 11.stack */
36
37     doCalc(key);
38
39     exit(EXIT_SUCCESS);
40 }
41

```

The terminal shows the assembly output for the main function, generated by the objdump command. The assembly code is as follows:

```

0000000000000782 <main>:
782: 55                push   %rbp
783: 48 89 e5          mov     %rsp,%rbp
786: 48 83 ec 10       sub     $0x10,%rsp
78a: 8b 7d fc          mov     %edi,%eax(%rbp)
78d: 48 89 75 f9       mov     %rsi,%rax(%rbp)
711: bf 75 26 00 00    mov     $0x2615,%edi
716: e8 15 ff ff ff   callq  60<doCalc>
71b: bf 00 00 00 00    mov     $0x0,%edi
720: e8 20 fe ff ff   callq  50<exit@plt>
725: 66 2e af 1f 54 00 00 nopl    %cs:(%rax,%rax,1)
72c: 00 00 00         nop
72f: 90                nop

```

I used the objdump command to so show that in function main we use stack functions like push , pop and mov.