Date
Page

# C_144 ⇒ Types of Storage classes in C - Part 4

## Extern Storage classes

* Default value for extern Storage class variables will be 0 not garbage value; [same as static Storage classes.] and it access only global variable

* extern storage class variables will be stored inside main memory of RAM [inside global section]

* Scope of extern storage class variables will be global (i.e) it has all the block scope, function scope & program scope; also accessible between the programs.

**NOTE:** Scope generally means accessibility of variable within the particular Scope / area.

* Lifetime of the extern storage class variables will be alive throughout the program; it will be dead only after exit of the program [same as static storage classes].

**NOTE:**

* only global variables comes under this External storage classes; (i.e) outside of any function or outside of any block.

* Extern keyword can be used either for function or variable (i.e) a function can also be extern and a variable can also be extern.

* what is accessible between programs? → For example in a team you are working in a single project and we have different files under a single project and our team member and you are working on different files like file1.c and file2.c.

↳ You have defined any variables as extern then this variable can be accessed by other file also

NOTE:-
* Understand the difference between declaration and definition

↳ Declaration means we just only declare the type of variable and no space is allocated in memory.

↳ Definition means based on the declaration of variable type now the memory space is allocated for the variable.

Eg: file1.c | file2.c

Declaration ⟵ `int x;` | `extern int x;`

Definition ⟵ `int x=10;` | `printf("x = %d", x);`

this variable is used in another file

here with the keyword 'extern'; this variable is not defined here and simply find the variable x in another file. So no memory is allocated for this.

* So extern keyword will look for that variable as a reference to access it externally from outside of the file and looks whether that variable is defined globally in any other file so that it can access the variable value.

* So with the help of extern keyword we are linking two files which are done with the help of linker but not compiler.

* we can also use extern keyword for functions also. Eg: extern void display();

* We can access the extern storage class variable not only between two files but also between different method or between different blocks but the thing is this variables can be accessed only if it is defined under global scope.

* Since it will access only global variables there is chance of getting accessed by another file also so the global variables will be changing its values frequently while it has be accessed, So security of this variables becomes less; hence try to reduce the use of this extern storage class variable and use only if it is more necessary.

Program ①

```
  void fun1(); void fun2();
int a=10;
int main()
{
   printf("%d", a); ⇒ (10)
    fun1();
    fun2();
 }
void fun1()
 {
    int a=2;
      a++;
    printf("a=%d", a);
 }
void fun2()
 {
   printf("Hello from fun2");
 }
```

```
O/p:-
  10
  3
  Hello from fun 2
```

Program ②

```
  void fun1(); void fun2();
int main()
{
   printf("%d", a); ⇒ × error.
    fun1();
    fun2();
 }
```

Date
Page

```
void fun1()
{
  int a=2;
   a++;
  printf("a = %d", a);
}

void fun2()
{
   printf("Hello from fun2");
}
```

```
O/p: Error
 undeclared 'a'
```

Program ③ & Program ④

```
int a=10;
int main()
{
  // extern int a;   → This extern declaration
  printf("%d", a); → 10   will find for this
   fun1();                variable 'a' outside of
   fun2();                main function or
}                         outside of any
void fun1()               other files.
{
   int a=2; a++;
   printf("a = %d", a);
}
void fun2()
{
   printf("Hello from fun2");
}
```

Remove

④
```
O/p
 10
 3
Hello from fun2
```

without using this line also we get same output and checks 'a' is available globally within the program

③
```
O/p
 10
 3
Hello from fun 2
```

NOTE: Global means declared at top

Date________
Page________

Program ⑤ & Program ⑥

```
int main()
{    // extern int a;
   printf("%d", a);
      fun1();
      fun2();
   }
void fun1()
 {
     int a=2;
       a++; printf("a=%d", a);
   }
void fun2()
   {
      printf("Hello from fun2");
   }
  int a=10;
```

⑤ O/P

```
Error
undeclared 'a'
```

not

⑥ O/P

```
10
3
Hello from fun2
```

* when you declared the variable 'a' somewhere within the program not at the top but somewhere b/w outside of any block or method; then we cannot access that variable.

* But when we tell compiler by declaring that variable as extern; then compiler will go and check externally either within the file (or) another file(or) within program like some where b/w outside of any block or method or at the top (global); and it will access that variable.

## Program ⑦

file1.c

```
# include <stdio.h>
//# include "support.c"
 int x=10;
 extern void display();
 void main()
  {
     display();
  }
```

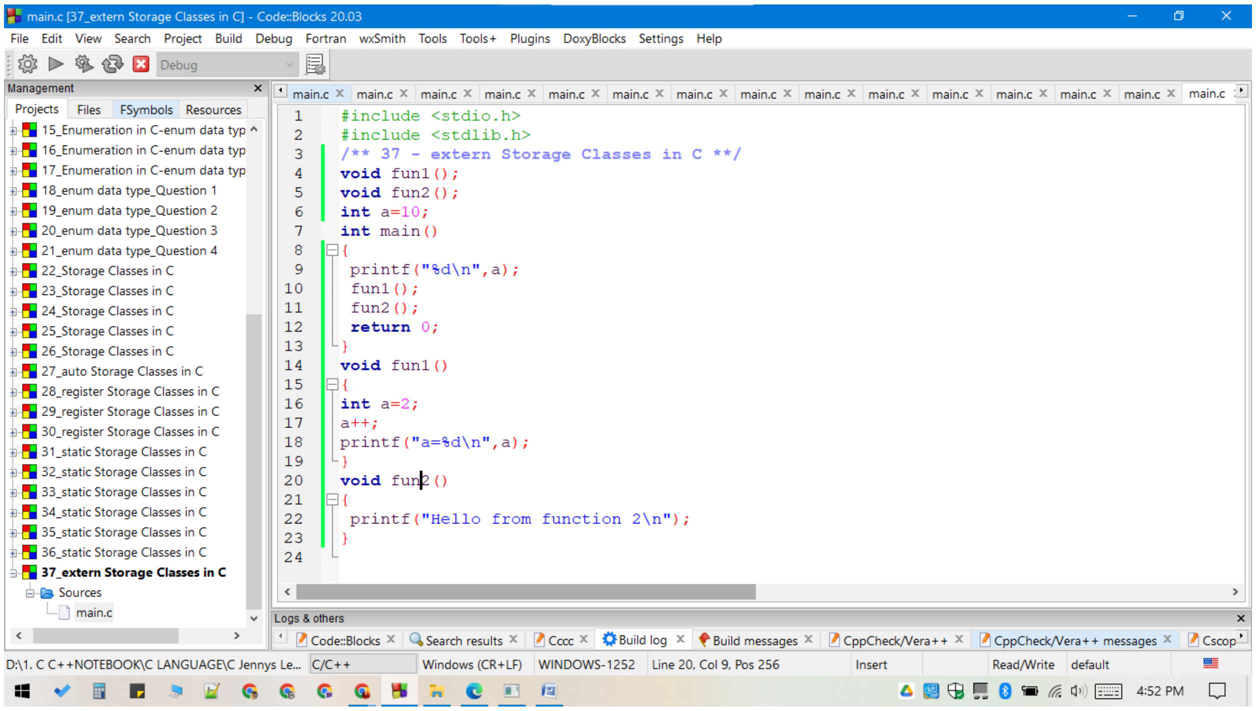
use when files are under different project

support.c

```
# include <stdio.h>
void display()
 {
    extern int x;
 printf(" Hello from support
                      file");
  printf(" x = %d", x);
```

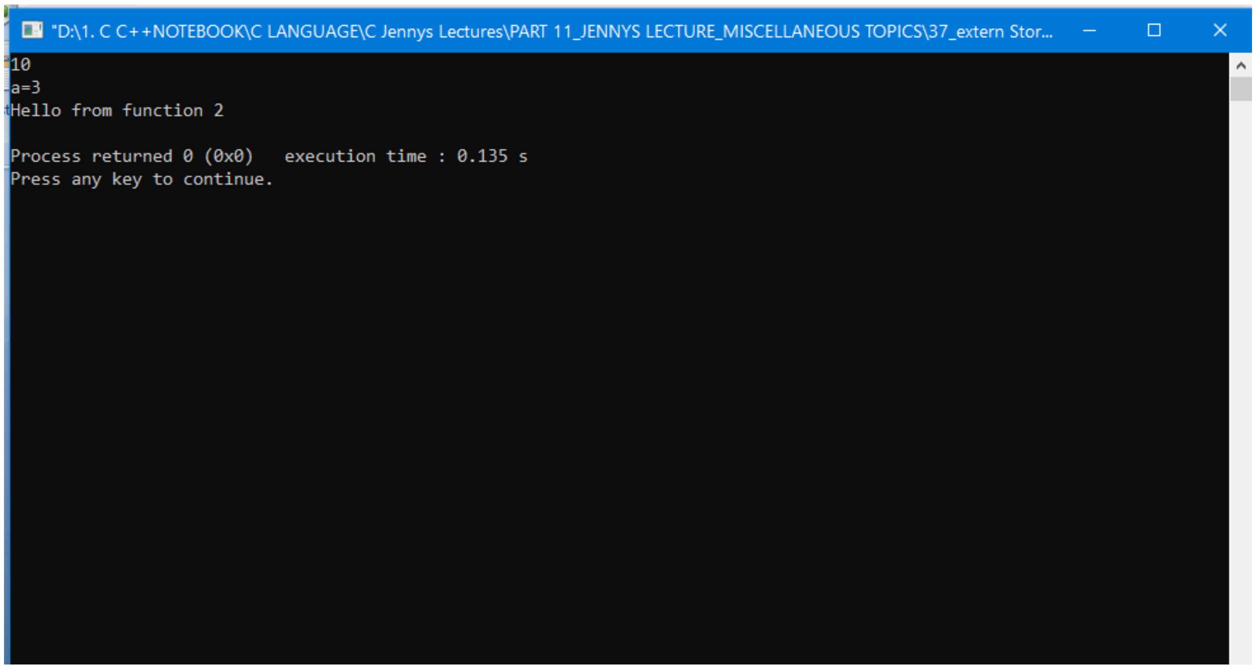
* Mainly we use extern keyword to access the global variables not only within the same file but also from another file.
* In this program; we acess the function display() which is defined in another file using extern keyword is function declaration.
* So linker will link these two files after Compilation by creating object files for these two files.

NOTE:-
* These two files must be under single project If two files not under single file then use
# include "support.c"



main.c [37_extern Storage Classes in C] - Code::Blocks 20.03
File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Management
Projects Files FSymbols Resources
15_Enumeration in C-enum data typ
16_Enumeration in C-enum data typ
17_Enumeration in C-enum data typ
18_enum data type_Question 1
19_enum data type_Question 2
20_enum data type_Question 3
21_enum data type_Question 4
22_Storage Classes in C
23_Storage Classes in C
24_Storage Classes in C
25_Storage Classes in C
26_Storage Classes in C
27_auto Storage Classes in C
28_register Storage Classes in C
29_register Storage Classes in C
30_register Storage Classes in C
31_static Storage Classes in C
32_static Storage Classes in C
33_static Storage Classes in C
34_static Storage Classes in C
35_static Storage Classes in C
36_static Storage Classes in C
37_extern Storage Classes in C
Sources
main.c
Logs & others
Code::Blocks Search results Cccc Build log Build messages CppCheck/Vera++ CppCheck/Vera++ messages Cscop
D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Le... C/C++ Windows (CR+LF) WINDOWS-1252 Line 20, Col 9, Pos 256 Insert Read/Write default
4:52 PM

```c
#include <stdio.h>
#include <stdlib.h>
/** 37 - extern Storage Classes in C **/
void fun1();
void fun2();
int a=10;
int main()
{
 printf("%d\n",a);
 fun1();
 fun2();
 return 0;
}
void fun1()
{
int a=2;
a++;
printf("a=%d\n",a);
}
void fun2()
{
 printf("Hello from function 2\n");
}
```



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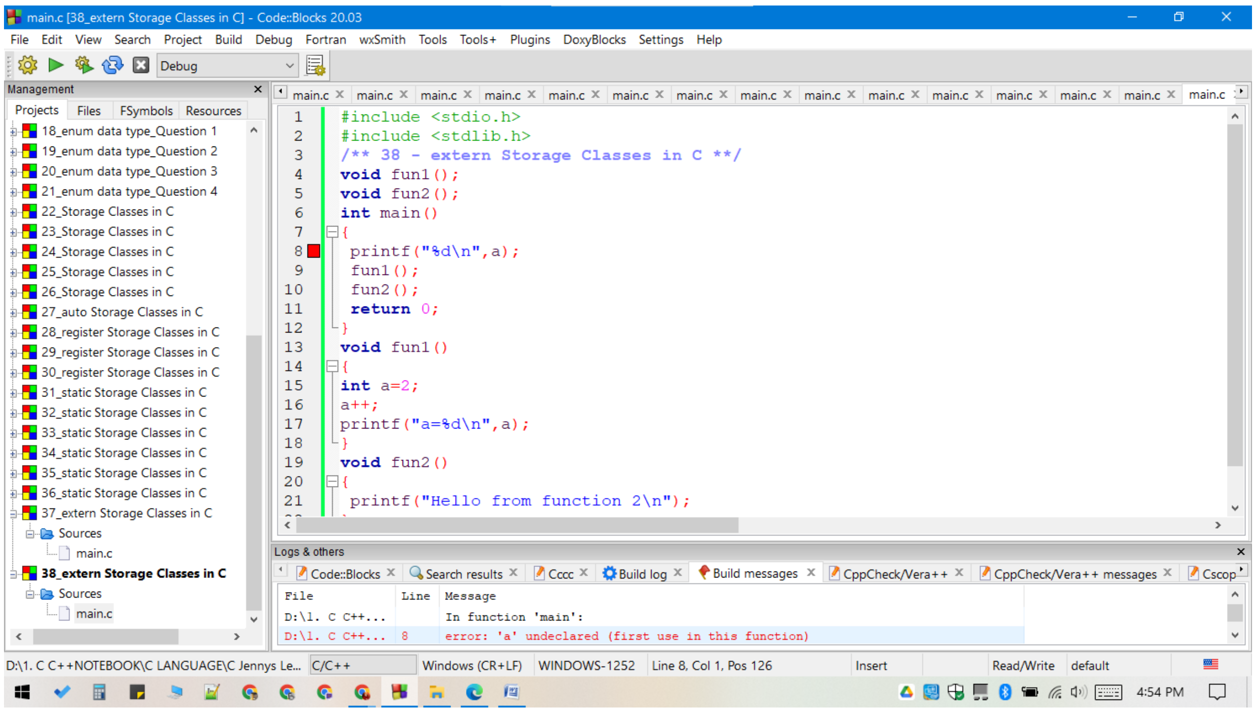
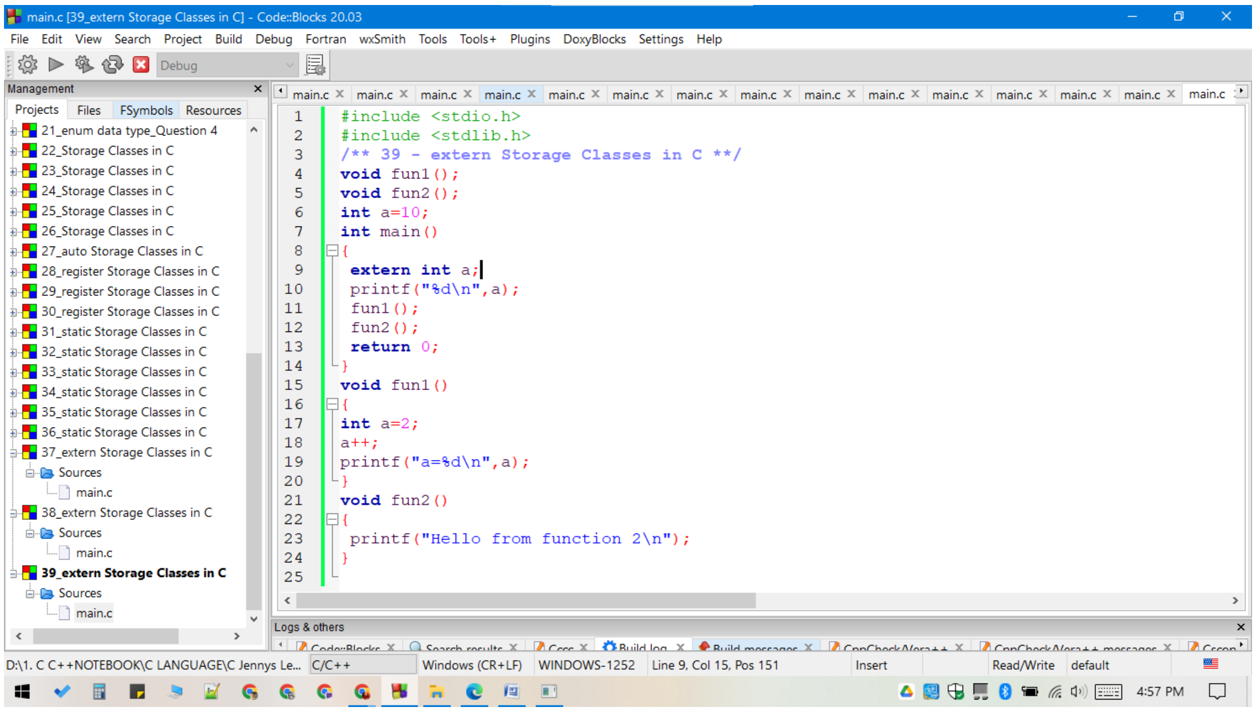
```
10
a=3
Hello from function 2

Process returned 0 (0x0)   execution time : 0.135 s
Press any key to continue.
```


main.c [38_extern Storage Classes in C] - Code::Blocks 20.03

```c
#include <stdio.h>
#include <stdlib.h>
/** 38 - extern Storage Classes in C **/
void fun1();
void fun2();
int main()
{
 printf("%d\n",a);
 fun1();
 fun2();
 return 0;
}
void fun1()
{
int a=2;
a++;
printf("a=%d\n",a);
}
void fun2()
{
 printf("Hello from function 2\n");
```

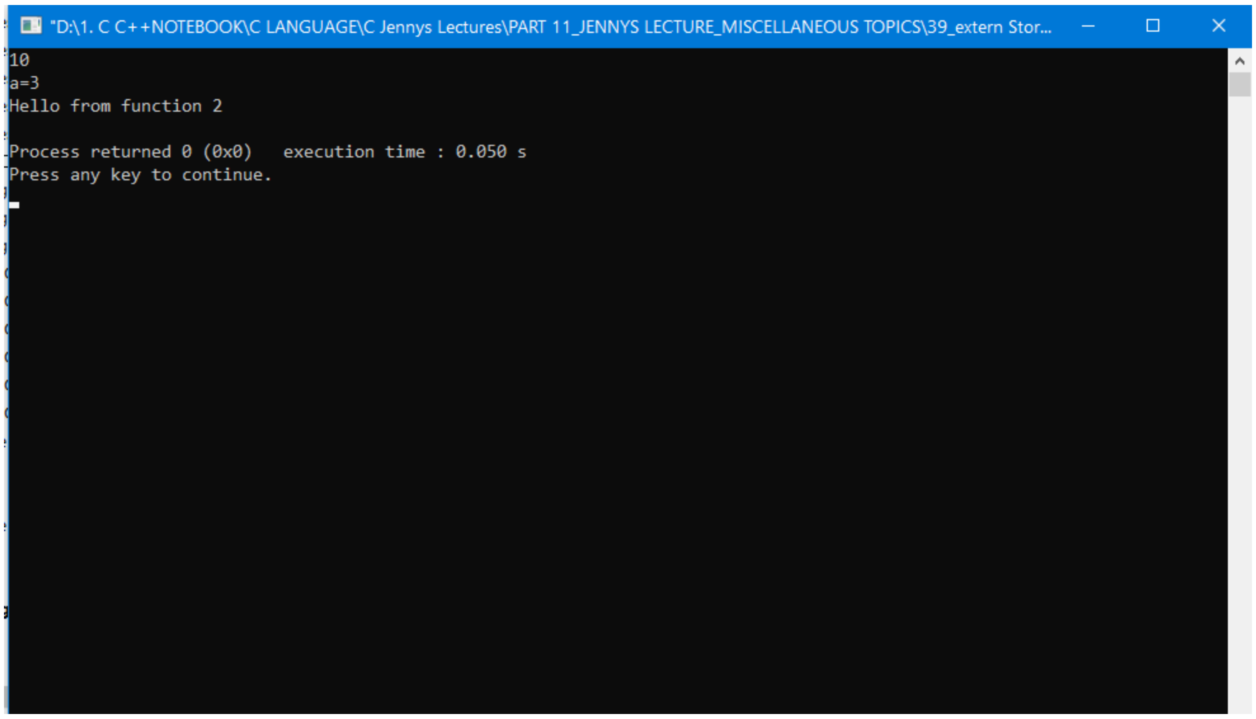
```
File            Line  Message
D:\1. C C++...        In function 'main':
D:\1. C C++...  8     error: 'a' undeclared (first use in this function)
```

D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Le... C/C++ Windows (CR+LF) WINDOWS-1252 Line 8, Col 1, Pos 126 Insert Read/Write default


main.c [39_extern Storage Classes in C] - Code::Blocks 20.03

```c
#include <stdio.h>
#include <stdlib.h>
/** 39 - extern Storage Classes in C **/
void fun1();
void fun2();
int a=10;
int main()
{
 extern int a;
 printf("%d\n",a);
 fun1();
 fun2();
 return 0;
}
void fun1()
{
int a=2;
a++;
printf("a=%d\n",a);
}
void fun2()
{
 printf("Hello from function 2\n");
}
```

D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Le... C/C++ Windows (CR+LF) WINDOWS-1252 Line 9, Col 15, Pos 151 Insert Read/Write default



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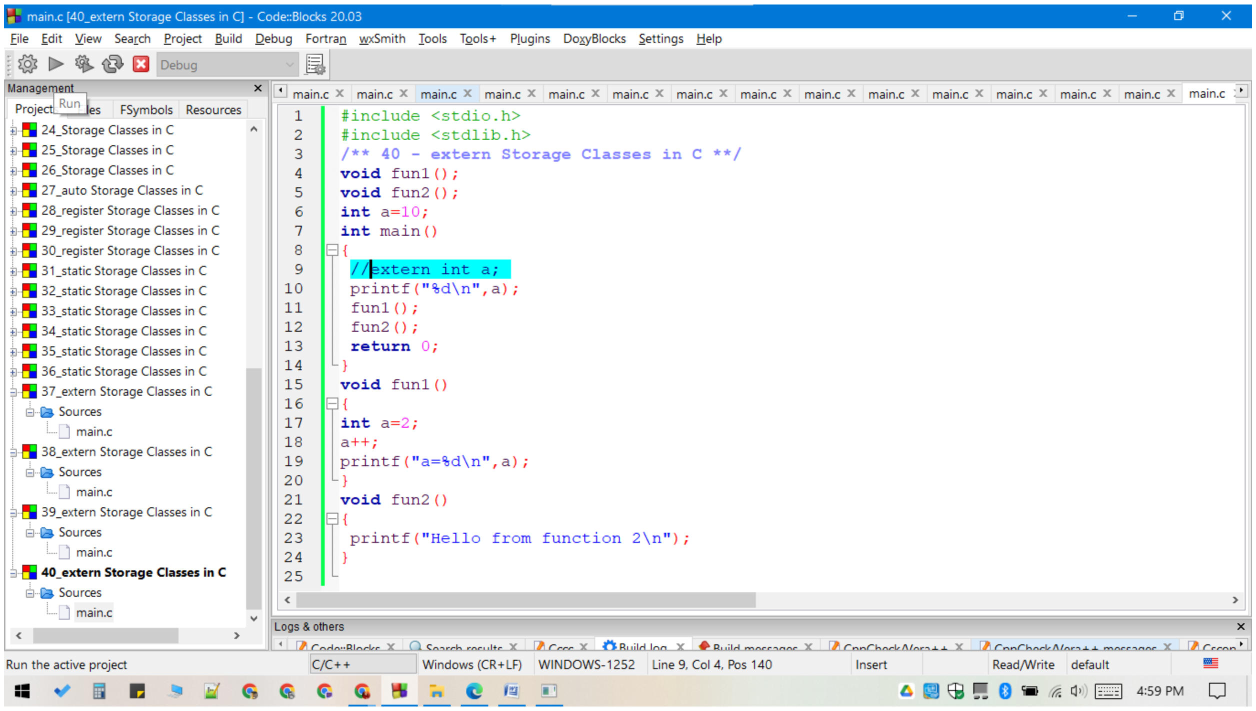
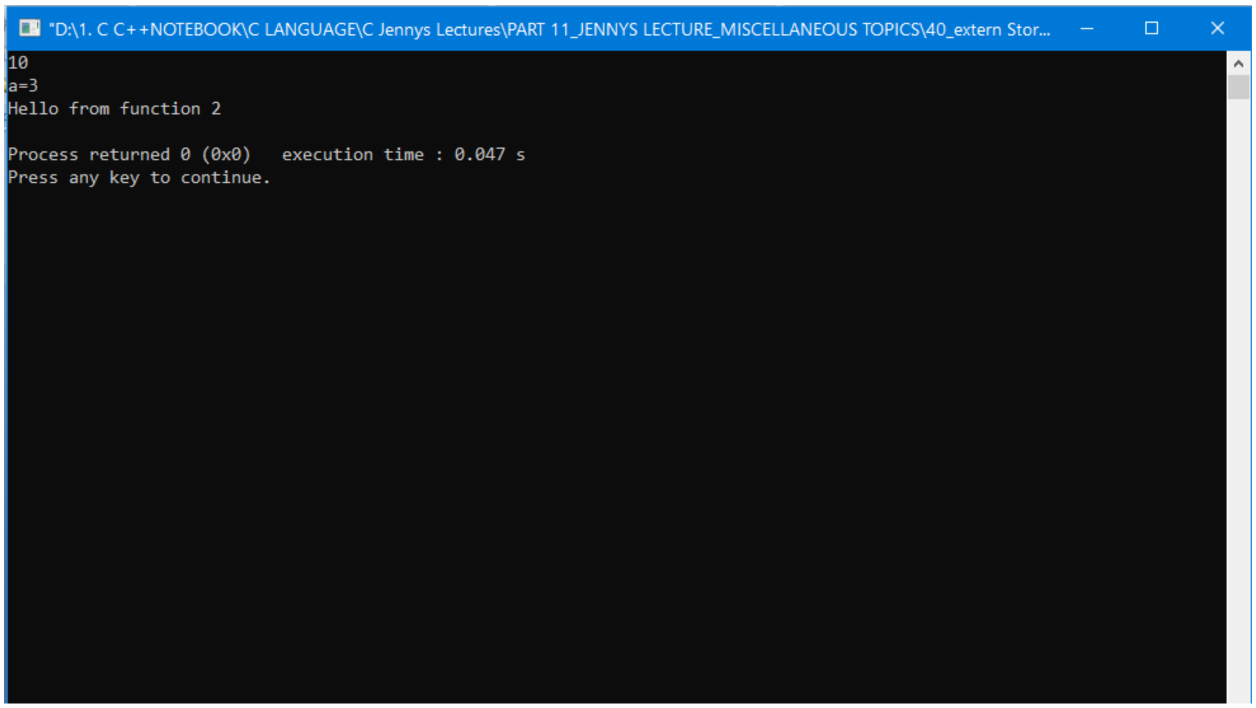
```
10
a=3
Hello from function 2

Process returned 0 (0x0)   execution time : 0.050 s
Press any key to continue.
```



main.c [40_extern Storage Classes in C] - Code::Blocks 20.03

```c
#include <stdio.h>
#include <stdlib.h>
/** 40 - extern Storage Classes in C **/
void fun1();
void fun2();
int a=10;
int main()
{
 //extern int a;
 printf("%d\n",a);
 fun1();
 fun2();
 return 0;
}
void fun1()
{
int a=2;
a++;
printf("a=%d\n",a);
}
void fun2()
{
 printf("Hello from function 2\n");
}
```

File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Debug
Management
Projects Files FSymbols Resources
24_Storage Classes in C
25_Storage Classes in C
26_Storage Classes in C
27_auto Storage Classes in C
28_register Storage Classes in C
29_register Storage Classes in C
30_register Storage Classes in C
31_static Storage Classes in C
32_static Storage Classes in C
33_static Storage Classes in C
34_static Storage Classes in C
35_static Storage Classes in C
36_static Storage Classes in C
37_extern Storage Classes in C
Sources
main.c
38_extern Storage Classes in C
Sources
main.c
39_extern Storage Classes in C
Sources
main.c
40_extern Storage Classes in C
Sources
main.c
Logs & others
Run the active project
C/C++
Windows (CR+LF)
WINDOWS-1252
Line 9, Col 4, Pos 140
Insert
Read/Write
default
4:59 PM



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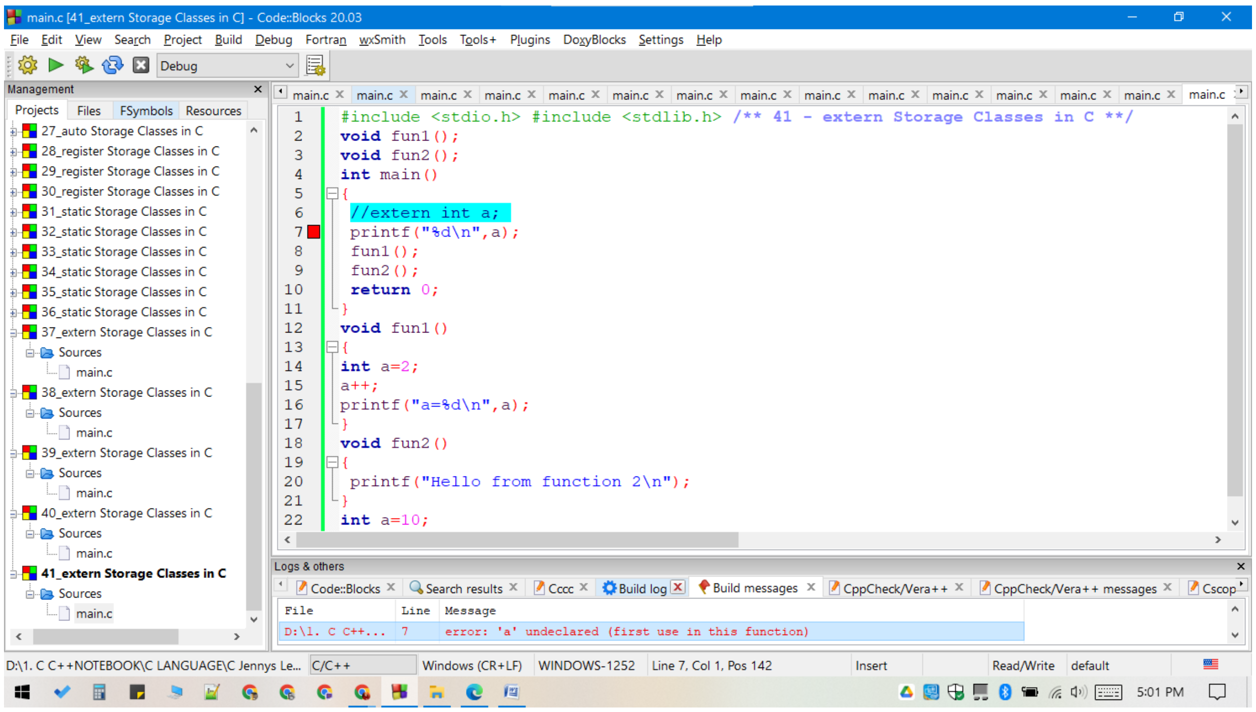
```
10
a=3
Hello from function 2

Process returned 0 (0x0)   execution time : 0.047 s
Press any key to continue.
```



main.c [41_extern Storage Classes in C] - Code::Blocks 20.03

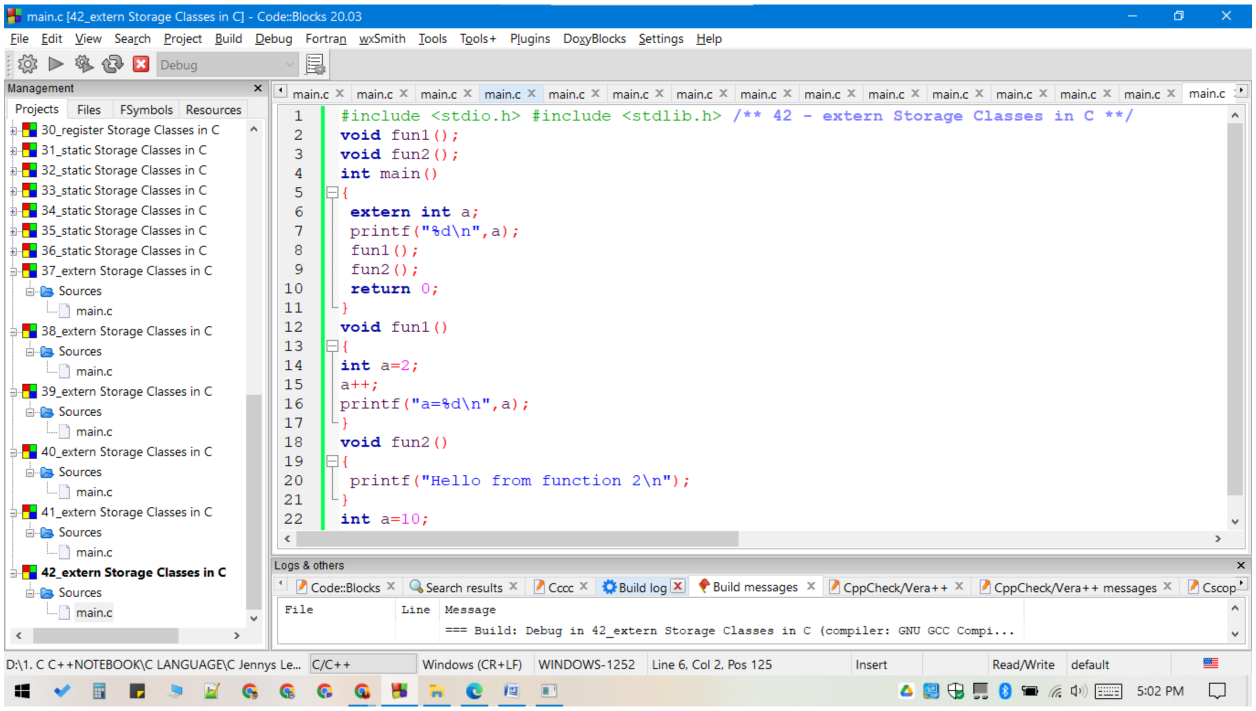
File
Edit
View
Search
Project
Build
Debug
Fortran
wxSmith
Tools
Tools+
Plugins
DoxyBlocks
Settings
Help
Debug
Management
Projects
Files
FSymbols
Resources
27_auto Storage Classes in C
28_register Storage Classes in C
29_register Storage Classes in C
30_register Storage Classes in C
31_static Storage Classes in C
32_static Storage Classes in C
33_static Storage Classes in C
34_static Storage Classes in C
35_static Storage Classes in C
36_static Storage Classes in C
37_extern Storage Classes in C
38_extern Storage Classes in C
39_extern Storage Classes in C
40_extern Storage Classes in C
41_extern Storage Classes in C
Sources
main.c
Logs & others
Code::Blocks
Search results
Cccc
Build log
Build messages
CppCheck/Vera++
CppCheck/Vera++ messages
Cscop

```c
#include <stdio.h> #include <stdlib.h> /** 41 - extern Storage Classes in C **/
void fun1();
void fun2();
int main()
{
 //extern int a;
 printf("%d\n",a);
 fun1();
 fun2();
 return 0;
}
void fun1()
{
int a=2;
a++;
printf("a=%d\n",a);
}
void fun2()
{
 printf("Hello from function 2\n");
}
int a=10;
```

```
File              Line   Message
D:\1. C C++...    7      error: 'a' undeclared (first use in this function)
```

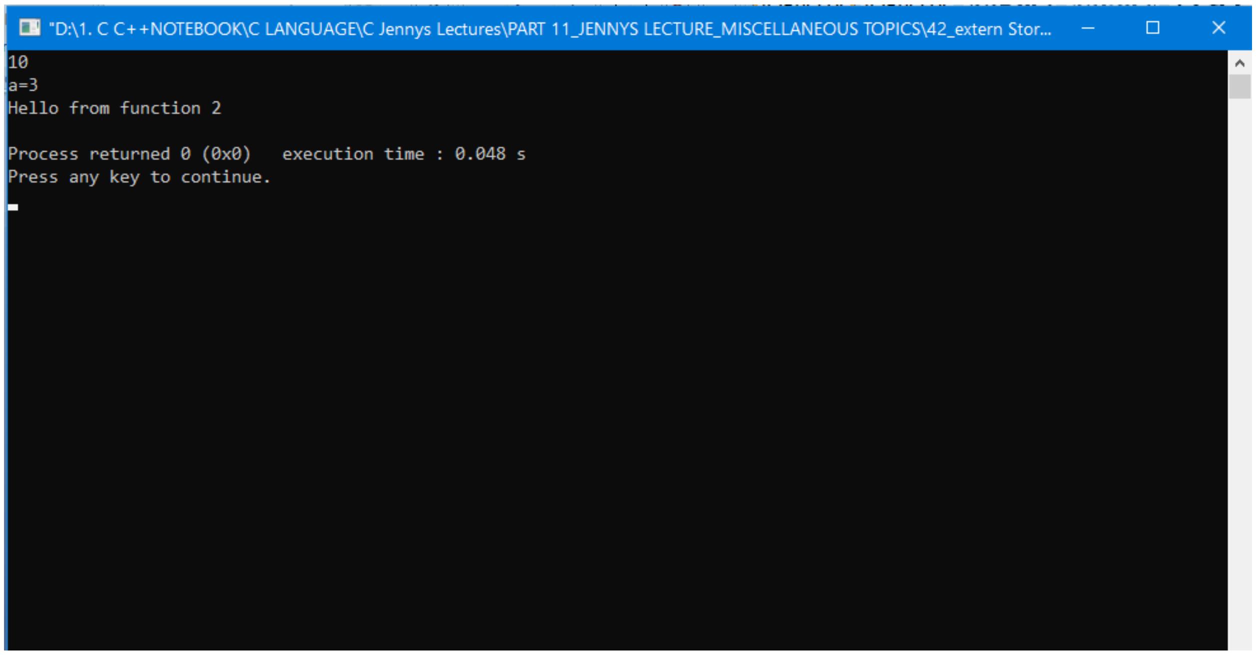
D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Le... | C/C++ | Windows (CR+LF) | WINDOWS-1252 | Line 7, Col 1, Pos 142 | Insert | Read/Write | default

5:01 PM



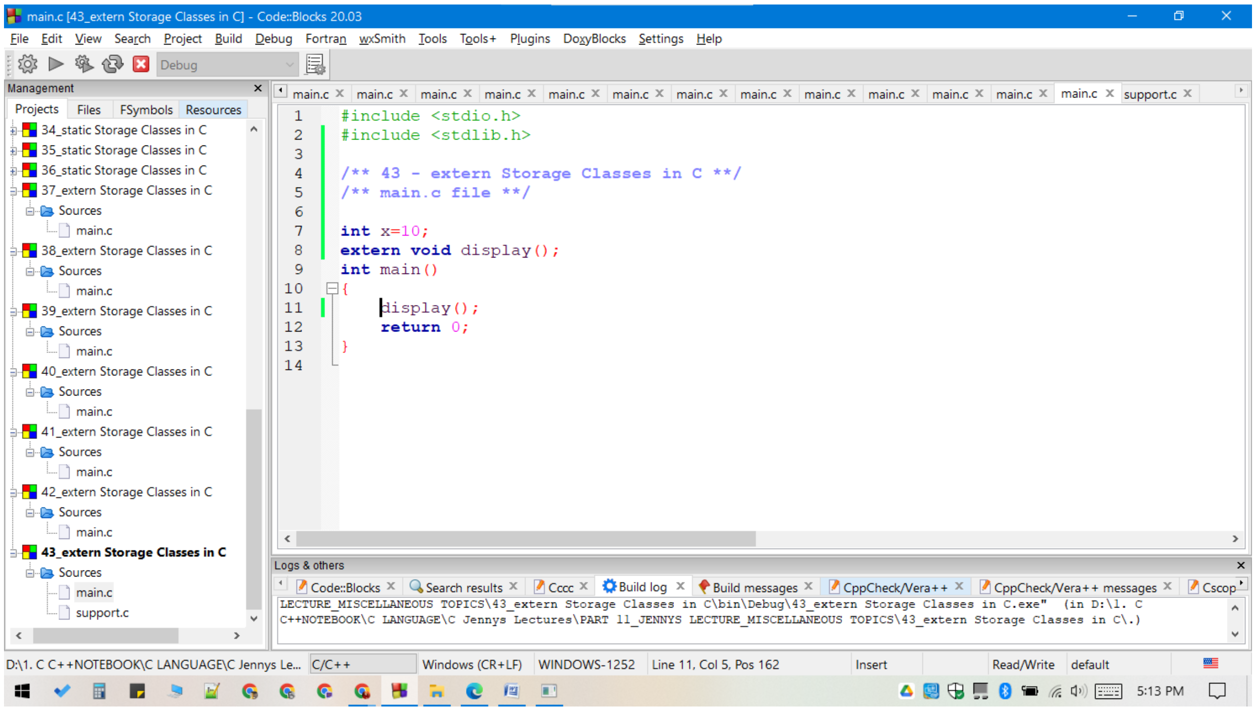
```
#include <stdio.h> #include <stdlib.h> /** 42 - extern Storage Classes in C **/
void fun1();
void fun2();
int main()
{
  extern int a;
  printf("%d\n",a);
  fun1();
  fun2();
  return 0;
}
void fun1()
{
int a=2;
a++;
printf("a=%d\n",a);
}
void fun2()
{
  printf("Hello from function 2\n");
}
int a=10;
```

```
File    Line  Message
              === Build: Debug in 42_extern Storage Classes in C (compiler: GNU GCC Compi...
```



```
10
a=3
Hello from function 2

Process returned 0 (0x0)   execution time : 0.048 s
Press any key to continue.
```


main.c [43_extern Storage Classes in C] - Code::Blocks 20.03
File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Debug
Management
Projects Files FSymbols Resources
34_static Storage Classes in C
35_static Storage Classes in C
36_static Storage Classes in C
37_extern Storage Classes in C
38_extern Storage Classes in C
39_extern Storage Classes in C
40_extern Storage Classes in C
41_extern Storage Classes in C
42_extern Storage Classes in C
43_extern Storage Classes in C
Sources
main.c
support.c
Logs & others
Code::Blocks Search results Cccc Build log Build messages CppCheck/Vera++ CppCheck/Vera++ messages Cscop

```c
#include <stdio.h>
#include <stdlib.h>

/** 43 - extern Storage Classes in C **/
/** main.c file **/

int x=10;
extern void display();
int main()
{
    display();
    return 0;
}
```

```
LECTURE_MISCELLANEOUS TOPICS\43_extern Storage Classes in C\bin\Debug\43_extern Storage Classes in C.exe"  (in D:\1. C
C++NOTEBOOK\C LANGUAGE\C Jennys Lectures\PART 11_JENNYS LECTURE_MISCELLANEOUS TOPICS\43_extern Storage Classes in C\.)
```

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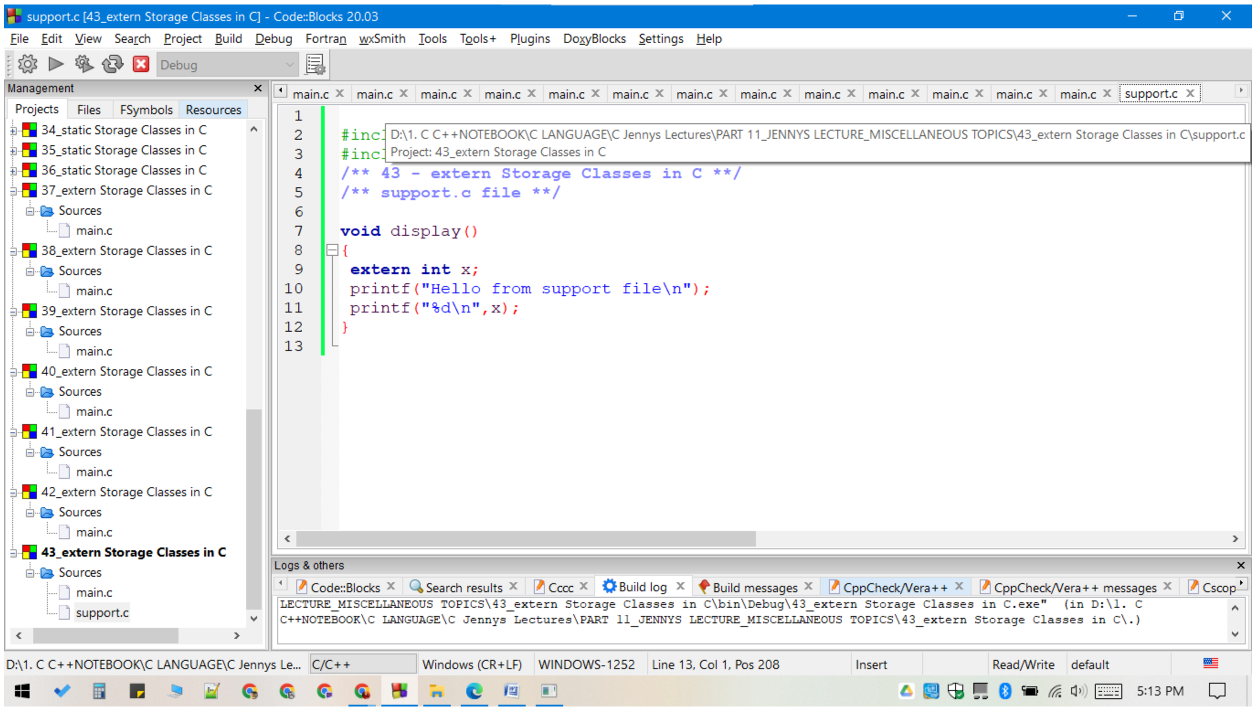

support.c [43_extern Storage Classes in C] - Code::Blocks 20.03
File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Debug
Management
Projects Files FSymbols Resources
43_extern Storage Classes in C
Sources
main.c
support.c
Logs & others

D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Lectures\PART 11_JENNYS LECTURE_MISCELLANEOUS TOPICS\43_extern Storage Classes in C\support.c
Project: 43_extern Storage Classes in C

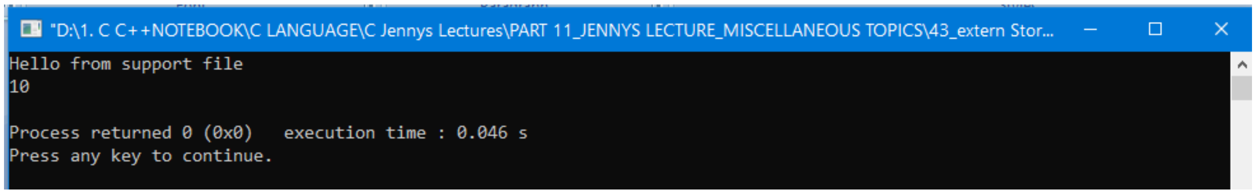
```c

#inc
#inc
/** 43 - extern Storage Classes in C **/
/** support.c file **/

void display()
{
 extern int x;
 printf("Hello from support file\n");
 printf("%d\n",x);
}
```

```
LECTURE_MISCELLANEOUS TOPICS\43_extern Storage Classes in C\bin\Debug\43_extern Storage Classes in C.exe"  (in D:\1. C
C++NOTEBOOK\C LANGUAGE\C Jennys Lectures\PART 11_JENNYS LECTURE_MISCELLANEOUS TOPICS\43_extern Storage Classes in C\.)
```

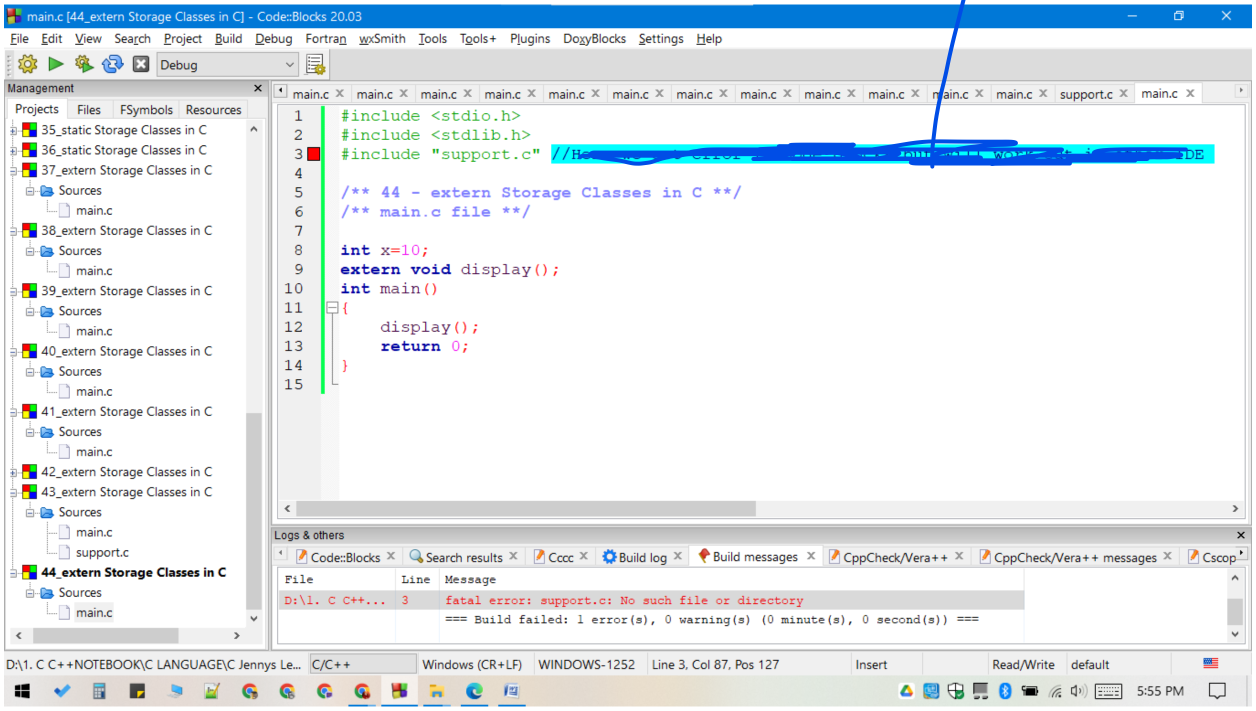
D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Le... | C/C++ | Windows (CR+LF) | WINDOWS-1252 | Line 13, Col 1, Pos 208 | Insert | Read/Write | default


"D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Lectures\PART 11_JENNYS LECTURE_MISCELLANEOUS TOPICS\43_extern Stor...

```
Hello from support file
10

Process returned 0 (0x0)   execution time : 0.046 s
Press any key to continue.
```

file path is not mentioned so we get error


main.c [44_extern Storage Classes in C] - Code::Blocks 20.03
File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Debug
Management
Projects Files FSymbols Resources
35_static Storage Classes in C
36_static Storage Classes in C
37_extern Storage Classes in C
38_extern Storage Classes in C
39_extern Storage Classes in C
40_extern Storage Classes in C
41_extern Storage Classes in C
42_extern Storage Classes in C
43_extern Storage Classes in C
44_extern Storage Classes in C
Sources
main.c
support.c
Logs & others
Code::Blocks Search results Cccc Build log Build messages CppCheck/Vera++ CppCheck/Vera++ messages Cscop

```c
#include <stdio.h>
#include <stdlib.h>
#include "support.c"  [redacted]

/** 44 - extern Storage Classes in C **/
/** main.c file **/

int x=10;
extern void display();
int main()
{
    display();
    return 0;
}
```

```
File          Line  Message
D:\1. C C++...  3    fatal error: support.c: No such file or directory
                     === Build failed: 1 error(s), 0 warning(s) (0 minute(s), 0 second(s)) ===
```

D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Le... C/C++ Windows (CR+LF) WINDOWS-1252 Line 3, Col 87, Pos 127 Insert Read/Write default

5:55 PM