C_142 ⇒ Types of Storage classes in C

Part-2 - Register storage class

* How to use this?

register int a;

* The defaut value of register storage class will be garbage value.

* Like auto, register storage class variables have only function and block scope; it cannot have program scope (global declaration).

* Lifetime of auto storage class variables is within the function or block.

NOTE:

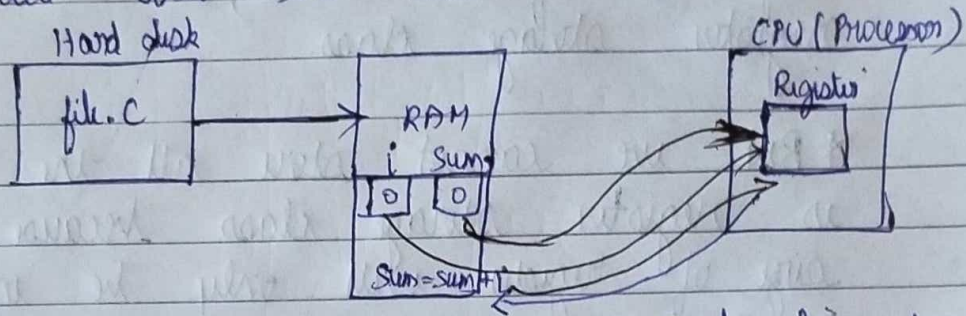
* We know auto storage class variables will be stored in RAM inside it stack segment.

* register storage class variables will be stored in CPU registers [for all its local variables]

* Now, why we store in CPU register?; Is it possible to store all variables in CPU register? Which type of variable we should store in CPU register?

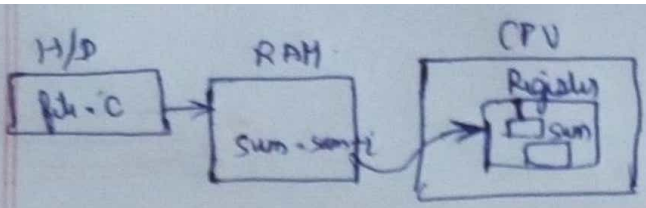
```
#include <stdio.h>
int main()
{
register int i, sum=0;
    for(i=0; i<10; i++)
        sum = sum+i;
    printf("%d", sum);
}
```

* whenever we execute a program; then that program which is in hard disk will be loaded into the RAM



* In RAM the program is processed line by line, instruction by instruction with the help of CPU's ALU & Registers; so all the instructions are sent one by one to the registers for processing.

* So for our above given program; at first i and sum variables are declared and initialized which has memory locations in stack section RAM memory. Then when it gets the instruction sum = sum+i; it will be processed inside the register and the value is returned back to the RAM for storing value of sum in RAM; this whole processing is called switching (ie) switching from RAM to register or vice versa.



* For this switching process it takes time; i.e running time increases and efficiency of our program decreases.

* So the better option is to store the variables in the register; where the data fetched from register itself and does the processing inside register hence the running time decrease and efficiency of our program increases; hence we are removing the fetching time which help in faster access; so we use register storage class.

* But we cannot store all the variables in register storage class because the size of register will only be in KB's i.e Kilo Bytes.

* If we store all the variables in register then for processing the instruction set we dont have memory in register and we face like this type of problems also.

* Then which variables we should store in registers? The variables which we use/access very frequently like counter variables, loop variables.

* We can only force the compilers to store the variables [in our program i, sum] inside the register but we cannot

guarentee that the variables are stored in register because it is based on the availability of memory in register.

* If there is no space in register then compiler by default take it as auto and allocate memory for those variables in stack section but we don't know this whether the memory is allocated in register or not; but for our satisfaction we have declared as register.

* We cannot use pointer reference for the register storage class variable since it is inside register we do not have any address for those variables here we cannot use the address of operator.

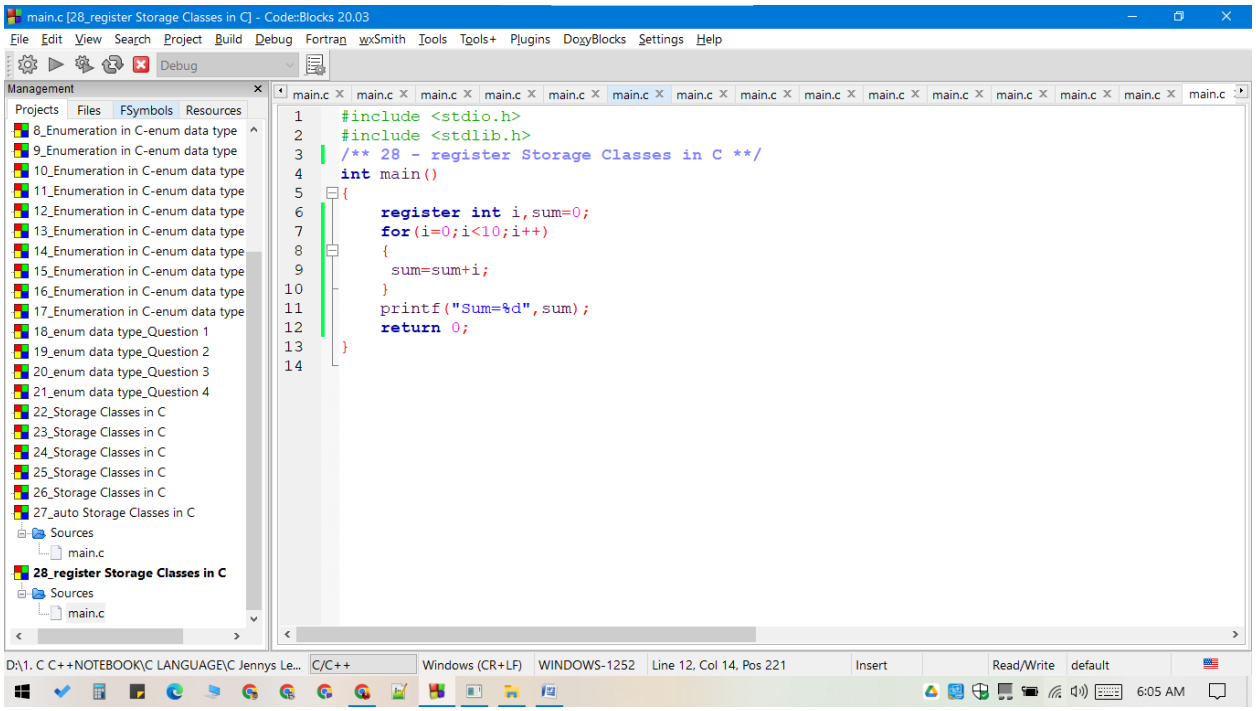
Eg:
```
# include<stdio.h>
int main()
{
  register int i, sum=0;
  for(i=0; i<10; i++)
    sum = sum + i;
  printf("%d", sum);

  int *ptr;
  ptr = &sum;   X -> because there is no address inside registers so we cannot store it as address variable inside ptr.
  printf("%d", *ptr);
}
```

* We cannot get the address of the register variable with the help of pointer.

* But we can use pointers variables inside register where we can store address of another variable

Eg:- register int *ptr; int a;
ptr = &a;


main.c [28_register Storage Classes in C] - Code::Blocks 20.03
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8_Enumeration in C-enum data type
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17_Enumeration in C-enum data type
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
Sources
main.c
28_register Storage Classes in C
Sources
main.c
1 #include <stdio.h>
2 #include <stdlib.h>
3 /** 28 - register Storage Classes in C **/
4 int main()
5 {
6 register int i,sum=0;
7 for(i=0;i<10;i++)
8 {
9 sum=sum+i;
10 }
11 printf("Sum=%d",sum);
12 return 0;
13 }
14
D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Le...
C/C++
Windows (CR+LF)
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Line 12, Col 14, Pos 221
Insert
Read/Write
default
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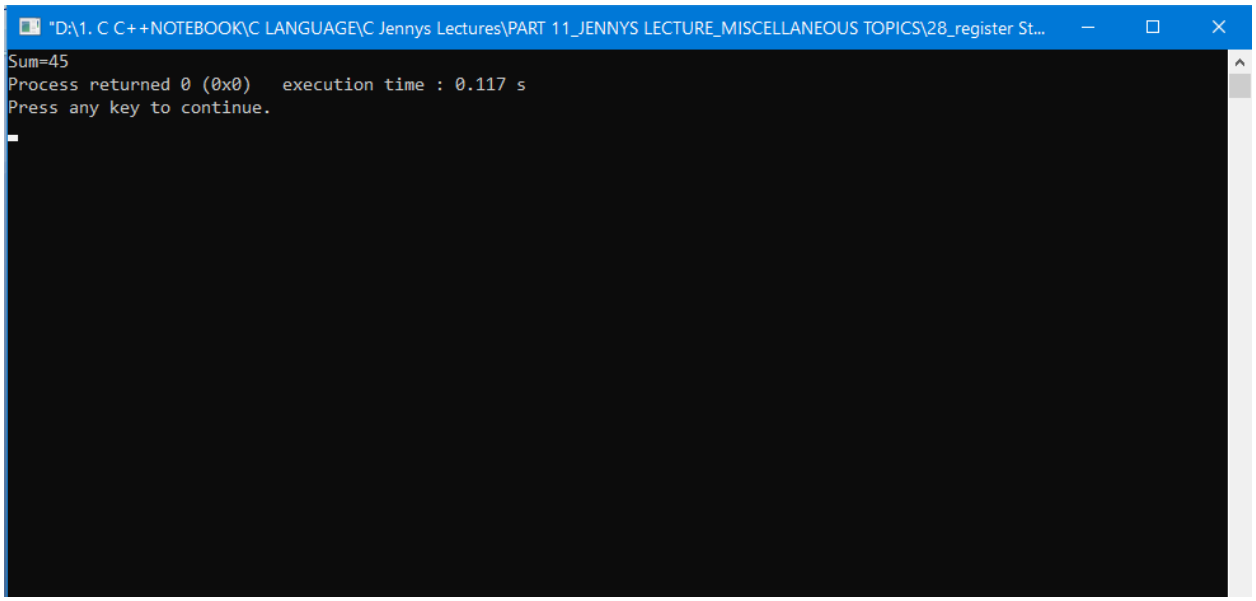
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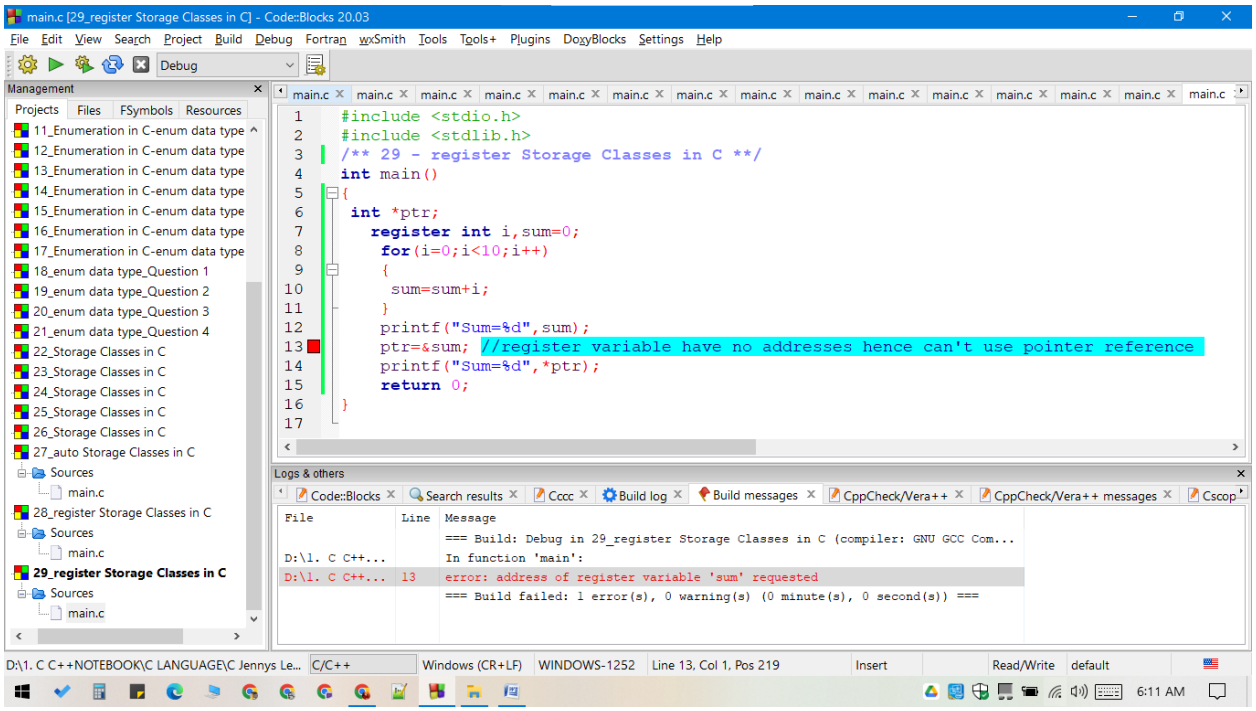
Sum=45
Process returned 0 (0x0) execution time : 0.117 s
Press any key to continue.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Sources
main.c
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2 #include <stdlib.h>
3 /** 29 - register Storage Classes in C **/
4 int main()
5 {
6 int *ptr;
7 register int i,sum=0;
8 for(i=0;i<10;i++)
9 {
10 sum=sum+i;
11 }
12 printf("Sum=%d",sum);
13 ptr=∑ //register variable have no addresses hence can't use pointer reference
14 printf("Sum=%d",*ptr);
15 return 0;
16 }
17
Logs & others
Code::Blocks Search results Cccc Build log Build messages CppCheck/Vera++ CppCheck/Vera++ messages Cscop
File Line Message
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D:\1. C C++... 13 error: address of register variable 'sum' requested
=== Build failed: 1 error(s), 0 warning(s) (0 minute(s), 0 second(s)) ===
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C/C++
Windows (CR+LF)
WINDOWS-1252
Line 13, Col 1, Pos 219
Insert
Read/Write
default
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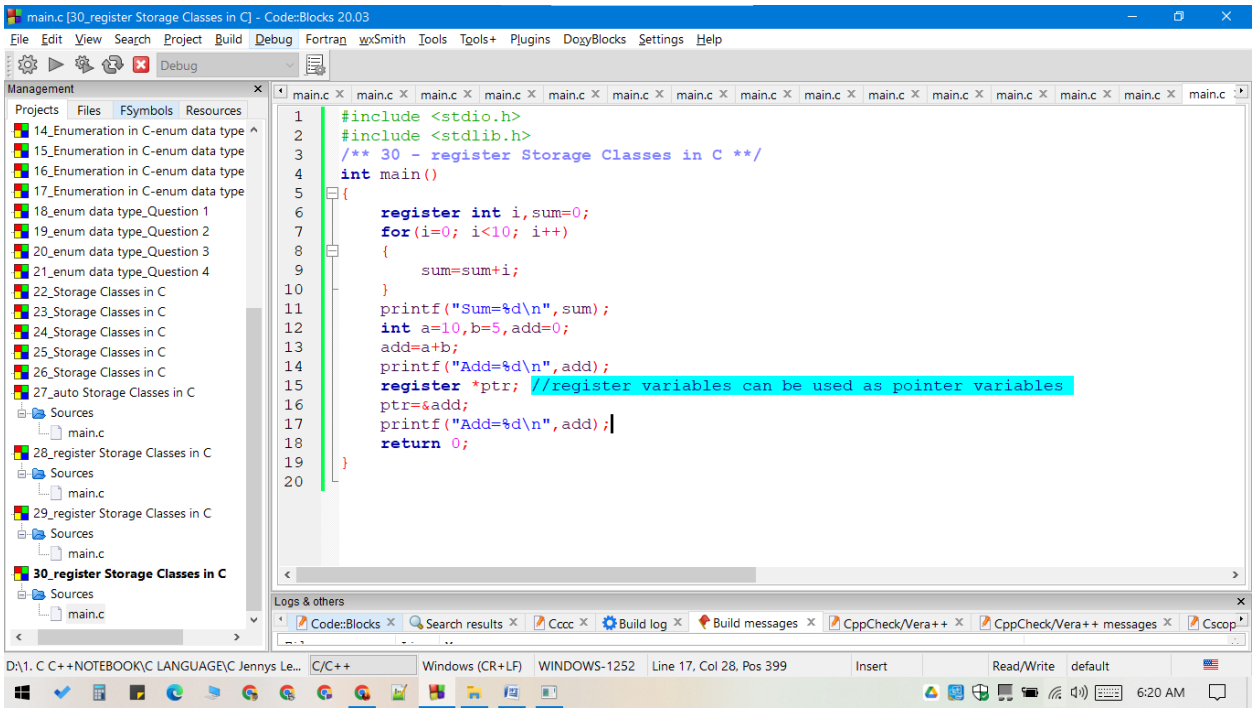
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30_register Storage Classes in C
Sources
main.c
1 #include <stdio.h>
2 #include <stdlib.h>
3 /** 30 - register Storage Classes in C **/
4 int main()
5 {
6 register int i,sum=0;
7 for(i=0; i<10; i++)
8 {
9 sum=sum+i;
10 }
11 printf("Sum=%d\n",sum);
12 int a=10,b=5,add=0;
13 add=a+b;
14 printf("Add=%d\n",add);
15 register *ptr; //register variables can be used as pointer variables
16 ptr=&add;
17 printf("Add=%d\n",add);
18 return 0;
19 }
20
Logs & others
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D:\1. C C++NOTEBOOK\C LANGUAGE\C Jennys Le...
C/C++
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Line 17, Col 28, Pos 399
Insert
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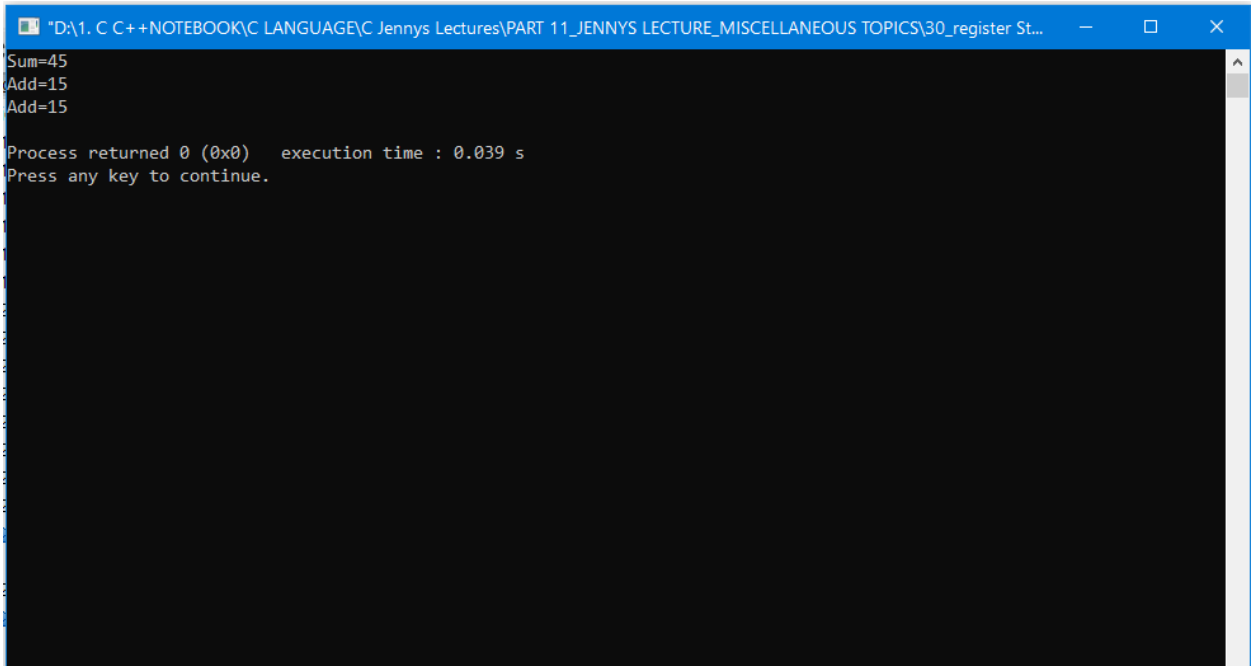
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Sum=45
Add=15
Add=15
Process returned 0 (0x0)   execution time : 0.039 s
Press any key to continue.