Structured Programming Language

Scope of a variable

```
char grade(int marks);
int main()
{
  int m;

  for(int i=1;i<=5;i++)
  {
    printf("\nEnter the marks of student %d :",i);
    scanf("%d",&m);
    char g=grade(m);
    printf("\nGrade of student %d is %c",i,g);
  }

  return 0;
}
char grade(int marks)
{
    if(marks>=90)
        return 'A';
    else if(marks>=80)
        return 'B';
    else if(marks>=70)
        return 'C';
    else
        return 'F';
```

Scope of a variable

A scope in any programming is a region of the program where a defined variable can have its *existence* and beyond that variable it *can't be accessed*.

Local Variables

- Variables that are *declared inside a function or block* are called local variables.
- They can be used only by statements that are inside that function or block of code.
- Local variables are not known to functions outside their own.

Global Variables

- Global variables are defined *outside a function*, usually on top of the program.
- Global variables hold their values throughout the lifetime of your program.
- A global variable *can be accessed by any function* i.e. a global variable is available for use throughout the entire program after its declaration.

Write a C program to show the difference between **local** and **global** variables.
Create a global variable `count` and a function `increment()` that defines a local variable `count`. Show how the local variable shadows the global one inside the function

Define a global variable count initialized to 10.
Define a function increment() with a local variable count initialized to 5.
Inside increment(), print both the local and global values.
In main(), call increment() and then display the global count again.

Sample Program

```c
#include<stdio.h>
int main()
{
    int a=10;

    return 0;
}
```

Sample Program

```
#include<stdio.h>
int main()
{
    int a=10;
    if(1)
    {
        int b=a/2;









    }


    return 0;
}
```

Sample Program

```c
#include<stdio.h>
int main()
{
    int a=10;
    if(1)
    {
        int b=a/2;
        printf("%d %d\n",a,b);          ///10 5

    }

    return 0;
}
```

Sample Program

```c
#include<stdio.h>
int main()
{
    int a=10;
    if(1)
    {
        int b=a/2;
        printf("%d %d\n",a,b);          ///10 5
        if(1)
        {
            int c=a+b;



        }


    }


    return 0;
}
```

Sample Program

```c
#include<stdio.h>
int main()
{
    int a=10;
    if(1)
    {
        int b=a/2;
        printf("%d %d\n",a,b);          ///10 5
        if(1)
        {
            int c=a+b;
            printf("%d %d %d\n",a,b,c);    ///10 5 15


        }


    }


    return 0;
}
```

Sample Program

```c
#include<stdio.h>
int main()
{
    int a=10;
    if(1)
    {
        int b=a/2;
        printf("%d %d\n",a,b);          ///10 5
        if(1)
        {
            int c=a+b;
            printf("%d %d %d\n",a,b,c);    ///10 5 15
            b=c;
            a=b*2;
        }


    }


    return 0;
}
```

Sample Program

```c
#include<stdio.h>
int main()
{
    int a=10;
    if(1)
    {
        int b=a/2;
        printf("%d %d\n",a,b);          ///10 5
        if(1)
        {
            int c=a+b;
            printf("%d %d %d\n",a,b,c);   ///10 5 15
            b=c;
            a=b*2;
        }
        printf("%d\n",c);             ///error
        printf("%d %d\n",b,a);        ///15 30
    }


    return 0;
}
```

Sample Program

```c
#include<stdio.h>
int main()
{
    int a=10;
    if(1)
    {
        int b=a/2;
        printf("%d %d\n",a,b);          ///10 5
        if(1)
        {
            int c=a+b;
            printf("%d %d %d\n",a,b,c);   ///10 5 15
            b=c;
            a=b*2;
        }
        printf("%d\n",c);               ///error
        printf("%d %d\n",b,a);          ///15 30
    }
    b=a*b;                              ///error
    printf("%d %d\n",c,b);              ///error
    printf("%d\n",a);                   ///30
    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=0;                    ///global variable

int main()
{




    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=0;                        ///global variable

int main()
{
    printf("%d\n",g);           ///0



    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=0;                          ///global variable

int main()
{
    printf("%d\n",g);             ///0
    int i;
    for(i=1;i<=5;i++){



    }


    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=0;                          ///global variable

int main()
{
    printf("%d\n",g);             ///0
    int i;
    for(i=1;i<=5;i++){
        int j=i;
        printf("%d\n",j);
        g=g+j;
    }


    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=0;                          ///global variable

int main()
{
    printf("%d\n",g);             ///0
    int i;
    for(i=1;i<=5;i++){
        int j=i;
        printf("%d\n",j);
        g=g+j;
    }
    printf("%d\n",j);             ///error
    printf("%d %d\n",i,g);        ///6 15
    return 0;
}
```

Special Case

- A program can have same name for variables within different scope.
- A program can have same name for local and global variables but the value of local variable inside a function will take preference.

Sample Program

```c
#include<stdio.h>

int g=100;                    ///global variable

int main()
{




    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=100;                  ///global variable

int main()
{
    printf("%d\n",g);       ///100

    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=100;                    ///global variable

int main()
{
    printf("%d\n",g);         ///100
    int g=50;




    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=100;                  ///global variable

int main()
{
    printf("%d\n",g);       ///100
    int g=50;
    printf("%d\n",g);       ///50
    if(1){




    }

    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=100;                  ///global variable

int main()
{
    printf("%d\n",g);       ///100
    int g=50;
    printf("%d\n",g);       ///50
    if(1){
        g=10;



    }

    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=100;                  ///global variable

int main()
{
    printf("%d\n",g);       ///100
    int g=50;
    printf("%d\n",g);       ///50
    if(1){
        g=10;
        int g=20;


    }

    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=100;                  ///global variable

int main()
{
    printf("%d\n",g);       ///100
    int g=50;
    printf("%d\n",g);       ///50
    if(1){
        g=10;
        int g=20;
        printf("%d\n",g);   ///20

    }

    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=100;                  ///global variable

int main()
{
    printf("%d\n",g);       ///100
    int g=50;
    printf("%d\n",g);       ///50
    if(1){
        g=10;
        int g=20;
        printf("%d\n",g);   ///20
        g=5;
    }

    return 0;
}
```

Sample Program

```c
#include<stdio.h>

int g=100;                  ///global variable

int main()
{
    printf("%d\n",g);       ///100
    int g=50;
    printf("%d\n",g);       ///50
    if(1){
        g=10;
        int g=20;
        printf("%d\n",g);   ///20
        g=5;
    }
    printf("%d\n",g);       ///10
    return 0;
}
```