Introduction to C Programming

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- **A Brief History of C**

- In 1972 C was first wrote at Bell Labs.

- In 1978 the publication of The C Programming Language caused a revolution in the computing world.

- In 1983, the American National Standards Institute (ANSI) established a committee to provide a modern, comprehensive definition of C. The resulting definition, the ANSI standard, or "ANSI C", was completed late 1988.

- **Why C?**

Features of C language	*Uses of C language:*
Reliability Portability Flexibility Interactivity Modularity	Database systems Graphics packages Word processors Spread sheets Operating system development Compilers and Assemblers Network drivers Interpreters

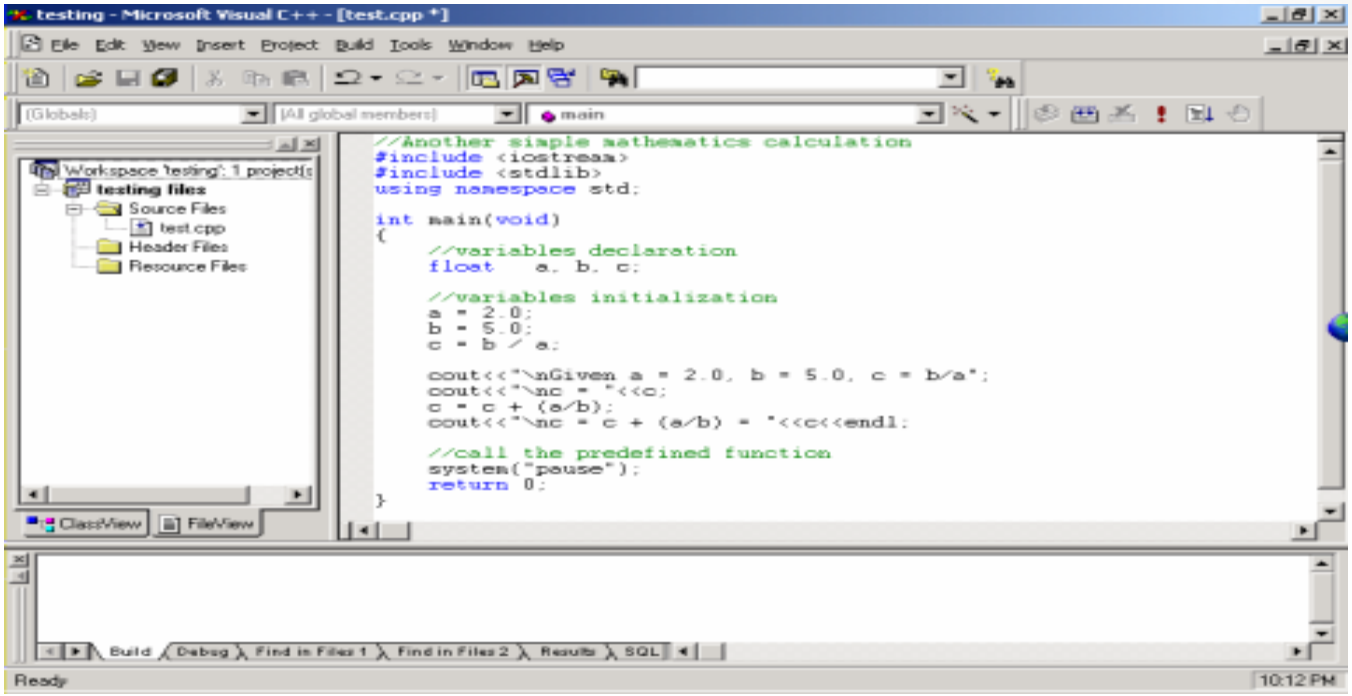
Running C Programs

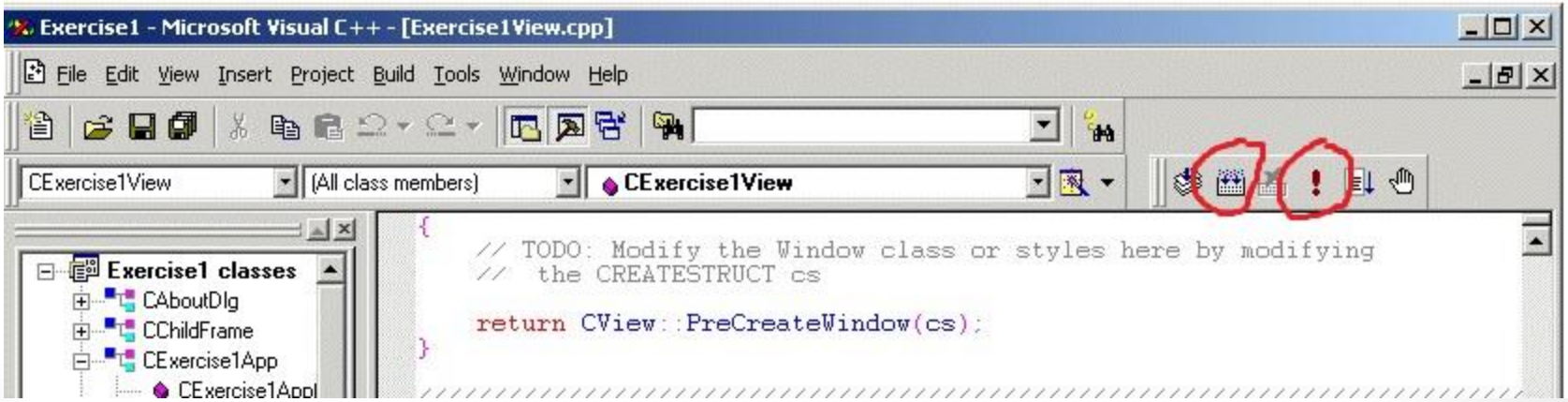
Developing a program in a compiled language such as C requires at least four steps:

- **editing** (or writing) the program *.c
- **compiling** it *.obj
- **linking** it *.exe *(stdio.h)*
- **executing** it

Using Microsoft C

- **Edit stage:**
- Type program in using one of the Microsoft Windows editing packages.
- **Compile and link:**
- Select **Build** from menu. **Building** option allows you to both **compile** and **link** in the same option.
- **Execute:**
- Select the **Build** menu → then, **Execute *filename.exe*** menu


testing - Microsoft Visual C++ - [test.cpp *]
File Edit View Insert Project Build Tools Window Help
(Globals)
(All global members)
main
Workspace 'testing': 1 project(s)
testing files
Source Files
test.cpp
Header Files
Resource Files
ClassView
FileView
//Another simple mathematics calculation
#include <iostream>
#include <stdlib>
using namespace std;
int main(void)
{
//variables declaration
float a, b, c;
//variables initialization
a = 2.0;
b = 5.0;
c = b / a;
cout<<"\nGiven a = 2.0, b = 5.0, c = b/a";
cout<<"\nc = "<<c;
c = c + (a/b);
cout<<"\nc = c + (a/b) = "<<c<<endl;
//call the predefined function
system("pause");
return 0;
}
Build
Debug
Find in Files 1
Find in Files 2
Results
SQL
Ready
10:12 PM


Exercise1 - Microsoft Visual C++ - [Exercise1View.cpp]
File Edit View Insert Project Build Tools Window Help
CExercise1View
(All class members)
CExercise1View
Exercise1 classes
CAboutDlg
CChildFrame
CExercise1App
CExercise1Appl
{
// TODO: Modify the Window class or styles here by modifying
// the CREATESTRUCT cs
return CView::PreCreateWindow(cs);
}

Unix systems

- **Online terminal emulator**
- http://simpleshell.com/

- *hello world example*

- #include <stdio.h>
- main()
- {
- printf("Hello world**\n**");
- }

- Please note that Unix is a case sensitive operating system and files named firstprog.c and FIRSTPROG.c are treated as two separate files on these system.

- By default the Unix system compiles and links a program in one step, as follows: **cc firstprog.c**
- This command creates an executable file called a.out .

- The program is run as follows:
- **./a.out**

Add Comments to a Program

- A **comment** is a note to yourself (or others). All comments are ignored by the compiler.
- **/* This is a comment. */**

- **main() /* main function*/**
- **{**
  - **printf("Hello, World! \n"); /* DisplayMessage */**
- **}**

Data Types

- You can create *variables* to store *values* in. There are five basic data types associated with variables:
- **int** - integer: a whole number.
- **float** - floating point value: ie a number with a fractional part.
- **double** - a double-precision floating point value.
- **char** - a single character.
- **void** - valueless.

- An **int** variable can store a value in the range -32768 to +32767. No fractional part is allowed.

- To declare an **int** : **int *variable name*;**
- **int a ;** Declares that you want to create an **int** variable called **a**.
- To assign a value to our integer variable we would use the following C statement:
- **a=10;**

- **Decimal Number Variables: float** and **double**.
- **float**: A float number has about seven digits of precision and a range of about 1.E-36 to 1.E+36.
- **double**: A double number has about 13 digits of precision and a range of about 1.E-303 to 1.E+303.

- To declare : **float total; double sum;**
- Assign a numerical value to our floating point and double precision variables:
- **total=0.0; sum=12.50;**

- **Character Variables**
- To declare a variable of type character we use the keyword **char**.
- For example:
- **char c;**
- To assign, or store, a character value in a **char** :
- **c='A'**

void

- Basically it means "nothing" or "no type"

- In C if you don’t specify the return type, the compiler automatically inferred that you wanted to return an int
- Function return value: void myFunc(int) -- the function returns nothing

True and False in C

- In C *true* is represented by any numeric value not equal to 0 and *false* is represented by 0.

- **if(a)**
- If **a** isn't zero then this also acts as the value *true*

Mathematical operations

Add, subtract, multiply and divide.

- add **a+b**
- subtract **a-b**
- multiply **a*b**
- divide **a/b**

- What is the answer to this simple calculation?
- **a=10/3**
- The answer depends upon how **a** was declared. If it was declared as type **int** the answer will be 3; if **a** is of type **float** then the answer will be 3.333.

```
#include  <stdio.h>
main(){
    int a,b,average;
    a=10; b=6;
    average = ( a+b ) / 2 ;
    printf("Here is the answers.. ");
    printf("\n");
    printf("%d.",average);
    printf("\n");


}
```

Input and Output Functions

- Input functions, called **scanf**
  - **scanf("%d",&a);**
- Output functions, called **printf**
  - **printf("The value stored in a is %d",a);**

```
#include <stdio.h>
main()
{
    int a,b,c;
    printf("\n The first number is ");
    scanf("%d",&a);
    printf("The second number is ");
    scanf("%d",&b);
    c=a+b;
    printf("The answer is %d \n",c);
}
```

```
#include <stdio.h>
main()
{
    int dec = 5;
    char ch = 's';
    float pi = 3.14;
    printf("%d %f %c\n", dec, pi, ch);
}
```

Functions

A function has the general form:

```
type FunctionName (type declared parameter list)
{
    statements that make up the function
}
```

```
#include<stdio.h>
void demo()
{
    printf("Hello");
}
main()
{
    demo();
}
```

Making The Connections

- How to get data into a function? *parameters* are used to carry data values into a function. Parameters are listed and declared in between the () brackets in the function's definition
- **sum(int a, int b){**
  - **int result;**
  - **result=a + b;**
- **}**
- **sum(l,2);**

- How do we get values out?
- **return *value*;**

- **int sum(int a, int b){**
  - **int result;**
  - **result = a + b;**
  - **return result;**
- **}**
- And to use it you can write something like:
- **r=sum(1,2);**

- **void demo();**
- is a function with no parameters and no return value.

```
#include<stdio.h>
int sum(int a, int b){
        int result;
        result=a+b;
        return result;
}

main(){
        int r;
        r=sum(1,3);
        printf("The answer is %d.\n", r);

}
```

The Standard Library Functions

- **stdio.h: I/O functions:**
  - **printf()** as previously described
  - **scanf()** as previously described
- **string.h: String functions**
  - **strcpy()** copys contents of str2 to str1
- **ctype.h: Character functions**
  - **islower()** returns non-0 if arg is lowercase letter
  - **isupper()** returns non-0 if arg is uppercase letter
- **math.h: Mathematics functions**
  - **sqrt()** returns square root of num
- **time.h: Time and Date functions**
  - **time()** returns current calender time of system

Data Types Part II

- So far we have looked at *local* variable now we switch our attention to other types of variables supported by the C programming language:
- **Global variables**
- int max;
- main(){
- .....
- }
- f1(){
- .....
- }

- **Constant Data Types**
- **Fixed values that may not be altered by program**
  - **#define CONSTANTNAME value**
  - For example:
  - **#define SALESTAX 0.05**

- **#define SALESTAX 0.05**
- **#include <stdio.h>**
- **main() {**
  - **float amount, taxes, total;**
  - **printf("Enter the amount purchased : ");**
  - **scanf("%f",&amount);**
  - **taxes = SALESTAX*amount;**
  - **printf("The sales tax is £%4.2f",taxes);**
  - **printf("\n The total bill is £%5.2f",total);**
- **}**

Questions?