VISUAL C++ PROGRAMING

UNIT - 3

CLASSES

- A class is a collections of similar type of objects and object is an instance of a class.
- Each class contains data member and member functions.
- Once a class is created, any number of objects belonging to this class can be created.

Microsoft Visual C++

- Microsoft Visual C++ compiler provides a 32-bit foundation class Library containing a new set of object oriented programming tools for exclusive development of 32 bit windows application.

- MFC (Microsoft Foundation Class) Library encapsulates all the procedure-oriented windows functions and support for control bars, property pages, OLE, ActiveX controls and more

Win32

- Win 32 is a library
- Its not a programming language
- It’s a documentation that allows programmers to know how they can use the library to create applications.
- Win32 was written in C
- Microsoft released windows 98 OS a library was updated Win32

MFC (Microsoft Foundation Class) Library

- A customized version of the Win32 library to make it easier called Microsoft Foundation Class Library
- Because Win32 is written in C and MFC is written in C / C++
- Other programmers of other languages would not understand it, so Microsoft created Microsoft VB environment (BASIC)
- Growth of Internet and Database, software. Microsoft decided to develop a new library that understand many different languages.
- This library is called .NET FRAMEWORK

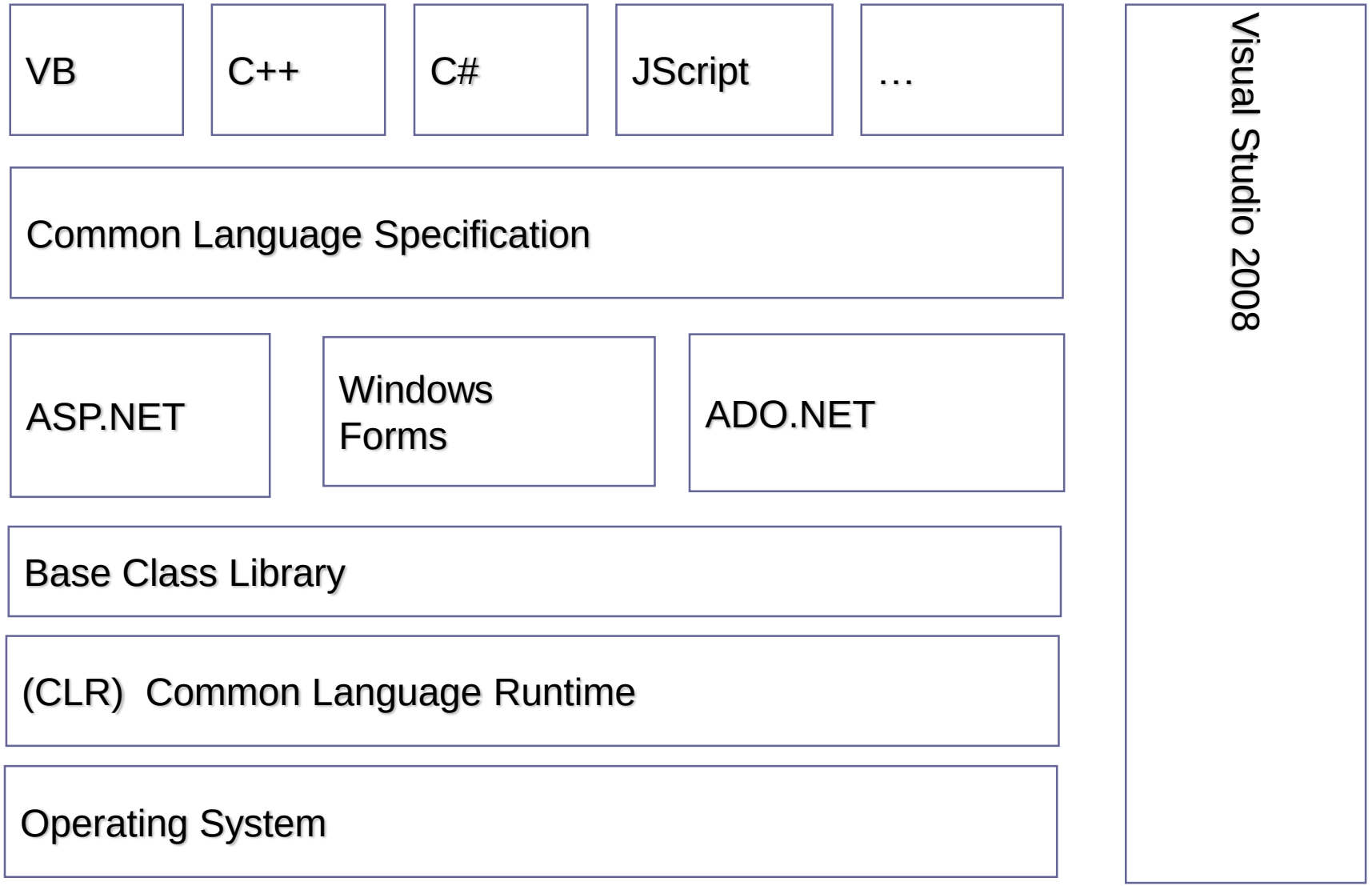
.NET FRAMEWORK

- Microsoft .NET is a Framework which provides a common platform to Execute or, Run the applications developed in various programming languages.

.NET Framework Objectives

- **The .NET Framework is designed to fulfill the following objectives:**
  - Provide object-oriented programming environment
  - Provide environment for developing various types of applications, such as Windows-based applications and Web-based applications
  - To ensure that code based on the .NET Framework can integrate with any other code

.NET Framework



Visual Designers

- Visual studio includes Visual designers in development of application.

- The tools are:

1) Windows forms Designer
2) The WPF Designer
3) Web Designer
4) Class Designer

1) Windows forms Designer

- Its used to build GUI applications using windows Forms
- Its includes controls like buttons, progress bar, labels, layout container and many more.
- It can be dragged and dropped on the form surface
- The designer generates either C# or VB.net code for the application

2) The WPF Designer

- Windows presentation Foundation
- Its like Windows forms Designer
- It includes data binding

3) The Web Designer

- Its used for developing Asp.net application
- And supports HTML, CSS (Cascading style Sheet) and JavaScript

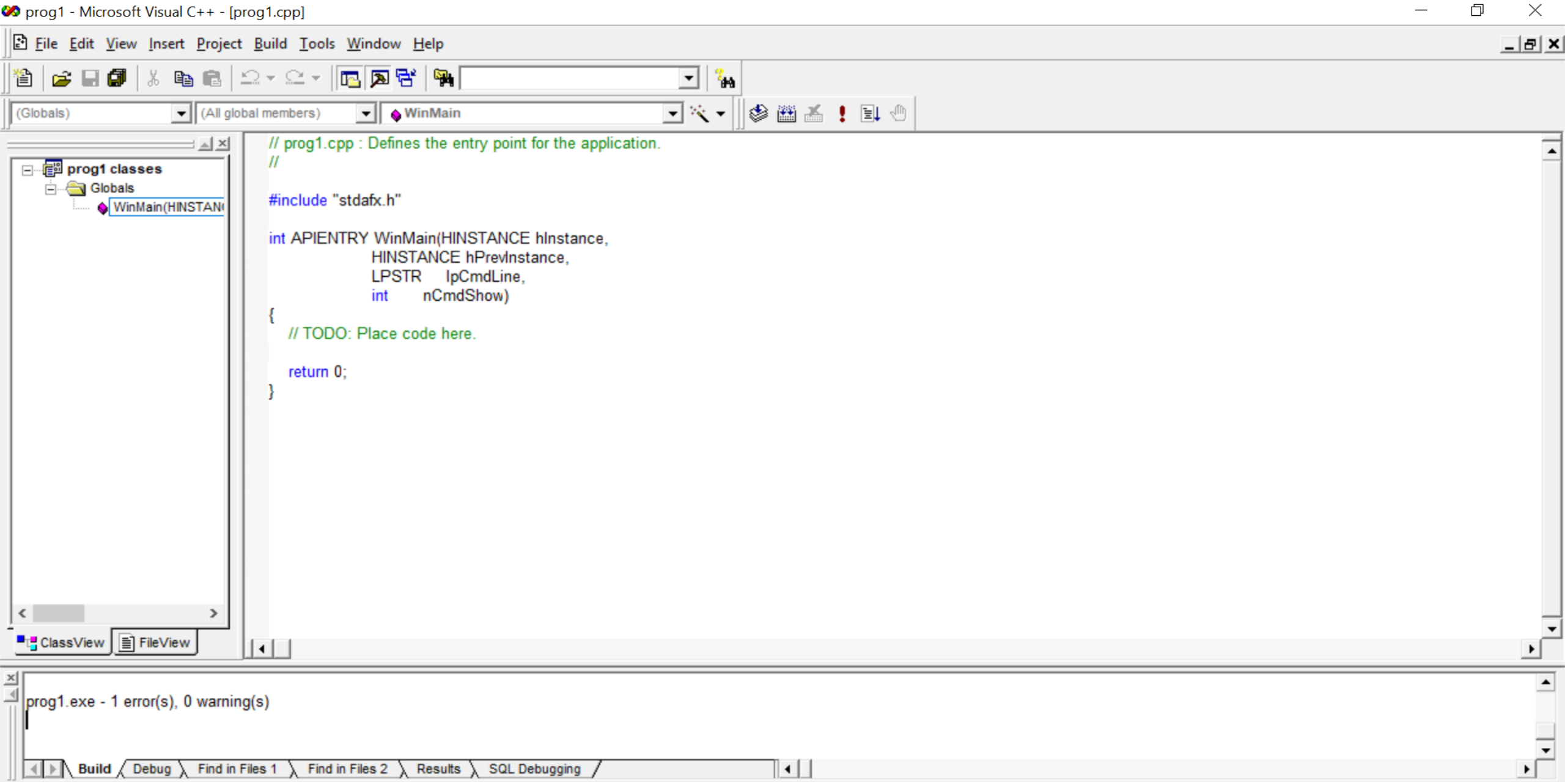
4) Class Designer

- Its used to create class including members and their access
- The class designer can generate C# and VB.NET code for classes and methods

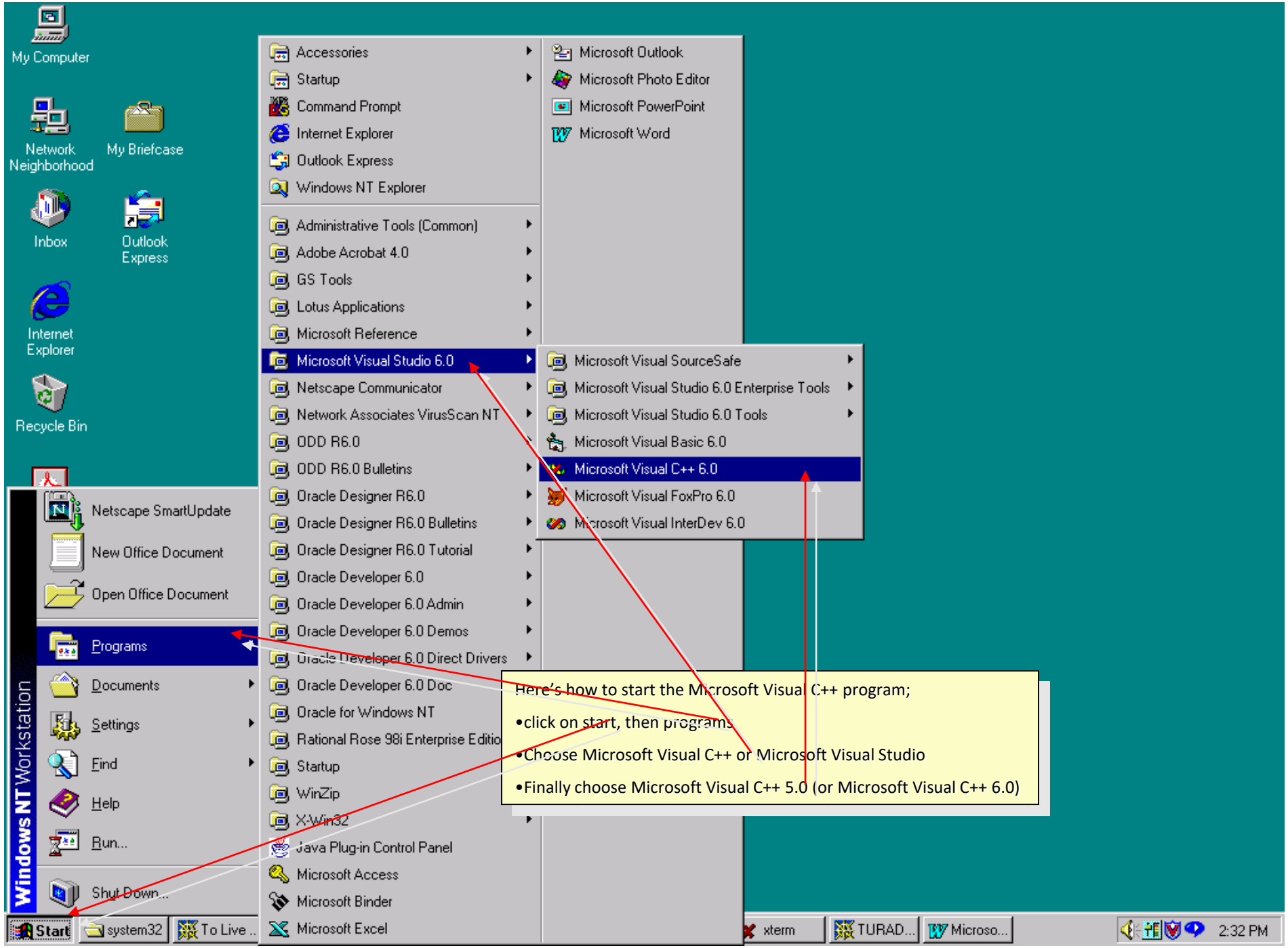
5) Data Designer

- Its used to graphically edit database schemas, includes typed tables primary key foreign key and also used for queries

Microsoft VC++ Environment



1) Tile Bar
2) Main Menu
3) Tool Bar
4) Workspace:
    a) File view tab
    b) class View Tab
    c) Resource view Tab
5) The editor pane
6) The output pane


My Computer
Network Neighborhood
My Briefcase
Inbox
Outlook Express
Internet Explorer
Recycle Bin
Windows NT Workstation
Netscape SmartUpdate
New Office Document
Open Office Document
Programs
Documents
Settings
Find
Help
Run...
Shut Down...
Start
system32
To Live ..
Accessories
Startup
Command Prompt
Internet Explorer
Outlook Express
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Administrative Tools (Common)
Adobe Acrobat 4.0
GS Tools
Lotus Applications
Microsoft Reference
Microsoft Visual Studio 6.0
Netscape Communicator
Network Associates VirusScan NT
ODD R6.0
ODD R6.0 Bulletins
Oracle Designer R6.0
Oracle Designer R6.0 Bulletins
Oracle Designer R6.0 Tutorial
Oracle Developer 6.0
Oracle Developer 6.0 Admin
Oracle Developer 6.0 Demos
Oracle Developer 6.0 Direct Drivers
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Microsoft PowerPoint
Microsoft Word
Microsoft Visual SourceSafe
Microsoft Visual Studio 6.0 Enterprise Tools
Microsoft Visual Studio 6.0 Tools
Microsoft Visual Basic 6.0
Microsoft Visual C++ 6.0
Microsoft Visual FoxPro 6.0
Microsoft Visual InterDev 6.0
Here's how to start the Microsoft Visual C++ program;
•click on start, then programs
•Choose Microsoft Visual C++ or Microsoft Visual Studio
•Finally choose Microsoft Visual C++ 5.0 (or Microsoft Visual C++ 6.0)
xterm
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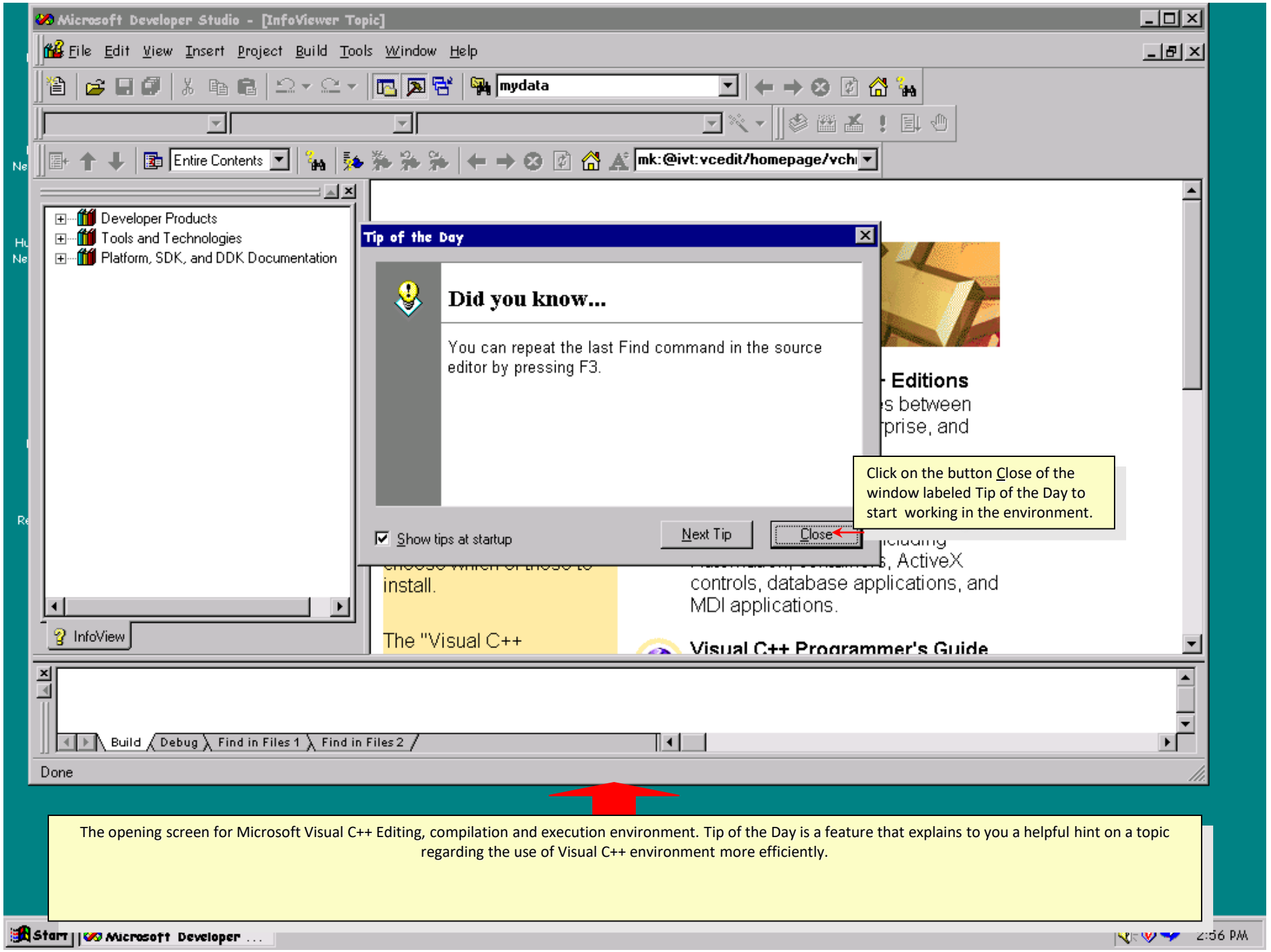
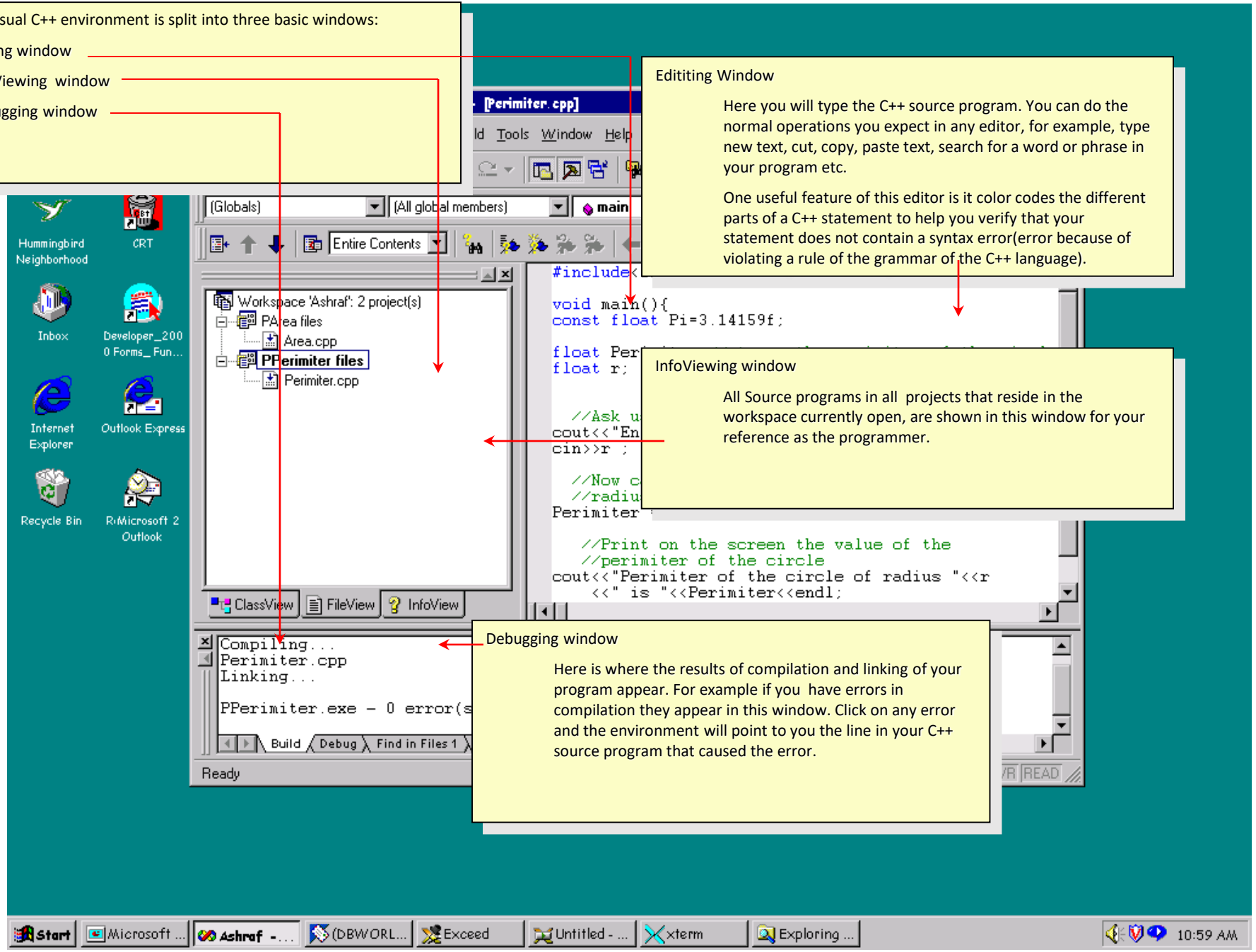


The opening screen for Microsoft Visual C++ Editing, compilation and execution environment. Tip of the Day is a feature that explains to you a helpful hint on a topic regarding the use of Visual C++ environment more efficiently.

The Visual C++ environment is split into three basic windows:

- Editing window
- InfoViewing window
- Debugging window



Edititing Window

Here you will type the C++ source program. You can do the normal operations you expect in any editor, for example, type new text, cut, copy, paste text, search for a word or phrase in your program etc.

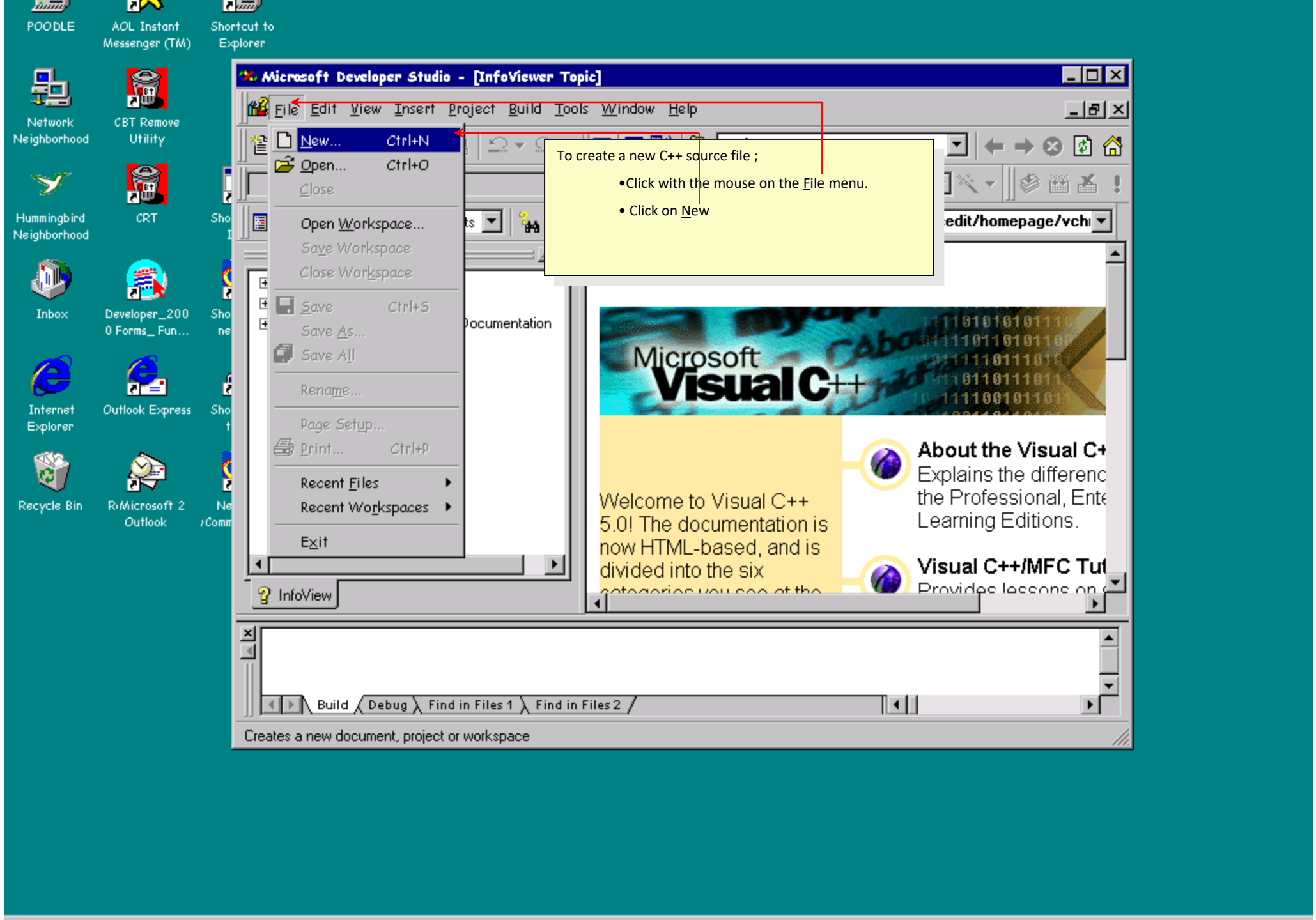
One useful feature of this editor is it color codes the different parts of a C++ statement to help you verify that your statement does not contain a syntax error(error because of violating a rule of the grammar of the C++ language).

InfoViewing window

All Source programs in all projects that reside in the workspace currently open, are shown in this window for your reference as the programmer.

Debugging window

Here is where the results of compilation and linking of your program appear. For example if you have errors in compilation they appear in this window. Click on any error and the environment will point to you the line in your C++ source program that caused the error.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AOL Instant Messenger (TM)
Shortcut to Explorer
Network Neighborhood
CBT Remove Utility
Hummingbird Neighborhood
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Build Debug Find in Files 1 Find in Files 2
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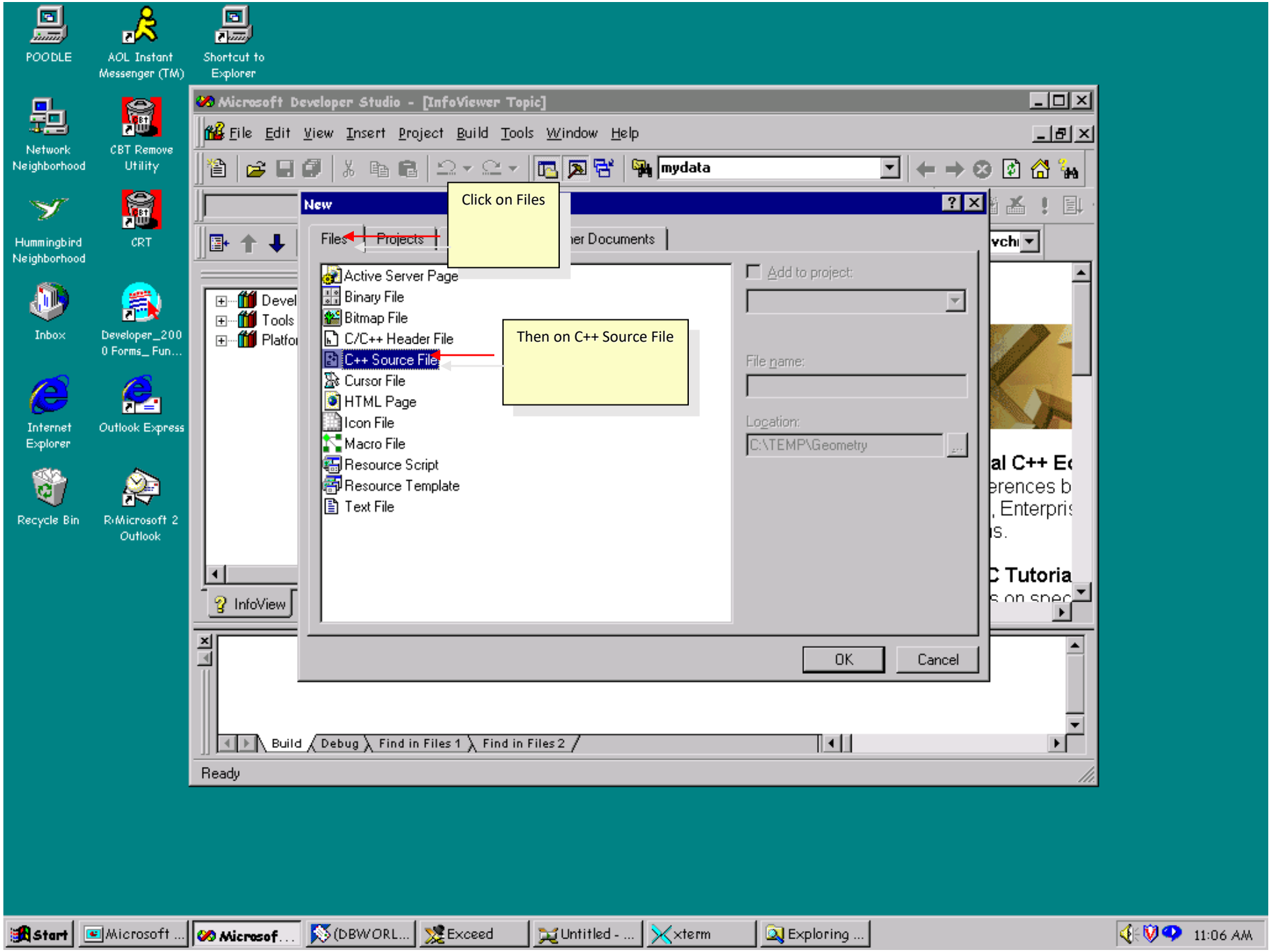
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Outlook Express
Recycle Bin
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Microsoft Developer Studio - [InfoViewer Topic]
File Edit View Insert Project Build Tools Window Help
mydata
Click on Files
New
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Active Server Page
Binary File
Bitmap File
C/C++ Header File
C++ Source File
Cursor File
HTML Page
Icon File
Macro File
Resource Script
Resource Template
Text File
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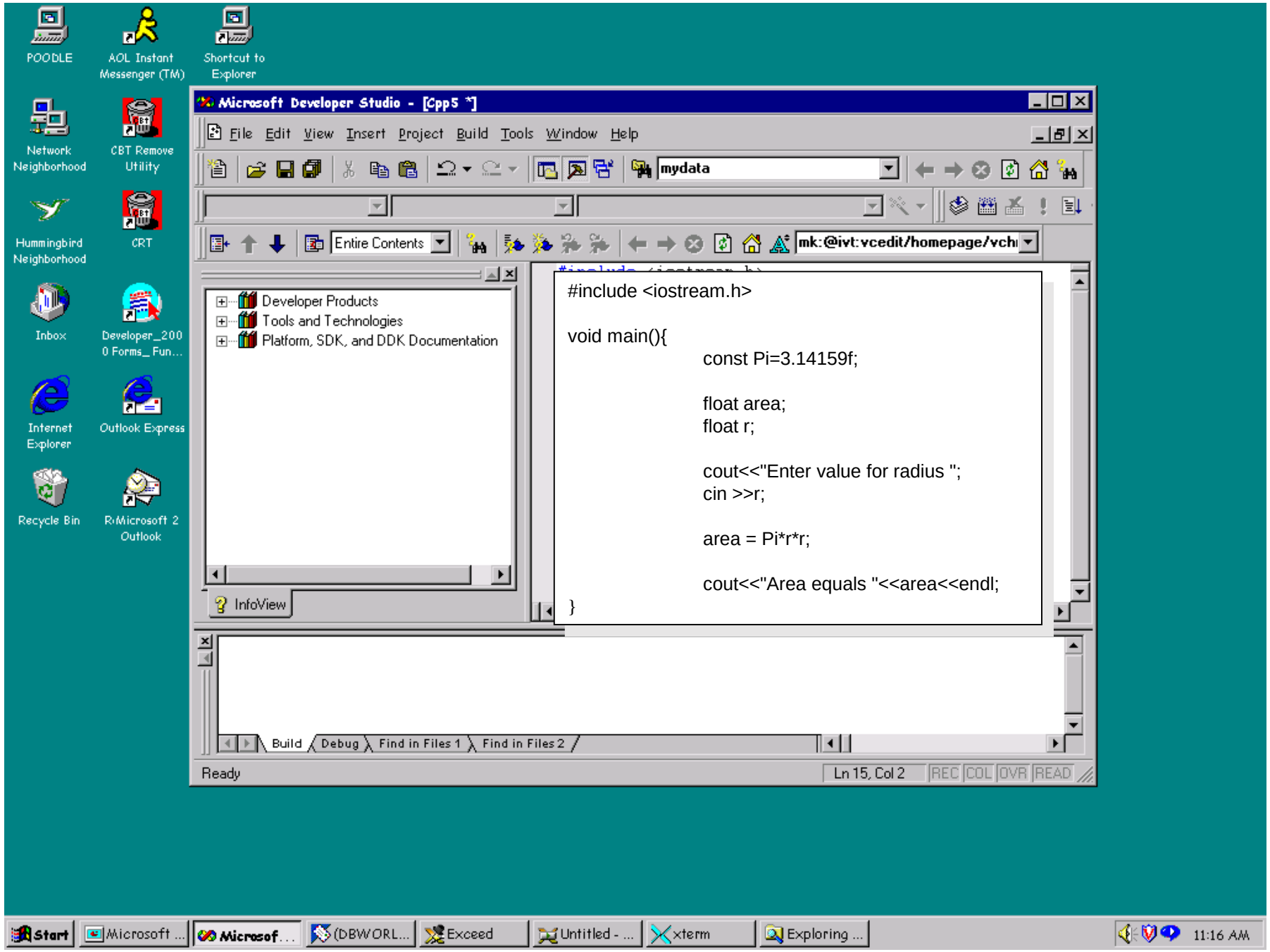
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Internet Explorer
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Microsoft Developer Studio - [Cpp5 *]
File Edit View Insert Project Build Tools Window Help
mydata
Entire Contents
mk:@ivt:vcedit/homepage/vch
Developer Products
Tools and Technologies
Platform, SDK, and DDK Documentation
InfoView
#include <iostream.h>
void main(){
const Pi=3.14159f;
float area;
float r;
cout<<"Enter value for radius ";
cin >>r;
area = Pi*r*r;
cout<<"Area equals "<<area<<endl;
}
Build Debug Find in Files 1 Find in Files 2
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RESOURCES

- A resource represents data which is included in the executable file of an application.
- Graphic object such as icons, cursors, message boxes , dialog boxes, bitmaps, etc
- Resources like icons, cursors, menus and bitmaps can turn ordinary windows applications into graphical presentation.
- Each resource must be pre-defined in a file called a resource file or resource script file, using resource editor.

ICONS, CURSORS AND BITMAPS

- A specific editor can produce an icon, cursor or bitmap.
- Main benefits of using resources is that many components of a program can be bound into programs .EXE file.
- To create an icon, select file → new → File→ select BITMAP
- Or Insert → resource or (CTRL + R)
- The bitmap divided into smaller cells with 32 X 32 grid
- The edit also provides smaller view window to allow the user to observe the graphics in true size

Menus

- Menus are one of the most important parts of the user interface.
- Menus allow the user to point and click that is predefined.
- These menu resources can be expanded eliminated or edited according to the requirement of the application.
- The user selects an option by using a mouse, the keyboard or a hot key.
- Windows responds by sending message to the application about the selected command.
- To create an Menu, select file → new → File→ select menu

- Different styles and attributes for menu can be included in the resource file.
- Like check marks to indicate status, align menu items, column format
- This all can be done with the help of the menu editor
- An Ampersand (&) can be used to produce an underline under the character eg: &Home
- Output will be Home
- Menu item box can be selected by ALT-A

- The resource compiler complies the menu resoure information with an .res extension is then combined with the application link and finally .exe created

DIALOG BOX

- Dialog boxes allow users to check items in a windows list, set buttons for various choices, directly enter strings and integers from the keyboard.
- The graphical design of a dialog box is eventually converted to a resource script file.
- The resource editor reads and saves dialog resource files in the text format .rc and the compiled format .res

Dialog boxes are of three types:

1. Modal
2. System modal
3. Modeless

Modal

- Modal dialog boxes are generally used inside a program, to display messages and to set program parameters.
- When a system modal dialog box is open, nothing else on the screen can be clicked or selected.

System modal

- They are also like modal boxes, except that they supersede the entire desktop area.
- When a system modal dialog box is open, nothing else on the screen can be clicked or selected.

Modeless

Modeless dialog box are able to be deselected, and control can be taken away from modeless dialog box and transfer to some other window.

Modeless dialog box are frequently used as a fast and easy way to create a window, without having to register a window class.

Creating a Dialog Box

- A dialog Box is a special type of window designed to obtain input from the user.
- The dialog box can be create using the resource editor.
- 2 types of dialog boxes (modal and modeless) has been enclosed by MFC in the class **Cdialog**
- This class **Cdialog** provides default handlers for **OK** and **Cancel** button on the dialog box

- MFC provides two mechanisms for usage of dialog boxes

1) Data validation – helps in validating the user data

2) Data Excahnge – can transfer data between the controls in the dialog box and the data members of the dialog class.

Dynamic Link Libraries (DLLs)

(It contains functions, classes and resources)

- It contains pre-defined functions, which are linked to an application program when it is loaded dynamically.
- It provides a powerful and flexible graphics user interface to the OS
- Libraries of functions, save the programmers, the task of re-creating new procedures for a common operation likes character font changing of justifying text.. Etc
- Dlls include KERNEL32.dll,USER32.dll,KEYBOARD, SYSTEM.DRV, MOUSE.DRV

MFC File Handling

- MFC library is a collection of C++ classes, provided as dynamic Link Library
- Libraries such as MFC are called application frameworks, since they give the user a framework for an application
- MS VC++ complier provides an up-to-date 32 bit foundation class library, which contains a new set of object oriented programming tools for the development of 32bit window application

The design principles of MFC

- Allow mixing of traditional function call, along with the new class libraries
- Design the library to be dynamic rather than static.
- Use the power of C++ without over whelming as window the programmer
- Create a class library that migrate easily to scalable platforms, such as window 2000 to XP, XP /windows NT to 2000
- Makes the transition from standard API function calls to the use of MFC library as simple.
- Its power and efficiency in designing of class libraries

Features of MFC Libraries

- An extensive exception handling design, make the code less subject to failure.
- Ability to send information about objects to file and validate member variable.
- Complete support for all windows functions, controls, message, menu, dialog boxes, graphics and GDI (graphic Device Interface)
- Allowing for a dynamic manipulation of a field when classes are instantiated.
- Uses small code for fast implementation

- Eliminate many case statement that are sources of errors. All messages are mapped to member functions within a class. This direct message-to-method mapping is available for all messages

- Uses the same naming convention as the windows API. Hence the action of a class is easily recognized by its name.

Document / View Architecture

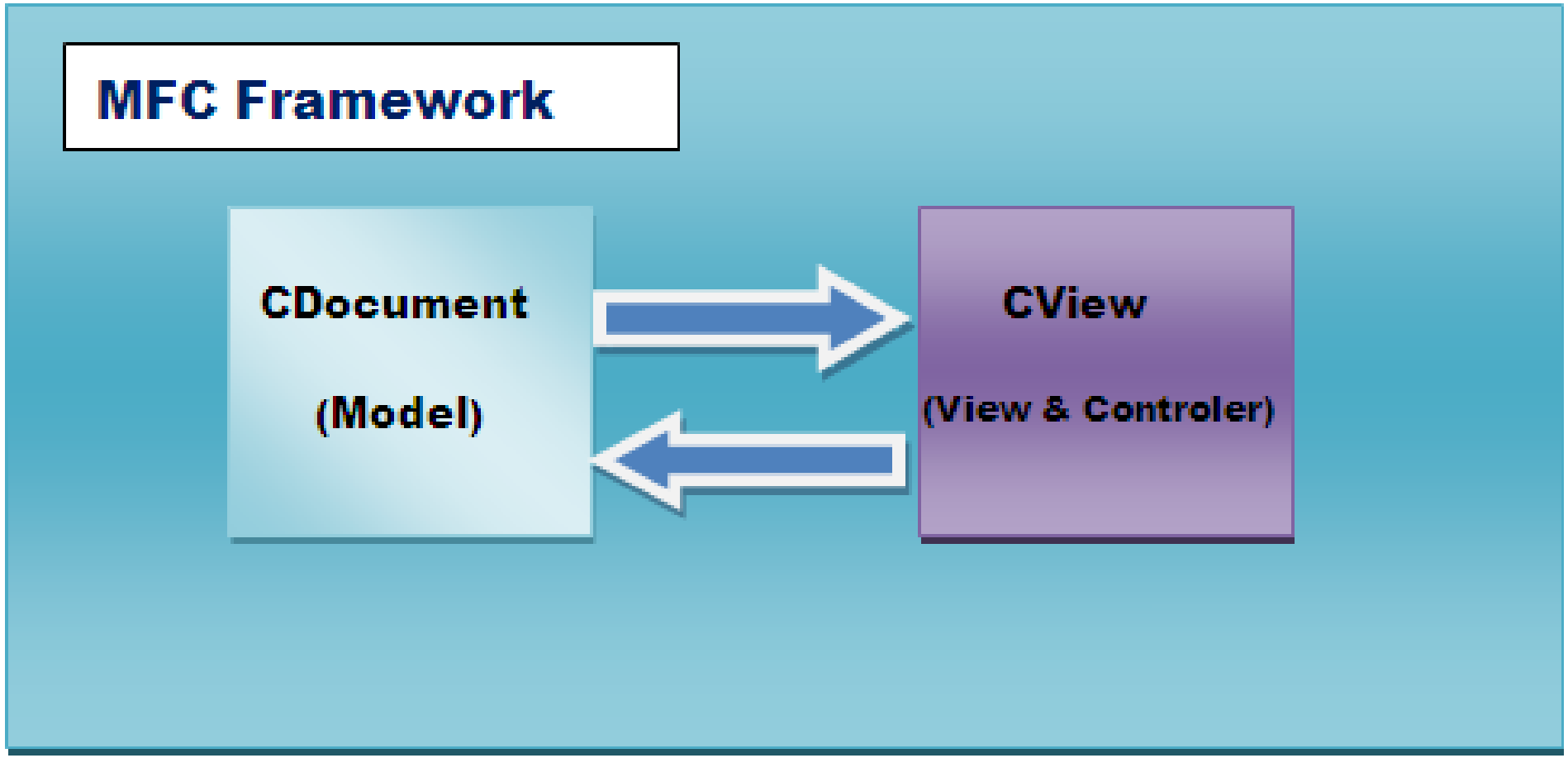
A document is a class that represents the data in the application. Its derived from Cdocument

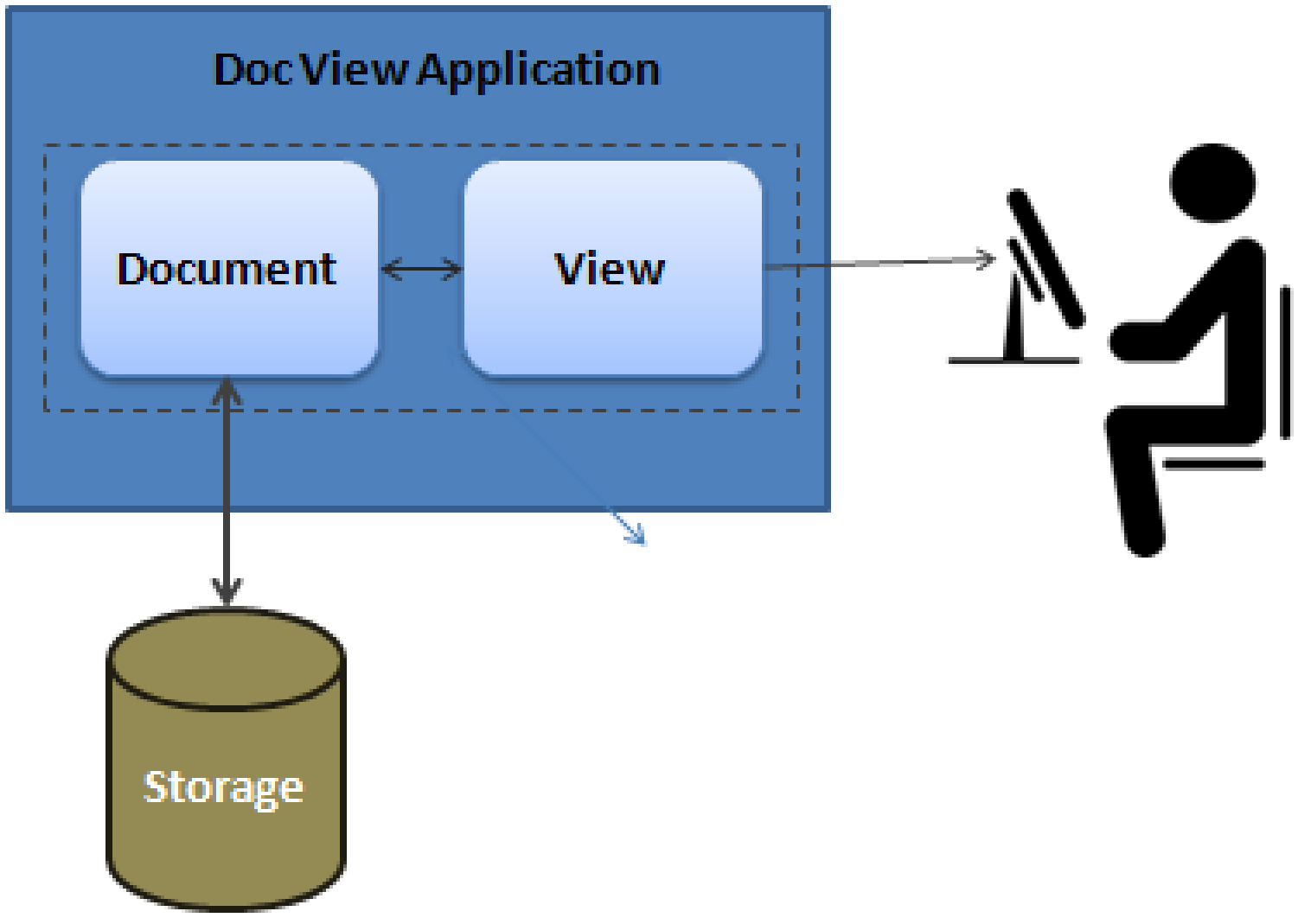
- The MFC document/view architecture includes a combination of a document in which data is stored and view which has access to the data.

- DOC/View application the data is represented by a document object and views of that data are represented by one or more view object.

- Doc/view architecture separates the storage and maintenance of data from displaying the data. This separate facilitates the development of the applications which display multiple views of a single set of data simultaneously.

- If the user changes the data in one view, the architecture notifies the other views that they must update and display the modified data.




Doc View Application
Document
View
Storage

Data flow direction

- The application object passes message to both the frame window and the view . The frame window sends message to view.

- The view object processes the mouse and keyboard input into commands which operate on the data in the document object.

- The document object communicates information about the data to the view, so that the view can display the data.

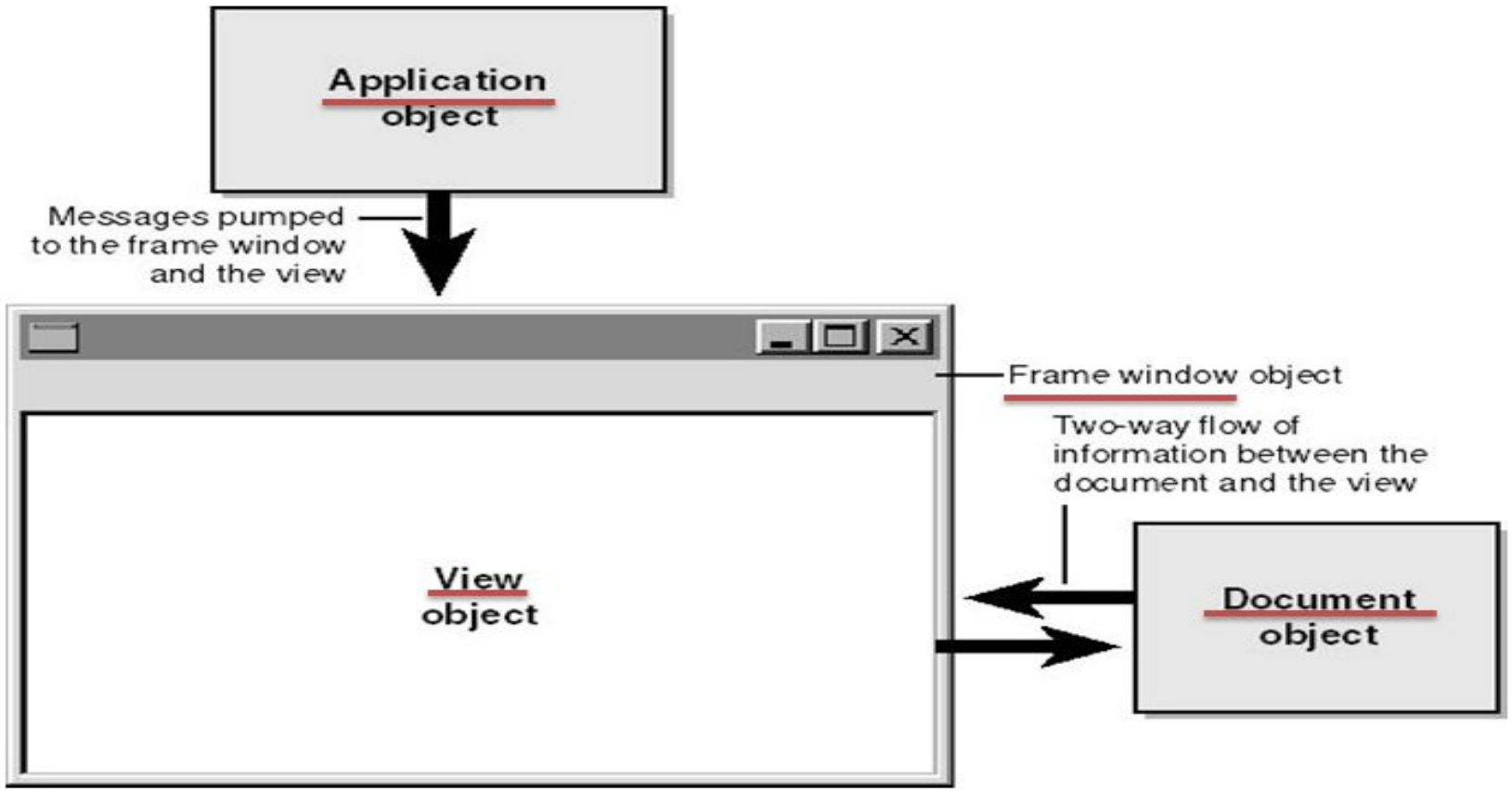
There are 2 MFC doc/view application

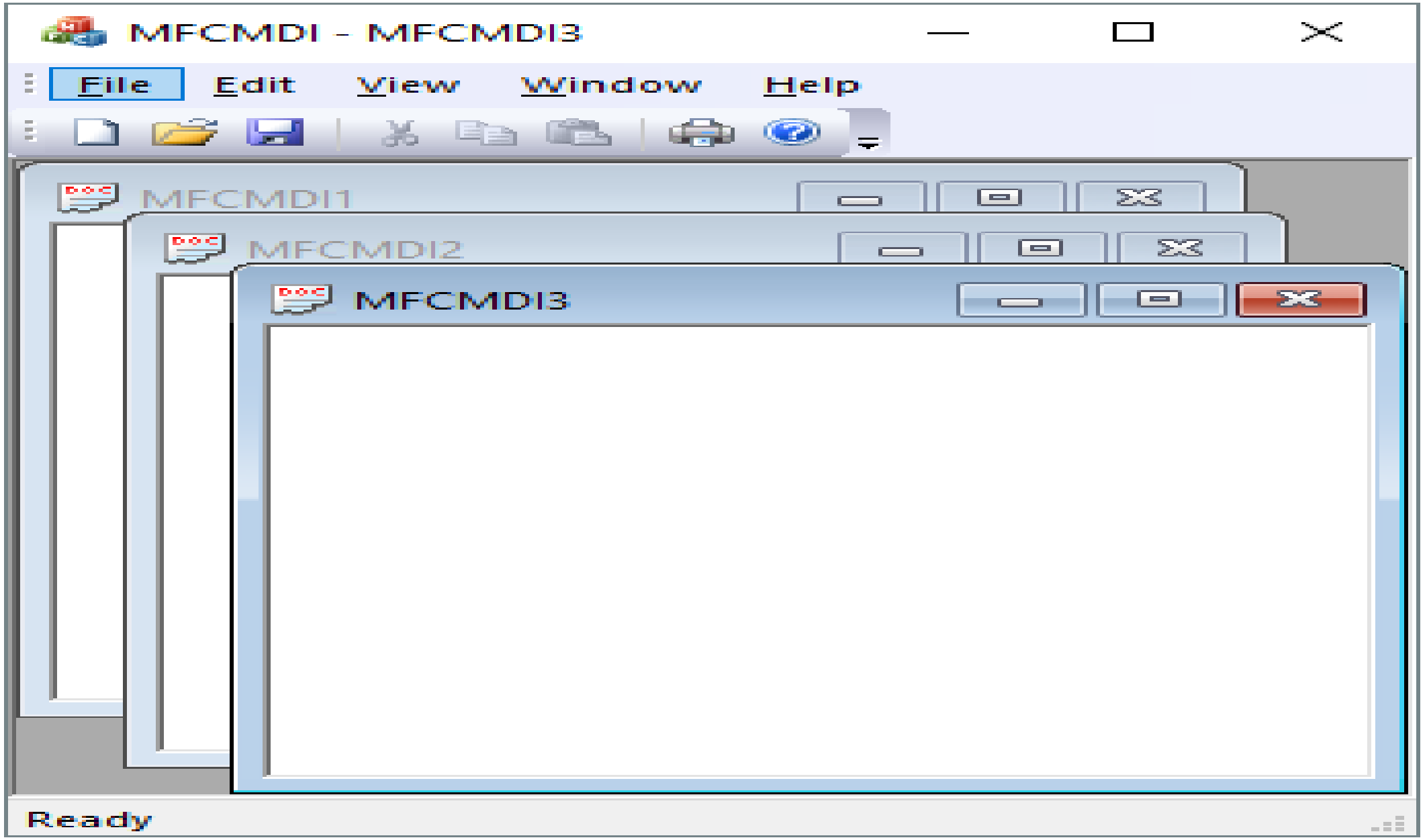
1) **Single document interface (SDI)** application support only one open document at a time

2) Multiple document interface (MDI) application allows users to open two more document simultaneously

Document/View Fundamentals

- Single document/view architecture




MFCMDI - MFCMDI3
File
Edit
View
Window
Help
MFCMDI1
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MFCMDI3
Ready

The Frame

- A frame is a combination of the building blocks, the structure and the borders of an item
- A frame gives physical presence to a window
- A frame defines the location of an object with regards to the windows desktop
- A frame provides borders to a window, borders that user can grab to move, size and resize the object
- The application cant be closed with out a frame.
- Frame holds the tools needed on an application

Document

- A document holds the users data.
- Document can hold the data and retrieved when needed.
- Eg: in the text processor, the user save the file such an action creates a document and same as opening an existing file action as creates a document
- To create the document part of the architecture object must be from the Cdocument class.

View

- A view provides the basic functionality for programming define view class
- A view is attached to a document and acts as an intermediary between the document and the user.
- Eg: word processing, the user works in a series of text and calculations on a spreadsheet application. Like chart..
- So the view renders the image for both printing and print preview
- It derived from the Cview Class

Message Map In VC++

- MFC application must be able to respond to message sent to its window.
- To respond to windows message, an MFC application must have a message map.

1) Declaring a message map:

Any class that has CCmdTarget can respond to windows message. Ie application, Frame-window, view-window, document and control classes

DECLARE_MESSAGE_MAP()

- Place this declaring of message at the end of the classes declaration just before the closing brace.
- **DECLARE_MESSAGE_MAP()** is a macro defined by MFC, this macro takes care of all the details required to declare a message map foe a class.

2) Defining a message map:

```
BEGIN_MESSAGE_MAP(MFC_window, CFrameWnd)
ON_WM_LBUTTONDOWN()
END_MESSAGE_MAP()
```

We throw away the _WM_in the macroname then function name in upper or lower case I,e ON_WM_LBUTTONDOWN() becomes onLbuttonDown()

3) Writing message map functions:

ON_WM_LBUTTONDOWN() is the macro for the WM_LBUTTONDOWN() window message. To complete the message mapping one should write the matching ONLbuttonDown() function

Declare the header file

afx_msg void onLButtonDown(UNIT nFlags,Cpoint point);

#Include<afxwin.h>

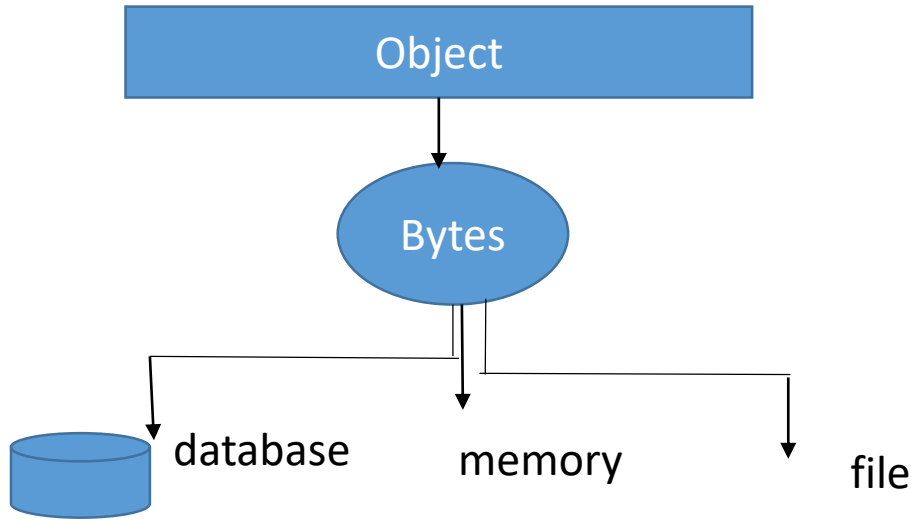
And function definition in the implementation file.

SERIALIZATION

Serialization is the process of converting an object into stream of bytes in order to store it into memory, a database or a file

When application data is stored on the system drive in the form of a file, it is called serialization.

When the application state is restored from the file, its called deserialization.



- The CArchive class allows to save a complex network of objects in a permanent binary form and later reconstituting them in memory. This process of making data persistent is called “**serialization”**

- A Cfile object is created before creating CArchive object. While constructing a CArchive object user should specify whether the archive will be used for loading or storing.

- A serialization class have serialize member function, and it uses the declare_serial and implement_serial macros as described user class cobject.