PROGRAMMING LANGUAGE 2 (SPM3112)

INTRODUCTION TO PROGRAMMING PARADIGM

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Objectives

- At the end of this session, student will be able to describe the differences between:
  1. Procedural Programming
  2. Object-Oriented Programming
  3. Event-Driven Programming
  4. Visual Programming

Procedural Programming

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Introduction

Are you familiar with these keywords:

- Programming ??
- Programming language ??
- Program ??
- Syntax ??
- Code ??

Can you explain any of those keywords?

Procedural Programming

- Introduced in early 1960s.
- Some people referred it as structured or modular programming.
- All High-level languages (i.e. C, Basic, Cobol) support procedural programming.
- Procedural programming works by telling the computer what to do and how to do it.
- Procedural programming involves procedures.
- Procedures are the steps that must be followed to accomplish a specific task.

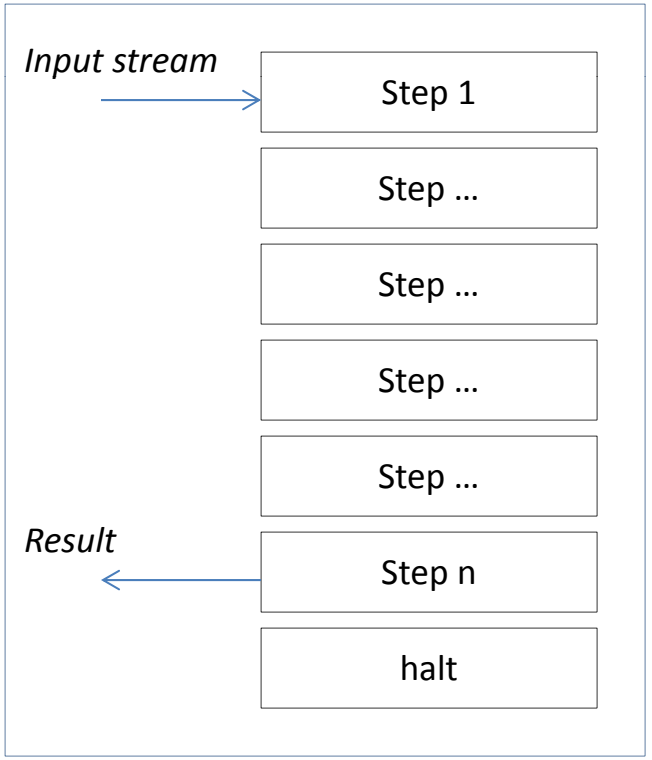
Example of C++ Procedure Program

```
#include <iostream.h>
#include <conio.h>

main()
{
   int distance, rate = 15, time;

   cout << "Enter time: ";
   cin >> time;

   while ( time > 0 ) {
      distance = rate * time;
      cout << "Time = " << time << " hours." << endl;
      cout << "Distance = " << distance << " kilometers.\n" << endl;
      cout << "Enter next time: ";
      cin >> time;
   }

   cout << "Bye!\n\n" << endl;
   getch();
}
```

Procedural Programming

- Basically procedure-oriented programs force the user or programmer to follow a predetermined path

  (as shown in below figure).



Procedural Programming

- Advantages of procedural programming:
  - Instructions can be written short without the need to rewrite the whole definition for every task.
- Eg. create two rectangles with blue & red colors, 4 & 6 heights and 2 & 4 base.

```
Draw Rectangle 1
  Height  4 cm
  Base    2 cm
  Color   Blue
End

Draw Rectangle 2
  Height  6 cm
  Base    4 cm
  Color   red
End
```



```
Draw Rectangle
  Height  X cm
  Base    y cm
  Color   z
End

Rectangle (4, 2, blue)
Rectangle (6, 4, red)
```

Procedural Programming

- Advantages of procedural programming:
  - Can avoid or reduce symptom of spaghetti code (the use of many GOTO or JUMP statements)

- Disadvantages of procedural programming:
  - The attempt to create larger and more complex programs led to software crisis/problem
  - Programs were not ready on time, exceed budgets and contained too many errors

Object-Oriented Programming

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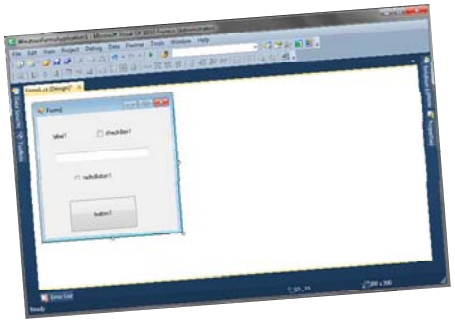
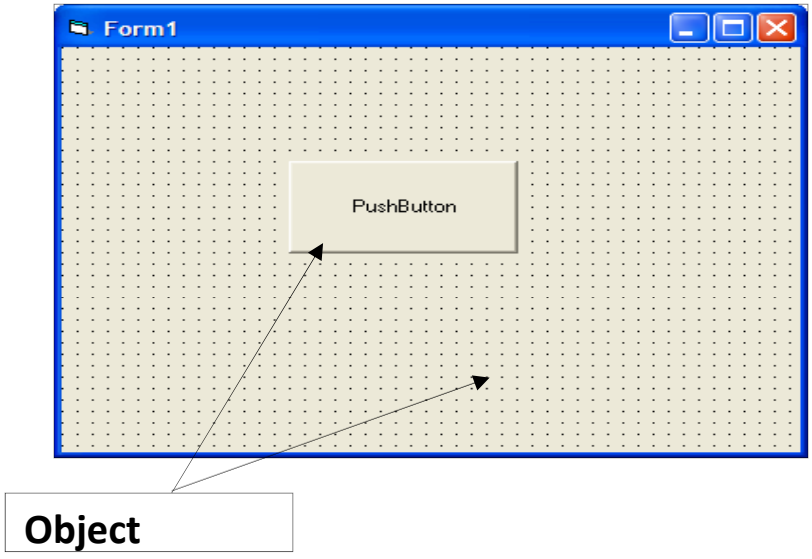
Object-Oriented Programming

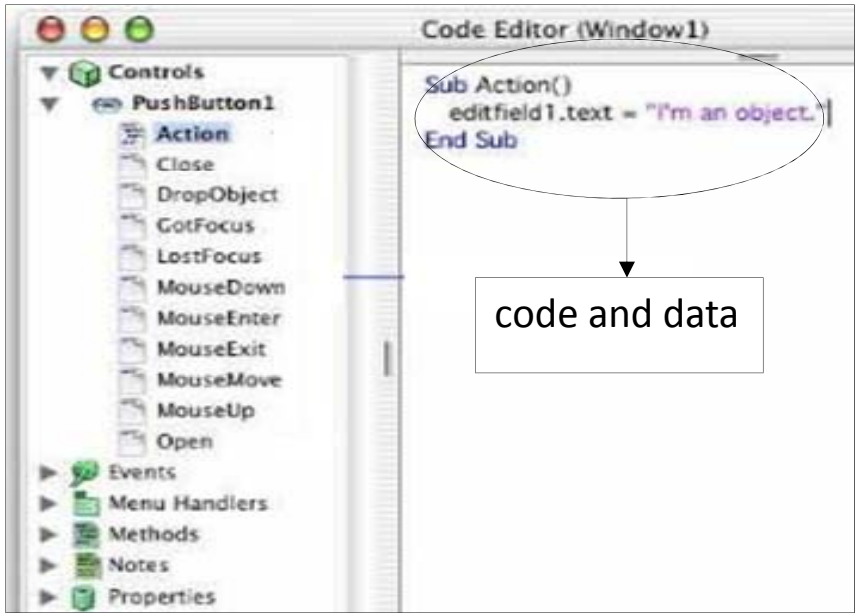
- Introduced in the late of 1960s.
- Object-oriented programming (OOP) is considered as a more recent approach to programming.
- In object-based languages, program contains objects and classes.
- An object is a unit of computer information that contains data as well as procedures.
- Class is a category of objects or template for creating objects.



Object-Oriented Programming

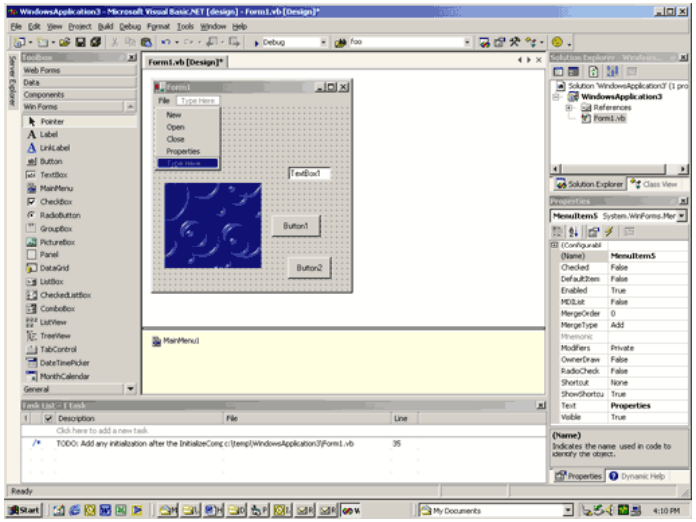
- What is basically an object in VB?
- Objects are entities you can create and use in the process of developing a Windows application such as form and controls.

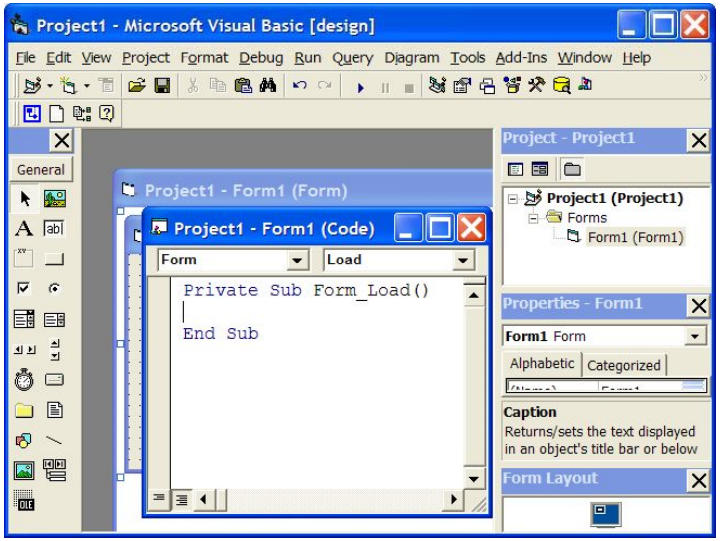




Object-Oriented Programming

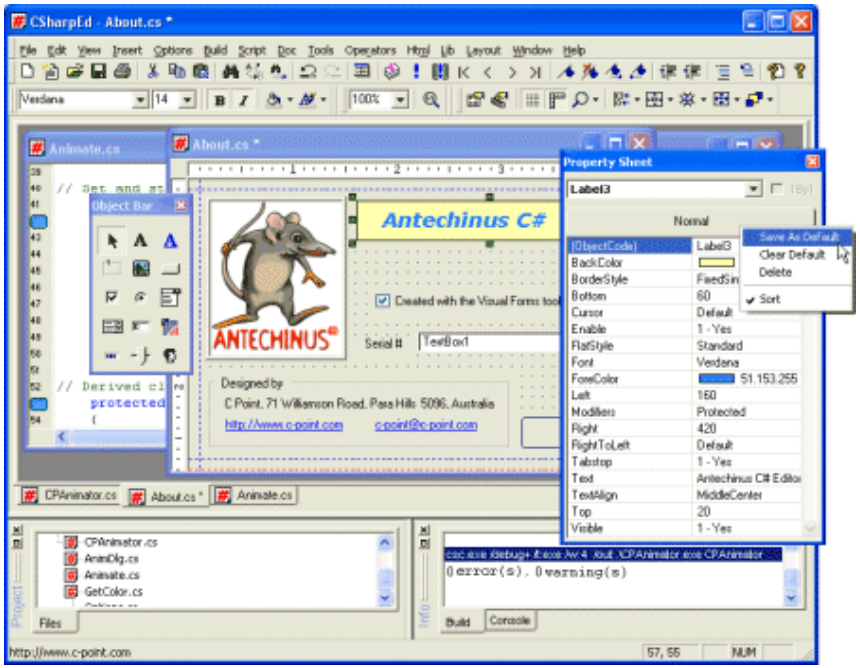
- Objects must be created from classes.
- The properties and methods of an object are contained in its classes.
- Properties are the characteristics of the objects while methods are used to cause the objects to do something.





Object-Oriented Programming

- Today, many popular programming languages such as :
  - Java, JavaScript, C#, C++, Python, PHP etc -support object-oriented programming (OOP).



Object-Oriented Programming

- Object-oriented programming involves three important concepts:
  - Encapsulation : means an object contains data and instructions (methods).
  - Inheritance: means once you have created an object, you can use it as the foundation for similar objects that have the same behavior and characteristics.
  - Polymorphism : means “many shapes” or a different results can be produced depending on the object that it is sent to.

Event Driven Programming

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Event-driven Programming

- In procedure-oriented programming → the flow of control moves predictably through a sequence of actions.

- Contrast with Windows-based applications → which procedures are called automatically when the end user chooses menu items, clicks the mouse, moves objects on the screen, etc.

- ∴ Windows-based applications or programs are being regard as event-driven.

Event-driven Programming

Event Type	Event Source	Handler Required
Button selection	Button	Action Performed
Text entry	TextField	Action Performed
Menu selection	Choice	itemStateChanged
Mouse		mouseReleased
		mouseClicked
		mouseExited
		mouseEntered
		mousePressed
Mouse motion		mouseDragged
		mouseMoved

Event-driven Programming

- event-driven programs do not have a set sequence of instructions to execute
- they also do not have a predetermined finish.
- most common example of event-driven applications are found in :
  - Microsoft Windows
  - Apples Mac OS
  - X11 under Unix
- Other applications → include embedded systems, control systems, sensor systems like home security, etc.

Event-driven Programming

- With the advent of the World Wide Web (WWW) event-driven programming has gained in popularity as a way to add interaction to web pages.

- Such interaction is programmed in a number of languages including JavaScript and Java.

Event-driven Programming

- Event Handler
  - Refer → application responds to the events which, executing particular code →meant for each type of event.
  - not all events need → handled by an application.
    - Eg: drawing application → may be interested in handling only mouse movements.
  - as designer →of an event-driven application, - write classes or methods to handle the relevant events.

Event-driven Programming

- Input → come from event sources.

- **Source** of an event→ modeled as an object.
  - Eg: button click's object is a button, sensors, input devices, objects on a web page.

Event-driven Programming

- **Type** of the event :
  - ActionEvent, WindowEvent, MouseEvent etc.
  - Eg: ActionEvent object → passed to application, which contains info about the action.
- Events occur asynchronously & are placed in an → **event queue** as they arise.
- Events are removed from the event queue & processed (**handled**) by the program's main processing loop.
- ∴ As a result - handling an event → the program may produce output or modify the value of a ***state variable***.
- There is no predefined starting or stopping point.

Visual Programming

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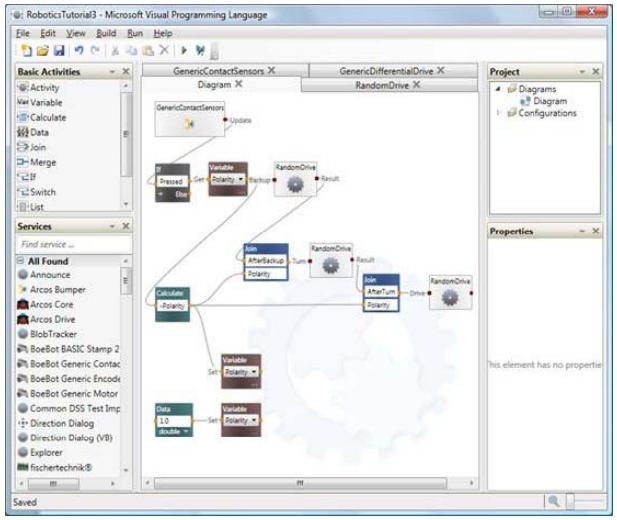
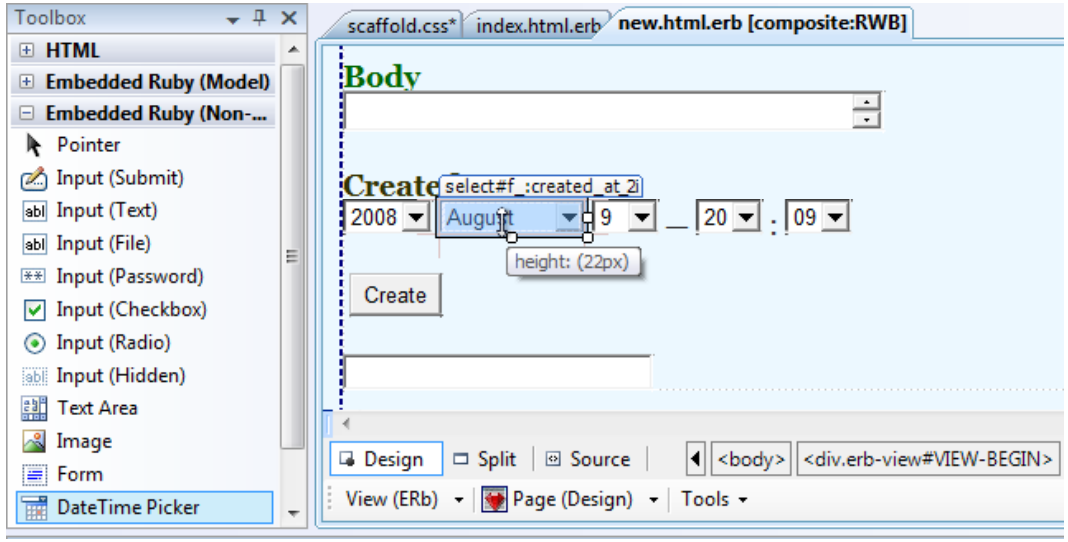
Visual Programming Language

- To simply stated, Visual Programming is a language in which a program is constructed using graphical and textual elements to create multi-dimensional expressions.
- Expressions in the above statement is referring to graphics, drawings, animation and icons.



Visual Programming Language

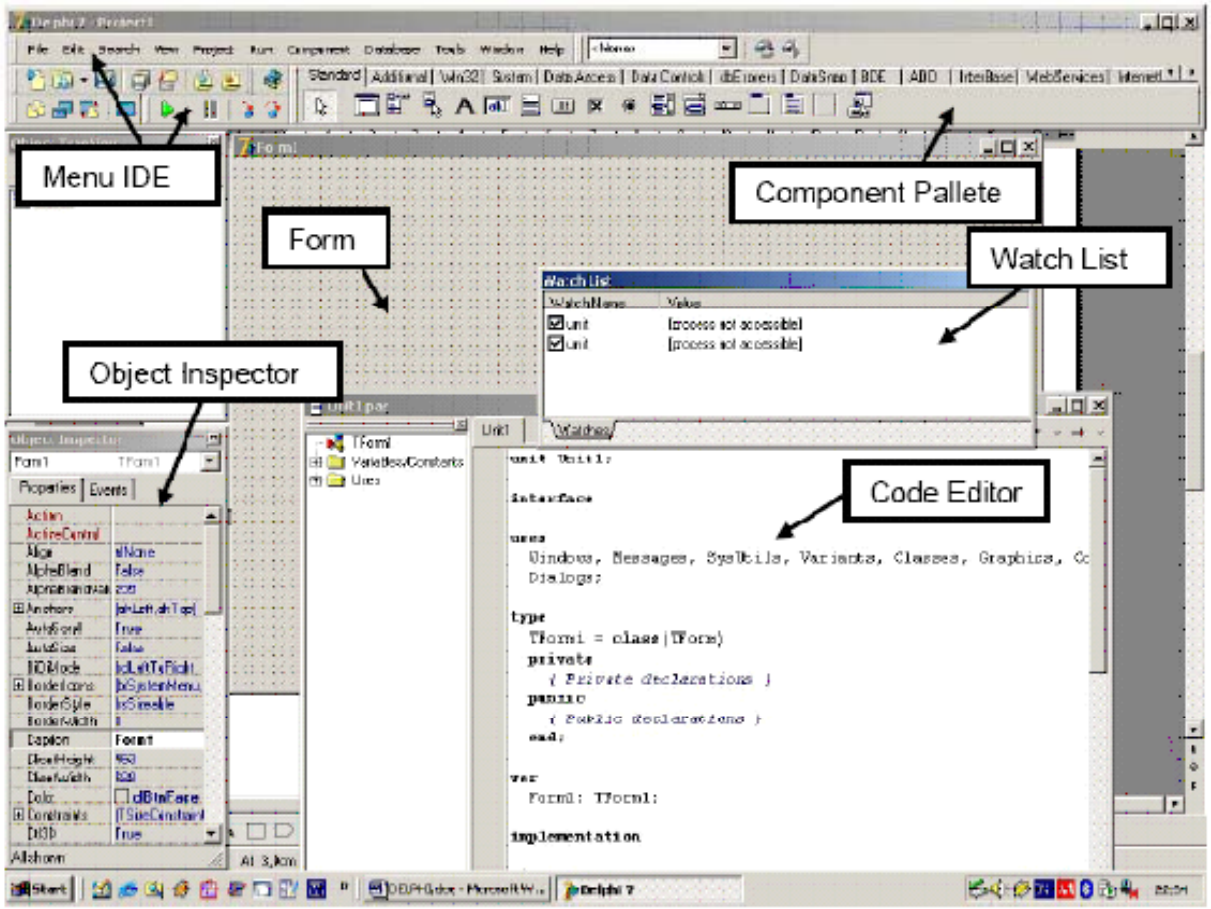
- The term *Visual language* → has been adopted by a number of people in recent years to mean a conventional textual language which has an attached of WYSIWYG GUI design tool along with other graphical RAD tools.
- Examples of this type of language would be Borland Delphi and Microsoft Visual Basic.



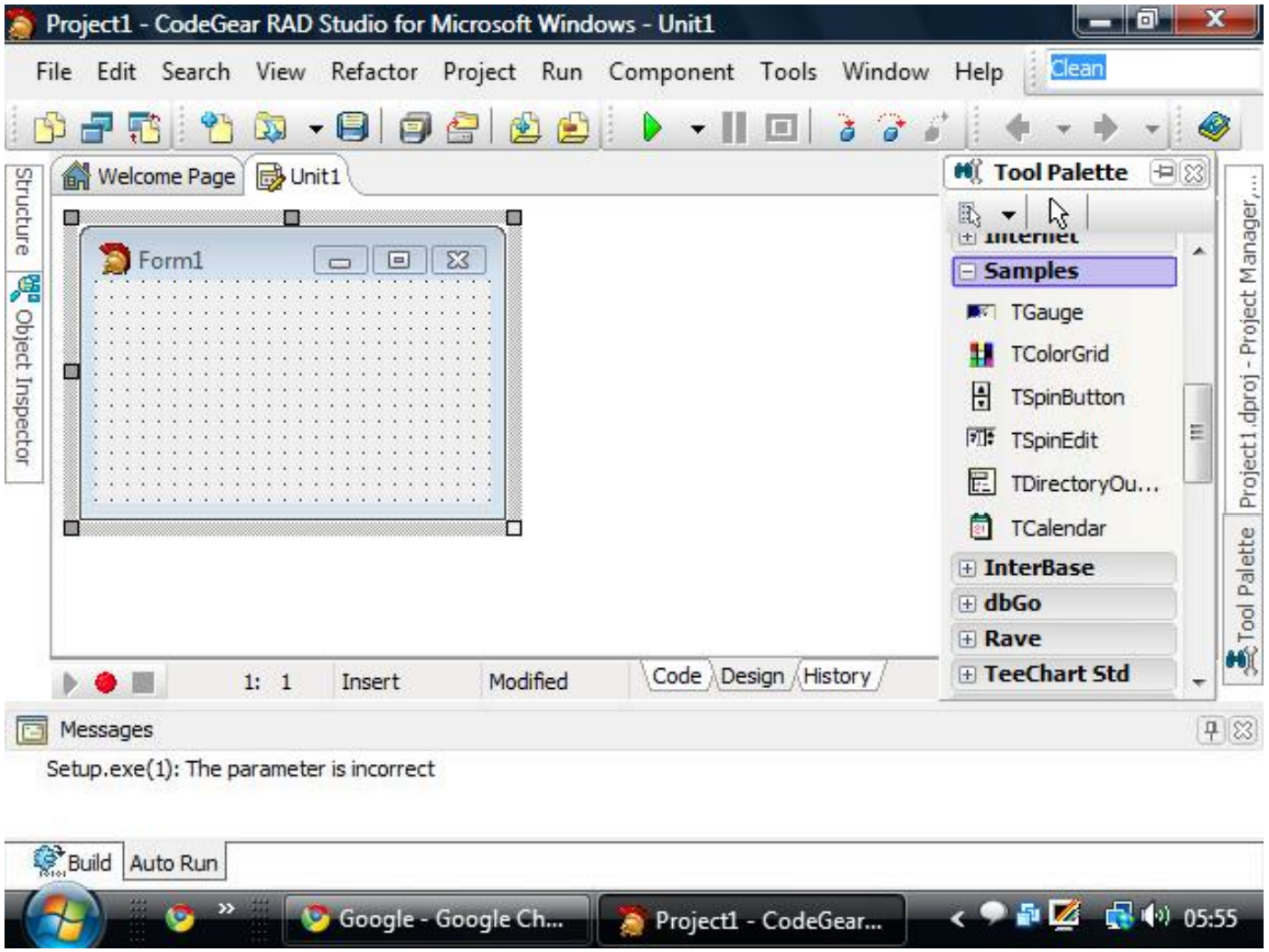
Visual Programming Language

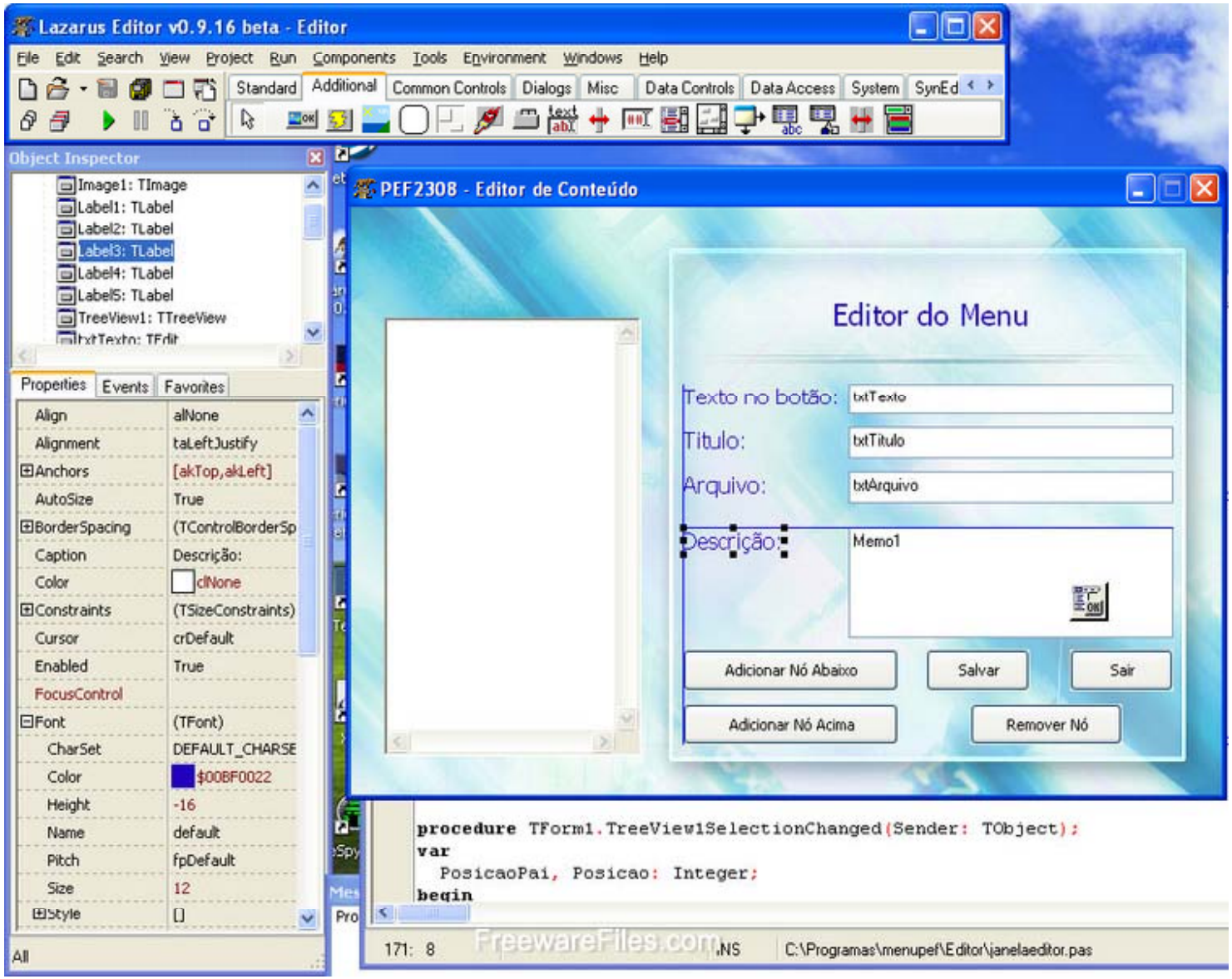
- Nowadays, visual programming has been used to describe:
  - Language for manipulating visual information
  - Language for supporting visual interaction or;
  - Allows programming with visual expressions.

Visual Programming Language



Visual Programming Language




Lazarus Editor v0.9.16 beta - Editor
File Edit Search View Project Run Components Tools Environment Windows Help
Standard Additional Common Controls Dialogs Misc Data Controls Data Access System SynEd
Object Inspector
Image1: TImage
Label1: TLabel
Label2: TLabel
Label3: TLabel
Label4: TLabel
Label5: TLabel
TreeView1: TTreeView
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PEF2308 - Editor de Conteúdo
Editor do Menu
Texto no botão: txtTexto
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Arquivo: txtArquivo
Descrição: Memo1
Adicionar Nó Abaixo
Salvar
Sair
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procedure TForm1.TreeView1SelectionChanged(Sender: TObject);
var
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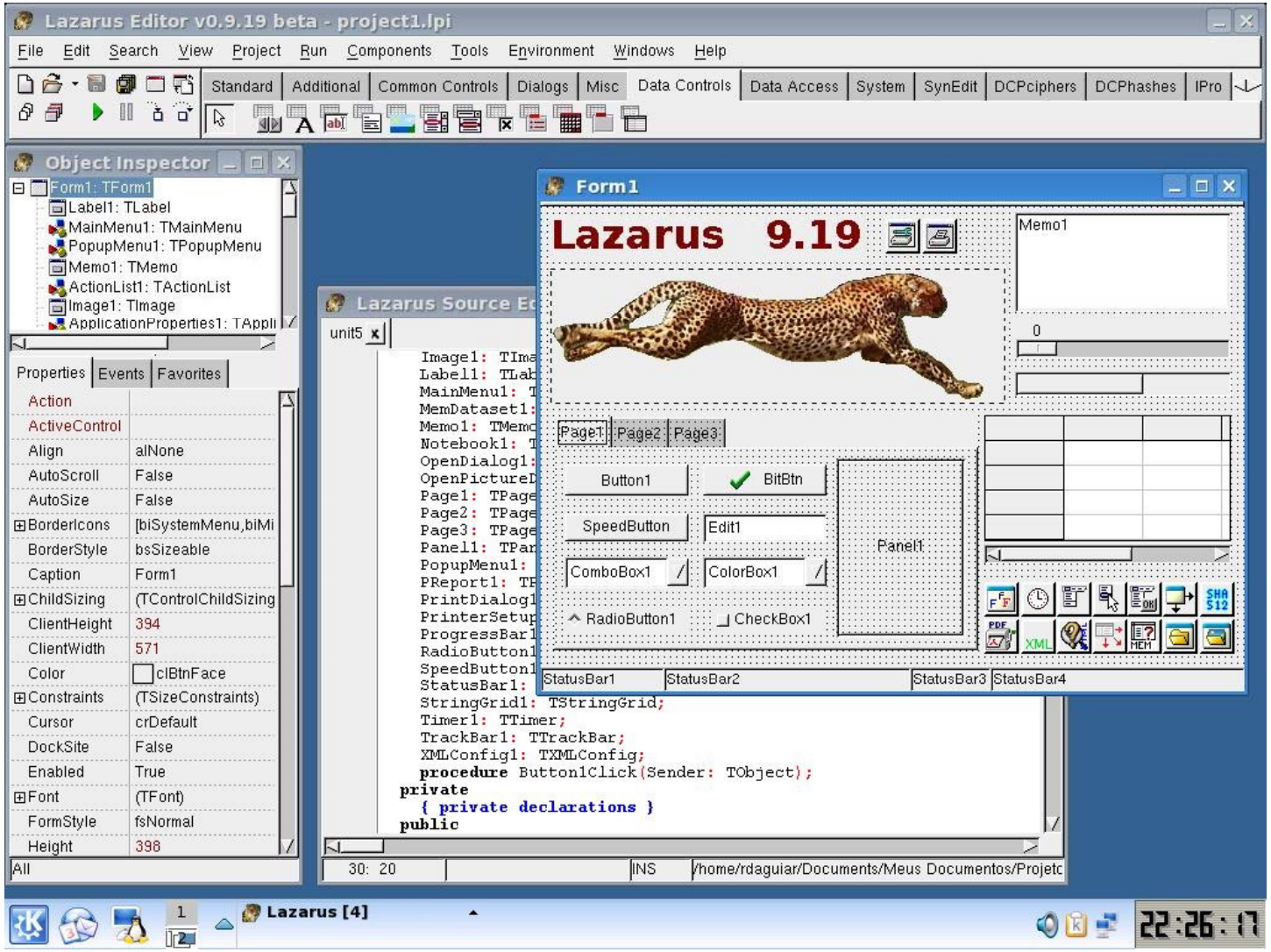
Visual Programming Language



So, what is Visual Basic actually?

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Introduction To Visual Basic

- Visual Basic (or simply known as VB) →
  - is a Microsoft Windows programming language,
  - developed by Microsoft in 1990 based upon the BASIC language.
- a textual language (BASIC) → use a graphical user interfaces (GUI) builder to make programming easier on the programmer.
- Visual Basic applications → created in a programming environment (IDE)
  - allows programmers to create Visual Basic applications in very little time.
- With the use of IDE,
  - programmers can create, run and debug VB applications conveniently.

Introduction To Visual Basic

- Visual Basic supports both the traditional procedure-oriented programming
- Visual Basic applications are also event-driven.
- In VB →programmer has to
  - design windows graphically
  - program elements
  - represented by icons, from the Visual BASIC Toolbox
  - writes BASIC code for each element

Introduction To Visual Basic

- Visual Basic is one of the members of group of software called Visual Studio.

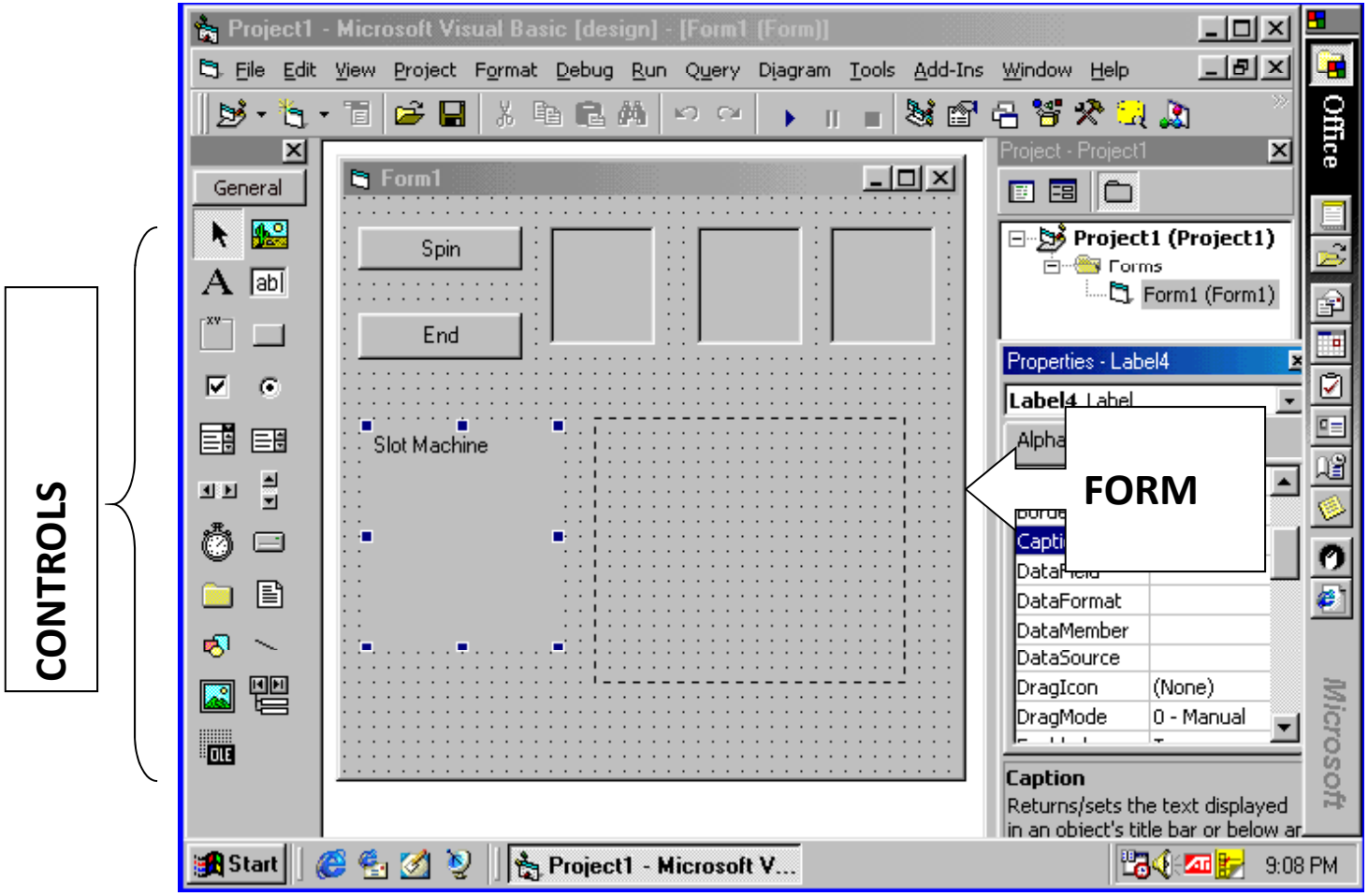
- Visual C++, Visual J++, Visual FoxPro and Visual InterDev are the other members of Visual Studio.

- Currently, there are four versions of Visual Basic:
  - Working Model
  - Learning Edition
  - Professional Edition; and
  - Enterprise Edition

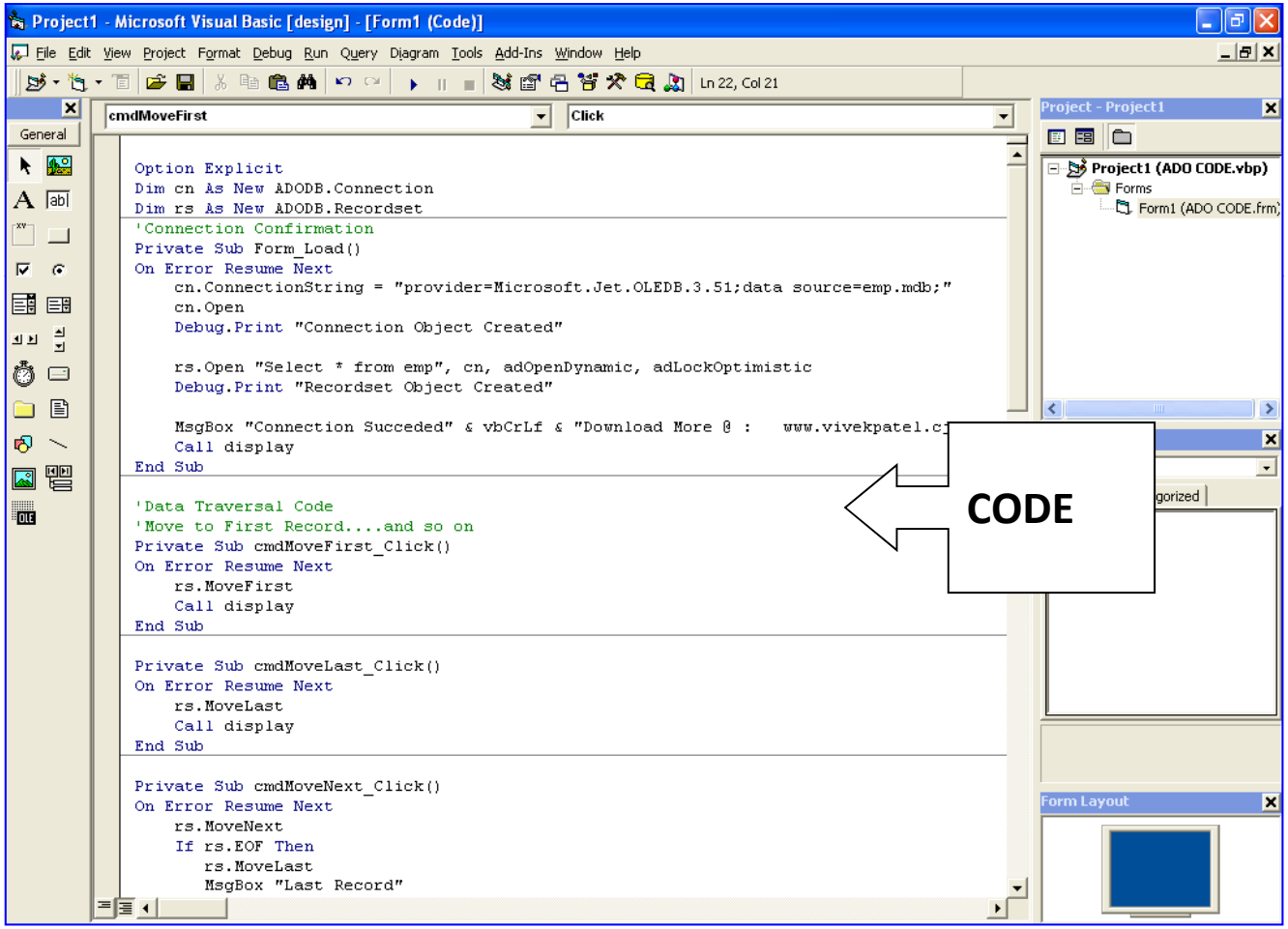
Visual Basic Elements

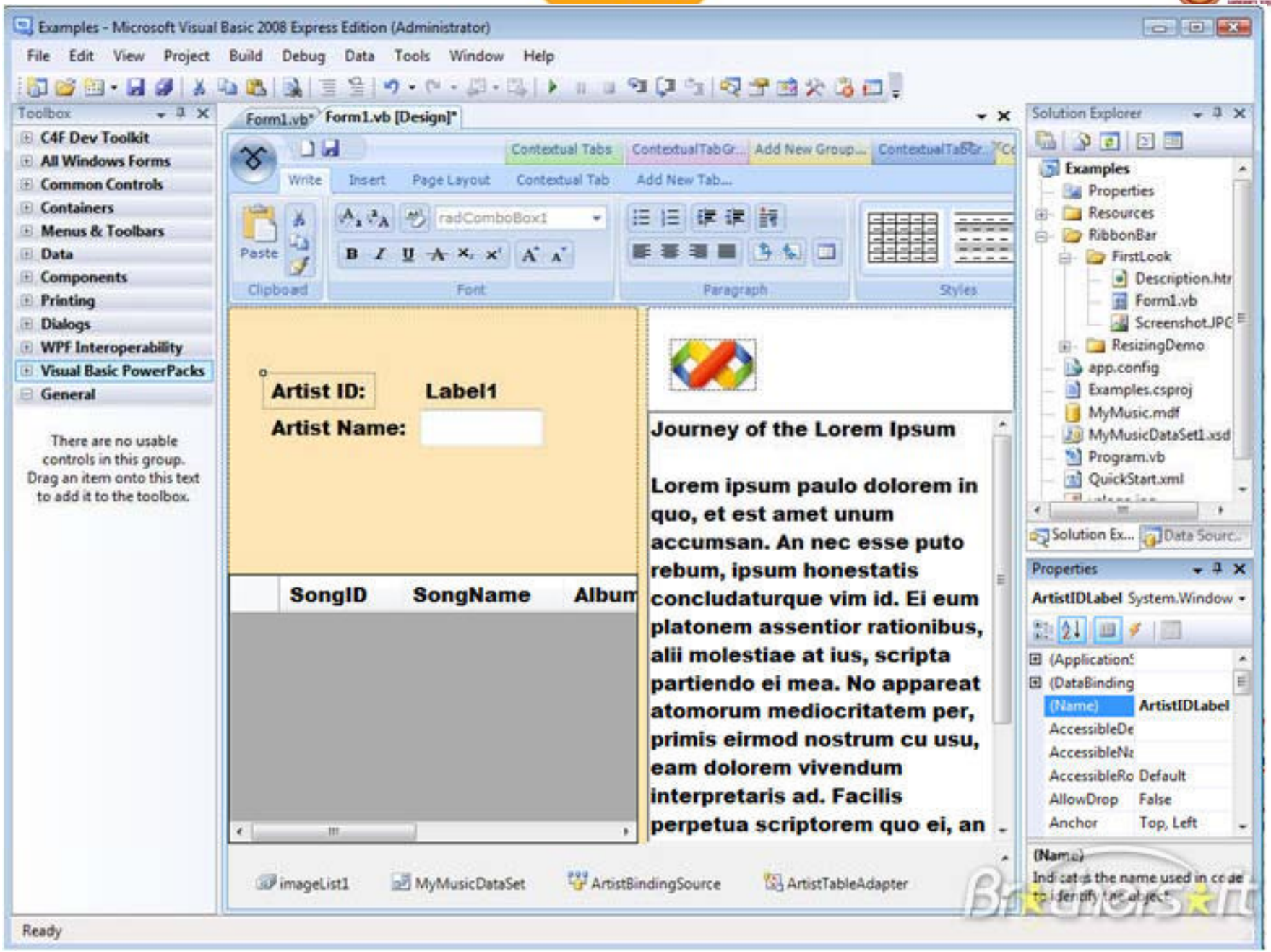
- **Forms**
  - Used to display information to the user, and to hold controls that allow the user to interact with the program.
- **Controls**
  - The user interface elements that users interact with, to input new data into a program, and to allow programs to display data to users.
- **Code**
  - Programmers need to add code to forms and controls to make the program works (tell VB what actions to perform when users interact with the programs).

Example Of Visual Basic



Example Of Visual Basic




Examples - Microsoft Visual Basic 2008 Express Edition (Administrator)
File Edit View Project Build Debug Data Tools Window Help
Toolbox
C4F Dev Toolkit
All Windows Forms
Common Controls
Containers
Menus & Toolbars
Data
Components
Printing
Dialogs
WPF Interoperability
Visual Basic PowerPacks
General
There are no usable controls in this group. Drag an item onto this text to add it to the toolbox.
Form1.vb* Form1.vb [Design]*
Contextual Tabs
Write Insert Page Layout Contextual Tab Add New Tab...
Paste
Clipboard
Font
Paragraph
Styles
Artist ID:
Label1
Artist Name:
SongID
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imageList1
MyMusicDataSet
ArtistBindingSource
ArtistTableAdapter
Solution Explorer
Examples
Properties
Resources
RibbonBar
FirstLook
Description.htr
Form1.vb
ScreenshotJPG
ResizingDemo
app.config
Examples.csproj
MyMusic.mdf
MyMusicDataSet1.xsd
Program.vb
QuickStart.xml
Properties
ArtistIDLabel System.Window
(DataBinding)
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AllowDrop False
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Ready

Visual Basic Features

- Graphical User Interface - Interface creation is totally visual
- Event handling.
- Structured programming - The actions to make the program run need to be coded, which is not visual.
- Object-oriented features.
- Error handling.
- Access to the Win32 API.