

The 4GL-Component Framework **Delphi**

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What is Delphi?

- Delphi is a 4GL-object-oriented, visual programming environment for RAD Client/Server applications for Windows 95/NT.
- Delphi provides a library of reusable software components and several integrated development tools like experts.
- Delphi is (deceptively) easy to use. Within minutes, an advanced programmer can create real Windows applications.
- To write Delphi programs, it is not necessary to be a Windows programming expert, but at least one must be familiar with some fundamental Windows concepts.

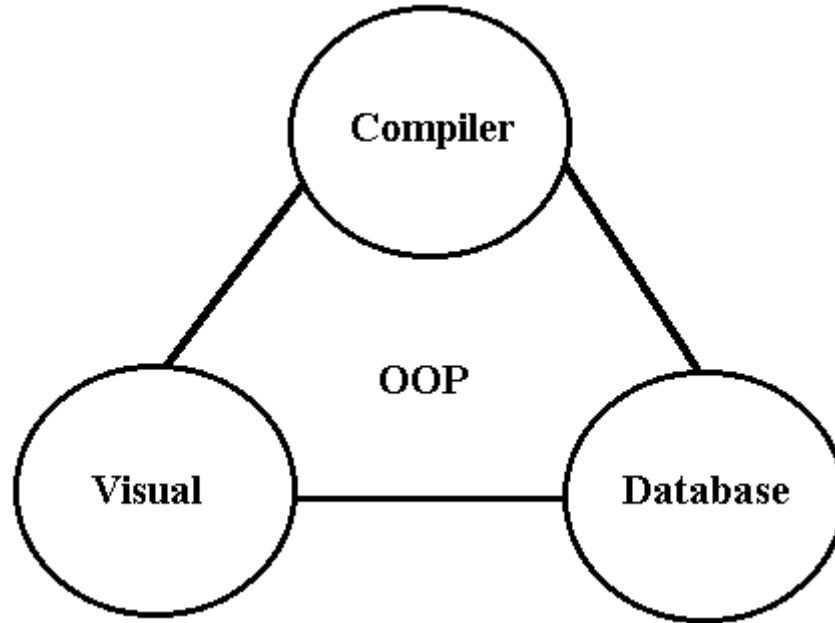
4GL-Environment

- A 4GL-environment integrates programming facilities, graphical user interfaces (GUI), and a database system in a single tool.
- The programming language used in these systems is usually object-oriented.
- The main purpose of these systems is to support application development for commercial problem domains as good as possible.
- A 4GL-environment is an end user tool that focuses on highest productivity.

Delphi - Goals and Objects

- Rapid Application Development environment for the Internet and Enterprise,
- Build large scale database solutions,
- Build high speed, native-code compiled, client and server applications for the Enterprise and the Internet,
- Reuse objects through-out the enterprise in a multi-tier environment.
- Simplifying distributed enterprise development through a one-step simultaneous support of COM and CORBA (Visibroker).

The environment



Delphi combines a RAD environment, high speed native code compiler, scalable database and reusable componentry to provide developer with the highest productivity.

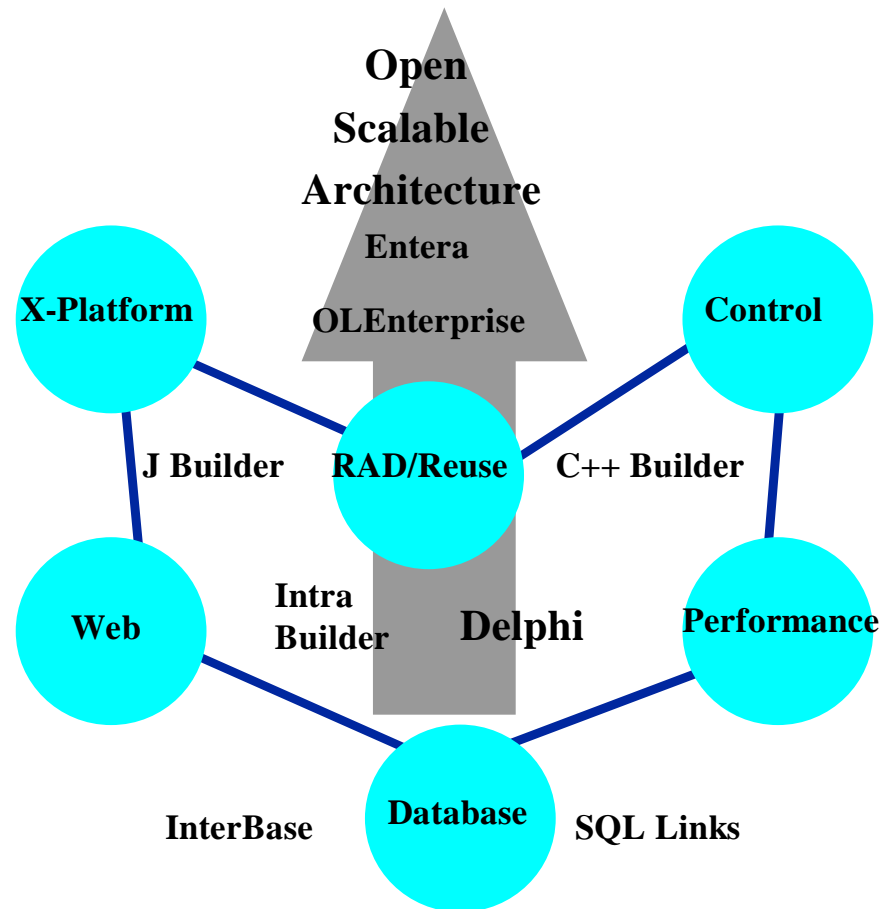
The product family

JBuilder:
Scalable cross-platform
web-applications

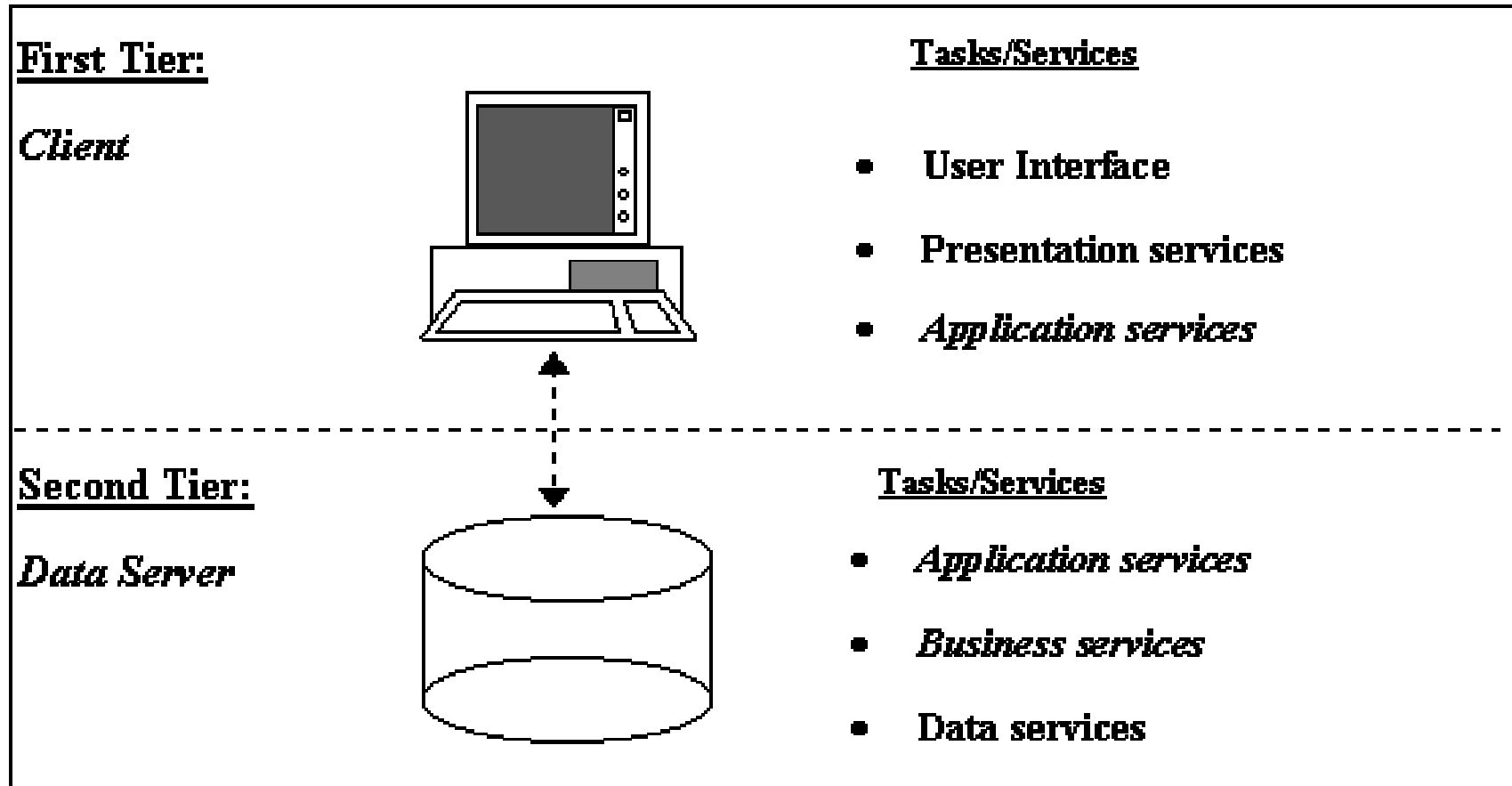
C++ Builder:
Critical business
applications

Intra Builder:
Corporate Data-driven
web-applications

Delphi:
Scalable Windows
applications

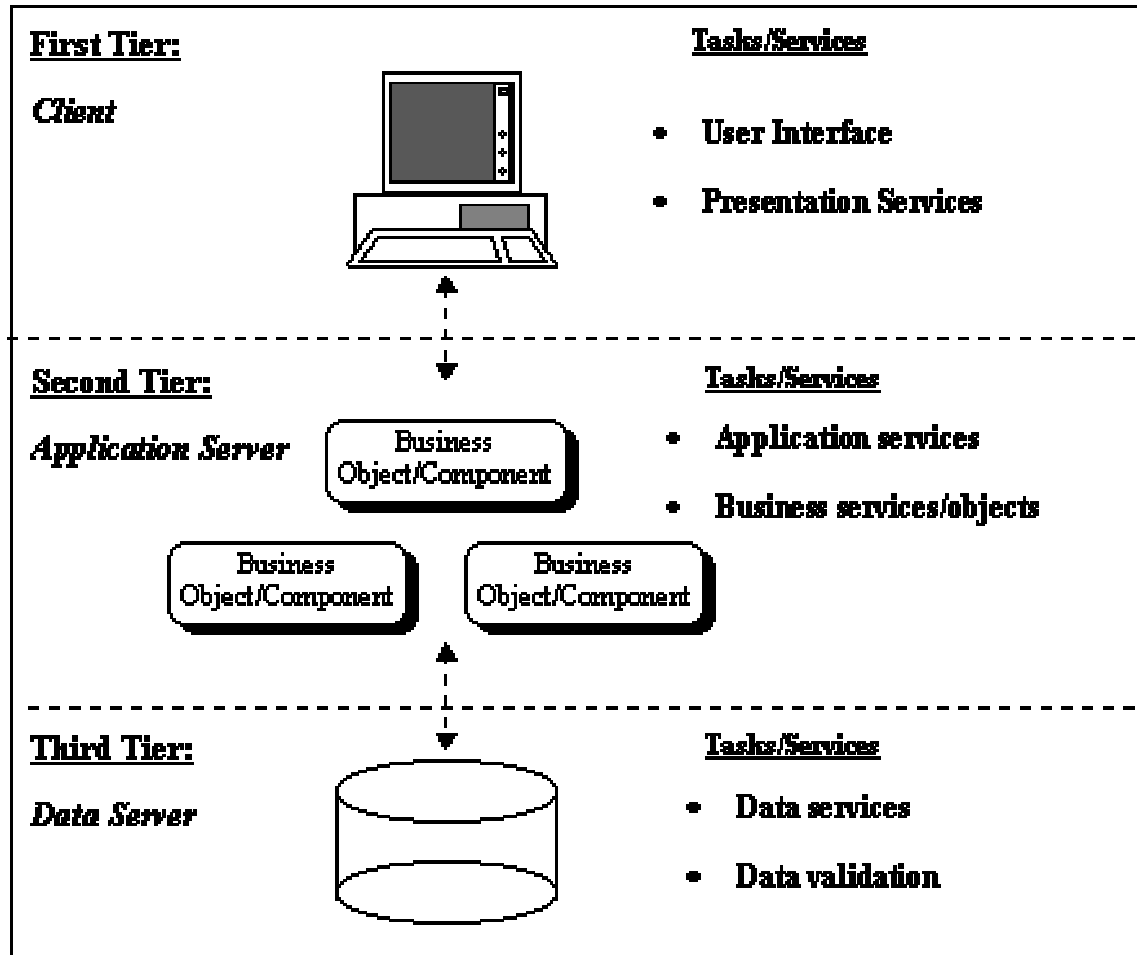


Two-tier Architecture



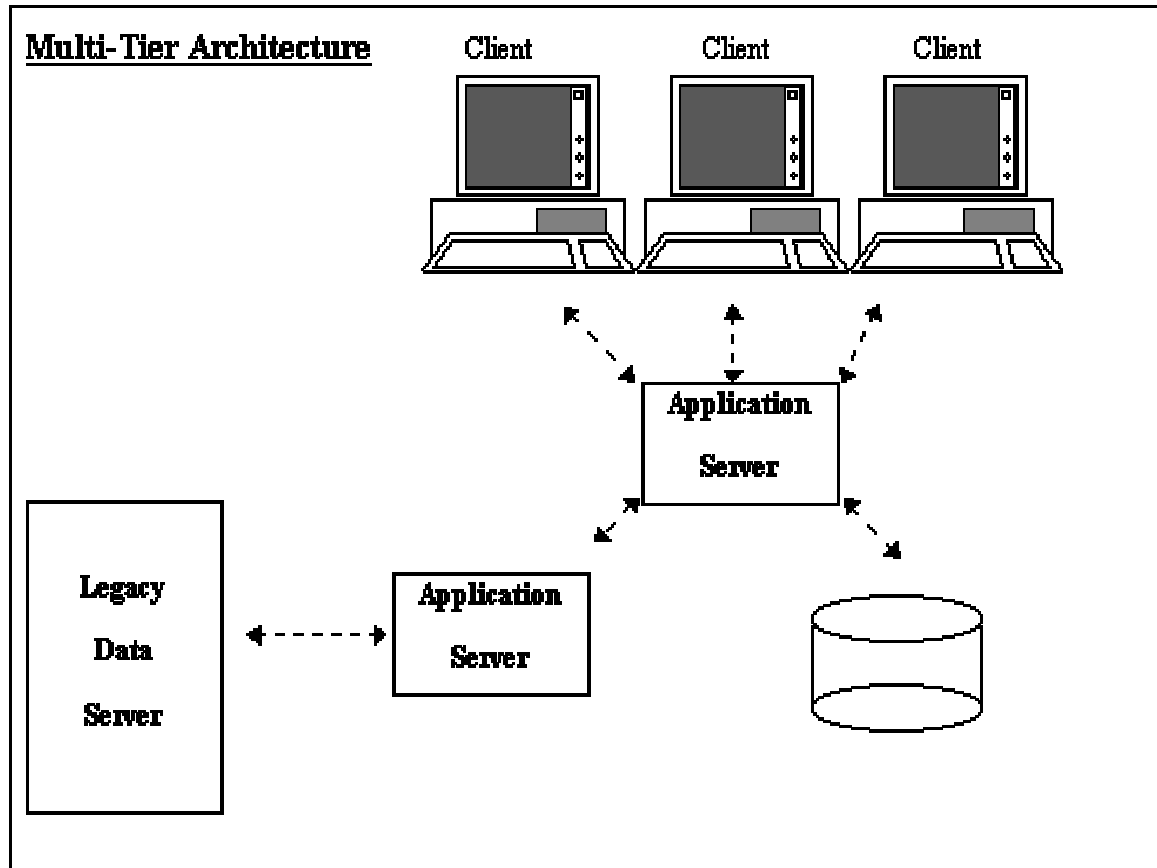
Provides basic separations of concerns.

Tree-tier Architecture



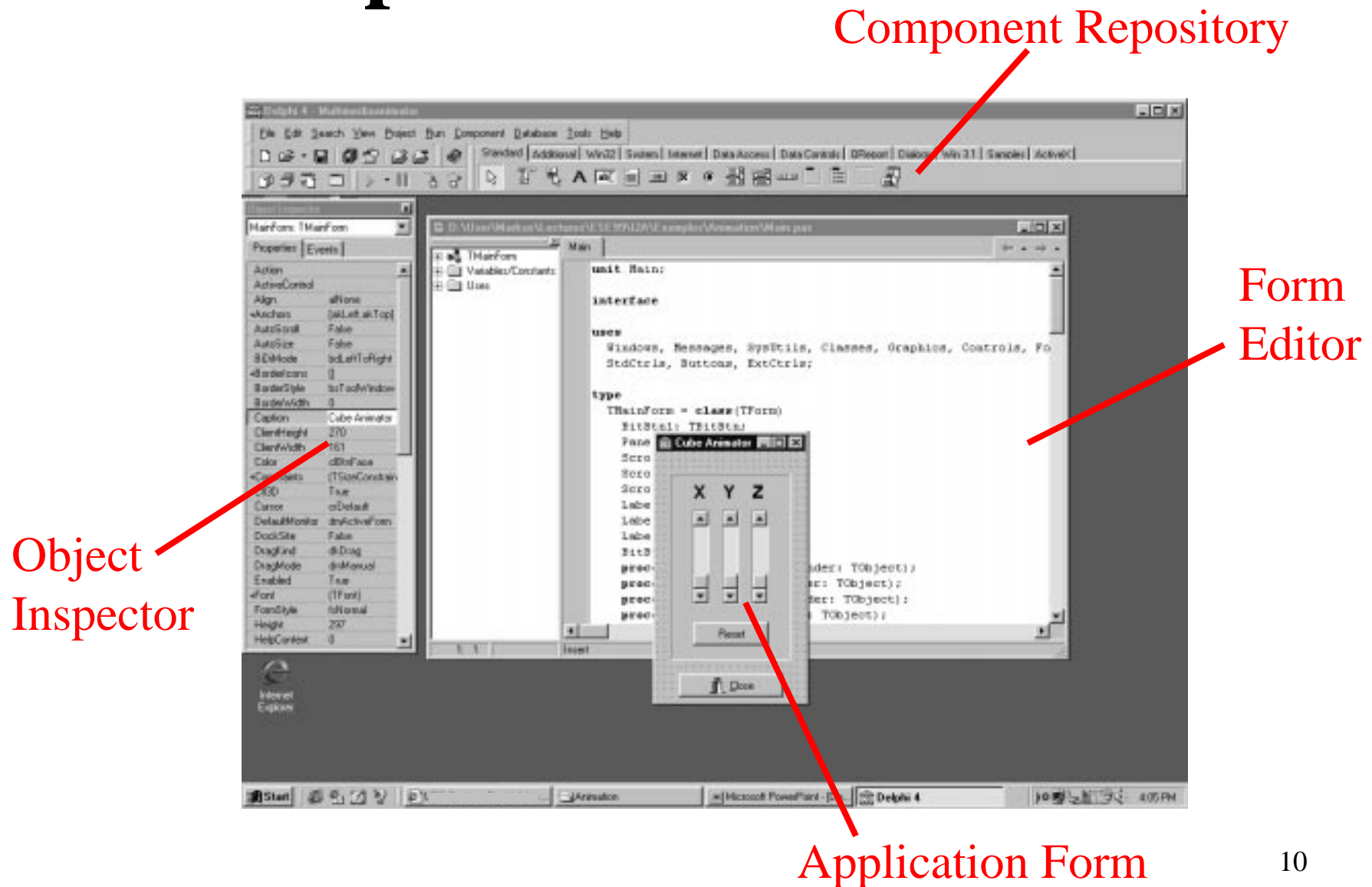
Offers a technology neutral method to develop client/server applications with vendors who employ standard interfaces which provide services for each logical tier.

Multi-tier Architecture



A multi-tier, three-tier, or N-tier implementation employs a three-tier logical architecture superimposed on a distributed physical model. Application Servers can access other application servers in order to supply services to the client application as well as supply services for other application servers.

The Delphi IDE



Hello World



Steps:

- new application
- add label
- set alignment
- change font
- resize form
- run

Delphi Component Definition

- A component is an item that can be selected from the component palette and which can be manipulated by the form designer or the program code.
- A component is an object whose class is derived from the class **TComponent**, TComponent defines the basic behaviour that must be fulfilled by every component.
- A component is an element which can be added to the Delphi environment. The complexity of a component can range from a simple extension of a standard component to a complex interface component for hardware and software.

Facts about Delphi

- Components + ObjectPascal = Application,
- Transparent integration of COM and CORBA components,
- Delphi components can easily be made a COM components,
- The JavaBeans model is derived from Delphi,
- Delphi has emerged a first component market.
- Delphi is a mixed-style programming environment; the user can or must use the textual or visual style of programming.
- Delphi components lack a binary standard like COM.

Working with Components

- All components are visible and configurable at design time.
- Visual components appear at runtime as designed.
- Non-visual components are invisible at runtime. These components provide a visual way of setting up properties.
- Only published properties can be changed at design time.
- Event handler provide a convenient way to add application specific code to your application.
- Understanding component properties and events is essential to effectively program with Delphi.

The Object Model

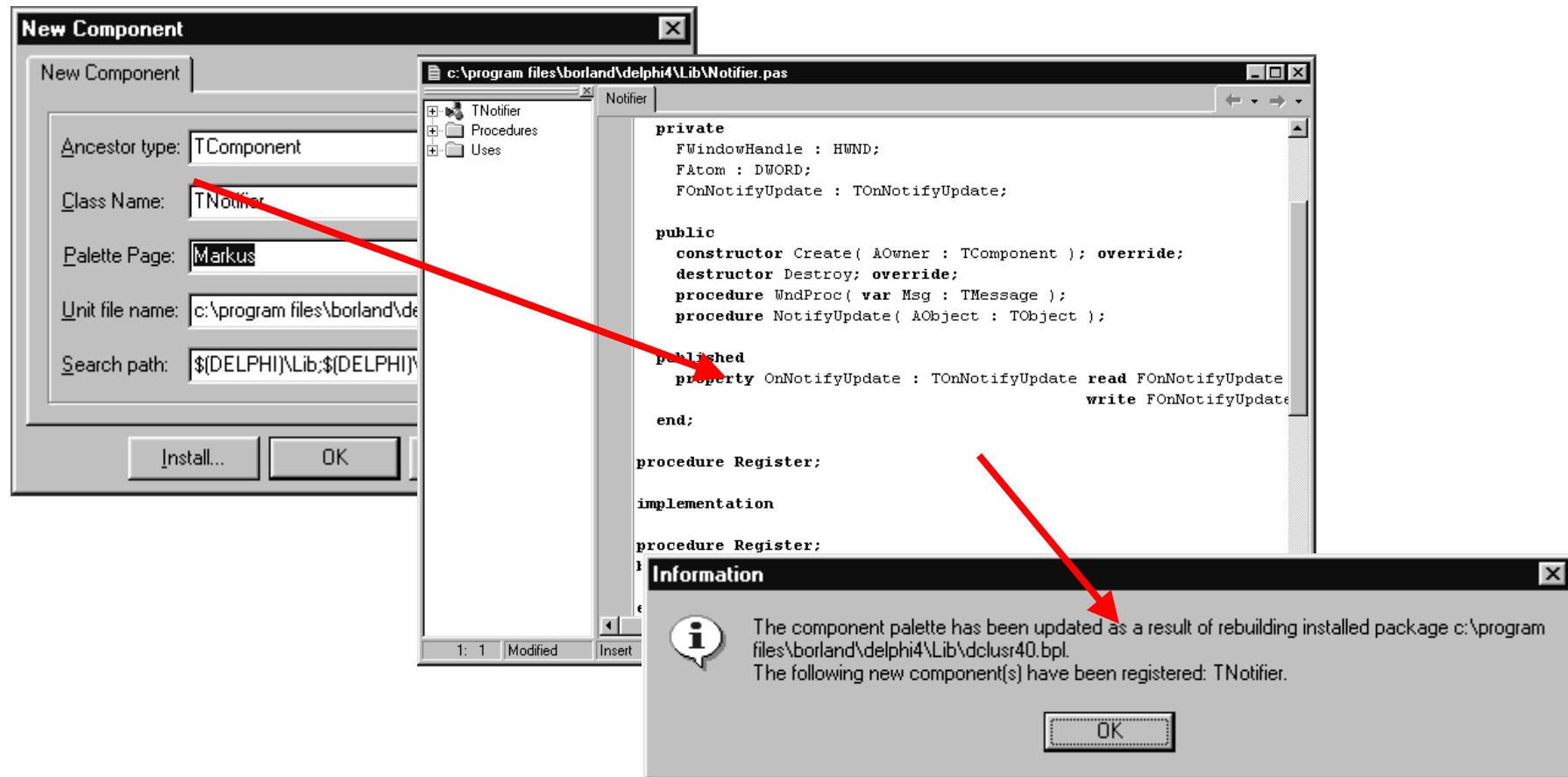
- The root class of every object is **TObject**.
- A class can have a private, protected, public, and published interface.
- The object model supports class-based features like class methods.
- Every object in Delphi is a dynamic instance - reference model.
- Delphi supports so-called method pointers.
- Type information is available at both design time and runtime.
- The object model provides a so-called property mechanism faking direct instance variable access.

Delphi's Object repository



Creating a new Component

- New component
- Implement component



- Test and install component

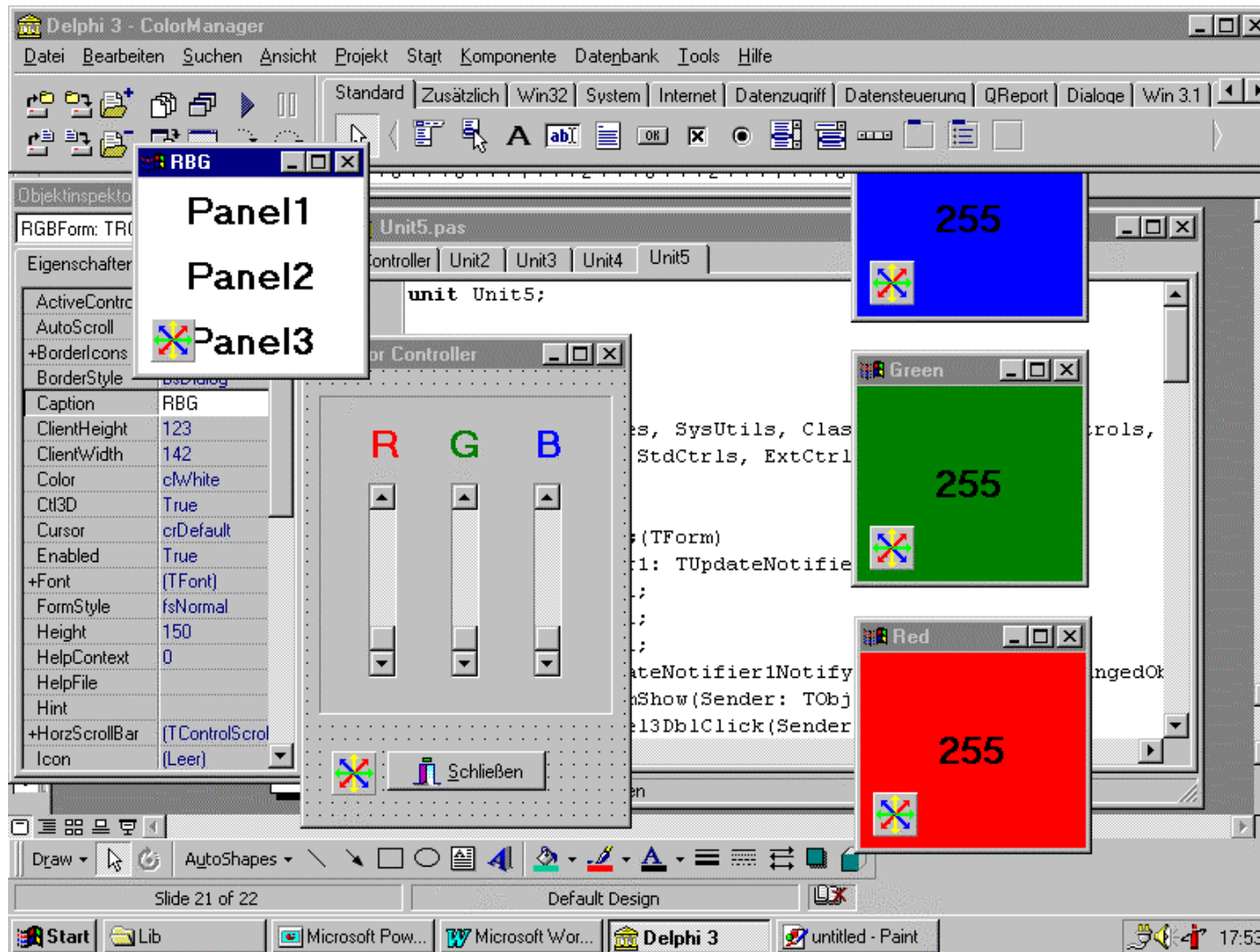
Publisher-Subscriber pattern I

```
TUpdateNotifier = class(TComponent)
private
    FWindowHandle : HWND;
    FAtom : DWORD;
    FOnNotifyUpdate : TOnNotifyUpdate;

public
    constructor Create( AOwner : TComponent ); override;
    destructor Destroy; override;
    procedure WndProc( var Msg : TMessage );
    procedure NotifyUpdate( AObject : TObject );

published
    property OnNotifyUpdate : TOnNotifyUpdate read FOnNotifyUpdate
        write FOnNotifyUpdate;
end;
```

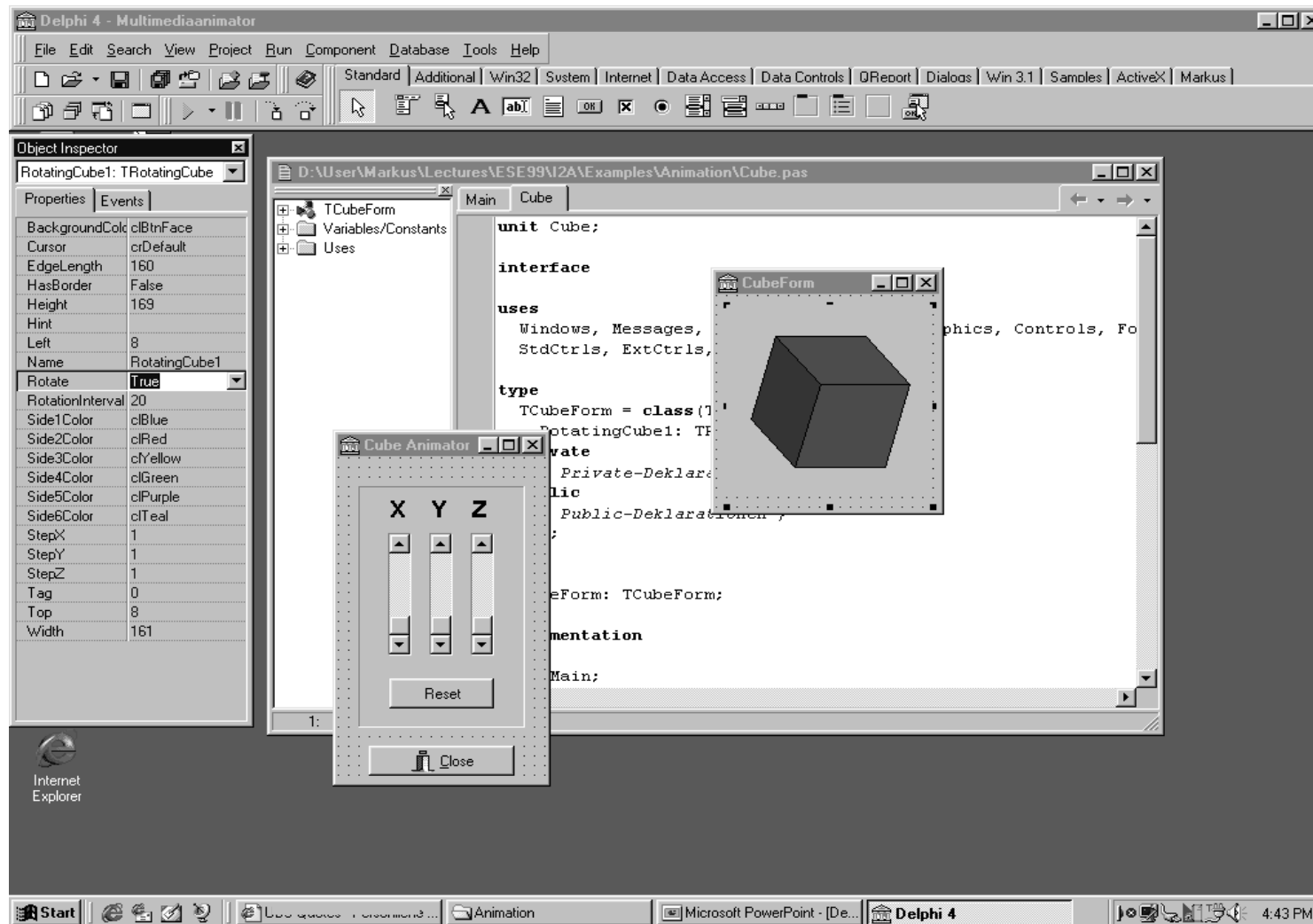
Publisher-Subscriber pattern II



Publisher-Subscriber pattern III

ColorManager

Rotating 3D Cube

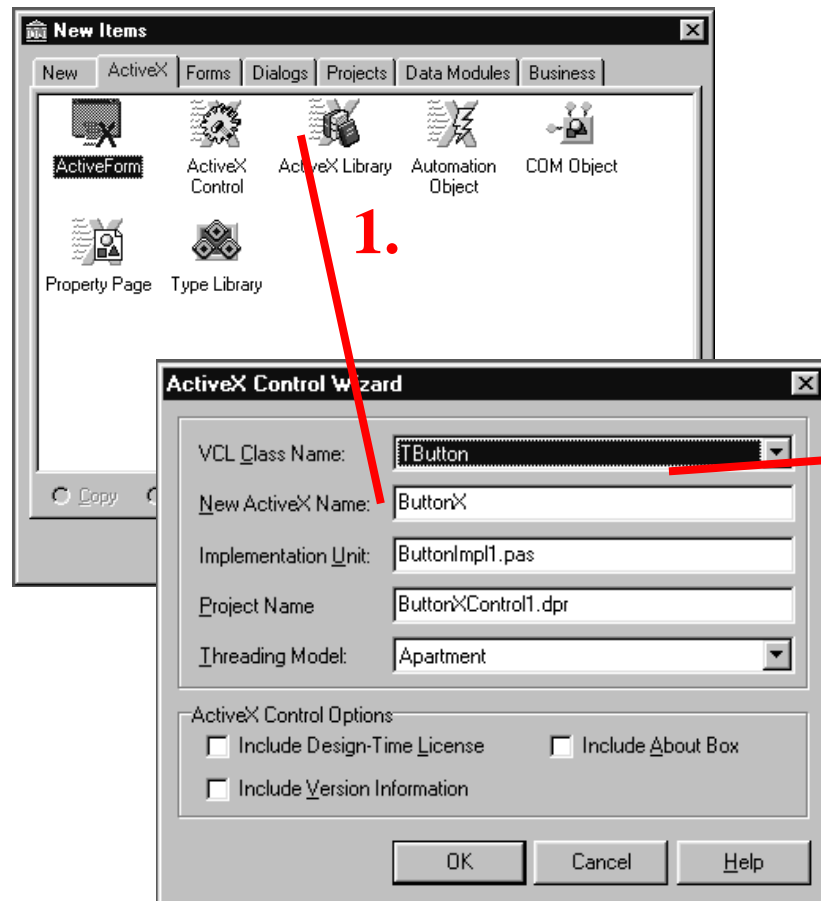


Rotating 3D Cube

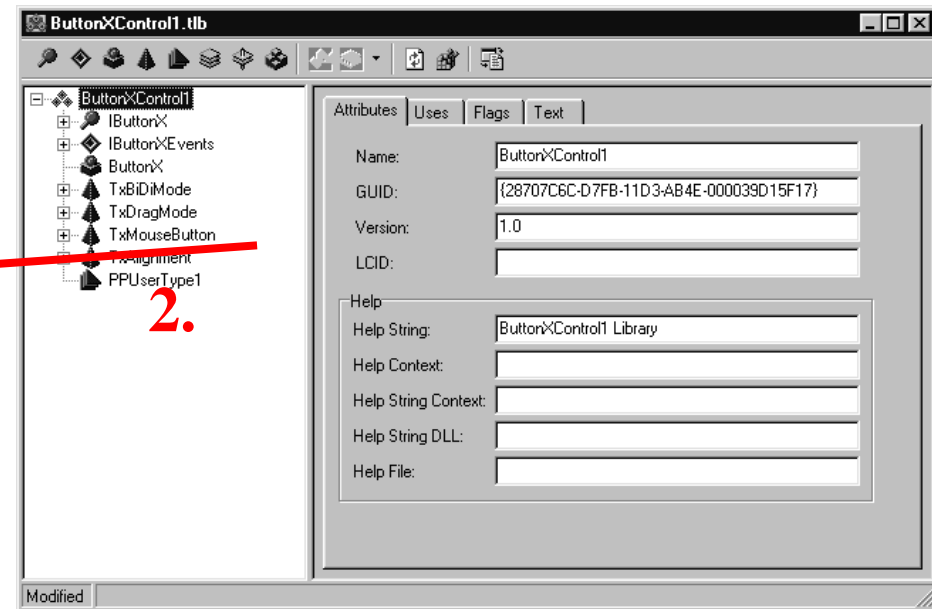
A rotating cube

One-Step ActiveX

New element:



Build-in COM support:

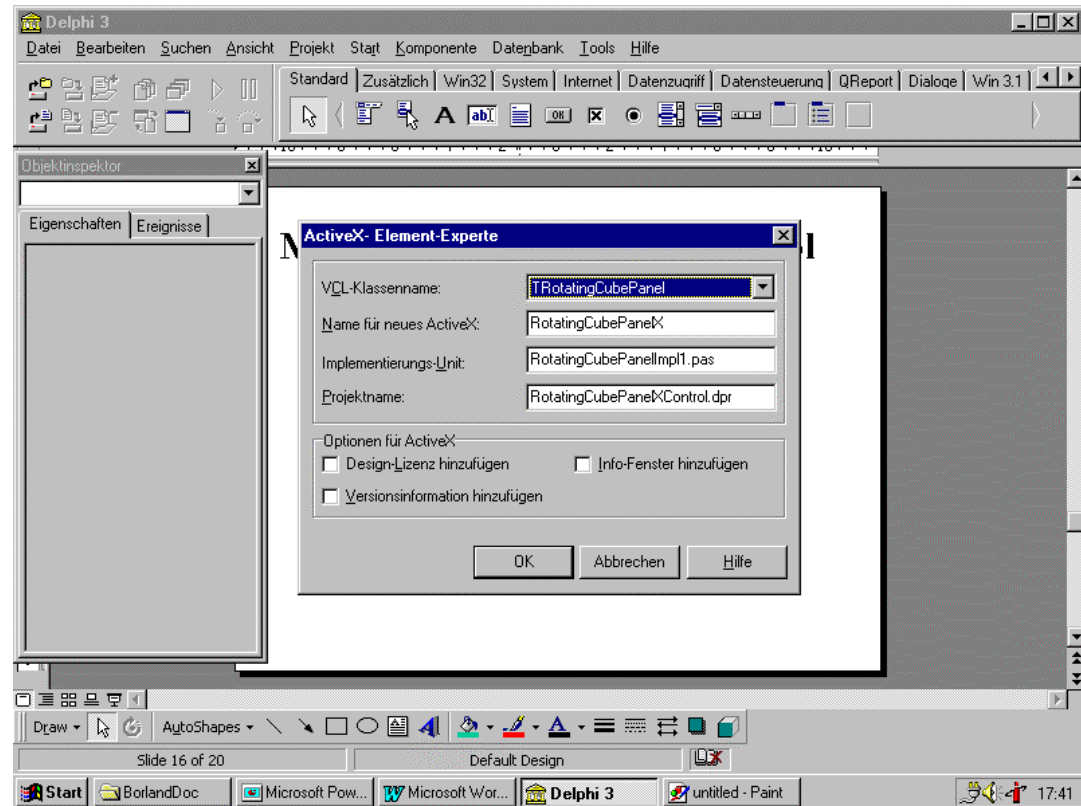


Derive from TWinControl

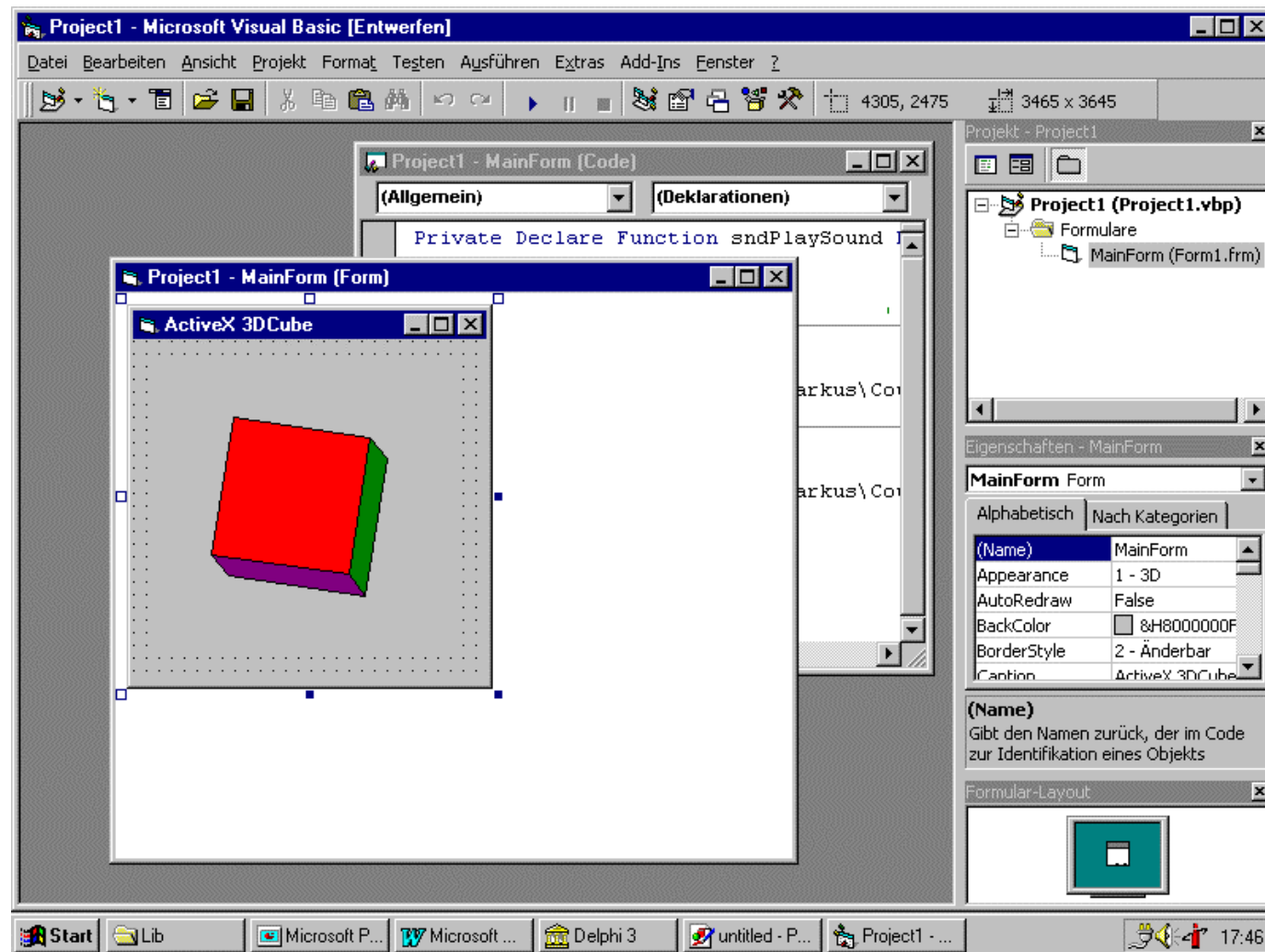
Make it into an ActiveX-control

Steps:

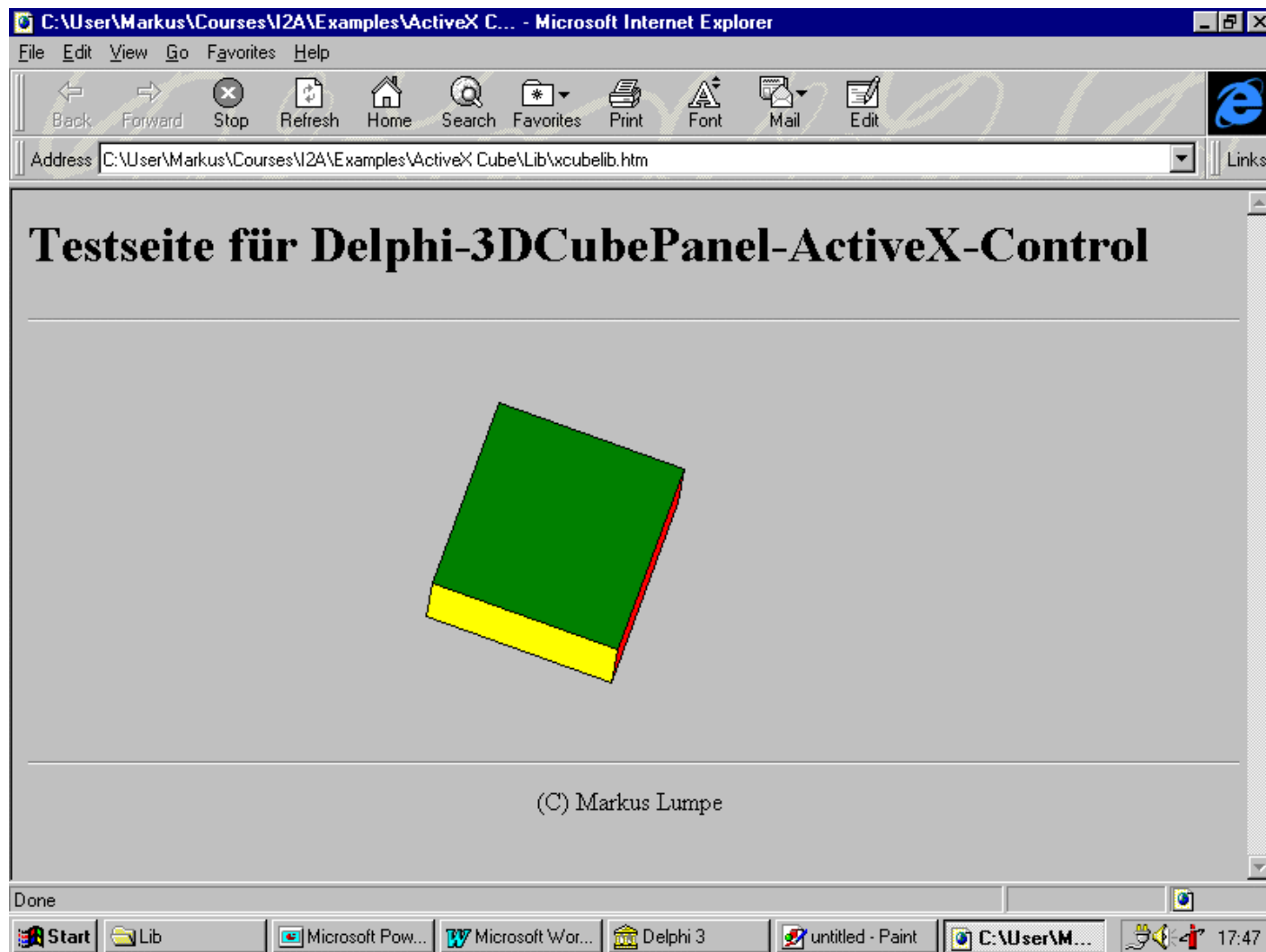
- Make cube component an window control
- Make new component a ActiveX-element
- Build OCX
- Register ActiveX-server



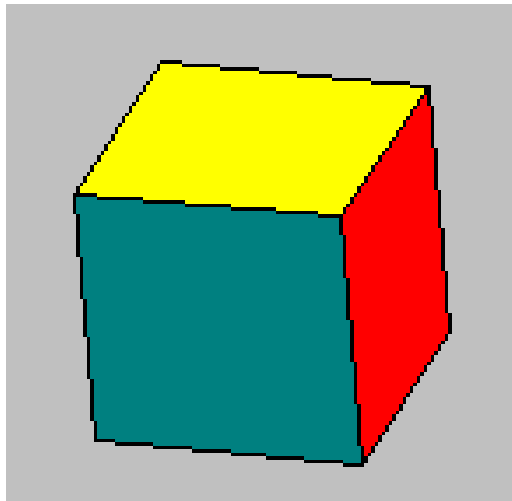
Use Delphi's ActiveX-control I



Use Delphi's ActiveX-control II



Use Delphi's ActiveX-control III



What have you learned about Delphi?

- Delphi is a rapid application development environment,
- Delphi supports enterprise and internet client/server solutions,
- Delphi supports an open, scalable multi-tier architecture,
- Delphi provides support to create, manage, and deliver data over the web,
- Delphi provides support to create reusable objects,
- Delphi provides support to graphically display of any kind of data,
- Delphi supports one-step COM and CORBA development.

Questions