Using ActiveX Controls with Delphi

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Delphi gives you the great advantage of easily integrating industry-standard ActiveX controls (formerly known as OCX or OLE controls) into your applications. Unlike Delphi’s own custom components, ActiveX controls are designed to be independent of any particular development tool. This means that you can count on many vendors to provide a variety of ActiveX solutions that open up a world of features and functionality.

ActiveX control support in 32-bit Delphi works similarly to the way VBX support works in 16-bit Delphi 1. You select an option to add new ActiveX controls from Delphi’s IDE main menu or package editor, and Delphi builds an Object Pascal wrapper for the ActiveX control—which is then compiled into a package and added to the Delphi Component Palette. Once there, the ActiveX control seamlessly merges into the Component Palette along with your other VCL and ActiveX components. From that point, you’re just a click and a drop away from adding an ActiveX control to any of your applications. This chapter discusses integrating ActiveX controls into Delphi, using an ActiveX control in your application, and shipping ActiveX-equipped applications.

**NOTE**

Delphi 1 was the last version of Delphi to support VBX (Visual Basic Extension) controls. If you have a Delphi 1 project that relies on one or more VBX controls, check with the VBX vendors to see whether they supply a comparable ActiveX solution for use in your 32-bit Delphi applications.

### What Is an ActiveX Control?

*ActiveX controls* are custom controls for 16-bit and 32-bit Windows applications that take advantage of the COM-based OLE and ActiveX technologies. Unlike VBX controls, which are designed for 16-bit Visual Basic (and therefore share Visual Basic’s limitations), ActiveX controls were designed from the ground up with application independence in mind. Roughly speaking, you can think of ActiveX controls as a merging of the easy-to-use VBX technology with the open ActiveX standard. For the purposes of this chapter, you can think of OLE and ActiveX as the same thing. If you’re looking for greater distinction between these terms, take a look at Chapter 23, “COM and ActiveX.”

Under the skin, an ActiveX control is really an ActiveX server that, in one package, can provide all the power of ActiveX—including all OLE functions and services, visual editing, drag and drop, and OLE Automation. Like all ActiveX servers, ActiveX controls are registered in the System Registry. ActiveX controls can be developed using a variety of products, including Delphi, Borland C++Builder, Visual C++, and Visual Basic.
Microsoft is actively promoting ActiveX controls as the choice medium for application-independent custom controls; Microsoft has stated that VBX technology will not be directly supported in the Win32 operating systems and beyond. For this reason, developers should look to ActiveX controls rather than VBX controls when developing 32-bit applications.

NOTE

For a more complete description of ActiveX control technology, see Chapter 25, “Creating ActiveX Controls.”

Deciding When To Use an ActiveX Control

There are typically two reasons why you would use an ActiveX control rather than a native Delphi component. The first reason is that no Delphi component is available that fits your particular need. Because the ActiveX control market is larger than that for VCL controls, you’re likely to find a greater variety of fully featured “industrial strength” controls, such as word processors, World Wide Web browsers, and spreadsheets, as ActiveX controls. The second reason you would use an ActiveX control instead of a native Delphi control is if you develop in multiple programming languages and you want to leverage your expertise in some particular control or controls across the multiple development platforms.

Although ActiveX controls integrate seamlessly into the Delphi IDE, keep in mind some inherent disadvantages to using ActiveX controls in your applications. The most obvious issue is that, although Delphi components are built directly into an application executable, ActiveX controls typically require one or more additional runtime files that must be deployed with an executable. Another issue is that ActiveX controls communicate with applications through the COM layer, whereas Delphi components communicate directly with applications and other components. This means that a well-written Delphi component typically performs better than a well-written ActiveX control. A more subtle disadvantage of ActiveX controls is that they’re a “lowest common denominator” solution, so they won’t exploit all the capabilities of the development tool in which they’re used.

Adding an ActiveX Control to the Component Palette

The first step in using a particular ActiveX control in your Delphi application is adding that control to the Component Palette in the Delphi IDE. This places an icon for the ActiveX control on the Component Palette among your other Delphi and ActiveX controls. After you add a particular ActiveX control to the Component Palette, you can drop it on any form and use it as you would any other Delphi control.
To add an ActiveX control to the Component Palette, follow these steps:

1. Choose Component, Import ActiveX Control from the main menu. The Import ActiveX
dialog box appears (see Figure 7.1).

   ![Image of Import ActiveX dialog box]

   **Figure 7.1**
   *The Import ActiveX dialog box.*

2. The Import ActiveX dialog box is divided into two parts: the top portion contains a list
box of registered ActiveX controls and provides Add and Remove buttons that enable
you to register and unregister controls. The bottom portion of the dialog box allows you
to specify parameters for creating a Delphi component and unit that encapsulates the
control.

3. If the name of the ActiveX control you want to use is listed in the top portion of the dia-
log box, proceed to step 4. Otherwise, click the Add button to register a new control with
the system. Clicking the Add button invokes the Register OLE Control dialog box (see
Figure 7.2). Select the name of the OCX or DLL file that represents the ActiveX control
you want to add to the system and click the Open button. This registers the selected
ActiveX control with the System Registry and dismisses the Register OLE Control dia-
log box.

4. In the upper portion of the Import ActiveX dialog box, select the name of the ActiveX
control you want to add to the Component Palette. The lower portion of the dialog box
contains edit controls for unit directory name, palette page, and search path as well as a
memo control that lists the classes contained within the OCX file. The pathname shown
in the Unit Dir Name edit box is the pathname of the Delphi wrapper component created
to interface with the ActiveX control. The filename defaults to the same name as the
OCX file (with a .pas extension); the path defaults to the \Delphi5\Imports subdirectory. Although the default is fine to use, you can edit the directory path to your liking.

5. The Palette Page edit control in the Import ActiveX dialog box contains the name of the page on the Component Palette where you want this control to reside. The default is the ActiveX page. You can choose another existing page; alternatively, if you make up a new name, a corresponding page is created on the Component Palette.

6. The Class Names memo control in the Import ActiveX dialog box contains the names of the new objects created in this control. You should normally leave these names set to the default unless you have a specific reason for doing otherwise. For example, such a reason would be if the default class name conflicts with another component already installed in the IDE.

7. At this point, you can click either the Install or the Create Unit button in the Import ActiveX dialog box. The Create Unit button will generate the source code for the unit for the ActiveX control component wrapper. The Install button will generate the wrapper code and then invoke the Install dialog box, which allows you to choose a package into which you may install the component (see Figure 7.3).
8. In the Install dialog box, you can choose to add the control to an existing package or create a new package that will be installed to the Component Palette. Click OK in this dialog box, and the component will be installed to the palette.

Now your ActiveX control is on the Component Palette and ready to roll.

The Delphi Component Wrapper

Now is a good time to look into the Object Pascal wrapper created to encapsulate the ActiveX control. Doing so can help shed some light on how Delphi’s ActiveX support works so that you can understand the capabilities and limitations inherent in ActiveX controls. Listing 7.1 shows the Card_TLB.pas unit generated by Delphi; this unit encapsulates the AxCard.ocx ActiveX control.

---

**NOTE**

AxCard.ocx is an ActiveX control developed in Chapter 25, “Creating ActiveX Controls.”

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**LISTING 7.1** The Delphi Component Wrapper Unit for AxCard.ocx.

```pascal
unit AxCard_TLB;

// ******************************************************************* //
// WARNING // ———- // The types declared in this file were generated from data read from a // Type Library. If this type library is explicitly or indirectly (via // another type library referring to this type library) re-imported, or // the 'Refresh' command of the Type Library Editor activated while // editing the Type Library, the contents of this file will be // regenerated and all manual modifications will be lost. // ****************************************************************** //

// PASTLWTR : $Revision: 1.88 $ // File generated on 8/24/99 9:24:19 AM from Type Library described below

// ******************************************************************* //
// NOTE: // Items guarded by $IFDEF_LIVE_SERVER_AT_DESIGN_TIME are used by // properties which return objects that may need to be explicitly created // via a function call prior to any access via the property. These items
```
// have been disabled in order to prevent accidental use from within the
// object inspector. You may enable them by defining
// LIVE_SERVER_AT_DESIGN_TIME or by selectively removing them from the
// $IFDEF blocks. However, such items must still be programmatically
// created via a method of the appropriate CoClass before they can be
// used.

interface
uses Windows, ActiveX, Classes, Graphics, OleServer, OleCtrls, StdVCL;

const
AxCardMajorVersion = 1;
AxCardMinorVersion = 0;

LIBID_AxCard: TGUID = '{7B33D940-0A2C-11D2-AE5C-04640BC10000}';
IID_ICardX: TGUID = '{7B33D941-0A2C-11D2-AE5C-04640BC10000}';
DIID_ICardXEvents: TGUID = '{7B33D943-0A2C-11D2-AE5C-04640BC10000}';
CLASS_CardX: TGUID = '{7B33D945-0A2C-11D2-AE5C-04640BC10000}';

TxDragMode = TOleEnum;
const
dmManual = $00000000;
dmAutomatic = $00000001;

continues
LISTING 7.1  Continued

// Constants for enum TxCardSuit
type
    TxCardSuit = TOleEnum;
const
    csClub = $00000000;
    csDiamond = $00000001;
    csHeart = $00000002;
    csSpade = $00000003;

// Constants for enum TxCardValue
    type
        TxCardValue = TOleEnum;
    const
        cvAce = $00000000;
        cvTwo = $00000001;
        cvThree = $00000002;
        cvFour = $00000003;
        cvFive = $00000004;
        cvSix = $00000005;
        cvSeven = $00000006;
        cvEight = $00000007;
        cvNine = $00000008;
        cvTen = $00000009;
        cvJack = $0000000A;
        cvQueen = $0000000B;
        cvKing = $0000000C;

// Constants for enum TxMouseButton
    type
        TxMouseButton = TOleEnum;
    const
        mbLeft = $00000000;
        mbRight = $00000001;
        mbMiddle = $00000002;

// Constants for enum TxAlignment
    type
        TxAlignment = TOleEnum;
    const
        taLeftJustify = $00000000;
        taRightJustify = $00000001;
        taCenter = $00000002;

// Constants for enum TxBiDiMode
    type
TxBiDiMode = T OleEnum;
const
bdLeftToRight = $00000000;
bdRightToLeft = $00000001;
bdRightToLeftNoAlign = $00000002;
bdRightToLeftReadingOnly = $00000003;

type

// *******************************************************************//
// Forward declaration of types defined in TypeLibrary
// *******************************************************************//
ICardX = interface;
ICardXDisp = dispinterface;
ICardXEvents = dispinterface;

// *******************************************************************//
// Declaration of CoClasses defined in Type Library
// (NOTE: Here we map each CoClass to its Default Interface)
// *******************************************************************//
CardX = ICardX;

// *******************************************************************//
// Interface: ICardX
// Flags:     (4416) Dual OleAutomation Dispatchable
// GUID:      {7B33D941-0A2C-11D2-AE5C-04640BC10000}
// *******************************************************************//
ICardX = interface(IDispatch)
    ['{7B33D941-0A2C-11D2-AE5C-04640BC10000}']
    function  Get_BackColor: OLE_COLOR; safecall;
    procedure Set_BackColor(Value: OLE_COLOR); safecall;
    function  Get_Color: OLE_COLOR; safecall;
    procedure Set_Color(Value: OLE_COLOR); safecall;
    function  Get_DragCursor: Smallint; safecall;
    procedure Set_DragCursor(Value: Smallint); safecall;
    function  Get_DragMode: TxDragMode; safecall;
    procedure Set_DragMode(Value: TxDragMode); safecall;
    function  Get_FaceUp: WordBool; safecall;
    procedure Set_FaceUp(Value: WordBool); safecall;
    function  Get_ParentColor: WordBool; safecall;
    procedure Set_ParentColor(Value: WordBool); safecall;
    function  Get_Suit: TxCardSuit; safecall;
    procedure Set_Suit(Value: TxCardSuit); safecall;
    function  Get_Value: TxCardValue; safecall;
    procedure Set_Value(Value: TxCardValue); safecall;

continues
Listing 7.1  Continued

    function Get_DoubleBuffered: WordBool; safecall;
    procedure Set_DoubleBuffered(Value: WordBool); safecall;
    procedure FlipChildren(AllLevels: WordBool); safecall;
    function DrawTextBiDiModeFlags(Flags: Integer): Integer; safecall;
    function DrawTextBiDiModeFlagsReadingOnly: Integer; safecall;
    function Get_Enabled: WordBool; safecall;
    procedure Set_Enabled(Value: WordBool); safecall;
    function GetControlsAlignment: TxAlignment; safecall;
    procedure InitiateAction; safecall;
    function IsRightToLeft: WordBool; safecall;
    function UseRightToLeftAlignment: WordBool; safecall;
    function UseRightToLeftReading: WordBool; safecall;
    function UseRightToLeftScrollBar: WordBool; safecall;
    function Get_BiDiMode: TxBiDiMode; safecall;
    procedure Set_BiDiMode(Value: TxBiDiMode); safecall;
    function Get_Visible: WordBool; safecall;
    procedure Set_Visible(Value: WordBool); safecall;
    function Get_Cursor: Smallint; safecall;
    procedure Set_Cursor(Value: Smallint); safecall;
    function ClassNameIs(const Name: WideString): WordBool; safecall;
    procedure AboutBox; safecall;
    property BackColor: OLE_COLOR read Get_BackColor write Set_BackColor;
    property Color: OLE_COLOR read Get_Color write Set_Color;
    property DragCursor: Smallint read Get_DragCursor write Set_DragCursor;
    property DragMode: TxDragMode read Get_DragMode write Set_DragMode;
    property FaceUp: WordBool read Get_FaceUp write Set_FaceUp;
    property ParentColor: WordBool read Get_ParentColor write Set_ParentColor;
    property Suit: TxCardSuit read Get_Suit write Set_Suit;
    property Value: TxCardValue read Get_Value write Set_Value;
    property DoubleBuffered: WordBool read Get_DoubleBuffered write Set_DoubleBuffered;
    property Enabled: WordBool read Get_Enabled write Set_Enabled;
    property BiDiMode: TxBiDiMode read Get_BiDiMode write Set_BiDiMode;
    property Visible: WordBool read Get_Visible write Set_Visible;
    property Cursor: Smallint read Get_Cursor write Set_Cursor;
end;

// *******************************************************************//
// DispIntf:  ICardXDisp
// Flags:     (4416) Dual OleAutomation Dispatchable
// GUID:      {7B33D941-0A2C-11D2-AE5C-04640BC10000}
// *******************************************************************//
ICardXDisp = dispinterface
property BackColor: OLE_COLOR dispid 1;
property Color: OLE_COLOR dispid -501;
property DragCursor: Smallint dispid 2;
property DragMode: TxDragMode dispid 3;
property FaceUp: WordBool dispid 4;
property ParentColor: WordBool dispid 5;
property Suit: TxCardSuit dispid 6;
property Value: TxCardValue dispid 7;
property DoubleBuffered: WordBool dispid 10;
procedure FlipChildren(AllLevels: WordBool); dispid 11;
function DrawTextBiDiModeFlags(Flags: Integer): Integer; dispid 14;
function DrawTextBiDiModeFlagsReadingOnly: Integer; dispid 15;
property Enabled: WordBool dispid -514;
function GetControlsAlignment: TxAlignment; dispid 16;
procedure InitiateAction; dispid 18;
function IsRightToLeft: WordBool; dispid 19;
function UseRightToLeftAlignment: WordBool; dispid 24;
function UseRightToLeftReading: WordBool; dispid 25;
function UseRightToLeftScrollBar: WordBool; dispid 26;
property BiDiMode: TxBiDiMode dispid 27;
property Visible: WordBool dispid 28;
property Cursor: Smallint dispid 29;
function ClassNameIs(const Name: WideString): WordBool; dispid 33;
procedure AboutBox; dispid -552;
end;

// DispIntf: ICardXEvents
// Flags:     (4096) Dispatchable
// GUID:      {7B33D943-0A2C-11D2-AE5C-04640BC10000}
// *******************************************************************//
ICardXEvents = dispinterface
['{7B33D943-0A2C-11D2-AE5C-04640BC10000}']
procedure OnClick; dispid 1;
procedure OnDblClick; dispid 2;
procedure OnKeyPress(var Key: Smallint); dispid 7;
end;

// *******************************************************************//
// OLE Control Proxy class declaration
// Control Name : TCardX
// Help String  : CardX Control
// Default Interface: ICardX
// Def. Intf. DISP? : No
continues
LISTING 7.1 Continued

// Event   Interface: ICardXEvents
// TypeFlags        : (34) CanCreate Control
// *******************************************************************//
TCardXOnKeyPress = procedure(Sender: TObject; var Key: Smallint) of object;

TCardX = class(TOleControl)
    private
      FOnClick: TNotifyEvent;
      FOnDb1Click: TNotifyEvent;
      FOnKeyPress: TCardXOnKeyPress;
      FIntf: ICardX;
      function GetControlInterface: ICardX;
    protected
      procedure CreateControl;
      procedure InitControlData; override;
    public
      procedure FlipChildren(AllLevels: WordBool);
      function DrawTextBiDiModeFlags(Flags: Integer): Integer;
      function DrawTextBiDiModeFlagsReadingOnly: Integer;
      function GetControlsAlignment: TxAlignment;
      procedure InitiateAction;
      function IsRightToLeft: WordBool;
      function UseRightToLeftAlignment: WordBool;
      function UseRightToLeftReading: WordBool;
      function UseRightToLeftScrollBar: WordBool;
      function ClassNameIs(const Name: WideString): WordBool;
      procedure AboutBox;
      property ControlInterface: ICardX read GetControlInterface;
      property DefaultInterface: ICardX read GetControlInterface;
      property DoubleBuffered: WordBool index 10 read GetWordBoolProp write SetWordBoolProp;
      property Enabled: WordBool index -514 read GetWordBoolProp write SetWordBoolProp;
      property BiDiMode: TOleEnum index 27 read GetTOleEnumProp write SetTOleEnumProp;
      property Visible: WordBool index 28 read GetWordBoolProp write SetWordBoolProp;
    published
      property TabStop;
      property Align;
      property ParentShowHint;
      property PopupMenu;
      property ShowHint;
      property TabOrder;
property OnDragDrop;
property OnDragOver;
property OnEndDrag;
property OnEnter;
property OnExit;
property OnStartDrag;
property BackColor: TColor index 1 read GetTColorProp write
  SetTColorProp stored False;
property Color: TColor index -501 read GetTColorProp write
  SetTColorProp stored False;
property DragCursor: Smallint index 2 read GetSmallintProp write
  SetSmallintProp stored False;
property DragMode: TOleEnum index 3 read GetTOleEnumProp write
  SetTOleEnumProp stored False;
property FaceUp: WordBool index 4 read GetWordBoolProp write
  SetWordBoolProp stored False;
property ParentColor: WordBool index 5 read GetWordBoolProp write
  SetWordBoolProp stored False;
property Suit: TOleEnum index 6 read GetTOleEnumProp write
  SetTOleEnumProp stored False;
property Value: TOleEnum index 7 read GetTOleEnumProp write
  SetTOleEnumProp stored False;
property Cursor: Smallint index 29 read GetSmallintProp write
  SetSmallintProp stored False;
property OnClick: TNotifyEvent read FOnClick write FOnClick;
property OnDblClick: TNotifyEvent read FOnDblClick write FOnDblClick;
property OnKeyPress: TCardXOnKeyPress read FOnKeyPress write
  FOnKeyPress;
end;

procedure Register;

implementation

uses ComObj;

procedure TCardX.InitControlData;
const
  CEventDispIDs: array [0..2] of DWORD = (
    $00000001, $00000002, $00000007);
  CControlData: TControlData2 = (
    ClassID: '{7B33D945-0A2C-11D2-AE5C-04640BC10000}';
    EventIID: '{7B33D943-0A2C-11D2-AE5C-04640BC10000}';
    EventCount: 3;
    EventDispIDs: @CEventDispIDs;
    LicenseKey: nil (*HR:$00000000*);
Flags: $00000009;
Version: 401);
begin
  ControlData := @CControlData;
  TControlData2(CControlData).FirstEventOfs :=
    Cardinal(@@FOnClick) - Cardinal(Self);
end;

procedure TCardX.CreateControl;

  procedure DoCreate;
  begin
    FIntf := IUnknown(OleObject) as ICardX;
  end;

begin
  if FIntf = nil then DoCreate;
end;

function TCardX.GetControlInterface: ICardX;
begin
  CreateControl;
  Result := FIntf;
end;

procedure TCardX.FlipChildren(AllLevels: WordBool);
begin
  DefaultInterface.FlipChildren(AllLevels);
end;

function  TCardX.DrawTextBiDiModeFlags(Flags: Integer): Integer;
begin
  Result := DefaultInterface.DrawTextBiDiModeFlags(Flags);
end;

function  TCardX.DrawTextBiDiModeFlagsReadingOnly: Integer;
begin
  Result := DefaultInterface.DrawTextBiDiModeFlagsReadingOnly;
end;

function  TCardX.GetControlsAlignment: TxAlignment;
begin
  Result := DefaultInterface.GetControlsAlignment;
end;
procedure TCardX.InitiateAction;
begin
  DefaultInterface.InitiateAction;
end;

function TCardX.IsRightToLeft: WordBool;
begin
  Result := DefaultInterface.IsRightToLeft;
end;

function TCardX.UseRightToLeftAlignment: WordBool;
begin
  Result := DefaultInterface.UseRightToLeftAlignment;
end;

function TCardX.UseRightToLeftReading: WordBool;
begin
  Result := DefaultInterface.UseRightToLeftReading;
end;

function TCardX.UseRightToLeftScrollBar: WordBool;
begin
  Result := DefaultInterface.UseRightToLeftScrollBar;
end;

function TCardX.ClassNameIs(const Name: WideString): WordBool;
begin
  Result := DefaultInterface.ClassNameIs(Name);
end;

procedure TCardX.AboutBox;
begin
  DefaultInterface.AboutBox;
end;

procedure Register;
begin
  RegisterComponents('ActiveX',[TCardX]);
end;

end.

Now that you’ve seen the code generated by the type library editor, let’s look a little deeper at the type library import mechanism.
Where Do Wrapper Files Come From?

The first thing you might notice is that the filename ends in _TLB. More subtly, you might have caught on to the fact that there are several references to “library” in the generated source file. Both of these are clues as to the origin of the wrapper file: the control’s type library. An ActiveX control’s type library is special information linked to the control as a resource that describes the different elements of an ActiveX control. In particular, type libraries contain information such as the interfaces supported by a control, the properties, methods, and events of a control, and the enumerated types used by the control. The first entry in the wrapper file is the GUID of the control’s type library.

**NOTE**

Type libraries are used more generally for any type of Automation object. Chapter 23, “COM and ActiveX,” contains more information on type libraries and their use.

Enumerations

Looking at the generated unit from the top down, immediately following the type library GUID, are the enumerated types used by the control. Notice that the enumerations are declared as simple constants rather than true enumerated types. This is done because type library enumerations, like those in the C language, do not need to start at zero, and the element ordinals do not need to be contiguous. Because this type of declaration isn’t legal in Object Pascal, the enumerations must be declared as constants.

Control Interfaces

Next in the wrapper file, the control’s primary interface is declared. Here, you’ll find all the properties and methods of the ActiveX control. The properties are also redeclared in a dispinterface, thus allowing the control to be used as a dual interface. The events are declared separately next in a dispinterface. You definitely don’t need to know about interfaces to use ActiveX controls in your applications. What’s more, working with interfaces can be a complicated topic, so we won’t go into too much detail right now. You’ll find more information on interfaces in general in Chapter 23, “COM and ActiveX,” and information on interfaces with ActiveX controls in Chapter 25, “Creating ActiveX Controls.”

T OleControl Descendant

Next in the unit file comes the class definition for the control wrapper. By default, the name of the ActiveX control wrapper object is TXX, where X is the name of the control’s coclass in the type library. This object, like all ActiveX control wrappers, descends from the TOleControl
TOleControl is a window handle–bearing component that descends from TWinControl. TOleControl encapsulates the complexities of mapping the functionality of ActiveX controls to Delphi components so that ActiveX controls work seamlessly from Delphi. TOleControl is an abstract class—meaning that you never want to create an instance of one but instead use it as a starting place for other classes.

The Methods
The first procedure shown is the InitControlData() procedure. This procedure is introduced in the TOleControl object and is overridden for all descendants. It sets up the unique OLE class and event identification numbers in addition to other control-specific information. In particular, this method makes the TOleControl aware of important ActiveX control details such as class IDs, control miscellaneous flags, and a license key if the control is licensed. This method is found in the protected part of the class definition because it’s not useful to users of the class—it only has meaning internal to the class.

The InitControlInterface() method is overridden to initialize the private FIntf interface field with a pointer to the control’s ICardsX interface.

The CardX ActiveX control exposes only one other method: AboutBox(). It’s standard for ActiveX controls to contain a method called AboutBox() that invokes a custom About dialog box for the control. This method is called through the vTable interface using the ControlInterface property, which is read from the FIntf field.

NOTE
In addition to vTable calls using the ControlInterface property, Control methods can also be invoked via Automation using TOleControl’s OleObject property. As you’ll learn in Chapter 23, “COM and ActiveX,” it’s usually more efficient to call methods via the vTable rather than through Automation.

The Properties
You might have noticed that the TCardX class has two distinct groups of properties. One group does not have read and write values specified. These are standard Delphi component properties and events inherited from the TWinControl and TComponent ancestor classes. The other group of properties all have an index as well as get and set methods specified. This group of properties includes the ActiveX control properties being encapsulated by the TOleControl.

The specialized get and set methods for the encapsulated properties provide the magic that bridges the gap between the ActiveX control properties and the Object Pascal component properties. Notice the read and write methods that get and set properties for every specific type
(such as GetBoolProp(), SetBoolProp(), GetStringProp(), SetStringProp(), and so on). Although there are get and set methods for each property type, they all operate similarly. In fact, the following code shows generic get and set methods for TOleControl that would work given a property of type X:

```pascal
function TOleControl.GetXProp(Index: Integer): X;
var
  Temp: TVarData;
begin
  GetProperty(Index, Temp);
  Result := Temp.VX;
end;

procedure TOleControl.SetXProp(Index: Integer; Value: X);
var
  Temp: TVarData;
begin
  Temp.VType := varX;
  Temp.VX := Value;
  SetProperty(Index, Temp);
end;
```

In this code, the index of the property (as indicated by the index directive in the properties of the TCardsCtrl component) is implicitly passed to the procedures. The variable of type X is packaged into a TVarData (a record that represents a Variant) data record, and those parameters are passed to the GetProperty() or SetProperty() method of TOleControl. Each property of the ActiveX control has a unique index that acts as an identifier. Using this index and the TVarData variable Temp, GetProperty() and SetProperty() use OLE Automation to get and set the property values inside the ActiveX control.

If you’ve worked with other development packages before, you’ll appreciate that Delphi provides easy access not only to the ActiveX control’s own properties but also to normal TWinControl properties and methods. This enables you to use an ActiveX control like other handle-bearing controls in Delphi and makes it possible for you to use object-oriented principles to override the behavior of an ActiveX control by creating customized descendants of ActiveX controls in the Delphi environment.

**Using ActiveX Controls in Your Applications**

After you link your ActiveX control wrapper into the component library, you’ve actually fought most of the battle. After an ActiveX control has been placed on the Component Palette, its usage is much the same as that of a regular Delphi component. Figure 7.4 shows the Delphi environment with a TCardX focused in the Form Designer. Notice the TCardX properties listed in the Object Inspector.
In addition to an ActiveX control’s properties being set with the Object Inspector, some ActiveX controls also provide a Properties dialog box that’s revealed by selecting the Properties option from the context menu in the Delphi Form Designer. The context menu, also shown in Figure 7.4, is revealed by right-clicking over a particular control. The Properties dialog box actually lives within the ActiveX control; its look, feel, and contents are determined entirely by the control designer. Figure 7.5 shows the Properties dialog box for the TCardX ActiveX control.

As you can imagine, this particular control comes equipped with properties that enable you to specify card suit, value, color and picture for card back as well as the standard properties that refer to position, tab order, and so on. The card in Figure 7.4 has its Value property set to 1 (Ace) and its Suit property set to 3 (Spades).
Shipping ActiveX Control–Equipped Applications

When you’re ready to ship your ActiveX control–equipped application, there are some deployment issues to bear in mind as you prepare to send your ActiveX control and associated files to your customers:

• You must ship the OCX or DLL file that contains the ActiveX controls you’re using in your application. OCX files, being DLLs, are not linked into your application’s executable. Additionally, before the user can use your application, the ActiveX control must be registered in that user’s System Registry. ActiveX control registration is discussed in the following section.

• Some ActiveX controls require one or more external DLLs or other files to operate. Check the documentation for your third-party ActiveX controls to determine whether any additional files must be deployed with your ActiveX control. See Chapter 25, “Creating ActiveX Controls,” for information on what additional files might need to be deployed along with your Delphi-written controls.

• Many ActiveX controls come with a license file that’s required if you want to use the control at design time. This file comes from the ActiveX control vendor, and it prevents your end users from designing applications with ActiveX controls you ship with your applications. You should not ship these LIC files with your application unless you intend for users of your application to use the licensed controls in a development tool and you have the appropriate license for such redistribution.

ActiveX Control Registration

Before an ActiveX control can be used on any system (including those of customers or clients who run your applications), it must be registered with the System Registry. Most commonly, this is accomplished using the RegSvr32.exe application, which comes with most versions of Windows. Alternatively, you can use the TRegSvr.exe command-line registration utility found in the Delphi bin directory. Occasionally, you might want to register the control more transparently to give your application an integrated feel. Luckily, it’s not difficult to integrate ActiveX control registration (and unregistration) into your application. Inprise provides the source code for the TRegSvr utility as a sample application, and it provides an excellent demonstration for how to register ActiveX servers and type libraries.

BlackJack: An OCX Application Example

The best way to demonstrate how to use an ActiveX control in an application is to show you how to write a useful application that incorporates an ActiveX control. This example uses the TCardX ActiveX control; what better way to demonstrate a card control than to make a blackjack game? For the sake of argument, assume that all programmers are high rollers and don’t
need to be told the rules of the game (didn’t know this book was a comedy, did you?). This way, you can concentrate on the programming job at hand.

As you can imagine, most of the code for this application deals with the logic of the game of blackjack. All the code is provided in the listings later in this chapter; right now, the discussion is narrowed to the individual portions of code that deal directly with managing and manipulating the ActiveX controls. The name of this project is BJ; to give you an idea of where the code comes from, Figure 7.6 shows a game of DDG BlackJack in progress.

![Figure 7.6]

Playing DDG BlackJack.

**The Card Deck**

Before writing the game itself, you must first write an object that encapsulates a deck of playing cards. Unlike a real card deck (in which cards are picked from the top of a scrambled deck), this card deck object contains an unscrambled card deck and uses pseudorandom numbers to pick a random card from the unscrambled deck. This is possible because each card has a notion of whether it has been used. This greatly simplifies the shuffle procedure, too, because all the object has to do is set each of the cards to unused. The code for the PlayCard.pas unit, which contains the TCardDeck object, is shown in Listing 7.2.

**Listing 7.2  The PlayCard.pas Unit**

```pascal
unit PlayCard;

interface

uses SysUtils, Cards;

type

continues
```
LISTING 7.2  Continued

    ECardError = class(Exception);  // generic card exception

    TPlayingCard = record           // represents one card
        Face: TCardValue;             // card face value
        Suit: TCardSuit;              // card suit value
    end;

    { an array of 52 cards representing one deck }
    TCardArray = array[1..52] of TPlayingCard;

    { Object which represents a deck of 52 UNIQUE cards. }
    { This is a scrambled deck of 52 cards, and the        }
    { object keeps track of how far throughout the deck  }
    { the user has picked. }
    TCardDeck = class
        private
            FCardArray: TCardArray;
            FTop: integer;
            procedure InitCards;
            function GetCount: integer;
        public
            property Count: integer read GetCount;
            constructor Create; virtual;
            procedure Shuffle;
            function Draw: TPlayingCard;
        end;

    { GetCardValue returns the numeric value of any card }
    function GetCardValue(C: TPlayingCard): Integer;

implementation

function GetCardValue(C: TPlayingCard): Integer;
{ returns a card's numeric value }
begin
    Result := Ord(C.Face) + 1;
    if Result > 10 then Result := 10;
end;

procedure TCardDeck.InitCards;
{ initializes the deck by assigning a unique value/suit combination }
{ to each card. }
var
    i: integer;
begin
  AFace := cvAce;  // start with ace
  ASuit := csClub; // start with clubs
  for i := 1 to 52 do // for each card in deck...
    begin
      FCardArray[i].Face := AFace; // assign face
      FCardArray[i].Suit := ASuit; // assign suit
      if (i mod 4 = 0) and (i <> 52) then // every four cards...
         inc(AFace); // increment the face
      if ASuit <> High(TCardSuit) then // always increment the suit
         inc(ASuit)
      else
         ASuit := Low(TCardSuit);
    end;
end;

constructor TCardDeck.Create;
{ constructor for TCardDeck object. }
begin
  inherited Create;
  InitCards;
  Shuffle;
end;

function TCardDeck.GetCount: integer;
{ Returns a count of unused cards }
begin
  Result := 52 - FTop;
end;

procedure TCardDeck.Shuffle;
{ Re-mixes cards and sets top card to 0. }
var
  i: integer;
  RandCard: TPlayingCard;
  RandNum: integer;
begin
  for i := 1 to 52 do // pick random number
    begin
      RandNum := Random(51) + 1;
      RandCard := FCardArray[RandNum]; // swap next card with
      FCardArray[RandNum] := FCardArray[i]; // random card in deck
      FCardArray[i] := RandCard;
    end;
}
Listing 7.2  Continued

FTop := 0;
end;

function TCardDeck.Draw: TPlayingCard;
{ Picks the next card from the deck. }
begin
inc(FTop);
if FTop = 53 then
raise ECardError.Create('Deck is empty');
Result := FCardArray[FTop];
end;

initialization
Randomize;               // must seed random number generator
end.

The Game

The DDG BlackJack game’s interaction with the TCardX object occurs primarily in three procedures. One procedure, called Hit(), is called when the player chooses to accept another card. Another procedure, DealerHit(), is called when the dealer wants another card. Finally, the FreeCards() procedure is called to dispose of all the cards on the screen to prepare for another hand to be dealt.

The Hit() procedure works with the TCardX ActiveX control uniquely in a couple ways. First, it creates all the controls dynamically rather than using controls dropped from the Component Palette. Also, it never uses an instance variable of type TCardX—instead, it takes advantage of a with..do construct to create and use the object in one step. The following code shows the Hit() procedure:

procedure TMainForm.Hit;
{ Player hit }
begin
CurCard := CardDeck.Draw;              // draw card
with TCardX.Create(Self) do            // create card OCX
begin
Left := NextPlayerPos;               // set position
Top := PYPos;
Suit := Ord(CurCard.Suit);           // set suit
Value := Ord(CurCard.Face);          // set value
Parent := Self;                      // assign parent
Inc(NextPlayerPos, Width div 2);     // track position
Update;                              // Display card
end;
Db1Btn.Enabled := False;               // hit disables double down
if CurCard.Face = cvAce then PAceFlag := True;  // set ace flag
Inc(PlayerTotal, GetCardValue(CurCard));        // keep running total
PlayLbl.Caption := IntToStr(PlayerTotal);        // cheat
if PlayerTotal > 21 then                        // track bust
begin
  ShowMessage('Busted!');
  ShowFirstCard;
  ShowWinner;
end;
end;

In this procedure, a random card, called CurCard, is drawn from a TCardDeck object called CardDeck. A TCardX ActiveX control is then created, and property values are assigned. NextPlayerPos is a variable that keeps track of the position on the X-axis for the next card. PYPos is a constant that dictates the Y-axis position of the player hand. The Suit and Value properties are assigned values that correspond to the Suit and Face of CurCard. MainForm is assigned to be the Parent of the control, and the NextPlayerPos variable is incremented by half the width of a card. After all that, the PlayerTotal variable is incremented by the card value to keep track of the player's score.

The DealerHit() procedure works similarly to the Hit() procedure. The code from that procedure is shown here:

procedure TMainForm.DealerHit(CardVisible: Boolean);
{ Dealer takes a hit }
begin
  CurCard := CardDeck.Draw;              // dealer draws a card
  with TCardX.Create(Self) do            // create the ActiveX control
  begin
    Left := NextDealerPos;               // place card on form
    Top := PYPos;
    Suit := Ord(CurCard.Suit);           // assign suit
    FaceUp := CardVisible;
    Value := Ord(CurCard.Face);          // assign face
    Parent := Self;                      // assign parent for OCX
    Inc(NextDealerPos, Width div 2);     // track where to place next card
    Update;                              // Display card
  end;
  if CurCard.Face = cvAce then DAceFlag := True;   // set Ace flag
  Inc(DealerTotal, GetCardValue(CurCard));         // keep count
  DealLbl.Caption := IntToStr(DealerTotal);        // cheat
  if DealerTotal > 21 then                        // track dealer bust
    ShowMessage('Dealer Busted!');
end;
This method accepts a Boolean parameter called CardVisible, which indicates whether the card should be dealt face up. This is because blackjack rules dictate that the dealer’s first card must remain face down until the player has chosen to hold or has busted. Observing this rule, the first call to DealerHit() will result in False being passed in CardVisible.

The FreeCards() procedure is responsible for removing all the TCardX controls on the main form. Because the application doesn’t keep an array or a bunch of variables of type TCardX around to manage the cards on the screen, this procedure iterates through the form’s Controls array property looking for elements of type TCardX. When a control of that type is found, its Free method is called to remove it from memory. The trick here is to be sure to go backward through the array. If you don’t go backward, you run the risk of changing the order of controls in the array while you’re traversing the array, which can cause errors. The code for the FreeCards procedure is shown here:

```pascal
procedure TMainForm.FreeCards;
{ frees all AX Ctl cards on the screen }
var
  i: integer;
begin
  for i := ControlCount - 1 downto 0 do  // go backward!
    if Controls[i] is TCardX then
      Controls[i].Free;
end;
```

That completes the explanation of the main portions of the code that manipulates the ActiveX controls. The complete listing for Main.pas, the main unit for this application, is shown in Listing 7.3.

**Listing 7.3  The Main.pas Unit for the BJ Project**

```pascal
unit Main;

interface

uses
  Windows, Messages, SysUtils, Classes, Graphics, Controls, Forms, Dialogs,
  OleCtrls, Card_TLB, Cards, PlayCard, StdCtrls, ExtCtrls, Menus;

type
  TMainForm = class(TForm)
    Panel1: TPanel;
    MainMenu1: TMainMenu;
    Play1: TMenuItem;
    Deal1: TMenuItem;
    Hit1: TMenuItem;
```

```
Hold1: TMenuItem;
DoubleDown1: TMenuItem;
N1: TMenuItem;
Close1: TMenuItem;
Help1: TMenuItem;
About1: TMenuItem;
Panel2: TPanel;
Label3: TLabel;
CashLabel: TLabel;
BetLabel: TLabel;
HitBtn: TButton;
DealBtn: TButton;
HoldBtn: TButton;
ExitBtn: TButton;
BetEdit: TEdit;
DblBtn: TButton;
CheatPanel: TPanel;
DealLbl: TLabel;
PlayLbl: TLabel;
Label4: TLabel;
Label6: TLabel;
Cheat1: TMenuItem;
N2: TMenuItem;
procedure FormCreate(Sender: TObject);
procedure FormDestroy(Sender: TObject);
procedure About1Click(Sender: TObject);
procedure Cheat1Click(Sender: TObject);
procedure ExitBtnClick(Sender: TObject);
procedure DblBtnClick(Sender: TObject);
procedure DealBtnClick(Sender: TObject);
procedure HitBtnClick(Sender: TObject);
procedure HoldBtnClick(Sender: TObject);

private
CardDeck: TCardDeck;
CurCard: TPlayingCard;
NextPlayerPos: integer;
NextDealerPos: integer;
PlayerTotal: integer;
DealerTotal: integer;
PAceFlag: Boolean;
DAceFlag: Boolean;
PBJFlag: Boolean;
DBJFlag: Boolean;
DDFlag: Boolean;
procedure DealerHit(CardVisible: Boolean);
Listing 7.3  Continued

```pascal
procedure DoubleDown;
procedure EnableMoves(Enable: Boolean);
procedure FreeCards;
procedure Hit;
procedure Hold;
procedure ShowFirstCard;
procedure ShowWinner;
end;

var
  MainForm: TMainForm;

implementation

{$R *.DFM}

uses AboutU;

const
  PYPos = 175;        // starting y pos for player cards
  DYPos = 10;         // ditto for dealer's cards

procedure TMainForm.FormCreate(Sender: TObject);
begin
  CardDeck := TCardDeck.Create;
end;

procedure TMainForm.FormDestroy(Sender: TObject);
begin
  CardDeck.Free;
end;

procedure TMainForm.About1Click(Sender: TObject);
{ Creates and invokes about box }
begin
  with TAboutBox.Create(Self) do
  try
    ShowModal;
  finally
    Free;
  end;
end;

procedure TMainForm.Cheat1Click(Sender: TObject);
begin
```

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end;

procedure TMainForm.ExitBtnClick(Sender: TObject);
begin
Close;
end;

procedure TMainForm.DblBtnClick(Sender: TObject);
begin
DoubleDown;
end;

procedure TMainForm.DealBtnClick(Sender: TObject);
begin
Deal;
end;

procedure TMainForm.HitBtnClick(Sender: TObject);
begin
Hit;
end;

procedure TMainForm.HoldBtnClick(Sender: TObject);
begin
Hold;
end;

procedure TMainForm.Deal;
{ Deals a new hand for dealer and player }
begin
FreeCards;                      // remove any cards from screen
BetEdit.Enabled := False;       // disable bet edit ctrl
BetLabel.Enabled := False;      // disable bet label
if CardDeck.Count < 11 then     // resuffle deck if < 11 cards
begin
Panel1.Caption := 'Reshuffling and dealing...';
CardDeck.Shuffle;
end
else
Panel1.Caption := 'Dealing...';
Panel1.Show;                    // show "dealing" panel
Panel1.Update;                  // make sure it's visible
NextPlayerPos := 10;            // set horiz position of cards
NextDealerPos := 10;
continues
PlayerTotal := 0;                 // reset card totals
DealerTotal := 0;
PAceFlag := False;                // reset flags
DAceFlag := False;
PBJFlag := False;
DBJFlag := False;
DDFlag := False;
Hit;                              // hit player
DealerHit(False);                 // hit dealer
Hit;                              // hit player
DealerHit(True);                  // hit dealer
Panel1.Hide;                      // hide panel
if (PlayerTotal = 11) and PAceFlag then
  PBJFlag := True;                // check player blackjack
if (DealerTotal = 11) and DAceFlag then
  DBJFlag := True;                // check dealer blackjack
if PBJFlag or DBJFlag then        // if a blackjack occurred
  begin
    ShowFirstCard;                  // flip dealer's card
    ShowMessage('Blackjack!');
    ShowWinner;                     // determine winner
  end
else
  EnableMoves(True);              // enable hit, hold double down
end;

procedure TMainForm.DealerHit(CardVisible: Boolean);
{ Dealer takes a hit }
begin
  CurCard := CardDeck.Draw;           // dealer draws a card
  with TCardX.Create(Self) do         // create the ActiveX control
  begin
    Left := NextDealerPos;            // place card on form
    Top := DYPos;
    Suit := Ord(CurCard.Suit);        // assign suit
    FaceUp := CardVisible;
    Value := Ord(CurCard.Face);       // assign face
    Parent := Self;                   // assign parent for AX Ctl
    Inc(NextDealerPos, Width div 2);  // track where to place next card
    Update;                           // show card
  end;
  if CurCard.Face = cvAce then DAceFlag := True;   // set Ace flag
  Inc(DealerTotal, GetCardValue(CurCard));         // keep count
  DealLbl.Caption := IntToStr(DealerTotal);        // cheat
  if DealerTotal > 21 then                         // track dealer bust
ShowMessage('Dealer Busted!');
end;

procedure TMainForm.DoubleDown;
{ Called to double down on dealt hand }
begin
  DDFlag := True;                // set double down flag to adjust bet
  Hit;                           // take one card
  Hold;                          // let dealer take his cards
end;

procedure TMainForm.EnableMoves(Enable: Boolean);
{ Enables/disables moves buttons/menu items }
begin
  HitBtn.Enabled := Enable;              // Hit button
  HoldBtn.Enabled := Enable;             // Hold button
  DblBtn.Enabled := Enable;              // Double down button
  Hit1.Enabled := Enable;                // Hit menu item
  Hold1.Enabled := Enable;               // Hold menu item
  DoubleDown1.Enabled := Enable;         // Double down menu item
end;

procedure TMainForm.FreeCards;
{ frees all AX Ctl cards on the screen }
var
  i: integer;
begin
  for i := ControlCount - 1 downto 0 do  // go backward!
    if Controls[i] is TCardX then
      Controls[i].Free;
end;

procedure TMainForm.Hit;
{ Player hit }
begin
  CurCard := CardDeck.Draw;          // draw card
  with TCardX.Create(Self) do        // create card AX Ctl
  begin
    Left := NextPlayerPos;           // set position
    Top := PYPos;
    Suit := Ord(CurCard.Suit);       // set suit
    Value := Ord(CurCard.Face);      // set value
    Parent := Self;                  // assign parent
    Inc(NextPlayerPos, Width div 2); // track position
    Update;                          // Display card
  end;
continues
Listing 7.3  Continued

DblBtn.Enabled := False;               // hit disables double down
if CurCard.Face = cvAce then PAceFlag := True;  // set ace flag
Inc(PlayerTotal, GetCardValue(CurCard));        // keep running total
PlayLbl.Caption := IntToStr(PlayerTotal);       // cheat
if PlayerTotal > 21 then                        // track bust
begin
  ShowMessage('Busted!');
  ShowFirstCard;
  ShowWinner;
end;
end;

procedure TForm1.Hold;
{ Player holds. This procedure allows dealer to draw cards. }
begin
  EnableMoves(False);
  ShowFirstCard;                  // show dealer card
  if PlayerTotal <= 21 then       // if player hasn't busted...
  begin
    if DAceFlag then              // if dealer has an Ace...
    begin
      { Dealer must hit soft 17 }
      while (DealerTotal <= 7) or ((DealerTotal >= 11) and
      (DealerTotal < 17)) do
        DealerHit(True);
    end
    else
    // if no Ace, keep hitting until 17 is reached
      while DealerTotal < 17 do DealerHit(True);
    end;
    ShowWinner;                     // Determine winner
  end;
procedure TForm1.ShowFirstCard;
var
  i: integer;
begi
  // make sure all cards are face-up
  for i := 0 to ControlCount - 1 do
    if Controls[i] is TCardX then
    begin
      TCardX(Controls[i]).FaceUp := True;
      TCardX(Controls[i]).Update;
    end;
procedure TMainForm.ShowWinner;
{ Determines winning hand }
var
  S: string;
begin
  if DAceFlag then                      // if dealer has an Ace...
    begin
      if DealerTotal + 10 <= 21 then      // figure best hand
        inc(DealerTotal, 10);
    end;
  if PACeFlag then                     // if player has an Ace...
    begin
      if PlayerTotal + 10 <= 21 then     // figure best hand
        inc(PlayerTotal, 10);
    end;
  if DealerTotal > 21 then             // set score to 0 if busted
    DealerTotal := 0;
  if PlayerTotal > 21 then
    PlayerTotal := 0;
  if PlayerTotal > DealerTotal then    // if player wins...
    begin
      S := 'You win!';
      if DDFlag then                     // pay 2:1 on double down
        CashLabel.Caption := IntToStr(StrToInt(CashLabel.Caption) +
          StrToInt(BetEdit.Text) * 2)
      else                               // pay 1:1 normally
        CashLabel.Caption := IntToStr(StrToInt(CashLabel.Caption) +
          StrToInt(BetEdit.Text));
      if PBJFlag then                    // pay 1.5:1 on blackjack
        CashLabel.Caption := IntToStr(StrToInt(CashLabel.Caption) +
          StrToInt(BetEdit.Text) div 2)
    end
  else if DealerTotal > PlayerTotal then    // if dealer wins...
    begin
      S := 'Dealer wins!';
      if DDFlag then                     // lose 2x on double down
        CashLabel.Caption := IntToStr(StrToInt(CashLabel.Caption) -
          StrToInt(BetEdit.Text) * 2)
      else                               // normal loss
        CashLabel.Caption := IntToStr(StrToInt(CashLabel.Caption) -
          StrToInt(BetEdit.Text));
    end
  else
    S := 'Push!';                      // push, no one wins

  CashLabel.Caption := S;
end;
Listing 7.3  Continued

if MessageDlg(S + 
  #13#10'Do you want to play again with the same bet?',
  mtConfirmation, [mbYes, mbNo], 0) = mrYes then
  Deal;
  BetEdit.Enabled := True; // allow bet to change
  BetLabel.Enabled := True;
end;
end.

Invoking an ActiveX Control Method

In Listing 7.3, you might have noticed that the main form contains a method that creates and
displays an About dialog box. Figure 7.7 shows what this About dialog box looks like when
invoked.

![About box](image)

**Figure 7.7**

DDG BlackJack’s About dialog box.

This About dialog box is special because it contains a button that, when selected, shows an
About box for the CardX ActiveX control by calling its AboutBox() method. The About box for
the CardX control is shown in Figure 7.8.

The code that accomplishes this task follows. Looking ahead, the same technique used to make
vTable calls to OLE Automation servers in Chapter 23, “COM and ActiveX,” is used here.

```pascal
procedure TAboutBox.CardBtnClick(Sender: TObject);
begin
  Card.AboutBox;
end;
```
Summary

After reading this chapter, you should understand all the important aspects of using ActiveX controls in the Delphi environment. You learned about integrating an ActiveX control into Delphi, how the Object Pascal ActiveX control wrapper works, how to deploy an ActiveX control–equipped application, how to register an ActiveX control, and how to incorporate ActiveX controls into an application. Because of their market presence, ActiveX controls often can offer a blast of instant productivity. However, because ActiveX controls have some disadvantages, also remember to look for native VCL components when shopping for controls.