Using ActiveX Controls

Microsoft ActiveX Controls

- **Reusable software components that can be plugged into many different programs**
- **Allows you to design & use custom controls**
- **Like concept of hardware components**
- **Expansion of OLE technology**
  - **Enabled combining docs created with different apps into a single doc**
  - **ActiveX allows it to work in a distributed environment (e.g., the internet)**

COM Technology

- **Microsoft's Component Object Model**
- **Interface and interaction model**
- **Defines how to construct ActiveX objects & how interfaces are designed**
- **A COM "Interface":**
  - **Like a function call into an ActiveX object**
  - **COM specifies how function must be built & called**
  - **To pass data & events to/from controls**
  - **Not specific to any language**
- **ActiveX controls can be used with many different tools (e.g., Access, FoxPro, VB)**

Automation

- **Key technology in ActiveX**
- **Enables an app embedded in another app to activate itself & control its part of the user interface**
  - **Does its thing and shuts itself down when user moves on**
  - **e.g., an Excel spreadsheet in a Word document**

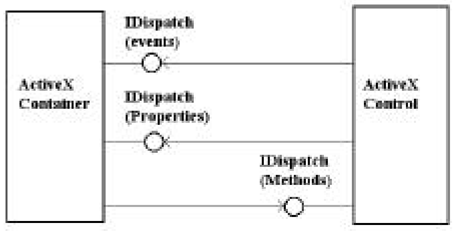
Servers and Containers

- **Embedding an ActiveX object in another**
- **Embedded object is implemented as an ActiveX server**
- **Containing object called a container**
- **A server can also be a container**
  - **(e.g., Internet Explorer)**
- An ActiveX control is a special case of an ActiveX server
- In MFC any class derived from CWnd can be an ActiveX control container
- COleControl is base class for ActiveX controls

Interaction between control & container

- Occur through three IDispatch Interfaces
  - Events
  - Properties
  - Methods

IDispatch Interfaces



ActiveX Control Events

- Notification messages sent from the control to the container application
- Control sends event to container when something occurs inside control
  - e.g., mouse clicks, pressed buttons, expiring timers
- Triggering of events done in the IDispatch interface in the container
- Two types: Stock & Custom

ActiveX Control Properties

- Attributes of controls visible to and usually modifiable by container
  - Stock: e.g., background color, default font
  - Custom: related to functionality of control
- Provided by container but maintained by control
- Use Class Wizard Automaton tab to specify control properties
- Must also specify property aspects
  - name shown to container
  - internal variable used in code

ActiveX Control Methods

- Function exposed by control and called by container
- Use Class Wizard Automation tab to add methods to a control
  - Specify name, return type, & parameters

Components and Controls Gallery

- Visual Studio’s store of reusable components
- Most are ActiveX controls
- Adding your own classes to the Gallery:
  - Open project containing the class
  - Open Class View in project workspace
  - Right click on class name
  - Select “Add to Gallery”
- Displaying all available controls on computer:
  - Main menu: “Project | Add to Project | “Components and Controls” --> Component Gallery dialog box
  - Select Registered ActiveX Controls from list box

Adding an ActiveX Control to Dialog Box Editor

- So you can use it like any of the other standard controls
  - Select desired ActiveX control icon
  - Click “Insert” button
  - Click “OK” on resulting message box
  - Click “OK” to resulting list box containing the classes that will be added to your project
  - Click “Close” to get rid of Gallery dialog box
- Now control will appear in Dialog box editor tool box and can be added by dragging and dropping

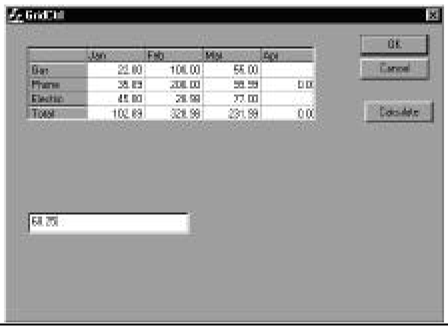
Configuring ActiveX Control w/ Class Wizard

- Just as with other controls, use Class Wizard to add message-handling functions and associate it with an MFC object
- Add member variables just as though it were a standard control
- Most controls will have many properties exposed as variables

An Example: Using the Microsoft Hierarchical Flex Grid Control

- Grid Control
  - Like a mini spread sheet
  - Divided into rows and columns --> cells
  - Tracks active cells, size & contents of each cell
  - Data in a cell obtained through a member function call
  - You can:
    - Retrieve current row, cell, column information
    - Set attributes (font, size, contents) for current cell
    - Retrieve attributes of current cell

The GridCtrl App



	Jan	Feb	Mar	Apr
Gas	22.00	106.00	55.00	
Phone	38.89	208.00	59.59	0.00
Electric	45.00	26.99	77.00	
Total	102.89	328.99	231.99	0.00

68.250

Preparing the App

- New MFC AppWizard (exe) application
  - Choose Dialog-based
  - Makes sure ActiveX Controls check box is selected
- Add the grid control to the app (see above)
  - Then open ResourceView and double-click on IDD_GRIDCTRL_DLG
  - Drag and drop the the new grid control from the tool bar to the dialog-app

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- Right click on grid control; select "Properties" "General" Tab:
  - ID: IDC_GRID
- "Control" tab:
  - Rows: 5, Fixed Rows: 1
  - Cols: 5, Fixed Cols: 1
  - ScrollBars: 0-None
- Add an edit control
  - ID: IDC_EDIT
- Add a "Calculate" button
  - ID: IDC_CALC

- Use Class Wizard to attach member variables to edit and grid controls in the CGridCtrlDlg class:

Resource ID	Category	Type	Variable name
IDC_EDIT	Control	Cedit	m_edit
IDC_GRID	Control	CMSFlexGrid	m_grid

- Add protected member variables to CGridCtrlDlg class:
  - BOOL m_bEditing
  - int m_nRow
  - int m_nCol

- Add initialization code to CGridCtrlDlg::OnInitDialog
  - See listing
- Use Class Wizard to add a “Click” handler for the Grid control
  - Class: CGridCtrlDlg
  - Tab: Message Maps
  - Object ID: IDC_GRID
  - Message: Click
  - Handler Function: default OnClickGrid()
- Add code to OnClickGrid() -- See listing

- Recomputing the totals
- Use Class Wizard to a message handler to the “Calculate” button
  - Object ID: IDC_CALC
  - Class: CGridCtrlDlg
  - Message: BN_CLICKED
  - Function: default OnCalc()
- Add code to OnCalc() -- See listing
- Build the Application