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**
  - **Enables combining documents 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**
  - **And how 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**

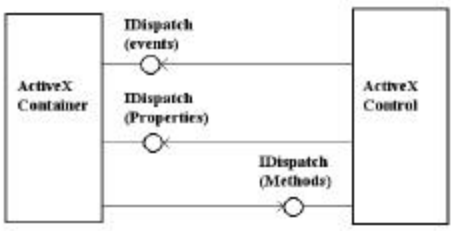
Servers and Containers

- **Embedding an ActiveX object in another app**
- **Embedded object is implemented as an ActiveX "server"**
- **Containing object called a "container"**
- **A server can also be a container**
  - **(e.g., Internet Explorer)**
- ActiveX control:a special case of ActiveX server
  - ActiveX controls cannot run on their own
  - Stored in an .ocx file
- 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
  - Usually as a result of user action
- 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
- Calls a handler function 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
- Must also specify property aspects
  - name shown to container
  - internal variable used in code

ActiveX Control Methods

- Functions exposed by control and called by container
- Use Visual Studio Wizards to add methods to a control
  - Specify name, return type, & parameters

Adding an ActiveX Control to a Dialog Box

- Right click on dialog box
  - Click “Insert ActiveX control”
  - “Insert ActiveX Control” dialog box appears
- Scroll through ActiveX controls registered on system
  - Select the one you want
- Click “OK” and control will be added

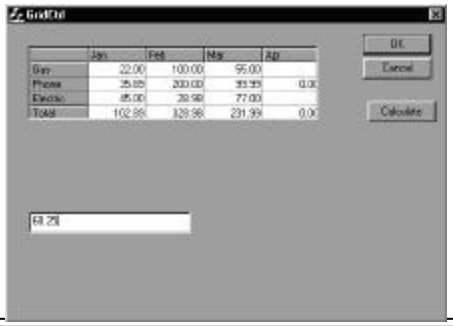
Configuring an ActiveX Control

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

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



Preparing the App

- New MFC AppWizard (exe) application
  - Choose Dialog-based application type
  - In Advanced Features, make sure ActiveX Controls check box is selected
  - Name it GridCtrl

Adding the Microsoft ActiveX FlexGrid Control

- Right click on App's dialog box
  - Click "Insert ActiveX control"
  - "Insert ActiveX Control" dialog box appears
- Scroll through ActiveX controls registered on system
  - Select "Microsoft Flex Grid Control 6.0"
- Click "OK" and control will be added to app's dialog box
- Expand size of control

- Click on grid control to bring up its properties box, change following properties:
  - ID: IDC_GRID
  - 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

- Add and attach member control 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 “Button Click” event handler for the Grid control
  - Class: CGridCtrlDlg
  - Lightning bolt (Events)
  - Object ID: IDC_GRID
  - Message: Click
  - Handler Function: default ClickGrid()
- Add code to ClickGrid()
  - See listing

Recomputing the Totals

- Add a click event handler to the “Calculate” button
  - Object ID: IDC_CALC
  - Class: CGridCtrlDlg
  - Message: BN_CLICKED
  - Function: default OnCalc()
- Add code to OnBnClickedCalc()
  - See listing
- Build the Application