



制图控件应用开发

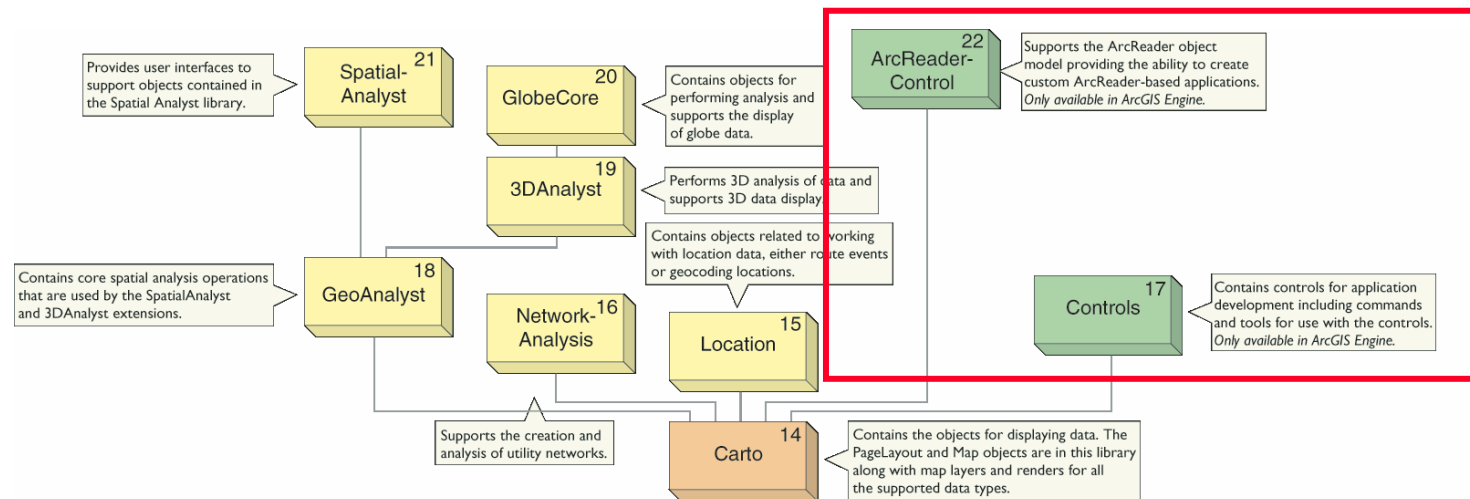


课 3 概述

- ◆ **ArcGIS Engine 控件**
- ◆ 控件框架
- ◆ 制图控件和对象
- ◆ 框架控件
- ◆ 命令和工具
- ◆ 管理地图文档

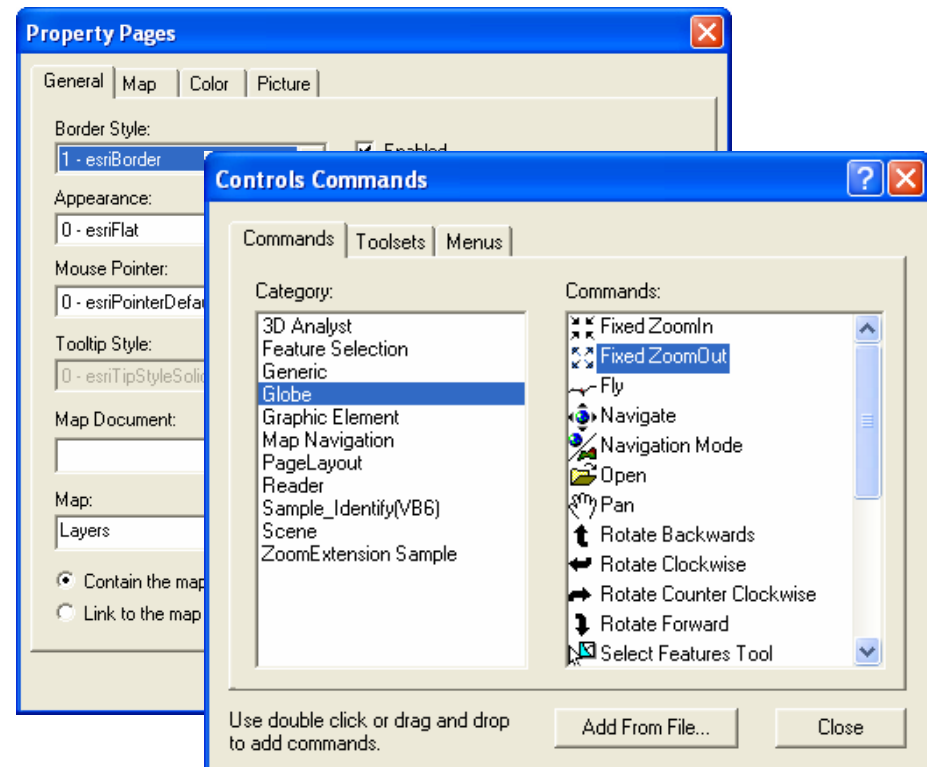
ArcGIS Engine 控件

- ◆ 制图控件: MapControl 和 PageLayoutControl
- ◆ 框架控件: TOCControl 和 ToolbarControl
- ◆ Reader Control: ReaderControl
- ◆ 所有控件都是通过Carto来访问 ArcObjects



开始使用控件

- ◆ 控件为开发者提供了一个开发的框架
- ◆ 封装了 **ArcObjects** 的功能
- ◆ 使用**property pages**易于快速入门
 - ◆ 设置伙伴控件
 - ◆ 访问数据
 - ◆ 加载命令和工具



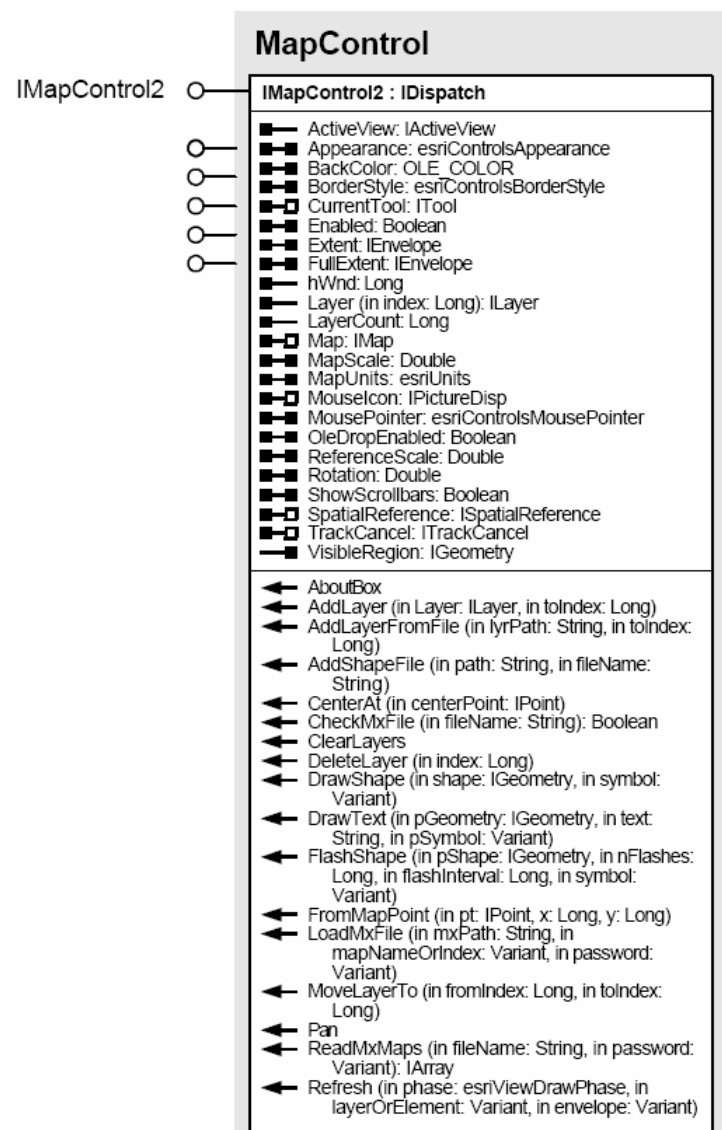
MapControl控件

◆ MapControl

- ◆ 封装Map coclass
- ◆ 绘制单Data Frame
- ◆ 用来分析和浏览
- ◆ 暴露鼠标和绘制事件
- ◆ 装载地图文档和其它文件
- ◆ 设置当前工具

◆ 库

◆ MapControl.ocx



PageLayoutControl控件

◆ PageLayoutControl

◆ 封装PageLayout coclass

◆ 绘制地图元素

◆ 创建版面视图

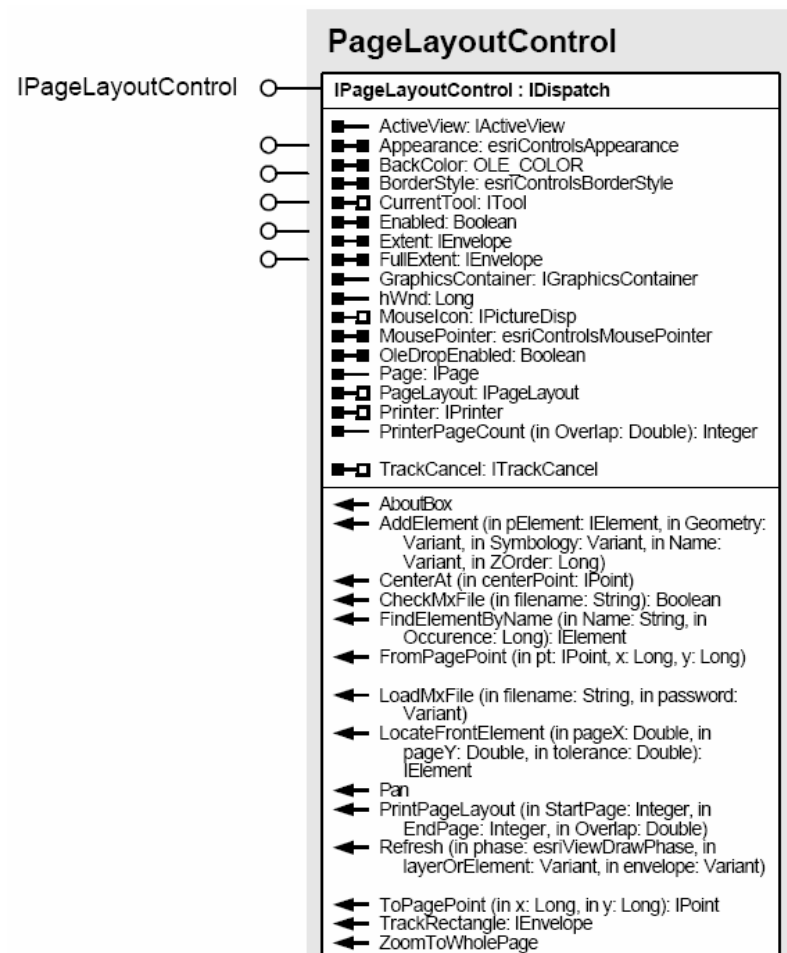
◆ 打印

◆ 设置当前工具

◆ 加载地图文档

◆ 库

◆ PageLayoutControl.ocx



制图控件: 数据访问

◆ IMapControl3/IPageLayoutControl2

◆ CheckMxFile

◆ LoadMxFile

◆ ReadMxMaps

```
Private Sub Form1_Load(ByVal sender As System.Object,
    ByVal e As System.EventArgs) Handles MyBase.Load
    'Load map document
    Dim fileName As String
    fileName = "C:\student\daae\data\world.mxd"
    If AxMapControl1.CheckMxFile(fileName) Then
        AxMapControl1.LoadMxFile(fileName, "")
    End If

    'Specify which dataframe to display in map
    Dim maps As IArray
    maps = AxMapControl1.ReadMxMaps(fileName, "")
    Dim map As IMap
    Dim i as Integer
    For i = 0 to maps.Count - 1
        map = maps.Element(i)
        If map.Name = "Layers" Then
            AxMapControl1.Map = map
        End If
    Next
End Sub
```

制图控件: 事件

◆ IMapControlEvents/IPageLayoutControlEvents

- ◆ OnAfterDraw, OnBeforeScreenDraw, OnAfterScreenDraw, OnExtentUpdated, OnMouseDown/Up/Move, OnKeyDown/Up, OnOleDrop, OnViewRefreshed, OnMap/PageReplaced

```
Private Sub AxMapControl1_OnMouseDown(...) Handles AxMapControl1.OnMouseDown
    ... 'Rotate if right mouse button is clicked
    pPoint = New Point
    pPoint.PutCoords(e.mapX, e.mapY)
    m_pMapControl.Extent.XMin + (m_pMapControl.Extent.Width / 2)
    m_pPoint.Y = m_pMapControl.Extent.YMin + (m_pMapControl.Extent.Height / 2)
    m_pMapControl.ActiveView.ScreenDisplay.RotateStart(pPoint, m_pPoint)
End Sub
Private Sub AxMapControl1_OnMouseMove(...) Handles AxMapControl1.OnMouseMove
    pPoint = New Point
    pPoint.PutCoords(e.mapX, e.mapY) 'Set current mouse location coordinates
    m_pMapControl.ActiveView.ScreenDisplay.RotateMoveTo(pPoint)
    m_pMapControl.ActiveView.ScreenDisplay.RotateTimer() 'Draw rotated display
End Sub
Private Sub AxMapControl1_OnMouseUp(...) Handles AxMapControl1.OnMouseUp
    Dim dRotationAngle As Double 'Get rotation angle
    dRotationAngle = m_pMapControl.ActiveView.ScreenDisplay.RotateStop
    m_pMapControl.Rotation = dRotationAngle 'Rotate the MapControl's display
    m_pMapControl.Refresh(ESRI.ArcGIS.Carto.esriViewDrawPhase.esriViewGeography)
End Sub
```


其它成员

◆ IMapControl3/IPageLayoutControl2

◆ DocumentFilename, Object, KeyIntercept, SuppressResizeDrawing, CustomProperty

```
Private Const WM_ENTERSIZEMOVE As Integer = &H231    'For resizing
Private Const WM_EXITSIZEMOVE As Integer = &H232    'For resizing
Private m_mapControl As IMapControl3
Private Sub Form1_Load(...) Handles MyBase.Load
    'Suppress drawing while resizing
    m_mapControl = AxMapControl1.Object
    setstyle(ControlStyles.EnableNotifyMessage, True)
End Sub
Protected Overrides Sub OnNotifyMessage(ByVal m As System.Windows.Forms.Message)
    If (m.Msg = WM_ENTERSIZEMOVE) Then
        AxMapControl1.SuppressResizeDrawing(True, 0)
    ElseIf (m.Msg = WM_EXITSIZEMOVE) Then
        AxMapControl1.SuppressResizeDrawing(False, 0)
    End If
End Sub
```

MapControl 对象

◆ 通过**Map**你可以访问所有的对象

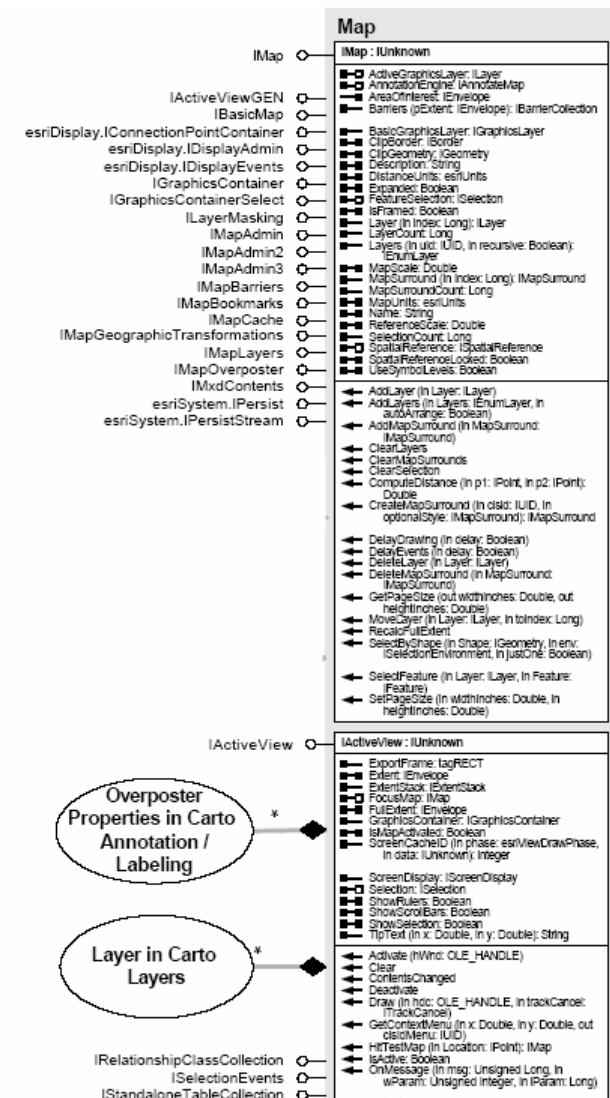
◆ **Layers**

◆ **Renderers**

◆ **Symbols**

◆ **FeatureClasses**

◆ **Workspaces**



使用map和layers属性

◆ 提供直接访问Map和Layer对象的方法属性

◆ IMapControl3

◆ AddLayerFromFile, AddShapeFile, AddLayer, DeleteLayer, MoveLayerTo, Layer, Map

```
Private Sub Form1_Load(...) Handles MyBase.Load
    Dim filePath As String = "C:\Program Files\ArcGIS\Bin\TemplateData\World"
    AxMapControl1.AddShapeFile(filePath, "cntry00.shp") 'Add the country shapefile
    AxMapControl1.AddShapeFile(filePath, "city.shp") 'Add the city shapefile
    'Add layer at index 1
    AxMapControl1.AddLayerFromFile("C:\student\daae\data\globedata\World Image.lyr", 1)
End Sub

Private Sub SwitchLayerOrder(ByVal lyrIndex1 As Integer, ByVal lyrIndex2 As Integer)
    AxMapControl1.MoveLayerTo(lyrIndex1, lyrIndex2)
    If lyrIndex1 < lyrIndex2 Then
        AxMapControl1.MoveLayerTo(lyrIndex2 - 1, lyrIndex1)
    Else
        AxMapControl1.MoveLayerTo(lyrIndex2 + 1, lyrIndex1)
    End If
End Sub

Private Sub btnApplySwitch_Click(...) Handles btnApplySwitch.Click
    SwitchLayerOrder(TextBox1.Text, TextBox2.Text)
End Sub
```

使用MapControl控件的显示函数

◆ 简化和地图相互作用的成员

◆ IMapControl3

◆ Drawshape, Flashshape, DrawText, TrackCircle, TrackLine, TrackPolygon, TrackRectangle

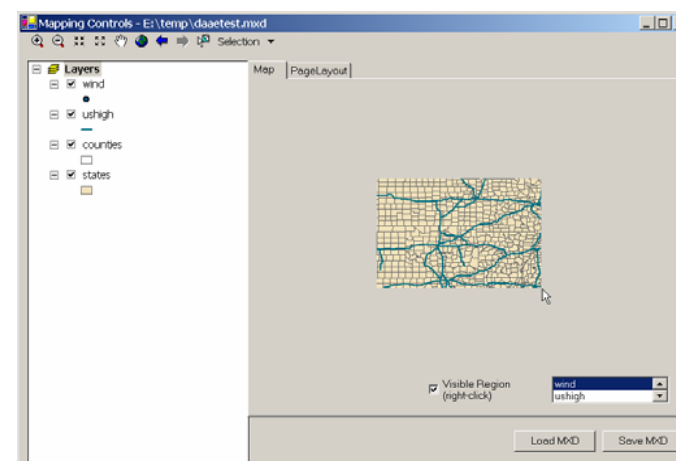
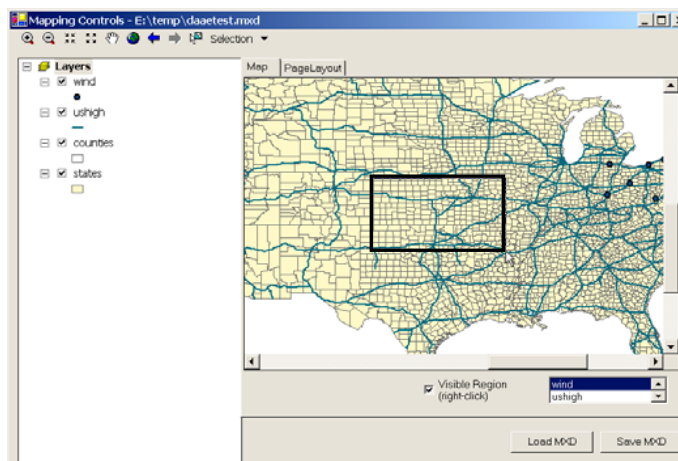
```
Private Sub AxMapControl1_OnMouseDown(...) Handles AxMapControl1.OnMouseDown
    'Zoom to the area of interest using the TrackRectangle
    If (e.button = 2) Then ' Right-click
        AxMapControl1.Extent = AxMapControl1.TrackRectangle
    End If
End Sub
```

```
Public Shared Sub FlashShape(ByVal axMapControl As AxMapControl, ByVal numFlash As Integer)
    ...
    'Flash all selected features in the map
    enumFeature = map.FeatureSelection
    enumFeature.Reset()
    feature = enumFeature.Next
    Do While Not feature Is Nothing
        axMapControl.FlashShape(feature.Shape, numFlash, 500) '500 is the flash interval
        feature = enumFeature.Next
    Loop
End Sub
```

设置地图的可视区

- ◆ 控制显示的可视区域
- ◆ 可以设置多种shapes (geometries)
- ◆ IMapControl3
 - ◆ VisibleRegion

```
Private Sub AxMapControl1_OnMouseDown(...) Handles  
    AxMapControl1.OnMouseDown  
    'Clip the layers using the TrackRectangle  
    If (e.button = 2) Then 'Right-click  
        Dim rect As IEnvelope  
        rect = m_mapControl.TrackRectangle  
        AxMapControl1.VisibleRegion = rect.Envelope  
    End If  
End Sub
```



在地图上显示提示（tips）

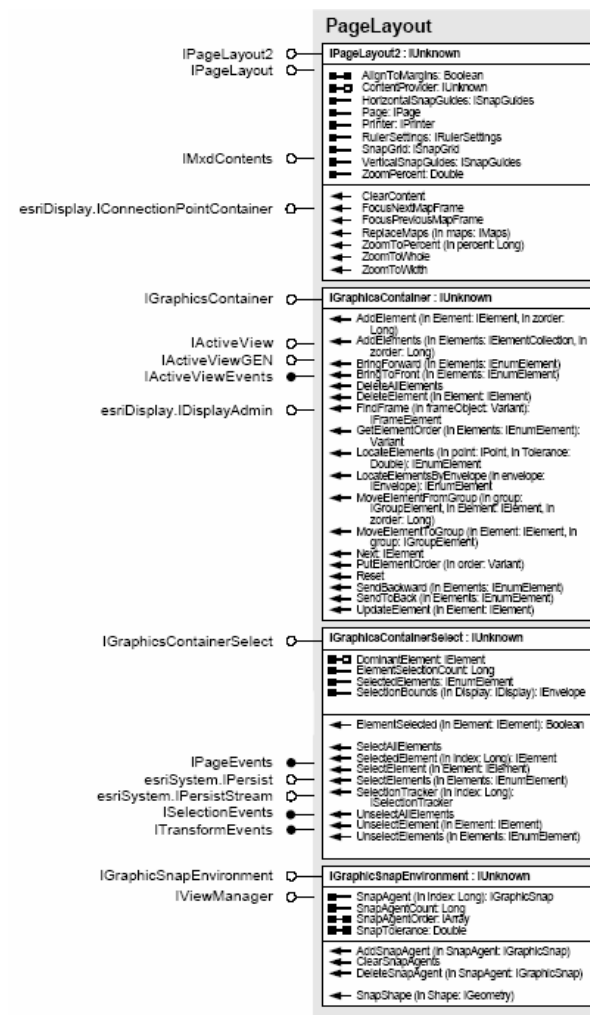
- ◆ 可以为图层设置提示
- ◆ 步骤
 1. 设置**ILayer::ShowTips**
 2. 在鼠标移动时显示提示文本
- ◆ 使用**ToolTip**控件来显示提示

```
Dim i As Integer
Dim layer As ILayer
For i = 0 To axMapControl.LayerCount - 1
    If index = i Then
        layer = axMapControl.get_Layer(i)
        layer.ShowTips = True
    End If
Next i
```

```
Private Sub AxMapControl1_OnMouseMove(...) Handles AxMapControl1.OnMouseMove
    'Set the MapControl tooltip text to that of the layers
    Dim layer As ILayer
    layer = AxMapControl1.Map.Layer(1stLayers.SelectedIndex)
    If Not TypeOf layer Is IFeatureLayer Then Exit Sub
    ToolTip1.SetToolTip(AxMapControl1, layer.TipText(e.mapX, e.mapY,
        AxMapControl1.Extent.Width / 100))
End Sub
```

PageLayoutControl对象

- ◆ 使用PageLayout 来访问其它对象
- ◆ Elements(例子代码 MapElements)
 - ◆ FrameElements
 - ◆ MapFrame
 - ◆ MapSurroundFrame
 - ◆ GraphicElements
 - ◆ PictureElements



使用elements

◆ 关于elements有很多高级的成员函数

◆ IPageLayoutControl

◆ AddElement

◆ FindElementByName

◆ LocateFrontElement

◆ GraphicsContainer

```
Private Sub AxPageLayoutControl1_OnMouseDown(ByVal...
    Dim point As IPoint = New Point
    point.PutCoords(e.Page.X, e.Page.Y)

    'Create a text element
    Dim textElement As ITextElement
    textElement = New TextElement
    textElement.Text = Today.Date
    Dim element As IElement = textElement
    Dim elementProperties as IElementProperties
    elementProperties = element
    elementProperties.Name = "Date Name"
    element.Geometry = point

    Dim graphicsContainer As IGraphicsContainer
    graphicsContainer = m_PageLayout.GraphicsContainer
    graphicsContainer.AddElement(element,0)
    m_PageLayout.Refresh()
End Sub
```

```
'Find the element by name later
Dim pageLayoutControl2 As IPageLayoutControl2
pageLayoutControl2 = AxPageLayoutControl1.Object
m_element = pageLayoutControl2.FindElementByName("Date Name")
```


显示选择的elements

◆ 使用SelectionTracker 来显示elements

◆ 两步

◆ 选择元素

◆ 绘制

◆ OnAfterDraw

```
' Select the element
Dim graphicsContainerSelect As IGraphicsContainerSelect
graphicsContainerSelect = AxPageLayoutControl1.ActiveView
graphicsContainerSelect.SelectElement(m_element)

AxPageLayoutControl1.ActiveView.PartialRefresh(esriViewDrawPhase.esriViewForeground, Nothing, Nothing)
```

```
Private Sub AxPageLayoutControl1_OnAfterDraw(...) Handles AxPageLayoutControl1.OnAfterDraw
    If (e.viewDrawPhase = esriViewDrawPhase.esriViewForeground) Then
        If (m_element Is Nothing) Then Exit Sub
        'Draw with element as selected
        Dim selectionTracker As ISelectionTracker
        selectionTracker = m_element.SelectionTracker
        selectionTracker.Draw(e.display, 0, esriTrackerStyle.esriTrackerDominant)
    End If
End Sub
```

打印版面视图

◆ IPageLayoutControl2

◆ Page

◆ Printer

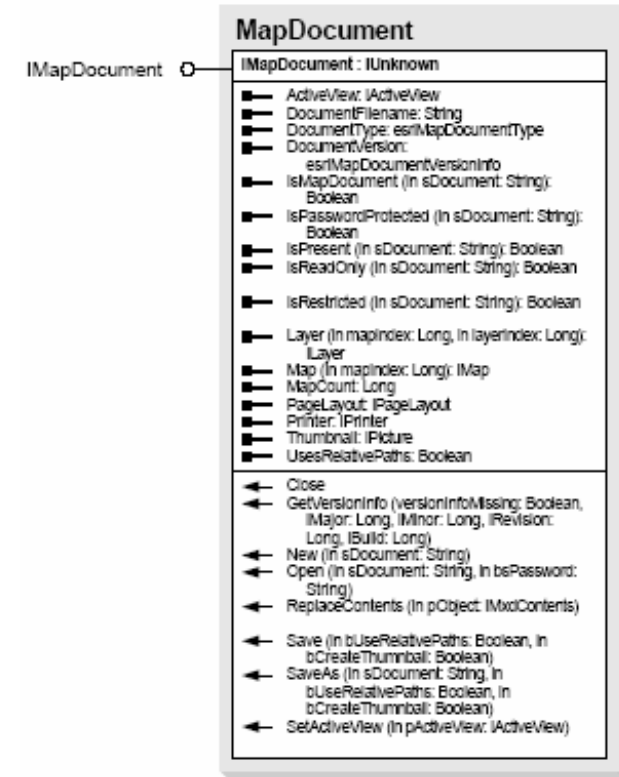
◆ PrinterPageCount

◆ PrintPageLayout

```
AxPageLayoutControl1.ZoomToWholePage()  
If Not AxPageLayoutControl1.Printer Is Nothing Then  
    'Set the page size  
    AxPageLayoutControl1.Page.FormID = esriPageFormID.esriPageFormLetter  
  
    'Portrait orientation  
    AxPageLayoutControl1.Page.Orientation = 1  
  
    'Determine page count  
    Dim pageCount as Integer = AxPageLayoutControl1.get_PrinterPageCount()  
  
    'Print page range  
    AxPageLayoutControl1.PrintPageLayout(1,pageCount,0.0)  
End If
```

使用地图文档

- ◆ **MXD** 文件是结构化的存储文档
- ◆ 通常由**ArcMap**创建
- ◆ 包含持久对象
 - ◆ Maps, Layers, PageLayout, ...
- ◆ **MapDocument** 使以下成为可能
 - ◆ 读取 **mx**d, **lyr**, **mxt**, and **pmf** files
 - ◆ 写新的 **mx**d files
 - ◆ 访问**map document**的内容



IMapDocument: 打开和保存

◆ 读取和写地图文档的成员函数

◆ **Open:** 打开已经存在的地图文档 (mxd, mxt, lyr, pmf)

◆ **SaveAs:** 保存当前文档到新的文件

```
Public Sub OpenDocument(ByRef sFilePath As String)
    m_pMapDocument = New MapDocument 'Create a new map document
    m_pMapDocument.Open(sFilePath) 'Open the map document selected
    'Set the PageLayoutControl page layout to the map document page layout
    AxPageLayoutControl1.PageLayout = m_pMapDocument.PageLayout
End Sub

Private Sub cmdSaveAs_Click(...) Handles cmdSaveAs.Click
    ...
    sFilePath = SaveFileDialog1.FileName
    If sFilePath = m_pMapDocument.DocumentFilename Then
        SaveDocument() 'Save changes to the current document
    Else
        m_pMapDocument.SaveAs(sFilePath, True) 'SaveAs a new document with relative paths
        OpenDocument(sFilePath) 'Open document
        MsgBox("Document saved successfully!", , "Saved Document")
    End If
End Sub
```

IMapDocument:新建和保存

◆ 读取和写地图文档的成员函数

◆ **New:** 用给定的名称（**mxid**）创建地图文档

◆ **Save:** 保存内容到当前文档

```
Private m_pMapDocument As IMapDocument
Private Sub btnNewCmd_Click(...) Handles btnNewCmd.Click
    SaveFileDialog1.Title = "Save Map Document"
    SaveFileDialog1.Filter = "Map Documents (*.mxid)|*.mxid"
    SaveFileDialog1.InitialDirectory = "C:\Temp\"
    SaveFileDialog1.ShowDialog()
    m_pMapDocument.New(SaveFileDialog1.FileName)
End SubPublic
Sub SaveDocument()
    If m_pMapDocument.IsReadOnly(m_pMapDocument.DocumentFilename) = True Then
        MsgBox("This map document is read only!", , "Save Failed")
        Exit Sub
    End If
    'Save with the current relative path setting
    m_pMapDocument.Save(m_pMapDocument.UsesRelativePaths)
    MsgBox("Changes saved successfully!", , "Saved Document")
End Sub
```

访问地图文档中的对象

- ◆ 控件可以直接引用对象 (**Map and PageLayout**) 或访问自己的拷贝

- ◆ **Reference**

- ◆ 直接

```
AxMapControl1.Map = m_pMapDocument.Map(0)  
AxPageLayoutControl1.PageLayout = m_pMapDocument.PageLayout
```

- ◆ **Copy**

- ◆ 使用**ObjectCopy** 避免共享引用
 - ◆ 深度复制

```
Dim objCopy As IObjectCopy = New ObjectCopy  
AxMapControl1.Map = objCopy.Copy(mapDocument.Map(0))  
AxPageLayoutControl1.PageLayout = objCopy.Copy(mapDocument.PageLayout)
```

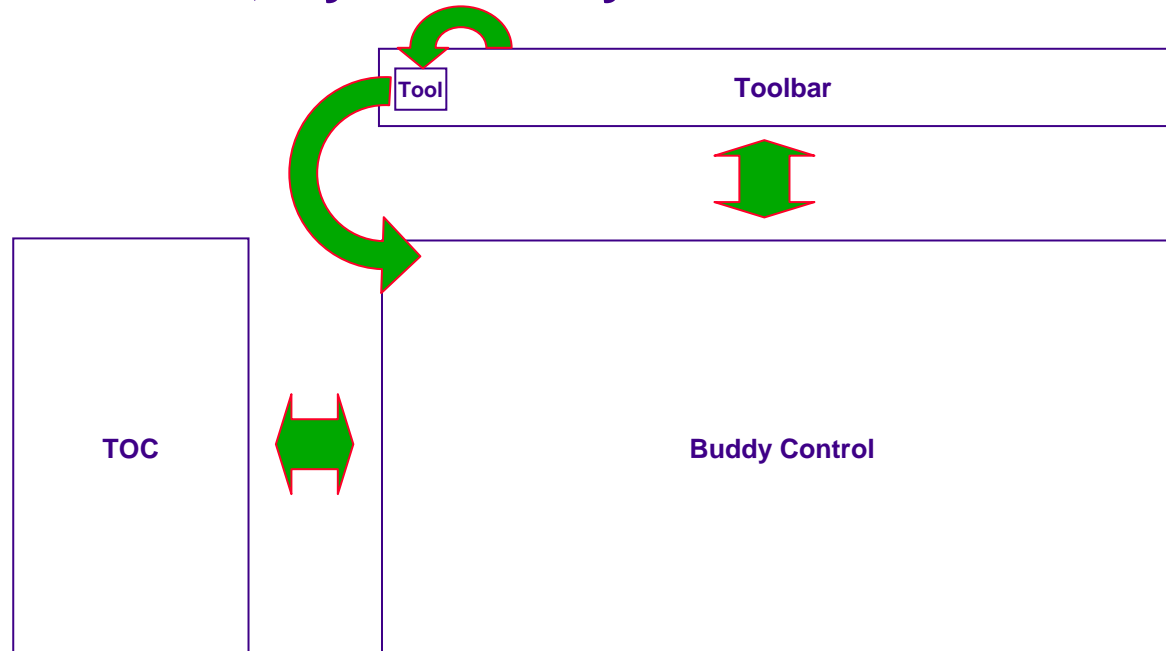
在MapDocument中替换内容

- ◆ 要设置地图文档的属性,必须替换 **Map** 和/或 **PageLayout** 对象
- ◆ 当你想要存储当前所做的修改时调用
 - ◆ **Visibility**
 - ◆ **Extent**
 - ◆ **Symbology**

```
Private Sub btnSaveMXD_Click(...) Handles btnSaveMXD.Click
    Dim sFilePath As String = "c:\temp\save.mxd"
    Dim mapDoc As IMapDocument = New MapDocument
    If not mapDoc.IsPresent(sFilePath) Then
        mapDoc.New(sFilePath)
        'Replace the contents of the MapDocument with
        'the map contents of the MapControl
        mapDoc.ReplaceContents(AxMapControl1.Map)
        'Save with relative paths
        mapDoc.Save(True)
        mapDoc.Close()
    End If
End Sub
```

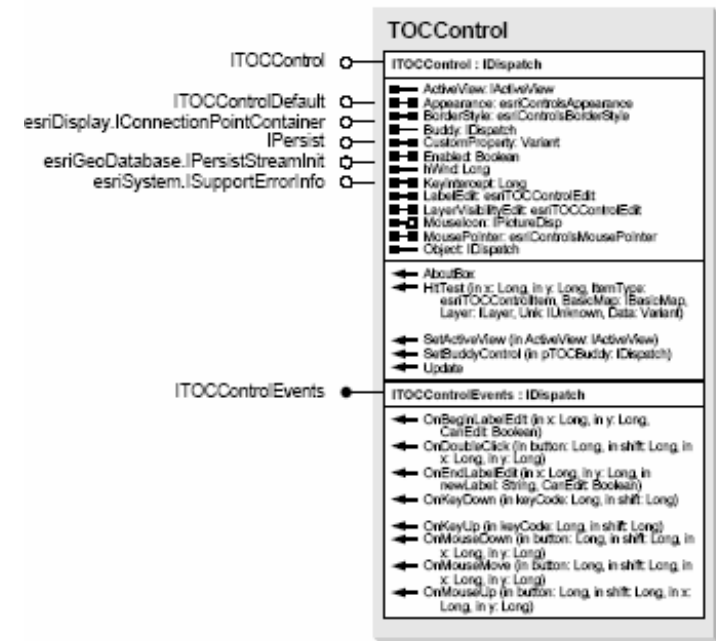
框架控件

- ◆ **ToolbarControl** 和 **TOCControl** 被设计成和其它控件协同工作
- ◆ 通过一个**buddy**控件自动捆绑在一起
- ◆ 根据彼此的状态通信和同步
 - ◆ 例子: **active tool, layer visibility**



TOCControl

- ◆ 显示所有的图层和符号
 - ◆ Simple symbols, renderers
 - ◆ Group layers
- ◆ 控制图层可视性
- ◆ 必须调用**SetBuddyControl**
- ◆ 库
 - ◆ TOCControl.ocx



ITOCControl 成员

◆ TOCControl 属性

◆ Buddy, SetBuddyControl, SetActiveView

◆ LabelEdit, LayerVisibilityEdit: 默认是自动的

◆ MousePointer

```
Private m_TOCControl As ITOCControl

Private Sub Form_Load(...) Handles MyBase.Load
    m_TOCControl = AxTOCControl1.Object
    'Set the buddy control to the MapControl
    m_TOCControl.SetBuddyControl(AxMapControl1)
    'Set layer visibility to be controlled programmatically
    m_TOCControl.LayerVisibilityEdit = esriTOCControlEdit.esriTocControlManual
    'Set label editing to be controlled programmatically
    m_TOCControl.LabelEdit = esriTOCControlEdit.esriTOCControlManual
End Sub
```

TOCControl 事件

- ◆ Labeling
- ◆ Mouse move
- ◆ Key press
- ◆ HitTest
 - ◆ X 和 Y 鼠标位置
 - ◆ ItemType
 - ◆ BasicMap
 - ◆ Layer
 - ◆ Unk: ILegendGroup
 - ◆ Data: Legend class index

```
Private Sub AxTOCControl_OnBeginLabelEdit(...) Handles
    AxTOCControl1.OnBeginLabelEdit
    'Do a hit test to determine what was selected
    Dim item As esriTOCControlItem
    Dim map As IMap
    Dim layer As ILayer
    Dim other As Object
    Dim index As Object
    m_TOCControl.HitTest _
        (e.X, e.Y,item,map,layer,other,index)
    If item <>
        esriTOCControlItem.esriTOCControlItemLayer Then
        e.canEdit = False
    End If
End Sub

Private Sub AxTOCControl_OnEndLabelEdit() Handles
    AxTOCControl1.OnEndLabelEdit
    If Trim(e.newLabel) = "" Then
        e.canEdit = False
    End If
End Sub
```

ToolbarControl

◆ 自定义 **commands, tools** 和 **menus**的容器

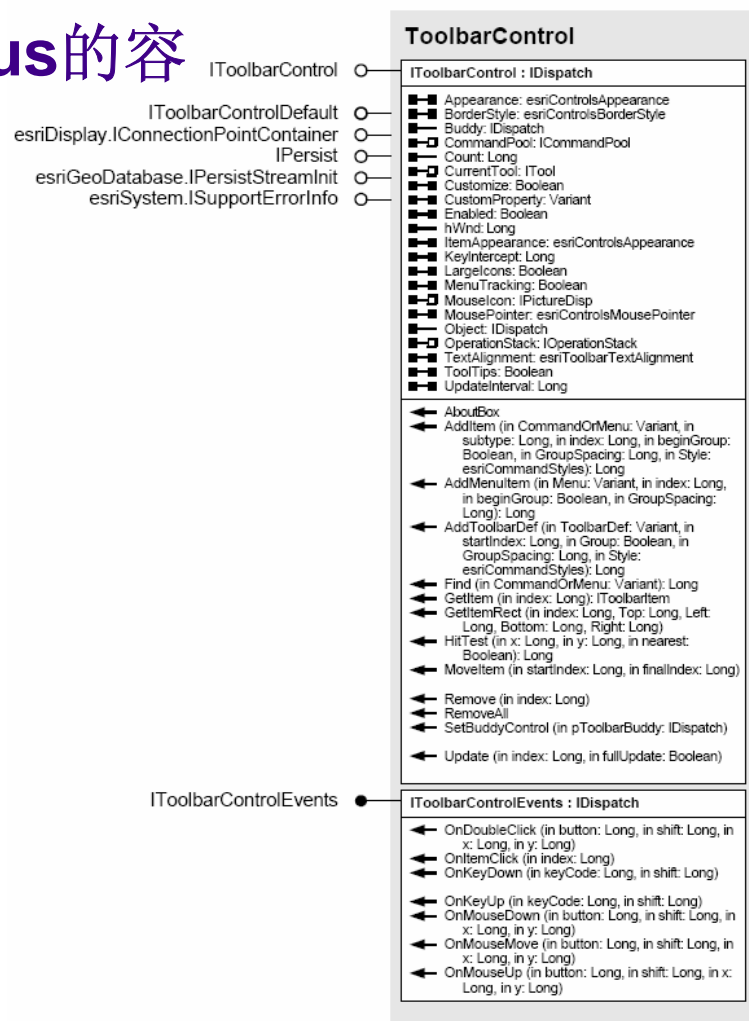
◆ 允许命令和以下控件对象进行交互

◆ **Map, PageLayout, Scene, 和 Globe**

◆ 必须调用 **SetBuddyControl**

◆ 库

◆ **ToolbarControl.ocx**



IToolbarControl 事件

- ◆ 使用函数 **HitTest** 来查询点击的工具项

- ◆ 鼠标事件

 - ◆ OnMouseDown

 - ◆ OnMouseUp

 - ◆ OnMouseMove

 - ◆ OnDoubleClick

```
Private Sub AxToolbarControl1_OnMouseDown(...) Handles  
    AxToolbarControl1.OnMouseDown  
    'Check if the right mouse button is clicked  
    If (e.button = 2) Then  
        AxToolbarControl1.Customize = True  
        m_CustomizeDialog.ShowDialog(AxToolbarControl1.hWnd)  
    End If  
End Sub
```

- ◆ 键盘事件

 - ◆ OnKeyDown 和 OnKeyUp

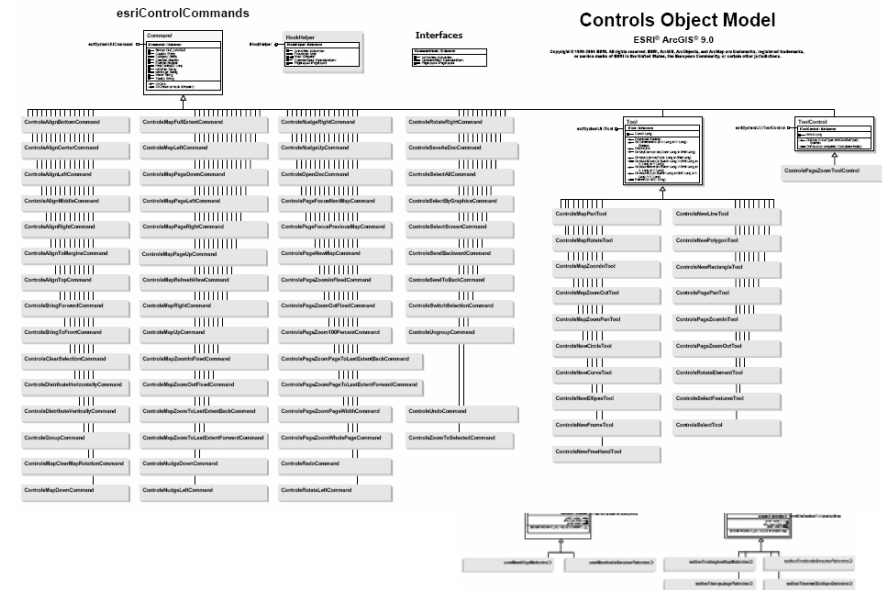
- ◆ 按钮和工具事件

 - ◆ OnItemClick

 - ◆ OnDoubleClick

制图控件命令

- ◆ 系统提供的控件命令, 工具, 工具条, 和菜单
- ◆ 命令和工具
 - ◆ 漫游, 缩放, 打开地图, 图形绘制, ...
- ◆ 工具条
 - ◆ 要素选择, 绘图, 地图导航, 和 **pagelayout**
- ◆ 菜单
 - ◆ 要素选择和地图浏览
- ◆ 库
 - ◆ **esriCommandControls.olb**
- ◆ 参考
 - ◆ 对象模型图或技术文档



加载内置的命令, 菜单和工具条

◆ 三种方式

- ◆ 创建一个新的实例
- ◆ 使用 **ProgID** 字符串
- ◆ 创建并定义一个 **UID** (传入 **ProgID** 或 **CLSID**参数)

◆ 可以在技术文档“**Controls Commands**” 找到内置的命令, 菜单, 和工具条

```
'Adding a command by ICommand
Dim pCommand As ICommand = New ControlsMapFullExtentCommandClass
AxToolbarControl1.AddItem(pCommand)

'Adding a command by ProgID
Dim sProgID As String = "esriControlCommands.ControlsMapFullExtentCommand"
AxToolbarControl1.AddItem(sProgID)

'Adding a command by UID
Dim pUid As New UIDClass
pUid.Value = "esriControlCommands.ControlsMapFullExtentCommand"
AxToolbarControl1.AddItem(pUid)
```

加载项的不同方法

◆ 三方法

◆ AddItem, AddToolbarDef, AddMenuItem

◆ 多参数

◆ UID, subtype, index, begin group, group spacing, style

```
Public Sub AddMapCommands()  
    'Add items to the ToolbarControl  
    Dim pUId As New UID  
    pUId.Value = "esriControlCommands.ControlsMapZoomInTool"  
    AxToolbarControl1.AddItem(pUId, , -1, True, 2,  
        esriCommandStyles.esriCommandStyleIconAndText)  
  
    pUId.Value = "esriControlCommands.ControlsMapNavigationToolbar"  
    AxToolbarControl1.AddToolbarDef(pUId, -1, False, 2,  
        esriCommandStyles.esriCommandStyleIconOnly)  
  
    pUId.Value = "esriControlCommands.ControlsFeatureSelectionMenu"  
    AxToolbarControl1.AddMenuItem(pUId, 1, False, 2)  
End Sub
```


ArcReaderControl vs. ReaderControl

◆ ArcReaderControl

- ◆ 属于 ArcGIS Desktop
- ◆ 需要有 ArcGIS Publisher extension 才能使用
- ◆ 能构建和分发独立应用程序
- ◆ 需要安装 ArcReader

◆ ReaderControl

- ◆ 属于 ArcGIS Engine
- ◆ 需要 ArcGIS Engine Runtime

ArcReaderControl vs. ReaderControl (续)

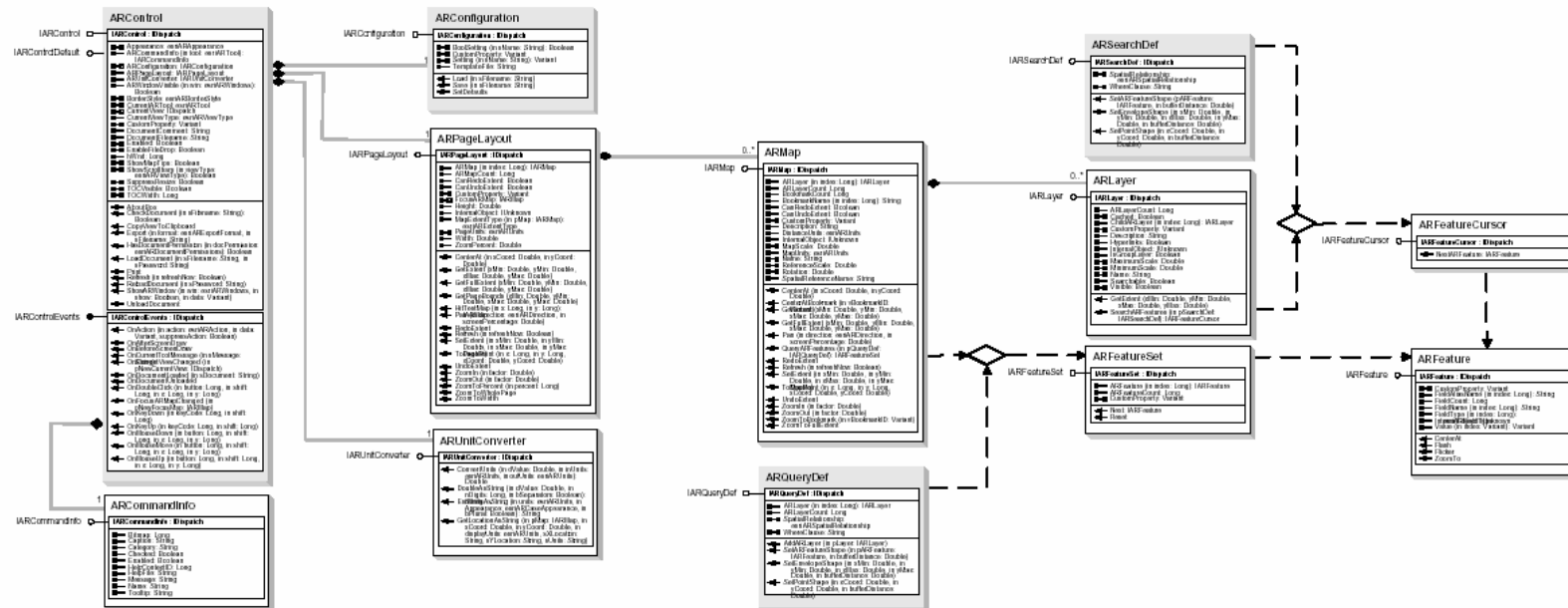
	ArcReaderControl	ReaderControl
需要的许可	ArcGIS Publisher Extension License	ArcGIS Engine Designer License
需要的 runtime	独立的 ArcReader 应用程序	被许可的 ArcGIS Engine Runtime
支持的 API's	COM (ActiveX Control), .NET (Windows Control)	COM (ActiveX Control), .NET (Windows Control), Java (Visual Java Bean), C++ (Motif Wigit)
支持的平台	Windows	Windows, UNIX
包括一组 Reader 命令	No	Yes
CoCreatable objects	ArcReaderSearchDef, ArcReaderConfiguration	ARSearchDef, ARConfiguration
是否可以用ArcObjects来扩展	No	Yes, for PMFs published with permission to load into a customized application, and published with unrestricted access to its contents
与ToolbarControl 和 TOCControl 协同开发应用	No	Yes, for PMFs published with permission to load into a customized application, and published with unrestricted access to its contents

ArcReaderControl 和 ReaderControl OMD

◆ 简化而强大的一组对象

ArcReaderControl Object Model ArcGIS™ 9.0

Copyright © 2003 Environmental Systems Research Institute, Inc.
All rights reserved. ArcGIS is a trademark of ESRI.

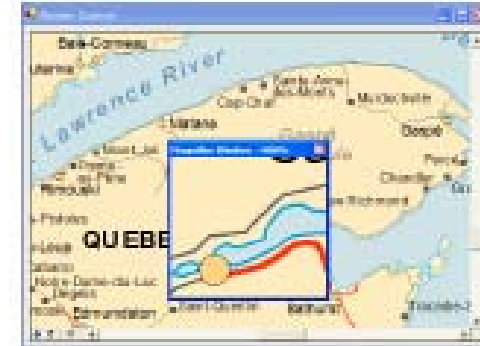


- ◆ **Commands**
- ◆ **Tools**
- ◆ **ToolControls**
- ◆ **Toolbars**



使用ReaderControl

- ◆ 加载 **PMF** 文档
- ◆ 更改控件的外形
- ◆ 显示任何可获取的窗口: **ShowARWindow**



```
Private Sub Form1_Load(...) Handles MyBase.Load
    Dim readerControl As IARControl
    readerControl = AxReaderControl1.Object
    'Load pmf file
    Dim fileName As String = "C:\arctgis\ArcTutor\ArcReader and Publisher\Gulf of St.
    Lawrence.pmf"
    If readerControl.CheckDocument(fileName) Then
        readerControl.LoadDocument(fileName, "")
    End If
    'Specify appearance of reader control
    readerControl.Appearance = esriARAppearance.esriARAppearance3D
    readerControl.BorderStyle = esriARBorderStyle.esriARBorderStyleBorder
    readerControl.TOCVisible = False
    'Determine whether the magnifier window is open
    If AxReaderControl1.get_ARWindowVisible(esriARWindows.esriARWindowsMagnifier) =
    False Then
        'Show the magnifier window
        AxReaderControl1.ShowARWindow(esriARWindows.esriARWindowsMagnifier, True)
    End If
End Sub
```

练习 3 总结

- ◆ 创建一个控件应用程序
- ◆ 使用**MapDocument** 和 **ObjectCopy**
- ◆ 使用控件成员
- ◆ 使用工具条和**TOC**控件
- ◆ 加载 **MXD** 文档
- ◆ 保存新文档

课 3 回顾

- ◆ **MapControl**控件和**SceneControl**控件不同点主要有哪些？
- ◆ 什么是框架控件应用程序？
- ◆ 项是怎样被加载到工具条控件上去的？
- ◆ 如何用**MapDocument** 类来帮助开发？
- ◆ **ObjectCopy** 能用来做什么？