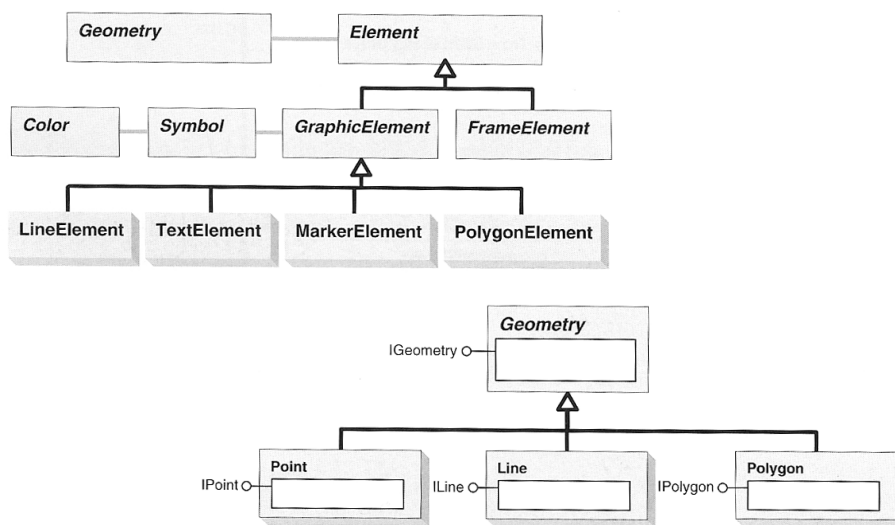


- * ArcObjects: Vector Data analysis I
- 1. Vector Geometry
- 2. Spatial Query and Selection Set

GEOG 4/590: GIS Programming

Vector Geometry



IGeometry

Dim pFeature As IFeature
 IFeature = pFCursor.NextFeature
 pFeature.Shape
 'Property Shape As IGeometry

| IArea : IUnknown | |
|--------------------------------------|--|
| Area: Double | |
| Centroid: IPoint | |
| LabelPoint: IPoint | |
| QueryCentroid (Center: IPoint) | |
| QueryLabelPoint (LabelPoint: IPoint) | |

| Point | |
|------------------------------------|--|
| IPoint : IGeometry | <ul style="list-style-type: none"> ID: Long M: Double X: Double Y: Double Z: Double |
| IGeometry2 | |
| IHitTest | |
| IMAware | |
| IPersist | |
| IPersistStream | |
| IPointIDAware | |
| IProximityOperator | |
| IRelationalOperator | |
| ITopologicalOperator | |
| IConstructPoint | |
| ITransform2D | |
| ITransform3D | |
| IZAware | |
| IGeometry3 | |
| IGeometry4 | |
| IConstructPoint2 | |
| IConstructPoint : IUnknown | |
| | <ul style="list-style-type: none"> ConstructAlong (curve: ICurve, Extension: esriSegmentExtension, Distance: Double, asRatio: Boolean) ConstructAngleBisector (from: IPoint, through: IPoint, to: IPoint, Distance: Double, useAcuteAngle: Boolean) ConstructAngleDistance (p: IPoint, inAngle: Double, Distance: Double) ConstructAngleIntersection (p1: IPoint, angle1: Double, p2: IPoint, angle2: Double) ConstructDeflection (baseLine: ILine, Distance: Double, inAngle: Double) ConstructDeflectionIntersection (baseLine: ILine, StartAngle: Double, EndAngle: Double, OnRightSide: Boolean) ConstructOffset (curve: ICurve, Extension: esriSegmentExtension, Distance: Double, asRatio: Boolean, Offset: Double) ConstructParallel (Segment: ISegment, Extension: esriSegmentExtension, Start: IPoint, Distance: Double) ConstructPerpendicular (base: ISegment, Extension: esriSegmentExtension, p: IPoint, Distance: Double, bUseLineOrientation: Boolean) ConstructThreePointResection (point1: IPoint, angle1P2: Double, point2: IPoint, angle2P3: Double, point3: IPoint, outArcAngle: Double) |
| IConstructPoint2 : IConstructPoint | |
| | <ul style="list-style-type: none"> ConstructAverage (Points: IPointCollection, attributeType: esriGeometryAttributes) |

IFeatureClass.ShapeType Property

| Constant | Value | Description |
|---------------------------|-------|--|
| esriGeometryNull | 0 | A geometry of unknown type. |
| esriGeometryPoint | 1 | A single zero dimensional geometry. |
| esriGeometryMultipoint | 2 | An ordered collection of points. |
| esriGeometryLine | 13 | A straight line segment between two points. |
| esriGeometryCircularArc | 14 | A portion of the boundary of a circle. |
| esriGeometryEllipticArc | 16 | A portion of the boundary of an ellipse. |
| esriGeometryBezier3Curve | 15 | A third degree bezier curve (four control points). |
| esriGeometryPath | 6 | A connected sequence of segments. |
| esriGeometryPolyline | 3 | An ordered collection of paths. |
| esriGeometryRing | 11 | An area bounded by one closed path. |
| esriGeometryPolygon | 4 | A collection of rings ordered by their containment relationship. |
| esriGeometryEnvelope | 5 | A rectangle indicating the spatial extent of another geometry. |
| esriGeometryAny | 7 | Any of the geometry coclass types. |
| esriGeometryBag | 17 | A collection of geometries of arbitrary type. |
| esriGeometryMultiPatch | 9 | A collection of surface patches. |
| esriGeometryTriangleStrip | 18 | A surface patch of triangles defined by three consecutive points. |
| esriGeometryTriangleFan | 19 | A surface patch of triangles defined by the first point and two consecutive points. |
| esriGeometryRay | 20 | An infinite, one-directional line extending from an origin point. |
| esriGeometrySphere | 21 | A complete 3 dimensional sphere. |
| esriGeometryTriangles | 22 | A surface patch of triangles defined by non-overlapping sets of three consecutive points each. |

IGeometry Example

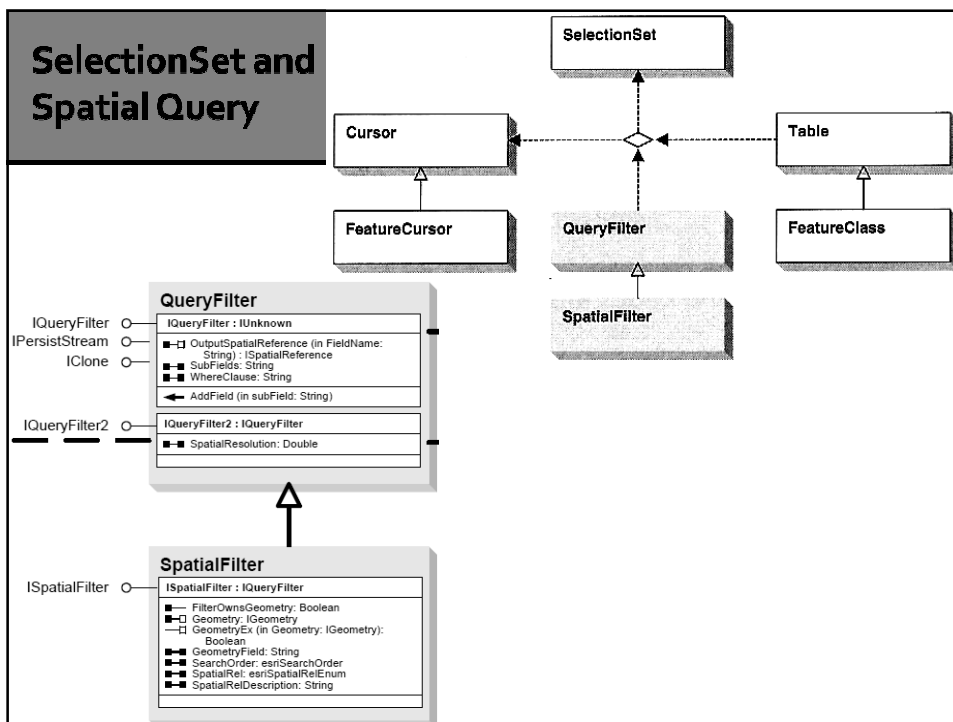
```

Dim pMxDoc As IMxDocument = My.ArcMap.Document
Dim pFLayer As IFeatureLayer = pMxDoc.SelectedLayer
'get the geometry of the filter layer
Dim pFCursor As IFeatureCursor = pFLayer.Search(Nothing, False)
Dim pFeature As IFeature = pFCursor.NextFeature
If pFeature IsNot Nothing Then
    Select Case pFLayer.FeatureClass.ShapeType
        Case ESRI.ArcGIS.Geometry.esriGeometryType.esriGeometryPoint
            Dim pPoint As IPoint = pFeature.Shape
            MsgBox("point x, y = " & pPoint.X & ", " & pPoint.Y)
        Case ESRI.ArcGIS.Geometry.esriGeometryType.esriGeometryPolyline
            Dim pPolyline As IPolyline = pFeature.Shape
            MsgBox("line length = " & pPolyline.Length)
        Case ESRI.ArcGIS.Geometry.esriGeometryType.esriGeometryPolygon
            Dim pArea As IArea = pFeature.Shape
            Dim pCenter As IPoint = New Point
            pArea.QueryCentroid(pCenter)
            MsgBox("polygon area = " & pArea.Area & vbCrLf & _
                "centroid x, y = " & pCenter.X & ", " & pCenter.Y)
        Case Else
            MsgBox("Not supported shapetype: " & pFLayer.FeatureClass.ShapeType.ToString)
    End Select
Else

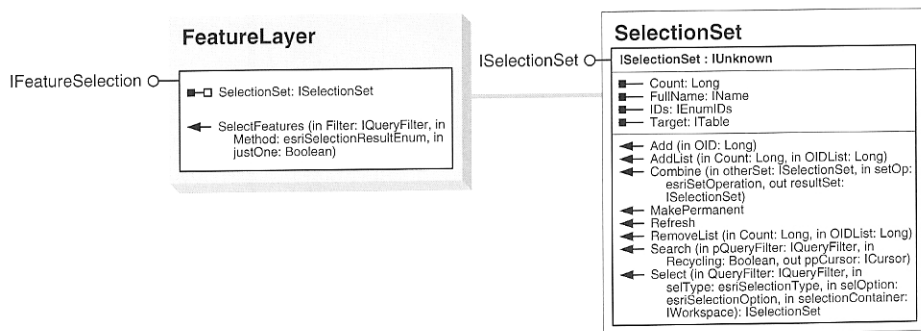
```

5

SelectionSet and Spatial Query



SelectionSet & FeatureLayer



7

Select Features: IFeatureSelection

```

Dim pMxDoc As IMxDocument = My.ArcMap.Document
Dim pMap As IMap = pMxDoc.FocusMap

Dim pFLayer As IFeatureLayer = pMap.Layer(0)
Dim pFSele As IFeatureSelection = _
    TryCast(pFLayer, IFeatureSelection)

'get a selection value
Dim input As String = InputBox("Enter a value")

'define selection queryfilter by attribute
Dim pQFilter As IQueryFilter = New QueryFilter
pQFilter.WhereClause = "GRID_CODE = " & input

pFSele.SelectFeatures(pQFilter, esriSelectionResultNew, False)
'refresh the view to see the selected features
pMxDoc.ActivatedView.Refresh()
  
```

8

Get Selected Features: ISelectionSet

```

Dim pMxDoc As IMxDocument = My.ArcMap.Document
Dim pMap As IMap = pMxDoc.FocusMap

Dim pFLayer As IFeatureLayer = pMap.Layer(o)
Dim pFSele As IFeatureSelection = pFLayer

'retrieve selected features using a FeatureCursor
Dim pSeleSet As ISelectionSet = pFSele.SelectionSet
Dim pFCursor As IFeatureCursor
pSeleSet.Search(Nothing, False, pFCursor)

Dim nf As Long = pSeleSet.Count
Dim pFeature As IFeature
Dim fIndex As Long = pFLayer.FeatureClass.FindField("GRID_CODE")

'display the GRID_CODE value in each feature
For i = 1 To nf
    pFeature = pFCursor.NextFeature
    Debug.Print(pFeature.Value(fIndex))
Next

'clear selection
pFSele.Clear()
pMxDoc.ActivatedView.Refresh() 'refresh the view

```

9

ISpatialFilter Interface

| | All | Description |
|---|--|---|
| ← | AddField | Appends a single field name to the list of sub-fields. |
| ■ | FilterOwnsGeometry | Indicates whether the filter owns the query geometry. |
| ■ | Geometry | The query geometry used to filter results. |
| → | GeometryEx | The query geometry used to filter results. |
| ■ | GeometryField | The name of the Geometry field to which the filter applies. |
| ■ | OutputSpatialReference | The spatial reference in which to output geometry for a given field. |
| ■ | SearchOrder | The search order used by the filter. |
| ■ | SpatialRel | The spatial relationship checked by the filter. |
| ■ | SpatialRelDescription | The array elements which describe the spatial relation between the query geometry and the requested geometries. There are 9 chars in this string which can be either 'F', 'T' or '*'; e.g., TT*FFT*** represents CONTAIN. |
| ■ | SubFields | The comma delimited list of field names for the filter. |
| ■ | WhereClause | The where clause for the filter. |

10

esriSpatialRelEnum Constants

Queryable Spatial Relationships.

| Constant | Value | Description |
|---|-------|---|
| esriSpatialRelUndefined | 0 | No Defined Spatial Relationship. |
| esriSpatialRelIntersects | 1 | Query Geometry Intersects Target Geometry. |
| esriSpatialRelEnvelopeIntersects | 2 | Envelope of Query Geometry Intersects Envelope of Target Geometry. |
| esriSpatialRelIndexIntersects | 3 | Query Geometry Intersects Index entry for Target Geometry (Primary Index Filter). |
| esriSpatialRelTouches | 4 | Query Geometry Touches Target Geometry. |
| esriSpatialRelOverlaps | 5 | Query Geometry Overlaps Target Geometry. |
| esriSpatialRelCrosses | 6 | Query Geometry Crosses Target Geometry. |
| esriSpatialRelWithin | 7 | Query Geometry is Within Target Geometry. |
| esriSpatialRelContains | 8 | Query Geometry Contains Target Geometry. |
| esriSpatialRelRelation | 9 | Query geometry IBE(Interior-Boundary-Exterior) relationship with target geometry. |

Spatial Filter: ISpatialFilter

```
Dim pFLayer As IFeatureLayer = pMap.Layer(o) 'target layer
Dim pFLayerSF As IFeatureLayer = pMap.Layer(1) 'filter layer
```

```
'get the geometry of the filter layer
Dim pFCursor As IFeatureCursor = pFLayerSF.Search(Nothing, False)
Dim pFeature As IFeature = pFCursor.NextFeature
```

```
Do While pFeature IsNot Nothing
    Dim pFSele As IFeatureSelection = _
        TryCast(pFLayer, IFeatureSelection)
```

```
Dim pSFilter As ISpatialFilter = New SpatialFilter
```

```
pSFilter.Geometry = pFeature.Shape
'Lab 5: pSFilter.Geometry = pEnv
pSFilter.SpatialRel = esriSpatialRelEnum.esriSpatialRelContains
```

```
pFSele.SelectFeatures(pSFilter, esriSelectionResultNew, False)
pMxDoc.ActivatedView.Refresh() 'refresh the view to see the selected features
MsgBox("Use next polygon as the filter")
pFeature = pFCursor.NextFeature
Loop
```