M.Tech Geoinformatics

Introduction to ArcObjects

Introduction to Practical Lab

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What is ArcGIS?

- arcgis is the flagship gis product from esri.
- it includes arcgis client software, components and data server.
- arcgis itself is not a gis application; rather, it is a set of software products for building arcgis systems that best suit your gis needs.
- arcgis is based on a common library of shared gis software components, called arcobjects.
- arcgis is composed of client and server applications. each software application can create, manage, analyze, and serve data stored in one or more formats.
- arcgis desktop: integrated suite of advanced gis applications consisting of three software products: *basic, standard, advanced.*
- the level of functionality available differs depending on which license you have. advanced license provides users with the most complete level of gis functionality.

Customize ArcGIS Desktop applications

ArcGIS Desktop applications can be customized to automate GIS tasks or create unique workflows and environments suitable for your organization.

The ArcGIS Desktop applications can be customized by,

- Configure the application User Interface (UI), such as rearranging toolbars, tools, commands, and dockable windows
- Python scripting to automate workflows
- Develop add-ins to create custom applications and extensions
- Develop custom components to add new functionality to ArcGIS applications (Extending ArcGIS)

What is ArcObjects?

- ArcObjects is a library of Component Object Model (COM) that make up the foundation of ArcGIS.
- The Software Development Kit (SDK) for developing with ArcObjects assists you in writing your applications by providing *best practices, conceptual documentation, code sections, and samples*.
- ArcGIS Desktop is a suite of integrated applications including ArcMap, ArcGlobe, ArcScene, and ArcCatalog.

What can ArcObjects do?

- Extend ArcGIS Products
  - Create custom user forms, buttons and tools
  - Automate workflows
- Build stand-alone applications with ArcGIS Engine and ArcGIS Desktop
- Develop Web applications with ArcGIS for Server

Add-ins for interactive tasks

- The desktop add-in model provides developers a framework for creating blocks of custom functionality within a single compressed file.
- These add-in files can easily shared between users without relying on installation programs or COM registration.
- Add-in files can be installed by copying them to a well known folder location and uninstalled by deleting them from that folder location.

Add-in types

Add-ins support the following fixed set of add-in types:

- Button
- Commands and tools
- Combo boxes
- Menus and context menus
- Toolbars
- Tool palettes
- Dockable windows
- Application and editor extensions

What is COM?

- Component Object Model
- COM is a component library
- COM is a standard for creating classes, methods and properties
- All ArcObjects are COM classes
- To locate classes, methods and properties, and directs to access them

Understanding Object Model Diagrams (OMD)

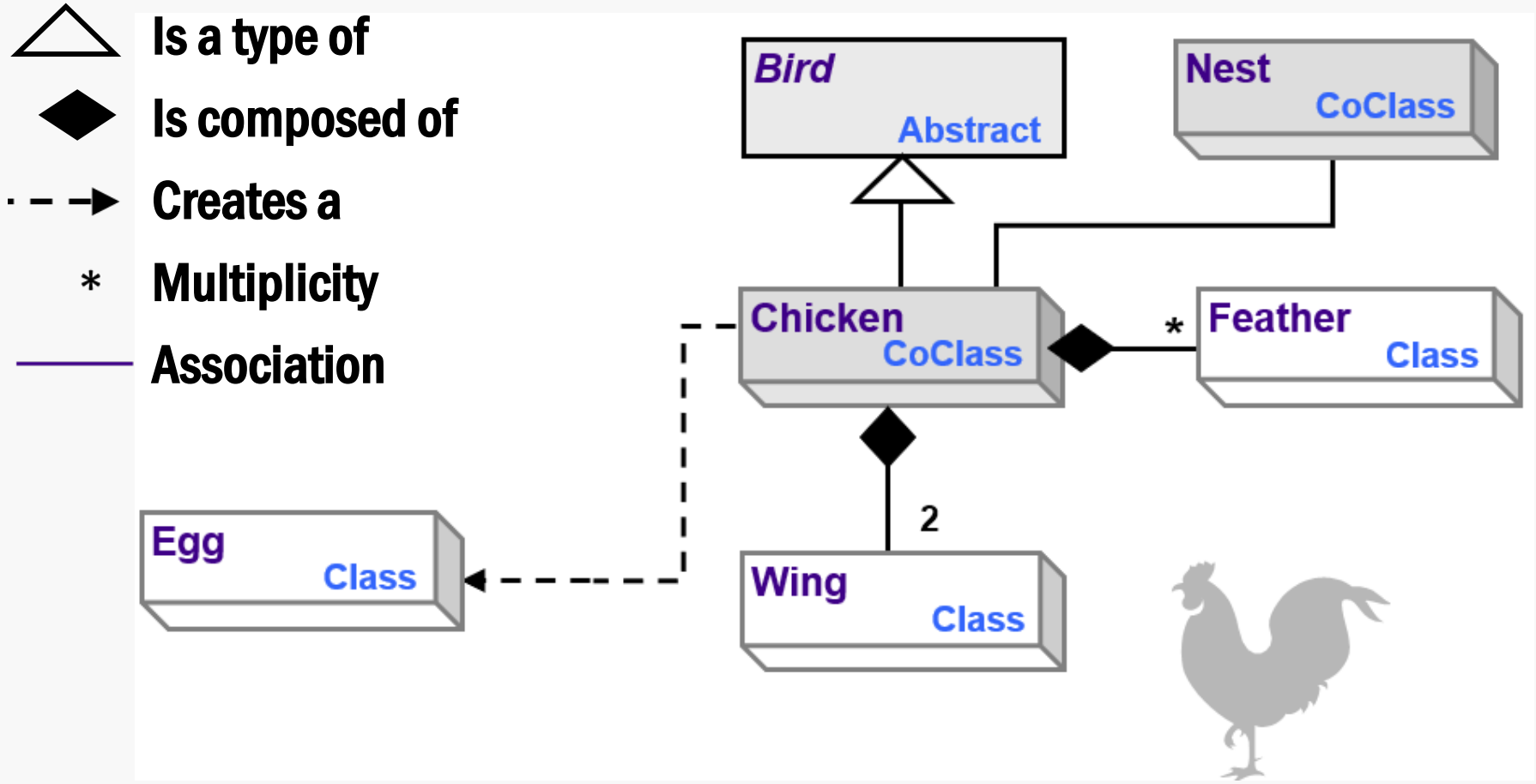
OMDs helps to understand,

- Interfaces, methods, and properties for each class
- Relationships between classes

Types of Classes

- An abstract class cannot be used to create new objects but is a specification for instances of subclasses (through type inheritance.)
- A CoClass can directly create objects by declaring a new object.
- A Class cannot directly create objects, but objects of this class can be created as a property of another class or instantiated by objects from another class.

Reading OMD


Is a type of
Is composed of
Creates a
Multiplicity
Association
Bird
Abstract
Nest
CoClass
Chicken
CoClass
Feather
Class
Egg
Class
Wing
Class
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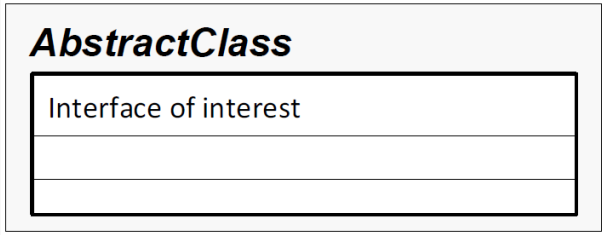
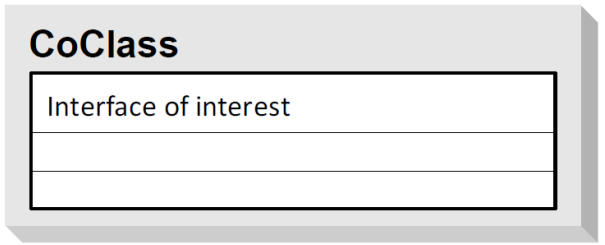
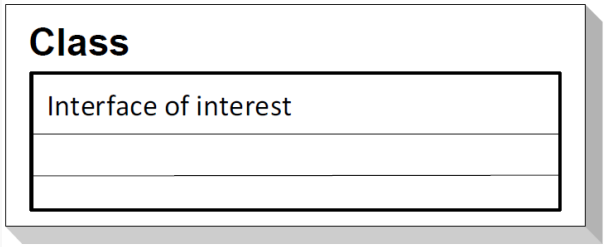

AbstractClass
Interface of interest

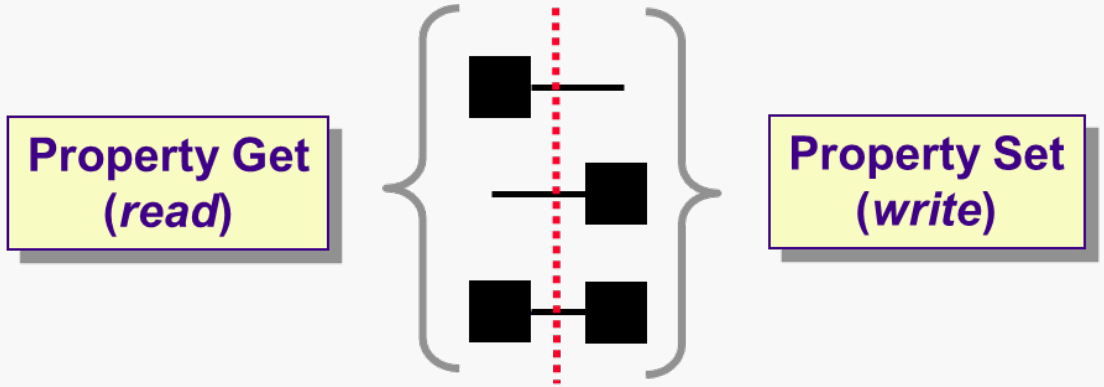

CoClass
Interface of interest

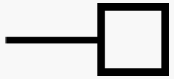

Class
Interface of interest

Property and method symbols

- **Property** 

  Barbell symbol



  Property set by reference 

  Must be same type

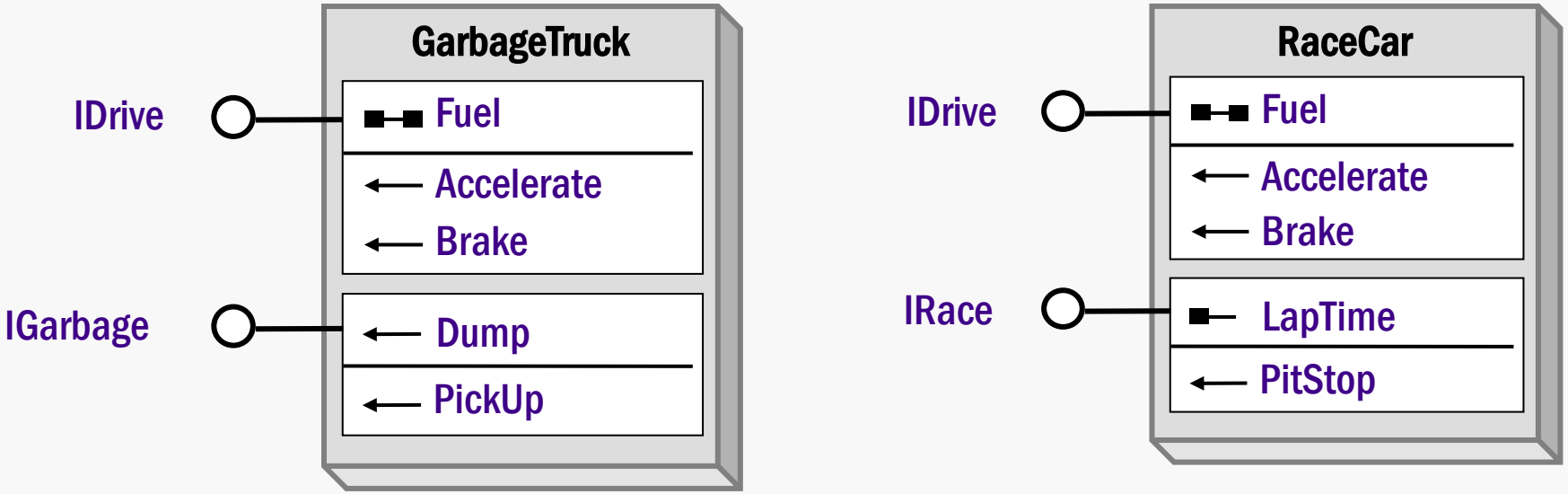
  No type casting

```
pLayer.FeatureClass = pFeatureClass1;
```

- **Method** 

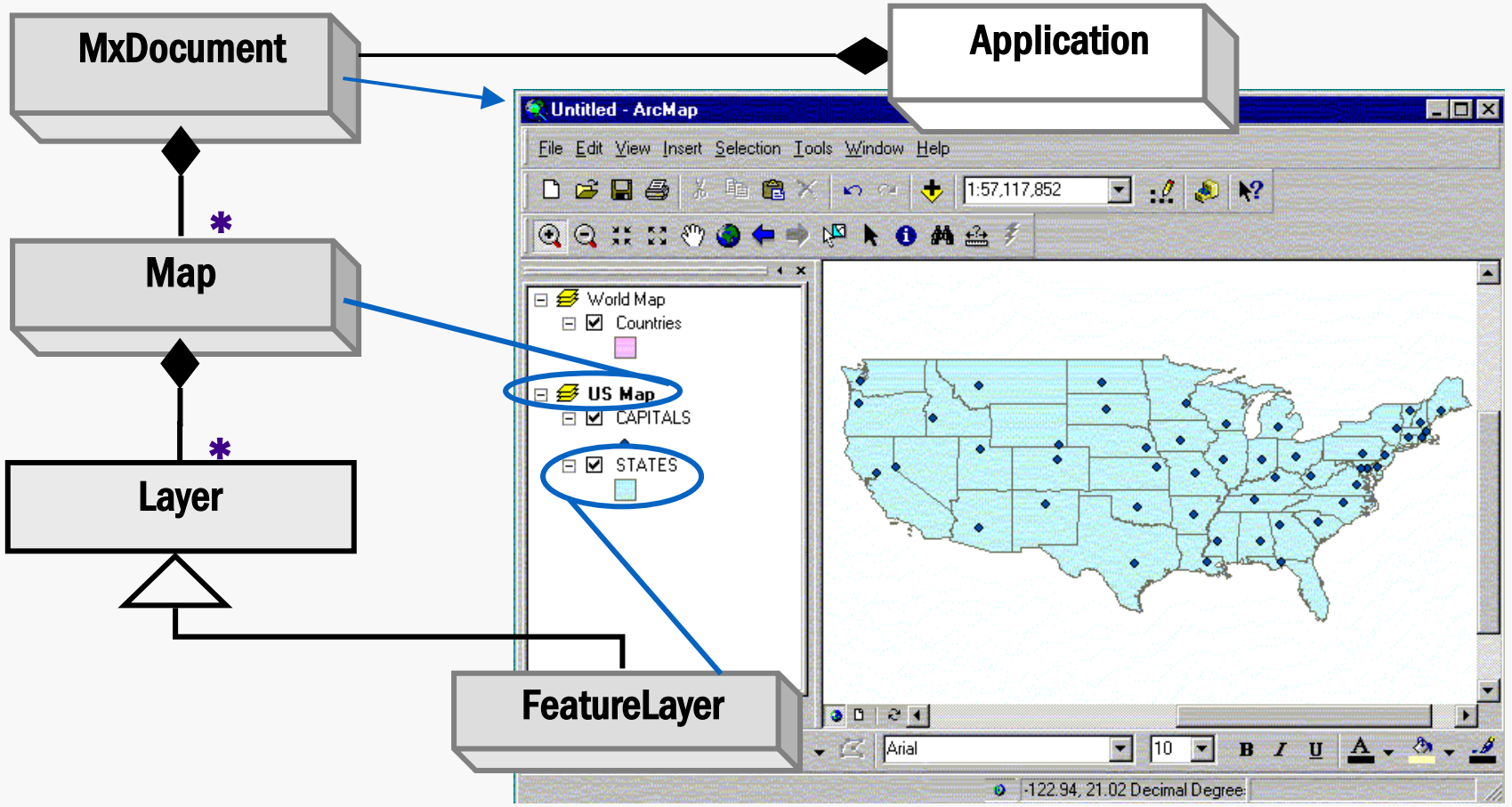
Interfaces

- COM classes have interfaces
- Objects have one or more interfaces
- Communicate with an object through an interface
- Interfaces define a logical group of methods and properties



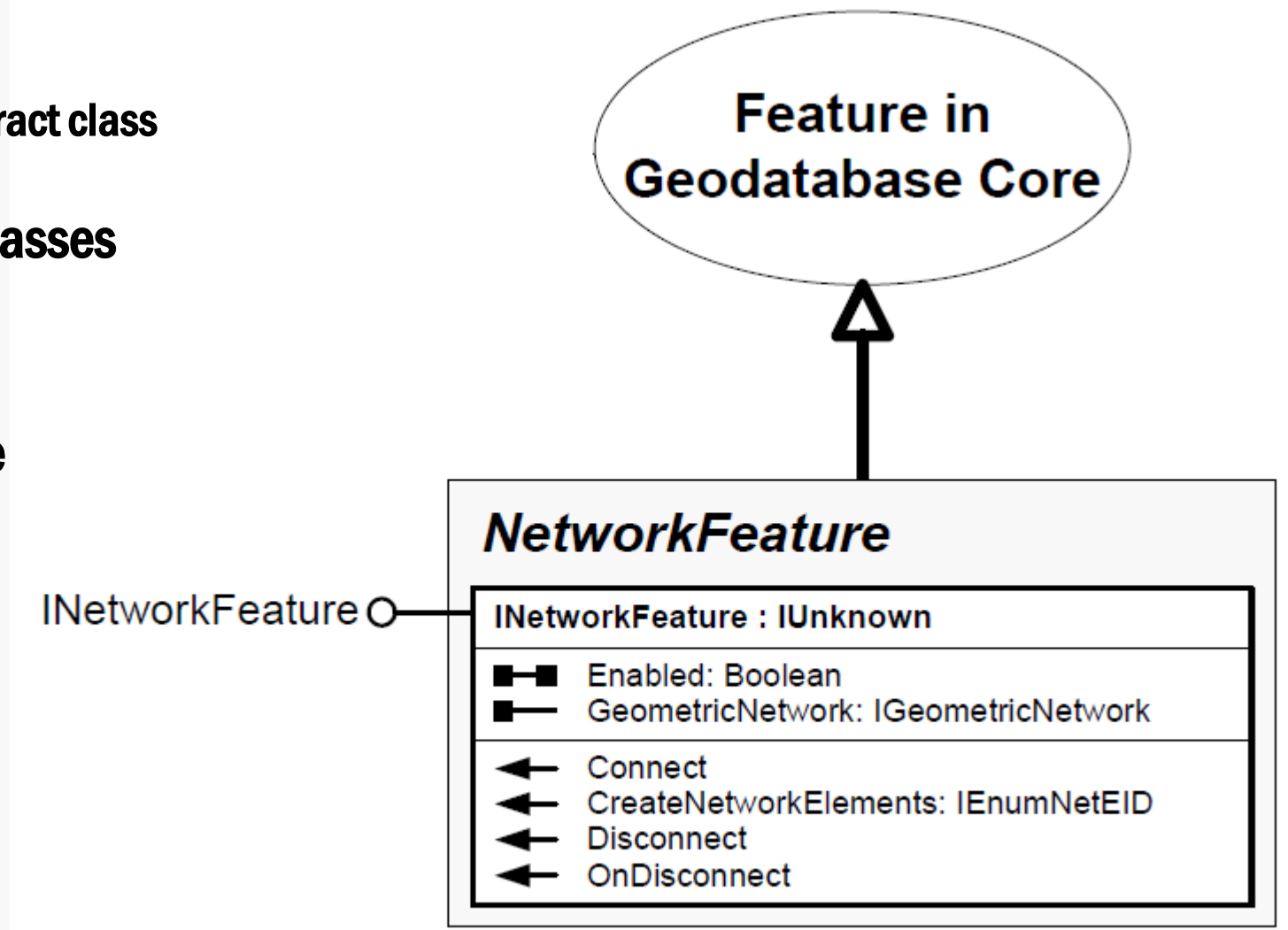
Accessing Objects

Classes and their corresponding objects



Abstract class

- Not creatable or instantiable
  - Can never have instances of an abstract class
- Define general interfaces for subclasses
  - Subclasses inherit interfaces
- OMD symbol: 2D shaded rectangle



Creatable Vs Instantiable Class

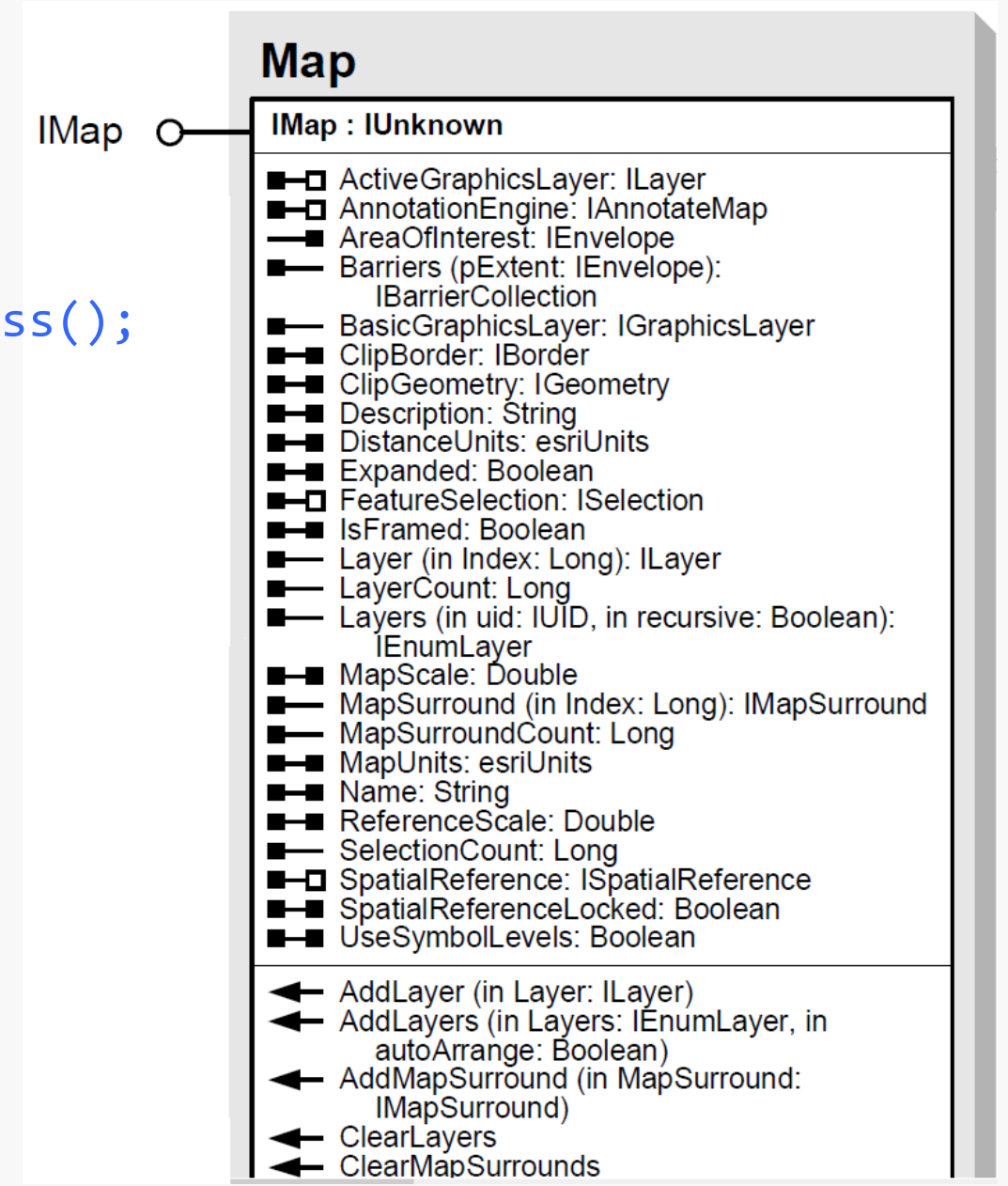
Creatable: Use the ***New*** keyword

```
IQueryFilter pQF = new QueryFilterClass();
```

Instantiable: Obtain from other objects

```
IMap pMap = pMxDocument.FocusMap;
```

OMD symbol: Shaded 3D rectangle

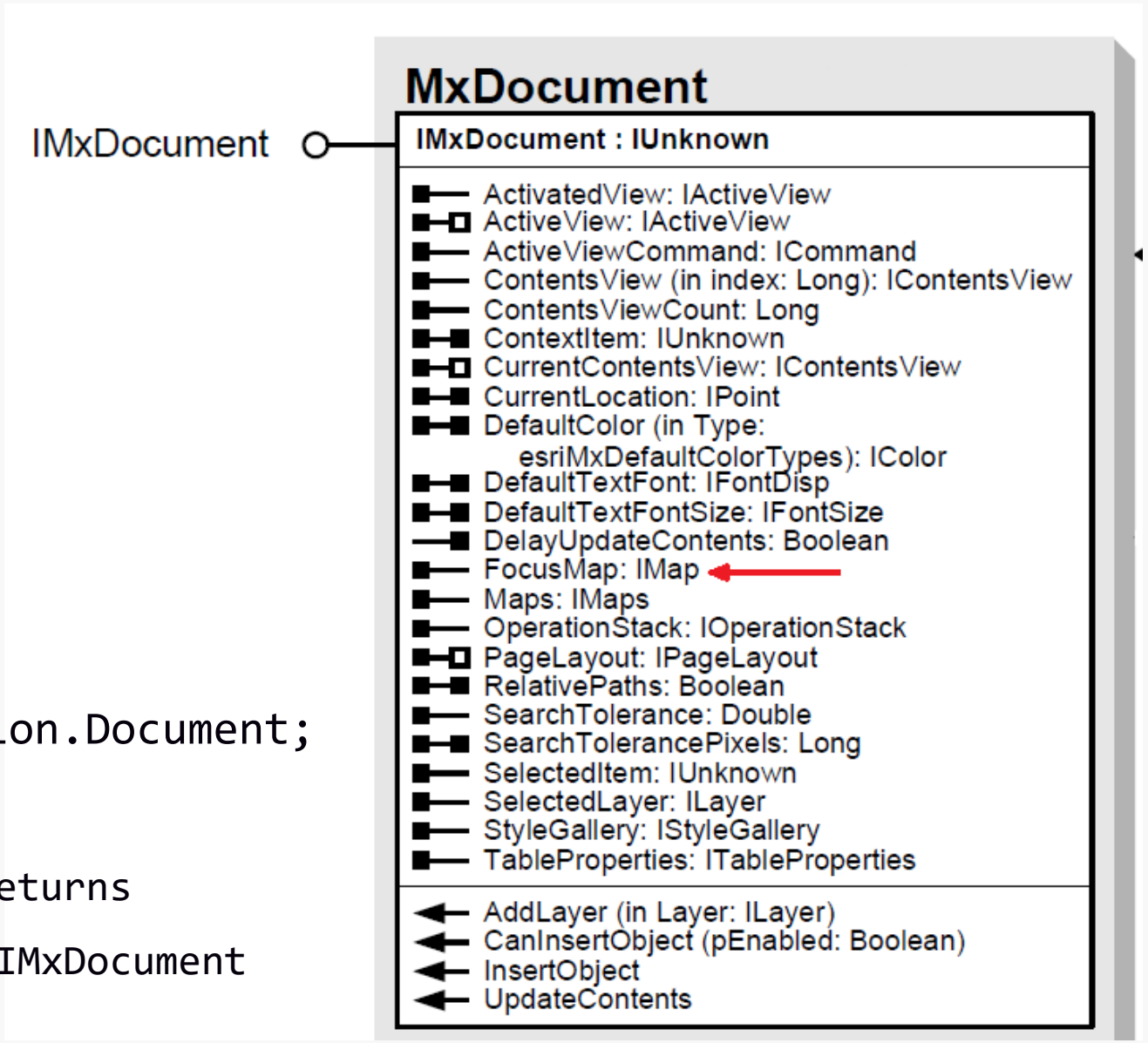


Inheritance

QueryInterface (QI) is the method that is used to fetch another interface implemented by the same COM object.

```
IMxDocument pMxDoc =
        (IMxDocument)ArcMap.Application.Document;
```

```
> ArcMap.Application.Document; - this returns
IDocument which we are converting into IMxDocument
```



Thank you!