

# ArcObjects™

*The Open Customization  
Environment Within ArcGIS™*



# An Overview of ArcObjects

The technology framework of ESRI® ArcGIS™ 8.1, known as ArcObjects™, is a set of components developers can use to programmatically enhance and extend ArcInfo™, ArcEditor™, and ArcView®. ArcObjects technology is based on the Component Object Model (COM). With ArcObjects, developers can add new tools or work flows to ArcInfo, ArcEditor, or ArcView software or extend the ArcGIS data model by adding new custom feature types.



## ArcObjects The Foundation of ArcGIS 8.1

### Customization Options

ArcGIS 8.1 includes three levels of customization. The first and simplest level of ArcGIS customization involves no programming and, therefore, no direct use of ArcObjects. Users can easily personalize the look and feel of the ArcGIS applications by using standard user interface capabilities. For example, toolbars can be turned on and off using the Customize dialog.

VBA provides a complete, integrated development environment that includes the same elements familiar to developers using Microsoft® Visual Basic including a Project window, a Properties window, and debugging tools. Visual Basic for Applications also includes support for Microsoft forms for creating custom dialog boxes and ActiveX controls for rapidly building user interfaces. Furthermore, VBA provides the ability to build solutions without the use of additional development environments.

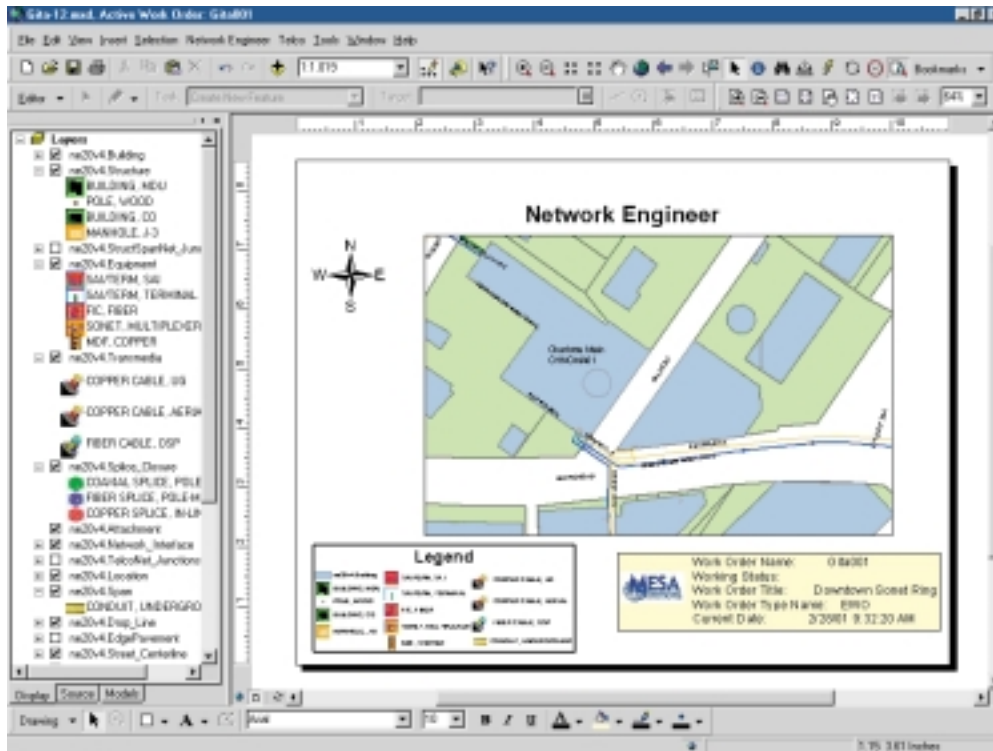


### VBA

The second level of customization involves using the built-in Visual Basic® for Applications (VBA) scripting capabilities to add new menus, tools, and work flows. With VBA it is possible to create extensive and sophisticated applications based on ArcObjects that run within ArcInfo, ArcEditor, and ArcView software. VBA is useful for many of the same types of tasks that ARC Macro Language (AML™) has been used for in the past with ArcInfo or Avenue™ for the ArcView users.

“My experiences developing with ArcObjects have been very good. We’ve made quite a bit of progress in a short amount of time. I credit a lot of this to the packaging of ArcObjects. ArcObjects comes across to a programmer as familiar territory that can quickly be adapted, and you can see results quickly.”

Rob Book  
Synergen



## Object-Component Programming

The third level of customization requires a COM-compliant programming language such as Visual Basic, Visual C++®, or Delphi™. Software developers who want to create reusable software building blocks, new applications, or custom feature additions to the geodatabase object model will prefer to work with ArcObjects directly. COM is a protocol that connects one software component or module with another. By making use of this protocol it is possible to build reusable software components that can be dynamically interchanged in a distributed system.

## COM Technology

To understand COM (and therefore all COM-based technologies), it is important to realize that COM is not an object-oriented language but rather a protocol or standard. COM does not specify how an application should be structured. The language, structure, and implementation details are left up to the application programmer. COM does specify an object model and programming requirements that enable COM objects (also called COM components or sometimes simply objects) to interact with other objects. These objects can be within a single process, in other processes, or even on remote

machines. They can be written in other languages and may be developed in very different ways. That is why COM is referred to as a binary specification or standard; it is a standard that applies after a program has been translated to binary machine code.

COM allows these components to be reused at a binary level, meaning that third party developers do not require access to source code, header files, or object libraries in order to extend the system even at the lowest level.

## Object Model

The ArcObjects software components are delivered as an organized collection of object–components. The ArcInfo object model describes the scope and organization of the components. Subsystem object models document the many classes that make up ArcObjects and the relationships between these classes. Each diagram has a description of what components can be found, and many of the common tasks performed on these objects are shown with examples.

## Development Opportunities

### Extend ArcGIS

The ArcGIS 8.1 suite provides the developer with an application framework that can be extended with little effort. Extensions can range from simple commands and tools to complete industry-focused solutions comprising customized tools, renderers, and user interfaces. The functionality of ArcInfo, ArcEditor, ArcView, and the ArcGIS extensions can be enhanced to fit the needs of any organization.

### Extend the data model

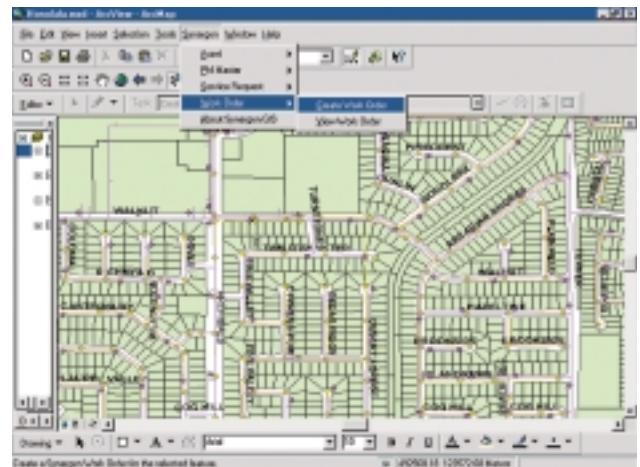
The ArcGIS data model can be extended in two ways. Specific behavior relevant to individual object classes of the data model can be modeled within the system framework using custom features and relationships. More generic support for new data types can also be added by extending the data formats supported by the geodatabase. ArcGIS 8.1 supports Unified Modeling Language (UML) static data models as part of the customization framework.

### Embed ArcObjects applications into other applications

Since ArcObjects is based on COM, any application that is capable of integrating COM components can embed an ArcObjects application. For example, a software developer can embed ArcObjects inside Microsoft Word® to provide a simple map viewer within Word documents.

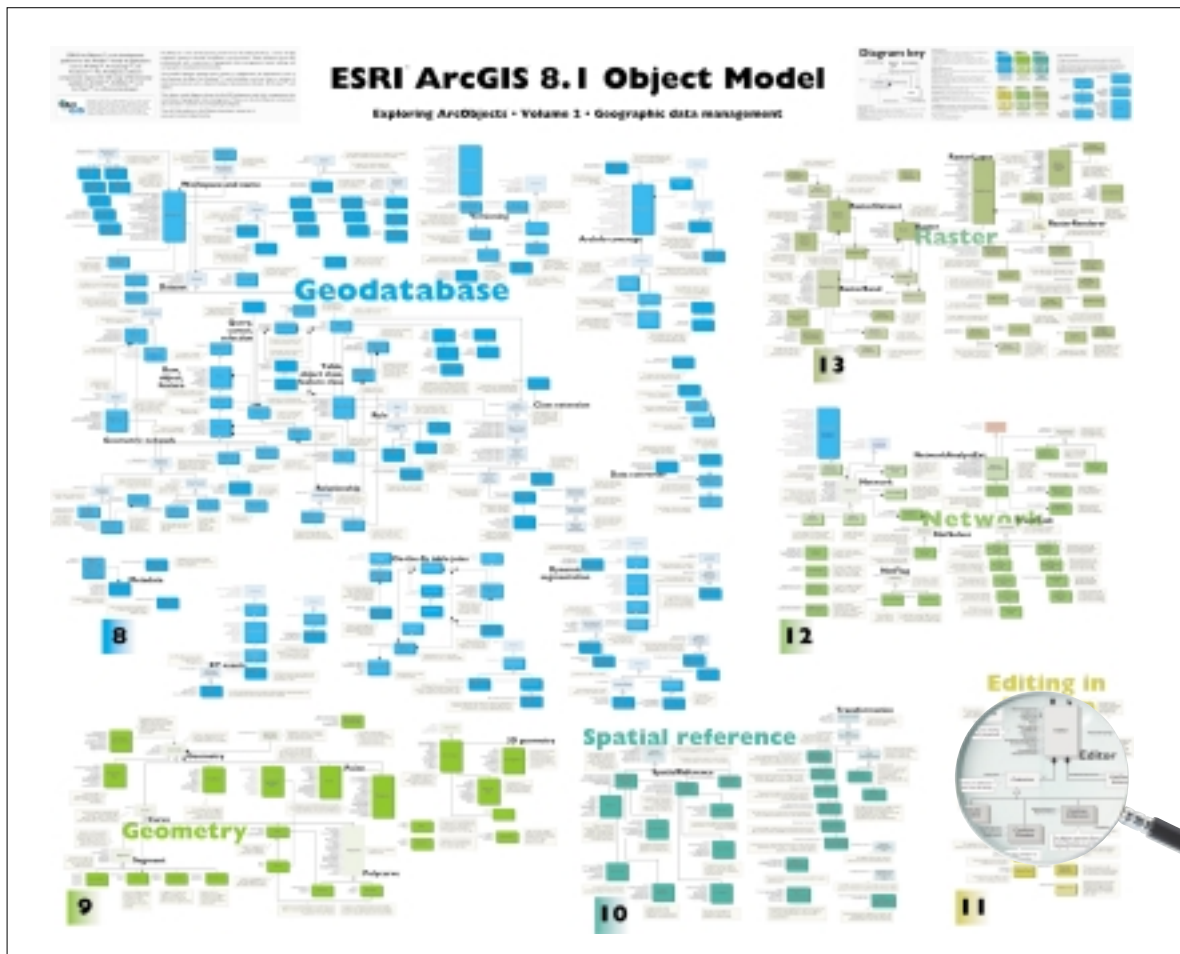
### Create new applications

In a similar fashion to the one described above, developers can use ArcObjects to create stand-alone applications. To use ArcObjects you must obtain a copy of ArcInfo, ArcEditor, or ArcView; any derivative applications require a licensed seat.



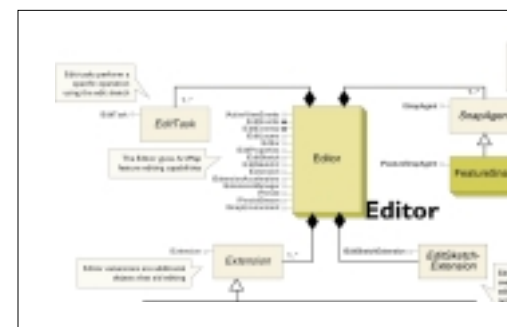
# The ArcGIS 8.1 Object Model

ArcObjects software components that make up ArcGIS 8.1 are wide open to developers. The ArcGIS 8.1 object model is a high-level overview of ArcObjects and cannot by itself fully display the fine granularity of customization control available. The software components are grouped into subsystems. Each subsystem has its own component object model diagram. These pages demonstrate the granularity of ArcObjects by looking at an individual subsystem.



The ArcGIS 8.1 object model Volume 2 —the second of two high level overviews of ArcObjects

The simple overview of the Editor subsystem is highlighted. This set of components is the foundation for editing vector data sets. An end user accesses this functionality through ArcMap™ software. Developers can use these same objects to create new custom editing tools or embed editing tools in other applications.

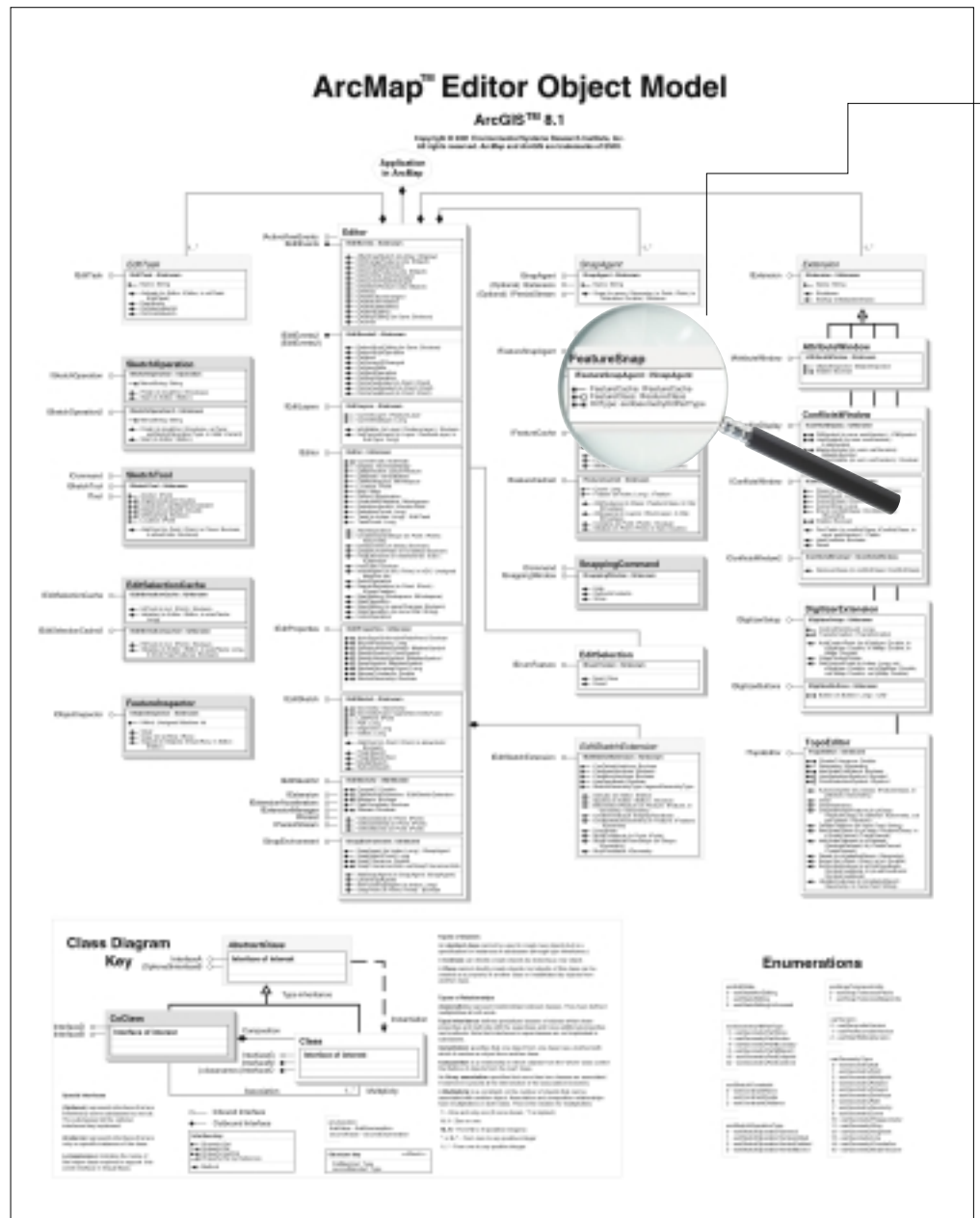


The Editor subsystem object model—s

The detailed object model of the Editor subsystem illustrates interfaces, properties, and methods. The Editor maintains a snapping environment to ensure requisite connectivity when modifying and creating features. The FeatureSnap component is highlighted.

“I am very excited that ESRI has provided access to ArcObjects at a fine level of granularity. Overall, it makes us look very good in front of our clients when we provide them the custom GIS solutions they actually need.”

Pawan Divakarla  
Geofields



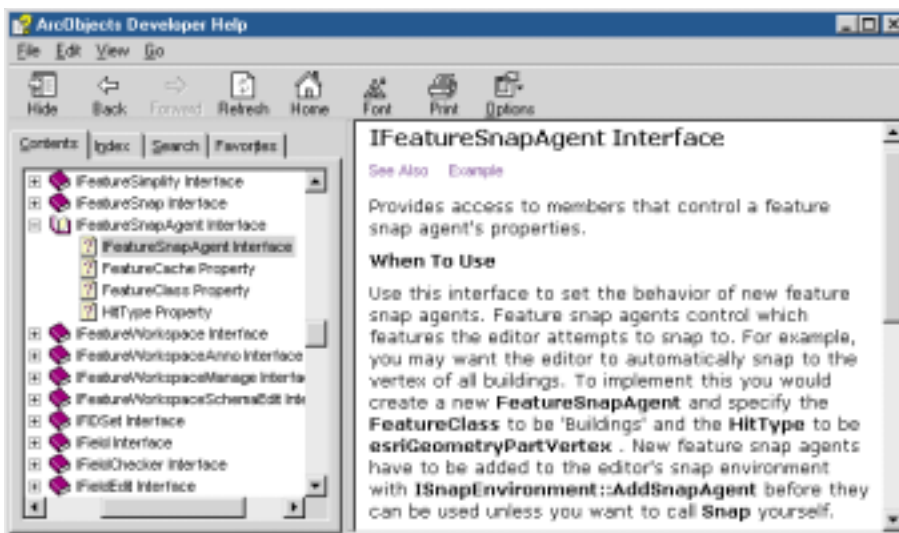
The ArcMap Editor subsystem object model—detailed diagram

Feature snap agents use feature caches to create a small selected set of features in memory. Snap agents cycle through all of the features in a cache and check to see if any of them are within the Editor's snap tolerance. The IFeatureSnapAgent interface is highlighted.



*The FeatureSnap component*

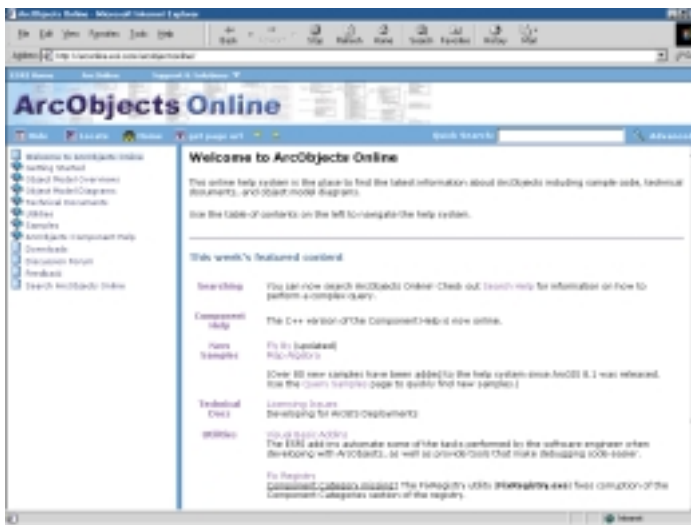
Developing with COM means using interfaces since you do not directly hold the individual components. The ArcObjects Developer Help provides detailed reference information on the component interfaces including properties, methods, and code samples.



*ArcObjects Developer Help*

## Developers' Resources

Along with ArcObjects, a rich collection of developer-oriented resources are available, including a printed developer guide, online developer help, and a series of class diagrams, are available. The *ArcObjects Developer's Guide* is for anyone who wants to learn the basic techniques and principles of customizing ArcGIS 8.1 end user applications by working graphically with the user interface or by referencing the ArcObjects object model in a development environment. The ArcObjects Online Developer Help provides reference information and coding tips and tricks as well as numerous complete code samples written in both Visual Basic and Visual C++.



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[www.esri.com/arcobjectsonline](http://www.esri.com/arcobjectsonline).

## Developer Program

The ESRI Developer Program is designed for professional software developers who are focused on building commercial off-the-shelf (COTS) solutions based on ESRI technologies. The program provides access to software, training, marketing opportunities, and other tools developers need to grow and be successful. Developers offer COTS solutions for specific industry areas or general GIS needs as well as extension tools for ESRI software.

Developers, whose target users need a one-package solution, may choose to participate in ESRI's Run-Time Reseller Program. Run-time resellers have the ability to sublicense limited-use ESRI technologies that are embedded within their value-added solutions. End user access to ESRI technology within these solutions is provided through a customer user interface.

For more information on the Developer Program, please visit [www.esri.com/partners](http://www.esri.com/partners).

## Interested?

To use ArcObjects, you need to license ArcInfo, ArcEditor, or ArcView. For more information, visit the ESRI web site at [www.esri.com/arcobjects](http://www.esri.com/arcobjects).



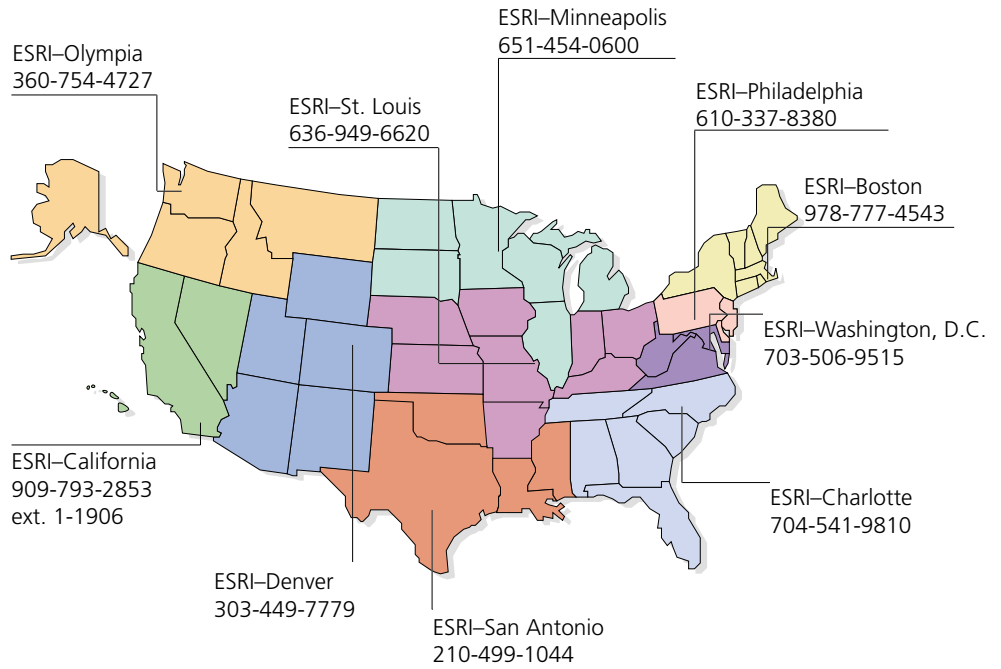


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ESRI  
 380 New York Street  
 Redlands, California  
 92373-8100, USA  
 Telephone: 909-793-2853  
 Fax: 909-793-5953  
 For more information  
 call ESRI at  
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