

Autodesk MapGuide® Release 6

autodesk®

User's Guide

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Introduction

This chapter provides you with general information about Autodesk MapGuide® as well as an introduction to the new features in this release. This chapter also includes an overview of how the Autodesk MapGuide products work together, suggestions for using this guide in the most efficient way, and where to go for more information.

This chapter may be helpful to:

- All Autodesk MapGuide users
- New Autodesk MapGuide users

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In this chapter

- Overview
- Key features of Autodesk MapGuide
- What's new in Release 6?
- System requirements
- What's the fastest way through this book?
- Where to get more information

Overview

Autodesk MapGuide is a suite of products that enable the distribution of geographic information systems, digital design data, and related applications over a network. Autodesk MapGuide allows you to deploy applications that create, modify, and display information, including maps, drawings, designs, schematics, and associated attribute data, over the Internet, an intranet, or an extranet.

Autodesk MapGuide® Author users integrate data to define the appearance and functions of maps, and Autodesk MapGuide® Viewer users access the data when they view and interact with maps from a Web browser. Autodesk MapGuide® Server responds to information requests generated by users as they interact with the application.

Key Features of Autodesk MapGuide

Autodesk MapGuide Author Key Features

- Ability to open maps and save maps in XML format
- Map and resource security control
- Thematic map settings and symbology
- Complete layer setup and definition, including support for layer groups
- Multiple Document Interface (MDI) support
- Global property settings, including projection information and map extents
- Interactive Map Explorer for creating and updating maps, drawings, designs, and schematics
- Full zoom/unzoom/pan functionality, including zooming to specific features
- Point feature posting
- Intelligent map caching
- Support for multi-server connection
- Arbitrary *X,Y* coordinate system support for CAD designs, drawings, or schematics
- Support for both vector and raster data types, overlaid, georeferenced, or not georeferenced

- Ability to link map features to Web applications
- Control over map width/scale

Autodesk MapGuide Server Key Features

- Integrates easily with existing Web sites
- Easy to configure and manage
- Scalable, multi-threaded architecture
- Standard CGI interface for Netscape® Internet servers and Microsoft® Internet Information Server
- Custom NSAPI interface for Netscape Internet servers
- Custom ISAPI interface for Microsoft Internet Information Server
- GUI-based Server administration and monitoring utility
- Comprehensive access, trace, error, and tracking logs
- Built-in security access restriction controls
- Support for data providers, allowing direct access to Oracle® Spatial, SHP, and Autodesk® GIS Design Server databases
- Serves interactive maps and drawings to users who have installed Autodesk MapGuide Viewer
- Serves maps and drawings with limited interactivity, without requiring installation of Autodesk MapGuide Viewer (requires Autodesk MapGuide® LiteView)

Autodesk MapGuide Viewer Key Features

- Access to dynamic, secure vector and raster data
- Versions available for Microsoft Windows®, Apple® Macintosh®, and Sun™ SPARCstation™
- Familiar browser interface
- Full zooming and panning functionality, including zooming to specific map features
- Ability to measure distances between indicated points on a map
- Style display by scale
- Multiple feature selection by list/radius/polygon
- Map bookmarking
- Buffer zone creation
- Ability to copy to Windows Clipboard
- Print capability

Note This guide does not include instructions for using Autodesk MapGuide Viewer. For information about using Autodesk MapGuide Viewer, refer to the *Autodesk MapGuide Viewer Help* included with the Viewer and available from the Autodesk MapGuide documentation page at the following Web site:
<http://www.autodesk.com/mapguidedocs>

What's New in Release 6?

Autodesk MapGuide includes the new features described in the following sections. In addition to the changes listed here, this release includes enhancements to the Autodesk MapGuide Viewer API. For details, refer to the *Autodesk MapGuide Viewer API Help*.

Warning After you open and save a map in Autodesk MapGuide Author Release 6, you cannot open the map in earlier releases of the program. To view maps created in Autodesk MapGuide Author Release 6, users can easily upgrade to Autodesk MapGuide Viewer Release 6 by downloading the new Viewer from the following Web site:
<http://www.autodesk.com/mapguideviewerdownload>

Dynamic Authoring Toolkit

The Dynamic Authoring Toolkit (DAT) is a new product offered within the Autodesk MapGuide product suite and designed to significantly increase the flexibility of Autodesk MapGuide application development. This toolkit is used for supporting applications that incorporate dynamic map authoring, including the programmatic generation and composition of new maps or the modification of existing maps and their properties. The Dynamic Authoring Toolkit enables programmatic creation or modification of MWF files quickly, without requiring the use of Autodesk MapGuide Author.

The Dynamic Authoring Toolkit serves as a conversion component, allowing for translation between binary map file formats, MWF (Map Window Files) and MLF (Map Layer Files), and its XML map file format, MWX (Map Window XML File). The Dynamic Authoring Toolkit cannot modify MWF, MLF, or MWX files. You will need to use a third-party XML tool to programmatically alter and validate XML files. Autodesk MapGuide Author can now open and save MWX files.

Using a variety of XML parsing tools and development techniques, you can dynamically generate new maps as well as modify existing maps and their properties that were initially set using Autodesk MapGuide Author—all during application run-time. For example, using the MSXML DOM object, you could reset map layer definition properties by modifying the MWX file directly. Alternatively, you could generate a new map (MWX) from scratch by simply generating XML files or by combining XML elements from several maps stored as MWX files.

The Dynamic Authoring Toolkit is implemented as an in-process COM DLL, named *MGDAT.dll*, and can be used in any development environment that supports COM automation.

For complete information about the Dynamic Authoring Toolkit, refer to the *Dynamic Authoring Toolkit Developer's Guide*.

Symbol Manager

Now, you can create your own symbol (SMB) files that include many different file formats, including bitmap and DIB graphics, and TrueType fonts. You can set up libraries of symbol files based on a theme or on the frequency with which you use certain symbols.

Support for Autodesk DWG

This release of Autodesk MapGuide includes the capability to serve design or map data stored in Autodesk drawing (DWG) format. Autodesk DWG design file format is a worldwide standard across vertical industries, such as architectural design, and facilities planning and maintenance. In the previous release, a data extension supported Autodesk DWG. This release incorporates all the features of the DWG data extension into Autodesk MapGuide and includes additional features for layer filtering, creating MapTips and reports, hyperlinking features on DWG layers to Web sites, and accessing data both in an Autodesk Map object data table and an external database using an Autodesk Map database link table.

What's New in Autodesk MapGuide Author?

XML Support

Autodesk MapGuide now supports a new XML representation of an MWF file: Map Window XML Files (MWXs), significantly increasing application development flexibility. In Autodesk MapGuide Author, you can open and modify maps saved in MWX format. With the Dynamic Authoring Toolkit, you can convert files between MWF, MLE, and MWX formats. You use third-party XML tools to modify the MWX files. See “Dynamic Authoring Toolkit” on page 12 for an overview of the Dynamic Authoring Toolkit.

Enhanced Symbol and Symbol Library Support

Now, you can incorporate numerous file formats, including bitmaps and TrueType fonts, into map layers. Using Autodesk MapGuide Author, you can modify the transparency of symbols you apply to both point layers and redline layers. You can also include both bitmap images and vector graphics in the same symbol file.

What's New in Autodesk MapGuide Server?

Improved Load Balancing

Changes to the MapAgent files improve load balancing between servers. All MapAgents now distribute requests evenly between the available servers, even at low load. MapAgents rank the available servers into an ordered list, starting with the best candidate to process the request. If a server fails to generate a response either because it is offline, or because it doesn't understand the request, the MapAgent tries the next server in the list until it gets a successful response, or until there are no more servers to try. In previous Autodesk MapGuide Server releases, MapAgents returned an error as soon as they encountered it.

Improved MapAgent Error Messaging

When working with multiple servers, Autodesk MapAgent now tells you which server is unable to process a client request without revealing the server's IP address but by displaying its order number in the list of servers in the registry file.

Support for ECW and MrSID Raster File Formats

Autodesk MapGuide Server enables you to access Enhanced Compressed Wavelet (ECW) images and Multi-Resolution Seamless Image Database (MrSID) version 1.6 images.

ECW and MrSID images already contain georeferencing information so you don't need to use Raster Workshop when working with them.

What's New in Autodesk MapGuide Viewer 6?

Support for Map Redraw Operations

New API methods enable developers to control how frequently and under what conditions a map displayed in Autodesk MapGuide Viewer redraws. Also, new map redrawing functionality removes the flash that was visible when a map displayed in Autodesk MapGuide Viewer redraws.

System Requirements

Following are the system requirements for using Autodesk MapGuide Author, Autodesk MapGuide Server, and Autodesk MapGuide Viewers.

Autodesk MapGuide Author Requirements

Autodesk MapGuide Author requires the following:

- Microsoft Windows 98 Second Edition, Windows NT 4.0 with Service Pack 4 or later, or Windows 2000 Professional
- Pentium-based PC
- 32 MB of RAM
- 16 MB of free hard disk space
- Super VGA or better video display
- Mouse or compatible pointing device

Autodesk MapGuide Server Requirements

Autodesk MapGuide Server requires the following:

- Microsoft Windows NT® 4.0 Server with Service Pack 4 or later, with one of the following Web servers:
 - Microsoft Internet Information Server 4.0
 - Netscape Enterprise Server 3.6 with Service Pack 3
 - iPlanet Web Server Enterprise 4.1 with Service Pack 8
- Windows 2000 Server with Service Pack 2 or later, running Microsoft Internet Information Server 5.0
- Microsoft Data Access Components (MDAC):
 - MDAC 2.5 with Service Pack 1
MDAC 2.5 is included on the Autodesk MapGuide product CD in the following location: `\MDAC2.5\MDAC_TYP.EXE`
 - MDAC 2.6 RTM with Microsoft Jet 4.0 with Service Pack 5
- Pentium-based PC
- 128 MB of memory
- 85 MB of free disk space (plus additional space for your data)
- VGA or higher resolution video adapter
- Mouse or compatible pointing device
- OLE DB providers required for access to relational data sources that contain map data. For a list of supported OLE DB providers, choose Help ► Contents, click the Index tab, and look up “data sources, about OLE DB.”
- TCP/IP network protocol installed on the Windows NT/2000 computer (TCP/IP provided on the Windows NT/2000 installation CD)

Help Index
data sources
about OLE DB

Autodesk MapGuide Viewer Requirements

The three versions of Autodesk MapGuide Viewer (ActiveX Control, Plug-In, and Java™ Edition) each require different configurations.

Autodesk MapGuide ActiveX Control Viewer Requirements

- Microsoft Windows 98 Second Edition, Windows NT 4.0 with Service Pack 4 or later, or Windows 2000 Professional
- 486 or Pentium-based PC with 16 MB of memory (24 MB required if using Windows NT 4.0)
- Mouse or compatible pointing device
- Web browser: Microsoft Internet Explorer 5.x

Autodesk MapGuide Plug-In Viewer Requirements

- Microsoft Windows 98 Second Edition, Windows NT 4.0 with Service Pack 4 or later, or Windows 2000 Professional
- 486 or Pentium-based PC with 16 MB of memory (24 MB required if using Windows NT 4.0)
- Mouse or compatible pointing device
- Web browser: Netscape Navigator® 4.x

Autodesk MapGuide Viewer, Java Edition Requirements

- Microsoft Windows 98 Second Edition, Windows NT 4.0 with Service Pack 4 or later, or Windows 2000 Professional
 - 486 or Pentium-based PC with 16 MB of memory (24 MB required if using Windows NT 4.0 and Microsoft Internet Explorer)
 - Mouse or compatible pointing device
 - Web browser: Netscape Navigator 4.7, or Microsoft Internet Explorer 5.x
- Mac® OS 9.1
 - Apple Macintosh computer with 32 MB of memory (64 MB or more recommended)
 - Mouse or compatible pointing device
 - Web browser: Microsoft Internet Explorer 5.x with Java VM MRJ 2.2.4.

- Sun Solaris™ 2.6 or 2.8
 - Sun SPARCstation with 64 MB of memory
 - Mouse or compatible pointing device
 - Web browser: Netscape Navigator 4.7

What's the Fastest Way Through This Book?

This guide is designed for all the different stages of Autodesk MapGuide development and for different kinds of Autodesk MapGuide users. To determine which parts of this guide you should read, review the following information.

I'm just getting started with Autodesk MapGuide.

Read the rest of this chapter to determine the types of people you will need to work on your project and the skills they will need, and where to go for more information. Then, follow the steps in “Overall Strategy” on page 43 for information about how to set up Autodesk MapGuide and develop applications that interact with it. Depending on your role in Autodesk MapGuide projects, you can then decide which chapters to read.

I already have Autodesk MapGuide up and running.

If you already have data that you are using, read Chapter 5, “Working with Data in Autodesk MapGuide,” for information about how to optimize your data to improve performance. If you want to evaluate how well you have set up your project, whether to use multiple servers instead of a single server, and other system design considerations, read Chapter 3, “Designing Your System.” Finally, read “Where to Get More Information” on page 22 for information that is beyond the scope of this guide.

I just want to know what tasks to do for my job.

Depending on your role, you will need to perform different tasks from other people working on the project with you. The scope of implementing Autodesk MapGuide can vary widely. In some cases, one or two people can create and post a map. In others, several contributors work together to create an Autodesk MapGuide Web site. The following list explains the possible roles involved in an Autodesk MapGuide implementation and describes the tasks and skills required of each role.

Note that one person might perform more than one of these roles, or you might divide the responsibilities of a single role among several people. If you are a project manager trying to determine whom you need to hire, or a developer trying to determine what training you need, information in this section can help you plan for your next Autodesk MapGuide implementation.

Data Engineer

The data engineer is responsible for gathering and managing all spatial data resources, such as vector mapping data and raster images, as well as attribute data, such as tables of population and other demographic information that is linked to the spatial data. If you will not be using a data provider to directly access Autodesk GIS Design Server, Oracle Spatial, or SHP data, the data engineer converts vector data from other formats into Spatial Data (SDF) files, uses Raster Workshop to work with raster images, and then provides those files to the server administrator. The data engineer might use Autodesk Map to create spatial data, or use SDF Loader to convert spatial data from other sources. Data engineers need to work with map authors to determine what spatial data is needed for the maps, and then either create or acquire that data.

Data engineers will find information they need in Chapter 5, “Working with Data in Autodesk MapGuide,” and Chapter 6, “Planning and Designing Maps.”

Map Author

The map author uses the resources provided by the data engineer to create maps in Autodesk MapGuide Author. Map authors need to be familiar with coordinate systems, and with GIS or CAD in general. They should have a good understanding of what information to show in the map and how to display information cartographically. They will work closely with the data engineer to get the data that they need. They will also work with the server administrator to make sure they are given authoring privileges and have access to the data through the server.

Map authors need to decide the type of maps to deliver:

- Maps and drawings with limited interactivity that do not require an Autodesk MapGuide Viewer installation (requires LiteView)
- Highly interactive maps and drawings requiring a Viewer installation
- A combination of both types of maps and drawings, offering limited maps initially, with the opportunity to install a Viewer for increased interactivity

Map authors will find information they need in Chapters 5 through 9.

Server Administrator

The server administrator oversees Autodesk MapGuide Server and the Windows NT Server or Windows 2000 Server computer on which it runs. This person is responsible for setting up the server architecture, security (password access and access keys), network connections, database access, and search paths for data sources and image files. The server administrator also installs the Web server, Autodesk MapGuide Server, and MapAgent software, as well as OLE DB providers, geocoding data and, in some cases, Macromedia ColdFusion® and/or Active Server Pages™ (ASP). Server administrators need to maintain Autodesk MapGuide Server using Autodesk MapGuide Server Admin.

Server administrators will find information they need in Chapters 2, 3, and 4.

Webmaster

The Webmaster is responsible for all Web site content, including HTML-embedded maps. Webmasters need to be able to build and maintain a Web site. The Webmaster will work with the application developer when creating a map-enabled Web site that extends the functionality of Autodesk MapGuide Viewer. Webmasters will find information they need in “Publishing a Map” on page 151.

Application Developer

The application developer uses programming skills to build custom Autodesk MapGuide Viewer applications and server-side scripts and reports. Application developers need to be able to perform the following tasks:

- Create HTML pages with embedded Java™, JavaScript, JScript, or VBScript code that accesses the objects of the Autodesk MapGuide Viewer API. For example, you might create an HTML form containing a button that turns a layer on and off, or a drop-down list that selects map features.
- Create custom reports with ColdFusion, Active Server Pages, or another third-party application.
- In some cases, create server-side applications with the SDF Component Toolkit. A server-side application created with the SDF Component Toolkit can dynamically update SDFs posted on an Autodesk MapGuide Server. For example, you could create an application that lets users add polygon lot lines to a map from their local browser.

Application developers should be very familiar with Autodesk MapGuide and will find information they need in Chapter 2, “Understanding Autodesk MapGuide,” Chapter 3, “Designing Your System,” (with particular attention to “Choosing a Viewer/Browser Environment” on page 63).

Conventions Used in This Manual

The following table describes conventions used in this manual:

This word or phrase...	Indicates this...
Choose Edit ► Properties	Click the Edit menu, and then choose Properties from the Edit menu. If three levels of menus are shown, it means that there is a secondary or submenu. For example, the text: Click Start ► Settings ► Control Panel indicates that when you click the Settings menu item in the Start menu, a submenu appears, from which you choose Control Panel.
the <Netscape home> \<Computer name>\config directory	Text in <i>italics</i> indicates directories, file names, and keys in the Windows Registry.
Click	Press and release the left or primary mouse button.
Right-click	Press and release the right or secondary mouse button.
Drag	Hold down the mouse button while you move the mouse.

Help Index
maps

Note When you see text in the left margin of this guide with the heading “Help Index” as shown to the left of this paragraph, this indicates that there is additional, related information in the Autodesk MapGuide Help, which is available when you choose Help ► Contents and click the Index tab in either Autodesk MapGuide Author or Autodesk MapGuide Server Admin.

Where to Get More Information

In addition to this guide, there are a number of helpful resources, both printed and online. To download any of these documents, go to <http://www.autodesk.com/mapguidedocs>. Most of the user documentation from the Autodesk Web site is in Portable Document Format (PDF).

Viewing PDFs

To view guides in PDF format, you need to install Adobe Acrobat Reader, which is available on the Autodesk MapGuide product CD in the following location:

`\AcrobatReader\ar500enu.exe`

Reusing PDF Text

You can copy text from this PDF file and paste it into another application. For example, you may want to copy code samples for use in your own work.

To copy text from a PDF file



- 1 Click the Text Select tool on the Acrobat Reader toolbar.
- 2 Drag to select the text you want to copy.
- 3 Right-click and choose Copy from the shortcut menu.

The text is copied to the Clipboard.

Autodesk MapGuide User Documentation

Following is a list of all of the guides and Help systems available for Autodesk MapGuide users.

Autodesk MapGuide Help

This Help system provided with Autodesk MapGuide Author and Autodesk MapGuide Server includes general information about using Autodesk MapGuide products, specific step-by-step procedures, and reference information. You can access the Help by choosing Help ► Contents, by clicking the Help button on the toolbar, or by clicking the Help button in any Autodesk MapGuide Author or Autodesk MapGuide Server Admin dialog box.

Autodesk MapGuide User's Guide

This printed guide is included in the Autodesk MapGuide product package. You can also install this guide in Adobe Acrobat (PDF) format from the Autodesk MapGuide Documentation installer on the Autodesk MapGuide CD. You can access this guide from the Start menu by choosing Products ► Autodesk MapGuide Release 6 ► Documentation ► Autodesk MapGuide User's Guide.

Symbol Manager Help

This Help system is included in the Autodesk MapGuide Help and includes general information about working with symbols and symbol (SMB) files. To access the Symbol Manager Help, choose Help ► Contents ► Creating and Publishing Maps ► Using Symbol Manager, or click the Help button in any Symbol Manager dialog box.

Autodesk MapGuide Viewer Help

This Help system is provided with Autodesk MapGuide Viewer. It includes information about using Autodesk MapGuide Viewer but does not include information for developers. You can access this Help file from the Autodesk MapGuide Viewer popup menu by choosing Help ► Contents ► or by clicking the Help button on the main toolbar.

SDF Loader Help

This Help system documents the SDF Loader command-line utility. It contains conceptual and reference information about SDFs, including parameters for converting from specific formats. You can access this Help system from the Start menu by choosing Products ► Autodesk MapGuide Release 6 ► Documentation ► SDF Loader Help.

Raster Workshop Help

This Help system is provided with Raster Workshop. It provides overall information as well as detailed descriptions of how to use Raster Workshop to convert images to TIFF and tiled TIFF format, create raster image catalogs, and more. To access this Help, click Help on either tab of the Raster Workshop main window.

LiteView Servlet Administrator's Guide

This guide, which is installed with the Autodesk MapGuide LiteView servlet, contains information to help server administrators set up and maintain the LiteView servlet environment. You can access this guide from the Start menu by choosing Programs ► Autodesk MapGuide Release 6 ► LiteView ► Servlet Administrator's Guide.

Provider for SHP Guide

This guide is installed with the Autodesk MapGuide Provider for SHP and is written both for system administrators who need to configure the product and for users who need to work with it. You can access this guide from the Start menu by choosing Programs ► Autodesk MapGuide Release 6 ► Documentation ► Provider for SHP Guide.

Provider for Oracle Spatial

This guide is installed with the Autodesk MapGuide Provider for Oracle Spatial and is written both for system administrators who need to configure the product and for users who need to work with it. You can access this guide from the Start menu by choosing Programs ► Autodesk MapGuide Release 6 ► Documentation ► Provider for Oracle Spatial Guide.

Autodesk MapGuide ReadMe File

The ReadMe file for all of the Autodesk MapGuide products includes a list of known issues or late-breaking information that was not included in other guides or Help files. You can access this file by going to \\Program Files\Autodesk\MapGuideDocumentation6 and opening *MGReadme.htm*.

Autodesk MapGuide Developer Documentation

Following is a list of the guides and Help systems available for Autodesk MapGuide developers.

Autodesk MapGuide Developer's Guide

This printed guide includes information about developing Autodesk MapGuide applications and is included in the Autodesk MapGuide product package. You can also install this guide in Adobe Acrobat (PDF) format from the Autodesk MapGuide Documentation installer on the Autodesk MapGuide CD. You can access this guide from the Start menu by choosing Programs ► Autodesk MapGuide Release 6 ► Documentation ► Autodesk MapGuide Developer's Guide.

Autodesk MapGuide Viewer API Help

This Help system is a complete reference to the Autodesk MapGuide Viewer API objects, properties, methods, and events. You install this Help system from the Autodesk MapGuide Documentation installer on the Autodesk MapGuide CD. You can access this Help system from the Start menu by choosing Programs ► Autodesk MapGuide Release 6 ► Documentation ► Autodesk MapGuide Viewer API Help.

Dynamic Authoring Toolkit Developer's Guide

This guide, which is installed with the Dynamic Authoring Toolkit, includes information about working programatically with maps using eXtensible Markup Language (XML) format. You can access this guide from the Start menu by choosing Programs ► Autodesk MapGuide Release 6 ► Documentation ► Dynamic Authoring Toolkit Developer's Guide.

Dynamic Authoring Toolkit Help

This Help file, which is installed with the Dynamic Authoring Toolkit, provides context-sensitive Help for Dynamic Authoring Toolkit objects when you develop applications in Visual Basic or in another visual environment. You can access this Help system from the Start menu by choosing Products ► Autodesk MapGuide Release 6 ► Documentation ► Dynamic Authoring Toolkit Help.

Dynamic Authoring Toolkit Sample Application Help

These HTML files, which are installed with the Dynamic Authoring Toolkit, describe four sample applications that demonstrate the functionality of the Dynamic Authoring Toolkit.

SDF Component Toolkit Help

This Help system is provided with the SDF Component Toolkit. The SDF Component Object Model is of interest to advanced application developers, who will want to refer to the list of objects, properties, and methods. You can access this Help file from the Start menu by choosing Programs ► Autodesk MapGuide Release 6 ► Documentation ► SDF Component Toolkit Help.

LiteView Developer's Guide

This guide, which is installed with Autodesk MapGuide LiteView, includes information about developing applications for Autodesk MapGuide LiteView. You can access this guide from the Start menu by choosing Programs ► Autodesk MapGuide Release 6 ► LiteView ► Developer's Guide.

LiteView Sample Application Help

These HTML files, which are included with Autodesk MapGuide LiteView, demonstrate the functionality of LiteView.

Third-Party Documentation

Many excellent third-party books are available. Your tastes may vary, but here are some that we found useful:

- *ColdFusion Web Application Construction Kit*, by Ben Forta et al. (Que Corporation)
- *Programming Active Server Pages*, by Scot Hillier and Daniel Mezick (Microsoft Press)
- *HTML Sourcebook, 4th Edition*, by Ian S. Graham (John Wiley & Sons, Inc.)
- *The Java Class Libraries, Second Edition: Volume 1 and Volume 2*, by Patrick Chan and Rosanna Lee (Addison Wesley Longman, Inc.)
- *JavaScript: The Definitive Guide, 3rd Edition*, by David Flanagan (O'Reilly and Associates)
- *Java in a Nutshell, 3rd Edition*, by David Flanagan (O'Reilly and Associates)

Additionally, there are many books that discuss GIS, its history, and its applications. Because these books vary in scope, quality, and price, you should take the time to browse through them in your bookstore and select the one that suits your needs. One title you might try is *Principles of Geographical Information Systems* by Peter A. Burrough and Rachael A. McDonnell (Oxford University Press).

Autodesk MapGuide Web Site

To get late-breaking information about the Autodesk MapGuide products, or for links to technical notes and white papers that discuss various topics, go to the Autodesk MapGuide Web site: <http://www.autodesk.com/mapguide>. There is also a link to the online Autodesk MapGuide demos, which walk you through the process of using sample applications. Many of the demos use JavaScript to access the Viewer API, and you might find it useful to view the HTML source used in these examples.

Tip From Autodesk MapGuide Author, you can go directly to the Autodesk MapGuide Web site by choosing Help ► Autodesk MapGuide Web Site.

Online Discussion Groups

The Autodesk online discussion groups, located at <http://www.autodesk.com/discussion>, are open forums for Autodesk customers, partners, or anyone with an interest in Autodesk's products. You can post information or questions, answer other members' questions, or just browse messages to gather information and learn tips and tricks from other users. Your questions will be answered by other discussion group members or Autodesk staff.

For best results when posting a question, please be sure to provide as much information about the situation as possible. This includes your hardware configuration (how many servers, how much RAM, etc.), your operating system, the release number of the specific product, what steps you took immediately prior to the problem, the exact error message that was displayed, and any other information that will help us to understand the issue. Providing this information will improve our ability to answer your question immediately.

Autodesk Developer Network

Autodesk Developer Network (ADN) is a developer-support organization that provides its members with services including the following:

- A quarterly CD containing Autodesk products, documentation, and sample code
- Technical training
- Direct, comprehensive technical support
- Marketing support
- Developer consulting services
- Access to private newsgroups

ADN membership is open to experienced professional software developers who develop products and services that interface or integrate with Autodesk products. For more information about membership requirements and fees, go to the Autodesk developers Web site at:
<http://www.autodesk.com/developers>

Understanding Autodesk MapGuide

2

This chapter includes an overview of the Autodesk MapGuide® product suite, as well as information about planning a strategy for using the Autodesk MapGuide products.

This chapter may be especially helpful to:

- Server administrators
- Application developers
- New Autodesk MapGuide users

In this chapter

- What is Autodesk MapGuide?
- How Autodesk MapGuide components work together
- Map authoring products
- Map viewing products
- Map serving products
- Developing applications with Autodesk MapGuide
- What is Autodesk MapGuide application development?
- Overall strategy

What Is Autodesk MapGuide?

Before you use Autodesk MapGuide, you need to understand some basic concepts, including how to use the Autodesk MapGuide product suite as a whole, and how to access your Autodesk MapGuide® Server and data resources.

Autodesk MapGuide is a geographic information system (GIS). Unlike a typical map or drawing, which shows only spatial data such as roads, cities, and country borders, a GIS links attribute data, such as population statistics, to spatial data. This link between the map data and the attribute data makes a GIS very powerful, because it allows you to use data in a whole new way.

For example, you could create a map of restaurants that allows users to zoom in to an area of interest, click a restaurant, and then view that restaurant's menu, pricing information, phone number, and address. Another example would be creating a map of all power transformers in an area, so that your technicians could quickly generate a report of all customers affected by a particular transformer when it goes out of service. You could also create a facilities map of your company, including information about personnel in each office, such as telephone extension, title, department, and so on.

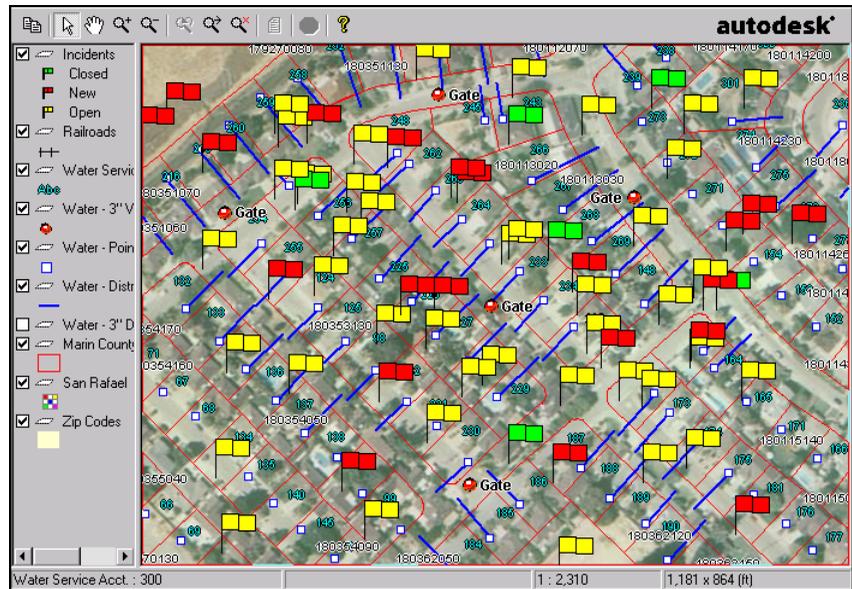
Keep in mind that when you use Autodesk MapGuide, you are not limited to using geographically projected maps—you can also use drawings, floor plans, schematics, or others kinds of spatial data.

How Autodesk MapGuide Works

To create an interactive map or drawing, you use Autodesk MapGuide® Author to combine resource data, such as spatial data (spatial data files and raster image files) and attribute data (from databases) in a Map Window File (MWF). The MWF contains the complete specifications of how the map will look and function.

To publish the map, you copy the MWF file to a location where the Web server can access it. Web page authors can then embed the file in their Web pages or create links to it. To view the map, users can install Autodesk MapGuide Viewer free of charge. When the user opens a Web page that contains an MWF file or clicks a link to an MWF file, the Web browser automatically loads Autodesk MapGuide® Viewer to display the map.

The Viewer displays the map according to the MWF settings specified in Autodesk MapGuide Author.



A map displayed with Autodesk MapGuide Viewer

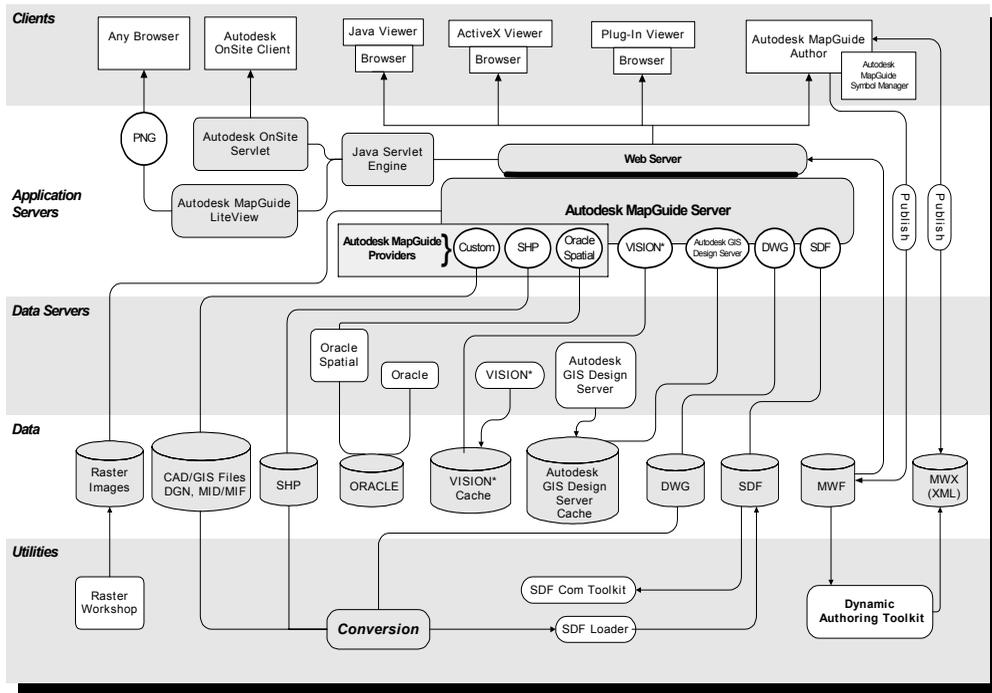
When you use either Autodesk MapGuide Author to create a map or Autodesk MapGuide Viewer to view a map, requests are made to Autodesk MapGuide Server to provide the required data in that map via the Internet, an intranet, or an extranet using the services of a Web server and a Web browser.

How Autodesk MapGuide Products Work Together

The three core products in the Autodesk MapGuide suite of products are:

- Autodesk MapGuide Author
- Autodesk MapGuide Server
- Autodesk MapGuide Viewer

In addition to these products, there are a number of utilities and development products. The following diagram provides an overview of how the Autodesk MapGuide products work together.



Map Authoring Products

This section describes the programs and data resources used to create a map.

Autodesk MapGuide Author

Autodesk MapGuide Author enables you to create maps by setting up Map Window Files (MWFs). You can then embed one or more MWF files (or create a link to them) in a Web page. When a user opens that Web page (or clicks its link in the Web browser), Autodesk MapGuide Viewer appears and displays the map.

Dynamic Authoring Toolkit

You use the Dynamic Authoring Toolkit to open and save MWFs in an XML-based format called Map Window XML (MWX). With MWX format, you can modify map layers, layer groups, zoom gotos, reports, and so on, using any third-party text editor or an application you develop.

You can extend the ability to modify maps to clients by monitoring Viewer API methods or by enabling users to submit requests using a Web interface. Based on Viewer activity or user response, you can dynamically modify the following:

- Zooming, to account for the user's map center and zoom extents
- Creating themes to display criteria users request
- Finding and modifying internal map settings at user requests

For example, users can submit the changes they want to apply to an MWF using a ColdFusion or Active Server Page. You can create an application that invokes the Dynamic Authoring Toolkit conversion component to convert the MWF to MWX and apply the user's changes. Using the Dynamic Authoring Toolkit conversion component, you can then convert the MWX back to MWF and send the modified map to the user's Viewer.

Symbol Manager

Symbol Manager enables you to create and modify symbol (SMB) files so that the symbols in the SMB files are based on criteria you define. You can also modify the properties of symbols within the SMB files.

SDF Loader

SDF Loader is a command-line utility that converts spatial map data from a variety of formats into Spatial Data Files (SDF), one of the native formats read by Autodesk MapGuide Server. Specifically, some of the formats that you can convert are Autodesk Map® DWG and DXF files, MapInfo MID/MIF files, ESRI Arc/Info Coverage files, Intergraph DGN files, ArcView Shapefile files, and Atlas BNA files, as well as ASCII comma-delimited CSV files. The SDF Loader can convert the coordinates from their original coordinate system into latitude/longitude, but it cannot perform datum shifts—all data must be based on the same datum.

The SDF Loader can also generalize your map data if it will be displayed at smaller scales (zoomed out), which improves performance and reduces required storage space. The SDF Loader is distributed on the Autodesk MapGuide CD. For more information, refer to the *SDF Loader Help* (*SDFLOAD.HLP*) located in the SDF Loader folder.

SDF Component Toolkit

The SDF Component Toolkit is a set of COM (Common Object Model) objects for reading and writing Spatial Data Files (SDF), Spatial Index Files (SIF), and Key Index Files (KIF), the native spatial data file formats of Autodesk MapGuide products.

You can access SDF Component Toolkit objects in development languages and environments such as C++, Visual Basic, VBA, VBScript, Java, JScript, ASP, CGI, and ColdFusion. Using these languages and environments, you can do the following:

- Write applications that convert spatial data to SDFs.
- Write applications that modify SDFs generated by Autodesk Map, Autodesk World®, or SDF Loader.
- Create server-side applications that read and modify existing SDFs. These applications can interact with client-side scripts, allowing for dynamic updates based on user input.

For more information, refer to the *SDF Component Toolkit Help* (*SDFCOMTK.HLP*) located in the *\Help* folder in the SDF Component Toolkit folder.

Raster Workshop

The Raster Workshop is a utility that allows you to optimize your raster images, which improves performance when they are accessed by Autodesk MapGuide. You can generate TIFF files and tiled TIFF files (tiled TIFF files improve performance) from standard image formats, create raster image catalog (RIC) files, and manipulate the images that are referenced by the RIC. You can then use the TIFF and RIC files with Autodesk MapGuide, or use the TIFF files with other Autodesk products that support raster images. The Raster Workshop is distributed on the Autodesk MapGuide CD. For more information, refer to the *Raster Workshop Help* (*RASTER.HLP*) located in the Raster Workshop folder.

Map Viewing Products

This section describes how your Web browser works with Autodesk MapGuide Viewer to display maps.

Web Browser

A Web browser is a client application that reads hypertext data in the form of HTML pages containing text, graphic, and programmatic content. Web pages are usually posted on the Internet, an intranet, or an extranet. An *intranet* uses Internet technology, but is used internally by a company or other organization; information on an intranet is not available to outside users. An *extranet* extends an intranet to outside users who have been given access rights, such as customers who access a site with a password.

In addition to reading and displaying Web pages, a Web browser can also perform file transfers using file transfer protocol (FTP) and run helper programs, such as Autodesk MapGuide Viewer.

Autodesk MapGuide Viewer

Autodesk MapGuide Viewer displays a map in your Web browser when you open a Web page that contains an embedded MWF or when you click a link to an MWF.

Autodesk MapGuide Viewer is available in three versions:

- A Plug-In for use with Netscape® Navigator on Windows systems
- An ActiveX Control for use with Microsoft® Internet Explorer on Windows systems
- A Java™ Edition for use with Netscape Navigator on Sun™ Solaris systems and with Microsoft Internet Explorer on Apple® Macintosh® systems. It can also be used on Windows, but we recommend that you use the Plug-In or ActiveX Control instead.

All are available for download free of charge from the Autodesk MapGuide Web site: <http://www.autodesk.com/mapguide>.

Note If you want to distribute maps without requiring that users install one of the Viewers, you can do so using Autodesk MapGuide LiteView. For more information, see the next section and the LiteView documentation.

You can also write a stand-alone C++, Visual Basic, or Java application that hosts Autodesk MapGuide Viewer without a Web browser. For details about supported platforms, see “Choosing a Viewer/Browser Environment” on page 63.

LiteView

LiteView serves maps in a raster format, with limited interactivity, so that users are not required to install Autodesk MapGuide Viewer. For more information, refer to the LiteView documentation.

Map Serving Products

This section describes the software components that process and serve data to the map.

Web Server

A Web server is an application that runs on a host computer. In response to requests from other computers, the Web server software processes and sends various types of files, such as Web pages and Map Window Files (MWFs). When a user requests map data, that request is received by the Web server and passed to Autodesk MapGuide Server. For information about the type of Web servers Autodesk MapGuide supports, see “Autodesk MapGuide Server Requirements” on page 16.

Autodesk MapGuide Server

Autodesk MapGuide Server serves map data in response to requests from Autodesk MapGuide Author and Autodesk MapGuide Viewer when a user is displaying a map in those programs.

When a request is made, Autodesk MapGuide Server reads the request to determine which data to provide, and then sends the data from the spatial data source, raster image file, Autodesk DWG data source, or OLE DB data source according to the specifications made in the request. Autodesk MapGuide Server allows you to control access to the data sources by checking for passwords, user IDs, and other optional settings you specify.

Autodesk MapGuide Server consists of three components: *MapAgent*, *Server Service*, and *Autodesk MapGuide Server Admin*.

MapAgent

Autodesk MapGuide® Server Agent (or MapAgent) is an interface between your Web server and Autodesk MapGuide Server. It receives requests for map data from Autodesk MapGuide Author or Autodesk MapGuide Viewer via a Web server. The MapAgent processes the requests as they are received and passes them to Autodesk MapGuide Server. There are three different MapAgent files that you can use with Autodesk MapGuide Server; for more information, see “Which MapAgent to Install” on page 54.

Server Service

Autodesk MapGuide Server Service is a Windows NT/2000 service that receives and processes the requests for map data distributed by the MapAgent, formats the data as requested by the map layer, and then sends the data back through the MapAgent across the Web to Autodesk MapGuide Author or Autodesk MapGuide Viewer.

Autodesk MapGuide Server Admin

Autodesk MapGuide Server Admin gives you complete operational control over Autodesk MapGuide Server. You can set security, generate log files, configure data source directories and database access, and start and stop the server.

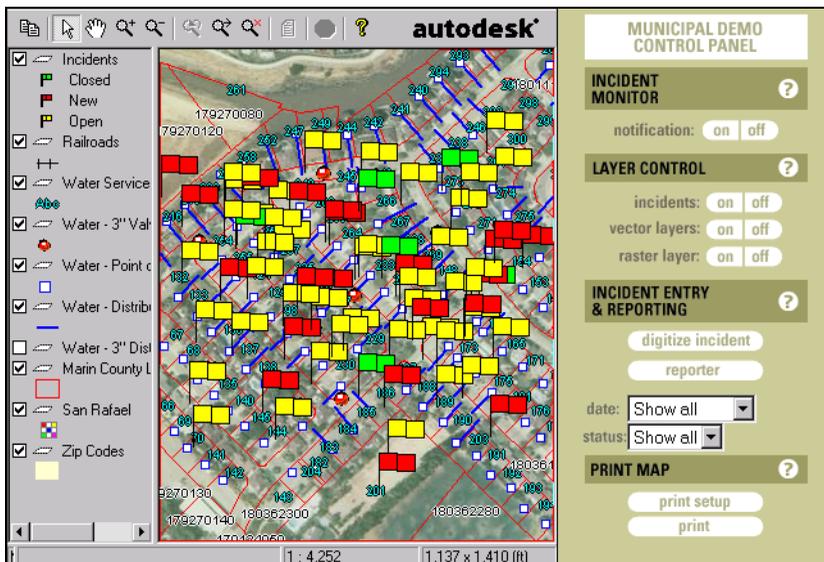
Autodesk MapGuide Data Providers

Autodesk MapGuide data providers enable Autodesk MapGuide to serve spatial and attribute data directly from a variety of traditional GIS, CAD, or relational spatial databases. When you use an Autodesk MapGuide data provider, you do not need to convert data to SDF format to use it with Autodesk MapGuide. You can purchase Autodesk MapGuide data providers for Autodesk® GIS Design Server, SHP, and Oracle8i™ and Oracle9i™ Spatial data. For information about these data providers, contact your nearest authorized Autodesk reseller. If you are not accessing spatial data through a data provider, you will need to convert your data into one of the supported formats.

Developing Applications with Autodesk MapGuide

This section describes the products and technologies used to create an Autodesk MapGuide application.

An Autodesk MapGuide application can be as simple as an HTML page that displays an embedded Map Window File (MWF), or it can be as complex as a CGI application, coded in C++, that modifies data files on the server and refreshes the browsers of everyone viewing the map. Usually it is something between the two, such as a map embedded in a Web page that has buttons and other controls on it that interact with the map.



Example of an Autodesk MapGuide application

Autodesk MapGuide applications can be *client-side* or *server-side*. A client-side application runs in the user's browser, using the processing power of the user's (client) computer. It is typically an HTML page that hosts Autodesk MapGuide Viewer and contains code to access the objects of the Autodesk MapGuide Viewer API. A server-side application runs on the server, and is typically used for generating custom map reports, generating dynamic HTML pages, and updating map resources, such as databases, GIS, or CAD files. In most cases, applications are a combination of both client-side and server-side

applications, but for the sake of simplicity, the following sections discuss the components as being one or the other.

Client-Side Application Components

Client-side applications run in the user's browser. A client-side application is usually made up of the following components:

- A Web browser and an HTML page that hosts Autodesk MapGuide Viewer
- An MWF that is read by Autodesk MapGuide Viewer and displayed as a map
- Web browser scripts that access the APIs for the browser and Autodesk MapGuide Viewer

HTML Pages

Usually, a client-side application is an instance of Autodesk MapGuide Viewer that is displayed in an HTML page by means of the `<EMBED>`, `<OBJECT>`, or `<APPLET>` tag. (`<EMBED>` is used for the Netscape Plug-In, `<OBJECT>` for the ActiveX Control, and `<APPLET>` for the Java Edition). The HTML page might contain form elements (such as buttons and list boxes) and code that access the Web browser API and the Autodesk MapGuide Viewer API. You can also display the map full-screen (not embedded in an HTML page) by using the `<A HREF>` tag in an HTML page and creating a link to the MWF. For more information, refer to the *Autodesk MapGuide Viewer API Help*.

Web Browser Scripts

Autodesk MapGuide supports the following HTML scripting languages:

- **JavaScript**—JavaScript is a full-featured scripting language that supports the Netscape Plug-In on the Windows platform and the Java Edition on the Windows and Sun Solaris platforms.
- **JScript**—JScript is Microsoft's variant of the JavaScript language. It supports the ActiveX Control and Java Edition for Internet Explorer on Windows platforms. Throughout this book, we will often refer to JScript and JavaScript collectively as JavaScript.
- **VBScript**—VBScript is a Visual Basic-derived language that supports the ActiveX Control for Internet Explorer on Windows platforms.

You can use these scripting languages to access the Autodesk MapGuide Viewer API and the Netscape and Internet Explorer browser APIs. The scripts can range from a single line to complex client-side map applications. For more information, see “Choosing a Viewer/Browser Environment,” on page 63, and refer to the *Autodesk MapGuide Viewer API Help*.

Autodesk MapGuide Viewer API

Autodesk MapGuide Viewer exposes an object-oriented programming interface (API) that gives you programmatic access to Autodesk MapGuide Viewer functionality. For example, you can create a redlining application that gives users the ability to digitize features and add notations to a map.

You can access the Autodesk MapGuide Viewer API from a browser script or from a stand-alone application you create that hosts the Viewer. The API is available when you install any version of Autodesk MapGuide Viewer. For more information, refer to the *Autodesk MapGuide Viewer API Help*.

Web Browser APIs

The Netscape and Internet Explorer APIs give you programmatic access to browser and document functionality. The APIs include a Document Object Model (DOM) that exposes the elements in an HTML page.

With the browser APIs, you can write a script that creates a new window or frame and then outputs HTML to it dynamically. You can also create HTML pages that change dynamically on user interaction. (This is called *Dynamic HTML*.)

Note The Document Object Models for Netscape and Internet Explorer vary somewhat. Therefore, when writing a single script for both browsers, be sure to test your script carefully in both browsers.

Stand-Alone Applications

You can write a stand-alone C++, Visual Basic, or Java application that hosts Autodesk MapGuide Viewer without a Web browser. For details about supported platforms, see “Choosing a Viewer/Browser Environment” on page 63.

Server-Side Applications

Server-side applications run on the server (or *host*), creating or processing data and serving it to the client machine. A server-side application (also known as a *server app*) might be a counter that shows how many times a site has been visited, or it might be a database that builds and serves HTML pages dynamically. LiteView, used to display raster maps without a browser, is also an example of a server-side application.

In Autodesk MapGuide, server-side applications are typically used to generate and serve reports or to allow a user to update map data on the server using a browser. Please note that these applications are typically a combination of client-side and server-side applications, but for the sake of simplicity, they are discussed here as server-side applications.

Reports

You can design customized *reports* for your map. A report is an HTML page generated by a script you create using a third-party tool like ColdFusion by Macromedia Corporation, or Microsoft Active Server Pages (ASP). Report scripts combine database queries and HTML tags to dynamically generate pages on the server. These pages are then sent to the browser as standard HTML. Because the design of the HTML page is specified as part of the report script, the author of the report controls the way the page displays in the browser.

In an Autodesk MapGuide application, the report typically provides information about the selected map features or about a point the user specifies, depending on the settings the map author specified in the MWF. In some cases, database resources might be queried directly, bypassing the MWF completely. When a user views the report, Autodesk MapGuide Server sends the feature or point information to the report script, which extracts the appropriate content from a database and then displays an HTML page with the results in the Web browser. Examples of reports might be demographic data for the specified layers or the latitude/longitude coordinate of the specified point. For more extensive information about reports, refer to the *Autodesk MapGuide Developer's Guide*.

User-Updatable Map Resources

You can create server applications that give users the ability to update map resources from their browsers. These resources can be database map layers, attribute data associated with a feature, or even the SDFs themselves. Updating a database from the browser uses the same mechanisms that reports use.

For example, you could create a “crime watch” application. The application would include an HTML form where users could add map points representing crime incidents, as well as attribute data describing details of the incidents. Subsequent users could use the form to add their own comments to the database. In another example, you could create a redlining tool for surveyors. Using this tool, workers in the field could add polylines representing lot lines to the SDFs so that the changes would be visible to anyone else viewing the map. For more information, refer to the *Autodesk MapGuide Developer’s Guide*.

What Is Autodesk MapGuide Application Development?

The Autodesk MapGuide application development process allows you to add Autodesk MapGuide functionality to your Web site. The entire process includes writing the client-side and server-side code, as well as the steps involved in designing your Autodesk MapGuide project and server layout, setting up an Autodesk MapGuide Server and a Web server, gathering your data, and creating your HTML pages.

The following are eight main tasks involved in setting up your Autodesk MapGuide Web site and developing applications:

- 1 Familiarize yourself with GIS and the Autodesk MapGuide product architecture.
- 2 Design your system, by deciding which Web server to use, whether to use multiple servers, the directory structure for your project, how you will implement security, and so on. Determine whether you will require users to install Autodesk MapGuide Viewer, or whether you want to use Lite-View to serve maps with limited interactivity.
- 3 Set up your server. This includes installing and configuring your Web server, installing Autodesk MapGuide Server, installing a reporting engine, setting up a development environment, and adding files to the server.

- 4 Decide on your data strategy and work with your data. You will need to determine whether to use a data provider to access data directly or whether to convert your data. This includes creating spatial data, attribute data, raster images, symbols, Zoom Goto categories, and reports, and then adding this data to your map. It also includes optimizing the data you create and ensuring that you're using the correct coordinate system and precision.
- 5 Create your maps using Autodesk MapGuide Author or Dynamic Authoring Toolkit, and post them on the server.
- 6 Add the maps to Web pages and develop client-side applications to interact with the maps.
- 7 Develop report scripts that either display data for selected features on the map or dynamically update the databases when the user clicks the map or enters information.
- 8 Optionally, use SDF Component Toolkit to develop applications that allow you to modify your Spatial Data Files (SDF) by editing, deleting, or adding geographic features from the browser.

Overall Strategy

Setting up Autodesk MapGuide and developing an application is much like cooking: rather than working on one task at a time, you need to work on several of them at once, going back and forth between the tasks as needed. This section uses this approach and outlines the best strategy for setting up Autodesk MapGuide and developing applications. The process includes three main phases: installation and testing, planning and design, and implementation.

The following sections describe these phases. For more information about the second phase, planning and design, see Chapter 3, "Designing Your System."

Phase One: Installation and Testing

This phase involves installing and testing all of the components to make sure that your system is ready. You can take two approaches to this phase. The first approach is to read through Chapter 3, "Designing Your System," to determine exactly how you want to set up your system before you install the products.

The other approach is to do a basic installation to get an idea of how everything works together and make sure it all works properly, and then use that knowledge in Phase Two when you plan and design your complete Autodesk MapGuide application. In either case, the data and map layer you create in this phase should be very basic and for testing purposes only.

To install and test the components

- 1 Install your Web server and Web browser, and then type your Web server URL in the Web browser to make sure that the browser is communicating with the Web server.
- 2 Create OLE DB data sources for your attribute data (or Autodesk DWG data sources if working with Autodesk DWG files), and then test them with Access, Excel, or another database application to make sure that you can access the data through the data source names you created. If you are not sure which attribute data you will be using, skip this step for now and return to it during Phase Three when you create your data.
- 3 Install Autodesk MapGuide Server, and then type your Autodesk MapGuide Server URL in the Web browser to make sure that the browser is communicating with Autodesk MapGuide Server.
- 4 Install Autodesk MapGuide Author, and then open *tutorial.mwf* to make sure you can access the Internet through Autodesk MapGuide Author. If you will be using Autodesk MapGuide on an intranet only, skip this step.
- 5 If you are using a data provider to access data directly, install the data provider as described in the data provider's documentation. If you are not using a data provider, install SDF Loader, and then convert one file to SDF format.
- 6 In Autodesk MapGuide Author, create a new layer based on the SDF you created in the previous step or based on the data you are accessing through a data provider.
- 7 If the layer links to an OLE DB data source or an Autodesk DWG data source, create the link and then test it by pausing the mouse over features on the layer to make sure the MapTips are displaying the feature names.
- 8 Save the MWF from Autodesk MapGuide Author.
- 9 Create an HTML page that references the MWF and post it in the Web server directory.
- 10 Install the version or versions of Autodesk MapGuide Viewer that you will be supporting, and then in your Web browser, type the URL to the HTML page you created in the previous step to verify that the map loads in Autodesk MapGuide Viewer.

Phase Two: Planning and Design

This is a critical phase, during which you determine how you need your Autodesk MapGuide application to function, and design it accordingly.

To plan and design your application

- 1 Determine your performance needs, and whether you should install multiple servers.
- 2 Determine which data you will need for the map, including what types of reports and Zoom Goto categories you will need.
- 3 Decide how to design the layers. Ask yourself the following questions:
 - What name do you want to display in the legend for each layer?
 - What name do you want to use for each legend for programmatic access (that is, access through the Viewer API)?
 - Should users be able to select features on this layer?
 - Do you want to display more or less data depending on the current scale? If so, create multiple layers of the same area that turn on and off at particular display ranges.
 - Will the data on this layer be used in any reports? If so, make a note to add this layer to the Report tab when you set up your reports.
- 4 Design your Autodesk MapGuide application. This involves determining the following:
 - How will the user interact with Autodesk MapGuide Viewer and the Web page? For example, will the user have to select features on the map, or will you add a list box to the Web page that allows the user to select a map feature from the list?
 - Depending on which functionality you want to add to the Web page, which Autodesk MapGuide functions do you need to use in order to provide this functionality?
 - Do you need to create other applications and scripts, such as CGI scripts? For example, if you want to allow the user to digitize points on the map and update the database with the new locations, you need to write a script to handle this.

Phase Three: Implementation

In Phase Three, you implement your Autodesk MapGuide application according to the plan you developed in Phase Two.

To implement your application

- 1 If you will be installing additional servers, do so now, and test them as you did in Phase One.
- 2 Create a skeleton of your application (without the MWF), creating placeholders and pseudo-code for your features and functions.
- 3 If you are not using a data provider to access data directly, perform data conversion, and then put the converted files in the necessary locations. If you create any additional databases, go back to Phase One and create and test OLE DB data sources for each database you add.
- 4 Create the report scripts or applications that Autodesk MapGuide will use to generate reports.
- 5 Create the Zoom Goto data.
- 6 Build the map according to your plan. This includes creating the layers, and then adding the reports and Zoom Goto categories to the Map Window Properties dialog box.
- 7 Add the MWF to the application skeleton, then test all layers, reports, Zoom Goto categories, and so on.
- 8 Build the placeholder functions and test them.

Designing Your System

3

This chapter covers topics that you need to take into consideration before you set up your Autodesk MapGuide® Server, author your map, or develop your Autodesk MapGuide® Viewer application. Read this chapter to decide how you want to design your system, what type of security you need, and what type of Viewer and browser environment you want to support before you install or configure any software.

This chapter may be especially helpful to:

- Server administrators
- Application developers

In this chapter

- Planning your directory structure
- Security
- Architecture and performance
- Choosing a Viewer/browser environment

Planning Your Directory Structure

The first step in designing your system is planning the structure of the files and directories you will have on your server. For example, will you have all of your files under one main directory, or will you split them into project directories? Will you have all of your data in one directory, to be used by all projects, or will you have a separate data directory for each project? Part of planning your directory structure comes from your own understanding of how many projects and how much data you have, and a major consideration is setting up the structure so that your files are secure.

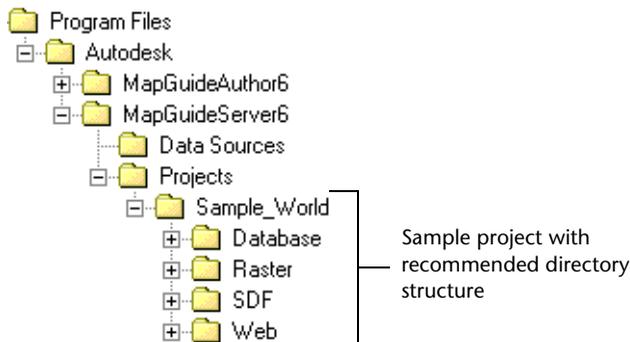
Note This chapter assumes you are familiar with Windows NT®, Windows® 2000, and Web server administration. If you are not, look up “Windows NT,” “Windows 2000,” and “Web servers” in the Autodesk MapGuide Help index.

Directory Structure Guidelines

You will need to create a directory structure for any of the file types you use with Autodesk MapGuide. In some cases you will also have to create virtual directories that map to physical directories. Your main security strategy is to keep your data repositories hidden from the Internet. You do this by placing spatial and attribute data away from the physical directories that are exposed to your server’s HTTP processing.

Virtual directories provide a mapping between the Web server directory structure and the physical directory structure in your file system. For example, when you install Autodesk MapGuide Server, it creates the virtual directory */MapGuide6/Sample_World/* on your local host, which maps to the physical installation directory *c:\Program Files\AutodeskMapGuideServer6\Projects\Sample_World\web*

The following illustration shows the physical installation directory:



This setup is designed for maximum portability and security as well as ease of maintenance. By setting up your projects in this way, you can easily move an entire project from one computer to another, as all of the necessary data is under the project directory. You can also add additional directories and subdirectories, as needed.

As shown in the illustration on page 48, when you map a virtual directory to `..\Projects\Sample_World\web`, your data directories (`..\Database`, `..\Raster`, and `..\SDF`) are not exposed to the Internet. Clients can only access the folders and files within the folder to which the virtual directory is mapped. Using virtual directories enables you to keep the same URL, even if you change file paths on your system. If you change file paths, just update the virtual directory mapping. Virtual directories also enable you to grant Execute permission to directories you create.

Use the following guidelines for setting up your directory structure.

Group files into projects with project directories

After you group files into projects with project directories, map virtual directories to the `..\<project name>\web` directory. For example, if you create two project folders on the file system of your Autodesk MapGuide Server, `..\Projects\project1` and `..\Projects\project2`, map virtual directories to `..\Projects\project1\web` and `..\Projects\project2\web` but do not put your data in directories below `..\web`.

Place files under a virtual directory

Unlike raw data, you must place all HTML-related files, including MWFs, under a virtual directory so they are directly accessible to the Internet. For example:

```
..\Projects\project1\web\map1.html  
(www.<your domain>.com/project1/map1.html)  
  
..\Projects\project2\web\map2.html  
(www.<your domain>.com/project2/map2.html)
```

Place files in directories that have Execute permission

You need to place your report files and server-side scripts in directories that have Web server Execute permission. If you are running Microsoft Internet Information Server (IIS), and you want to assign Execute permissions to a directory, you must create a virtual directory that maps to it, regardless of whether that directory is under the Web root or not.

For instructions on creating a virtual directory, refer to the documentation that came with your Web server.

Strategically locate MapAgent files

You can locate your MapAgent files anywhere on the file system where they can be executed by the Web server software. If you are running IIS, we recommend you use the default directory, */MapGuide6/*, which the Autodesk MapGuide Server installation creates for your MapAgent files. This way you do not need to create a virtual directory for these files. If you choose to place your MapAgent files elsewhere, you must create a virtual directory that maps to its physical counterpart and assign Execute permissions with your Web server software.

Netscape Enterprise Server does not create a default directory. If you use the NSAPI version of the MapAgent, you must enter a pointer in the Netscape configuration file that points to the *MapAgent_NSAPI.dll* file. Typically, the *MapAgent_NSAPI.dll* directory is:

C:/Program Files/Autodesk/MapGuideServer6/MapAgents

If you are going to use the CGI agent, you must create a CGI directory and create a mapping to that directory in the Netscape Administrator.

Security

Security is an important consideration when setting up any kind of server application. With Autodesk MapGuide, you can implement security for your server computer at a number of different levels. There are three main methods for setting up security:

- Use the Windows NT or Windows 2000 Administrator tools to set security for files and directories on the server computer.
- Use your Web server to set security for virtual directories. Plan your directory structure so that files requiring security are not exposed to the Internet, for instance, by physically creating these files hierarchically above their virtual directories.
- Use Autodesk MapGuide to set up user IDs and passwords, access keys, passkeys to protect resources (such as SDFs and databases), maps, and map layers.

Using Windows NT or Windows 2000 Security

Help Index

Windows NT, security
Windows 2000, security

We recommend that you review the security settings for all folders on your server and adjust them appropriately, depending on the files they contain. If your Autodesk MapGuide Server directories are on a drive that uses the file allocation table (FAT) file system, you do not need to set Windows permissions, because all users have access to all files and directories. If these directories are on a drive that uses a Windows NT File System (NTFS), you must set the appropriate permissions on these directories for each account intended to access these directories.

In addition to setting security for individual files and directories, you can also set security for all directories controlled by your Web server. The next section discusses this approach.

Using Web Server Security

Help Index

Web servers
security

When you create a Web publishing directory, you can set access permissions for the defined home directory or virtual directory and all of the directories below it. The World Wide Web (WWW) service provides the access permissions, which are in addition to the permissions provided by the NTFS file system. Note that ColdFusion template files (*.cfm* files) interact with the Web server in a similar manner to a CGI scripting process, so any directory containing these files must also have Execute access.

The security considerations for your Autodesk MapGuide site are the same as those for any other Web site that provides data. With that in mind, we recommend that you create an organized directory structure with permissions that appropriately protect the files on the Web site enabled by Autodesk MapGuide.

In addition to the Windows NT/Windows 2000 and Web server security methods just discussed, you can also use a variety of methods in Autodesk MapGuide Server to set up security.

Using Autodesk MapGuide Security

Autodesk MapGuide Server and Autodesk MapGuide® Author provide you with the following methods for keeping your data resources and maps secure:

- User IDs and passwords to control access to maps, map layers, and data sources
- Access keys to control map layer access to data sources and map feature coordinate values

- Passkeys to control Viewer API access to layer setup data and map feature coordinate values

You can use one or more of these methods depending on your security needs.

Controlling Access to Maps

In addition to controlling access to your maps using the standard security features of your Web server, you can add password protection to your maps using Autodesk MapGuide Author. Password protection prevents other Autodesk MapGuide Author users from opening a proprietary Internet-published map and accessing the information stored in the MWF. You must enter the correct password each time you open a password-protected map.

If you have a public site, another way to add security to your MWFs is to store the MWFs on a server inside of your firewall and have the MapAgent and HTML files on a server outside of the firewall. For more information, see “Using a Remote MapAgent” on page 55 and “Firewalls” on page 73.

Controlling Map Layer Access to Data Sources

You can control access to data sources (resources) by assigning access keys to them using Autodesk MapGuide Server Admin. An access key is a unique string that can include a start and end date. To use a resource that has an access key assigned to it, the map author embeds the access key in the layer or Zoom Goto definition that will access that resource.

Each time a user attempts to access that map layer (such as by panning or zooming) or Zoom Goto definition, the access key is automatically sent to the server along with the request for the data. Autodesk MapGuide Server verifies the key and its start/end dates (if any) against the list of access keys assigned to that resource before providing the data. If the key is verified, Autodesk MapGuide Server loads the layer’s data; otherwise, the program displays a message indicating that access to the data is denied.

When assigning access keys to map layers, you need to coordinate with the person administering Autodesk MapGuide Server to make sure that the access key is properly assigned to the specific resource that provides data to that map layer. For more information, see “Creating and Modifying Access Keys” on page 84 and “Specifying Security for Layers” on page 173.

Controlling User Access to Resources

You can control which users can access resources (SDFs, raster image files, databases, and so on) by assigning user IDs and passwords to resources using Autodesk MapGuide Server Admin. Whenever Autodesk MapGuide Viewer or Autodesk MapGuide Author requests data from a resource, the user is prompted to enter a user ID and password. Autodesk MapGuide Server then verifies that this user ID and password has been assigned to the resource and provides the data.

Additionally, you can assign users to the Authors user group using Autodesk MapGuide Server Admin. When authors create maps, they can browse for available resources only if they are assigned to the Authors user group. This provides only a minimal level of security, because authors can still use a resource by typing its path, but they cannot browse for available resources without the recognized user ID and password that you specified in Autodesk MapGuide Server Admin. For more information, see “Creating and Modifying Users and Groups” on page 83.

Note Be sure to run Autodesk MapGuide Server and Autodesk MapGuide Server Admin under the same account (the System account or a user account). Otherwise, the resources you see in Autodesk MapGuide Server Admin might not be the same resources that are available to Autodesk MapGuide Server. See “Configuring Autodesk MapGuide Server under a Different Account” on page 75 for more information.

Accessing Data from the Autodesk MapGuide Viewer API

Map authors can control whether developers can access coordinate values and map layer setup data using the API `getVertices()` and `getLayerSetup()` methods. You control the security of this data from the Map Layer Properties dialog box in Autodesk MapGuide Author. If you allow API access, you can also specify that the application must send a specific passkey first, which the application developer passes in with the `unlock` method. The developer can then use the `getVertices()` and `getLayerSetup()` methods to access the coordinate values and layer setup data. For more information, refer to the *Autodesk MapGuide Viewer API Help*.

We do not recommend hard coding the passkey in your HTML application script because users can always view the source code of an HTML page. One option is to prompt users for their user IDs and passwords when they attempt to view secured data and then authenticate the user ID and password against a database on your server.

Map authors can also control whether developers have access to the tracking ID using the `getTrackingID()` and `setTrackingID()` methods. You control the security of this data from the Map Window Properties dialog box in Autodesk MapGuide Author.

Architecture and Performance

This section discusses the different server agents and distributed architectures that you can implement for Autodesk MapGuide Server and how they affect performance. On installation, Autodesk MapGuide Server selects a MapAgent based on the Web server it detects. You can, however, go back to the installation program and install a different MapAgent at any time.

Which MapAgent to Install

There are three types of Autodesk MapGuide Server agents (MapAgents) that you can install:

- **CGI**—This MapAgent works on any type of Web server and is easy to install. Therefore, if you are building a Web server for the first time, and you are not distributing or mirroring your map data across multiple servers, you might want to install the CGI MapAgent instead of the ISAPI or NSAPI MapAgents to avoid complications. Note that the CGI MapAgent is slower than the ISAPI and NSAPI MapAgents because it does not run as part of the Web server.
- **ISAPI**—The ISAPI (Internet Server Application Programming Interface) MapAgent is an ISAPI server extension that can be loaded by Microsoft Internet Information Server (IIS). Because it runs as part of the Web server process, it improves performance by eliminating the overhead of communicating between the Web server and a separate CGI executable. The ISAPI MapAgent resides on the user's computer, so it is faster than the CGI agent. It is also fairly easy to install. However, you can install the ISAPI agent only on IIS.
- **NSAPI**—The NSAPI (Netscape Server API) MapAgent is similar to the ISAPI MapAgent, except it works on the Netscape Enterprise Server. Like ISAPI, it is faster than a CGI MapAgent, and thus optimizes your server's performance.

For more information, see “Understanding Multiple Simultaneous Server Requests” on page 56.

Using a Remote MapAgent

The MapAgent uses Distributed Component Object Model (DCOM) built on the Remote Procedure Calls (RPC) transport. Because DCOM calls can be made across a network, the MapAgent does not need to reside on the same computer as Autodesk MapGuide Server. This is useful for enhancing security, because it allows you to publish maps from your public server while keeping your data, Autodesk MapGuide Server, and the communication between them secure on your private internal LAN.

For example, you could have your Web server, MapAgent, HTML files, and supporting files for the HTML files (such as bitmaps that appear in the Web page, not within the map) all on a public server outside of the firewall or other Internet security mechanism you are using. Inside the firewall, you would have Autodesk MapGuide Server and your resources (databases, SDFs, and raster images that appear within the map). With this setup, not only is all of your data behind the firewall, but all communication between Autodesk MapGuide Server and your data takes place behind the firewall. This approach enables anyone to use your maps, but minimizes the possibility of hackers accessing your data files or taking advantage of the communication between Autodesk MapGuide Server, and your databases. You can specify exactly which ports you want DCOM to use for communication between Autodesk MapGuide Server and the MapAgent. The data passed between them is only useful for display in Autodesk MapGuide Viewer. For more information, see “Data File Placement” on page 61.

To use a remote MapAgent, you need to make sure the MapAgent can communicate with your Autodesk MapGuide Server through the firewall. For more information, see “Setting Up the MapAgent” on page 71.

Standardizing on UDP or TCP

Different versions of Windows use either UDP ports or TCP ports for DCOM communication by default. When you use the MapAgent on a different computer from the Autodesk MapGuide Server, be sure that the computers are using compatible operating systems. Otherwise, if the MapAgent computer attempts to communicate with the Autodesk MapGuide Server computer using a different protocol, there will be a 30–45 second delay. At the end of the delay, an attempt will be made to connect with the alternate protocol. This delay will occur unless the last working protocol type (UDP or TCP) is cached by the operating system on the MapAgent computer.

Using Multiple Servers

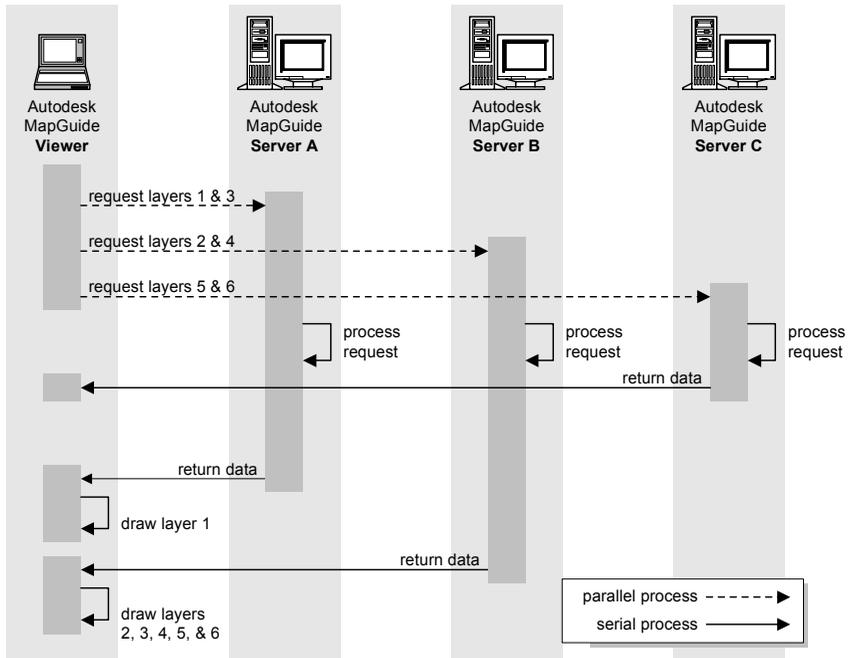
Autodesk MapGuide Server is scalable, meaning that it has mechanisms built in to take advantage of multiple servers, which improves performance. Autodesk MapGuide Server can process multiple requests simultaneously, balance the load of requests across the available servers, and use data that is distributed across different servers. This section discusses how Autodesk MapGuide Server takes advantage of multiple servers and helps you determine which is the best strategy for you.

Understanding Multiple Simultaneous Server Requests

Autodesk MapGuide Server is a multi-threaded application, meaning that it can process multiple requests for data in parallel, as opposed to serially processing each request one after another.

MapGuide clients can send multiple simultaneous requests to several MapAgents at once and simultaneously receive the responses from those requests. This means that instead of using one server to process a large request, or sending smaller requests one at a time, multiple servers can process all smaller requests at the same time. You do this by setting up your map layers to use data from different Autodesk MapGuide Servers. Autodesk MapGuide Viewer will then send off requests for data for all of those layers in parallel, where they are all processed at the same time. Therefore, if you have three servers, processing time could be up to three times faster than using one server.

For example, in the following illustration, there are requests coming from layers 1 through 6. In this example, layers 1 and 3 make the requests to server A, layers 2 and 4 send the requests to server B, and layers 5 and 6 send the requests to server C. All the requests to these servers go out at the same time, so the servers process the requests simultaneously. Each server then sends its processed data back to the Autodesk MapGuide Viewer. The Autodesk MapGuide Viewer always draws layer 1 first, and then draws all of the other layers simultaneously once it has received all of the data.



Simultaneous request model

MapAgents and Server Ranking

When the ISAPI, NSAPI, or CGI MapAgents receive a request from a MapGuide client, they rank the available servers and select one to which they dispatch the request. If the chosen server is offline or invalid, the MapAgent tries the next server in the rank.

CGI MapAgent

Each Autodesk MapGuide client request invokes a separate instance of the CGI MapAgent that lasts only the duration of the request. Because of this, the CGI MapAgent cannot track the number of requests dispatched to each server. It randomly selects an available server for each request and then ranks all other servers based on their proximity to this server in the list that appears in the Window's registry. The CGI MapAgent distributes requests evenly among all available servers regardless of their current workload.

NSAPI and ISAPI MapAgent

Once loaded by the Web server, the ISAPI or NSAPI MapAgents remain in memory until the Web server service is shut down. Since they persist between requests, they are able to use a more sophisticated system of load balancing by ranking all servers into one of the following groups:

- **Available**—This server is online and ready to process requests. From this group, the MapAgent will dispatch the client request to the server that is currently processing the fewest requests.
- **Offline**—This server has been taken offline and will not be polled again until the MapAgent receives 50 more client requests.
- **Invalid/Unavailable**—This machine is physically shut off or disconnected from the network and will not be polled again until the MapAgent receives 100 more client requests.

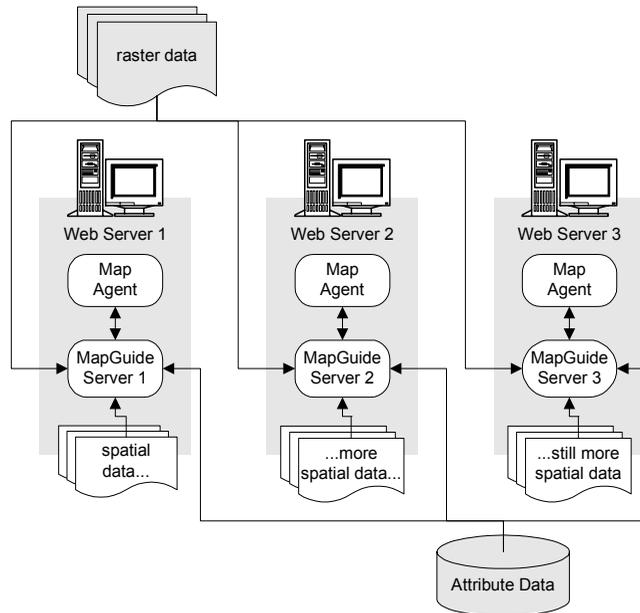
Distributed Data vs. Mirrored Systems

There are two approaches to using multiple servers: distributed data and mirrored systems. In the distributed data model, the servers contain different resource files so that the map data is distributed across the servers. In the mirrored model, you have multiple servers with identical setups and data so that the additional servers act as backups if the first server is busy or unavailable.

The distributed data model requires less maintenance than the mirrored systems model. However, this approach is not fault tolerant—if one Autodesk MapGuide Server goes down, Autodesk MapGuide Viewers cannot access the data on that server. The mirrored systems model is safer than the distributed data model because it does have fault tolerance, which provides a backup server so that the data is still available. However, mirrored systems can require more maintenance than distributed data systems if you need to update the servers.

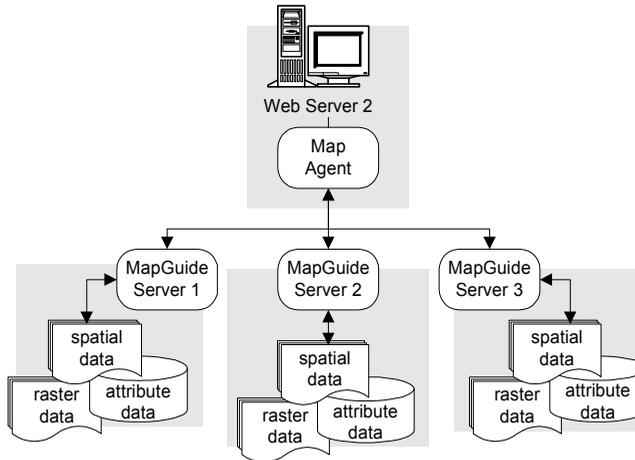
The following diagrams illustrate the two different multiple server architectures.

In the first diagram, notice that there are three Web server computers, each with its own Autodesk MapGuide Server. Each contains different data. In this case, requests are distributed among the servers based solely on which data is requested; if repeated requests are made for the same data, only the server containing that data will process the requests. To make this model work, you must plan the placement of your data carefully so that requests are distributed equally among the servers.



Example of distributed data

In the next diagram, a Web server has a MapAgent that points to several Autodesk MapGuide Servers, each of which has exactly the same data as the others. In this case, requests made to this server will be distributed among the Autodesk MapGuide Servers based on their availability, so if one of the Autodesk MapGuide Servers is busy processing another request, the request will go to the next server.



Example of mirrored data

For maximum benefit, you can use a combination of the two approaches. For example, in the mirrored data illustration, Web Server 2 might be one of several Web servers that is used only when requests are made for its particular data. However, when requests are made to Web Server 2, all requests it receives are distributed for processing among three Autodesk MapGuide Servers, each of which contains exactly the same data. Thus, in this example using a combination of methods, several Web servers use the distributed data model, and one of the distributed Web servers also uses the mirrored data model to handle its individual requests.

Setting Up Multiple Servers

If you choose to have multiple Autodesk MapGuide Servers on your network, you must configure their TCP/IP settings to operate correctly through your Internet connection configuration. Also, to maximize performance, be sure to set up your MapAgent for load balancing between the servers.

Data File Placement

When using remote and/or multiple servers, it is important to know where to store your data so that the server(s) can access it. The following table describes whether each type of data needs to be available to the Autodesk MapGuide Server(s) or the Web server. Note that the MapAgent does not need access to data files, as it simply relays whatever data is sent to it from the Autodesk MapGuide Server.

This type of data...	Must be available to...	Comments
Map source data (SDFs, data accessed using a data provider, raster images, OLE DB data sources)	All Autodesk MapGuide Server installations	The Autodesk MapGuide Server(s) processes the data, then sends it to the MapAgent to be relayed to Autodesk MapGuide Author or Viewer.
Raster images in Web page (outside of map)	Web server	The Web server processes these files because they are outside of the map. Therefore, the Autodesk MapGuide Server(s) does not need access to them.
MWFs, MWXs, and MLFs	Web server	The Web server processes these files; the Autodesk MapGuide Server(s) does not need access to them.

Additional Performance Considerations

In addition to using multiple servers, there are several ways in which you can improve performance. Keep the following tips in mind when setting up your site, authoring your maps, and preparing your data.

Site Configuration

- Bandwidth is a critical factor. This includes internal and external bandwidth, as well as network traffic (particularly at peak hours on the Internet).
- Your hardware has many factors that affect performance, including processor speed, memory, and disk space.

Map Authoring

- Show only the layers that users really need. You can make the layers available but not visible when the user first displays the map, reducing the amount of data that needs to be processed when the map is first loaded.
- Create static layers for small, frequently accessed data that does not need to be kept secure. Static layers are loaded only once, and zooming in and out on the layer does not send requests to the server. For larger data sets, data that changes frequently, and data that needs to be kept secure, use dynamic layers instead.
- Use the Display Ranges option and pyramid the data. This involves creating multiple layers that show the same data but at different resolutions. You might have one layer that displays very detailed data and appears only when the user is zoomed in close, a second layer that displays less detail and appears only when the user is zoomed out farther, and a third layer that shows very generalized data and displays only when the user is zoomed out quite far.

Data Preparation

- For point and text layers, rather than creating an SDF for the points and linking it to a SQL table for the attribute data, consider storing the points in the SQL table as well and using that table as the source for the layer. Whenever you link an SDF to a SQL table, it takes longer to process than a layer based on just an SDF or a SQL table. This is not true of themes, however. When setting up a theme, it doesn't matter whether the data source and theme source are the same SQL table, or the data source is an SDF and the theme source is a SQL table—performance will be the same in both cases.
- If there are multiple theme categories for a layer, consider using separate layers that reference separate SDFs. If possible, you could also export the information in a SQL table to a comma-separated (CSV) file and import it into its own SDF, rather than including it as a theme category of a layer based on another SDF.
- Generalize data as much as possible. This involves reducing the resolution of the data so that there is less data to process. You can generalize SDFs using SDF Loader or SDF Component Toolkit; you can subsample raster images using Raster Workshop. Note that generalization reduces the amount of detail you will see when you zoom in, so you might want to create multiple layers of the same area using different resolutions for different display ranges. Also, data with complex shapes, such as parcel data,

might not generalize well, because their boundaries might not line up properly afterwards.

- Trim feature names if they are not used. You can use the /NULLNAME switch in SDF Loader to do this. Also, use the /LINK switch to specify the URL column(s) only if you plan to use the URLs.
- For raster images, use Raster Workshop to create uncompressed, subsampled, tiled TIFF files.

Choosing a Viewer/Browser Environment

As you plan your Autodesk MapGuide application, there are four major components you need to consider:

- **Operating system**—Will your users be running Windows, Mac OS, or Solaris to view maps?
- **Web browser**—Will your users be running Netscape Navigator or Microsoft Internet Explorer? Or do you want to create a stand-alone application to run the Viewer, so that a browser is not necessary?
- **Autodesk MapGuide Viewer/LiteView**—Depending on which operating system and browser your users have, they will use the Autodesk MapGuide Viewer ActiveX Control, Autodesk MapGuide Viewer Plug-In, or Autodesk MapGuide Viewer, Java™ Edition. If all of your users are running the same operating system and browser (such as on a corporate intranet), you can develop your application for one version of Autodesk MapGuide Viewer. However, if your users all have different setups and thus use all versions of the Autodesk MapGuide Viewer, you will need to develop your application to handle all three. If you do not need the full interactivity of Autodesk MapGuide Viewer and you need complete cross-platform support, you can consider using LiteView to deliver raster-based maps with limited interactivity.
- **Scripting language**—Which language will you use to develop your application? Each version of Autodesk MapGuide Viewer is accessible from one or more specific languages.

The following table is designed to help you consider each of these factors:

Components for Choosing a Viewer/Browser Environment

Operating System	Browser	Viewer	Language
Windows	Internet Explorer	Autodesk MapGuide Viewer ActiveX Control	HTML, VBScript, Jscript, JavaScript
	Internet Explorer	Autodesk MapGuide Viewer, Java Edition	HTML, JScript, JavaScript, Java
	Netscape Navigator	Autodesk MapGuide Viewer Plug-In	HTML, JavaScript
	Netscape Navigator	Autodesk MapGuide Viewer, Java Edition	HTML, JavaScript, Java
	Any browser that supports PNG file format	LiteView	ColdFusion (CF), Active Server Pages (ASP), Java Server Pages (JSP), or Perl
	none (stand-alone application)	Autodesk MapGuide Viewer ActiveX Control	Visual Basic
Mac OS	Internet Explorer	Autodesk MapGuide Viewer, Java Edition	HTML, Java
	Any browser that supports PNG file format	LiteView	ColdFusion (CF), Active Server Pages (ASP), Java Server Pages (JSP), or Perl
	none (stand-alone application)	Autodesk MapGuide Viewer, Java Edition	Java

Components for Choosing a Viewer/Browser Environment (*continued*)

Operating System	Browser	Viewer	Language
Solaris	Netscape Navigator	Autodesk MapGuide Viewer, Java Edition	HTML, JavaScript, Java
	Any browser that supports PNG file format	LiteView	ColdFusion (CF), Active Server Pages (ASP), Java Server Pages (JSP), or Perl
	none (stand-alone application)	Autodesk MapGuide Viewer, Java Edition	Java

Autodesk MapGuide Viewer ActiveX Control for Internet Explorer

The Autodesk MapGuide Viewer ActiveX Control exposes an API that is accessible from VBScript, JScript (Microsoft's implementation of JavaScript), and Java. The ActiveX Control API is exposed through ActiveX/COM/Automation technology. If you develop an application **only** for the ActiveX Control version of the Viewer, users can access that application with Internet Explorer only; if someone tries to view your application with Netscape, it will fail. You can also write stand-alone applications for the ActiveX Control with Visual Basic or C++. In this case, no browser is required, as your stand-alone application takes the place of a browser. For platform information, see "Autodesk MapGuide ActiveX Control Viewer Requirements" on page 17.

Autodesk MapGuide Viewer Plug-In for Netscape

The Autodesk MapGuide Viewer Plug-In exposes an API that is accessible from JavaScript and Java. The Plug-In API objects are exposed via Netscape LiveConnect technology.

If you develop an application **only** for the Plug-In version of the Viewer, users can access that application with Netscape only; if someone tries to view your application with Internet Explorer, it will fail. For platform information, see "Autodesk MapGuide Plug-In Viewer Requirements" on page 17.

Autodesk MapGuide Viewer, Java Edition

The Autodesk MapGuide Viewer Java Edition works with certain combinations of both browsers on Windows, Mac OS, and Solaris (see previous table). It is accessible from JScript, JavaScript, and Java. Internet Explorer exposes the Java Edition API through a combination of the Java bean and ActiveX/COM/Automation technology. Netscape Communicator exposes the Java Edition API through a combination of Java introspection and Live-Connect technology. The API classes are defined in the *com.autodesk.mgjava* package, which is typically contained in the *mgjava.jar* file. All configurations expose the Java Edition API to other Java code if it has been compiled to directly instantiate *MGMapApplet* or *MGMapComponent*. For platform information, see “Autodesk MapGuide Viewer, Java Edition Requirements” on page 17. For implementation information, see the *Autodesk MapGuide Developer’s Guide* and the *Autodesk MapGuide Viewer API Help*.

LiteView

LiteView is a Java program that runs on the server side (as a servlet). It converts an MWF file into a PNG image and returns it as an HTTP response to a request. It extends the capabilities of Autodesk MapGuide to quickly display maps as raster images in Netscape Navigator, Internet Explorer, or any other browser that supports the PNG image format. Application users do not have to download a plug-in to display the maps.

Third-party integrators can create a custom LiteView viewer, using the sample application provided with the servlet as an example. For more information, refer to the *LiteView Developer’s Guide*.

Assembling and Administering Your Server

4

This chapter includes information about setting up and administering your server. Before you begin, please read Chapter 3, “Designing Your System,” to help you decide how to set up your server security and architecture.

This chapter may be especially helpful to:

- Server administrators
- Application developers

In this chapter

- Setting up your servers
- Autodesk MapGuide Server Admin overview
- Starting and stopping the server
- Setting general server properties
- Setting up your data sources
- Managing server security
- Tracking server requests
- Adding geocoding data

Setting Up Your Servers

To enable your computer to serve maps over the Web, you must install and configure Autodesk MapGuide® Server and your Web server software.

Before You Install Autodesk MapGuide Server

Before installing Autodesk MapGuide Server, be sure to do the following:

Log On with Administrative Rights

Before you install Autodesk MapGuide Server, log on to Windows as an administrator or as a user who has administrative privileges.

Verify Your System Requirements

Be sure that your system meets the criteria listed in “Autodesk MapGuide Server Requirements” on page 16.

The Autodesk MapGuide Server installation program requires that you have Microsoft® Windows® Installer (MSI) on your computer. MSI is included with Microsoft Windows 2000. If you do not have MSI on your computer, the Autodesk MapGuide Server installation program will install the MSI software for you. You will then need to restart your computer and manually restart the Autodesk MapGuide Server installation.

Warning If Autodesk Mapguide Server Release 5 is installed on your machine, you must ensure that you have also installed patch release 5.0.8.x. before you can install Autodesk MapGuide Server Release 6. You can download this patch from the Autodesk product support Web site. If you did not install the 5.0.8.x patch release, you must uninstall Autodesk Mapguide Server Release 5 before installing Autodesk MapGuide Server Release 6.

Remove Autodesk MapGuide Server 4.1 for VISION*

If you have Autodesk MapGuide Server for VISION* installed on your computer, follow these steps before installing Autodesk MapGuide Server.

- 1 Use Autodesk MapGuide Server Admin to stop Autodesk MapGuide Server Service.
- 2 Close Autodesk MapGuide Server Admin.
- 3 Using the Add/Remove Programs Control Panel, uninstall Autodesk MapGuide Server for VISION*.

Install Your Web Server Software

Install and configure the Web server software, as described in “Installing Microsoft Internet Information Server” on page 70 and “Installing Netscape Web Server” on page 70.

During the Autodesk MapGuide Server installation, you will be asked to select one or more MapAgents to install (see “Which MapAgent to Install” on page 54). If, during the installation, you select a MapAgent for which you have not yet installed a Web server, you will need to perform the following steps *after* you finish installing Autodesk MapGuide Server:

- 1 Copy each MapAgent listed in the MapAgents Not Supported screen of the Autodesk MapGuide Server installation from the *<installation directory>* \MapAgent directory to a virtual directory for the Web server.
- 2 Enable Scripting and Execute permissions for the virtual directory.
- 3 If using a server other than Microsoft Internet Information Server or Netscape Enterprise Web Server, you must manually configure the following MIME types after Autodesk MapGuide Server Service is installed:

File Type	MIME Type	File Extension
Map Data File	application/x-mdf	.mdf
Map Window File	application/x-mwf	.mwf
Map Layer File	application.x-mlf	.mlf
Map Window XML File	application/x-mwx	.mwx

Note that you may need to omit the period (.) that precedes the file extension. For more information about manually configuring MIME types, refer to your Web server documentation.

Installing Microsoft Internet Information Server

If you plan to run Microsoft Internet Information Server (IIS) on Windows NT, you need to install the Windows NT Option Pack 4.0. This is not necessary with Windows 2000 because IIS is included with Windows 2000.

To install the Option Pack

- 1 Install Microsoft Internet Explorer 5.0.
- 2 Install Option Pack 4.0. When you install the Option Pack, select the Upgrade Plus option and be sure to select Internet Information Service as a component to install.

Installing Netscape Web Server

Before installing a Netscape Web server, you must first have the following:

- A system that meets the criteria listed in “Autodesk MapGuide Server Requirements” on page 16.
- Netscape Navigator installed on your machine. Either install Netscape Navigator from the Netscape Developer's CD or download it from: <http://www.netscape.com>
- An entry in a DNS server. Make sure that the administrator of the DNS server in your network enters the computer on which you are installing Autodesk MapGuide Server into the domain.
- A user account set up on the computer.

After you have met all of these criteria, you are ready to install the Netscape Enterprise Server software from the Netscape CD.

To install Netscape Enterprise Server

- 1 Insert the Netscape CD, and then follow the instructions on the screen to start the installation.
- 2 The installation program prompts you to specify whether or not you want to use Lightweight Directory Access Protocol (LDAP). Because you do not need LDAP, leave the box unchecked and go on to the next dialog box.
- 3 When prompted for user information, enter the name and password of the user you created in the User Manager.

- 4 The installer generates numbers for the administrator and Web server ports. Accept these defaults and write them down for future use.
- 5 Optionally, specify the default home directory for your Web documents instead of using the default content directory.

You should now be able to access the *index.html* file. If you cannot, refer to the Netscape Server documentation for troubleshooting tips.

Testing Your Web Server

You can test your Web server by locally by opening a Web browser and typing the reserved loop-back address; for example, *http://127.0.0.1* or *http://localhost*. If you have problems, refer to your Web server documentation for troubleshooting tips.

Setting Up the MapAgent

Typically, to set up the MapAgent, you first decide which MapAgent you want to use (see “Which MapAgent to Install” on page 54) and then select that MapAgent during the Autodesk MapGuide Server installation process. However, if you want to use the MapAgent on a different computer from Autodesk MapGuide Server, or if you want to take advantage of load balancing for multiple servers, read the following sections for configuration information.

Setting Up a Remote MapAgent

The MapAgent uses a Distributed Component Object Model (DCOM) to forward client requests for map data to the Autodesk MapGuide Server. DCOM is built upon the Remote Procedure Calls (RPC) transport. Because DCOM calls can be made across a network, the MapAgent does not need to reside on the same computer as Autodesk MapGuide Server.

To configure the MapAgent to use a remote server

- 1 Run the Autodesk MapGuide Server Setup program on the machine where you want to install the MapAgent.
- 2 In the Select Components panel, deselect the Server Service item, and verify that the correct MapAgent is selected.

You will be prompted to enter the IP address for the Autodesk MapGuide Server machine. When the installation is complete, the MapAgent is ready to route requests to the remote Autodesk MapGuide Server.

If necessary, you can move the MapAgent executable file to a different CGI script directory *after* you finish the installation. You can also change the remote Autodesk MapGuide Server's IP address by manually editing the REG_MULTI_SZ registry, as described in the following procedure.

Warning Whenever you edit your registry, be sure to use great caution. We recommend that you make a backup of your registry before you proceed.

To edit a remote server's IP address

- 1 Run the Windows NT *REGEDT32.EXE* tool. You can do this by clicking the Start button, choosing Run, and then entering **REGEDT32** in the Open box.

We do not advise that you use the Windows NT tool *REGEDIT.EXE*, because currently it does not have a friendly interface for editing registry values.

- 2 In the Registry Editor, navigate to the key *HKEY_LOCAL_MACHINE\SOFTWARE\Autodesk\MapGuide Server Agent\6.0*, and then double-click the *Mapserver_IP* value.
- 3 By default, the value is blank, which directs the MapAgent to the local computer. To direct the MapAgent to Autodesk MapGuide Server on a remote computer, enter that computer's IP address. If your Autodesk MapGuide Server IP address is assigned via DHCP, the IP will vary over time; in this case, enter the DNS host name of the Autodesk MapGuide Server instead of the IP address.

While you are editing the value for this key, you can also set up Autodesk MapGuide to take advantage of load balancing.

Configuring for Load Balancing

You can specify multiple Autodesk MapGuide Servers by entering each IP, or DNS host name, on a separate line in the REG_SZ value *Mapserver_IP*. The MapAgent will balance the processing requirements by distributing the map requests among the Autodesk MapGuide Servers specified in this value. Note that when you add IP addresses or DNS host names to this value, the local computer is no longer included by default, so you must also enter the IP or DNS host name of the local computer if you want the MapAgent to continue to use it along with the other servers specified.

When installed, the MapAgent reads the MapServer_IP value from the registry and gets all the MapGuide Server IPs that can handle requests. The ISAPI and NSAPI MapAgents keep track of the number of requests each Autodesk MapGuide Server is currently handling. The CGI MapAgent cannot keep track of the number of requests each Autodesk MapGuide Server is handling. When a new request comes in, the ISAPI and NSAPI MapAgents assigns the new request to the Autodesk MapGuide Server that is currently handling the fewest requests.

If you are using the ISAPI or NSAPI version of the MapAgent, the requests are distributed to the servers in a rotating manner. If you are using the CGI version of the MapAgent, it has no persistent memory between requests, so it distributes the requests randomly among the servers. For more information, see “Understanding Multiple Simultaneous Server Requests” on page 56.

You may also want to consider purchasing a third-party load-balancing solution such as Microsoft Windows NT Load Balancing Service (WLBS), the F5 Networks 3DNS Controller, or the RADWARE Web Server Director (WSD) products.

Firewalls

When you use a remote MapAgent, you need to configure your firewall to permit DCOM penetration from the outside to the inside. First, you must limit the DCOM port range on the Autodesk MapGuide Server computer. By default, a DCOM server uses port 135 for handshaking and uses any port in the range of 1,024 through 65,535 to service the DCOM call. To limit the range of DCOM, you must use *REGEDT32.EXE*.

Add the following three values to the key *HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Rpc\Internet* (the *Internet* key does not exist by default, so you might need to create it):

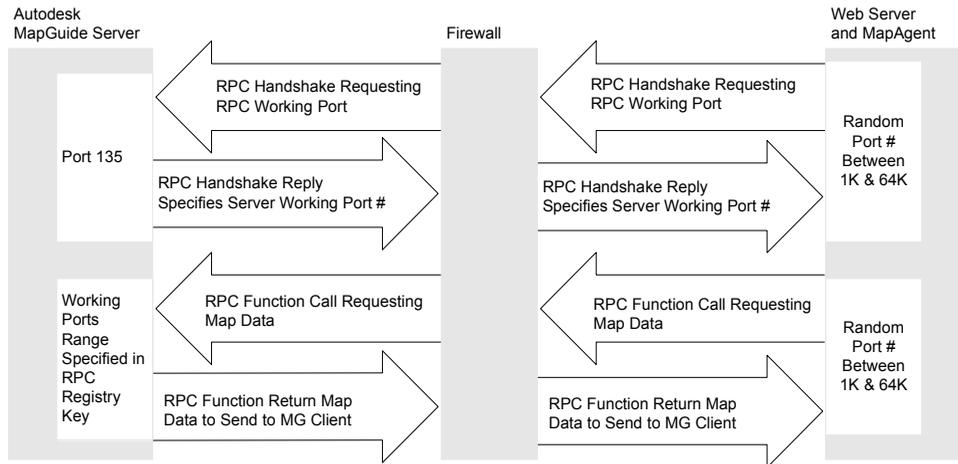
Autodesk MapGuide Server RPC Values

Value Name	Data Type	Text
PortsInternetAvailable	REG_SZ	Y
UseInternetPorts	REG_SZ	Y
Ports	REG_MULTI	6600-6610

The value in “Ports” specifies the valid range of ports on the server for use by RPC. (The value “6600-6610” is simply an example.) You can specify multiple ranges for availability by entering each range on a separate line. You will need to restart Windows for the changes to take effect.

After you have specified which ports are available for use by RPC (port 135 and the ports you specified in the “Ports” value), you must configure your firewall to allow the MapAgent computer to establish a connection with the Autodesk MapGuide Server computer on these ports.

The following diagram provides a basic overview of how the MapAgent and Autodesk MapGuide Server communicate over the firewall.



RPC communication over a firewall

For information about the configuration of your particular firewall, please consult the firewall’s documentation or your network administrator.

Warning This section does not address any security concerns regarding the configuration of your firewall. As with all changes to your firewall’s configuration, your network administrator should assess the risks that a change may bring.

If you set up more than one MapAgent (see “Using Multiple Servers” on page 56), be sure to specify the correct MapAgent when you set up the map layers. You do this on the Data Sources tab of the Map Layer Properties dialog box in Autodesk MapGuide Author.

Installing a Report Engine

If you will include reports in your maps, you need to install a reporting engine, such as ColdFusion or Active Server Pages. You can install ColdFusion Application Server from the Autodesk MapGuide CD. If your Web server is on the computer where developers are going to work, install ColdFusion Studio there as well. For details about installing ColdFusion, refer to the ColdFusion documentation.

Configuring Autodesk MapGuide Server under a Different Account

Autodesk MapGuide Server Service runs under the default *System* account. However, if you have data sources on another computer that you want to serve from Autodesk MapGuide Server, you need to run them under a user account that has access to that computer. Follow these steps after installing Autodesk MapGuide Server.

To change the account for Autodesk MapGuide Server Service

- 1 Do one of the following:
 - In Windows NT, choose Start ► Settings ► Control Panel, and double-click the Services icon.
 - In Windows 2000, choose Start ► Settings ► Control Panel ► Administrative Services.
- 2 In the Services dialog box, select Autodesk MapGuide Server Service, and click Startup.
- 3 In the Log On As area, select This Account, and then specify a user account and password that has access to the data sources on the remote computer.
- 4 Click OK, and then close the Services window.

Autodesk MapGuide Server Admin Overview

You use Autodesk MapGuide Server Admin to do the following tasks:

- Start and stop the server
- Set general server properties
- Set up and manage data sources
- Manage server security
- Track server requests and generate log files

To start Autodesk MapGuide Server Admin

- From the Windows Start menu, choose Programs ► Autodesk MapGuide Release 6 ► Autodesk MapGuide Server Admin.

The Autodesk MapGuide Server Admin window is displayed.



The complete, step-by-step procedures for using Autodesk MapGuide Server Admin are included in the online Help. Choose Help ► Contents, then refer to the topics listed under "Administering Your Autodesk MapGuide Server."

Starting and Stopping the Server

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server
starting and stopping

You can start and stop the server using Autodesk MapGuide Server Admin. Starting the server brings it online so that it is ready to accept and process requests. Stopping the server takes it offline so that it cannot accept or process requests.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up "server, starting and stopping."

Setting General Server Properties

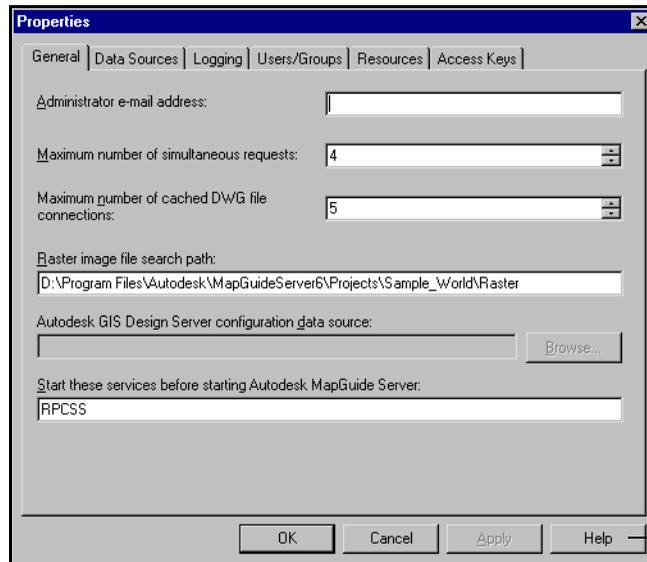
Help Index
server
general properties

On the General tab in the Autodesk MapGuide Server Admin Properties dialog box, you can specify the following properties for Autodesk MapGuide Server:

- Server administrators e-mail address
- Maximum number of simultaneous requests to the server
- Maximum number of DWG file connections to cache
- Search path for raster image files
- Autodesk® GIS Design Server configuration data source
- Services that must start before starting Autodesk MapGuide Server

To open the Properties dialog box

- In Autodesk MapGuide Server Admin, choose Edit ► Properties. The Properties dialog box is displayed.



Click for details about the options in this dialog box.

You use the six tabs in this dialog box to specify all of the properties for Autodesk MapGuide Server. This chapter includes basic information about each tab. You can find complete, step-by-step procedures in the online Help.

Setting Up Your Data Sources

You can set up and manage your data sources using Autodesk MapGuide Server Admin. See “Managing Your Data Sources” on page 79 for more information, and read this and the next section for an overview of data sources and data providers.

Autodesk MapGuide Server needs access to the data sources containing the spatial and attribute data for your maps. To communicate with these data sources, Autodesk MapGuide Server uses *data providers* that provide communication between Autodesk MapGuide and your data source. Direct access to the native data sources eliminates the need to convert your data before using it with Autodesk MapGuide.

Autodesk MapGuide Server can access attribute data from an Autodesk DWG data source or any standard OLE DB data provider, including Microsoft Access, SQL Server, Oracle[®], or any ODBC data source (using the Microsoft OLE DB Provider for ODBC Drivers).

Spatial Data Providers (SDPs) are similar to OLE DB Providers but with extended functionality that enables Autodesk MapGuide Server to access data stored in a data source in binary format, such as polygons and polylines, in an Autodesk SDF data source. Spatial data providers include Autodesk MapGuide SDF, SHP, and Oracle Spatial.

Autodesk MapGuide Server connects to data sources using plain text files that describe how to connect to a given data source. For OLE DB data sources, Autodesk Mapguide Server uses a Microsoft Data Link file with a *.udl* file extension. Autodesk MapGuide Server connects to Autodesk DWG data sources using an Autodesk Data Link (*.adl*) file.

Data Providers

Support for SDF and Autodesk DWG data sources is included with Autodesk MapGuide Server. You can purchase the following data providers for other types of data sources:

- Autodesk GIS Design Server Extension
- Autodesk MapGuide Provider for Oracle Spatial
- Autodesk MapGuide Provider for SHP

The following OLE DB providers are installed with MDAC 2.5 or later:

- Microsoft OLE DB Provider for SQL Server
- Microsoft OLE DB Provider for Oracle
- Microsoft Jet 4 OLE DB Provider
- Microsoft OLE DB Provider for ODBC

MDAC 2.5 is included on the Autodesk MapGuide product CD in the following location: `\MDAC2.5\MDAC_TYP.EXE`

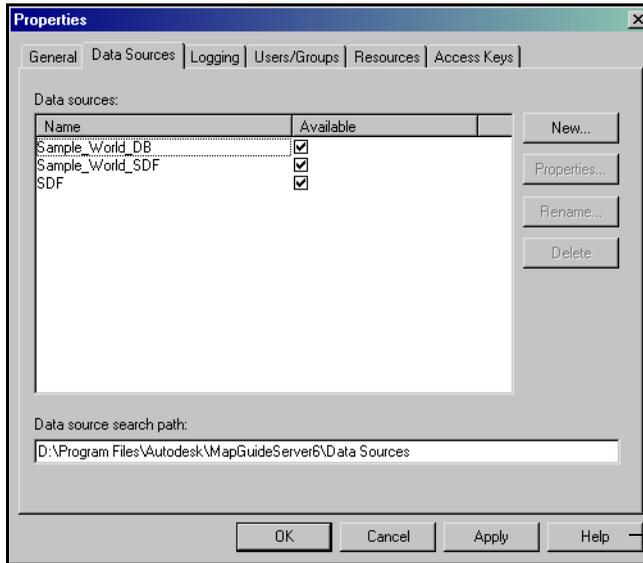
Tip If a native OLE DB provider is not available for your data source (for example, if you are using Lotus Notes), you can use the Microsoft OLE DB Provider for ODBC Drivers.

Managing Your Data Sources

Using Autodesk MapGuide Server Admin, you can view a list of your data sources, make data sources available or unavailable, create new data sources, rename existing data sources, delete data sources, and specify where Autodesk MapGuide Server looks for data sources. Autodesk MapGuide Server Admin also links to the Microsoft Data Link Properties dialog box where you can configure your data sources.

You use the Data Sources tab of the Properties dialog box to manage your data sources.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “data sources, managing.”



Click for details about the options in this dialog box.

Managing Server Security

In addition to setting Windows permissions and using the access control tools provided with your Web server to control access to individual maps (MWF files) at your site, you can add another level of security by using Autodesk MapGuide Server to control access to the *resources* (SDFs, DWG files, raster image files, SQL data tables, and Zoom Goto Address definitions) used by these published maps. This means that you can set up Autodesk MapGuide Server to require additional authorization before providing resources requested by a map, even if a user has access to the map. You can do this in two ways:

- Use access keys to provide time-sensitive, map-embedded, passive, transaction-based security.
- Use user-group/password security to provide map-independent, active, session-based security.

Access Keys Versus User IDs and Passwords

Access keys are passwords that the author of a map embeds in the definition of the map layer. Each time the map layer requests map data, Autodesk MapGuide Server verifies the embedded access key against the list of valid access keys for the resource before fulfilling the request. Because this process takes place automatically and invisibly every time the map layer requests data, access keys are a convenient way to provide greater resource security with no impact on the user. Additionally, access keys can be preset to be valid for only a certain period of time, adding an additional level of control.

User passwords require the user to enter a valid user name and password at the first request of map data from Autodesk MapGuide Server. Like the typical Web server security model, the user name and password are required only once for each layer that uses the restricted resource, providing a high level of security without unnecessary impact on the user.

Together, access keys and user passwords provide a great deal of flexibility in solving security problems over a variety of Internet/intranet implementations.

The following table provides a summary of the differences between the two security methods:

	Users/Groups/Passwords	Access Keys
Time Period	Active until deleted.	Preset time periods.
End-User Interaction	User must enter correct name and password.	No end-user interaction.
Implementation	Use Autodesk MapGuide Server Admin to enter and maintain users, groups, and passwords.	Use Autodesk MapGuide Author to enter access keys in MWFs; use Autodesk MapGuide Server Admin to link access keys to resources at the server level.
Authorization Frequency	Checked once per resource per layer request (until the user exits the current browser session).	Checked by Autodesk MapGuide Server for every layer request.

Choosing the Best Security Method

The following table offers recommendations about when each security method is most appropriate:

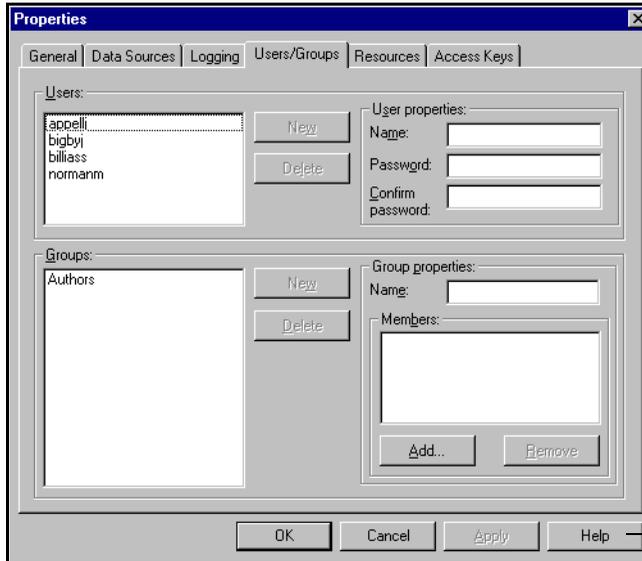
Goal	Method
Provide MWF files for a certain group of users only	Use the security protection in your HTTP server to provide the MWF files to only a defined user group.
Allow user of Autodesk MapGuide Author to change styles but not map content	Use access keys. You may want to allow a specific group of map authors to change styles and display ranges without being able to create new layers or add layer files. In this case, you can protect your resources with access keys. When you save a layer to a Map Layer File (MLF), do not select the Include Access Key In Map Layer File option. If users want to add that layer to a map or create a new layer, they must enter the correct access key for the resource, or Autodesk MapGuide Server will not respond to a request for that resource.
Limit access to confidential data to a specific list of users	Assign users to a group, and assign that group to the confidential resources, changing the passwords regularly.
Provide secure access that can be disabled for a casual and changing group of users	Assign access keys to the resources. Access key security is transaction-based (every request requires authentication) and requires no client-side action. This makes it easier to allow distribution to casual or public user groups without requiring them to know and enter the name/password for every layer in a published map.
Allow users to create maps and to query Autodesk MapGuide Server for a list of the resources that are available to facilitate the setup of map layers	Add users to the group called Authors. All members of this group will have map authoring privileges and full access to map data resources.

To implement any or all of these techniques for controlling access to the map data resources at your site, you use Autodesk MapGuide Server Admin.

Creating and Modifying Users and Groups

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users and groups

In order to control access to resources, you set up users and groups using the Users/Groups tab of the Autodesk MapGuide Server Admin Properties dialog box. To display the Autodesk MapGuide Server Admin Properties dialog box, choose Edit ► Properties. Then, click the Users/Groups tab.



Click for details
about the options
in this dialog box.

First, you create users by specifying their names and passwords. Then, you create groups. Finally, you assign users to the groups as members.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “users and groups.”

Assigning Users to the Authors Group

Autodesk MapGuide Server contains a predefined group called Authors. When creating a map layer in Autodesk MapGuide Author, members of the Authors group can query Autodesk MapGuide Server for a list of the available data sources. Such queries elicit a prompt for a user name and password, which are validated against the Authors group list. Although a user can enter a data source’s full path name to include the data source in a map layer, it is much easier to be able to choose from a list of available resources, rather than entering a full path name.

Warning Before Autodesk MapGuide Author users attempt to create map layers, they must be assigned to the Authors group.

For step-by-step instructions on assigning users to the Authors group, choose Help ► Contents, click the Index tab, and look up “Authors user group.”

Creating and Modifying Access Keys

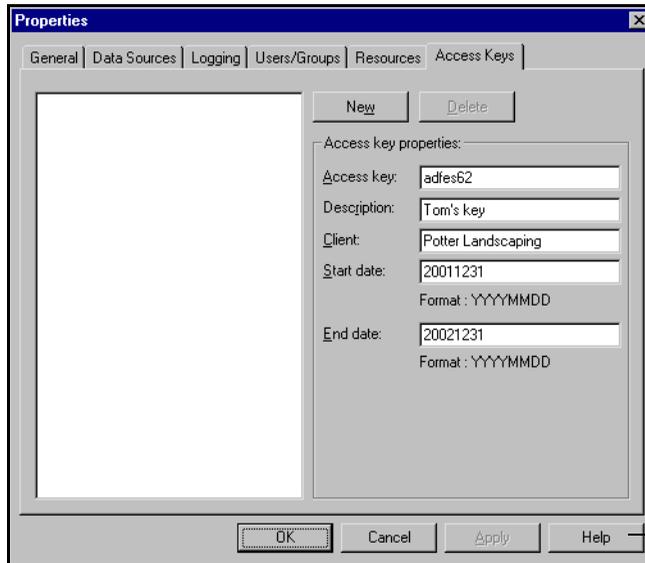
When you author maps, you can embed a hidden access key within each map layer or Zoom Goto definition. Then, each time a user attempts to access that map layer or Zoom Goto definition, the access key is automatically sent to the server along with the request for the data. Autodesk MapGuide Server then verifies that the access key is on the list of access keys assigned to that resource before providing the data.

For example, you could specify in Autodesk MapGuide Server Admin that the text string FL1WMTD is an access key for the SDF *lakes.sdf*. An author creating a map could then embed that string in a map layer that uses data from *lakes.sdf*. Then, whenever a user zooms in or out on the map or works with a feature on that layer, Autodesk MapGuide Viewer sends the access key along with the request for data. This happens automatically without the user being aware of the access key or needing to enter any information. Autodesk MapGuide Server verifies that the access key is on the list of access keys assigned to the resource *lakes.sdf* in Autodesk MapGuide Server Admin, and then provides the data. The map author needs to coordinate with the Autodesk MapGuide Server administrator to make sure that the access key the author enters in a map layer is properly assigned to the specific resource that provides data to that map layer.

Access keys are also useful for creating maps that are valid for only a specific period of time, as you can change the values of access keys and their start and end dates. Access keys also make it easy to stop serving data from a specific resource quickly.

For step-by-step instructions on creating access keys, choose Help ► Contents, click the Index tab, and look up “access keys, creating.”

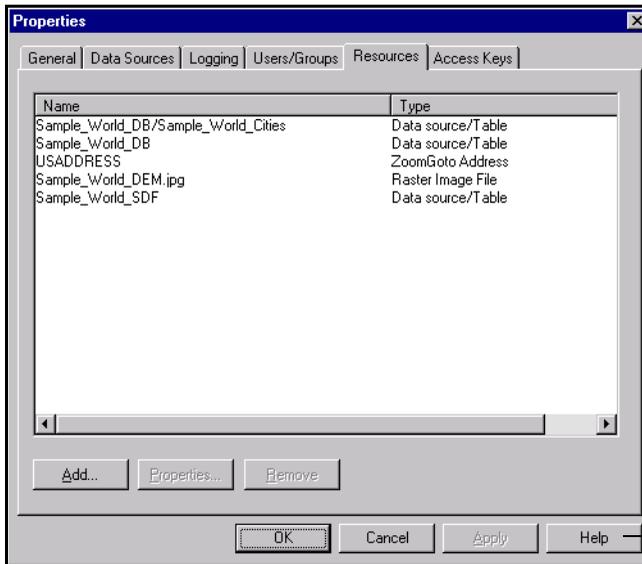
You assign access keys using the Access Keys tab in the Autodesk MapGuide Server Admin Properties dialog box. To display the Properties dialog box, choose Edit ► Properties. Then, click the Access Keys tab.



Click for details about the options in this dialog box.

Restricting Access to Resources

You can restrict access to your resources (data sources) by adding the resources to the Resources tab in the Autodesk MapGuide Server Admin Properties dialog box. To display the Properties dialog box, choose Edit ► Properties. Then, click the Resources tab.



Click for details about the options in this dialog box.

The Resource tab lists any resources you have added to Autodesk MapGuide Server Admin. A resource can be any of the following:

- Spatial Data File (SDF)
- Raster image file
- Directory containing multiple SDF or raster image files
- OLE DB data source and all of its tables (optionally, a specific table)
- ADL data source (optionally, a specific DWG file)
- Zoom Goto specification
- Autodesk GIS Design Server data source (optionally, a configuration and theme)

Note that you add resources on this tab only if you wish to restrict access to those resources.

Warning When you run Autodesk MapGuide Server Admin, you are always logged in under a user account. If Autodesk MapGuide Server is running under the System account, it will not be able to access the User DSNs you can access in Autodesk MapGuide Server Admin. In this case, you need to ensure that any DSNs you configure through Autodesk MapGuide Server Admin are System DSNs. Otherwise, database resources will not be set up correctly. Likewise, if Autodesk MapGuide Server is running under a user account, be sure to log on to that same user account before running Autodesk MapGuide Server Admin so that Autodesk MapGuide Server and Autodesk MapGuide Server Admin can access the same User DSNs.

To change the access properties of a resource, you must first add the resource to the Resources tab of the Properties dialog box.

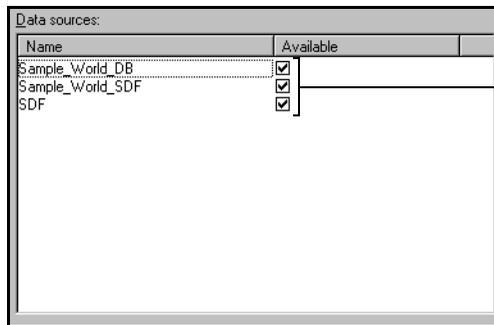
For step-by-step instructions on adding resources, choose Help ► Contents, click the Index tab, and look up “resources, adding.”

Taking Data Sources Offline

When you need to update or replace a data source, you must ensure that no users are accessing the data source. To do this, you need to take the data source offline.

To take a data source offline

- 1 On the Data Sources tab, select the data source you want to disconnect. Note that you cannot take a single table offline.
- 2 Clear the Available check box.



Clear a check box to take a data source offline. Select the check box to put the data source back online.

When you take a data source offline, all current connections to the data source are removed and no new connections are allowed. Users cannot access the data source again until you put it back online by selecting the Available check box.

Keep in mind that taking a data source offline affects only the current server. If other servers have access to this data source, you must take the data source offline on each of those servers as well.

Tracking Server Requests

When Autodesk MapGuide Server is running, its status is displayed on the Autodesk MapGuide Server Admin title bar, and the number of requests currently being processed is shown in parentheses. You can view additional usage information by displaying one of the log files or running a usage report. You can also rename and rotate log files, and customize the access and map layer access log files.

For step-by-step instructions on viewing log files, choose Help ► Contents, click the Index tab, and look up “log files, viewing.”

Access Log File

The access log file records all requests to Autodesk MapGuide Server and gives you a record of the activity at your site. An access log record is created for each request as the request is completed. For information about customizing the access log file for map layer data requests, see “Customizing the Access Log” on page 90.

Error Log File

The error log file records errors that occur during Autodesk MapGuide Server requests.

Trace Log File

The trace log file records the details of each request to Autodesk MapGuide Server. Because any request can include data for several map layers, each record in the trace log displays the details of the request for each layer. Entries in the trace log are created as soon as a request comes in, before it is serviced.

Map Layer Access Log File

The map layer access log file records all requests to Autodesk MapGuide Server for individual map layers. A map layer access log record is created for each request as the request is completed. For information about customizing the map layer access log, see “Customizing the Map Layer Access Log” on page 91.

Usage Reports

You can run usage reports to track the number of Autodesk MapGuide Viewers with unique IDs that query the Autodesk MapGuide Server. Usage reports do not track instances of Autodesk MapGuide Author that query the server.

The Standard Usage and Mobile Device Usage reports display the number of unique Autodesk MapGuide Viewers for each day of the past twelve months, and the total number of unique Autodesk MapGuide Viewers for each month. The Summary Usage report displays the total number of bytes, requests, and users served each month. These usage reports are not designed to provide absolute numbers—they can help you spot trends in usage. This helps you determine when you might need to improve performance as your number of users increases.

For step-by-step instructions on viewing usage reports, choose Help ► Contents, click the Index tab, and look up “usage reports, viewing.”

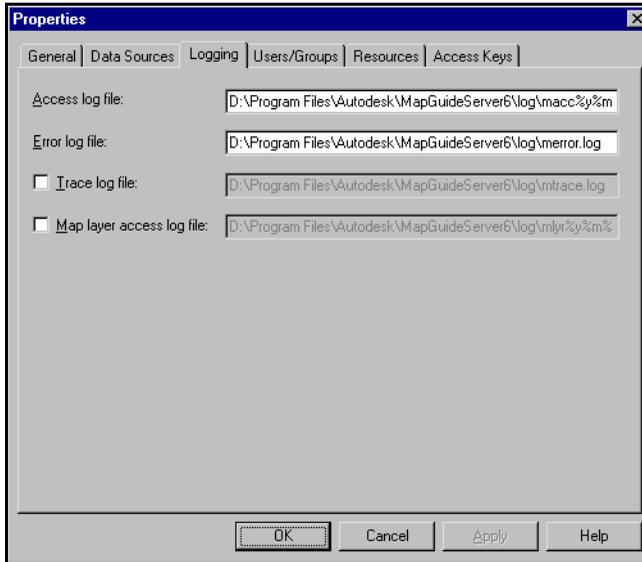
Renaming Log Files

You can rename the access log, error log, and trace log using the Logging tab of the Properties dialog box.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “log files, renaming.”

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Rotating Log Files

For the access log, error log, and trace log, you can automatically create a new file for each log every day at midnight, allowing you to have a different log file every day. This is useful if you need to go back to check the information in the log files for a particular day.

To rotate the log files, you include a date format string in the log file names to indicate which date information will be used in the name of the log files. For a complete list of format codes you can use, choose **Help** ► **Contents**, click the **Index** tab, and look up “log files, rotating.”

Customizing the Access Log

When a user sends a request to build map layer data in Autodesk MapGuide® Author or Autodesk MapGuide® Viewer, the program sends a Map Layer Data (MLData) request. Autodesk MapGuide Server site administrators can customize the information that is recorded in the access log file for MLData request types by modifying values in the Windows registry.

Warning Whenever you edit your registry, be sure to use great caution. We recommend that you make a backup of your registry before you proceed.

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The MLData values are in the following key:

HKEY_LOCAL_MACHINE\SOFTWARE\Autodesk\MapGuide Server\6.0\Log\MLData

For a complete list of parameters that you can use to customize the access log file, choose Help ► Contents, click the Index tab, and look up “access log, customizing.”

Customizing the Map Layer Access Log

The map layer access log records all requests to the Autodesk MapGuide Server for each map layer. Autodesk MapGuide Server site administrators can customize the information that is recorded in the map layer access log file by modifying values in the Windows registry.

Warning Whenever you edit your registry, be sure to use great caution. We recommend that you make a backup of your registry before you proceed.

The map layer data values are in the following key:

HKEY_LOCAL_MACHINE\SOFTWARE\Autodesk\MapGuide Server\6.0\Log\MapLayerAccessLog

For a complete list of parameters that you can use to customize the map layer access log file, choose Help ► Contents, click the Index tab, and look up “map layer access log, customizing.”

Adding Geocoding Data

Before you can enable zooming to a US street address or ZIP code, Autodesk MapGuide Server must have access to a geocoding database. When the user enters an address or ZIP code, Autodesk MapGuide finds that address and its corresponding coordinates in the database, and then zooms to that location on the map. For more information, see “Zoom Goto Address (Geocoding) Data” on page 101.

After you have obtained the geocoding files, you need to set them up so that Autodesk MapGuide Server can properly serve them to Autodesk MapGuide Author or Autodesk MapGuide Viewer. For information about obtaining geocoding data, go to: <http://www.mapguide.com/data>.

Working with Data in Autodesk MapGuide

This chapter discusses the basic steps for working with data and includes information about the different kinds of data you can use with Autodesk MapGuide®.

This chapter may be especially helpful to:

- Data engineers
- Map authors

5

In this chapter

- Basic steps for working with data
- Working with spatial data
- Working with attribute data
- Working with raster images
- Working with symbols
- Working with other types of spatial data

Basic Steps for Working with Data

In order to gather or create data, and then add it to map layers, you need to follow these basic steps:

- 1 Determine the coordinate precision and coordinate system to use. For more information, see “Designing the Map” on page 118.
- 2 Create spatial data sources and add them to layers. See the next section, “Working with Spatial Data,” and see “Specifying Data Source Properties for Layers” on page 160.
- 3 Create attribute data and link it to spatial data. For more information, see “Working with Attribute Data” on page 97.
- 4 Create raster images and add them to layers. For more information, see “Working with Raster Images” on page 101.
- 5 Create symbols and add them to layers. For more information, see “Working with Symbols” on page 109.
- 6 Create Zoom Goto categories. For more information, see “Setting Zoom Goto Data” on page 100.
- 7 Create reports and add them to the map. For more information, see “Working with Reports” on page 149.

This chapter is designed to give you an understanding of the different types of data you can use with Autodesk MapGuide, and how you create or procure the data. For information about using the data in map layers, see Chapter 9, “Working with Map Layers.”

Working with Spatial Data

Coordinates that represent the geographic features on a map are called *spatial data*. When you create a layer in a map, you specify which file contains the spatial data to display on that layer.

Spatial data can be in a variety of formats. SDF is the native Autodesk MapGuide format. However, Autodesk MapGuide can read spatial data from other formats as well (such as Oracle® Spatial) if you have a data provider installed for that specific format. For more information, see “Working with Other Types of Spatial Data” on page 112. If you are creating a point or text layer, you can specify an OLE DB data source, such as a table that contains coordinates and text. For more information, see “Working with Attribute Data” on page 97.

Map Features

Map features are the geographic features that appear on a map. In Autodesk MapGuide, map features are points, such as fire hydrants and cities, polylines, such as rivers and roads, and polygons, such as lakes and land parcels. Each map feature has a name, an optional URL link, and geometric data specified by one or more coordinate pairs.

The files containing the spatial data can also contain compound map features, such as polypolylines and polypolygons. Polypolylines are multiple polylines grouped as one to represent compound line features, such as road networks and river systems. Polypolygons represent compound area features, such as islands in a lake.

The following sections describe each of the types of map features you might have in your Spatial Data Files.

Points

A point is single place on a map, such as a telephone pole, or a city. Every point corresponds to a single coordinate pair that locates the point's symbol or text on the map. To use the points from a Spatial Data File in a map, you create a point layer.

Lines/Polylines/Polypolylines

A line represents a linear feature, such as a street, river, or sewer pipe. A polyline is simply a line with multiple segments, such as a winding road. A polypolyline is a single feature that includes two or more polylines; this is a convenient way to group related polylines into one map feature so that they can be selected or linked to a database as a single entity. The starting point and the ending point of each line segment in a line, polyline, or polypolyline has a coordinate pair, so that a polyline with several line segments, for example, will have several coordinate pairs that define the polyline.

Autodesk MapGuide treats lines, polylines, and polypolylines the same way—to use the lines, polylines, and polypolylines from a Spatial Data File in a map, you create a polyline layer.

Polygons/Polypolygons

A polygon represents a filled area on a map, such as a country or a lake. A polypolygon is a map feature consisting of two or more polygons, for example, a house with a detached garage. Although the polygons forming the house and the garage are not connected, you may still want to treat them as a single map feature. You can achieve this by making them both part of the same polypolygon. Each vertex on a polygon or polypolygon is a coordinate pair, and all the coordinate pairs make up the polygon. Autodesk MapGuide treats polygons and polypolygons the same way—to use the polygons and polypolygons from a Spatial Data File in a map, you create a polygon layer.

Text

Also known as annotations in other applications, text features are blocks of text placed at specific coordinates on the map. Like points, each text feature has a single coordinate pair associated with it.

Creating a Spatial Data File

Typically, you use a GIS application to create your spatial data, then export it to an Autodesk MapGuide SDF. If the application you are using does not support the SDF format, you can use SDF Loader or the SDF Component Toolkit to convert the data to SDF format. Then, Autodesk MapGuide® Server reads the SDF data and sends it to Autodesk MapGuide® Author and Autodesk MapGuide® Viewer to be displayed.

If you need to convert data to SDF format, you should be aware of the coordinate precision you will need (see “About Coordinate Precision” on page 119), and then choose the best conversion tool for your needs.

When creating SDFs, you should use only one type of data in each SDF, if possible. For example, an SDF might contain only points, lines/polylines, polygons, or annotations (text) from your Autodesk Map® data. This optimizes performance in Autodesk MapGuide.

Note When naming the SDF, make sure that the file name does not contain any of the following characters: double quote ("), asterisk (*), colon (:), slash (/), backslash (\), less than (<), greater than (>), question mark (?), pound symbol (#), or vertical bar (|).

For points/symbols and text, you can store coordinates in a database instead of an SDF. You can update coordinates in a standard database application quite easily, and you can rotate, align, and size text based on fields in the database.

The following sections explain the information you need to know about using the two SDF conversion applications.

SDF Loader

You can use the SDF Loader to convert several file formats individually, or you can create batch files to convert multiple files. The batch file can run the SDF Loader and any necessary third-party programs to convert the files. This is an efficient way to set up your source data and create your SDFs. For complete information, refer to the *SDF Loader Help*.

SDF Component Toolkit

You can use the SDF Component Toolkit and a programming language, such as Visual Basic or C++, to create an application that works with SDFs. The SDF Component Toolkit provides powerful access to SDFs, including the ability to work with individual features within an SDF. This means that your program could convert individual features in the SDF rather than the whole file at once, so you have more control of your conversion than you do with the SDF Loader. For complete information, refer to the *SDF Component Toolkit Help*.

Working with Attribute Data

Attribute data is data that can be linked to the spatial data in maps to provide the user with information about those spatial features. Examples of attribute data are population, area, name, total sales, a URL link to a related Web page, style data, and any other data you want to associate with a spatial feature.

When you link attribute data to your spatial data, the data can be used in one of four ways: to display the names of the features, to set the width (of symbols), height and rotation (of symbols and text), and alignment (of text), to create themes, or to generate reports. The following sections describe how to prepare and use your attribute data.

Linking Attribute Data to Spatial Data Files

To link the attribute data to spatial data, you simply specify the OLE DB or Autodesk DWG database table you want to use when setting up the layer. Autodesk MapGuide Author matches the records in the table to the spatial features in the SDF from which the layer was created by means of a *key*. A key is a string that uniquely identifies each spatial feature in the SDF and each record in the database. When a record in the attribute database and a spatial feature in the SDF have the same key, the record is linked to the spatial feature.

You can also use a database table for theme information. For example, you might have three sources of data: an SDF of coordinates that represent lakes, a secondary database table containing the name and linked URL for each lake, and another database table containing theme information, such as the size of each lake, water purity, and more. When you create the layer in the Map Layer Properties dialog box in Autodesk MapGuide Author, you specify the secondary table on the Data Sources tab, and specify the theme table from the Styles tab when adding a theme. Note that neither of the tables need to contain coordinates—they are linked to the polygons in the SDF only by their keys. For more information, see “Setting Display Styles for DWG Layers” on page 171.

To avoid potential conversion problems, be careful when creating the key field. Depending on the type of database, you might not be able to use the attribute data unless the key field in the database is exactly the same size as the key field in the SDF to which you are linking it. Some databases, when queried, will append the keys with blank space characters to make them the exact length you specified for the field, so the database keys will not match those in the SDF. For more information, choose Help ► Contents, click the Index tab, and look up “troubleshooting, problems creating themes.”

Linking Attribute Data to Another Database

You can create point layers and text layers from OLE DB or Autodesk DWG data sources instead of SDFs. For these layers, you can still use a OLE DB or Autodesk DWG database table for creating themes. For example, if you are setting up a layer of cities, you might have two tables: one that contains basic information about each city, such as the key, coordinates, name, and a URL link, and a second table that contains data on which you want to create themes, such as the population, majority political party, and so on. The second table would also contain the same key values as the first table; Autodesk MapGuide uses these keys to assign the theme values in the second table to the corresponding cities in the first table.

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problems creating themes

Preparing Attribute Data for Themes

As mentioned in the previous sections, you can use the data in a linked attribute table as the basis for themes. Themes draw the map features on a layer according to particular values. For example, on a map layer that contains cities, you could use different symbols to represent cities that fall within different population ranges. Themes also help to differentiate features in a layer. For example, on a roads layer, you could draw interstate highways differently from city streets, even though they're on the same layer.

When setting up your attribute data, you should consider whether you will be creating themes, and whether the data in the table lends itself easily to this task. For example, for a roads layer, do you already have a column that contains the text "Interstate" or "City Street" for each feature in the table? If so, it will be very simple to specify this column as the theme column and specify that if the column contains "Interstate," the feature will be drawn as a thick yellow line, and if the column contains "City Street," the features will be drawn as a thin black line. However, if you want your roads to be drawn in such a way as to show how heavy the traffic is, a column indicating whether it's an interstate highway or city street will not be useful—you will need a column that indicates how much traffic each road has. You can then use this third column to specify how the roads are drawn to show traffic.

For example, you might create four theme categories: fewer than 200 cars per month, between 201 and 5,000, between 5,001 and 10,000, and greater than 10,000. You can then specify the display attributes separately for each of these categories, so that roads with the lightest traffic are drawn in thin black lines and roads with heaviest traffic are drawn in thick red lines, and so on.

If you are using point or text data, you need to consider which symbols you will want to use for each theme category. For more information, see "Working with Symbols" on page 109.

Setting Up Your Attribute Database

You need to take the following points into consideration when setting up your attribute database:

- Before Autodesk MapGuide can use your databases, you must set them up and configure them as OLE DB data sources or Autodesk DWG data sources. For more information, see "Setting Up Your Data Sources" on page 78.
- You can limit users' access to data sources by setting up passwords for users or for groups or by assigning access keys to the resource. For more information, see "Managing Server Security" on page 80.

- When naming your attribute data sources, avoid using the ampersand (&) in the names of databases, tables, and columns. This character is unsupported in all names in Autodesk MapGuide, including SDF names, layer names, user names, access keys, tracking IDs, and passwords.
- Make sure that the fields containing the coordinates, keys, names, and URLs are all in the same table, view, or query in the data source. Your theme data can be located in a different table, but it must contain keys that match those in the source data.
- When setting up the layer, you can use a SQL Where clause to filter and customize the data. For example, if this layer will display cities, you could specify that the layer include only those cities with a population greater than 10,000. For more information, see Chapter 9, “Working with Map Layers.”
- When setting up a theme, the Theme Column text box will accept a simple expression in addition to the field.

Setting Zoom Goto Data

You can use Zoom Goto categories to allow users to zoom in on specific features in the layer. There are two types of Zoom Goto data: Zoom Goto Location categories and Zoom Goto Address data.

Zoom Goto Location Categories

A Zoom Goto category enables users to zoom in on a specific location that falls within the current category. For example, if you have a category called Airports, the user would be able to select from a list of airports and zoom to the selected airport on the map.

Features that need to be part of a Zoom Goto category must have their coordinates and category value entered into fields in an OLE DB data source. Unlike other types of attribute data, Zoom Goto categories do not require a feature key, so you do not need to include it in your Zoom Goto category database. For instance, if you have a polygon layer of parcels that you want users to be able to zoom to, you could store all of your parcel IDs and coordinate values in an OLE DB database. You could then use Autodesk MapGuide Author to create a Zoom Goto category called “parcels” with a SQL statement that retrieves coordinates from the database based on a parcel ID that is passed in. The Zoom Goto dialog box in Autodesk MapGuide Viewer would let users enter the ID of the parcel they want to zoom to, and the SQL statement would retrieve the coordinate values, enabling the Viewer to zoom to that feature.

Zoom Goto Address (Geocoding) Data

With a geocoding database installed on your server, map authors can add the Zoom Goto US Street Address category to their maps. Autodesk MapGuide Author comes with a predefined location category called “US Street Address.” When map authors activate this category, they access the geocoding database that you installed on your server (see “Adding Geocoding Data” on page 91). When the category is in place, users can type an address or ZIP code and zoom directly to that location on the map. For more information, see “Creating and Modifying Zoom Goto Location Categories” on page 146.

Working with Raster Images

Raster images are pixel-based images, such as digital photographs (satellite images, for example). Raster images are very useful as background images underneath your vector data, for example, an aerial photograph of a city with a layer of streets overlaying it.

Autodesk MapGuide supports various raster image file formats. The following section contains a complete list of supported file formats.

Raster Image File Formats

The following table provides a brief description of the raster image file formats supported by Autodesk MapGuide Author and Autodesk MapGuide Server:

Format	File Extension	Description
BMP	<i>.bmp</i>	Microsoft Windows Bitmap
CALS	<i>.cal</i>	CALS MIL-R-28002A Type 1 Format
ECW	<i>.ecw</i>	Enhanced Compression Wavelet
GeoSPOT	<i>.bil</i>	Band Interleaved (GeoSPOT, others) Note that GeoSPOT files need their associated color index files, which have a <i>.clr</i> file extension. The CLR file should be in the same directory as the BIL file.

Format	File Extension	Description
JPEG	<i>.jpg, .jpeg</i>	Joint Photographic Experts Group
MrSID	<i>.sid</i>	Multi-Resolution Seamless Image Database
PNG	<i>.png</i>	Portable Network Graphic
TGA	<i>.tga</i>	TrueVision Targa 2.0 Format
TIFF	<i>.tif, .tiff</i>	Tagged Image File Format

Efficient Raster Formats

Because raster images can be quite large, they can slow down performance. To improve performance significantly, use tiled TIFF files, ECW files, or MrSID version 1.6 files.

Tiled TIFFs

A tiled TIFF file allows Autodesk MapGuide to access only specific portions of the image. This greatly improves access speed, because Autodesk MapGuide Server does not need to load the entire image every time—just the specific portion requested. The difference in performance between using standard TIFF files and tiled TIFF files is dramatic. You can use Raster Workshop to generate tiled TIFFs from other raster file formats.

ECW Files

ECW, supported by ER Mapper, is a wavelet-based image compression format with high-quality results at high compression rates.

MrSID Files

MrSID (Multi-Resolution Seamless Image Database), supported by Lizard-Tech, Inc., is a wavelet-based image compression format designed specifically for GIS to enable true portability of large images. Autodesk MapGuide supports MrSID version 1.6 format *.sid* files.

Raster Image Catalog Files

In addition to individual raster image files, Autodesk MapGuide supports Raster Image Catalog (RIC) files. A RIC is a list of raster image files and their lower-left and upper-right coordinates. When creating a raster map layer, you can reference an individual raster image in any of the supported formats shown on page 101, or in a RIC file. Each raster image file (whether an individual image or a RIC) must be accompanied by a georeferencing file, which provides additional information about how to position the raster image on the map. Note that GeoTIFF files do not require a separate georeferencing file. Raster images in ECW and MrSID format are already optimized, so there is no reason to include them in RIC files.

When you access a layer that references a RIC file, Autodesk MapGuide Server scans through the RIC file to determine the images or portions of images that correspond to the area being viewed, and then sends only the data for that area. This greatly increases performance, as only the necessary data is stored in memory instead of the entire image.

It is important to keep in mind that the RIC file only determines which images might be visible. Georeferencing information for each individual raster image must still be available, as this information—not the information in the RIC file—is used to place them in the correct position on the map. Note that the raster image must be based on the same coordinate system as the rest of the data on the map, and it cannot be converted automatically if you change the coordinate system for the map.

If Autodesk MapGuide Server is running under the System account, please note the following:

- All of the image files in the RIC must be on the same server as the RIC.
- The RIC must reference the raster image files using relative paths. If you use a computer name in the path, Windows NT/2000 will not be able to recognize it.

Raster Image Catalog File Format

Raster image catalog files are ASCII, comma-delimited (CSV) files with the following format:

```
"<Name of the raster image file1>",<xMin>,<yMin>,<xMax>,<yMax>  
"<Name of the raster image file2>",<xMin>,<yMin>,<xMax>,<yMax>  
"<Name of the raster image file3>",<xMin>,<yMin>,<xMax>,<yMax>  
...  
"<Name of the raster image filen>",<xMin>,<yMin>,<xMax>,<yMax>
```

Note that the names of the raster image files may not contain commas (,), and the quotation marks (") around the raster image file names are optional. The names of the individual raster image files entered in the RIC may be specified using the full absolute path name, the path relative to the RIC file location, or only the file name itself. If only the file name of the raster image is specified, the search will start in the directory where the RIC is located before using the Raster Image Search Path (specified in Autodesk MapGuide Server Admin) to locate the file.

All images in a RIC must be of the same color depth (1, 8, 24, or 32 bits); combinations of different color depths are not supported. However, images of different resolutions are supported. For example, you could mix 1- and 2-meter resolution data. Also, images in a RIC can be in different formats, such as TIFF, TGA, PNG, and so on.

Images are processed in the same order in which they are listed in the RIC. Therefore, if two images overlap each other, the image specified later in the list will cover the image specified earlier in the list. When you create a layer, you can specify a transparent background for bitonal images, so the bottom images can show through the background area of the top image. For detailed information about creating a raster layer, choose Help ► Contents, click the Index tab, and look up "raster layers, creating."

The extents (outer boundary) of each raster image must be specified using the xMin, yMin, xMax, and yMax parameters. These parameters specify the center or middle position of the lower-left and upper-right pixels of the image (as opposed to the corners of the pixel), and they must be specified in the same coordinate system as that used by the map and any other images in the RIC. Autodesk MapGuide Server uses the extent parameters to quickly determine if an image is within the viewing area without having to open the georeference file associated with each raster image.

Generating Raster Image Catalog Files

The simplest way to generate RIC files is to use Raster Workshop, a utility available from the Autodesk MapGuide CD. You can use this utility to create a RIC, add raster image files to the RIC, subsample and merge the files, and more.

You can also generate RICs manually by using an ASCII text editor or by exporting the data in CSV format from a database. However, in many cases the extents of the raster image file may not be readily available. For example, ESRI world files use the coordinates of one corner and the width of each pixel. You would have to open the image itself to determine how many pixels it contained, and then calculate the extents for each image.

Another way to generate a RIC manually is to use Autodesk MapGuide Author to obtain the coordinates of the image extents. First, display each image on a layer, and then zoom to opposite corners of the image (lower-left and upper-right), reading the coordinates from the status bar. These coordinates indicate the extents of the image. They do not have to be exact, only greater than the extents of the actual image. The extents in the RIC are used only to determine if an image might be visible. The georeferencing information from each image will be used to georeference the image within the tiled suite.

Georeference File Formats

A georeference file indicates how to place a raster image on a map. Autodesk MapGuide Author supports four georeference file formats: ESRI world files, MapInfo tab files, GeoTIFF files, and header files.

ESRI World File

An ESRI world file is an ASCII text file that uses the following formats:

Format	Example
<x dimension of a pixel>	2.0
<x rotation factor>	0.0
<y rotation factor>	0.0
<negative y dimension of a pixel>	-2.0
<x value of the upper-left pixel>	233001.5
<y value of the upper-left pixel>	901999.5

For example, a typical ESRI world file might look like this:

```
2.0
0.000000
0.000000
```

-2.0
233001.5
901999.5

Note that the formats <x rotation factor> and <y rotation factor> must always have a value of 0.0.

The ESRI world file extension depends on the raster image file format as listed in the following table:

Raster Image Format	World File Extension
TGA	<i>.taw</i>
CALS	<i>.clw</i>
PNG	<i>.pgw</i>
BMP	<i>.bpw</i>
JPEG	<i>.jgw</i>
TIFF	<i>.tfw</i>

MapInfo Tab File

MapInfo uses a TAB file (*.tab*) to georeference a raster image. It contains control points to map pixel coordinates in a raster image to world or map coordinates. To work in Autodesk MapGuide Author, you need to specify the control points so that linear scaling is possible.

The raster image formats supported by the MapInfo tab file are: TGA, CALS, PNG, BMP, JPEG, and TIFF. The following is an example of a tab file:

Example

```
!table  
!version 300  
!charest WindowsLatin1
```

```
Definition Table:  
File "dublinca.tif"  
Type "RASTER"
```

```
(6144414, 2088370) (0,0) Label "Pt 1"  
(6144416, 2088370) (1,0) Label "Pt 2"  
(6144414, 2088370) (0,1) Label "Pt 3"  
CoordSys Earth Projection 3, 74, "ft", 120.50, 36.50, 38.43, 37.07, 2000000,  
500000  
Units "ft"  
RasterStyle 2 74
```

GeoTIFF

A GeoTIFF file is an extended version of the TIFF format, with embedded georeference information inside one or more of its tags. A single file contains both the raster image and its georeference information.

Header File

A header file is an ASCII text file containing keywords and values for specifying the georeference information of the raster image. This format works only with the GeoSPOT BIL raster image format. The following is an example of a header file:

Example

```
! GIS-GEOSPOT Header File  
!  
! Image Information  
!  
DELTA_X_ORIGIN    0.0 M  
DELTA_Y_ORIGIN    0.0 M  
MAPUNITS          METERS  
ULXMAP            543134.90 M  
ULYMAP            5283921.00 M  
XDIM              10.0 M  
YDIM              10.0 M  
NCOLS             1269  
NROWS             1862  
NBANDS            3  
!  
! Frame Corner Support  
!  
NW_X_PIXEL        1  
NW_Y_PIXEL        11  
NE_X_PIXEL        1251
```

```

NE_Y_PIXEL      1
SW_X_PIXEL      15
SW_Y_PIXEL      1862
SE_X_PIXEL      1269
SE_Y_PIXEL      1852
!
! File Encoding
!
NBITS           8
BYTEORDER       1
SKIPBYTES       0
RECORDSKIPBYTES 0
BANDROWBYTES    1269
TOTALROWBYTES   3807
LAYOUT          BIL
BAND_RGB        3 2 1
!
! Process Information
!
PRE_PROCESSING_LEVEL "3a"
!
! End of File

```

Exporting from ER Mapper

You can also use ER Mapper from Earth Resource Mapping to export images as raster images in BIL (Band Interleaved Line) format along with associated HDR files. Autodesk MapGuide Server can access BIL files randomly, increasing performance over regular non-tiled raster images in some situations. For information about ER Mapper, go to: <http://www.ermapper.com/>

Adding Raster Images to Your Map

As stated earlier, you can use raster images as layers that underlay vector layers, so that, for example, street data could appear on top of an aerial photo of the city. In this case, you must create a separate raster layer for each raster image or RIC file. For detailed information about creating a raster layer, choose Help ► Contents, click the Index tab, and look up “raster layers, creating.”

Working with Symbols

Autodesk MapGuide Author enables you to select and modify symbols that you want to make available to either a point layer or a redline layer, by using one of the following three options:

- Symbol Manager
- Point Layer Symbol Manager dialog box
- API Symbol Manager dialog box

While the Point Layer Symbol Manager dialog box and API Symbol Manager dialog box are accessed from within Autodesk MapGuide Author, you can also work with symbols using Symbol Manager, a separate product.

Although used for different purposes, all three symbol managers support the following functionality:

- Pasting symbols of any graphic file format from the Windows Clipboard into the Symbol Manager
- Creating complex symbols that contain both bitmap images and vector graphics
- Renaming symbols
- Making the color of a bitmap within a symbol transparent
- Importing symbol files of the following type:
 - Bitmap (BMP)
 - Device Independent Bitmap (DIB)
 - Enhanced Metafile (EMF)
 - Symbol Manager (SMB)
 - Windows Metafile (WMF)

The differences between the three symbol managers are described in the following sections.

Note that you can also use the SDF Loader to convert blocks from Autodesk Map to EMFs using the `/BLOCKS:EMF` switch. For more information, refer to the *SDF Loader Help*.

Symbol Manager

This application, which is installed with Autodesk MapGuide Author, enables you to create your own SMB files or modify SMB files installed with Autodesk MapGuide.

SMB files and the individual symbols they contain can be composed of bitmap images and vector graphics. This enables you to combine vector graphics and bitmaps in one symbol, create new SMB files, or modify existing SMB files by adding and removing symbols. You can also modify the display properties of specific symbols within SMB files to specify where the symbols are inserted in a map layer and to make a bitmap color in a symbol transparent.

After you modify SMB files using Symbol Manager, you use one of the other symbol managers to access the SMB file and apply the symbols in the SMB file to a point layer or redline layer.

Using the Point Layer Symbol Manager dialog box from within Autodesk MapGuide Author, you can select a point layer and add symbols. For more information, see “Point Layers and the Point Layer Symbol Manager” on page 111.

Using the API Symbol Manager dialog box from within Autodesk MapGuide Author, you can make symbols available to a redline layer. For more information, see “Redline Layers and the API Symbol Manager” on page 112.

As well as enabling you to modify SMB files, Symbol Manager includes the following features not available in the Point Layer Symbol Manager or API Symbol Manager dialog boxes:

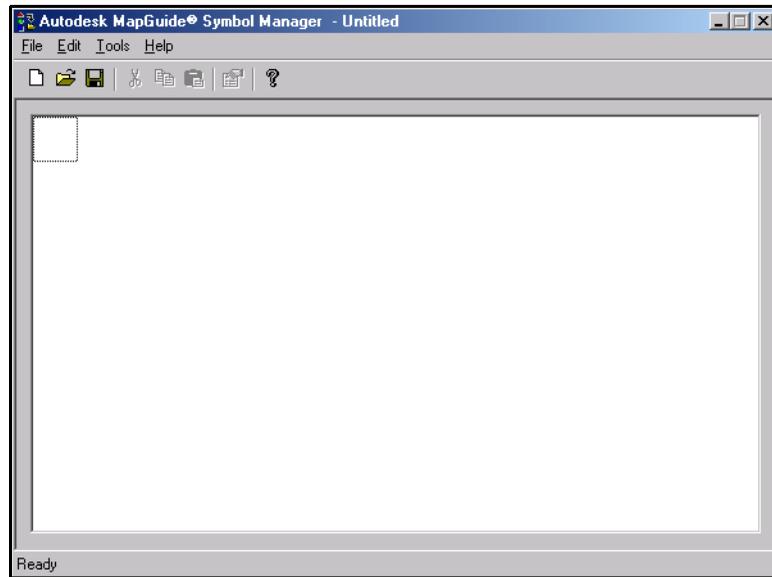
- Creating and modifying SMB files
- Importing TrueType fonts to use as symbols
- Setting symbol reference points

For detailed information, choose Help ► Contents, click the Index tab, and look up “symbols, Symbol Manager.”

To start Symbol Manager

- From the Start menu, choose Programs ► Autodesk MapGuide Release 6 ► Symbol Manager.

The Symbol Manager dialog box appears, displaying a blank file.



The complete, step-by-step procedures for using Symbol Manager are included in the online Help. Choose Help ► Contents, then refer to the topics listed under “Creating and Publishing Maps ► Using Autodesk MapGuide Symbol Manager.”

Help Index
symbols
adding for point layers

Point Layers and the Point Layer Symbol Manager

You add symbols to point layers using the Point Layer Symbol Manager dialog box available in Autodesk MapGuide Author. You use the Point Layer Symbol Manager dialog box to access symbol files within SMB files, symbols saved to a local or networked location, and symbols pasted to the Windows Clipboard.

The symbols you add to point layers are visible to Autodesk MapGuide Viewers and denote map features, such as state capitals or other point layer features.

For details about adding symbols to point layers, see “Adding New Symbols for Use in Point Layers” on page 168. For detailed information, choose Help ► Contents, click the Index tab, and look up “symbols, adding for point layers.”

Redline Layers and the API Symbol Manager

Using the API Symbol Manager dialog box in Autodesk MapGuide Author, you select and modify symbols and then make the symbols accessible to a redline layer. Autodesk MapGuide developers can add these symbols to redline layers using the Viewer API. For more information, refer to the *Autodesk MapGuide Developer's Guide* and the *Autodesk MapGuide Viewer API Help*.

Working with Other Types of Spatial Data

In addition to Autodesk MapGuide SDFs, you can use other types of spatial data formats with Autodesk MapGuide.

- **DWG files**—Leave DWG files in their native format. With this release of Autodesk MapGuide, you can use DWG files as map layers without converting them to SDF format.
- **SHP files**—Leave SHP files in their native format and use the Autodesk MapGuide Provider for SHP with Autodesk MapGuide Server.
- **Oracle Spatial data**—Leave Oracle Spatial data in their native format, and use the Autodesk MapGuide Provider for Oracle Spatial with Autodesk MapGuide Server.
- **GIS Design Server Theme Data**—Leave GIS Design Server Theme data in their native format, and use the Autodesk GIS Design Server Extension with Autodesk MapGuide Server. See “Autodesk GIS Design Server Theme Data” on page 112, for more information.
- **Other data types**—Convert other types of spatial data to SDF format using the SDF Loader or SDF Component Toolkit.

Autodesk GIS Design Server Theme Data

When Autodesk MapGuide uses Autodesk® GIS Design Server theme features in a layer, it must perform several steps to transform the data so that it can be displayed correctly in the map. Most data appears exactly as it does in Autodesk GIS Design Server, but there are some important points you need to know.

Using URL Links

You can display the name of a map feature in Autodesk MapGuide by pausing the mouse over the feature. The name then displays in a small yellow rectangle called a *MapTip*. Also, if a map feature has a URL associated with it, the pointer changes from an arrow to a hand when the mouse passes over that feature, allowing the user to double-click and open the Web page specified by that URL.

Under normal circumstances, features on an Autodesk GIS Design Server theme layer will not have URL links associated with them. This is because the Autodesk GIS Design Server cache does not contain this information for each feature in the theme. If you need to have URLs associated with the features, you could create a custom utility to export the Autodesk GIS Design Server features from the database to an SDF or OLE DB data source. For example, you could use Visual Basic with Autodesk GIS Design Server Objects and the SDF Component Toolkit. This kind of utility is beyond the scope of this documentation and should be implemented by a system administrator who is familiar with Autodesk GIS Design Server and Autodesk MapGuide.

Parsing Map Feature Keys

If you will be developing reports, it is important to know how to parse the keys for the map feature so that you can get information about the original Autodesk GIS Design Server features. The keys of map features on Autodesk GIS Design Server theme layers are formed from a composite of the original Autodesk GIS Design Server Feature, Plan, Version Mode, Layer, and Network numbers, with a vertical bar (|) character delimiting each of the numbers as follows:

F<Feature#>|<Plan#>|<VersionMode#>|<Layer#>|<Network#>

For example, if the feature # is 967, plan # is 5, version mode # is 0, layer # is 20, and network # is 7, the key for the map feature will be the following string:

F967|5|0|20|7

Note The version mode number used in the key is different from the version number associated with a feature in the Autodesk GIS Design Server database. The version mode number indicates whether the feature is from the Autodesk GIS Design Server permanent version or from one of the more recent versions, as defined in the following table.

Version Mode Value	Description
0	Permanent version. Always version number 0 in the Autodesk GIS Design Server database.
1	A recent version. The most recent version number in relation to when the theme was generated.

Planning and Designing Maps

6

This chapter includes information to help you plan your maps, including details about designing the maps and the information you will need from your server administrator.

This chapter may be especially helpful to:

- Map authors
- Data engineers

In this chapter

- Planning the data
- Planning layers
- Designing the map
- Information you need from your Autodesk MapGuide Server administrator

Planning the Data

In planning the data you will need, data engineers and map authors should consider the following questions along with possible solutions:

- How should the data look? For example, what colors, symbols, linestyles, and fills will you use?
- Does the data relate to a database table? If so, create an OLE DB data source for that database, and determine which data you will use as the key.
- Is it point/text data or line/polygon data? If text, do you need to rotate or resize the text differently? Does the location of the text need to be “fixed,” that is, placed precisely? You can add columns in the table that indicate the rotation angle, height, and width, so that Autodesk MapGuide® can rotate and resize the text accordingly.
- Do you need to display database information thematically? If so, which column contains the theme data?
- How large is the data set? Do you want to show different versions of the data, each of which is used at different display ranges?
- Will you need to use raster data? Where is the raster data referenced? How is this data georeferenced?

Planning Layers

After you have created, gathered, converted, and prepared all of your data, authors can use it to create their maps. Remember that when you create a map and add data to it, you add the data to layers. Therefore, you need to plan the layer to which you will add the data carefully. Before you create the layer, consider the following questions:

- What naming standard are you using for layers?
- Do you want to organize layers into layer groups?
- Do you want to use a different name in the Viewer legend? You can enter a separate name for the layer in the Legend Label box on the General tab of the Map Layer Properties dialog box. This is useful if you want to have long descriptive names appear in the Design tab of the Autodesk MapGuide Author Map Explorer when you’re working with the map, but you want shorter names to appear for Autodesk MapGuide Viewer users.

For example, you might create two layers that show the same areas at different levels of detail: the less detailed layer displays when you zoom out and the more detailed layer displays when you zoom in. In this case, you might name the layers “Roads - General” and “Roads - Detailed” so that you know which one you’re working with in Autodesk MapGuide® Author (and through the Viewer API), but you could have them both display the name “Roads” in the Viewer, so that they appear to be the same layer to the user.

- Should users be able to select features on this layer? If the layer is unselectable, users will not be able to generate reports, create buffers, or use the Select Within command. However, if the layer contains data that is primarily background data, making it unselectable prevents users from accidentally selecting data on that layer when they try to select an overlapping feature on another layer.

For example, if you have outlines of neighborhoods that are only for orientation purposes, you could make the layer unselectable so that users don’t accidentally select the neighborhood outline when they are trying to click a street. Note that if a particular data set will be selectable, you should divide it by feature types (transformers on one layer, fire hydrants on another). If the data set will be unselectable, divide it the way you want it to display (red lines on one layer, green lines on another).

- Do you want to display more or less data depending on the current scale? If so, create multiple layers of the same area that turn on and off at particular display ranges. You can quickly create copies of a layer by pressing CTRL as you drag and drop a layer in the Map Explorer in Autodesk MapGuide Author.
- Will the data on this layer be used in a report? If so, be sure to add the appropriate report to the map.

As you plan multiple layers, you can create a spreadsheet that helps you keep track of your layers and the data sources they use. As you start filling it in with your layers, you are beginning to plan for the whole map. For example, you might decide that there are really three main display ranges: the first shows the whole world, the second shows a whole country, and the third shows a city. You could then look at your spreadsheet and determine which layers should fall within which of these three display ranges and set display ranges for them accordingly. For more information, see “Creating a Design Spreadsheet” on page 120.

Designing the Map

After you have planned the data and layers for your map, you need to address design issues, such as which coordinate system to use, what precision you want, and how to set up and use a design spreadsheet—as well as following general design guidelines.

About Coordinate Systems

Mapping applications use coordinate systems to determine where to display features on the map. In a latitude/longitude coordinate system, each coordinate pair corresponds to an exact fixed location on the Earth; in an arbitrary *XY* system, the coordinates have meaning in relation to each other but do not necessarily correspond to exact fixed locations on the Earth.

For example, a floor plan map might specify that the southwest corner is 0,0 and the northeast corner is 500,500, so that if the building were moved to another location, these coordinates would still be accurate because they are not tied to exact locations on the Earth. If you used latitude/longitude coordinates for that map, however, the coordinates would change if you moved the building, because each pair corresponds to one exact point on the Earth.

Some types of arbitrary *XY* systems, such as the state plane coordinate systems, make use of both of these concepts. Each coordinate system represents a specific area, usually a state or a section of a state. Within that area, the coordinates are meaningful and represent exact locations on the Earth. So a point with the coordinates 100000,100000 will always represent a specific location in the New York state plane coordinate system. However, if you change the coordinate system to another state plane coordinate system, all of the data will move to that area, where 100000,100000 represents a specific location in that area. In this way, the data is arbitrary *XY*, because the numbers themselves do not represent exact locations except within the context of the fixed areas.

Note that if you are using arbitrary *XY* data, it is **not** converted to latitude/longitude, so you can use it only in maps that use arbitrary *XY* as the coordinate system and in which all data is in arbitrary *XY*. For more information, see the *SDF Loader Help (SDFLOAD.HLP)* located in the SDF Loader directory.

To see a complete list of the coordinate systems in Autodesk MapGuide, as well as their corresponding codes that you use with the `/COORDSYS` parameter in the SDF Loader, refer to the file *cscodes.txt* that is installed with the SDF Loader.

About Coordinate Precision

Coordinate precision is the level of accuracy at which a point can be stored and retrieved to match its original location. When you use the SDF Loader, SDF Component Toolkit, or Autodesk Map® to convert your data to an SDF, you can specify whether to use single (32-bit) precision or double (64-bit) precision. For latitude/longitude coordinates, single precision is accurate to about 16 feet or 5 meters, whereas double precision is accurate to better than a fraction of an inch or 1mm. Single precision is usually more than enough accuracy for most applications, but if you are creating very large-scale maps for applications that require that you accurately pinpoint items, you might need double precision. If you are using arbitrary *XY* coordinates and the base unit of the map is already very small (such as inches on a facilities management map of office equipment), single precision will probably be sufficient.

For more information, refer to the Coordinate Precision White Paper at: <http://www.autodesk.com/utilitypapers>

Choosing a Coordinate System

If you do not know which coordinate system to use, or if you need to decide which coordinate system to use in your office or department, consider your options in this order:

- Consult with the data engineer who provided your data.
- Use the same coordinate system as other staff in your organization.
- Use the same coordinate system as your most common data source.
- Choose the coordinate system used by people who share data with you.
- If the area is small, use the same coordinate system as your local city or county government. If the area is large, use the same coordinate system as the state, regional, provincial, or national mapping group.
- Ask surveyors, cartographers, consultants, and other mapping professionals for suggestions.

Creating a Design Spreadsheet

One very effective technique for keeping track of all your data for a map is to create a spreadsheet of all of the layers you create, consisting of the legend layer name, which data sources they reference, the display range, and display styles, such as color or line style, and notes. For example, you could create a spreadsheet or table that looks something like this:

Layer Name	Layer Name in Legend	Data Source	Display Range	Display Style	Notes
roads_1	roads	roads_coarse.sdf	40K-10M	thin green lines	Visible only when zoomed out. Shows coarser data.
roads_2	roads	roads_fine.sdf	0-40K	thick green lines	Visible only when zoomed in. Shows finer data.
roadsbytype1	roads by type	roads_coarse.sdf	40K-10M	thin red lines	Visible only when zoomed out. Shows coarser data. Linked to SQL and themed.
roadsbytype2	roads by type	roads_fine.sdf	0-40K	thick red lines	Visible only when zoomed in. Shows finer data. Linked to SQL and themed.

In this example, there are four layers. The first two layers use different data to show the same area at different levels of detail when zoomed in or out. The second two are set up the same way. Note that the first and third layers use the same SDF, and the second and fourth layers use the same SDF. As you might imagine, as you start adding several layers to achieve different results at various scale ranges, it can become difficult to manage the process, so taking an organized approach is critical during planning. In addition to the columns shown in the example, you could also add columns that indicate which server each layer uses, whether it is selectable, the layer type, the layer group to which a particular layer belongs, and more.

Another way you might set up a design spreadsheet is to break the Display Range column into several discrete ranges; you can then block out the display ranges in which layers are on. Also, you might want to place layers in the spreadsheet according to their data type, which often corresponds to the display ranges. For example, point layers would be in rows near the top of the spreadsheet, polyline layers below point layers, polygon layers below polyline layers, and so on.

General Guidelines

Following is a list of guidelines you should consider when designing your map:

- Use elements of nearly equal size with no features dominating the map. Text size should be neither too small to read nor so large that the text dominates or obscures features in the map.
- Use different symbols to represent different features. For example, you can use symbols to represent landmarks, such as hospitals, churches, and cemeteries. Draw symbols at an appropriate scale so they are legible and do not obscure other data.
- Use line type and colors to represent different features. Representing roads as double lines can be helpful for small areas, such as subdivisions, or for maps in which right-of-way information is important.
- Do not use an excessive number of colors. Otherwise, the map becomes too bright, and the colors dominate. Try to limit the map to four colors.
- If you are not using themes, use one color per layer. For example, if you have an SDF that contains roads and highways, and you want to draw them in different colors, it's usually best to create a separate roads layer and highway layer and apply one color to each. The other option is to create one layer and create theme categories for roads and highways on that layer, applying the colors you want to the theme categories. However, this approach can decrease performance.
- Make layers selectable only if necessary. Always ask yourself whether the data on this layer is there to help orient the user on the map or contains features the user needs for retrieving information. If it's there for orientation, such as lakes and parks in a parcel map, make the layer unselectable.
- Do not try to present too much data on the map at once. Maps are more effective when they show topics clearly. Always set up the map so that only the most necessary layers are turned on when the user first accesses the map; this also speeds up the initial loading of the map. The user can then turn on additional layers to get more information as needed.

For more information about designing and creating the features that appear on the map, refer to the documentation for the program you are using to create map data.

Information You Need from Your Server Administrator

Before you can begin creating map layers, you need information about the resources (spatial, raster, and attribute data) that you will use in your map. You also need information about Autodesk MapGuide® Server through which you will access those resources. The following list tells you which information you need to gather. Your server administrator will be able to provide you with this information.

- The location of the resources, and any access keys or passwords assigned to the resources. You will use this information when setting up a layer.
- The URL of the Autodesk MapGuide Server Agent (or MapAgent). If your organization has more than one Autodesk MapGuide Server, you may have more than one MapAgent to choose from. You specify the MapAgent you want to use when you set up a layer. Typically, the URL looks something like:
`http://www.yourcompany.com/MapAgent6/mapagent.exe`
- Confirmation that you have been granted authoring privileges. Before you can browse for available resources to use for a layer, the server administrator must grant you authoring privileges by adding your user name and password to the Authors group in the Autodesk MapGuide Server Admin. For more information see “Managing Server Security” on page 80.

Getting Familiar with Autodesk MapGuide Author

7

This chapter includes the essential information you need to get started with Autodesk MapGuide® Author, including instructions for installing and starting the program, navigating maps and layers, and other map authoring fundamentals.

This chapter may be especially helpful to:

- Map authors

In this chapter

- Installing Autodesk MapGuide Author
- Starting Autodesk MapGuide Author
- Introduction to the program window layout
- Setting preferences
- Opening a map
- Moving around on a map
- Using the Map Explorer
- Viewing map information
- Measuring distances
- Selecting map features
- Creating buffers around map features
- Printing a map

Installing Autodesk MapGuide Author

The setup program for Autodesk MapGuide Author installs the software in a separate directory and program group specifically for this release. If you have more than one release of Autodesk MapGuide Author installed at the same time, you can try out the new release while still running the previous release. You can also uninstall older releases without affecting the current release.

Note Before you install Autodesk MapGuide Author, log on to Windows as an administrator or as a user who has administrative privileges. If you are using Windows® 2000, you must have Power User/Administrator rights to install Autodesk MapGuide Author. This is required for the installation process only; you can log on with any privileges to run Autodesk MapGuide Author after you have installed it.

To install Autodesk MapGuide Author

- 1 Insert the Autodesk MapGuide CD in the CD-ROM drive.
Note If the installation does not start automatically when you insert the CD in the drive, click the Start button on the Windows Taskbar and then choose Run. In the Run dialog box, enter `e:\setup`, where e: is your CD-ROM drive.
- 2 On the CD Browser screen, click Autodesk MapGuide Author Products.
- 3 In the Autodesk MapGuide Author Release 6 Setup dialog box, click Next. The Software License Agreement dialog box appears.
- 4 Select your country of residence from the drop-down list, click I Accept to accept the license agreement, and then click Next.
- 5 When the setup program prompts you to enter your serial number and authorization code, do one of the following:
 - If you are installing an evaluation copy, you do not need to enter a serial number or authorization code. Click OK.
 - If you are installing a registered copy of the software, enter your serial number and authorization code, and then click OK. Your serial number is the 11-digit number located on the Autodesk MapGuide package. For instructions on obtaining an authorization code from Autodesk, refer to the Read This First card included with your product documentation. Note that if you are upgrading from a previous release, you will need a new authorization code for Autodesk MapGuide Release 6.

- 6 When prompted, accept the default installation directory, or click Browse to specify a different directory.

If there are coordinate system (CSMap) files installed on your machine from a previous version of Autodesk MapGuide®, you are prompted to retain the existing CSMap files or update them.

- 7 Click Next to install Autodesk MapGuide Author, and when prompted, click Finish.

If you do not enter your serial number, the product will be installed as an evaluation copy. You will then have 30 days to try out the program, after which it will expire unless you purchase the product and enter a serial number and authorization code. During the 30-day evaluation period, the Authorization Reminder dialog box will appear every time you start Autodesk MapGuide Author. From this dialog box, you can access the dialog box in which you enter your serial number and authorization code.

Starting Autodesk MapGuide Author

To work with your map, you need to gain access to your server (for example, log on to your network so that you have access to the server) before you start Autodesk MapGuide Author. If you do not currently have access to Autodesk MapGuide® Server, you can still start Autodesk MapGuide Author, but you will be limited in what you can do. For example, you will not be able to access any databases or browse for spatial data located on other machines.

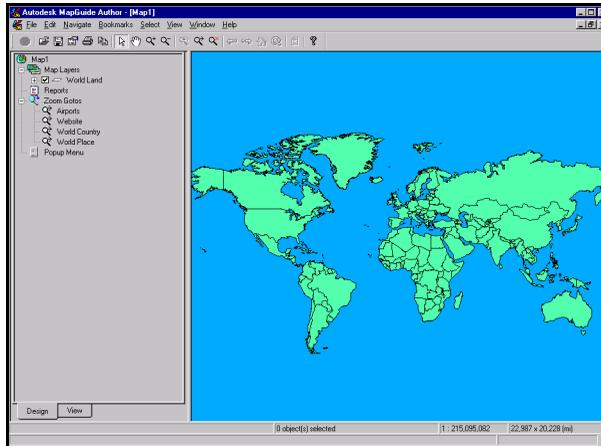
To start Autodesk MapGuide Author and create a new map

- 1 Click the Start button, and then choose Programs ► Autodesk MapGuide Release 6 ► Autodesk MapGuide Author.

The program window appears. You can now open an existing map or create a new one.

- 2 Choose File ► New.

Autodesk MapGuide Author opens a new Map Window File (MWF) of the world.



About Map Window Files and Map Window XML Files

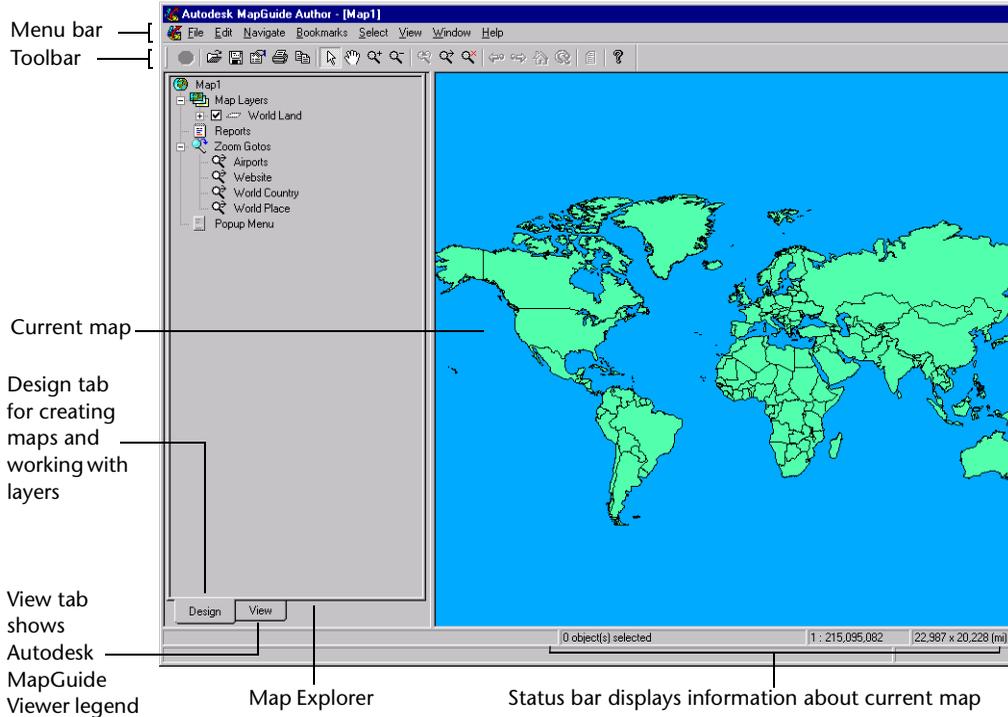
Autodesk MapGuide Author enables you to store each individual map as a Map Window File (MWF) or in XML format as a Map Window XML File (MWX).

MWFs contain the specifications of the map window in binary format. MWXs contain the specifications of the map window in text format using XML element tags, or nodes. Both MWFs and MWXs contain map information such as the map boundary, the background color, data source information (SQL databases, SDFs, and raster image files), layers of cartographic data (such as roads and countries), layer display information (such as attributes and visible scales), and map display configuration specifications (such as menus and legends).

MWFs can only be modified using Autodesk MapGuide Author. MWXs can be modified using Autodesk MapGuide Author or any XML parser. You can use the Dynamic Authoring Toolkit to perform conversions between these file formats. For more information about the Dynamic Authoring Toolkit, refer to the *Dynamic Authoring Toolkit Developer's Guide*.

Introduction to the Program Window Layout

The program window is designed to maximize the amount of space used for displaying the map while still providing easy access to the Autodesk MapGuide Author commands.



Using the Map Window Popup Menu

The map window popup menu, which appears in both Autodesk MapGuide Author and Autodesk MapGuide Viewer, provides quick access to the default commands. You use the commands in the popup menu to modify map properties, move around on a map, or get information about map features. As a map author, you can modify the popup menu to show or hide functionality in Autodesk MapGuide Viewer. You can customize all but the first item on the popup menu by adding or deleting commands, or by modifying the actions assigned to specific commands. For more information, see "Customizing the Popup Menu" on page 148.

Note Changes that you make to the map window popup menu in Autodesk MapGuide Author will also appear in the Autodesk MapGuide Viewer popup menu for this map.

Right-click in the map to display the map window popup menu.



The following list summarizes the commands in the default map window popup menu:

Popup Menu Commands

This command...	Does this...
Properties	Displays the Map Window Properties dialog box, where you can specify the name, location, and coordinate system of a map file, set up reports, specify locations that can be zoomed to by name, customize the popup menu, and assign a password to the map. This command does not appear in Autodesk MapGuide Viewer.
Pan	Moves the map to display areas that are outside the current view. Drag the hand cursor to move a different area of the map into view.
Reload	Reloads the map from the last saved version. This option discards any changes that have not been saved.
Print	Accesses the Print commands, which you can use to customize the print layout (Page setup command) or print the map (Print command).

Popup Menu Commands (continued)

This command...	Does this...
Copy	Copies the current map view to the Clipboard as an Enhanced Windows Metafile (EMF). Programs that cannot display Windows metafiles (WMF) will not be able to use the files from the Clipboard. If you use the Copy command when the Design tab of the Map Explorer has focus, the currently selected layers or layer groups are copied to the Clipboard.
Zoom	Accesses the Zoom commands, which you can use to magnify specific areas of the map or zoom out. For more information about zooming and a list of the Zoom commands, see "Moving Around on a Map" on page 133.
Bookmarks	Accesses the Bookmark commands. You can use these commands to add a bookmark for the current view to the Bookmark menu (so that you can quickly access this same view of the map again), select a bookmark, or delete existing bookmarks.
Select	Accesses the Select commands, which you can use to select features on the map in various ways.
View	Accesses the View commands, which you can use to view a report, create buffers, or measure distances on the map.
Help	In Autodesk MapGuide Author, accesses the Help commands, which you can use to set preferences for the map window, access the Autodesk MapGuide Help contents, and view version and copyright information for Autodesk MapGuide Author. In Autodesk MapGuide Viewer, the Help commands are specific to Autodesk MapGuide Viewer.

All of the commands in the popup menu are also available from the menu bar, and many of the same commands are available in the toolbar.

Using the Toolbar

You use the toolbar to access the most commonly used commands. To use the toolbar, simply click a button to perform that command.



The following table lists each toolbar button, its associated command, and a brief description of the action that results.

Toolbar Buttons

Button	Command	Description
	New	Creates a new map, starting with a map of the world.
	Open	Opens an existing map file on a local or network drive.
	Save	Saves the current map.
	Properties	Displays the Map Window Properties dialog box, where you can specify the name, location, and coordinate system of a map file, set up reports, specify locations that can be zoomed to by name, customize the popup menu, and assign a password to the map.
	Print	Prints the current map view.
	Copy	Copies the current map view to the Clipboard as an Enhanced Windows Metafile (EMF). Programs that cannot display Windows metafiles (WMF) will not be able to use the files from the Clipboard. If you use the Copy button while the Design tab of the Map Explorer is active, the currently selected layers or layer groups are copied to the Clipboard.
	Select	Selects features in the map.
	Pan	Moves the map around in the map window to display areas that are outside of the current view.

Toolbar Buttons (continued)

Button	Command	Description
	Zoom	Zooms in to a specified rectangular area of the map, or to a specified center point by a magnification factor of two.
	Zoom Out	Zooms out by a magnification factor of two and centers the view at the point you click.
	Zoom Previous	Returns to the previous zoom magnification and location.
	Zoom Goto	Zooms to a specified location.
	Unzoom	Redraws the map so that Autodesk MapGuide Author displays the full extents of the map in the current window.
	Stop	Stops or interrupts Autodesk MapGuide Author from updating the map display.
	Reload	Reloads the map from the last saved version. This option discards any changes that have not been saved.
	View Report	Lists reports available for the current view or selected features.
	Help	Starts the Autodesk Mapguide Help, where you can get information about working with Autodesk MapGuide Author.

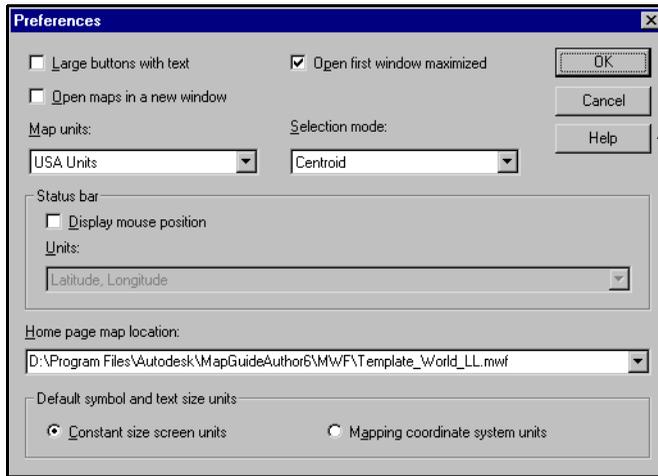
By default, the toolbar buttons are displayed in a small size without text. If you prefer, you can display the buttons with their names for easy reference. See the next section, “Setting Preferences,” for more information.

Setting Preferences

Help Index
preferences

You can customize Autodesk MapGuide Author by specifying preferences for toolbar button size, map units, status bar display, and more. When you change the preferences, the new settings apply to all currently open maps, as well as to all maps you open after setting the preferences. You open the Preferences dialog box by choosing File ► Preferences.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “preferences.”



Click for details about the options in this dialog box.

Opening a Map

Help Index
opening maps

Autodesk MapGuide Author can open maps saved as Map Window Files (MWF) and Map Window XML Files (MWX) in the following ways:

- Open a map located on a local or network drive using the File ► Open command
- Download and open a map from a Web server using the File ► Open Location command

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “opening maps.”

Moving Around on a Map

You use the zoom and pan commands to move around on a map. To access these commands, right-click in the map window to display the map window popup menu. You can also access these commands from the Edit menu.

Autodesk MapGuide Author downloads additional layer data from the server when the zoom and pan commands display new areas or layers of the map. You can click Stop or press ESC to interrupt a data download.

Pan and Zoom Commands

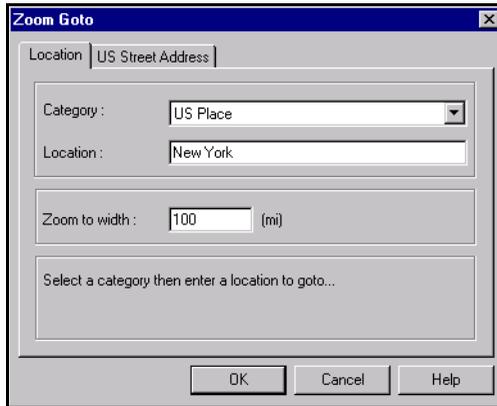
Command	Description
Pan	Moves the map to display areas that are outside the current view. Drag the hand cursor to move a different area of the map into view.
Zoom ► Zoom	Increases magnification by a factor of two or zooms in to a specific area of the map. To magnify by a factor of two, click a point on the map to indicate the center of the magnified area. To zoom to a specific area, drag a rectangle around the area, and then release the mouse button to zoom to the enclosed area.
Zoom ► Goto	Zooms to a specified location. Select a category, enter the name of a location, and then specify the width of the area you want to view. Autodesk MapGuide Author zooms to the specified width using the specified location as the center of the map.
Zoom ► Width	Zooms to a specified width on the center of the current view.
Zoom ► Scale	Zooms in or out to a specified scale, retaining the current center of the map.
Zoom ► Selected	Zooms to an area just large enough to enclose the selected map features.
Zoom ► Previous	Redraws the map at the previous zoom level and location.
Zoom ► Out	Zooms out by a magnification factor of two. Click a point on the map to zoom out and recenter the map on the point you clicked.
Zoom ► Unzoom	Redraws the map so that Autodesk MapGuide Author displays the entire map.

Zooming to a Location

Help Index
zooming
to a location

When you zoom to a location, you specify the category of the location you want to view (such as museums, parks, airports, etc.) and then type the name of the specific location you want to see. Autodesk MapGuide Author looks up the location and zooms to it. The categories of locations that are available depend on the way the map was authored.

You use the Location tab of the Zoom Goto dialog box to zoom to a specific location. To open this dialog box, choose Edit ► Zoom Goto, and then click the Location tab.



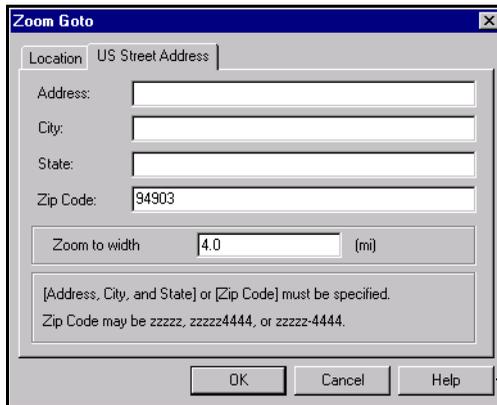
Click for details about the options in this dialog box.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “zooming, to a location.”

Zooming to a U.S. Street Address or ZIP Code

Help Index
zooming
to an address

If the map was authored to include a United States geocoding database, you can type in a street address or ZIP code and zoom right to it on the map. You use the US Street Address tab of the Zoom Goto dialog box to zoom to a U.S. street address or ZIP code. To open this dialog box, choose Edit ► Zoom Goto, and then click the US Street Address tab.



Click for details about the options in this dialog box.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “zooming, to a US street address.”

Using Bookmarks to Save the Current Map View

After you have panned and zoomed to get the exact view of the map you want, you can add a bookmark to save the current view. In the future, when you want to get to this view again, you simply choose the bookmark instead of panning and zooming all over again. This can save you time and effort.

You create a bookmark by choosing Bookmarks ► Add Bookmark. Note that the name you type or select for your bookmark cannot contain any commas (,), question marks (?), ampersands (&), or pound symbols (#).

For step-by-step instructions on using bookmarks, choose Help ► Contents, click the Index tab, and look up “bookmarks.”

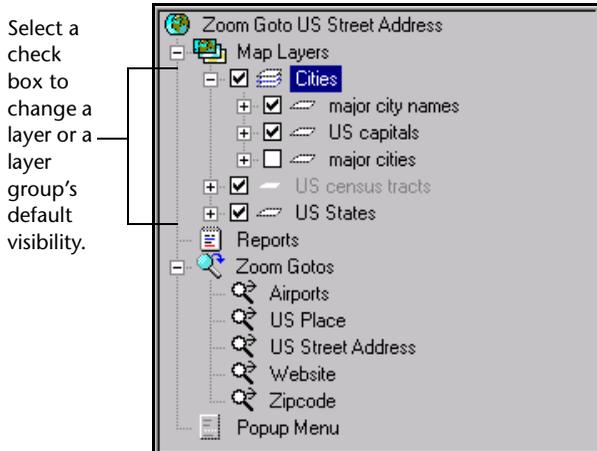
Using the Map Explorer

The Map Explorer, which appears on the left side of the Autodesk MapGuide Author window, contains the Design tab and the View tab. Both tabs display the layers and layer groups in the map. As you design and create maps, you work in the Design tab. You use the View tab to get an idea of what users will see when they view your maps in Autodesk MapGuide Viewer. For information about layers and layer groups, see Chapter 9, “Working with Map Layers.”

Help Index
bookmarks

Using the Design Tab

The Design tab of the Map Explorer lists the names of all layers in the map and their display ranges. Display ranges contain style information for a specific display range. For more information, see “Specifying Display Ranges for Layer Styles” on page 164. The layer and layer group names are always listed in the Design tab, even if the layer or layer group is not currently displayed. The Design tab also lists the reports and zoom goto definitions in the map and gives you easy access to customize the popup menu.

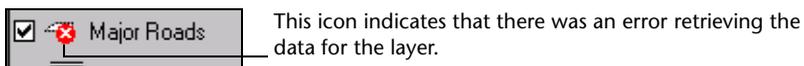


Layers that are available at the current scale are listed in the legend in black, and those that are unavailable at the current scale are dimmed (gray).

The check boxes in front of the layer names indicate whether or not the available layers are visible by default when the layers are within the current display range. You can turn a layer's visibility on or off simply by clicking its check box.

Selected layers are highlighted. When a layer is selected, you can remove, save, delete, compress, or expand it, or change its properties. You can also drag and drop layers to move them. By pressing CTRL as you drag and drop, you can quickly make copies of layers.

If the data for a layer cannot be retrieved, the layer is displayed as shown in the following illustration:



To select layers

Do one of the following:

- To select a layer, click the layer name.
- To select multiple contiguous layers, click the first layer, and then SHIFT-click the last one.
- To select multiple non-contiguous layers, click the first layer, and then CTRL-click each additional layer.

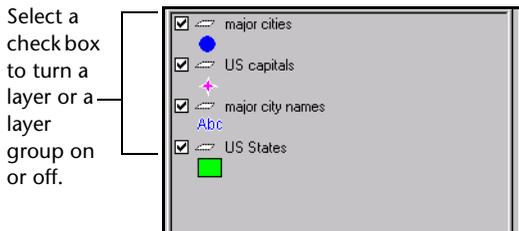
To deselect layers

Do one of the following:

- To select another layer instead of the currently selected layer, click the other layer.
- To deselect a single layer in a group of selected layers, Ctrl-click a layer that is already selected.

Using the View Tab

As you are creating a map or after you have finished creating a map, you can use the View tab to see how the map's legend will appear in Autodesk MapGuide Viewer. This can help you verify that you have created your layers as you planned. You can turn layers and layer groups on and off from the View tab by clicking the check box next to a layer or layer group name.



Note The default width of the View tab is 275 pixels while the default width of the Viewer legend is only 150 pixels. This means that text that appears in full on the View tab may be truncated in the Viewer. To get an exact idea of how your maps will appear in the Viewer, be sure to open your maps in Autodesk MapGuide Viewer.

You can select layers and layer groups in the View tab just as you do in the Design tab.

Changing the Width of the Map Explorer

In either the Design tab or the View tab, you can make the Map Explorer wider or narrower. If layer names are too long to display at the current Map Explorer width, you may want to widen it. If you do not need the current width of the Map Explorer to display layer information, you may want to narrow it to display more of the current map.

To resize the Map Explorer

- Drag the vertical bar between the Map Explorer and map area left or right.

As you drag the vertical resizing bar right or left, the status bar displays the width in pixels so that you can set the Viewer legend to a specific width.

Viewing Map Information

You can easily get information about the map as well as about individual features on the map. The status bar displays information about the map. For example, it displays the current map scale, width, and height, as shown in the following illustration.



[Help Index](#)
[MapTips](#)

The status bar also displays information about individual features on the map. When you point with the mouse to a map feature, the status bar displays the feature's layer followed by the feature's name. Additionally, Autodesk MapGuide Author displays the feature name in a yellow MapTip popup that appears when you move the pointer over the feature. If the feature is unnamed, the layer and feature name area of the status bar remains blank, and no MapTip appears.



If the feature under the pointer is linked to a Web document, the pointer changes from an arrow to a hand, and Autodesk MapGuide Author displays the URL of the linked Web document on the status bar. You can then double-click the feature under the pointer to load and display the linked Web document.

Help Index
linked documents
displaying

If the linked document does not appear when you double-click the pointer, you may need to configure your browser to display linked documents.



Measuring Distances

Help Index
measuring distances

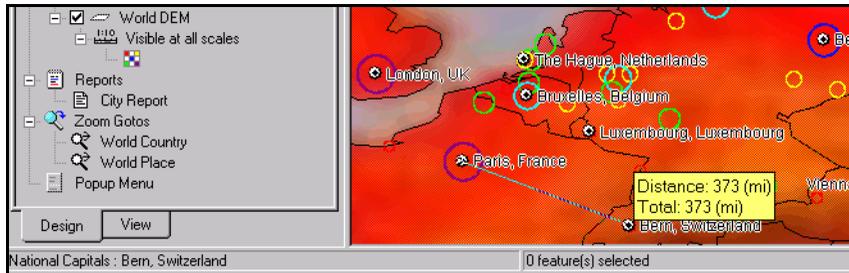
You can easily measure the distance between points on a map. When you measure the distance between multiple points in succession, you can view the distance between each segment you measure as well as the cumulative total of all segments measured.

For each map you create using Autodesk MapGuide Author, you can specify whether to use the Euclidean or Great Circle formula for measuring distances. If your map uses arbitrary XY coordinates, you must use the Euclidean formula. For maps using geographic coordinate systems, distance measurements will be more accurate if you use the Great Circle formula. You specify which distance formula to use in the General tab of the Map Window Properties dialog box.

Note Depending on the map’s coordinate system and the area displayed (smaller areas tend to be more accurate than larger areas), distances may not be accurate. To improve the accuracy of distances, you can select a coordinate system that has accurate or partly accurate distances, keeping in mind that the areas will then appear distorted.

You use the View ► Distance command to measure distances.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “measuring distances.”



In the previous illustration, Autodesk MapGuide Author displays the distance between Paris and Bern, 373 miles, in the yellow MapTip popup. Because only one segment was measured (the distance between two points only), the total distance is the same as the distance of the segment.

Selecting Map Features

Help Index
selecting map features

When you select features on the map, you can then view a report that provides information about the selected features, or you can adjust the map display to zoom to the selected features. The number and type of selected features are displayed on the status bar at the bottom of the map.

You can select map features only if you enable the Make Map Features Selectable option on the General tab of the Map Layer Properties dialog box. For more information, see “Specifying General Properties for Layers” on page 159.

Note When you select a map feature, Autodesk MapGuide Author selects the feature by its key. Therefore, if you select a map feature that contains multiple points, each of which has the same key, each of those points will be selected. Similarly, if there are multiple features in the map with the same key, selecting one of those features will select all features that share that same key.

You can select map features in several different ways:

- Use the mouse to select features.
- Use one of the options on the Select menu.

You can also combine multiple selection techniques.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “selecting map features.”

Note If a map includes multiple selectable polygon layers, some selection techniques (such as Select ► Radius, Select ► Polygon, Select ► Within, and using the mouse to drag a rectangle around map features) will select features from all selectable layers. When selected features on different layers overlap one another, the selection color for each layer varies depending on how many features overlap. Portions of unselected map features also change color if a feature in a layer beneath them is selected. These color changes differentiate the different layers.

Creating Buffers Around Map Features

Help Index
buffers

A common GIS spatial query involves finding all features within a specified distance, or a *buffer*, of one or more other features. A buffer is a polygon that defines its boundaries at a specified distance from a point, line, or another polygon. For example, you could locate all customers within one mile of a number of store locations. As part of this query, you might also want to see the area that defines the spatial query. Autodesk MapGuide Author can create buffer zones around one or more selected features. You can then select features that fall within these buffers.

You use the View ► Buffer command to create buffers.

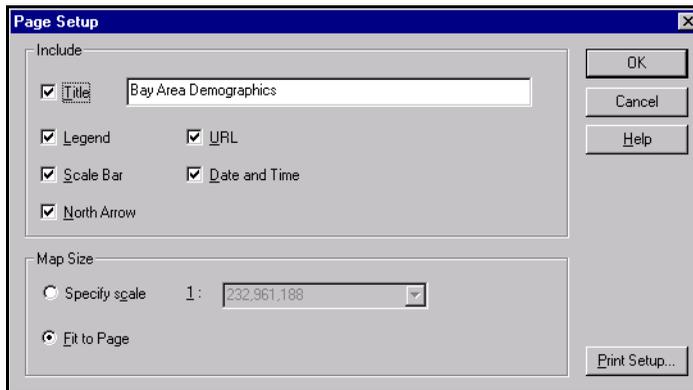
For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “buffers.”

Printing a Map

Although most users work with maps almost exclusively online, it is very useful to be able to print out a map. If you are authoring a map, you might want to print it out, to verify that it looks the way you want it to look, before publishing it online. Or, if you are working with the map to answer specific questions, such as determining the best location for a new store or substation, you might want to print out the map that accompanies a report you generated to present to others on your team.

You can customize your printed maps by including a title, a legend, a scale bar, a North arrow, the map's URL, and the current date and time. Also, you can specify the scale of the map you want to print, or you can have MapGuide automatically scale the map to fit the printed page.

You use the File ► Page Setup command to specify how to print your map. For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “page setup” and “printing maps.”



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page setup
printing maps

Creating and Publishing a Map

8

This chapter explains how to create, save, and publish a map, including details about setting passwords, specifying a coordinate system, and working with Zoom Goto location categories. It also includes information about customizing the Map Window popup menu, working with reports, and keeping track of how and when users access your map.

This chapter may be especially helpful to:

- Map authors

In this chapter

- Creating a new map
- Specifying a coordinate system
- Specifying a password to protect a map
- Creating and modifying Zoom Goto location categories
- Customizing the popup menu
- Working with reports
- Tracking user access to a map
- Saving a map
- Publishing a map

Creating a New Map

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maps
creating

To create a new map, you start with either the map of the world or another existing map. To create a new map, you can use one of two methods:

- Open the map of the world using the File ► New command, specify the area and settings you want, and then save it as a new map. Use this method if you do not have any existing maps, or if you need to create a map of a larger area than your existing maps.
- Open a map of the specific area you want using the File ► Open command, make modifications, and then save it as a new map. Use this method if you want to create a map that is similar to an existing map and uses the same area or a smaller area within it.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “maps, creating.”

Changing the File to Use for New Maps

Help Index
newmap.mwf

By default, the map of the world shown in the illustration on page 125 is the basis for any new map you create using the File ► New command in Autodesk MapGuide® Author. The file used to create new maps is called *Newmap.mwf*. If you prefer to start with a different map for all new maps that you create, you can do so by saving your own map as *Newmap.mwf*, overwriting the default new map. For more information, choose Help ► Contents, click the Index tab, and look up “newmap.mwf.”

Specifying a Coordinate System

Help Index
coordinate systems
specifying

The coordinate system you use determines which projection, center, and unit of distance measurement you will use for this map. The default coordinate system is World-Miller, which is an appropriate coordinate system for a map of the entire world.

Specifying the correct coordinate system is a critical part of setting up the map. Even if you created the map based on an existing map, you should still verify that the coordinate system you are using is right for your purposes, particularly if you are using a much smaller area than the original map. For more information about how to choose an appropriate coordinate system, see “Choosing a Coordinate System” on page 119.

When you open a map that was created in Release 5.0 or earlier, it is a good idea to reselect the coordinate system to ensure that you take advantage of any fixes that were made in this release. By reselecting the coordinate system, you update the map projection with the new information in this release.

You use the Coordinate System tab of the Map Window Properties dialog box to specify a coordinate system.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “coordinate systems, specifying.”

Specifying a Password to Protect a Map

Help Index
passwords
setting for maps

You can secure your maps by assigning passwords to them. Using passwords prevents other Autodesk MapGuide Author users from opening a proprietary Internet-published map and accessing the information stored in its MWF file. When you assign a password to a map, users must enter the correct password each time they open the map.

Warning Don't forget your password! Autodesk MapGuide Author has no mechanism for accessing passwords, so assign them thoughtfully and record them in a secure location.

You use the Security tab of the Map Window Properties dialog box to specify a password for a map.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “passwords, setting for maps.”

Note You can also secure your maps by assigning access control keys to each layer. For information about doing this, see “Specifying Security for Layers” on page 173. Furthermore, you can assign access keys and passwords to the resources themselves, so that all maps that use those resources require an access key or password. See “Using Autodesk MapGuide Security” on page 51 and “Managing Server Security” on page 80 for more information.

Creating and Modifying Zoom Goto Location Categories

Help Index
Zoom Goto location
categories

Before you can zoom to specific map locations using the Zoom Goto function, you need to set up Zoom Goto location categories for your map. Each Zoom Goto location category includes the information required by Autodesk MapGuide® Server to look up locations in an SQL database. When Autodesk MapGuide Server finds one or more matching locations, it returns the associated coordinates to Autodesk MapGuide Author or Autodesk MapGuide Viewer, which zooms to the specified location.

For example, if you have a database containing the coordinates for each country in the world, you could create a category called “World Country.” This would allow users to zoom directly to a country simply by typing the name of the country in the location box. Adding location categories to your map can save users a lot of time.

You can create, modify, and delete zoom location categories using the Zoom Goto tab in the Map Window Properties dialog box. Note that you cannot delete the US Street Address category.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “Zoom Goto location categories.”

Data Source Formats for Zoom Goto Location Categories

To use a data source for a Zoom Goto location category, it must contain five specific types of data in separate fields. These fields are described in the following table:

Field	Type of Data It Contains
Location name	The name to display if one or more features have been found that match the query you specify.
Minimum latitude	The minimum latitude for polylines and polygons, or the latitude location for points. For arbitrary <i>XY</i> coordinates, this field should specify the minimum <i>Y</i> value.
Minimum longitude	The minimum longitude for polylines and polygons, or the longitude location for points. For arbitrary <i>XY</i> coordinates, this field should specify the minimum <i>X</i> value.
Maximum latitude	The maximum latitude for polylines and polygons, or the latitude location for points (same as minimum latitude for points). For arbitrary <i>XY</i> coordinates, this field should specify the maximum <i>Y</i> value.
Maximum longitude	The maximum longitude for polylines and polygons, or the longitude location for points (same as minimum longitude for points). For arbitrary <i>XY</i> coordinates, this field should specify the maximum <i>X</i> value.

Following are some important notes about the data in these fields:

- When you specify the location for a point, the minimum longitude and latitude are the same as the maximum longitude and latitude. Therefore, when the user selects this zoom location, the Width that the user specifies (if any) is used. If the minimum longitude and latitude are different from the maximum longitude and latitude, the Width that the user specifies is ignored.
- The Location name field must not contain any special characters, such as “\n” for forcing a new line. This can cause conflict if you have only one name field that you want to use for both location names and feature names, and you want to include newline characters to create multi-line MapTips from the feature names. In this case, you should add a second field for use as feature names in MapTips that contains the same name

information and includes newline characters, while excluding newline characters in the first field that will be used for location names.

The US Street Address Location Category

Autodesk MapGuide Author comes with a predefined location category called “US Street Address.” When you activate this category, you access a geocoding database that contains U.S. street addresses and their coordinates, so that your users can type an address or ZIP code and zoom directly to that location on the map.

To use this feature, you must have a U.S. street address geocoding database licensed to Autodesk MapGuide Server. For more information, see 150.

To see an example of how to set up the US Street Address location category, choose Help ► Contents, click the Index tab, and look up “Zoom Goto location categories, US Street Address.”

Customizing the Popup Menu

The Map Window popup menu provides quick access to Map Window commands from the menus and toolbar buttons. You can customize all but the first item on the popup menu by adding or deleting commands, or by modifying the actions assigned to specific commands. The changes you make to the popup menu in Autodesk MapGuide Author will appear when users view your maps using Autodesk MapGuide® Viewer. If you have your own online Help system that you want to use for your Autodesk MapGuide Viewer, you can specify it in the popup menu.

Note The first item on the menu is always Properties in Autodesk MapGuide Author; however, Properties does not appear on the menu in Autodesk MapGuide Viewer.

You use the Popup Menu tab of the Map Window Properties dialog box to customize a map’s popup menu.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “popup menu, customizing.”

Working with Reports

Help Index
reports
adding to maps

You can design customized reports for your map. When you link a report to a layer, an Autodesk MapGuide Viewer or Autodesk MapGuide Author user can select features on that layer and then generate a report for those selected features. You can also add reports that are not linked to any layer, so that when the user clicks a point on the map, the report is generated for that point. Reports can include data such as population, total sales, a URL link to a related Web page, or any other data you want to associate with a feature.

To design a report, use ColdFusion® by Macromedia or another third-party network database connectivity and reporting tool, such as Active Server Pages (ASP). Specify the data to retrieve for the selected map feature keys and the output format for the report, and then place the report on your Web database server. For information about designing reports, refer to the documentation that came with the reporting tool you are using.

In addition to the report itself, you need a data source that contains the information you will use in the report. Each record in the data source must either contain a key that matches the key of the spatial feature to which you want it linked, or it must contain coordinates in latitude/longitude format. For more information, see “Specifying Data Source Properties for Layers” on page 160.

To add the report to your map, use Autodesk MapGuide Author to specify the report properties, which include a name for the report, the URL location of the report, the map layers that may access the report, and any optional parameters to be sent with the report request.

When users view a report, Autodesk MapGuide Author or Autodesk MapGuide Viewer sends a request to the URL defined for that report. The report engine then creates the report for the selected features or points.

When you have designed a report and have data for the report, you can add the report to your map. You use the Reports tab of the Map Window Properties dialog box to add reports.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “reports, adding to maps.”

Viewing a Report

Help Index
reports
viewing

When users want to view a report, Autodesk MapGuide Author or Autodesk MapGuide Viewer sends a request to the URL defined for the report, sending as parameters the map feature keys that you specified and any optional parameters defined for the report. The report engine extracts the data from sources on the server, creates the report, and then sends it either to the user or somewhere else, depending on how the report was designed.

You use the View ► Report command to view a report for selected features or for a specific point you click in the map.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “reports, viewing.”

Tracking User Access to a Map

Help Index
tracking ID

To keep track of access to your map, you can set a tracking ID that is stored with the map. When users access a map that has a tracking ID, every action they perform (such as panning or zooming) can be logged by Autodesk MapGuide Server. Using Autodesk MapGuide Server Admin, you can then run a report to monitor usage based on the tracking ID. This can be useful, for example, if you want to charge customers for using your maps.

You use the Security tab of the Map Window Properties dialog box to specify a tracking ID for a map.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “tracking ID.”

Saving a Map

Help Index
saving
maps

Saving your map as a Map Window File (MWF) is the last step in creating your map. However, as with all software applications, it is a good idea to save periodically to avoid lost work if your system fails.

Warning After you save a map in Autodesk MapGuide Release 6, you cannot open the map in earlier releases of the program. Autodesk MapGuide Viewer users using older versions can easily upgrade to Release 6 by downloading the new Viewer from:

<http://www.autodesk.com/prods/mapguide/download/index.htm>

If you opened the map using its Web URL by choosing File ► Open Location instead of File ► Open, you can save the map locally, but you cannot save it to the Web server. You can save the map to the Web server only if you opened the map using File ► Open, you have access to the Web server through a network, and you have the proper permissions set up. For more information about setting permissions, refer to “Creating and Modifying Users and Groups” on page 83.

You use the File ► Save, or File ► Save As commands to save maps.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “saving maps.”

Publishing a Map

Help Index
publishing maps

You can publish a map by copying or uploading the map to your Web server.

Note You must have either FTP access or Write access to the *maps* directory. If you are not able to save the map to the Web server, you should ask your server administrator to post it for you.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “publishing maps.”

Help Index
linking and embedding
maps

After you have posted the map, Web site developers can embed your map in their HTML pages or create links to them. When a user visits a Web page that contains your map or clicks the link to it, Autodesk MapGuide Server sends the map data to Autodesk MapGuide Viewer, which displays the map in the user’s Web browser. The Web developer should make a note on the Web page that Autodesk MapGuide Viewer is required for viewing the map and should add a link to the Autodesk MapGuide Web site where the user can download Autodesk MapGuide Viewer free of charge.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “linking and embedding maps.”

Working with Map Layers

9

Each map authored with Autodesk MapGuide® Author contains one or more map layers. This chapter explains how to work with layers, including creating layers, specifying layer properties, protecting layers with access keys, and saving layers.

This chapter may be especially helpful to:

- Map authors

In this chapter

- About map layers
- Working with map layers in the Map Explorer
- Specifying general properties for layers
- Specifying data source properties for layers
- Setting style properties for layers
- Specifying security for layers
- Modifying multiple layers simultaneously
- Saving a layer
- Adding a saved layer to the current map
- Rebuilding a layer or layer group
- Deleting a layer or layer group

About Map Layers

Layers are like separate transparent sheets on which your map data is drawn. Every map generally contains a minimum of one layer, but because layers are so useful for organizing and working with your data, a map typically will contain several layers. At minimum, you must have a separate layer for each type of data you use in the map. You cannot display points and polygons on the same layer, for example.

You can create a layer and use it for a specific map, or save it as a separate Map Layer File (MLF) and use it in several different maps. A map can contain multiple layers of the same type, such as multiple polygon layers, each of which you can set up independently of the others. You can also create collections of related layers, called *layer groups* to help you organize layers in a map.

You can create dynamic and static map layers. A dynamic layer stores only the layer styles (such as color, style, and symbology) in the Map Window File (MWF), not the map data, thus minimizing file size. When you access a dynamic map layer using Autodesk MapGuide® Author or Autodesk MapGuide Viewer, Autodesk MapGuide® Server sends the map data for the layer on demand. As you zoom in and out on the map, Autodesk MapGuide Server sends the data for the visible area only, not for the entire map. Dynamic layers are most appropriate for medium to large data sets and for maps that cover a large area.

A static map layer stores a snapshot copy of the layer data for the entire Map Window and embeds it in the map file. Because all of the data is already in the map, the layer takes a little longer to load, but zooming in and out is faster than with dynamic layers, because no additional data needs to be downloaded from the server. Note that if you change the map's default center and size or map projection, Autodesk MapGuide Server must rebuild all static map layers, as it does with dynamic layers. Static map layers are most appropriate when the data set does not change often, the size of the data set is relatively small, and the map covers a small area. Also, because the data is contained within the map itself, static layers are best used when data security is not an issue.

Autodesk MapGuide Author draws layers in order of increasing priority starting with priority 0, then priority 1 on top of layer priority 0, and so on, until it draws the layer with priority 100 last, on top of all other layers. The drawing order is reflected in the Autodesk MapGuide Viewer legend and in the Map Explorer, where the layer with the lowest priority is at the bottom of the list, and the layer with the highest priority is at the top of the list.

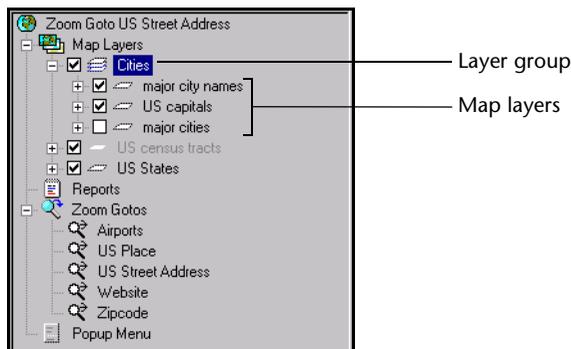
For information about changing a layer's priority, see “Specifying General Properties for Layers” on page 159.

In Autodesk MapGuide Author, there are two main types of layers: vector and raster. Vector layers contain spatial data that is made up of points and lines, such as cities, countries, and roads. Each vector layer can contain only one type of vector data, either text, points, polylines, or polygons. Raster layers contain spatial data that is made up of tiny squares (pixels) that form an image. An aerial or satellite photograph is a typical example of a raster image. Most of the layers you create will probably be vector layers, which you might place over a single raster image that you use as a background image.

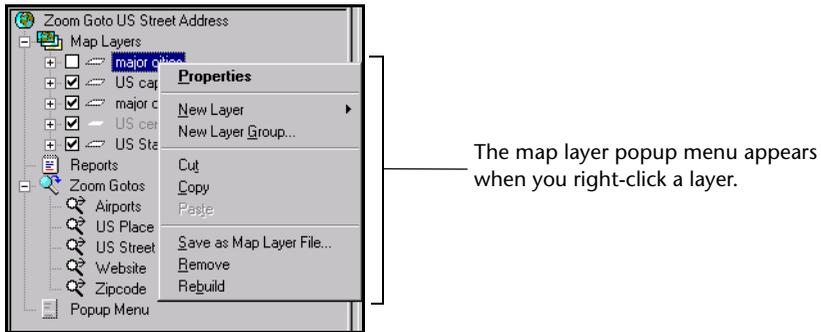
If you have Autodesk® GIS Design Server theme data and the Autodesk GIS Design Server Extension, you can create Autodesk GIS Design Server theme layers. If you have Oracle® Spatial data and the Autodesk MapGuide Provider for Oracle Spatial, you can create Oracle Spatial layers. If you have Autodesk DWG files, you can automatically create Autodesk DWG layers. If you have ArcView SHP files and the Autodesk MapGuide Provider for SHP, you can create ArcView SHP layers.

Working with Map Layers in the Map Explorer

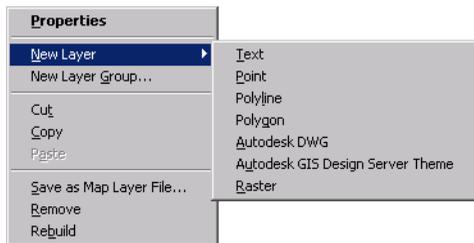
To work with map layers, you use the Design tab of the Map Explorer in Autodesk MapGuide Author. Layers are listed under the Map Layers item. Layers can be part of a layer group, such as the Cities layer group in the following illustration.



When you right-click a layer in the Design tab of the Map Explorer, the map layer popup menu appears, as shown in the following illustration. You use the commands in the map layer popup menu to create, modify, or manipulate the layers in a map.



You create new layers in the Design tab of the Map Explorer, using one of the commands in the New Layer submenu in the map layer popup menu.



Creating a Vector Layer

You can create four types of vector map layers—text, point, polyline, and polygon. Each layer can contain only one map feature type.

You create vector map layers from spatial data provider (SDP) data sources; if you are creating point or text layers, you can also create them from points in a SQL database table that you have set up as an OLE DB data source. You can also use SQL database tables to link style information to the features in a layer. For example, you could link a layer of roads to a table that provides each road's name, length, and last date paved. You could then create a theme to display the data and quickly see which roads need paving the most.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “vector layers, creating.”

Another type of vector layer you can create is a buffer layer. Buffer layers are created automatically when you use the View ► Buffer command in the Map Window popup menu; you cannot create them manually as you do with the other types of layers. You can modify a buffer layer using the Map Layer Properties dialog box as you would with the other layers, but because buffer layers are intended for buffers only, you can specify only a limited set of options. For more information, see “Creating Buffers Around Map Features” on page 141.

Creating a Raster Layer

When you add a raster map layer to a map, Autodesk MapGuide Author assumes that the raster images are in the same coordinate system as that used by the map file. You cannot edit raster images within Autodesk MapGuide Author; therefore, you must project them into the map’s coordinate system using third-party image analysis and enhancement software before you create the raster map layers.

You can create a raster map layer by referencing either a single raster image or a Raster Image Catalog (RIC) file. A RIC file lists all the raster image files that tile the area covered by a map or map layer. When you access a layer that references a RIC file, Autodesk MapGuide Server scans through the RIC file to determine the images or portions of images that correspond to the area being viewed. It then sends the data for that area only.

Keep in mind that the RIC file is used only to determine which images might be visible. Each image that is referenced by the RIC file must have its own georeferencing file that indicates how to place this image correctly on a map. Autodesk MapGuide Author uses the information in the georeferencing file (not the information in the RIC file) to place the images in your map.

The simplest way to generate RIC files is to use Raster Workshop, a utility available from the Autodesk MapGuide CD. You can use this utility to create a RIC file, add raster image files to it, subsample and merge the files, and more. For more information, see “Working with Raster Images” on page 101.

For step-by-step instructions on creating a raster layer, choose Help ► Contents, click the Index tab, and look up “raster layers, creating.”

Creating an Autodesk GIS Design Server Theme Layer

If you have Autodesk GIS Design Server theme data and the Autodesk GIS Design Server Extension, you can create Autodesk GIS Design Server theme layers. Unlike other layer types, each feature on a Autodesk GIS Design Server theme layer can be drawn with a different style (font, color, line style, fill style, and so on). All display characteristics are taken directly from the features themselves in the Autodesk GIS Design Server theme. Therefore, you do not specify the styles for the layer, as you do with other types of layers in Autodesk MapGuide Author, nor are the styles stored with the layer definition in the MWF.

To change the styles of the map features on a Autodesk GIS Design Server theme layer, you must change the symbology definitions of the features in the Autodesk GIS Design Server theme on which the layer is based.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “Autodesk GIS Design Server, creating Autodesk GIS Design Server theme layers.”

Creating an Autodesk DWG Layer

If you have Autodesk DWG files, you can create Autodesk DWG layers by choosing New Layer ► Autodesk DWG Layer from the popup menu in the Design tab of the Map Explorer.

Autodesk MapGuide supports scale, rotation, and *XY* offset of drawings referenced by Autodesk Map project drawings. If you want to tile a set of arbitrary *XY* drawings, or if you want to scale, offset, or rotate one or more drawings, attach the drawings to an Autodesk Map project drawing and set the appropriate values for the scale, offset, and rotation.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “DWG layers, creating.”

Creating a Layer Group

Help Index
layer groups

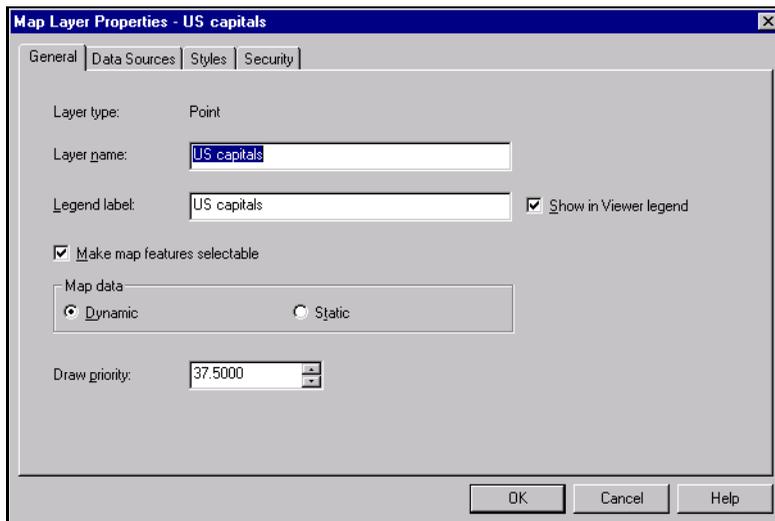
To organize your layers, you can create one or more layer groups and then add layers to the appropriate groups. The layer groups appear in the Map Explorer. You can specify whether or not they appear in the Autodesk MapGuide Viewer legend. One advantage of using layer groups is that you can turn on or off all of the layers in a layer group with a single command.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “layer groups.”

Specifying General Properties for Layers

Help Index
layers
general properties

You use the General tab of the Map Layer Properties dialog box to assign a name to the map layer. You can also specify properties that control how it will be listed in the legend, whether a layer is selectable, dynamic, or static, and the drawing priority for the layer.



Specifying Data Source Properties for Layers

Help Index
layers
data source properties

You use the Data Sources tab of the Map Layer Properties dialog box to specify the data source that contains the features you want to use on this layer, the URL of the Autodesk MapGuide Server MapAgent that will serve this data, and additional data source properties. If you are creating a raster layer, the Data Sources tab looks different than it does when you are creating a vector layer. For more information, see “Creating a Raster Layer” on page 157. If you are working with a buffer layer that you created with the View ► Buffer command, the Data Sources tab is not available.

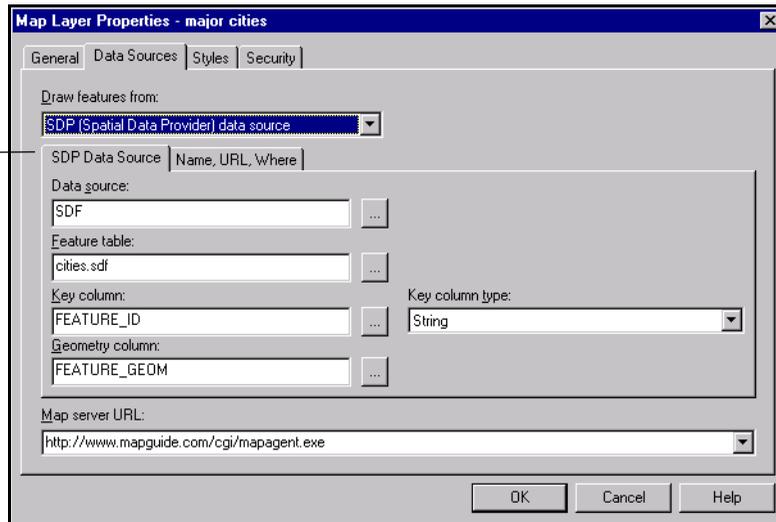
To specify data source properties

- 1 Double-click a layer in the Design tab of the Map Explorer, and then click the Data Sources tab in the Map Layer Properties dialog box.
- 2 Do one of the following:
 - For an SDP (Spatial Data Provider) or OLE DB Data Source, select from the Draw Features From drop-down list.
 - For a DWG (Autodesk) data source, click the browse button next to the Data Sources box.

The dialog box that is displayed depends on the type of data source you selected.

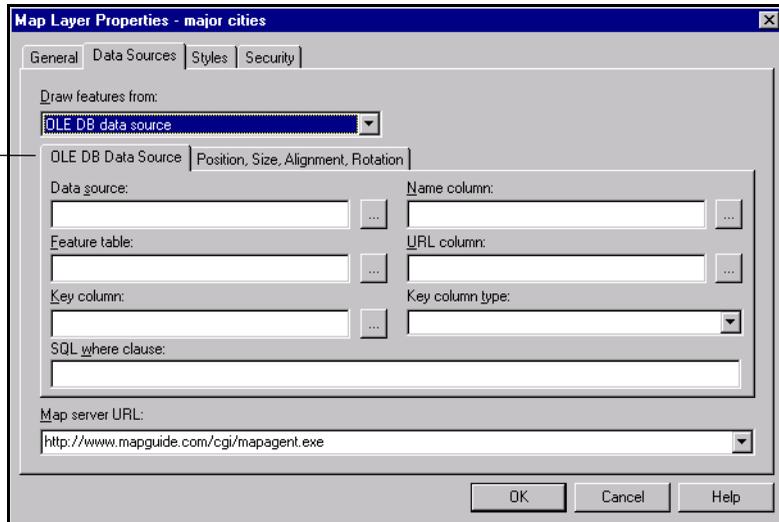
If you choose SDP (Spatial Data Provider) Data Source, the dialog box displays two secondary tabs as shown below.

Secondary tabs for SDP Data Sources: SDP Data Source and Name, URL, Where



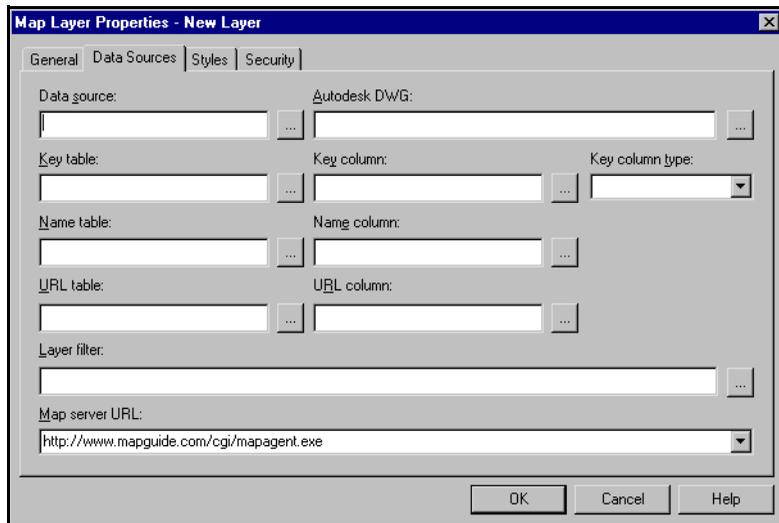
If you choose OLE DB Data Source, the dialog box displays two different secondary tabs, as shown below.

Secondary tabs for OLE DB Data Sources: OLE DB Data Source and Position, Size, Alignment, Rotation



Note The Position, Size, Alignment, Rotation tab is available only for text and point layers based on an OLE DB data source.

If you choose DWG Data Source, the following dialog box appears.



- 3 Specify data source properties as described in the online Help.
You can click the Help button in each secondary tab to get details about the options on the tab.

Setting Style Properties for Layers

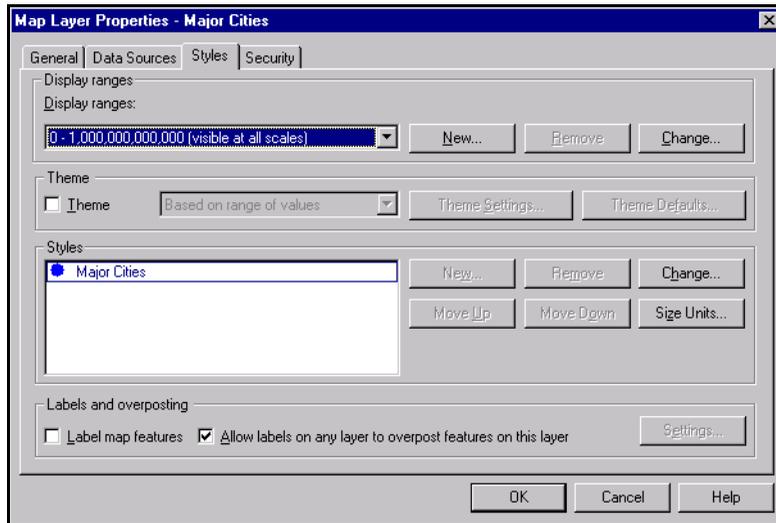
You can specify properties that control how data appears on a map. For example, you can specify the display (scale) ranges at which a layer is visible, the line color, and add labels to the map features. You can also set up a theme, which displays the data in varying styles to indicate different values in the data.

Note Raster layers have different style properties from vector layers. For more information, see “Setting Style Properties for Raster Layers” on page 163.

When specifying the style properties for a layer, you are setting up one or more *style sets*. Each style set has a display range and at least one style that controls how the data displays. By default, there is only one style set per layer, but you can add more style sets to display the data differently depending on the current scale. For example, you could create one style set to display roads with thick lines when you zoom in, and create a second style set that displays roads with thin lines when you zoom out.

You use the Styles tab of the Map Layer dialog box to set styles for a layer.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “layers, style properties.”



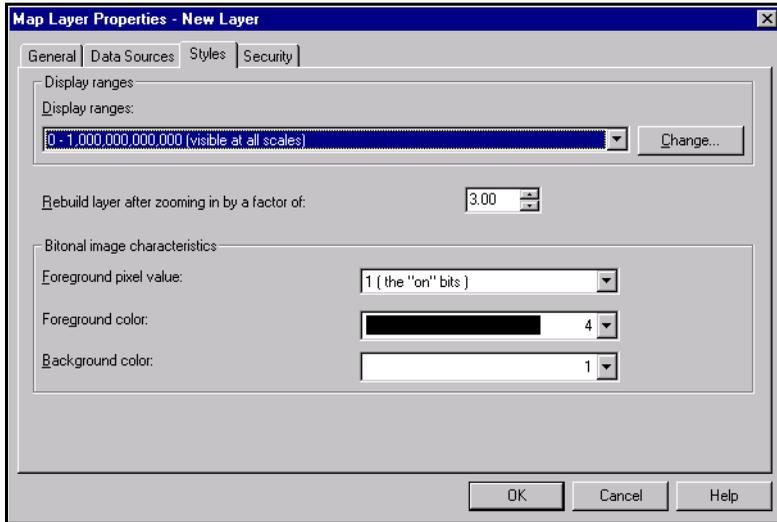
Styles tab for vector layers

Setting Style Properties for Raster Layers

The style properties that you can set for raster layers are different from those you can set for other types of layers.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “raster layers, styles.”

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raster layers
styles



Styles tab for raster layers

Specifying Display Ranges for Layer Styles

You use the Display Ranges area on the Styles tab to specify the visible display range for the current style set. The other options on the Styles tab determine how the layer displays in the Map Window when the map's zoom level is within the display range currently shown in the Display Ranges box.

When the current zoom level of Autodesk MapGuide Author or Autodesk MapGuide Viewer is within the visible display range of a particular layer, the program redraws that layer as specified in the associated style set.

Most map layers have only one style set, but multiple style sets can be useful for some polyline map layers. In the following table, three different display ranges, each with its own set of styles, are set up to display major roads.

Using these ranges and styles, Autodesk MapGuide Author draws the roads with heavier line styles as the zoom increases.

Display Range	Styles Used To Draw the Road
0 – 20,000	
20,000 – 50,000	
50,000 – 100,000	

When setting up multiple style sets for a layer, make sure that the display ranges do not conflict. For example, the ranges 500,000 – 5,000,000 and 2,000,000 – 10,000,000 conflict, because the second range overlaps the first one. In such cases, when the current map scale is within the overlapping display range, Autodesk MapGuide Author displays the features using the styles of the first style set in the list only.

Keep in mind that the style set will be used if the current map scale is *greater than* the From value and *less than or equal to* the To value. For example, if the display range is 0 – 20,000, the style set will be used if the current map scale is between 1 and 20,000. Therefore, when setting up adjacent display ranges, you should use the same From value as the previous style set's To value. Do not set one range to 0 – 20,000 and then set the next range to start at 20,001.

If you want to draw the same data multiple times in different ways to create the effect of complex line styles, you can specify multiple styles for a single style set. For details, see “Creating Complex Line Styles with Polyline” on page 170.

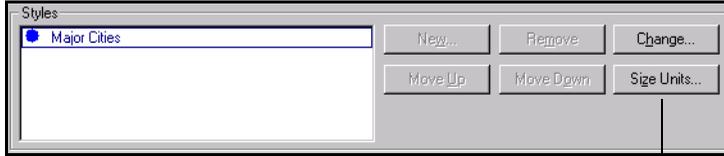
For step-by-step instructions on specifying display ranges, choose Help ► Contents, click the Index tab, and look up “display ranges.”

Specifying Map Layer Styles

You can specify different display styles for each layer in your map, such as new symbols for a point layer or font style for a text layer. Use the Styles area of the Styles tab in the Map Layer Properties dialog box to specify how a layer is displayed.

When themes are disabled, the Styles list contains only one display style (a symbol for point layers, text font for text layers, line style for polyline layers, or fill style for polygon layers), as shown in the following illustration.

The settings you specify for this particular style determine how all features on the layer are drawn. However, on polyline layers, you can add additional display styles if you want to overlap display styles to create the effect of complex line styles. For more information, see “Creating Complex Line Styles with Polylines” on page 170.



This button is enabled for text and point layers only.

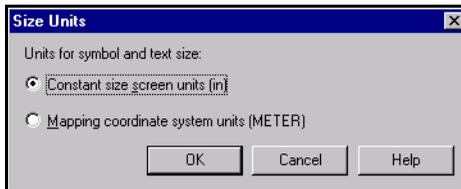
When themes are enabled, there is a separate entry in the Styles list for each theme category. You specify settings for each theme category separately. For more information, see “Setting Display Styles for DWG Layers” on page 171.

Specifying Size Units for Text and Point Layers

With text and point layers, you can specify whether to use screen units (inches or centimeters) or mapping coordinate system units to express the width and height of features in the map.

To specify size units, you click the Size Units button in the Styles tab of the Map Layer Properties dialog box.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “size units, for text and point layers.”



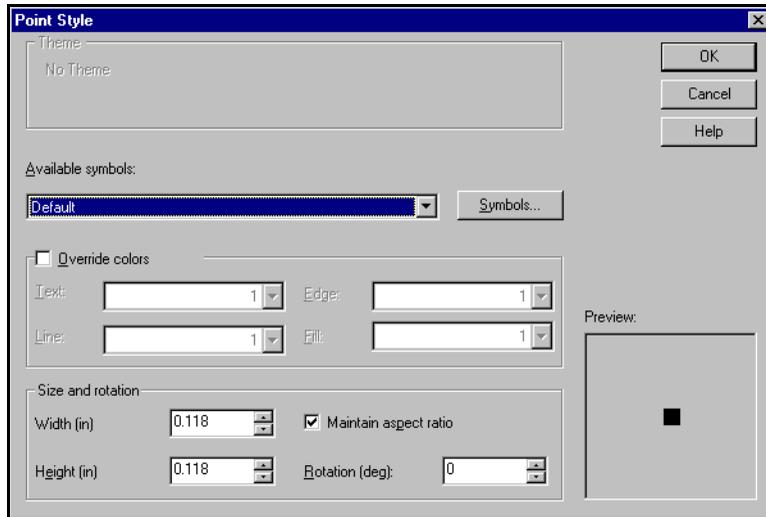
Help Index
size units
for text and point layers

Setting Display Styles for Point Layers

You can use symbols to represent point layer features. Autodesk MapGuide Author comes with predefined symbols that are grouped by type in a number of symbol (SMB) files. These files are located in the \SMB folder installed in the Autodesk MapGuide Author program folder. You can also use Windows Metafiles (WMF), Enhanced Windows Metafiles (EMF), Bitmaps (BMP), Device Independent Bitmaps (DIB), and pictures from the Clipboard as symbols. Additionally, you can create your own symbols in Autodesk Map, and import or paste them into Autodesk MapGuide Author.

For details about working with SMB files and symbols, see “Working with Symbols” on page 109.

To specify styles for point layers, you double-click a style (or click Change) in the Styles tab of the Map Layer Properties dialog box, to display the Point Style dialog box.



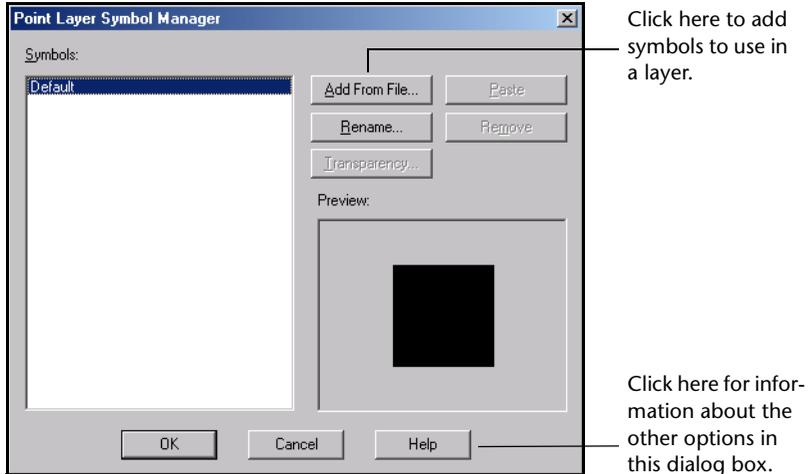
For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “point layers, styles.”

Adding New Symbols for Use in Point Layers

If you have symbol files that you want to use on point layers, you can add them so that they are available in Autodesk MapGuide Author. You use the Point Layer Symbol Manager dialog box to add symbols.

For detailed information, choose Help ► Contents, click the Index tab, and look up “symbols, adding for point layers.”

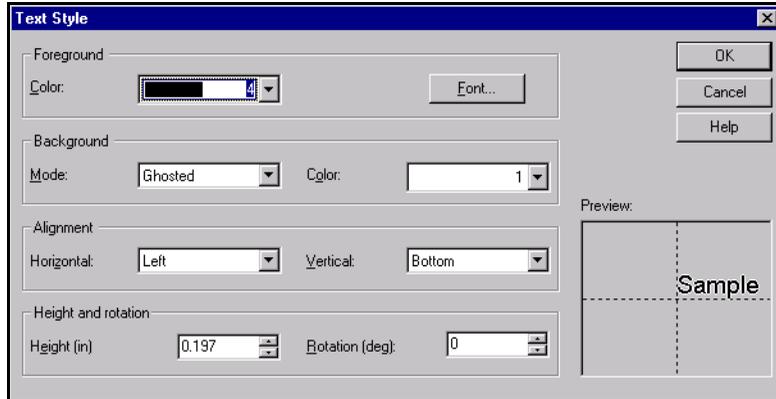
For details about working with SMB files and symbols, see “Working with Symbols,” on page 109.



Setting Display Styles for Text Layers

You can specify the font, color, background, alignment, height, and rotation of text layer features. To specify styles for text layers, double-click a style in the Styles tab of the Map Layer Properties dialog box to display the Text Style dialog box.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “text layers, styles.”

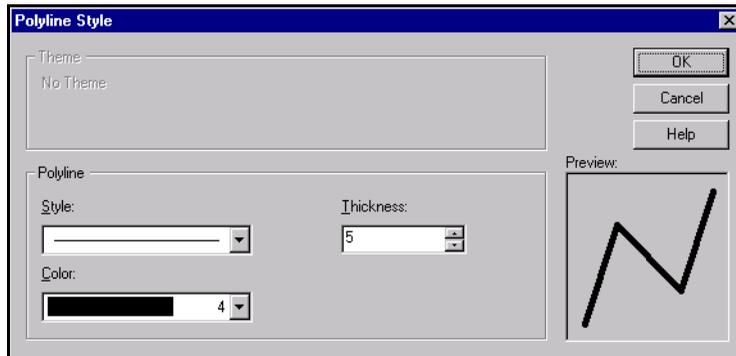


Setting Display Styles for Polyline Layers

Help Index
polyline layers
styles

You can specify the line style, color, and thickness of polyline layer features. To specify styles for polyline layers, you double-click a style in the Styles tab of the Map Layer Properties dialog box to display the Polyline Style dialog box.

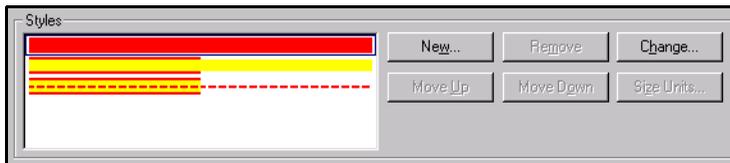
For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “polyline layers, styles.”



Creating Complex Line Styles with Polylines

On polyline map layers that do not use themes, you can create complex line styles by defining multiple display styles for the same display range. Autodesk MapGuide Author draws each display style on top of the one that precedes it in the Style list, creating a more complex display than a single style can produce.

The following illustration shows a style set with three styles. The first is a wide red line, the second is a narrower yellow line, and the third is a very thin dashed red line. This will draw the polylines on the layer three times in three different ways to create the visual effect of a highway with a center line.



Style area in the Styles tab of the Map Layer Properties dialog box

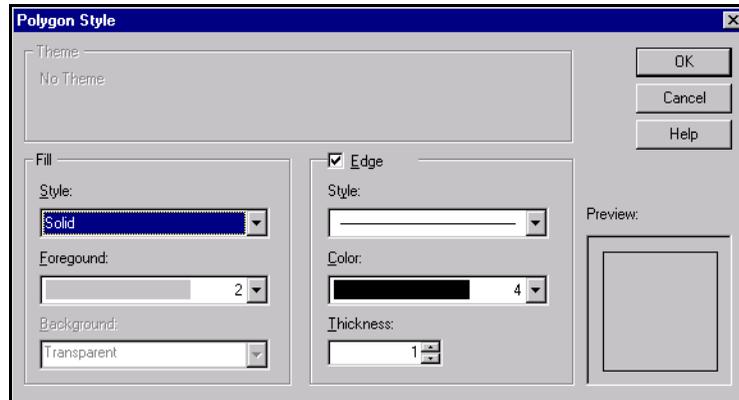
In the preview box, the right half of each style shows the style you specified for it, and the left half of each style shows the cumulative effect of drawing that style on the previous style (the first style in the list is drawn first, the second style is drawn on top of that, and so on). Thus, the left side of the last style shows you the final style that will be used to draw the polylines on the map.

To create another style, click New in the Styles area, and then specify the line style, color, and width that you want to appear on top of the existing style.

Setting Display Styles for Polygon Layers

You can specify the fill style and color, edge style and color, background, and line thickness used to draw polygon layer features. To specify styles for polygon layers, you double-click a style in the Styles tab of the Map Layer Properties dialog box to display the Polygon Style dialog box.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “polygon layers, styles.”

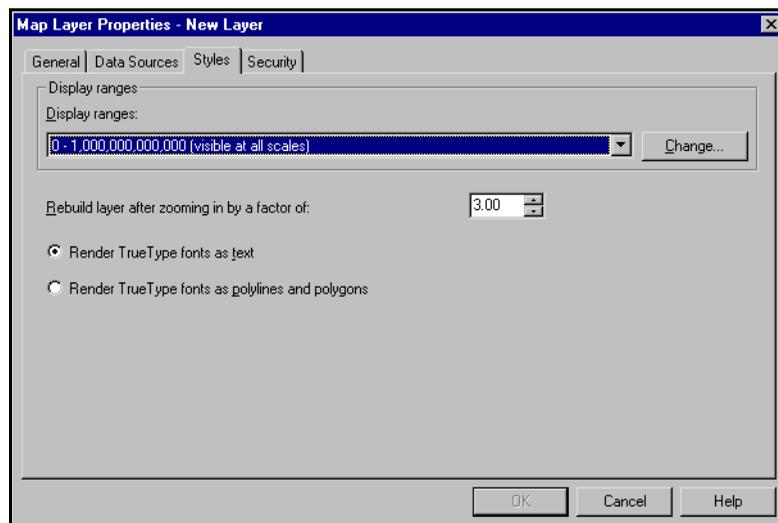


Setting Display Styles for DWG Layers

Help Index
DWG layers
setting styles

You can set the display styles of Autodesk DWG layers including the display range at which the layer is visible, the number of times the user can zoom in before the layer is redrawn, and whether to render fonts describing layer features using TrueType fonts or polygons.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “DWG layers, setting styles.”



Creating Themes

You can create themes that allow users to quickly see and understand data on your map. For example, a typical theme for a point layer could display retail store locations with a different symbol for each type of store. A polygon layer theme could display each land use classification with a different color or shading.

Note You cannot apply themes to text or buffer layers.

Use the Theme area in the Styles tab in the Map Layer Properties dialog box to create or change a display theme for the features on the current map layer.



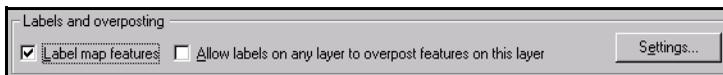
Theme area in the Styles tab of the Map Layer Properties dialog box

Before you can create a theme, you need to link the layer to a database. For more information, see “Specifying Data Source Properties for Layers” on page 160.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “themes, creating.”

Specifying Layer Feature Labeling and Overposting

Use the Labels And Overposting area in the Styles tab of the Map Layer Properties dialog box to specify the font, size, color, and map display range of automatic labeling for this style set, and to control how features overlap on a layer.



Labels And Overposting area in the Styles tab of the Map Layer Properties dialog box

Overposting occurs when feature labels overlap or cover other map features. To minimize overposting, the default setting prevents a label from being drawn at a specific zoom level if it will obscure other labels or features on the map. However, the program will display the label when you zoom in far enough to allow sufficient space to display it. The source of the map feature label is the name field of the data source for the layer. Note that you cannot create labels for buffer layers.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “labels for features.”

Specifying Security for Layers

Help Index
layers
security

You can secure the data on a layer and control access to resources by setting an access key. The access key you specify is embedded in the layer, so that when Autodesk Mapguide Author or Autodesk MapGuide Viewer requests data from a resource for the layer, Autodesk MapGuide Server checks the resource access key against the layer access key. If the keys match, Autodesk MapGuide Server loads the layer's data. If keys do not match, access to the resource data is denied. If the resource does not use an access key, the access key embedded in the layer is ignored.

You can also control whether Autodesk MapGuide Viewer API users can obtain coordinate information from map features in your map and whether they can access the map layer setup. Disabling API access to the coordinates prevents developers from writing scripts that can download all of the coordinates on the layer and re-use the data.

You use the Security tab of the Map Layer Properties dialog box to specify security settings.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “layers, security.”

Click here for information about the other options in this dialog box.

The screenshot shows the 'Map Layer Properties - Roads' dialog box with the 'Security' tab selected. The dialog has four tabs: 'General', 'Data Sources', 'Styles', and 'Security'. The 'Security' tab contains two main sections: 'Access key security' and 'API security'. The 'Access key security' section has two text input fields labeled 'Access key:' and 'Confirm access key:'. The 'API security' section has three radio button options: 'Do not allow access to coordinate values from API' (selected), 'Allow access to coordinate values from API', and 'Allow access to coordinate values from API with the following passkey'. Below the second and third options are pairs of text input fields labeled 'Passkey:' and 'Confirm passkey:'. At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

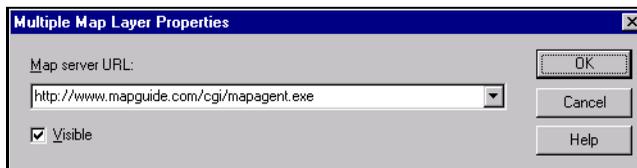
Modifying Multiple Layers Simultaneously

Help Index
layers
 modifying multiple

Although you need to specify most properties for each layer individually, you can change the visibility status and the Autodesk MapGuide Server MapAgent URL of multiple layers at the same time. If you have several layers in a map, this can save you time.

To modify properties of multiple layers, you use the Multiple Map Layer Properties dialog box, which you access by selecting two or more layers in the Design tab of the Map Explorer, and then choosing Properties from the popup menu.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up “layers, modifying multiple.”



Saving a Layer

After you save a layer as a Map Layer File (MLF), you can use it to create new layers in the same map or in different maps. This can save you time if you create similar layers repeatedly, because you can simply add the MLF as a new layer and make modifications to its existing settings. Therefore, you should consider saving commonly used layers as MLFs. Note that if the layer is static, the MLF will include all of the data for that layer, as well its properties. For more information, see the next section, “Adding a Saved Layer to the Current Map.”

You can also add MLFs to a map using the Autodesk MapGuide Viewer API. For more information, refer to the *Autodesk MapGuide Viewer API Help*.

To save a layer to a file

- 1 In the Design tab of the Map Explorer, right-click the name of the map layer to be saved, and then choose Save As Map Layer File from the popup menu.
- 2 Navigate to the folder where you want to save the layer file, and then enter a name for the file.
- 3 If you have assigned an access key to the layer, select the Include Access Key In Map Layer File check box to save the access key with the layer file, or clear it to prevent the access key from being saved with the layer.

Adding a Saved Layer to the Current Map

You can use the same layer in multiple maps. This is very useful, for example, when you need to create several maps of the same area that show variations of the same data. Using a saved layer saves you the work of having to recreate the same layer for each map. Before you can add a layer from one map to another, you must save the layer.

To add a saved layer to a map

- 1 Right-click over the Map Layers item in the Design tab of the Map Explorer, and then choose Add Layer From File.
- 2 Navigate to the folder where the saved layer's MLF file resides, select the folder, and then click OK.

Rebuilding a Layer or Layer Group

Help Index rebuilding layers

If you have made changes to one or more layers, you can have Autodesk MapGuide Server rebuild the layers so that you can see the changes in Autodesk MapGuide Author. Rebuilding a layer group rebuilds all of the layers in the group. Note that you cannot rebuild a buffer or redline layer. You use the Rebuild All Layers command or the Rebuild command to rebuild layers.

For step-by-step instructions, choose Help ► Contents, click the Index tab, and look up "rebuilding layers."

Deleting a Layer or Layer Group

You can delete layers and layer groups that you do not want in your map. Note that deleting a layer group deletes all of the layers in the group.

To delete a layer or layer group

- 1 In the Design tab of the Map Explorer, select one or more layers or layer groups to delete.
- 2 Right-click and choose Remove from the popup menu.
A message appears to confirm the deletion.
- 3 Click Yes to delete the selected layer(s) or layer group(s).

Glossary

access key An alphanumeric string used by Autodesk MapGuide Server to determine whether a map layer has permission to gain access to a resource. In the Autodesk MapGuide Server Admin, you can assign one or more access keys to a resource. Then, when a map author sets up a layer to use that resource, the author must type one of the valid access keys in the Map Layer Properties dialog box.

ADL See *Autodesk Data Link file*.

arbitrary XY coordinates Cartesian coordinates that specify points on a particular map, which do not correlate to coordinates on the globe as latitude/longitude do. An arbitrary XY coordinate system is suitable for floor plans or very small sites.

ArcView Shape file (SHP) A data format that includes files created in ESRI ArcView. You can convert these files to latitude/longitude SDFs using the SDF Loader.

attribute data Alphanumeric data that describes the characteristics of map features. Attribute data is maintained in tables and databases, which are linked to map layers in Autodesk MapGuide Author. Examples of attribute data include street names, building addresses, land-use codes, and population counts. Attribute data is used either to label map features, create themes, or generate reports. See also *spatial data*.

attribute table See *database* and *table*.

Autodesk Data Link file (ADL) A file that establishes a connection between Autodesk MapGuide Server and Autodesk DWG files. ADL files are similar to UDL files but have an *.adl* file extension. You can create or modify ADL files using Autodesk MapGuide Server Admin.

Band Interleaved Line (BIL) A format for compressing raster images that consists of an unstructured file and an ASCII metadata HDR file that are combined into one file.

BIL See *Band Interleaved Line*.

bmp A format for compressing raster images that is typically used for icons or images that need to load quickly.

BNA file format A data format that includes files created in ESRI Atlas GIS. You can convert these files to latitude/longitude SDFs using the SDF Loader.

bookmark A saved view position and zoom magnification identified by a URL that you specify. When you use a bookmark, the map is redrawn at the view position and zoom magnification saved in the bookmark.

buffer A polygon that locates its boundaries at a certain distance from a point, line, or other polygon. An example of a buffer is a polygon whose boundaries are 200 feet from the bank of a river.

Cals See *Computer Aided Acquisition and Logistics Support*.

centroid A point designated as the center of a polygon. A centroid is typically computed using information derived from the boundary of the polygon. Computed centroids generally lie within the polygon, but they can also lie outside of the polygon.

CGI See *Common Gateway Interface*.

character spacing ratio The ratio of the distance between text characters to average character width. For example, if the distance between text characters is 3.5 mm, and the character spacing ratio is 0.5, the average character width is 7 mm.

Common Gateway Interface (CGI) An interface that allows server applications to work with Web servers. You can use the CGI version of the Autodesk MapGuide Server MapAgent to work with either Microsoft Internet Information Server or a Netscape Internet Server.

complex symbols A symbol composed of one or multiple bitmaps and one or multiple vector graphics, all of which appear as one symbol in the associated layer.

Computer Aided Acquisition and Logistics Support (CALS) A format for compressing raster images. MapGuide supports CALS MIL-R_28002A Type 1 Format. This format typically works best for black-and-white images that use 1 bit per pixel.

coordinate system Any of a number of reference systems used to define the unique location of a point in space and to reference point, line, and area information by defining its geographic location. A coordinate system is usually defined by a projection, an ellipsoid definition, a datum definition, one or more standard parallels, and a central meridian.

coordinate system origin The reference location for a planar coordinate system that is stored with a map.

Coverage A data format that includes files created in ESRI Arc/Info. You can convert these files to latitude/longitude SDFs using the SDF Loader.

CTRL-click A method of selecting multiple, non-contiguous items in a list by holding down the CTRL key, and then clicking each item you want to select.

database A collection of interrelated alphanumeric data files controlled by a database management system (DBMS). Databases are structured so that the DBMS can perform rapid search and retrieval by various data elements. In Autodesk MapGuide, "database" refers to a relational database that stores attribute data, such as a database of records that contain information like population and area for each country. See also *RDBMS*.

data provider A data provider that can process spatial queries and access spatial data. You can purchase Autodesk MapGuide data providers for Autodesk GIS Design Server, Oracle Spatial, and ArcView SHP.

data source A Microsoft Data Link (UDL) file or Autodesk Data Link (ADL) file, with a *.udl* or *.adl* extension. These files contain all the information required to connect to a specific data provider. Before you can access an external database from within Autodesk MapGuide, you must configure it as an OLE DB or Autodesk DWG data source.

Data Source Name (DSN) An ODBC data source that contains information about how to connect to a particular database, spreadsheet, or other data source. You can set up User DSNs, which are available only when you log on to your computer, and System DSNs, which are available to all users and to NT services on your computer.

datum Information about the interpretation of the Earth on which the coordinate system is based. The datum can include the size and shape of the Earth (such as an ellipsoid or flat map), origin point, orientation, and more. The datum is critical for accuracy, because if a different datum is applied to a coordinate system, the coordinates will fall onto different positions on the Earth.

decimal degrees The mathematical representation of degrees in floating point values. For example, in decimal degrees, 30°30'0" is 30.5°.

degrees° minutes' seconds" The mathematical representation of degrees as minutes and seconds, where one degree equals 60 minutes and one minute equals 60 seconds. For example, in degrees° minutes' seconds", 30.5° is 30°30'0".

DGN file format See *Microstation Design File*.

digitize To convert spatially dispersed information on maps, drawings, or charts into machine-readable digital data that can be processed by computer software. Digitizing captures spatial data as XY coordinates in digital form.

display range The maximum and minimum scale at which Autodesk MapGuide will display a layer. In Autodesk MapGuide Author, you can specify that a layer will display only at certain ranges, or specify multiple display ranges for a layer and specify different attribute styles for each of the display ranges, so that the layer will be drawn differently depending on the current scale at which the map is displayed. By default, Autodesk MapGuide displays the layer regardless of the current scale. See also *map scale*.

display styles A set of properties that define how to display data on the layer. Layers without themes typically have only one display style, which defines how to display all of the data on the layer. Layers with themes typically have multiple display styles: one for each category in the theme. You specify different properties for each display style, such as color, fill style, line width, or point symbol. Display styles are defined for each style set on a layer.

drive alias A name for the location of drawings attached to an Autodesk Map project drawing that replaces the traditional file path. Drive alias information is stored in the Autodesk Map initialization file (*acadmap.ini*). Network users of Autodesk Map typically assign the same drive alias to a network location when they share projects containing attached source drawings. You create the aliases in Autodesk Map or by editing the *acadmap.ini* file. The *acadmap.ini* file is shared by all your Autodesk Map projects.

dynamic layer A layer that gets data from Autodesk MapGuide Server as the user zooms in and out on the map, turns the layer on and off, and so forth. Unlike static layers, which store all of the data for the entire layer in the MWF, dynamic layers download only the data needed for the current view, so the dynamic option is better for layers with large data sets or data that needs to be kept more secure.

ECW See *Enhanced Compression Wavelet*.

ellipsoid An approximation of the Earth's shape that does not account for variations caused by non-uniform density of the Earth.

Enhanced Compression Wavelet (ECW) Supported by ER Mapper, a wavelet-based image compression format with high-quality results at high compression rates.

extents The smallest rectangle that contains all features in a map, that is, the outermost boundaries of the map.

extranet An intranet that is available to authorized users outside of the organization.

DWG layer A single layer within an Autodesk drawing (DWG) file.

DWG map layer A single Autodesk MapGuide map layer that is sourced from an Autodesk DWG or an Autodesk DWG Project File.

feature See *map feature*.

FeatureProperties table A table of Autodesk Map object properties (color, area, and object handle) that are on an Autodesk MapGuide DWG layer.

field A specific class, or column, of information in a database. For example, in a database of demographic information for countries, one field might be “Country Name,” and another might be “Population.”

geocode When used as a noun, refers to the unique key of a map feature (see *key*). As a verb, to geocode means to assign real-world coordinates to spatial features so that they can be displayed consistently and correctly on a map. See also *georeferencing file*.

geographic coordinate system A coordinate system that uses angular coordinates, such as latitude and longitude. This is the default Autodesk MapGuide Author coordinate system.

Geographic Information System (GIS) An organized collection of computer hardware, software, and geographic data designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information.

georeferencing file (TFW) A file that accompanies a raster image file and tells Autodesk MapGuide Server how to scale and translate the raster image onto the current map.

GIS See *Geographic Information System*.

handle A unique numeric identifier for an Autodesk Map object.

hatch A regular pattern used to fill an area with a series of cross-angled lines.

IntelliMouse A pointing device designed by Microsoft that has a wheel control (a rotating wheel that is also a third button). The IntelliMouse provides extended navigational functions in the areas of zooming and panning. It allows you to perform these operations directly from the mouse instead of interacting with navigation controls on the screen.

Internet A global collection of linked, independent networks that use the TCP/IP protocol to function as a single large network. The Internet can be accessed by the public.

Internet Server Application Programming Interface (ISAPI) An interface that allows server applications to work with Microsoft Internet Information Server (Microsoft IIS). If you are using Microsoft IIS as your Web server, you can use either the ISAPI or CGI version of the Autodesk MapGuide Server MapAgent.

intranet A private network that uses Internet technology but cannot be accessed by the public. If an intranet extends access to authorized users outside of the organization, it is called an extranet.

ISAPI See *Internet Server Application Programming Interface*.

island An excluded area within the perimeter of a closed polygon. An island can also be an included area outside such a perimeter. A lake in a parcel and an island in a lake are both examples of islands.

Joint Photographic Experts Group (JPEG) A format for compressing raster images that offers a compression ratio of up to 20:1. Note that some image information is lost when a raw image such as TIFF or BMP is converted to JPEG format.

JPEG See *Joint Photographic Experts Group*.

key An alphanumeric character string or an integer used to uniquely identify a map feature or a record in an attribute table. If a spatial feature in an SDF and a record in an attribute table use the same key, they are linked, so you can select that spatial feature and retrieve the data in that record. This is useful for generating reports because you can select the spatial features you want and then generate a report containing the attribute data for those features only. Keys must be unique; if more than one spatial feature or record uses the same key, the links between the spatial features and the attribute data do not work. Note that for an SDF and for OLE DB providers linked to an SDF, the key must be a string. See also *primary key*.

latitude/longitude system A global coordinate system in which locations are expressed by geographical coordinates (the geodetic latitude and longitude) that depict angular measurements relative to the Earth's ellipsoid. These coordinates are often expressed in decimal degrees or degrees° minutes' seconds". See also *arbitrary XY coordinates*.

layer See *map layer*.

layer group A collection of related map layers. You create layer groups in Autodesk MapGuide Author.

legend A key to or an explanation of the symbols in a map, and their meaning or values. In the View tab of the Autodesk MapGuide Author Map Explorer and in Autodesk MapGuide Viewer, you can use the legend to turn layers on and off so that the map features they contain are no longer visible or selectable.

line A drawing entity with start and end coordinates connected by a single straight line. Lines typically represent the shape of map features too narrow to be displayed as an area at the given scale (contours, street centerlines, or streams), or linear features with no area (county boundary lines).

line spacing ratio The ratio of the distance between lines of text to text character height. For example, if the distance between lines of text is 10 mm, and the line spacing ratio is 0.5, the font height is 20 mm.

linetype A property of a line that defines its appearance. Examples of linetypes include continuous, dashed, and dotted.

linked table or database A table or database linked to a layer using Autodesk MapGuide Author. The records in the table are linked to the spatial features in the layer via common keys.

map An abstract representation of the physical features of a portion of the Earth's surface graphically displayed on a planar surface. Maps display signs, symbols, and spatial relationships among the features. They typically emphasize, generalize, and omit certain features from the display to meet design objectives. For example, railroad features might be included in a transportation map but excluded from a highway map.

map feature Any spatial feature on a map. In the Autodesk MapGuide products, map features can be points, polylines, polygons, or text. Although raster images are technically not map features, you can display them in raster layers.

MapInfo Interchange File (MIF/MID) A data format that includes files created in MapInfo. You can convert these files to latitude/longitude SDFs using the SDF Loader.

map layer A grouping of map features that are stored and displayed together. Individual map layers can be turned on and off to show or hide the features they contain. When all map layers are displayed, they overlap like transparencies and show all features in the map. There can be several types of Autodesk MapGuide map layers, including ones sourced from SDF files, SHP files, DWG files, and so on.

map projection The representation of the Earth, which is curved, on a flat map surface. A map projection defines the units and characteristics of a coordinate system. The three basic types of map projections are azimuthal, conical, and cylindrical.

map scale The ratio between one unit of distance on the map and the real-world distance it represents. For example, if a map is displayed at a scale of 1:200,000, then one centimeter on the map would represent 200,000 centimeters (2,000 meters) in the real world. The larger the second number in the ratio, the larger the area of the world that is displayed (zoomed out), and the smaller the scale; the smaller the second number in the ratio, the smaller the area of the world that is displayed (zoomed in), and the larger the scale. For example, 1:1 is life size and is therefore large scale, whereas 1:200,000,000 is zoomed out to display the whole Earth and is therefore small scale. The fact that a larger second number creates a smaller scale and vice versa can be very confusing. A good phrase to remember is “as large as life” to help you remember that the closer you get to a scale of 1:1 (life size), the larger the scale is.

Map Window File (MWF) Created with Autodesk MapGuide Author, Map Window Files (MWFs) contain the specifications of the map window. These specifications include the boundary of the map, the background color, data source information (SQL databases, Spatial Data Files, and raster image files), layers of cartographic data (such as roads and countries), layer display information (such as styles and display ranges), and map display configuration specifications (such as menus and legends).

Map Window XML file (MWX) Created with Autodesk MapGuide Author, Map Window XML files contain the specifications of the map window in XML format. These specifications are denoted by XML element tags, or XML Nodes, that specify the boundary of the map, the background color, data source information (SQL databases, Spatial Data Files, and raster image files), layers of cartographic data (such as roads and countries), layer display information (such as styles and display ranges), and map display configuration specifications (such as menus and legends).

MapTip The information that is displayed in a yellow popup when the user pauses the mouse pointer over a map feature. See also *ToolTip*.

Microsoft Data Link (UDL) file A file that establishes an OLE DB connection between Autodesk MapGuide Server and a provider, such as the Autodesk Spatial Data Provider for SHP. UDL files have a *.udl* extension and include the type of data to access, the server where the data resides, and the database where the data is stored. You can create or modify UDL files using Autodesk MapGuide Server Admin.

Microstation Design File (DGN) A data format that includes files created in Intergraph/Bentley Microstation. You can convert these files to latitude/longitude SDFs using the SDF Loader.

MIF/MID file format See *MapInfo Interchange File*

MrSID See *Multi-Resolution Seamless Image Database*.

Multi-Resolution Seamless Image Database (MrSID) Supported by LizardTech, Inc., a wavelet-based image compression format designed specifically for GIS to enable true portability of large images. Autodesk MapGuide supports MrSID version 1.6 format *.sid* files.

MWF See *Map Window File*.

MWX See *Map Window XML File*.

Netscape Server Application Programming Interface (NSAPI) An interface that allows server applications to work with Netscape Internet servers, either Netscape FastTrack Server or Netscape Enterprise Server. If you are using one of these Netscape Internet Servers as your Web server, you can use either the NSAPI or CGI version of the Autodesk MapGuide Server MapAgent.

NSAPI See *Netscape Server Application Programming Interface*.

object See *map feature*.

Object Linking and Embedding Database (OLE DB) Provides communication between client applications and a variety of databases.

ODBC See *Open Database Connectivity*.

OLE DB See *Object Linking and Embedding Database*.

Open Database Connectivity (ODBC) A standard API (Application Programming Interface) used to communicate with database management systems, developed by Microsoft.

pan To move the active view up, down, or sideways to display areas in the map that, at the current viewing scale, lie outside the window.

paper boundary A rectangle with a drop shadow that represents the printable area. It is also called the Printable Page.

pattern A property of a fill entity that consists of an artistic or mechanical design. A pattern typically incorporates lines or symbols that are equidistant from each other in the form of a matrix. For example, you could fill a polygon with a hatch pattern.

PNG See *Portable Network Graphic*.

point A zero-dimensional abstraction of a feature represented by a single coordinate. A point normally represents a map feature too small to be displayed as a line or area; for example, the location of a building on a small scale map, or the location of a service cover on a medium scale map.

polygon Also called an area, a polygon is a closed, connected set of lines that reside on the same layer and share the same line style, linetype, and thickness. Because a polygon is a closed area, you can apply fill colors and patterns to it.

polyline A connected set of points, arcs, splines, or vertices that reside on the same layer and share the same line style, linetype, and thickness.

Portable Network Graphic (PNG) A format for compressing raster images that is primarily designed for use on the World Wide Web. PNG enables partial transparency of colors; for example, you can set the transparency of a color to 5%.

primary key A field or combination of fields that uniquely identifies each record in a table. The primary key is used to link the records to map features that share the same primary key. See also *key* and *primary key field*.

primary key field A field or combination of fields that uniquely identify each record in a table. The primary key is used to link the records to map features that share the same primary key. See also *key* and *primary key*.

project drawing file An Autodesk Map DWG drawing file with additional project information including links to a set of attached source drawing, coordinate system information, options, and other settings.

projection See *map projection* and *coordinate system*.

properties The parameters and settings for a map feature or layer. For example, the properties of a line layer include the SDF file containing the lines, the display styles (such as the color and thickness), and more.

Raster Image Catalog (RIC) file A file containing a list of raster image files. Raster Image Catalog files allow a map author to use multiple raster images on the same layer in a map. This is useful if the images are set up to look like a single image (tiled), because you can create one layer with many images, rather than creating a separate layer for each image. Autodesk MapGuide Author allows only one image file or RIC per layer.

raster image file A file containing an image such as a photograph that is stored in a grid of pixels (or cells), unlike SDFs, which store spatial data as vectors (lines). The ability to overlay vector data on raster data is a key feature of Autodesk MapGuide. For example, you can display a raster image file containing a photograph of a particular area, and then overlay a layer of streets and ZIP code boundaries to help identify landmarks in the photograph. Because raster images store a value for every pixel in the grid, rather than storing only the vertices of the lines as SDFs do, raster image files can be quite large and require greater amounts of memory to process.

RDBMS See *Relational Database Management System*.

Relational Database Management System (RDBMS) A database that can include links to other databases, so that when you update the data in one database, the linked database is updated as well. See also *database*.

report An HTML page generated by a script you create using a third-party tool like ColdFusion from Macromedia. The report provides information about the selected map features or a point you specify, depending on the settings you specify in Autodesk MapGuide Author. When a user chooses to view the report, Autodesk MapGuide Server sends the selected map features or specified point to the report script, which then extracts attribute data from a database for those map features or that point, and then displays the HTML page in your Web browser with the results. Examples of reports might be demographic data for the specified layers or the latitude/longitude of the specified point.

resource A file that contains spatial data or attribute data that you can use in a map layer. A resource can be a Spatial Data File (SDF), Raster Image File, Zoom Goto specification, or attribute database.

RIC See *Raster Image Catalog File*.

scale See *map scale*.

scale range See *display range*.

SDF See *Spatial Data File*.

SDP See *Spatial Data Provider*.

select To designate one or more map features as those you want to work on. You can select by clicking with the mouse, dragging an area around a feature, selecting the name of the map features from a list, and more. Selected features are displayed in a different color (specified in Autodesk MapGuide Author).

Select statement See *SQL Select statement*.

server There are three types of servers that are related to Autodesk MapGuide: a Windows NT server, which is a computer with Windows NT installed on it that is configured as a server; Autodesk MapGuide Server, which is an application that runs on the Windows NT server and serves map data to Autodesk MapGuide Author and Autodesk MapGuide Viewer; and a Web server, which works with a Web browser to provide access to the Internet via the World Wide Web and display the maps sent by Autodesk MapGuide Server.

SHIFT-click A method of selecting multiple, contiguous items in a list by clicking the first item you want to select, and then holding down the SHIFT key and clicking the last item you want to select.

SHP See *ArcView Shape file*.

spatial data Data that represents the location of a spatial feature, such as text, points, lines, and polygons. In Autodesk MapGuide, spatial data is contained in spatial data files (SDFs) or spatial data provider (SDP) data sources. Point and text features can also be contained in SQL databases. See also *attribute data* and *raster image file*.

Spatial Data File (SDF) The Autodesk MapGuide native file format for files that contain spatial data, such as roads, cities, and countries.

Spatial Data Provider (SDP) An OLE DB data provider that can process spatial queries and access spatial data.

SQL See *Structured Query Language*.

SQL Select statement A SQL statement that you specify to select records from a database. You use a SQL Select statement when creating a Zoom Goto location in Autodesk MapGuide Author, for example. See also *Structured Query Language*.

static layer A layer that stores all of the data for the entire layer in the MWF. Unlike dynamic layers, which download only the data needed for the current view, static layers download all of the data for the layer when the layer is first accessed, so the static option is better for layers with small data sets and data that does not require high security.

Structured Query Language (SQL) A syntax for defining and manipulating data from a relational database. Developed by IBM in the 1970s, it has become an industry standard for query languages in most relational database management systems. See also *SQL Select statement*.

style set A style set defines how a layer will display at a particular display range. Each layer has at least one style set. To display the layer always the same way, you define the style properties for this one style set only. To display the layer differently at different display ranges, such as adding a theme to the layer when the map is zoomed in far enough, you create additional style sets, and define their style properties.

table A set of data with a horizontal dimension (rows/records) and a vertical dimension (columns/fields). A table has a specified number of columns and any number of rows. Tables are typically stored in relational databases (RDBMS), such as Oracle or Access, but can also be stored in files such as Excel spreadsheets and delimited text files.

Tagged Image File Format (TIFF) A format for compressing raster images that is widely used and supported.

Targa See *TrueVision Targa 2.0*.

template A saved map layer file (*.mlf*) that you can add to any map. Templates save time, as you can open an existing template (map layer file) and simply modify the properties you want to change, rather than creating a new layer and having to set all of its properties.

text A textual description, composed of printable characters, that you define in a map layer. Text entities are often used to label the graphic representations of spatial features.

TFW See *georeferencing file*.

TGA See *TrueVision Targa 2.0*.

theme A set of categories that display the map features with different styles and symbols to depict different values. A theme can have categories for a range of values (such as displaying countries in varying colors between black and white to show heavy and light population) and for individual values (such as displaying highways in red and surface streets in black). Examples of themes might be property assessment, housing quality, population density, and average rainfall.

TIFF See *Tagged Image File Format*.

ToolTip An online Help feature that displays a brief explanation of a toolbar button when you hold the mouse pointer over the button for more than a second. See also *MapTip*.

TrueVision Targa 2.0 (TGA) A format for compressing raster images also referred to as TARGA.

UCS A coordinate system that defines the orientation of the X,Y, and Z axes in three-dimensional space. The UCS determines the default placement of geometry in a drawing.

UDL See *Microsoft Data Link files*.

UNC See *Universal Naming Convention*.

units The unit of measurement used in all areas where a distance is specified or displayed. You can specify that a map use U.S. units or metric units using the Preferences dialog box in Autodesk MapGuide Author or Autodesk MapGuide Viewer.

Universal Naming Convention (UNC) The standard method of specifying the full path name of a file. For example, to specify a file named *ROADS.SDF* in a folder named *SDF* on a computer named *Data* with the share name *CDrive*, you would type `\\Data\CDrive\SDF\ROADS.SDF`. If the computer is mapped to a drive letter, you could use the drive letter in the path, such as `D:\SDF\ROADS.SDF`, but it is safer to use the UNC, just in case, for example, the drive mapping is lost.

vertex One of a set of ordered *XY* coordinates that constitute a map feature.

width ratio The ratio of text character width to text character height. For example, if the font size is 20 mm, and the width ratio is 0.5, the width of a text character is 10 mm.

zoom To change the display magnification so that it focuses on progressively smaller areas (when you zoom in) or larger areas (when you zoom out) of an image.

Zoom Goto category A set of locations you can zoom to. For example, a Zoom Goto category, “Offices,” might allow you to type the name of one of your offices and zoom directly to it on the map.

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