

FDO Data Access Technology – How to add new data sources with Third Party and Open Source FDO Providers

Work seamlessly with your geospatial data whatever the format

Autodesk released MapGuide Open Source and Feature Data Object (FDO) Data Access Technology to the open source community in November 2005 working with key members of the open source geospatial community to establish the Open Source Geospatial Foundation™ (OSGeo™) (<http://www.osgeo.org>). Autodesk is a sustaining sponsor of OSGeo and supports the collaborative development of open geospatial technologies and data.

With the release of new FDO Providers via the FDO Open Source Project (<http://fdo.osgeo.org>), the vision of having a community of developers collaborating and offering new FDO technology is realized. Project developers have contributed code that extends the data access capabilities of applications that utilize FDO Data Access Technology.

This paper describes how data access can be extended for the following software using FDO Data Access Technology and third party or open source FDO Providers.

- AutoCAD® Map 3D
- AutoCAD® Civil 3D®
- AutoCAD® Land Desktop
- Autodesk® Topobase™
- Autodesk MapGuide® Enterprise
- MapGuide Open Source

Note: FDO Providers from sources other than Autodesk are not supported or warranted by Autodesk.

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Terminology

When working with FDO Data Access Technology, it is essential to understand the associated terminology and concepts. The following terms are used throughout this document.

Data Store—In Feature Data Objects (FDO), a collection of feature classes contained in a single storage location. The data store consists of an integrated set of objects, which are modeled by classes or feature classes defined within one or more schemas. Data stores can be either file based, such as SDF, or a database, such as Oracle® Spatial database.

FDO Data Access Technology— Is used for defining, querying, and manipulating geospatial information. FDO Data Access Technology includes the application programming interface (API) and the FDO Providers for several data sources. It enables Autodesk and third-party developers to produce applications that are data store agnostic and that facilitate information exchange. For more information visit www.autodesk.com/fdo.

FDO Provider— An implementation of the FDO API that provides access to data in a particular data store. For example, the FDO Provider for Oracle lets applications work directly with geometry and attributes stored in an Oracle database using standard database concepts.

Feature Source— A collection of related feature classes contained in a single data-storage location. In Autodesk products, an FDO Feature Source is any source of feature data that has been accessed using an FDO Provider. A Feature Source can be a file, such as a SHP or SDF file; a relational database, such as Microsoft® SQL Server™, Oracle, or MySQL®; or middleware, such as ESRI® ArcSDE® software. These feature sources may contain a single feature type, such as a parcel or street centerline, or a complex data model with multiple features and attribute tables.

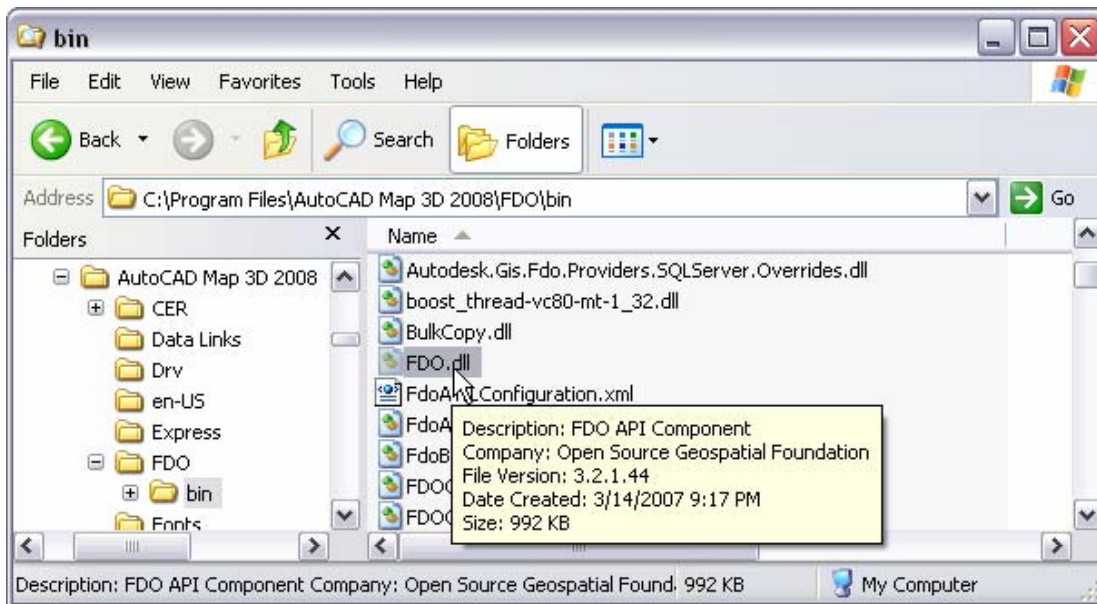
Feature Layer—A layer in the Display Manager in AutoCAD Map 3D software containing features from an FDO Feature Source.

Find and Install new FDO Providers into AutoCAD Map 3D 2008

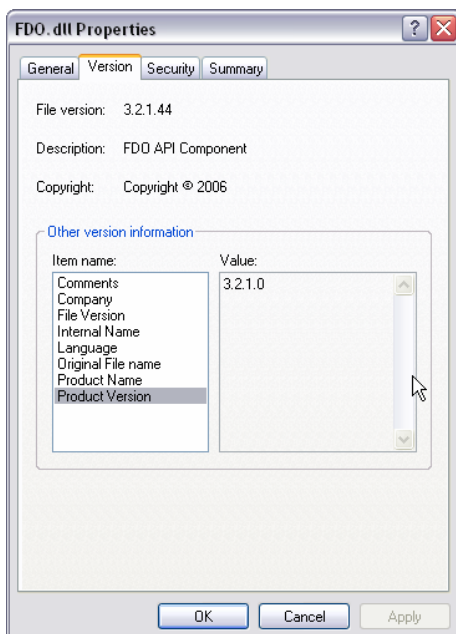
Verify FDO version

Applications using FDO technology may use different builds of FDO. In order to use new FDO Providers, you must ensure that you use a version of the FDO provider that matches the FDO API version that your application uses (e.g., AutoCAD Map 3D 2008 uses FDO build 3.2.1)

1. Navigate to the location of the FDO libraries, e.g. *C:\Program Files\AutoCAD Map 3D 2008\FDO\bin* and select the FDO.dll.



2. To verify the FDO API version, view the file properties. Right click and select Properties. Select the Version Tab and then select Product Version.



Find and Download FDO Providers

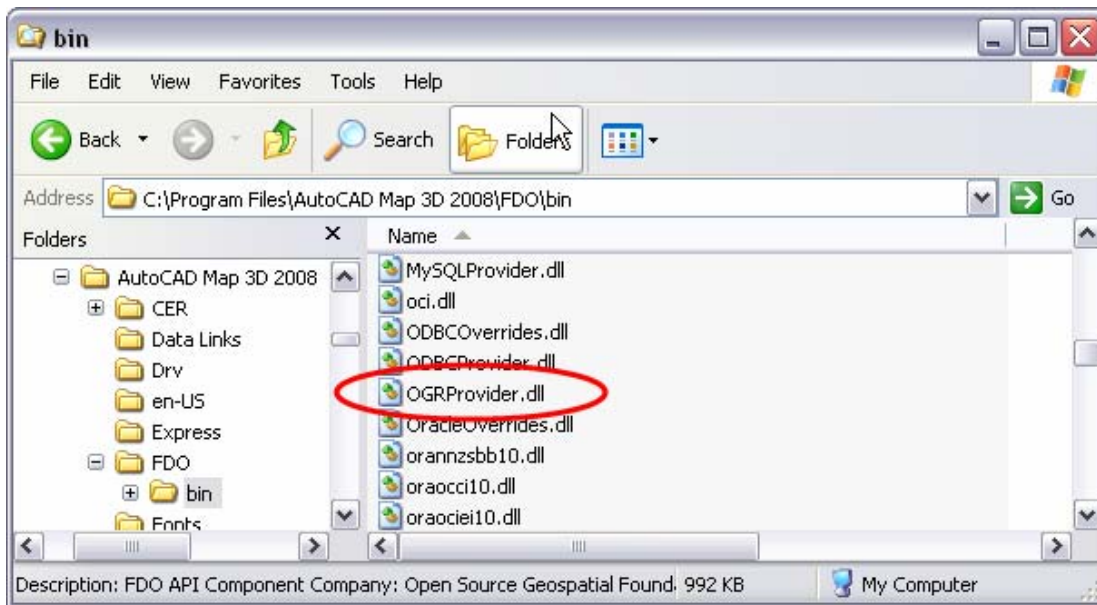
1. Go to www.autodesk.com/fdo to find a list of third-party and open source FDO data provider software developers and download locations.
2. Download the compiled new FDO data provider of your choice and save to your desktop.

Install FDO Provider Files

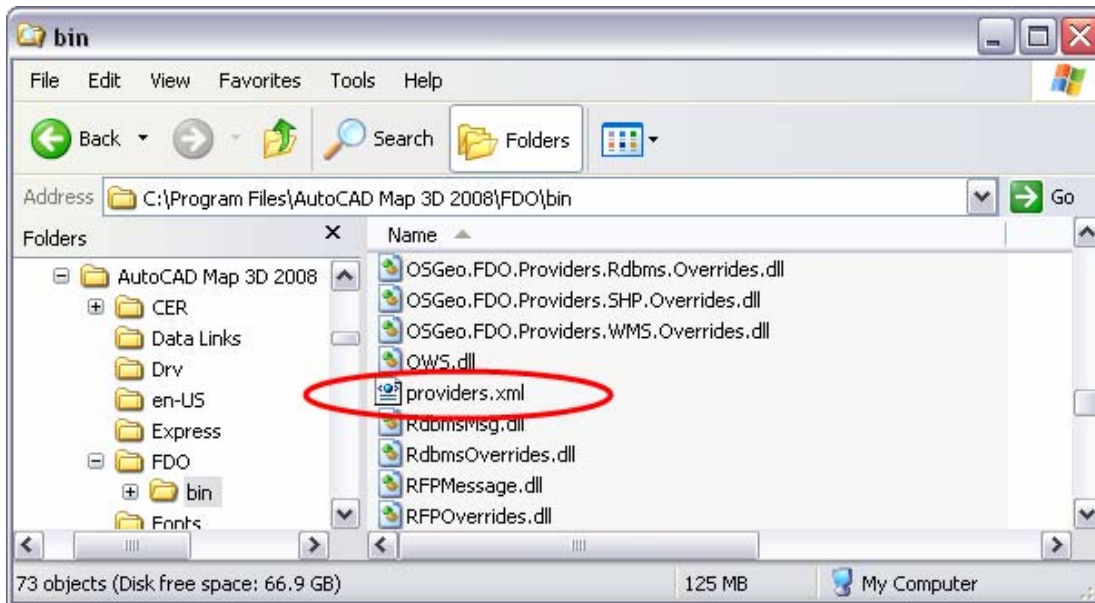
The following set of steps will illustrate how to install a new FDO provider using the OSGeo FDO Provider for OGR as an example. The OSGeo FDO Provider for OGR is available from <http://fdo.osgeo.org/downloads.html>

Note: Some software vendors may include installation software, negating the steps listed below.

1. Navigate to the location of FDO libraries, e.g. *C:\Program Files\AutoCAD Map 3D 2008\FDO\bin* and copy the specific FDO Provider DLL to this directory.



2. Navigate to the FDO libraries location, e.g. *C:\Program Files\AutoCAD Map 3D 2008\FDO\bin* and open the *providers.xml* in a text editor.



3. Within the text editor, add an entry for the new FDO provider and save the changes.

<FeatureProvider>

<Name>OSGeo.OGR.3.2</Name>

<DisplayName>OSGeo FDO Provider for OGR</DisplayName>

<Description>Access to OGR data sources</Description>

<IsManaged>False</IsManaged>

<Version>3.2.1.0</Version>

<FeatureDataObjectsVersion>3.2.1.0</FeatureDataObjectsVersion>

<LibraryPath>OGRProvider.dll</LibraryPath>

</FeatureProvider>

Note: Make sure you match the Feature Data Objects version to the other entries in the providers.xml file.

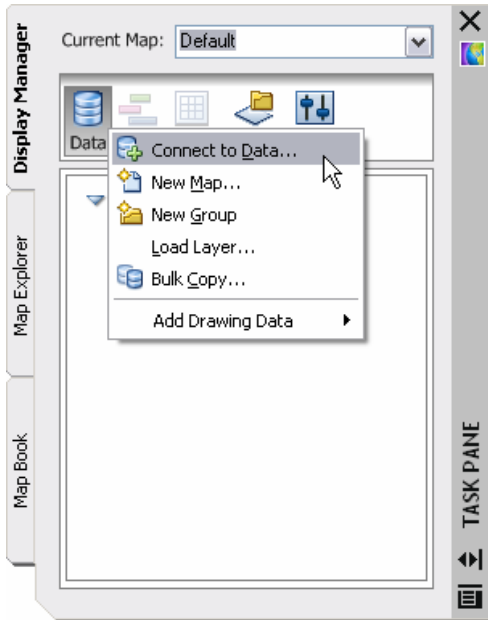
Using the new FDO Provider in AutoCAD Map 3D

AutoCAD Map 3D users can utilize spatial data accessed through FDO Providers in a variety of ways. In many instances, AutoCAD Map 3D users may need to only access and view spatial information for reference purposes when starting a new design project such as a highway or residential development. In other cases, users can aid in the creation and maintenance of spatial information by directly editing and creating new information in the data store accessed through FDO Data Access Technology. In the case of a new infrastructure project, an engineer can design and populate the organization’s spatial data store within the same application (depending upon specific FDO Provider capabilities), streamlining workflow and enabling other users in the organization to instantly use this new information. The following scenario shows how AutoCAD Map 3D software can be used to directly access FDO Data Stores.

Connect AutoCAD Map 3D to Data Store

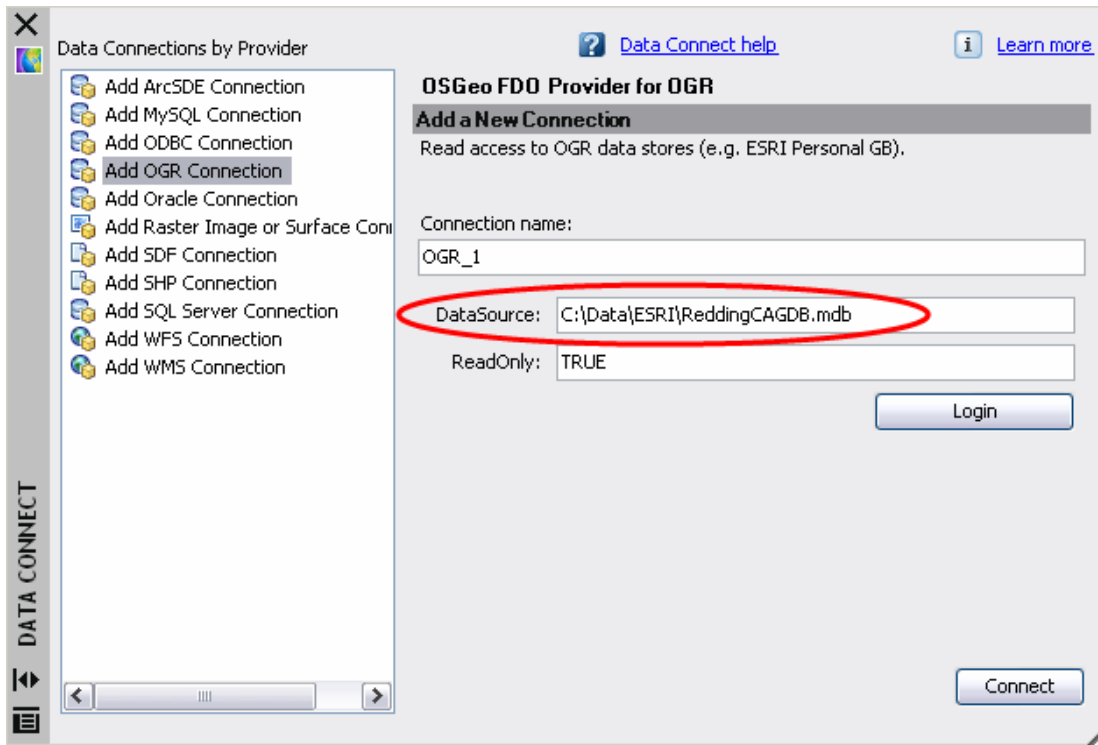
Once you have installed the correct files, the next step is to use AutoCAD Map 3D to connect to an OGR supported Data Store. For more information on OGR refer to <http://www.gdal.org/ogr>

1. Start AutoCAD Map 3D 2008, and open the drawing you want to use with the OGR FDO provider.
2. If you haven't already, assign a coordinate system to the drawing (See AutoCAD Map 3D Help for details).
3. In Display Manager, click Data and then select Connect to Data.



4. In the Data Connect dialog box, under Data Connections by Provider choose Add OGR Connection. AutoCAD Map 3D 2008 enables connection and data access to data stores supported by new FDO Providers through the use of a generic graphic user interface. Specify the Connection name and DataSource (the OGR connection string). The example below shows connection to an ESRI personal geodatabase (.mdb). For other file-based data stores the connection string will be similar.

Note: Some developers of FDO Provider software may implement a separate graphic user interface. For more information on OGR connection strings, refer to the OGR documentation at http://gdal.osgeo.org/ogr/ogr_formats.html.



5. For secured Data Stores, click the Login button and provide security credentials.
6. Click the Connect button. If the connection is successful, you see a list of feature classes.

Note: Read and display of coordinate system information depends on the specific FDO provider capabilities.

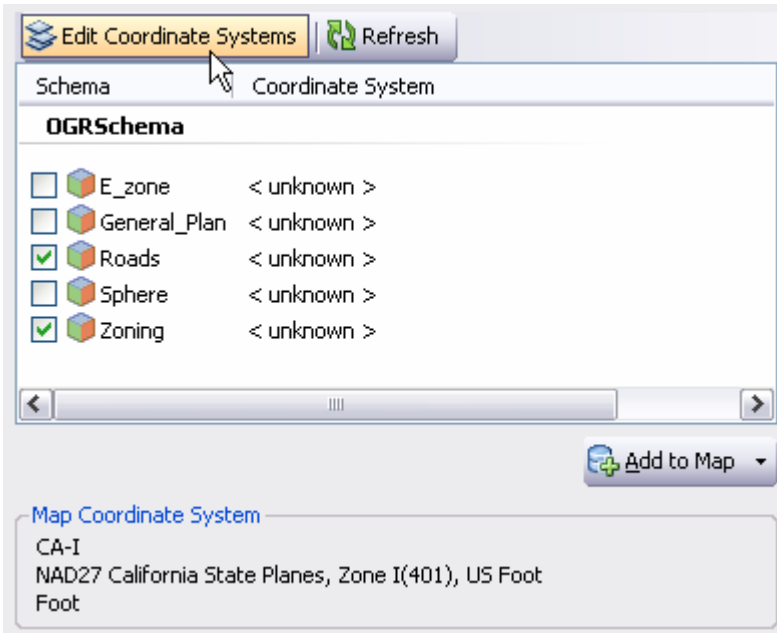
Schema	Coordinate System
OGRSchema	
<input type="checkbox"/> E_zone	< unknown >
<input type="checkbox"/> General_Plan	< unknown >
<input type="checkbox"/> Roads	< unknown >
<input type="checkbox"/> Sphere	< unknown >
<input type="checkbox"/> Zoning	< unknown >

Note: To save connection information for future projects, save the DWG™ file as a drawing template file (DWT).

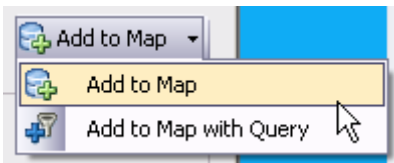
Query Data in AutoCAD Map 3D

Once you have connected to the data store of choice, you can query data directly in AutoCAD Map 3D.

1. In the Data Connect dialog box, specify coordinate system override parameters (if applicable).



2. Select the feature classes that you want to bring into the drawing project. Click Add to Map. You can also add query conditions to filter data based on location, properties, and/or custom SQL where clauses by selecting Add to Map with Query.



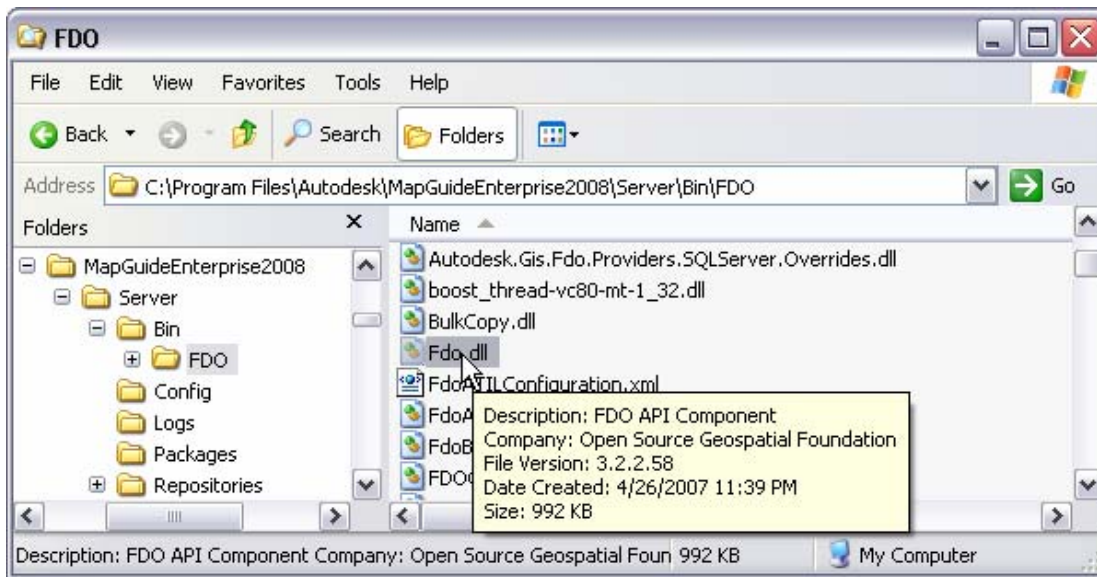
When you query data from an external data store into AutoCAD Map 3D, the feature class or classes you queried are displayed in the Display Manager. AutoCAD Map 3D also assigns a default stylization to the features. To change the stylization of a feature class, use the Display Manager tools. For full details and instructions refer to the AutoCAD Map 3D Help.

Find and Install new FDO Providers into Autodesk MapGuide Enterprise and MapGuide Open Source

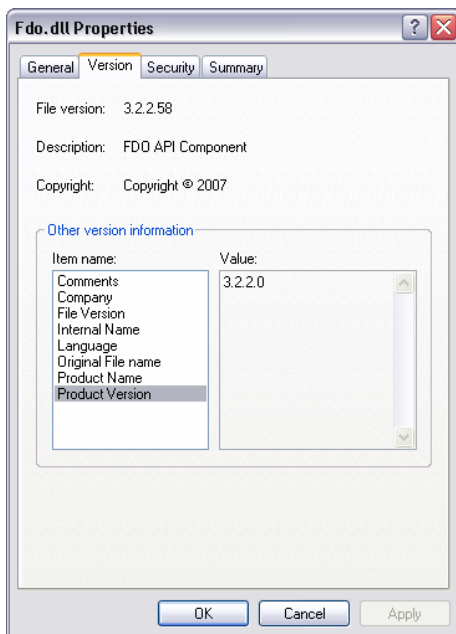
Verify FDO version

Applications using FDO technology may use different builds of FDO. In order to use new FDO Providers, you must ensure that you use a version of the FDO provider that matches the FDO API version that your application uses. (E.g., Autodesk MapGuide Enterprise 2008 uses FDO build 3.2.2)

1. Navigate to the location of the FDO libraries, e.g. *C:\Program Files\Autodesk\MapGuideEnterprise2008\Server\Bin\FDO* and select the FDO.dll.



2. To verify the FDO API version, view the file properties. Right click and select Properties. Select the Version Tab and then select Product Version.



Find and Download FDO Providers

1. Go to www.autodesk.com/fdo to find a list of third-party and open-source FDO data provider software developers and download locations.
2. Download the compiled new FDO data provider of your choice and save to your desktop.

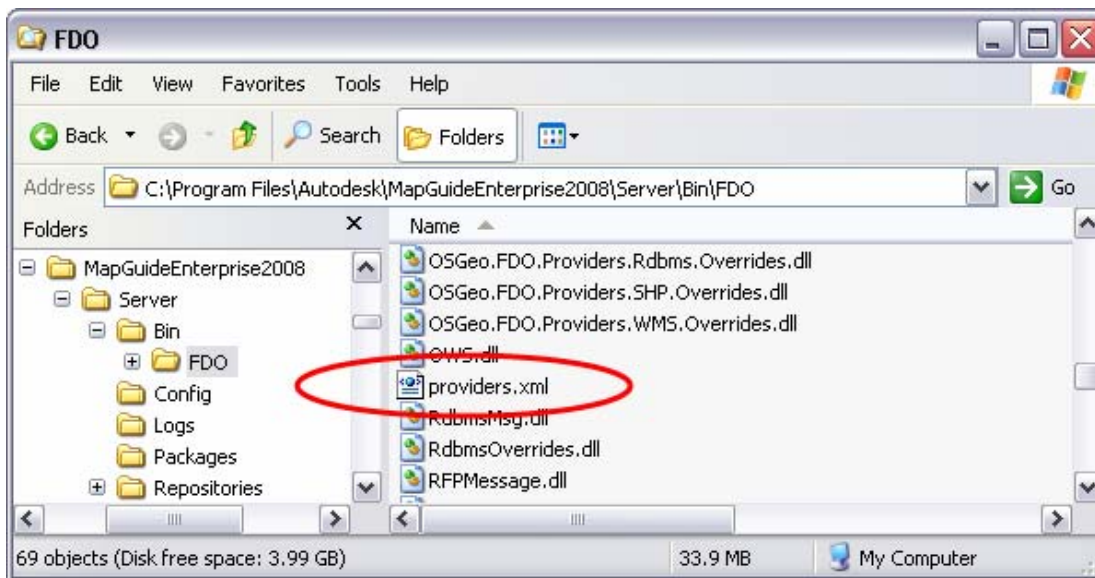
Install FDO Provider Files

The following set of steps will illustrate how to install a new FDO provider using the OSGeo FDO Provider for OGR.

1. Navigate to the location of FDO libraries and copy the specific FDO Provider DLL to this directory.
 - On Microsoft® Windows® it would be in the \FDO subdirectory of where your MapGuide Server component is installed, e.g. *C:\Program Files\MapGuideOpenSource\Server\Bin\FDO* or *C:\Program Files\Autodesk\MapGuideEnterprise2008\Server\Bin\FDO*
 - On the Linux® operating system, this is */usr/local/fdo-3.x.x/lib*.



2. Navigate to the FDO libraries location, e.g., *C:\Program Files\Autodesk\MapGuideEnterprise2008\Server\Bin\FDO* and open the *providers.xml* in a text editor.



3. Within the text editor, add an entry for the new FDO Provider and save the changes.

<FeatureProvider>

<Name>OSGeo.OGR.3.2</Name>

<DisplayName>OSGeo FDO Provider for OGR</DisplayName>

<Description>Access to OGR data sources</Description>

<IsManaged>False</IsManaged>

<Version>3.2.2.0</Version>

<FeatureDataObjectsVersion>3.2.2.0</FeatureDataObjectsVersion>

<LibraryPath>OGRProvider.dll</LibraryPath>

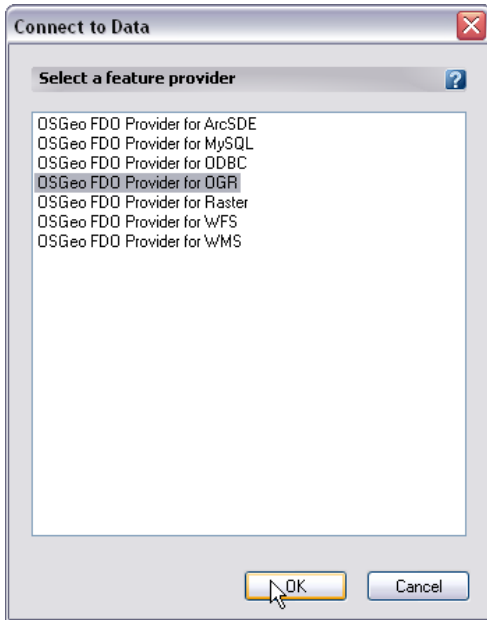
</FeatureProvider>

Note: Make sure you match the Feature Data Objects version to whatever the other entries in the provider.xml are using.

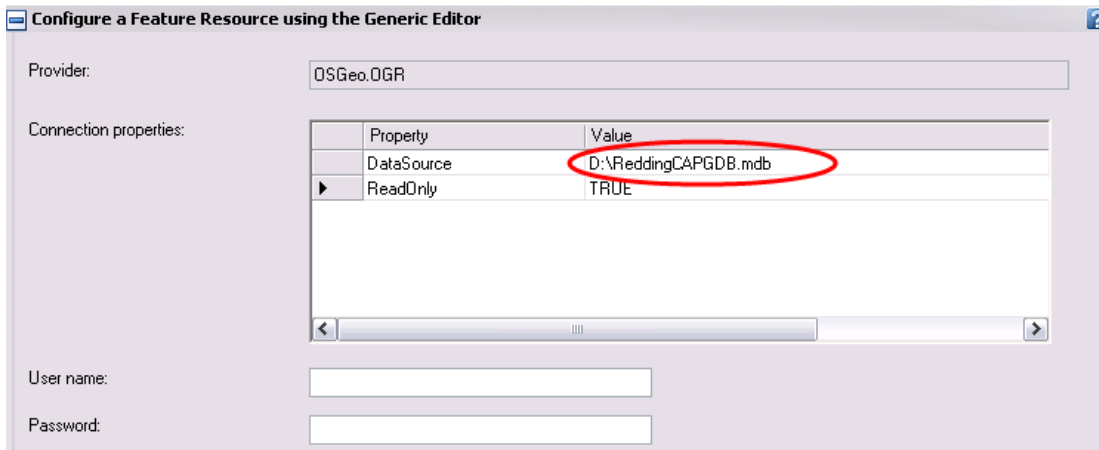
Using the new FDO Provider in Autodesk MapGuide Studio

Once you have installed the correct files, the next step is to use Autodesk MapGuide Studio software to connect to an OGR supported data store.

1. In Autodesk MapGuide Studio, configure a new Data Connection by selecting File >New>Data Connection.
2. In the Connect to Data dialog box, select the third party FDO Provider, e.g., OGR and click OK.

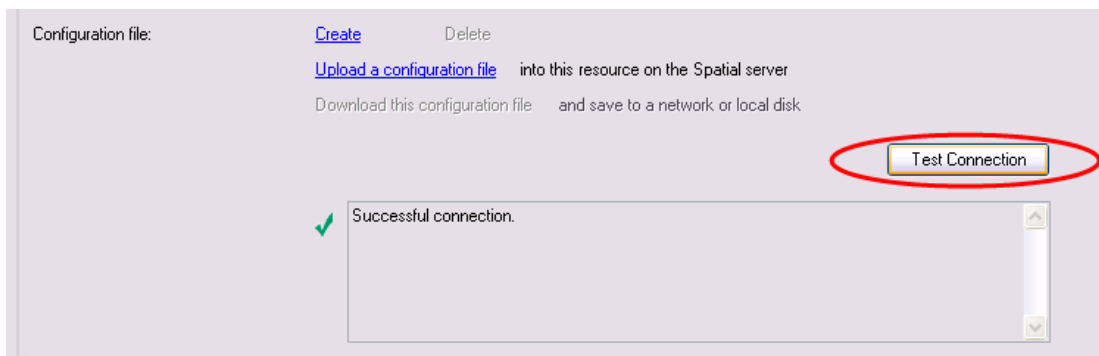


3. Specify the DataSource. The example below shows connection to an ESRI personal geodatabase (.mdb). For other file-based data stores the connection string will be similar.

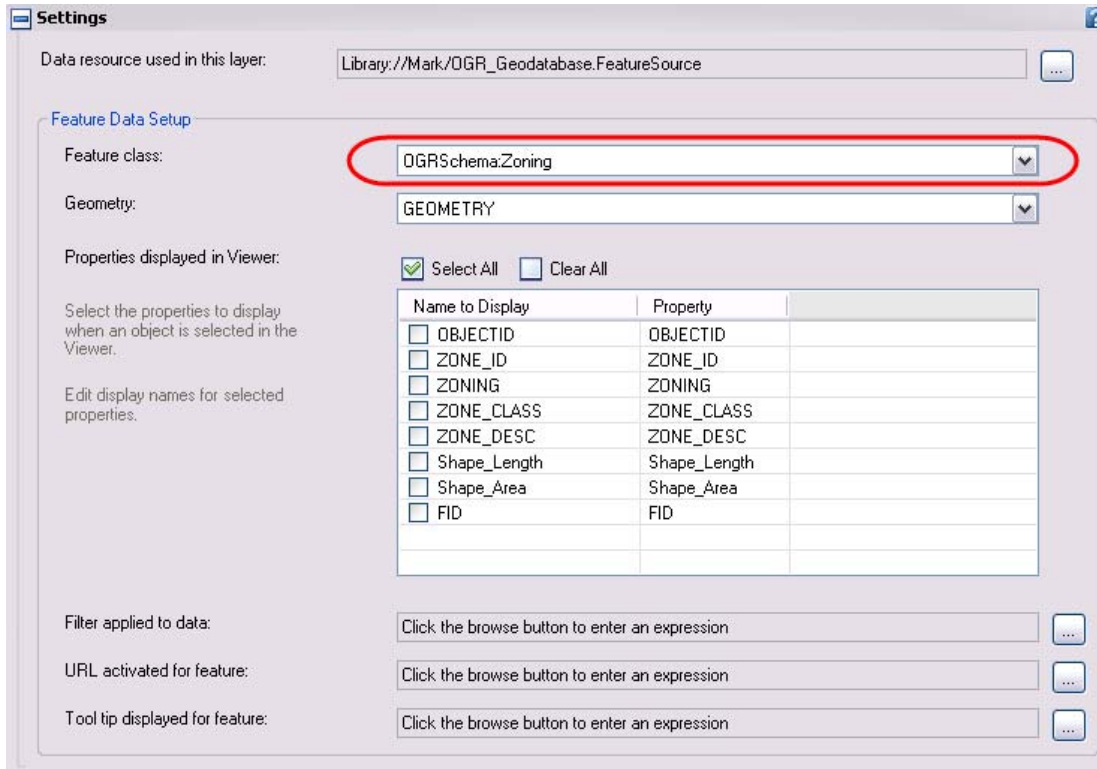


Note: For FDO Providers that support read/write capabilities, the map author will have to set the ReadOnly option based on the intended application usage.

4. Click the Test Connection. You should see a Successful connection message.



5. On the Autodesk MapGuide Studio toolbar, click Save to store this connection resource in the repository.
6. Your next step is to create a Layer in Autodesk MapGuide Studio using the resource you configured above. After determining the feature class you want to use for the layer, you need to define layer criteria such as properties, filters, layer stylization, and scales ranges.



7. After creating a layer in Autodesk MapGuide Studio you can incorporate this layer into new or existing maps. For full details and instructions, refer to the Autodesk MapGuide Studio Help.

Working with the OSGeo FDO Provider for OGR

When working with the OSGeo FDO Provider for OGR, you must follow specific parameters as well as understand some limitations.

Features, Schema and Feature Classes—At the time this paper was first published, the latest posted release of the OSGeo FDO Provider for OGR (Build version 3.2.1 - February 22, 2007) does not support creation of new features, schemas or feature classes.

Platforms—Microsoft Windows and Linux

Data Format Support—At the time of publishing, the OSGeo FDO Provider for OGR supports read and write access and had been tested with ESRI SHP files, ESRI personal geodatabase (.mdb), MapInfo files (.TAB) and Oracle Spatial.

Data Format Capabilities— A full list of OGR supported data stores and capabilities can be found at http://gdal.osgeo.org/ogr/ogr_formats.html

Documentation—In-depth documentation on FDO Data Access Technology can be found in the *Autodesk FDO Developer's Guide* available in the Autodesk Developer Center at www.autodesk.com/developer.

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