ODM Streaming Data Loader
Version 1.0

An application for loading streaming sensor data into the CUAHSI Hydrologic Information System Observations Data Model

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Distribution

The ODM Streaming Data Loader application and all associated source code and documentation are available at the following URL:
http://water.usu.edu/cuahsi/ODM/

The ODM Streaming Data Loader software, source code, and documentation are provide free of charge under the Berkely Software Distribution (BSD) license. Please see the following license information:

Disclaimers

Although much effort has been expended in the development and testing of the ODM Streaming Data Loader application, errors and inadequacies may still occur. Users must make the final evaluation as to the usefulness of the ODM Streaming Data Loader for their application.

The ODM Streaming Data Loader application and this software manual are based upon work supported by the National Science Foundation under Grants No. 03-26064, and 06-10075. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

Acknowledgements

The team of engineers and software developers that developed the ODM Streaming Data Loader application includes:

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Technical Support

There is no formal ongoing support for this freely distributed open source software. However, we are interested in feedback. If you find errors, have suggestions, or are interested in any later versions, please contact:

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1.0 Introduction and Software Description

The CUAHSI Hydrologic Information System (HIS) Project is developing information technology infrastructure to support hydrologic science. One of the components of the HIS is a point Observations Data Model (ODM) (Tarboton et al., 2007), which is a relational database schema that was designed for storing time series data. The purpose of the ODM is to provide a framework for optimizing data storage and retrieval for integrated analysis of information collected by multiple investigators. The CUAHSI HIS ODM has been implemented by a number of local work groups throughout the country, and these work groups are using the ODM as a mechanism for publication of individual investigator data, which includes streaming sensor data, and for registering these data with the National HIS.

Under this premise, the ODM Streaming Data Loader (SDL) application was created to allow administrators of local instances of the ODM to automate the process of loading their streaming sensor data from text files generated by their monitoring and telemetry system into an instance of the ODM. The development of the ODM SDL application has several advantages. First, ODM SDL protects the security and consistency of a work group HIS ODM database because it provides users with a set of automated tools for loading their streaming data into ODM. This minimizes the potential for human caused errors in loading these data into an ODM database. The ODM SDL provides simple visual tools for mapping streaming data files to the ODM schema and for specifying all of the required metadata, which means that users do not need to perform any specialized programming to parse and load the data and that the data are fully qualified with valid metadata when they are loaded. Finally, the ODM SDL application can be scheduled as a Windows task to run on a user customized schedule. This means that loading of sensor data with multiple reporting frequencies can be run automatically and optimized according to a user defined schedule.

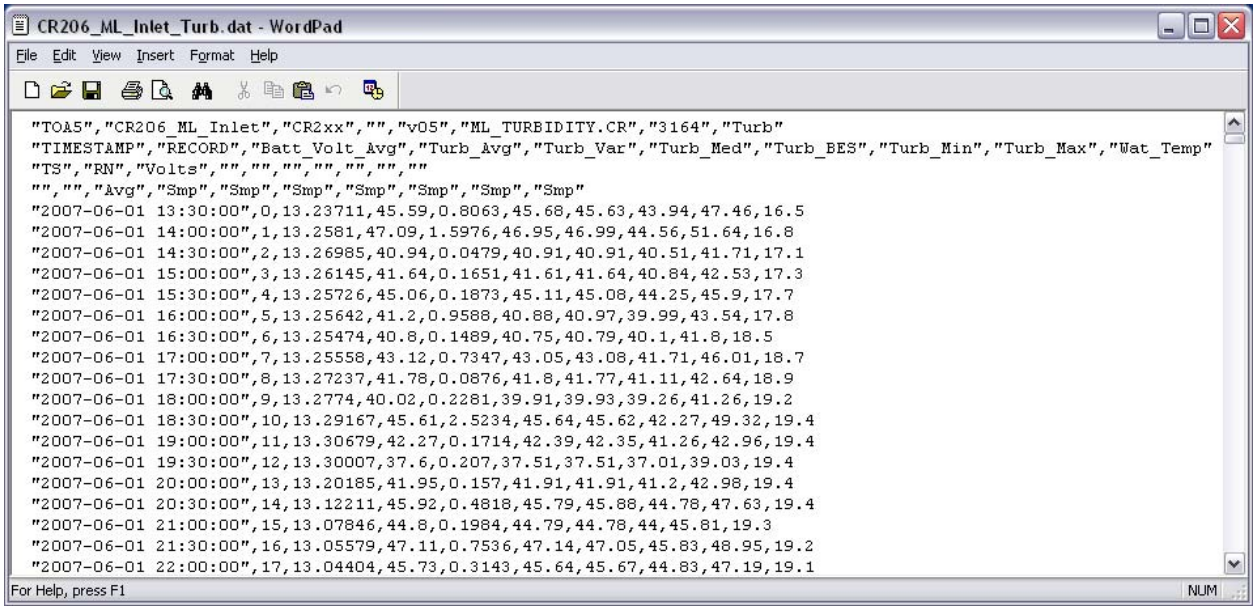
1.1 General Functionality

The main objective of the ODM SDL application is to provide managers of work group instances of the ODM with a set of tools for automating the process of loading their streaming sensor data into and ODM database. The ODM SDL is implemented as two separate executable programs. The first is the ODM SDL Configuration Wizard, which allows users to create and save the mapping of their sensor data file and all associated metadata to the ODM schema. The second executable is the ODM SDL Data Loader. It has no user interface and was designed to be run automatically as a Windows scheduled task. It reads the configuration file generated by the Configuration Wizard, parses the streaming data file, and loads the data into the ODM database according to the settings in the configuration file. The Data Loader executable can be scheduled to run automatically on any user defined interval using the Windows task scheduler (so that new data are loaded into the ODM database automatically as they are received), or it can be run manually through the Configuration Wizard.

1.2 Supported Streaming Data File Formats

The ODM SDL was designed to automatically load data from streaming data files. It currently supports table based, delimited text files, where the date and time of each observation are stored in one column and the observed values are stored in subsequent columns (one column for each

variable) delimited by commas. The following is an example of a streaming data file produced by Campbell Scientific's LoggerNet software. Input files do not have to be generated by dataloggers. Any file that contains a time series of data values for one or more variables that is formatted as described above can be loaded using the ODM SDL.



1.2 Platform and Minimum System Requirements

The ODM SDL was designed to run on Microsoft Windows XP or Windows 2003 Server based computers. It is recommended that machines running the ODM Tools software have at least 100 MB of free disk space and 1 gigabyte of RAM. In addition, computers running the ODM SDL application must have the Microsoft .Net Framework Version 2.0 installed prior to installing the ODM SDL. Instructions for obtaining the .Net Framework Version 2.0 from Microsoft are included in the Installation Instructions section below.

The ODM SDL is a client application. It must be connected to an instance of the CUAHSI HIS ODM Version 1.0 that has been implemented in Microsoft SQL Server 2005. The SQL Server database can be located on the same machine as the ODM SDL application, or the ODM SDL has the capability to connect to a remote ODM database provided that the database server name and ODM database name are known and the user has been given access to, and SQL Server authentication information for, that server and database.

2.0 Installation Information

2.1 Installation Prerequisites

Prior to running the ODM SDL installation, you must first install the Microsoft .Net Framework Version 2.0 (if it is not installed already). The .Net Framework Version 2.0 is free, and is required to run software applications developed in Microsoft's Visual Studio .Net 2005. Instructions for downloading and installing the .Net Framework Version 2.0 can be obtained from the Microsoft website via the following URL:

http://www.microsoft.com/downloads/details.aspx?FamilyID=0856eacb-4362-4b0d-8edd-aab15c5e04f5&displaylang=en

Once the .Net Framework Version 2.0 has been installed, you can continue with the ODM SDL installation.

NOTE: ODM SDL requires that you have an ODM database implemented in Microsoft SQL Server 2005. If you do not already have an instance of Microsoft SQL Server running, you can download and install Microsoft SQL Server 2005 Express from Microsoft for free. It is recommended that you download and install both SQL Server 2005 Express and SQL Server Management Studio Express. You can get these products and instructions for installing them at the following Microsoft URL:

http://www.microsoft.com/sql/editions/express/default.mspx

Directions for attaching a blank ODM database to your instance of Microsoft SQL Server 2005 are included in Appendix A of this document.

2.2 Installing the ODM SDL Application

Install the ODM SDL using the following steps:

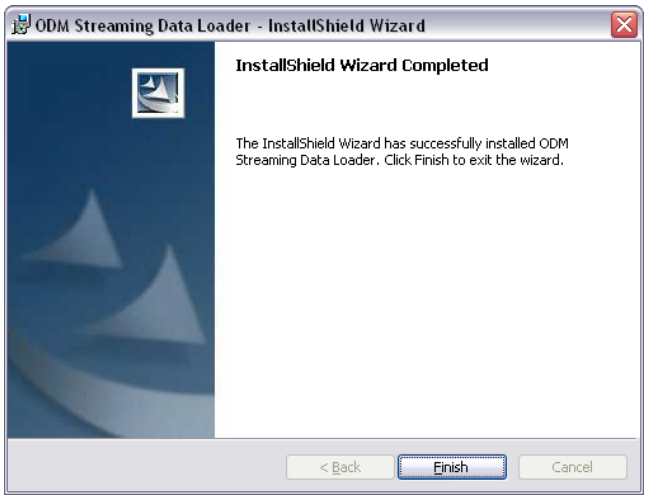
1. First, ensure that you have installed the Microsoft .Net Framework Version 2.0. See the previous section if you have not done so.

2. Double click on the setup.exe installation file. This will begin the installation of the ODM SDL application. After a few moments, the following window will appear:

3. Click the "Next" button to continue with the ODM Tools installation. You will see the following window.

4. Read the license and then click on the radio button next to "I accept the terms in the license agreement" to accept the license. Click the "Next" button. The following window will appear for a few moments.

5. When the installation is complete, you will see the following window. Click the "Finish" button to complete the ODM SDL installation. You will notice that two shortcuts have been added to your desktop, one for the Configuration Wizard, and one for the Data Loader. These shortcuts can also be found under the CUAHSI HIS group in the Windows Start menu.

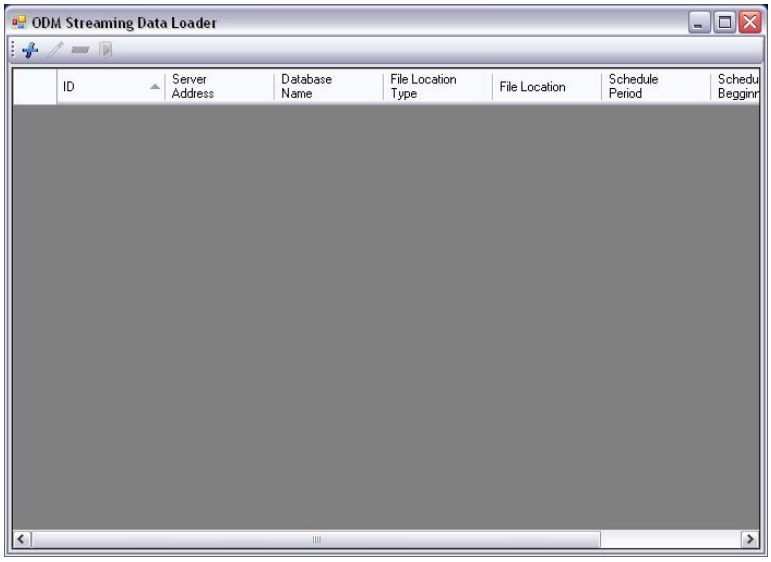


3.0 Mapping a Streaming Data File to an ODM Database

NOTE: The steps in this section assume that you already have an ODM database set up and running within an instance of Microsoft SQL Server 2005. If you do not have SQL Server 2005 or a working ODM database, please consult the information in the Installation Prerequisites section above and in the appendices of this document for information on how to remedy this situation.

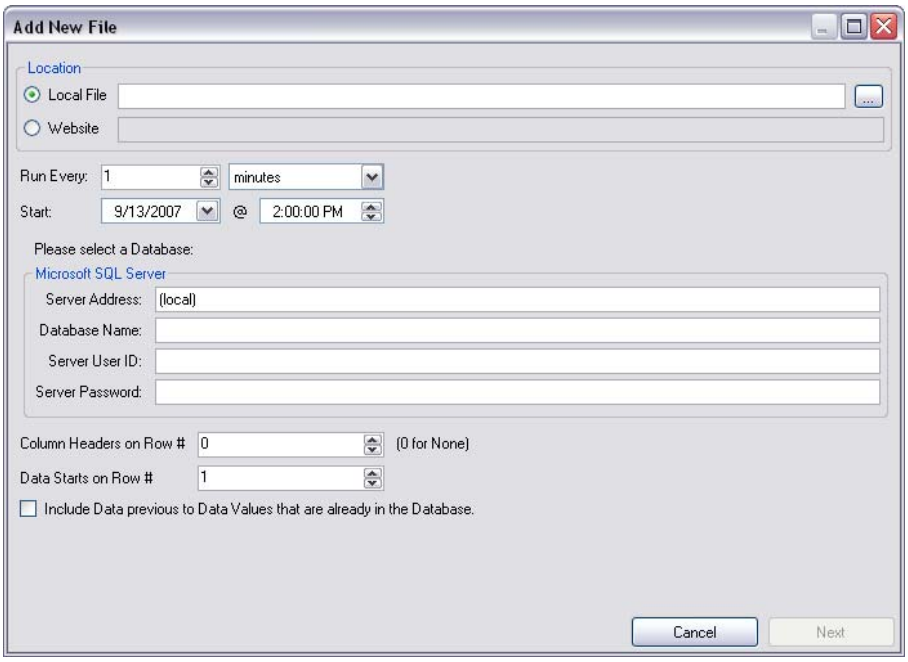
The first step in loading streaming data is to map the streaming data file to your ODM database using the ODM SDL Configuration Wizard. Use the following steps to map a streaming data file to your ODM database.

1. Open the Configuration Wizard by double clicking on the shortcut on your desktop (Setup ODM SDL) or by selecting "ODM SDL Config Wizard" from the Windows Start Menu (Start – All Programs – CUAHSI HIS – ODM SDL Config Wizard). The following window will appear.



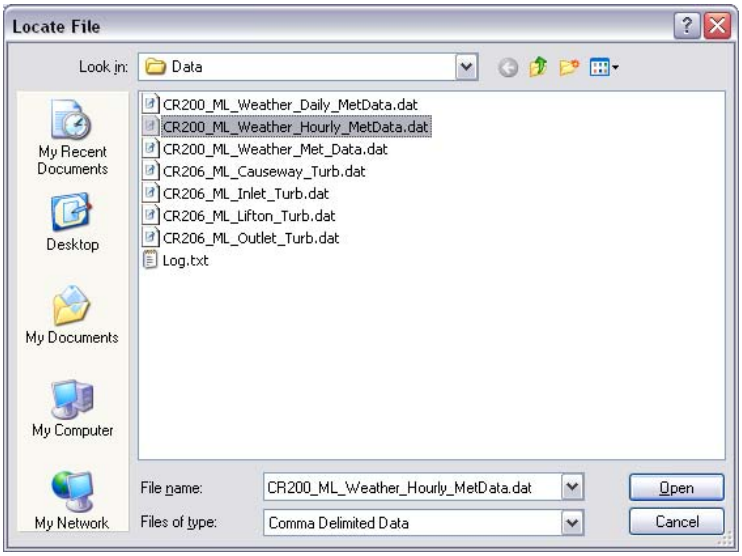
   This is the main window of the Configuration Wizard. The table view on this form will list all of the streaming data files (i.e., the text files containing time series of data for one or more variable) that you have mapped to your ODM database. You will notice that the window is currently blank since no streaming data files have been mapped to your ODM database.

2. To map a sensor data file, click on the "Add" button  at the top of the form. The following window will appear.



On this form you can specify the location of the file that you are loading data from, information about the server and database that you are loading data to, and information about the format of the file that you are loading.

3. First, specify the location of the text file that contains your sensor data. You can load data from local text files (i.e., files on your machines hard drive, OR files that are accessible via file sharing over a local intranet) or remote text files (i.e., files that are available via a website using either HTTP or FTP protocols). In this example, we will use a local file. Click on the browse button next to the Local File input text box  . This will open the standard Windows "Locate file" dialog.

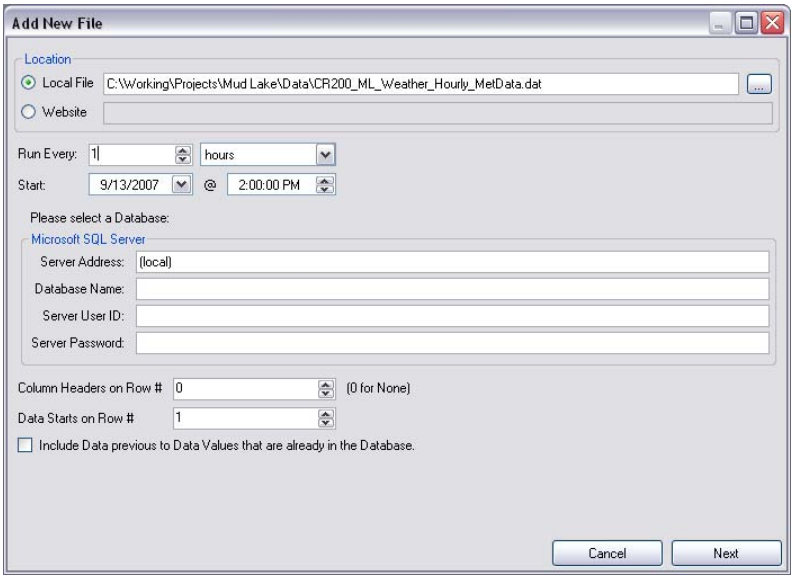


Navigate to the location of your streaming data file, select it, and then click on "Open." You will notice that the "Local File" input text box is now populated with the path to your streaming data file.

NOTE: In the case that your monitoring and telemetry system creates a new streaming data file for each datalogger each time data is downloaded, you can connect to multiple local files containing data from the same datalogger by using wildcard characters (i.e., entering 'C:\StreamingData\ThisSite*.dat' will use all files within the C:\StreamingData folder that begin with 'ThisSite' and have a '.dat' extension. All of these files must be formatted exactly the same. The ODM SDL will scan each file each time the update is run for new data to load into the database.

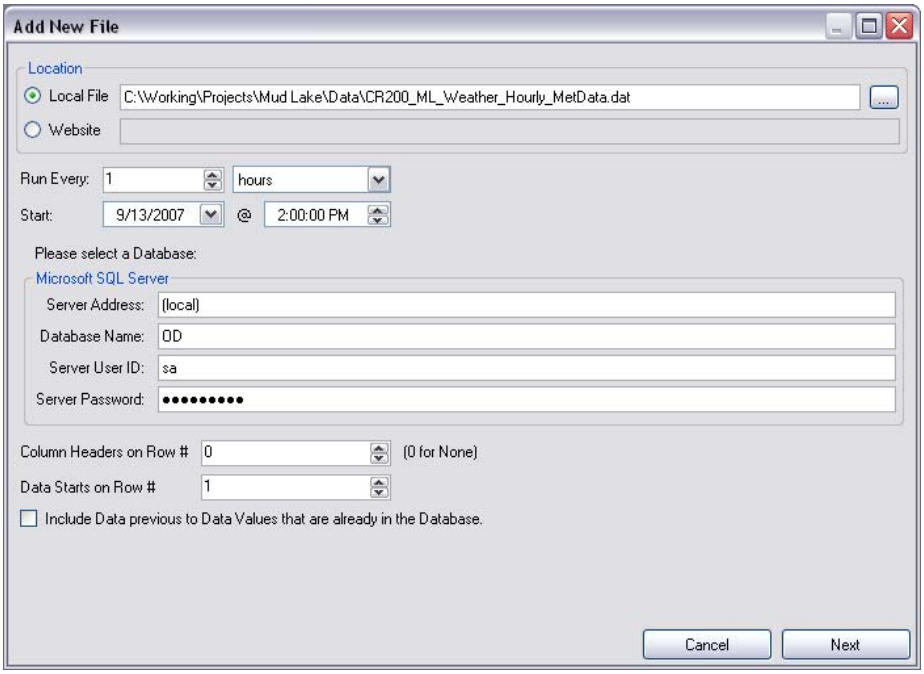
4. Next, you need to select an interval on which the update will be run. The interval that you input here will control how frequently the data from this file will be loaded to the database. This interval should be set so that it is consistent with the schedule under which data are being added to the text file. For example, if new data are being written to the streaming data text file once per day, you should select 1 day as the interval on which the update will be run. It does not make any sense to run the update any more frequently than this because there will be no new data in the file to load into the database. You should also carefully select a start time for the update to be run that is consistent with your data collection schedule. For example, if new data are written to the streaming data text file daily at midnight by your monitoring and telemetry system, you may choose to start the update at 1:00 AM to ensure that the newest data get written to the streaming data text file before you try to load them into the ODM database.

   For this example, we are using a streaming data text file to which data are being added hourly. Given this, we will choose to run the update every 1 hour, and we will leave the start time alone. This means that the Data Loader application will try to open the file and parse new data into the database every hour starting on 9/13/2007 at 2:00 PM. See the following figure.



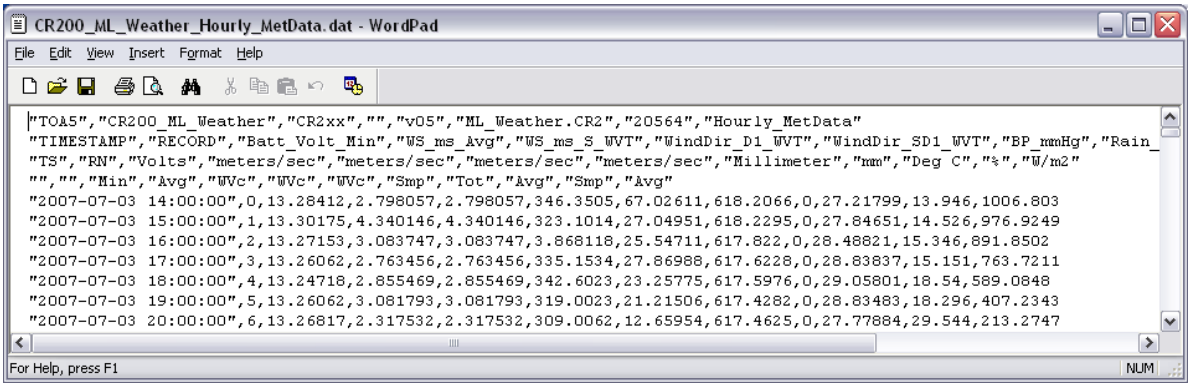
NOTE: The interval that you set here is independent of and overrides the frequency with which you schedule the Data Loader application to run using the Windows Task Scheduler. For example, if you choose 1 day as the frequency on the "Add New File" form but schedule the Data Loader to run every hour using the Windows Task Scheduler the database will still only be updated once per day.

5. The next step is to specify the connection information for your ODM SQL Server database. In the boxes provided, you should enter your server address, the name of the database to which you are loading data, and the username and password for your SQL Server authentication account. See the following figure for an example.



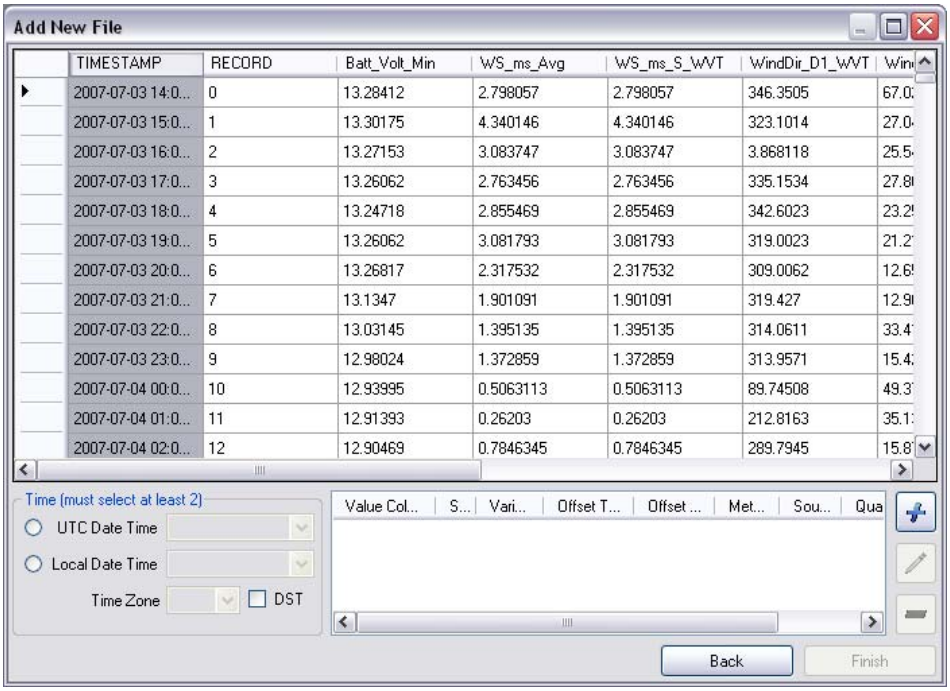
NOTE: In this example, we are connecting to a database called "OD" on the local instance of SQL Server using the "sa" account. You can connect to your ODM database using any SQL Server account, but you must have permission to read and write to the database.

6. The final step on this form is to specify a bit of information about the text file that we are loading data from. First, we need to enter the number of the row in the text file that has the column headers (if they exist) and the number of the row on which the data start. For our example file, the column headers are on the second row and the data starts on row 5 (see below).



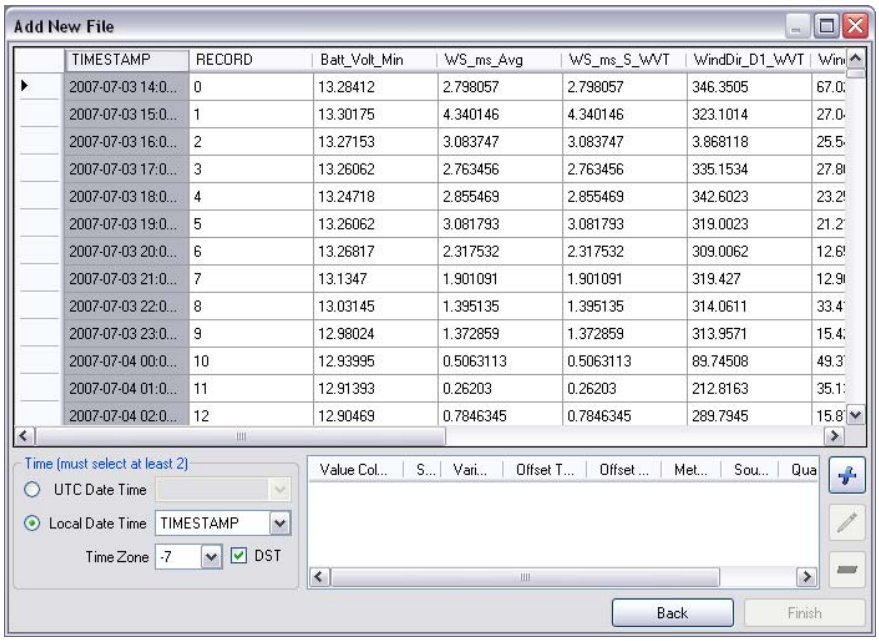
NOTE: If your file does not have column headers, you should enter 0 in the column headers box. You can still load your data, but you must know which variables are in which columns.

7. The last option on the form allows you to specify whether you want to check the text file for data that are older than those in the database as well as those that are newer than those in the database. If this box is checked, data that precede those that are in the database will be added. For this example, our database is empty so all of the data in the file will be loaded. We will leave this box unchecked. This completes the input on this form. When you click on "Next," the following form will appear.

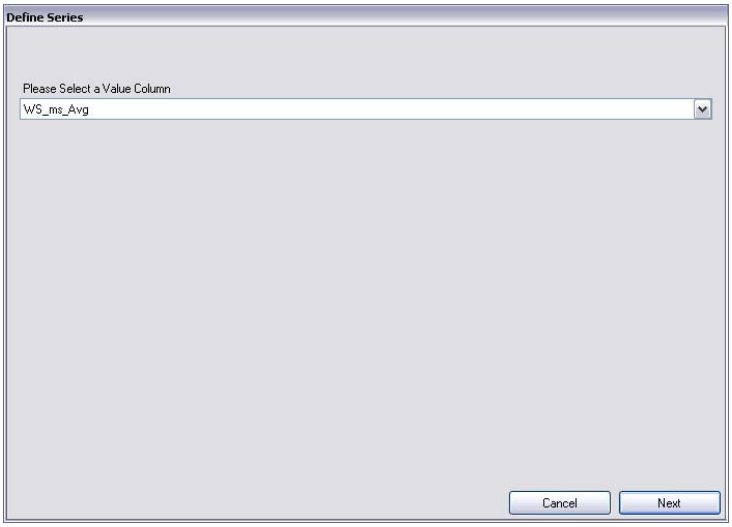


8. The Configuration Wizard has now read the streaming data text file and is displaying it in the table at the top of the form. On this form, we must first specify the column that holds the date and time information (see the options at the lower left on the form). The ODM SDL is capable of handing dates and times in either UTC or as local dates and times. You must check one of these options. In our example, the datalogger is being run on

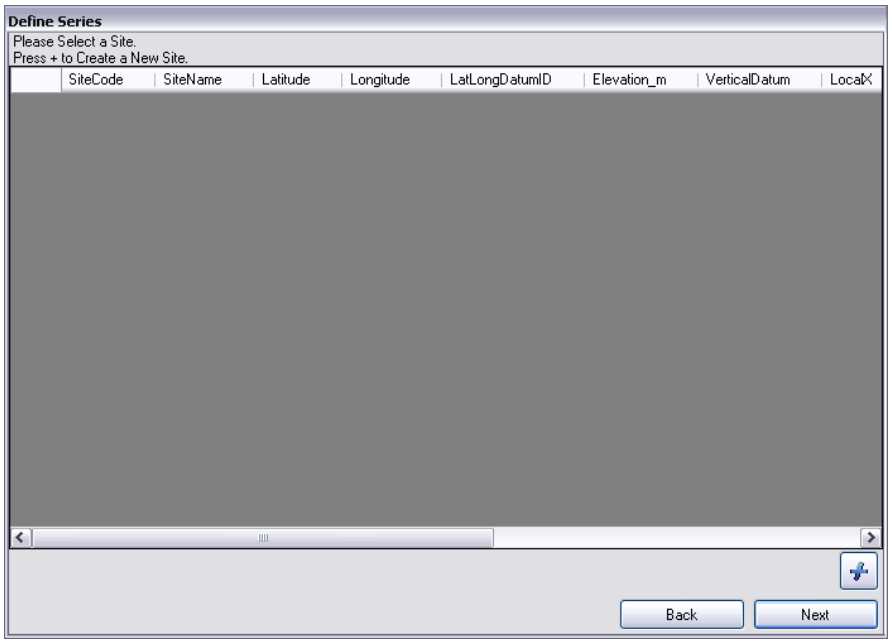
local time and uses daylight savings time. In order to capture this, we can click on the "Local Date Time" radio button and then select the column name in which the dates/times are stored. We then select the time zone in which we are located and specify whether daylight savings time is used (for Utah the Time Zone is -7, and daylight savings time is used). See the following figure.



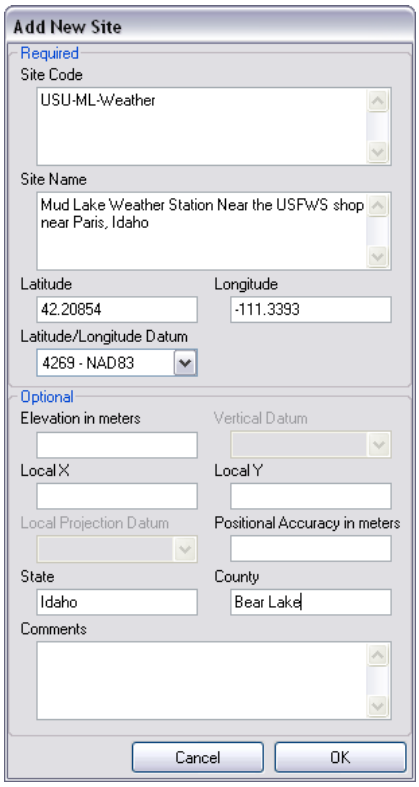
9. Now, we must map each of the individual columns in the file as separate variables, as well as associated the data in the file with a site, methods, a source, etc. This is done column by column because each column represents a different data series in ODM. To do this, we first select a column that contains data by clicking on its header at the top of the table and then clicking the "Add" button  . For this example, we will select the "WS_ms_Avg" column, and after clicking on the "Add" button, the following window appears, indicating the column that we have selected.



10. Click “Next” to continue, and the following form will appear.

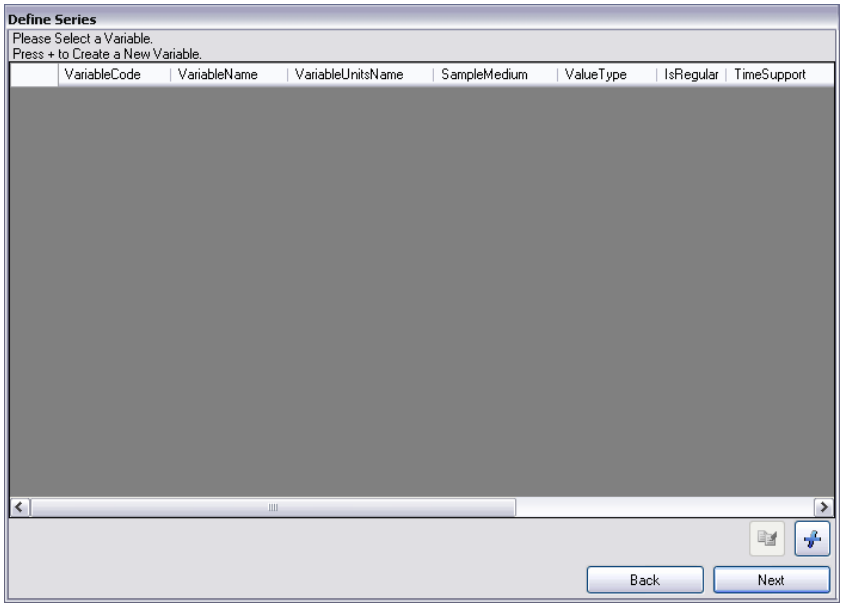


This form lists all of the monitoring sites in the database. If you are adding new data to an existing site, you would be able to pick the site from the list and then move on by clicking “Next.” However, since our database is empty, there are no existing sites, and so we must create one for our data. Click on the “Add” button  at the bottom of the form to create a new site. The following is an example of the “Add New Site” form with all of the required attributes filled out. When you are finished filling out the form, click on “OK.”

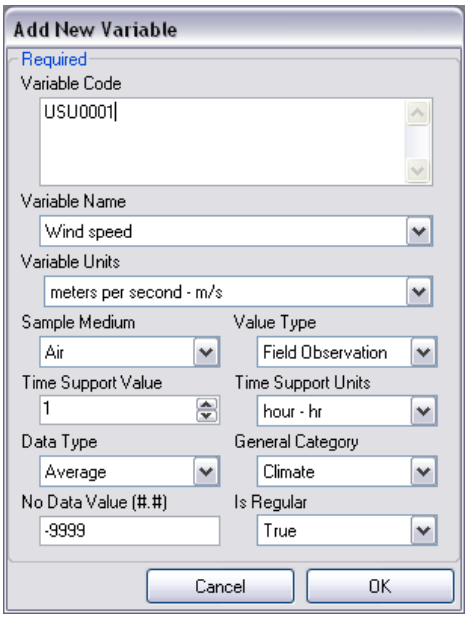


NOTE: You will notice that the required fields are organized near the top of the form and the optional attributes are at the bottom. You must fill out all of the required fields. You will also notice that the Latitude/Longitude Datum input is a drop down box. This drop down lists all of the items in the SpatialReferences controlled vocabulary table. In general, when you are required to input a value for an attribute that is tied to a controlled vocabulary you will be supplied with a list of the controlled vocabulary terms to choose from.

11. You will now notice that your new site has been added to the site selection form. Make sure that it is selected by clicking on it and then click "Next." The following form will appear.

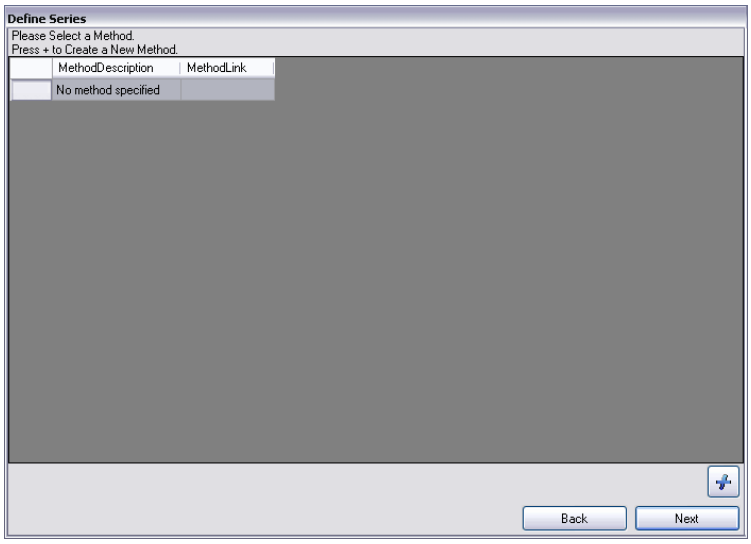


On this form, you will select a variable to associate with your data. Again, you will notice that there are no variables to choose from in the list. Click the "Add" button to create a new variable. The following is an example of the "Add New Variable" form with all of the required attributes populated appropriately for this wind speed data series.

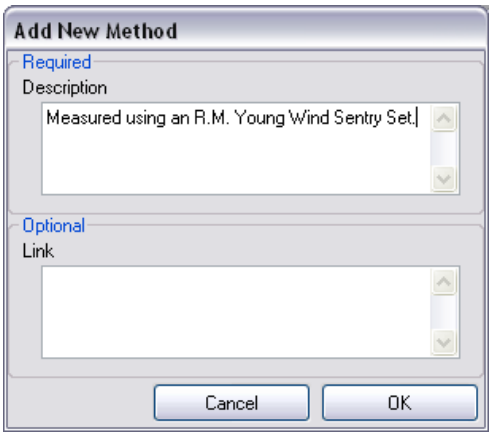


NOTE: In this example, we are creating a variable for field observations of hourly average wind speed measured in meters per second. These data are collected regularly by a sensor connected to a datalogger. All of the variable attributes are required.

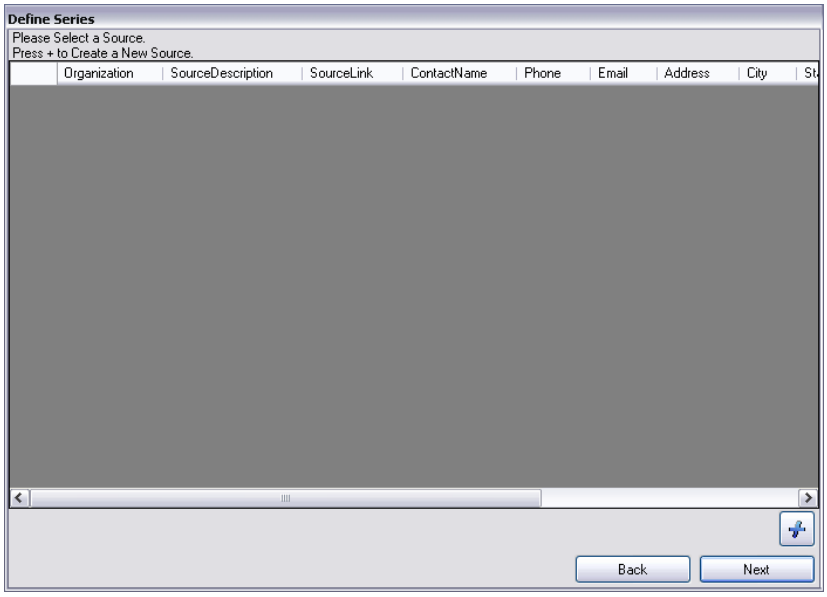
12. Click "OK" to create the new variable and return to the variable section form. You will notice that the new variable has been added to the list. Make sure it is selected by clicking on it and then click "Next". The following form will appear.



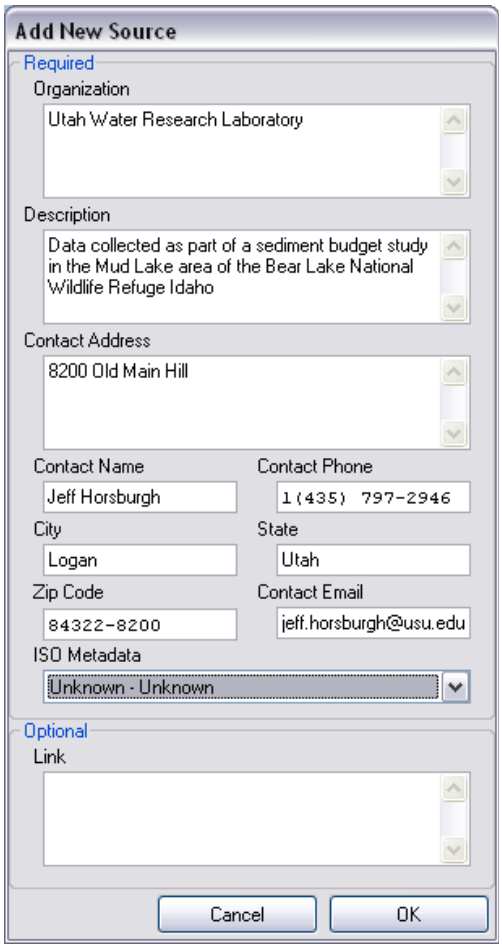
13. On the Select Method form you can associate a method with the observations in your data series. You can either select the default value (i.e., "No method specified"), or you can create a new method by clicking on the "Add" button. The following is an example of the required field populated on the "Add New Method" form.



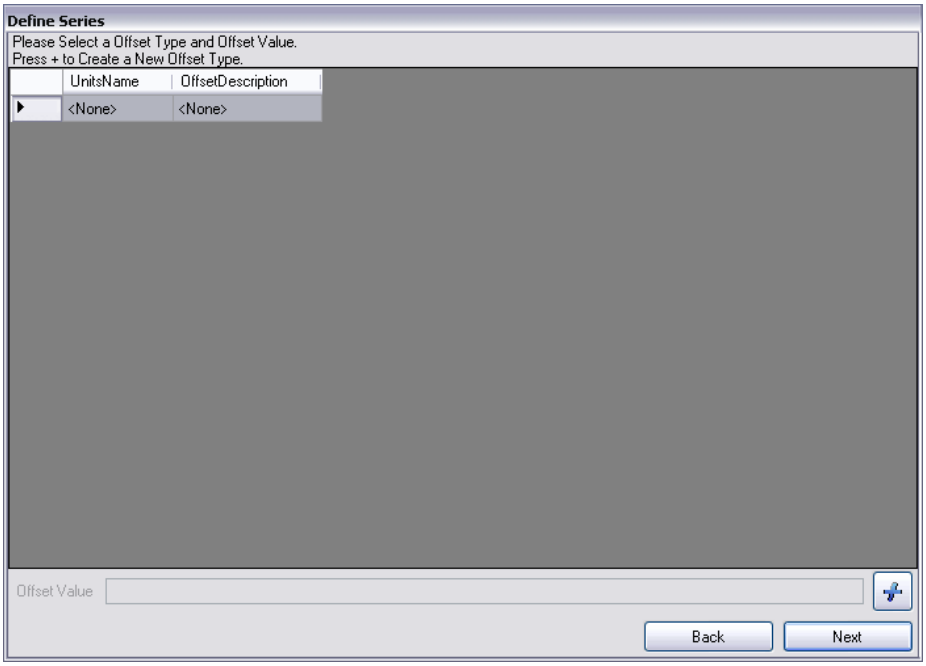
Click on the "OK" button to return to the Select Method Form, make sure that your new method is selected by clicking on it and then Click on "Next". The following form will appear.



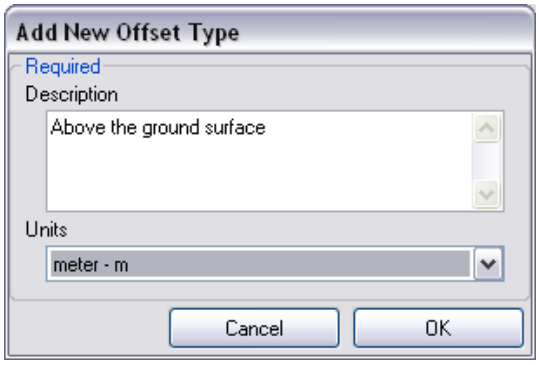
14. Click on the "Add" button to create a new source in your database. The following is an example of the "Add New Source" form populated with all of the required fields.



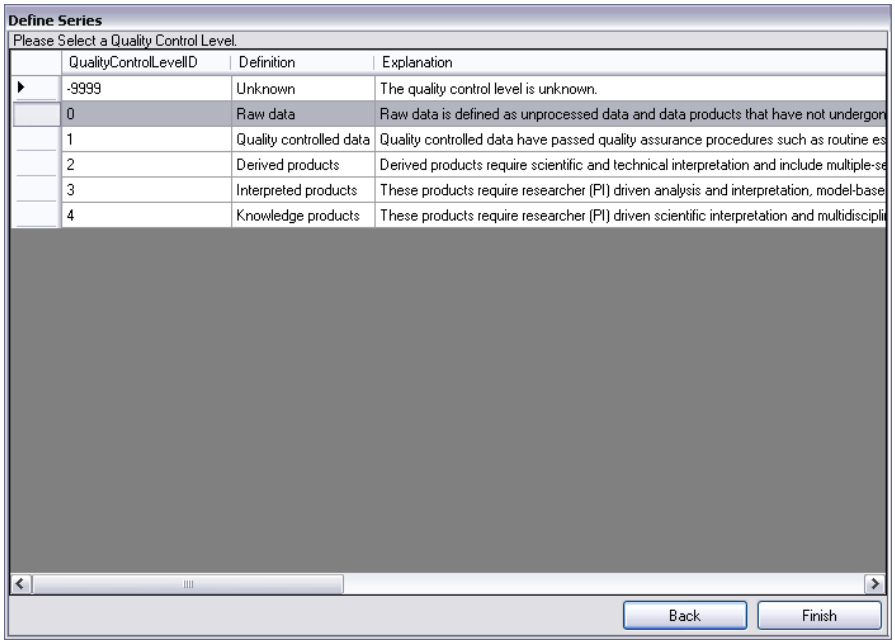
15. Click on “OK” to return to the Select Source form. Make sure that the new source that you just created is selected by clicking on it and then click “Next.” The following form will appear.



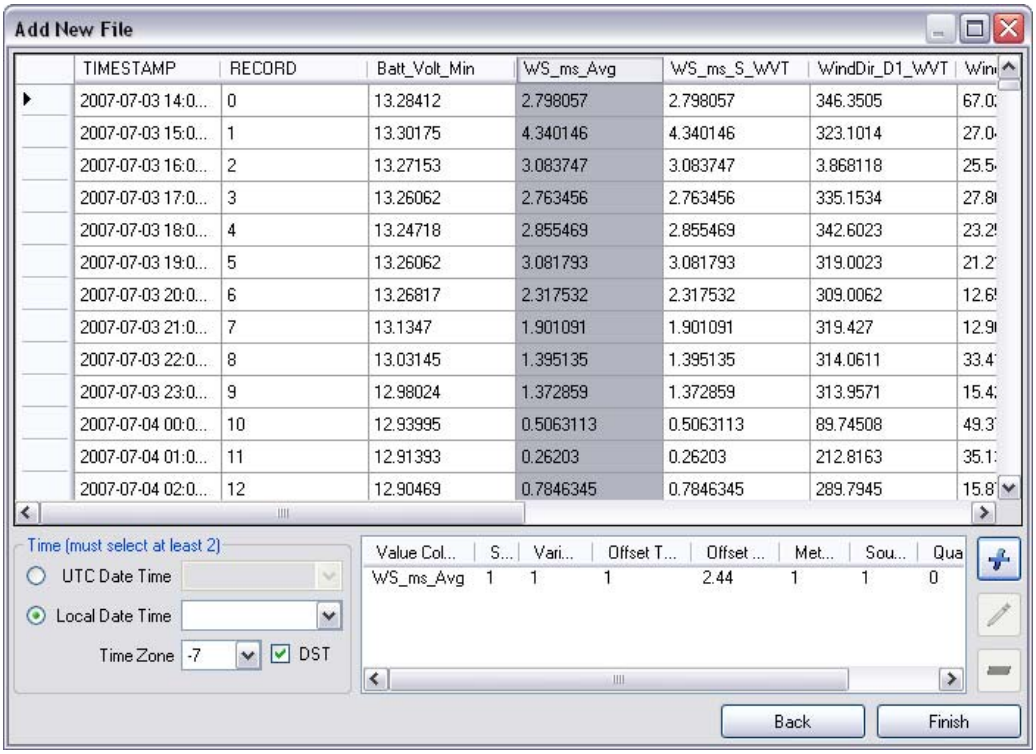
16. On this form, you can select an offset for your data values. Since there are not offsets currently defined in the database, we must create one. Click on the “Add” button to create a new offset. The following is an example of the “Add New Offset Type” form with all of the required fields populated.



Click on OK to return to the Select Offset Type form. You will notice that the new offset type that you just created is now in the list. Make sure that it is selected and then input a value for the offset in the “Offset Value” field. In this example, we are measuring wind speed 8 feet (2.44 meters) above the ground surface, so we will enter 2.44 for the offset value and then click on “Next”. The following form will then appear.



17. On this form, you can select a quality control level to go with your data. Since this is raw sensor data, we will select a quality control level of 0 and then click "Finish". This will return us to the "Add New File" form and it will look like the following.



You will notice that a new row has been added to the table at the bottom right of the form representing the column that you just mapped. At this point, you can either go on and map all of the other columns in your file using the same steps outlined above, or you can

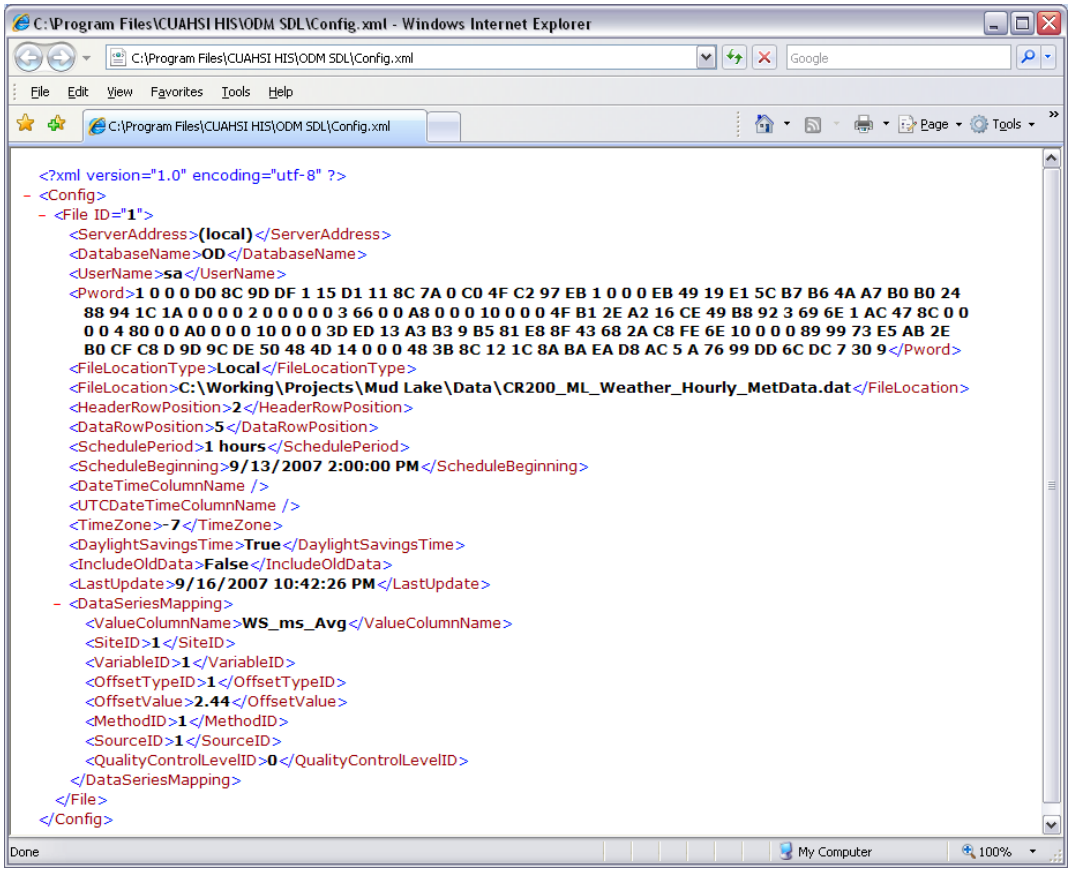
click on “Finish”, which will save the configuration for the current file and take you back to the main Configuration Wizard form. If you wish to edit the configuration for the column that you just mapped, select its record in the table at the bottom right of the form and click on the “Edit” button  . You will then be able to revisit the mapping for that column in the file. You can also remove the mapping for the column from the configuration file by clicking on the “Delete” button  .

WARNING: If you edit the mapping for a data series after an update has been run and data have been added to the database it is likely that any new data with the updated mapping will show up as a different data series in your ODM database because you have edited the attributes of the data series.

18. If you click “Finish”, you will be taken back to the main Configuration Wizard form, which will look like the following.

A record has been added for the file that you just mapped. You will notice in the attributes of this file, the server address, the name of the database to which you are adding the data, the type of file you are adding, the location of the file, and the information about scheduling the update. You will notice that the Last Update field is not initialized because the update has not been run yet.

19. Congratulations! You are now ready to run the update either manually through the Configuration Wizard, or automatically by scheduling the data loader using the Windows Task Scheduler. The mapping that you have just created has been stored as XML in a configuration file. This file is located in the same location as the ODM SDL Configuration Wizard and Data Loader executables (C:\Program Files\CUAHSI HIS\ODM SDL). The configuration file stores all of the information that is needed to parse the streaming data from the text file into the ODM database. The configuration file for the example that we just completed is shown below.


C:\Program Files\CUAHSI HIS\ODM SDL\Config.xml - Windows Internet Explorer
C:\Program Files\CUAHSI HIS\ODM SDL\Config.xml
File Edit View Favorites Tools Help
C:\Program Files\CUAHSI HIS\ODM SDL\Config.xml
Page Tools
<?xml version="1.0" encoding="utf-8" ?>
<Config>
<File ID="1">
<ServerAddress>(local)</ServerAddress>
<DatabaseName>OD</DatabaseName>
<UserName>sa</UserName>
<Pword>1 0 0 0 D0 8C 9D DF 1 15 D1 11 8C 7A 0 C0 4F C2 97 EB 1 0 0 0 EB 49 19 E1 5C B7 B6 4A A7 B0 B0 24 88 94 1C 1A 0 0 0 0 2 0 0 0 0 0 3 66 0 0 A8 0 0 0 10 0 0 0 4F B1 2E A2 16 CE 49 B8 92 3 69 6E 1 AC 47 8C 0 0 0 0 4 80 0 0 A0 0 0 0 10 0 0 0 3D ED 13 A3 B3 9 B5 81 E8 8F 43 68 2A C8 FE 6E 10 0 0 0 89 99 73 E5 AB 2E B0 CF C8 D 9D 9C DE 50 48 4D 14 0 0 0 48 3B 8C 12 1C 8A BA EA D8 AC 5 A 76 99 DD 6C DC 7 30 9</Pword>
<FileLocationType>Local</FileLocationType>
<FileLocation>C:\Working\Projects\Mud Lake\Data\CR200_ML_Weather_Hourly_MetData.dat</FileLocation>
<HeaderRowPosition>2</HeaderRowPosition>
<DataRowPosition>5</DataRowPosition>
<SchedulePeriod>1 hours</SchedulePeriod>
<ScheduleBeginning>9/13/2007 2:00:00 PM</ScheduleBeginning>
<DateTimeColumnName />
<UTCDateTimeColumnName />
<TimeZone>-7</TimeZone>
<DaylightSavingsTime>True</DaylightSavingsTime>
<IncludeOldData>False</IncludeOldData>
<LastUpdate>9/16/2007 10:42:26 PM</LastUpdate>
<DataSeriesMapping>
<ValueColumnName>WS_ms_Avg</ValueColumnName>
<SiteID>1</SiteID>
<VariableID>1</VariableID>
<OffsetTypeID>1</OffsetTypeID>
<OffsetValue>2.44</OffsetValue>
<MethodID>1</MethodID>
<SourceID>1</SourceID>
<QualityControlLevelID>0</QualityControlLevelID>
</DataSeriesMapping>
</File>
</Config>
Done
My Computer
100%

4.0 Running the ODM SDL Manually

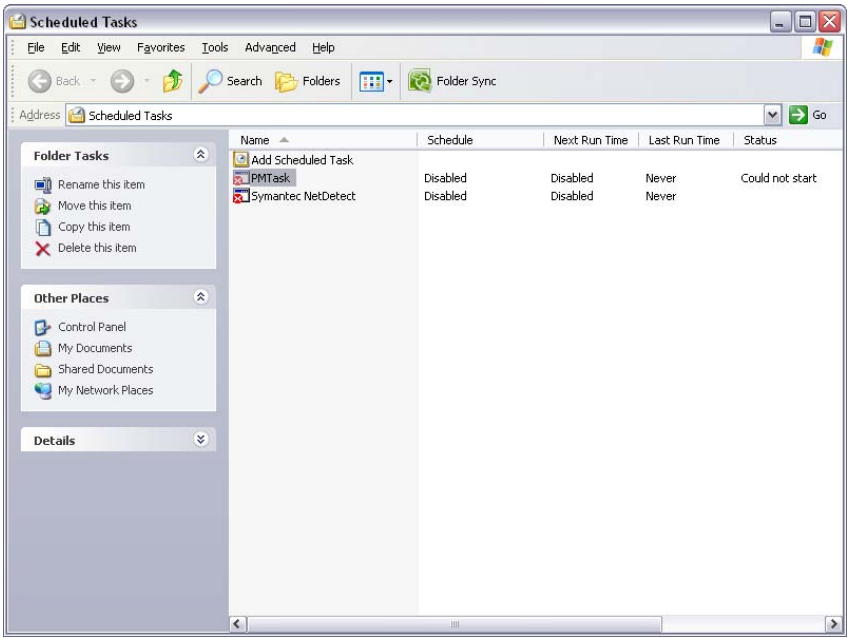
Once you have created a mapping for a streaming data file, you can run the data loader manually directly from the configuration wizard. To do this, select a row in the main Configuration Wizard window (remember that each row represents a file mapping) and then click on the "Execute" button  , which is located on the toolbar, to run the update.

When you click on the "Execute" button, all of the set time intervals for the updates are overridden and the update is run at once. The Configuration Wizard launches the Data Loader, which opens the streaming data file, checks for any new data that have not already been added to the database, and then parses any new data into the database. Manual updates can be run at any time from the main form of the Configuration Wizard.

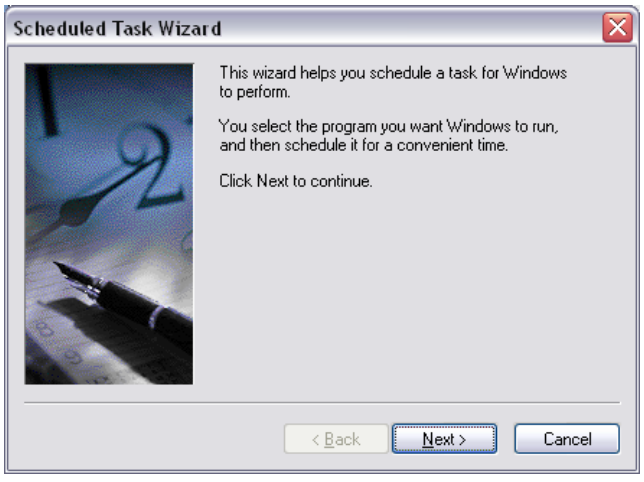
5.0 Running the ODM SDL Automatically

If you wish to automate the execution of the Data Loader application, you can schedule it as a regular task using the Windows Task Scheduler. When the Data Loader is run as a Windows task, it is exactly the same as if it were run manually from the toolbar of the Configuration Wizard. Windows executes the Data Loader application, which opens the configuration file and the streaming data file, and then parses any new data into the ODM database for data series that have been mapped. Use the following steps to automate the running of the ODM SDL.

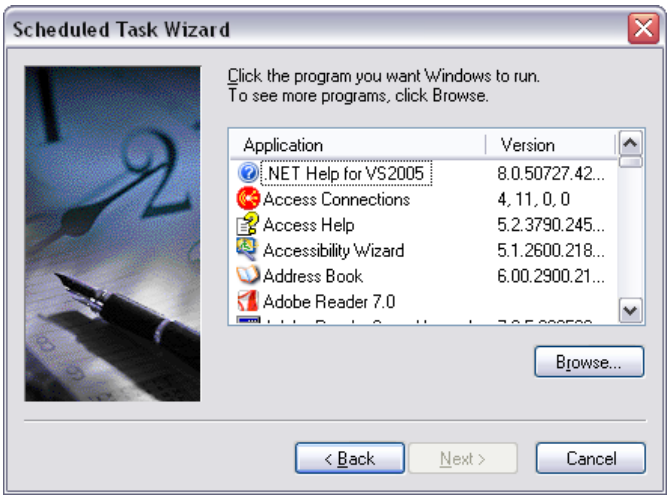
1. Start the Windows Task Scheduler by clicking on Start – All Programs – Accessories – System Tools – Scheduled Tasks. The following window will open.



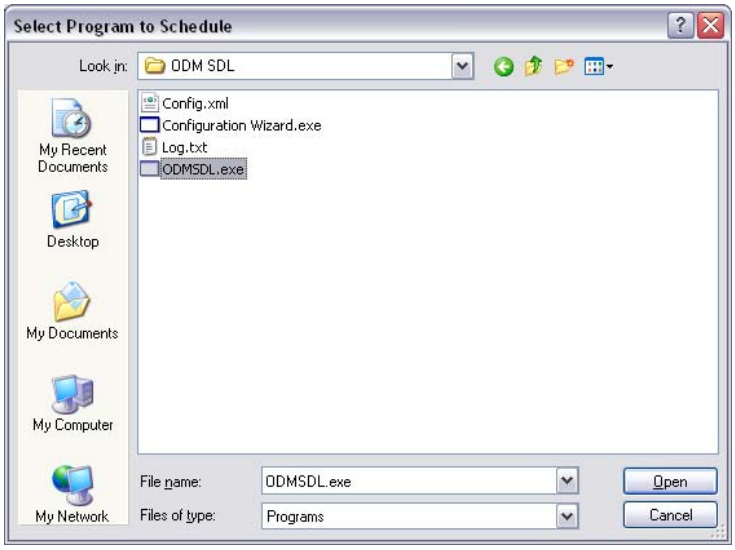
2. Double click on "Add Scheduled Task". The following window will open.



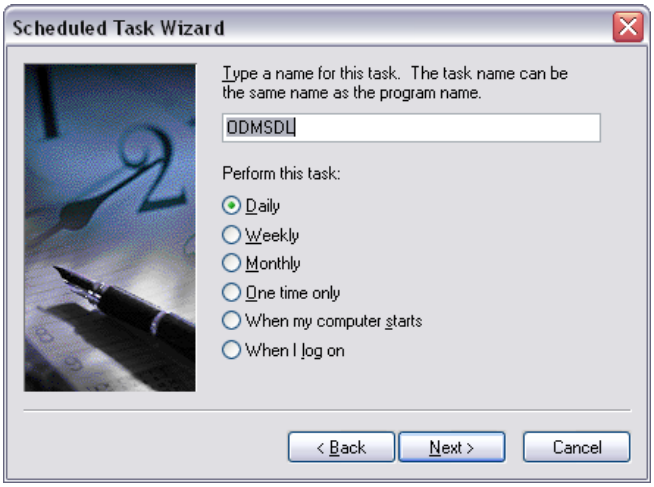
3. Click “Next”. On the Window that opens click “Browse” to browse to the location of the ODM SDL Data Loader executable.



4. On the “Select Program to Schedule” form navigate to the following location: C:\Program Files\CUAHSI HIS\ODM SDL. In this folder you will find an executable called ODMSDL.exe. Select this executable and then click “Open.”

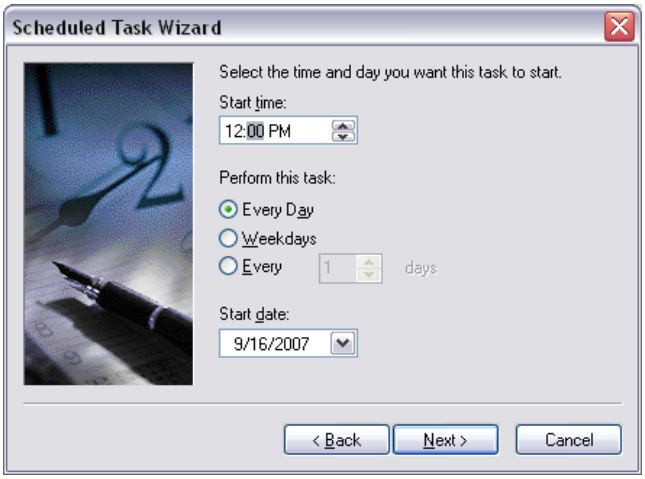


5. On the next form that opens, give the task a name and then select the schedule that you wish to use for your automated update. Click the “Next” button.



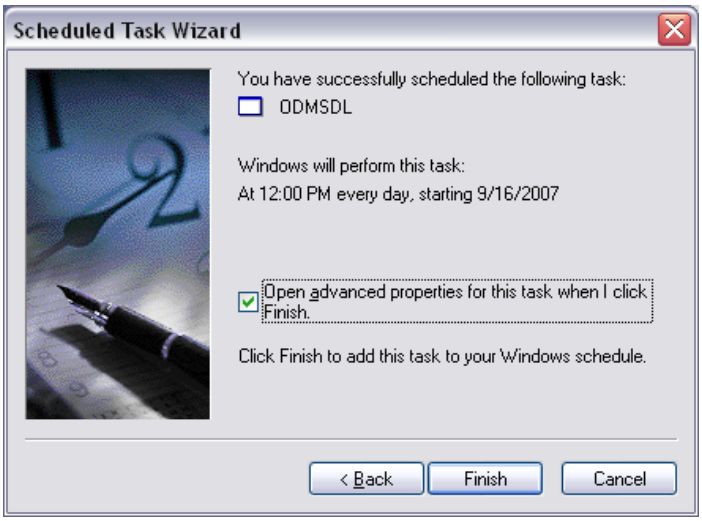
NOTE: If you wish to schedule the Data Loader to run more frequently than daily, select daily on this form and then use the advanced options available later to specify a more frequent interval.

6. Next, select the time and day you want the task to start. Then click "Next."

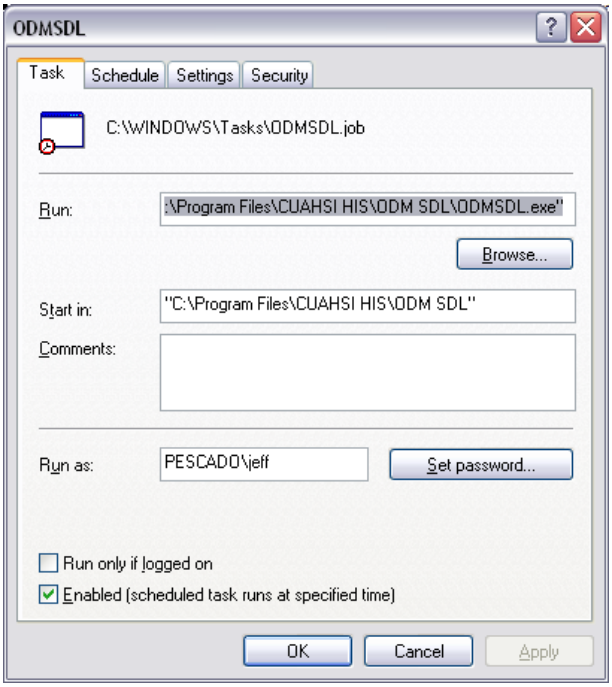


7. You must now specify a valid Windows username and password for the task to use so that it can be run whether you are logged on or not. Enter your authentication information and then click "Next".

8. On the final form, you can either finish the task, or you can check the box next to the option to open the advanced option. If you wish to schedule a task more frequently than daily, you must use the advanced options.



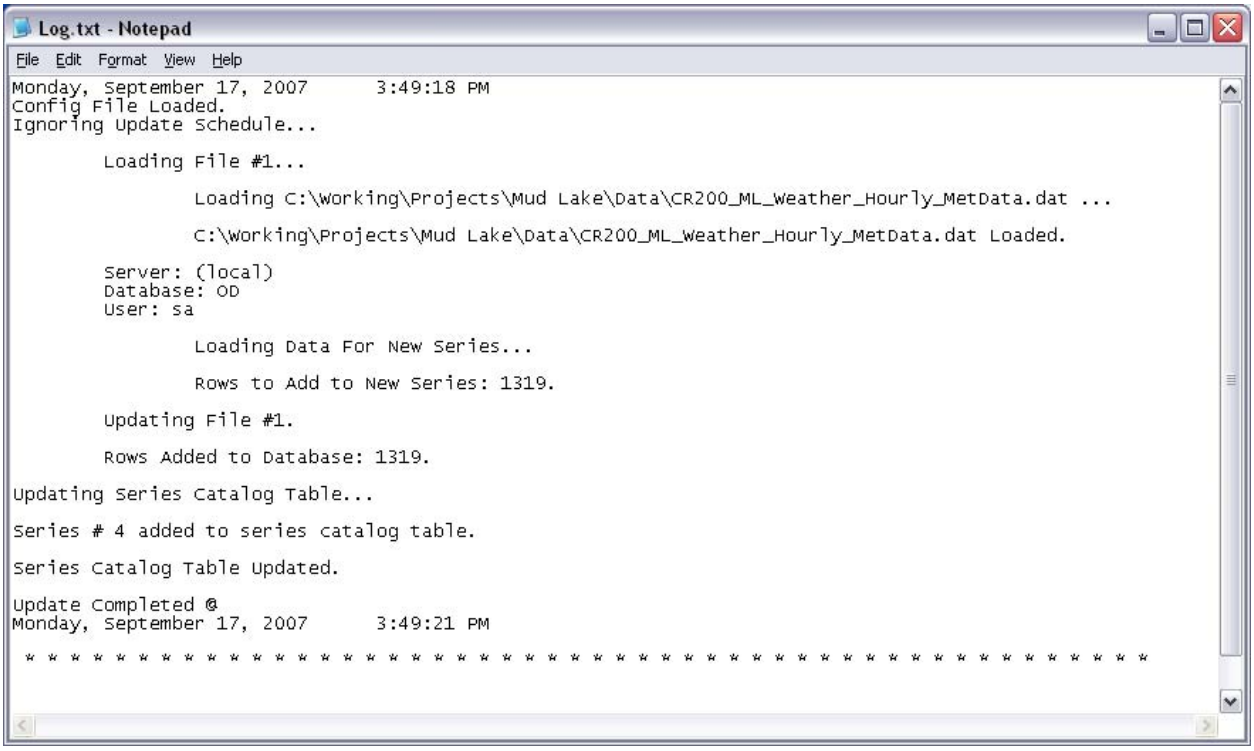
9. When you click “Finish,” the following form will appear. This form contains all of the settings for the task that you just created. To access the advanced settings for the schedule, click on the “Schedule” tab and then click on the “Advanced” button. If you do not need to change any other settings for this task, click the “OK” button.



10. Congratulations! You have now created an automated Windows task that will run the ODM SDL. On the schedule that you just created, Windows will open your configuration file and perform the data load for any streaming data files that you have mapped in the configuration file. The Windows task will run regardless of whether you are logged in to your computer or not. If you wish to remove a scheduled task, just right click on it in the list of scheduled tasks and click on “Delete.”

6.0 Viewing the ODM SDL Log File

Each time an update is run, information about that update is written to the ODM SDL log file. This log file is a text file and is located at the same location as the ODM SDL Configuration Wizard and Data Loader application executables (C:\Program Files\CUAHSI HIS\ODM SDL). A summary of the update is written to the log file as well as any errors that are encountered. The following is an excerpt from a log file.



References

Tarboton, D.G., Horsburgh, J.S., and D.R. Maidment. 2007. CUAHSI Community Observations Data Model (ODM) Design Specifications Document: Version 1.0. http://www.cuahsi.org/his/odm.html

Appendix A
Instructions for Attaching a Blank ODM Database to an Instance of Microsoft SQL Server 2005

Introduction

This Appendix describes how to attach the ODM Version 1.0 blank SQL Server schema database to your instance of SQL Server so that you can get started with using ODM. In order to do so, you must be running a version of Microsoft SQL Server 2005 (i.e., Express, Standard, Enterprise). If you do not already have an instance of Microsoft SQL Server running, you can download and install Microsoft SQL Server 2005 Express from Microsoft for free. It is recommended that you download and install both SQL Server 2005 Express and SQL Server Management Studio Express. You can get both of these products in a single installation (download and install the SQL Server 2005 Express Edition with Advanced Services SP2) as well as installation instructions at the following Microsoft URL:

http://www.microsoft.com/sql/editions/express/default.mspx

When you install SQL Server 2005 Express, you should enable mixed mode authentication (both SQL Server authentication and Windows authentication). This will allow you to work with the ODM SDL application. ODM SDL relies on SQL Server authentication to connect to ODM databases, and SQL Server authentication is only enabled when you choose the mixed mode authentication during installation. When you enable mixed mode authentication during installation, you will be prompted to create a password for the "sa" logon. The "sa" login is the administrative account and allows you to manage all other logins. Choose a password that you will remember as you will use this account frequently.

Attaching the Blank ODM Schema Database to SQL Server

The following are the steps required to attach the blank ODM schema database to an instance of Microsoft SQL Server. You can obtain a copy of the blank ODM Schema for SQL Server 2005 at the following URL: http://water.usu.edu/cuahsi/odm/ODM_downloads.aspx. These steps were written using SQL Server Management Studio Express; however, the steps are similar regardless of which version of the Microsoft SQL Server Management Studio you are using.

1. Extract the blank schema database and its log file from the zip file to a location on your hard drive using WinZip or some other equivalent software. It is suggested that you extract your database to the default SQL Server data folder, which is located at the following location on disk: C:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\Data\

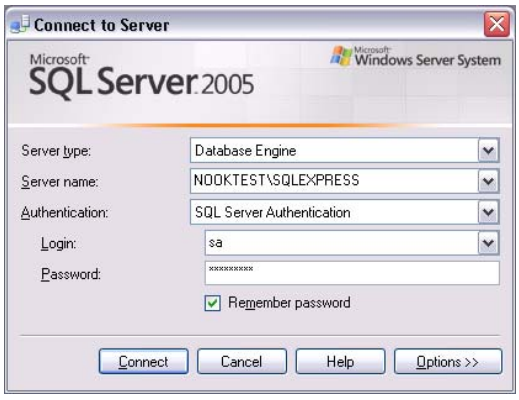
NOTE: You can extract your blank schema databases to any location on disk. However, if you do so and you have connected to SQL Server using SQL Server authentication and not Windows

Authentication, you will have to give SQL Server access to read and write to the folder where you extracted your database prior to attaching it. SQL Server already has access to its default data folder using either SQL Server or Windows authentication and so this is the easiest location in which to work.

2. Open the Microsoft SQL Server Management Studio Express from the Start Menu by clicking on Start --- All Programs --- Microsoft SQL Server 2005 --- SQL Server Management Studio Express. The following window will appear.

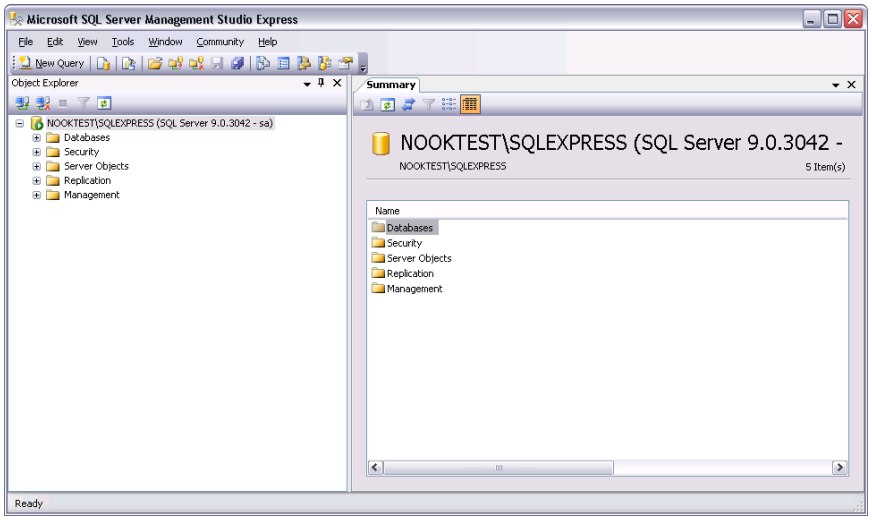
NOTE: The path to your SQL Server Management Studio shortcut in the Start menu may be different depending on which version of SQL Server you have installed and where you chose to put the shortcut in the Start Menu.

3. It is assumed that you are connecting to your local instance of SQL Server. You should see your computer's name followed by "\SQLEXPRESS" in the "Server Name" drop down. In the following figure, the computer's name is "NOOKTEST." Change the Authentication dropdown to "SQL Server Authentication," enter "sa" for your login, and then enter your administrative password in the "Password" text box. Your login screen should look similar to the following.

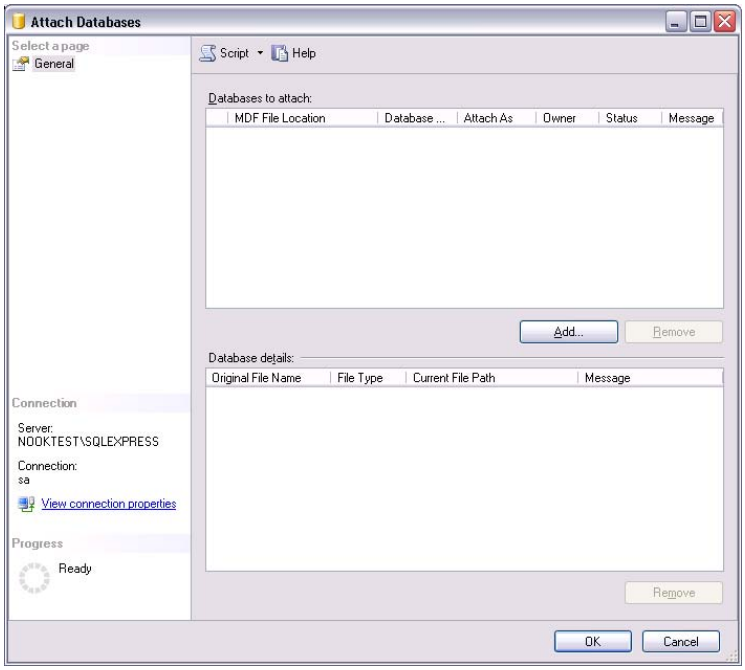


NOTE: You can complete these steps using Windows authentication rather than SQL Server authentication. However, if you wish to use the ODM SDL application with this database you will be required to have a SQL Server authentication login for the database that you are attaching.

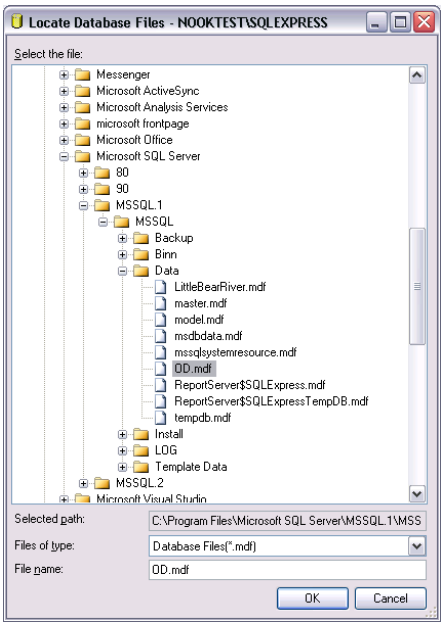
4. Click on the “Connect” button. This will connect the Management Studio to your local SQL Server instance. Your Management Studio window should look similar to the following.



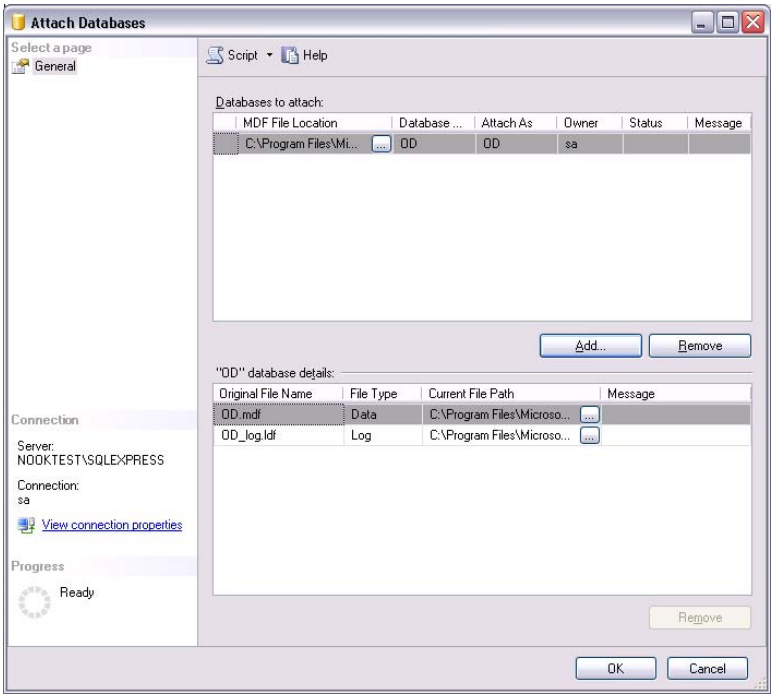
5. Right click on the “Databases” item under your server in the Object Explorer at the left of the window and choose “Attach” from the context menu. The following window will appear.



6. Click on the “Add” button near the center of the form. In the window that opens, navigate to the location on your hard drive where you extracted the blank ODM database. Select the .mdf file associated with the database that you want to attach (OD.mdf). See the following figure for an example.

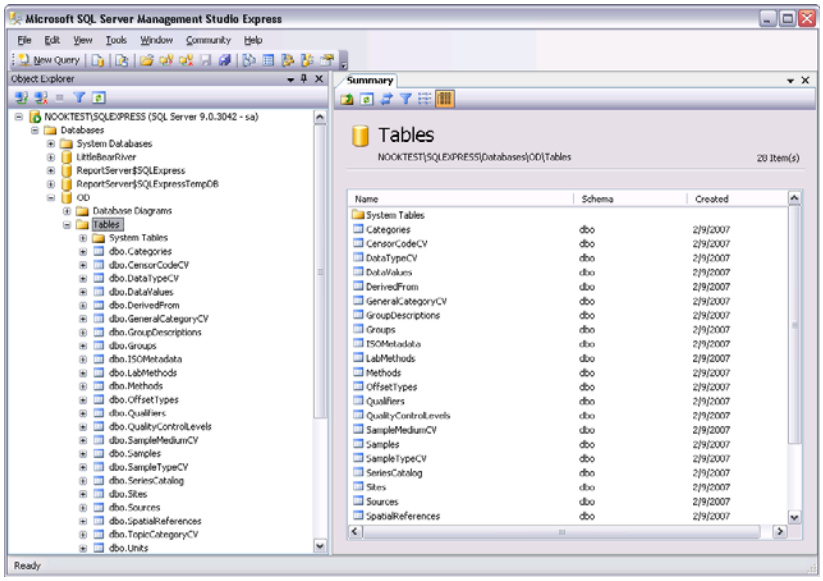


7. Click the “OK” button. This will return you to the “Attach Databases” form and will populate that form with the information needed to attach the database that you have selected. You will notice that your selected database is listed in the “Databases to attach” section and that the details of your database files are shown at the bottom of the form. See the following figure.

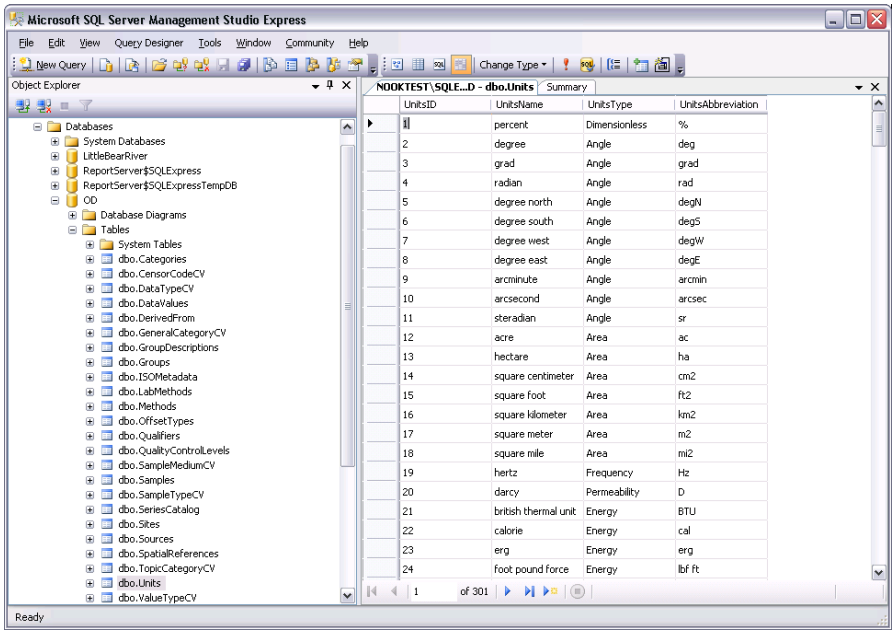


8. Click the “OK” button and then wait for a moment while the blank schema database is being attached.

9. Once the database has been attached, expand the “Databases” item under your server in the Object Explorer by clicking on the plus sign next to “Databases.” You should now see an item under “Databases” for the database that you just attached. If you do not see an item for the OD database, right click on the “Databases” item and choose “Refresh” from the context menu. You can further expand the OD database by clicking on the plus sign next to its name and then clicking on the plus sign next to “Tables” (see the following figure).



10. Although there is no data in the blank schema database, you can view the contents of the controlled vocabulary tables in the OD database by right clicking on them in the Object Explorer and choosing “Open Table” from the context menu (see the following for the Units table).



11. You are now ready to begin adding data to your ODM SQL Server database.